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LANDS AND PEOPLES

VIII

Rohit

Part III

A Geography Textbook for Class VIII

VIII - E

98-99

Editors

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VIII - E

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Geography Book

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UNIT ONE

Lithosphere and Landforms

The earth is the home of millions of people. It consists of land, water and air. As almost all people in the world live on land, it is important for us. The solid crust of the earth, on which we live, is not the same everywhere. There are great mountain ranges, lofty peaks, mighty rivers, deep valleys in some places and extensive plains and plateaus at others. The earth's surface not only changes from place to place but also changes from time to time. The changes brought about on the surface of the earth are both sudden and slow. These changes are the result of various natural forces and processes at work. Volcanic eruptions and earthquakes bring about sudden changes in the earth's crust. Natural forces such as weather, running water, ground water, moving ice, winds, sea waves are constantly but slowly engaged in sculpturing the earth's surface.

Man is continually interacting with his changing environment. The following chapters seek to explain various natural forces and processes at work in ever changing environment.

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1. Lithosphere and Landforms

The Terms You Already Know. *Lithosphere*: The realm of the earth consisting of solid matter, namely, stone or rock. *Lava*: The boiling hot rock-material that comes out from a volcano or fissure.

The earth, the home of man, on which we live has three distinct parts, consisting of land, water and air. These are known as the lithosphere, the hydrosphere and the atmosphere respectively. At the interface of these three spheres, there exists a narrow but complex zone containing all forms of life. It is known as the *biosphere*. Since human beings live on the land part of our earth, it is indeed very important for us.

Look at the section of the earth in Fig. 1. It will give you an idea of the structure of the earth. Note that the outermost shell is the earth's crust or lithosphere. It forms the continents and the islands, and underlies the seas and the oceans. The lithosphere is a thin layer composed of various kinds of light-weight rocks. It is about 60 kilometres thick. The central part of the earth is called the *inner core*. There are other layers between the inner core and the crust. The core is believed to be made of metals like iron and nickel, which are fairly heavy. The inner core of the earth is also known as the metallic core. The density of the different shells of the earth goes on increasing towards the centre of the earth.

The temperature inside the earth increases with depth. It has been recorded in mines and deep wells all over the world that the temperature increases progressively at the rate of 1°C for every 32 metres depth. You can imagine how high the temperature must be in the interior of the earth. At such an extremely high temperature all rocks and metals would melt. However, owing to the great pressure of the outer shell, the earth's interior behaves like a solid.

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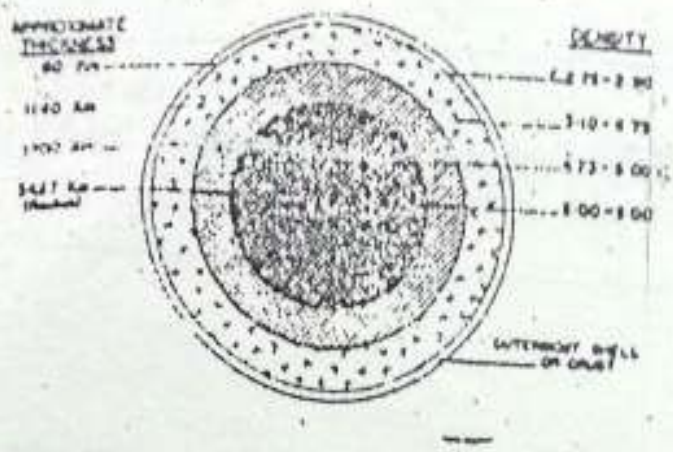

Fig. 1 Section through the earth showing its structure

Note the four shells forming the earth's structure. Also note that the density of rocks is increasing with depth. Which shell would have the highest temperature?

Rocks

The lithosphere is composed of various kinds of rocks. The word 'rock' in popular usage means any hard and resistant material such as granite, sandstone and marble, forming the earth's crust. But in the correct sense it includes even soft and loose materials like silt, sand, gravel, mud, chalk, clay, rock, salt and even coal.

The rocks are composed of one or more minerals. The common minerals forming the rock are felspar and quartz. Some rocks contain particles of useful minerals and are sources of metals like iron, copper or gold, so valuable to us.

Kinds of Rocks

There are three main kinds of rocks, each formed in a different way. They are igneous rocks, sedimentary rocks and metamorphic rocks.

Igneous Rocks

You know that deep below the lithosphere there is a hot molten rock material with a very high temperature and pressure. This molten matter cools and hardens, and it forms a rock known as *igneous rock*. When the molten matter cools slowly under the crust, it forms igneous rock known as granite. It is the most abundant of all igneous rocks and is commonly used as a building stone.

Sometimes the molten material comes out of a hole or crack in the earth's surface. It then cools quickly and forms a rock known as basalt. Basalt is a dark coloured igneous rock. Its mineral grains are very small and cannot be identified with the naked eye. This very hard and heavy rock is used for building roads.

Sedimentary Rocks

Tiny particles of rocks are carried away by wind, running water or moving ice and are deposited in layers on the floor of the sea or land. These deposits are also called sediments. When these sediments are hardened by their weight or by the weight of sea

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water above them, they form into layers of rocks. Such rocks are known as *sedimentary rocks*. Sandstone, limestone and clay are good examples of sedimentary rocks.

Coal is also a sedimentary rock. It has been formed of trees and ferns in the marshes, which in course of time were subjected to high temperature and pressure deep below the earth's surface some thousands of years ago.

Metamorphic Rocks

Sometimes the original form of rocks changed entirely owing to excessive heat and great pressure, and then it is known as *metamorphic rock*. Both igneous and sedimentary rocks may be changed into metamorphic rocks by heat and pressure. Common examples of metamorphic rocks are marble, quartzite, slate and gneiss.

Landforms

The surface or relief features of our earth are not the same everywhere. In fact, we do come across a wide variety of landforms. Some of them have been developed over long periods of time. Many more may still be in the process of development. The distribution of these landforms on the earth's surface helps us much to have a better idea about the distribution of man on our planet and his varying responses to his environment.

In broad terms, the major landforms of the earth may be classified into three categories, namely, mountains, plateaus and plains. But you will do well to keep in mind that these landforms are by no means permanent. They keep on changing, sometimes all of a sudden and abruptly, but more often slowly and almost imperceptibly. You will know the examples of the landforms found in our own country later on.

Sudden Movements of Earth's Crust

Sudden movements of the earth's crust are commonly noticed during volcanic eruptions and earthquakes. They bring about a change in the earth's surface very quickly.

Volcanoes

Most people think of a volcano as a mountain that throws out lava and flames every now and then. Actually, a *volcano* is a vent or an opening in the earth's crust through which molten lava, clouds of gases, dust and steam and even pieces of rocks come out. Sometimes the hot lava comes out through a deep crack or a fissure in the crust.

1) Igneous Rock → Granite & Basalt
2) Sedimentary → Sandstone

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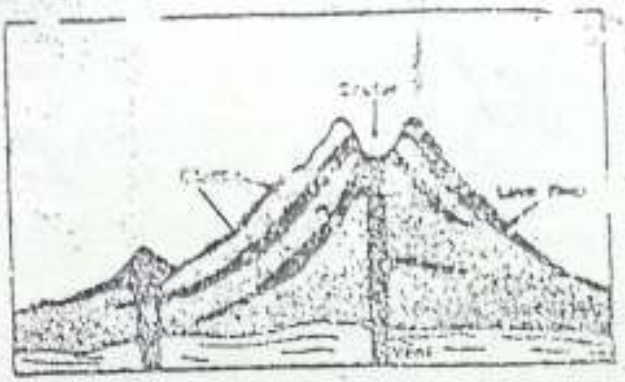

Fig. 2 A volcanic cone

Some of the materials erupted from a volcano accumulate round the opening and form a cone. What are the different materials that are thrown out from a volcano?

In course of time, the lava and other material accumulate round the opening and form a cone as shown in Fig. 2. A conical hill or a mountain peak is formed around the vent if the lava goes on accumulating for a long time. The top of a volcano generally shows a cup - shaped depression which is called a *crater*.

All volcanoes do not erupt regularly. Some of them may not show any sign of activity for many years, even then they may not be dead or extinct. They are said to be *dormant* or *sleeping volcanoes*. For example, the Vesuvius near Naples in Italy is a dormant volcano. Can you give any other example of this kind?

The volcanoes which erupt frequently are called *active volcanoes*. The Barren island in the Andaman group of islands in our country and Etna in Sicily are the examples of active volcanoes. Mount Etna has erupted several times in recent years.

A volcano which is neither active nor dormant and which has not erupted within the last few thousand years is known as an *extinct volcano* or dead volcano. Mount Kilimanjaro in Tanzania in East Africa is an example of an extinct volcano.

There are several thousand volcanoes in the world. About 450 of them are known to be alive. There is a circular belt of volcanoes round the Pacific Ocean. It is called the Ring of Fire because of the many active volcanoes in it.

Earthquakes

When the earth's crust suddenly vibrates or shakes, we call it an *earthquake*. It is caused by sudden movements inside the earth. Earthquakes are also caused when a volcano erupts. An earthquake lasts for a few seconds only. Sometimes the earthquakes may be so violent as to cause serious damage.

Earthquakes may occur anywhere on the earth. However, there are certain areas of the earth where they

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occur more frequently. These are the regions where the surface of the earth is rather weak. By far, the most active region is a belt surrounding the Pacific Ocean. More than eighty per cent of the earthquakes occur in this zone. You will remember that most of the active volcanoes are also found in this very region.

In India, most of the earthquakes occur in the Himalayan zone and the Ganga-Brahmaputra valley. Only a few earthquakes have shaken the Deccan plateau of India in historical times. The earthquake of December, 1967 at Koyna Nagar on the western edge of the Western Ghats was one of them.

The New Terms You Have Learnt. *Rock* : The material composed of one or more minerals forming the earth's crust, *i.e.* Lithosphere, or any portion of it. *Volcano* : A vent in the earth's crust through which lava and other materials come out.

EXERCISES

Review Questions

1. Answer the following questions :
   - (i) Name the three kinds of rocks. Give one example of each.
   - (ii) What is a volcano? Name three kinds of volcanoes and give an example of each.
   - (iii) Name the major landforms, giving examples from India.
2. Distinguish between :
   - (i) Igneous rocks and sedimentary rocks.
   - (ii) An active volcano and a dormant volcano.
3. Read the list of rocks given below. Classify the rocks into three groups— (a) igneous, (b) sedimentary and (c) metamorphic :
   (i) coal; (ii) marble; (iii) slate; (iv) granite; (v) limestone; (vi) basalt; (vii) sandstone; (viii) quartzite; (ix) gneiss and (x) clay.
4. Write a paragraph on the structure of the earth.
5. What are rocks? How are the different kinds of rocks formed?

Draw a diag. of earth and the table
" " " volcano & label it

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Map Work

6. On an outline map of the world mark and name the following with the help of your atlas.
   (i) The Andes and the Rockies
   (ii) Vesuvius, Etna, Fuji Yama and Kilimanjaro

Topic for Class Discussion

7. 'Volcanoes and Earthquakes'

Students may collect pictures and information on (a) sudden eruption of a volcano and (b) damage caused by an earthquake. They may present this information and exhibit the pictures of the same to the class.

* Indo-Gangetic Plains → Once Occupied by Shallow Sea Named Tethys

* Gradation

Aggradation Degradation.

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2. Agents of Gradation (I)

The Terms You Already Know. *Earthquake* : Vibrations or shakings caused in the earth's crust by sudden movements inside the earth. *Dormant Volcano* : A volcano which has been inactive for a considerable time in the past.

Changes on the earth's crust caused by an earthquake or a volcanic activity may impress you by the suddenness or abruptness of its occurrence. But you must never forget that there are also changes brought about on the face of the earth which are of abiding interest and of great economic importance. These are the changes that are still taking place very slowly and almost imperceptibly under the impact of many forces, including the activities of man.

Take for example the Aravallies in Rajasthan or the Urals in Soviet Union. They are among the oldest mountains in the world. Compared to the Himalayas or the Alps they are very low and exhibit rounded features. At one time, it is believed, they were probably as tall and picturesque as the Himalayas or the Alps. If they are so low today, it is because they have been worn down through a long period of time, extending over millions and millions of years.

To take another example, the area now called the Indo-Gangetic plain, was, in the remote past, occupied by a shallow sea named Tethys. Over the ages, it had been gradually filled up. The plain, as it exists today, is made up of fine silt brought down by the Himalayan rivers on the one hand and those of the Indian peninsula on the other.

Gradation

It would appear, therefore, that a process of levelling has been going on, changing the face of the earth ever since it came into existence as a separate planet. This process is continuous and almost endless, and is known

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as *gradation*.

Aggradation and Degradation

The over-all process of gradation has two distinct aspects: the process of wearing down and the process of filling up. The wearing down of the earth's elevated features is known as *degradation*. Filling up the natural depressions on the earth's surface is called *aggradation*.

Agents of Gradation

Natural factors capable of eroding and transporting earth material are known as agents of gradation. They include running water, ground water, moving ice, wind and the waves of the sea.

How Rocks Break into Pieces

The process of degradation and aggradation begins when rocks begin to break up into fragments and loose rock materials. But how do rocks break up or disintegrate into rock fragments? This takes place in various ways.

The outer layers of rocks exposed to the atmosphere are heated during day time by the sun's heat. As a result of this heating, the outer layers of rocks tend to expand. On the other hand, during night when the temperature of air drops considerably, the outer layers of rocks contract. This results in the loosening of the outer parts of the rocks which finally break away from the main rock.

Cracks also develop in rocks as a result of alternate expansion and contraction of their outer layers. In regions of cold climate if water happens to enter into such cracks, it is generally frozen by night. You are already aware of the peculiar behaviour of water. It actually expands when it freezes into ice. As a result, the cracks already developed inside the rock are further widened. This progressive widening of cracks ultimately splits the rock into pieces.

Sometimes a rock comes in contact with water. Some of its soluble minerals like rock-salt get dissolved in water and are removed from it.

Roots of plants and trees are also responsible for developing cracks in rocks and breaking them. Even animals and man often lend a helping hand in hastening the disintegration of rocks.

The breaking up or decay of exposed rocks by changes in temperature, freezing of water and the action of plants, animals and man is collectively known as *weathering*. The

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weathered material is carried away from its place by the agents of gradation.

Now let us see how different agents of gradation are constantly busy at changing or modifying the face of the earth. Of these agents of gradation, the running water is perhaps the most important.

Work of Running Water

As you know, most of the rain-water is drained into a river. Barring a few exceptions, the river, in turn, ultimately empties itself into the sea. Thus, the rain-water returns to its original source from which it had come. This cycle of water—from ocean to land, and from land to ocean—goes on endlessly.

Rain-water which runs off the ground causes widespread erosion in different ways. Heavy and incessant rain in hilly regions very often causes large chunks of brittle rocks to slide down resulting in landslides. This sudden downward movement of a large mass of earth or rock from a mountain like the Himalayas is called *landslide*.

Rain-water is responsible for washing away the layers of soil on a much larger scale. This kind of surface erosion is the most widespread and is known as *sheet erosion*.

While moving down the slope in an uneven terrain, rain-water scoops out the soil, forming small deep channels called *gullies*. These gullies gradually multiply and spread over a wide area. This is known as gully erosion. It causes great damage by making the land unfit for agriculture. If you happen to travel between Gwalior and Agra, you would be able to see how a maze of gullies has been formed.

The Work of a River

The river is a powerful agent of gradation. If you happen to see it in a hilly region, you would find it very active even though the volume of its water may be small. Further downstream, especially in the plains, the river winds its way rather leisurely in spite of a great volume of water. In its lower reaches, that is, in coastal regions, it moves very sluggishly before it joins the sea. It would be interesting to follow the journey of a river from its source to its mouth. This may be conveniently divided into three stages—upper course, middle course and lower course of a river.

Upper Course: In a hilly or moun-

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tainous region, a river flows very swiftly on its way because of steep slopes from place to place. Here the river water is further armed with pointed stones and rock materials which it carries along with it. The river, therefore, actively wears away both its banks as well as its bed. The narrow valley through which it flows in this region is thus both widened and deepened steadily.

Boulders and pebbles moving with the strong current of a river keep on constantly rubbing against one another. They also rub against the rocky bed of the river. In the process they get rounded and worn down. Thus a river in its upper course is busy in erosion and transportation. In its upper course, it develops quite a few typical land forms like gorges, V-shaped valleys and waterfalls.

If a river flows through an area made up of hard rocks and having a little rainfall, it generally forms a narrow valley with steep or almost

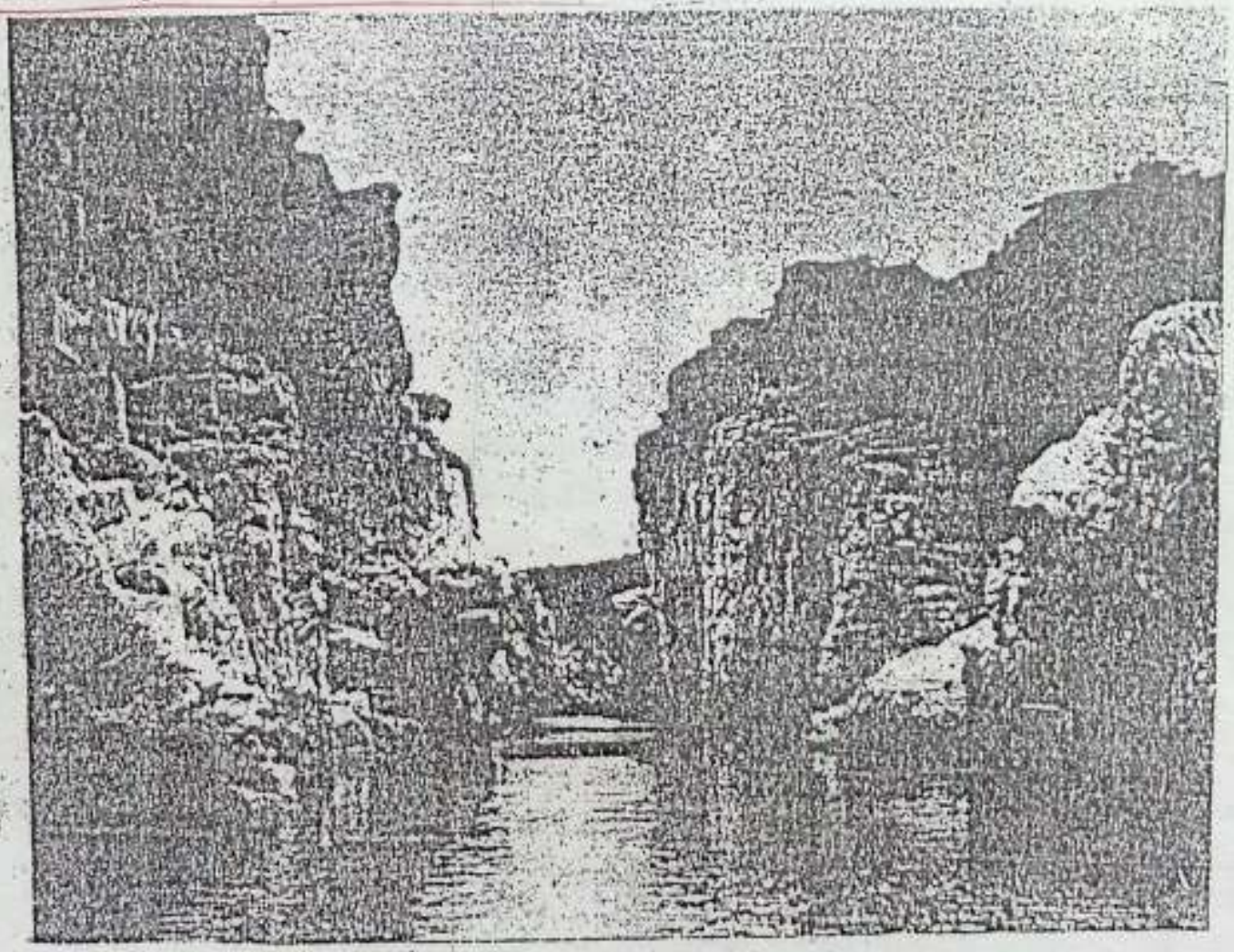

Photo 1 A river forcing its way through a gorge

The Narmada has been flowing through this gorge less than 20 metres wide. The gorge extends over 3 km into marble rocks and the Deccan traps.

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vertical walls. Such a deep narrow valley bounded by steep or vertical walls is known as *gorge*. It is the result of a downcutting action of a river.

Some areas are made up of relatively soft rocks and receive a heavy rainfall. In such regions, the sides of the river valley are quickly weathered and eroded by the rain water. Thus with its sides sufficiently widened the river valley acquires a typical V-shape. Such valleys are, therefore, known as *V-shaped valleys*.

A *waterfall*, as you know, is a sudden descent of water over a big vertical step formed in a river bed. It is generally formed at the edge of a hard rock overlying a soft one. In the case of a waterfall, the river tumbles down almost vertically along its course. Sometimes it just hops, skips and leaps forming rapids on its way. A series of rapids, big and small, are called *cascades*.

In brief, it may be described that a river in its upper course is very active and naughty. It gives you the impression of being in a great hurry. It is, therefore, said to be in its "youthful stage". Its major work is to erode and wear away the land through which it flows.

Middle Course : The river, after leaving the hilly region, generally flows across a plain. As the land is almost flat and low, the river considerably slows down its speed. It now winds its way more leisurely. It widens its bed by eroding its banks. It thus widens its valley floor.

Owing to occasional floods, a flat valley floor is covered with mud brought down by the river from its upper reaches. A flat valley floor covered with alluvium brought by the river is known as *flood plain*.

In a wide and flat flood plain, the river winds its way leisurely forming big loops. These big loops formed by the river in its flood plains are known as *meanders*.

In spite of the greater volume of water, the river in its middle course seems to move with restraint. It is, therefore, said to be in a "mature stage". Its major work lies in transportation and deposition at this stage.

Lower Course : The river in its lower course is mainly busy with deposition. It deposits fine alluvium—mud and silt—not only on its flood-plain but also on its own bed. As a result, the river channel is frequently blocked. This makes a river either change its course from one side of the flood-plain to the other, or divide itself

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to by-pass the deposits it has left in its own channel. The numerous channels into which the river is forced to divide itself before reaching the sea are known as *distributaries*—just the opposite of tributaries. As you already know, this is how the deltas are formed by rivers near their mouths.

As the region is extremely flat and low and there are obstructions in the way, the river flows very sluggishly. Therefore, the river in its lower course is often described to be in its "old stage".

Now you know that not only men, animals and plants, but the mountains and rivers also pass through a cycle of life consisting of youth, maturity and old age. Is it not very interesting?

The New Terms You Have Learnt. *Gradation* : The continuous process of levelling the earth's surface. *Weathering* : Breaking up or disintegration of exposed rocks by natural agents. *Tethys* : An ancient sea once lying between northern Eurasia and the peninsula of southern Asia and Africa.

EXERCISES

Review Questions

1. Give three examples for each of the following :
   (i) Changes brought about on land by man.
   (ii) Very slow but significant changes brought about in the earth's surface by nature.
   (iii) Sudden and drastic changes brought about on land by nature.

2. Distinguish between :
   (a) Aggradation and degradation.
   (b) A V-shaped valley and a gorge.
   (c) A tributary and a distributary.

3. Given below is a list of landforms developed by a river along its course. Re-arrange them in the logical order in which you would come across them if you start your journey at the source of a river and end it where the river joins the sea.
   (i) Flood-plain; (ii) V-shaped valley; (iii) Delta; (iv) Waterfall; (v) Gorge; (vi) Cascades and (vii) Meander.

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4. Fill in the blanks with suitable terms :
   (i) Sudden downward movement of a large mass of earth or rock is called.....
   (ii) Washing away of layers of soil over a large area is known as.....erosion.
   (iii) Small deep channels scooped out in the soil by rain water are called.....

5. What is gradation? Give examples of two distinct aspects of gradation.

6. Name the agents of gradation and explain the work of a river in its upper course.

Map Work

7. In your atlas take out the relief map of India and see where you would look for the following : (a) A delta; (b) a meandering course of a river; (c) a major tributary of the Ganga; (d) Distributaries of the Krishna; (e) river disappearing in a desert and (f) a big waterfall of a small tributary of the Kaveri.

Topic for Class Discussion

8. Journey of a River

Imagining yourself to be a river, write a graphic account of your journey from the source to the mouth. Read out this autobiographical account of a river to your class.

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3. Agents of Gradation (II)

The Terms You Already Know. *Glacier* : A slow moving mass of snow and ice. *Ice Cap* : Vast areas covered with deep ice and snow for a considerable time.

If the ways of running water are wonderful in changing the face of our land, those of moving ice, winds and waves are no less interesting.

Occurrence of Ice

As you know, snow and ice are always found only in the extremely cold areas. Can you tell what must be the maximum temperature of the atmosphere where snow and ice are permanently found? Such areas having very cold climate are generally situated near the poles. They are also found at very high altitudes irrespective of their distance from the equator. How will you explain this fact ?

Our country is situated nearer to the equator than to the pole. Therefore, the areas permanently covered with snow and ice are confined only to the high mountain ranges.

In certain areas, more snow falls each year than what melts there. As a result, the areas are permanently covered with snow and ice. They are known as *snow-fields*. The lowest limit of perpetual snow and ice is called *snow-line*. Snow-fields are, therefore, always situated above the snow-line.

In the equatorial region, the snow-line lies only at a very high altitude of more than 5,500 metres above sea level. Can you name two places, one each from Africa and South America where the permanent snow-fields are situated very close to the equator? Find out the height of permanently covered snow peaks in these two regions.

In the Himalayas, the snow-line lowers down to an altitude of about 4,250 metres above sea level. In the polar regions, where it is always very

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cold, it drops down to the sea level. As a result, most of the Arctic Ocean is permanently frozen. You may recollect that a very large part of Greenland and a large number of islands lying north of Canada are permanently covered with snow and ice. Do you also recall that the whole continent of Antarctica is permanently covered with snow and ice? Such a vast area covered with deep ice is known as *continental ice sheet* or *ice cap*.

The continental ice caps of today are thus confined only to polar regions. They are fewer and smaller than what they were at times in the past. However, it has been found that in the past the polar ice caps had advanced towards the equator covering the northern areas of North America and Eurasia. Such periods when very large parts of the earth were covered with ice sheets or ice caps are known as *ice-ages*.

The Work of the Moving Ice

Ice caps and snow-fields give rise to glaciers. As you know, *glaciers* are slow moving rivers made up of huge quantities of snow and ice. They crawl, as it were, at a rate of only a few metres per day. Gangotri and Jamnotri are the two famous glaciers of our country.

A glacier is responsible for modifying the face of the land in a variety of ways. It causes erosion as well as deposition. Glaciers, like rivers of

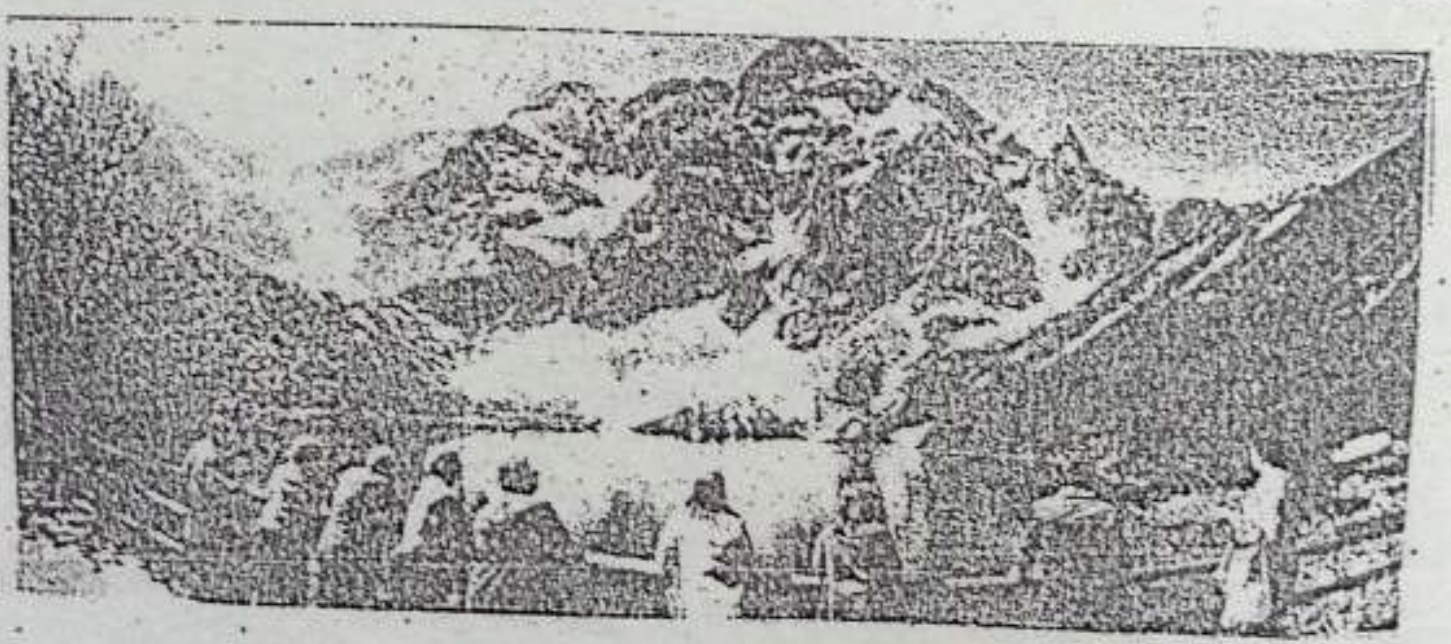

Photo II Tatras mountain

Note the Tatras, the highest mountain range in the Carpathians. Can you find out the small glaciers with their moraines joining together near the lake in the foreground?

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water, also form valleys of their own. A hard and heavy mass of ice further armed with pieces of rocks goes on grinding a valley bottom as well as its sides. As a result, the valleys, formed or modified by glaciers, have flat bottoms and steep or vertical sides. Because of their typical shape they are called *U-shaped valleys*.

Glaciers carry pieces of rocks, big and small, along with them. They are often left on the way at certain places. Such deposits dropped by the glaciers are known as *moraines*.

The Work of the Wind

Wind is yet another important agent of gradation. It is responsible both for degradation and aggradation. It is, however, more effective in desert regions where there is neither running water nor moving ice.

In the absence of any moisture and vegetation, particles of soil get easily loosened in arid and semi-arid regions. They are freely picked up and carried away by the wind. Strong winds pick up and carry not only fine soil or dust but also sand and gravel. Heavy and frequent dust storms remind us that they too are responsible for eroding fine and fertile top layers of soil.

You already know how loess deposits are formed by the wind with fine soil or dust particles blown away from distant areas. The slow but steady work of the wind spread over tens of thousands of years has resulted in developing these deposits hundreds of metres deep.

One typical landform developed in a desert is the *sand dune*. This is a result of deposition by wind. A dune is a hill of sand and has a crest or a summit. It is somewhat mobile as it keeps on rolling or shifting, of course slowly along the direction of the prevailing winds. It originates at places where there is some small obstruction in the path of the wind. Dunes vary in size. Their height ranges from a few metres to as much as 300 metres.

The Work of Sea Waves

The sea is also an important agent of gradation. Its work of erosion and deposition is obviously confined to the coastal areas.

Strong sea waves, dashing against the coast day in and day out, are able to break down hard rocks. They are further aided in their work by the presence of loose pieces of rocks and sand in them. They act as cutting tools for the sea waves. Coastal erosion caus

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by the sea waves is known as *marine erosion*.

Sea waves are also responsible for deposition. Pieces of rocks, gravel, and mud are being constantly sorted out and deposited along the coast or on the sea bed itself by sea waves and currents. The marine deposits along the shore modify the coast lines in several ways.

At places sand, gravel and pebbles get deposited temporarily on the shore. They are called *beaches*. Triplicane or Marina Beach in Madras is a famous beach in India.

Sometimes embankments of sand and gravel get built up on the sea floor not far from the coast. They are called *bars*. Very often they prove a hazard for shipping along the coast.

Occasionally, a sand bar almost cuts off a portion of the sea or a bay from the main body of sea water. This results in the formation of salt water lakes along the coast. They are known as *lagoons*. Lagoons are able to maintain a connection with the open sea through narrow outlets. In India there are several lagoons along the Malabar coast. On the east coast there are two large lagoons. They are the Chilka lake in Orissa and the Pulicat Lake near Madras.

We have thus seen how the various natural agencies are at work in changing the face of the land. How ingenious are the ways of nature that develop a variety of landforms steadily and stealthily!

Formation of Soil

No study of landforms will be complete without a reference to the formation and conservation of soil.

We owe a good deal to the natural process of weathering and erosion. But for this process there would not have been any soil for man on which to raise a variety of crops. The formation of soil through the natural process of weathering is a very slow process. It may take about thousand years to have a layer of soil two-and-a-half centimetres thick.

You will notice that the soil is derived from rocks. The upper layers of rock gradually break into sizable pieces of rocks. They, in turn, give place to smaller pieces of rocks and silt. This is known as sub-soil. At long last, we get a fairly thick top layer of soil which is so useful to us for deriving our food. In fact, *soil*, which is of great use to us, is the uppermost layer of the earth's crust. It contains a fine powdered mineral material and humus. *Humus*, as you know, is a very fine

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Fig. 3 Formation of soil

Look at the various layers, indicating the stages in the formation of soil. What is top soil?

material derived from the remains of plants and animals. It is the presence of this humus which makes the soil fertile.

Presence of grass, plants and trees on the land is very useful to us in a variety of ways. Their remains add to the humus content of the soil and make it fertile. The roots of the vegetation also help in binding the top layer of soil. This prevents it from being carried away by water or wind.

Conservation of Soil

Unfortunately, very often man ignores the usefulness of natural vegetation. He fells trees and clears forests. He removes grass and other natural vegetation either himself or by allowing his domesticated animals to overgraze. Such bare and uncared-for soil is eroded both by running water and wind. Sheet and gully erosions are the two well-known types of soil erosion. These need to be avoided at any cost. Why? As you know, it is possible that the soil which was developed by nature in the course of a thousand years, can be carried away by running water and winds in a few years merely to be deposited into the sea. If we want more and more food for our rapidly growing population, can we afford to neglect our soil?

It is because of this that our government and intelligent farmers take great care to conserve our soil. This is done through several means. We must

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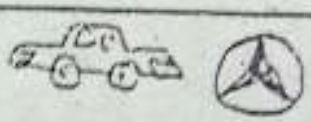
put an end to the reckless felling of trees or clearing of forests. Every effort must be made to plant more and more trees. This is why we celebrate 'Vanamahotsava' every year. We must not allow our cattle, sheep, goats, etc., to overgraze. Farms should be properly levelled and bunded. In hills the terraced farms are more paying since they are well levelled and properly bunded. This helps in the conservation of soil as well as water. Can we ever do without either?

The New Terms You Have Learnt. *Snow-line* : The lowest limit of the perpetual snow and ice. *Ice-age* : A considerably long period during which very large parts of the earth were covered with ice sheets or ice caps.



EXERCISES

Review Questions

1. Answer the following questions :
   (i) What is a snowfield? How and where is it formed?
   (ii) What is the average height of a snow-line in the Himalaya?
   (iii) Where do we find the largest ice cap?

2. Make out correct pairs from the two columns :

(i)	The lowest limit of perpetual snow and ice	(a)	Ice cap
(ii)	A vast area covered with deep ice	(b)	Glacier
(iii)	Slow moving rivers of ice and snow	(c)	Marine erosion
(iv)	Gradual breaking up of rocks and their carrying away by sea waves	(d)	Beach
(v)	Pebbles, sand and gravel temporarily deposited on the shore	(e)	Snow-field

SNOW LINE

3. Complete the following table, as indicated, from the list of landforms given below :
(i) lagoons, (ii) sand dunes, (iii) loess plateaus, (iv) gulleys, (v) U-shaped valleys, (vi) beaches, (vii) V-shaped valleys, (viii) moraines, (ix) sand bars, (x) flood plains, (xi) deltas, (xii) gorges.

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Agent of Gradation	Landforms due to erosion	Landforms due to deposition
Running water	V-shaped valleys	
Moving ice		
Wind		Sand dunes
Sea waves		

4. Explain how soil is formed. List various steps that must be taken to conserve soil.

Model-making

5. Prepare suitable clay models of various landforms such as a V-shaped valley, a delta, a sand dune, a U-shaped valley and a gorge. Prepare suitable labels for your models giving a definition of each one of them.

Topic for Class Discussion

6. Vanamahotsava and its Usefulness

Discuss how plantation of trees on a large scale should help in conserving soil and water. Also discuss how you can help in conserving soil and water.

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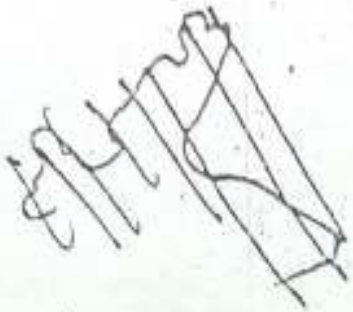
UNIT TWO



Asia

Asia is the world's largest continent. It possesses one-third of the land area of the world. It also contains more than 58 per cent population of the world.

Asia has the highest mountain chains of the world. It is also a land of broad plateaus, plains and river valleys.

There are great variations in the climate and natural vegetation of Asia.

Asia's large population is crowded in a few river valleys which are among the world's most fertile agricultural lands. Nearly three-fourths of the population of Asia still depends upon agriculture. Asia leads the world in the production of various crops such as rice, millets, jute, raw silk, rubber, tea, sugar-cane, spices, oilseeds and coconuts.

Asia possesses large deposits of tin, mica, mineral oil, coal, iron-ore, bauxite and manganese. It is a leading manufacturer of cotton, jute and silk textiles.

Asia is a continent with a very old history. All the leading religions of the world originated in Asia. It has therefore been a pioneer in the field of culture and religion.

Asia is a continent of several countries. A majority of them have become independent only recently. These countries are now trying hard to catch up with the advanced countries of the world.

Pakistan, Nepal, Bhutan, Bangladesh, Burma and Sri Lanka are our closest neighbours. Along with India they are all situated in South Asia. Malaysia and Indonesia are the two south-east Asian countries known for their plantation agriculture.

China, a land where farming has been practised for four thousand years, has the highest population in the world. Japan is a country with an ancient civilisation and modern economy. It is one of the most prosperous countries of the world.

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4. Land and Climate

The Terms You Already Know. *Tundra*: The region within the Arctic Circle where the climate is very cold and the natural vegetation mainly consists of mosses and lichen. *Coniferous trees*: Trees growing in cool climate and bearing cones and needle-like leaves. *Taiga*: The coniferous forest land of Siberia. *Steppe*: The treeless grassland found mainly in semi-arid regions.

Asia is the largest of all the continents. It possesses one-third of the land area of the world. It lies between 10°S. and 80°N. latitudes, and thus extends from the hottest to the coldest region. Its east-west extension is about half of the surface of the globe.

Look at Fig. 4. Find out the three largest countries of Asia. Which large country lies in both Asia and Europe? Which countries are land-locked, i.e. do not have access to sea? Which countries have common boundaries with India? Locate the capital cities of Japan, China and India. Name three countries which consist of large groups of islands.

The Land

Asia may be divided into five major physical divisions. They are (i) the Northern Lowlands; (ii) the Central Mountain Belt; (iii) the Southern Plateaus; (iv) the Great River Valleys; and (v) Island Groups of South-east and East Asia. (Fig. 5)

(i) The Northern Lowlands. The northern part of the continent is a vast lowland called the Siberian Plain. Ob, Yenisei and Lena are the rivers which flow through this plain from south to north and drain into the Arctic Ocean. Due to the severe winter of the polar region, the lower courses and mouths of the rivers remain frozen for several months. Hence, the water coming from the upper courses is blocked and inundates a large part of the flat plain making it swampy and marshy.

(ii) The Central Mountain Belt. To the south of the northern lowlands is a

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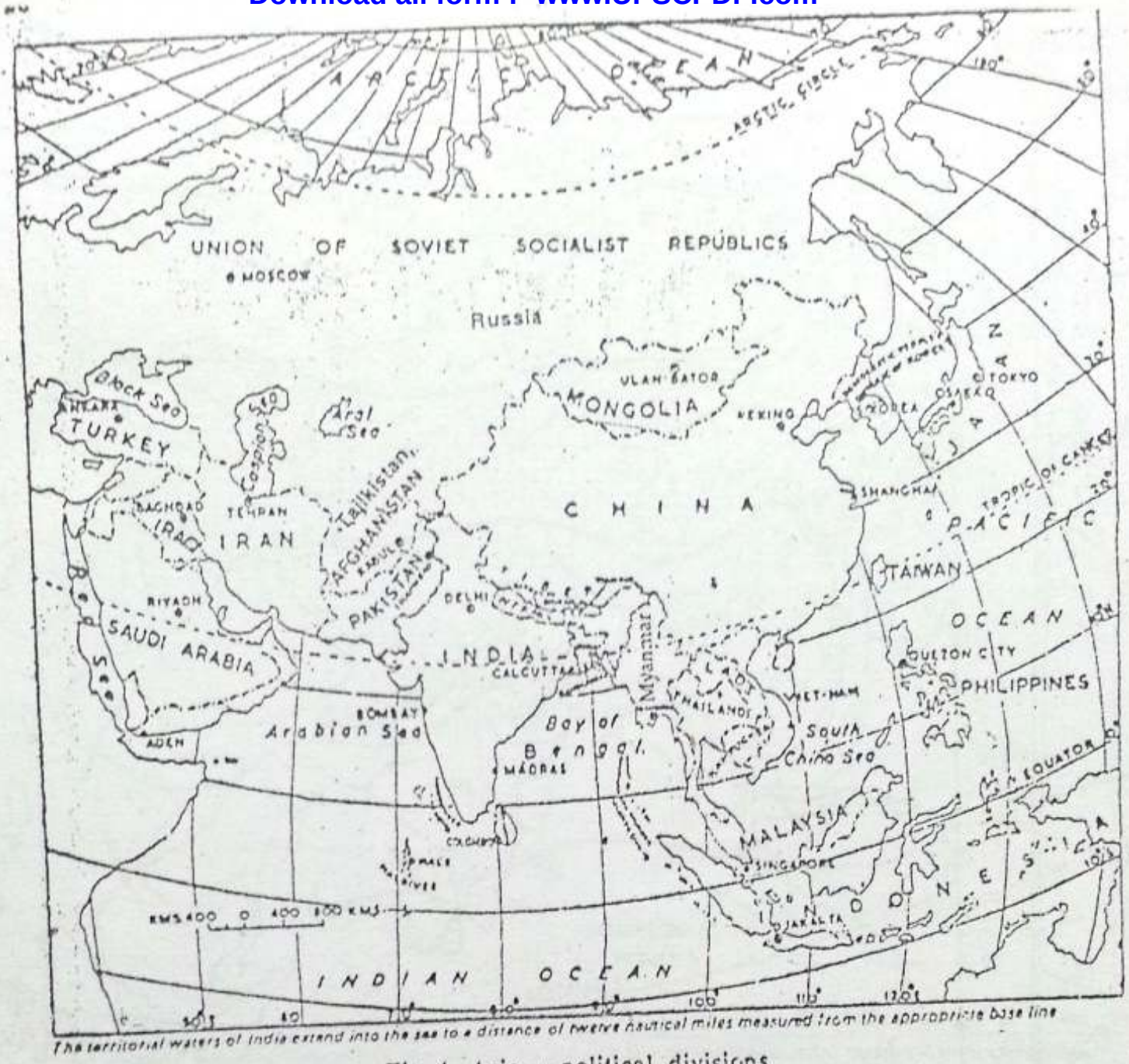

Fig. 4. Asia — political divisions

Asia consists of a third of the total land area of the world and contains about half of the world's population.

great belt of mountains and plateaus. As you can see from the map, the Pamir Plateau in central Asia forms a mountainous knot from which several mountain chains run out in different directions. These mountain chains enclose huge plateaus and desert basins.

Two mountain chains which run westward enclose the plateaus of Iran and Anatolia. The mountain chains of the Himalayas, the Karakoram and the Kunlun run towards the east. The plateau of Tibet, enclosed by the Himalayas and the Kunlun, is the largest and highest plateau of the world.

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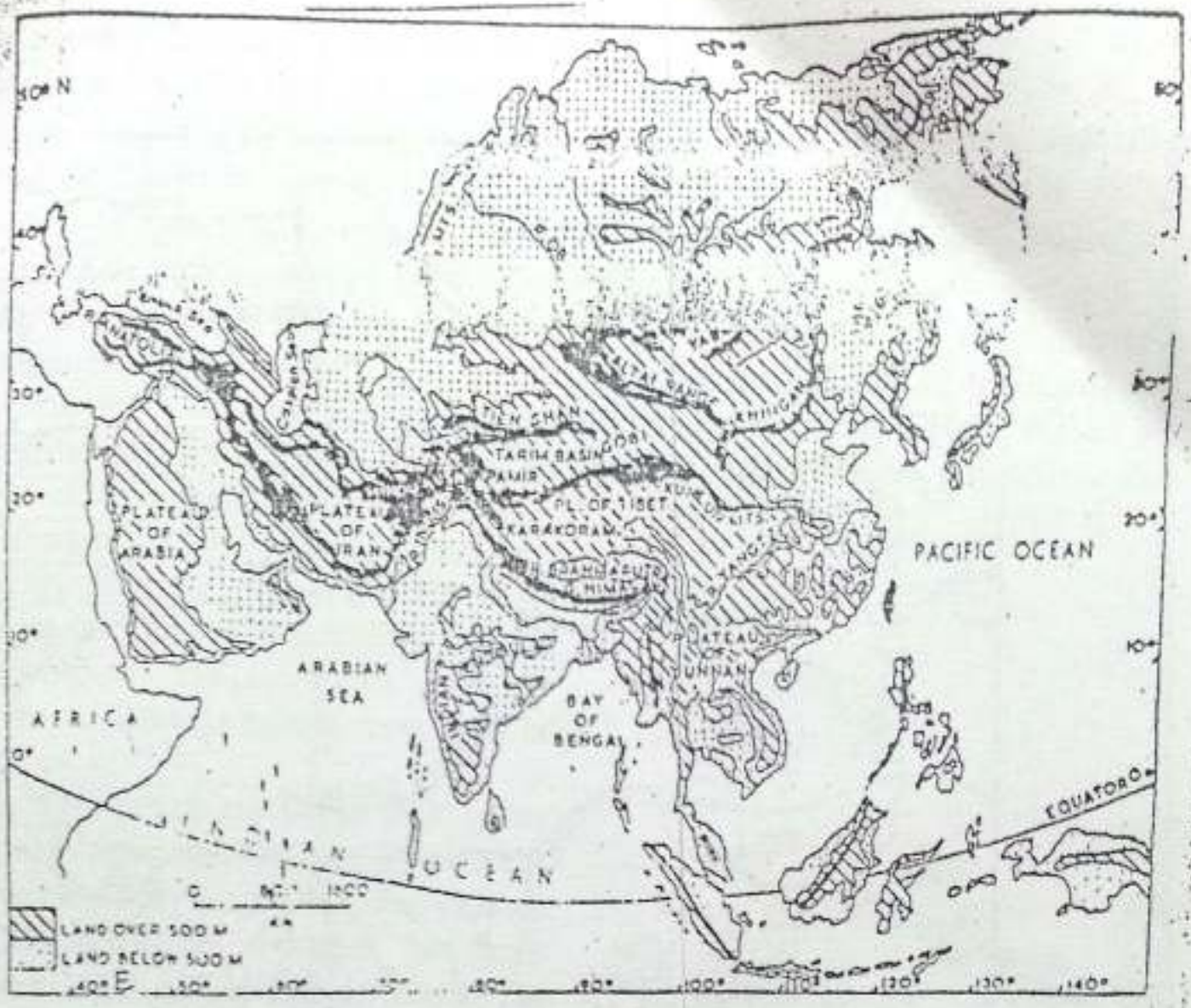

The territorial waters of India extend into the sea to a distance of twelve nautical miles measured from appropriate base line.

Fig. 5. Asia — physical divisions

Asia is a continent of mountains, plateaus and river valleys. Note the position of the Pamir Knot and the mountain ranges which run out in different directions from the knot.

The vast cool desert of Gobi lies to its north-east. Look at the map and note the other mountain chains and the plateaus and desert basins which they enclose.

(iii) The Southern Plateaus. To the south of this mountain belt there are some plateaus of very old rocks. These are the Plateau of Arabia, the Deccan Plateau and the Plateau of Shan and Yunnan.

(iv) The Great River Valleys. From these mountains and plateaus many great rivers emerge to form big fertile

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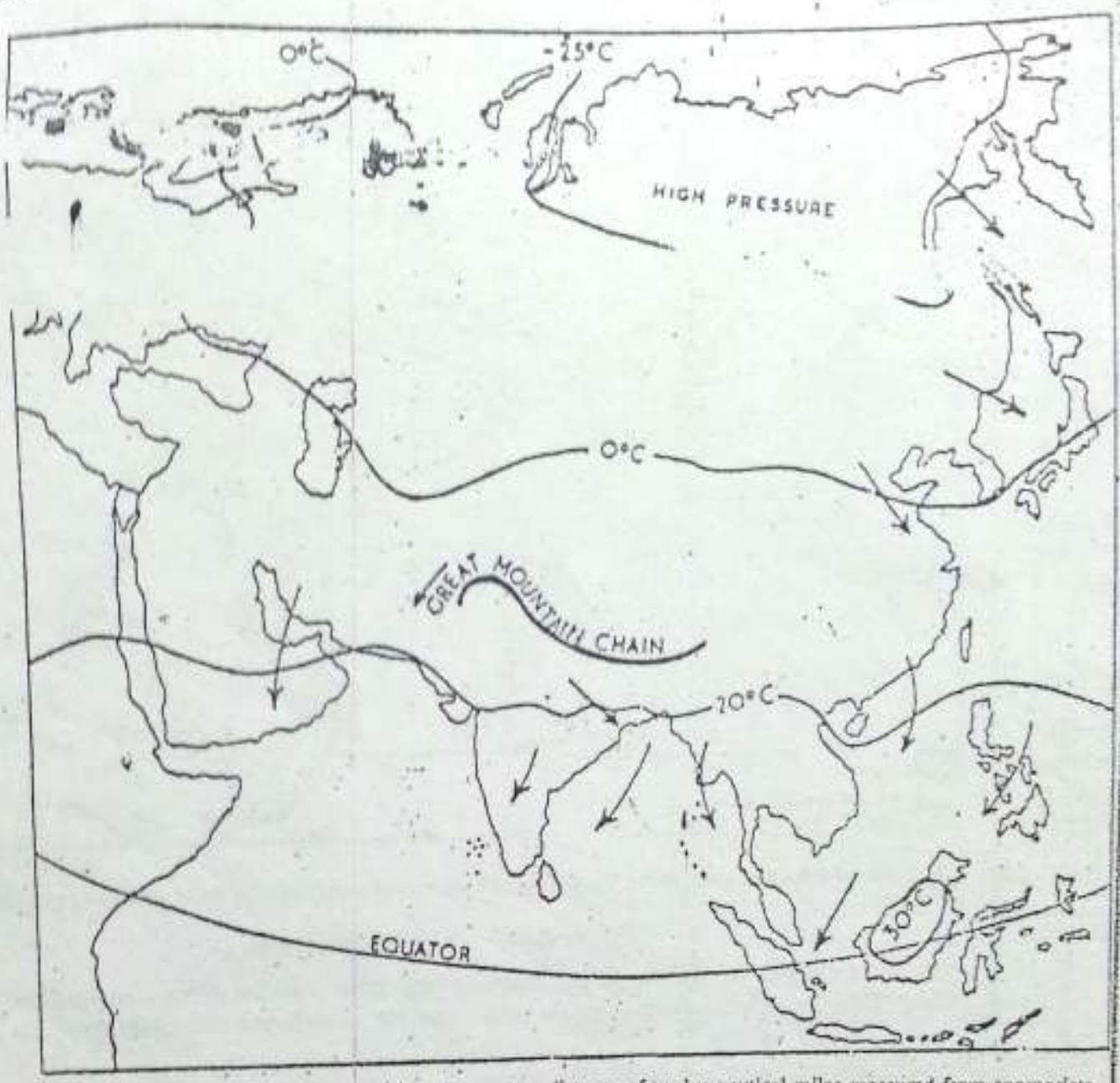

The territorial waters of India extend into the sea to a distance of twelve nautical miles measured from appropriate base line.

Fig. 6 Asia — climatic conditions in winter (January)

Note that in winter northern and central Asia have very low temperatures, high pressure and outblowing winds. Why does the climate of most parts of Asia remain dry in this season?

valleys. Some of the important valleys are those made by the Tigris-Euphrates, the Indus, the Ganga-Brahmaputra, the Irrawaddy, the Mekong, the Sikiang, the Chang-jiang and the Hwang Ho. These fertile valleys are some of the world's most thickly populated regions.

(v) The Island Groups. The imports

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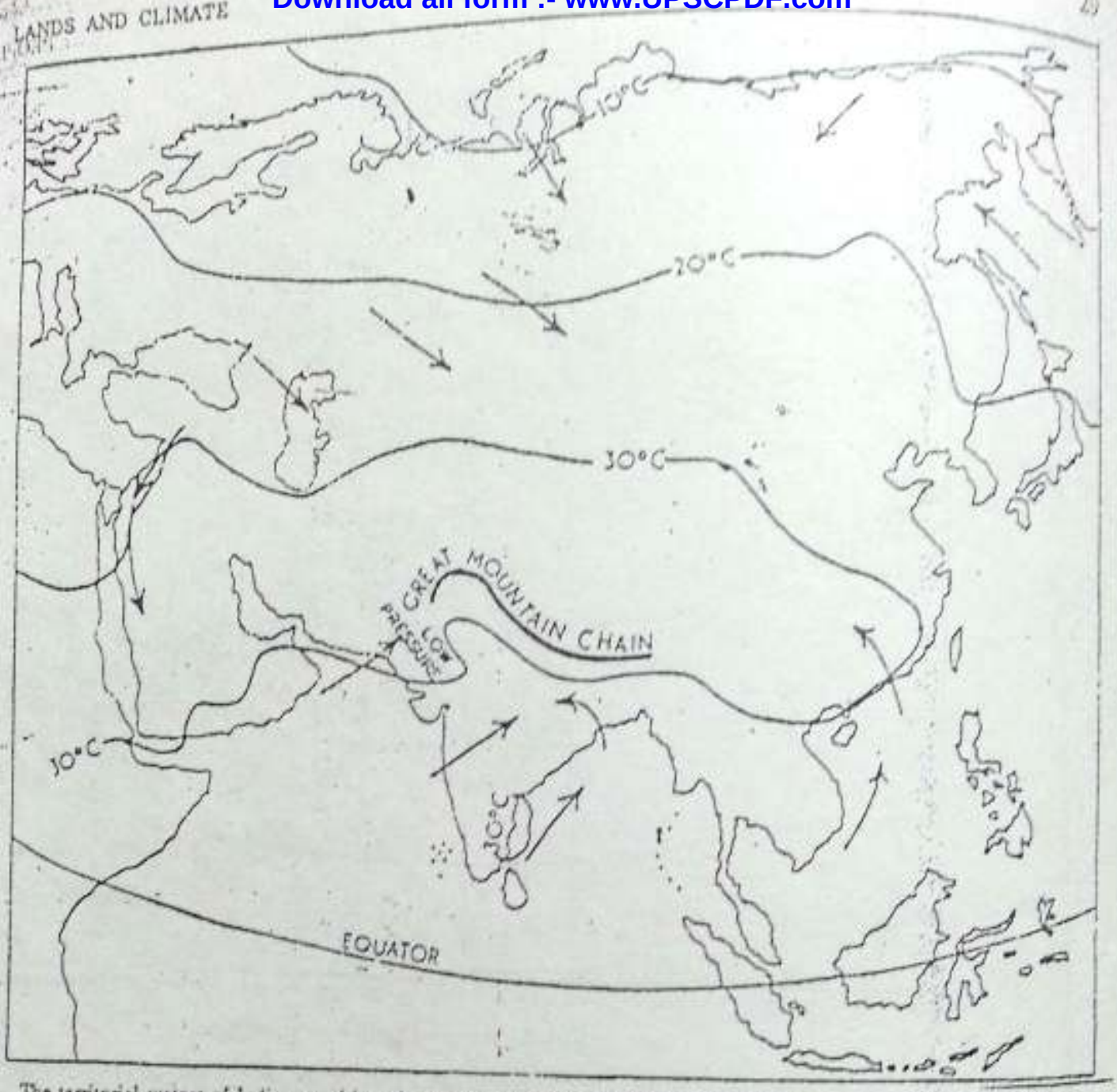

The territorial waters of India extend into the sea to a distance of twelve nautical miles measured from appropriate base line.

Fig. 7 Asia — climatic conditions in summer (July)

Note that in summer the interior of Asia is very hot and becomes a huge low pressure area. Winds from the surrounding oceans are drawn towards this low pressure. These winds give rainfall to most parts of Asia.

island groups consist of Indonesia, the Philippines and Japan. Most of these islands are mountainous. Some of them are known for their volcanoes which are active or have been active in the recent past.

Climate and Vegetation

Asia is a huge continent and possesses great differences in elevation. It

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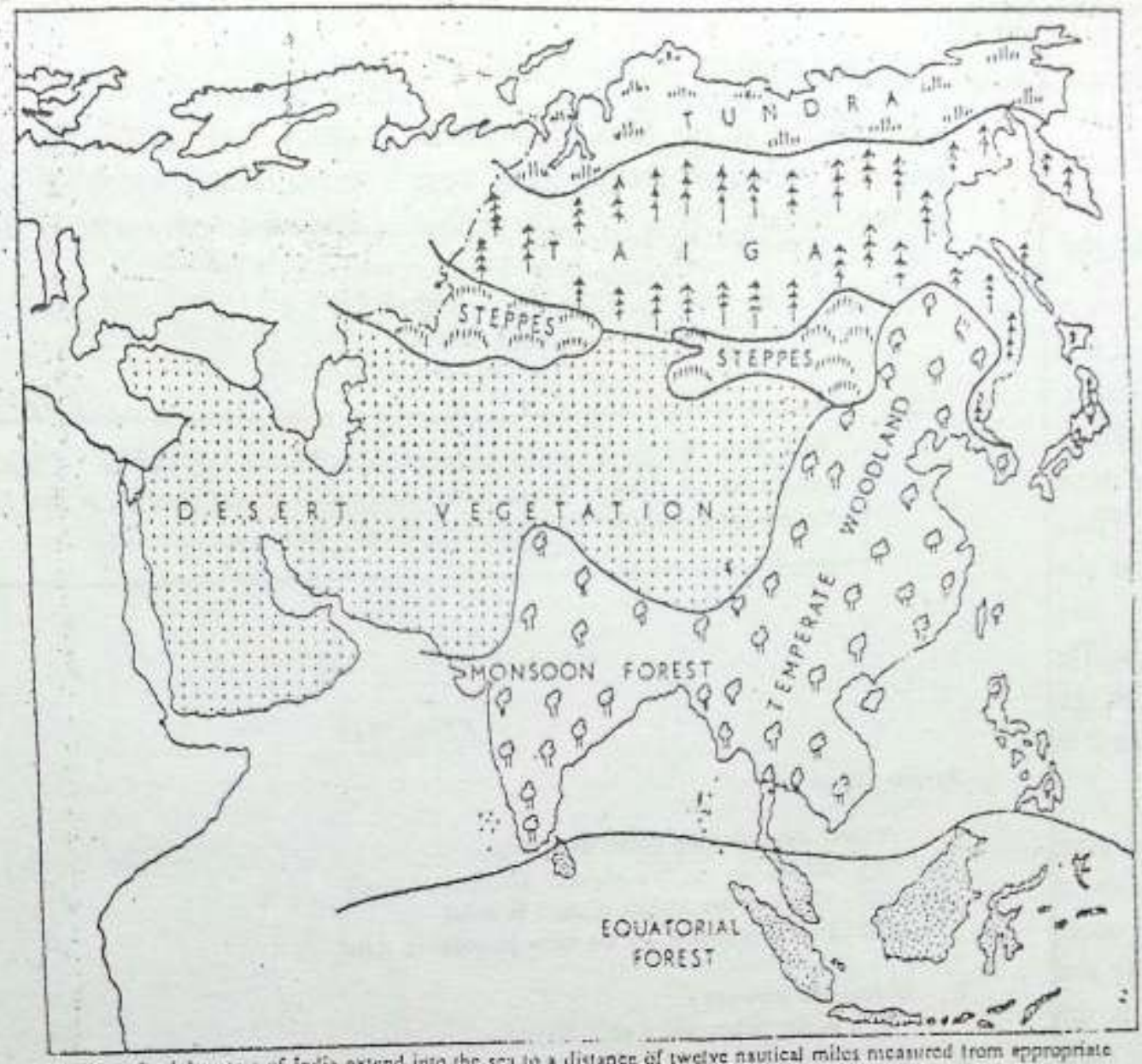

The territorial waters of India extend into the sea to a distance of twelve nautical miles measured from appropriate base line.

Fig. 8 Asia — natural vegetation zones

Note the broad natural vegetation belts. They generally run from east to west. What is the relationship between climate and vegetations ?

has therefore a great range of climate and vegetation.

In Figs. 6 and 7, you will notice the change in the climatic conditions of Asia from winter to summer.

In winter, the central parts of Asia have temperatures below freezing point. Hence, the air over the region contracts. It becomes heavy, forming a high pressure area. The winds blow outward from this region. They are dry because they blow from the land. They pick up moisture only when they

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blow over the sea and then may cause rainfall. Japan, parts of south-east Asia, the south-eastern coast of India, and Sri Lanka receive rain from such winds in this season. Parts of south-west Asia receive rainfall from winds blowing eastwards from the Mediterranean sea.

During the summer season, the interior of Asia becomes very hot. As the air is heated, it expands. It thus becomes light and a low pressure area develops in the region. It draws in air from the surrounding relatively cooler oceans. As the air comes from the oceans, it brings rain to most parts of Asia.

The annual rainfall in Asia varies greatly from area to area. Some areas receive a very large amount of rainfall. Cherrapunji, for example, has more than 1,000 centimetres of rainfall annually. At the other extreme, there are the desert regions which may not have even a drop of rain for many successive years.

The natural vegetation of Asia is very closely related to the climate. Look at Fig. 8.

Along the northern coast of Asia is the belt of *Tundra* vegetation. The region is mostly covered with snow and ice for the major part of the year. Summer is short and cool. Precipitation is about 30 centimetres annually, mostly in the form of snow. Due to the cold weather conditions plants do not attain much height and the vegetation mainly consists of moss and lichen. The reindeer is the chief animal of this region.

To the south of the Tundra, there is a much broader belt of coniferous forests known as *Taiga*. Here, winters are severe and summers are warm. Pre-

Photo III The Tundra

A hunter is taking a polar fox out of a trap. Note the soft and long fur of this animal. Look at the clothes of the hunter. What are they made of?

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cipitation is only 25-50 centimetres, mostly in the form of snow. As there is little evaporation, the small amount of rain is sufficient for the growth of trees. The region is famous for its softwood trees such as fir, spruce and pine. These are used as timber and in making paper-pulp and rayon. The *Taiga* is the home of fur-bearing animals such as fox, sable and mink.

Further south is the belt of temperate grasslands known as the *Steppe*. Winters here are cold and summers are fairly hot. Rainfall is between 20 and 40 centimetres. As there is much evaporation, the moisture is sufficient for grasses but not for trees. The antelope is a common animal of this region.

Photo IV The Taiga

A hunter in the Taiga forest has killed this giant bear. How is the life of a hunter in the Taiga different from that of a hunter in the Tundra.

Very large parts of south-west and central Asia have *Desert Vegetation*. In the South-west are the hot deserts of Arabia and the Thar, while in the north are the cold deserts of Gobi and Tibet. As conditions are unfavourable for plant growth, only shrubs, thorny bushes and poor grasses can grow. The common animals are camel, ass, gazelle and cheetah. The yak is found on the high plateau region.

In south, south-east and east Asia the natural vegetation consists of *Monsoon Forests*. As rainfall occurs mostly in summer, trees generally shed their leaves in winter which is dry. The forests consist of many useful trees such as teak, sal, and sandal wood. The elephant is a typical animal of monsoon forests.

In north-eastern Asia, as the climate becomes cooler, the monsoon forests change into *Temperate Woodlands*.

In the extremely southern portion of Asia, the natural vegetation consists of *Equatorial Forests*. Such forests

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are confined to the Malaysian Peninsula and the island groups lying close to the equator. You already know about these dense and gloomy evergreen forests which are homes of apes, monkeys and a variety of animals.

The New Terms You Have Learnt. *Land-locked Countries* : Countries which do not possess direct access to the sea. *Desert Basin* : A low lying desert area enclosed by mountains on all sides.

EXERCISES

Review Questions

1. Answer the following questions briefly :
   (i) Which are the five physical divisions of Asia?
   (ii) Which is the highest plateau in Asia?
   (iii) In which season are the rains plentiful in Asia?

2. Distinguish between :
   (i) A hot desert and a cold desert.

3. State the chief characteristics of each of the five physical divisions into which Asia is divided.

4. Name the natural vegetation belts of Asia. Take any two belts and state how their vegetation depends on their climate.

5. Place the following words in the table given below :
   (i) moss; (ii) short grasses; (iii) teak; (iv) reindeer; (v) lichen; (vi) antelope; (vii) sal; (viii) thorny shrub; (ix) elephant; (x) camel; (xi) fir; (xii) pine; (xiii) date palm; (xiv) creepers; (xv) silver fox; (xvi) apes.

Vegetation Belt	*Common Vegetation*	*Animals*
Tundra		
Taiga		
Steppe		
Arid deserts		
Monsoon forests		
Equatorial forests		

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Picture Reading

6. Look at the pictures in this chapter and study carefully the differences in the climate of the regions. See if the landscape, vegetation, animals and the way people dress themselves can help you in this regard.

Map Work

7. Study the map of Asia from your atlas and find out the following :
   (i) *Mountains* : The Hindukush and the Karakoram
   (ii) *Rivers* : The Tigris-Euphrates and the Mekong
   (iii) *Countries* : Turkey, Afghanistan and Thailand
   (iv) *Cities* : The capital cities of Iraq and Iran.

Topic for Class Discussion

8. *'The Clothes and the Houses in Different Parts of Asia'*

   Collect information on the above topic and present it to the class. Collect pictures in support of your information.

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5. The People and the Resources of Asia

The Terms You Already Know . *Irrigation* : Supplying water to the land for the growth of crops. *Civilisation* : An advanced stage of social life with art, science, culture, good government, and good customs and manners. *Growing Season* : A part of the year with temperatures high enough to allow the growth of crops.

The People

The population of Asia is nearly 2818 million, which is more than 58 per cent of the total population of the world. The average density of population is 102 persons per square kilometre but the actual distribution of population is very uneven.

Look at the population map of Asia (Fig. 9). You will find that there are certain regions in which the population is very sparse. These regions are the northern and eastern parts of Siberia, the deserts and highlands of central Asia, the Arabian Desert, the plateau of Iran and the Thar Desert in India.

The most thickly populated parts of Asia include the plains of India, Bangladesh, Java island in Indonesia and the plains of China and Japan. Most of these areas are fertile lowlands or river valleys.

The vast continent of Asia is inhabited by different people. Let us note some of them.

The yellow peoples of eastern and south-eastern Asia constitute more than one-third of the population of the continent. They include Chinese, Japanese, Koreans, Philippino, Malay, Indonesian, Thai, Myanmaries and peoples of other countries. They are mainly farmers.

The brown peoples of India, Pakistan, Bangladesh and some other countries of South Asia account for some one-fourth of the population of Asia. These people are also mainly farmers.

Southwest Asia is inhabited by Arabs, Turks, Persians, Afghans and a

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number of other groups. Their main occupation is farming and animal rearing.

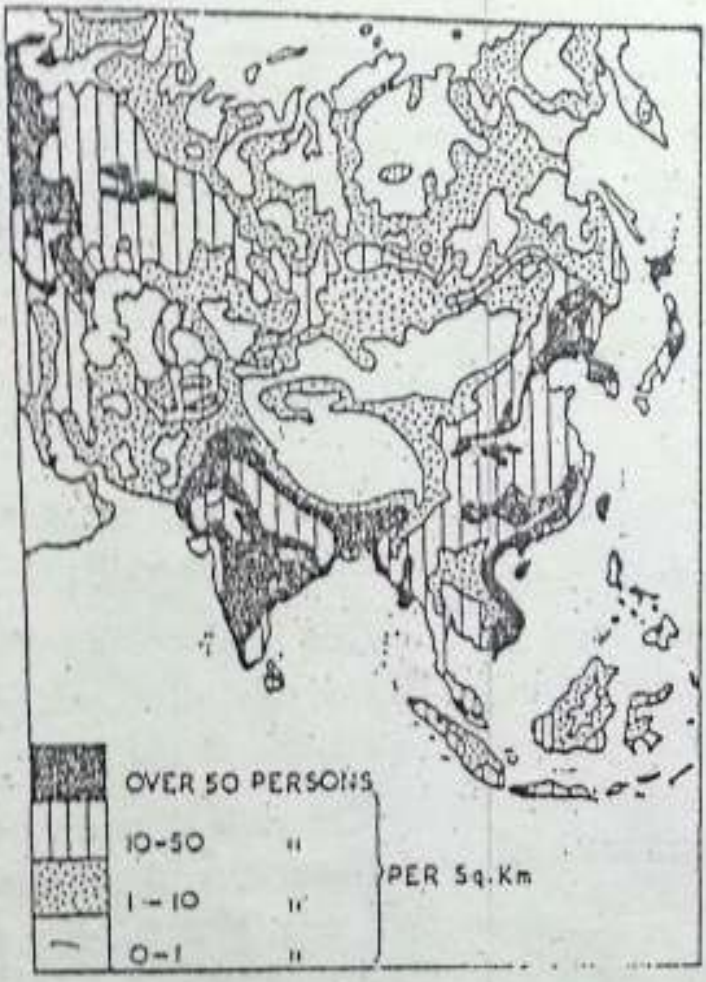

Fig. 9 Asia — density of population

Note the most densely peopled parts of Asia. How will you explain the very heavy concentration of population in these areas?

Central Asia has a number of groups such as Mongols, Kazakhs, Uzbeks and Kirghiz. Most of these peoples are herders and great horsemen. See Photo V.

The people of Asia follow different religions. In fact, Asia has been the cradle of great religions. Can you name them and their places of origin?

The Resources

The greatest wealth of Asia consists of its agricultural resources. These include fertile soil, sufficient water for irrigation and favourable climatic conditions for the growth of plants. Other resources of Asia include forests and mineral deposits.

Agricultural Resources. Large parts of Asia are occupied by mountains, plateaus, deserts and forests. As a result, only one-sixth of the total area is suitable for agriculture. Even so, Asia is a continent rich in agricultural resources.

There are large valleys. Many of them were cradles of ancient civilisations. Fertile soils, assured water-supply from the rivers and a long growing season helped in the early beginning of agriculture in these valleys.

Rainfall in Asia is not evenly distributed through the course of the year. As a result, irrigation in certain parts of Asia becomes necessary.

Irrigation is done by means of canals, tanks and wells. In recent years, several large river valley projects have been set up. They serve several purposes such as irrigation, flood control, soil conservation and production of waterpower. Hence, they

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are known as *multipurpose projects*. The Bhakra-Nangal Scheme in India is one of the biggest multi-purpose projects in Asia. Another big project is the one in Siberia on river Angara (Photo VI).

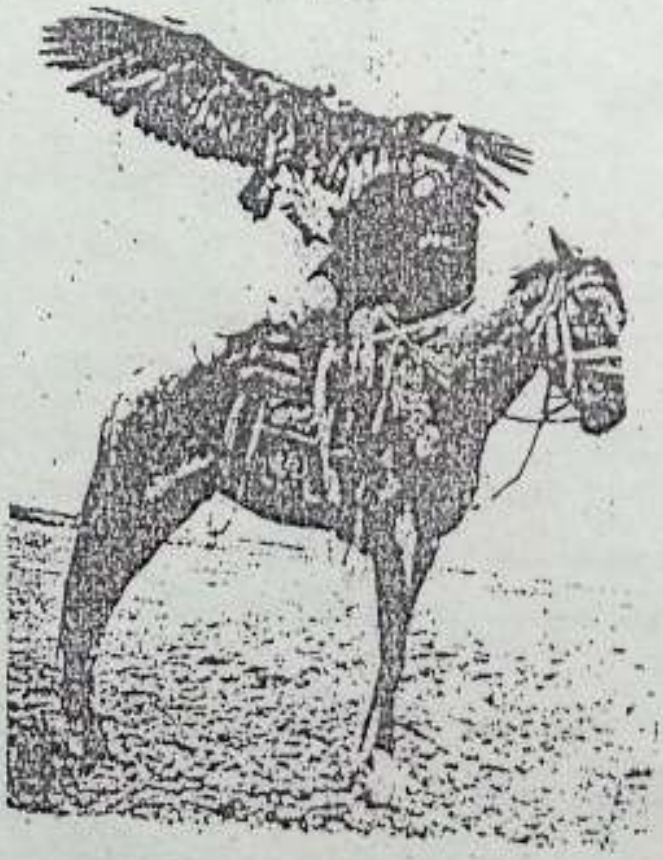

Photo V A Kirghiz Horseman

Look at a Kirghiz farmer with a golden eagle in his hand. The old farmer is a fine horseman. What kind of landscape do you see in the picture?

Types of Agriculture. There are several types of agriculture in Asia. One of them is called *shifting agriculture*. It is practised in some mountainous and forested areas. A patch of forest is cleared by burning the trees. The farmer cultivates the cleared patch for a few years. As that patch loses its fertility in two or three years, he gives it up and makes a fresh clearing in the forest for cultivation. Such an agricultural practice requires a great deal of land. It is a wasteful method of farming.

Another type of agriculture, which is the commonest in Asia, is known as *intensive agriculture*. It involves a good deal of manual labour on a small piece of land. Farmers prepare their fields before the rains start and sow them soon after. In the case of rice, the seeds are first sown in a nursery. When the plants are about 15 centimetres high, they are taken out and planted in carefully prepared fields. The farmer has to apply fertilisers to his field, irrigate it when necessary and remove the weeds continually. Much labour is required at the time of sowing and harvesting the crop. Generally, the farmer grows different successive crops in such a way that the fertility of the soil is maintained as much as possible. This is known as *rotation of crops*.

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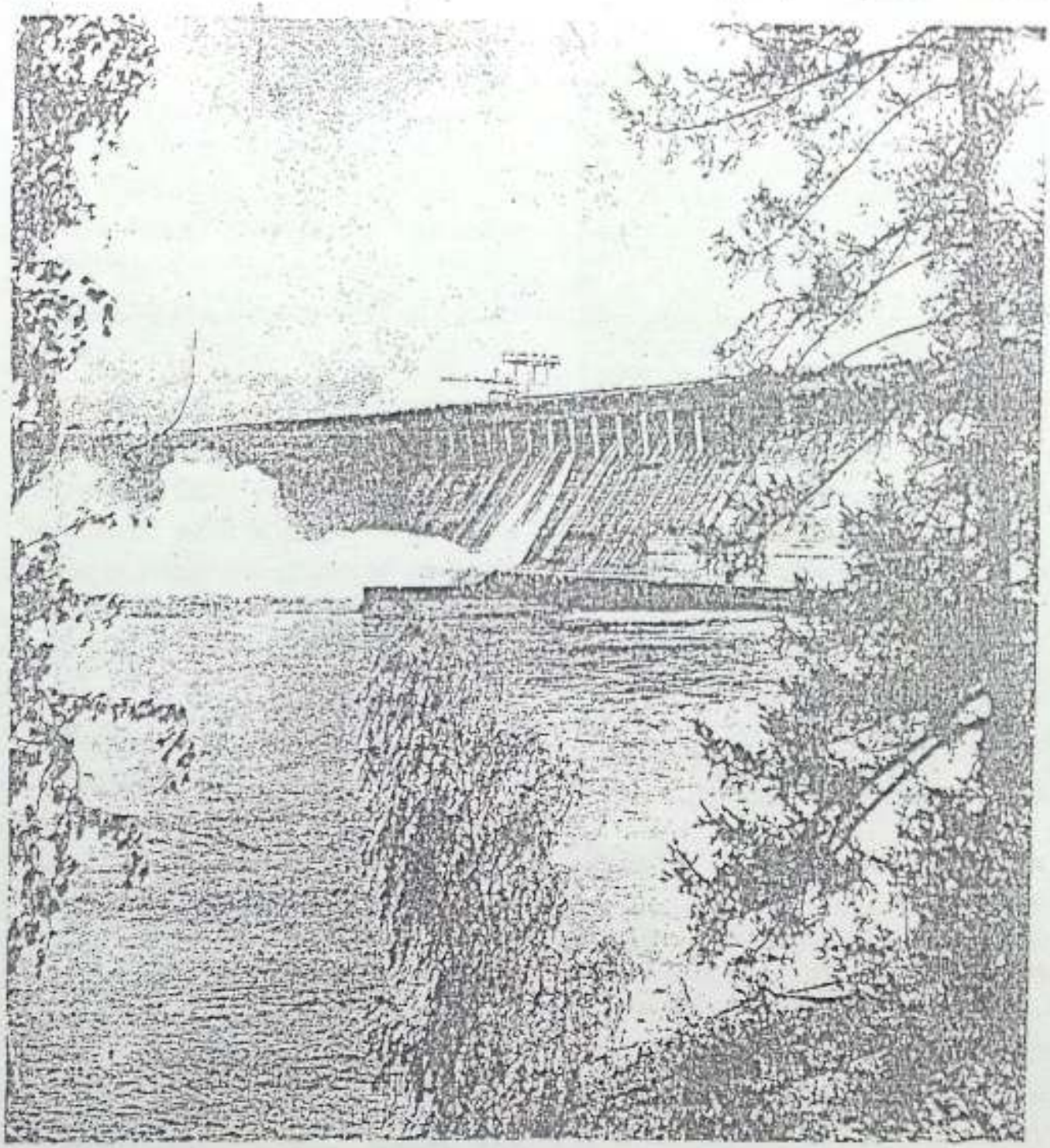

Photo VI A Big Water-Power Station

Look at the world's biggest water-power station built on the river Angara in Siberia. Note the dam and the vegetation in this picture.

In Asia, the average yield per acre is generally very low. There are several reasons for this. The farms are very small. Farmers are generally poor and uneducated. They work with simple and old type of tools. They do

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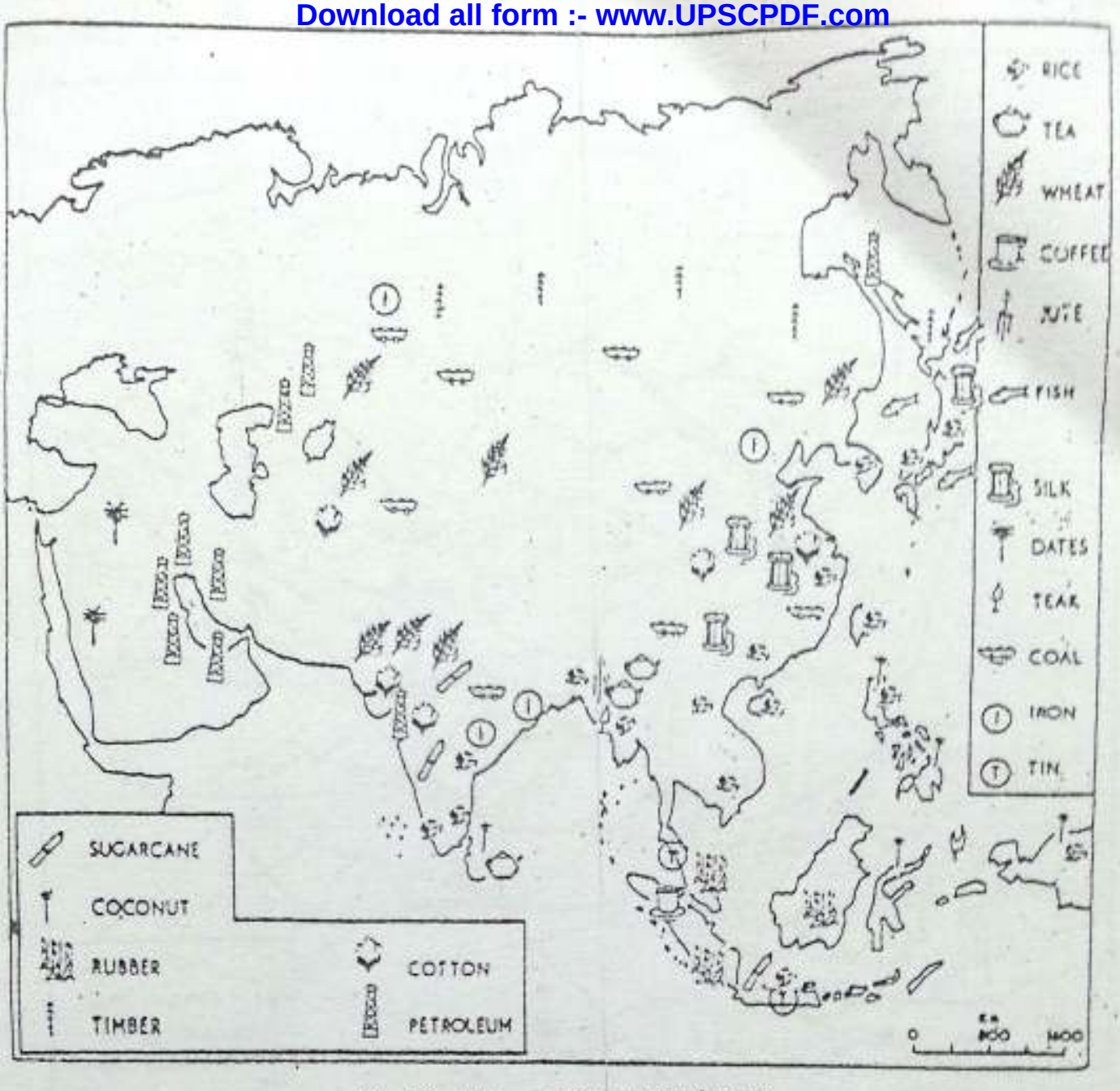

Fig. 10 Asia — crops and minerals

Note the areas producing rice and wheat. What climate do they suggest? In what areas would you expect the iron and steel industry?

not have enough irrigation facilities, fertilisers and good seeds. Hence, the production is very low and just enough to feed the farmer and his family.

Still another type of agriculture is that known as *extensive agriculture*. Some parts of Central Asia and West Siberia have very large farms. Manual labour is not possible on such huge farms. Machines are, therefore, used for farming. It is obvious that such mechanised farming requires a good deal of money.

Crops : Various crops are grown in

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Asia. Food crops, especially cereals, are the most important. Rice is the chief crop in most parts of the continent. More than 90 per cent of the world's rice is grown here. The main producers are China, India, Japan, Bangladesh and the countries of South-east Asia.

Wheat is grown in the sub-tropical and temperate lands of Russia, Ukraine, China, Northern India, Pakistan and South-west Asia. Millets such as bajra, jowar and ragi are grown in semi-arid regions. Pulses and oilseeds are also grown along with cereals.

The important cash crops of Asia are cotton, jute, sugarcane and tea. Cotton is grown in China, Kazakhastan, Azerbaijan India, Pakistan and South-west Asia. Jute is produced in the Ganga-Brahmaputra delta. Sugarcane is chiefly grown in India, Indonesia and Pakistan. Tea is cultivated in India, Sri Lanka, China, Japan and Indonesia.

Forest Resources : Asia has three main types of forests, namely, coniferous forests, monsoon forests and equatorial forests. Coniferous forests are found in the Russia, Japan, and the Himalayan region. They provide softwood which is used as timber and for making paper-pulp and rayon. Monsoon forests are found in India, Myanmar and parts of South-east Asia. They provide useful trees such as teak, sal and bamboo. Equatorial forests are found in Malaysia and Indonesia. Much of these forests has now been converted into rubber estates. Malaysia is the largest produer and exporter of rubber in the world.

Photo VII A coal-mine in Central Asia.

Look at a coalmine in the Central Asian Region of the Soviet Union. The mine is worked entirely with the help of machines. Note that the coal is found very close to the surface.

Mineral Resources : Asia possesses large mineral deposits. Some of the important minerals are iron, manganese, tungsten, bauxite, mica, tin, coal and oil.

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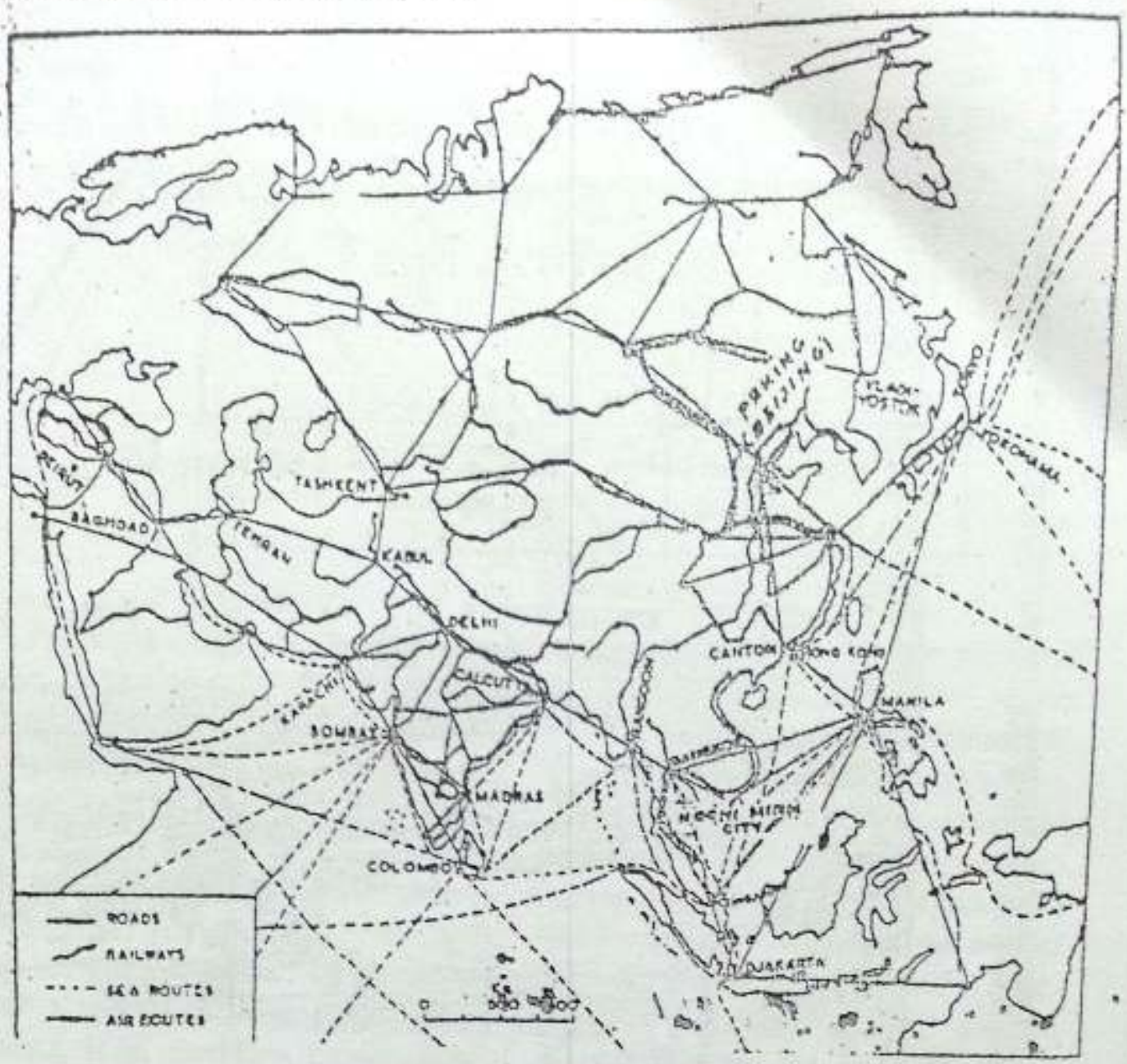

The territorial waters of India extend into the sea to a distance of twelve nautical miles measured from appropriate base line.

Fig. 11 Asia — important railways, seaports and airways

Note that there is very uneven distribution of railways. Why does Asia lack a well developed and integrated network of railways ? Note the important sea routes from the Suez Canal to Singapore. Which are the important seaports on this route ?

Iron ore is found in India, China Russia and the Azerbaijan Bauxite and mica deposits are mainly in India. Malaysia is very rich in tin. Large deposits of coal occur in China, Russia, and India. Countries of South-west Asia possess large deposits of oil. While the leading producers of oil are

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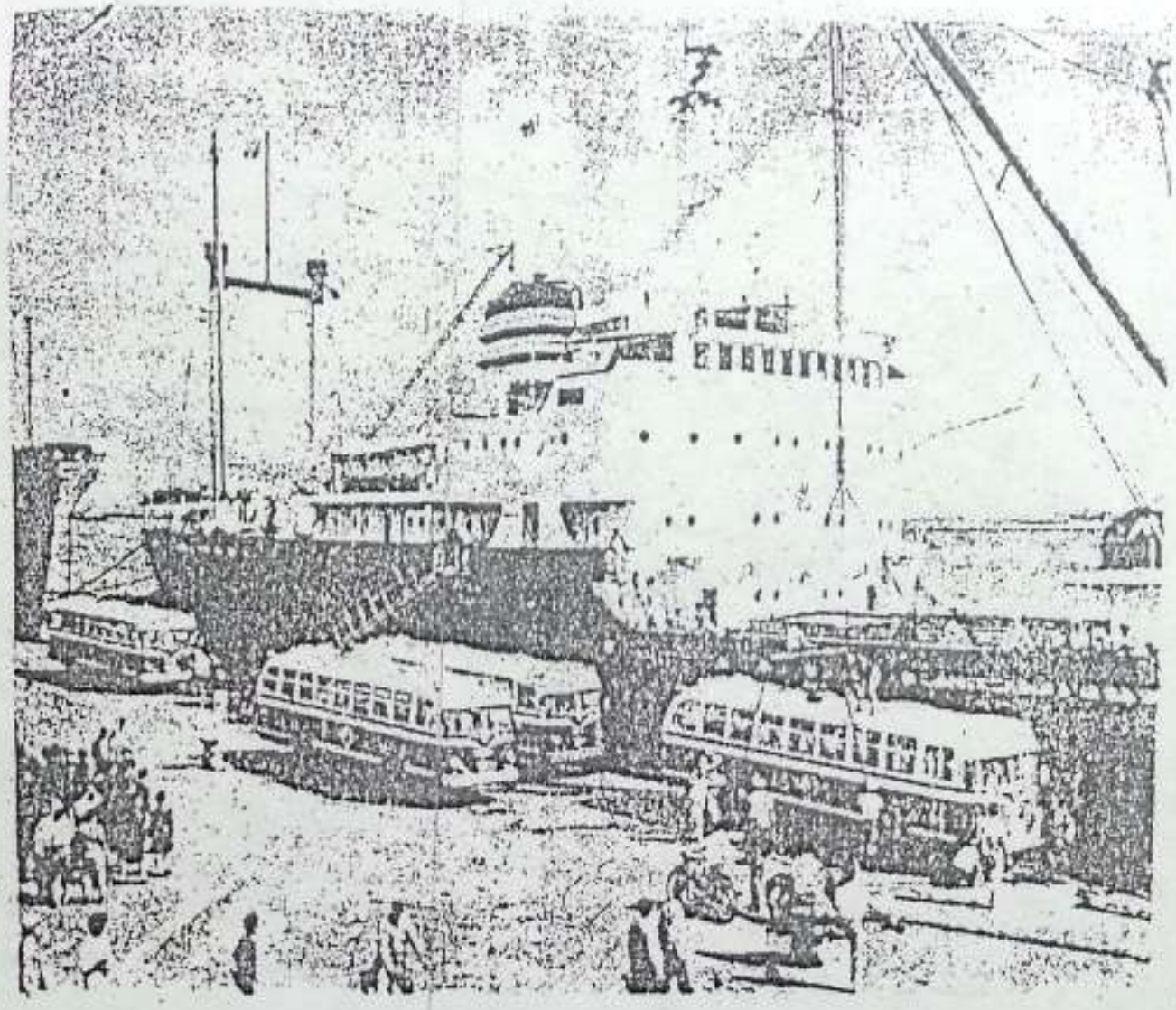

Photo VIII A Japanese port

Look at a Japanese port where a big ship is being loaded with buses. Note the powerful cranes lifting these buses so easily. How are the people in this picture dressed ?

Kuwait, Bahrain, Iraq, Iran, Saudi Arabia, China and Russia. a good deal of oil is produced in Myanmar Indonesia and India also.

Asia has rich agricultural and mineral resources. But they are unevenly distributed. Also, they have not been developed properly and sufficiently. Now things are changing. Some countries have progressed much, while others have only recently started to progress. Methods of farming are being improved. Various industries based on agricultural and mineral resources are developing rapidly.

Transport : Look at Fig. 11. You will

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find that in Asia there are various modes of transport, namely, land, water and air.

The public roads joining distant places are known as *highways*. When they connect places within a country they are known as national highways. When they connect places situated in different countries they are called international highways. Japan possesses the best highways, in Asia. India and China also have good networks of highways. An international highway connecting Istanbul in Turkey with Singapore in South-east Asia is being constructed.

From Fig.11 find out the longest railway line in Asia? Compare this map with the maps of relief and population of Asia. It is easier and more profitable to construct railways in the plains and the thickly populated areas than in the hilly regions and the thinly populated areas.

Airways are becoming more and more important in different parts of Asia. Locate the important airports on the map of Asia.

The New Terms You Have Learnt . *Intensive Agriculture* : A farming practice involving a good deal of labour on a small piece of land. *Extensive Agriculture* : Large farms cultivated with the help of machines. *Highway* : A public road connecting distant places.

EXERCISES

Review Questions

1. Answer the following questions briefly :
   (i) Which are the major cereal crops of Asia?
   (ii) Which are the four important cash crops of Asia?
   (iii) Which is the most important mineral of South-west Asia?
   (iv) Name three nations of Central Asia and three of South-west Asia.
   (v) What is an international highway?
   (vi) Which four major seaports are also international airports?
2. Distinguish between :
   (i) Intensive and extensive agriculture
   (ii) A port and a harbour.

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3. Complete the following statement with the most suitable ending from those given below the statement.
A multi-purpose project means.....
(a) a big river dam built to irrigate a very large area.
(b) a dam built especially for the development of electricity.
(c) a group of dams on several rivers.
(d) a river valley project to achieve several objectives at the same time.

4. Describe important agricultural types in Asia. What are the main difficulties of Asian farmers?

5. Which parts of Asia are very densely populated and why?

Picture Reading

6. Study the picture of the port in Photo VIII and write down the functions which a port performs.

Map Work

7. In an outline map of Asia show the major crops and sea routes

Topic for Class Discussion

8. *Trade and Transport*

List a number of articles of daily use. Think of the places from where these articles have come. Tell the class the probable journey they may have completed before reaching you.

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6. Our Closest Neighbours : Pakistan, Nepal, Bhutan, Bangladesh, Myanmar and Sri Lanka

> The Terms You Already Know. *Pass* : A gap in a mountain range providing a natural route across the range.

Pakistan, Nepal, Bhutan, Bangladesh, Myanmar and Sri Lanka are our closest neighbours. All of them have close relations with our country.

PAKISTAN

Pakistan is our western neighbour. Generally, Pakistan has very little rainfall but a large part of the country has a good network of irrigation canals. It is, therefore, rightly known as the land of canals.

Land and Climate

Pakistan has common boundaries with Iran in the west, with Afghanistan in the north-west and with India in the east and south-east. The Arabian Sea lies to the south.

Pakistan is a country of hills and plains. It is divided into two physical units, namely, the western region and the eastern region. The western region consists of the Baluchistan Plateau and the mountain ranges of the north-west. The main ranges are Kirthar, Sulaiman and Hindu Kush. These ranges together with the Himalayas separate the Indian sub-continent from the rest of Asia. There are only two natural gateways in these ranges. They are the Khyber Pass and the Bolan Pass.

The other physical unit, i.e. the eastern region, consists of the Plains of the Indus and its tributaries. Much of the region would be a desert but for the life-giving waters of the Indus and its tributaries. The Indus flows from north to south. On its way to the Arabian Sea, it is joined by the rivers Kabul, Jhelam, Chenab, Ravi, Beas and Sutlej. In its lower reaches, it

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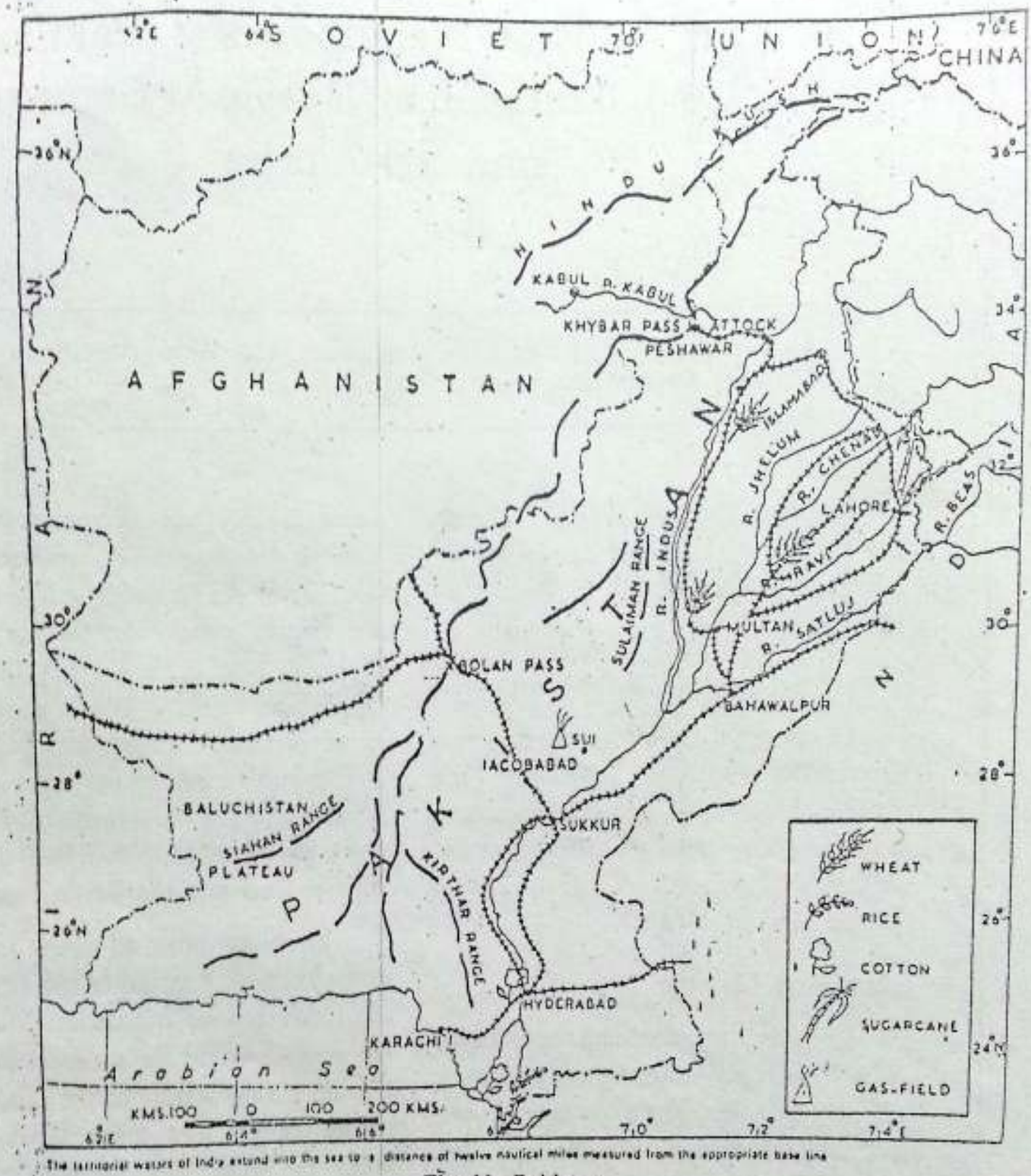

Fig. 12 Pakistan

Locate the mountain chains which separate the plateaus of Baluchistan and Afghanistan from the Indus Plain. Why is the Indus the most important river of Pakistan ?

flows through the Thar Desert. It forms a fertile delta at its mouth.

Pakistan experiences extremes of climate. It is very hot in summer and

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very cold in winter. The average rainfan in the Indus Valley is no more than 25 centimetres a year. This shows that the country is generally very dry.

Economic Development

In spite of the arid climate, agriculture is the main occupation. This has been made possible by the fine network of irrigation canals, which is the world's largest single network. Several large dams have been built on the Indus and its tributaries.

Wheat is the major food crop of Pakistan. Millets such as jowar and bajra are grown in the arid regions where irrigation is not possible. Cotton is the important cash crop. It is of a fine quality as its fibres are long. It is mostly grown in the lower Indus Valley. Sugarcane and rice are also grown. Rearing of milch cattle is very important.

Pakistan has only a few mineral resources. It possesses some deposits of mineral oil and natural gas. The gas field at Sui is very important. Rock salt is the only other important mineral.

Pakistan has developed some new industries in recent years. Cotton and woollen textiles, sugar and cement are important amongst them.

Population and Transport

Pakistan has a total of about 100 million people. The average density of population is about 125 persons per square kilometre. Most of the people follow Islam. The official language is Urdu.

Karachi is the largest city. It is also a big industrial and commercial centre. It is a major seaport and an international airport. Lahore is another big city. Islamabad is the new capital city of Pakistan. Pakistan has a good network of railways especially in West Punjab.

NEPAL

As Nepal is situated in the lap of the Himalayas, it is often called a 'Himalayan Kingdom'.

Land and Climate

Nepal is a mountainous country. The Great Himalayan Range, which is the highest range of the Himalayas, passes along the northern border of Nepal. It contains some of the loftiest peaks such as Mount Everest, and Dhaulagiri. To the south lies the Mahabharata Range of the Middle Himalayas. Further south is the low Shivalik Range of the Outer Himalayas. The valley of Kathmandu lies in Central Nepal.

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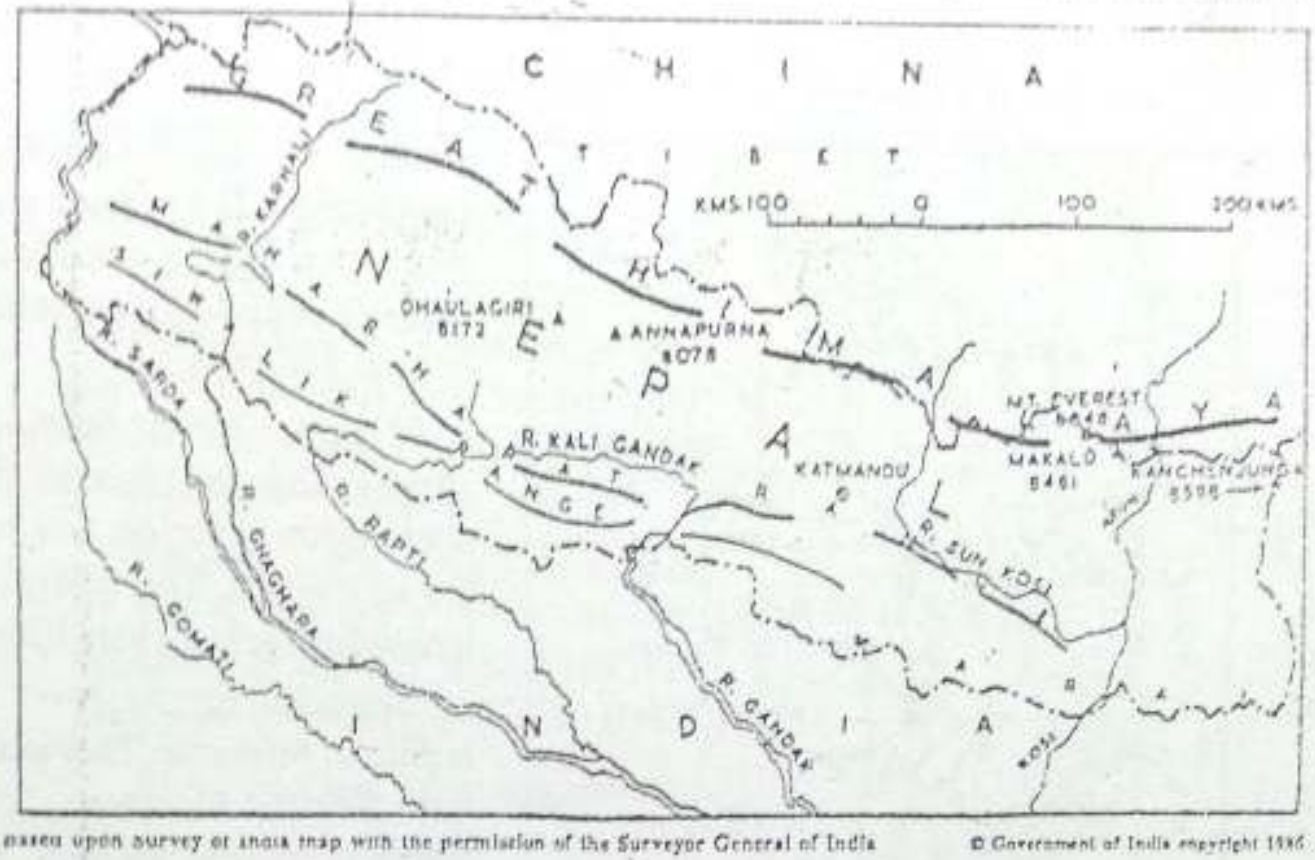

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Fig. 13 Nepal

Note that Nepal is situated between India and China, the two big countries of Asia. Which are the rivers that enter India from Nepal?

Along the southern border of Nepal, there is a swampy and marshy plain known as the Tarai. Much of it is covered with thick jungle and tall grasses but a large part of it has now been drained and made good for cultivation.

The climate is warm and humid in the Tarai. As one goes northward into the higher region, the climate becomes cool. The vegetation also changes and the grasslands of the south are replaced by the monsoon forests of sal and teak. Further north, there are the temperate forests in which oak and maple trees are common. At still higher altitudes, the commonest trees are fir and birch.

Economic Development

Nearly 93 per cent of the people of Nepal are engaged in agriculture. Rice is the main food crop. Maize, millets, wheat and potato are also grown. Some cash crops such as sugarcane, jute and tobacco are grown on a small scale. Cattle rearing is important. The country exports a wide variety of

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animal products. Forests provide medicinal herbs and honey. A large number of people are engaged in handicrafts. In recent years some industries have been developed.

Population

The total population of Nepal is about 18.8 million. The average density of population is about 117 persons per square kilometre.

The Gurkhas, the Sherpas and the Bhotias are the major groups of people living in Nepal. The Gurkhas are among the best soldiers and the Sherpas are among the best mountaineers in the world.

Kathmandu is the capital city of Nepal. A large number of tourists visit Nepal to admire the scenic beauty of the Himalayas or to scale the high peaks.

BHUTAN

Bhutan is a small country on the northern border of India. It is located in the eastern Himalayas. It is a mountainous country with high ridges and deep valleys. Most of the settlements are along the track which goes to Sikkim through the Chumbi Valley. Thimpu is the capital of Bhutan.

Sub-tropical crops such as rice and wheat are grown in the southern lowlands. In the upland areas, shifting agriculture is practised for cultivating maize and millets.

The total population of Bhutan is about 1,417,000. The average density of population is only 30 persons per square kilometre. Most of the people are Buddhists. Bhutanese are known for their handicrafts, woodwork and metal craft.

BANGLADESH

Bangladesh is our eastern neighbour. It is a fertile country and is also very densely populated.

Land and Climate

In Fig.14, you will notice that on three sides Bangladesh has a common border with India. The country is a maze of rivers and their tributaries. It occupies the major part of the world's largest delta, namely, the Ganga-Brahmaputra delta. Bangladesh is a level land with only a few hill ranges in the east.

Bangladesh has a hot and humid climate. It receives plenty of rain ranging from 200 to 400 centimetres a year.

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The territorial waters of India extend into the sea to a distance of twelve nautical miles measured from the appropriate base line.

Fig. 14 Bangladesh

Bangladesh occupies the Ganga-Brahmaputra delta, which is the largest delta in the world. What is the name of the combined flow of the Ganga and the Brahmaputra?

Economic Development

Agriculture is the main occupation. Rice and jute are the major crops. Rice is the staple food of the people, while jute is an important cash crop for them. Bangladesh is an agricultural country and has only a few industries. It has now set up some jute mills and paper mills.

Population and Transport

The total population of Bangladesh is about 109 million. The average density of population is about 702 persons per square kilometre.

The majority of people are Bengalis. Most of them are Muslims. But there are also a large number of Hindus and some Christians. The official language is Bangla.

As the country is criss-crossed by rivers, there are not many railways and roads. However, rivers themselves are important means of transport.

Dhaka is the capital city. Narayanganj is the port of Dhaka. However, the major port of Bangladesh is Chittagong.

MYANMAR

Myanmar (Burma) is yet another neighbour of India. The country has a common border with Bangladesh, India, China, Laos and Thailand. On the west, it is flanked by the Bay of Bengal. It is a country of beautiful pagodas, the temples dedicated to Lord Buddha.

Land and Climate

Myanmar is a mountainous country. It is separated from its neighbours by high mountain ranges which are heavily forested. The central part of

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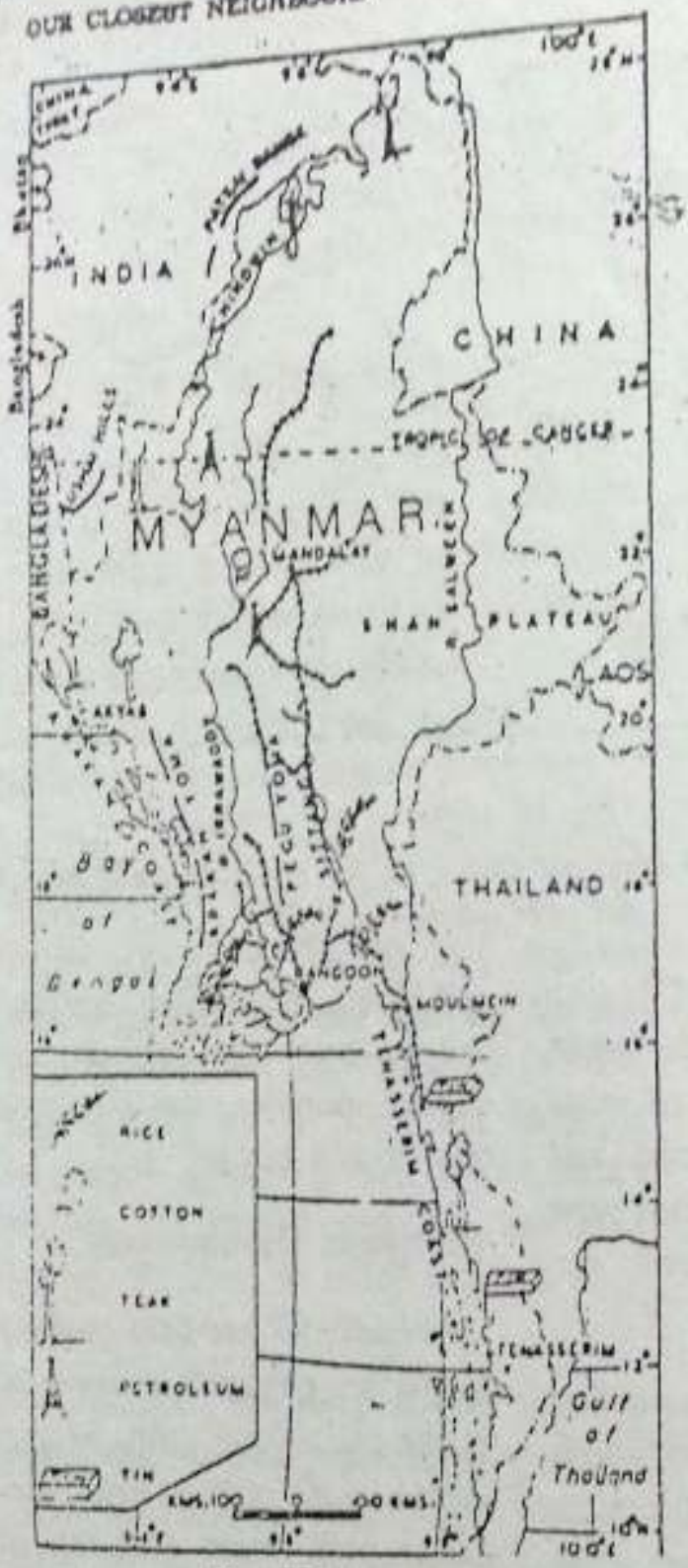

Fig. 15 Myanmar

Which mountain ranges separate Myanmar from India? Locate the towns of Rangoon and Mandalay.

the country is drained by the Irrawaddy, Sittang and Salween rivers. In the eastern part of the country is the Shan Plateau. The coastline of Myanmar is very broken. It has deep cracks, bays and capes. Such a coastline is called *indented coastline*. It possesses several natural harbours.

Myanmar has the monsoon type of climate. The amount of rainfall varies from region to region. It is heaviest in the south-west. The central valley of Irrawaddy receives very little rainfall.

Monsoon forests cover the hilly regions of Myanmar. They include large teak forests. Mangrove forests are found in coastal swamps along the coast. The natural vegetation on the Shan Plateau consists of coarse grasses and shrubs.

Economic Development

About one-fourth of the total area of Myanmar is under cultivation. Rice is the major crop. It is mostly grown in the delta regions of the Irrawaddy and Sittang. About half of the rice production is exported to other Asian countries. Pulses, maize, groundnut, cotton, tobacco and sugarcane are the other crops which are grown.

Teak is the next major export after rice. Trained elephants are used to transport big and heavy logs of wood out of the forests.

Myanmar is rich in several mineral resources such as petroleum, tungsten,

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lead, zinc and tin. New industries are now being set up in the country.

Population and Transport

The total population of Myanmar is nearly 43 million. The average density of population is thus 55 persons per square kilometre. People are mostly Buddhists here.

Rangoon is the largest town. It is the capital city and a large river port. Mandalay is the old capital city and even now an important centre.

River transport is very important. Rivers are also used for transporting logs by floating them from the upper to the lower courses of the rivers.

SRI LANKA

Sri Lanka is a beautiful country, so that it is often called 'The Pearl of the East'. Look at the map of Sri Lanka (Fig.16). The Palk Strait separates Sri Lanka from India. A line of submerged rocks and sand banks run between Dhanushkodi near Rameshwaram and Talaimannar in Sri Lanka. It is known as Adam's Bridge.

Land and Climate

The southern part of Sri Lanka is hilly, while the northern part consists of an extensive flat plain. This plain is

Fig. 16 Sri Lanka

Note the location of this island country in the Indian Ocean, in relation to the international sea routes. Why is Colombo an important port ?

[illegible] by the Mahaweli Ganga, Yan and Aruvi rivers.

As the country is situated very close to the Equator, its climate is hot all through the year. However, the influence of the surrounding sea makes the climate moderate.

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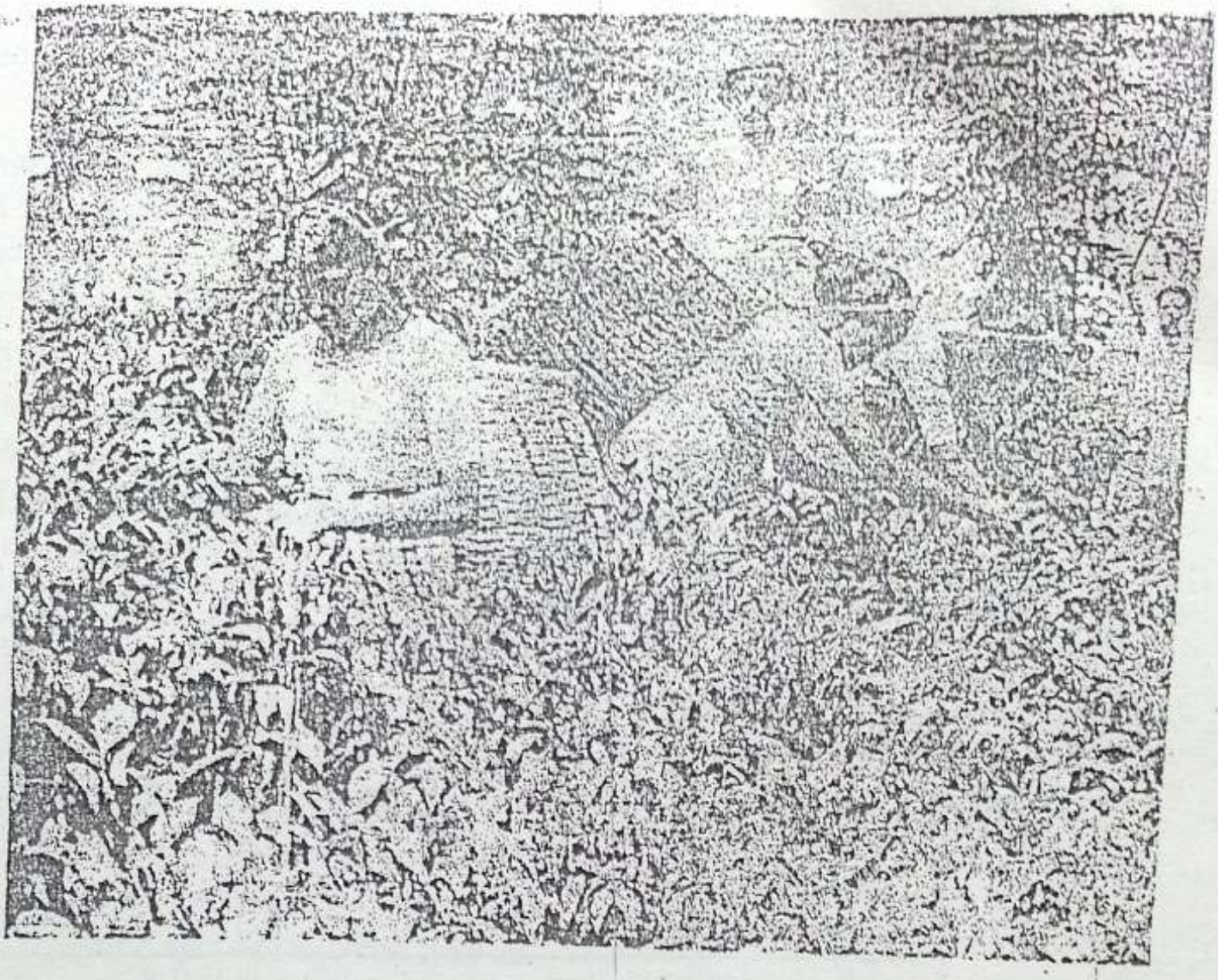

Photo IX Plucking Tea Leaves

Look at the Sri Lankan girls engrossed in plucking tender leaves of the tea plants. Note the dresses of the people in this picture. Where do you think these tea gardens are located?

The south-western and central parts of Sri Lanka receive heavy rainfall from the south-west monsoon in summer. In winter, the northern and eastern parts get rain from the north-east monsoons. Equatorial and monsoon forests are found in areas of heavy rainfall.

Economic Development

Agriculture is the main occupation of the people. Rice is the staple food. But the country does not produce enough rice and has to import nearly half of its rice needs. Tea, rubber, coconut and spices are the major cash

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crops. Tea is the largest source of Sri Lanka's national income. Sri Lanka has some of the best tea gardens of the world.

Amongst the minerals, graphites and precious stones are the most important. Pearl fishing is practised in the Gulf of Mannar for which it has been famous for a long time.

Industries such as paper, plywood, rubber goods, textiles, cement and sugar have developed in recent years.

Population

The total population of Sri Lanka is nearly 16 million. The average density of population is about 247 persons per square kilometre.

The majority of the people in Sri Lanka consists of Sinhalese. A large number of Tamilians from India have also settled in the country.

Both Sinhalese and Tamil are the official languages. There are several religions in the country but Buddhists are in the majority. They are followed by the Hindus, Muslims and Christians.

Colombo is the capital city and the largest port of Sri Lanka. Kandy is a modern city and a hill station in the central part of the country.

The New Terms You Have Learnt. *Indian Subcontinent* : A part of Asia separated from the mainland by the mountain ranges of the Sulaiman, the Hindukush, the Karakoram and the Himalayas. *Indented Coastline* : A very broken coastline with several cracks, bays and capes.

EXERCISES

Review Questions

1. Answer the following questions briefly :
   (i) Why is the Indus called the lifeline of Pakistan?
   (ii) Which is the most important cash crop of Bangladesh?
   (iii) Which are the two groups of people of Nepal who are among the best soldiers and the best mountaineers of the world?
   (iv) Which is the second most important export of Myanmar
   (v) Name four important cash crops of Sri Lanka.

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2. Make the correct pairs from the following two columns :

(a) An important gas-field of Pakistan	(i) Chittagong
(b) The largest port of Bangladesh	(ii) Mandalay
(c) A hill station of Sri Lanka	(iii) Sui
(d) The former capital city of Myanmar	(iv) Thimpu
(e) The capital of Bhutan	(v) Kandy

II

(a) 'The land of canals'	(i) Myanmar
(b) 'The pearl of the east'	(ii) Pakistan
(c) 'The Himalayan kingdom'	(iii) Sri Lanka
(d) 'The land of pagodas'	(iv) Nepal

3. What are the major crops of Pakistan?

4. Name the main exports of Myanmar and Sri Lanka.

Map Work

5. In outline maps of India's neighbours show the capital cities, major rivers and agricultural products.

Topic for Class Discussion

6. *'The Successful Indian Expedition to the Everest'*

Collect information and pictures on the topic. Tell the class something about the equipment used by mountaineers in scaling the high peaks.

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7. Lands of Plantations : Malaysia and Indonesia

The Terms You Already Know. *Rubber estate* : A large farm planted with rubber trees.

Malaysia and Indonesia are two South-east Asian countries with which India has close relations. The location of these countries is important as they face the Indian Ocean on the one hand and the Pacific Ocean on the other.

MALAYSIA

Look at the map in Fig.17. Malaysia lies north of the Equator but not far from it. The country includes two widely separated areas, the Malay Peninsula, which is part of the mainland of Asia, and the northern part of Borneo island.

Land and Climate

A mountain range forms the backbone of the Malay Peninsula. It slopes abruptly to a coastal plain on both sides. The western coast is wider than the eastern. The soils in the highlands are infertile but those in the plains and the valleys consist of fertile alluvium.

The country has a typical equatorial type of climate, i.e. hot and wet. The natural vegetation consists of thick evergreen forests which occupy three-fourths of the country.

Economic Development

In spite of mountains and thick forests, nearly one-sixth of the land is under cultivation. Agriculture is the main occupation of the people. They grow rice, rubber, cacao, pepper, pineapples, bananas, tapioca and coconuts. Rice is the staple food of the people. The country has to import rice because its own production is inadequate.

The main crop is rubber. Sixty-five per cent of the cultivated land is occupied by rubber trees. There are large rubber estates where rubber trees are planted in rows at fixed intervals.

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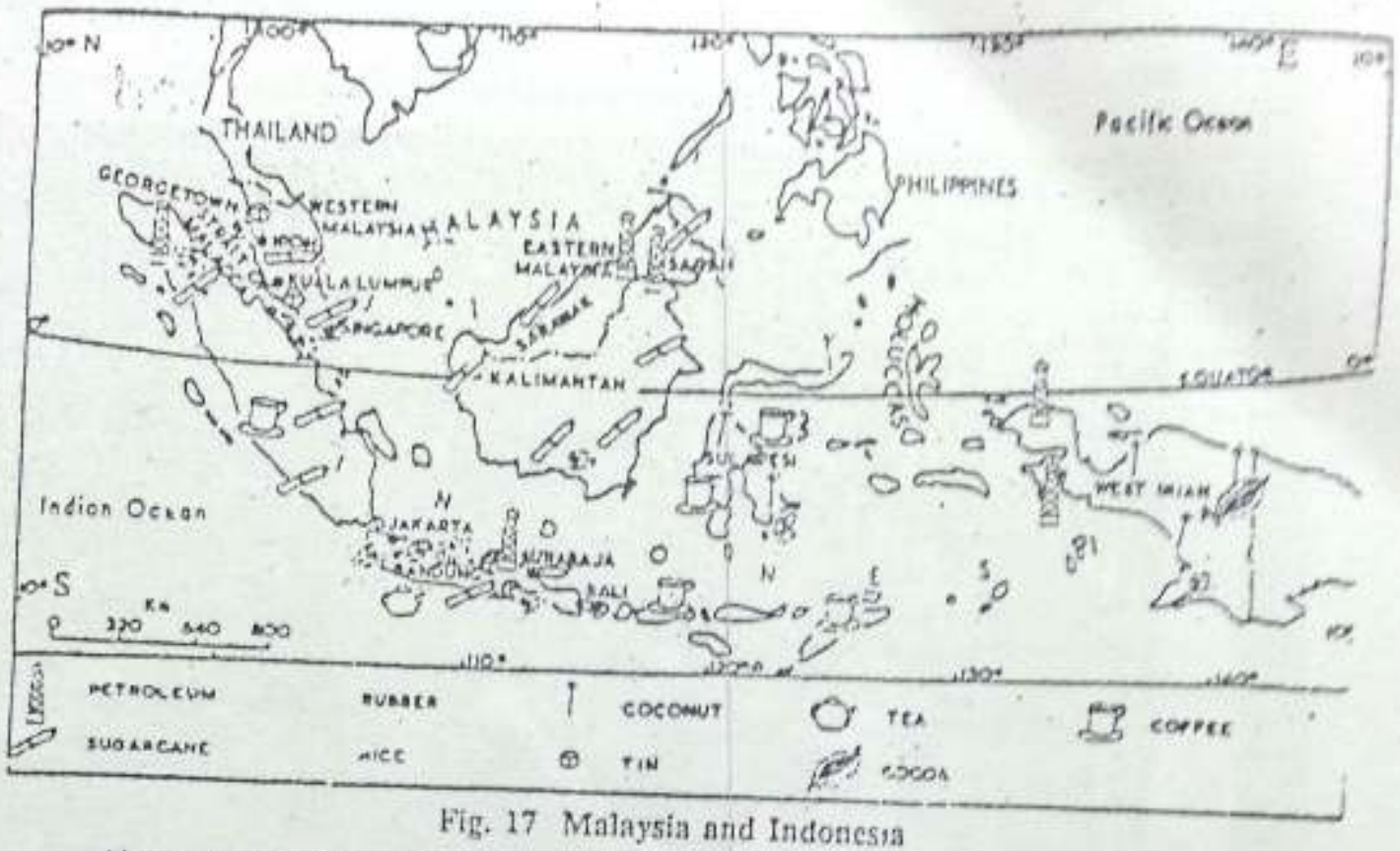

Fig. 17 Malaysia and Indonesia

Note the locations of Malaysia and Indonesia. Why is Indonesia called the 'Island Country ?'

These estates are managed by big firms. They spend large amounts of money to improve the quality of crops. The scientific and commercial type of farming specialising in a single crop is known as *plantation agriculture*. Malaysia today accounts for nearly one-third of the world's total production of rubber.

Among the mineral resources of Malaysia, tin is very important. In fact, Malaysia is the world's leading producer and exporter of tin. Other important exports of Malaysia include coconut oil and pineapples. The country has to import rice, machineries and textiles.

Population

The total population of Malaysia is about 17, million. The average density of population is thus 49 persons per square kilometre.

The majority of the population consists of the Malays, who are the original inhabitants. They speak Malay and follow Islam. The remaining population consists of Chinese and Indians, who came here to work in the tin mines or on the rubber estates or for trading.

Kuala Lumpur is the capital city of Malaysia. Much of the trade of Malaysia is done through Singapore which is a small independent island

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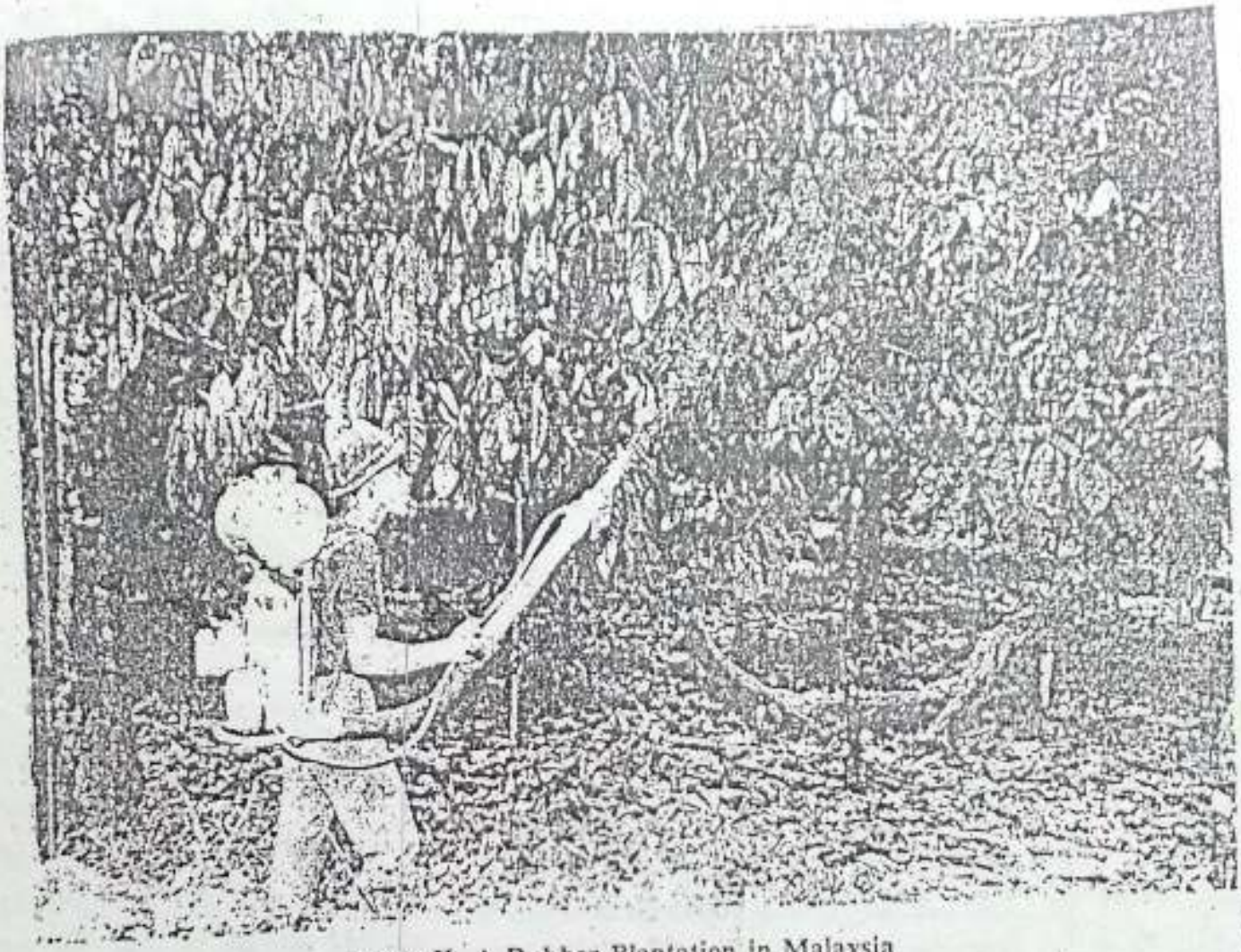

Photo X A Rubber Plantation in Malaysia

Look at the man engaged in spraying insecticides on the rubber trees. Note the automatic pump he has been using for spraying.

state. It is the most cosmopolitan city of South-east Asia where people of different nationalities live side by side.

INDONESIA

Indonesia consists of nearly 3,000 big and small islands. They are spread along the Equator over a distance of about 5,000 kilometres from west to east.

Land and Climate

Look at the map of Indonesia and note the bigger islands of Andalas (Sumatra), Java, Madura, Bali, Kalimantan (Borneo), Sulawesi, Maluku and West Irian.

Indonesia is a mountainous land. Mountain ranges form the backbone of the chain of islands. There are a num-

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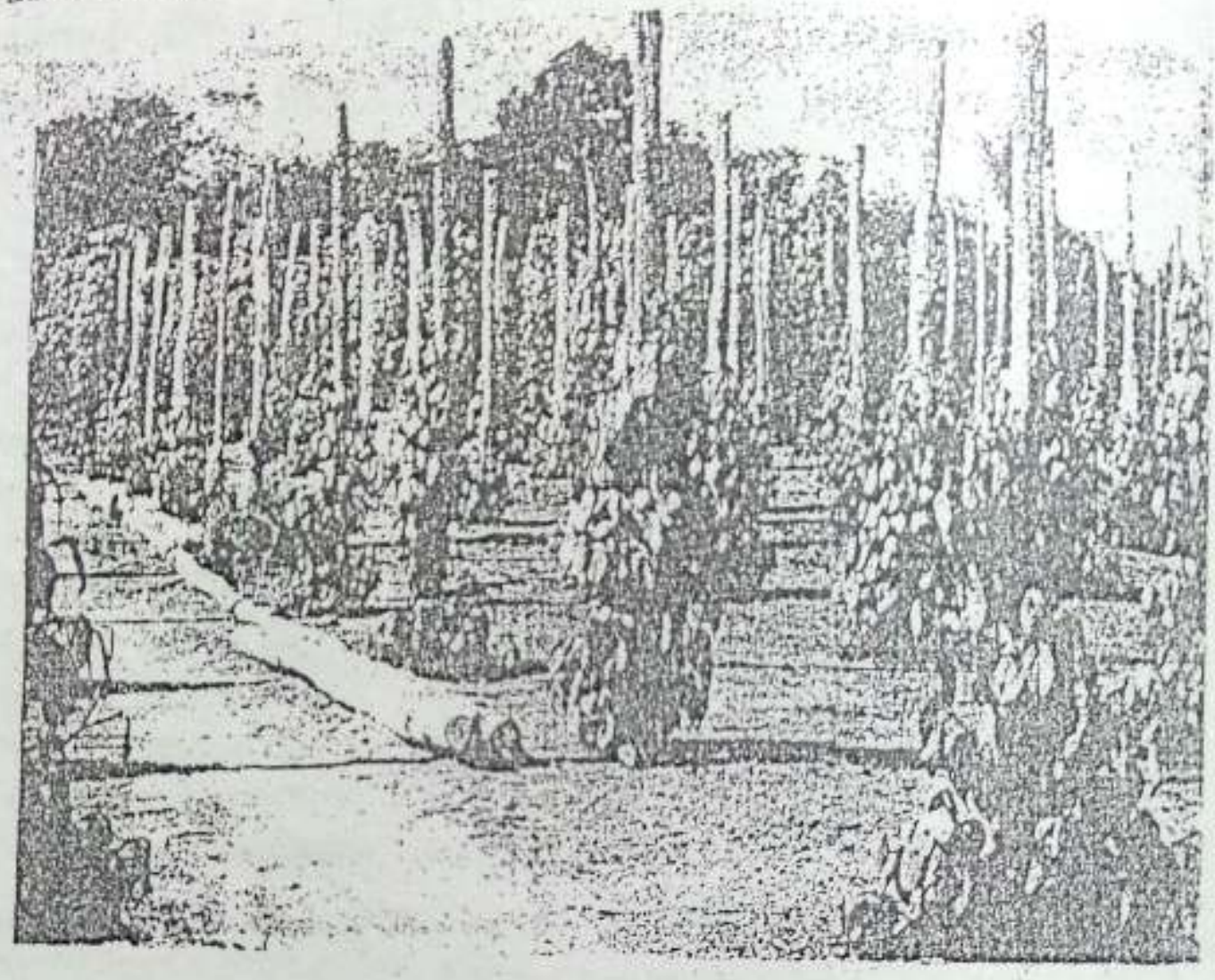

Photo XI A Pepper Plantation

Look at the creepers of pepper and the support they need to climb up. Do you see that they are planted in rows ?

ber of volcanic mountains. A volcano of Indonesia which became most well known was Krakatoa. After its great eruption in 1883, what remains today is a small island with a lake.

The climate of Indonesia is of the equatorial type. Most of the islands are heavily forested. Soils in some parts of Indonesia are very fertile as they have been formed by lava from volcanic activity.

Economic Development

Only about one-eighth of the total area of Indonesia is cultivated but as much as three-fourths of the population is engaged in agriculture. The cultivated land is mostly confined to the coastal lowlands and river valleys. The most intensively cultivated island of

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Indonesia is Java.

Rice is the staple food of the people. But its production is insufficient for the population. It has to be imported in such large quantities that it forms the main item of imports. Other crops which are grown include maize, cassava, groundnut, soyabean and coconut.

Like Malaysia, Indonesia is also known for its plantation agriculture. But there are several plantation crops. They are rubber, sugarcane, tobacco, cinchona and tea. Indonesia is the world's largest producer of cinchona, which is the source of quinine.

Indonesia is rich in mineral resources. It possesses large deposits of tin. There are good deposits of petroleum, gold, iron ore, bauxite and manganese also.

Indonesia has a wide variety of small-scale industries scattered in different parts of the country. It is now building up new industries such as sugar, paper, cement, iron and steel, chemicals and mineral oil.

Population

The total population of Indonesia is over 178 million. The average density of population is 88 persons per square kilometre. But the actual distribution is very uneven. In some parts the density is as much as 480 persons per square kilometre while there are large areas in which there is little population.

The majority of the people follow Islam. The Hindus, Buddhists and Christians form small groups. 'Bhasha Indonesia' is the national language. It is similar to the Malay language but has a number of Sanskrit and Arabic words.

The capital city is Djakarta. Other important cities are Surabaja and Bandung.

The New Terms You Have Learnt. *Plantation Agriculture* : Scientific and commercial farming usually specialising in a single crop.

EXERCISES

Review Questions

1. Answer the following questions briefly:
   (i) What is a rubber estate?
   (ii) Why is the soil in some parts of Indonesia very fertile?
   (iii) What is the most important mineral resource of Malaysia?
   (iv) What are the plantation crops of Indonesia?

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2. Make out the correct pairs from the following two columns:

(a) The most cosmopolitan city of South-east Asia	(i) Djakarta
(b) The most well known volcano of Indonesia	(ii) Kuala Lumpur
(c) The capital city of Malaysia	(iii) Singapore
(d) The world's largest producer of cinchona	(iv) Malaysia
(e) The capital of Indonesia	(v) Indonesia
(f) The country famous for rubber plantations	(vi) Krakatoa

3. Complete the following statement by choosing the most appropriate ending from those given below the statement.

Malaysia is a prosperous land because ....

(a) it is self-sufficient in food.
(b) it is the largest producer of tin.
(c) it is situated on a busy trade route.
(d) it has large plantations of rubber.

4. Why have rubber plantations been very successful in Malaysia? What are the three important features of plantation agriculture?

Picture Reading

5. Look at the Picture X and XI. What kind of agriculture do they suggest?

Map Work

6. In an outline map of Asia show the important Asian seaports.

Topic for Class Discussion

7. *'Bombay versus Singapore'*

Collect information on these two port cities in respect of their location, climate, local industries, people and items of import and export. Tell the class how these port cities differ from each other.

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8. The Home of One-fifth of Mankind: China

The Terms You Already Know. *Gorge* : A narrow and deep river valley with very steep sides. *Terraced farms* : Small strips of level fields out across the hill slopes, so that the fields look like giant staircases.

The People's Republic of China is one of the largest countries of the world. Its population is the largest in the world. It is so large that one can say that every fifth person in the world is a Chinese. Look at the map of China (Fig.18). The country is situated between 18°N. and 54°N. latitudes. Find out its longitudes. Which countries have a common border with China ?

Land and Climate

The western part of China is very mountainous. It has a number of very prominent mountain ranges such as the Kailas, the Kunlun, the Tien Shan and the Nan Shan. The plateau of Tibet is the world's largest and highest plateau. Taklamakan is a dreary desert of China lying north of Tibet. Several big rivers originate from the plateau of Tibet and flow in different directions. The rivers Indus, Sutlej and Brahmaputra (Tsangpo) find their way into India. The Salween and the Mekong flow into South-east Asia. The Sikiang, the Chang Jiang and the Hwang Ho remain within China and flowing eastwards drain into the Pacific Ocean.

The eastern part of China is a land of great plains and a few hills. The plains are very fertile for they are made of the alluvium brought by the rivers.

From south to north, the most important valleys are those of Sikiang, Chang Jiang and Hwang Ho. The Sikiang valley is the smallest of the three and is rather narrow. The Chang Jiang valley is the longest and is very useful for irrigation and navigation. The Hwang Ho, which is the northernmost river, carries a [illegible]

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The territorial waters of India extend into the sea to a distance of twelve nautical miles measured from the appropriate base line.

Fig. 18 China

China is a land of great rivers. Most of them originate on the plateau of Tibet. Name the three most important rivers of China.

amount of yellow silt. It is used for irrigation in the Great Northern Plain of China.

To the west of the Great Northern Plain of China, there is a huge plateau made of a very fine dust called *loess*. This dust, which is hundreds of metres thick, has been brought and deposited by the strong winter winds blowing from the deserts in the interior.

China has a monsoon type of climate. Temperature decreases as one

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goes from south to north. Rainfall, most of which is caused by the south-east monsoons, decreases from south to north and also from east to west. Thus, in the south and south-east, summers are hot and wet, winters are mild and the annual rainfall high. Further north, in the Chang Jiang basin, summers are warm and rainy, winters are cool and annual rainfall moderate. In northern China, summers are warm but winters are very cold and annual rainfall rather scanty.

Economic Development

Agriculture, mining and industry are the three major occupations of the people of China.

Although China is about three times the size of India, the area under cultivation there is less than that in India. Large areas in the western and northern portions of the country are unsuitable for agriculture because of rugged surface, scanty rainfall and poor soils. Most of the cultivable land is in the south and the east. The pressure of population on agricultural land is very heavy. Hence, every available piece of land is cultivated. Even the hill-sides have terraced fields

Chinese farmers have been practising agriculture for more than 4,000 years. They know from their long experience the best crops for different areas and the best methods of maintaining soil fertility. The per acre crop yield is often high. In fact, the Chinese farmer is very skilful and works like a gardener, taking care of each plant. He conserves rain or snow water to irrigate his field. He also uses manures to increase the yield from his land. Agriculture in China is intensive.

As the population which has to be fed is very large, attention is mainly given to the production of cereal crops. Hence, in southern and central China the main crop is rice along with tea and sugarcane. In northern China the main crops are wheat, soyabean and millets. Amongst the important cash crops of China are silk, cotton and tobacco.

Silk is produced by silkworms, which are reared on the leaves of mulberry trees. The silkworm makes a *cocoon* around itself. The cocoon is some 2.5 centimetres long and 2 centimetres broad. It is made of a silky thread which the silkworm ejects from its mouth. The cocoons are boiled in water to kill the silkworm before it turns into a moth and emerges from the cocoon. Then the fine thread is separated and wound on reels. The rearing of silkworm and production of raw silk is known as *sericulture*.

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Pigs, chickens and ducks are widely reared in China as domestic animals and birds. In the arid grasslands, horses, camels, sheep and goats are raised. Cattle are very few and dairying is not of much significance. Fishing is important both on the coast and in the flooded rice-fields.

China has a large variety of minerals such as copper, tin, iron, coal, tungsten and antimony. Petroleum is now found on a fairly large scale.

Rich deposits of coal and iron ore have enabled China to develop the iron and steel industry. It now produces heavy machinery, small machines and tools, and transport equipment. Similarly, a large production of cotton and raw silk accounts for the well developed textile industry. Other important industries of China include electrical goods, chemicals, paper, glass and processed foods.

Population and Transport

The population of China is estimated at about 1102 million. The average density of population is thus about 110 persons per square kilometre. But the actual distribution is very uneven. While in the fertile lands the average density may range from 400 to 800 persons per square kilometre, large tracts of Tibet, Mongolia and the mountainous regions are very sparsely populated.

Means of transport in China are rather inadequate for its huge size and population. Rivers are used as natural means of transport. New roads and railways are being built at a fast rate. Beijing is the capital city of China. Shanghai is the largest port and a big textile centre. Canton and Nanking are other important cities of the country.

TAIWAN

The island of Taiwan lies off the mainland of China. It has a separate government of its own and is often called Nationalist China. It has a population of about 18 million. Its main crop is rice. Taipeh is the capital city of Taiwan.

The New Terms You Have Learnt. *Loess* : Very fine material brought by the winds and deposited in layers to a great thickness. *Sericulture* : Rearing of silkworms and production of raw silk.

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EXERCISES

Review Questions

1. Answer the following questions briefly:
   (i) Which three rivers originate on the plateau of Tibet but flow through other countries?
   (ii) Name three important mountain ranges of China.
   (iii) What is sericulture?

2. Make out correct pairs from the following columns:

(a) The longest river of China	(i) Hwang Ho
(b) A low desert basin	(ii) Loess
(c) The capital of Taiwan	(iii) Taklamakan
(d) The capital of the People's Republic of China	(iv) Chang. Jiang.
(e) A fertile plateau of very fine dust	(v) Taipeh
(f) The Yellow River of China	(vi) Beijing

3. What are the important crops of China? Write an essay on the important features of farming in China.

4. Why is population in China very unevenly distributed?

Map Work

5. In an outline map of China show the important rivers.

Topic for Class Discussion

6. *'The Wall of China'*

Collect information on this topic. Tell the class why this wall was built and how far it is useful today.

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9. The Land of the Rising Sun: Japan

The Terms You Already Know. *Earthquake* – Shaking of the Earth's surface produced by volcanic or similar forces within the crust.

The Japanese call their country *Nippon* which means 'Land of the Rising Sun'. Japan may also be called a country of islands, for it has no less than 3,900 islands. There are, however, only four islands which are large and important. They are Honshu, Hokkaido, Kyushu and Shikoku in order of their size. The word *archipelago* means 'a chain of islands', so Japan is an *archipelago* which forms an arc extending for nearly 3,000 kilometres off the east coast of Asia. Find out the northern and southern latitudes of the Japanese *archipelago*.

Japan is a small mountainous country. It has a large population but very limited natural resources. However, the Japanese are a hard-working people and by their effort have made their country one of the richest in the world.

Land and Climate

Mountains form the backbone of the entire archipelago. There are only a few lowland areas. The Kwanto plain on the eastern coast of Honshu is the important plain of Japan. Look at the map (Fig.19) and locate the cities of Tokyo and Yokohama on this plain.

Japan is said to be the land of volcanos and earthquakes. Many of its mountains are volcanic. The most prominent amongst them is Mount Fuji, known to the Japanese as Fujisan. It is a symbol of Japan's natural beauty. Since 1707, Mount Fuji has been inactive, which means that it is a *dormant volcano*.

Earthquakes are very common in Japan. On an average, two or three earthquake shocks are felt everyday.

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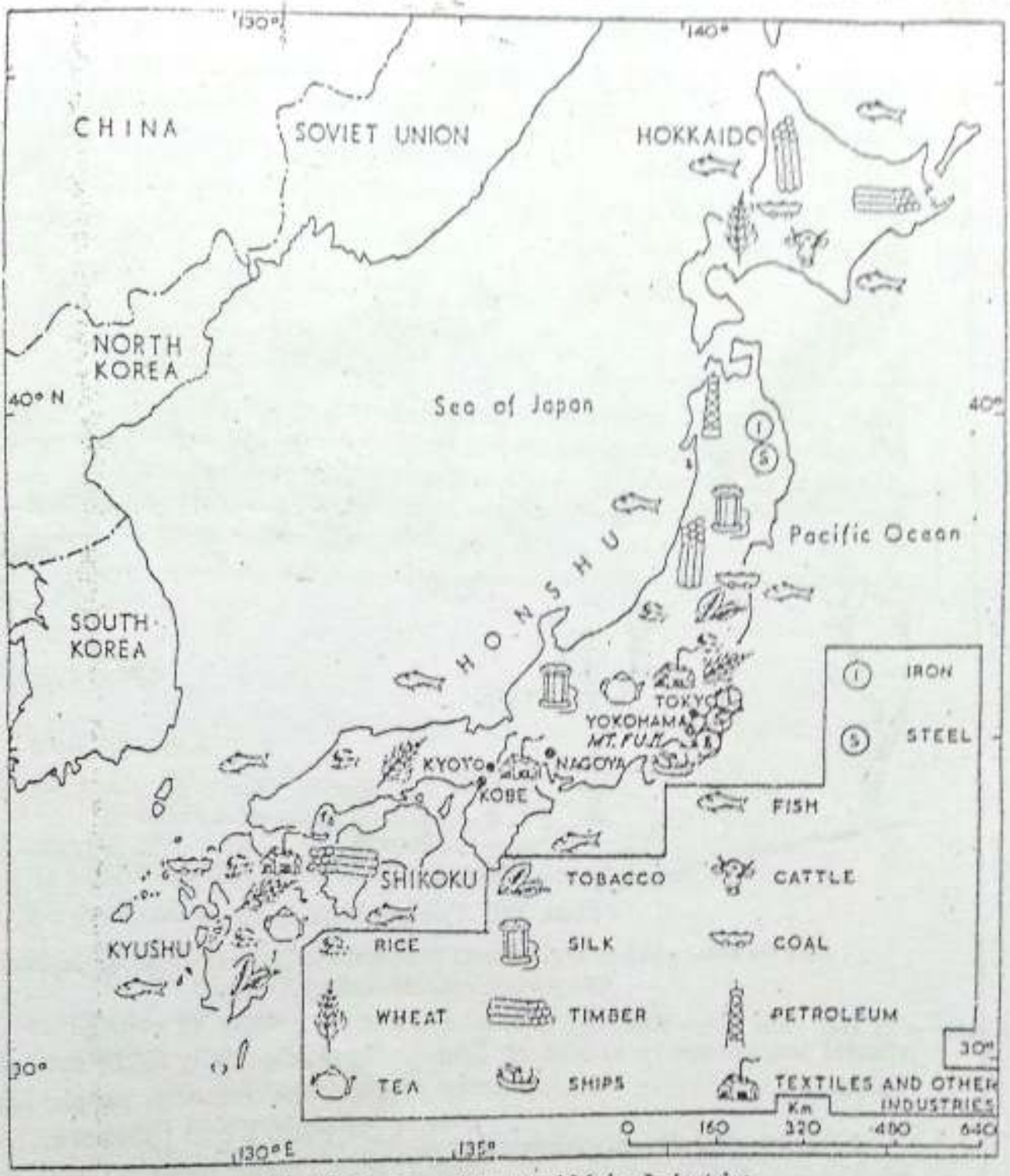

Fig. 19. Japan — Crops and Major Industries

Japan's prosperity is largely due to its various industries. What are they ?

Some earthquakes cause terrible loss of life and property. For example, an earthquake in 1823 followed by widespread fire caused such havoc in the Tokyo-Yokohama area that several thousand persons lost their lives and

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millions became homeless.

The coastline of Japan is highly indented. It, therefore, possesses a large number of natural harbours which are used for shipping and fishing.

The climate of Japan is moderate but the north is colder than the south. In winter, cold winds coming from Siberia cause heavy snow and rain in the northern and western parts of the country. Hence, the winters of the north are very cold. The cold ocean currents make the climate still colder.

In summer, the south-east monsoons bring rain to the southern and eastern parts of Japan. The climate there is warm and humid. The warm Kuro Shio current also helps in warming up the climate of the region. The southern parts of Japan are frequently visited by violent tropical rain-storms known as *typhoons*. They often cause great loss of life and property.

The mingling of cold and warm ocean currents on the eastern coast causes thick fog and a condition in which fish thrives. This area is therefore one of the major fishing grounds, or *fisheries*, of the world.

Economic Development

Manufacturing, agriculture, forestry and fishing are the four major economic activities of Japan.

Industries. Japan is very poor in mineral resources. It possesses some copper deposits and a little coal and oil. But it is rich in water-power. Even this water-power is not enough to meet the large requirements of its industries. The country, therefore, depends largely on thermal electricity.

In spite of the paucity of minerals and raw materials, Japan is a highly industrialised country. The Japanese have lived and prospered by manufacturing and exporting finished goods. The principal industries are iron and steel, ship-building, textiles, chemicals, electronics and paper. Other Japanese products which have a world-wide market are television and radio sets, transistors, cameras, optical instruments, potteries, toys and synthetic fibres for textiles.

Japan depends on its international trade for its prosperity. While it exports processed material and finished goods, it has to import food-stuff, minerals and metals and raw materials such as crude oil, iron ore and cotton.

Agriculture. Only 14 per cent of the total area of Japan is under cultivation because the land is generally hilly. Nearly 18 per cent of the population is

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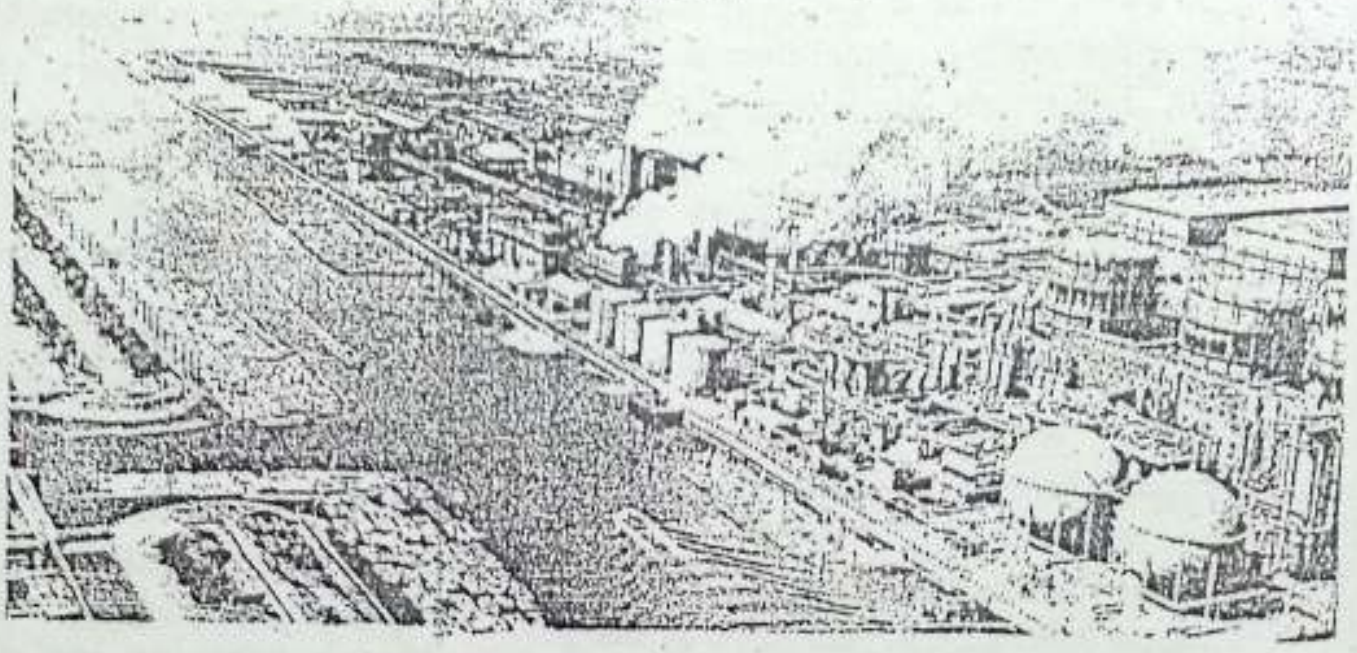

Photo XII An Industrial District of Tokyo

Look at the port and the industrial district of Tokyo. Locate the harbour and the oil refinery in the picture.

engaged in agriculture. The pressure of population on the cultivated land is very high. Hence, every bit of land suitable for cultivation is put under crops. Terraced farms on the hillsides are common.

Japanese farmers have very small farms but these are intensively cultivated. The crop yields per acre are very high because of irrigation, fertiliser, good seeds and hard work. Most of the agricultural work is done by hand, using simple tools specially designed for the small fields.

The Japanese grow several crops but the main crop is rice. It is grown on about half of the cultivated land. Wheat, barley, oats, potatoes, soya-beans and vegetables are some other important food crops. Silk from mul-berry trees and tea are two important cash crops. Japan leads the world in the production of raw silk. The Japa-nese are very fond of tea and have a

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Photo XIII Terraced Fields in Japan

Note the snow which covers the farms. How would the snow be useful for the farmer? Can you guess the climate of this region?

special tea ceremony known as Cha-no-yu.

Forestry. Nearly two-thirds of the total area of Japan is forested. The forests provide timber, fuel and paper-pulp. And yet, Japan has to import these products to meet its own needs.

Fisheries. The waters surrounding Japan, especially in the east, abound in fish. The Japanese people are among the world's best fishermen. The Japanese fishing industry leads the world in the size of the fishing fleet, the size of the annual catch and the number of people employed. Fish is second only to rice as an item of food and is the main source of protein in the Japanese diet.

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People

Japan is one of the most densely populated countries of the world. Its total population is about 120 million. The average density of population is about 324 persons per square kilometre.

Most of the Japanese are Buddhists. They are known for their great aesthetic sense.

Tokyo is the capital city of Japan. It is also a big industrial and commercial centre. Osaka is the largest textile centre. Kobe, Nagasaki and Yokohama are the other important industrial centres.

The New Terms You Have Learnt. *Archipelago* : A chain of islands. *Dormant Volcano* : A volcano which has been inactive for a long period of time. *Typhoon* : Violent tropical rainstorms originating in the East China Sea. *Fisheries* : The business of catching fish on a large scale. Also refers to places where fishes are caught.

EXERCISES

Review Questions

1. Answer the following questions briefly :
   (i) Which is the largest island of Japan?
   (ii) Why is fishing very important in Japan?
   (iii) Name the four important economic activities of Japan.
2. Distinguish between :
   (a) A warm current and a cold current.
   (b) An active volcano and a dormant volcano.
3. Complete the following statement with the most appropriate ending from those given below the statement.

   Today the prosperity of Japan depends upon.....
   (a) its very high agricultural yields.
   (b) its highly developed fishing industry.
   (c) its large industries and trade.
   (d) its varied natural resources.
4. Describe how the climate of Japan is influenced by winds and ocean currents.
5. How has Japan become an important industrial nation of the world?

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Picture Reading

6. Study the picture of the terraced farms in Japan and find out how it helps in conserving soil and water.

Map Work

7. In an outline map of Japan, locate the important industries.

Topic for Class Discussion

8. *'Comparison of Japanese farming and Indian farming'*

Collect information on the farming practices in the two countries and tell the class how they differ from each other.

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UNIT THREE

India — Our Motherland

India is a well-knit geographical unit having an individuality of its own. Various geographical divisions of India are so interdependent that no part of the country would be able to grow to its maximum without assistance from the other.

The annual cycle of seasons in India is dominated by the monsoons. All over India there is a common seasonal rhythm to which every kind of life responds. The mighty Himalaya lends this country a distinct tropical touch and a monsoonal unity almost from one end of the country to the other.

Soil is the most important resource of our people. Directly or indirectly we derive all our food and many of our necessities from nothing but soil. We need to make the best possible use of every patch of land keeping in view its merits and demerits. The same is true of our other equally precious natural resources—water, vegetation, wild life and mineral resources. It is our solemn duty to avoid wastage and destruction of these resources.

Key to our all-sided and rapid development lies in modernising our agriculture which forms the base of our economy. Development of mineral resources is a must for the rapid growth of our industries. Similarly, the means of transport and communication serve as lifeline of our nation. They bring our people close to one another not only economically but culturally as well.

Finally, it is the people who are the greatest resource of any country. It is not the quantity but the quality of our people that would make our country wealthy and prosperous, enabling us to raise the standard and quality of our living.

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10. The Face of Our Motherland

whole chapter

The Terms You Already Know. *Tropic of Cancer* : An imaginary circle running along the earth's surface at an angular distance of 23°30' from the equator to its north. Running parallel to the equator it makes the northern limit of the Tropical Zone. *Standard Meridian of India* : The Meridian of 82° 30' E whose local time serves as the standard time for the whole country.

India, that is Bharat, is a land of lofty mountains and mighty rivers. Extensive are its plains and no less wide are its plateaus. A vast land with such varied relief is inhabited by about 844 million people. They have several things in common inspite of their outward differences.

A geographical study of this ancient and populous country will help us appreciate the differences in the ways of living from region to region. It will also explain physical and other basic factors that bind the diverse people into a great nation—OUR INDIA.

Location and Size

India is situated at the head of an ocean named after itself. Ours is the only country after which an ocean is named. This tells us how important our country was even in olden times in international trade and commerce. Look at the map and note how centrally it is situated in relation to Asia, Europe, Africa and Australia.

Do you see the Tropic of Cancer running almost half-way through the country? India, thus, lies entirely in the tropical and sub-tropical zones of the Northern Hemisphere. Its mainland extends between latitudes 8°4' and 37°6' North and longitudes 68°7' and 97°25' East. –

Kanyakumari, the southernmost tip of the mainland of India, is only 8° north of the equator. Closer still to the equator is the Great Nicobar Island of India. At these places the sun is almost overhead all the year round; and the maximum difference between the

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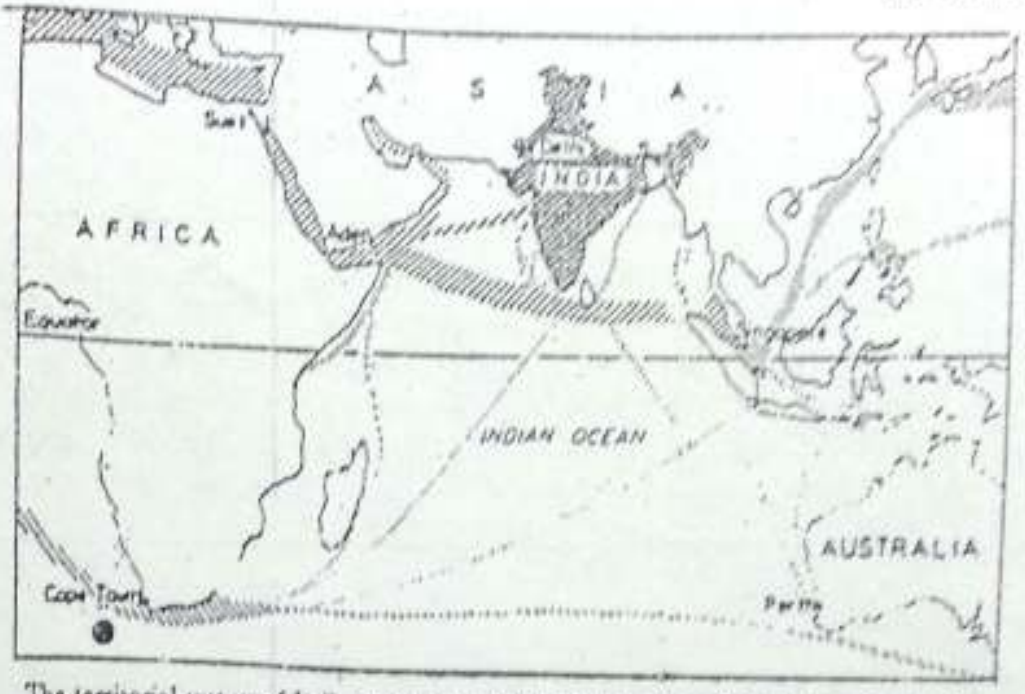

The territorial waters of India extend into the sea to a distance of twelve nautical miles measured from the appropriate base line.

Fig. 20 Location of India

Note the location of India in relation to international sea routes and air routes.

length of the day and night is hardly 45 minutes. But at the northernmost point of India the rays of the sun are always oblique. There the maximum difference between the length of the day and night becomes as large as five hours. These two extreme points of India are 30° apart—a distance of over 3,200 kilometres. It is as much as one-twelfth the earth's total circumference. What does it convey? It means that the sun takes full two hours to rise at Dwarka after it has done so in the easternmost part of Arunachal Pradesh. In order to avoid any confusion of time from place to place in a vast country like ours, 82°30' E. longitude is taken as the Standard Meridian of India. The local time along this meridian serves as the Indian Standard Time (IST) for each and every place in the whole of India.

India occupies the south-central peninsula of the Asian continent. This peninsula tapering towards the south, divides the northern part of the Indian Ocean into two—the Arabian Sea and the Bay of Bengal. This gives India a long coastline of about 6,100 kilometres. With Sri Lanka situated very close to its southern tip and the highest crest of the Himalaya determining much of its northern borders, India has indeed a very pleasing shape. The country's land frontier alone is as long

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as 15,200 kilometres. Add the length of the coastline to this figure and it would amount to going half-way round the world.

Besides the Indian mainland, a few groups of islands are a part and parcel of the Indian Union. Off the coast of Kerala in the Arabian sea, are the islands of Lakshadweep. Most of these are small coral islands. In the Bay of Bengal is the group of Andaman and Nicobar islands. They are fairly large both in size and number.

Study the map of India and name the countries that have a common frontier with our country. They are Pakistan, Afghanistan, China (Tibet) Nepal, Bangladesh and Myanmar Then there is the Himalayan kingdom of Bhutan whose defence is also the responsibility of India.

A narrow stretch of water, namely, the Palk Strait, separates Sri Lanka from the Indian mainland towards the south. Look at the Andaman and Nicobar Islands. Indonesia, Malaysia and Thailand situated not far from these islands, are our close neighbours.

India is the seventh largest country of the world in area. With a total area of over 3.2 million square kilometres, it accounts for nearly two per cent of the world's total land. But this small percentage is big enough to include about two dozen nations of Western Europe. Can you now imagine how large our country is?

Political Divisions

The Republic of India is called the Union of States as it is divided into 26 States and 6 Union Territories for administrative purposes. Madhya Pradesh in the heart of our country is the largest state and Goa is the smallest in area. Among Union Territories, Andaman and Nicobar Islands is the largest and Lakshadweep is the smallest.

Four States are almost entirely located in the Himalaya. Six States and two Union Territories have very large portions covering the Great Plains of India. Nine States and two Union Territories are coastal units. Madhya Pradesh covers a large part of Great Indian Plateau and Rajasthan has a great part of that desert in it. Five states form parts of north-eastern hills.

The Union Territories off the mainland comprise ten small inhabited islands of Lakshadweep in the Arabian Sea and a little over 300 islands of Andaman and Nicobar group in the Bay of Bengal.

Each administrative unit is divided into districts. Uttar Pradesh has the

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greatest number of 56 districts and Goa has only 2 districts at the other end. Andaman and Nicobar Islands have two districts, while many of our Union Territories have not been divided into districts.

A large number of factors like population, local cultures, languages spoken and administrative convenience are at present the important considerations for political divisions of our country. But there are a number of ties which bind all our States into a well-knit country.

While our coastal States and islands stand along the seas, the non-coastal States touch the international land frontiers with our neighbouring countries. There are as many as 16 States which share the border with other countries. There are others which touch neither the international land frontiers nor the seas.

Note the location of various States, the centrally controlled Territories and their capitals in the map of India.

Relief and Physical Divisions

Look at the map of southern Asia. You will see a great chain of mountains separating Pakistan, India, Bangladesh and Nepal from the rest of the continent. Such a big geographical unit, which stands out distinctly from the rest of the continent, is often called a sub-continent. It is difficult to study the relief features and drainage of our country without reference to the Indian sub-continent as a whole.

Our country consists of three main physical divisions. They are the Great Mountains of the North, the Great Plains of Northern India and the Great Plateau of Peninsular India. The southern plateau is flanked by narrow coastal strips which are a part and parcel of the peninsular land mass.

The Great Mountains of the North: Look at the map of India. You will see a chain of mountains consisting mainly of the Karakoram and the Himalayan mountains lies all along the northern frontiers of our country. This chain of mountains lies between the plateau of Pamir on one end and the frontier of Myanmar on the other, covering a distance of nearly 3,000 kilometres. The width of the mountainous belt varies between 150 and 400 kilometres.

These arc-shaped mountains have high peaks, steep slopes and deep valleys. The snow-covered peaks, big and small glaciers, deep gorges, and thick forests make these mountains one of the most attractive regions of the

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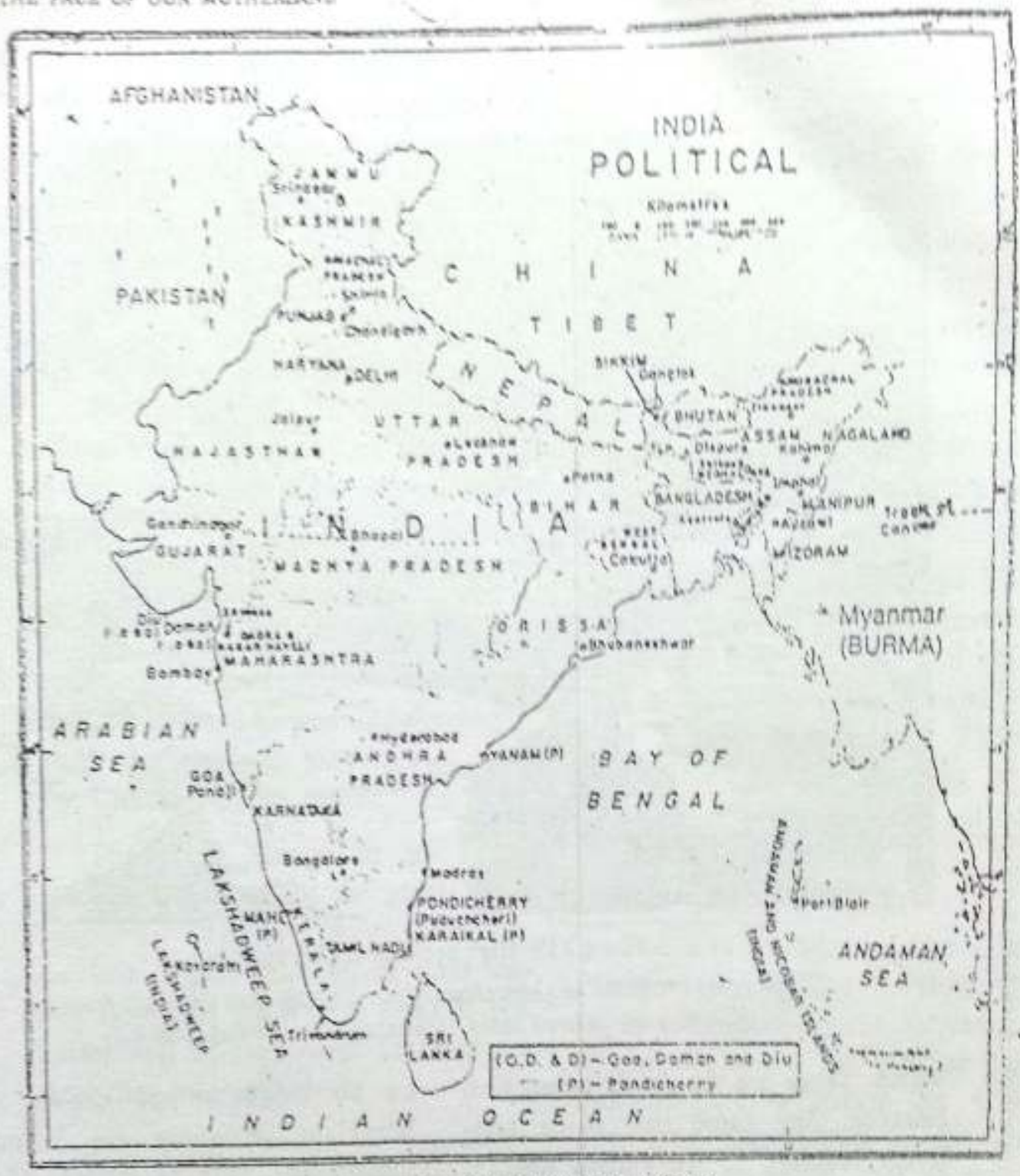

Based upon Survey of India map with the permission of the Surveyor General of India.

The territorial waters of India extend into the sea to a distance of twelve nautical miles measured from the appropriate base line.

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The boundary of Meghalaya shown on this map is as interpreted from the North-Eastern Areas (Reorganisation) Act, 1971 but has yet to be verified.

The administrative headquarters of Chandigarh, Haryana and Punjab are at Chandigarh.

Fig. 21 India — Political divisions

Note the States and the Union Territories sharing border with our neighbouring countries.

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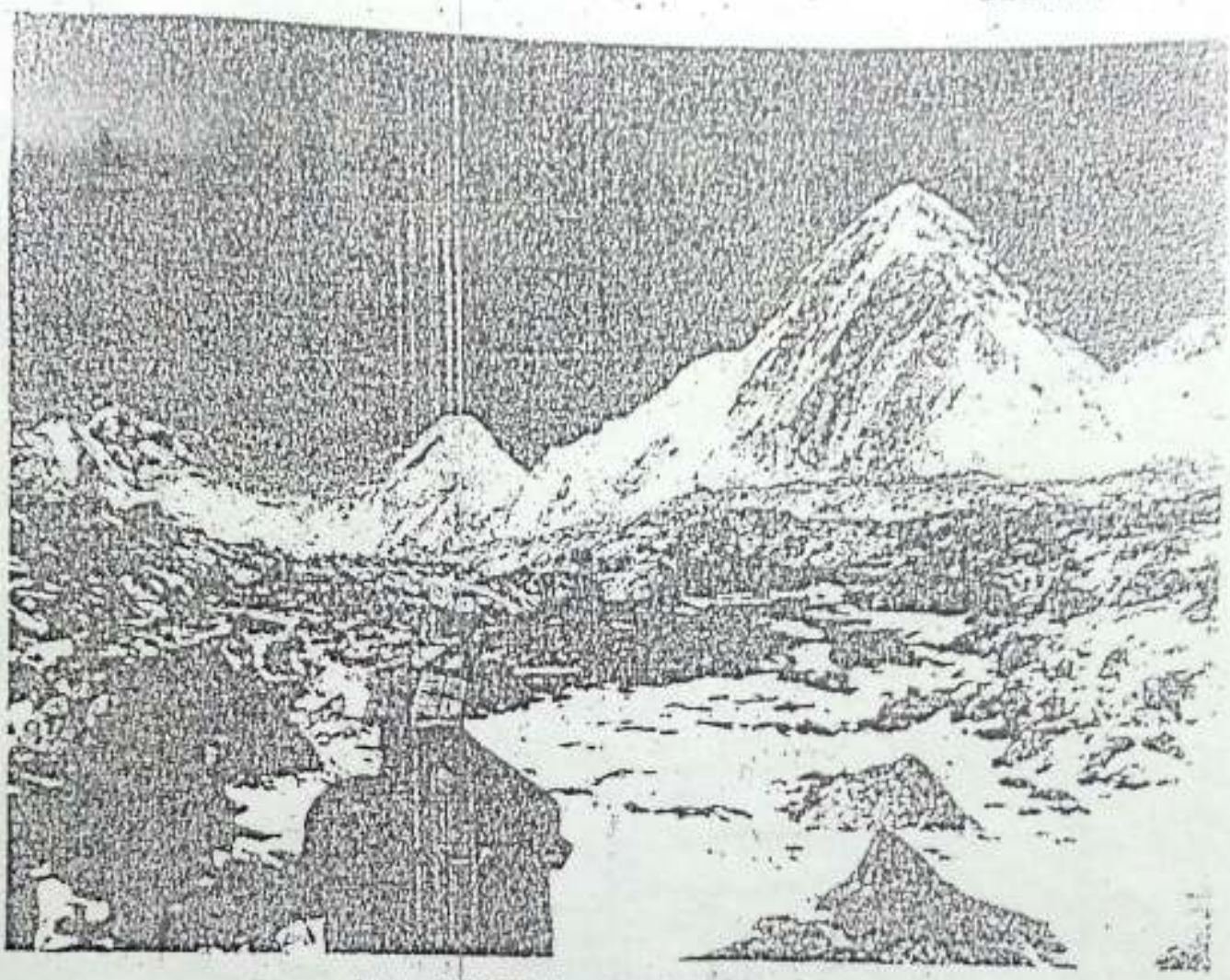

Photo XIV High peaks of the Himalayas

These peaks are in the neighbourhood of Mt. Everest. Note the sharp features of these snow-covered peaks. In what country are they situated ?

world. These are the young mountains, because they came into being relatively recently in the earth's history. Their parallel ranges and world's highest peaks make it further clear that they are young fold mountains.

The mountains extending between the Pamir Plateau and the Indus river in Kashmir are known as the Karakoram Mountains. Those between the Indus on one hand and the Brahmaputra on the other are known as the Himalaya, meaning the 'abode of snow'. The eastern section of these mountains in Arunachal Pradesh and Sikkim in our country is known as the eastern Himalaya. Their extension along the eastern border of our country in Nagaland and Manipur is known as the Purvachal hills.

The Karakoram Mountains in the northern part of Kashmir are the north-

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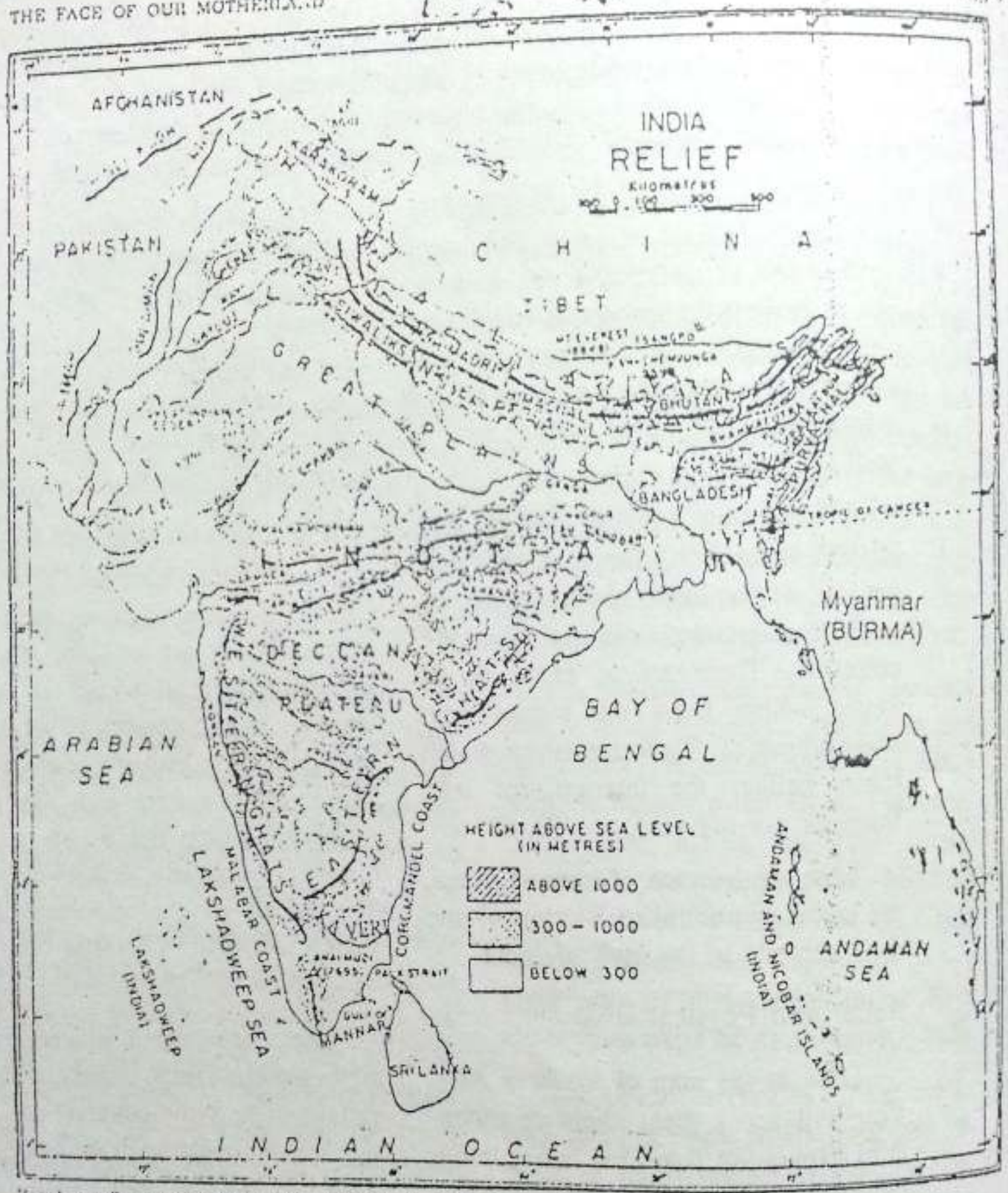

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The territorial waters of India extend into the sea to a distance of twelve nautical miles measured from the appropriate base line.

Fig. 22 Indian sub-continent— Relief

Note the three major physical divisions of India. What are the main mountain and hill ranges? Find out the main rivers flowing out into the Bay of Bengal and the Arabian Sea.

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western extension of the Himalaya. K2, the world's second highest mountain peak, belongs to this mountain range. Also famous is its Baltoro glacier. The other important ranges of the Kashmir Himalaya are the Ladakh, the Zaskar and the Pirpanjal. The valley of Kashmir, drained by the Jhelum river, is the most beautiful and famous in this part of the Himalayas.

The northernmost range of the Himalaya proper is known as the Himadri. On an average, it is about 6,000 metres high. This loftiest Himalayan range contains the world's highest peaks, many of which are more than 8,000 metres above sea level. Mount Everest in Nepal is the world's highest peak with an elevation of 8,848 metres above sea level. Some of the other important peaks are Nanga Parbat, Nanda Devi, Dhaulagiri, Annapurna, Makalu, Manaslu and Kanchenjunga. Kanchenjunga in Sikkim is the highest peak of the Himalaya in India.

The range lying south of the Himadri is known as the Himachal. The average height of this range is a little less than 5,000 metres above sea level. On the ridges and spurs of this range are situated many of the important hill stations of India. Some of the more famous are Shimla, Mussoorie, Naini Tal and Darjeeling.

The southernmost range of the Himalaya is known as the Siwalik. It is not a continuous range. In fact, towards the east it merges with the main mountains. Unlike other ranges this mountain range is made up of mud and soft rocks. Its average height is less than 1,250 metres above sea level. There are broad longitudinal valleys in it known as 'Duns'. Dehradun is situated in one such valley.

In the north-east, the Purvachal mountains consist of Patkai, Bum and the Naga Hills in the north, Garo, Khasi and Jaintia in the centre and the Lushai Hills in the south.

The Great Plains : To the south of the Great Mountains of the north lie the Great Plains of Northern India. This region is made up of alluvium and is extremely level. It extends roughly about 2,500 kilometres from east to west.

The Great Plains consist of two river basins, namely, those of the Indus and the Ganga-Brahmaputra. The Indus, the Ganga and the Brahmaputra are the three most important rivers of the Indian sub-continent. Two of them—the Indus and the Brahmaputra—rise beyond the Himalaya. All the three flow through India, enter either into Pakistan or Bangladesh and then join the sea.

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The Indus basin is drained by the river Indus and its tributaries—the Jhelum, Chenab, Beas, Ravi, and Sutlej. Of these, the Sutlej also rises beyond the Himalaya. The waters of these rivers flow into the Arabian Sea. Now only the Sutlej, Beas and Ravi pass through Indian part of this basin.

The major portion of the Great Indian Plains consists of the Ganga Basin. Its greater part is drained by Ganga and its many tributaries such as the Yamuna, Ghaghara, Gandak, Kosi, and Yamuna. All of them rise in the Himalaya. Another set of the tributaries of the Ganga consists of the Chambal, Sind, Betwa, Son and Damodar. They rise either in the Vindhya or in the Chhota Nagpur region.

The river Ganga in its lower reaches is joined by the great Brahmaputra. Together they form the world's largest delta before their waters flow into the Bay of Bengal. The major part of the Ganga-Brahmaputra delta lies in Bangladesh.

The Great Plateau of Peninsular India : To the south of the Northern Plains lies the Great Plateau of the peninsula. This plateau, made up mostly of hard and igneous rocks, is the oldest part of the Indian subcontinent. It consists of two distinct parts—the Malwa Plateau in the north and the Deccan Plateau in the south.

The northern part of this Great Plateau is bounded by the Aravalli range in the west and the Vindhya to its south. It extends from Malwa Plateau in the west to Chhota Nagpur in the east. They all slope towards the north merging gradually into the plains of northern India. Note that all the rivers of this region form part of the Ganga Basin.

To the north-west of the Malwa Plateau lies the Desert of Rajasthan. It lies west of the Aravalli hill ranges. The desert is made up of rocks and sand. It extends also into Pakistan. Few small rivers in this part of the Thar Desert either drain into salt lakes or disappear into sands. Thus, it is a region of inland drainage.

The western edge of the Deccan Plateau is called the Western Ghat. These are formed by the Sahyadri, the Nilgiri, the Annamalai and the Cardamom Hills. Overlooking the Arabian Sea, they run parallel to the coast. Their average height goes on increasing from north to south. With an elevation of 2,695 metres above sea level, Anai Mudi in Kerala is the highest peak of peninsular India. The Deccan Plateau gently slopes towards

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the east and its height varies from 300 metres to 900 metres above sea level. The Eastern edge of the plateau is marked by the hills which are low and discontinuous. They are collectively known as the Eastern Ghat. Both the Western and the Eastern Ghats converge at the Nilgiris. The peninsular hills are low and old and do not have lofty peaks and the glaciers like those in the Himalayas. They are remnants of high mountains of the past.

The north-western part of the Deccan Plateau, covering almost the whole of Maharashtra and parts of Gujarat and Madhya Pradesh, is made up of volcanic rocks called the Deccan Trap. They are made of lava flows.

The river Narmada, flowing from east to west, separates the plateau of Malwa from the Deccan. It flows through a narrow valley between the Vindhya to its north and the Satpura ranges to its south. To the south of Satpuras lies yet another west-flowing river, the Tapi. Like the Narmada it also joins the Arabian Sea. All other major rivers of the Deccan Plateau—the Mahanadi, Godavari, Krishna and Kaveri—flow into the Bay of Bengal. The Godavari is the longest of them all.

The Deccan Plateau is flanked by a narrow coastal plain on the west. It is broadest in the north where it includes the plain of Gujarat. The coastal strip south of Gujarat is divided into two — Konkan in the north and the Malabar in the south. The coastline is slightly indented having estuaries in the north and lagoons or back-waters in the south, especially in Kerala. In Bombay and Marmagao it possesses the two best natural harbours of India.

The eastern coastal strip is wider than the west and possesses the fertile deltas of the Kaveri, Krishna, Godavari and Mahanadi. The southern part of east coast is known as the Coromandel coast. The coastal strip in the north merges with the delta of the Ganga-Brahmaputra.

Geographical Unity of India

All the major physical divisions of India are closely related to one another. These parts are also interdependent. The story of how India acquired its present form and shape is very very old and highly interesting. Scientists believe that the sediments forming the Himalayas were once lying at the bottom of a shallow sea. They gradually rose above the sea level when the land masses of peninsular India on one hand, and the Asian mainland on the other began to come closer and closer. In course of time the

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Himalayan Mountains acquired great height, and the rivers flowing from them helped to form the Great Indian Plains.

The Great Mountains of the north in the past have protected India from invasions from the rest of the continent. This helped India to grow and prosper in peace. This is why India has been able to develop a distinct culture and nationhood of its own. But they no longer act as such a defence barrier in modern air age. Once the invading army manages to cross the passes in the mountains, it may become more difficult to check its advance. This mountainous region abounds in forest wealth and water-power. The Great Plains of Northern India are one of the most important and fertile agricultural land of the world. It sustains nearly two-fifth of the total population of India and provides agricultural raw materials for various industries of the country. The Great Plateau of India is the most important storehouse of minerals on which our modern industries depend. The coastal strips, particularly on the east, contain important rice bowls of India. Our major port towns, besides being big centres of internal trade, have now become the gateways of our international trade and commerce. In fact, no one part of our country would be able to grow to its maximum without adequate assistance from the other.

The New Terms You Have Learnt. *Sub-continent* : A big geographical unit which stands out distinctly from the rest of the continent. *Indian Standard Time (IST)* : The local time along the Standard Meridian (82° 30' E) which serves as the standard time for the whole of India. It is five and a half hours ahead of Greenwich Time.

EXERCISES

Review Questions

1. Answer the following questions in brief :
   (i) What are the three major physical divisions of India?

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(ii) Name the three largest rivers of the Indian sub-continent.
(iii) Name the highest Himalayan Peak in India?

2. Distinguish between :
   (i) the eastern coast and the western coast of India.
   (ii) the mountains of northern India and the hill ranges of peninsular India.

3. Describe in about 15 lines either the Himalayan Mountains or the Deccan Plateau.

4. Make out the correct pairs from the two columns:

(i) the highest peak of the Indian sub-continent	K_2
(ii) the highest peak of the Karakoram	Mt. Everest
(iii) the highest peak of the Himalaya in India	Anai Mudi
(iv) the highest peak of Peninsular India	Kanchenjunga

Map Work

5. Draw a map of India and show therein the following :
   (i) The highest range of the Himalaya.
   (ii) The two great rivers that rise beyond the Himalaya.
   (iii) Five deltas along the Bay of Bengal.
   (iv) Two west-flowing big rivers of the Deccan Plateau.

Topic for Class Discussion

6. *'Frontiers of India'*

Divide the class into six groups, each one dealing with our frontier with one of the countries (i) Pakistan, (ii) China, (iii) Nepal, (iv) Bangladesh and (v) Myanmar. Let there be one more group to deal with the strategic importance of our islands in the Bay of Bengal and in the Arabian Sea.

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11. India—The Land of the Monsoon

The Terms You Already Know. *Monsoon* : A complete reversal of wind direction over a large part of Asia leading to change of seasons. *Trade Winds* : The winds which blow in the same direction from sub-tropical high pressure belts to the equatorial low pressure belt.

The land and climate together influence the life of the people in our country from region to region. You know how varied is its relief and how beautiful is its landscape from place to place. It has several great mountains, plateaus and plains. Its mountains and hills, lakes and rivers, beaches and backwaters attract thousands of tourists from all over the world. You will see that, apart from location, shape and size of our country, its relief plays a great part in shaping its climate.

A study of the climate of our country and its variations from region to region will further confirm that our big country is indeed a part of sub-continent. In spite of these climatic variations, you will also see that the monsoon lend a climatic unity to this land known for its diversity.

Climatic Contrasts

Some places in our country have an extremely hot climate. Others have too cold a climate. Certain places enjoy an equable climate all the year round. In some of these places even the difference between the summer and winter mean temperatures is less than what it is between those of the day and night. As against this, some places in India have an extreme type of climate. If certain places are well known for the heaviest rainfall (anywhere) in the world, the others are known for their extreme aridity. In still other parts, it even snows very heavily.

Study the temperature and rainfall graphs given in this chapter. They show mean monthly temperatures and rainfall for a few selected places in India. Now you should be able to

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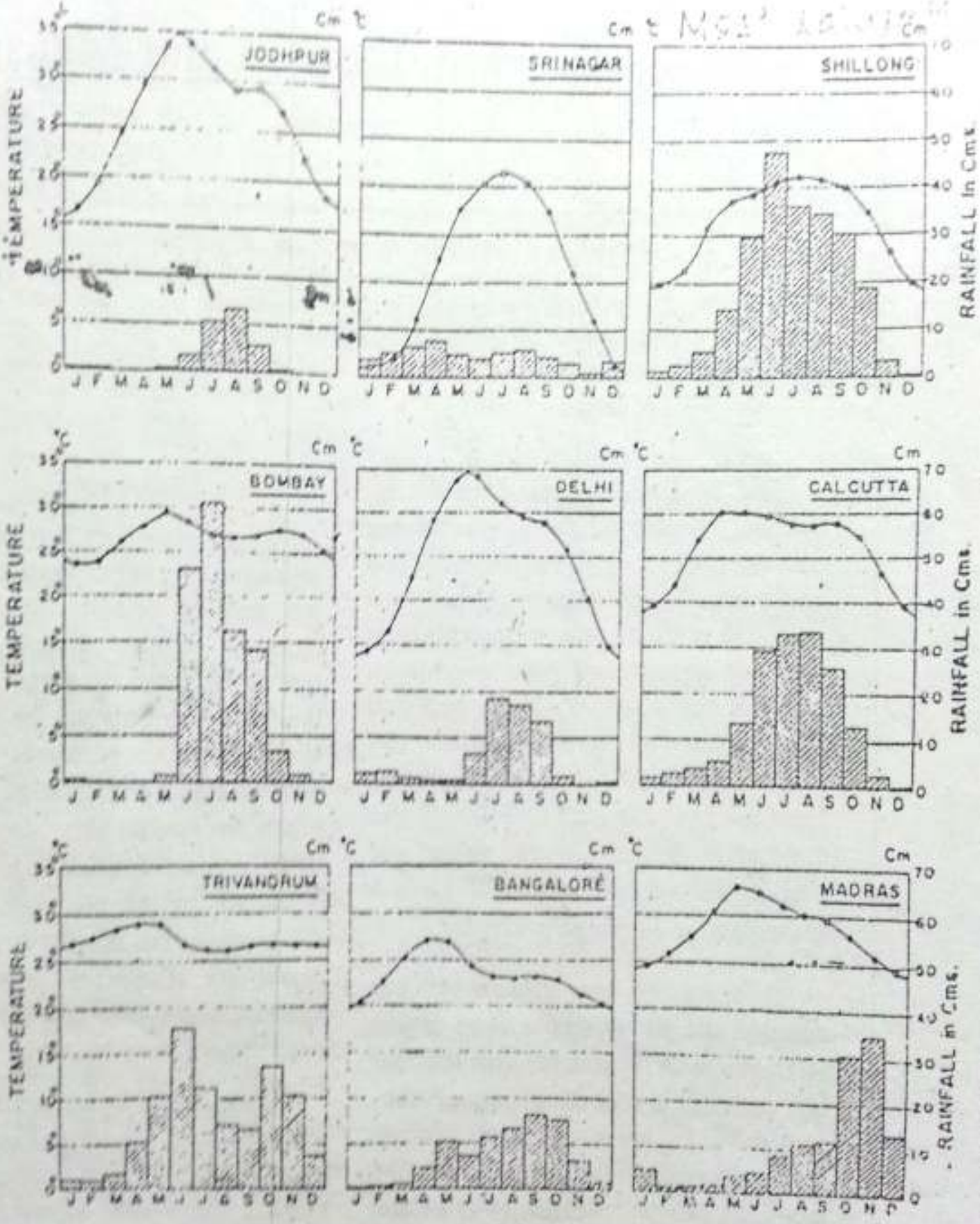

Fig. 23 Temperature and rainfall of some places in India

Locate these places on a map of India. Make out pairs of places having opposite type of climate : (a) Hot and cold. (b) Arid and rainy. (c) Equable and extreme.

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describe the climate of each place, comparing it with others.

Which of these places has the most equable climate? Name the two places having the most extreme type of climate. Which two places have a considerable rainfall in winter? Which of these places is most rainy? Which one is most arid? Which are the rainy months for the most parts of India? It will be interesting to know the factors that are responsible for differences as well as similarities between the climates of different regions.

Factors Influencing the Climate of India

You already know that the southern half of our country lies within the tropics, whereas the northern half belongs to the sub-tropical zone. Yet the whole country has almost uniformly high temperatures especially in summer. By and large, the winters are dry. Together they lend an unmistakable tropical touch to our country's climate.

This tropical nature of the climate all over India is in a large measure due to the Himalayas. The long and wide ranges of this mountain system with their great elevations protect our country from bitterly cold winds of the north. The Himalayan ranges are not only a physical barrier, but they also act as a great natural wall separating two distinct climatic regions. They thus, act as a climatic divide as well.

With a long coastline, India has large coastal area enjoying equable climate. But a far greater area of the country, especially in the north, lies too far away to receive any moderating influence of the sea. Such a continental type of climate can be seen in the interior of the peninsular India.

Yet another factor affecting the temperatures in India is the relief of our land. On the Deccan Plateau, even when they are not far from the equator, there are popular hill stations, for instance Ootacamund, also known as Ooty. However, most numerous and popular of the hill stations are confined to the Himalayas. On which of its ranges are they situated? The Kashmir Valley is often called the paradise on earth. What makes it so?

In fact, it is the variations in rainfall from place to place that account for marked differences in the climate of our country. These are again governed, to a large extent, by the relief of our land. A place like Mahabaleshwar, situated on the crest of the Western Ghat, may receive as much as 625 centimetres of annual rainfall. But a

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place like Pune, only a few kilometres to its north-east, hardly receives about one-tenth this amount.

The gigantic relief features like the Himalayan ranges even deflect the winds. They are, in fact, responsible for trapping the monsoon winds and forcing them to shed their moisture inside the Indian sub-continent.

Cycle of Seasons in India

Let us follow an annual cycle of seasons starting with the month of January. The cold weather season all over India has well set in by early December. Recall the planetary winds, and you will remember that India lies in the belt of the trade winds. Being in the northern hemisphere, they are north-east trades. January and February are the two cold months almost all over India. During these months the day temperatures in Calicut and Madras are about 24°C or 25°C. In the northern plains they are about 10°C to 15°C. Days are fairly warm even though the nights are cold.

During this season there is a high pressure area developed over the plains of the north-west. Land-bearing light winds blow out from the high pressure area. Weather is very fine with clear skies, enjoyable sun and light winds.

In northern India, however, this fine weather is disturbed at intervals by clouds and light rains. These winter rains are associated with cyclones originating in the Mediterranean Sea. They travel eastward across Iran and Pakistan before entering north-western part of our country. These are the winds which cause heavy snowfall along the higher reaches of the Himalayas. The rainfall caused by these winds decreases towards the east and the south. These "Western disturbances" in our country are often followed by cold waves.

During this season the Coromandel coast of Tamil Nadu also receives winter rains. These are, however, due to the north-eastern monsoon. These winds pick up moisture while blowing over the Bay of Bengal before striking the coast south of Madras.

The period between March and May forms the summer season. This season marches, as it were, from south to north. In the month of March, the highest day temperatures of about 38°C are recorded in the southern and central parts of the Deccan Plateau. In April, the belt of the highest temperature shifts further north and lies in Gujarat and Madhya Pradesh where day temperatures vary from 38°C to 43°C. In the month of May the belt of the highest temperature moves still

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further north. The day temperatures around 48°C are recorded in the north-western part of the country.

During this period, northern India becomes a region of rising temperatures and decreasing air pressure. Violent local storms accompanied by rain and hail are not uncommon towards the end of this period. In the north-west, the hot dry winds, called loo, are common in the months of May and June. So are the dust storms. Though temporarily they help to bring down the temperatures appreciably.

The period from June to September is a south-west monsoon season. The low pressure area developed in the north-west of the sub-continent becomes more and more intense. The south-east trade winds which blow from the Tropic of Capricorn in the southern hemisphere towards the equator are attracted towards this low pressure area in north India. These moist winds extend into the Bay of Bengal and the Arabian Sea. Suddenly, they are caught up in the air circulation over India. They are deflected towards the Indian Peninsula and Burma as south-westerly winds.

The direction of these winds is controlled by the relief of our country. It is the Indian peninsula which rather deflects the monsoon into two branches, called the Arabian Sea branch and the Bay of Bengal branch. The Arabian Sea branch of the monsoon marches from the southern tip of the country towards the north. The Bay of Bengal branch of the monsoon is deflected by the Arakan Mountains of Burma and the Himalayas in India and moves eastwards up the Ganga basin. The monsoon winds are normally expected to break in Kerala by the beginning of June and reach the plains of the Punjab by the first week of July. These two branches together thus overrun the country in about four or five weeks' time. The bulk of the annual rainfall is received during this season in the whole country barring the east coast of Tamil Nadu.

Even during this period it does not rain continuously. Heavy showers or downpours are generally followed by rainless intervals. These successive waves of rainfall, as it were, depend upon the formation of cyclones in the Bay of Bengal and the paths they follow.

Then comes the period of retreating south-west monsoon. By October the intensity of rainfall becomes much less, and the south-west monsoon begins to retreat gradually. It becomes

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a weak current or, in other words, it withdraws from Punjab by about mid-September, and leaves the Ganga Delta by late October. The south-west monsoon bids an annual farewell to India by early November when it leaves the southern part of the peninsula.

With the retreat of monsoon, the month of October again is known for its oppressive heat. This "October heat" as it is popularly known, is due to a combination of high temperatures and excessive humidity, since the land is still water-logged. In late October, temperatures begin to decrease rapidly especially in northern India, and by December, the winter is well established. Thus, the months of October and November form a period of transition from a hot-rainy season to the dry winter conditions.

This period of transition in which the low pressure area is transferred from north-west India to the Bay of Bengal is marked again by the formation of cyclones. These cyclones as that which hit Andhra Pradesh in November 1977 generally enter into the Indian peninsula through the mouths of river valleys causing widespread havoc in the deltas of the Kaveri, Krishna and Godavari. Occasionally, they hit the coast of Orissa and Bengal causing damage in the deltas of the Mahanadi and Ganga-Brahmaputra. The havoc caused in Bangladesh in the year 1970 was similar. For the Coromandel coast these are the rainiest months. In this part, rainfall is further continued by the north-east monsoon.

Thus, the annual cycle of seasons in India is dominated by the monsoon. There is some kind of a seasonal rhythm to which every kind of life—plant, animal and human being—responds. In spite of abundant rainfall, India is a water-thirsty land. This is largely due to the concentration of rainfall over only a few months of the year. The rapid run-off and the quick evaporation of rain-water are further responsible for this water famine even in those parts where rainfall is very heavy, for example in the Konkan area of Maharashtra.

The monsoons are eagerly awaited all over India. Long breaks or delays in them are fraught with danger. The whims or vagaries of the monsoon form the most important topic for discussion throughout the length and breadth of the country. Floods and droughts are constant sources of worry and no part of India is totally free from one or the other.

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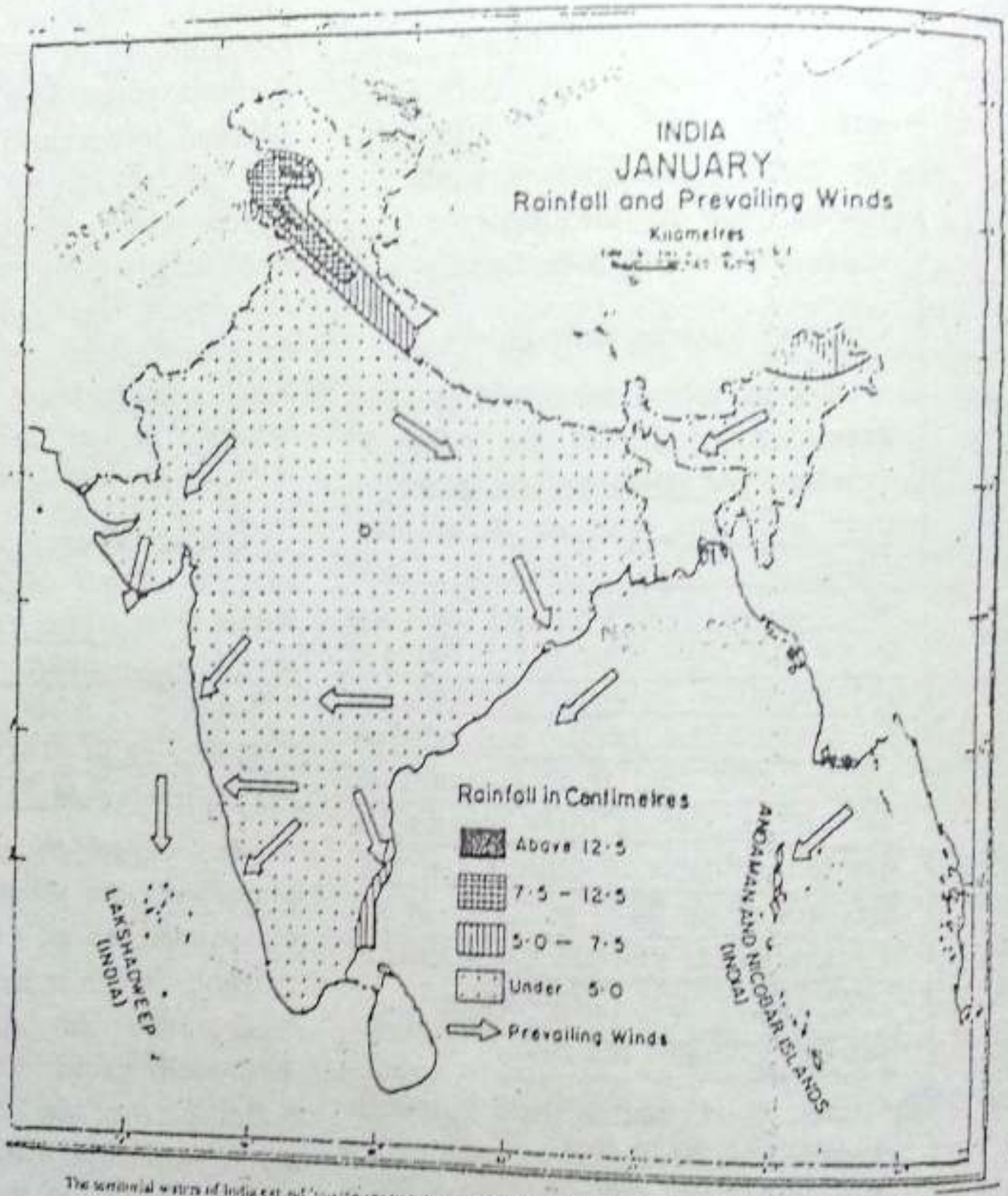
Rohit



The seasonal winds of India set out from the sea at distances of twelve nautical miles measured from the appropriate base line.

Fig. 24 (a) India — Seasonal winds and rainfall

Note the direction of winds in January. Which area in the peninsular India has more than 5 cm. of rainfall in January? Why is it so?

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Distribution of Rainfall

In India the distribution of rainfall is determined by two important factors. They are the direction of the rain-bearing winds, particularly the south-west monsoons and the relief of the land.

The Arabian Sea branch of the monsoon winds striking the west coast has to climb up the Western Ghat. As the warm moist winds rise up, they become cold and are forced to 'throw out' or drop down the moisture they carry. Thus, heavy precipitation takes place on the western coastal strip and all along the Western Ghat. The rainfall in this belt decreases gradually from south to north. Why should it be so ?

As these winds cross the Western Ghat, they begin to climb down. By this time, they have already shed much of their moisture they have carried. While climbing down, they begin to get warm, increasing thereby their capacity to hold moisture. As a result, they give very little rain in a belt spread along the eastern side of the Western Ghat. This is a typical rain-shadow area.

By and large, the western parts of Rajasthan receive a very scanty rainfall. This is because the winds while passing over the Great Rajasthan Desert become more warm and increase their capacity to retain moisture. But at times it receives heavy rainfall causing sudden floods even in this desert area.

The south-west monsoon of the Bay of Bengal branch moves northwards to central Burma, where also lies a low pressure area. But the Arakan Mountains succeed in deflecting a sizable part of these winds northwards. Thus these winds take a southerly to south-easterly direction and move into the Ganga-Brahmaputra delta. A considerable part of these winds gets trapped into the valleys of the Brahmaputra and Surma in the east, and cause heavy rainfall in the region. The strong monsoon winds are funnelled into a narrow valley surrounded by hills on three sides causing the world's heaviest rainfall in the neighbourhood of Cherrapunji, about 1,142 centimetres per annum on an average.

A very large proportion of the Bay of Bengal branch of the south-west monsoon is attracted by the low pressure lying over the north-western part of the country. These winds move up the Ganga basin over which lies a low pressure trough. The Himalayan ranges are responsible for deflecting these

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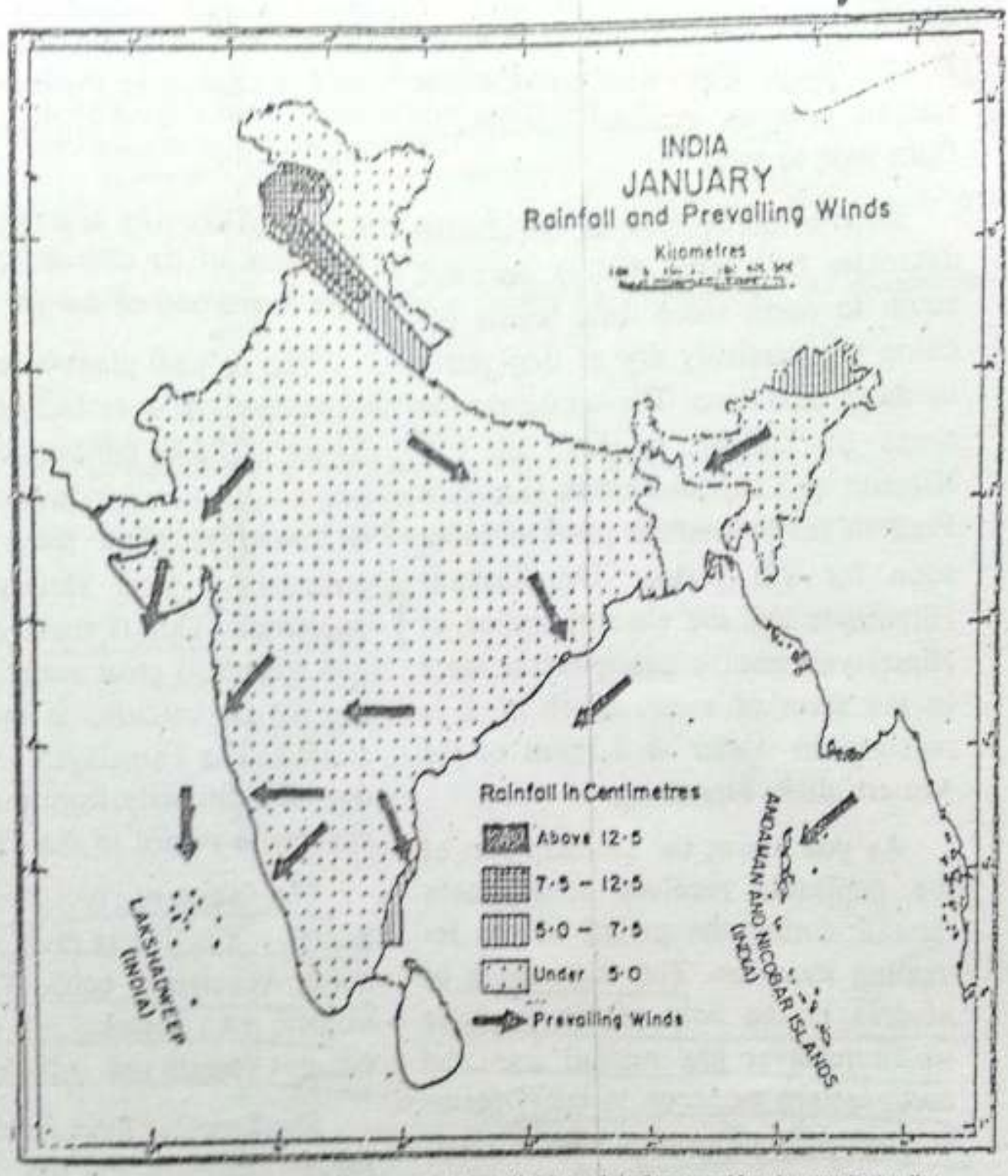

The territorial waters of India extend into the sea to a distance of twelve nautical miles measured from the appropriate base line.

Fig. 24 (b) India — Seasonal wind and rainfall

Note the change in the direction of winds from January to July. Which areas have more than 50 cm. and less than 5 cm. of rainfall in July ? Why is it so ?

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winds up the Ganga basin. Look at the rainfall map. You will see that the rainfall goes on gradually decreasing from east to west.

Even in the Himalayas, the rainfall decreases both from east to west and south to north since these winds become progressively dry as they move in these directions. The northern-most areas of Ladakh in Kashmir and Kinnaur and Lahaul-Spiti in Himachal Pradesh are beyond the reach of monsoon for this reason. The Kashmir Himalayas and the western section of Himalayas receive precipitation more in the form of snow. Much of it is received in winter as a result of the western disturbances.

As you know, the southern part of the peninsula receives considerable rainfall during the period of the retreating monsoon. The coast south of Madras is the only region in India which receives any rainfall from the north-eastern monsoon in late December and part of January.

But for the monsoon, India would have been a country altogether different. Besides the monsoon, the relief, particularly the mighty Himalayas, also plays a great role in shaping the climate of our country. It gives the country a distinct tropical touch and a monsoonal unity almost from one end of the country to the other.

Vegetation

Vegetation in any major region is an index of its climatic conditions. It also forms part of the physical setting.

The original plant cover in most of our populous areas has been removed by man. Unlike the savanna lands, the original plant cover in India consisted of forest vegetation. Even today, India possesses a great variety of natural vegetation. This is mainly because of two factors (i) great variations in relief and (ii) the variation in the amount of rainfall. The Himalayan region stands out very distinctly from the rest of the country in regard to the above factors.

The country lying outside the Himalayan region is divided into three major vegetation belts. They are (i) tropical rain forests, (ii) tropical deciduous forests and (iii) thorn forests.

The Tropical Rain Forests : These forests consist of the varieties—evergreen and semi-evergreen. The former lies in the region with a rainfall over 300 centimetres. It is a region of high humidity, with even temperature and a short dry season. These forests are common on the rainy slopes of the Western Ghat and in the hills of

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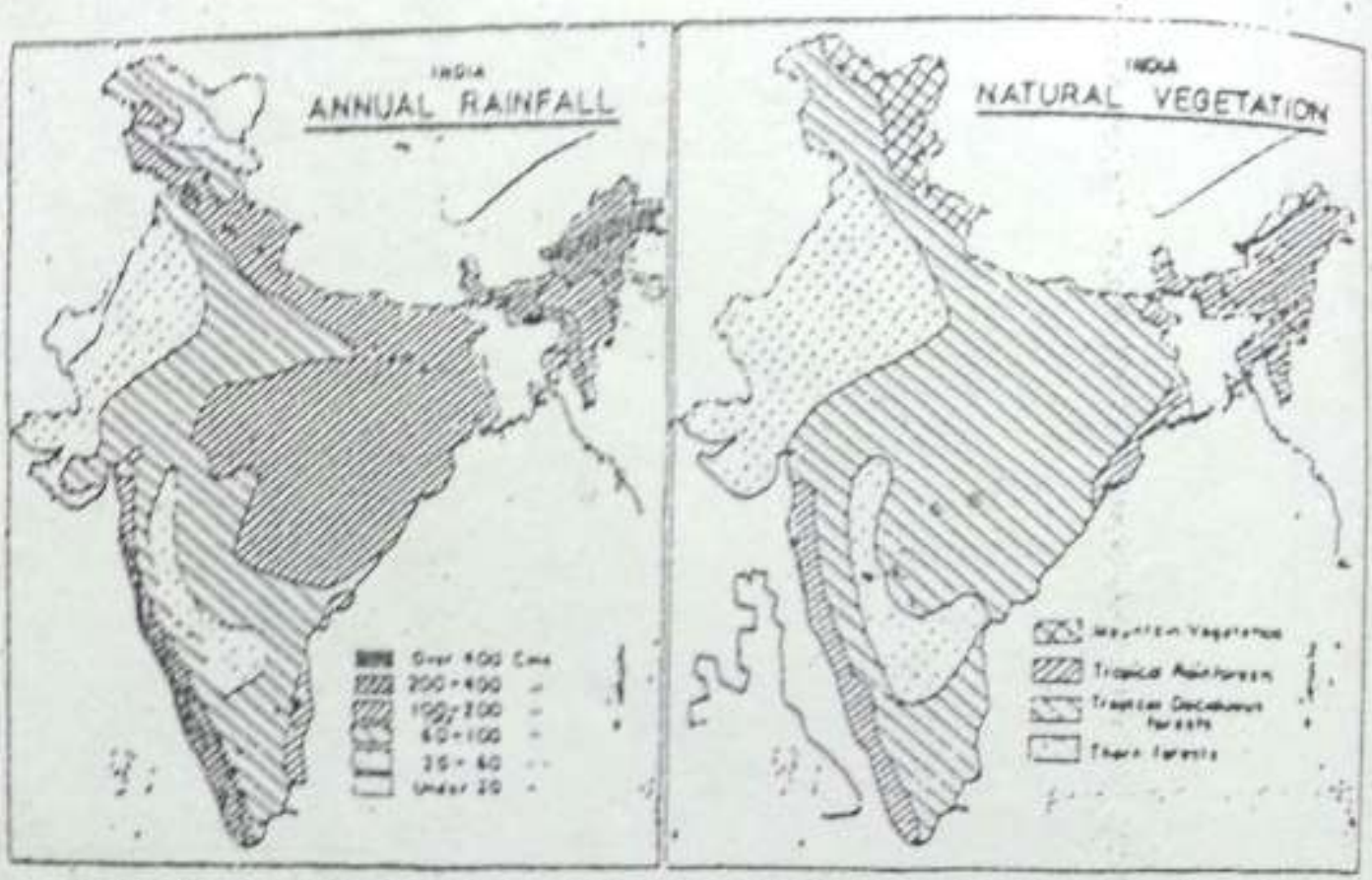

Fig. 25 India — Distribution of rainfall and natural vegetation

Note the regions of heavy rainfall. What relationship do you find between rainfall and natural vegetation ?

Assam. The semi-evergreen forests lie close to the evergreen forests. They belong to a region receiving rainfall between 200 and 300 centimetres per year. They are found in the Western Ghat, Assam, West Bengal and Orissa.

The Tropical Deciduous Forests : These forests are the most typical of the monsoon region. Therefore, they are also called the monsoon forests. They belong to the region enjoying a rainfall between 100 and 200 centimetres per annum. Owing to a long dry spell, trees shed their leaves for about six to eight weeks in summer. Every species has its own time of shedding leaves. As a result, at no time is the entire forest absolutely bare. Teak and sal are the most important trees of these forests. Sandalwood, rosewood, ebony, *shisham* and *mahua* are the other species of economic importance. Bamboos are also very common. This vegetation belt extends from the Western Ghat in the south to the Siwalik in the north.

The Thorn Forests : They are confined to the regions having a rain-

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fall of less than 80 centimetres a year. It consists of open stunted forests and bushes. Trees like babul, kikar and wild palms are common in a region with a moderate rainfall. Scrubs, shrubs and thorny bushes are mainly confined to a region where the rainfall is very scanty. Most of these trees and bushes have deep roots and long thorns. This vegetation is found in Rajasthan, Punjab, Haryana, Gujarat, the dry parts of Madhya Pradesh and the Deccan.

Yet another special type of vegetation consists of tidal forests common only to the areas flooded by the tides of the sea. Mangroves and the sundari trees of the Sundarban in Bengal are the common trees of this category.

Very imp.

Vegetation of the Himalayan Region : Vegetation in this region varies according to the height or altitude of the region. The foot-hills of the Himalayas are covered with tropical deciduous forests. Sal is the most important tree in this belt. This is followed by sub-tropical hill vegetation further up. The forests there consist of evergreen oaks, chestnuts and chir pine trees. When we reach an altitude between 1,600 to 3,300 metres, we find a belt of coniferous trees—blue pines, cedars, silver firs and deodars. Thereafter the alpine variety of vegetation becomes more and more common. It consists of shrubs, scrubs and grasses. They are found at 3,500 metres and above, till we reach the permanent snowline.

> **The New Terms You Have Learnt.** *Climatic Divide* : A bold relief feature separating distinct climatic regions lying on its either side. *Rain-shadow Area* : Area lying on the leeward side of mountains or a plateau which receives little or no rain.

EXERCISES

Review Questions

1. Answer the following questions :

W, S, M, (i) Into how many seasons will you divide a year to explain the climate of India?

(ii) What is relief rain?

(iii) Why are the Himalayas called a climatic divide?

When a mountain range comes in b/w the rain bearing winds, thus leads to condensation.

The side of the mou. which receives is called windward ...

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2. Distinguish between :
   (i) The south-west monsoon and the north-east monsoon.
   (ii) Deciduous and coniferous vegetation.

3. Complete the following statement with a correct ending :
   Jodhpur receives very scanty rainfall because
   (i) it lies in the region of land-bearing winds.
   (ii) it lies in a region too hot to allow precipitation.
   (iii) it lies in the rain-shadow area.
   (iv) the Aravallis obstruct the rain-bearing winds.

4. Write in brief how and why India receives the bulk of its rainfall in the months from June to September.

5. Name important vegetation belts of India. Describe the characteristics of the monsoon forests.

Map Work

6. On a map of India show the following :
   (i) A place having the world's highest rainfall.
   (ii) A region receiving rainfall from the north-east monsoons.
   (iii) Areas receiving rain from the western disturbances.
   (iv) Direction of winds of the Bay of Bengal branch of the south-west monsoon.

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12. Soil and Land Use

whole chapter

The Terms You Already Know. *Soil* : Loose rock material together with humus that forms the upper layer of the earth's crust. It serves as a source of food and moisture for plants. *Agriculture* : A systematic practice of tilling or cultivating soil, raising crops and trees and rearing animals.

You know how bountiful Mother Nature is ! Her precious gifts include soil, water and vegetation. Fish and wild life, too, form part of the gifts of nature. So also the mineral wealth hidden under the earth's surface. Together they are known as natural resources. Of these, the soil is the most important resource for mankind.

Think of the food that helps you to sustain and grow. The cereals like wheat, rice or millets like jowar and bajra are, indeed, a must for you. So are the pulses or dals. What will your mother do to cook food with, had there been no oil-seeds at all? Your morning breakfast may not be the same in the absence of beverages like tea or coffee, of course, added with sugar to your taste. Do you think your food would be complete without fruits and vegetables ? Where do these cereals, pulses, oil-seeds, beverages, vegetables and fruits come from? We obtain all these things directly from the soil.

Then there are a few more items of our food like milk and meat. It is true that we do not obtain these animal products directly from the soil. But the animals that give us milk and meat, largely sustain on grasses which, in turn, come from the soil and nothing else. Therefore, it should be correct to say that ultimately even these food items, we derive indirectly though, come from the soil itself.

The products like cereals, vegetables, etc., which we obtain directly from the soil are termed as primary food products. Those that are derived indirectly are referred to as secondary food products. All our food, be it primary or secondary, thus, comes from the soil, and soil alone. But the soil is our prime resource not only

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because it provides all our food but also because it is the only source for many more things.

The wood we use for fuel or as timber is a primary product of the soil. So are tobacco and rubber. Whereas plant fibres like cotton, jute and sisal are the primary products of the soil, the animal fibres like silk and wool fall under the category of secondary products of the soil. Thus the basic elements of our food, clothing and even shelter, to a large extent, are obtained only from the soil which, indeed, is our prime resource.

The art of cultivating soil, raising crops and trees and rearing animals is known as agriculture. With the tremendous growth of knowledge, agriculture has now become a science by itself. In this chapter we shall study some important facts about soils, our forests, wild life and livestock. The next chapter will deal with crops that we raise from the soil.

Major Soil Types

India is known for the diversity of its rocks, relief, vegetation and climatic conditions.

It has resulted in a large variety of soils. Let us recognise some major soils and mark out their distribution in the map.

Alluvial soils are generally made up of fine silt brought down by rivers from mountainous region. Very fine and relatively new alluvium is found in the flood-plains and the deltas. It is locally known as *khadar* and is most fertile. Alluvium that is relatively old and coarse is known as bangar. It lies on the piedmont plains or on the upper sides of the river valleys. The bangar soils are slightly less fertile than khadar soils. The fertile alluvial soils are found in the Great Northern Plains of India and in the deltas of the rivers in peninsular India.

Black lava soils are common in Deccan Trap region, and are made up of volcanic rocks of lava flows. These fertile soils are clayey. They retain moisture for a long period. These soils are mainly found in Maharashtra and parts of Madhya Pradesh and Gujarat. As they are most suited for raising cotton crops, they are also known as black cotton soils. Locally, they are known as 'regar' soils.

Red soils are generally developed on crystalline igneous rocks in the hot and relatively dry parts of the southern and eastern parts of the Indian peninsula. They are relatively less fertile, but are capable of growing good crops with the help of fertilizers.

Laterite soils are typical of hot

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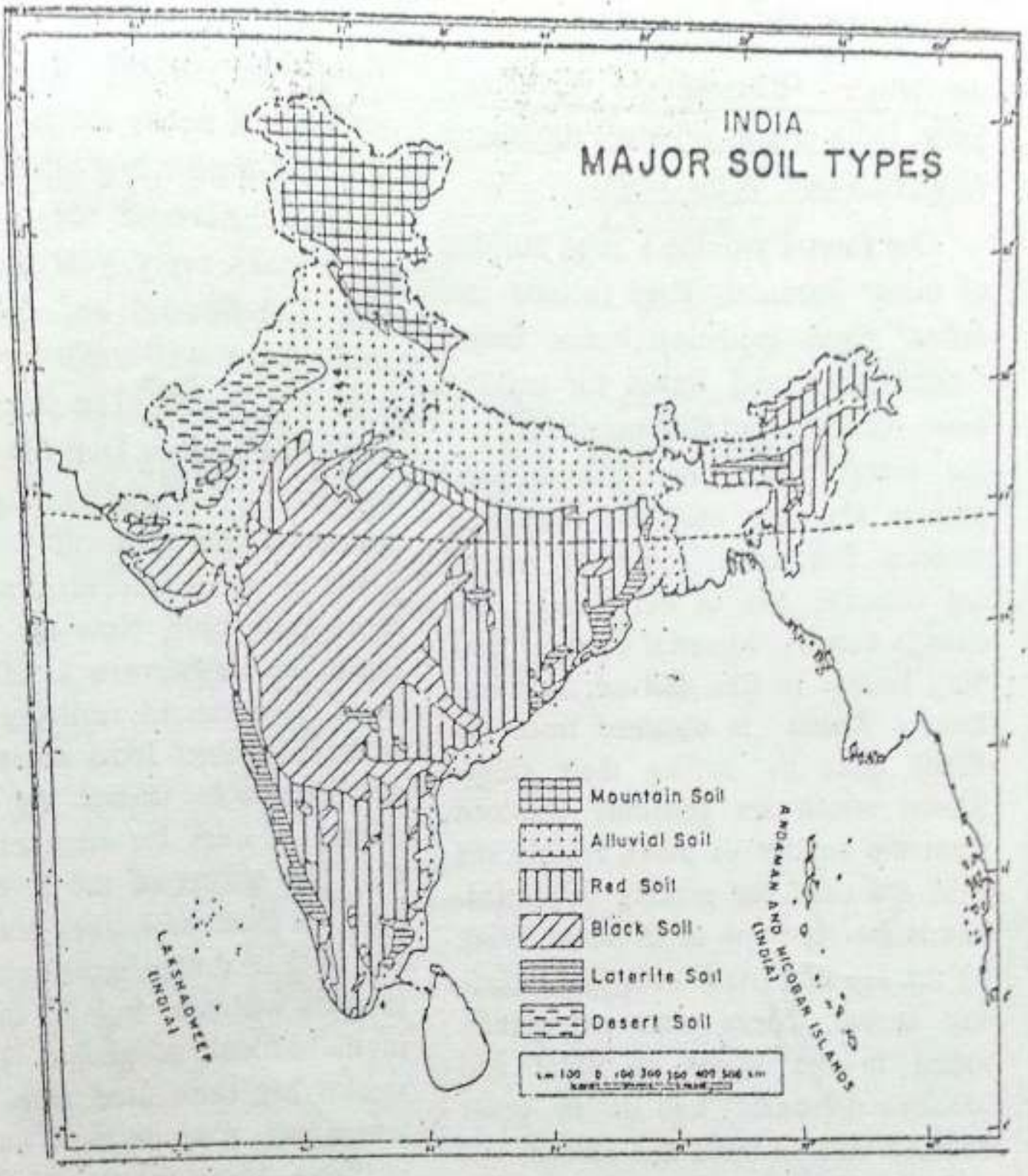

The territorial waters of India extend into the sea to a distance of twelve nautical miles measured from the appropriate base line.

Fig. 26 India — Soil types

Name the major types of soils found in peninsular India. Which are the areas of alluvial soil? Why is it found here?

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rainy climates of the hilly regions of the Western Ghat and the Chhotanagpur Plateau. Heavy rains wash away the fertile part of the soil dissolved in water. This process is known as leaching.

In addition to these, there are a variety of mountain soils found in Himalayan region. The arid sandy soils are confined to west Rajasthan. These desert soils also include the wind-blown loess. Such a large variety of soils in India partly ensures a very wide range of crops. Also it allows and calls for a proper use of land according to its suitability from place to place.

Land Use

As you know the prosperity of the people largely depends upon how wisely they use the land they possess. The use of the land for agriculture depends upon the kind of soil, relief of land, climatic conditions, adequate supply of water for irrigation and the drainage of surplus water. All these facts together determine the best possible use of every piece or strip of land in the country.

Let us find out the broad pattern of land use in our country (See Fig.27). Much less land is now left to be brought under agriculture, of course with great effort. This is only a poor quality land and would require large investment to make it economically productive.

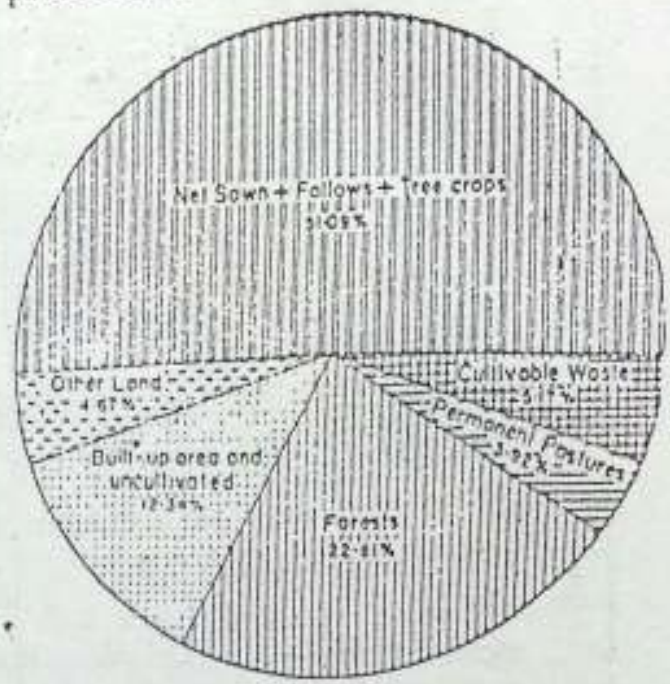

Fig. 27 Land use in India

Note that India has very little land under permanent pastures and the area still suitable for cultivation. Why should it be so ?

Land under Forests

India has hardly 23 per cent of its land area under forests. For the balanced development of a country, it has been found that it should have at least one-fourth of its area under forests. Confining themselves to hilly and uneven areas, the forests provide us with fuel and timber. When properly looked after, they become a permanent or perennial source of these resources.

USES OF FORESTS

① Forest trees growing in rocky and stony soils help to develop fertile soils,

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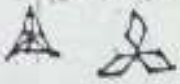
of course, very gradually. They supply the necessary humus content to these new or developing soils. Roots of the trees, the thick under-growth and grasses together help to conserve soil and water in the rainy and very uneven areas. In their absence it is these areas that suffer most in terms of soil-erosion. Forests also help in checking floods by holding a considerable amount of rain-water in the sub-soil. They also help to a certain extent in increasing the rainfall.



Yet another important advantage of forests is that they offer the necessary food and seclusion for wild life.

Our Forest Wealth

The forest land in India seems big enough covering as much as 75 million hectares of land. But only a little more than three-fourths of our forests are suitable for commercial exploitation. The bulk of the forest land is under deciduous trees, leaving only 6 per cent of it under coniferous ones. Much of the forest area has only a nominal or degraded plant cover.

The forest wealth is generally divided into two categories : major products and minor products. Wood that we obtain from the forest forms the major product. It is used either as fuel or as timber. The coniferous forests found in the Himalayan region have several commercially useful species of trees. They include pines, spruce, silver fir and deodar. The blue pine and deodar are the prized soft woods of the Himalayas in our country. They are used as timber for building houses, constructing bridges, making railway sleepers and furniture and manufacturing boxes for packing purposes. The silver fir and spruce have a great scope for making paper, newsprint and cellulose.

Sal and teak are the two most important species which belong to the deciduous or the monsoon forests of our country. They are widely used as timber, since their wood is fairly hard and durable. The sal tree is more widespread and is found in North and Central India. Teak forests mostly occur on the Western Ghat and in the Satpura ranges of Madhya Pradesh. The other important trees of our forests are bamboos, mahogani, rosewood and sandalwood. Bamboos are now-a-days used for making pulp which in turn is used for manufacturing paper and newsprint. Rosewood is used for making furniture and decorative pieces of wood carvings. Sandalwood is also used for decorative purposes with an added advantage of its fine scent. This prized wood comes from the forests of

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the Nilgiri Hills of the Karnataka State. India enjoys a virtual monopoly of sandalwood in the world.

Our forests provide a large number of minor products. They include lac, resins, gums, medicinal herbs, *katha*, fodder, grass and leaves for making *bidis*. Charcoal is also obtained from the forest wood. *Russa* and *khus* grasses are also used for extracting essence. The sandal and other essential oils are one of our foreign exchange earners. Material used for tanning leather is also derived from our forests. *Katha* is obtained from the Khair trees by boiling their chips. Resins which are generally obtained from the coniferous pines, mainly the chir, are used for making turpentine. Lac is the secretion of an insect living on the sap of certain trees like *palash* and *kusum*. These trees are chiefly found in the States of Bihar and Madhya Pradesh. Lac is in great demand both in India and abroad. We are the largest supplier of lac in the world market. You must have seen seals made out of lac or sheilac. It is also used in making bangles, gramophone records and electrical instruments.

Forests play an important role in the economy of our country. It is, therefore, necessary to take care of our forests on scientific lines. In order to maintain a steady supply of wood for fuel and timber and other minor products, we have to see that we plant more trees every year than what we fell. The Central and State Governments have well-trained staff to look after our forests. The forest Research Institute of Dehra Dun has been doing very useful work in training our forest personnel and conducting research in order to make our forests more and more productive. Now the people living in the vital forests as of the Himalayas have started realising the value of trees of their local areas. They do not look with favour the wholesale cutting of trees for commercial benefits. The efforts of the forest department to plant new trees and improve the yield of timber, grasses and minor produce will bear fruit by this change in the outlook of people. The forest wealth has been used more in areas where rail, road or river transport is available. Many forests yet not served by good transport are awaiting their commercial exploitation.

Wild Life

Various kinds of wild animals and birds are found in the Indian forests. Important among them are the elephants, tigers, leopards, cheetas, rhinoceros and the lions of the Gir

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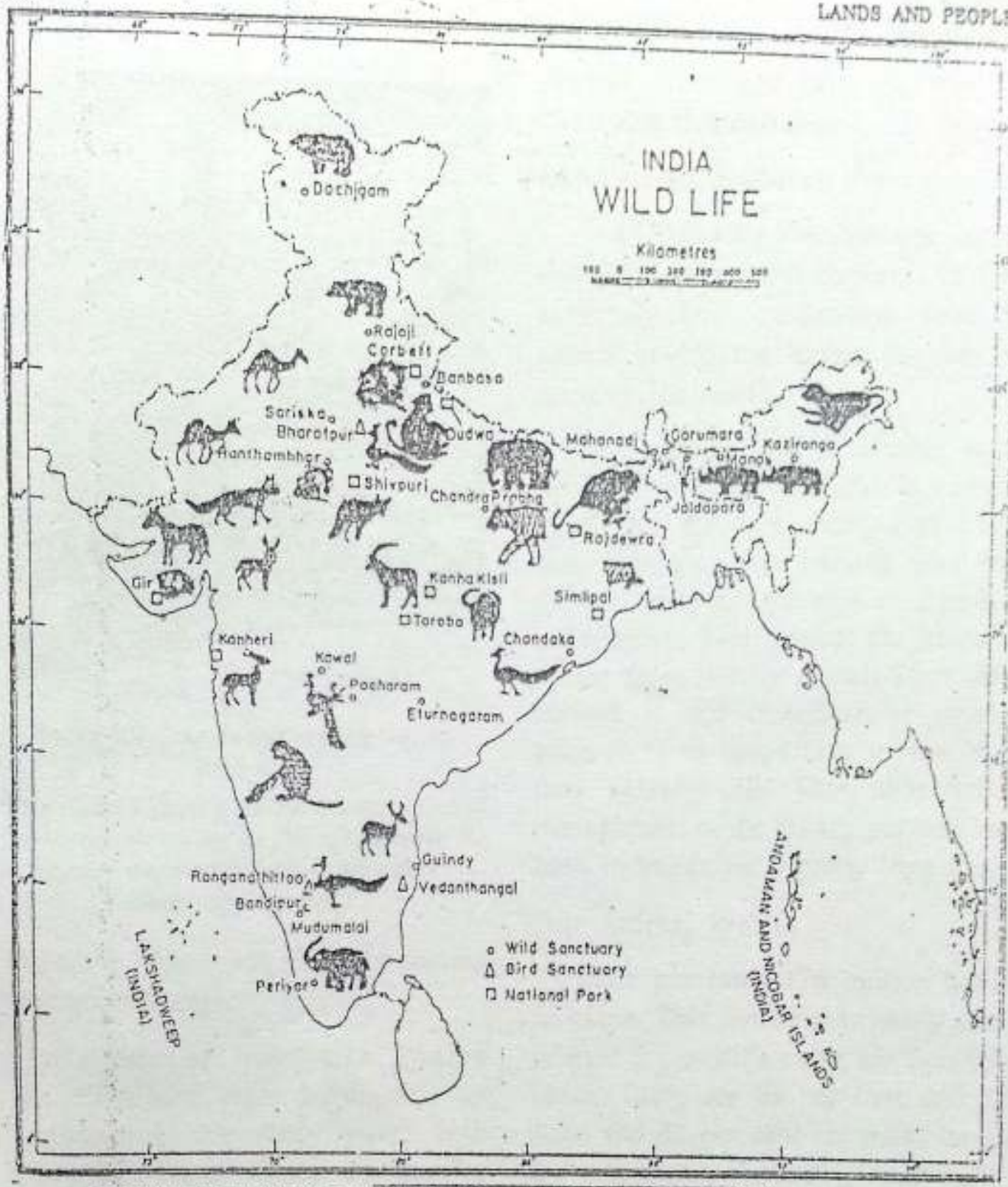

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The territorial waters of India extend into the sea to a distance of twelve nautical miles measured from the appropriate base line.

Fig. 28 India — Wild life

See the diversity of wild life in India. Locate the national parks in the States of Uttar Pradesh, Madhya Pradesh, Maharashtra, Bihar, Orissa and Gujarat. Name the wild life sanctuaries in Tamil Nadu, Kerala, Assam and Kashmir.

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forests in Gujarat. Deer and antelope are also common in most parts of the country. The peacock with its beautiful plumage has now been declared the national bird of our country.

The wild life of our country is indeed our national asset. Thousands of tourists from other countries visit India to "shoot" these animals with their cameras. We are able to see these animals and watch some of their habits in a zoo where they are kept for our benefit. In order to preserve wild life in its natural setting, the Central and the State Governments have established national parks. National park, as you know, is a reserved area meant for preserving its natural vegetation, natural beauty and its wild life. They are, thus, much different from a zoo. At present there are 20 national parks in different parts of our country besides many wild life sanctuaries and zoological gardens.

It is the duty of every citizen to preserve wild life. This is very necessary because a large number of species of birds and animals have already become extinct in our country. Clearing of forests and wreckless hunting of animals on the part of man for his immediate and personal gain has been mainly responsible for this tragic state of affairs. At present the rhinoceros, the hunting cheeta, lion, musk deer and the great Indian bustard are found only in very small numbers. Let us hope that we shall be wise enough to preserve these precious assets of our country.

We in India observe Wild Life Week in the first week of October which coincides with the birth anniversary of Mahatma Gandhi.

Fish are not directly related to the soil. But they form an important part of wild life. You would, therefore, like to know something about our fisheries as well.

India with its long coastline has access to wide fishing areas. The most common varieties of fish found in Indian waters are herring, sardine, tuna, salmon, mackerel and shark. Both the Arabian Sea and the Bay of Bengal are rich in fish because the ocean currents and numerous rivers joining the sea provide ample food for the fish. Our fishermen are also adventurous. With modern fishing boats, better fishing nets, increased cold storage facilities and newly established fishing harbours, the annual catch of fish has been steadily rising. More than 2.25 million tonnes of fish are caught in our seas, lakes and rivers every year. Some of the Indian varieties of fish are popular abroad and,

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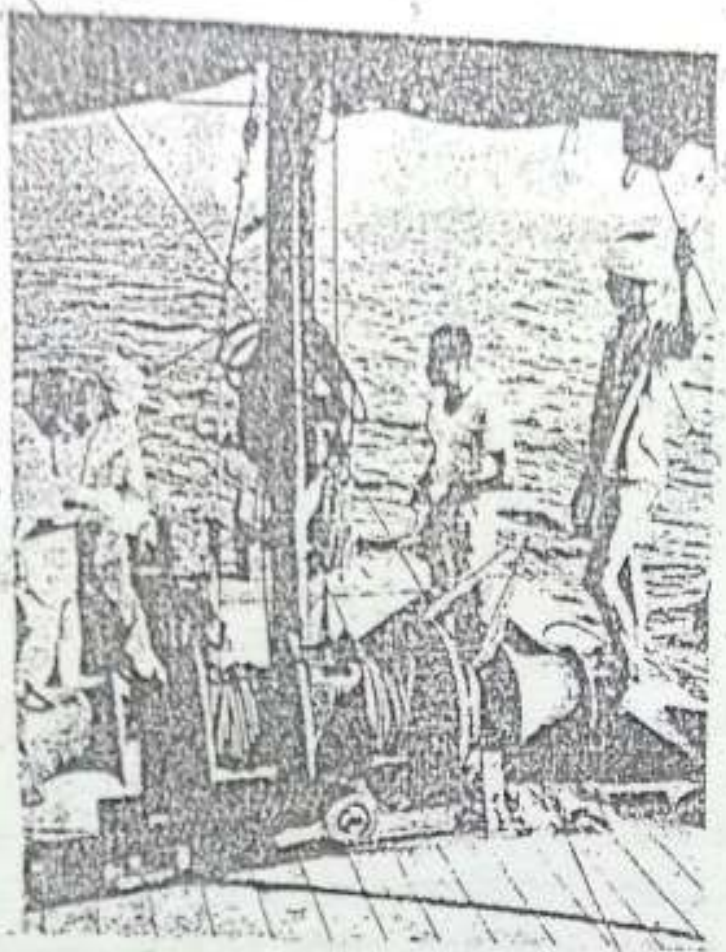

Photo XV An Indian trawler on the high seas

This modern fishing trawler on the coast of Kerala points out to us that we increase the fish catch considerably. Why do we need to increase the fish catch?

therefore, offer much scope for earning foreign exchange.

Number of dams like Bhakra and Nagarjuna sagar have come up impounding the river water into man-made lakes. These are turning into a store-house of fisheries. Our Government has taken steps to stock our rivers, tanks, reservoirs, lakes, etc., with suitable and better varieties of fish. In fact in view of the shortage of proteins in our diet, India has to depend more and more on fish to overcome this deficiency.

Land under Pastures

India has only four per cent of its total land area under pastures. This is extremely low, particularly when it claims having the largest number of cattle in the world.

The pasture land is widely scattered all over the country. In certain parts, the villagers themselves have been managing and looking after the pasture lands as common cooperative undertaking. They protect the pastures till the grass is fully grown. Then they harvest it and distribute it among themselves in proportion to the land they actually till. This cooperative management of the village pastures has been in vogue for a pretty long time.

Our Animal Wealth

India possesses 176 million heads of cattle. This means that nearly one-fifth of the world's cattle are found in India. There are 69 per cent draught bulls and 31 per cent are milch cows. India possesses about 51 million buffaloes. It accounts for nearly half the world's total. Of this, nearly 50 per cent are milch animals, and account for the bulk of the milk production in India. Punjab, Haryana, Delhi, western Uttar Pradesh and Gujarat have some

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of the best buffaloes and cows in India.

India has about 40 million sheep. Only a small percentage of these yield quality wool. They are reared mainly in the western Himalayan region—Jammu and Kashmir and Himachal Pradesh.

There are about 64 million goats in India. This is about one-sixth the world's total. A goat is often called a poor man's cow. The rest of the live-stock consists of horses, mules, don-keys, camels, pigs and yaks.

It is obvious that such a large number of animals in India cannot be supported by a mere 4 per cent of its pasture land. Most of these animals are reared on the farmlands. These animals are supported mostly on the fodder produced on the farms. They consume fodder in large quantities and return valuable manures to the land. These manures have helped to maintain the fertility of the soils. Unfortunately, many farmers consume cow-dung as a cheap source of fuel. Now some of the progressive farmers have shown that the cow-dung can be used both as a fuel and as a manure. It is used as a raw material for producing gas which serves as a cheap and handy fuel. This is done before the dung is applied as a manure in the field.

India, because of its huge animal wealth, can export hides and skins bringing in return valuable foreign exchange. Wool is used for making woollen cloth. The rugs and carpets made out of the wool are also exported on a large scale.

Although India possesses a variety of livestock in a very huge number, the quality of the most of its animals is far from satisfactory. We have great affection for our animals but we do not take care of them on scientific lines, as the people in the developed countries do. Now we also want to improve the quality of our animals so that we have an adequate supply of milk, mutton, chicken, eggs, etc. With this end in view, special breeds of cattle, buffa-loes, sheep and poultry are being de-veloped in our country. *Gosadans* or *Goshalas* are also maintained. India has yet to make tremendous progress in the development of our animal wealth in order to improve the quality of the diet of our people and meet their several other requirements.

The New Terms You Have Learnt. *Primary Food Products* : The products like cereals, fruits, vegetables which we obtain directly from the soil. *Secon-dary Food Products* : The products like milk, eggs and meat which are derived indirectly from the soil. *Leaching* : The process by which fertile soluble part of the soil is dissolved and carried away by water.

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EXERCISES

Review Questions

1. Answer the following questions :
   (i) Name five main uses of land.
   (ii) What is humus?
   (iii) What is the difference between *khadar* and *bangar* soils?
   (iv) What is leaching?

2. Distinguish between :
   (a) Primary food products and secondary food products.
   (b) A zoo and a national park.
   (c) Milch animals and draught animals.
   (d) Livestock and wild life.

3. Explain what is soil and how it is formed. What are the major types of soils in India? How is soil conserved and its fertility maintained?

4. Write an essay of about 20 lines on the forest wealth of India. Cover the following points : (i) Area under forests, (ii) Types of forests and (iii) major forest products.

5. Why is wild life very important? How can we help in preserving our wild life?

Map Work

6. On an outline map of India show the following :
   (i) areas of coniferous forests.
   (ii) areas of quality sheep.
   (iii) areas of teak and ivory.
   (iv) areas of fine breeds of milch cows and buffaloes.

Topic for Class Discussion

7. *'Our Animal Wealth'*

   Let the class collect information and figures regarding our livestock. Then they may discuss why the average yield of milk is so low in our country. Finally, they may find out and report to the class what steps are being taken to improve this situation.

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13. Our Agriculture

The Terms You Already Know. *Cash Crops:* Crops grown by the farmer not for his own consumption but mainly for the cash they bring him on sale. *Rotation of Crops:* Different crops that are grown one after the other on the same piece of land, mainly with a view to restoring fertility of soil.

India is fortunate enough to possess rich agricultural resources. They include a wide variety of fertile soils, ample water for irrigation and a growing season almost all the year round. The variety of soils and variations in climatic conditions from region to region make it possible to grow a large number of crops in our country.

India occupies an outstanding position in the world in several agricultural products. It stands first in the production of tea, sugarcane, millets, groundnuts, sesame and mustard. It stands second in the production of rice, jute and jowar. It is also an important producer of tobacco, linseeds, wheat and cotton.

Slightly less than 23% of our total land area is left under forests and another 4% under permanent pastures. Nearly 13% of the land is either a total waste land or built-up area. This leaves a balance of 59% of the total land area of which about 54% has already been cultivated either for trees or for crops. Of this, nearly 45 per cent of the total land area is actually under crops every year. A little over 8 per cent of the remaining land is brought under crops only once in two or three years. The rest of the period it is left fallow in order to restore its fertility. Thus, we have really no more land to bring under the plough. We need to use our existing arable land more intensively. Then alone we may be able to grow enough food and agricultural raw materials for our exceptionally large population increasing further at a much rapid pace.

In India 76 per cent of the total land area under cultivation is devoted to food crops; and yet the country is

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not always self-sufficient in its food requirements. Although 75 per cent of the population derives its livelihood from agriculture, the total value of the entire agricultural produce is not more than half of the national income. This indicates the unsatisfactory state of our agriculture although it forms the backbone of our country's economy.

PRE-INDEPENDENCE PROBLEMS

Thus, Indian agriculture, although it employs a lot of manual labour, is predominantly a subsistence type. Over large parts of India, family members consisting of men and women work shoulder to shoulder with one another in the fields. The subsistence type of agriculture, unlike commercial agriculture, is one in which a farmer consumes almost everything that he produces on his farm, leaving very little of his produce for marketing.

Crops have been raised year after year. As a result, in many cases soils have been impoverished or exhausted. Reckless clearing of forests, overgrazing and occasional heavy downpours have led to extensive soil erosion. The constant growth of population has led to fragmentation of agricultural land. Very small size of land holdings often makes them uneconomic.

Agricultural yields in our country are still among the lowest in the world. The methods of farming, the seeds used and the marketing of agricultural produce still need a great improvement. There is little or no security for the farmers against failure of crops in a very large part of the country.

Since Independence, efforts are being made to provide more and more of irrigation facilities. In many parts of the country, electricity is now supplied to the farms as well. The use of manures and fertilizers is being encouraged. The government has set up demonstration farms to propagate use of new farming methods and implements. The government has succeeded in developing new seeds which are responsible for considerably high yields. The prices of agricultural crops have also been raised; and the farmer is assured of the minimum price which would encourage him to invest more money in raising crops. Loans are also made available to farmers through banks and cooperative societies to construct wells and purchase waterpumps, tractors and other machinery. Arrangements are made to protect crops from pests and diseases. A few large mechanised farms have been set up by the government for demonstration purposes. The Suratgarh Farm in Rajasthan is a well-known example of this kind. Special rural programmes

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are arranged on radio and television for the benefit of farmers. All this has resulted in raising the agricultural production in many parts of our country. Besides exporting many of the cash crops, we have become surplus in foodgrains like wheat and rice. This increase in their production has been the result of higher market prices. They have thus become our new cash crops.

For the first time after years, India exported them to foreign countries in 1977. In certain parts of the country, especially in Punjab and Haryana, the yields of crops like wheat have been considerably increased. This recent break-through in Indian agriculture is often referred to as the Green Revolution.

Agricultural Seasons

Agricultural operations in India begin with the arrival of the monsoon in June. There are two agricultural seasons— kharif and rabi. The kharif season begins with the onset of the monsoon. The important kharif crops are rice, millets, maize, jute and cotton. These crops are harvested in autumn. The rabi season begins in autumn after the rains, and crops are harvested a little after the spring. The important rabi crops are wheat, gram, barley, linseeds and mustard.

Major Crops

Rice is the leading food crop of India. Our country stands next only to China in the production of rice.

Rice requires uniformly high temperature and an assured rainfall of about 100 to 200 centimetres. The rice plant does well in clayey soils since it requires standing water during its period of growth.

As a result, rice fields in the plains are always properly bunded. Along the hill slopes, they are terraced so that they may be able to hold water. Rice is a staple food of the coastal strips of India, West Bengal, Assam, Bihar and the eastern parts of both Uttar Pradesh and Madhya Pradesh. It is also grown in the valley of Kashmir and in the irrigated parts of Himachal Pradesh, Punjab and Haryana. The deltas of the Kaveri and Krishna raise two to three crops a year, whereas in many other areas rice is grown as a kharif crop only during the rainy season.

Wheat is the second important food grain of India. Unlike rice, it is a rabi or a winter crop grown in well-drained soils in areas having 50-75 cms. of annual rainfall. It requires rains during early period of its growth. At the time of ripening, the grain requires warm and sunny weather. In India it is

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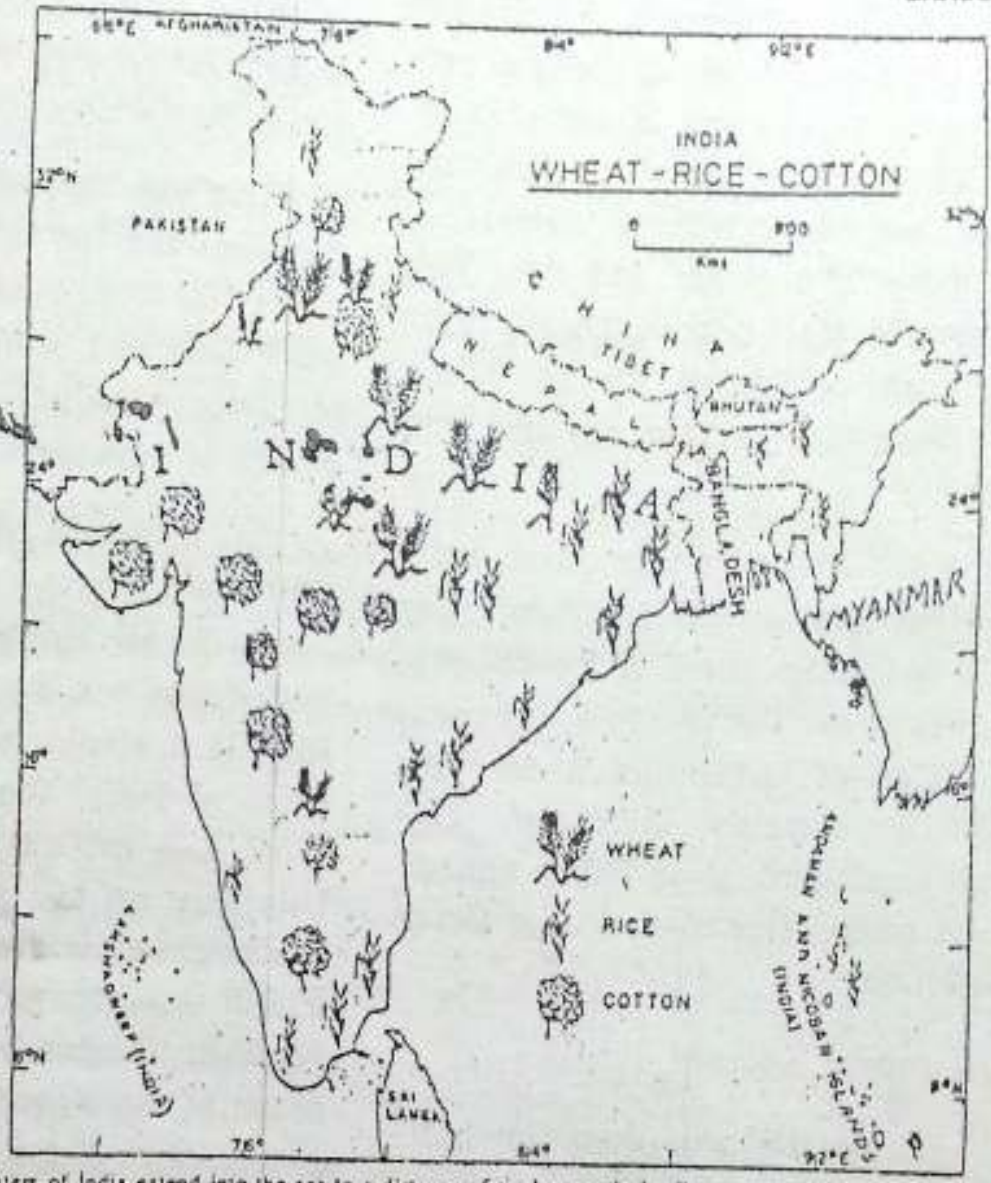

The territorial waters of India extend into the sea to a distance of twelve nautical miles measured from the appropriate base line.

Fig. 29 India — Areas producing rice, wheat and cotton

Note and name the areas which produce these crops.

generally grown in the northern parts of the country that is Haryana and western Uttar Pradesh where the winters are relatively long and somewhat wet. Wheat is also grown on the Malwa Plateau, the parts of the Deccan Plateau and in the plains of Gujarat and Rajasthan. As a result of the new hybrid variety of wheat plant, the yield and the production of wheat have substantially increased in the States of Punjab and Haryana.

Millets: Ragi, jowar and bajra are the three important millets or the coarse grains grown in the areas where rice cannot be grown because of inadequate rainfall. It is an important crop of the Karnataka Plateau. Jowar requires less rainfall than ragi and is

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grown on the Deccan Plateau in parts of Karnataka, Maharashtra and Madhya Pradesh. Bajra is grown in those parts where rainfall is still less. It is grown in parts of Maharashtra, Gujarat, Madhya Pradesh, Rajasthan, Uttar Pradesh and Haryana. The yield of these millets has been steadily increasing with the expansion of irrigation facilities and the development of new and high yielding varieties.

Maize is a high yielding food crop. It grows well in an area with a moderate rainfall and high temperature. It is grown in large quantities in Uttar Pradesh, Rajasthan, Punjab and Bihar.

Pulses and Oilseeds

Pulses such as gram, arhar, lentil (*masur*), black gram (*urd*), *moong* and peas are important sources of protein. They are particularly necessary for those who do not eat meat. They are grown almost all over India, except the areas with heavy rainfal. Pulses are leguminous plants which help to restore fertility of the soil in which they are grown. They play an important part in rotation of crops.

Oilseeds: India is one of the leading oilseed producing countries of the world. The chief oilseeds grown in India are groundnut, sesame, mustard, linseeds and castorseeds.

Groundnuts are extensively grown in the red soils of South India and also in parts of Gujarat and Maharashtra. Groundnut oil is used in cooking and also in manufacturing vegetable ghee or vanaspati. Its cake which is left after extracting oil is a good feed for dairy cattle and is also used as manure for soil. However, groundnut has a great demand abroad and large quantities are exported for earning valuable foreign exchange in years of surplus production.

Linseed oil is used as edible oil, and also for the manufacturing paints, varnishes, etc. Copra obtained from coconuts is yet another source of oil in India. Coconuts are grown on the coastal strips particularly in Kerala on a very large scale. Mustard is grown in the wheat producing regions and is widely used for cooking in northern India.

Sugarcane

Sugarcane is a kind of grass with a thick stem. Its homeland is believed to be India, the largest producer of sugarcane in the world. Sugarcane plant needs high temperature, plenty of irrigation water and well-drained fertile soil.

Although sugarcane is grown in several parts of India, it mostly comes

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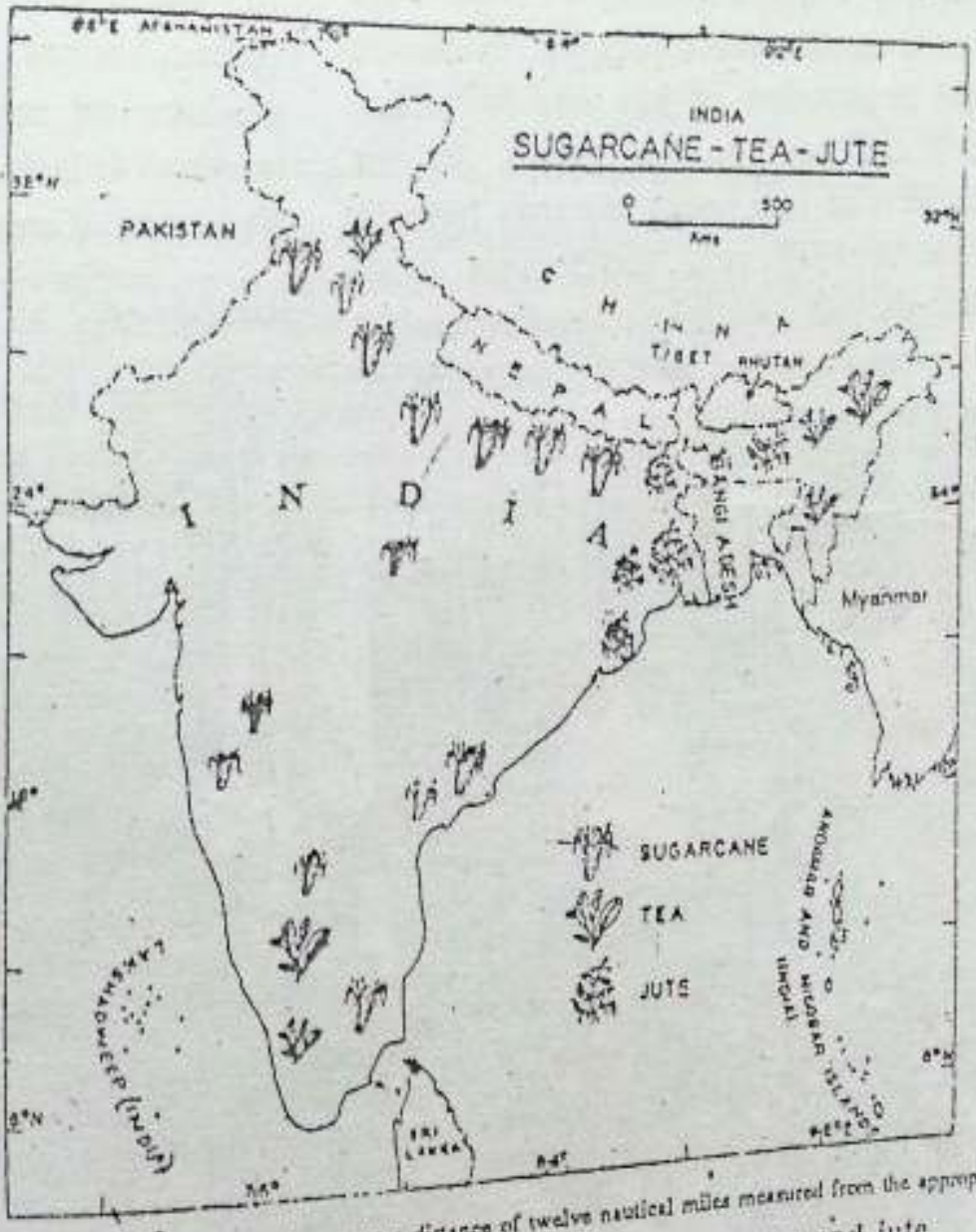
from the irrigated lands of Uttar Pradesh, Punjab, Haryana and Bihar. Nearly half of the total production of sugarcane comes from Uttar Pradesh alone. The other producers are Maharashtra, Karnataka, Tamil Nadu and Andhra Pradesh. Although the area under sugarcane is less in the southern states, its yield per hectare in these states is much higher. In our country sugarcane is used for manufacturing gur, khandsari and sugar.

New varieties of sugarcane have been developed at the research station at Coimbatore.

Tea

India is the leading producer of tea



The territorial waters of India extend into the sea to a distance of twelve nautical miles measured from the appropriate base line.

Fig. 30 India — Areas producing sugarcane, tea and jute

What makes Uttar Pradesh the largest producer of sugarcane? Why are tea and jute mainly concentrated in Assam and West Bengal?

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followed by Sri Lanka and China. It is a plantation crop and grows well in deep fertile and well-drained soils. Also necessary for its growth are a warm and moist climate, and a rainfall of over 200 centimetres, well distributed throughout the year. The skill of the female labour in plucking high quality tea leaves is a great asset in tea-growing areas.

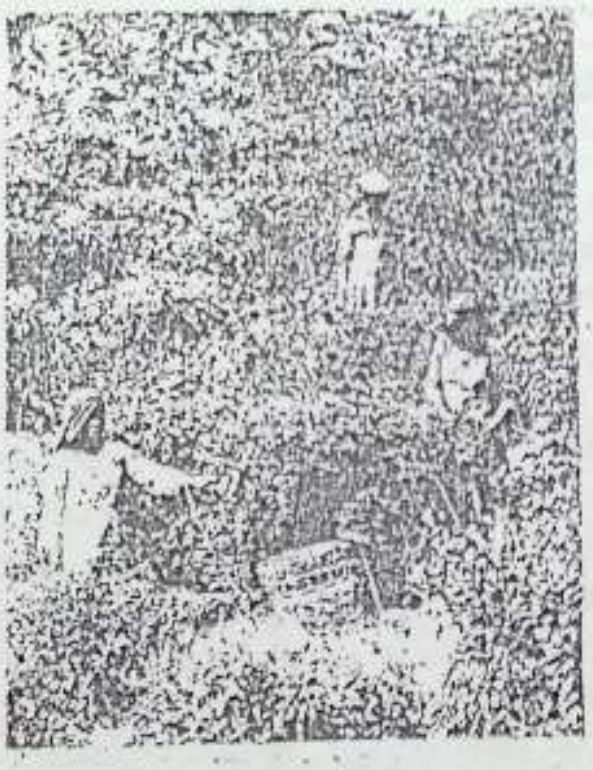

Photo XVI A Tea Garden in Himachal Pradesh

Look at the women and children busy at picking the tea leaves. Which two states in India have virtual monopoly of tea?

Tea gardens are confined to the valleys of the Brahmaputra and the Surma in Assam extending towards the hills. Tea is also grown in northern Bengal, along the slopes of Nilgiri Hills in the south and Kangra and Kumaon hills of west and central Himalayas. India is the leading exporter of tea rivalled only by Sri Lanka. We are able to earn a good deal of foreign exchange through the export of tea.

Coffee

Coffee is the second most popular beverage of India. A coffee plant requires rich well-drained soil, warm climate and moderate supply of moisture. It grows best in the tropical highlands. In India its production is confined to the state of Karnataka followed by Kerala and Tamil Nadu. The quality of Indian coffee is very good and is, therefore, in good demand even outside India. We export nearly half of our production every year.

Spices

India has been well-known throughout its history for the spices it produces. It produces black pepper, chillies, ginger and cardamom. The spices are generally grown in the areas having constantly high temperature and a very heavy rainfall. In India the production of spices is confined mainly to the Malabar coast of the states of Kerala and Karnataka.

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Fruits and Nuts

India produces a wide variety of fruit. Mango is by far the most important fruit of India and is very widely grown. The delicious varieties of alfanso locally known as *hapus* from Goa and Konkan and the *dasehri* from Uttar Pradesh are exported because of their high quality. India also produces bananas, oranges, pineapples, litchis and coconuts which are essentially tropical fruits.

Cashewnuts are grown in Kerala and the coastal belt of the Karnataka State. The nuts are roasted and their shells are carefully broken up maintaining the kernel intact. This delicate job is done with great deftness by the women workers of the west coast. Despite the tediousness of this job, women workers do not get good wages for doing it. India has been exporting more and more cashewnuts to other countries earning a good deal of foreign exchange in return. However, it has to depend upon imported raw cashewnuts.

Our country also produces fruits like apples, plums, almonds, apricots, peaches, pears and cherries which are essentially the fruits of the temperate climate. They are mostly grown in the valleys of Kashmir and Kulu, and on higher hills of Shimla and Kumaon areas.

Cotton

Cotton, the king among the fibres, is perhaps the most important cash crop of India. It is a kharif crop. A cotton plant does well in the black cotton soil of the Deccan Plateau. It requires high temperature and sufficient rainfall during the growing period. However, it requires sunny and dust-free weather when the balls ripen and are ready for picking. Most of the cotton grown in India is of the short and medium staple variety. The long staple crop is now grown in parts of Punjab, Haryana and their adjoining areas. The major producers of cotton in India are Maharashtra and Gujarat followed by Punjab, Karnataka, Tamil Nadu and Madhya Pradesh. The yield of cotton in our country is still very low.

Jute

Jute, another plant-fibre, occupies a very important position in our country's economy. Being an important foreign exchange earner, it is often called the 'Golden Fibre' of India. Jute plant needs high temperature, plenty of water and rich soils that need to be continually renewed. As a

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result, the cultivation of jute in India is concentrated mainly in the delta of the Ganga in West Bengal. It is now also grown in states adjoining it. Immediately after partition, India was producing very little jute to meet the requirements of its jute mills located around Calcutta. Since then we have made considerable progress in raising the production of jute and becoming self-sufficient in this regard. In our exports of jute goods, we may have to face a very stiff competition from Bangladesh which is more favourably situated in regard to the production of quality jute. Cooperation and not competition would be in the interest of both.

Tobacco

Tobacco is yet another non-food cash crop of India. We stand third in the world in production of tobacco. In India, Andhra Pradesh is the leading producer of tobacco. The other states in which it is grown are Gujarat, Tamil Nadu and Karnataka.

Rubber

Rubber is an important industrial

Photo XVII A Rubber Estate in Kerala

Look at the woman tapping rubber trees and collecting latex. Note the big grass hat worn by a woman worker. What type of climate does it indicate ?

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raw material. It is grown in India almost exclusively in Kerala. Natural rubber is obtained from the latex of the rubber tree. This plant grows well in areas having a high temperature and heavy rainfall well distributed throughout the year. We use all our rubber in the manufacture of tyres and tubes.

Now you would realise how much we owe to our soil in meeting our various requirements. Soil provides us not only the food but also the industrial raw materials like wood, rubber, tobacco, cotton, jute and sugarcane. In fact, many of our industries like the textiles and sugar will be directly affected if agricultural production does not maintain a steady progress.

The New Terms You Have Learnt. *Green Revolution* : Recent developments in agriculture in our country which have led to a considerable increase in agricultural yields of certain cereals mainly as a result of new seeds, application of manures and chemical fertilizers, and the provision of an assured water supply. *Plantation Agriculture* : A system of planting one or more kinds of plants for commercial production in large economic units.

EXERCISES

Review Questions

1. Answer the folowing questions :
   (i) Name the two most important cereals of India.
   (ii) What are the three important millets grown in our country?
   (iii) Name three cash crops of India. Would you now consider wheat as a cash crop and why?
   (iv) Which is the most important plantation crop of our country? Tea, Rubber

2. Distinguish between :
   (i) A cash crop and a plantation crop.
   (ii) Commercial agriculture and subsistence agriculture.

3. Use a single technical term for each of the following :
   (i) Crops sown soon after the onset of the monsoon and harvested in autumn in our country.
   (ii) Crops sown in autumn after the rains and harvested in spring or early summer.
   (iii) The land that has already been brought under the plough but periodically left uncultivated for restoring its fertility.
   (iv) One-crop farming on scientific and commercial lines resembling factory production.

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4. Describe the conditions of soil and climate required for growing rice, wheat and cotton.

5. State various steps taken since Independence to improve Indian agriculture.

Map Work

6. On an outline map of India show the areas producing rice, wheat, tea and cotton.

Topic for Class Discussion

7. *'Items of our daily diet and where from they come'.*

Let the students list various items of their daily diet including breakfast. Then they may find out where they were originally produced. Finally, they may draw conclusions with regard to the interdependence of various parts of the country.

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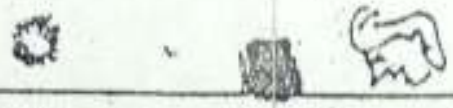
14. Our Water Resources



The Terms You Already Know. *River Basin* : A large area drained by a single river and its tributaries. *Reservoir:* A large artificial lake created by building a dam across a valley for storing water for irrigation and other purposes.

It is not too much to say that water is life. As you know, it is the presence of water that makes all the difference between the earth and the rest of its sister planets. You may recall that our earth is often called 'a watery planet' since the major portion of the earth's surface is covered with oceans. However, it is through the natural processes of evaporation, condensation and precipitation that we derive all our sweet or fresh water. In India the most productive use of fresh water lies in irrigating our farms for raising more and more crops.

The Need for Irrigation

India has already a huge population of about 844 million people. Moreover, it has been increasing at a very rapid pace. Therefore, we have pinned all our hopes on increasing irrigation facilities to produce enough food for our ever-growing population. India already stands next only to China in its total irrigated area. Yet the need for bringing more and more land under irrigation is almost never ending. This is because there is hardly any land that can be brought hereafter under the plough.

Higher yields of crops are made possible through timely and adequate supply of water. The use of fertilizers also helps in this regard, provided the irrigation water is readily available. Above all, irrigation helps us in raising more than one crop on the same piece of land.

Nearly one-tenth of the total area of our country receives a rainfall of over 200 centimetres per annum. On the other hand, a third of its total area receives a rainfall ranging between 0 and 75 centimetres a year. In other

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words, several parts of the country have to put up with heavy downpours, not knowing what to do with this 'too much' of rain water. As a result these and several other adjoining parts of the country often suffer from devastating floods. At the same time there are vast areas which receive too little rainfall to raise any crops.

The distribution of rainfall over a year in our land is equally uneven. Nearly three-fourths of the total annual precipitation is concentrated in a short period of just three to four months in a year.

The figures of the average annual rainfall in many parts of our country are often meaningless. It is due to a lot of variation in the total amount of rainfall from year to year. Thus the monsoons are highly erratic and are far from reliable. As a result famine conditions in one part of the country or the other are not very uncommon.

Furthermore, we live in that part of the world where the rate of evaporation of water is very high. This is more so because the bulk of the rainfall in our country is confined to a few summer months.

Thus it becomes imperative on our part to make an intelligent use of our rain water, in order to irrigate our fields. You will see that all our means of irrigation, namely, tanks, wells and canals, are geared towards this sole objective. With great effort we have now been able to bring nearly one-fifth of our total cultivated land under irrigation.

Sources of Irrigation

Tanks: Since olden days, it has been a common practice to store rain water in natural hollows where rain water is automatically collected. They are called tanks. The rain water thus collected from the surrounding areas is then used during a dry period when the water for crops is in great demand. Tank irrigation today accounts for nearly 8 per cent of the net irrigated area in our country. They are particularly common in the south, especially in Andhra Pradesh and Tamil Nadu where the land is rocky and uneven.

Wells: As you know, all the rain water is not carried away by streams or rivers. A considerable part of it manages to seep into the ground. Water which is thus stored up in the ground is called ground water or sub-soil water. Since early times, we have been using the ground water drawn from the wells for drinking, as well as for irrigation. There are two types of wells—*kucha* and pucca. A pucca well is one which is lined with bricks or stones.

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Various mechanical devices like the pulley, wheel and lever have been in use to draw water from wells. Nowadays pumping sets, working with the help of mineral oil or electricity have become fairly common on our wells.

Tube Wells: So far we were using only the well water which was within easy reach as it was not very deep from the surface. Now with the growing use of electricity in our countryside it has been possible for us to tap even bigger reserves of sub-soil water available at considerable depth. A very deep bore is dug into the earth with a drilling machine and water is drawn out with the help of electricity. Such deep bore wells worked with electricity are known as tube wells.

The tube wells have now become most common in the alluvial plains of Punjab, Haryana, Uttar Pradesh and Bihar. In this area there are huge water reserves at great depths and the need for irrigation is also considerable. These tube wells have proved very useful to our farmers since they ensure a timely and assured supply of water. Generally these wells are least affected by the variations in or failure of rainfall.

Wells and tube wells together account for about 48 per cent of the net irrigated area. Uttar Pradesh, followed by several other states, leads in well irrigation.

Canals: Yet another source of irrigation is the river water. In many parts of the country water of the streams, rivulets or rivers is impounded in an artificial lake by constructing a small dam across the river bed. The water thus stored is diverted to the fields through small channels called canals. Such local canals have been in use in our country since long.

Besides these local canals, there are some seasonal canals although on a big scale. During high floods, water rising above a certain level is diverted through canals. These canals utilizing flood waters are known as inundation canals, where the inundation stands for 'flood'.

These canals are useful for controlling floods. They are useful for irrigation only during the rainy season. Even so they have been found useful in the arid parts of north-west India, where rainfall is very uncertain.

More important are the diversion canals as they are perennial in nature. They are taken out from the main stream by building a small weir across it. About 39 per cent of the net irrigated area is benefited from them.

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Major Canals

Before Independence, undivided India had the world's best network of irrigation canals. After partition the major portion of this intricate network went to Pakistan. Since then we have been able to rebuild our own canal system in Punjab and Haryana. Today it is the most closely knit irrigation canal system of our country. Western Uttar Pradesh is also well served by canal irrigation.

In the states of Punjab and Haryana the important canals are Western Yamuna Canal, the Sirhind Canal and the Upper Bari Doab Canal and the Bhakra Canals. In Uttar Pradesh they are the Upper Ganga Canal, Lower Ganga Canal, Eastern Yamuna Canal, Agra Canal and Sharda Canal.

The canals are also important in the deltas of the Godavari, Krishna and Kaveri. The Periyar river, in the Cardamom Hills, drains into the Arabian Sea after flowing through Kerala. The waters of this west-flowing river have been impounded and taken to the eastern part of the Ghat through a tunnel. It thus irrigates the flat areas around Madurai where the soils are also fertile. The Mettur Dam across the Kaveri supplies water to the canals in the delta region. The network of canals in the Kaveri delta is one of the oldest and the largest in India.

Managing Our Water Resources

In our country the lack of irrigation water in certain areas and the need to control floods in others are the real problems. These two problems are interconnected. They cannot be tackled or solved merely at the local level. In fact, their best solution lies in working at the inter-state or national level. If you glance at the map of India you will find that none of our major rivers is confined to a single state be it the Ganga in the north or the Kaveri in the south.

In view of the extremely uneven distribution of rainfall in our country, we need to store water in those parts where it is too much. We may then divert it carefully to such other parts where it is too little and hence is in great demand. This again we can do and have been doing through extensive network of canals. It is in this way that we can have an integrated scheme of controlling floods, irrigating water-thirsty lands and draining away surplus rain water.

But we cannot use possibly all our water resources for various reasons. There are wide fluctuations in the flow

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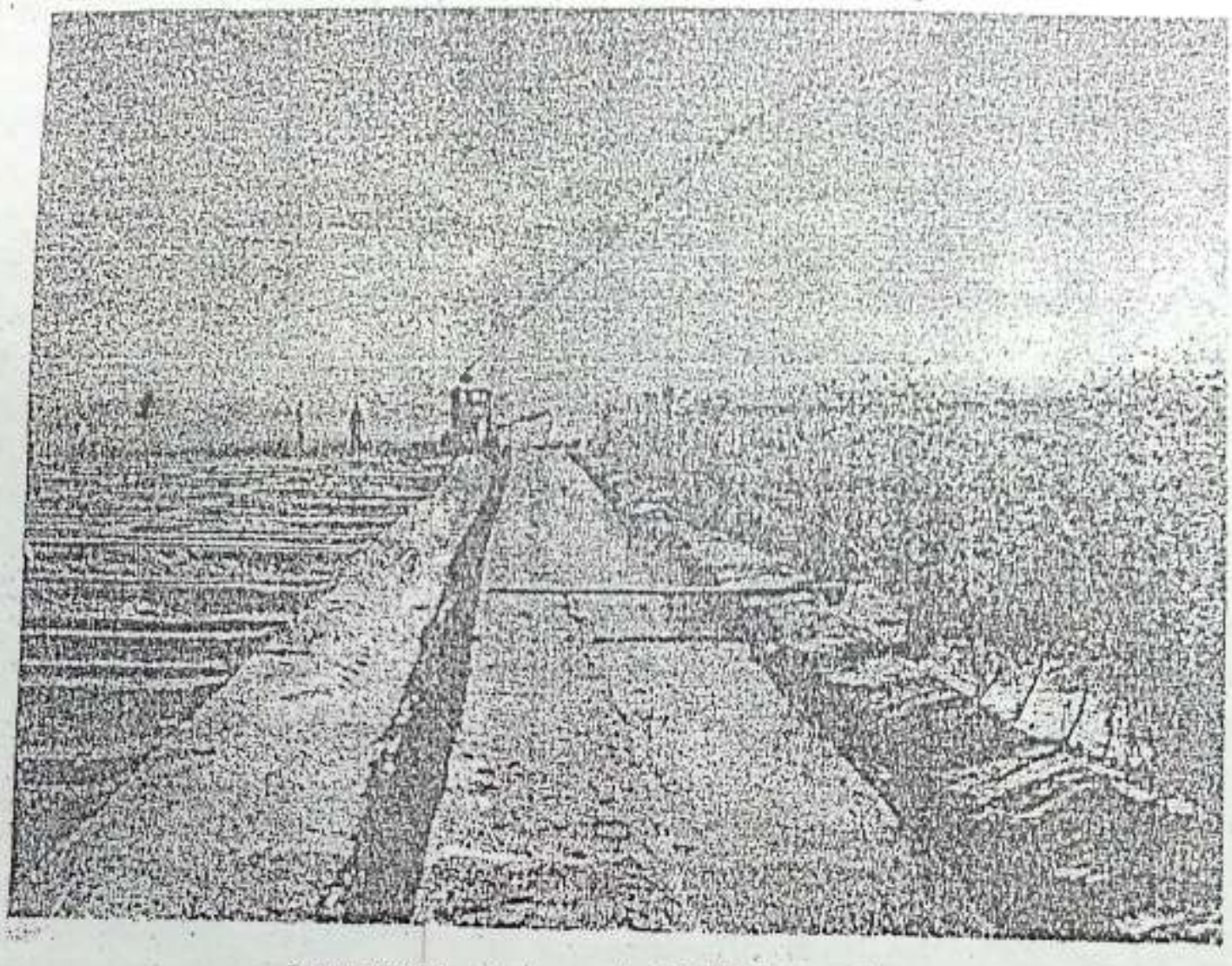

Photo XVIII A new method of irrigating farms

Look at the long tube attached to the tractor. The artificial rain maker is found more effective and economical in the use of water. Where from do you think water has been brought to this Suratgarh farm ?

of the river waters from season to season. Then the uneven nature of the land relief is yet another difficulty in using all our water resources. Keeping these and some such considerations in view, it has been found out that nearly one-third of the total flow of our river waters could be utilized by us for irrigation.

Of this total usable flow of our river waters we have been able to utilize nearly two-fifths so far. We have nearly 45 per cent of the total irrigated area under canal irrigation.

In the above context it would be interesting to compare the rivers rising in the Himalayas with those of peninsu-

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lar India. The rivers rising in the Himalayas are fed both by rain and snow. As a result, they flow all through the year and are perennial. The seasonal variations in their flow is relatively less. In view of this fact they do not require huge dams to be built across their beds to store water. In the upper reaches these rivers flow swiftly forming cascades and waterfalls. They provide useful sites for locating water-power stations to develop water power or hydro-electricity.

The rivers of the peninsular India on the other hand are solely fed by the monsoon rains. As a result, they either become lean or dry out in the long dry season. They generally flow on a rocky and uneven terrain having often steep slopes. They are thus less useful for irrigation and water power, unless their water is stored through gigantic dams demanding huge investments.

In the south most of the dams are built of stone which is strong and readily available at low cost. The dam made of stone are called masonry dams.

River Valley Projects

After Independence, more and more emphasis is being laid on tackling the problems of irrigation, flood control and drainage in an integrated fashion. Big projects have been planned aiming at an all-sided development of the entire river valley. Since they help to serve several purposes at a time, they are known as multi-purpose projects.

In a multi-purpose river valley project one or several big dams are constructed to store water. The water thus stored is then utilized when it is in great demand. Such dams naturally help in checking the floods as well. In catchment areas of these rivers an intensive programme is undertaken to plant trees. This is known as afforestation. It helps to conserve both water and soil. Water is taken down the steep slopes for developing hydro-electricity. Thus these projects become a permanent and inexhaustible source of electricity at low cost. Wherever possible, canals are also made navigable for boats and small ships. These man-made lakes are also stocked with fish. These big river projects are often described as the new temples of modern India, and attract large number of tourists.

The Damodar Valley Project in Bihar and West Bengal was the first of its kind undertaken in India immediately after Independence. It consists of a series of dams built on the Damodar and its tributaries. Besides irrigating

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large area, it checks floods which used to cause great havoc in West Bengal. One of its canals has been made navigable. The importance of this river valley project lies also in the development of hydro-electricity. Power is in great demand for the development of extremely rich mineral resources found in this region.

In the north the Bhakra Nangal Project is another big river valley project. The states of Himachal Pradesh, Punjab, Haryana, Rajasthan and Delhi are its beneficiaries.

The Bhakra Dam with a height of 225 metres is the world's highest gravity dam constructed across the river Sutlej. A huge wall has been built between the hills standing on either side of the river. It is claimed that the cement and concrete used in this dam would be enough to build a highway from Delhi to London. Bricks used in this project, if laid in a single row, would be sufficient to connect our earth with the moon. The great man-made lake behind this dam is known as Gobind Sagar, named after Guru Gobind Singh. It is irrigating 1.4 million hectares of land and producing badly needed hydro-electricity for the north-western part of our country.

The Beas project is yet another important project of Punjab, Haryana and Rajasthan. It consists mainly of the Beas dam at Pong and the Beas-Sutlej link. Beas-Sutlej link brought the waters of Beas river into Sutlej river in Himachal Pradesh in October, 1977 mainly to produce more of power. Beas dam at Pong close to the borders of Punjab and Himachal Pradesh has already been completed principally as an irrigation project.

Rajasthan Canal Project will utilize waters of the Sutlej, the Ravi and the Beas to irrigate land in Ganganagar, Bikaner and Jaisalmer districts in north-west Rajasthan. The main canal in Rajasthan itself would be 468 kilometres long. There will be a feeder canal 215 kilometres long. Considerable progress has already been made on this project.

The Kosi Project in Bihar will help in irrigation and controlling floods. So far the river has been known as the "Sorrow of Bihar" because of havoc caused by the river during floods. When tamed, the river will change North Bihar into a prosperous region. The project will help Nepal as well.

The Hirakud Project across the Mahanadi in Orissa is the world's longest dam and will help to irrigate large areas in the delta of the Mahanadi.

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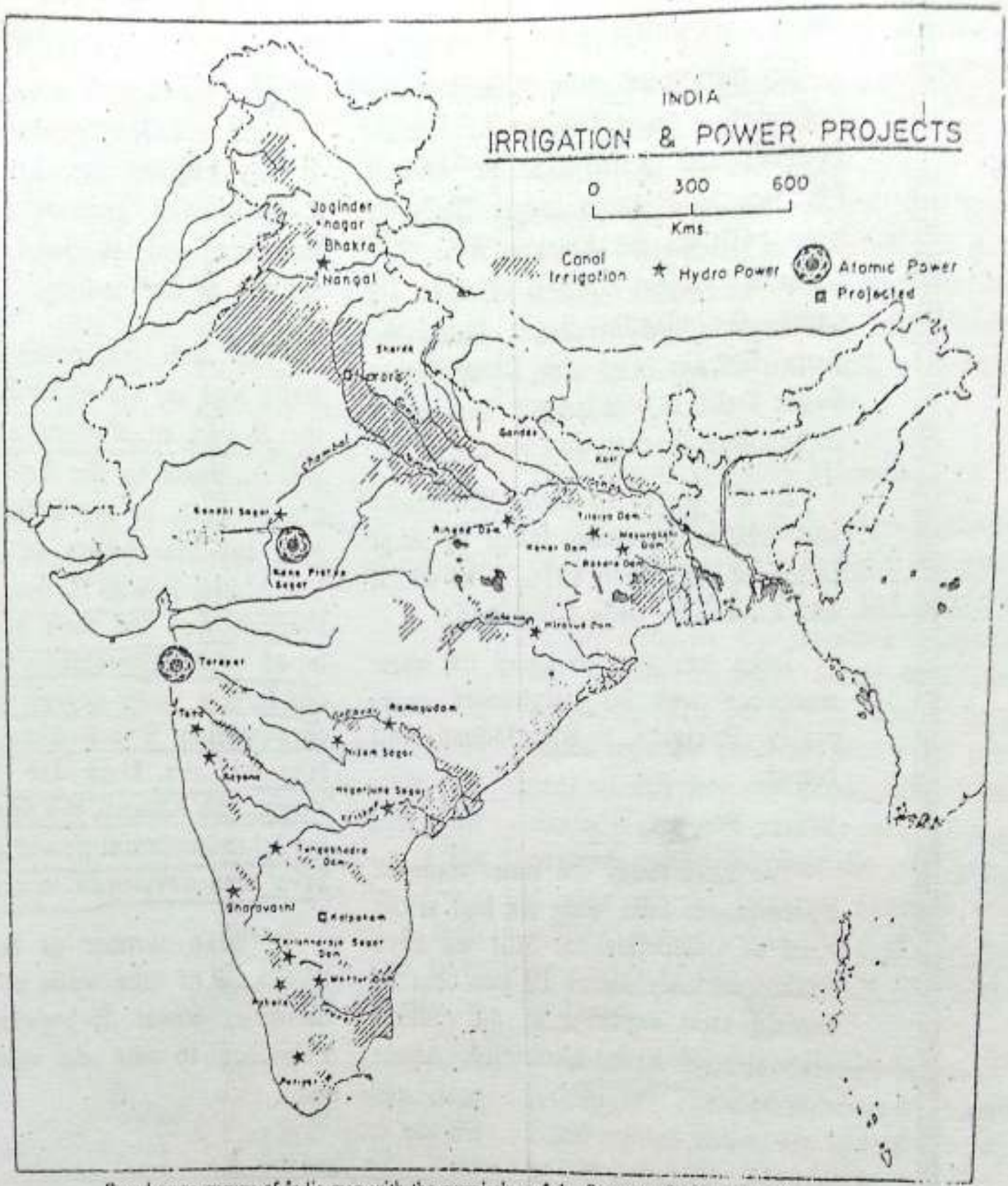

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The territorial waters of India extend into the sea to a distance of twelve nautical miles measured from the appropriate base line.

Fig. 31 India — Major irrigation and power projects

Find out the states having major canal irrigated areas in the country. Name the rivers on which major hydro-power projects have been located. In which states atomic power projects have been constructed?

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In the south, the Tungabhadra Project is a joint venture of Andhra Pradesh and Karnataka. In Andhra Pradesh the Nagarjunasagar Dam has been built on the Krishna river. The Chambal Project consists of three big dams—the Gandhi Sagar Dam, the Kota Barrage and the Rana Pratap Sagar Dam. It will irrigate large areas in Madhya Pradesh and Rajasthan.

In all, there are about 800 major and medium projects taken up after Independence up to 1976-77 of which 445 have been fully completed.

India has also to share its water resources with its neighbours especially Pakistan, Bangladesh and Nepal.

Water Power

We have today ten times more of hydro-power than what we had at the time of Independence. Still we have developed only about 10 per cent of India's total capacity of 42 million kilowatts of hydro-electricity. About 60 per cent of total energy generated is thermal electricity produced from coal. It supplements the 37 per cent of hydro-power generated largely in northern and southern coal-hungry regions of our country.

The first water-power station in India was set up at Sivasamudram on the Kaveri in Karnataka in 1902. It was followed by the Tata Hydro-electric Scheme, in the Bombay-Pune region and the Pykara in Tamil Nadu. The Mandi Power House in Himachal Pradesh was the first scheme developed in the Himalayan region where our largest water-power resources are concentrated. The Bhakra Nangal, the Hirakud, the Damodar Valley, the Koyna, the Rihand, the Sharawathi are the other important power projects that have been developed in recent years.

A large number of factories and thousands of tube wells are being run on water power. It provides employment both to men and women.

The New Terms You Have Learnt. *Ground water:* Water stored up in the ground. Also called sub-soil water. *Inundation canals:* Canals meant for diverting flood waters for checking floods and irrigating fields. These canals are seasonal. *A multi-purpose project* : A big river valley project serving several purposes at a time—irrigation, flood control, conservation of water and soil, navigation, development of electricity, tourism and fishery.

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EXERCISES

Review Questions

1. Answer the following questions:
   (i) What are the three important sources of irrigation? TANKS, CANALS, T.W.
   (ii) What is ground water?
   (iii) In what three ways do the rivers of peninsular India differ from those rising in the Himalayas?
   (iv) Name four important water-power projects of India. DAMODAR, BHAKRA NANGAL, HIRAKUD, KOSI

2. Distinguish between:
   (i) An inundation canal and a perennial canal.
   (ii) A well and a tube well.
   (iii) A tank and a dam.

3. Fill in the blanks:
   (i) Tank irrigation is most common in the States of ..... A.P. ..... and ..... T.N. .....
   (ii) The .....water-power project was the first ever in India.
   (iii) In the Himalayan region the first water-power station was set up at .....
   (iv) The .....dam is the longest dam in the world.
   (v) The highest gravity dam in the world is the BHAKRA dam.

4. Write an essay of about 20 lines on the importance of irrigation in India. Give at least four reasons along with suitable examples.

5. What is a river-valley project ? Explain the various aspects of any one river-valley project in India.

Map Work

6. On an outline map of India show the following:
   (i) The areas with a large number of tube wells.
   (ii) An area where tank irrigation is very common.
   (iii) Areas with a close network of canals.
   (iv) Pykara, Sharawathi, Koyna, Rihand, Hirakud and Bhakra.

Topic for Class Discussion

7. *'Are rivers a source of misery or prosperity ?'*

   Let one group explain in what ways rivers are responsible for causing great damage. Then the other group may explain how these things can be overcome turning rivers into sources of happiness and prosperity. Discussion may be concluded by organizing an exhibition of pictures showing how rivers, when tamed, help to bring prosperity.

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15. Our Underground Wealth

The Terms You Already Know. *Sedimentary Rocks*: Rocks developed as a result of sediments deposited in layers one over the other. *Metamorphic Rocks*: Rocks developed as a result of drastic change in the basic characteristics of original rocks. This happens owing to extreme heat, very high pressure and intense chemical action deep inside the earth's crust.

We have been using every natural resource found on the earth's surface, be it soil, water, natural vegetation or animal wealth. They are of course the most conspicuous of the gifts provided by nature. But is this all that we make use of?

Think of innumerable machines made of iron and steel. Then there are wires made of copper or aluminium helping us to conduct electricity. Remember how coal is used for producing steam or electric energy to run big machines like railway engines. In the absence of petroleum, our motor cars and aeroplanes would be good for nothing. Wherefrom shall we have costly ornaments and jewellery had there been no valuable metals like gold and silver, and precious stones like diamonds? Can we have food to our taste unless there is salt?

All these products which we value so much in our daily life are made of minerals which nature has generally preferred to keep hidden from us. Now that considerable mineral wealth is buried deep under the surface of the earth, we shall see in this chapter what is in store for us beneath the earth's surface. Also, you may like to know how we procure it.

Minerals and Metals

Our country possesses a large variety of mineral-ores in fairly huge quantities. Minerals are of two kinds— metallic and non-metallic. For instance, iron-ore is a metallic mineral. So is bauxite, the ore from which aluminium is obtained. On the other hand, sulphur, coal, petroleum and salt are non-metallic minerals. The important metals are iron, copper,

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...in, zinc, lead, silver and ... are generally solid and ...re often hard and have a ...e of their own. Metals ... They can be drawn into ...ey ...n also be rolled into

... non-metallic minerals, ...oleum are the most use- ... now the most important ...ergy required for trans- ...ustry. We burn these ...els to generate power. ...efore, known as mineral

... Drilling

... pit from which stone is ...nown as quarry. When ... pit is on a big scale, it is ...-pit mine. But in order ... mineral deposits a big ...is dug into the earth's ...mine is called a shaft ... are lowered into it to ...d bring out the mineral

... also some very deep ... ...ve us not water but the ...s and mineral oil. They ... wells. The process of ... wells and bringing out ...own as drilling.

Prospecting Our Mineral Wealth

The scientists known as geologists believe that the story of the earth is written in rocks. They tell us that metallic minerals are found in igneous rocks. Non-metallic minerals are generally associated with sedimentary rocks. Highly sensitive instruments now assist us in prospecting mineral deposits.

Deposits of Metallic Minerals

Iron: India has very huge deposits of iron-ore. It is estimated that we possess about one-fourth of the world's known deposits. Our iron-ore deposits are located in south Bihar and the adjoining parts of Orissa. These two states together produce nearly 85 per cent of our iron-ore production. The rest of it comes from other parts of our southern peninsula. Now the total production of our iron-ore exceeds 40 million tonnes a year. A very large proportion of this iron-ore is exported to Japan.

Bauxite: India is also rich in bauxite deposits. The total reserves of about 1,250 million tonnes are widely spread in the country. Aluminium can be extracted from bauxite only when there is abundant power at low cost. This metal is used in the manufacture of

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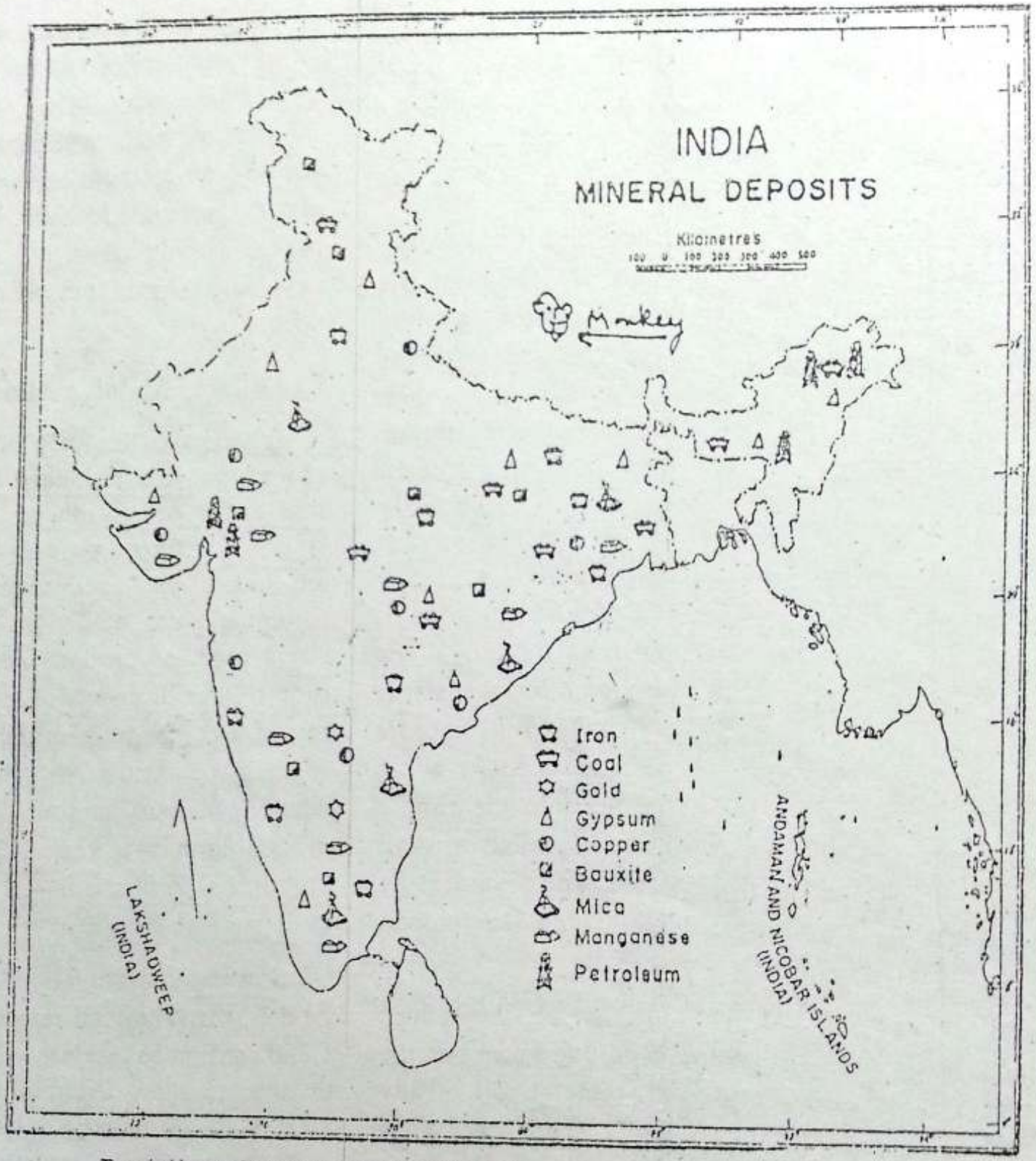

Fig 32 India — mineral deposits

Note that the deposits of iron and coal are in close proximity to one another. Name the states having concentration of iron, coal, manganese and petroleum.

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aeroplanes and electric wires. Bihar, Gujarat and Madhya Pradesh are the major producers of bauxite.

Manganese : The mineral is used in the manufacture of special varieties of steel. It helps to harden steel. India possesses large deposits of manganese-ore. The already measured deposits are estimated to be 80 million tonnes. Orissa is the leading producer of this ore followed by Karnataka, Madhya Pradesh and Maharashtra. We are one of the important exporters of this ore.

Copper : Our known deposits of copper-ore are very scanty. Singhbhum and Hazaribagh districts of Bihar and Khetri fields in Rajasthan have some deposits. Our annual production of finished copper is far from enough in view of our increasing need of electric transmission wires and other instruments.

Gold : India has very meagre reserves of gold. Karnataka is the only gold-producing state in our country. Its Kolar gold mine is one of the deepest mines in the world. Of late its working has become more and more expensive and its share in world production has become more insignificant.

The production of silver, lead and zinc in India is very low. We have to import these metals from abroad to meet our requirements.

Non-Metallic Minerals

Mica : Mica is a non-conductor of electricity. India has the largest deposits of mica in the world. It accounts for nearly two-thirds of the world's production. Bihar accounts for nearly a half of our annual production of mica. The remaining half is shared equally by Andhra Pradesh and Rajasthan.

Salt : We obtain salt from sea, lakes and rocks. Sea salt is obtained mostly along the coasts of Gujarat, Tamil Nadu, Maharashtra and Andhra Pradesh. More than half of sea salt is made along the Gujarat coast. The lake salt comes from Sambhar lake in Rajasthan. It accounts for nearly one-tenth of the total production of salt in India. Rock salt is obtained from Mandi district in Himachal Pradesh. Its annual production is only 1 per cent of the total salt produced in India. We are one of the leading exporters of salt.

Diamonds : India was once known for its diamond mines of Panna in Madhya Pradesh and Golkonda mines in Andhra Pradesh. Now once again the Panna mines are being worked. The mines are worked by a government-owned corporation. Diamonds are in fact metamorphic rocks made of

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carbon. They are, therefore, extremely hard and are used for industrial purposes. They are also used in jewellery.

Gypsum : Gypsum is mainly used in the manufacture of fertilizers, cement and sulphuric acid. Nearly four-fifths of it comes from the desert region of Rajasthan.

Limestone : Limestone is a sedimentary rock originally formed in shallow seas. It is composed of shells and skeletons of dead sea animals like clams, oysters, corals and algae. This stone is used in the manufacture of cement and mortar. Its most important use lies in smelting iron-ore. It is found in the states of Bihar, Orissa and Madhya Pradesh.

Mineral Fuels

Coal : Coal is yet another sedimentary rock. It is derived from an accumulation of various types of plant material buried long, long ago in swamps.

In India coal reserves are estimated differently. There is at least 85,770 million tonnes. However, the best quality coal is estimated to be far less. Our average annual production has reached now 100 million tonnes. We must use our quality coal cautiously. We must also see how best we can utilize our low quality coal. One way of doing it is to produce thermal electricity near the pit-head.

Nearly four-fifths reserves are in the Damodar the states of Bihar and Some coal is also found in Pradesh.

Indian railways are consumers of coal. Railways with iron and steel ind nearly half of our annual Now new coal-fields are developed by the National Development Corporation of India set up by the Government of India. The Korba Mines in Madhya such new mines, and have mechanised.

Mineral Oil : Petrol another mineral fuel found tary rocks. It is believed marine sediments are source of petroleum. In India which may contain reserves oil are found in the Brahmaputra and Surma in Northern Plains, the Ganga West Bengal, the plains of Gujarat the desert region of Rajasthan also likely to be found in the coastal area of Kerala and in the Kaveri, Krishna, Godavari Mahanadi.

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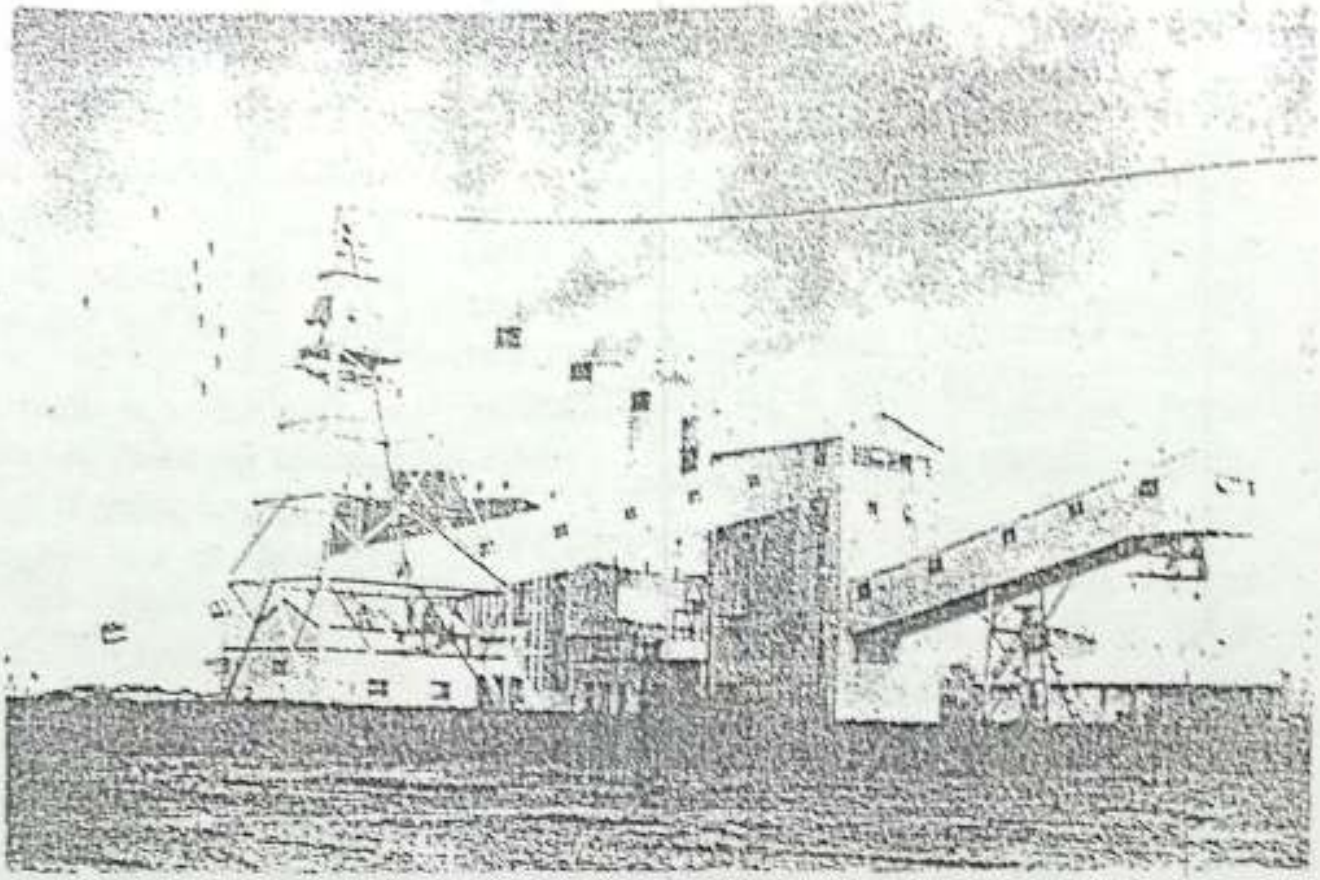

Photo XIX Bokaro power station

This thermal power plant is one of the largest in the country. It produces electricity from coal. Why are such big power plants needed in this region ?

The oil-fields which have been proved, lie in the valley of Brahmaputra in Assam and in the plains of Gujarat. Off-shore drilling is already in progress in Bombay High, 160 km away from Bombay. Our annual production of oil is now nearly 30 million tonnes. Still we are importing a large amount of our national needs from abroad. In view of the growing demand for oil we are exploring for petroleum and setting up a number of refineries to process the local and the imported crude oil. Besides mineral oil, India has found natural gas in Gujarat and Andhra Pradesh.

Atomic Energy : Uranium and thorium are the important sources of atomic energy. We have large deposits of uranium in Bihar and Rajasthan. The monazite sands found along the coast of Kerala yield thorium. In India we have already in operation two atomic energy stations. One is at Tarapur (Maharashtra) and the other is

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near Kota at Rana Pratap Sagar Dam in Rajasthan. Two more plants have been set up at Narora near Bulandshahar district of Uttar Pradesh and the other at Kalpakkam near Madras in Tamil Nadu. The contribution to power generation from sources other than coal and water is yet insignificant.

Production of Electricity

Since we get rain every year, water becomes a perennial source of power. It has its own importance. However, we cannot depend upon hydro-electricity alone. In our country we have also been using coal and petroleum to develop thermal electricity. In the year 1967 the total installed capacity of electric energy, both thermal and hydel, was more than 10 million kilowatts. In 1986 it is more than 45 million kilowatts.

By now all towns with a population above 10,000 have been electrified. On the other hand only about 64 per cent of all villages are now supplied with electric energy in our country. The states of Punjab, Haryana, Kerala, Tamil Nadu and union territories of Delhi, Chandigarh and Pondicherry claim to have electrified all the villages in their areas.

Hardly one-fifth of total electricity is consumed in agricultural sector to satisfy its increasing demand in developed parts of our countryside.

One kilowatt hour of power is equal to 10 hours of continuous work done by one man. It costs very little compared to the wages of manual labour. Therefore, we have to use more and more electric energy to increase production in every field.

Our country is thus endowed with rich mineral resources. They provide necessary raw materials for our industries. Some of them are even more important because they provide power to run the industries. Therefore, they are a must in expanding our industries. However, it must be remembered that mineral resources once used are lost for ever. We should, therefore, conserve them so that we may use them economically. We need to use our mineral resources even more intelligently than what we do with our soil and water resources.

The New Terms You Have Learnt. *Mineral Ores* : Metals in their raw state as extracted from the earth. *Geologists* : Scientists who study the nature of rocks and their formation. *Off-shore Drilling* : Digging deep bores into the bed of shallow seas near the coast for extracting mineral oil.

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EXERCISES

Review Questions

1. Answer the following questions :
   (i) Which is the most important metallic mineral obtained in India?
   (ii) What are the two important mineral fuels?
   (iii) Name three sources of electricity.
   (iv) Name any four major coal-fields of India.

2. Distinguish between :
   (i) Metallic and non-metallic minerals.
   (ii) Rock and mineral-ore.
   (iii) Thermal electricity and hydro-electricity.

3. Make correct pairs from the two columns :

(i) An open pit from which stone is obtained	(a) Seam
(ii) A big and deep bore dug into the earth's crust to obtain mineral deposits	(b) Bauxite
(iii) A mineral-ore of aluminium	(c) An open-pit mine
(iv) A metamorphic rock composed of carbon	(d) Quarry
(v) Layers in which coal is found	(e) Shaft mine
	(f) Diamond

4. Complete the following statement with the most appropriate ending :
   Hydro-electricity is very important because
   (a) its production is always very easy.
   (b) it always costs very little.
   (c) it is produced from a perennial source.
   (d) we have very large resources for its development.

5. Give a brief account of our iron and coal deposits naming the most important states in which they are found.

Map Work

6. On an outline map of India locate the following :
   (i) One atomic power plant in operation.
   (ii) The first hydro-electric power station.
   (iii) The new oil-field.
   (iv) The river valley where our largest coal deposits are found.

Topic for Class Discussion

7. *'Which is the most important —coal, petroleum or water-power?'*

Let the class divide itself into three groups, each representing one item. Each group may be then asked to present its case to the class. See if the class can reach any common conclusion.

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16. Our Manufacturing Industries

The Terms You Already Know . *Small-scale Industries* : Industries in which not many labourers are employed in each unit. *Civilization* : An advanced stage of civilized and social life.

We derive cereals, fruits and vegetables from the soil. Milk and meat are obtained from animals. We get wood from trees. Wide range of minerals are procured from the deposits of the earth. All these products which we obtain directly from nature are called primary products. Agriculture, animal-rearing, fishing, lumbering and mining are organised human efforts to obtain primary products. They are, therefore, called primary industries.

Many of the products cannot be utilized by us unless they are further processed. We do not consume primary products like wheat, sugarcane, cotton, surplus milk, logs, and iron-ore just in their original form. We use them as bread, sugar, cloth, butter, furniture and iron bars. The products which have been processed and transformed into utilities are called secondary products. The organized human efforts to transform primary products into secondary products are known as secondary industries.

Growth of Modern Industry

Formerly the work of processing primary products into secondary products was done at home by members of a family. The work was done with simple hand-operated tools. It involved manual labour and use of muscle or animal power.

In course of time all this has changed. The simple tools like a wheel, a pulley and a lever gave place to more and more complicated and powerful machines. They were run not with muscle or animal power but with the help of energy derived from water, coal or mineral oil. One single machine would do what even a few hundred persons would be unable to

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perform. Thus they would produce a lot more in much a shorter period of time. Furthermore, articles produced with the help of machines on a large scale were of the uniform size and quality.

A house was too small a place for these 'giants' to work efficiently. Therefore, the place of work moved from a humble cottage to a big establishment called a factory or a mill.

The use of machines called for specialization and division of labour. A big job was broken up into a series of small steps in a definite sequence. Each worker was responsible for only a part of a small job which he could do more quickly and efficiently. We are now living in this age of 'modern industry'.

Nowadays, growth of industry depends upon a large number of factors. First of all, there should be adequate and continuous supply of raw materials. In India, many of our industries depend upon agricultural raw materials like cotton, jute, sugarcane, oil-seeds, rubber and tobacco. Another set of industries are based on mineral resources such as iron-ore, mineral oil, coal, gypsum, salt and sulphur. 2 Supply of cheap electric energy is a must for the rapid growth of industries. 3 Adequate facilities for quick transport are equally necessary. 4 Industries also require huge amounts of money or capital for setting up machines, purchasing raw materials and paying wages to labour. 5 Well-trained and skilled labour should also be readily available. 6 Finally, there should be a good demand or market for the products of industry. Fortunately, we fulfil most of these requirements.

Industries are classified in various ways. Industries employing a large number of labour in each unit are known as large-scale industries. Cotton and jute textile industries are good examples of such industries. Industries producing fans, cycles, sewing-machines belong to small-scale industries employing a small number of people. Industries most common in villages are called village industries. Handloom, khadi and leather are examples of this type. Then there are handicrafts and cottage industries in which artisans work with wood, cane, ivory, brass, stone, clay and the like. Industries are also classified according to ownership. Industries belonging to individuals or a group of them are known as private sector industries. Then there are certain industries which are owned and managed by the

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Government, for instance defence industries. They are said to be in the public sector.

INDUSTRIES BASED ON AGRICULTURAL PRODUCE

In India, industries depending upon agriculture have a great part to play. Textiles, sugar, beverages, vegetable oil, tobacco and rubber are the major industries under this category. Then there are rice mills, flour mills and oil mills, scattered almost all over the country.

Textile Industry

This is one of the oldest and the most famous industries of India. Even today the spinning wheel and handloom are seen in almost every village, providing employment to a large number of people.

The modern textile industry was born in India in 1854 when the first cotton mill was set up in Bombay with Indian capital. At the end of 1977 there were 704 cotton mills, producing 3,921 million metres of cloth during 1979-80. The industry provides direct employment to about one million workers. The industry is concentrated in cotton-producing states of Maharashtra and Gujarat. Bombay and Ahmedabad are the two leading centres of this industry. The other centres are 'Coimbatore, Solapur, Calcutta, Kanpur, Nagpur and Indore.

A considerable part of our cotton textiles is produced on handlooms and powerlooms. The beautiful Indian sarees are produced in this sector. So is the entire production of Khaddar cloth made out of hand-spun yarn. Over 4,000 million metres of cloth still produced yearly in this sector. We now export different varieties of cloth to foreign countries including the United Kingdom and the United States of America.

Jute Textiles : This is yet another important industry of India. There are over 106 jute mills in our country. Most of them are located along the river Hooghly around Calcutta. India has nearly half the world's total capacity of jute manufacture. Our total production of jute goods in the year 1979-80 was over one million tonnes.

Woollen Textiles : There are about 50 woollen textile mills in the country. Nearly half of them are situated in the state of Punjab. The important centres of this industry are Amritsar, Dhariwal, Kanpur, Bombay, Srinagar, Bangalore and Jamnagar.

Silk Textiles : India has been famous for its silk textiles since long.

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Its silk products have been in great demand in many parts of the world. The states of Karnataka, West Bengal, Jammu and Kashmir, Himachal Pradesh and Assam are the producers of raw silk.

Important centres of silk industry are Murshidabad, Varanasi, Srinagar, Amritsar, Mysore, Thanjavur and Kanchipuram near Madras.

Synthetic Textile : India now also produces rayon, nylon, terene and dacron varieties of man-made fibres developed through chemical processes. They are known as synthetic fibres. The important centres of the industry are Bombay, Ahmedabad, Surat, Calcutta, Amritsar, Gwalior and Delhi.

Sugar Industry

India is the largest producer of sugarcane. If we take into consideration *gur*, khandsari, and sugar produced from sugarcane, India stands first in the world. There were about 307 sugar mills in the country in 1980. Half of the sugar mills are located in Uttar Pradesh alone. The average annual production of sugar now exceeds 4 million tonnes. India is now in a position to export its surplus production, after supplying the home needs.

Vegetable Oil Industry

India is the leading producer of oil-seeds. Oil derived from the oil-seeds such as groundnuts and cotton seeds is converted into vegetable ghee or vanaspati.

Paper Industry

The first machine-made paper was manufactured in India in the year 1870 near Calcutta. Now there are nearly 121 paper mills in the country producing nearly 10 lakh tonnes of paper and paper board every year. In view of the growing demand for newsprint, India has set up a newsprint mill at Nepanagar in Madhya Pradesh. Its capacity is being raised to 75,000 tonnes per annum. Nearly 70 per cent of the raw material for our paper industry comes from bamboo pulp.

INDUSTRIES BASED ON MINERALS

Most of the modern industries fall under this category. Iron and steel industry is often called a key industry as it serves as a backbone to many other industries.

Iron and Steel Industry

India possesses abundant reserves of iron-ore and limestone. It has some coal reserves as well. Deposits of all the three minerals are found close to one another. This has helped in avoiding transport costs. In India there are six big iron and steel plants. They are

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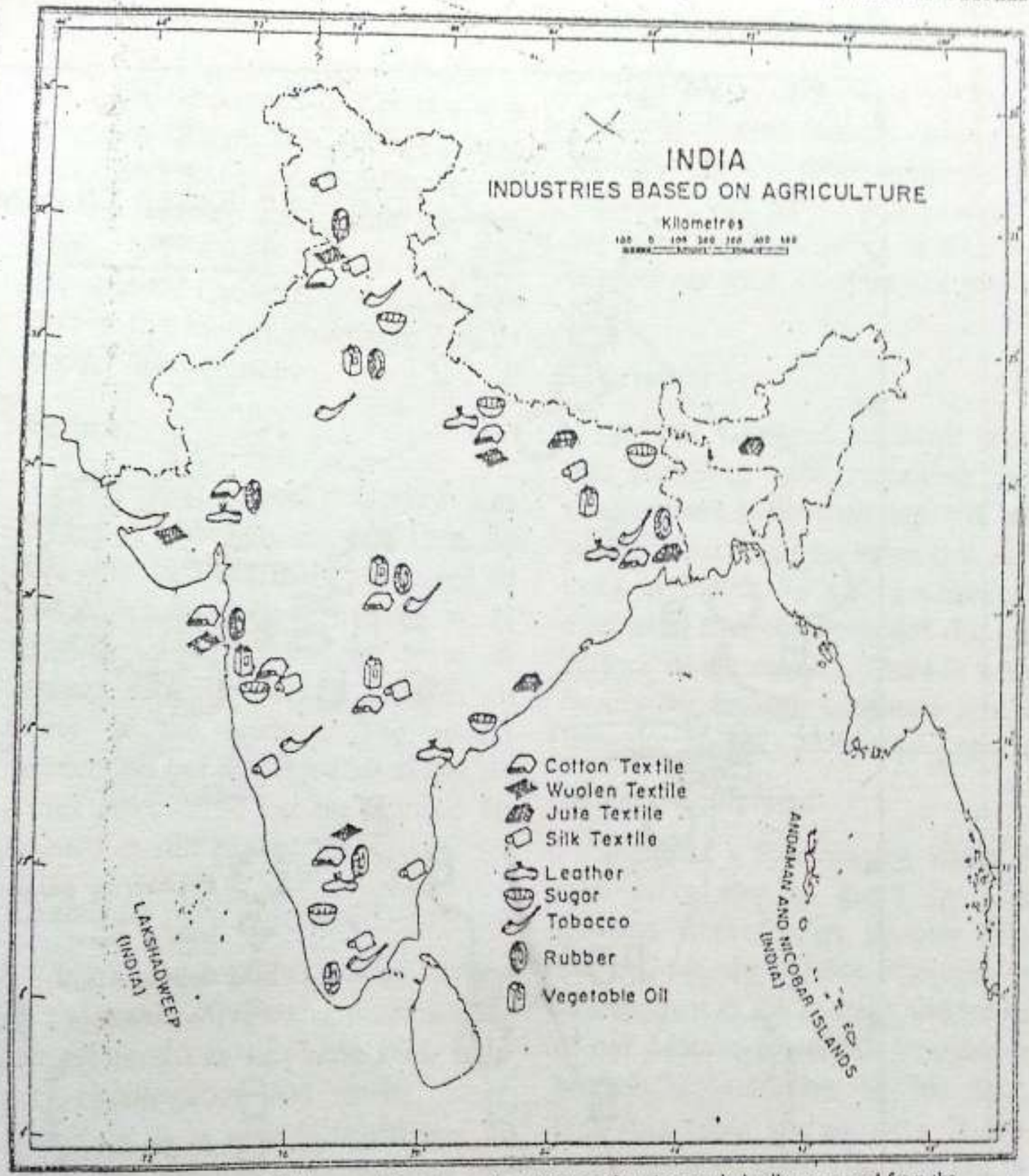

The territorial waters of India extend into the sea to a distance of twelve nautical miles measured from the appropriate base line.

Fig 33 India — Agriculture-based industries

Note the distribution of jute, cotton and sugarcane industry. Which of the industries are related to animal products ?

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at Jamshedpur, Burnpur, Bhilai, Rourkela, Durgapur and Bokaro. A part of the new steel plant at Bokaro is still under construction. All these centres are located near the iron and coal fields in Bihar, West Bengal, Orissa and eastern Madhya Pradesh. There is another steel plant at Bhadravathi in Karnataka. The annual production of finished steel from these plants is about 7 million tonnes and that of pig iron 10 million tonnes. In addition to these, three more steel plants are going to be located in Karnataka, Tamil Nadu and Andhra Pradesh.

Railway Engines and Wagons

India with its large network of railways requires railway wagons, coaches and railway engines in large numbers. We are now self-sufficient in most of our rolling-stock requirements. We now export railway wagons on a very large scale. Broad gauge locomotives running on steam and electricity are manufactured at Chittaranjan loco works in West Bengal. Engines for metre gauge are produced at Jamshedpur and the diesel engines at Varanasi. Railway coaches are produced at Perambur near Madras and wagons are manufactured at a number of places.

Ship-building

India has now set up ship-yards at Vishakhapatnam, Cochin, Calcutta and Mazagaon near Bombay. The ship-yard at Vishakhapatnam has produced a number of ships. The Cochin ship-yard is under construction. The Mazagaon ship-yard is meant for manufacturing ships for the Indian Navy, and that of Garden Reach near Calcutta builds tugs, barges, dredges and coasters.

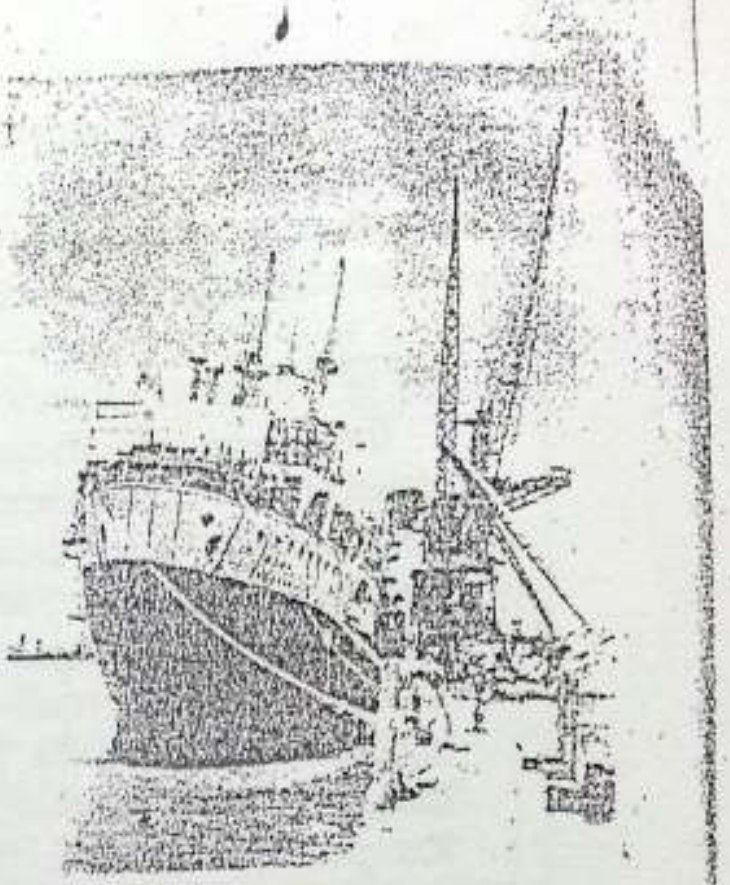

Photo XX A ship under construction

This passenger ship — S.S. Andaman — has been made at the Hindustan Shipyard, Vishakhapatnam.

Automobiles

India manufactures cars, trucks, jeeps and scooters. Fiat car is produced

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in Bombay, Ambassador in Calcutta and Maruti in Gurgaon. Trucks or commercial vehicles are produced at Jamshedpur and jeeps in Bombay.

Aircraft

India now manufactures certain varieties of small aircraft. Indian aeroplanes are being used by Indian Airlines and Indian Air Force. We now produce Krishak, Pushpak, Gnat, Mig and Avro 748 varieties of aircraft. The important centres of the industry are Bangalore, Kanpur, Ojhar near Nasik, Koraput in Orissa and Hyderabad in Andhra Pradesh.

Heavy Engineering and Machine Tools

India has now started making its own machinery for different industries. It produces machines for the textile, sugar, and mining industries. The Heavy Engineering Corporation at Ranchi now manufactures big machines and equipment required for setting up iron and steel plants. The Hindustan Machine Tools produces a large variety of small and medium machines and has now developed several units of its own at places like Bangalore, Pinjore (Haryana), Hyderabad, Kalamassery in Kerala and Srinagar in Kashmir. One of the units of the Hindustan Machine Tools now produces watches as well. These units are in the public sector and are in a position to export machinery to other countries.

India now produces a large variety of engineering goods like water pumps, diesel engines, electric fans, sewing-machines, bicycles and the like.

Oil Refining and Petro-chemicals

With the growing use of automobiles the demand for petroleum has been rapidly increasing. In spite of the production from new oil-fileds in Gujarat and at 'Bombay High', we have to import large quantities of crude oil from Iran and other countries around the Persian Gulf. In order to refine crude petroleum several oil refineries have been set up. The oldest oil refinery is at Digboi in Assam. New oil refineries have been set up at Bombay (two refineries), Vishakhapatnam, Barauni, Noonmati, Madras, Haldia (near Calcutta), Cochin and Koyali near Baroda. In the year 1979-80, 27 million tonnes of crude oil was refined. Two new refineries at Bongaigaon (Assam) and Mathura (Uttar Pradesh) have been set up now.

Fertilizers

In order to increase the supply of food, the production of fertilizers in

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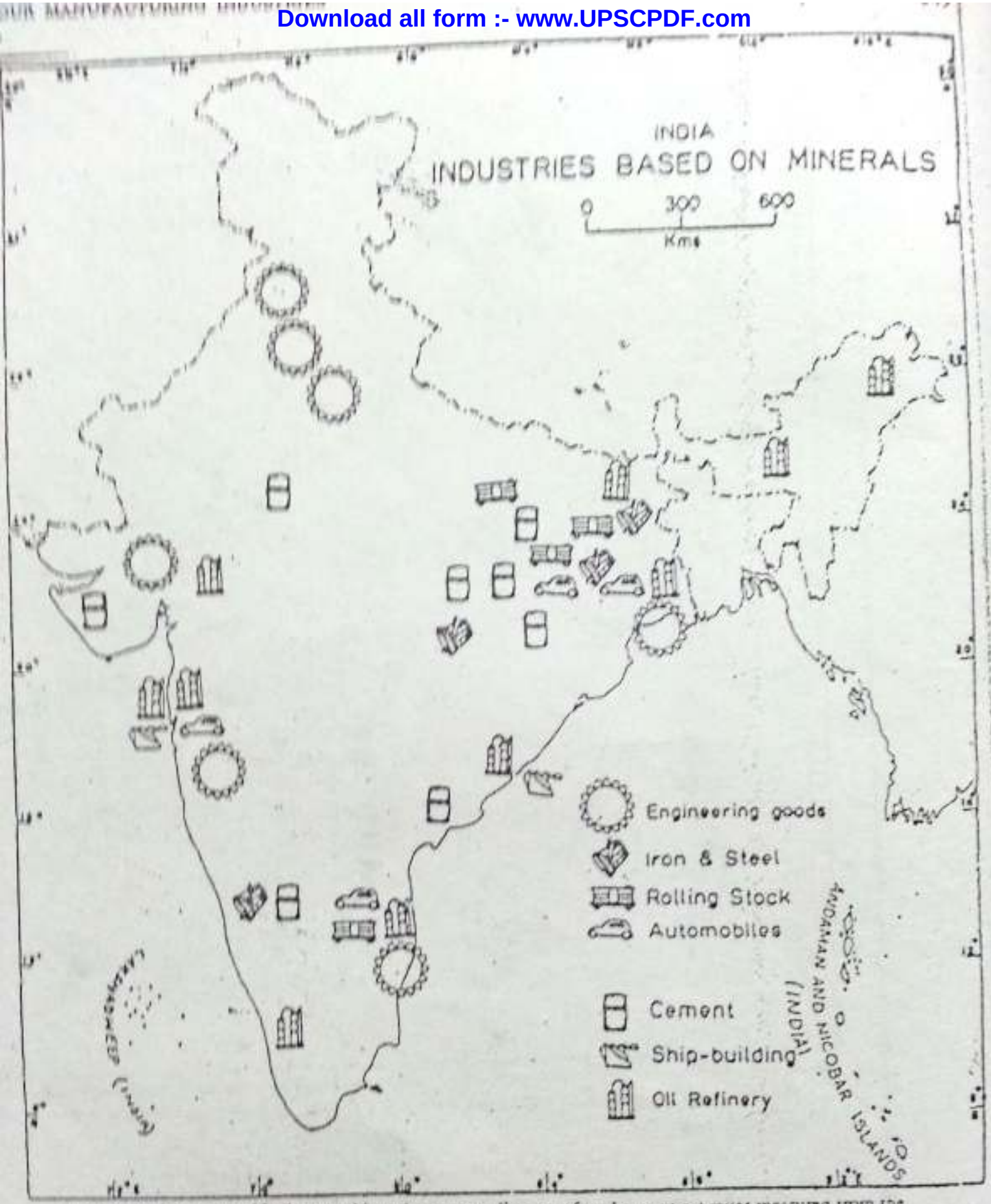

The territorial waters of India extend into the sea to a distance of twelve nautical miles measured from the appropriate base line.

Fig 34 India — Mineral-based industries

Note the concentration of industries in Bihar, West Bengal and Orissa. How will you explain it ?

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our country has become very necessary. The fertilizer plants were first of all set up at Alwaye in Kerala and at Sindri in Bihar. This followed by a number of new plants in different parts of the country during the last few years. In 1979-80 the production of nitrogenous fertilizers was 22.26 lakh tonnes and that of phosphatic fertilizers 7.7 lakh tonnes.

Cement

The first cement factory was started at Madras in the year 1904. By the year 1979-80 India has raised its annual production of cement to 17 million tonnes. There are now 60 cement factories located in different parts of the country. The annual production has increased by nearly six times since 1950 but the demand for cement is still higher.

Chemicals

India now produces a large number of chemicals, drugs and pharmaceuticals. It produces sulphuric acid, soda ash, caustic soda and several other chemicals. It is now self-sufficient in antibiotics and a large number of synthetic drugs. Even surgical instruments are now produced in India. Penicillin is produced at Pimpri near Pune. D.D.T. is produced at Delhi and Alwaye.

Heavy Electrical Equipment

The Heavy Electricals at Bhopal produces electric motors, generators, transformers and other equipment for setting up big power plants. Another big plant has been set up at Hardwar. It produces water turbines and generators.

Electronics

A large variety of electronic goods like telephone, radio receiving sets, transistorised radio receiving sets and television sets are now being manufactured in India. We also manufacture electronic equipment needed for the defence of our country. There is a big factory for making telephone sets at Bangalore. ← Tel. producing centre

Defence Equipment

India, as a free country, needs to take every step to guard its long frontiers from foreign invasion. For this purpose, the defence equipment is as important as the courage and valour of our defence personnel. In order to become self-sufficient in this field, India has taken several steps. It now produces small arms, guns and ammunition in the country. It also produces vehicles for the army. India has set up a tank factory at Awadi in Tamil Nadu. India now produces missiles on its own. However, this is one area in

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which we have to be on our guard and keep ourselves abreast of the rest of the world.

India has thus made rapid strides in almost every industry. Free India has achieved within a period of about thirty years what many countries could not achieve even in hundred years of their earlier industrial development. In view of our population, however, we have yet to go a long way to raise the standard of living of our people. The only way to do it is to expand our industries as quickly as possible.

The New Terms You Have Learnt. *Primary Industries* : Organized human effort to obtain primary products. *Secondary products* : The new products made after processing and transforming the primary commodities into utilities. *Manufacturing industries* : The organized human effort to transform primary products into secondary products.

EXERCISES

Ans (ii) Agri., lumbering, fishing mining.

Review Questions

1. Answer the following questions :
   (i) What is an industry? State three characteristic features of a modern industry.
   (ii) What are the four important primary industries of India?
   (iii) Which State leads in sugar industry? U.P.
   (iv) Name three makes of motor cars produced in India.

2. Distinguish between :
   Primary industry and secondary industry.

3. Make out correct pairs from the two columns :

(i)	The leading centre of cotton textile industry Bom.	(a)	Bangalore
(ii)	The manufacturing centre of jute textile Calcutta	(b)	Perambur
(iii)	The oldest iron and steel town Jamshedpur, Chittaranjan	(c)	Jamshedpur
(iv)	The centre producing electric railway engines	(d)	Bombay
(v)	The place where railway coaches are manufactured Perambur	(e)	Sindri
(vi)	Ship-building yard VISM.	(f)	Bhopal
(vii)	Centre for producing telephone sets Bangalore	(g)	Vishakhapatnam
(viii)	A big fertilizer plant Sindri	(h)	Chittaranjan
		(i)	Calcutta

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done 4. What factors help the rapid growth of industry? Explain this with the example of iron and steel industry in India.

done 5. Give a brief account of the cotton textile industry in India under the following points : causes of early growth, location and importance of handlooms.

Map Work

6. On an outline map of India show the following :
   (i) Three places known for iron and steel plants in the public sector
   (ii) Three places known for factories making aircraft
   (iii) Three oil refineries
   (iv) Three centres of the Hindustan Machine Tools

Topic for Class Discussion

7. *'Large and small-scale industry in our country.'*

   Let two groups in the class take sides and argue their own cases. Record the conclusions.

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17. The Lifelines of Our Country

map

The Terms You Already Know. *Highway* : A Big and important public road connecting distant places. *Pass* : A gap in a mountain range providing natural or easy route across.

The modern means of transport have been able to conquer distances making our country a small well-knit unit.

The roads, railways, navigable rivers and canals, coastal waterways and airways have all now become the common means of transport. It is along them that the people and goods move speedily and conveniently from one place to another. Then there is a network of post and telegraph offices spread all over the country. All our towns and big villages have been interconnected with telegraph and telephone wires. Even more important is the national network of radio and television stations.

It is these means of transport and communication that are rightly called the lifelines of a country. They help in bringing us close to one another, both culturally and economically. The importance of these lifelines in the defence of a vast country such as ours cannot be overemphasized.

Trade and Transport

For a while, think of the various articles of daily use in your life. Even a cup of tea or coffee cannot be had unless we are able to get tea from Assam, coffee from Karnataka and sugar from Uttar Pradesh. Maybe, the bread you ate this morning was made of wheat brought from the state of Punjab or Haryana. It is likely that vegetable ghee used in cooking was made from groundnuts produced in Gujarat. The white table salt must have come from Rajasthan unless it is sea salt from Gujarat. The spices that make your food so tasty come all the way from Kerala. So do cashewnuts, coconuts and copra. The bananas and oranges that you buy in a local market are in all probability produced in a

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farm in Maharashtra. Apples, grapes and dry fruits must have made their way from the valleys of Kashmir of Himachal Pradesh.

Have a look at your clothes. Maybe, your shirt is made of cloth produced in a textile mill in Bombay. A colourful saree may have been woven into cloth somewhere in Karnataka or Tamil Nadu. The yarn for the same is likely to have been spun in Coimbatore or Bombay, whereas cotton from which it was spun had been grown somewhere in Maharashtra or Gujarat. A sweater or the woollens which you wear in winter are likely to have come from Punjab. A fine shawl and a beautiful carpet in all probability are the prized products from Kashmir.

The gunny bags which we use for packing foodgrains come from West Bengal—the producer of jute, the golden fibre of India. Coir mats are brought from the extreme south especially Kerala. This state also supplies us with rubber which we require for making various articles of daily use. Footwear which are so essential for us may have been manufactured in Uttar Pradesh.

Timber which we require for making furniture and building houses is likely to have come from the Himalayan region or from Madhya Pradesh. Cement may have been brought from Bihar or Madhya Pradesh. Iron bars and sheets have to be hauled all the way from Bihar, West Bengal or Orissa. This is true of coal which we consume at home or in power houses. Kerosene and petroleum can be had either from Assam or from Gujarat if it is not imported from abroad.

The means of transport help in collecting raw materials at manufacturing centres. They also help in distributing finished products to various parts of the country. In the absence of the modern means of transport severe famines always resulted in great loss of life. Now large quantities of foodgrains are rushed to famine affected areas from elsewhere in no time.

The modern means of transport are a must for making quick movements of our defence forces. They also assist in maintaining a constant supply of ration, ammunition and other supplies to the forces defending our borders. Indeed, the railways in India were built by the British primarily to serve their military needs.

Roads

The importance of roads in India has been realised since early times. The total length of road network in our country now exceeds 19.70 lakh

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kilometres. Thus the total length of the surfaced and unsurfaced roads in our country is nearly two-and-a-half times the distance between the earth and the moon. However, in view of the total area and the huge population of our country, the total length of the roads is rather inadequate.

① The most important roads, running from one end of the country to the other through several states are called national highways. They are developed and maintained by the Central Government. The Government is also responsible for building and maintaining roads in the border areas. During the past few years the Government has been busy in building new roads in the border areas, particularly in the Himalayan region. Some of the important highways connect India with Tibet, now part of China, through the mountain passes. Locate Chumbi valley, Shipki La and Karakoram pass along our northern frontiers.

The important national highways connect places like Bombay, Calcutta, Delhi, Madras, Kanyakumari, Leh, Kandla and Sadiya (Assam) with one another.

② The state highways are the roads which are important enough within a given state. They are developed and maintained by the State Governments. Also there are district roads which are looked after by the local authorities. Finally, there are village roads. All these roads are taken care of by the states concerned.

Railways

The total length of the railways criss-crossing our country was over 70865, kilometres in 1988-89. The railway network in India is the largest in Asia and the fourth largest in the world. Our railways carry over 10 million passengers every day.

Perhaps more important is the fact that there are 405,000 wagons engaged in carrying goods over long distances. Our goods trains carry well over 6 lakh tonnes of goods every day. This accounts for nearly fourth-fifths of the total goods traffic in the country. Thus railways are our principal national means of transport.

The important railway routes connect the major cities of India—Bombay, Calcutta, Delhi and Madras—with one another. Most of the railway trains, either originate or terminate at one of these four cities of India. Look at the map and locate trunk routes inter-connecting the four major cities of India.

Indian railways are divided into three categories according to the width of the railway gauge—the broad gauge

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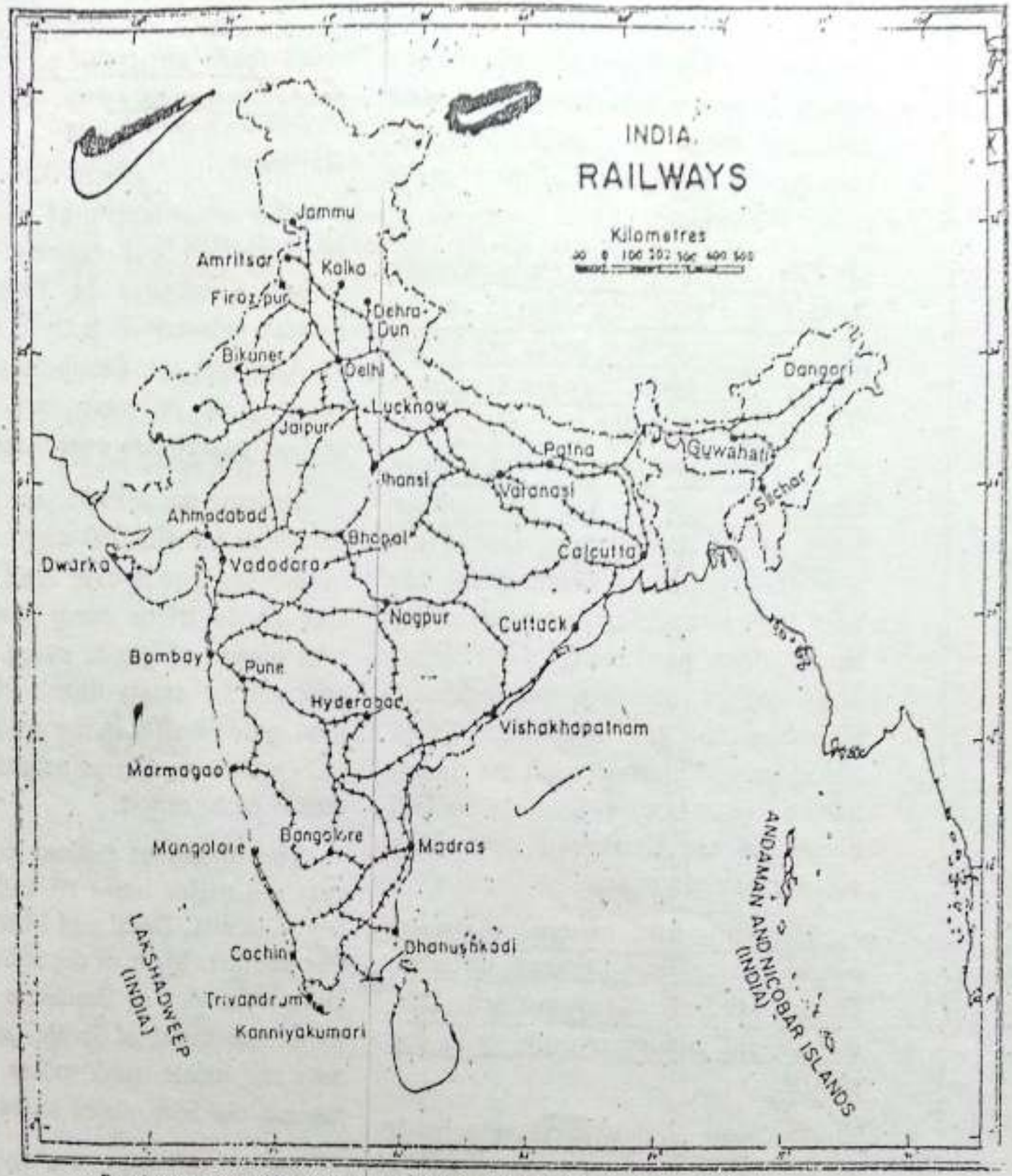

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The territorial waters of India extend into the sea to a distance of twelve nautical miles measured from the appropriate base line.

Fig. 35 (a) - India — Major rail routes

Note the major trunk rail routes and their terminal stations.

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(1.69 metres), metre gauge (1 metre) and narrow gauge (0.77 metre). The narrow gauge railway track is generally confined to the hills. Nearly half of the railway track consists of broad gauge.

About 8880 kilometres of the railway-track has been electrified. It ensures quick and clean travel. It helps to save or conserve our coal. It has also helped in relieving pressure on railway wagons. Many important long distance trains now run with diesel engines with increased speed. Some of our fastest trains are Rajdhani Express between Delhi-Calcutta and New Delhi-Bombay and Satabdi Express between Delhi-Bhopal Delhi-Chadigarh and Delhi-Lucknow. Some other mail and express trains are also running at 100 to 110 km. per hour.

Waterways

India with a long coastline has 11 major ports. They are Bombay Madras, Calcutta, Cochin, Marmagao, Vishakhapatnam, Kandla and Paradip, Mangalore and Nhava, Sheva Tuticorin. Major ports serve as gateways of international trade and commerce. India is the second largest ship owning country in Asia and ranks sixteenth in the world. Indian ships move on most of the sea-routes of the world and also connect our islands with the mainland.

The cargo handled by Indian ships

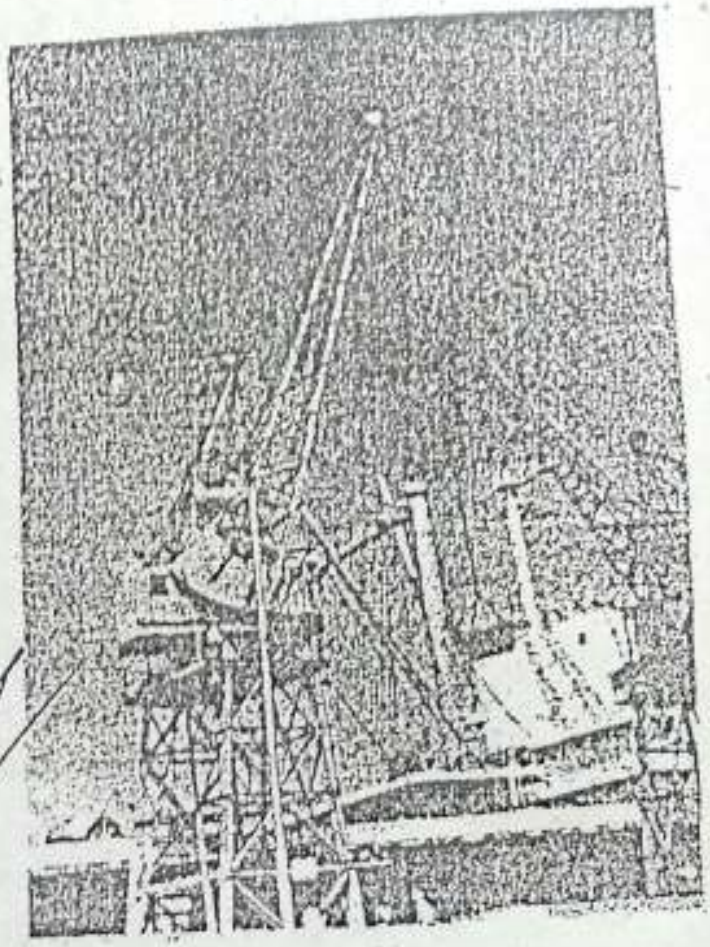

Photo XXI Loading iron ore at Marmagao

See how iron-ore is being loaded on the ship. To which country do we export iron-ore ?

in our overseas trade in 1978-79 formed 40 per cent of our trade with other countries.

In India inland navigation is almost insignificant. Only 5,200 km. of inland waterways are also navigable by steamers. The Ganga and Brahmaputra are the two navigable rivers of India. Also navigable are the lower reaches of the Godavari and Krishna. The canals of these two rivers, the Buckingham Canal in Tamil Nadu and Andhra Pradesh, and West Coast Canals of Kerala are the only navigable canals in India.

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Airways

A large number of aeroplanes span our skies. They help in carrying passengers, cargo and air mail. There are about 88 aerodromes in the country. In the year 1979 well over 6.6 million passengers were carried by air. This is nearly fourteen times more than what we could do in the year 1947.

India has four major international airports. They are Bombay, Calcutta, Delhi and Madras. Even the major national air traffic is confined between these four places. These places are in turn connected with various regional towns. The Indian Airlines is mainly responsible for the internal traffic. It has also a few flights with the neighbouring countries like Burma, Sri Lanka, Nepal and Afghanistan. It has now acquired jet planes (Boeing 737) for its trunk routes to cope with the growing air traffic.

Air travel has in recent years become very important in the north-eastern part of the country. Why should it be so? Look at the map and see how difficult it is to reach Tripura, Manipur, Nagaland, Meghalaya, Arunachal, Mizoram and Assam from Calcutta. In the hilly and mountainous regions along our northern frontiers helicopter is the most convenient means of transport. It helps to maintain constant supplies to the jawans guarding our frontiers.

India has a big international air service—Air India. It carries international air traffic to as many as 34 countries. There are regular air flights linking India with a large number of countries of the world. Maharaja—its symbol—is now well known in almost every part of the world. The "Air-India" has now acquired the jambo jets, the largest and the faster commercial planes in the world.

Means of Communication

The means of transport and communication are closely related to each other. There cannot be proper development of one without the other. Can you think of railways and airways without proper means of long distance communications?

There are well over 1,38,000 post offices throughout the country. The total number of telegraph offices is over 20,000. There are more than 2.5 million kilometres of overhead telegraph wires in our country. The underground cables which ensure more safety and efficiency are two-and-a-half times as long. Urgent personal messages are sent through telegrams at negligible cost.

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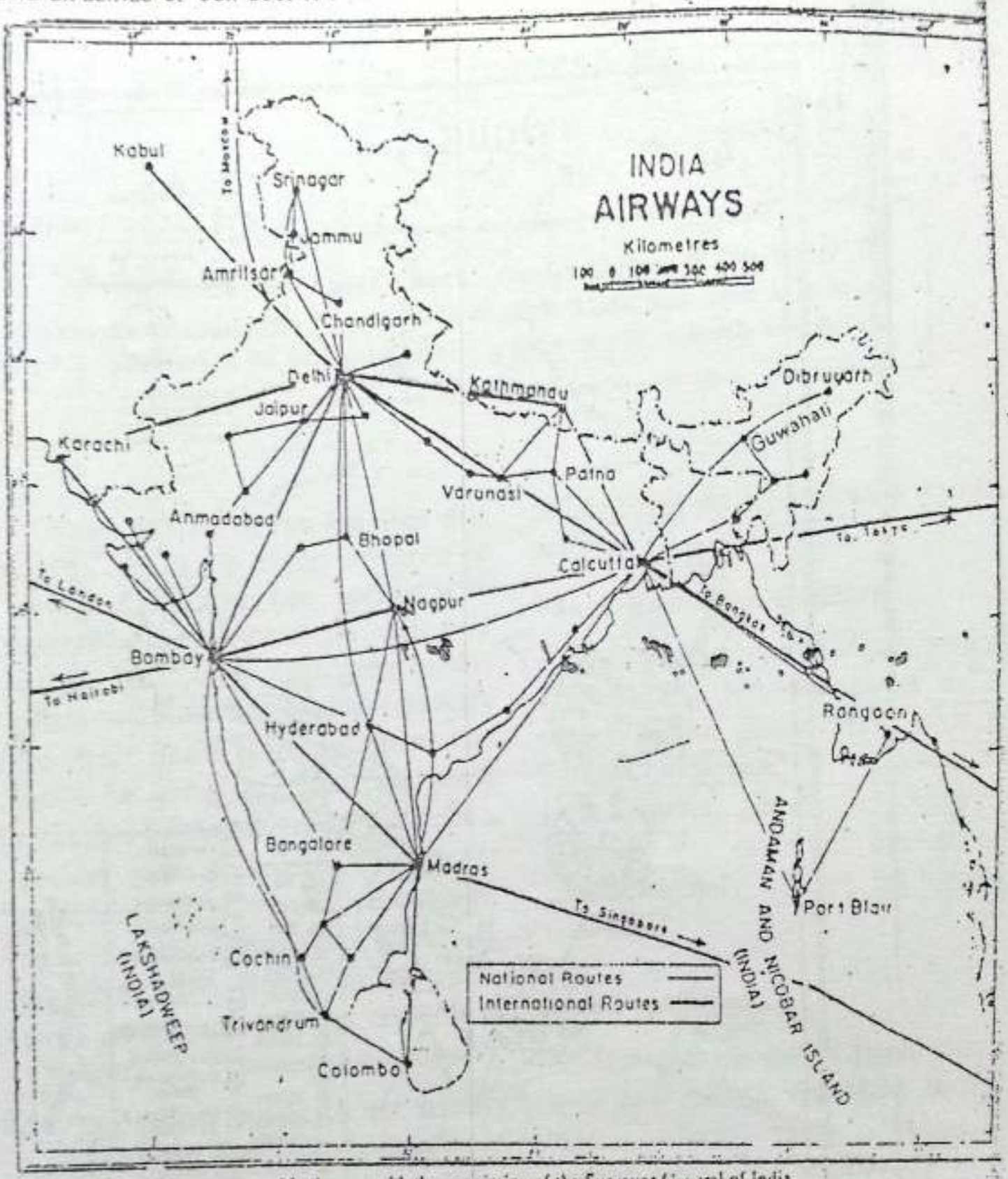

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The territorial waters of India extend into the sea to a distance of twelve nautical miles measured from the appropriate base line.

Fig. 35 (b) India — Major air routes

Note the airways connecting Delhi, Madras, Calcutta and Bombay with other parts of India and other countries.

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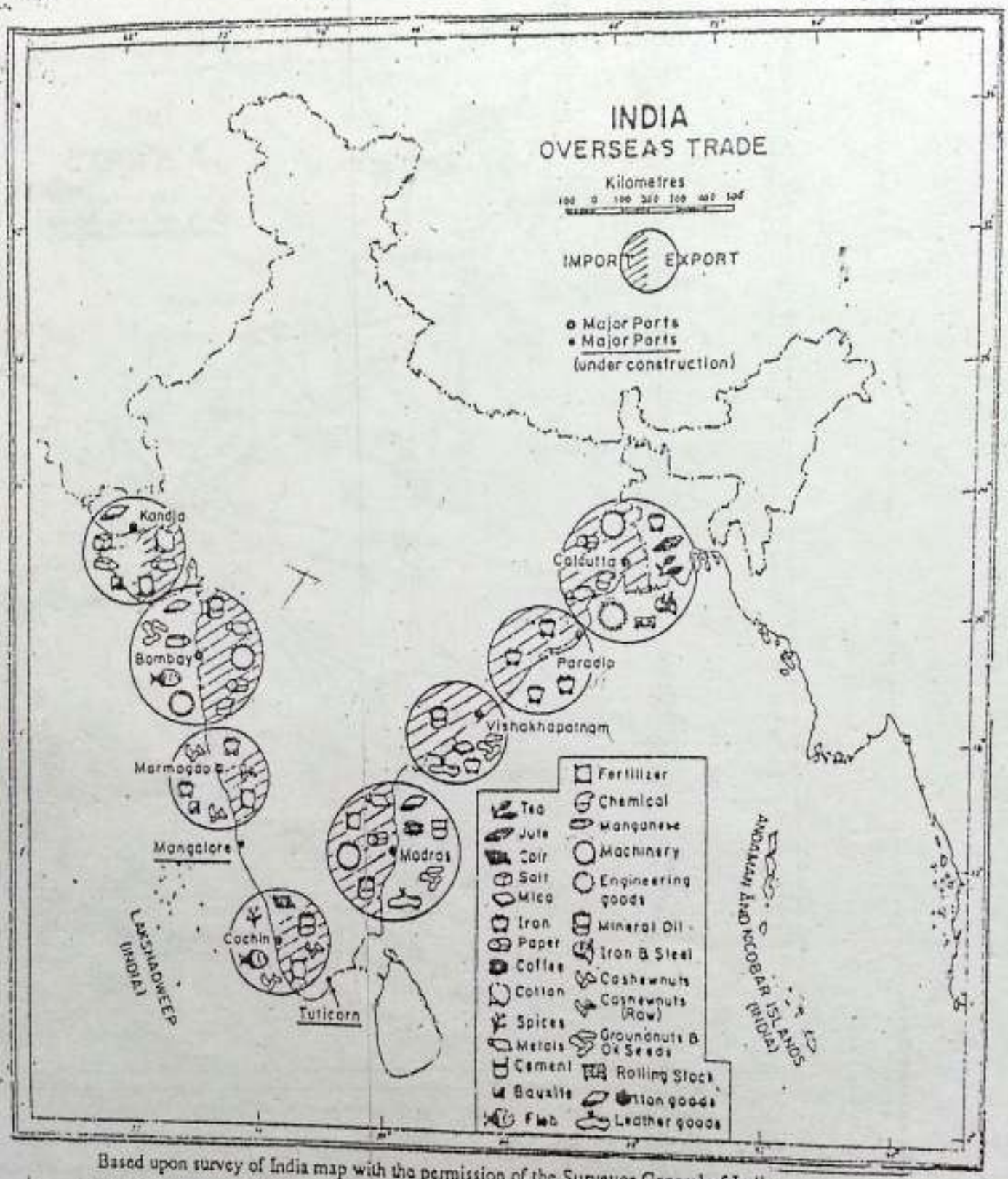

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The territorial waters of India extend into the sea to a distance of twelve nautical miles measured from the appropriate base line.

Fig. 36 India — Major ports and international trade

Note the major items of export from Calcutta, Vishakhapatnam, Paradip and Marmagao. What are the major imports of India ?

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Telephones, however, represent further improvement over telegrams. In this case "live voices" are carried over telephone wires. Today there are well over a million telephone sets all over the country, all manufactured in our own factories. The national telex service is available between 117 cities sending and receiving printed messages directly from one subscriber to another. Our Overseas Communications Service provides telegraph service to all, and telephone, telex and radio photo services to a number of countries.

Then there are several means of mass communication. The All India Radio with nearly 85 broadcasting centres all over the country is the most important among them. The total number of radio receiving sets in the country now exceeds the 20 million mark. Today different parts of our country are linked with the television transmissions, which is an im tant means of mass communication these means of communication hel bringing our people close to another culturally, economically politically. Besides men, women play a large part in running our c munication services.

Imports and Exports of India

It is true that various means transport and communication h brought different parts of our cou very close to one another. They hel speeding up the economic deve ment of different regions. Nati trade is also promoted. However, is only a part of the story. The mo means of transport and communica also promote international trade travel making our world a really s place to live in. Look at Fig. 36 note the major items of export import of our country.

The New Terms You Have Learnt. *The lifelines of a Country* : The modern means of transport and communication which bring people close to one another and help in economic development, national and international trade and in the defence of the country.

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EXERCISES

Review Questions

1. Answer the following questions :
   (i) What are the two important means of land transport? Roads, Railways
   (ii) What are the leading four major ports of India? Bombay, Madras, Calcutta, Cochin
   (iii) Name the four categories of roads according to their importance. NH SH DR VR

2. Distinguish between :
   (i) A national highway and a state highway.
   (ii) Broad gauge and narrow gauge.

3. What are the lifelines of a country? Why are they so called?

4. Why is railway transport very important in our country? In what ways do the railways help us?

5. Given below in the first column are certain jobs to be done relating to (a) Communication and (b) Transport. In the other column are listed means for doing the same. Make out correct pairs from the two columns.

(A) Communication

(i) Sending Rs. 25/- to your relation	(b)	(a) Telephone call
(ii) Congratulating a friend on his success	(a)	(b) Air mail
(iii) Making urgent queries about the illness of your relations and to give necessary advice immediately	(c)	(c) Money order
(iv) Sending medicine from Delhi to a serious patient in Bangalore	(d)	(d) Telegram

(B) Transport

(i) Sending 5,000 tonnes of cement from Katni (M.P.) to Hyderabad	(d)	(a) Express train
(ii) Sending 500 kilogrammes of fresh vegetables from Patiala to Delhi	(c)	(b) Cargo ship
(iii) Travelling from Bhopal to Ajmer to attend Urs	(a)	(c) Motor Truck
(iv) Sending 10,000 tonnes of iron-ore from Goa to Osaka (Japan)	(b)	(d) Goods train

Map Work

6. On a map of India show the following :
   (i) A railway route between Delhi and Madras with four important junctions on the way.
   (ii) Four new major ports.
   (iii) Four important international airports and the airways connecting them.
   (iv) Two important inland waterways.

Topic for Class Discussion

7. *'Had there been no means of transport and communication.'*
   Let the class discuss this topic around three points: (a) how it would affect our day-to-day life? (b) how it would affect primary industries and secondary industries? (c) how it would affect the defence of our country?

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18. People—The Greatest Resource of a Country

The Terms You Already Know. *Average Density of Population:* The number of people that would be found in a unit area, such as a square kilometre if the total population in a given area is uniformly distributed.

There can be no two opinions that ours is one of the largest countries of the world and it has been blessed with natural resources that are rich and varied. In fact our vast geographical extent and abundant natural resources are great assets that any nation can justly be proud of. However, these resources by themselves do not make a country great. If, indeed, a country is to become great, its natural resources must be transformed into wealth by organised effort. Herein lies the importance of the most precious resource of a country, its people or man-power.

The human resource of our country is frightfully large. Its distribution in the country is woefully uneven. It has been increasing at an alarmingly fast rate. And its relation to the country's resources such as availability of arable land or the quantity of food that may be produced on it is already causing anxiety.

The Area of Our Country

Our country has a total area of 32,87,782 sq. km. and ranks as the seventh largest in the world after the Russia Canada, China, the United States, Brazil and Australia. However this extent of our country constitutes only 2% of the world's total area.

Our Population

Our country has a population of over 844 million according to 1991 Census India ranks as the second most populous country in the world, next only to China. In other words it carries as much as 15% of the world's total population, which means that every seventh man in the world

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an Indian.

What Does It Mean to Us?

It should have become quite apparent to you by now that about 2% of the world's land area (India) carries 15% of its population. Herein lies the challenge that we, the people of India, have to face. It may be that China has a larger population but she is only a little less than three times the size of our country. The Russia, with more than Five times the area of our country has hardly half the population of our country. Barring China, the total population of the other 5 countries bigger than India, is smaller than that of our country.

Distribution of Population

If we distribute our total population (1991, census) evenly all over the country, there would be 267 persons per square kilometre. This is the average density of our population. But the actual distribution of population in our country is very uneven. It varies from region to region. It becomes much higher than the national average in plains and along the coastline. It is much below the average in high mountains, hills, desert and the marshy areas. In rest of India over a larger part of the plateau region, it is more or less moderate.

The most thickly populated parts of India are the plains and delta of the Ganga-Brahmaputra, the deltas of the Kaveri, Krishna, Godavari, Mahanadi and the Malabar Coastal strip. The plateaus of the Deccan and Central India and large parts of Punjab, Haryana and Gujarat are moderately populated. Kutch, the Thar desert of west Rajasthan, western and central Himalayas and the whole hill area of north-eastern India are sparsely populated.

Relief and Rainfall

They play an important part in determining the distribution of population in our country. Thus you find a great concentration of population in the flat alluvial lowlands with a fairly heavy and assured rainfall. The arid lands of Kutch and Rajasthan are thinly populated. So also are the high hills with extremely uneven terrain and too heavy rainfall.

In between these two extremes are the plateau areas where neither the soil is very fertile nor the rainfall is abundant or dependable. In recent years, however, we find population increasing in these areas also because of irrigation facilities provided on a large scale.

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Statewise, the density of population is the highest in Kerala where it is about 654 people per square kilometre. Then comes West Bengal with an average density of a little over 600 persons per sq. km. In the Ganga Basin the average density of population tends to decrease from east to west. The average density of population in Uttar Pradesh is slightly less than that of Bihar and Tamil Nadu. The most thinly populated states are Nagaland, Jammu and Kashmir, Sikkim, Meghalaya, Manipur and Himachal Pradesh.

Population in India is Mostly Rural

In 1901 around 89% of our people were living in rural areas. By 1981, it has come down to 76% and this trend is continuing. This means that more and more people are coming to urban areas in search of jobs. This migration of people from villages to large towns and cities results in overcrowding and attendant problems. At the same time it robs many of our villages of the youth who are the most active workers.

There are about 12 cities in India with a population of over a million people. They are Calcutta, Bombay, Delhi, Madras, Hyderabad, Bangalore, Ahmedabad, Kanpur, Nagpur, Lucknow, Jaipur and Pune. 204 cities have a population between 100,000 and 1,000,000 people.

How Fast Our Population has been Growing

About 60 years ago, say in 1921, the population of India was 251 million. Today it is over 781 million. This means that our population has grown more than three times in 68 years. Do you know the number of people we are adding to our population every year? It is equal to the total population of the whole continent of Australia.

This rapid growth of our population is largely due to a fall in the number of deaths of our people. This has been possible because of the success we have achieved in controlling or eradicating certain diseases like malaria and epidemics like plague and cholera. This means that a child born in the seventies can expect to live a much longer life than what could have been possible 50 years ago. The life expectancy has gradually increased from a mere 20 years during 1920 to a little over 50 years in 1970.

However, lowering the number of deaths alone will not solve our problem. We must bring down the number of newly born children and establish a balance between deaths and births.

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The growth rate of our population was 11 per cent between 1921 and 1931. It shot up more than double to 24.7 per cent between 1971 and 1981. If this rapid rise of population is not arrested it is sure to bring in its wake an agonising series of problems relating to food, clothing, housing, health, education and employment of our growing millions, besides undermining our standard of living.

Towards a Qualitative Growth

People do have a place for developing and utilising the country's resources. In fact they constitute a valuable asset in a country's economic progress. However, beyond a certain limit they cease to be an asset.

Take for example our own country. We have made phenomenal progress in almost all fields of human endeavour since Independence. Our production has increased by leaps and bounds in both agriculture and industry. Judged by our progress, our rightful place must, indeed, be with the highly developed nations of the world. But the harsh reality of the situation points to the other way. Nearly 60% of our people are below the poverty line having little money to purchase their bare needs. Thus our standard of living is among the lowest in the world. The reason, however, is not far to seek. Most certainly, it is not an unkind fate that makes us suffer. A major cause is our frightfully growing population that has almost negatived our achievements and is adding to our problems. What then is the way out ? It is to be found in stabilising the growth rate of our population.

The New Terms You Have Learnt. *Census* : Official enumeration of population along with certain economic and social statistics in a given territory. In our country this information is collected by the Government all over the country in the first year of every decade. *Growth Rate of Population:* Gap between births and deaths expressed as per cent of population of a given region over a given period. Registration of births and deaths has been made compulsory under an Act of Parliament passed in 1969. This useful record is finally passed on to the census authorities at the national level from all over the country.

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EXERCISES

Review Questions

1. Answer the following questions :
   (i) Which country in the world has the largest population?
   (ii) How densely is India populated as compared to the rest of the world?
   (iii) What is the average density of population in India?

2. Distinguish between :
   (a) Total population and average density of population.
   (b) Growth rate and birth rate of population.

3. Make out correct pairs from the two columns:

(i) State with the highest population	(a) Delhi
(ii) State having the highest average density of population	(b) Uttar Pradesh
(iii) State having the lowest density of population	(c) Nagaland
(iv) Union Territory with the highest proportion of urban population	(d) Kerala
	(e) West Bengal

4. Complete the following statements with the correct ending :
   (a) Population in India has been growing very fast because
   (i) We need more and more people in view of the shortage of labour.
   (ii) We have been setting up new big cities like Chandigarh and Bhubaneswar.
   (iii) The number of deaths in our country has been dropping.
   (iv) The number of births in India has been constantly increasing.
   (b) We can stabilize our population by
   (i) Reversing the present trend in the number of deaths.
   (ii) Bringing down the number of births through planned efforts.
   (iii) Encouraging migration of people to the neighbouring countries.
   (iv) Setting up new cities and townships.

5. Discuss the distribution of population in India with special reference to the areas of very high and density of population.

Map Work

6. Prepare a suitable graph to show the growth of population of Delhi since the beginning of this cen

	(in '000s)
1901	406
1911	414
1921	488
1931	636
1941	917
1951	1,774
1961	2,659
1971	3,630
1981	6,220

Write suitable comments on this graph.

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Topic for Class Discussion

7. *'What is more important—the quality or the quantity of population?'*

Let the class discuss this topic and decide why it is necessary to improve the quality or standard of living in our country. What steps are necessary to realise this objective?

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UNIT FOUR

Studying Local Maps

You have also learnt how to study maps in the previous class. In this unit, we will give you some more information in order to help you in recognizing the landforms in the field and also on maps in a better way. Once we learn how to study local geography with the help of observation and maps, we would be able to understand the geography of even distant places.

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19. Studying Local Maps

You know that a map is a conventional representation of any area of the earth's surface, small or large, drawn to scale on a flat surface. It helps us in locating and identifying the various features of the area depicted on the map. You have studied several maps of continents and countries in this book. All these maps are made on small scales. Hence, they do not show a large number of details. You may have also seen the maps of your village or town. They are prepared on larger scales. That is why they depict more details than those of the continents and countries. Look at the two maps (Fig. 37a,b). One map shows the location of the city area of Delhi. The other map depicts a portion of the city of Delhi on a larger scale. Both these maps show by different symbols the main physical and urban features. These will help you in answering the following questions:

Study Fig. 37 (a). On which side of the river Yamuna is Delhi situated? Where do the railway lines from Delhi go? In which direction of Delhi do you observe low hills? Now study Fig. 37(b). Name the four main roads which diverge from Connaught Pla in four opposite directions. Find o New Delhi Railway Station on t map. In which part of the are depicted on the map, is Lal Qila sit ated? What is the direction of Purar Qila with respect to Lal Qila and wh is the distance between them in kilon etres? Which part of Delhi is covere with forests? Locate on the map som important buildings like India Gat Rashtrapati Bhawan, Parliament Hous and the Secretariat. Name the part o the city in which all these building are situated. How many kilometre away is India Gate from Rashtrapat Bhawan?

Recognition of Landforms in the Neighbourhood

You know that mountains, plateaus and plains are the three major landforms of the earth's surface. Each landform is recognised on the basis of its distinguished features which are mainly two—height and slope.

Given below are the main characteristics of a mountain, a plateau and a plain for your information. They will help you to identify various landforms

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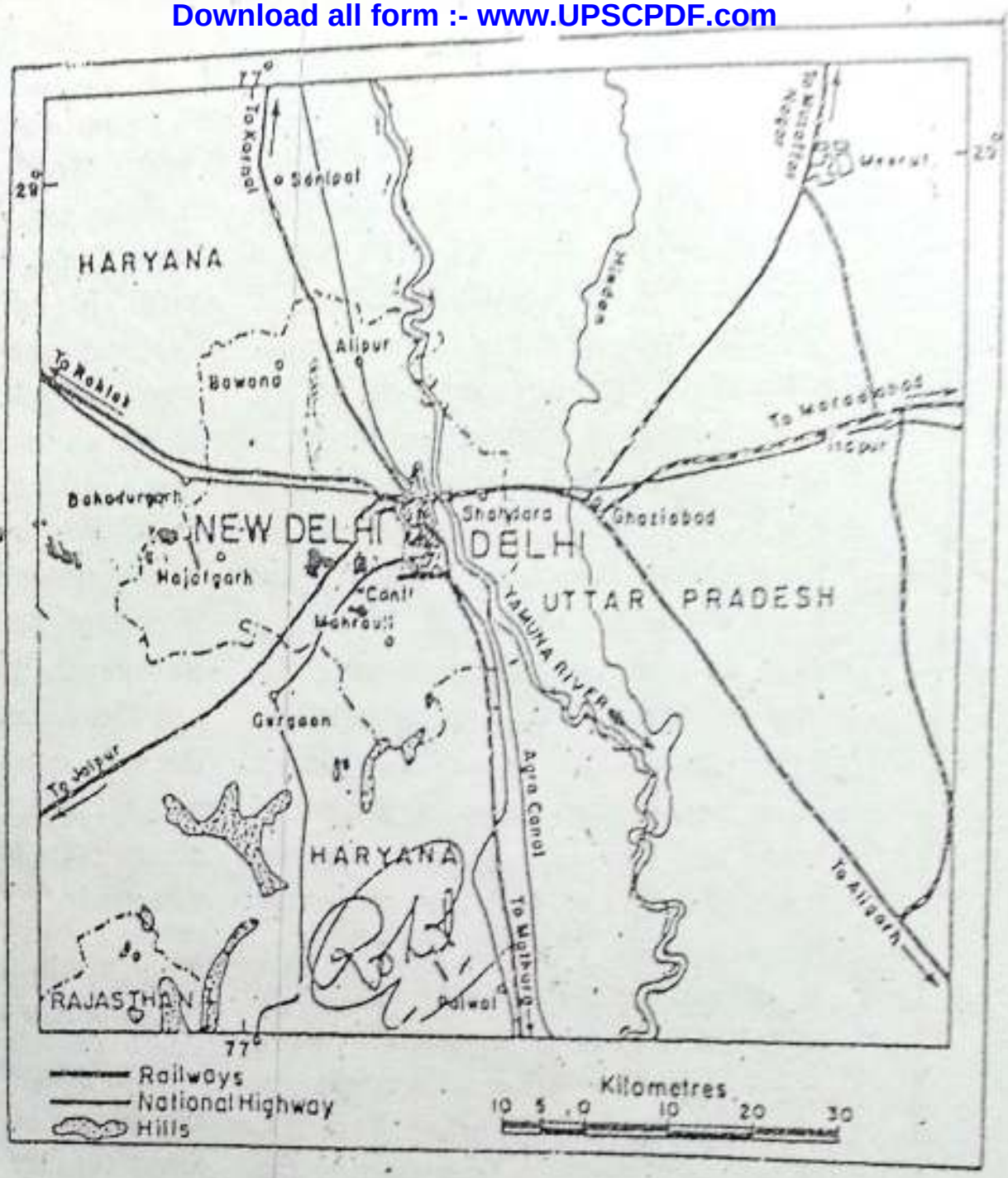

Fig. 37 (a) Map showing the location of Delhi

Note that in this map only the location of Delhi has been shown. The map has been drawn on a small scale. As such, it shows a bigger area but lacks in details.

in the field.

A *mountain* is a mass of land considerably higher than the surrounding area. Mountainous regions are very rugged. They have very high peaks and sharp, pointed features. High conical peaks, deep valleys and wall-like slopes are some of the main features of mountains.

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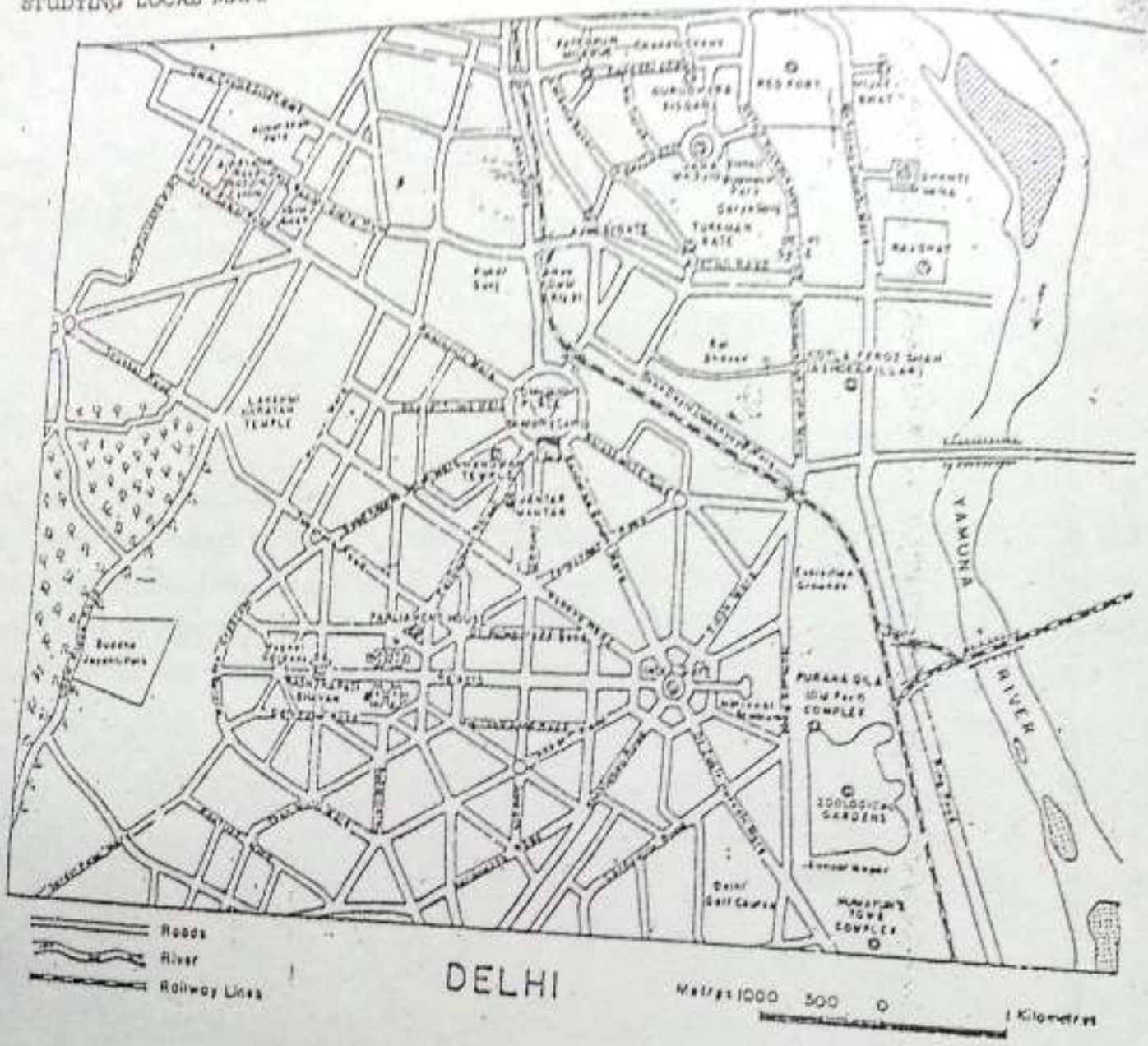

Fig. 37 (b) Map showing a part of Delhi's city area

This map shows a large number of details because it is made on a larger scale. How much actual distance on the ground is represented by a centimetre on each map ?

A *plateau* is a broad and rather level stretch of land rising sharply above some nearby lowland. We may also call it an elevated plain having slopy margins. Tops of the mountains have very small stretch of level land, known as the peak; but the plateau tops have very long and wide stretches of flat land.

A *plain* is a relatively flat and featureless lowland. Its surface is not rugged like a mountainous region. Its slope is very gentle. In other words, unlike a mountain, there is very less difference of height between the high and low points of a plain. Rivers flow in the plains very sluggishly and form great meanders. They also have v

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wide and shallow valley bottoms. But in mountainous or plateau regions, rivers flow very swiftly and their valleys are narrow and deep.

Identifying Landforms on Maps

In this book, you have studied the physical maps of Asia and India. These maps show the land with varying heights above sea level by different shades of the same colour. However, most of the atlas maps depict physical features by different colours. Lowland or plain region is shown by green, highest land or mountainous region by dark brown and the land of the intermediate height on plateau region by light brown or yellow colours. Water features are shown by blue colour. Method of showing physical features on maps by different colours or by various shades of the same colour is the most common practice throughout the world.

Various landforms on maps are mostly shown by contours. A *contour* is an imaginary line, drawn on a map which joins the points of the same height above sea level. The method of showing landforms through contours is perhaps the most accurate, common and popular. When the contours are closely spaced on the map, the slope will be steep and when they are further apart, the slope will be gentle. The contour patterns on maps give us an idea about the shape or form of various relief features on the earth's surface. Some typical contour patterns

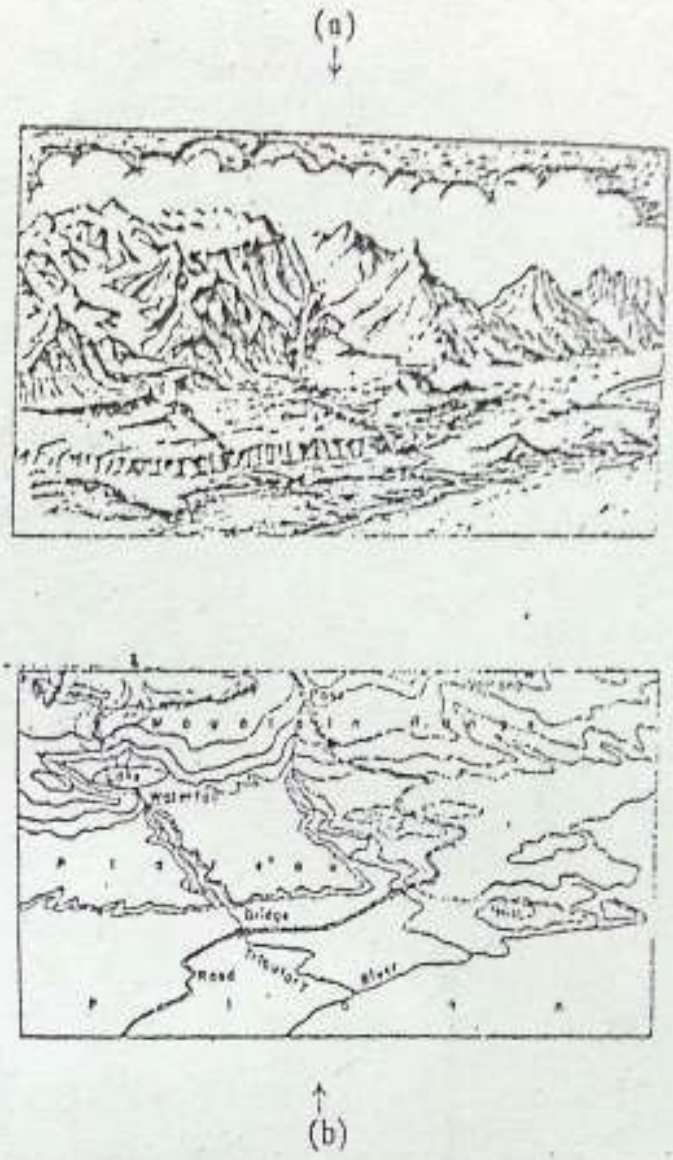

Fig. 38 Landforms — the picture and the map

Look at the picture of mountain, plateau and plain in Fig. 38 (a). What difference do you see in the shapes of the three? In Fig. 38 (b), some important features of these landforms like hieght and slope are shown by contours and shadings.

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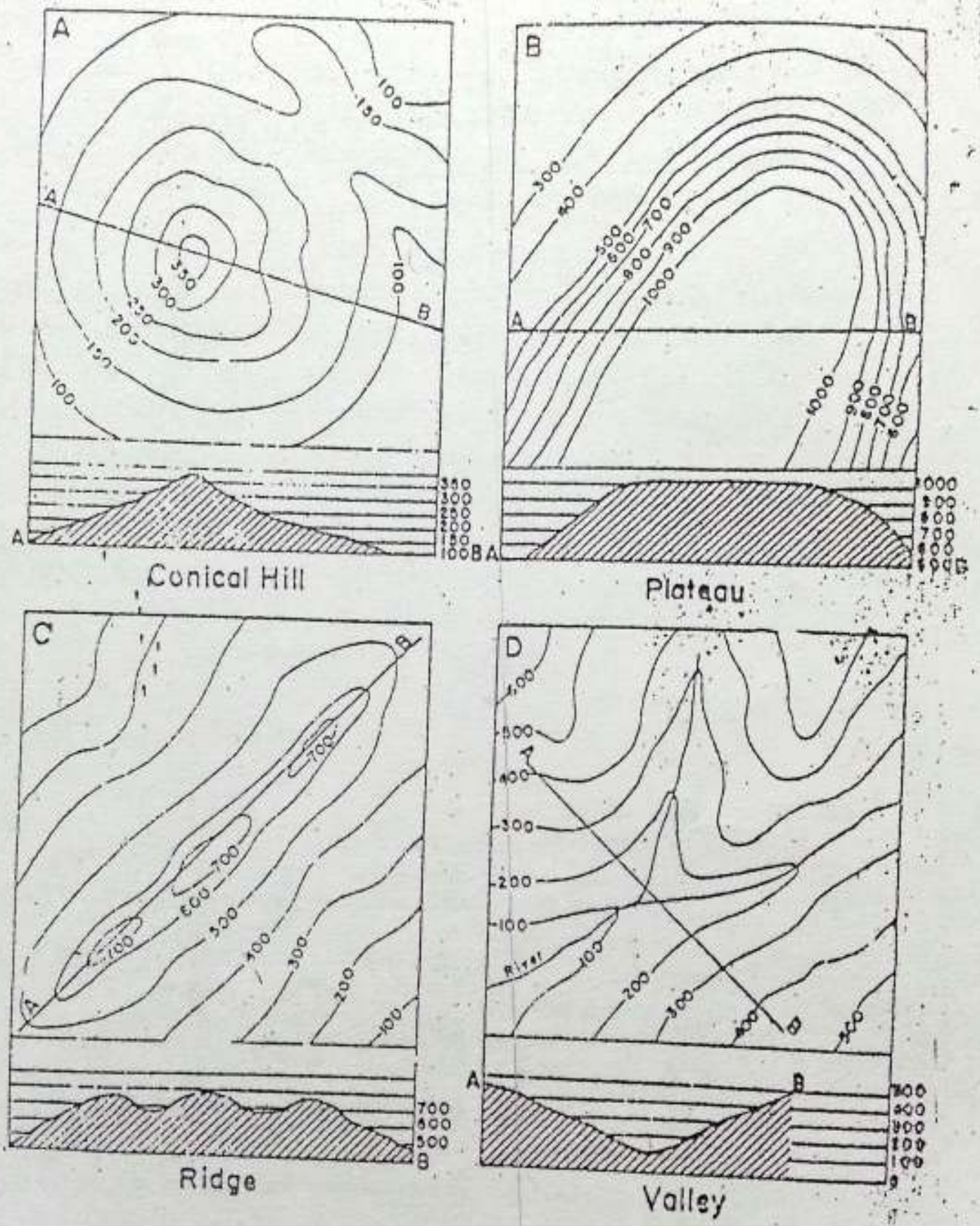

Fig. 39 Contour patterns of a conical hill, a plateau, a ridge and a valley

Compare the contour patterns of all the four landforms and find out the difference between them.

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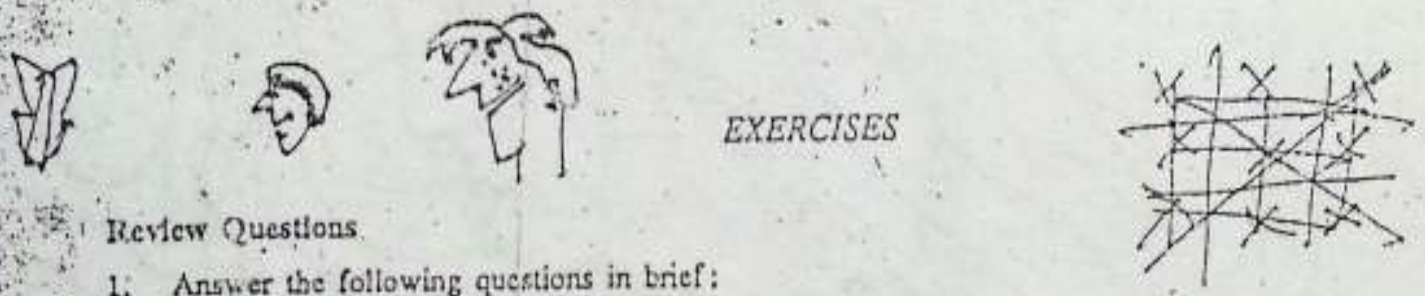
of a few landforms are being given (Fig. 39) for your information. They will help you to recognise some relief features on your local map.

Concentric contours spaced almost evenly on a map represent a conical hill. The top of a plateau is more or less flat and is represented by very few contours. But its sides are steep and they are shown by closely spaced contours on a map. Contours forming linear shapes and very often enclosing isolated peaks represent a ridge or an elongated hill on a map. A plain on a map is represented by very widely spaced contours. A valley is represented on a map by inverted V-shaped contours.

You are now in a position to recognise some of the relief features on the map with the help of contour patterns. Now study Fig. 38(b) carefully. What kind of contour do the mountains depict? What do the closely spaced contours indicate? What kind of slope is on the margins of the plateau? Explain its nature with the help of contours.



EXERCISES

Review Questions

1. Answer the following questions in brief:
   (i) Name three major landforms.
   (ii) What is the most common practice of showing relief on maps?
   (iii) What is a contour?
   (iv) How is a plain represented on a map with the help of contours ?
2. Distinguish between:
   (i) Maps made on large and small scales.
   (ii) A plateau and a plain.
3. Describe the main characteristics of a mountain, a plateau and a plain that would help a person to recognise these landforms in the field.
4. Explain clearly the difference between the contour patterns of a conical hill, a plateau, a ridge and valley.

Map Work

5. Represent the following landforms by contours :
   (i) A flat-topped hill with uniform slope.
   (ii) A plateau whose slope is steep on one side and gentle on the other.
   (iii) A river valley.

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LANDS AND PEOPLES

VIII

Rohit

Part III

A Geography Textbook for Class VIII

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(ONLY MAPS)

Mapwork - India (RIVERS, PLATEAU, PEAKS AND PASSES)

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UNIT ONE

Lithosphere and Landforms

The earth is the home of millions of people. It consists of land, water and air. As almost all people in the world live on land, it is important for us. The solid crust of the earth, on which we live, is not the same everywhere. There are great mountain ranges, lofty peaks, mighty rivers, deep valleys in some places and extensive plains and plateaus at others. The earth's surface not only changes from place to place but also changes from time to time. The changes brought about on the surface of the earth are both sudden and slow. These changes are the result of various natural forces and processes at work. Volcanic eruptions and earthquakes bring about sudden changes in the earth's crust. Natural forces such as weather, running water, ground water, moving ice, winds, sea waves are constantly but slowly engaged in sculpturing the earth's surface.

Man is continually interacting with his changing environment. The following chapters seek to explain various natural forces and processes at work in ever changing environment.

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1. Lithosphere and Landforms

The Terms You Already Know. *Lithosphere*: The realm of the earth consisting of solid matter, namely, stone or rock. *Lava*: The boiling hot rock-material that comes out from a volcano or fissure.

The earth, the home of man, on which we live has three distinct parts, consisting of land, water and air. These are known as the lithosphere, the hydrosphere and the atmosphere respectively. At the interface of these three spheres, there exists a narrow but complex zone containing all forms of life. It is known as the *biosphere*. Since human beings live on the land part of our earth, it is indeed very important for us.

Look at the section of the earth in Fig. 1. It will give you an idea of the structure of the earth. Note that the outermost shell is the earth's crust or lithosphere. It forms the continents and the islands, and underlies the seas and the oceans. The lithosphere is a thin layer composed of various kinds of light-weight rocks. It is about 60 kilometres thick. The central part of the earth is called the *inner core*. There are other layers between the inner core and the crust. The core is believed to be made of metals like iron and nickel, which are fairly heavy. The inner core of the earth is also known as the metallic core. The density of the different shells of the earth goes on increasing towards the centre of the earth.

The temperature inside the earth increases with depth. It has been recorded in mines and deep wells all over the world that the temperature increases progressively at the rate of 1°C for every 32 metres depth. You can imagine how high the temperature must be in the interior of the earth. At such an extremely high temperature all rocks and metals would melt. However, owing to the great pressure of the outer shell, the earth's interior behaves like a solid.

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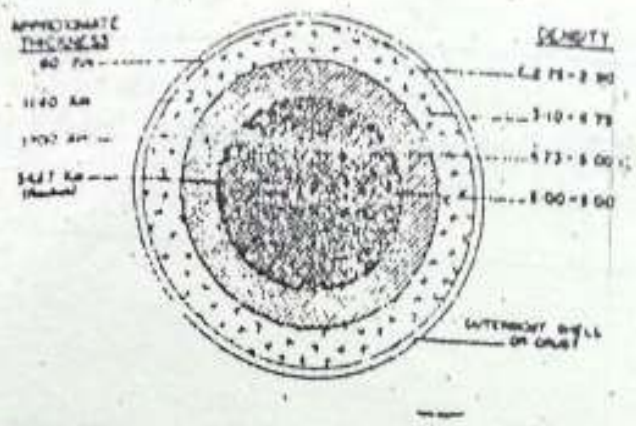

Fig. 1 Section through the earth showing its structure

Note the four shells forming the earth's structure. Also note that the density of rocks is increasing with depth. Which shell would have the highest temperature?

Rocks

The lithosphere is composed of various kinds of rocks. The word 'rock' in popular usage means any hard and resistant material such as granite, sandstone and marble, forming the earth's crust. But in the correct sense it includes even soft and loose materials like silt, sand, gravel, mud, chalk, clay, rock, salt and even coal.

The rocks are composed of one or more minerals. The common minerals forming the rock are felspar and quartz. Some rocks contain particles of useful minerals and are sources of metals like iron, copper or gold, so valuable to us.

Kinds of Rocks

There are three main kinds of rocks, each formed in a different way. They are igneous rocks, sedimentary rocks and metamorphic rocks.

Igneous Rocks

You know that deep below the lithosphere there is a hot molten rock material with a very high temperature and pressure. This molten matter cools and hardens, and it forms a rock known as *igneous rock*. When the molten matter cools slowly under the crust, it forms igneous rock known as granite. It is the most abundant of all igneous rocks and is commonly used as a building stone.

Sometimes the molten material comes out of a hole or crack in the earth's surface. It then cools quickly and forms a rock known as basalt. Basalt is a dark coloured igneous rock. Its mineral grains are very small and cannot be identified with the naked eye. This very hard and heavy rock is used for building roads.

Sedimentary Rocks

Tiny particles of rocks are carried away by wind, running water or moving ice and are deposited in layers on the floor of the sea or land. These deposits are also called sediments. When these sediments are hardened by their weight or by the weight of sea

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water above them, they form into layers of rocks. Such rocks are known as *sedimentary rocks*. Sandstone, limestone and clay are good examples of sedimentary rocks.

Coal is also a sedimentary rock. It has been formed of trees and ferns in the marshes, which in course of time were subjected to high temperature and pressure deep below the earth's surface some thousands of years ago.

Metamorphic Rocks

Sometimes the original form of rocks changed entirely owing to excessive heat and great pressure, and then it is known as *metamorphic rock*. Both igneous and sedimentary rocks may be changed into metamorphic rocks by heat and pressure. Common examples of metamorphic rocks are marble, quartzite, slate and gneiss.

Landforms

The surface or relief features of our earth are not the same everywhere. In fact, we do come across a wide variety of landforms. Some of them have been developed over long periods of time. Many more may still be in the process of development. The distribution of these landforms on the earth's surface helps us much to have a better idea about the distribution of man on our planet and his varying responses to his environment.

In broad terms, the major landforms of the earth may be classified into three categories, namely, mountains, plateaus and plains. But you will do well to keep in mind that these landforms are by no means permanent. They keep on changing, sometimes all of a sudden and abruptly, but more often slowly and almost imperceptibly. You will know the examples of the landforms found in our own country later on.

Sudden Movements of Earth's Crust

Sudden movements of the earth's crust are commonly noticed during volcanic eruptions and earthquakes. They bring about a change in the earth's surface very quickly.

Volcanoes

Most people think of a volcano as a mountain that throws out lava and flames every now and then. Actually, a *volcano* is a vent or an opening in the earth's crust through which molten lava, clouds of gases, dust and steam and even pieces of rocks come out. Sometimes the hot lava comes out through a deep crack or a fissure in the crust.

1) Igneous Rock → Granite & Basalt
2) Sedimentary → Sandstone

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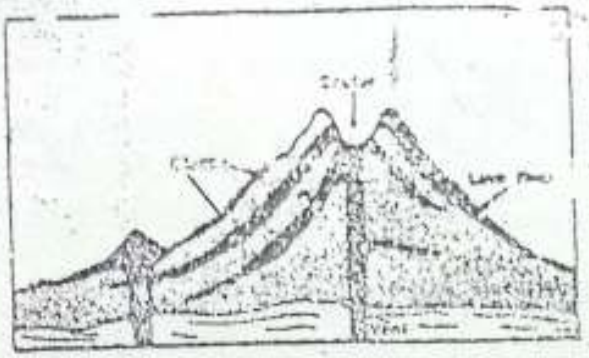

Fig. 2 A volcanic cone

Some of the materials erupted from a volcano accumulate round the opening and form a cone. What are the different materials that are thrown out from a volcano?

In course of time, the lava and other material accumulate round the opening and form a cone as shown in Fig. 2. A conical hill or a mountain peak is formed around the vent if the lava goes on accumulating for a long time. The top of a volcano generally shows a cup - shaped depression which is called a *crater*.

All volcanoes do not erupt regularly. Some of them may not show any sign of activity for many years, even then they may not be dead or extinct. They are said to be *dormant* or *sleeping volcanoes*. For example, the Vesuvius near Naples in Italy is a dormant volcano. Can you give any other example of this kind?

The volcanoes which erupt frequently are called *active volcanoes*. The Barren island in the Andaman group of islands in our country and Etna in Sicily are the examples of active volcanoes. Mount Etna has erupted several times in recent years.

A volcano which is neither active nor dormant and which has not erupted within the last few thousand years is known as an *extinct volcano* or dead volcano. Mount Kilimanjaro in Tanzania in East Africa is an example of an extinct volcano.

There are several thousand volcanoes in the world. About 450 of them are known to be alive. There is a circular belt of volcanoes round the Pacific Ocean. It is called the Ring of Fire because of the many active volcanoes in it.

Earthquakes

When the earth's crust suddenly vibrates or shakes, we call it an *earthquake*. It is caused by sudden movements inside the earth. Earthquakes are also caused when a volcano erupts. An earthquake lasts for a few seconds only. Sometimes the earthquakes may be so violent as to cause serious damage.

Earthquakes may occur anywhere on the earth. However, there are certain areas of the earth where they

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occur more frequently. These are the regions where the surface of the earth is rather weak. By far, the most active region is a belt surrounding the Pacific Ocean. More than eighty per cent of the earthquakes occur in this zone. You will remember that most of the active volcanoes are also found in this very region.

In India, most of the earthquakes occur in the Himalayan zone and the Ganga-Brahmaputra valley. Only a few earthquakes have shaken the Deccan plateau of India in historical times. The earthquake of December 1967 at Koyna Nagar on the western edge of the Western Ghats was one of them.

The New Terms You Have Learnt. *Rock* : The material composed of one or more minerals forming the earth's crust, *i.e.* Lithosphere, or any portion of it. *Volcano* : A vent in the earth's crust through which lava and other materials come out.

EXERCISES

Review Questions

1. Answer the following questions :
   - (i) Name the three kinds of rocks. Give one example of each.
   - (ii) What is a volcano? Name three kinds of volcanoes and give an example of each.
   - (iii) Name the major landforms, giving examples from India.

2. Distinguish between :
   - (i) Igneous rocks and sedimentary rocks.
   - (ii) An active volcano and a dormant volcano.

3. Read the list of rocks given below. Classify the rocks into three groups— (a) igneous, (b) sedimentary and (c) metamorphic :
   (i) coal; (ii) marble; (iii) slate; (iv) granite; (v) limestone; (vi) basalt; (vii) sandstone; (viii) quartzite; (ix) gneiss and (x) clay.

4. Write a paragraph on the structure of the earth.

5. What are rocks? How are the different kinds of rocks formed?

Draw a diag. of earth and the table
" " " volcano & label it

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Map Work

6. On an outline map of the world mark and name the following with the help of your atlas.
   (i) The Andes and the Rockies
   (ii) Vesuvius, Etna, Fuji Yama and Kilimanjaro

Topic for Class Discussion

7. 'Volcanoes and Earthquakes'

Students may collect pictures and information on (a) sudden eruption of a volcano and (b) damage caused by an earthquake. They may present this information and exhibit the pictures of the same to the class.

* Indo-Gangetic Plains → Once Occupied by Shallow Sea Named Tethys

* Gradation

Aggradation Degradation.

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2. Agents of Gradation (I)

The Terms You Already Know. *Earthquake* : Vibrations or shakings caused in the earth's crust by sudden movements inside the earth. *Dormant Volcano* : A volcano which has been inactive for a considerable time in the past.

Changes on the earth's crust caused by an earthquake or a volcanic activity may impress you by the suddenness or abruptness of its occurrence. But you must never forget that there are also changes brought about on the face of the earth which are of abiding interest and of great economic importance. These are the changes that are still taking place very slowly and almost imperceptibly under the impact of many forces, including the activities of man.

Take for example the Aravallies in Rajasthan or the Urals in Soviet Union. They are among the oldest mountains in the world. Compared to the Himalayas or the Alps they are very low and exhibit rounded features. At one time, it is believed, they were probably as tall and picturesque as the Himalayas or the Alps. If they are so low today, it is because they have been worn down through a long period of time, extending over millions and millions of years.

To take another example, the area now called the Indo-Gangetic plain, was, in the remote past, occupied by a shallow sea named Tethys. Over the ages, it had been gradually filled up. The plain, as it exists today, is made up of fine silt brought down by the Himalayan rivers on the one hand and those of the Indian peninsula on the other.

Gradation

It would appear, therefore, that a process of levelling has been going on, changing the face of the earth ever since it came into existence as a separate planet. This process is continuous and almost endless, and is known

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as *gradation*.

Aggradation and Degradation

The over-all process of gradation has two distinct aspects: the process of wearing down and the process of filling up. The wearing down of the earth's elevated features is known as *degradation*. Filling up the natural depressions on the earth's surface is called *aggradation*.

Agents of Gradation

Natural factors capable of eroding and transporting earth material are known as agents of gradation. They include running water, ground water, moving ice, wind and the waves of the sea.

How Rocks Break into Pieces

The process of degradation and aggradation begins when rocks begin to break up into fragments and loose rock materials. But how do rocks break up or disintegrate into rock fragments? This takes place in various ways.

The outer layers of rocks exposed to the atmosphere are heated during day time by the sun's heat. As a result of this heating, the outer layers of rocks tend to expand. On the other hand, during night when the temperature of air drops considerably, the outer layers of rocks contract. This results in the loosening of the outer parts of the rocks which finally break away from the main rock.

Cracks also develop in rocks as a result of alternate expansion and contraction of their outer layers. In regions of cold climate if water happens to enter into such cracks, it is generally frozen by night. You are already aware of the peculiar behaviour of water. It actually expands when it freezes into ice. As a result, the cracks already developed inside the rock are further widened. This progressive widening of cracks ultimately splits the rock into pieces.

Sometimes a rock comes in contact with water. Some of its soluble minerals like rock-salt get dissolved in water and are removed from it.

Roots of plants and trees are also responsible for developing cracks in rocks and breaking them. Even animals and man often lend a helping hand in hastening the disintegration of rocks.

The breaking up or decay of exposed rocks by changes in temperature, freezing of water and the action of plants, animals and man is collectively known as *weathering*. The

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weathered material is carried away from its place by the agents of gradation.

Now let us see how different agents of gradation are constantly busy at changing or modifying the face of the earth. Of these agents of gradation, the running water is perhaps the most important.

Work of Running Water

As you know, most of the rain-water is drained into a river. Barring a few exceptions, the river, in turn, ultimately empties itself into the sea. Thus, the rain-water returns to its original source from which it had come. This cycle of water—from ocean to land, and from land to ocean—goes on endlessly.

Rain-water which runs off the ground causes widespread erosion in different ways. Heavy and incessant rain in hilly regions very often causes large chunks of brittle rocks to slide down resulting in landslides. This sudden downward movement of a large mass of earth or rock from a mountain like the Himalayas is called *landslide*.

Rain-water is responsible for washing away the layers of soil on a much larger scale. This kind of surface erosion is the most widespread and is known as *sheet erosion*.

While moving down the slope in an uneven terrain, rain-water scoops out the soil, forming small deep channels called *gullies*. These gullies gradually multiply and spread over a wide area. This is known as gully erosion. It causes great damage by making the land unfit for agriculture. If you happen to travel between Gwalior and Agra, you would be able to see how a maze of gullies has been formed.

The Work of a River

The river is a powerful agent of gradation. If you happen to see it in a hilly region, you would find it very active even though the volume of its water may be small. Further downstream, especially in the plains, the river winds its way rather leisurely in spite of a great volume of water. In its lower reaches, that is, in coastal regions, it moves very sluggishly before it joins the sea. It would be interesting to follow the journey of a river from its source to its mouth. This may be conveniently divided into three stages—upper course, middle course and lower course of a river.

Upper Course: In a hilly or moun-

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tainous region, a river flows very swiftly on its way because of steep slopes from place to place. Here the river water is further armed with pointed stones and rock materials which it carries along with it. The river, therefore, actively wears away both its banks as well as its bed. The narrow valley through which it flows in this region is thus both widened and deepened steadily.

Boulders and pebbles moving with the strong current of a river keep on constantly rubbing against one another. They also rub against the rocky bed of the river. In the process they get rounded and worn down. Thus a river in its upper course is busy in erosion and transportation. In its upper course, it develops quite a few typical land forms like gorges, V-shaped valleys and waterfalls.

If a river flows through an area made up of hard rocks and having a little rainfall, it generally forms a narrow valley with steep or almost

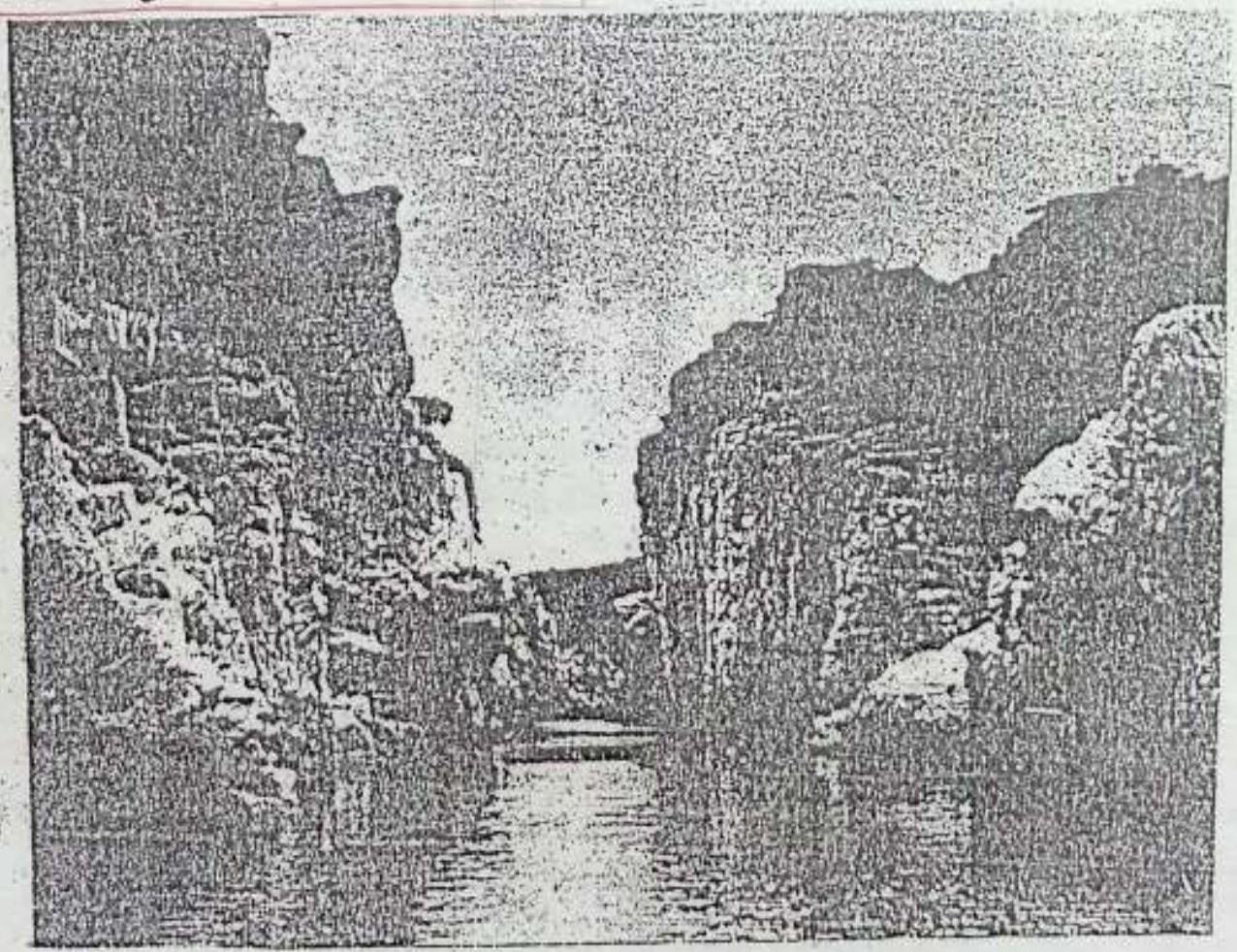

Photo 1 A river forcing its way through a gorge

The Narmada has been flowing through this gorge less than 20 metres wide. The gorge extends over 3 km into marble rocks and the Deccan traps.

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vertical walls. Such a deep narrow valley bounded by steep or vertical walls is known as *gorge*. It is the result of a downcutting action of a river.

Some areas are made up of relatively soft rocks and receive a heavy rainfall. In such regions, the sides of the river valley are quickly weathered and eroded by the rain water. Thus with its sides sufficiently widened the river valley acquires a typical V-shape. Such valleys are, therefore, known as *V-shaped valleys*.

A *waterfall*, as you know, is a sudden descent of water over a big vertical step formed in a river bed. It is generally formed at the edge of a hard rock overlying a soft one. In the case of a waterfall, the river tumbles down almost vertically along its course. Sometimes it just hops, skips and leaps forming rapids on its way. A series of rapids, big and small, are called *cascades*.

In brief, it may be described that a river in its upper course is very active and naughty. It gives you the impression of being in a great hurry. It is, therefore, said to be in its "youthful stage". Its major work is to erode and wear away the land through which it flows.

Middle Course : The river, after leaving the hilly region, generally flows across a plain. As the land is almost flat and low, the river considerably slows down its speed. It now winds its way more leisurely. It widens its bed by eroding its banks. It thus widens its valley floor.

Owing to occasional floods, a flat valley floor is covered with mud brought down by the river from its upper reaches. A flat valley floor covered with alluvium brought by the river is known as *flood plain*.

In a wide and flat flood plain, the river winds its way leisurely forming big loops. These big loops formed by the river in its flood plains are known as *meanders*.

In spite of the greater volume of water, the river in its middle course seems to move with restraint. It is, therefore, said to be in a "mature stage". Its major work lies in transportation and deposition at this stage.

Lower Course : The river in its lower course is mainly busy with deposition. It deposits fine alluvium—mud and silt—not only on its flood-plain but also on its own bed. As a result, the river channel is frequently blocked. This makes a river either change its course from one side of the flood-plain to the other, or divide itself

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to by-pass the deposits it has left in its own channel. The numerous channels into which the river is forced to divide itself before reaching the sea are known as *distributaries*—just the opposite of tributaries. As you already know, this is how the deltas are formed by rivers near their mouths.

As the region is extremely flat and low and there are obstructions in the way, the river flows very sluggishly. Therefore, the river in its lower course is often described to be in its "old stage".

Now you know that not only men, animals and plants, but the mountains and rivers also pass through a cycle of life consisting of youth, maturity and old age. Is it not very interesting?

The New Terms You Have Learnt. *Gradation* : The continuous process of levelling the earth's surface. *Weathering* : Breaking up or disintegration of exposed rocks by natural agents. *Tethys* : An ancient sea once lying between northern Eurasia and the peninsula of southern Asia and Africa.

EXERCISES

Review Questions

1. Give three examples for each of the following :
   (i) Changes brought about on land by man.
   (ii) Very slow but significant changes brought about in the earth's surface by nature.
   (iii) Sudden and drastic changes brought about on land by nature.

2. Distinguish between :
   (a) Aggradation and degradation.
   (b) A V-shaped valley and a gorge.
   (c) A tributary and a distributary.

3. Given below is a list of landforms developed by a river along its course. Re-arrange them in the logical order in which you would come across them if you start your journey at the source of a river and end it where the river joins the sea.
   (i) Flood-plain; (ii) V-shaped valley; (iii) Delta; (iv) Waterfall; (v) Gorge; (vi) Cascades and (vii) Meander.

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4. Fill in the blanks with suitable terms :
   (i) Sudden downward movement of a large mass of earth or rock is called.....
   (ii) Washing away of layers of soil over a large area is known as.....erosion.
   (iii) Small deep channels scooped out in the soil by rain water are called.....

5. What is gradation? Give examples of two distinct aspects of gradation.

6. Name the agents of gradation and explain the work of a river in its upper course.

Map Work

7. In your atlas take out the relief map of India and see where you would look for the following : (a) A delta; (b) a meandering course of a river; (c) a major tributary of the Ganga; (d) Distributaries of the Krishna; (e) river disappearing in a desert and (f) a big waterfall of a small tributary of the Kaveri.

Topic for Class Discussion

8. Journey of a River

Imagining yourself to be a river, write a graphic account of your journey from the source to the mouth. Read out this autobiographical account of a river to your class.

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3. Agents of Gradation (II)

The Terms You Already Know. *Glacier* : A slow moving mass of snow and ice. *Ice Cap* : Vast areas covered with deep ice and snow for a considerable time.

If the ways of running water are wonderful in changing the face of our land, those of moving ice, winds and waves are no less interesting.

Occurrence of Ice

As you know, snow and ice are always found only in the extremely cold areas. Can you tell what must be the maximum temperature of the atmosphere where snow and ice are permanently found? Such areas having very cold climate are generally situated near the poles. They are also found at very high altitudes irrespective of their distance from the equator. How will you explain this fact ?

Our country is situated nearer to the equator than to the pole. Therefore, the areas permanently covered with snow and ice are confined only to the high mountain ranges.

In certain areas, more snow falls each year than what melts there. As a result, the areas are permanently covered with snow and ice. They are known as *snow-fields*. The lowest limit of perpetual snow and ice is called *snow-line*. Snow-fields are, therefore, always situated above the snow-line.

In the equatorial region, the snow-line lies only at a very high altitude of more than 5,500 metres above sea level. Can you name two places, one each from Africa and South America where the permanent snow-fields are situated very close to the equator? Find out the height of permanently covered snow peaks in these two regions.

In the Himalayas, the snow-line lowers down to an altitude of about 4,250 metres above sea level. In the polar regions, where it is always very

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cold, it drops down to the sea level. As a result, most of the Arctic Ocean is permanently frozen. You may recollect that a very large part of Greenland and a large number of islands lying north of Canada are permanently covered with snow and ice. Do you also recall that the whole continent of Antarctica is permanently covered with snow and ice? Such a vast area covered with deep ice is known as *continental ice sheet* or *ice cap*.

The continental ice caps of today are thus confined only to polar regions. They are fewer and smaller than what they were at times in the past. However, it has been found that in the past the polar ice caps had advanced towards the equator covering the northern areas of North America and Eurasia. Such periods when very large parts of the earth were covered with ice sheets or ice caps are known as *ice-ages*.

The Work of the Moving Ice

Ice caps and snow-fields give rise to glaciers. As you know, *glaciers* are slow moving rivers made up of huge quantities of snow and ice. They crawl, as it were, at a rate of only a few metres per day. Gangotri and Jamnotri are the two famous glaciers of our country.

A glacier is responsible for modifying the face of the land in a variety of ways. It causes erosion as well as deposition. Glaciers, like rivers of

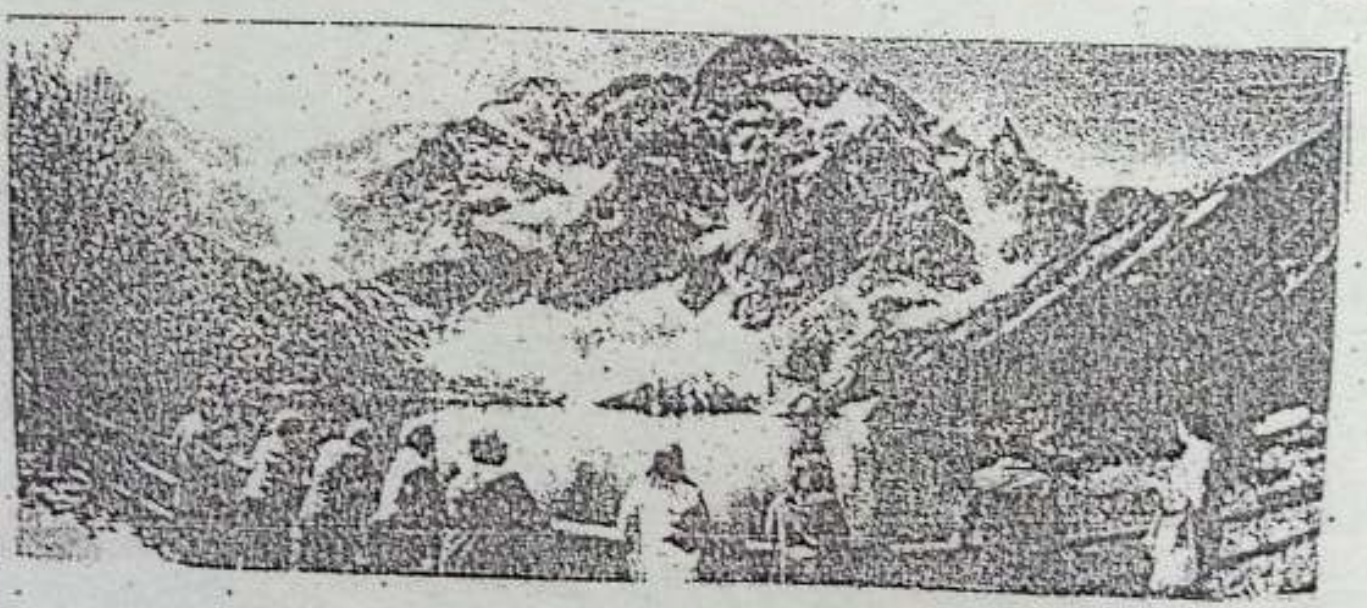

Photo II Tatras mountain

Note the Tatras, the highest mountain range in the Carpathians. Can you find out the small glaciers with their moraines joining together near the lake in the foreground?

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water, also form valleys of their own. A hard and heavy mass of ice further armed with pieces of rocks goes on grinding a valley bottom as well as its sides. As a result, the valleys, formed or modified by glaciers, have flat bottoms and steep or vertical sides. Because of their typical shape they are called *U-shaped valleys*.

Glaciers carry pieces of rocks, big and small, along with them. They are often left on the way at certain places. Such deposits dropped by the glaciers are known as *moraines*.

The Work of the Wind

Wind is yet another important agent of gradation. It is responsible both for degradation and aggradation. It is, however, more effective in desert regions where there is neither running water nor moving ice.

In the absence of any moisture and vegetation, particles of soil get easily loosened in arid and semi-arid regions. They are freely picked up and carried awny by the wind. Strong winds pick up and carry not only fine soil or dust but also sand and gravel. Heavy and frequent dust storms remind us that they too are responsible for eroding fine and fertile top layers of soil.

You already know how loess deposits are formed by the wind with fine soil or dust particles blown away from distant areas. The slow but steady work of the wind spread over tens of thousands of years has resulted in developing these deposits hundreds of metres deep.

One typical landform developed in a desert is the *sand dune*. This is a result of deposition by wind. A dune is a hill of sand and has a crest or a summit. It is somewhat mobile as it keeps on rolling or shifting, of course slowly along the direction of the prevailing winds. It originates at places where there is some small obstruction in the path of the wind. Dunes vary in size. Their height ranges from a few metres to as much as 300 metres.

The Work of Sea Waves

The sea is also an important agent of gradation. Its work of erosion and deposition is obviously confined to the coastal areas.

Strong sea waves, dashing against the coast day in and day out, are able to break down hard rocks. They are further aided in their work by the presence of loose pieces of rocks and sand in them. They act as cutting tools for the sea waves. Coastal erosion caus

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by the sea waves is known as *marine erosion*.

Sea waves are also responsible for deposition. Pieces of rocks, gravel, and mud are being constantly sorted out and deposited along the coast or on the sea bed itself by sea waves and currents. The marine deposits along the shore modify the coast lines in several ways.

At places sand, gravel and pebbles get deposited temporarily on the shore. They are called *beaches*. Triplicane or Marina Beach in Madras is a famous beach in India.

Sometimes embankments of sand and gravel get built up on the sea floor not far from the coast. They are called *bars*. Very often they prove a hazard for shipping along the coast.

Occasionally, a sand bar almost cuts off a portion of the sea or a bay from the main body of sea water. This results in the formation of salt water lakes along the coast. They are known as *lagoons*. Lagoons are able to maintain a connection with the open sea through narrow outlets. In India there are several lagoons along the Malabar coast. On the east coast there are two large lagoons. They are the Chilka lake in Orissa and the Pulicat Lake near Madras.

We have thus seen how the various natural agencies are at work in changing the face of the land. How ingenious are the ways of nature that develop a variety of landforms steadily and stealthily!

Formation of Soil

No study of landforms will be complete without a reference to the formation and conservation of soil.

We owe a good deal to the natural process of weathering and erosion. But for this process there would not have been any soil for man on which to raise a variety of crops. The formation of soil through the natural process of weathering is a very slow process. It may take about thousand years to have a layer of soil two-and-a-half centimetres thick.

You will notice that the soil is derived from rocks. The upper layers of rock gradually break into sizable pieces of rocks. They, in turn, give place to smaller pieces of rocks and silt. This is known as sub-soil. At long last, we get a fairly thick top layer of soil which is so useful to us for deriving our food. In fact, *soil*, which is of great use to us, is the uppermost layer of the earth's crust. It contains a fine powdered mineral material and humus. *Humus*, as you know, is a very fine

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Fig. 3 Formation of soil

Look at the various layers, indicating the stages in the formation of soil. What is top soil?

material derived from the remains of plants and animals. It is the presence of this humus which makes the soil fertile.

Presence of grass, plants and trees on the land is very useful to us in a variety of ways. Their remains add to the humus content of the soil and make it fertile. The roots of the vegetation also help in binding the top layer of soil. This prevents it from being carried away by water or wind.

Conservation of Soil

Unfortunately, very often man ignores the usefulness of natural vegetation. He fells trees and clears forests. He removes grass and other natural vegetation either himself or by allowing his domesticated animals to overgraze. Such bare and uncared-for soil is eroded both by running water and wind. Sheet and gully erosions are the two well-known types of soil erosion. These need to be avoided at any cost. Why? As you know, it is possible that the soil which was developed by nature in the course of a thousand years, can be carried away by running water and winds in a few years merely to be deposited into the sea. If we want more and more food for our rapidly growing population, can we afford to neglect our soil?

It is because of this that our government and intelligent farmers take great care to conserve our soil. This is done through several means. We must

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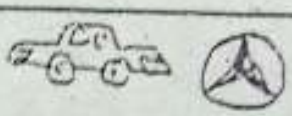
put an end to the reckless felling of trees or clearing of forests. Every effort must be made to plant more and more trees. This is why we celebrate 'Vanamahotsava' every year. We must not allow our cattle, sheep, goats, etc., to overgraze. Farms should be properly levelled and bunded. In hills the terraced farms are more paying since they are well levelled and properly bunded. This helps in the conservation of soil as well as water. Can we ever do without either?

The New Terms You Have Learnt. *Snow-line* : The lowest limit of the perpetual snow and ice. *Ice-age* : A considerably long period during which very large parts of the earth were covered with ice sheets or ice caps.



EXERCISES

Review Questions

1. Answer the following questions :
   (i) What is a snowfield? How and where is it formed?
   (ii) What is the average height of a snow-line in the Himalaya?
   (iii) Where do we find the largest ice cap?

2. Make out correct pairs from the two columns :

(i)	The lowest limit of perpetual snow and ice	(a)	Ice cap
(ii)	A vast area covered with deep ice	(b)	Glacier
(iii)	Slow moving rivers of ice and snow	(c)	Marine erosion
(iv)	Gradual breaking up of rocks and their carrying away by sea waves	(d)	Beach
(v)	Pebbles, sand and gravel temporarily deposited on the shore	(e)	Snow-field

3. Complete the following table, as indicated, from the list of landforms given below :
(i) lagoons, (ii) sand dunes, (iii) loess plateaus, (iv) gulleys, (v) U-shaped valleys, (vi) beaches, (vii) V-shaped valleys, (viii) moraines, (ix) sand bars, (x) flood plains, (xi) deltas, (xii) gorges.

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Agent of Gradation	Landforms due to erosion	Landforms due to deposition
Running water	V-shaped valleys	
Moving ice		
Wind		Sand dunes
Sea waves		

4. Explain how soil is formed. List various steps that must be taken to conserve soil.

Model-making

5. Prepare suitable clay models of various landforms such as a V-shaped valley, a delta, a sand dune, a U-shaped valley and a gorge. Prepare suitable labels for your models giving a definition of each one of them.

Topic for Class Discussion

6. Vanamahotsava and its Usefulness

Discuss how plantation of trees on a large scale should help in conserving soil and water. Also discuss how you can help in conserving soil and water.

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UNIT TWO

Asia

Asia is the world's largest continent. It possesses one-third of the land area of the world. It also contains more than 58 per cent population of the world.

Asia has the highest mountain chains of the world. It is also a land of broad plateaus, plains and river valleys.

There are great variations in the climate and natural vegetation of Asia.

Asia's large population is crowded in a few river valleys which are among the world's most fertile agricultural lands. Nearly three-fourths of the population of Asia still depends upon agriculture. Asia leads the world in the production of various crops such as rice, millets, jute, raw silk, rubber, tea, sugar-cane, spices, oilseeds and coconuts.

Asia possesses large deposits of tin, mica, mineral oil, coal, iron-ore, bauxite and manganese. It is a leading manufacturer of cotton, jute and silk textiles.

Asia is a continent with a very old history. All the leading religions of the world originated in Asia. It has therefore been a pioneer in the field of culture and religion.

Asia is a continent of several countries. A majority of them have become independent only recently. These countries are now trying hard to catch up with the advanced countries of the world.

Pakistan, Nepal, Bhutan, Bangladesh, Burma and Sri Lanka are our closest neighbours. Along with India they are all situated in South Asia. Malaysia and Indonesia are the two south-east Asian countries known for their plantation agriculture.

China, a land where farming has been practised for four thousand years, has the highest population in the world. Japan is a country with an ancient civilisation and modern economy. It is one of the most prosperous countries of the world.

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4. Land and Climate

The Terms You Already Know. *Tundra*: The region within the Arctic Circle where the climate is very cold and the natural vegetation mainly consists of mosses and lichen. *Coniferous trees*: Trees growing in cool climate and bearing cones and needle-like leaves. *Taiga*: The coniferous forest land of Siberia. *Steppe*: The treeless grassland found mainly in semi-arid regions.

Asia is the largest of all the continents. It possesses one-third of the land area of the world. It lies between 10°S. and 80°N. latitudes, and thus extends from the hottest to the coldest region. Its east-west extension is about half of the surface of the globe.

Look at Fig. 4. Find out the three largest countries of Asia. Which large country lies in both Asia and Europe? Which countries are land-locked, i.e. do not have access to sea? Which countries have common boundaries with India? Locate the capital cities of Japan, China and India. Name three countries which consist of large groups of islands.

The Land

Asia may be divided into five major physical divisions. They are (i) the Northern Lowlands; (ii) the Central Mountain Belt; (iii) the Southern Plateaus; (iv) the Great River Valleys; and (v) Island Groups of South-east and East Asia. (Fig. 5)

(i) The Northern Lowlands. The northern part of the continent is a vast lowland called the Siberian Plain. Ob, Yenisei and Lena are the rivers which flow through this plain from south to north and drain into the Arctic Ocean. Due to the severe winter of the polar region, the lower courses and mouths of the rivers remain frozen for several months. Hence, the water coming from the upper courses is blocked and inundates a large part of the flat plain making it swampy and marshy.

(ii) The Central Mountain Belt. To the south of the northern lowlands is a

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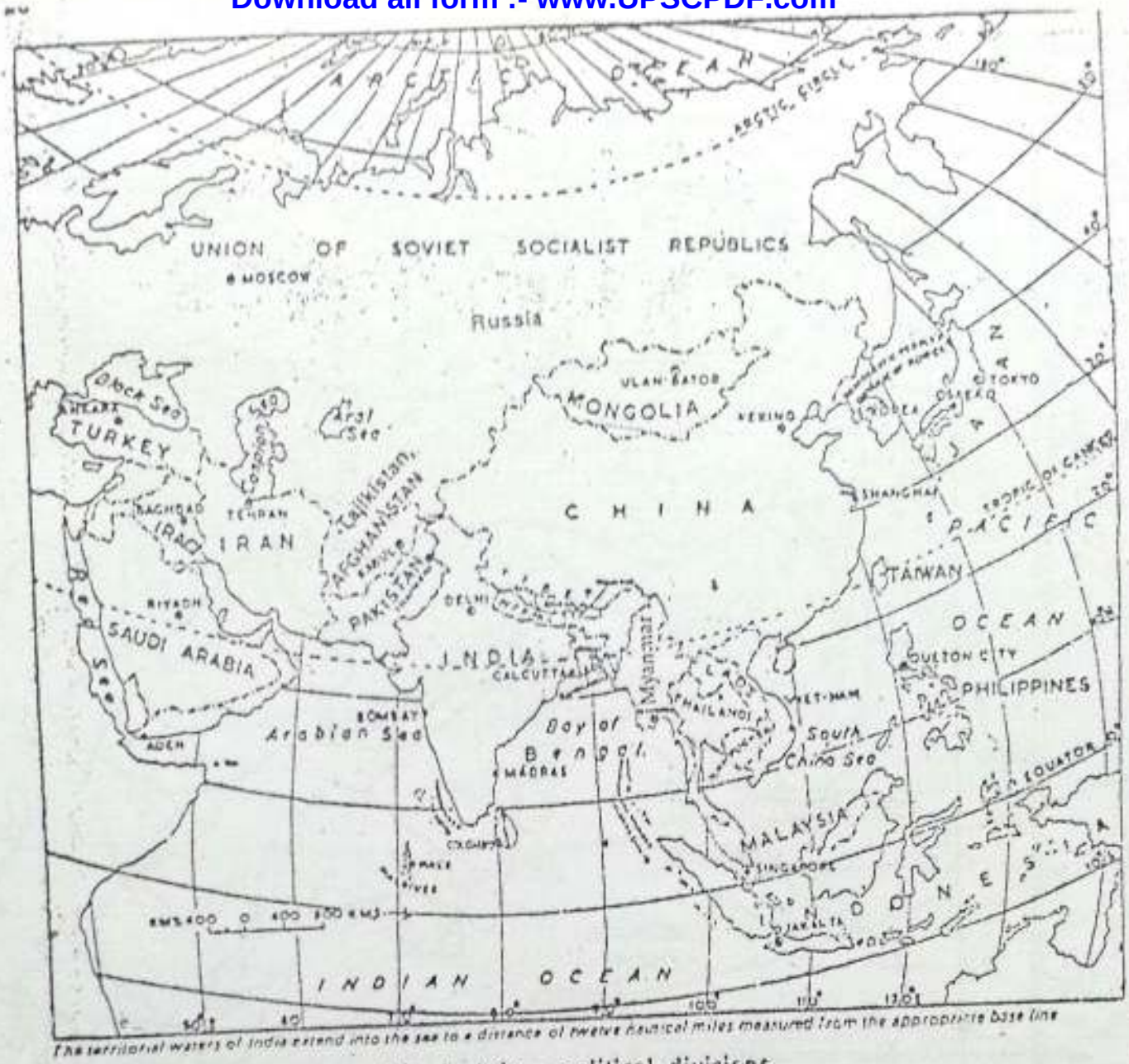

Fig. 4. Asia — political divisions

Asia consists of a third of the total land area of the world and contains about half of the world's population.

great belt of mountains and plateaus. As you can see from the map, the Pamir Plateau in central Asia forms a mountainous knot from which several mountain chains run out in different directions. These mountain chains enclose huge plateaus and desert basins.

Two mountain chains which run westward enclose the plateaus of Iran and Anatolia. The mountain chains of the Himalayas, the Karakoram and the Kunlun run towards the east. The plateau of Tibet, enclosed by the Himalayas and the Kunlun, is the largest and highest plateau of the world.

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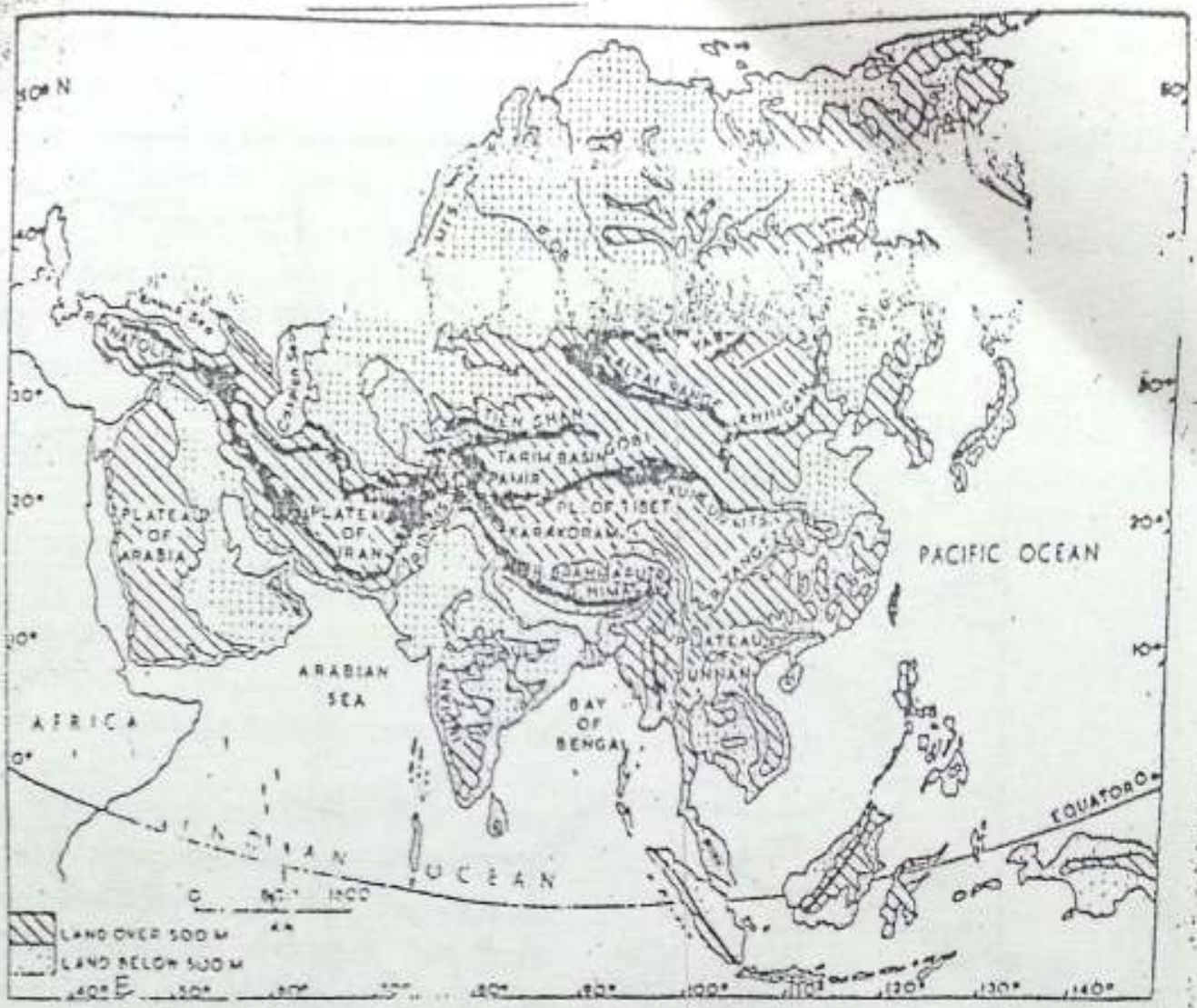

The territorial waters of India extend into the sea to a distance of twelve nautical miles measured from appropriate base line.

Fig. 5. Asia — physical divisions

Asia is a continent of mountains, plateaus and river valleys. Note the position of the Pamir Knot and the mountain ranges which run out in different directions from the knot.

The vast cool desert of Gobi lies to its north-east. Look at the map and note the other mountain chains and the plateaus and desert basins which they enclose.

(iii) The Southern Plateaus. To the south of this mountain belt there are some plateaus of very old rocks. These are the Plateau of Arabia, the Deccan Plateau and the Plateau of Shan and Yunnan.

(iv) The Great River Valleys. From these mountains and plateaus many great rivers emerge to form big fertile

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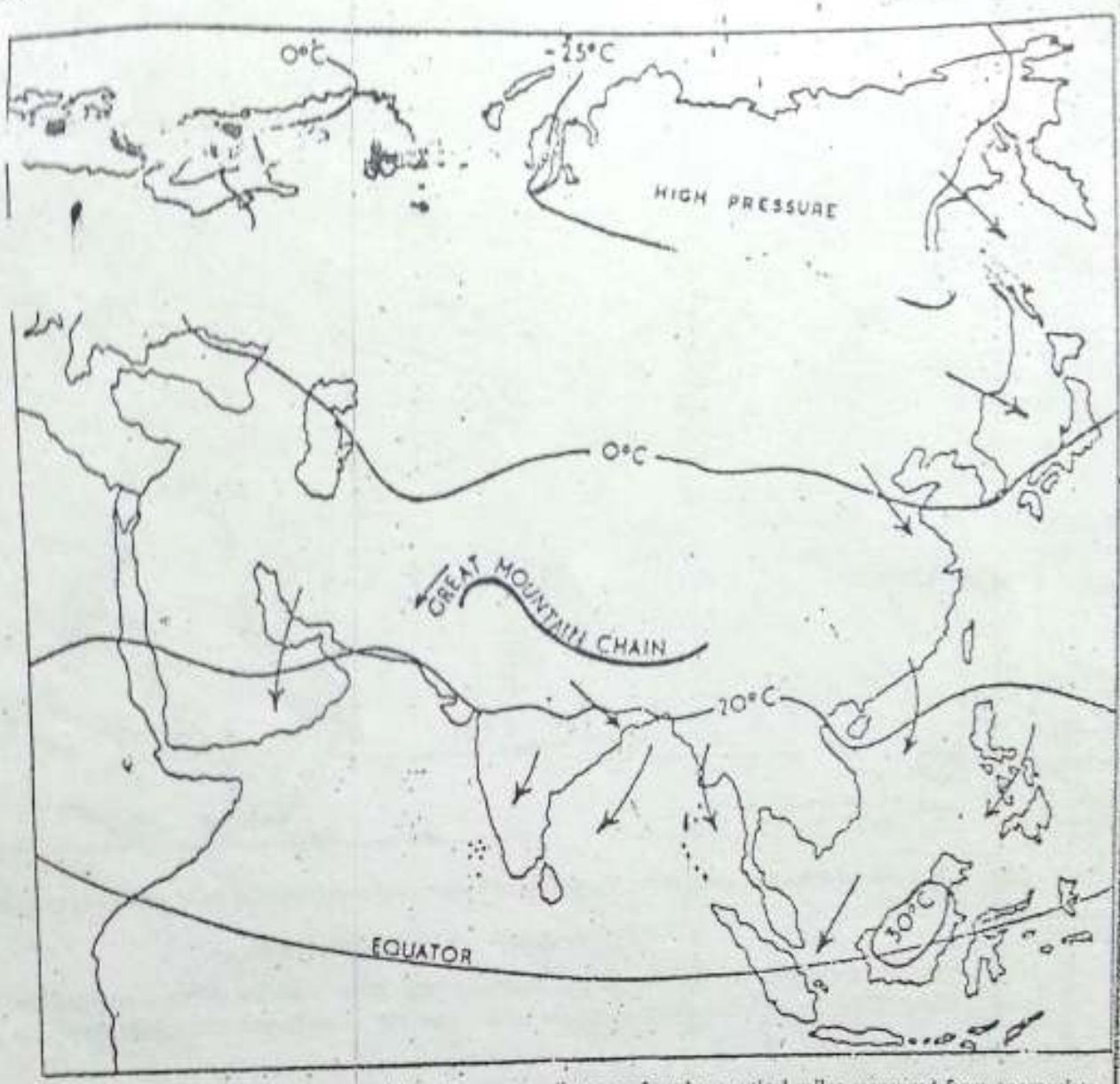

The territorial waters of India extend into the sea to a distance of twelve nautical miles measured from appropriate base line.

Fig. 6 Asia — climatic conditions in winter (January)

Note that in winter northern and central Asia have very low temperatures, high pressure and outblowing winds. Why does the climate of most parts of Asia remain dry in this season?

valleys. Some of the important valleys are those made by the Tigris-Euphrates, the Indus, the Ganga-Brahmaputra, the Irrawaddy, the Mekong, the Sikiang, the Chang-jiang and the Hwang Ho. These fertile valleys are some of the world's most thickly populated regions.

(v) The Island Groups. The imports

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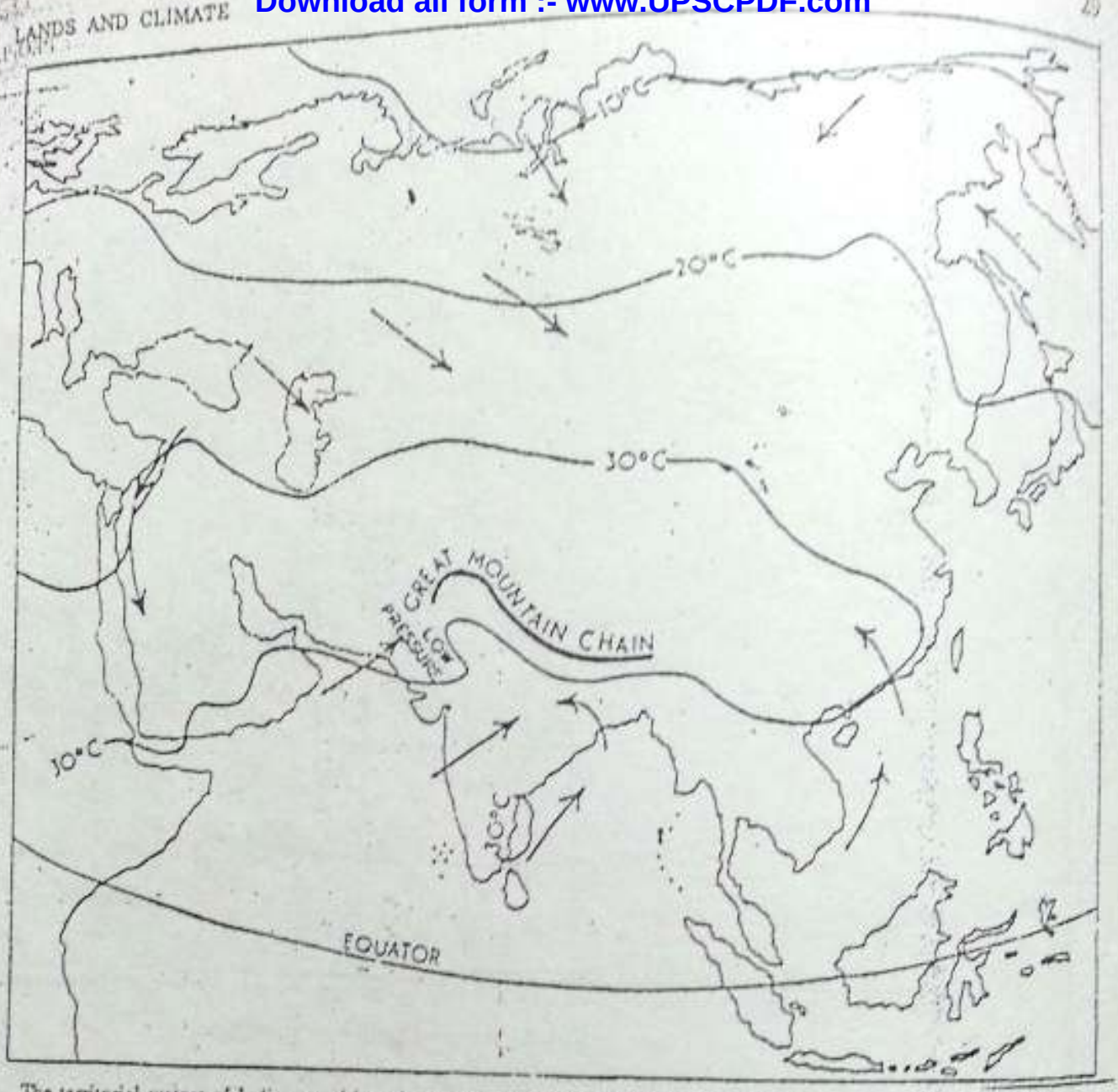

The territorial waters of India extend into the sea to a distance of twelve nautical miles measured from appropriate base line.

Fig. 7 Asia — climatic conditions in summer (July)

Note that in summer the interior of Asia is very hot and becomes a huge low pressure area. Winds from the surrounding oceans are drawn towards this low pressure. These winds give rainfall to most parts of Asia.

island groups consist of Indonesia, the Philippines and Japan. Most of these islands are mountainous. Some of them are known for their volcanoes which are active or have been active in the recent past.

Climate and Vegetation

Asia is a huge continent and possesses great differences in elevation. It

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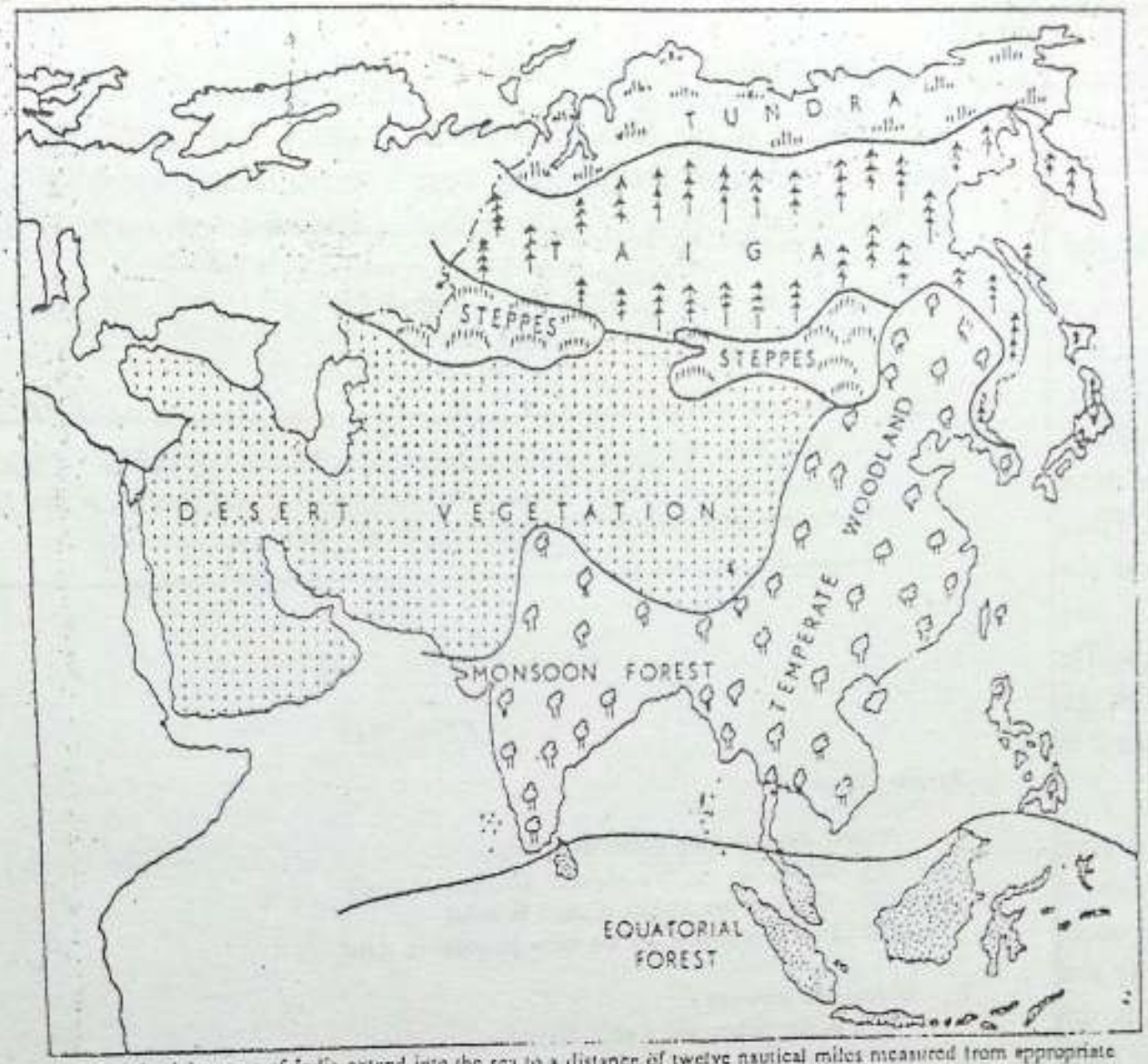

The territorial waters of India extend into the sea to a distance of twelve nautical miles measured from appropriate base line.

Fig. 8 Asia — natural vegetation zones

Note the broad natural vegetation belts. They generally run from east to west. What is the relationship between climate and vegetations ?

has therefore a great range of climate and vegetation.

In Figs. 6 and 7, you will notice the change in the climatic conditions of Asia from winter to summer.

In winter, the central parts of Asia have temperatures below freezing point. Hence, the air over the region contracts. It becomes heavy, forming a high pressure area. The winds blow outward from this region. They are dry because they blow from the land. They pick up moisture only when they

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blow over the sea and then may cause rainfall. Japan, parts of south-east Asia, the south-eastern coast of India, and Sri Lanka receive rain from such winds in this season. Parts of south-west Asia receive rainfall from winds blowing eastwards from the Mediterranean sea.

During the summer season, the interior of Asia becomes very hot. As the air is heated, it expands. It thus becomes light and a low pressure area develops in the region. It draws in air from the surrounding relatively cooler oceans. As the air comes from the oceans, it brings rain to most parts of Asia.

The annual rainfall in Asia varies greatly from area to area. Some areas receive a very large amount of rainfall. Cherrapunji, for example, has more than 1,000 centimetres of rainfall annually. At the other extreme, there are the desert regions which may not have even a drop of rain for many successive years.

The natural vegetation of Asia is very closely related to the climate. Look at Fig. 8.

Along the northern coast of Asia is the belt of *Tundra* vegetation. The region is mostly covered with snow and ice for the major part of the year. Summer is short and cool. Precipitation is about 30 centimetres annually, mostly in the form of snow. Due to the cold weather conditions plants do not attain much height and the vegetation mainly consists of moss and lichen. The reindeer is the chief animal of this region.

To the south of the Tundra, there is a much broader belt of coniferous forests known as *Taiga*. Here, winters are severe and summers are warm. Pre-

Photo III The Tuhdra

A hunter is taking a polar fox out of a trap. Note the soft and long fur of this animal. Look at the clothes of the hunter. What are they made of ?

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cipitation is only 25-50 centimetres, mostly in the form of snow. As there is little evaporation, the small amount of rain is sufficient for the growth of trees. The region is famous for its softwood trees such as fir, spruce and pine. These are used as timber and in making paper-pulp and rayon. The *Taiga* is the home of fur-bearing animals such as fox, sable and mink.

Further south is the belt of temperate grasslands known as the *Steppe*. Winters here are cold and summers are fairly hot. Rainfall is between 20 and 40 centimetres. As there is much evaporation, the moisture is sufficient for grasses but not for trees. The antelope is a common animal of this region.

Photo IV The Taiga

A hunter in the Taiga forest has killed this giant bear. How is the life of a hunter in the Taiga different from that of a hunter in the Tundra.

Very large parts of south-west and central Asia have *Desert Vegetation*. In the South-west are the hot deserts of Arabia and the Thar, while in the north are the cold deserts of Gobi and Tibet. As conditions are unfavourable for plant growth, only shrubs, thorny bushes and poor grasses can grow. The common animals are camel, ass, gazelle and cheetah. The yak is found on the high plateau region.

In south, south-east and east Asia the natural vegetation consists of *Monsoon Forests*. As rainfall occurs mostly in summer, trees generally shed their leaves in winter which is dry. The forests consist of many useful trees such as teak, sal, and sandal wood. The elephant is a typical animal of monsoon forests.

In north-eastern Asia, as the climate becomes cooler, the monsoon forests change into *Temperate Woodlands*.

In the extremely southern portion of Asia, the natural vegetation consists of *Equatorial Forests*. Such forests

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are confined to the Malaysian Peninsula and the island groups lying close to the equator. You already know about these dense and gloomy evergreen forests which are homes of apes, monkeys and a variety of animals.

The New Terms You Have Learnt. *Land-locked Countries* : Countries which do not possess direct access to the sea. *Desert Basin* : A low lying desert area enclosed by mountains on all sides.

EXERCISES

Review Questions

1. Answer the following questions briefly :
   (i) Which are the five physical divisions of Asia?
   (ii) Which is the highest plateau in Asia?
   (iii) In which season are the rains plentiful in Asia?

2. Distinguish between :
   (i) A hot desert and a cold desert.

3. State the chief characteristics of each of the five physical divisions into which Asia is divided.

4. Name the natural vegetation belts of Asia. Take any two belts and state how their vegetation depends on their climate.

5. Place the following words in the table given below :
   (i) moss; (ii) short grasses; (iii) teak; (iv) reindeer; (v) lichen; (vi) antelope; (vii) sal; (viii) thorny shrub; (ix) elephant; (x) camel; (xi) fir; (xii) pine; (xiii) date palm; (xiv) creepers; (xv) silver fox; (xvi) apes.

Vegetation Belt	*Common Vegetation*	*Animals*
Tundra		
Taiga		
Steppe		
Arid deserts		
Monsoon forests		
Equatorial forests		

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Picture Reading

6. Look at the pictures in this chapter and study carefully the differences in the climate of the regions. See if the landscape, vegetation, animals and the way people dress themselves can help you in this regard.

Map Work

7. Study the map of Asia from your atlas and find out the following :
   (i) *Mountains* : The Hindukush and the Karakoram
   (ii) *Rivers* : The Tigris-Euphrates and the Mekong
   (iii) *Countries* : Turkey, Afghanistan and Thailand
   (iv) *Cities* : The capital cities of Iraq and Iran.

Topic for Class Discussion

8. *'The Clothes and the Houses in Different Parts of Asia'*

   Collect information on the above topic and present it to the class.
   Collect pictures in support of your information.

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5. The People and the Resources of Asia

The Terms You Already Know . *Irrigation* : Supplying water to the land for the growth of crops. *Civilisation* : An advanced stage of social life with art, science, culture, good government, and good customs and manners. *Growing Season* : A part of the year with temperatures high enough to allow the growth of crops.

The People

The population of Asia is nearly 2818 million, which is more than 58 per cent of the total population of the world. The average density of population is 102 persons per square kilometre but the actual distribution of population is very uneven.

Look at the population map of Asia (Fig. 9). You will find that there are certain regions in which the population is very sparse. These regions are the northern and eastern parts of Siberia, the deserts and highlands of central Asia, the Arabian Desert, the plateau of Iran and the Thar Desert in India.

The most thickly populated parts of Asia include the plains of India, Bangladesh, Java island in Indonesia and the plains of China and Japan. Most of these areas are fertile lowlands or river valleys.

The vast continent of Asia is inhabited by different people. Let us note some of them.

The yellow peoples of eastern and south-eastern Asia constitute more than one-third of the population of the continent. They include Chinese, Japanese, Koreans, Philippino, Malay, Indonesian, Thai, Myanmaries and peoples of other countries. They are mainly farmers.

The brown peoples of India, Pakistan, Bangladesh and some other countries of South Asia account for some one-fourth of the population of Asia. These people are also mainly farmers.

Southwest Asia is inhabited by Arabs, Turks, Persians, Afghans and n

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number of other groups. Their main occupation is farming and animal rearing.

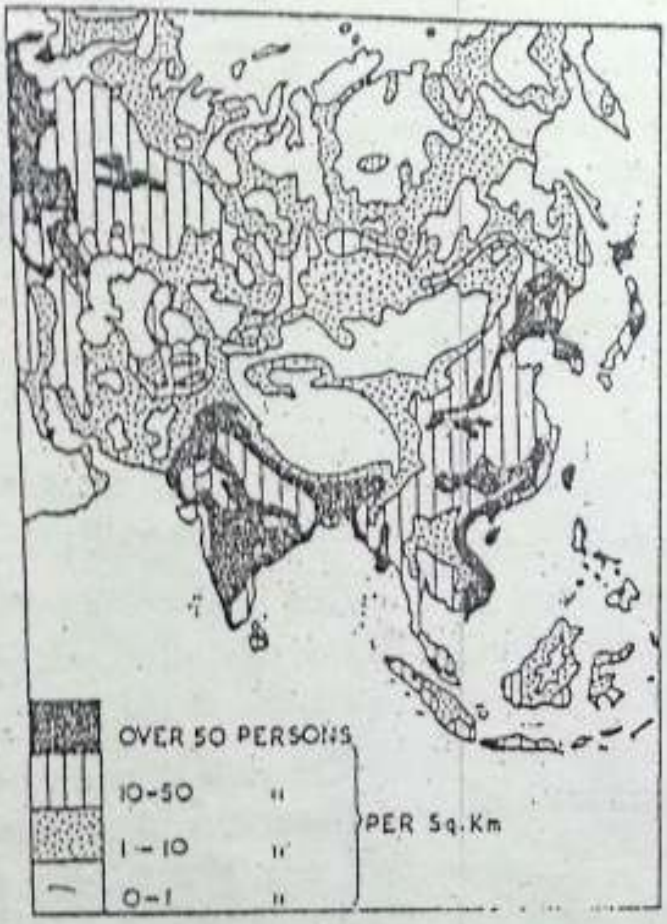

Fig. 9 Asia — density of population

Note the most densely peopled parts of Asia. How will you explain the very heavy concentration of population in these areas?

Central Asia has a number of groups such as Mongols, Kazakhs, Uzbeks and Kirghiz. Most of these peoples are herders and great horsemen. See Photo V.

The people of Asia follow different religions. In fact, Asia has been the cradle of great religions. Can you name them and their places of origin?

The Resources

The greatest wealth of Asia consists of its agricultural resources. These include fertile soil, sufficient water for irrigation and favourable climatic conditions for the growth of plants. Other resources of Asia include forests and mineral deposits.

Agricultural Resources. Large parts of Asia are occupied by mountains, plateaus, deserts and forests. As a result, only one-sixth of the total area is suitable for agriculture. Even so, Asia is a continent rich in agricultural resources.

There are large valleys. Many of them were cradles of ancient civilisations. Fertile soils, assured water-supply from the rivers and a long growing season helped in the early beginning of agriculture in these valleys.

Rainfall in Asia is not evenly distributed through the course of the year. As a result, irrigation in certain parts of Asia becomes necessary.

Irrigation is done by means of canals, tanks and wells. In recent years, several large river valley projects have been set up. They serve several purposes such as irrigation, flood control, soil conservation and production of waterpower. Hence, they

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are known as *multipurpose projects*. The Bhakra-Nangal Scheme in India is one of the biggest multi-purpose projects in Asia. Another big project is the one in Siberia on river Angara (Photo VI).

Photo V A Kirghiz Horseman

Look at a Kirghiz farmer with a golden eagle in his hand. The old farmer is a fine horseman. What kind of landscape do you see in the picture?

Types of Agriculture. There are several types of agriculture in Asia. One of them is called *shifting agriculture*. It is practised in some mountainous and forested areas. A patch of forest is cleared by burning the trees. The farmer cultivates the cleared patch for a few years. As that patch loses its fertility in two or three years, he gives it up and makes a fresh clearing in the forest for cultivation. Such an agricultural practice requires a great deal of land. It is a wasteful method of farming.

Another type of agriculture, which is the commonest in Asia, is known as *intensive agriculture*. It involves a good deal of manual labour on a small piece of land. Farmers prepare their fields before the rains start and sow them soon after. In the case of rice, the seeds are first sown in a nursery. When the plants are about 15 centimetres high, they are taken out and planted in carefully prepared fields. The farmer has to apply fertilisers to his field, irrigate it when necessary and remove the weeds continually. Much labour is required at the time of sowing and harvesting the crop. Generally, the farmer grows different successive crops in such a way that the fertility of the soil is maintained as much as possible. This is known as *rotation of crops*.

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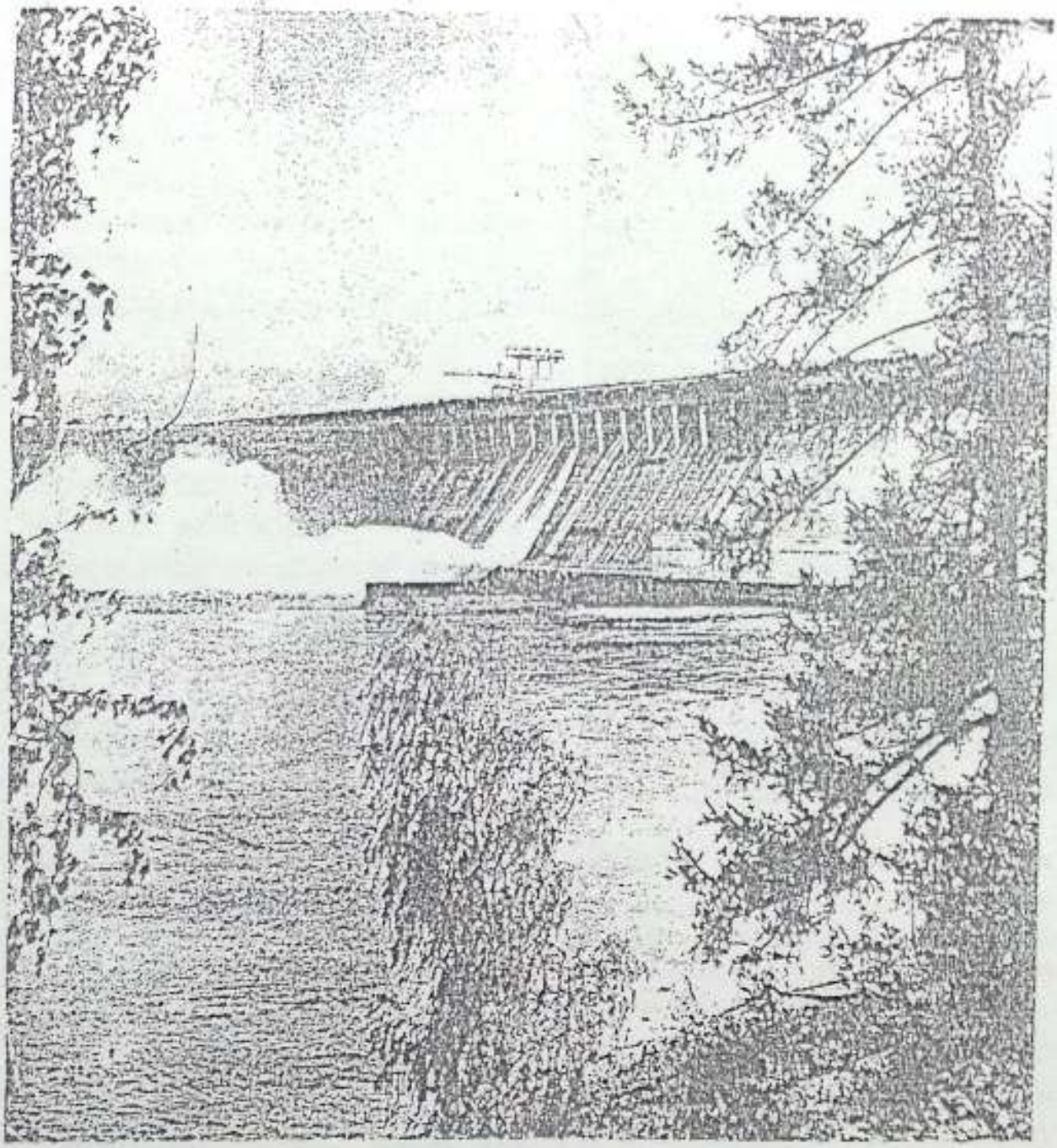

Photo VI A Big Water-Power Station

Look at the world's biggest water-power station built on the river Angara in Siberia. Note the dam and the vegetation in this picture.

In Asia, the average yield per acre is generally very low. There are several reasons for this. The farms are very small. Farmers are generally poor and uneducated. They work with simple and old type of tools. They do

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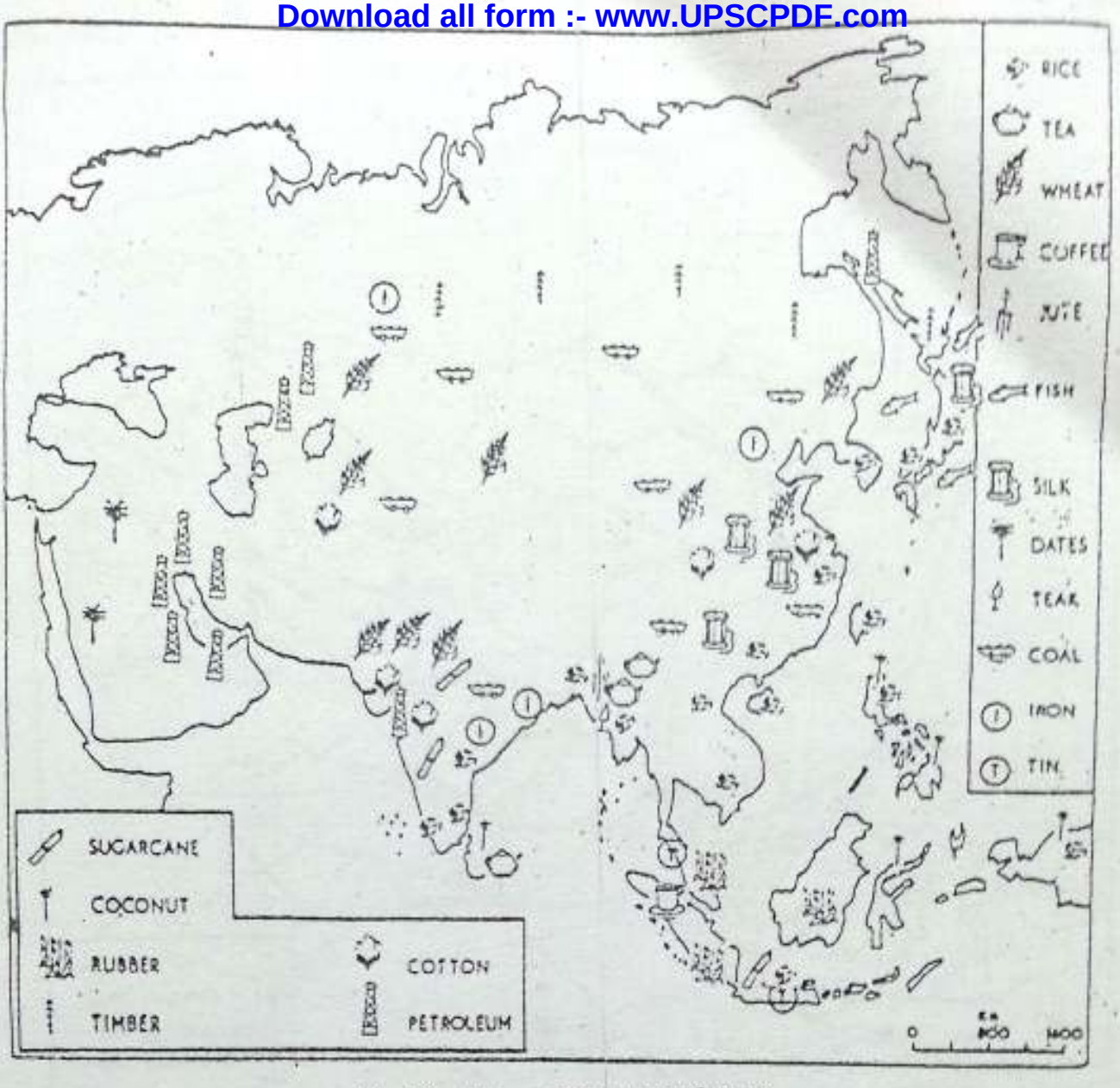

Fig. 10 Asia — crops and minerals

Note the areas producing rice and wheat. What climate do they suggest? In what areas would you expect the iron and steel industry?

not have enough irrigation facilities, fertilisers and good seeds. Hence, the production is very low and just enough to feed the farmer and his family.

Still another type of agriculture is that known as *extensive agriculture*. Some parts of Central Asia and West Siberia have very large farms. Manual labour is not possible on such huge farms. Machines are, therefore, used for farming. It is obvious that such mechanised farming requires a good deal of money.

Crops : Various crops are grown in

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Asia. Food crops, especially cereals, are the most important. Rice is the chief crop in most parts of the continent. More than 90 per cent of the world's rice is grown here. The main producers are China, India, Japan, Bangladesh and the countries of South-east Asia.

Wheat is grown in the sub-tropical and temperate lands of Russia, Ukraine, China, Northern India, Pakistan and South-west Asia. Millets such as bajra, jowar and ragi are grown in semi-arid regions. Pulses and oilseeds are also grown along with cereals.

The important cash crops of Asia are cotton, jute, sugarcane and tea. Cotton is grown in China, Kazakhastan, Azerbaijan India, Pakistan and South-west Asia. Jute is produced in the Ganga-Brahmaputra delta. Sugarcane is chiefly grown in India, Indonesia and Pakistan. Tea is cultivated in India, Sri Lanka, China, Japan and Indonesia.

Forest Resources : Asia has three main types of forests, namely, coniferous forests, monsoon forests and equatorial forests. Coniferous forests are found in the Russia, Japan, and the Himalayan region. They provide softwood which is used as timber and for making paper-pulp and rayon. Monsoon forests are found in India, Myanmar and parts of South-east Asia. They provide useful trees such as teak, sal and bamboo. Equatorial forests are found in Malaysia and Indonesia. Much of these forests has now been converted into rubber estates. Malaysia is the largest produer and exporter of rubber in the world.

Photo VII A coal-mine in Central Asia.

Look at a coalmine in the Central Asian Region of the Soviet Union. The mine is worked entirely with the help of machines. Note that the coal is found very close to the surface.

Mineral Resources : Asia possesses large mineral deposits. Some of the important minerals are iron, manganese, tungsten, bauxite, mica, tin, coal and oil.

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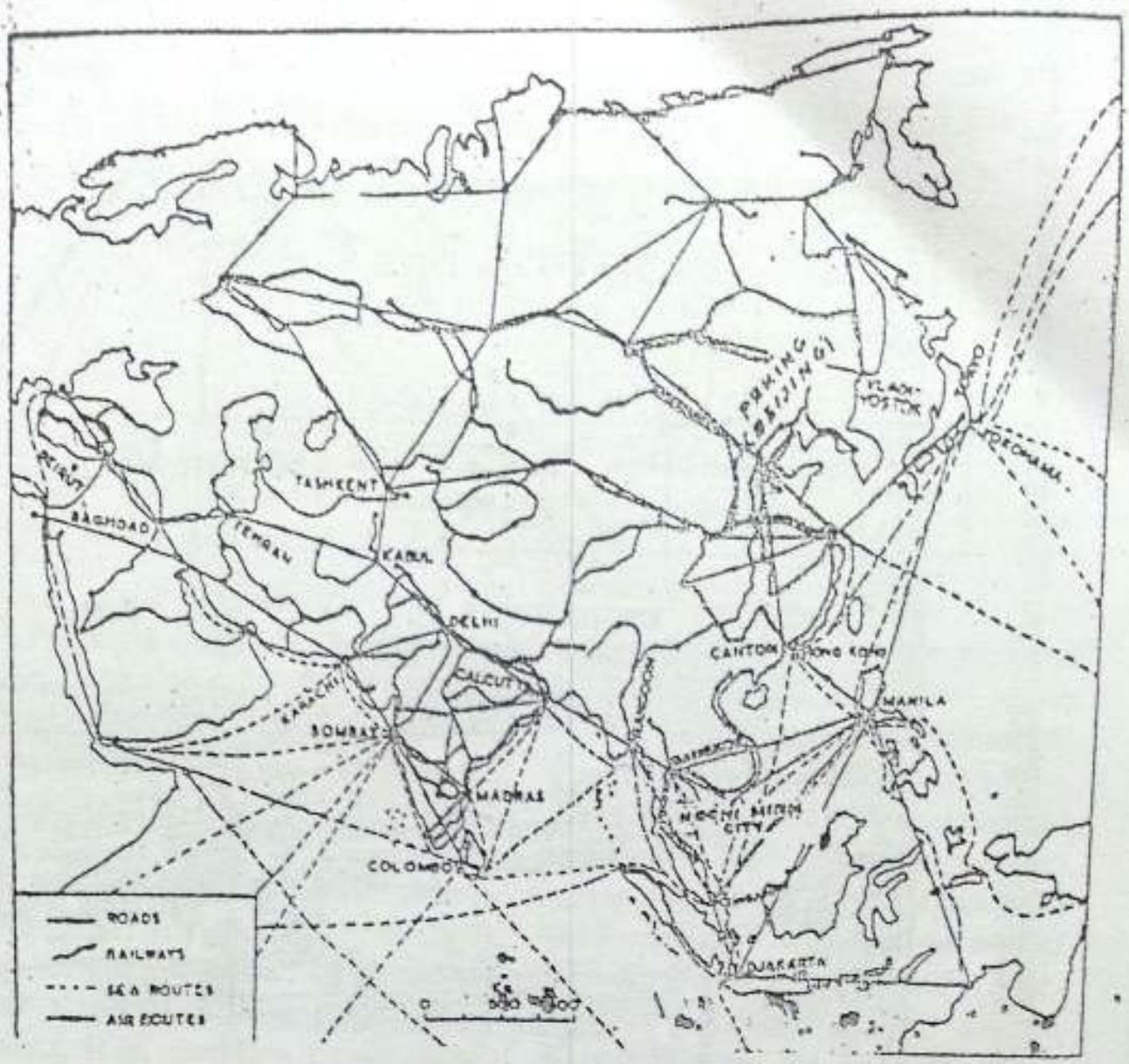

The territorial waters of India extend into the sea to a distance of twelve nautical miles measured from appropriate base line.

Fig. 11 Asia — important railways, seaports and airways

Note that there is very uneven distribution of railways. Why does Asia lack a well developed and integrated network of railways? Note the important sea routes from the Suez Canal to Singapore. Which are the important seaports on this route?

Iron ore is found in India, China Russia and the Azerbaijan Bauxite and mica deposits are mainly in India. Malaysia is very rich in tin. Large deposits of coal occur in China, Russia, and India. Countries of South-west Asia possess large deposits of oil. While the leading producers of oil are

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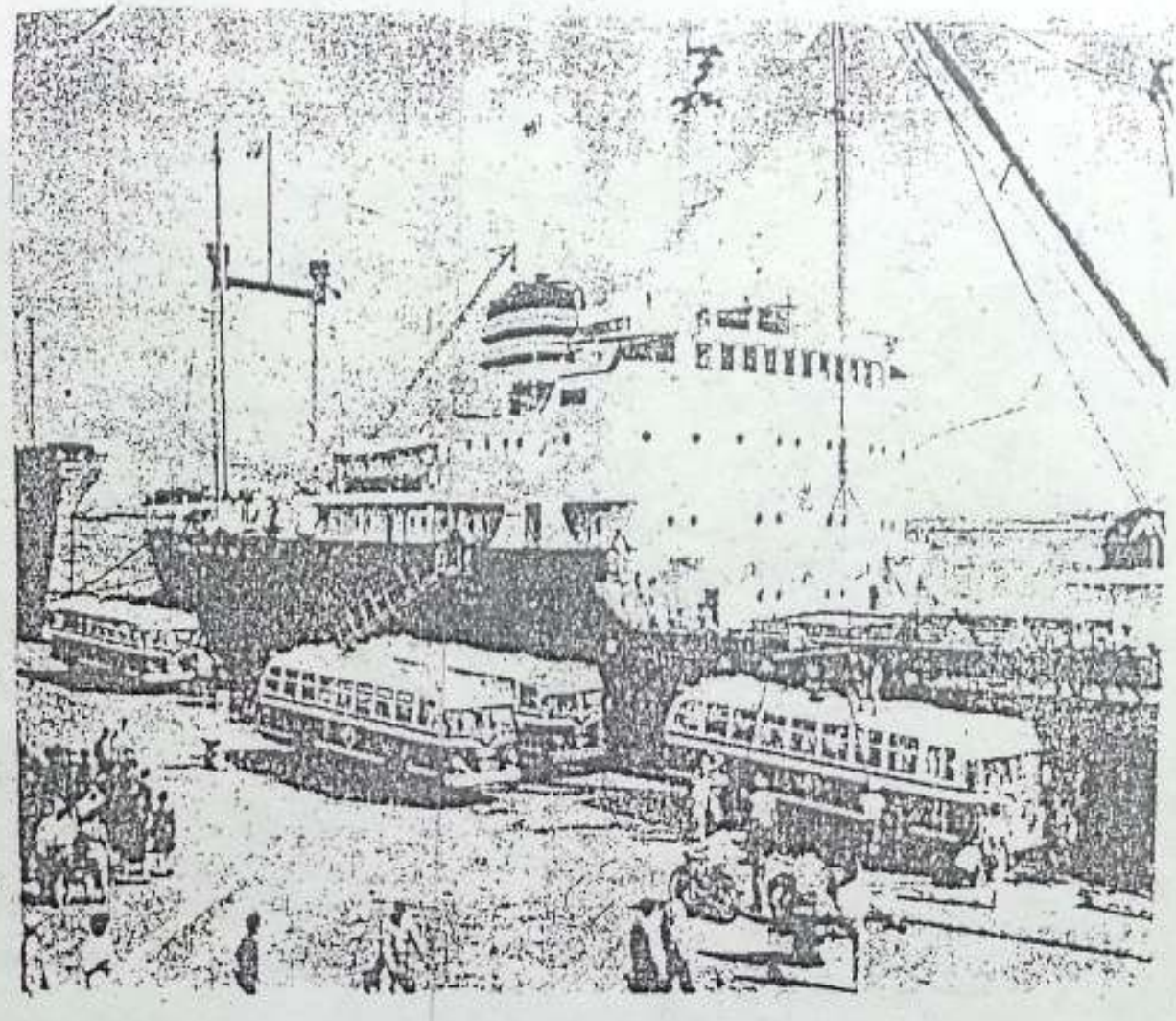

Photo VIII A Japanese port

Look at a Japanese port where a big ship is being loaded with buses. Note the powerful cranes lifting these buses so easily. How are the people in this picture dressed ?

Kuwait, Bahrain, Iraq, Iran, Saudi Arabia, China and Russia. a good deal of oil is produced in Myanmar Indonesia and India also.

Asia has rich agricultural and mineral resources. But they are unevenly distributed. Also, they have not been developed properly and sufficiently. Now things are changing. Some countries have progressed much, while others have only recently started to progress. Methods of farming are being improved. Various industries based on agricultural and mineral resources are developing rapidly.

Transport : Look at Fig. 11. You will

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find that in Asia there are various modes of transport, namely, land, water and air.

The public roads joining distant places are known as *highways*. When they connect places within a country they are known as national highways. When they connect places situated in different countries they are called international highways. Japan possesses the best highways, in Asia. India and China also have good networks of highways. An international highway connecting Istanbul in Turkey with Singapore in South-east Asia is being constructed.

From Fig.11 find out the longest railway line in Asia? Compare this map with the maps of relief and population of Asia. It is easier and more profitable to construct railways in the plains and the thickly populated areas than in the hilly regions and the thinly populated areas.

Airways are becoming more and more important in different parts of Asia. Locate the important airports on the map of Asia.

The New Terms You Have Learnt . *Intensive Agriculture* : A farming practice involving a good deal of labour on a small piece of land. *Extensive Agriculture* : Large farms cultivated with the help of machines. *Highway* : A public road connecting distant places.

EXERCISES

Review Questions

1. Answer the following questions briefly :
   (i) Which are the major cereal crops of Asia?
   (ii) Which are the four important cash crops of Asia?
   (iii) Which is the most important mineral of South-west Asia?
   (iv) Name three nations of Central Asia and three of South-west Asia.
   (v) What is an international highway?
   (vi) Which four major seaports are also international airports?
2. Distinguish between :
   (i) Intensive and extensive agriculture
   (ii) A port and a harbour.

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3. Complete the following statement with the most suitable ending from those given below the statement.
A multi-purpose project means.....
(a) a big river dam built to irrigate a very large area.
(b) a dam built especially for the development of electricity.
(c) a group of dams on several rivers.
(d) a river valley project to achieve several objectives at the same time.

4. Describe important agricultural types in Asia. What are the main difficulties of Asian farmers?

5. Which parts of Asia are very densely populated and why?

Picture Reading

6. Study the picture of the port in Photo VIII and write down the functions which a port performs.

Map Work

7. In an outline map of Asia show the major crops and sea routes

Topic for Class Discussion

8. *'Trade and Transport'*

List a number of articles of daily use. Think of the places from where these articles have come. Tell the class the probable journey they may have completed before reaching you.

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6. Our Closest Neighbours : Pakistan, Nepal, Bhutan, Bangladesh, Myanmar and Sri Lanka

> The Terms You Already Know. *Pass* : A gap in a mountain range providing a natural route across the range.

Pakistan, Nepal, Bhutan, Bangladesh, Myanmar and Sri Lanka are our closest neighbours. All of them have close relations with our country.

PAKISTAN

Pakistan is our western neighbour. Generally, Pakistan has very little rainfall but a large part of the country has a good network of irrigation canals. It is, therefore, rightly known as the land of canals.

Land and Climate

Pakistan has common boundaries with Iran in the west, with Afghanistan in the north-west and with India in the east and south-east. The Arabian Sea lies to the south.

Pakistan is a country of hills and plains. It is divided into two physical units, namely, the western region and the eastern region. The western region consists of the Baluchistan Plateau and the mountain ranges of the north-west. The main ranges are Kirthar, Sulaiman and Hindu Kush. These ranges together with the Himalayas separate the Indian sub-continent from the rest of Asia. There are only two natural gateways in these ranges. They are the Khyber Pass and the Bolan Pass.

The other physical unit, i.e. the eastern region, consists of the Plains of the Indus and its tributaries. Much of the region would be a desert but for the life-giving waters of the Indus and its tributaries. The Indus flows from north to south. On its way to the Arabian Sea, it is joined by the rivers Kabul, Jhelam, Chenab, Ravi, Beas and Sutlej. In its lower reaches, it

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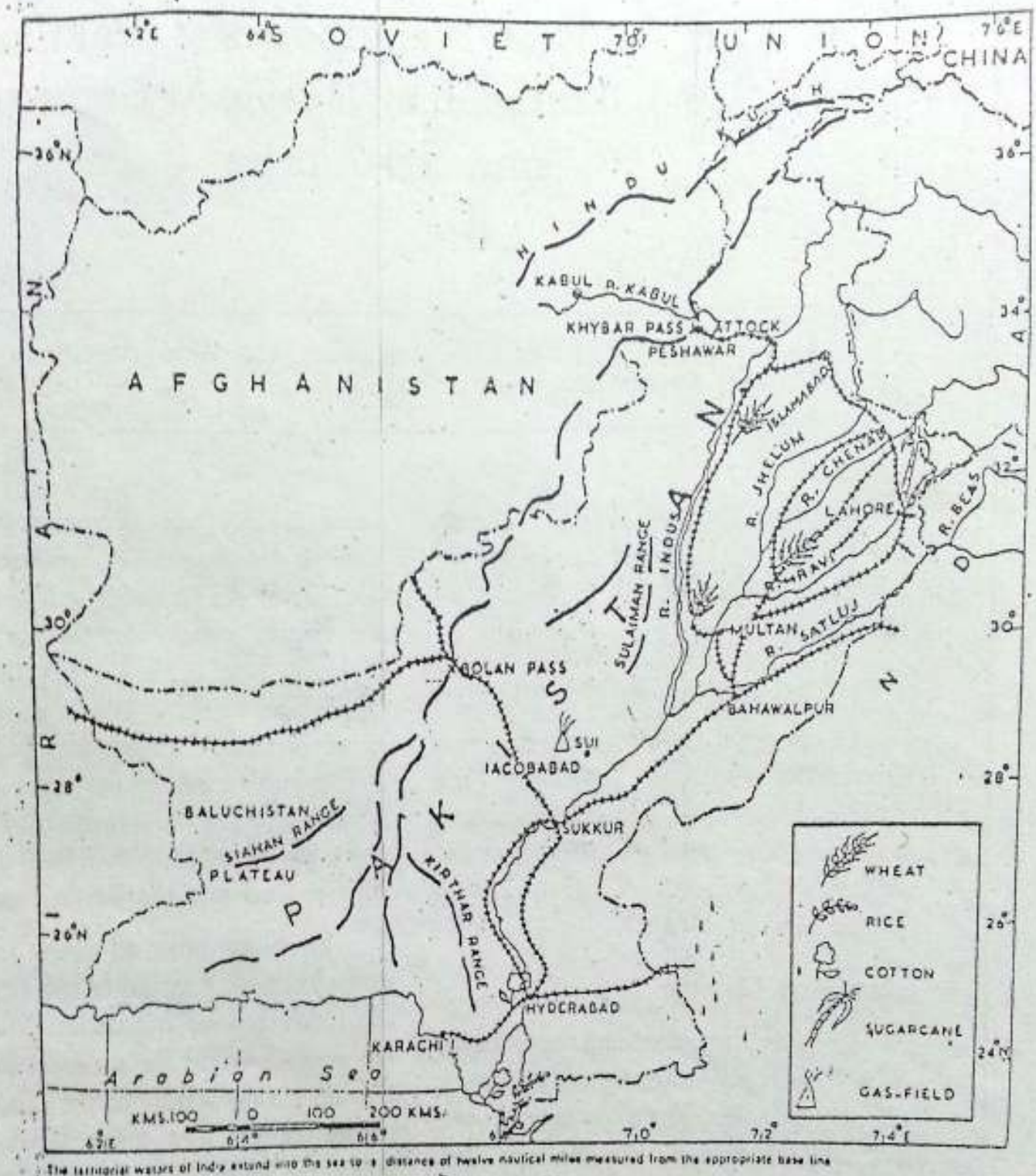

Fig. 12 Pakistan

Locate the mountain chains which separate the plateaus of Baluchistan and Afghanistan from the Indus Plain. Why is the Indus the most important river of Pakistan?

flows through the Thar Desert. It forms a fertile delta at its mouth.

Pakistan experiences extremes of climate. It is very hot in summer and

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very cold in winter. The average rainfan in the Indus Valley is no more than 25 centimetres a year. This shows that the country is generally very dry.

Economic Development

In spite of the arid climate, agriculture is the main occupation. This has been made possible by the fine network of irrigation canals, which is the world's largest single network. Several large dams have been built on the Indus and its tributaries.

Wheat is the major food crop of Pakistan. Millets such as jowar and bajra are grown in the arid regions where irrigation is not possible. Cotton is the important cash crop. It is of a fine quality as its fibres are long. It is mostly grown in the lower Indus Valley. Sugarcane and rice are also grown. Rearing of milch cattle is very important.

Pakistan has only a few mineral resources. It possesses some deposits of mineral oil and natural gas. The gas field at Sui is very important. Rock salt is the only other important mineral.

Pakistan has developed some new industries in recent years. Cotton and woollen textiles, sugar and cement are important amongst them.

Population and Transport

Pakistan has a total of about 100 million people. The average density of population is about 125 persons per square kilometre. Most of the people follow Islam. The official language is Urdu.

Karachi is the largest city. It is also a big industrial and commercial centre. It is a major seaport and an international airport. Lahore is another big city. Islamabad is the new capital city of Pakistan. Pakistan has a good network of railways especially in West Punjab.

NEPAL

As Nepal is situated in the lap of the Himalayas, it is often called a 'Himalayan Kingdom'.

Land and Climate

Nepal is a mountainous country. The Great Himalayan Range, which is the highest range of the Himalayas, passes along the northern border of Nepal. It contains some of the loftiest peaks such as Mount Everest, and Dhaulagiri. To the south lies the Mahabharata Range of the Middle Himalayas. Further south is the low Shivalik Range of the Outer Himalayas. The valley of Kathmandu lies in Central Nepal.

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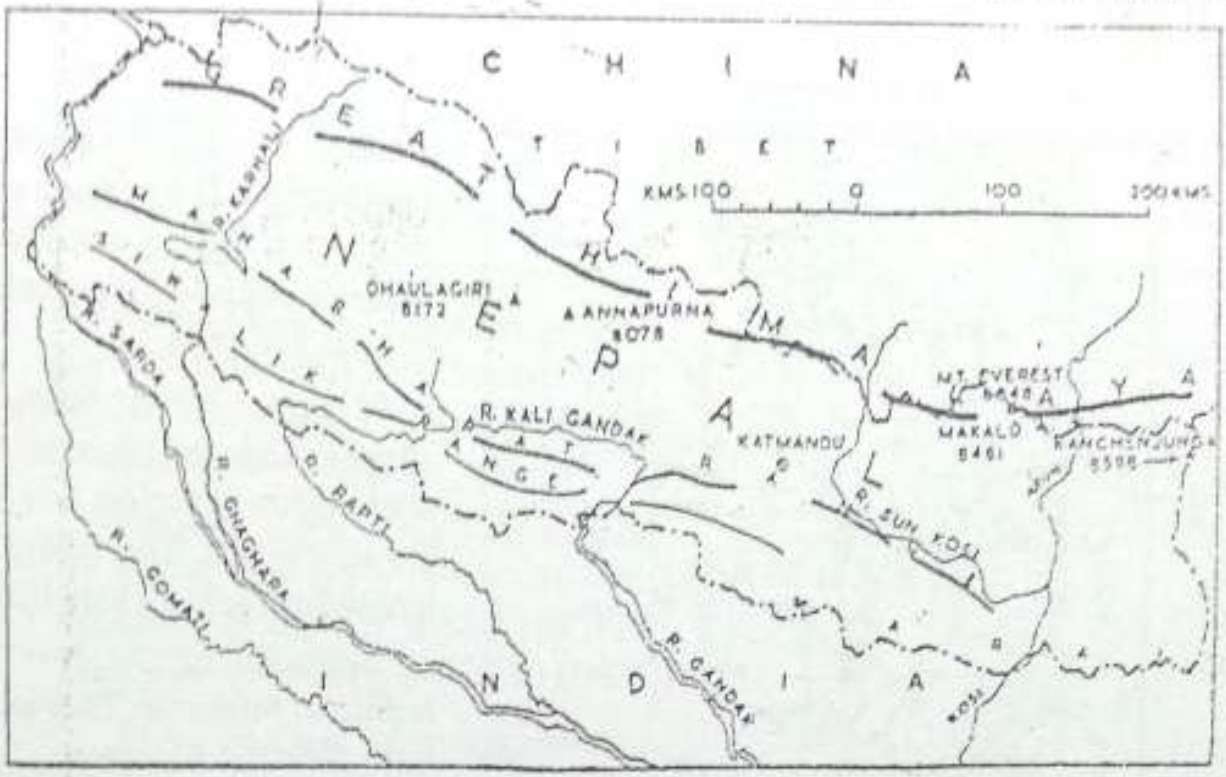

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Fig. 13 Nepal

Note that Nepal is situated between India and China, the two big countries of Asia. Which are the rivers that enter India from Nepal?

Along the southern border of Nepal, there is a swampy and marshy plain known as the Tarai. Much of it is covered with thick jungle and tall grasses but a large part of it has now been drained and made good for cultivation.

The climate is warm and humid in the Tarai. As one goes northward into the higher region, the climate becomes cool. The vegetation also changes and the grasslands of the south are replaced by the monsoon forests of sal and teak. Further north, there are the temperate forests in which oak and maple trees are common. At still higher altitudes, the commonest trees are fir and birch.

Economic Development

Nearly 93 per cent of the people of Nepal are engaged in agriculture. Rice is the main food crop. Maize, millets, wheat and potato are also grown. Some cash crops such as sugarcane, jute and tobacco are grown on a small scale. Cattle rearing is important. The country exports a wide variety of

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animal products. Forests provide medicinal herbs and honey. A large number of people are engaged in handicrafts. In recent years some industries have been developed.

Population

The total population of Nepal is about 18.8 million. The average density of population is about 117 persons per square kilometre.

The Gurkhas, the Sherpas and the Bhotias are the major groups of people living in Nepal. The Gurkhas are among the best soldiers and the Sherpas are among the best mountaineers in the world.

Kathmandu is the capital city of Nepal. A large number of tourists visit Nepal to admire the scenic beauty of the Himalayas or to scale the high peaks.

BHUTAN

Bhutan is a small country on the northern border of India. It is located in the eastern Himalayas. It is a mountainous country with high ridges and deep valleys. Most of the settlements are along the track which goes to Sikkim through the Chumbi Valley. Thimpu is the capital of Bhutan.

Sub-tropical crops such as rice and wheat are grown in the southern lowlands. In the upland areas, shifting agriculture is practised for cultivating maize and millets.

The total population of Bhutan is about 1,417,000. The average density of population is only 30 persons per square kilometre. Most of the people are Buddhists. Bhutanese are known for their handicrafts, woodwork and metal craft.

BANGLADESH

Bangladesh is our eastern neighbour. It is a fertile country and is also very densely populated.

Land and Climate

In Fig.14, you will notice that on three sides Bangladesh has a common border with India. The country is a maze of rivers and their tributaries. It occupies the major part of the world's largest delta, namely, the Ganga-Brahmaputra delta. Bangladesh is a level land with only a few hill ranges in the east.

Bangladesh has a hot and humid climate. It receives plenty of rain ranging from 200 to 400 centimetres a year.

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The territorial waters of India extend into the sea to a distance of twelve nautical miles measured from the appropriate base line.

Fig. 14 Bangladesh

Bangladesh occupies the Ganga-Brahmaputra delta, which is the largest delta in the world. What is the name of the combined flow of the Ganga and the Brahmaputra?

Economic Development

Agriculture is the main occupation. Rice and jute are the major crops. Rice is the staple food of the people, while jute is an important cash crop for them. Bangladesh is an agricultural country and has only a few industries. It has now set up some jute mills and paper mills.

Population and Transport

The total population of Bangladesh is about 109 million. The average density of population is about 702 persons per square kilometre.

The majority of people are Bengalis. Most of them are Muslims. But there are also a large number of Hindus and some Christians. The official language is Bangla.

As the country is criss-crossed by rivers, there are not many railways and roads. However, rivers themselves are important means of transport.

Dhaka is the capital city. Narayanganj is the port of Dhaka. However, the major port of Bangladesh is Chittagong.

MYANMAR

Myanmar (Burma) is yet another neighbour of India. The country has a common border with Bangladesh, India, China, Laos and Thailand. On the west, it is flanked by the Bay of Bengal. It is a country of beautiful pagodas, the temples dedicated to Lord Buddha.

Land and Climate

Myanmar is a mountainous country. It is separated from its neighbours by high mountain ranges which are heavily forested. The central part of

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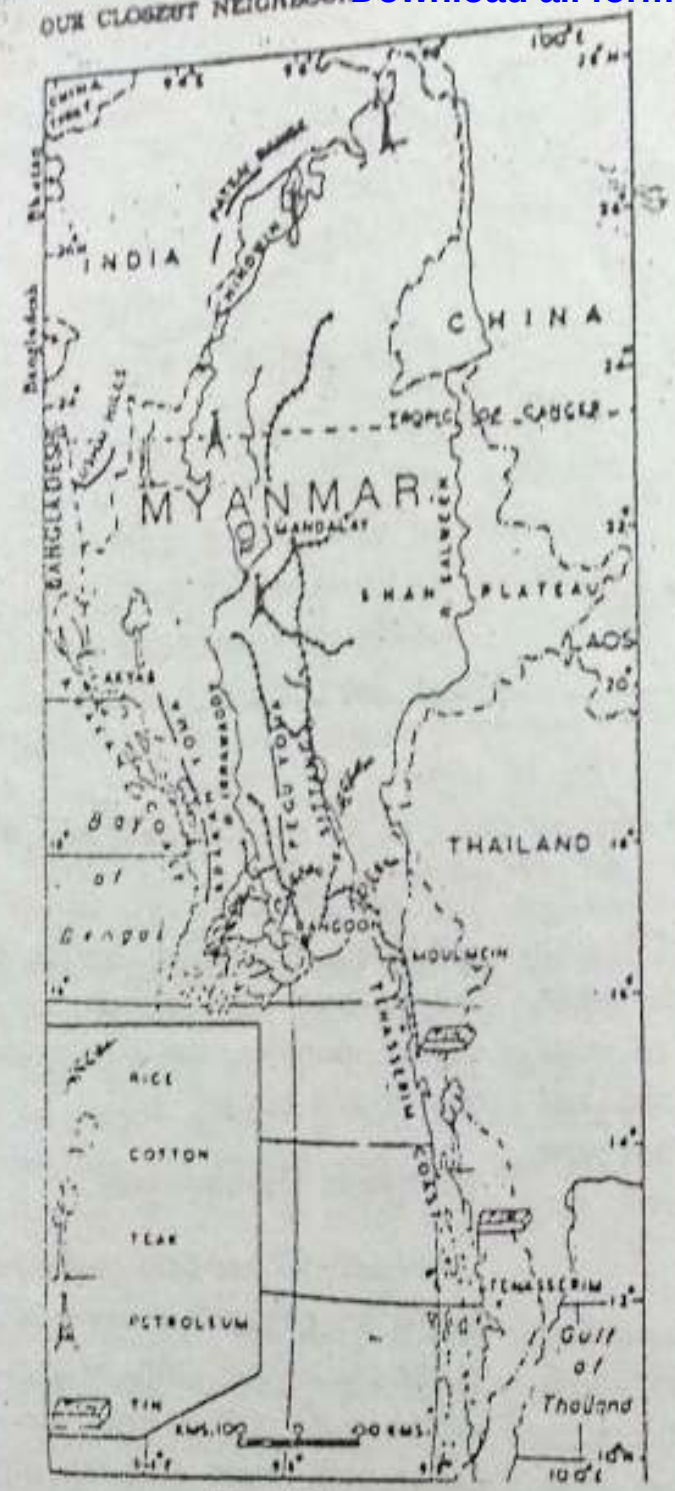

Fig. 15 Myanmar

Which mountain ranges separate Myanmar from India? Locate the towns of Rangoon and Mandalay.

the country is drained by the Irrawaddy, Sittang and Salween rivers. In the eastern part of the country is the Shan Plateau. The coastline of Myanmar is very broken. It has deep cracks, bays and capes. Such a coastline is called *indented coastline*. It possesses several natural harbours.

Myanmar has the monsoon type of climate. The amount of rainfall varies from region to region. It is heaviest in the south-west. The central valley of Irrawaddy receives very little rainfall.

Monsoon forests cover the hilly regions of Myanmar. They include large teak forests. Mangrove forests are found in coastal swamps along the coast. The natural vegetation on the Shan Plateau consists of coarse grasses and shrubs.

Economic Development

About one-fourth of the total area of Myanmar is under cultivation. Rice is the major crop. It is mostly grown in the delta regions of the Irrawaddy and Sittang. About half of the rice production is exported to other Asian countries. Pulses, maize, groundnut, cotton, tobacco and sugarcane are the other crops which are grown.

Teak is the next major export after rice. Trained elephants are used to transport big and heavy logs of wood out of the forests.

Myanmar is rich in several mineral resources such as petroleum, tungsten,

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lead, zinc and tin. New industries are now being set up in the country.

Population and Transport

The total population of Myanmar is nearly 43 million. The average density of population is thus 55 persons per square kilometre. People are mostly Buddhists here.

Rangoon is the largest town. It is the capital city and a large river port. Mandalay is the old capital city and even now an important centre.

River transport is very important. Rivers are also used for transporting logs by floating them from the upper to the lower courses of the rivers.

SRI LANKA

Sri Lanka is a beautiful country, so that it is often called 'The Pearl of the East'. Look at the map of Sri Lanka (Fig.16). The Palk Strait separates Sri Lanka from India. A line of submerged rocks and sand banks run between Dhanushkodi near Rameshwaram and Talaimannar in Sri Lanka. It is known as Adam's Bridge.

Land and Climate

The southern part of Sri Lanka is hilly, while the northern part consists of an extensive flat plain. This plain is

Fig. 16 Sri Lanka

Note the location of this island country in the Indian Ocean, in relation to the international sea routes. Why is Colombo an important port ?

[illegible] by the Mahaweli Ganga, Yan and Aruvi rivers.

As the country is situated very close to the Equator, its climate is hot all through the year. However, the influence of the surrounding sea makes the climate moderate.

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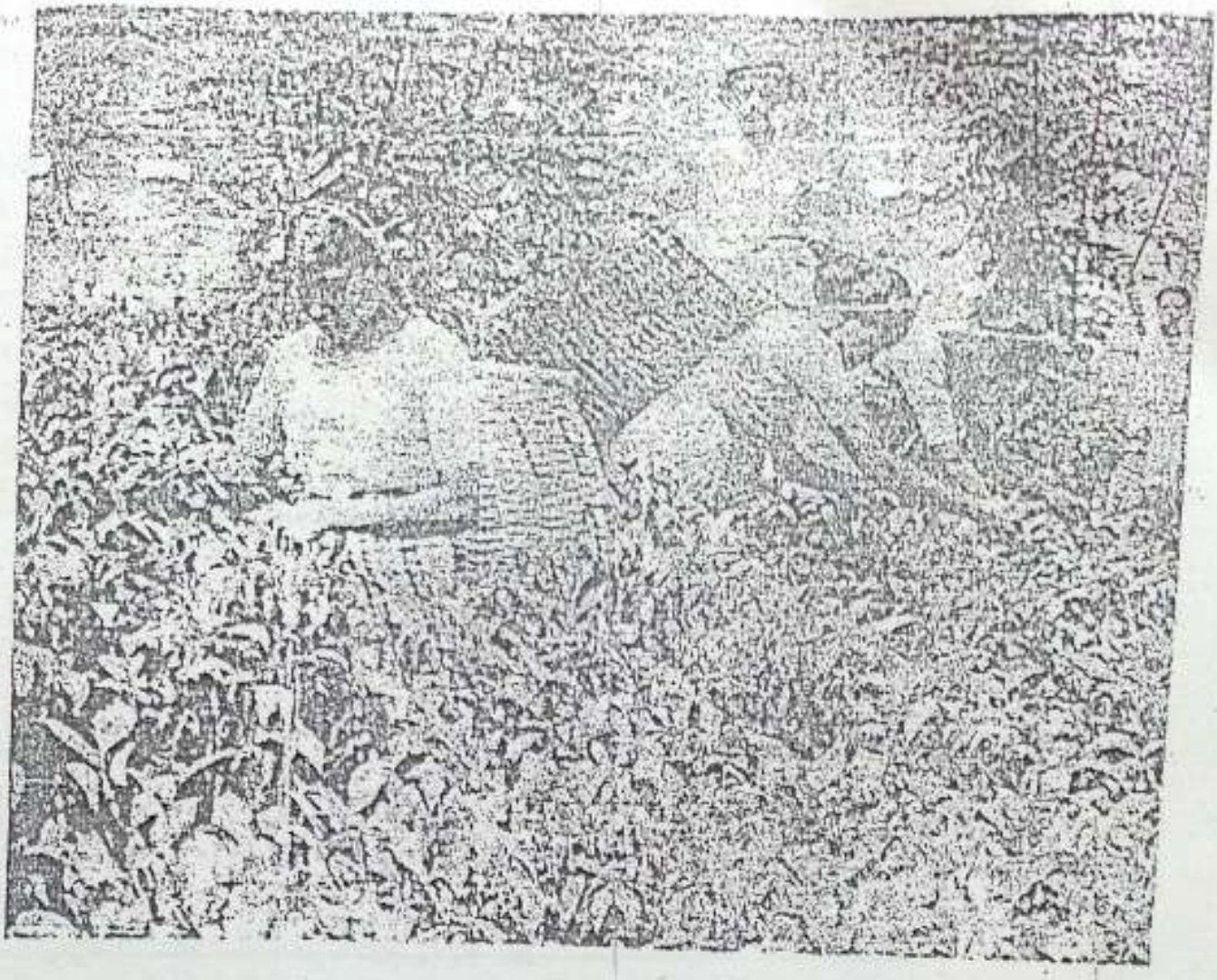

Photo IX Plucking Tea Leaves

Look at the Sri Lankan girls engrossed in plucking tender leaves of the tea plants. Note the dresses of the people in this picture. Where do you think these tea gardens are located?

The south-western and central parts of Sri Lanka receive heavy rainfall from the south-west monsoon in summer. In winter, the northern and eastern parts get rain from the north-east monsoons. Equatorial and monsoon forests are found in areas of heavy rainfall.

Economic Development

Agriculture is the main occupation of the people. Rice is the staple food. But the country does not produce enough rice and has to import nearly half of its rice needs. Tea, rubber, coconut and spices are the major cash

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crops. Tea is the largest source of Sri Lanka's national income. Sri Lanka has some of the best tea gardens of the world.

Amongst the minerals, graphites and precious stones are the most important. Pearl fishing is practised in the Gulf of Mannar for which it has been famous for a long time.

Industries such as paper, plywood, rubber goods, textiles, cement and sugar have developed in recent years.

Population

The total population of Sri Lanka is nearly 16 million. The average density of population is about 247 persons per square kilometre.

The majority of the people in Sri Lanka consists of Sinhalese. A large number of Tamilians from India have also settled in the country.

Both Sinhalese and Tamil are the official languages. There are several religions in the country but Buddhists are in the majority. They are followed by the Hindus, Muslims and Christians.

Colombo is the capital city and the largest port of Sri Lanka. Kandy is a modern city and a hill station in the central part of the country.

The New Terms You Have Learnt. *Indian Subcontinent* : A part of Asia separated from the mainland by the mountain ranges of the Sulaiman, the Hindukush, the Karakoram and the Himalayas. *Indented Coastline* : A very broken coastline with several cracks, bays and capes.

EXERCISES

Review Questions

1. Answer the following questions briefly :
   (i) Why is the Indus called the lifeline of Pakistan?
   (ii) Which is the most important cash crop of Bangladesh?
   (iii) Which are the two groups of people of Nepal who are among the best soldiers and the best mountaineers of the world?
   (iv) Which is the second most important export of Myanmar
   (v) Name four important cash crops of Sri Lanka.

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2. Make the correct pairs from the following two columns :

(a) An important gas-field of Pakistan	(i) Chittagong
(b) The largest port of Bangladesh	(ii) Mandalay
(c) A hill station of Sri Lanka	(iii) Sui
(d) The former capital city of Myanmar	(iv) Thimpu
(e) The capital of Bhutan	(v) Kandy

II

(a) 'The land of canals'	(i) Myanmar
(b) 'The pearl of the east'	(ii) Pakistan
(c) 'The Himalayan kingdom'	(iii) Sri Lanka
(d) 'The land of pagodas'	(iv) Nepal

3. What are the major crops of Pakistan?

4. Name the main exports of Myanmar and Sri Lanka.

Map Work

5. In outline maps of India's neighbours show the capital cities, major rivers and agricultural products.

Topic for Class Discussion

6. *'The Successful Indian Expedition to the Everest'*

Collect information and pictures on the topic. Tell the class something about the equipment used by mountaineers in scaling the high peaks.

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7. Lands of Plantations : Malaysia and Indonesia

The Terms You Already Know. *Rubber estate* : A large farm planted with rubber trees.

Malaysia and Indonesia are two South-east Asian countries with which India has close relations. The location of these countries is important as they face the Indian Ocean on the one hand and the Pacific Ocean on the other.

MALAYSIA

Look at the map in Fig.17. Malaysia lies north of the Equator but not far from it. The country includes two widely separated areas, the Malay Peninsula, which is part of the mainland of Asia, and the northern part of Borneo island.

Land and Climate

A mountain range forms the backbone of the Malay Peninsula. It slopes abruptly to a coastal plain on both sides. The western coast is wider than the eastern. The soils in the highlands are infertile but those in the plains and the valleys consist of fertile alluvium.

The country has a typical equatorial type of climate, i.e. hot and wet. The natural vegetation consists of thick evergreen forests which occupy three-fourths of the country.

Economic Development

In spite of mountains and thick forests, nearly one-sixth of the land is under cultivation. Agriculture is the main occupation of the people. They grow rice, rubber, cacao, pepper, pineapples, bananas, tapioca and coconuts. Rice is the staple food of the people. The country has to import rice because its own production is inadequate.

The main crop is rubber. Sixty-five per cent of the cultivated land is occupied by rubber trees. There are large rubber estates where rubber trees are planted in rows at fixed intervals.

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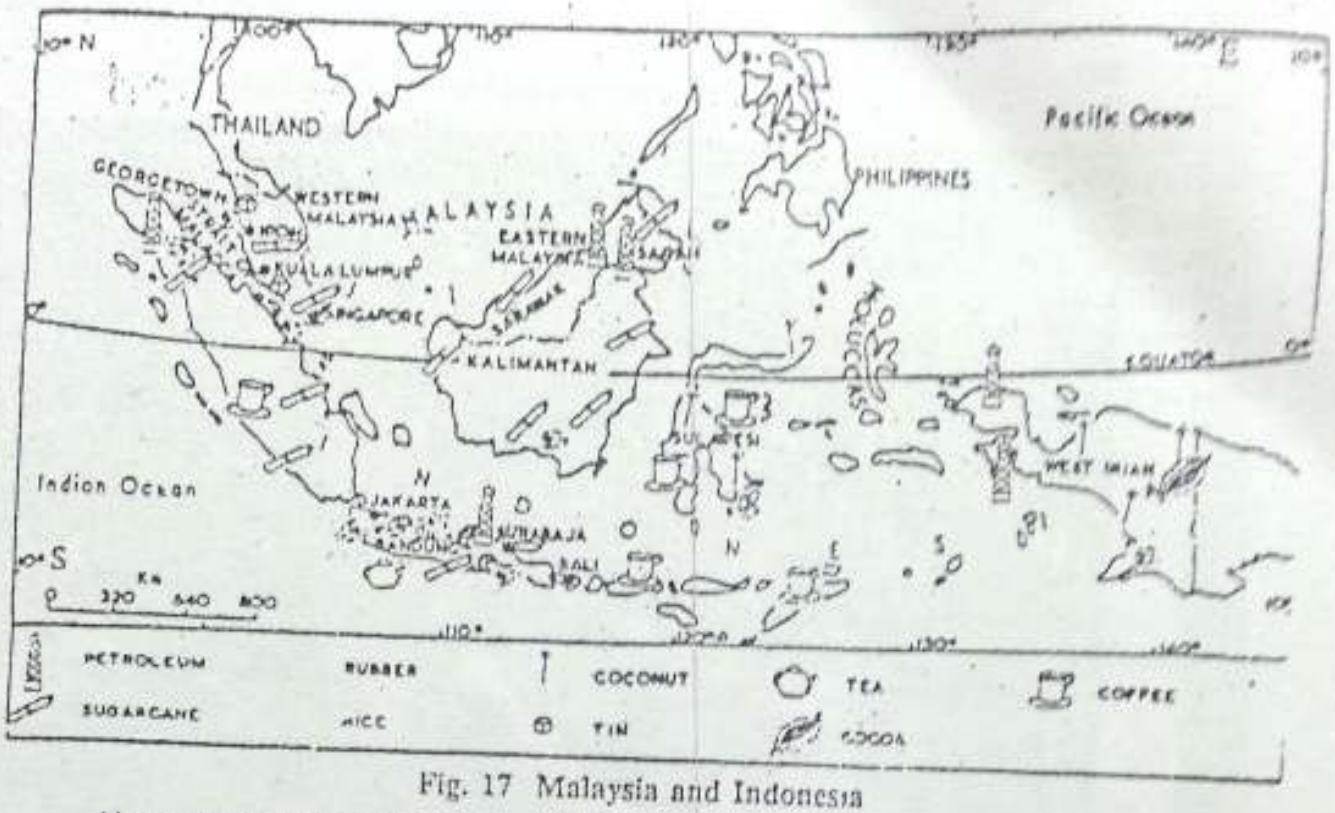

Fig. 17 Malaysia and Indonesia

Note the locations of Malaysia and Indonesia. Why is Indonesia called the 'Island Country ?'

These estates are managed by big firms. They spend large amounts of money to improve the quality of crops. The scientific and commercial type of farming specialising in a single crop is known as *plantation agriculture*. Malaysia today accounts for nearly one-third of the world's total production of rubber.

Among the mineral resources of Malaysia, tin is very important. In fact, Malaysia is the world's leading producer and exporter of tin. Other important exports of Malaysia include coconut oil and pineapples. The country has to import rice, machineries and textiles.

Population

The total population of Malaysia is about 17, million. The average density of population is thus 49 persons per square kilometre.

The majority of the population consists of the Malays, who are the original inhabitants. They speak Malay and follow Islam. The remaining population consists of Chinese and Indians, who came here to work in the tin mines or on the rubber estates or for trading.

Kuala Lumpur is the capital city of Malaysia. Much of the trade of Malaysia is done through Singapore which is a small independent island

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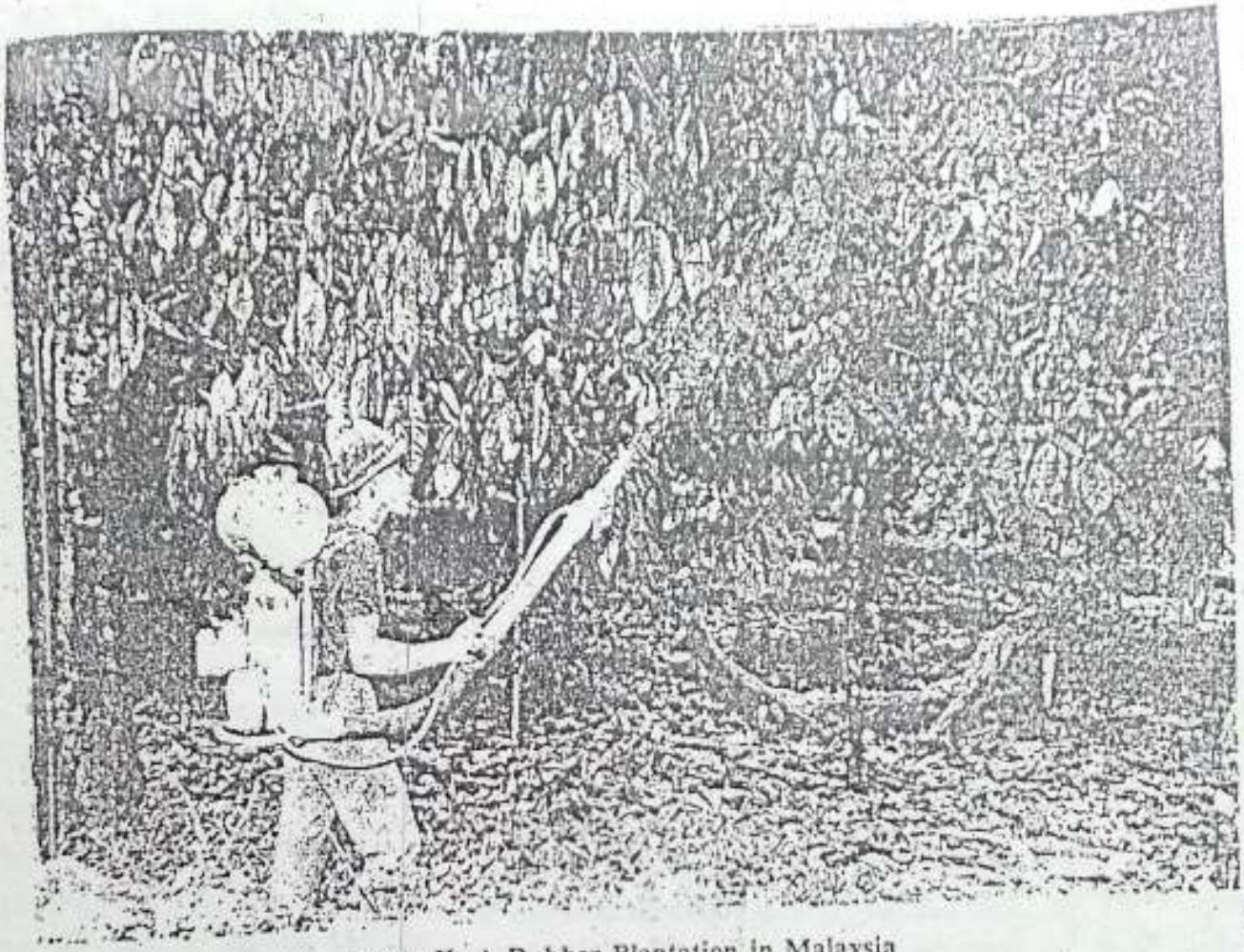

Photo X A Rubber Plantation in Malaysia

Look at the man engaged in spraying insecticides on the rubber trees. Note the automatic pump he has been using for spraying.

state. It is the most cosmopolitan city of South-east Asia where people of different nationalities live side by side.

INDONESIA

Indonesia consists of nearly 3,000 big and small islands. They are spread along the Equator over a distance of about 5,000 kilometres from west to east.

Land and Climate

Look at the map of Indonesia and note the bigger islands of Andalas (Sumatra), Java, Madura, Bali, Kalimantan (Borneo), Sulawesi, Maluku and West Irian.

Indonesia is a mountainous land. Mountain ranges form the backbone of the chain of islands. There are a num-

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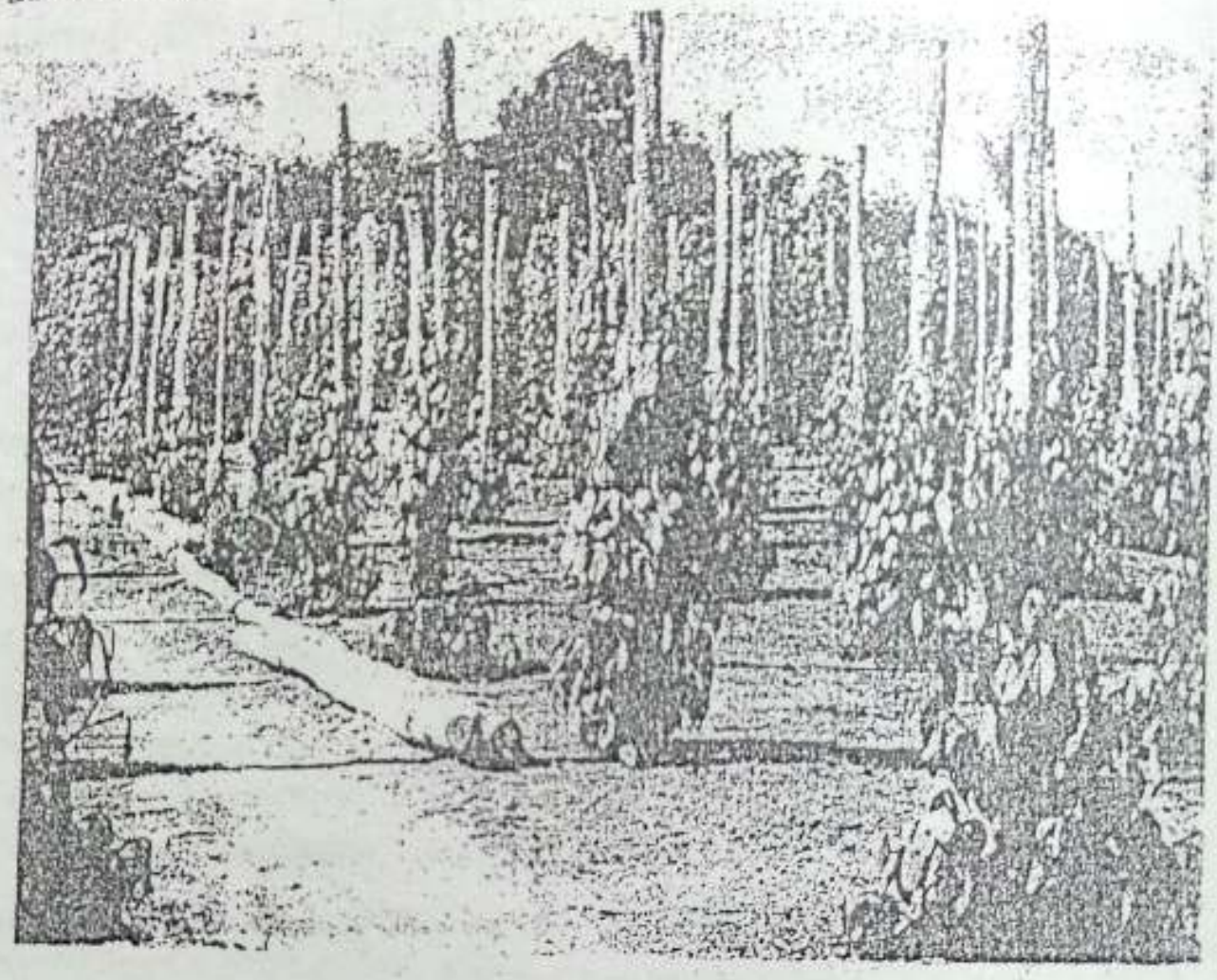

Photo XI A Pepper Plantation

Look at the creepers of pepper and the support they need to climb up. Do you see that they are planted in rows ?

ber of volcanic mountains. A volcano of Indonesia which became most well known was Krakatoa. After its great eruption in 1883, what remains today is a small island with a lake.

The climate of Indonesia is of the equatorial type. Most of the islands are heavily forested. Soils in some parts of Indonesia are very fertile as they have been formed by lava from volcanic activity.

Economic Development

Only about one-eighth of the total area of Indonesia is cultivated but as much as three-fourths of the population is engaged in agriculture. The cultivated land is mostly confined to the coastal lowlands and river valleys. The most intensively cultivated island of

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Indonesia is Java.

Rice is the staple food of the people. But its production is insufficient for the population. It has to be imported in such large quantities that it forms the main item of imports. Other crops which are grown include maize, cassava, groundnut, soyabean and coconut.

Like Malaysia, Indonesia is also known for its plantation agriculture. But there are several plantation crops. They are rubber, sugarcane, tobacco, cinchona and tea. Indonesia is the world's largest producer of cinchona, which is the source of quinine.

Indonesia is rich in mineral resources. It possesses large deposits of tin. There are good deposits of petroleum, gold, iron ore, bauxite and manganese also.

Indonesia has a wide variety of small-scale industries scattered in different parts of the country. It is now building up new industries such as sugar, paper, cement, iron and steel, chemicals and mineral oil.

Population

The total population of Indonesia is over 178 million. The average density of population is 88 persons per square kilometre. But the actual distribution is very uneven. In some parts the density is as much as 480 persons per square kilometre while there are large areas in which there is little population.

The majority of the people follow Islam. The Hindus, Buddhists and Christians form small groups. 'Bhasha Indonesia' is the national language. It is similar to the Malay language but has a number of Sanskrit and Arabic words.

The capital city is Djakarta. Other important cities are Surabaja and Bandung.

The New Terms You Have Learnt. *Plantation Agriculture* : Scientific and commercial farming usually specialising in a single crop.

EXERCISES

Review Questions

1. Answer the following questions briefly:
   (i) What is a rubber estate?
   (ii) Why is the soil in some parts of Indonesia very fertile?
   (iii) What is the most important mineral resource of Malaysia?
   (iv) What are the plantation crops of Indonesia?

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2. Make out the correct pairs from the following two columns:

(a) The most cosmopolitan city of South-east Asia	(i) Djakarta
(b) The most well known volcano of Indonesia	(ii) Kuala Lumpur
(c) The capital city of Malaysia	(iii) Singapore
(d) The world's largest producer of cinchona	(iv) Malaysia
(e) The capital of Indonesia	(v) Indonesia
(f) The country famous for rubber plantations	(vi) Krakatoa

3. Complete the following statement by choosing the most appropriate ending from those given below the statement.

Malaysia is a prosperous land because ....

(a) it is self-sufficient in food.
(b) it is the largest producer of tin.
(c) it is situated on a busy trade route.
(d) it has large plantations of rubber.

4. Why have rubber plantations been very successful in Malaysia? What are the three important features of plantation agriculture?

Picture Reading

5. Look at the Picture X and XI. What kind of agriculture do they suggest?

Map Work

6. In an outline map of Asia show the important Asian seaports.

Topic for Class Discussion

7. *'Bombay versus Singapore'*

Collect information on these two port cities in respect of their location, climate, local industries, people and items of import and export. Tell the class how these port cities differ from each other.

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8. The Home of One-fifth of Mankind: China

> **The Terms You Already Know.** *Gorge* : A narrow and deep river valley with very steep sides. *Terraced farms* : Small strips of level fields out across the hill slopes, so that the fields look like giant staircases.

The People's Republic of China is one of the largest countries of the world. Its population is the largest in the world. It is so large that one can say that every fifth person in the world is a Chinese. Look at the map of China (Fig.18). The country is situated between 18°N. and 54°N. latitudes. Find out its longitudes. Which countries have a common border with China ?

Land and Climate

The western part of China is very mountainous. It has a number of very prominent mountain ranges such as the Kailas, the Kunlun, the Tien Shan and the Nan Shan. The plateau of Tibet is the world's largest and highest plateau. Taklamakan is a dreary desert of China lying north of Tibet. Several big rivers originate from the plateau of Tibet and flow in different directions. The rivers Indus, Sutlej and Brahmaputra (Tsangpo) find their way into India. The Salween and the Mekong flow into South-east Asia. The Sikiang, the Chang Jiang and the Hwang Ho remain within China and flowing eastwards drain into the Pacific Ocean.

The eastern part of China is a land of great plains and a few hills. The plains are very fertile for they are made of the alluvium brought by the rivers.

From south to north, the most important valleys are those of Sikiang, Chang Jiang and Hwang Ho. The Sikiang valley is the smallest of the three and is rather narrow. The Chang Jiang valley is the longest and is very useful for irrigation and navigation. The Hwang Ho, which is the northernmost river, carries a [illegible]

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The territorial waters of India extend into the sea to a distance of twelve nautical miles measured from the appropriate base line.

Fig. 18 China

China is a land of great rivers. Most of them originate on the plateau of Tibet. Name the three most important rivers of China.

amount of yellow silt. It is used for irrigation in the Great Northern Plain of China.

To the west of the Great Northern Plain of China, there is a huge plateau made of a very fine dust called *loess*. This dust, which is hundreds of metres thick, has been brought and deposited by the strong winter winds blowing from the deserts in the interior.

China has a monsoon type of climate. Temperature decreases as one

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goes from south to north. Rainfall, most of which is caused by the south-east monsoons, decreases from south to north and also from east to west. Thus, in the south and south-east, summers are hot and wet, winters are mild and the annual rainfall high. Further north, in the Chang Jiang basin, summers are warm and rainy, winters are cool and annual rainfall moderate. In northern China, summers are warm but winters are very cold and annual rainfall rather scanty.

Economic Development

Agriculture, mining and industry are the three major occupations of the people of China.

Although China is about three times the size of India, the area under cultivation there is less than that in India. Large areas in the western and northern portions of the country are unsuitable for agriculture because of rugged surface, scanty rainfall and poor soils. Most of the cultivable land is in the south and the east. The pressure of population on agricultural land is very heavy. Hence, every available piece of land is cultivated. Even the hill-sides have terraced fields

Chinese farmers have been practising agriculture for more than 4,000 years. They know from their long experience the best crops for different areas and the best methods of maintaining soil fertility. The per acre crop yield is often high. In fact, the Chinese farmer is very skilful and works like a gardener, taking care of each plant. He conserves rain or snow water to irrigate his field. He also uses manures to increase the yield from his land. Agriculture in China is intensive.

As the population which has to be fed is very large, attention is mainly given to the production of cereal crops. Hence, in southern and central China the main crop is rice along with tea and sugarcane. In northern China the main crops are wheat, soyabean and millets. Amongst the important cash crops of China are silk, cotton and tobacco.

Silk is produced by silkworms, which are reared on the leaves of mulberry trees. The silkworm makes a *cocoon* around itself. The cocoon is some 2.5 centimetres long and 2 centimetres broad. It is made of a silky thread which the silkworm ejects from its mouth. The cocoons are boiled in water to kill the silkworm before it turns into a moth and emerges from the cocoon. Then the fine thread is separated and wound on reels. The rearing of silkworm and production of raw silk is known as *sericulture*.

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Pigs, chickens and ducks are widely reared in China as domestic animals and birds. In the arid grasslands, horses, camels, sheep and goats are raised. Cattle are very few and dairying is not of much significance. Fishing is important both on the coast and in the flooded rice-fields.

China has a large variety of minerals such as copper, tin, iron, coal, tungsten and antimony. Petroleum is now found on a fairly large scale.

Rich deposits of coal and iron ore have enabled China to develop the iron and steel industry. It now produces heavy machinery, small machines and tools, and transport equipment. Similarly, a large production of cotton and raw silk accounts for the well developed textile industry. Other important industries of China include electrical goods, chemicals, paper, glass and processed foods.

Population and Transport

The population of China is estimated at about 1102 million. The average density of population is thus about 110 persons per square kilometre. But the actual distribution is very uneven. While in the fertile lands the average density may range from 400 to 800 persons per square kilometre, large tracts of Tibet, Mongolia and the mountainous regions are very sparsely populated.

Means of transport in China are rather inadequate for its huge size and population. Rivers are used as natural means of transport. New roads and railways are being built at a fast rate. Beijing is the capital city of China. Shanghai is the largest port and a big textile centre. Canton and Nanking are other important cities of the country.

TAIWAN

The island of Taiwan lies off the mainland of China. It has a separate government of its own and is often called Nationalist China. It has a population of about 18 million. Its main crop is rice. Taipeh is the capital city of Taiwan.

The New Terms You Have Learnt. *Loess* : Very fine material brought by the winds and deposited in layers to a great thickness. *Sericulture* : Rearing of silkworms and production of raw silk.

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EXERCISES

Review Questions

1. Answer the following questions briefly:
   (i) Which three rivers originate on the plateau of Tibet but flow through other countries?
   (ii) Name three important mountain ranges of China.
   (iii) What is sericulture?

2. Make out correct pairs from the following columns:

(a) The longest river of China	(i) Hwang Ho
(b) A low desert basin	(ii) Loess
(c) The capital of Taiwan	(iii) Taklamakan
(d) The capital of the People's Republic of China	(iv) Chang. Jiang.
(e) A fertile plateau of very fine dust	(v) Taipeh
(f) The Yellow River of China	(vi) Beijing

3. What are the important crops of China? Write an essay on the important features of farming in China.

4. Why is population in China very unevenly distributed?

Map Work

5. In an outline map of China show the important rivers.

Topic for Class Discussion

6. *'The Wall of China'*

   Collect information on this topic. Tell the class why this wall was built and how far it is useful today.

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9. The Land of the Rising Sun: Japan

The Terms You Already Know. *Earthquake* – Shaking of the Earth's surface produced by volcanic or similar forces within the crust.

The Japanese call their country *Nippon* which means 'Land of the Rising Sun'. Japan may also be called a country of islands, for it has no less than 3,900 islands. There are, however, only four islands which are large and important. They are Honshu, Hokkaido, Kyushu and Shikoku in order of their size. The word *archipelago* means 'a chain of islands', so Japan is an *archipelago* which forms an arc extending for nearly 3,000 kilometres off the east coast of Asia. Find out the northern and southern latitudes of the Japanese *archipelago*.

Japan is a small mountainous country. It has a large population but very limited natural resources. However, the Japanese are a hard-working people and by their effort have made their country one of the richest in the world.

Land and Climate

Mountains form the backbone of the entire archipelago. There are only a few lowland areas. The Kwanto plain on the eastern coast of Honshu is the important plain of Japan. Look at the map (Fig.19) and locate the cities of Tokyo and Yokohama on this plain.

Japan is said to be the land of volcanos and earthquakes. Many of its mountains are volcanic. The most prominent amongst them is Mount Fuji, known to the Japanese as Fujisan. It is a symbol of Japan's natural beauty. Since 1707, Mount Fuji has been inactive, which means that it is a *dormant volcano*.

Earthquakes are very common in Japan. On an average, two or three earthquake shocks are felt everyday.

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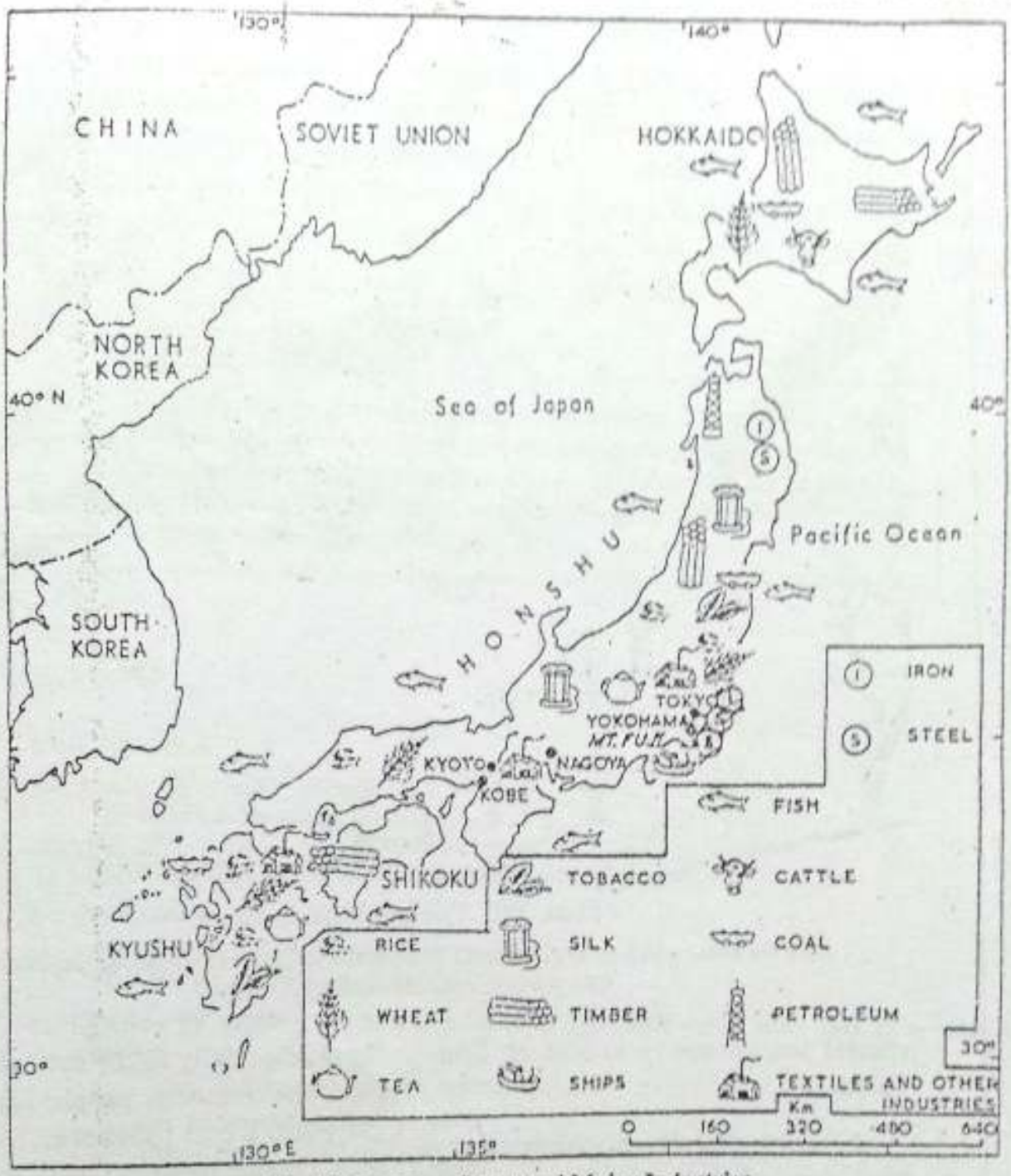

Fig. 19. Japan — Crops and Major Industries

Japan's prosperity is largely due to its various industries. What are they ?

Some earthquakes cause terrible loss of life and property. For example, an earthquake in 1823 followed by widespread fire caused such havoc in the Tokyo-Yokohama area that several thousand persons lost their lives and

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millions became homeless.

The coastline of Japan is highly indented. It, therefore, possesses a large number of natural harbours which are used for shipping and fishing.

The climate of Japan is moderate but the north is colder than the south. In winter, cold winds coming from Siberia cause heavy snow and rain in the northern and western parts of the country. Hence, the winters of the north are very cold. The cold ocean currents make the climate still colder.

In summer, the south-east monsoons bring rain to the southern and eastern parts of Japan. The climate there is warm and humid. The warm Kuro Shio current also helps in warming up the climate of the region. The southern parts of Japan are frequently visited by violent tropical rain-storms known as *typhoons*. They often cause great loss of life and property.

The mingling of cold and warm ocean currents on the eastern coast causes thick fog and a condition in which fish thrives. This area is therefore one of the major fishing grounds, or *fisheries*, of the world.

Economic Development

Manufacturing, agriculture, forestry and fishing are the four major economic activities of Japan.

Industries. Japan is very poor in mineral resources. It possesses some copper deposits and a little coal and oil. But it is rich in water-power. Even this water-power is not enough to meet the large requirements of its industries. The country, therefore, depends largely on thermal electricity.

In spite of the paucity of minerals and raw materials, Japan is a highly industrialised country. The Japanese have lived and prospered by manufacturing and exporting finished goods. The principal industries are iron and steel, ship-building, textiles, chemicals, electronics and paper. Other Japanese products which have a world-wide market are television and radio sets, transistors, cameras, optical instruments, potteries, toys and synthetic fibres for textiles.

Japan depends on its international trade for its prosperity. While it exports processed material and finished goods, it has to import food-stuff, minerals and metals and raw materials such as crude oil, iron ore and cotton.

Agriculture. Only 14 per cent of the total area of Japan is under cultivation because the land is generally hilly. Nearly 18 per cent of the population is

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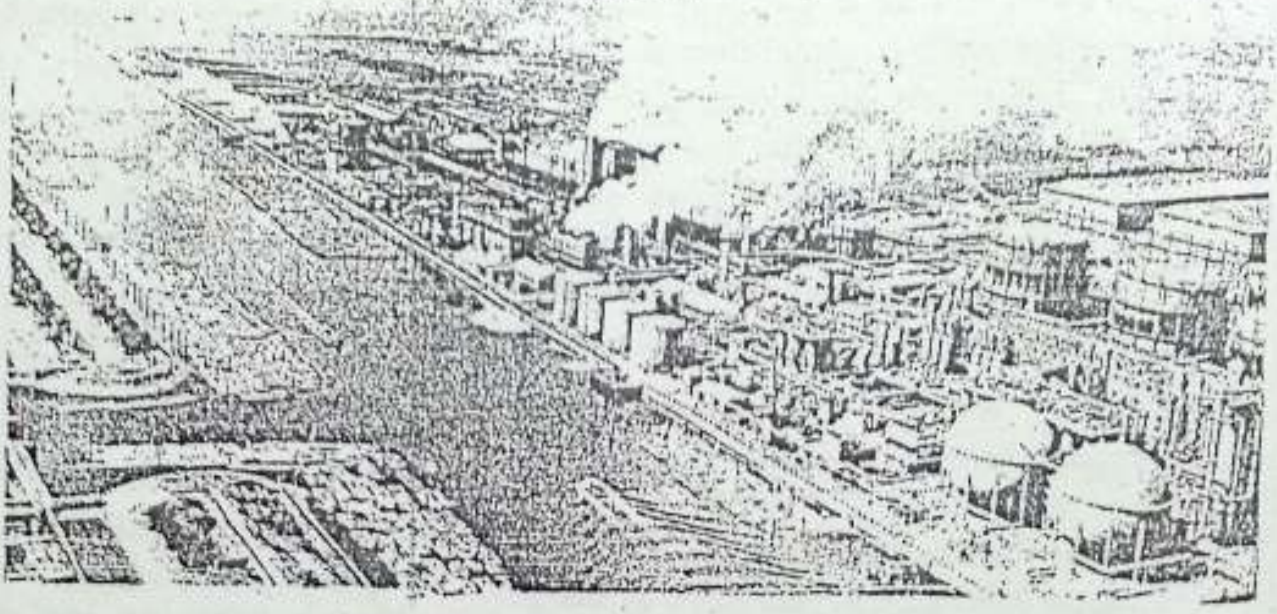

Photo XII An Industrial District of Tokyo

Look at the port and the industrial district of Tokyo. Locate the harbour and the oil refinery in the picture.

engaged in agriculture. The pressure of population on the cultivated land is very high. Hence, every bit of land suitable for cultivation is put under crops. Terraced farms on the hillsides are common.

Japanese farmers have very small farms but these are intensively cultivated. The crop yields per acre are very high because of irrigation, fertiliser, good seeds and hard work. Most of the agricultural work is done by hand, using simple tools specially designed for the small fields.

The Japanese grow several crops but the main crop is rice. It is grown on about half of the cultivated land. Wheat, barley, oats, potatoes, soya-beans and vegetables are some other important food crops. Silk from mulberry trees and tea are two important cash crops. Japan leads the world in the production of raw silk. The Japanese are very fond of tea and have a

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Photo XIII Terraced Fields in Japan

Note the snow which covers the farms. How would the snow be useful for the farmer? Can you guess the climate of this region?

special tea ceremony known as Cha-no-yu.

Forestry. Nearly two-thirds of the total area of Japan is forested. The forests provide timber, fuel and paper-pulp. And yet, Japan has to import these products to meet its own needs.

Fisheries. The waters surrounding Japan, especially in the east, abound in fish. The Japanese people are among the world's best fishermen. The Japanese fishing industry leads the world in the size of the fishing fleet, the size of the annual catch and the number of people employed. Fish is second only to rice as an item of food and is the main source of protein in the Japanese diet.

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People

Japan is one of the most densely populated countries of the world. Its total population is about 120 million. The average density of population is about 324 persons per square kilometre.

Most of the Japanese are Buddhists. They are known for their great aesthetic sense.

Tokyo is the capital city of Japan. It is also a big industrial and commercial centre. Osaka is the largest textile centre. Kobe, Nagasaki and Yokohama are the other important industrial centres.

The New Terms You Have Learnt. *Archipelago* : A chain of islands. *Dormant Volcano* : A volcano which has been inactive for a long period of time. *Typhoon* : Violent tropical rainstorms originating in the East China Sea. *Fisheries* : The business of catching fish on a large scale. Also refers to places where fishes are caught.

EXERCISES

Review Questions

1. Answer the following questions briefly :
   (i) Which is the largest island of Japan?
   (ii) Why is fishing very important in Japan?
   (iii) Name the four important economic activities of Japan.
2. Distinguish between :
   (a) A warm current and a cold current.
   (b) An active volcano and a dormant volcano.
3. Complete the following statement with the most appropriate ending from those given below the statement.

   Today the prosperity of Japan depends upon.....
   (a) its very high agricultural yields.
   (b) its highly developed fishing industry.
   (c) its large industries and trade.
   (d) its varied natural resources.
4. Describe how the climate of Japan is influenced by winds and ocean currents.
5. How has Japan become an important industrial nation of the world?

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Picture Reading

6. Study the picture of the terraced farms in Japan and find out how it helps in conserving soil and water.

Map Work

7. In an outline map of Japan, locate the important industries.

Topic for Class Discussion

8. *'Comparison of Japanese farming and Indian farming'*

Collect information on the farming practices in the two countries and tell the class how they differ from each other.

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UNIT THREE

India — Our Motherland

India is a well-knit geographical unit having an individuality of its own. Various geographical divisions of India are so interdependent that no part of the country would be able to grow to its maximum without assistance from the other.

The annual cycle of seasons in India is dominated by the monsoons. All over India there is a common seasonal rhythm to which every kind of life responds. The mighty Himalaya lends this country a distinct tropical touch and a monsoonal unity almost from one end of the country to the other.

Soil is the most important resource of our people. Directly or indirectly we derive all our food and many of our necessities from nothing but soil. We need to make the best possible use of every patch of land keeping in view its merits and demerits. The same is true of our other equally precious natural resources—water, vegetation, wild life and mineral resources. It is our solemn duty to avoid wastage and destruction of these resources.

Key to our all-sided and rapid development lies in modernising our agriculture which forms the base of our economy. Development of mineral resources is a must for the rapid growth of our industries. Similarly, the means of transport and communication serve as lifeline of our nation. They bring our people close to one another not only economically but culturally as well.

Finally, it is the people who are the greatest resource of any country. It is not the quantity but the quality of our people that would make our country wealthy and prosperous, enabling us to raise the standard and quality of our living.

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10. The Face of Our Motherland

whole chapter

The Terms You Already Know. *Tropic of Cancer* : An imaginary circle running along the earth's surface at an angular distance of 23°30' from the equator to its north. Running parallel to the equator it makes the northern limit of the Tropical Zone. *Standard Meridian of India* : The Meridian of 82° 30' E whose local time serves as the standard time for the whole country.

India, that is Bharat, is a land of lofty mountains and mighty rivers. Extensive are its plains and no less wide are its plateaus. A vast land with such varied relief is inhabited by about 844 million people. They have several things in common inspite of their outward differences.

A geographical study of this ancient and populous country will help us appreciate the differences in the ways of living from region to region. It will also explain physical and other basic factors that bind the diverse people into a great nation—OUR INDIA.

Location and Size

India is situated at the head of an ocean named after itself. Ours is the only country after which an ocean is named. This tells us how important our country was even in olden times in international trade and commerce. Look at the map and note how centrally it is situated in relation to Asia, Europe, Africa and Australia.

Do you see the Tropic of Cancer running almost half-way through the country? India, thus, lies entirely in the tropical and sub-tropical zones of the Northern Hemisphere. Its mainland extends between latitudes 8°4' and 37°6' North and longitudes 68°7' and 97°25' East.

Kanyakumari, the southernmost tip of the mainland of India, is only 8° north of the equator. Closer still to the equator is the Great Nicobar Island of India. At these places the sun is almost overhead all the year round; and the maximum difference between the

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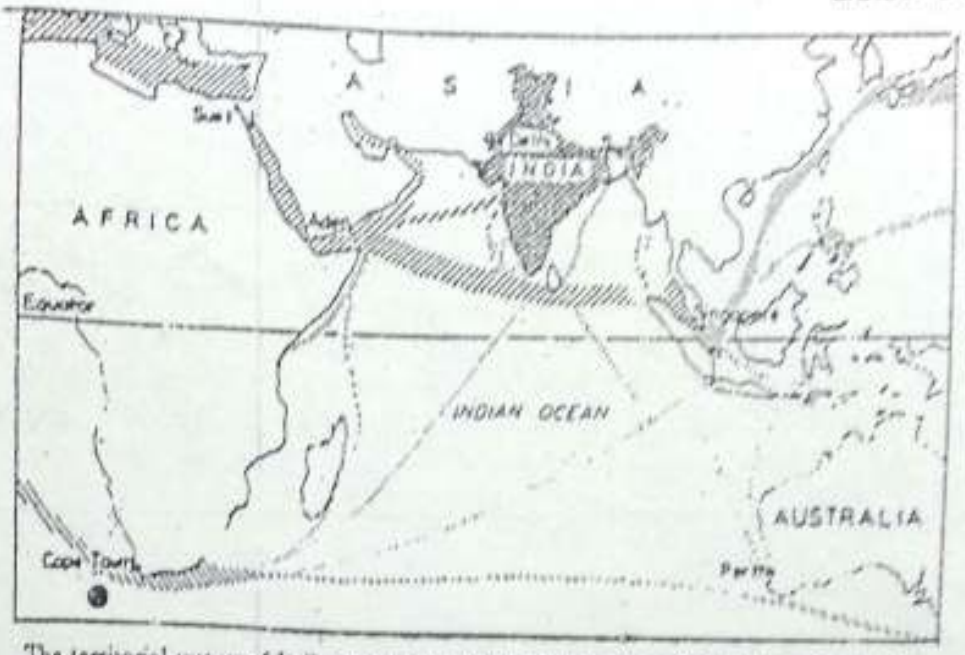

The territorial waters of India extend into the sea to a distance of twelve nautical miles measured from the appropriate base line.

Fig. 20 Location of India

Note the location of India in relation to international sea routes and air routes.

length of the day and night is hardly 45 minutes. But at the northernmost point of India the rays of the sun are always oblique. There the maximum difference between the length of the day and night becomes as large as five hours. These two extreme points of India are 30° apart—a distance of over 3,200 kilometres. It is as much as one-twelfth the earth's total circumference. What does it convey ? It means that the sun takes full two hours to rise at Dwarka after it has done so in the easternmost part of Arunachal Pradesh. In order to avoid any confusion of time from place to place in a vast country like ours, 82°30' E. longitude is taken as the Standard Meridian of India. The local time along this meridian serves as the Indian Standard Time (IST) for each and every place in the whole of India.

India occupies the south-central peninsula of the Asian continent. This peninsula tapering towards the south, divides the northern part of the Indian Ocean into two—the Arabian Sea and the Bay of Bengal. This gives India a long coastline of about 6,100 kilometres. With Sri Lanka situated very close to its southern tip and the highest crest of the Himalaya determining much of its northern borders, India has indeed a very pleasing shape. The country's land frontier alone is as long

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as 15,200 kilometres. Add the length of the coastline to this figure and it would amount to going half-way round the world.

Besides the Indian mainland, a few groups of islands are a part and parcel of the Indian Union. Off the coast of Kerala in the Arabian sea, are the islands of Lakshadweep. Most of these are small coral islands. In the Bay of Bengal is the group of Andaman and Nicobar islands. They are fairly large both in size and number.

Study the map of India and name the countries that have a common frontier with our country. They are Pakistan, Afghanistan, China (Tibet) Nepal, Bangladesh and Myanmar Then there is the Himalayan kingdom of Bhutan whose defence is also the responsibility of India.

A narrow stretch of water, namely, the Palk Strait, separates Sri Lanka from the Indian mainland towards the south. Look at the Andaman and Nicobar Islands. Indonesia, Malaysia and Thailand situated not far from these islands, are our close neighbours.

India is the seventh largest country of the world in area. With a total area of over 3.2 million square kilometres, it accounts for nearly two per cent of the world's total land. But this small percentage is big enough to include about two dozen nations of Western Europe. Can you now imagine how large our country is?

Political Divisions

The Republic of India is called the Union of States as it is divided into 26 States and 6 Union Territories for administrative purposes. Madhya Pradesh in the heart of our country is the largest state and Goa is the smallest in area. Among Union Territories, Andaman and Nicobar Islands is the largest and Lakshadweep is the smallest.

Four States are almost entirely located in the Himalaya. Six States and two Union Territories have very large portions covering the Great Plains of India. Nine States and two Union Territories are coastal units. Madhya Pradesh covers a large part of Great Indian Plateau and Rajasthan has a great part of that desert in it. Five states form parts of north-eastern hills.

The Union Territories off the mainland comprise ten small inhabited islands of Lakshadweep in the Arabian Sea and a little over 300 islands of Andaman and Nicobar group in the Bay of Bengal.

Each administrative unit is divided into districts. Uttar Pradesh has the

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greatest number of 56 districts and Goa has only 2 districts at the other end. Andaman and Nicobar Islands have two districts, while many of our Union Territories have not been divided into districts.

A large number of factors like population, local cultures, languages spoken and administrative convenience are at present the important considerations for political divisions of our country. But there are a number of ties which bind all our States into a well-knit country.

While our coastal States and islands stand along the seas, the non-coastal States touch the international land frontiers with our neighbouring countries. There are as many as 16 States which share the border with other countries. There are others which touch neither the international land frontiers nor the seas.

Note the location of various States, the centrally controlled Territories and their capitals in the map of India.

Relief and Physical Divisions

Look at the map of southern Asia. You will see a great chain of mountains separating Pakistan, India, Bangladesh and Nepal from the rest of the continent. Such a big geographical unit, which stands out distinctly from the rest of the continent, is often called a sub-continent. It is difficult to study the relief features and drainage of our country without reference to the Indian sub-continent as a whole.

Our country consists of three main physical divisions. They are the Great Mountains of the North, the Great Plains of Northern India and the Great Plateau of Peninsular India. The southern plateau is flanked by narrow coastal strips which are a part and parcel of the peninsular land mass.

The Great Mountains of the North: Look at the map of India. You will see a chain of mountains consisting mainly of the Karakoram and the Himalayan mountains lies all along the northern frontiers of our country. This chain of mountains lies between the plateau of Pamir on one end and the frontier of Myanmar on the other, covering a distance of nearly 3,000 kilometres. The width of the mountainous belt varies between 150 and 400 kilometres.

These arc-shaped mountains have high peaks, steep slopes and deep valleys. The snow-covered peaks, big and small glaciers, deep gorges, and thick forests make these mountains one of the most attractive regions of the

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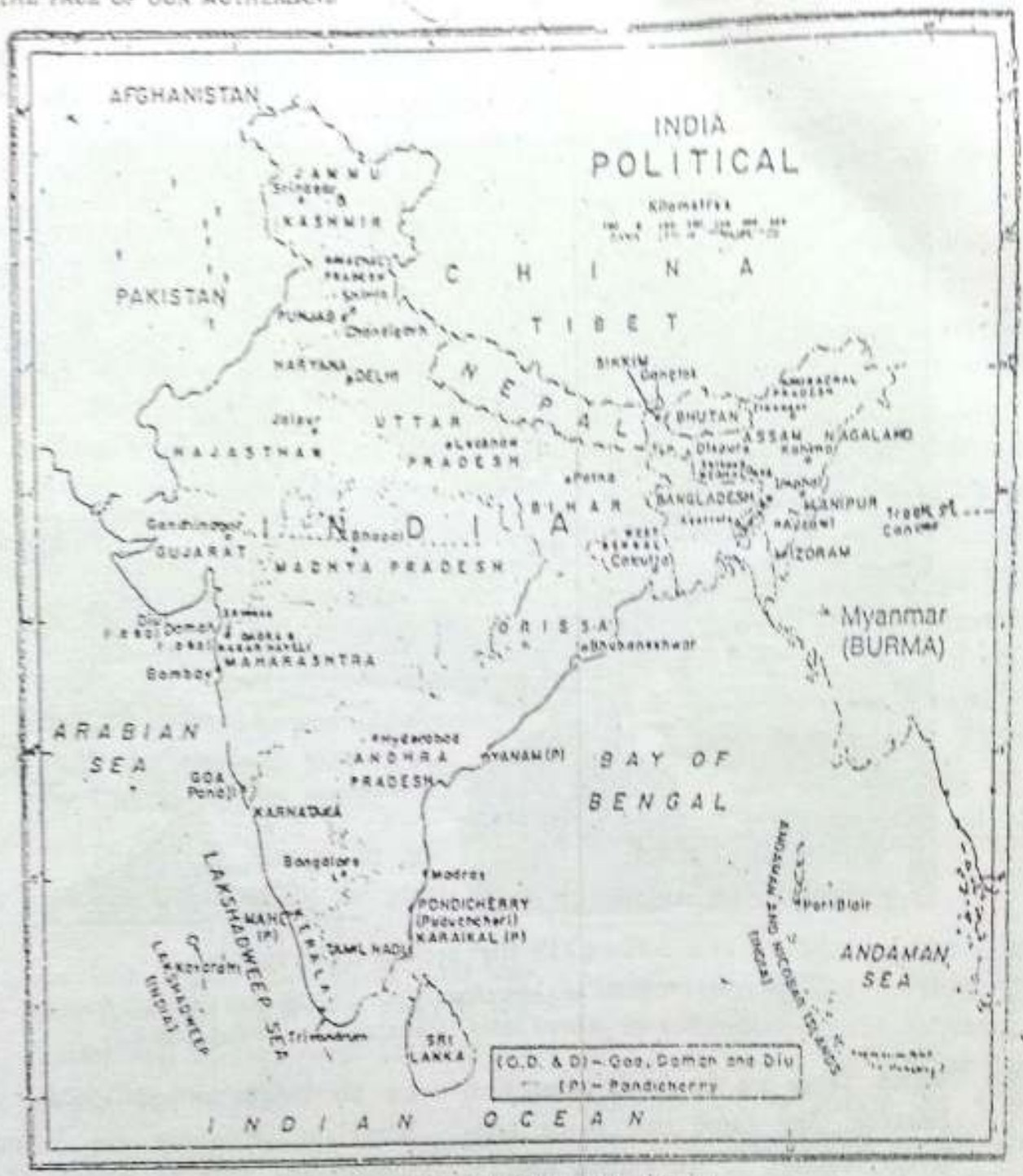

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The territorial waters of India extend into the sea to a distance of twelve nautical miles measured from the appropriate base line. © Government of India copyright, 1985

The boundary of Meghalaya shown on this map is as interpreted from the North-Eastern Areas (Reorganisation) Act, 1971 but has yet to be verified.

The administrative headquarters of Chandigarh, Haryana and Punjab are at Chandigarh.

Fig. 21 India — Political divisions

Note the States and the Union Territories sharing border with our neighbouring countries.

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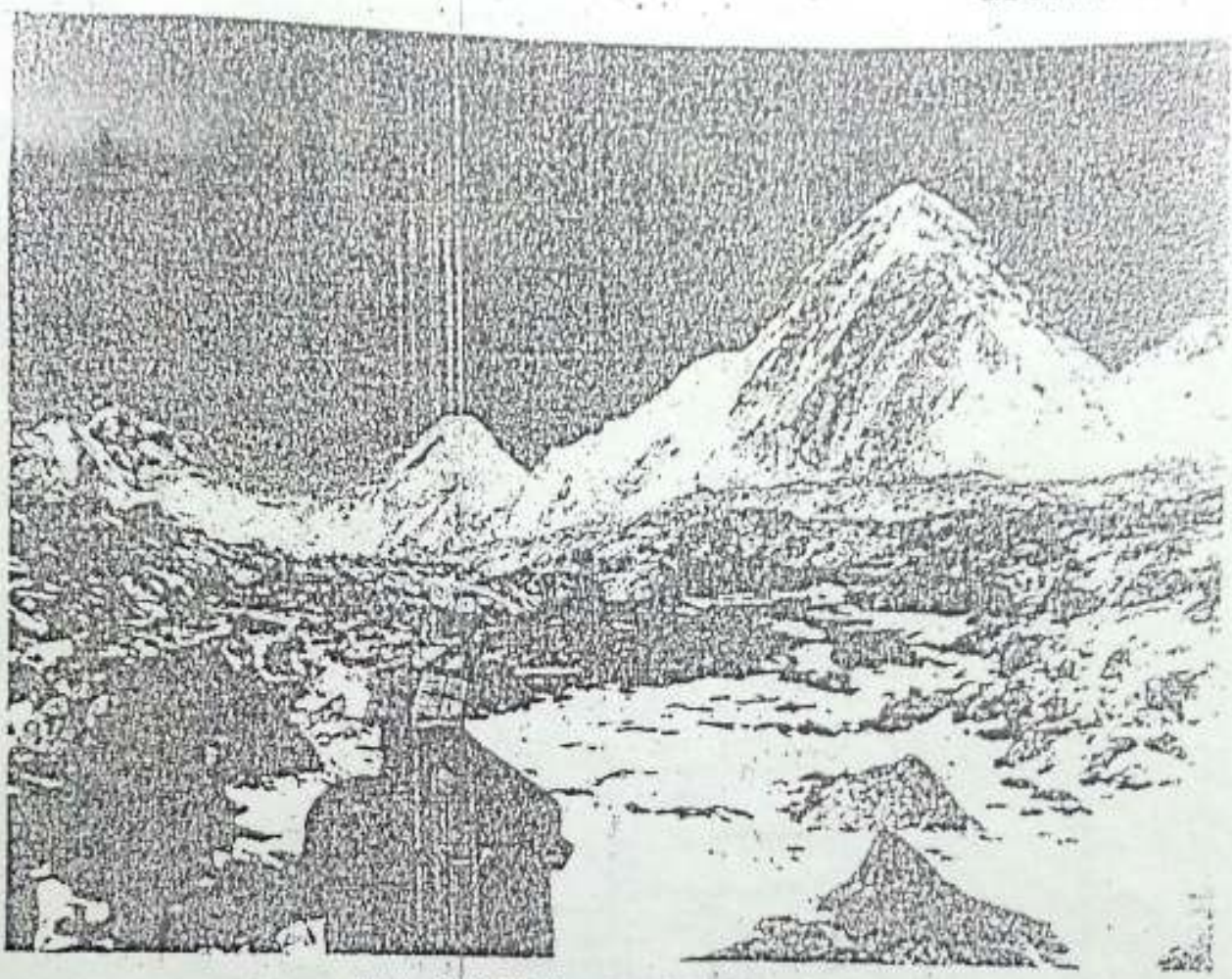

Photo XIV High peaks of the Himalayas

These peaks are in the neighbourhood of Mt. Everest. Note the sharp features of these snow-covered peaks. In what country are they situated ?

world. These are the young mountains, because they came into being relatively recently in the earth's history. Their parallel ranges and world's highest peaks make it further clear that they are young fold mountains.

The mountains extending between the Pamir Plateau and the Indus river in Kashmir are known as the Karakoram Mountains. Those between the Indus on one hand and the Brahmaputra on the other are known as the Himalaya, meaning the 'abode of snow'. The eastern section of these mountains in Arunachal Pradesh and Sikkim in our country is known as the eastern Himalaya. Their extension along the eastern border of our country in Nagaland and Manipur is known as the Purvachal hills.

The Karakoram Mountains in the northern part of Kashmir are the north-

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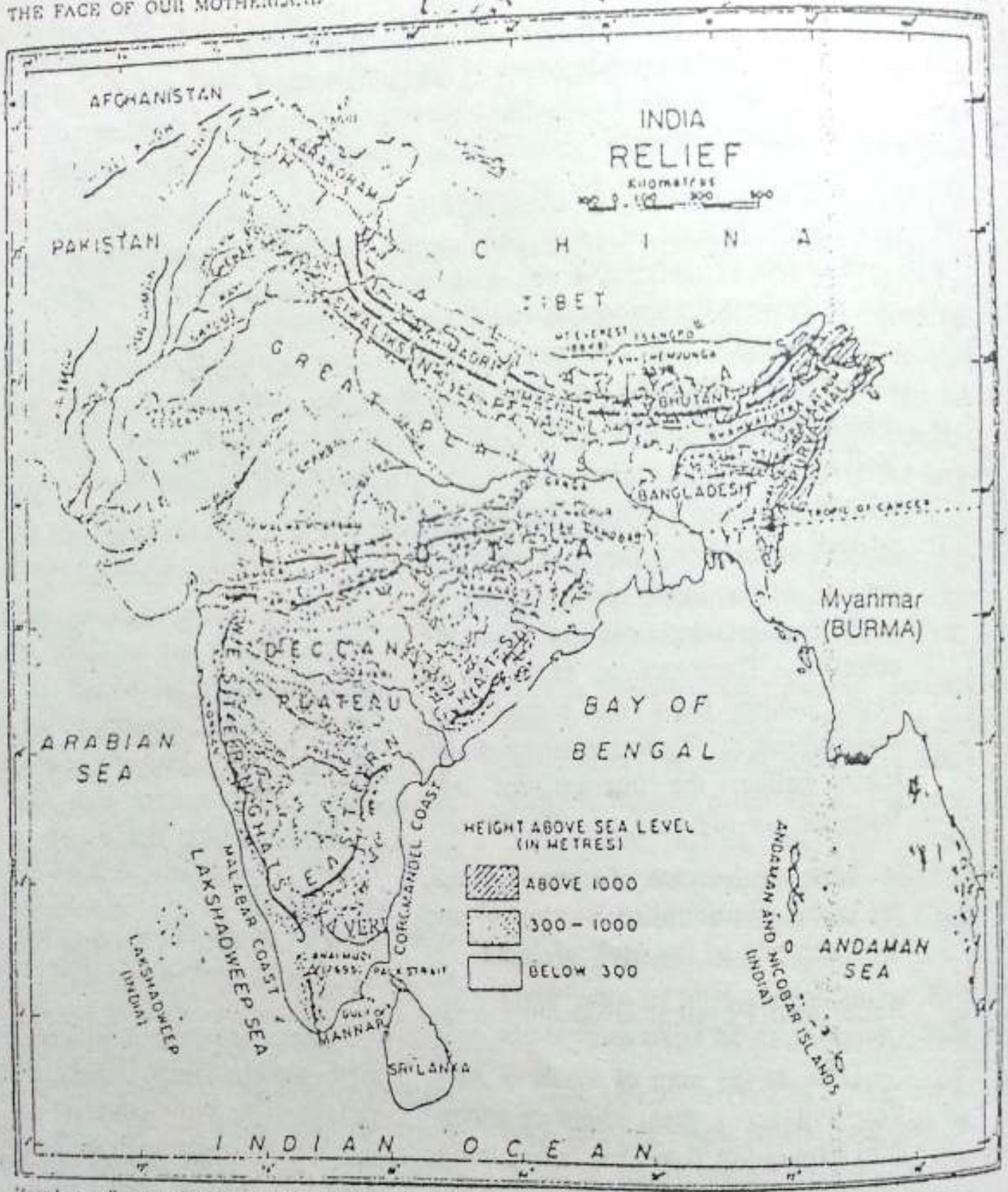

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The territorial waters of India extend into the sea to a distance of twelve nautical miles measured from the appropriate base line.

Fig. 22 Indian sub -continent— Relief

Note the three major physical divisions of India. What are the main mountain and hill ranges? Find out the main rivers flowing out into the Bay of Bengal and the Arabian Sea.

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western extension of the Himalaya. K2, the world's second highest mountain peak, belongs to this mountain range. Also famous is its Baltoro glacier. The other important ranges of the Kashmir Himalaya are the Ladakh, the Zaskar and the Pirpanjal. The valley of Kashmir, drained by the Jhelum river, is the most beautiful and famous in this part of the Himalayas.

The northernmost range of the Himalaya proper is known as the Himadri. On an average, it is about 6,000 metres high. This loftiest Himalayan range contains the world's highest peaks, many of which are more than 8,000 metres above sea level. Mount Everest in Nepal is the world's highest peak with an elevation of 8,848 metres above sea level. Some of the other important peaks are Nanga Parbat, Nanda Devi, Dhaulagiri, Annapurna, Makalu, Manaslu and Kanchenjunga. Kanchenjunga in Sikkim is the highest peak of the Himalaya in India.

The range lying south of the Himadri is known as the Himachal. The average height of this range is a little less than 5,000 metres above sea level. On the ridges and spurs of this range are situated many of the important hill stations of India. Some of the more famous are Shimla, Mussoorie, Naini Tal and Darjeeling.

The southernmost range of the Himalaya is known as the Siwalik. It is not a continuous range. In fact, towards the east it merges with the main mountains. Unlike other ranges this mountain range is made up of mud and soft rocks. Its average height is less than 1,250 metres above sea level. There are broad longitudinal valleys in it known as 'Duns'. Dehradun is situated in one such valley.

In the north-east, the Purvachal mountains consist of Patkai, Bum and the Naga Hills in the north, Garo, Khasi and Jaintia in the centre and the Lushai Hills in the south.

The Great Plains : To the south of the Great Mountains of the north lie the Great Plains of Northern India. This region is made up of alluvium and is extremely level. It extends roughly about 2,500 kilometres from east to west.

The Great Plains consist of two river basins, namely, those of the Indus and the Ganga-Brahmaputra. The Indus, the Ganga and the Brahmaputra are the three most important rivers of the Indian sub-continent. Two of them—the Indus and the Brahmaputra—rise beyond the Himalaya. All the three flow through India, enter either into Pakistan or Bangladesh and then join the sea.

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The Indus basin is drained by the river Indus and its tributaries—the Jhelum, Chenab, Beas, Ravi, and Sutlej. Of these, the Sutlej also rises beyond the Himalaya. The waters of these rivers flow into the Arabian Sea. Now only the Sutlej, Beas and Ravi pass through Indian part of this basin.

The major portion of the Great Indian Plains consists of the Ganga Basin. Its greater part is drained by Ganga and its many tributaries such as the Yamuna, Ghaghara, Gandak, Kosi, and Sista. All of them rise in the Himalaya. Another set of the tributaries of the Ganga consists of the Chambal, Sind, Betwa, Son and Damodar. They rise either in the Vindhya or in the Chhota Nagpur region.

The river Ganga in its lower reaches is joined by the great Brahmaputra. Together they form the world's largest delta before their waters flow into the Bay of Bengal. The major part of the Ganga-Brahmaputra delta lies in Bangladesh.

The Great Plateau of Peninsular India : To the south of the Northern Plains lies the Great Plateau of the peninsula. This plateau, made up mostly of hard and igneous rocks, is the oldest part of the Indian subcontinent. It consists of two distinct parts—the Malwa Plateau in the north and the Deccan Plateau in the south.

The northern part of this Great Plateau is bounded by the Aravalli range in the west and the Vindhya to its south. It extends from Malwa Plateau in the west to Chhota Nagpur in the east. They all slope towards the north merging gradually into the plains of northern India. Note that all the rivers of this region form part of the Ganga Basin.

To the north-west of the Malwa Plateau lies the Desert of Rajasthan. It lies west of the Aravalli hill ranges. The desert is made up of rocks and sand. It extends also into Pakistan. Few small rivers in this part of the Thar Desert either drain into salt lakes or disappear into sands. Thus, it is a region of inland drainage.

The western edge of the Deccan Plateau is called the Western Ghat. These are formed by the Sahyadri, the Nilgiri, the Annamalai and the Cardamom Hills. Overlooking the Arabian Sea, they run parallel to the coast. Their average height goes on increasing from north to south. With an elevation of 2,695 metres above sea level, Anai Mudi in Kerala is the highest peak of peninsular India. The Deccan Plateau gently slopes towards

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the east and its height varies from 300 metres to 900 metres above sea level. The Eastern edge of the plateau is marked by the hills which are low and discontinuous. They are collectively known as the Eastern Ghat. Both the Western and the Eastern Ghats converge at the Nilgiris. The peninsular hills are low and old and do not have lofty peaks and the glaciers like those in the Himalayas. They are remnants of high mountains of the past.

The north-western part of the Deccan Plateau, covering almost the whole of Maharashtra and parts of Gujarat and Madhya Pradesh, is made up of volcanic rocks called the Deccan Trap. They are made of lava flows.

The river Narmada, flowing from east to west, separates the plateau of Malwa from the Deccan. It flows through a narrow valley between the Vindhya to its north and the Satpura ranges to its south. To the south of Satpuras lies yet another west-flowing river, the Tapi. Like the Narmada it also joins the Arabian Sea. All other major rivers of the Deccan Plateau—the Mahanadi, Godavari, Krishna and Kaveri—flow into the Bay of Bengal. The Godavari is the longest of them all.

The Deccan Plateau is flanked by a narrow coastal plain on the west. It is broadest in the north where it includes the plain of Gujarat. The coastal strip south of Gujarat is divided into two — Konkan in the north and the Malabar in the south. The coastline is slightly indented having estuaries in the north and lagoons or back-waters in the south, especially in Kerala. In Bombay and Marmagao it possesses the two best natural harbours of India.

The eastern coastal strip is wider than the west and possesses the fertile deltas of the Kaveri, Krishna, Godavari and Mahanadi. The southern part of east coast is known as the Coromandel coast. The coastal strip in the north merges with the delta of the Ganga-Brahmaputra.

Geographical Unity of India

All the major physical divisions of India are closely related to one another. These parts are also interdependent. The story of how India acquired its present form and shape is very very old and highly interesting. Scientists believe that the sediments forming the Himalayas were once lying at the bottom of a shallow sea. They gradually rose above the sea level when the land masses of peninsular India on one hand, and the Asian mainland on the other began to come closer and closer. In course of time the

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Himalayan Mountains acquired great height, and the rivers flowing from them helped to form the Great Indian Plains.

The Great Mountains of the north in the past have protected India from invasions from the rest of the continent. This helped India to grow and prosper in peace. This is why India has been able to develop a distinct culture and nationhood of its own. But they no longer act as such a defence barrier in modern air age. Once the invading army manages to cross the passes in the mountains, it may become more difficult to check its advance. This mountainous region abounds in forest wealth and water-power. The Great Plains of Northern India are one of the most important and fertile agricultural land of the world. It sustains nearly two-fifth of the total population of India and provides agricultural raw materials for various industries of the country. The Great Plateau of India is the most important storehouse of minerals on which our modern industries depend. The coastal strips, particularly on the east, contain important rice bowls of India. Our major port towns, besides being big centres of internal trade, have now become the gateways of our international trade and commerce. In fact, no one part of our country would be able to grow to its maximum without adequate assistance from the other.

The New Terms You Have Learnt. *Sub-continent* : A big geographical unit which stands out distinctly from the rest of the continent. *Indian Standard Time (IST)* : The local time along the Standard Meridian (82° 30' E) which serves as the standard time for the whole of India. It is five and a half hours ahead of Greenwich Time.

EXERCISES

Review Questions

1. Answer the following questions in brief :
   (i) What are the three major physical divisions of India?

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(ii) Name the three largest rivers of the Indian sub-continent.
(iii) Name the highest Himalayan Peak in India?

2. Distinguish between :
   (i) the eastern coast and the western coast of India.
   (ii) the mountains of northern India and the hill ranges of peninsular India.

3. Describe in about 15 lines either the Himalayan Mountains or the Deccan Plateau.

4. Make out the correct pairs from the two columns:

(i) the highest peak of the Indian sub-continent	K_2
(ii) the highest peak of the Karakoram	Mt. Everest
(iii) the highest peak of the Himalaya in India	Anai Mudi
(iv) the highest peak of Peninsular India	Kanchenjunga

Map Work

5. Draw a map of India and show therein the following :
   (i) The highest range of the Himalaya.
   (ii) The two great rivers that rise beyond the Himalaya.
   (iii) Five deltas along the Bay of Bengal.
   (iv) Two west-flowing big rivers of the Deccan Plateau.

Topic for Class Discussion

6. *'Frontiers of India'*

Divide the class into six groups, each one dealing with our frontier with one of the countries (i) Pakistan, (ii) China, (iii) Nepal, (iv) Bangladesh and (v) Myanmar. Let there be one more group to deal with the strategic importance of our islands in the Bay of Bengal and in the Arabian Sea.

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11. India—The Land of the Monsoon

The Terms You Already Know. *Monsoon* : A complete reversal of wind direction over a large part of Asia leading to change of seasons. *Trade Winds* : The winds which blow in the same direction from sub-tropical high pressure belts to the equatorial low pressure belt.

The land and climate together influence the life of the people in our country from region to region. You know how varied is its relief and how beautiful is its landscape from place to place. It has several great mountains, plateaus and plains. Its mountains and hills, lakes and rivers, beaches and backwaters attract thousands of tourists from all over the world. You will see that, apart from location, shape and size of our country, its relief plays a great part in shaping its climate.

A study of the climate of our country and its variations from region to region will further confirm that our big country is indeed a part of sub-continent. In spite of these climatic variations, you will also see that the monsoon lend a climatic unity to this land known for its diversity.

Climatic Contrasts

Some places in our country have an extremely hot climate. Others have too cold a climate. Certain places enjoy an equable climate all the year round. In some of these places even the difference between the summer and winter mean temperatures is less than what it is between those of the day and night. As against this, some places in India have an extreme type of climate. If certain places are well known for the heaviest rainfall (anywhere) in the world, the others are known for their extreme aridity. In still other parts, it even snows very heavily.

Study the temperature and rainfall graphs given in this chapter. They show mean monthly temperatures and rainfall for a few selected places in India. Now you should be able to

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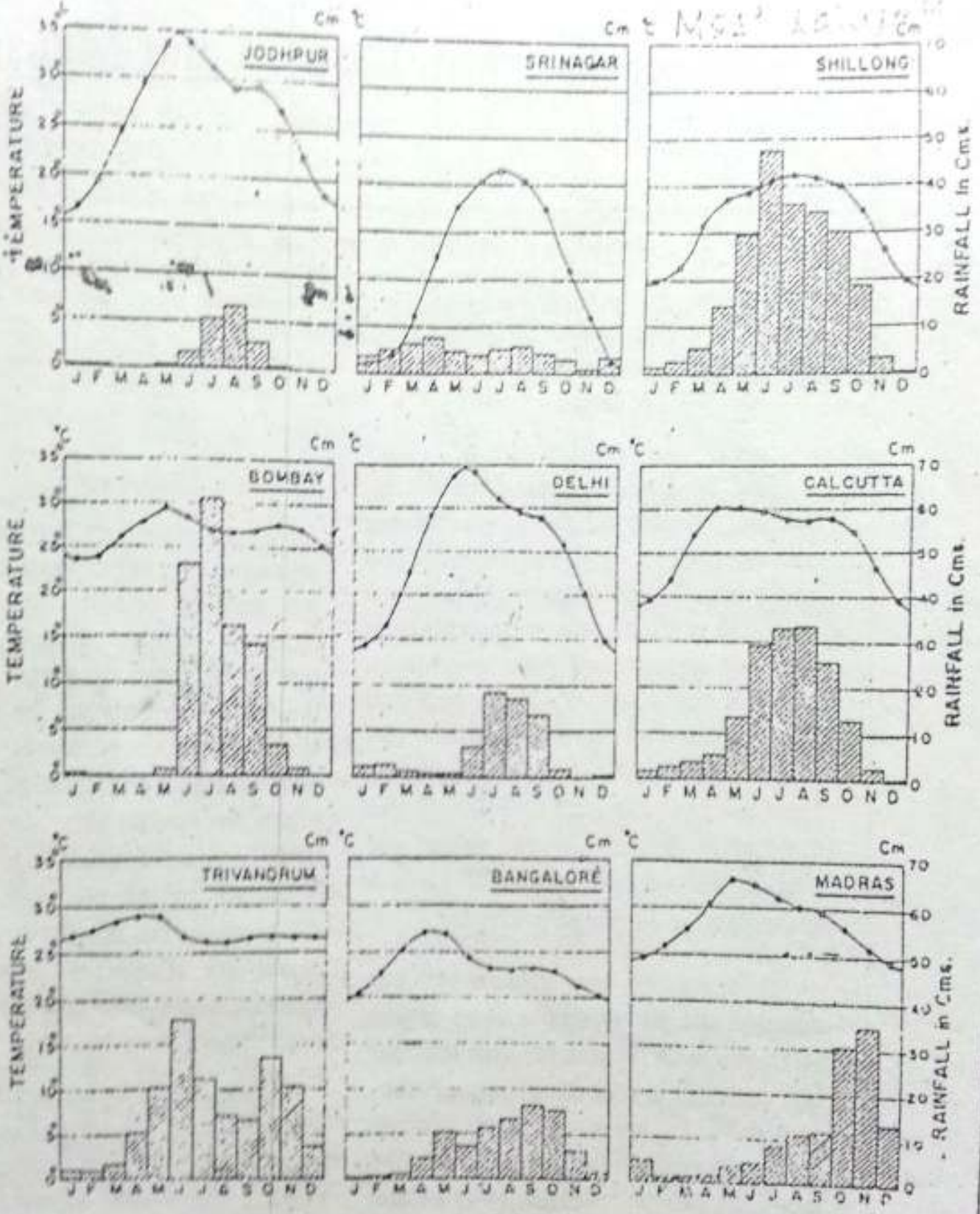

Fig. 23 Temperature and rainfall of some places in India

Locate these places on a map of India. Make out pairs of places having opposite type of climate : (a) Hot and cold. (b) Arid and rainy. (c) Equable and extreme.

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describe the climate of each place, comparing it with others.

Which of these places has the most equable climate? Name the two places having the most extreme type of climate. Which two places have a considerable rainfall in winter? Which of these places is most rainy? Which one is most arid? Which are the rainy months for the most parts of India? It will be interesting to know the factors that are responsible for differences as well as similarities between the climates of different regions.

Factors Influencing the Climate of India

You already know that the southern half of our country lies within the tropics, whereas the northern half belongs to the sub-tropical zone. Yet the whole country has almost uniformly high temperatures especially in summer. By and large, the winters are dry. Together they lend an unmistakable tropical touch to our country's climate.

This tropical nature of the climate all over India is in a large measure due to the Himalayas. The long and wide ranges of this mountain system with their great elevations protect our country from bitterly cold winds of the north. The Himalayan ranges are not only a physical barrier, but they also act as a great natural wall separating two distinct climatic regions. They thus, act as a climatic divide as well.

With a long coastline, India has a large coastal area enjoying equable climate. But a far greater area of the country, especially in the north, lies too far away to receive any moderating influence of the sea. Such a continental type of climate can be seen in the interior of the peninsular India.

Yet another factor affecting the temperatures in India is the relief of our land. On the Deccan Plateau, even when they are not far from the equator, there are popular hill stations, for instance Ootacamund, also known as Ooty. However, most numerous and popular of the hill stations are confined to the Himalayas. On which of its ranges are they situated? The Kashmir Valley is often called the paradise on earth. What makes it so?

In fact, it is the variations in rainfall from place to place that account for marked differences in the climate of our country. These are again governed, to a large extent, by the relief of our land. A place like Mahabaleshwar, situated on the crest of the Western Ghat, may receive as much as 625 centimetres of annual rainfall. But a

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place like Pune, only a few kilometres to its north-east, hardly receives about one-tenth this amount.

The gigantic relief features like the Himalayan ranges even deflect the winds. They are, in fact, responsible for trapping the monsoon winds and forcing them to shed their moisture inside the Indian sub-continent.

Cycle of Seasons in India

Let us follow an annual cycle of seasons starting with the month of January. The cold weather season all over India has well set in by early December. Recall the planetary winds, and you will remember that India lies in the belt of the trade winds. Being in the northern hemisphere, they are north-east trades. January and February are the two cold months almost all over India. During these months the day temperatures in Calicut and Madras are about 24°C or 25°C. In the northern plains they are about 10°C to 15°C. Days are fairly warm even though the nights are cold.

During this season there is a high pressure area developed over the plains of the north-west. Land-bearing light winds blow out from the high pressure area. Weather is very fine with clear skies, enjoyable sun and light winds.

In northern India, however, this fine weather is disturbed at intervals by clouds and light rains. These winter rains are associated with cyclones originating in the Mediterranean Sea. They travel eastward across Iran and Pakistan before entering north-western part of our country. These are the winds which cause heavy snowfall along the higher reaches of the Himalayas. The rainfall caused by these winds decreases towards the east and the south. These "Western disturbances" in our country are often followed by cold waves.

During this season the Coromandel coast of Tamil Nadu also receives winter rains. These are, however, due to the north-eastern monsoon. These winds pick up moisture while blowing over the Bay of Bengal before striking the coast south of Madras.

The period between March and May forms the summer season. This season marches, as it were, from south to north. In the month of March, the highest day temperatures of about 38°C are recorded in the southern and central parts of the Deccan Plateau. In April, the belt of the highest temperature shifts further north and lies in Gujarat and Madhya Pradesh where day temperatures vary from 38°C to 43°C. In the month of May the belt of the highest temperature moves still

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further north. The day temperatures around 48°C are recorded in the north-western part of the country.

During this period, northern India becomes a region of rising temperatures and decreasing air pressure. Violent local storms accompanied by rain and hail are not uncommon towards the end of this period. In the north-west, the hot dry winds, called loo, are common in the months of May and June. So are the dust storms. Though temporarily they help to bring down the temperatures appreciably.

The period from June to September is a south-west monsoon season. The low pressure area developed in the north-west of the sub-continent becomes more and more intense. The south-east trade winds which blow from the Tropic of Capricorn in the southern hemisphere towards the equator are attracted towards this low pressure area in north India. These moist winds extend into the Bay of Bengal and the Arabian Sea. Suddenly, they are caught up in the air circulation over India. They are deflected towards the Indian Peninsula and Burma as south-westerly winds.

The direction of these winds is controlled by the relief of our country. It is the Indian peninsula which rather deflects the monsoon into two branches, called the Arabian Sea branch and the Bay of Bengal branch. The Arabian Sea branch of the monsoon marches from the southern tip of the country towards the north. The Bay of Bengal branch of the monsoon is deflected by the Arakan Mountains of Burma and the Himalayas in India and moves eastwards up the Ganga basin. The monsoon winds are normally expected to break in Kerala by the beginning of June and reach the plains of the Punjab by the first week of July. These two branches together thus overrun the country in about four or five weeks' time. The bulk of the annual rainfall is received during this season in the whole country barring the east coast of Tamil Nadu.

Even during this period it does not rain continuously. Heavy showers or downpours are generally followed by rainless intervals. These successive waves of rainfall, as it were, depend upon the formation of cyclones in the Bay of Bengal and the paths they follow.

Then comes the period of retreating south-west monsoon. By October the intensity of rainfall becomes much less, and the south-west monsoon begins to retreat gradually. It becomes

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a weak current or, in other words, it withdraws from Punjab by about mid-September, and leaves the Ganga Delta by late October. The south-west monsoon bids an annual farewell to India by early November when it leaves the southern part of the peninsula.

With the retreat of monsoon, the month of October again is known for its oppressive heat. This "October heat" as it is popularly known, is due to a combination of high temperatures and excessive humidity, since the land is still water-logged. In late October, temperatures begin to decrease rapidly especially in northern India, and by December, the winter is well established. Thus the months of October and November form a period of transition from a hot rainy season to the dry winter conditions.

This period of transition in which the low pressure area is transferred from north-west India to the Bay of Bengal is marked again by the formation of cyclones. These cyclones as that which hit Andhra Pradesh in November 1977 generally enter into the Indian peninsula through the mouths of river valleys causing widespread havoc in the deltas of the Kaveri, Krishna and Godavari. Occasionally, they hit the coast of Orissa and Bengal causing damage in the deltas of the Mahanadi and Ganga-Brahmaputra. The havoc caused in Bangladesh in the year 1970 was similar. For the Coromandel coast these are the rainiest months. In this part, rainfall is further continued by the north-east monsoon.

Thus, the annual cycle of seasons in India is dominated by the monsoon. There is some kind of a seasonal rhythm to which every kind of life—plant, animal and human being—responds. In spite of abundant rainfall, India is a water-thirsty land. This is largely due to the concentration of rainfall over only a few months of the year. The rapid run-off and the quick evaporation of rain-water are further responsible for this water famine even in those parts where rainfall is very heavy, for example in the Konkan area of Maharashtra.

The monsoons are eagerly awaited all over India. Long breaks or delays in them are fraught with danger. The whims or vagaries of the monsoon form the most important topic for discussion throughout the length and breadth of the country. Floods and droughts are constant sources of worry and no part of India is totally free from one or the other.

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Rohit

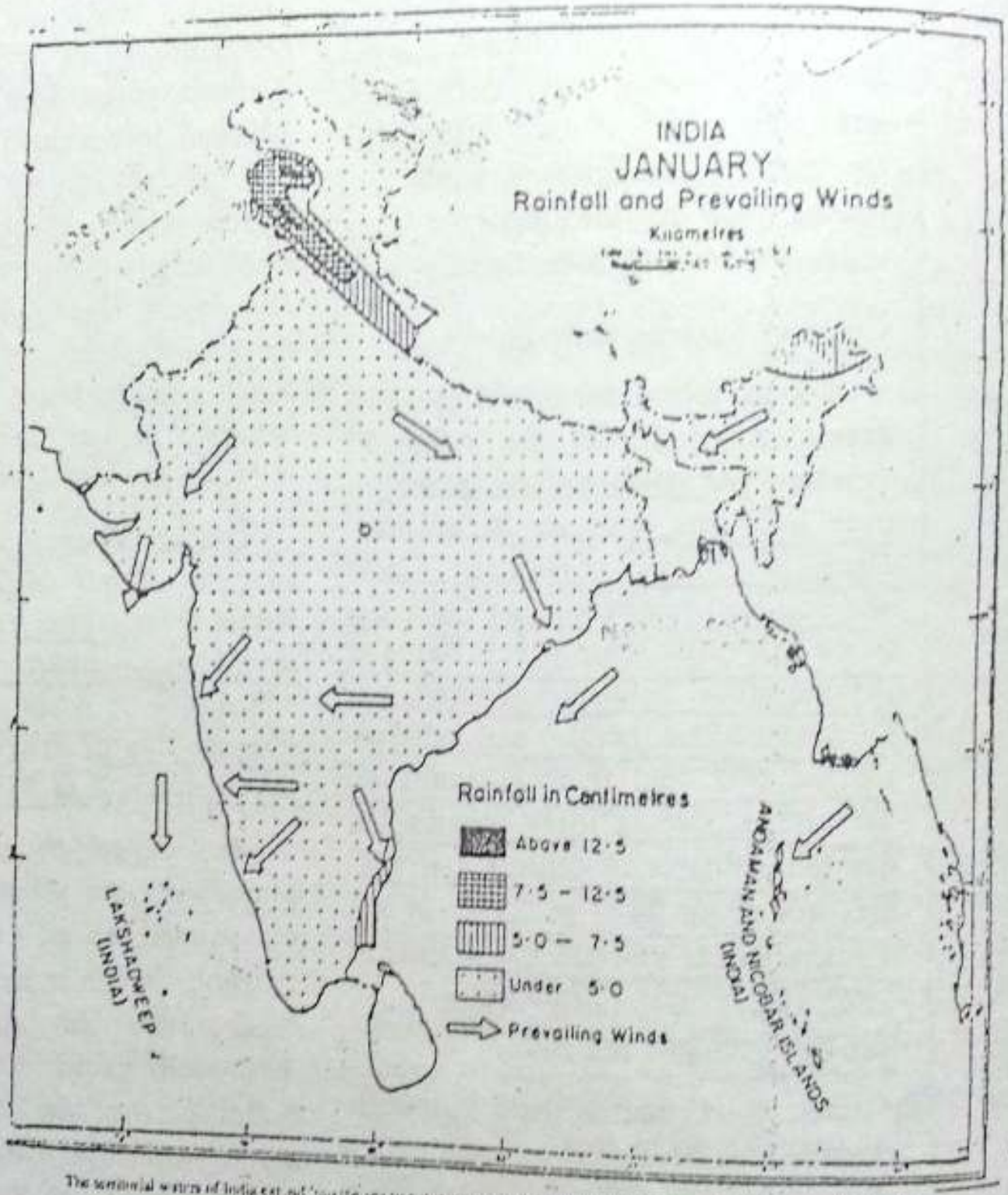

Fig. 24 (a) India — Seasonal winds and rainfall

Note the direction of winds in January. Which area in the peninsular India has more than 5 cm. of rainfall in January ? Why is it so ?

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Distribution of Rainfall

In India the distribution of rainfall is determined by two important factors. They are the direction of the rain-bearing winds, particularly the south-west monsoons and the relief of the land.

The Arabian Sea branch of the monsoon winds striking the west coast has to climb up the Western Ghat. As the warm moist winds rise up, they become cold and are forced to 'throw out' or drop down the moisture they carry. Thus, heavy precipitation takes place on the western coastal strip and all along the Western Ghat. The rainfall in this belt decreases gradually from south to north. Why should it be so ?

As these winds cross the Western Ghat, they begin to climb down. By this time, they have already shed much of their moisture they have carried. While climbing down, they begin to get warm, increasing thereby their capacity to hold moisture. As a result, they give very little rain in a belt spread along the eastern side of the Western Ghat. This is a typical rain-shadow area.

By and large, the western parts of Rajasthan receive a very scanty rainfall. This is because the winds while passing over the Great Rajasthan Desert become more warm and increase their capacity to retain moisture. But at times it receives heavy rainfall causing sudden floods even in this desert area.

The south-west monsoon of the Bay of Bengal branch moves northwards to central Burma, where also lies a low pressure area. But the Arakan Mountains succeed in deflecting a sizable part of these winds northwards. Thus these winds take a southerly to south-easterly direction and move into the Ganga-Brahmaputra delta. A considerable part of these winds gets trapped into the valleys of the Brahmaputra and Surma in the east, and cause heavy rainfall in the region. The strong monsoon winds are funnelled into a narrow valley surrounded by hills on three sides causing the world's heaviest rainfall in the neighbourhood of Cherrapunji, about 1,142 centimetres per annum on an average.

A very large proportion of the Bay of Bengal branch of the south-west monsoon is attracted by the low pressure lying over the north-western part of the country. These winds move up the Ganga basin over which lies a low pressure trough. The Himalayan ranges are responsible for deflecting these

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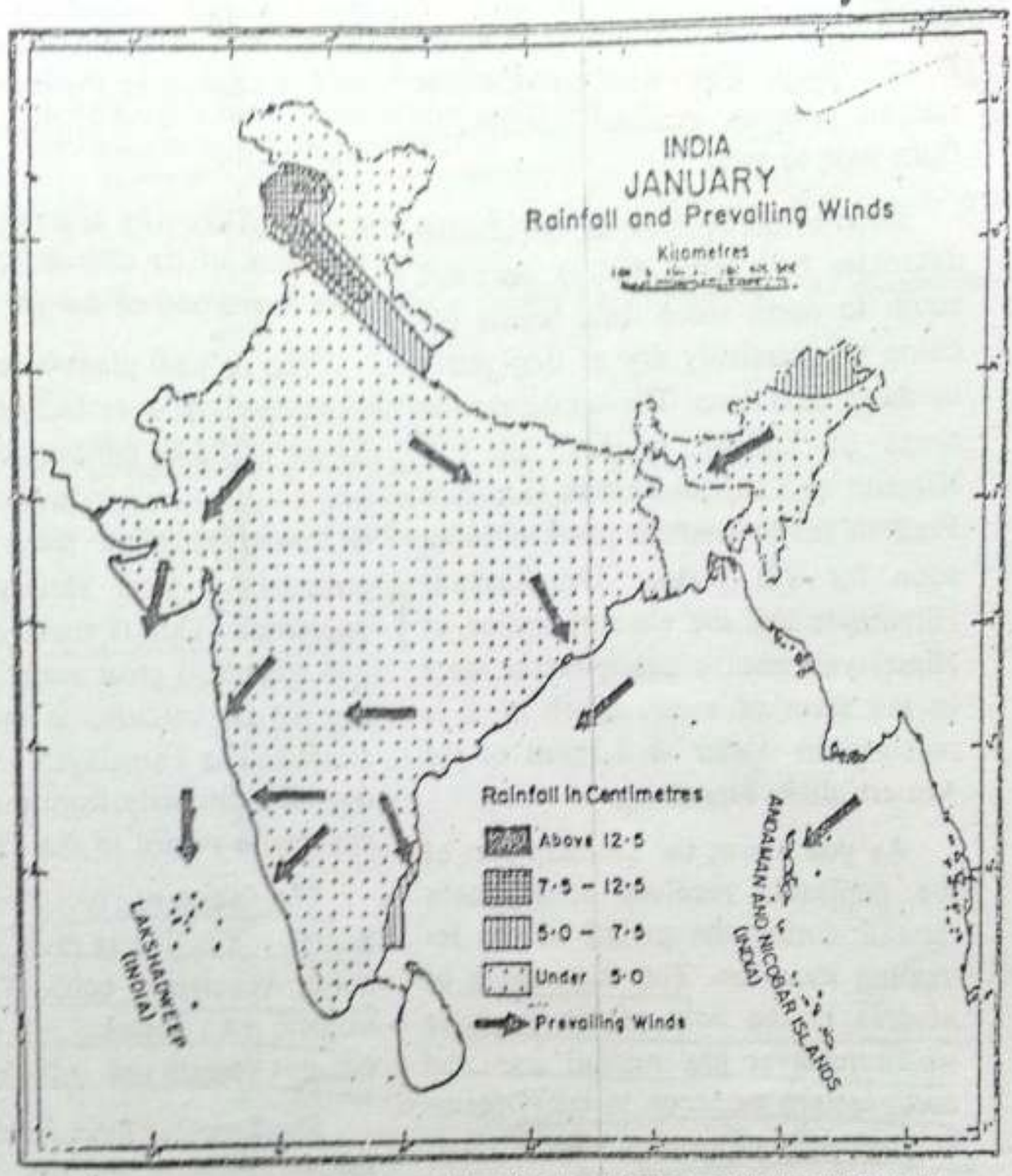

Fig. 24 (b) India — Seasonal wind and rainfall

Note the change in the direction of winds from January to July. Which areas have more than 50 cm. and less than 5 cm. of rainfall in July ? Why is it so ?

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winds up the Ganga basin. Look at the rainfall map. You will see that the rainfall goes on gradually decreasing from east to west.

Even in the Himalayas, the rainfall decreases both from east to west and south to north since these winds become progressively dry as they move in these directions. The northern-most areas of Ladakh in Kashmir and Kinnaur and Lahaul-Spiti in Himachal Pradesh are beyond the reach of monsoon for this reason. The Kashmir Himalayas and the western section of Himalayas receive precipitation more in the form of snow. Much of it is received in winter as a result of the western disturbances.

As you know, the southern part of the peninsula receives considerable rainfall during the period of the retreating monsoon. The coast south of Madras is the only region in India which receives any rainfall from the north-eastern monsoon in late December and part of January.

But for the monsoon, India would have been a country altogether different. Besides the monsoon, the relief, particularly the mighty Himalayas, also plays a great role in shaping the climate of our country. It gives the country a distinct tropical touch and a monsoonal unity almost from one end of the country to the other.

Vegetation

Vegetation in any major region is an index of its climatic conditions. It also forms part of the physical setting.

The original plant cover in most of our populous areas has been removed by man. Unlike the savanna lands, the original plant cover in India consisted of forest vegetation. Even today, India possesses a great variety of natural vegetation. This is mainly because of two factors (i) great variations in relief and (ii) the variation in the amount of rainfall. The Himalayan region stands out very distinctly from the rest of the country in regard to the above factors.

The country lying outside the Himalayan region is divided into three major vegetation belts. They are (i) tropical rain forests, (ii) tropical deciduous forests and (iii) thorn forests.

The Tropical Rain Forests : These forests consist of the varieties—evergreen and semi-evergreen. The former lies in the region with a rainfall over 300 centimetres. It is a region of high humidity, with even temperature and a short dry season. These forests are common on the rainy slopes of the Western Ghat and in the hills of

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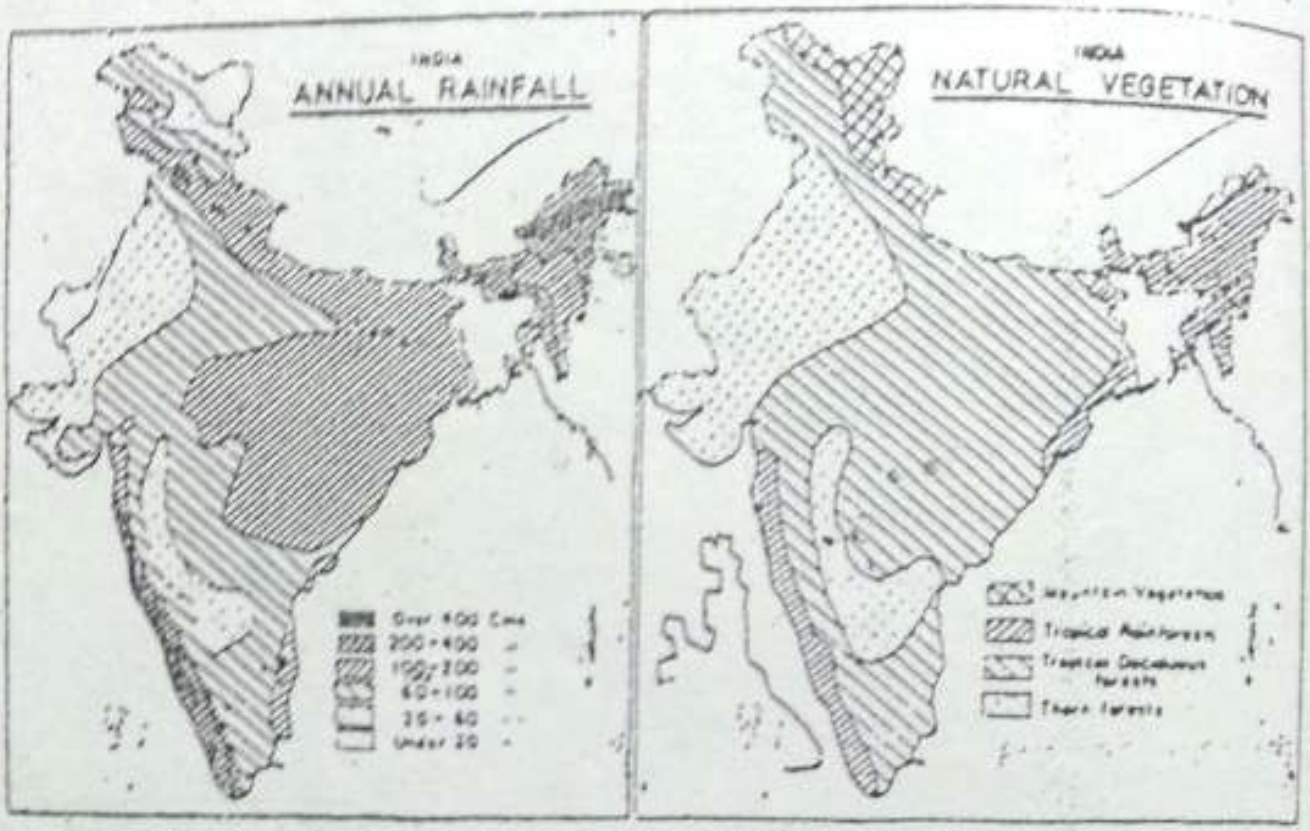

The territorial waters of India extend into the sea to a distance of twelve nautical miles measured from the appropriate base line.

Fig. 25 India — Distribution of rainfall and natural vegetation

Note the regions of heavy rainfall. What relationship do you find between rainfall and natural vegetation ?

Assam. The semi-evergreen forests lie close to the evergreen forests. They belong to a region receiving rainfall between 200 and 300 centimetres per year. They are found in the Western Ghat, Assam, West Bengal and Orissa.

The Tropical Deciduous Forests : These forests are the most typical of the monsoon region. Therefore, they are also called the monsoon forests. They belong to the region enjoying a rainfall between 100 and 200 centimetres per annum. Owing to a long dry spell, trees shed their leaves for about six to eight weeks in summer. Every species has its own time of shedding leaves. As a result, at no time is the entire forest absolutely bare. Teak and sal are the most important trees of these forests. Sandalwood, rosewood, ebony, *shisham* and *mahua* are the other species of economic importance. Bamboos are also very common. This vegetation belt extends from the Western Ghat in the south to the Siwalik in the north.

The Thorn Forests : They are confined to the regions having a rain-

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fall of less than 80 centimetres a year. It consists of open stunted forests and bushes. Trees like babul, kikar and wild palms are common in a region with a moderate rainfall. Scrubs, shrubs and thorny bushes are mainly confined to a region where the rainfall is very scanty. Most of these trees and bushes have deep roots and long thorns. This vegetation is found in Rajasthan, Punjab, Haryana, Gujarat, the dry parts of Madhya Pradesh and the Deccan.

Yet another special type of vegetation consists of tidal forests common only to the areas flooded by the tides of the sea. Mangroves and the sundari trees of the Sundarban in Bengal are the common trees of this category.

Vegetation of the Himalayan Region : Vegetation in this region varies according to the height or altitude of the region. (1) The foot-hills of the Himalayas are covered with tropical deciduous forests. Sal is the most important tree in this belt. This is followed by (2) sub-tropical hill vegetation further up. The forests there consist of evergreen oaks, chestnuts and chir pine trees. (3) When we reach an altitude between 1,600 to 3,300 metres, we find a belt of coniferous trees—blue pines, cedars, silver firs and deodars. (4) Thereafter the alpine variety of vegetation becomes more and more common. It consists of shrubs, scrubs and grasses. (5) They are found at 3,500 metres and above, till we reach the permanent snowline.

The New Terms You Have Learnt. *Climatic Divide* : A bold relief feature separating distinct climatic regions lying on its either side. *Rain-shadow Area* : Area lying on the leeward side of mountains or a plateau which receives little or no rain.

EXERCISES

Review Questions

1. Answer the following questions :
   (i) Into how many seasons will you divide a year to explain the climate of India?
   (ii) What is relief rain?
   (iii) Why are the Himalayas called a climatic divide?

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2. Distinguish between :
   (i) The south-west monsoon and the north-east monsoon.
   (ii) Deciduous and coniferous vegetation.

3. Complete the following statement with a correct ending :

   Jodhpur receives very scanty rainfall because
   (i) it lies in the region of land-bearing winds.
   (ii) it lies in a region too hot to allow precipitation.
   (iii) it lies in the rain-shadow area.
   (iv) the Aravallis obstruct the rain-bearing winds.

4. Write in brief how and why India receives the bulk of its rainfall in the months from June to September.

5. Name important vegetation belts of India. Describe the characteristics of the monsoon forests.

Map Work

6. On a map of India show the following :
   (i) A place having the world's highest rainfall.
   (ii) A region receiving rainfall from the north-east monsoons.
   (iii) Areas receiving rain from the western disturbances.
   (iv) Direction of winds of the Bay of Bengal branch of the south-west monsoon.

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12. Soil and Land Use

The Terms You Already Know. *Soil* : Loose rock material together with humus that forms the upper layer of the earth's crust. It serves as a source of food and moisture for plants. *Agriculture* : A systematic practice of tilling or cultivating soil, raising crops and trees and rearing animals.

You know how bountiful Mother Nature is ! Her precious gifts include soil, water and vegetation. Fish and wild life, too, form part of the gifts of nature. So also the mineral wealth hidden under the earth's surface. Together they are known as natural resources. Of these, the soil is the most important resource for mankind.

Think of the food that helps you to sustain and grow. The cereals like wheat, rice or millets like jowar and bajra are, indeed, a must for you. So are the pulses or dals. What will your mother do to cook food with, had there been no oil-seeds at all? Your morning breakfast may not be the same in the absence of beverages like tea or coffee, of course, added with sugar to your taste. Do you think your food would be complete without fruits and vegetables ? Where do these cereals, pulses, oil-seeds, beverages, vegetables and fruits come from? We obtain all these things directly from the soil.

Then there are a few more items of our food like milk and meat. It is true that we do not obtain these animal products directly from the soil. But the animals that give us milk and meat, largely sustain on grasses which, in turn, come from the soil and nothing else. Therefore, it should be correct to say that ultimately even these food items, we derive indirectly though, come from the soil itself.

The products like cereals, vegetables, etc., which we obtain directly from the soil are termed as primary food products. Those that are derived indirectly are referred to as secondary food products. All our food, be it primary or secondary, thus, comes from the soil, and soil alone. But the soil is our prime resource not only

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because it provides all our food but also because it is the only source for many more things.

The wood we use for fuel or as timber is a primary product of the soil. So are tobacco and rubber. Whereas plant fibres like cotton, jute and sisal are the primary products of the soil, the animal fibres like silk and wool fall under the category of secondary products of the soil. Thus the basic elements of our food, clothing and even shelter, to a large extent, are obtained only from the soil which, indeed, is our prime resource.

The art of cultivating soil, raising crops and trees and rearing animals is known as agriculture. With the tremendous growth of knowledge, agriculture has now become a science by itself. In this chapter we shall study some important facts about soils, our forests, wild life and livestock. The next chapter will deal with crops that we raise from the soil.

Major Soil Types

India is known for the diversity of its rocks, relief, vegetation and climatic conditions.

It has resulted in a large variety of soils. Let us recognise some major soils and mark out their distribution in the map.

Alluvial soils are generally made up of fine silt brought down by rivers from mountainous region. Very fine and relatively new alluvium is found in the flood-plains and the deltas. It is locally known as *khadar* and is most fertile. Alluvium that is relatively old and coarse is known as bangar. It lies on the piedmont plains or on the upper sides of the river valleys. The bangar soils are slightly less fertile than khadar soils. The fertile alluvial soils are found in the Great Northern Plains of India and in the deltas of the rivers in peninsular India.

Black lava soils are common in Deccan Trap region, and are made up of volcanic rocks of lava flows. These fertile soils are clayey. They retain moisture for a long period. These soils are mainly found in Maharashtra and parts of Madhya Pradesh and Gujarat. As they are most suited for raising cotton crops, they are also known as black cotton soils. Locally, they are known as 'regar' soils.

Red soils are generally developed on crystalline igneous rocks in the hot and relatively dry parts of the southern and eastern parts of the Indian peninsula. They are relatively less fertile but are capable of growing good crops with the help of fertilizers.

Laterite soils are typical of hot

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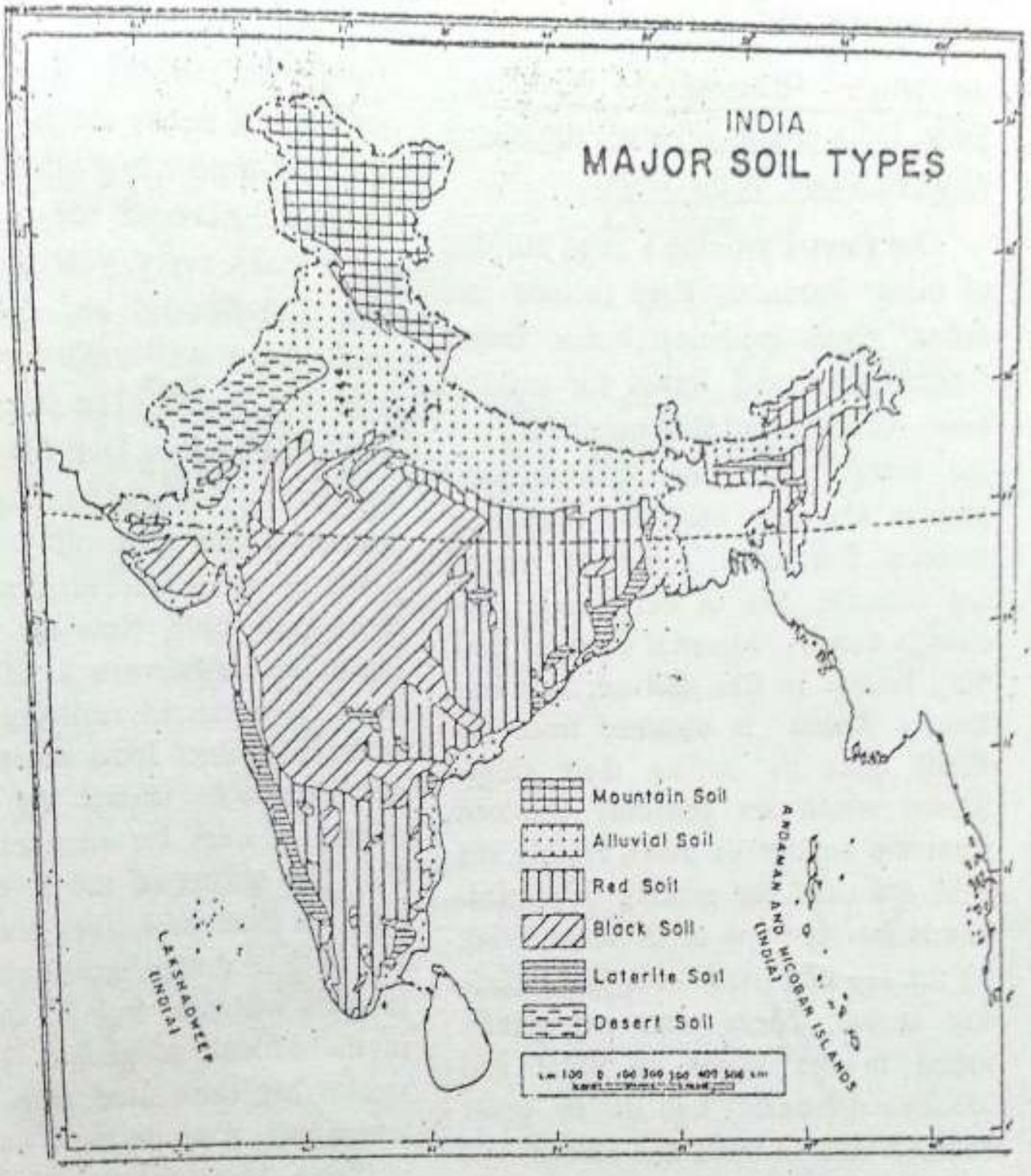

The territorial waters of India extend into the sea to a distance of twelve nautical miles measured from the appropriate base line.

Fig. 26 India — Soil types

Name the major types of soils found in peninsular India. Which are the areas of alluvial soil ? Why is it found here ?

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rainy climates of the hilly regions of the Western Ghat and the Chhotanagpur Plateau. Heavy rains wash away the fertile part of the soil dissolved in water. This process is known as leaching.

In addition to these, there are a variety of mountain soils found in Himalayan region. The arid sandy soils are confined to west Rajasthan. These desert soils also include the wind-blown loess. Such a large variety of soils in India partly ensures a very wide range of crops. Also it allows and calls for a proper use of land according to its suitability from place to place.

Land Use

As you know the prosperity of the people largely depends upon how wisely they use the land they possess. The use of the land for agriculture depends upon the kind of soil, relief of land, climatic conditions, adequate supply of water for irrigation and the drainage of surplus water. All these facts together determine the best possible use of every piece or strip of land in the country.

Let us find out the broad pattern of land use in our country (See Fig.27). Much less land is now left to be brought under agriculture, of course with great effort. This is only a poor quality land and would require large investment to make it economically productive.

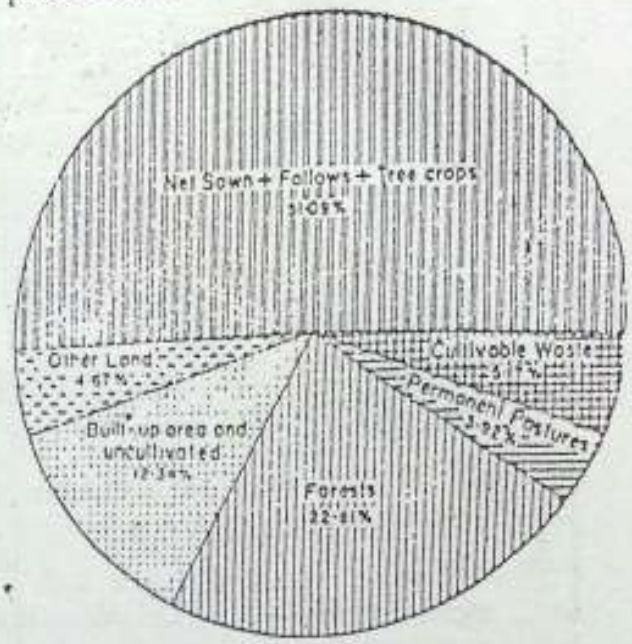

Fig. 27 Land use in India

Note that India has very little land under permanent pastures and the area still suitable for cultivation. Why should it be so ?

Land under Forests

India has hardly 23 per cent of its land area under forests. For the balanced development of a country, it has been found that it should have at least one-fourth of its area under forests. Confining themselves to hilly and uneven areas, the forests provide us with fuel and timber. When properly looked after, they become a permanent or perennial source of these resources.

USES OF FORESTS

① Forest trees growing in rocky and stony soils help to develop fertile soils,

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of course, very gradually. They supply the necessary humus content to these new or developing soils. Roots of the trees, the thick under-growth and grasses together help to conserve soil and water in the rainy and very uneven areas. In their absence it is these areas that suffer most in terms of soil-erosion. Forests also help in checking floods by holding a considerable amount of rain-water in the sub-soil. They also help to a certain extent in increasing the rainfall.

Yet another important advantage of forests is that they offer the necessary food and seclusion for wild life.

Our Forest Wealth

The forest land in India seems big enough covering as much as 75 million hectares of land. But only a little more than three-fourths of our forests are suitable for commercial exploitation. The bulk of the forest land is under deciduous trees, leaving only 6 per cent of it under coniferous ones. Much of the forest area has only a nominal or degraded plant cover.

The forest wealth is generally divided into two categories : major products and minor products. Wood that we obtain from the forest forms the major product. It is used either as fuel or as timber. The coniferous forests found in the Himalayan region have several commercially useful species of trees. They include pines, spruce, silver fir and deodar. The blue pine and deodar are the prized soft woods of the Himalayas in our country. They are used as timber for building houses, constructing bridges, making railway sleepers and furniture and manufacturing boxes for packing purposes. The silver fir and spruce have a great scope for making paper, newsprint and cellulose.

Sal and teak are the two most important species which belong to the deciduous or the monsoon forests of our country. They are widely used as timber, since their wood is fairly hard and durable. The sal tree is more widespread and is found in North and Central India. Teak forests mostly occur on the Western Ghat and in the Satpura ranges of Madhya Pradesh. The other important trees of our forests are bamboos, mahogani, rosewood and sandalwood. Bamboos are now-a-days used for making pulp which in turn is used for manufacturing paper and newsprint. Rosewood is used for making furniture and decorative pieces of wood carvings. Sandalwood is also used for decorative purposes with an added advantage of its fine scent. This prized wood comes from the forests of

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the Nilgiri Hills of the Karnataka State. India enjoys a virtual monopoly of sandalwood in the world.

Our forests provide a large number of minor products. They include lac, resins, gums, medicinal herbs, *katha*, fodder, grass and leaves for making *bidis*. Charcoal is also obtained from the forest wood. *Russa* and *khus* grasses are also used for extracting essence. The sandal and other essential oils are one of our foreign exchange earners. Material used for tanning leather is also derived from our forests. *Katha* is obtained from the Khair trees by boiling their chips. Resins which are generally obtained from the coniferous pines, mainly the chir, are used for making turpentine. Lac is the secretion of an insect living on the sap of certain trees like *palash* and *kusum*. These trees are chiefly found in the States of Bihar and Madhya Pradesh. Lac is in great demand both in India and abroad. We are the largest supplier of lac in the world market. You must have seen seals made out of lac or sheilac. It is also used in making bangles, gramophone records and electrical instruments.

Forests play an important role in the economy of our country. It is, therefore, necessary to take care of our forests on scientific lines. In order to maintain a steady supply of wood for fuel and timber and other minor products, we have to see that we plant more trees every year than what we fell. The Central and State Governments have well-trained staff to look after our forests. The Forest Research Institute of Dehra Dun has been doing very useful work in training our forest personnel and conducting research in order to make our forests more and more productive. Now the people living in the vital forests as of the Himalayas have started realising the value of trees of their local areas. They do not look with favour the wholesale cutting of trees for commercial benefits. The efforts of the forest department to plant new trees and improve the yield of timber, grasses and minor produce will bear fruit by this change in the outlook of people. The forest wealth has been used more in areas where rail, road or river transport is available. Many forests yet not served by good transport are awaiting their commercial exploitation.

Wild Life

Various kinds of wild animals and birds are found in the Indian forests. Important among them are the elephants, tigers, leopards, cheetas, rhinoceros and the lions of the Gir

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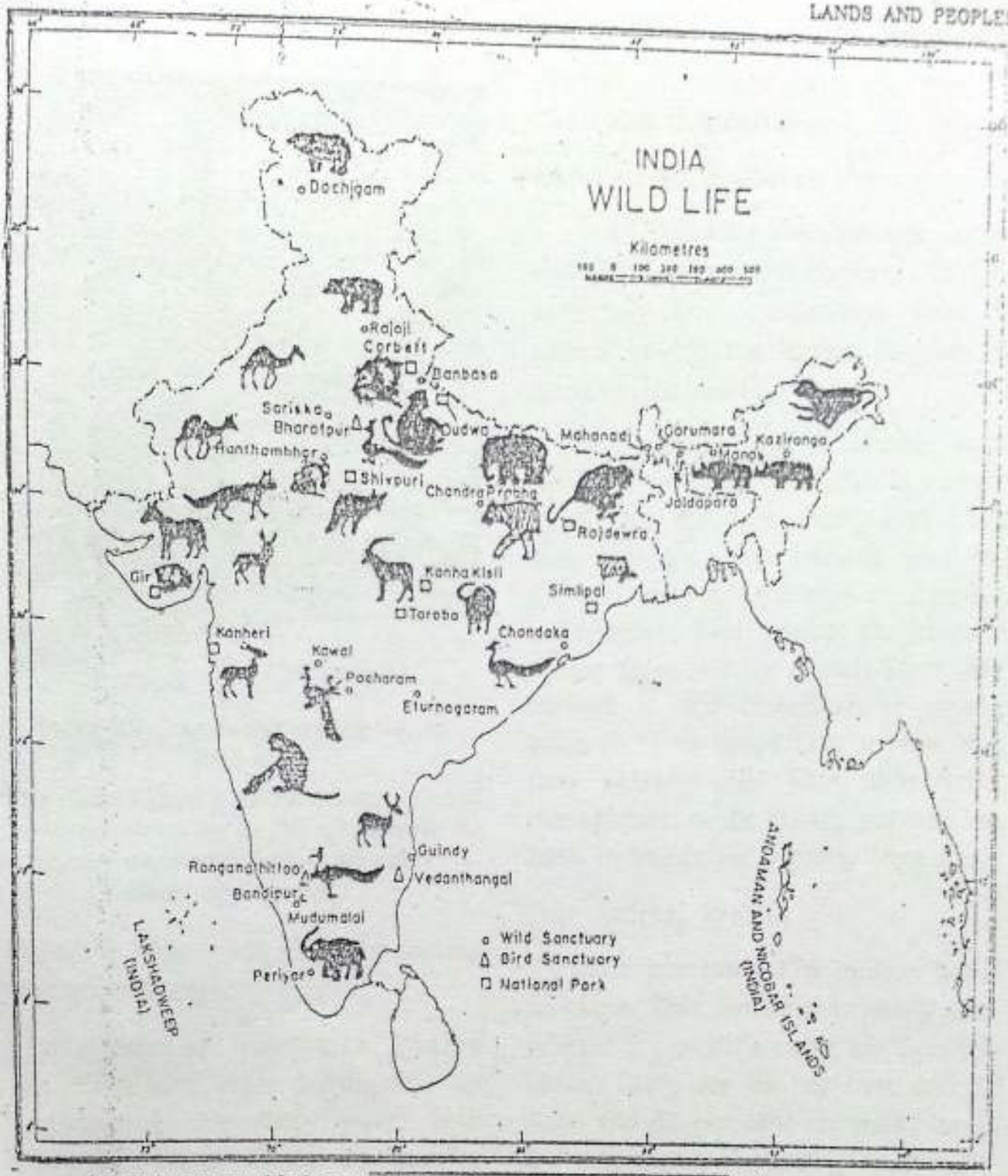

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The territorial waters of India extend into the sea to a distance of twelve nautical miles measured from the appropriate base line.

Fig. 28 India — Wild life

See the diversity of wild life in India. Locate the national parks in the States of Uttar Pradesh, Madhya Pradesh, Maharashtra, Bihar, Orissa and Gujarat. Name the wild life sanctuaries in Tamil Nadu, Kerala, Assam and Kashmir.

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forests in Gujarat. Deer and antelope are also common in most parts of the country. The peacock with its beautiful plumage has now been declared the national bird of our country.

The wild life of our country is indeed our national asset. Thousands of tourists from other countries visit India to "shoot" these animals with their cameras. We are able to see these animals and watch some of their habits in a zoo where they are kept for our benefit. In order to preserve wild life in its natural setting, the Central and the State Governments have established national parks. National park, as you know, is a reserved area meant for preserving its natural vegetation, natural beauty and its wild life. They are, thus, much different from a zoo. At present there are 20 national parks in different parts of our country besides many wild life sanctuaries and zoological gardens.

It is the duty of every citizen to preserve wild life. This is very necessary because a large number of species of birds and animals have already become extinct in our country. Clearing of forests and wreckless hunting of animals on the part of man for his immediate and personal gain has been mainly responsible for this tragic state of affairs. At present the rhinoceros, the hunting cheeta, lion, musk deer and the great Indian bustard are found only in very small numbers. Let us hope that we shall be wise enough to preserve these precious assets of our country.

We in India observe Wild Life Week in the first week of October which coincides with the birth anniversary of Mahatma Gandhi.

Fish are not directly related to the soil. But they form an important part of wild life. You would, therefore, like to know something about our fisheries as well.

India with its long coastline has access to wide fishing areas. The most common varieties of fish found in Indian waters are herring, sardine, tuna, salmon, mackerel and shark. Both the Arabian Sea and the Bay of Bengal are rich in fish because the ocean currents and numerous rivers joining the sea provide ample food for the fish. Our fishermen are also adventurous. With modern fishing boats, better fishing nets, increased cold storage facilities and newly established fishing harbours, the annual catch of fish has been steadily rising. More than 2.25 million tonnes of fish are caught in our seas, lakes and rivers every year. Some of the Indian varieties of fish are popular abroad and,

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Photo XV An Indian trawler on the high seas

This modern fishing trawler on the coast of Kerala points out to us that we increase the fish catch considerably. Why do we need to increase the fish catch?

therefore, offer much scope for earning foreign exchange.

Number of dams like Bhakra and Nagarjuna sagar have come up impounding the river water into man-made lakes. These are turning into a store-house of fisheries. Our Government has taken steps to stock our rivers, tanks, reservoirs, lakes, etc., with suitable and better varieties of fish. In fact in view of the shortage of proteins in our diet, India has to depend more and more on fish to overcome this deficiency.

Land under Pastures

India has only four per cent of its total land area under pastures. This is extremely low, particularly when it claims having the largest number of cattle in the world.

The pasture land is widely scattered all over the country. In certain parts, the villagers themselves have been managing and looking after the pasture lands as common cooperative undertaking. They protect the pastures till the grass is fully grown. Then they harvest it and distribute it among themselves in proportion to the land they actually till. This cooperative management of the village pastures has been in vogue for a pretty long time.

Our Animal Wealth

India possesses 176 million heads of cattle. This means that nearly one-fifth of the world's cattle are found in India. There are 69 per cent draught bulls and 31 per cent are milch cows. India possesses about 51 million buffaloes. It accounts for nearly half the world's total. Of this, nearly 50 per cent are milch animals, and account for the bulk of the milk production in India. Punjab, Haryana, Delhi, western Uttar Pradesh and Gujarat have some

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of the best buffaloes and cows in India.

India has about 40 million sheep. Only a small percentage of these yield quality wool. They are reared mainly in the western Himalayan region—Jammu and Kashmir and Himachal Pradesh.

There are about 64 million goats in India. This is about one-sixth the world's total. A goat is often called a poor man's cow. The rest of the live-stock consists of horses, mules, donkeys, camels, pigs and yaks.

It is obvious that such a large number of animals in India cannot be supported by a mere 4 per cent of its pasture land. Most of these animals are reared on the farmlands. These animals are supported mostly on the fodder produced on the farms. They consume fodder in large quantities and return valuable manures to the land. These manures have helped to maintain the fertility of the soils. Unfortunately, many farmers consume cow-dung as a cheap source of fuel. Now some of the progressive farmers have shown that the cow-dung can be used both as a fuel and as a manure. It is used as a raw material for producing gas which serves as a cheap and handy fuel. This is done before the dung is applied as a manure in the field.

India, because of its huge animal wealth, can export hides and skins bringing in return valuable foreign exchange. Wool is used for making woollen cloth. The rugs and carpets made out of the wool are also exported on a large scale.

Although India possesses a variety of livestock in a very huge number, the quality of the most of its animals is far from satisfactory. We have great affection for our animals but we do not take care of them on scientific lines, as the people in the developed countries do. Now we also want to improve the quality of our animals so that we have an adequate supply of milk, mutton, chicken, eggs, etc. With this end in view, special breeds of cattle, buffaloes, sheep and poultry are being developed in our country. *Gosadans* or *Goshalas* are also maintained. India has yet to make tremendous progress in the development of our animal wealth in order to improve the quality of the diet of our people and meet their several other requirements.

The New Terms You Have Learnt. *Primary Food Products* : The products like cereals, fruits, vegetables which we obtain directly from the soil. *Secondary Food Products* : The products like milk, eggs and meat which are derived indirectly from the soil. *Leaching* : The process by which fertile soluble part of the soil is dissolved and carried away by water.

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EXERCISES

Review Questions

1. Answer the following questions :
   (i) Name five main uses of land.
   (ii) What is humus?
   (iii) What is the difference between *khadar* and *bangar* soils?
   (iv) What is leaching?

2. Distinguish between :
   (a) Primary food products and secondary food products.
   (b) A zoo and a national park.
   (c) Milch animals and draught animals.
   (d) Livestock and wild life.

3. Explain what is soil and how it is formed. What are the major types of soils in India? How is soil conserved and its fertility maintained?

4. Write an essay of about 20 lines on the forest wealth of India. Cover the following points : (i) Area under forests, (ii) Types of forests and (iii) major forest products.

5. Why is wild life very important? How can we help in preserving our wild life?

Map Work

6. On an outline map of India show the following :
   (i) areas of coniferous forests.
   (ii) areas of quality sheep.
   (iii) areas of teak and ivory.
   (iv) areas of fine breeds of milch cows and buffaloes.

Topic for Class Discussion

7. *'Our Animal Wealth'*

   Let the class collect information and figures regarding our livestock. Then they may discuss why the average yield of milk is so low in our country. Finally, they may find out and report to the class what steps are being taken to improve this situation.

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13. Our Agriculture

The Terms You Already Know. *Cash Crops:* Crops grown by the farmer not for his own consumption but mainly for the cash they bring him on sale. *Rotation of Crops:* Different crops that are grown one after the other on the same piece of land, mainly with a view to restoring fertility of soil.

India is fortunate enough to possess rich agricultural resources. They include a wide variety of fertile soils, ample water for irrigation and a growing season almost all the year round. The variety of soils and variations in climatic conditions from region to region make it possible to grow a large number of crops in our country.

India occupies an outstanding position in the world in several agricultural products. It stands first in the production of tea, sugarcane, millets, groundnuts, sesame and mustard. It stands second in the production of rice, jute and jowar. It is also an important producer of tobacco, linseeds, wheat and cotton.

Slightly less than 23% of our total land area is left under forests and another 4% under permanent pastures. Nearly 13% of the land is either a total waste land or built-up area. This leaves a balance of 59% of the total land area of which about 54% has already been cultivated either for trees or for crops. Of this, nearly 45 per cent of the total land area is actually under crops every year. A little over 8 per cent of the remaining land is brought under crops only once in two or three years. The rest of the period it is left fallow in order to restore its fertility. Thus, we have really no more land to bring under the plough. We need to use our existing arable land more intensively. Then alone we may be able to grow enough food and agricultural raw materials for our exceptionally large population increasing further at a much rapid pace.

In India 76 per cent of the total land area under cultivation is devoted to food crops; and yet the country is

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not always self-sufficient in its food requirements. Although 75 per cent of the population derives its livelihood from agriculture, the total value of the entire agricultural produce is not more than half of the national income. This indicates the unsatisfactory state of our agriculture although it forms the backbone of our country's economy.

PRE-INDEPENDENCE PROBLEMS

Thus, Indian agriculture, although it employs a lot of manual labour, is predominantly a subsistence type. Over large parts of India, family members consisting of men and women work shoulder to shoulder with one another in the fields. The subsistence type of agriculture, unlike commercial agriculture, is one in which a farmer consumes almost everything that he produces on his farm, leaving very little of his produce for marketing.

Crops have been raised year after year. As a result, in many cases soils have been impoverished or exhausted. Reckless clearing of forests, overgrazing and occasional heavy downpours have led to extensive soil erosion. The constant growth of population has led to fragmentation of agricultural land. Very small size of land holdings often makes them uneconomic.

Agricultural yields in our country are still among the lowest in the world. The methods of farming, the seeds used and the marketing of agricultural produce still need a great improvement. There is little or no security for the farmers against failure of crops in a very large part of the country.

Since Independence, efforts are being made to provide more and more of irrigation facilities. In many parts of the country, electricity is now supplied to the farms as well. The use of manures and fertilizers is being encouraged. The government has set up demonstration farms to propagate use of new farming methods and implements. The government has succeeded in developing new seeds which are responsible for considerably high yields. The prices of agricultural crops have also been raised; and the farmer is assured of the minimum price which would encourage him to invest more money in raising crops. Loans are also made available to farmers through banks and cooperative societies to construct wells and purchase waterpumps, tractors and other machinery. Arrangements are made to protect crops from pests and diseases. A few large mechanised farms have been set up by the government for demonstration purposes. The Suratgarh Farm in Rajasthan is a well-known example of this kind. Special rural programmes

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are arranged on radio and television for the benefit of farmers. All this has resulted in raising the agricultural production in many parts of our country. Besides exporting many of the cash crops, we have become surplus in foodgrains like wheat and rice. This increase in their production has been the result of higher market prices. They have thus become our new cash crops.

For the first time after years, India exported them to foreign countries in 1977. In certain parts of the country, especially in Punjab and Haryana, the yields of crops like wheat have been considerably increased. This recent break-through in Indian agriculture is often referred to as the Green Revolution.

Agricultural Seasons

Agricultural operations in India begin with the arrival of the monsoon in June. There are two agricultural seasons— kharif and rabi. The kharif season begins with the onset of the monsoon. The important kharif crops are rice, millets, maize, jute and cotton. These crops are harvested in autumn. The rabi season begins in autumn after the rains, and crops are harvested a little after the spring. The important rabi crops are wheat, gram, barley, linseeds and mustard.

Major Crops

Rice is the leading food crop of India. Our country stands next only to China in the production of rice.

Rice requires uniformly high temperature and an assured rainfall of about 100 to 200 centimetres. The rice plant does well in clayey soils since it requires standing water during its period of growth.

As a result, rice fields in the plains are always properly bunded. Along the hill slopes, they are terraced so that they may be able to hold water. Rice is a staple food of the coastal strips of India, West Bengal, Assam, Bihar and the eastern parts of both Uttar Pradesh and Madhya Pradesh. It is also grown in the valley of Kashmir and in the irrigated parts of Himachal Pradesh, Punjab and Haryana. The deltas of the Kaveri and Krishna raise two to three crops a year, whereas in many other areas rice is grown as a kharif crop only during the rainy season.

Wheat is the second important food grain of India. Unlike rice, it is a rabi or a winter crop grown in well-drained soils in areas having 50-75 cms. of annual rainfall. It requires rains during early period of its growth. At the time of ripening, the grain requires warm and sunny weather. In India it is

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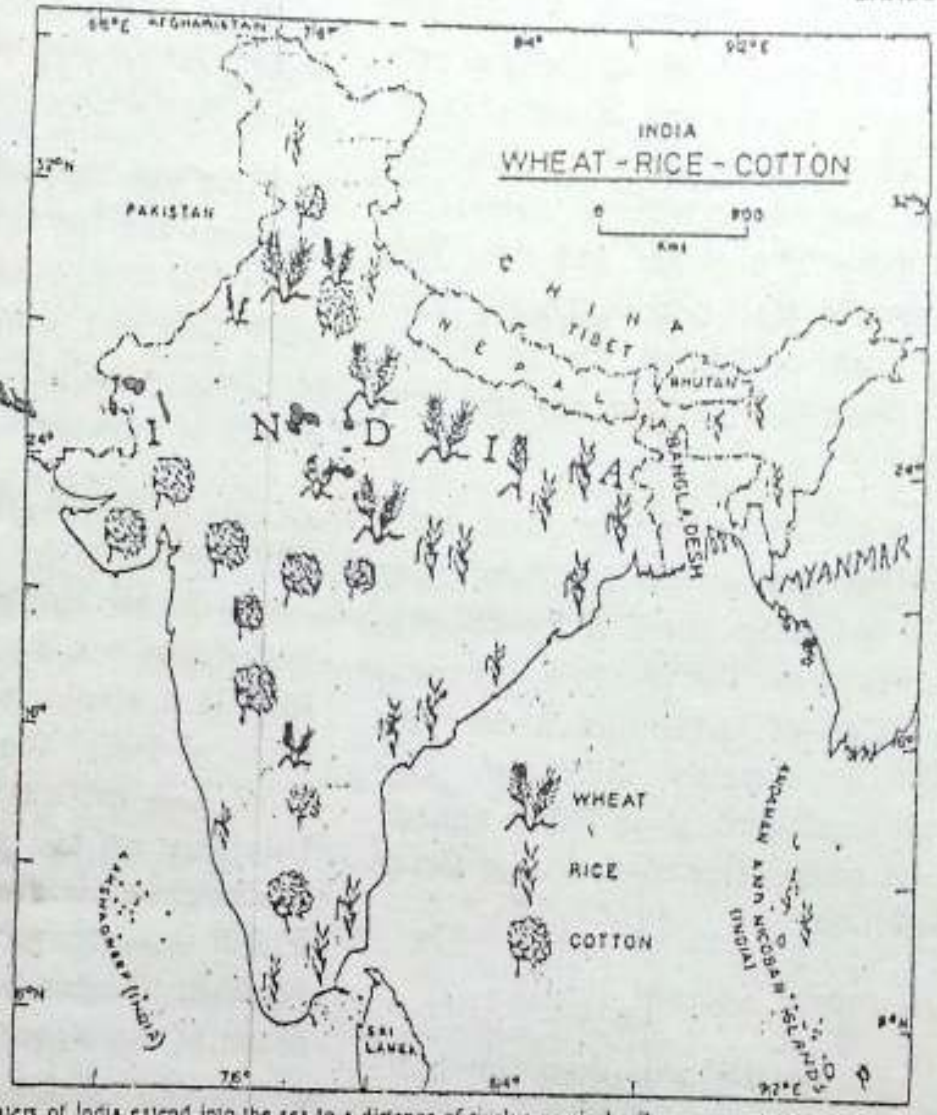

The territorial waters of India extend into the sea to a distance of twelve nautical miles measured from the appropriate base line.

Fig. 29 India — Areas producing rice, wheat and cotton

Note and name the areas which produce these crops.

generally grown in the northern parts of the country that is Punjab, Haryana and western Uttar Pradesh where the winters are relatively long and somewhat wet. Wheat is also grown on the Malwa Plateau, the parts of the Deccan Plateau and in the plains of Gujarat and Rajasthan. As a result of the new hybrid variety of wheat plant, the yield and the production of wheat have substantially increased in the States of Punjab and Haryana.

Millets: Ragi, jowar and bajra are the three important millets or the coarse grains grown in the areas where rice cannot be grown because of inadequate rainfall. It is an important crop of the Karnataka Plateau. Jowar requires less rainfall than ragi and is

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grown on the Deccan Plateau in parts of Karnataka, Maharashtra and Madhya Pradesh. Bajra is grown in those parts where rainfall is still less. It is grown in parts of Maharashtra, Gujarat, Madhya Pradesh, Rajasthan, Uttar Pradesh and Haryana. The yield of these millets has been steadily increasing with the expansion of irrigation facilities and the development of new and high yielding varieties.

Maize is a high yielding food crop. It grows well in an area with a moderate rainfall and high temperature. It is grown in large quantities in Uttar Pradesh, Rajasthan, Punjab and Bihar.

Pulses and Oilseeds

Pulses such as gram, arhar, lentil (*masur*), black gram (*urd*), *moong* and peas are important sources of protein. They are particularly necessary for those who do not eat meat. They are grown almost all over India, except the areas with heavy rainfal. Pulses are leguminous plants which help to restore fertility of the soil in which they are grown. They play an important part in rotation of crops.

Oilseeds: India is one of the leading oilseed producing countries of the world. The chief oilseeds grown in India are groundnut, sesame, mustard, linseeds and castorseeds.

Groundnuts are extensively grown in the red soils of South India and also in parts of Gujarat and Maharashtra. Groundnut oil is used in cooking and also in manufacturing vegetable ghee or vanaspati. Its cake which is left after extracting oil is a good feed for dairy cattle and is also used as manure for soil. However, groundnut has a great demand abroad and large quantities are exported for earning valuable foreign exchange in years of surplus production.

Linseed oil is used as edible oil, and also for the manufacturing paints, varnishes, etc. Copra obtained from coconuts is yet another source of oil in India. Coconuts are grown on the coastal strips particularly in Kerala on a very large scale. Mustard is grown in the wheat producing regions and is widely used for cooking in northern India.

Sugarcane

Sugarcane is a kind of grass with a thick stem. Its homeland is believed to be India, the largest producer of sugarcane in the world. Sugarcane plant needs high temperature, plenty of irrigation water and well-drained fertile soil.

Although sugarcane is grown in several parts of India, it mostly comes

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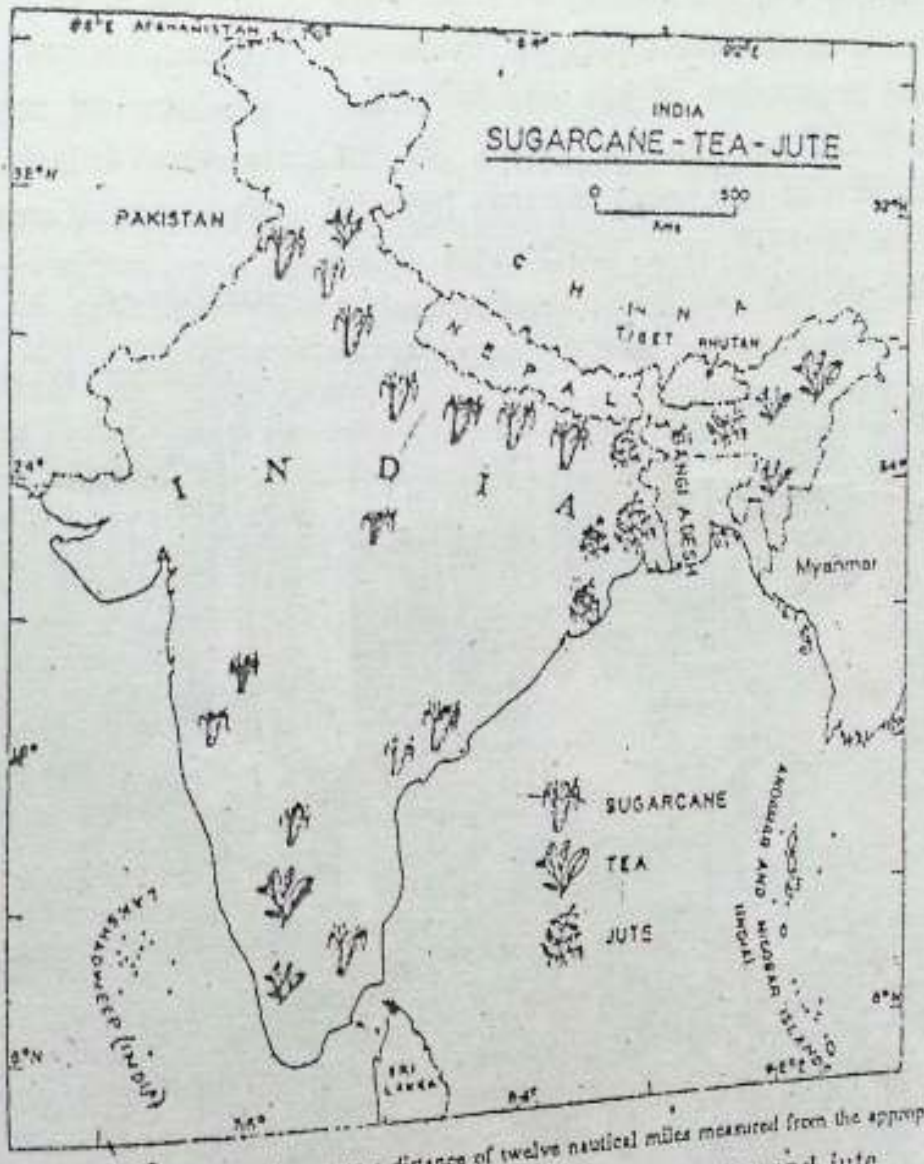
from the irrigated lands of Uttar Pradesh, Punjab, Haryana and Bihar. Nearly half of the total production of sugarcane comes from Uttar Pradesh alone. The other producers are Maharashtra, Karnataka, Tamil Nadu and Andhra Pradesh. Although the area under sugarcane is less in the southern states, its yield per hectare in these states is much higher. In our country sugarcane is used for manufacturing gur, khandsari and sugar.

New varieties of sugarcane have been developed at the research station at Coimbatore.

Tea

India is the leading producer of tea



The territorial waters of India extend into the sea to a distance of twelve nautical miles measured from the appropriate base line.

Fig. 30 India — Areas producing sugarcane, tea and jute

What makes Uttar Pradesh the largest producer of sugarcane? Why are tea and jute mainly concentrated in Assam and West Bengal?

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followed by Sri Lanka and China. It is a plantation crop and grows well in deep fertile and well-drained soils. Also necessary for its growth are a warm and moist climate, and a rainfall of over 200 centimetres, well distributed throughout the year. The skill of the female labour in plucking high quality tea leaves is a great asset in tea-growing areas.

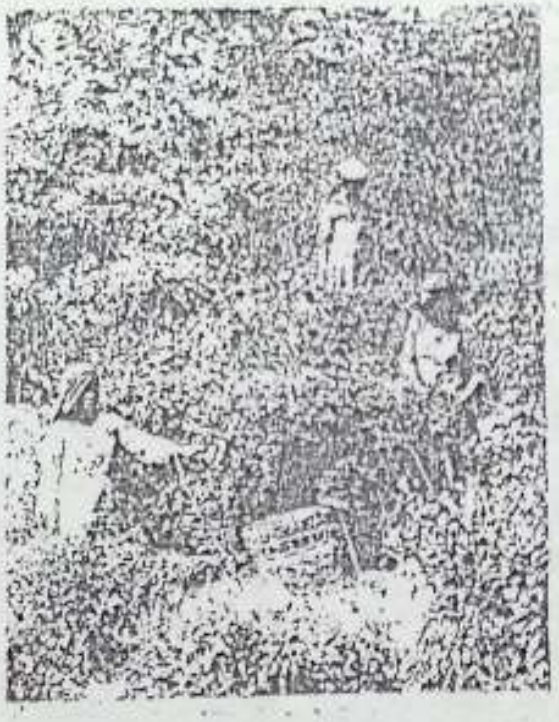

Photo XVI A Tea Garden in Himachal Pradesh

Look at the women and children busy at picking the tea leaves. Which two states in India have virtual monopoly of tea?

Tea gardens are confined to the valleys of the Brahmaputra and the Surma in Assam extending towards the hills. Tea is also grown in northern Bengal, along the slopes of Nilgiri Hills in the south and Kangra and Kumaon hills of west and central Himalayas. India is the leading exporter of tea rivalled only by Sri Lanka. We are able to earn a good deal of foreign exchange through the export of tea.

Coffee

Coffee is the second most popular beverage of India. A coffee plant requires rich well-drained soil, warm climate and moderate supply of moisture. It grows best in the tropical highlands. In India its production is confined to the state of Karnataka followed by Kerala and Tamil Nadu. The quality of Indian coffee is very good and is, therefore, in good demand even outside India. We export nearly half of our production every year.

Spices

India has been well-known throughout its history for the spices it produces. It produces black pepper, chillies, ginger and cardamom. The spices are generally grown in the areas having constantly high temperature and a very heavy rainfall. In India the production of spices is confined mainly to the Malabar coast of the states of Kerala and Karnataka.

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Fruits and Nuts

India produces a wide variety of fruit. Mango is by far the most important fruit of India and is very widely grown. The delicious varieties of alfanso locally known as *hapus* from Goa and Konkan and the *dasehri* from Uttar Pradesh are exported because of their high quality. India also produces bananas, oranges, pineapples, litchis and coconuts which are essentially tropical fruits.

Cashewnuts are grown in Kerala and the coastal belt of the Karnataka State. The nuts are roasted and their shells are carefully broken up maintaining the kernel intact. This delicate job is done with great deftness by the women workers of the west coast. Despite the tediousness of this job, women workers do not get good wages for doing it. India has been exporting more and more cashewnuts to other countries earning a good deal of foreign exchange in return. However, it has to depend upon imported raw cashewnuts.

Our country also produces fruits like apples, plums, almonds, apricots, peaches, pears and cherries which are essentially the fruits of the temperate climate. They are mostly grown in the valleys of Kashmir and Kulu, and on higher hills of Shimla and Kumaon areas.

Cotton

Cotton, the king among the fibres, is perhaps the most important cash crop of India. It is a kharif crop. A cotton plant does well in the black cotton soil of the Deccan Plateau. It requires high temperature and sufficient rainfall during the growing period. However, it requires sunny and dust-free weather when the balls ripen and are ready for picking. Most of the cotton grown in India is of the short and medium staple variety. The long staple crop is now grown in parts of Punjab, Haryana and their adjoining areas. The major producers of cotton in India are Maharashtra and Gujarat followed by Punjab, Karnataka, Tamil Nadu and Madhya Pradesh. The yield of cotton in our country is still very low.

Jute

Jute, another plant-fibre, occupies a very important position in our country's economy. Being an important foreign exchange earner, it is often called the 'Golden Fibre' of India. Jute plant needs high temperature, plenty of water and rich soils that need to be continually renewed. As a

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result, the cultivation of jute in India is concentrated mainly in the delta of the Ganga in West Bengal. It is now also grown in states adjoining it. Immediately after partition, India was producing very little jute to meet the requirements of its jute mills located around Calcutta. Since then we have made considerable progress in raising the production of jute and becoming self-sufficient in this regard. In our exports of jute goods, we may have to face a very stiff competition from Bangladesh which is more favourably situated in regard to the production of quality jute. Cooperation and not competition would be in the interest of both.

Tobacco

Tobacco is yet another non-food cash crop of India. We stand third in the world in production of tobacco. In India, Andhra Pradesh is the leading producer of tobacco. The other states in which it is grown are Gujarat, Tamil Nadu and Karnataka.

Rubber

Rubber is an important industrial

Photo XVII A Rubber Estate in Kerala

Look at the woman tapping rubber trees and collecting latex. Note the big grass hat worn by a woman worker. What type of climate does it indicate ?

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raw material. It is grown in India almost exclusively in Kerala. Natural rubber is obtained from the latex of the rubber tree. This plant grows well in areas having a high temperature and heavy rainfall well distributed throughout the year. We use all our rubber in the manufacture of tyres and tubes.

Now you would realise how much we owe to our soil in meeting our various requirements. Soil provides us not only the food but also the industrial raw materials like wood, rubber, tobacco, cotton, jute and sugarcane. In fact, many of our industries like the textiles and sugar will be directly affected if agricultural production does not maintain a steady progress.

The New Terms You Have Learnt. *Green Revolution* : Recent developments in agriculture in our country which have led to a considerable increase in agricultural yields of certain cereals mainly as a result of new seeds, application of manures and chemical fertilizers, and the provision of an assured water supply. *Plantation Agriculture* : A system of planting one or more kinds of plants for commercial production in large economic units.

EXERCISES

Review Questions

1. Answer the following questions :
   (i) Name the two most important cereals of India.
   (ii) What are the three important millets grown in our country?
   (iii) Name three cash crops of India. Would you now consider wheat as a cash crop and why?
   (iv) Which is the most important plantation crop of our country? Tea, Rubber

2. Distinguish between :
   (i) A cash crop and a plantation crop.
   (ii) Commercial agriculture and subsistence agriculture.

3. Use a single technical term for each of the following :
   (i) Crops sown soon after the onset of the monsoon and harvested in autumn in our country.
   (ii) Crops sown in autumn after the rains and harvested in spring or early summer.
   (iii) The land that has already been brought under the plough but periodically left uncultivated for restoring its fertility.
   (iv) One-crop farming on scientific and commercial lines resembling factory production.

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4. Describe the conditions of soil and climate required for growing rice, wheat and cotton.

5. State various steps taken since Independence to improve Indian agriculture.

Map Work

6. On an outline map of India show the areas producing rice, wheat, tea and cotton.

Topic for Class Discussion

7. *'Items of our daily diet and where from they come'.*

Let the students list various items of their daily diet including breakfast. Then they may find out where they were originally produced. Finally, they may draw conclusions with regard to the interdependence of various parts of the country.

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14. Our Water Resources

The Terms You Already Know. *River Basin* : A large area drained by a single river and its tributaries. *Reservoir:* A large artificial lake created by building a dam across a valley for storing water for irrigation and other purposes.

It is not too much to say that water is life. As you know, it is the presence of water that makes all the difference between the earth and the rest of its sister planets. You may recall that our earth is often called 'a watery planet' since the major portion of the earth's surface is covered with oceans. However, it is through the natural processes of evaporation, condensation and precipitation that we derive all our sweet or fresh water. In India the most productive use of fresh water lies in irrigating our farms for raising more and more crops.

The Need for Irrigation

India has already a huge population of about 844 million people. Moreover, it has been increasing at a very rapid pace. Therefore, we have pinned all our hopes on increasing irrigation facilities to produce enough food for our ever-growing population. India already stands next only to China in its total irrigated area. Yet the need for bringing more and more land under irrigation is almost never ending. This is because there is hardly any land that can be brought hereafter under the plough.

Higher yields of crops are made possible through timely and adequate supply of water. The use of fertilizers also helps in this regard, provided the irrigation water is readily available. Above all, irrigation helps us in raising more than one crop on the same piece of land.

Nearly one-tenth of the total area of our country receives a rainfall of over 200 centimetres per annum. On the other hand, a third of its total area receives a rainfall ranging between 0 and 75 centimetres a year. In other

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words, several parts of the country have to put up with heavy downpours, not knowing what to do with this 'too much' of rain water. As a result these and several other adjoining parts of the country often suffer from devastating floods. At the same time there are vast areas which receive too little rainfall to raise any crops.

The distribution of rainfall over a year in our land is equally uneven. Nearly three-fourths of the total annual precipitation is concentrated in a short period of just three to four months in a year.

The figures of the average annual rainfall in many parts of our country are often meaningless. It is due to a lot of variation in the total amount of rainfall from year to year. Thus the monsoons are highly erratic and are far from reliable. As a result famine conditions in one part of the country or the other are not very uncommon.

Furthermore, we live in that part of the world where the rate of evaporation of water is very high. This is more so because the bulk of the rainfall in our country is confined to a few summer months.

Thus it becomes imperative on our part to make an intelligent use of our rain water, in order to irrigate our fields. You will see that all our means of irrigation, namely, tanks, wells and canals, are geared towards this sole objective. With great effort we have now been able to bring nearly one-fifth of our total cultivated land under irrigation.

Sources of Irrigation

Tanks: Since olden days, it has been a common practice to store rain water in natural hollows where rain water is automatically collected. They are called tanks. The rain water thus collected from the surrounding areas is then used during a dry period when the water for crops is in great demand. Tank irrigation today accounts for nearly 8 per cent of the net irrigated area in our country. They are particularly common in the south, especially in Andhra Pradesh and Tamil Nadu where the land is rocky and uneven.

Wells: As you know, all the rain water is not carried away by streams or rivers. A considerable part of it manages to seep into the ground. Water which is thus stored up in the ground is called ground water or sub-soil water. Since early times, we have been using the ground water drawn from the wells for drinking, as well as for irrigation. There are two types of wells—*kucha* and pucca. A pucca well is one which is lined with bricks or stones.

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Various mechanical devices like the pulley, wheel and lever have been in use to draw water from wells. Nowadays pumping sets, working with the help of mineral oil or electricity have become fairly common on our wells.

Tube Wells: So far we were using only the well water which was within easy reach as it was not very deep from the surface. Now with the growing use of electricity in our countryside it has been possible for us to tap even bigger reserves of sub-soil water available at considerable depth. A very deep bore is dug into the earth with a drilling machine and water is drawn out with the help of electricity. Such deep bore wells worked with electricity are known as tube wells.

The tube wells have now become most common in the alluvial plains of Punjab, Haryana, Uttar Pradesh and Bihar. In this area there are huge water reserves at great depths and the need for irrigation is also considerable. These tube wells have proved very useful to our farmers since they ensure a timely and assured supply of water. Generally these wells are least affected by the variations in or failure of rainfall.

Wells and tube wells together account for about 48 per cent of the net irrigated area. Uttar Pradesh, followed by several other states, leads in well irrigation.

Canals: Yet another source of irrigation is the river water. In many parts of the country water of the streams, rivulets or rivers is impounded in an artificial lake by constructing a small dam across the river bed. The water thus stored is diverted to the fields through small channels called canals. Such local canals have been in use in our country since long.

Besides these local canals, there are some seasonal canals although on a big scale. During high floods, water rising above a certain level is diverted through canals. These canals utilizing flood waters are known as inundation canals, where the inundation stands for 'flood'.

These canals are useful for controlling floods. They are useful for irrigation only during the rainy season. Even so they have been found useful in the arid parts of north-west India, where rainfall is very uncertain.

More important are the diversion canals as they are perennial in nature. They are taken out from the main stream by building a small weir across it. About 39 per cent of the net irrigated area is benefited from them.

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Major Canals

Before Independence, undivided India had the world's best network of irrigation canals. After partition the major portion of this intricate network went to Pakistan. Since then we have been able to rebuild our own canal system in Punjab and Haryana. Today it is the most closely knit irrigation canal system of our country. Western Uttar Pradesh is also well served by canal irrigation.

In the states of Punjab and Haryana the important canals are Western Yamuna Canal, the Sirhind Canal and the Upper Bari Doab Canal and the Bhakra Canals. In Uttar Pradesh they are the Upper Ganga Canal, Lower Ganga Canal, Eastern Yamuna Canal, Agra Canal and Sharda Canal.

The canals are also important in the deltas of the Godavari, Krishna and Kaveri. The Periyar river, in the Cardamom Hills, drains into the Arabian Sea after flowing through Kerala. The waters of this west-flowing river have been impounded and taken to the eastern part of the Ghat through a tunnel. It thus irrigates the flat areas around Madurai where the soils are also fertile. The Mettur Dam across the Kaveri supplies water to the canals in the delta region. The network of canals in the Kaveri delta is one of the oldest and the largest in India.

Managing Our Water Resources

In our country the lack of irrigation water in certain areas and the need to control floods in others are the real problems. These two problems are interconnected. They cannot be tackled or solved merely at the local level. In fact, their best solution lies in working at the inter-state or national level. If you glance at the map of India you will find that none of our major rivers is confined to a single state be it the Ganga in the north or the Kaveri in the south.

In view of the extremely uneven distribution of rainfall in our country, we need to store water in those parts where it is too much. We may then divert it carefully to such other parts where it is too little and hence is in great demand. This again we can do and have been doing through extensive network of canals. It is in this way that we can have an integrated scheme of controlling floods, irrigating water-thirsty lands and draining away surplus rain water.

But we cannot use possibly all our water resources for various reasons. There are wide fluctuations in the flow

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Photo XVIII A new method of irrigating farms

Look at the long tube attached to the tractor. The artificial rain maker is found more effective and economical in the use of water. Where from do you think water has been brought to this Suratgarh farm ?

of the river waters from season to season. Then the uneven nature of the land relief is yet another difficulty in using all our water resources. Keeping these and some such considerations in view, it has been found out that nearly one-third of the total flow of our river waters could be utilized by us for irrigation.

Of this total usable flow of our river waters we have been able to utilize nearly two-fifths so far. We have nearly 45 per cent of the total irrigated area under canal irrigation.

In the above context it would be interesting to compare the rivers rising in the Himalayas with those of peninsu-

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lar India. The rivers rising in the Himalayas are fed both by rain and snow. As a result, they flow all through the year and are perennial. The seasonal variations in their flow is relatively less. In view of this fact they do not require huge dams to be built across their beds to store water. In the upper reaches these rivers flow swiftly forming cascades and waterfalls. They provide useful sites for locating water-power stations to develop water power or hydro-electricity.

The rivers of the peninsular India on the other hand are solely fed by the monsoon rains. As a result, they either become lean or dry out in the long dry season. They generally flow on a rocky and uneven terrain having often steep slopes. They are thus less useful for irrigation and water power, unless their water is stored through gigantic dams demanding huge investments.

In the south most of the dams are built of stone which is strong and readily available at low cost. The dam made of stone are called masonry dams.

River Valley Projects

After Independence, more and more emphasis is being laid on tackling the problems of irrigation, flood control and drainage in an integrated fashion. Big projects have been planned aiming at an all-sided development of the entire river valley. Since they help to serve several purposes at a time, they are known as multi-purpose projects.

In a multi-purpose river valley project one or several big dams are constructed to store water. The water thus stored is then utilized when it is in great demand. Such dams naturally help in checking the floods as well. In catchment areas of these rivers an intensive programme is undertaken to plant trees. This is known as afforestation. It helps to conserve both water and soil. Water is taken down the steep slopes for developing hydro-electricity. Thus these projects become a permanent and inexhaustible source of electricity at low cost. Wherever possible, canals are also made navigable for boats and small ships. These man-made lakes are also stocked with fish. These big river projects are often described as the new temples of modern India, and attract large number of tourists.

The Damodar Valley Project in Bihar and West Bengal was the first of its kind undertaken in India immediately after Independence. It consists of a series of dams built on the Damodar and its tributaries. Besides irrigating

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large area, it checks floods which used to cause great havoc in West Bengal. One of its canals has been made navigable. The importance of this river valley project lies also in the development of hydro-electricity. Power is in great demand for the development of extremely rich mineral resources found in this region.

In the north the Bhakra Nangal Project is another big river valley project. The states of Himachal Pradesh, Punjab, Haryana, Rajasthan and Delhi are its beneficiaries.

The Bhakra Dam with a height of 225 metres is the world's highest gravity dam constructed across the river Sutlej. A huge wall has been built between the hills standing on either side of the river. It is claimed that the cement and concrete used in this dam would be enough to build a highway from Delhi to London. Bricks used in this project, if laid in a single row, would be sufficient to connect our earth with the moon. The great man-made lake behind this dam is known as Gobind Sagar, named after Guru Gobind Singh. It is irrigating 1.4 million hectares of land and producing badly needed hydro-electricity for the north-western part of our country.

The Beas project is yet another important project of Punjab, Haryana and Rajasthan. It consists mainly of the Beas dam at Pong and the Beas-Sutlej link. Beas-Sutlej link brought the waters of Beas river into Sutlej river in Himachal Pradesh in October, 1977 mainly to produce more of power. Beas dam at Pong close to the borders of Punjab and Himachal Pradesh has already been completed principally as an irrigation project.

Rajasthan Canal Project will utilize waters of the Sutlej, the Ravi and the Beas to irrigate land in Ganganagar, Bikaner and Jaisalmer districts in north-west Rajasthan. The main canal in Rajasthan itself would be 468 kilometres long. There will be a feeder canal 215 kilometres long. Considerable progress has already been made on this project.

The Kosi Project in Bihar will help in irrigation and controlling floods. So far the river has been known as the "Sorrow of Bihar" because of havoc caused by the river during floods. When tamed, the river will change North Bihar into a prosperous region. The project will help Nepal as well.

The Hirakud Project across the Mahanadi in Orissa is the world's longest dam and will help to irrigate large areas in the delta of the Mahanadi.

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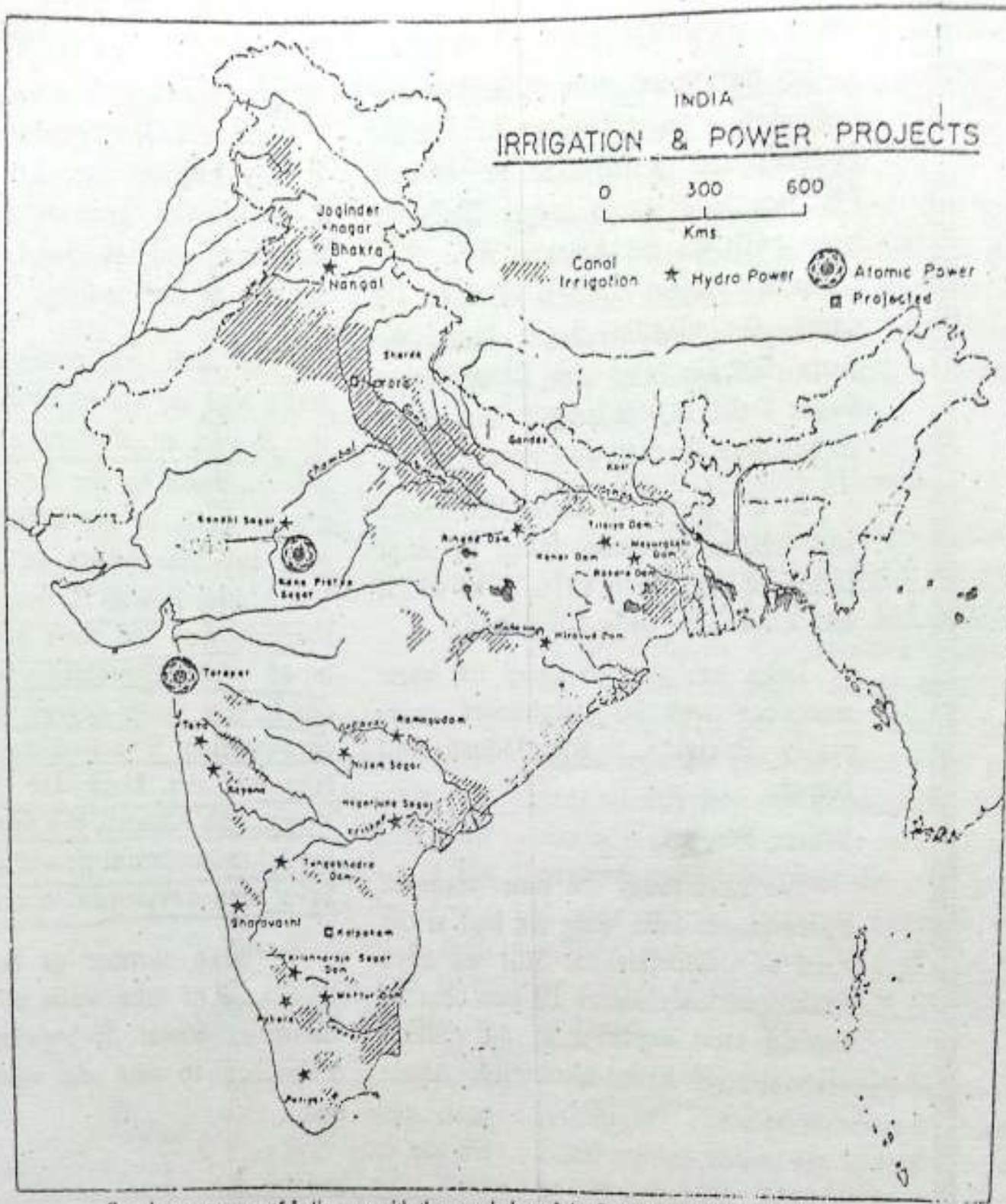

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The territorial waters of India extend into the sea to a distance of twelve nautical miles measured from the appropriate base line.

Fig. 31 India — Major irrigation and power projects

Find out the states having major canal irrigated areas in the country. Name the rivers on which major hydro-power projects have been located. In which states atomic power projects have been constructed?

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In the south, the Tungabhadra Project is a joint venture of Andhra Pradesh and Karnataka. In Andhra Pradesh the Nagarjunasagar Dam has been built on the Krishna river. The Chambal Project consists of three big dams—the Gandhi Sagar Dam, the Kota Barrage and the Rana Pratap Sagar Dam. It will irrigate large areas in Madhya Pradesh and Rajasthan.

In all, there are about 800 major and medium projects taken up after Independence up to 1976-77 of which 445 have been fully completed.

India has also to share its water resources with its neighbours especially Pakistan, Bangladesh and Nepal.

Water Power

We have today ten times more of hydro-power than what we had at the time of Independence. Still we have developed only about 10 per cent of India's total capacity of 42 million kilowatts of hydro-electricity. About 60 per cent of total energy generated is thermal electricity produced from coal. It supplements the 37 per cent of hydro-power generated largely in northern and southern coal-hungry regions of our country.

The first water-power station in India was set up at Sivasamudram on the Kaveri in Karnataka in 1902. It was followed by the Tata Hydro-electric Scheme, in the Bombay-Pune region and the Pykara in Tamil Nadu. The Mandi Power House in Himachal Pradesh was the first scheme developed in the Himalayan region where our largest water-power resources are concentrated. The Bhakra Nangal, the Hirakud, the Damodar Valley, the Koyna, the Rihand, the Sharawathi are the other important power projects that have been developed in recent years.

A large number of factories and thousands of tube wells are being run on water power. It provides employment both to men and women.

The New Terms You Have Learnt. *Ground water:* Water stored up in the ground. Also called sub-soil water. *Inundation canals:* Canals meant for diverting flood waters for checking floods and irrigating fields. These canals are seasonal. *A multi-purpose project* : A big river valley project serving several purposes at a time—irrigation, flood control, conservation of water and soil, navigation, development of electricity, tourism and fishery.

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EXERCISES

Review Questions

1. Answer the following questions :
   (i) What are the three important sources of irrigation? TANKS, CANALS, T.W.
   (ii) What is ground water?
   (iii) In what three ways do the rivers of peninsular India differ from those rising in the Himalayas?
   (iv) Name four important water-power projects of India. DAMODAR, BHAKRA NANGAL, HIRAKUD, KOSI

2. Distinguish between :
   (i) An inundation canal and a perennial canal.
   (ii) A well and a tube well.
   (iii) A tank and a dam.

3. Fill in the blanks :
   (i) Tank irrigation is most common in the States of ..... A.P. ..... and ..... T.N. .....
   (ii) The .....water-power project was the first ever in India.
   (iii) In the Himalayan region the first water-power station was set up at .....
   (iv) The ..... HIRAKUD dam is the longest dam in the world.
   (v) The highest gravity dam in the world is the BHAKRA dam.

4. Write an essay of about 20 lines on the importance of irrigation in India. Give at least four reasons along with suitable examples.

5. What is a river-valley project ? Explain the various aspects of any one river-valley project in India.

Map Work

6. On an outline map of India show the following :
   (i) The areas with a large number of tube wells.
   (ii) An area where tank irrigation is very common.
   (iii) Areas with a close network of canals.
   (iv) Pykara, Sharawathi, Koyna, Rihand, Hirakud and Bhakra.

Topic for Class Discussion

7. *'Are rivers a source of misery or prosperity ?'*

   Let one group explain in what ways rivers are responsible for causing great damage. Then the other group may explain how these things can be overcome turning rivers into sources of happiness and prosperity. Discussion may be concluded by organizing an exhibition of pictures showing how rivers, when tamed, help to bring prosperity.

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15. Our Underground Wealth

Only Table

The Terms You Already Know. *Sedimentary Rocks*: Rocks developed as a result of sediments deposited in layers one over the other. *Metamorphic Rocks*: Rocks developed as a result of drastic change in the basic characteristics of original rocks. This happens owing to extreme heat, very high pressure and intense chemical action deep inside the earth's crust.

We have been using every natural resource found on the earth's surface, be it soil, water, natural vegetation or animal wealth. They are of course the most conspicuous of the gifts provided by nature. But is this all that we make use of?

Think of innumerable machines made of iron and steel. Then there are wires made of copper or aluminium helping us to conduct electricity. Remember how coal is used for producing steam or electric energy to run big machines like railway engines. In the absence of petroleum, our motor cars and aeroplanes would be good for nothing. Wherefrom shall we have costly ornaments and jewellery had there been no valuable metals like gold and silver, and precious stones like diamonds? Can we have food to our taste unless there is salt?

All these products which we value so much in our daily life are made of minerals which nature has generally preferred to keep hidden from us. Now that considerable mineral wealth is buried deep under the surface of the earth, we shall see in this chapter what is in store for us beneath the earth's surface. Also, you may like to know how we procure it.

Minerals and Metals

Our country possesses a large variety of mineral-ores in fairly huge quantities. Minerals are of two kinds— metallic and non-metallic. For instance, iron-ore is a metallic mineral. So is bauxite, the ore from which aluminium is obtained. On the other hand, sulphur, coal, petroleum and salt are non-metallic minerals. The important metals are iron, copper,

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...in, zinc, lead, silver and ... are generally solid and ...re often hard and have a ...e of their own. Metals ... They can be drawn into ...ey ...n also be rolled into

... non-metallic minerals, ...oleum are the most use- ...are now the most important ...ergy required for trans- ...ustry. We burn these ...uels to generate power. ...efore, known as mineral

...Drilling

... pit from which stone is ...nown as quarry. When ... pit is on a big scale, it is ...-pit mine. But in order ... mineral deposits a big ... is dug into the earth's ...mine is called a shaft ... are lowered into it to ...d bring out the mineral

... also some very deep ...ve us not water but the ...s and mineral oil. They ... wells. The process of ...wells and bringing out ...nown as drilling.

Prospecting Our Mineral Wealth

The scientists known as geologists believe that the story of the earth is written in rocks. They tell us that metallic minerals are found in igneous rocks. Non-metallic minerals are generally associated with sedimentary rocks. Highly sensitive instruments now assist us in prospecting mineral deposits.

Deposits of Metallic Minerals

Iron: India has very huge deposits of iron-ore. It is estimated that we possess about one-fourth of the world's known deposits. Our iron-ore deposits are located in south Bihar and the adjoining parts of Orissa. These two states together produce nearly 85 per cent of our iron-ore production. The rest of it comes from other parts of our southern peninsula. Now the total production of our iron-ore exceeds 40 million tonnes a year. A very large proportion of this iron-ore is exported to Japan.

Bauxite: India is also rich in bauxite deposits. The total reserves of about 1,250 million tonnes are widely spread in the country. Aluminium can be extracted from bauxite only when there is abundant power at low cost. This metal is used in the manufacture of

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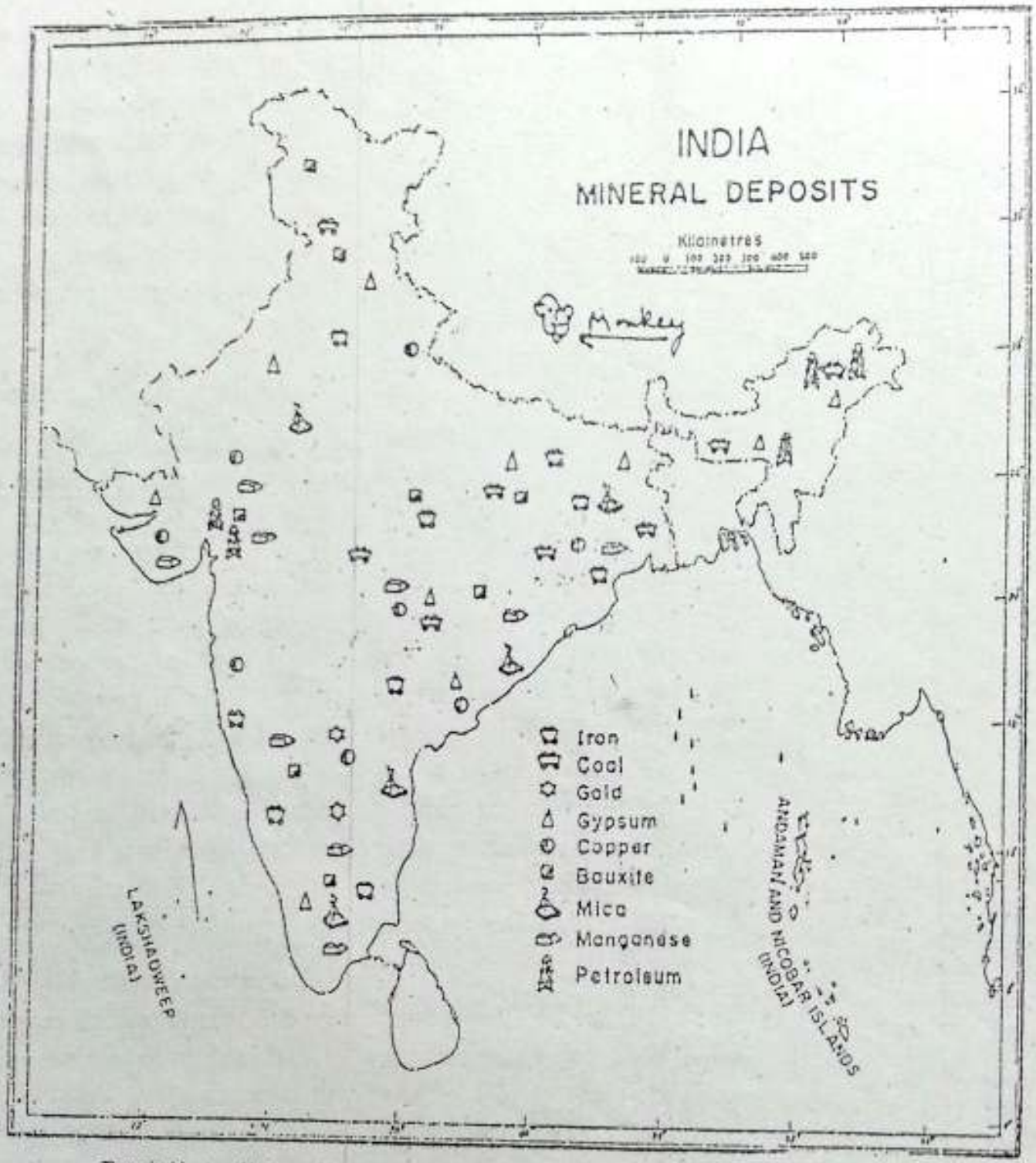

The territorial waters of India extend into the sea to a distance of twelve nautical miles measured from the appropriate base line.

Fig 32 India — mineral deposits

Note that the deposits of iron and coal are in close proximity to one another. Name the states having concentration of iron, coal, manganese and petroleum.

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aeroplanes and electric wires. Bihar, Gujarat and Madhya Pradesh are the major producers of bauxite.

Manganese : The mineral is used in the manufacture of special varieties of steel. It helps to harden steel. India possesses large deposits of manganese-ore. The already measured deposits are estimated to be 80 million tonnes. Orissa is the leading producer of this ore followed by Karnataka, Madhya Pradesh and Maharashtra. We are one of the important exporters of this ore.

Copper : Our known deposits of copper-ore are very scanty. Singhbhum and Hazaribagh districts of Bihar and Khetri fields in Rajasthan have some deposits. Our annual production of finished copper is far from enough in view of our increasing need of electric transmission wires and other instruments.

Gold : India has very meagre reserves of gold. Karnataka is the only gold-producing state in our country. Its Kolar gold mine is one of the deepest mines in the world. Of late its working has become more and more expensive and its share in world production has become more insignificant.

The production of silver, lead and zinc in India is very low. We have to import these metals from abroad to meet our requirements.

Non-Metallic Minerals

Mica : Mica is a non-conductor of electricity. India has the largest deposits of mica in the world. It accounts for nearly two-thirds of the world's production. Bihar accounts for nearly a half of our annual production of mica. The remaining half is shared equally by Andhra Pradesh and Rajasthan.

Salt : We obtain salt from sea, lakes and rocks. Sea salt is obtained mostly along the coasts of Gujarat, Tamil Nadu, Maharashtra and Andhra Pradesh. More than half of sea salt is made along the Gujarat coast. The lake salt comes from Sambhar lake in Rajasthan. It accounts for nearly one-tenth of the total production of salt in India. Rock salt is obtained from Mandi district in Himachal Pradesh. Its annual production is only 1 per cent of the total salt produced in India. We are one of the leading exporters of salt.

Diamonds : India was once known for its diamond mines of Panna in Madhya Pradesh and Golkonda mines in Andhra Pradesh. Now once again the Panna mines are being worked. The mines are worked by a government-owned corporation. Diamonds are in fact metamorphic rocks made of

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carbon. They are, therefore, extremely hard and are used for industrial purposes. They are also used in jewellery.

Gypsum : Gypsum is mainly used in the manufacture of fertilizers, cement and sulphuric acid. Nearly four-fifths of it comes from the desert region of Rajasthan.

Limestone : Limestone is a sedimentary rock originally formed in shallow seas. It is composed of shells and skeletons of dead sea animals like clams, oysters, corals and algae. This stone is used in the manufacture of cement and mortar. Its most important use lies in smelting iron-ore. It is found in the states of Bihar, Orissa and Madhya Pradesh.

Mineral Fuels

Coal : Coal is yet another sedimentary rock. It is derived from an accumulation of various types of plant material buried long, long ago in swamps.

In India coal reserves are estimated differently. There is at least 85,770 million tonnes. However, the best quality coal is estimated to be far less. Our average annual production has reached now 100 million tonnes. We must use our quality coal cautiously. We must also see how best we can utilize our low quality coal. One way of doing it is to produce thermal electricity near the pit-head.

Nearly four-fifths reserves are in the Damodar the states of Bihar and Some coal is also found in Pradesh.

Indian railways are consumers of coal. Ra with iron and steel ind nearly half of our annu Now new coal-fields developed by the National Development Corporation of India set up by the Government of India. The Korba Mines in Madhya such new mines, and have mechanised.

Mineral Oil : Petrol another mineral fuel foun tary rocks. It is believed marine sediments are source of petroleum. In India which may contain reserves oil are found in the Brahmaputra and Surma in Northern Plains, the Ganga West Bengal, the plains of Gu the desert region of Rajasthan also likely to be found in the coastal area of Kerala and in the Kaveri, Krishna, Godavari Mahanadi.

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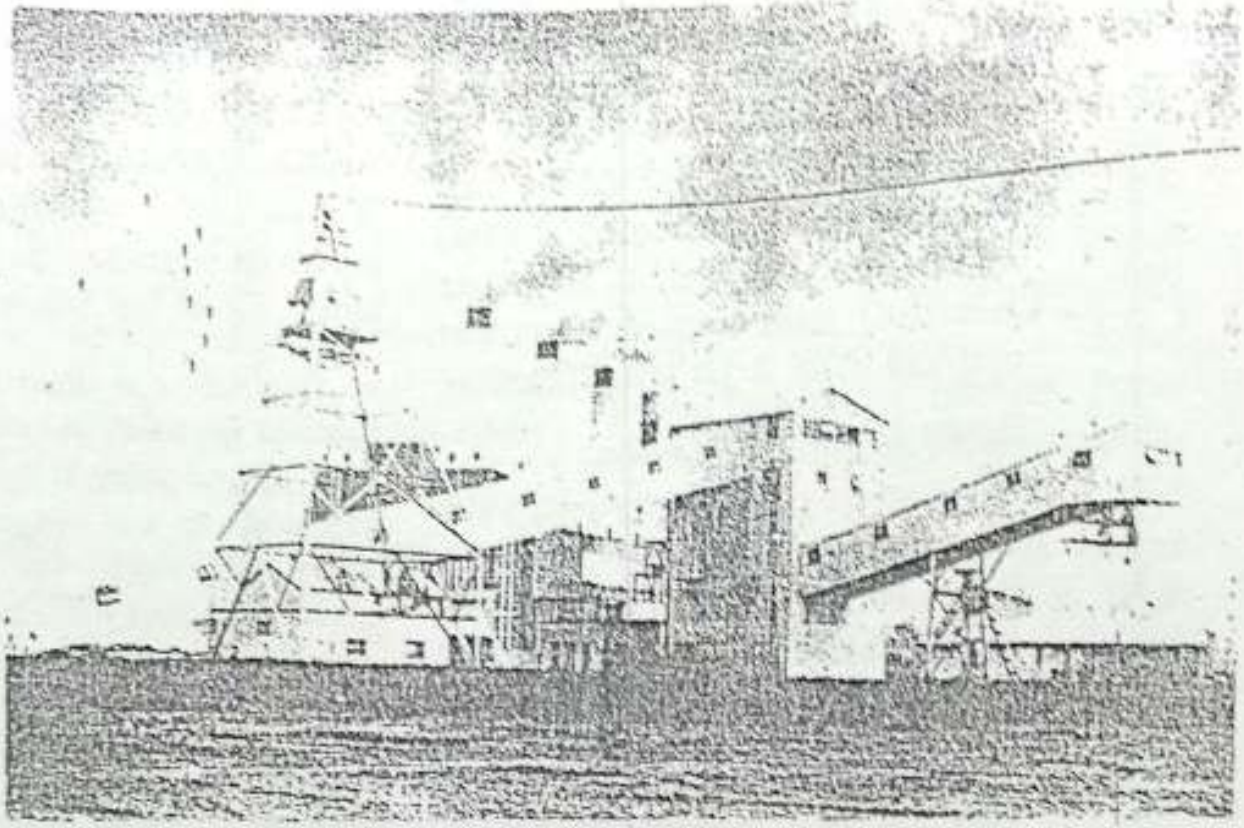

Photo XIX Bokaro power station

This thermal power plant is one of the largest in the country. It produces electricity from coal. Why are such big power plants needed in this region ?

The oil-fields which have been proved, lie in the valley of Brahmaputra in Assam and in the plains of Gujarat. Off-shore drilling is already in progress in Bombay High, 160 km away from Bombay. Our annual production of oil is now nearly 30 million tonnes. Still we are importing a large amount of our national needs from abroad. In view of the growing demand for oil we are exploring for petroleum and setting up a number of refineries to process the local and the imported crude oil. Besides mineral oil, India has found natural gas in Gujarat and Andhra Pradesh.

Atomic Energy : Uranium and thorium are the important sources of atomic energy. We have large deposits of uranium in Bihar and Rajasthan. The monazite sands found along the coast of Kerala yield thorium. In India we have already in operation two atomic energy stations. One is at Tarapur (Maharashtra) and the other is

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near Kota at Rana Pratap Sagar dam in Rajasthan. Two more plants have been set up at Narora near Bulandshahar district of Uttar Pradesh and the other at Kalpakkam near Madras in Tamil Nadu. The contribution to power generation from sources other than coal and water is yet insignificant.

Production of Electricity

Since we get rain every year, water becomes a perennial source of power. It has its own importance. However, we cannot depend upon hydro-electricity alone. In our country we have also been using coal and petroleum to develop thermal electricity. In the year 1967 the total installed capacity of electric energy, both thermal and hydel, was more than 10 million kilowatts. In 1986 it is more than 45 million kilowatts.

By now all towns with a population above 10,000 have been electrified. On the other hand only about 64 per cent of all villages are now supplied with electric energy in our country. The states of Punjab, Haryana, Kerala, Tamil Nadu and union territories of Delhi, Chandigarh and Pondicherry claim to have electrified all the villages in their areas.

Hardly one-fifth of total electricity is consumed in agricultural sector to satisfy its increasing demand in developed parts of our countryside.

One kilowatt hour of power is equal to 10 hours of continuous work done by one man. It costs very little compared to the wages of manual labour. Therefore, we have to use more and more electric energy to increase production in every field.

Our country is thus endowed with rich mineral resources. They provide necessary raw materials for our industries. Some of them are even more important because they provide power to run the industries. Therefore, they are a must in expanding our industries. However, it must be remembered that mineral resources once used are lost for ever. We should, therefore, conserve them so that we may use them economically. We need to use our mineral resources even more intelligently than what we do with our soil and water resources.

The New Terms You Have Learnt. *Mineral Ores* : Metals in their raw state as extracted from the earth. *Geologists* : Scientists who study the nature of rocks and their formation. *Off-shore Drilling* : Digging deep bores into the bed of shallow seas near the coast for extracting mineral oil.

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EXERCISES

Review Questions

1. Answer the following questions :
   (i) Which is the most important metallic mineral obtained in India?
   (ii) What are the two important mineral fuels?
   (iii) Name three sources of electricity.
   (iv) Name any four major coal-fields of India.

2. Distinguish between :
   (i) Metallic and non-metallic minerals.
   (ii) Rock and mineral-ore.
   (iii) Thermal electricity and hydro-electricity.

3. Make correct pairs from the two columns :

(i) An open pit from which stone is obtained	(a) Seam
(ii) A big and deep bore dug into the earth's crust to obtain mineral deposits	(b) Bauxite
(iii) A mineral-ore of aluminium	(c) An open-pit mine
(iv) A metamorphic rock-composed of carbon	(d) Quarry
(v) Layers in which coal is found	(e) Shaft mine
	(f) Diamond

4. Complete the following statement with the most appropriate ending :
   Hydro-electricity is very important because
   (a) its production is always very easy.
   (b) it always costs very little.
   (c) it is produced from a perennial source.
   (d) we have very large resources for its development.

5. Give a brief account of our iron and coal deposits naming the most important states in which they are found.

Map Work

6. On an outline map of India locate the following :
   (i) One atomic power plant in operation.
   (ii) The first hydro-electric power station.
   (iii) The new oil-field.
   (iv) The river valley where our largest coal deposits are found.

Topic for Class Discussion

7. *'Which is the most important —coal, petroleum or water-power?'*

Let the class divide itself into three groups, each representing one item. Each group may be then asked to present its case to the class. See if the class can reach any common conclusion.

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16. Our Manufacturing Industries

The Terms You Already Know . *Small-scale Industries* : Industries in which not many labourers are employed in each unit. *Civilization* : An advanced stage of civilized and social life.

We derive cereals, fruits and vegetables from the soil. Milk and meat are obtained from animals. We get wood from trees. Wide range of minerals are procured from the deposits of the earth. All these products which we obtain directly from nature are called primary products. Agriculture, animal-rearing, fishing, lumbering and mining are organised human efforts to obtain primary products. They are, therefore, called primary industries.

Many of the products cannot be utilized by us unless they are further processed. We do not consume primary products like wheat, sugarcane, cotton, surplus milk, logs, and iron-ore just in their original form. We use them as bread, sugar, cloth, butter, furniture and iron bars. The products which have been processed and transformed into utilities are called secondary products. The organized human efforts to transform primary products into secondary products are known as secondary industries.

Growth of Modern Industry

Formerly the work of processing primary products into secondary products was done at home by members of a family. The work was done with simple hand-operated tools. It involved manual labour and use of muscle or animal power.

In course of time all this has changed. The simple tools like a wheel, a pulley and a lever gave place to more and more complicated and powerful machines. They were run not with muscle or animal power but with the help of energy derived from water, coal or mineral oil. One single machine would do what even a few hundred persons would be unable to

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perform. Thus they would produce a lot more in much a shorter period of time. Furthermore, articles produced with the help of machines on a large scale were of the uniform size and quality.

A house was too small a place for these 'giants' to work efficiently. Therefore, the place of work moved from a humble cottage to a big establishment called a factory or a mill.

The use of machines called for specialization and division of labour. A big job was broken up into a series of small steps in a definite sequence. Each worker was responsible for only a part of a small job which he could do more quickly and efficiently. We are now living in this age of 'modern industry'.

Nowadays, growth of industry depends upon a large number of factors. First of all, there should be adequate and continuous supply of raw materials. In India, many of our industries depend upon agricultural raw materials like cotton, jute, sugarcane, oil-seeds, rubber and tobacco. Another set of industries are based on mineral resources such as iron-ore, mineral oil, coal, gypsum, salt and sulphur. 2 Supply of cheap electric energy is a must for the rapid growth of industries. 3 Adequate facilities for quick transport are equally necessary. 4 Industries also require huge amounts of money or capital for setting up machines, purchasing raw materials and paying wages to labour. 5 Well-trained and skilled labour should also be readily available. Finally, there should be a good demand or market for the products of industry. Fortunately, we fulfil most of these requirements.

Industries are classified in various ways. Industries employing a large number of labour in each unit are known as large-scale industries. Cotton and jute textile industries are good examples of such industries. Industries producing fans, cycles, sewing-machines belong to small-scale industries employing a small number of people. Industries most common in villages are called village industries. Handloom, khadi and leather are examples of this type. Then there are handicrafts and cottage industries in which artisans work with wood, cane, ivory, brass, stone, clay and the like. Industries are also classified according to ownership. Industries belonging to individuals or a group of them are known as private sector industries. Then there are certain industries which are owned and managed by the

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Government, for instance defence industries. They are said to be in the public sector.

INDUSTRIES BASED ON AGRICULTURAL PRODUCE

In India, industries depending upon agriculture have a great part to play. Textiles, sugar, beverages, vegetable oil, tobacco and rubber are the major industries under this category. Then there are rice mills, flour mills and oil mills, scattered almost all over the country.

Textile Industry

This is one of the oldest and the most famous industries of India. Even today the spinning wheel and handloom are seen in almost every village, providing employment to a large number of people.

The modern textile industry was born in India in 1854 when the first cotton mill was set up in Bombay with Indian capital. At the end of 1977 there were 704 cotton mills, producing 3,921 million metres of cloth during 1979-80. The industry provides direct employment to about one million workers. The industry is concentrated in cotton-producing states of Maharashtra and Gujarat. Bombay and Ahmedabad are the two leading centres of this industry. The other centres are Coimbatore, Solapur, Calcutta, Kanpur, Nagpur and Indore.

A considerable part of our cotton textiles is produced on handlooms and powerlooms. The beautiful Indian sarees are produced in this sector. So is the entire production of Khaddar cloth made out of hand-spun yarn. Over 4,000 million metres of cloth still produced yearly in this sector. We now export different varieties of cloth to foreign countries including the United Kingdom and the United States of America.

Jute Textiles : This is yet another important industry of India. There are over 106 jute mills in our country. Most of them are located along the river Hooghly around Calcutta. India has nearly half the world's total capacity of jute manufacture. Our total production of jute goods in the year 1979-80 was over one million tonnes.

Woollen Textiles : There are about 50 woollen textile mills in the country. Nearly half of them are situated in the state of Punjab. The important centres of this industry are Amritsar, Dhariwal, Kanpur, Bombay, Srinagar, Bangalore and Jamnagar.

Silk Textiles : India has been famous for its silk textiles since long.

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Its silk products have been in great demand in many parts of the world. The states of Karnataka, West Bengal, Jammu and Kashmir, Himachal Pradesh and Assam are the producers of raw silk.

Important centres of silk industry are Murshidabad, Varanasi, Srinagar, Amritsar, Mysore, Thanjavur and Kanchipuram near Madras.

Synthetic Textile : India now also produces rayon, nylon, terene and dacron varieties of man-made fibres developed through chemical processes. They are known as synthetic fibres. The important centres of the industry are Bombay, Ahmedabad, Surat, Calcutta, Amritsar, Gwalior and Delhi.

Sugar Industry

India is the largest producer of sugarcane. If we take into consideration *gur*, khandsari, and sugar produced from sugarcane, India stands first in the world. There were about 307 sugar mills in the country in 1980. Half of the sugar mills are located in Uttar Pradesh alone. The average annual production of sugar now exceeds 4 million tonnes. India is now in a position to export its surplus production, after supplying the home needs.

Vegetable Oil Industry

India is the leading producer of oil-seeds. Oil derived from the oil-seeds such as groundnuts and cotton seeds is converted into vegetable ghee or vanaspati.

Paper Industry

The first machine-made paper was manufactured in India in the year 1870 near Calcutta. Now there are nearly 121 paper mills in the country producing nearly 10 lakh tonnes of paper and paper board every year. In view of the growing demand for newsprint, India has set up a newsprint mill at Nepanagar in Madhya Pradesh. Its capacity is being raised to 75,000 tonnes per annum. Nearly 70 per cent of the raw material for our paper industry comes from bamboo pulp.

INDUSTRIES BASED ON MINERALS

Most of the modern industries fall under this category. Iron and steel industry is often called a key industry as it serves as a backbone to many other industries.

Iron and Steel Industry

India possesses abundant reserves of iron-ore and limestone. It has some coal reserves as well. Deposits of all the three minerals are found close to one another. This has helped in avoiding transport costs. In India there are six big iron and steel plants. They are

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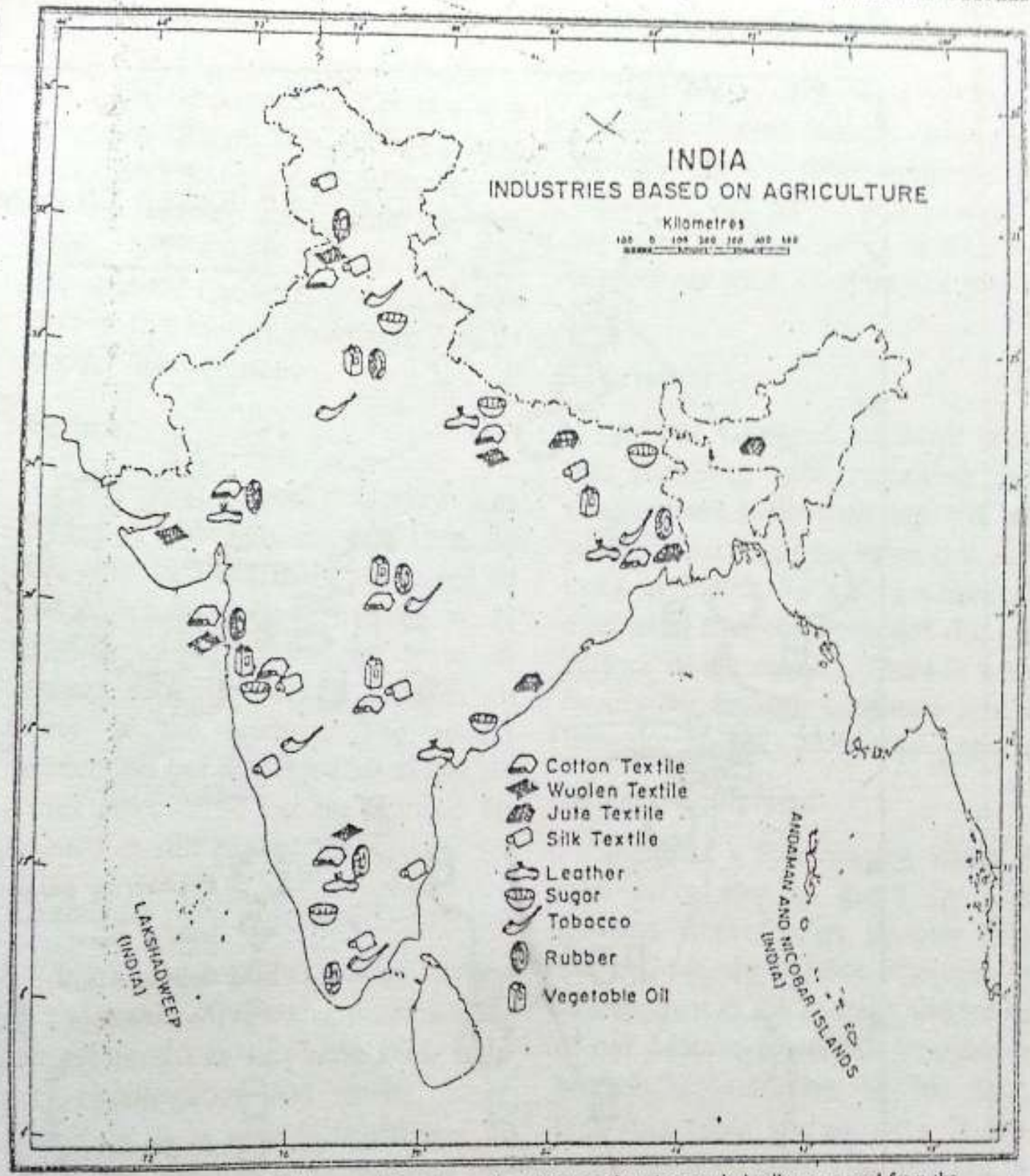

The territorial waters of India extend into the sea to a distance of twelve nautical miles measured from the appropriate base line.

Fig 33 India — Agriculture-based industries

Note the distribution of jute, cotton and sugarcane industry. Which of the industries are related to animal products ?

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at Jamshedpur, Burnpur, Bhilai, Rourkela, Durgapur and Bokaro. A part of the new steel plant at Bokaro is still under construction. All these centres are located near the iron and coal fields in Bihar, West Bengal, Orissa and eastern Madhya Pradesh. There is another steel plant at Bhadravathi in Karnataka. The annual production of finished steel from these plants is about 7 million tonnes and that of pig iron 10 million tonnes. In addition to these, three more steel plants are going to be located in Karnataka, Tamil Nadu and Andhra Pradesh.

Railway Engines and Wagons

India with its large network of railways requires railway wagons, coaches and railway engines in large numbers. We are now self-sufficient in most of our rolling-stock requirements. We now export railway wagons on a very large scale. Broad gauge locomotives running on steam and electricity are manufactured at Chittaranjan loco works in West Bengal. Engines for metre gauge are produced at Jamshedpur and the diesel engines at Varanasi. Railway coaches are produced at Perambur near Madras and wagons are manufactured at a number of places.

Ship-building

India has now set up ship-yards at Vishakhapatnam, Cochin, Calcutta and Mazagaon near Bombay. The ship-yard at Vishakhapatnam has produced a number of ships. The Cochin ship-yard is under construction. The Mazagaon ship-yard is meant for manufacturing ships for the Indian Navy, and that of Garden Reach near Calcutta builds tugs, barges, dredges and coasters.

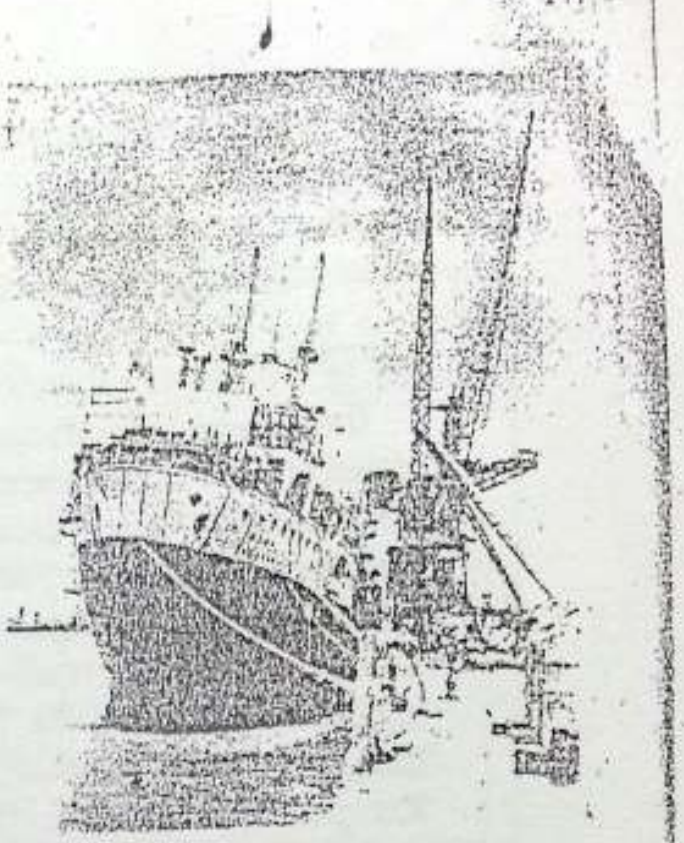

Photo XX A ship under construction

This passenger ship — S.S. Andaman — has been made at the Hindustan Shipyard, Vishakhapatnam.

Automobiles

India manufactures cars, trucks, jeeps and scooters. Fiat car is produced

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in Bombay, Ambassador in Calcutta and Maruti in Gurgaon. Trucks or commercial vehicles are produced at Jamshedpur and jeeps in Bombay.

Aircraft

India now manufactures certain varieties of small aircraft. Indian aeroplanes are being used by Indian Airlines and Indian Air Force. We now produce Krishak, Pushpak, Gnat, Mig and Avro 748 varieties of aircraft. The important centres of the industry are Bangalore, Kanpur, Ojhar near Nasik, Koraput in Orissa and Hyderabad in Andhra Pradesh.

Heavy Engineering and Machine Tools

India has now started making its own machinery for different industries. It produces machines for the textile, sugar and mining industries. The Heavy Engineering Corporation at Ranchi now manufactures big machines and equipment required for setting up iron and steel plants. The Hindustan Machine Tools produces a large variety of small and medium machines and has now developed several units of its own at places like Bangalore, Pinjore (Haryana), Hyderabad, Kalamassery in Kerala and Srinagar in Kashmir. One of the units of the Hindustan Machine Tools now produces watches as well. These units are in the public sector and are in a position to export machinery to other countries.

India now produces a large variety of engineering goods like water pumps, diesel engines, electric fans, sewing-machines, bicycles and the like.

Oil Refining and Petro-chemicals

With the growing use of automobiles the demand for petroleum has been rapidly increasing. In spite of the production from new oil-fileds in Gujarat and at 'Bombay High', we have to import large quantities of crude oil from Iran and other countries around the Persian Gulf. In order to refine crude petroleum several oil refineries have been set up. The oldest oil refinery is at Digboi in Assam. New oil refineries have been set up at Bombay (two refineries), Vishakhapatnam, Barauni, Noonmati, Madras, Haldia (near Calcutta), Cochin and Koyali near Baroda. In the year 1979-80, 27 million tonnes of crude oil was refined. Two new refineries at Bongaigaon (Assam) and Mathura (Uttar Pradesh) have been set up now.

Fertilizers

In order to increase the supply of food, the production of fertilizers in

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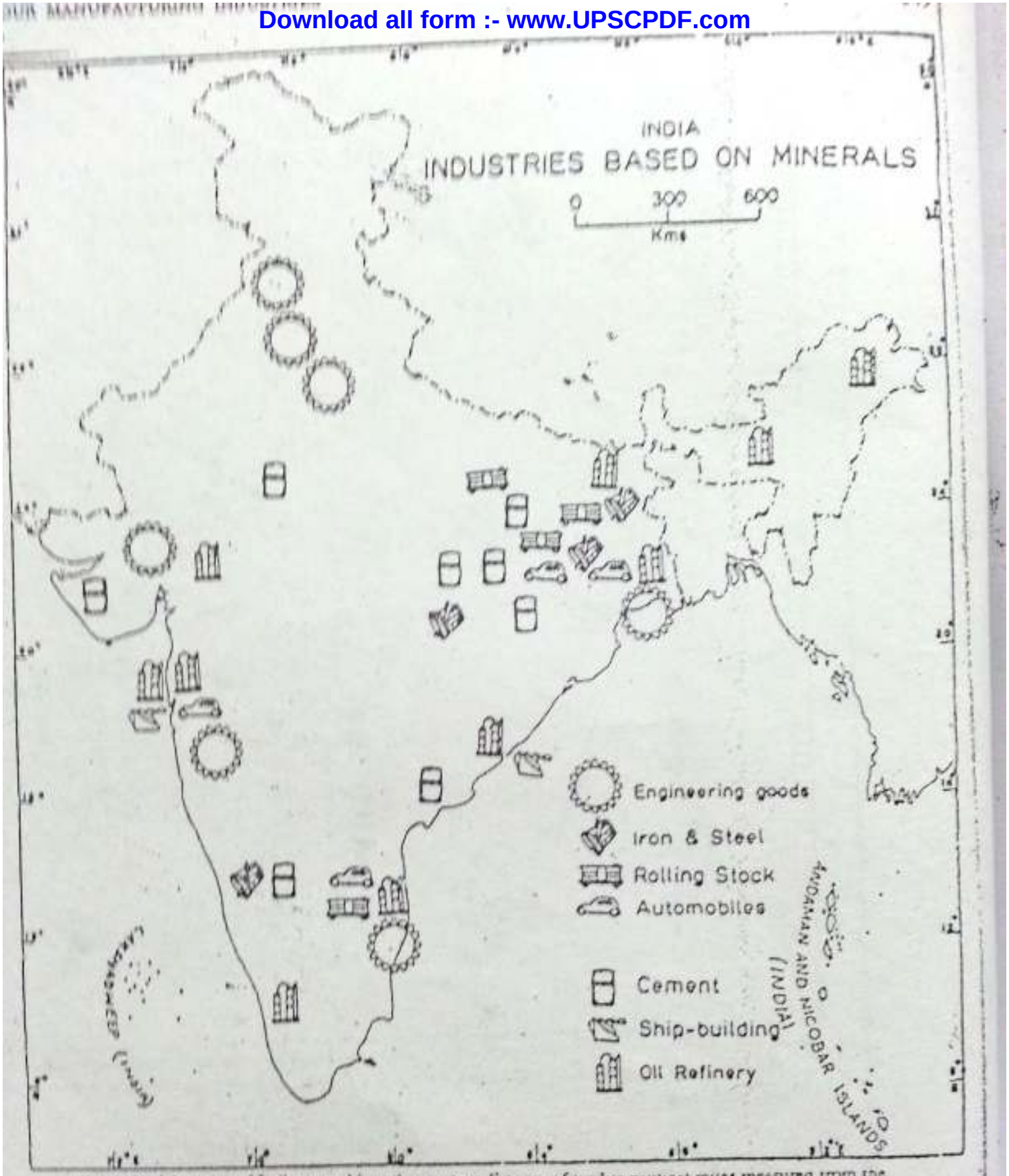

The territorial waters of India extend into the sea to a distance of twelve nautical miles measured from the appropriate base line.

Fig 34 India — Mineral-based industries

Note the concentration of industries in Bihar, West Bengal and Orissa. How will you explain it ?

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our country has become very necessary. The fertilizer plants were first of all set up at Alwaye in Kerala and at Sindri in Bihar. This followed by a number of new plants in different parts of the country during the last few years. In 1979-80 the production of nitrogenous fertilizers was 22.26 lakh tonnes and that of phosphatic fertilizers 7.7 lakh tonnes.

Cement

The first cement factory was started at Madras in the year 1904. By the year 1979-80 India has raised its annual production of cement to 17 million tonnes. There are now 60 cement factories located in different parts of the country. The annual production has increased by nearly six times since 1950 but the demand for cement is still higher.

Chemicals

India now produces a large number of chemicals, drugs and pharmaceuticals. It produces sulphuric acid, soda ash, caustic soda and several other chemicals. It is now self-sufficient in antibiotics and a large number of synthetic drugs. Even surgical instruments are now produced in India. Penicillin is produced at Pimpri near Pune. D.D.T. is produced at Delhi and Alwaye.

Heavy Electrical Equipment

The Heavy Electricals at Bhopal produces electric motors, generators, transformers and other equipment for setting up big power plants. Another big plant has been set up at Hardwar. It produces water turbines and generators.

Electronics

A large variety of electronic goods like telephone, radio receiving sets, transistorised radio receiving sets and television sets are now being manufactured in India. We also manufacture electronic equipment needed for the defence of our country. There is a big factory for making telephone sets at Bangalore ← Tel. producing centre

Defence Equipment

India, as a free country, needs to take every step to guard its long frontiers from foreign invasion. For this purpose, the defence equipment is as important as the courage and valour of our defence personnel. In order to become self-sufficient in this field, India has taken several steps. It now produces small arms, guns and ammunition in the country. It also produces vehicles for the army. India has set up a tank factory at Awadi in Tamil Nadu. India now produces missiles on its own. However, this is one area in

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which we have to be on our guard and keep ourselves abreast of the rest of the world.

India has thus made rapid strides in almost every industry. Free India has achieved within a period of about thirty years what many countries could not achieve even in hundred years of their earlier industrial development. In view of our population, however, we have yet to go a long way to raise the standard of living of our people. The only way to do it is to expand our industries as quickly as possible.

The New Terms You Have Learnt. *Primary Industries* : Organized human effort to obtain primary products. *Secondary products* : The new products made after processing and transforming the primary commodities into utilities. *Manufacturing industries* : The organized human effort to transform primary products into secondary products.

EXERCISES

Review Questions

1. Answer the following questions :
   (i) What is an industry? State three characteristic features of a modern industry.
   (ii) What are the four important primary industries of India?
   (iii) Which State leads in sugar industry?
   (iv) Name three makes of motor cars produced in India.

2. Distinguish between :
   Primary industry and secondary industry.

3. Make out correct pairs from the two columns :

(i) The leading centre of cotton textile industry	(a) Bangalore
(ii) The manufacturing centre of jute textile	(b) Perambur
(iii) The oldest iron and steel town	(c) Jamshedpur
(iv) The centre producing electric railway engines	(d) Bombay
(v) The place where railway coaches are manufactured	(e) Sindri
(vi) Ship-building yard	(f) Bhopal
(vii) Centre for producing telephone sets	(g) Vishakhapatnam
(viii) A big fertilizer plant	(h) Chittaranjan
	(i) Calcutta

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done✓ What factors help the rapid growth of industry? Explain this with the example of iron and steel industry in India.

done✓ Give a brief account of the cotton textile industry in India under the following points : causes of early growth, location and importance of handlooms.

Map Work

6. On an outline map of India show the following :
   (i) Three places known for iron and steel plants in the public sector
   (ii) Three places known for factories making aircraft
   (iii) Three oil refineries
   (iv) Three centres of the Hindustan Machine Tools

Topic for Class Discussion

7. *'Large and small-scale industry in our country.'*

   Let two groups in the class take sides and argue their own cases. Record the conclusions.

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17. The Lifelines of Our Country

map

The Terms You Already Know. *Highway* : A Big and important public road connecting distant places. *Pass* : A gap in a mountain range providing natural or easy route across.

The modern means of transport have been able to conquer distances making our country a small well-knit unit.

The roads, railways, navigable rivers and canals, coastal waterways and airways have all now become the common means of transport. It is along them that the people and goods move speedily and conveniently from one place to another. Then there is a network of post and telegraph offices spread all over the country. All our towns and big villages have been interconnected with telegraph and telephone wires. Even more important is the national network of radio and television stations.

It is these means of transport and communication that are rightly called the lifelines of a country. They help in bringing us close to one another, both culturally and economically. The importance of these lifelines in the defence of a vast country such as ours cannot be overemphasized.

Trade and Transport

For a while, think of the various articles of daily use in your life. Even a cup of tea or coffee cannot be had unless we are able to get tea from Assam, coffee from Karnataka and sugar from Uttar Pradesh. Maybe, the bread you ate this morning was made of wheat brought from the state of Punjab or Haryana. It is likely that vegetable ghee used in cooking was made from groundnuts produced in Gujarat. The white table salt must have come from Rajasthan unless it is sea salt from Gujarat. The spices that make your food so tasty come all the way from Kerala. So do cashewnuts, coconuts and copra. The bananas and oranges that you buy in a local market are in all probability produced in a

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farm in Maharashtra. Apples, grapes and dry fruits must have made their way from the valleys of Kashmir of Himachal Pradesh.

Have a look at your clothes. Maybe, your shirt is made of cloth produced in a textile mill in Bombay. A colourful saree may have been woven into cloth somewhere in Karnataka or Tamil Nadu. The yarn for the same is likely to have been spun in Coimbatore or Bombay, whereas cotton from which it was spun had been grown somewhere in Maharashtra or Gujarat. A sweater or the woollens which you wear in winter are likely to have come from Punjab. A fine shawl and a beautiful carpet in all probability are the prized products from Kashmir.

The gunny bags which we use for packing foodgrains come from West Bengal—the producer of jute, the golden fibre of India. Coir mats are brought from the extreme south especially Kerala. This state also supplies us with rubber which we require for making various articles of daily use. Footwear which are so essential for us may have been manufactured in Uttar Pradesh.

Timber which we require for making furniture and building houses is likely to have come from the Himalayan region or from Madhya Pradesh. Cement may have been brought from Bihar or Madhya Pradesh. Iron bars and sheets have to be hauled all the way from Bihar, West Bengal or Orissa. This is true of coal which we consume at home or in power houses. Kerosene and petroleum can be had either from Assam or from Gujarat if it is not imported from abroad.

The means of transport help in collecting raw materials at manufacturing centres. They also help in distributing finished products to various parts of the country. In the absence of the modern means of transport severe famines always resulted in great loss of life. Now large quantities of foodgrains are rushed to famine affected areas from elsewhere in no time.

The modern means of transport are a must for making quick movements of our defence forces. They also assist in maintaining a constant supply of ration, ammunition and other supplies to the forces defending our borders. Indeed, the railways in India were built by the British primarily to serve their military needs.

Roads

The importance of roads in India has been realised since early times. The total length of road network in our country now exceeds 19.70 lakh

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kilometres. Thus the total length of the surfaced and unsurfaced roads in our country is nearly two-and-a-half times the distance between the earth and the moon. However, in view of the total area and the huge population of our country, the total length of the roads is rather inadequate.

① The most important roads, running from one end of the country to the other through several states are called national highways. They are developed and maintained by the Central Government. The Government is also responsible for building and maintaining roads in the border areas. During the past few years the Government has been busy in building new roads in the border areas, particularly in the Himalayan region. Some of the important highways connect India with Tibet, now part of China, through the mountain passes. Locate Chumbi valley, Shipki La and Karakoram pass along our northern frontiers.

The important national highways connect places like Bombay, Calcutta, Delhi, Madras, Kanyakumari, Leh, Kandla and Sadiya (Assam) with one another.

② The state highways are the roads which are important enough within a given state. They are developed and maintained by the State Governments. Also there are district roads which are looked after by the local authorities. Finally, there are village roads. All these roads are taken care of by the states concerned.

Railways

The total length of the railways criss-crossing our country was over 70865, kilometres in 1988-89. The railway network in India is the largest in Asia and the fourth largest in the world. Our railways carry over 10 million passengers every day.

Perhaps more important is the fact that there are 405,000 wagons engaged in carrying goods over long distances. Our goods trains carry well over 6 lakh tonnes of goods every day. This accounts for nearly fourth-fifths of the total goods traffic in the country. Thus railways are our principal national means of transport.

The important railway routes connect the major cities of India—Bombay, Calcutta, Delhi and Madras—with one another. Most of the railway trains, either originate or terminate at one of these four cities of India. Look at the map and locate trunk routes inter-connecting the four major cities of India.

Indian railways are divided into three categories according to the width of the railway gauge—the broad gauge

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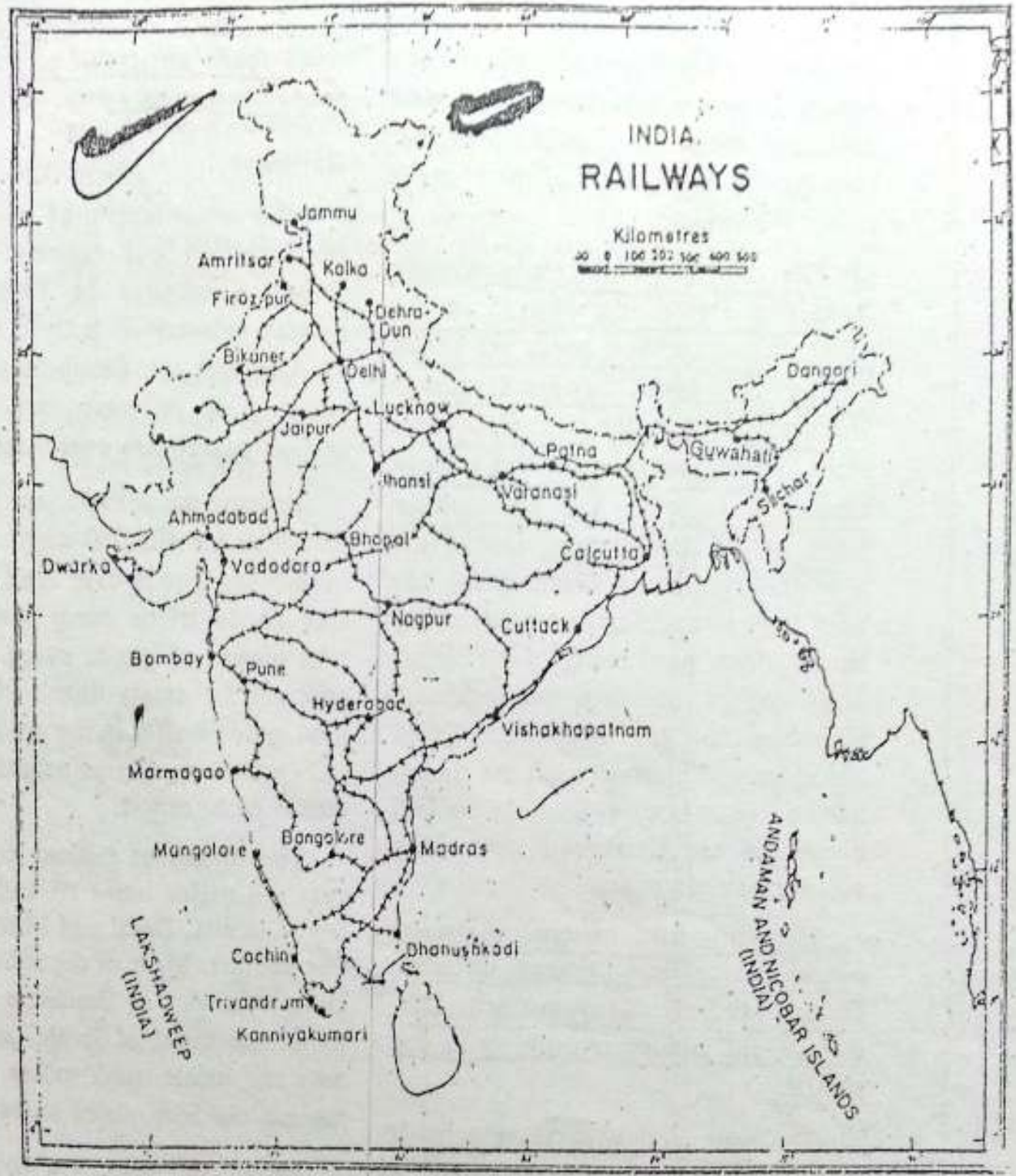

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The territorial waters of India extend into the sea to a distance of twelve nautical miles measured from the appropriate base line.

Fig. 35 (a) - India — Major rail routes

Note the major trunk rail routes and their terminal stations.

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(1.69 metres), metre gauge (1 metre) and narrow gauge (0.77 metre). The narrow gauge railway track is generally confined to the hills. Nearly half of the railway track consists of broad gauge.

About 8880 kilometres of the railway-track has been electrified. It ensures quick and clean travel. It helps to save or conserve our coal. It has also helped in relieving pressure on railway wagons. Many important long distance trains now run with diesel engines with increased speed. Some of our fastest trains are Rajdhani Express between Delhi-Calcutta and New Delhi-Bombay and Satabdi Express between Delhi-Bhopal Delhi-Chadigarh and Delhi-Lucknow. Some other mail and express trains are also running at 100 to 110 km. per hour.

Waterways

India with a long coastline has 11 major ports. They are Bombay Madras, Calcutta, Cochin, Marmagao, Vishakhapatnam, Kandla and Paradip, Mangalore and Nhava, Sheva Tuticorin. Major ports serve as gateways of international trade and commerce. India is the second largest ship owning country in Asia and ranks sixteenth in the world. Indian ships move on most of the sea-routes of the world and also connect our islands with the mainland.

The cargo handled by Indian ships in our overseas trade in 1978-79 formed 40 per cent of our trade with other countries.

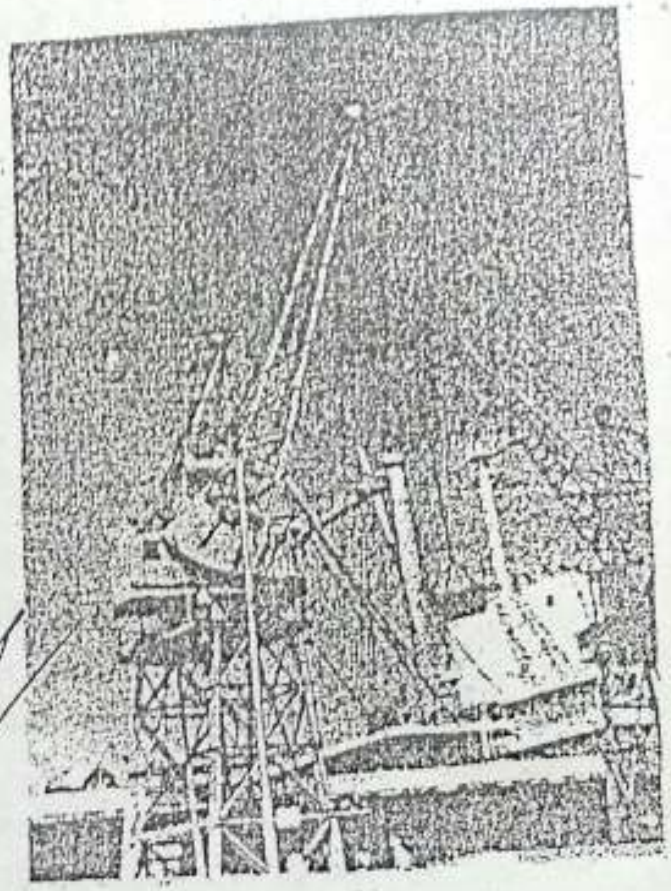

Photo XXI Loading iron ore at Marmagao

See how iron-ore is being loaded on the ship. To which country do we export iron-ore ?

In India inland navigation is almost insignificant. Only 5,200 km. of inland waterways are also navigable by steamers. The Ganga and Brahmaputra are the two navigable rivers of India. Also navigable are the lower reaches of the Godavari and Krishna. The canals of these two rivers, the Buckingham Canal in Tamil Nadu and Andhra Pradesh, and West Coast Canals of Kerala are the only navigable canals in India.

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Airways

A large number of aeroplanes span our skies. They help in carrying passengers, cargo and air mail. There are about 88 aerodromes in the country. In the year 1979 well over 6.6 million passengers were carried by air. This is nearly fourteen times more than what we could do in the year 1947.

India has four major international airports. They are Bombay, Calcutta, Delhi and Madras. Even the major national air traffic is confined between these four places. These places are in turn connected with various regional towns. The Indian Airlines is mainly responsible for the internal traffic. It has also a few flights with the neighbouring countries like Burma, Sri Lanka, Nepal and Afghanistan. It has now acquired jet planes (Boeing 737) for its trunk routes to cope with the growing air traffic.

Air travel has in recent years become very important in the north-eastern part of the country. Why should it be so? Look at the map and see how difficult it is to reach Tripura, Manipur, Nagaland, Meghalaya, Arunachal, Mizoram and Assam from Calcutta. In the hilly and mountainous regions along our northern frontiers helicopter is the most convenient means of transport. It helps to maintain constant supplies to the jawans guarding our frontiers.

India has a big international air service—Air India. It carries international air traffic to as many as 34 countries. There are regular air flights linking India with a large number of countries of the world. Maharaja—its symbol—is now well known in almost every part of the world. The "Air-India" has now acquired the jambo jets, the largest and the faster commercial planes in the world.

Means of Communication

The means of transport and communication are closely related to each other. There cannot be proper development of one without the other. Can you think of railways and airways without proper means of long distance communications?

There are well over 1,38,000 post offices throughout the country. The total number of telegraph offices is over 20,000. There are more than 2.5 million kilometres of overhead telegraph wires in our country. The underground cables which ensure more safety and efficiency are two-and-a-half times as long. Urgent personal messages are sent through telegrams at negligible cost.

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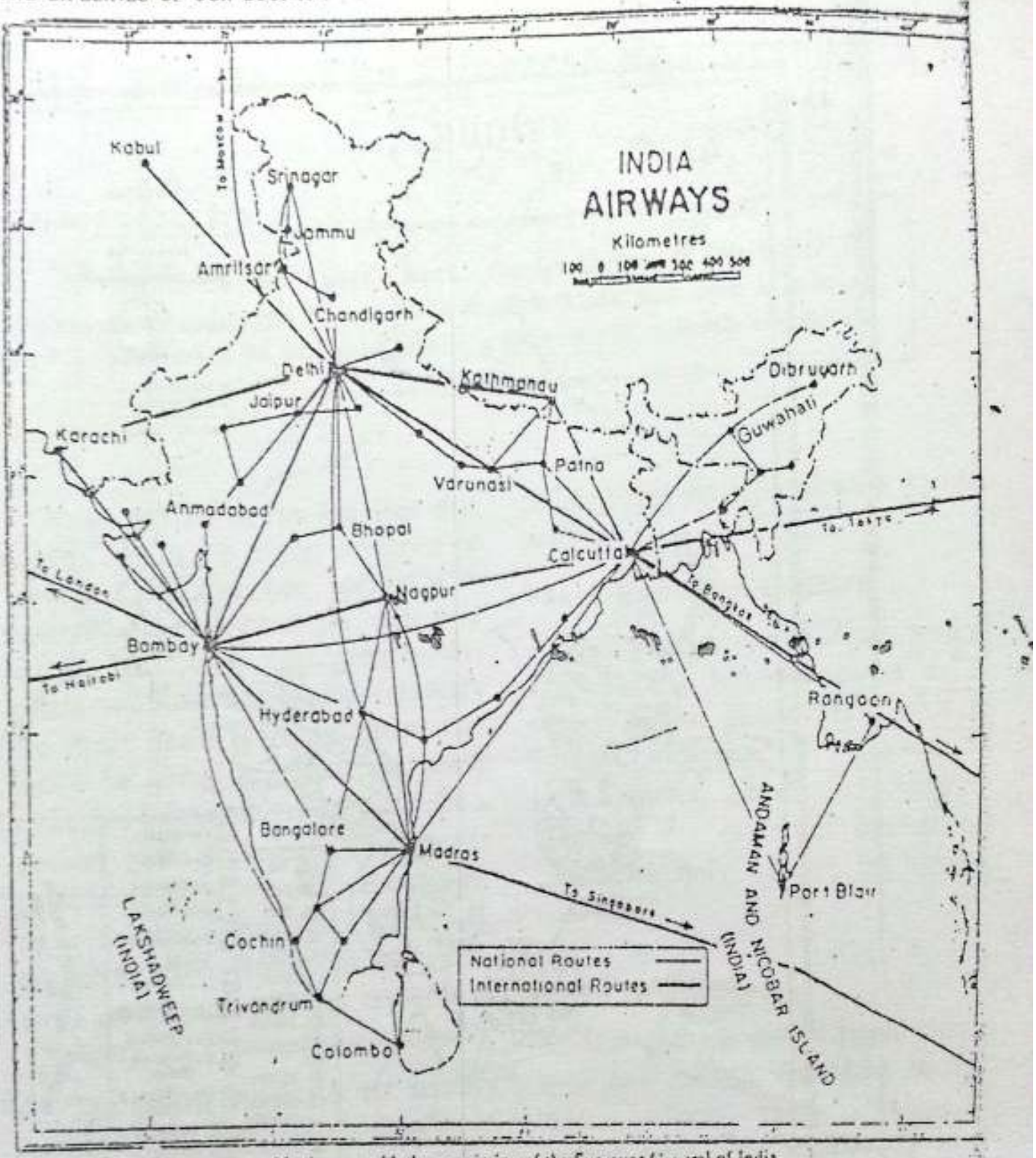

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The territorial waters of India extend into the sea to a distance of twelve nautical miles measured from the appropriate base line.

Fig. 35 (b) India — Major air routes

Note the airways connecting Delhi, Madras, Calcutta and Bombay with other parts of India and other countries.

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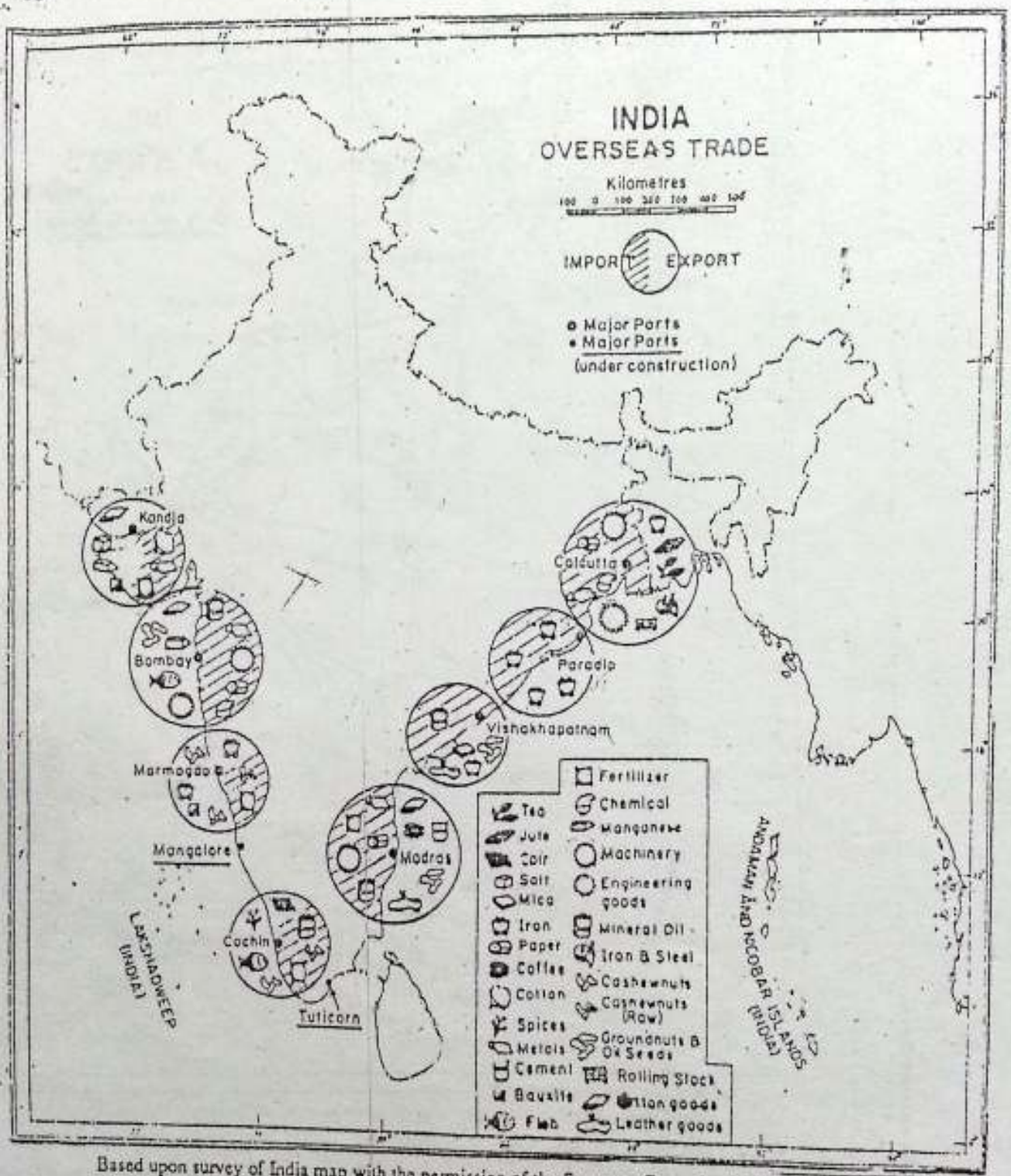

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The territorial waters of India extend into the sea to a distance of twelve nautical miles measured from the appropriate base line.

Fig. 36 India — Major ports and international trade

Note the major items of export from Calcutta, Vishakhapatnam, Paradip and Marmagao. What are the major imports of India ?

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Telephones, however, represent further improvement over telegrams. In this case "live voices" are carried over telephone wires. Today there are well over a million telephone sets all over the country, all manufactured in our own factories. The national telex service is available between 117 cities sending and receiving printed messages directly from one subscriber to another. Our Overseas Communications Service provides telegraph service to all, and telephone, telex and radio photo services to a number of countries.

Then there are several means of mass communication. The All India Radio with nearly 85 broadcasting centres all over the country is the most important among them. The total number of radio receiving sets in the country now exceeds the 20 million mark. Today different parts of our country are linked with the television transmissions, which is an im tant means of mass communication these means of communication hel bringing our people close to another culturally, economically politically. Besides men, women play a large part in running our c munication services.

Imports and Exports of India

It is true that various means transport and communication h brought different parts of our cou very close to one another. They hel speeding up the economic deve ment of different regions. Nati trade is also promoted. However, is only a part of the story. The mo means of transport and communica also promote international trade travel making our world a really s place to live in. Look at Fig. 36. note the major items of export import of our country.

The New Terms You Have Learnt. *The lifelines of a Country* : The modern means of transport and communication which bring people close to one another and help in economic development, national and international trade and in the defence of the country.

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EXERCISES

Review Questions

1. Answer the following questions:
   (i) What are the two important means of land transport? Roads, Railways
   (ii) What are the leading four major ports of India? Bombay, Madras, Calcutta, Cochin
   (iii) Name the four categories of roads according to their importance. NH SH DR VR

2. Distinguish between:
   (i) A national highway and a state highway.
   (ii) Broad gauge and narrow gauge.

3. What are the lifelines of a country? Why are they so called?

4. Why is railway transport very important in our country? In what ways do the railways help us?

5. Given below in the first column are certain jobs to be done relating to (a) Communication and (b) Transport. In the other column are listed means for doing the same. Make out correct pairs from the two columns.

(A) Communication

(i)	Sending Rs. 25/- to your relation	(b)	(a) Telephone call
(ii)	Congratulating a friend on his success	(a)	(b) Air mail
(iii)	Making urgent queries about the illness of your relations and to give necessary advice immediately	(c)	(c) Money order
(iv)	Sending medicine from Delhi to a serious patient in Bangalore	(d)	(d) Telegram

(B) Transport

(i)	Sending 5,000 tonnes of cement from Katni (M.P.) to Hyderabad	(c)	(a) Express train
(ii)	Sending 500 kilogrammes of fresh vegetables from Patiala to Delhi	(d)	(b) Cargo ship
(iii)	Travelling from Bhopal to Ajmer to attend Urs	(a)	(c) Motor Truck
(iv)	Sending 10,000 tonnes of iron-ore from Goa to Osaka (Japan)	(b)	(d) Goods train

Map Work

6. On a map of India show the following:
   (i) A railway route between Delhi and Madras with four important junctions on the way.
   (ii) Four new major ports.
   (iii) Four important international airports and the airways connecting them.
   (iv) Two important inland waterways.

Topic for Class Discussion

7. *'Had there been no means of transport and communication.'*
   Let the class discuss this topic around three points: (a) how it would affect our day-to-day life? (b) how it would affect primary industries and secondary industries? (c) how it would affect the defence of our country?

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18. People—The Greatest Resource of a Country

The Terms You Already Know. *Average Density of Population:* The number of people that would be found in a unit area, such as a square kilometre if the total population in a given area is uniformly distributed.

There can be no two opinions that ours is one of the largest countries of the world and it has been blessed with natural resources that are rich and varied. In fact our vast geographical extent and abundant natural resources are great assets that any nation can justly be proud of. However, these resources by themselves do not make a country great. If, indeed, a country is to become great, its natural resources must be transformed into wealth by organised effort. Herein lies the importance of the most precious resource of a country, its people or man-power.

The human resource of our country is frightfully large. Its distribution in the country is woefully uneven. It has been increasing at an alarmingly fast rate. And its relation to the country's resources such as availability of arable land or the quantity of food that may be produced on it is already causing anxiety.

The Area of Our Country

Our country has a total area of 32,87,782 sq. km. and ranks as the seventh largest in the world after the Russia Canada, China, the United States, Brazil and Australia. However this extent of our country constitutes only 2% of the world's total area.

Our Population

Our country has a population of over 844 million according to 1991 Census India ranks as the second most populous country in the world, next only to China. In other words it carries as much as 15% of the world's total population, which means that every seventh man in the world

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an Indian.

What Does It Mean to Us ?

It should have become quite apparent to you by now that about 2% of the world's land area (India) carries 15% of its population. Herein lies the challenge that we, the people of India, have to face. It may be that China has a larger population but she is only a little less than three times the size of our country. The Russia, with more than Five times the area of our country has hardly half the population of our country. Barring China, the total population of the other 5 countries bigger than India, is smaller than that of our country.

Distribution of Population

If we distribute our total population (1991, census) evenly all over the country, there would be 267 persons per square kilometre. This is the average density of our population. But the actual distribution of population in our country is very uneven. It varies from region to region. It becomes much higher than the national average in plains and along the coastline. It is much below the average in high mountains, hills, desert and the marshy areas. In rest of India over a larger part of the plateau region, it is more or less moderate.

The most thickly populated parts of India are the plains and delta of the Ganga-Brahmaputra, the deltas of the Kaveri, Krishna, Godavari, Mahanadi and the Malabar Coastal strip. The plateaus of the Deccan and Central India and large parts of Punjab, Haryana and Gujarat are moderately populated. Kutch, the Thar desert of west Rajasthan, western and central Himalayas and the whole hill area of north-eastern India are sparsely populated.

Relief and Rainfall

They play an important part in determining the distribution of population in our country. Thus you find a great concentration of population in the flat alluvial lowlands with a fairly heavy and assured rainfall. The arid lands of Kutch and Rajasthan are thinly populated. So also are the high hills with extremely uneven terrain and too heavy rainfall.

In between these two extremes are the plateau areas where neither the soil is very fertile nor the rainfall is abundant or dependable. In recent years, however, we find population increasing in these areas also because of irrigation facilities provided on a large scale.

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Statewise, the density of population is the highest in Kerala where it is about 654 people per square kilometre. Then comes West Bengal with an average density of a little over 600 persons per sq. km. In the Ganga Basin the average density of population tends to decrease from east to west. The average density of population in Uttar Pradesh is slightly less than that of Bihar and Tamil Nadu. The most thinly populated states are Nagaland, Jammu and Kashmir, Sikkim, Meghalaya, Manipur and Himachal Pradesh.

Population in India is Mostly Rural

In 1901 around 89% of our people were living in rural areas. By 1981, it has come down to 76% and this trend is continuing. This means that more and more people are coming to urban areas in search of jobs. This migration of people from villages to large towns and cities results in overcrowding and attendant problems. At the same time it robs many of our villages of the youth who are the most active workers.

There are about 12 cities in India with a population of over a million people. They are Calcutta, Bombay, Delhi, Madras, Hyderabad, Bangalore, Ahmedabad, Kanpur, Nagpur, Lucknow, Jaipur and Pune. 204 cities have a population between 100,000 and 1,000,000 people.

How Fast Our Population has been Growing

About 60 years ago, say in 1921, the population of India was 251 million. Today it is over 781 million. This means that our population has grown more than three times in 68 years. Do you know the number of people we are adding to our population every year? It is equal to the total population of the whole continent of Australia.

This rapid growth of our population is largely due to a fall in the number of deaths of our people. This has been possible because of the success we have achieved in controlling or eradicating certain diseases like malaria and epidemics like plague and cholera. This means that a child born in the seventies can expect to live a much longer life than what could have been possible 50 years ago. The life expectancy has gradually increased from a mere 20 years during 1920 to a little over 50 years in 1970.

However, lowering the number of deaths alone will not solve our problem. We must bring down the number of newly born children and establish a balance between deaths and births.

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The growth rate of our population was 11 per cent between 1921 and 1931. It shot up more than double to 24.7 per cent between 1971 and 1981. If this rapid rise of population is not arrested it is sure to bring in its wake an agonising series of problems relating to food, clothing, housing, health, education and employment of our growing millions, besides undermining our standard of living.

Towards a Qualitative Growth

People do have a place for developing and utilising the country's resources. In fact they constitute a valuable asset in a country's economic progress. However, beyond a certain limit they cease to be an asset.

Take for example our own country. We have made phenomenal progress in almost all fields of human endeavour since Independence. Our production has increased by leaps and bounds in both agriculture and industry. Judged by our progress, our rightful place must, indeed, be with the highly developed nations of the world. But the harsh reality of the situation points to the other way. Nearly 60% of our people are below the poverty line having little money to purchase their bare needs. Thus our standard of living is among the lowest in the world. The reason, however, is not far to seek. Most certainly, it is not an unkind fate that makes us suffer. A major cause is our frightfully growing population that has almost negatived our achievements and is adding to our problems. What then is the way out ? It is to be found in stabilising the growth rate of our population.

The New Terms You Have Learnt. *Census* : Official enumeration of population along with certain economic and social statistics in a given territory. In our country this information is collected by the Government all over the country in the first year of every decade. *Growth Rate of Population:* Gap between births and deaths expressed as per cent of population of a given region over a given period. Registration of births and deaths has been made compulsory under an Act of Parliament passed in 1969. This useful record is finally passed on to the census authorities at the national level from all over the country.

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EXERCISES

Review Questions

1. Answer the following questions:
   (i) Which country in the world has the largest population?
   (ii) How densely is India populated as compared to the rest of the world?
   (iii) What is the average density of population in India?

2. Distinguish between:
   (a) Total population and average density of population.
   (b) Growth rate and birth rate of population.

3. Make out correct pairs from the two columns:

(i) State with the highest population	(a) Delhi
(ii) State having the highest average density of population	(b) Uttar Pradesh
(iii) State having the lowest density of population	(c) Nagaland
(iv) Union Territory with the highest proportion of urban population	(d) Kerala
	(e) West Bengal

4. Complete the following statements with the correct ending:
   (a) Population in India has been growing very fast because
   (i) We need more and more people in view of the shortage of labour.
   (ii) We have been setting up new big cities like Chandigarh and Bhubaneswar.
   (iii) The number of deaths in our country has been dropping.
   (iv) The number of births in India has been constantly increasing.
   (b) We can stabilize our population by
   (i) Reversing the present trend in the number of deaths.
   (ii) Bringing down the number of births through planned efforts.
   (iii) Encouraging migration of people to the neighbouring countries.
   (iv) Setting up new cities and townships.

5. Discuss the distribution of population in India with special reference to the areas of very high and density of population.

Map Work

6. Prepare a suitable graph to show the growth of population of Delhi since the beginning of this cen

	(in '000s)
1901	406
1911	414
1921	488
1931	636
1941	917
1951	1,774
1961	2,659
1971	3,630
1981	6,220

Write suitable comments on this graph.

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Topic for Class Discussion

7. *'What is more important—the quality or the quantity of population?'*

Let the class discuss this topic and decide why it is necessary to improve the quality or standard of living in our country. What steps are necessary to realise this objective?

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UNIT FOUR

Studying Local Maps

You have also learnt how to study maps in the previous class. In this unit, we will give you some more information in order to help you in recognizing the landforms in the field and also on maps in a better way. Once we learn how to study local geography with the help of observation and maps, we would be able to understand the geography of even distant places.

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19. Studying Local Maps

You know that a map is a conventional representation of any area of the earth's surface, small or large, drawn to scale on a flat surface. It helps us in locating and identifying the various features of the area depicted on the map. You have studied several maps of continents and countries in this book. All these maps are made on small scales. Hence, they do not show a large number of details. You may have also seen the maps of your village or town. They are prepared on larger scales. That is why they depict more details than those of the continents and countries. Look at the two maps (Fig. 37a,b). One map shows the location of the city area of Delhi. The other map depicts a portion of the city of Delhi on a larger scale. Both these maps show by different symbols the main physical and urban features. These will help you in answering the following questions:

Study Fig. 37 (a). On which side of the river Yamuna is Delhi situated? Where do the railway lines from Delhi go? In which direction of Delhi do you observe low hills? Now study Fig. 37(b). Name the four main roads which diverge from Connaught Pla in four opposite directions. Find o New Delhi Railway Station on t map. In which part of the are depicted on the map, is Lal Qila sit ated? What is the direction of Purar Qila with respect to Lal Qila and wh is the distance between them in kilom etres? Which part of Delhi is covere with forests? Locate on the map som important buildings like India Gat Rashtrapati Bhawan, Parliament Hous and the Secretariat. Name the part o the city in which all these building are situated. How many kilometre away is India Gate from Rashtrapat Bhawan?

Recognition of Landforms in the Neighbourhood

You know that mountains, plateaus and plains are the three major landforms of the earth's surface. Each landform is recognised on the basis of its distinguished features which are mainly two—height and slope.

Given below are the main characteristics of a mountain, a plateau and a plain for your information. They will help you to identify various landforms

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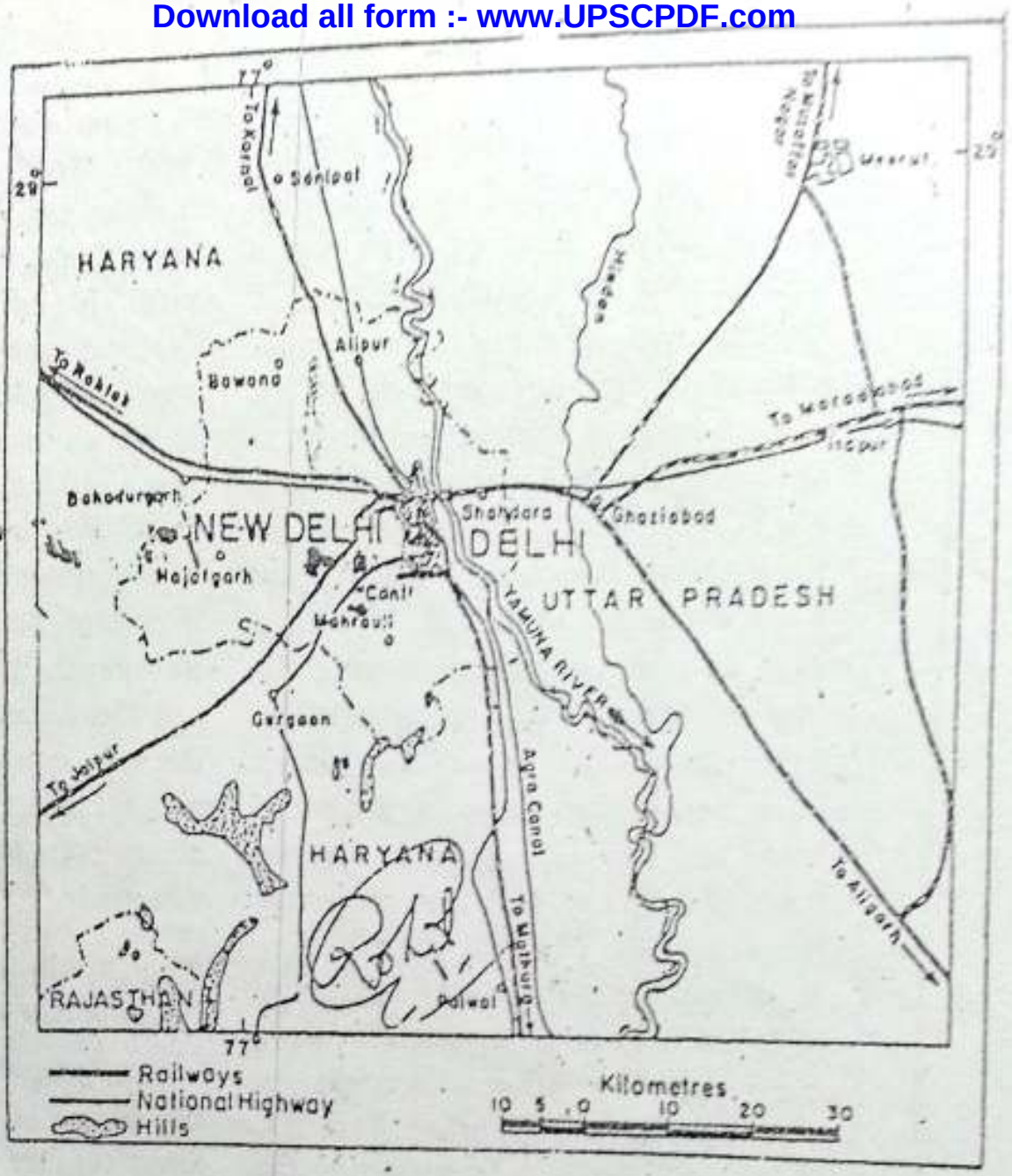

Fig. 37 (a) Map showing the location of Delhi

Note that in this map only the location of Delhi has been shown. The map has been drawn on a small scale. As such, it shows a bigger area but lacks in details.

in the field.

A *mountain* is a mass of land considerably higher than the surrounding area. Mountainous regions are very rugged. They have very high peaks and sharp, pointed features. High conical peaks, deep valleys and wall-like slopes are some of the main features of mountains.

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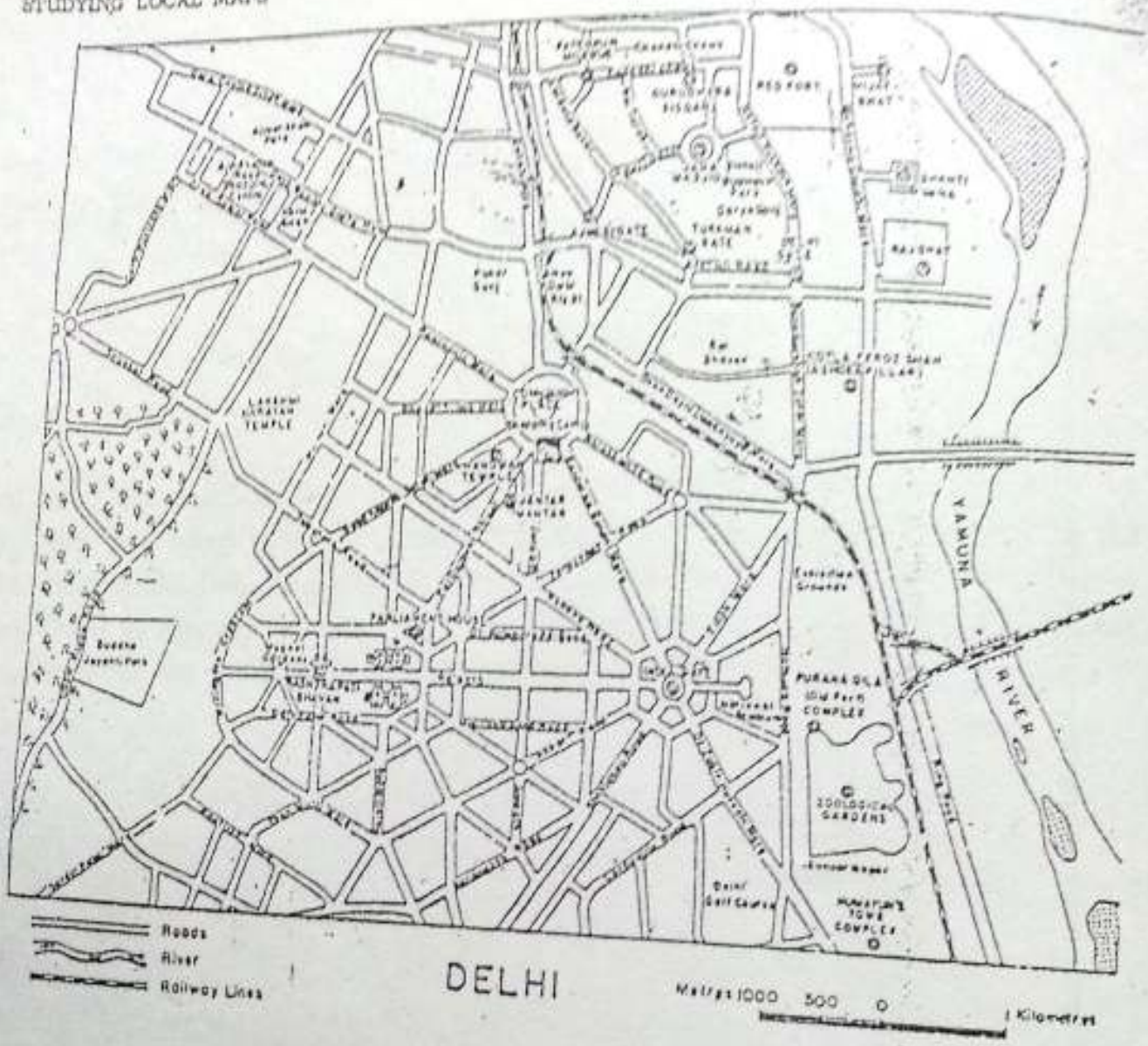

Fig. 37 (b) Map showing a part of Delhi's city area

This map shows a large number of details because it is made on a larger scale. How much actual distance on the ground is represented by a centimetre on each map ?

A *plateau* is a broad and rather level stretch of land rising sharply above some nearby lowland. We may also call it an elevated plain having slopy margins. Tops of the mountains have very small stretch of level land, known as the peak; but the plateau tops have very long and wide stretches of flat land.

A *plain* is a relatively flat and featureless lowland. Its surface is not rugged like a mountainous region. Its slope is very gentle. In other words, unlike a mountain, there is very less difference of height between the high and low points of a plain. Rivers flow in the plains very sluggishly and form great meanders. They also have v

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wide and shallow valley bottoms. But in mountainous or plateau regions, rivers flow very swiftly and their valleys are narrow and deep.

Identifying Landforms on Maps

In this book, you have studied the physical maps of Asia and India. These maps show the land with varying heights above sea level by different shades of the same colour. However, most of the atlas maps depict physical features by different colours. Lowland or plain region is shown by green, highest land or mountainous region by dark brown and the land of the intermediate height on plateau region by light brown or yellow colours. Water features are shown by blue colour. Method of showing physical features on maps by different colours or by various shades of the same colour is the most common practice throughout the world.

Various landforms on maps are mostly shown by contours. A *contour* is an imaginary line, drawn on a map which joins the points of the same height above sea level. The method of showing landforms through contours is perhaps the most accurate, common and popular. When the contours are closely spaced on the map, the slope will be steep and when they are further apart, the slope will be gentle. The contour patterns on maps give us an idea about the shape or form of various relief features on the earth's surface. Some typical contour patterns

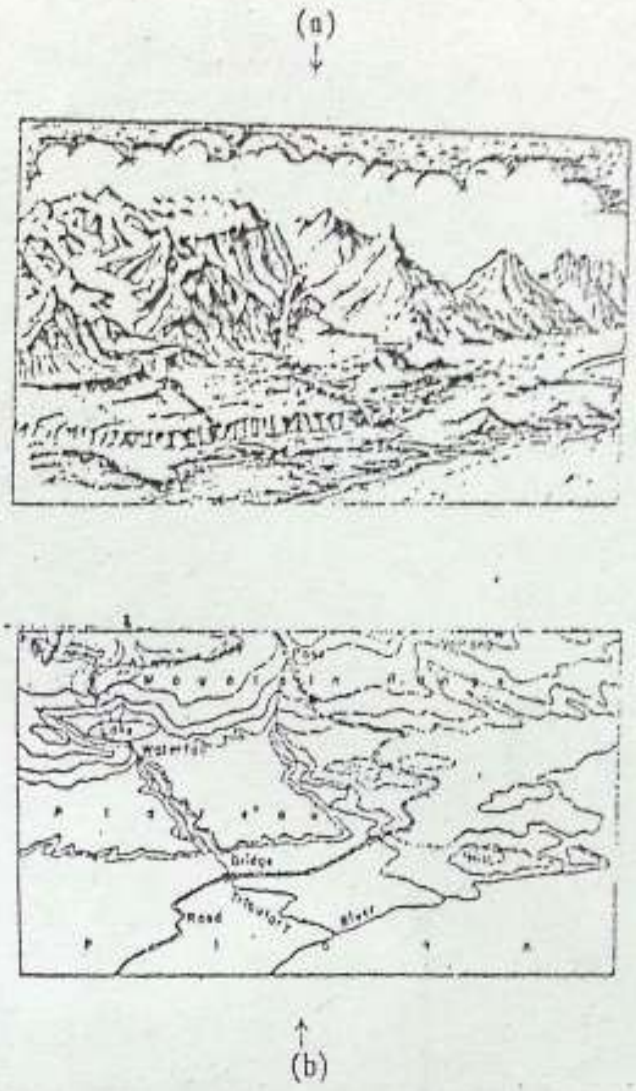

Fig. 38 Landforms — the picture and the map

Look at the picture of mountain, plateau and plain in Fig. 38 (a). What difference do you see in the shapes of the three? In Fig. 38 (b), some important features of these landforms like height and slope are shown by contours and shadings.

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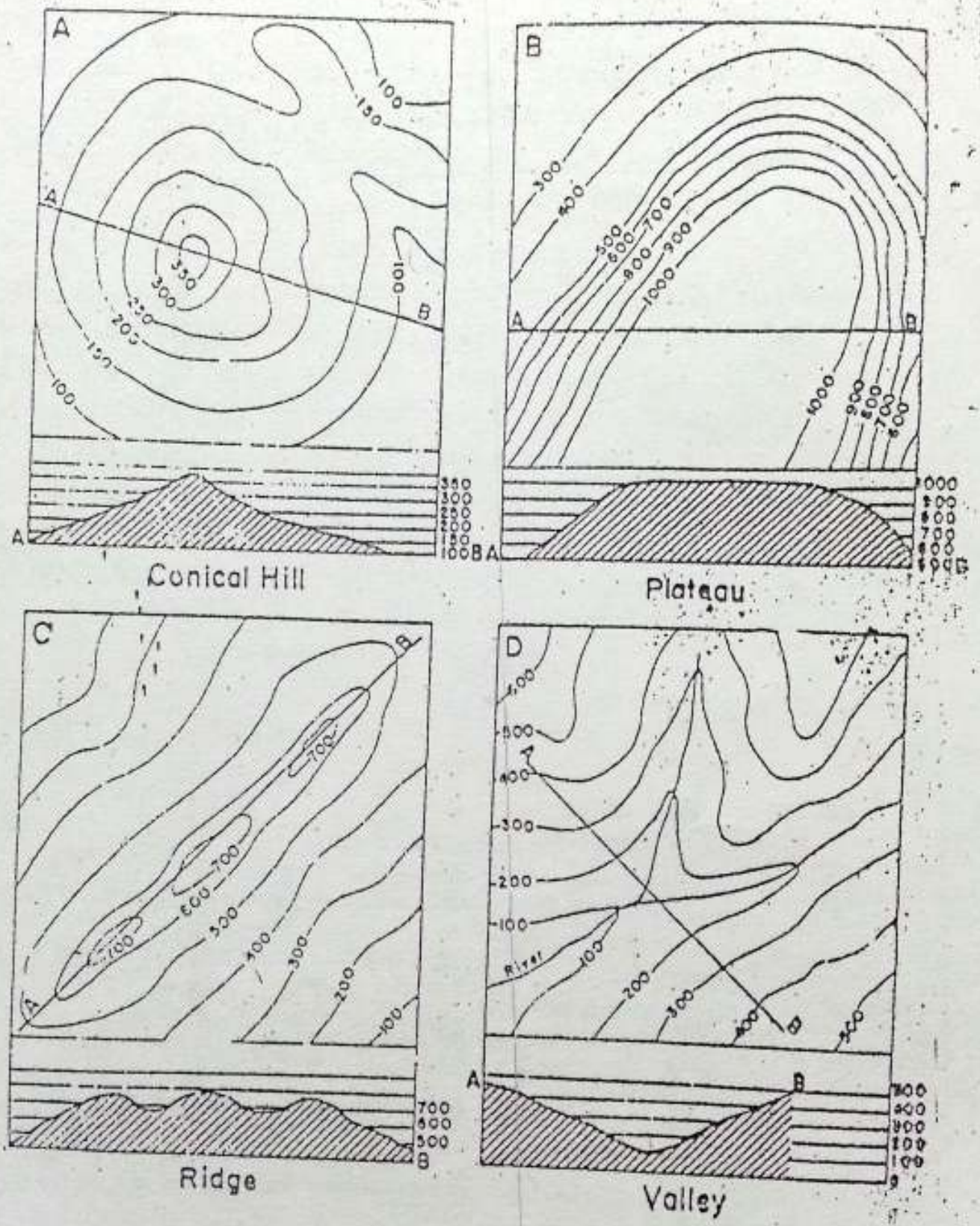

Fig. 39 Contour patterns of a conical hill, a plateau, a ridge and a valley

Compare the contour patterns of all the four landforms and find out the difference between them.

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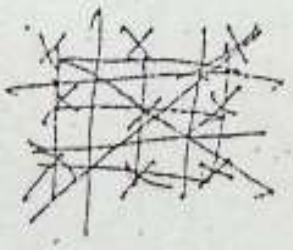
of a few landforms are being given (Fig. 39) for your information. They will help you to recognise some relief features on your local map.

Concentric contours spaced almost evenly on a map represent a conical hill. The top of a plateau is more or less flat and is represented by very few contours. But its sides are steep and they are shown by closely spaced contours on a map. Contours forming linear shapes and very often enclosing isolated peaks represent a ridge or an elongated hill on a map. A plain on a map is represented by very widely spaced contours. A valley is represented on a map by inverted V-shaped contours.

You are now in a position to recognise some of the relief features on the map with the help of contour patterns. Now study Fig. 38(b) carefully. What kind of contour do the mountains depict? What do the closely spaced contours indicate? What kind of slope is on the margins of the plateau? Explain its nature with the help of contours.



EXERCISES

Review Questions

1. Answer the following questions in brief:
   (i) Name three major landforms.
   (ii) What is the most common practice of showing relief on maps?
   (iii) What is a contour?
   (iv) How is a plain represented on a map with the help of contours ?
2. Distinguish between:
   (i) Maps made on large and small scales.
   (ii) A plateau and a plain.
3. Describe the main characteristics of a mountain, a plateau and a plain that would help a person to recognise these landforms in the field.
4. Explain clearly the difference between the contour patterns of a conical hill, a plateau, a ridge and valley.

Map Work

5. Represent the following landforms by contours :
   (i) A flat-topped hill with uniform slope.
   (ii) A plateau whose slope is steep on one side and gentle on the other.
   (iii) A river valley.

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