2

India – An Introduction

The Structure of the Subcontinent – Unity in Diversity

India is a vast country. To the north lie the Himalayas, the world's highest and youngest mountain range. The Indus, Sutlej, Ganges and Brahmaputra rivers flow through deep canyons in these mountains. The peninsular plateau is an ancient land mass. India is a land of contrasts. You freeze in the extreme cold of Kargil in Jammu and Kashmir while you swelter in the heat of the Thar Desert in Rajasthan. Mawsynram in Meghalaya has the highest rainfall in the world. Many different kinds of trees and animals are found in in the subcontient. Different languages are spoken in different regions. People dress and eat in different ways. These differences complement each other. Every region depends on the other for its needs.

The Indian subcontinent can be seen as an independent geographical region in the map of the Asian continent. To the north-west lie the Kirthar and Sulaiman mountain chains. To the north is the Hindu Kush range. The Himalayas extend like a bow from north to east. The Arakan Yoma Mountains are

Map 2.1: The Indian subcontinent

Some Terms

Island: A landmass that is surrounded by water on all sides, for example, the Andaman Island.

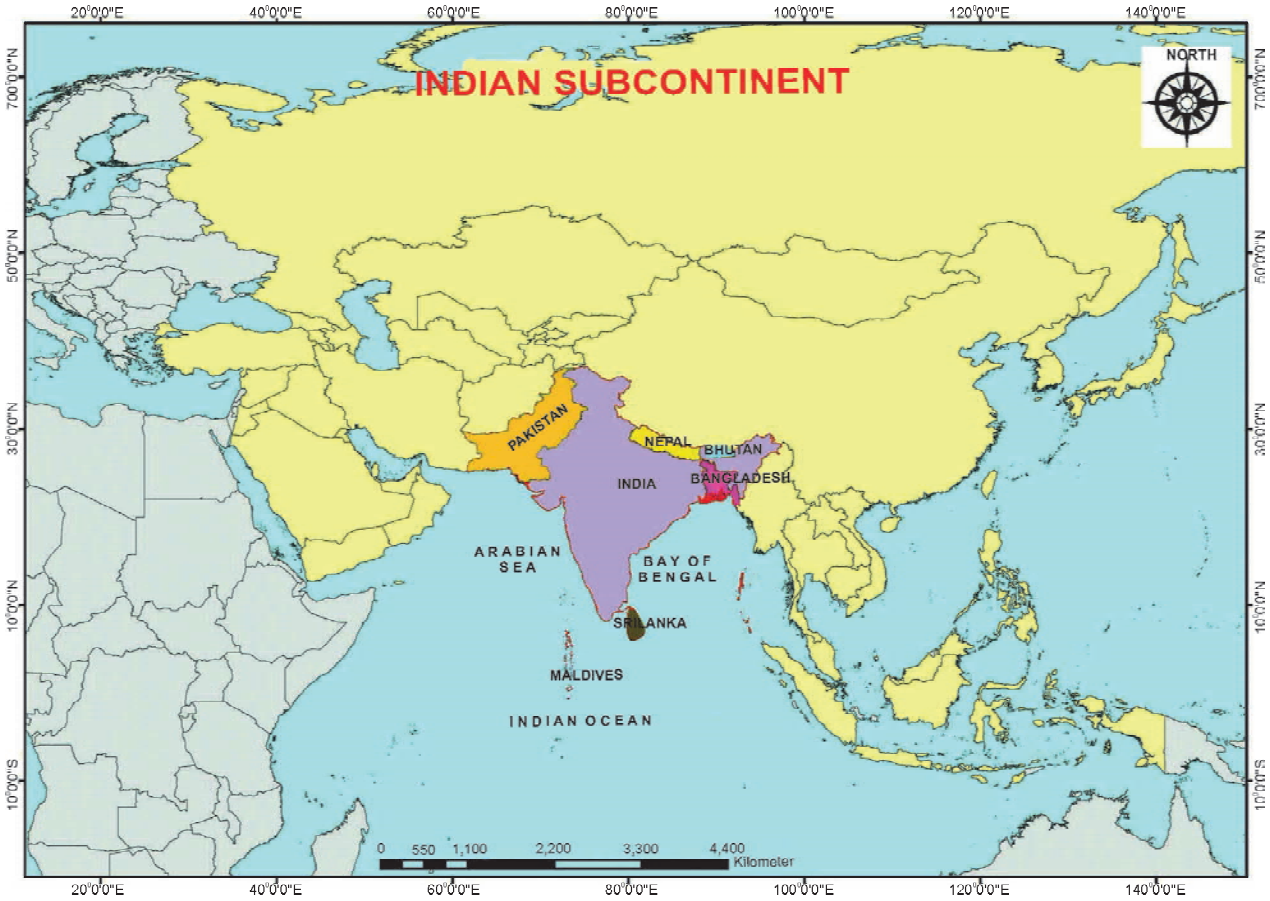
Continent: There is no universally accepted definition of a continent. But from early times, it was accepted that a continent is a huge and contiguous land mass that is surrounded by a vast expanse of water on all sides. Australia and Antarctica would qualify as continents, according to this definition. Asia and Europe would not because they are not separate. Together, they are often referred to as Eurasia. Also, if you look carefully at the world map, you will see that Asia, Europe and Africa are connected to each other. But they are not connected to North and South America. So it would be more correct to say that a continent is a vast and contiguous land mass that has been traditionally defined as a continent.

Sub-continent: A subcontinent is a land mass within a continent that is unique from a geographical, cultural or historical point of view, such as the Indian subcontinent.

Peninsula: A landmass surrounded by water on three sides is called a peninsula.

located in the north-east. They extend from western Myanmar in the south, along the coast of the Bay of Bengal, and connect with the Himalayas in the north.

Map 2.1: The geographical area of the Indian subcontinent in the Asian continent



Map 2.2: The Indian subcontinent in the map of Eurasia

Figure 2.1: The Khyber Pass

Look at the dark, black line in Map 2.1. The line runs along the high and inaccessible mountain ranges that separate India from the rest of Asia. The peninsula extends to the south. The waves of the Arabian Sea and the Bay of Bengal lap its shores on two sides. The entire region appears impregnable and inaccessible from all sides. This region of South Asia is called the Indian subcontinent.

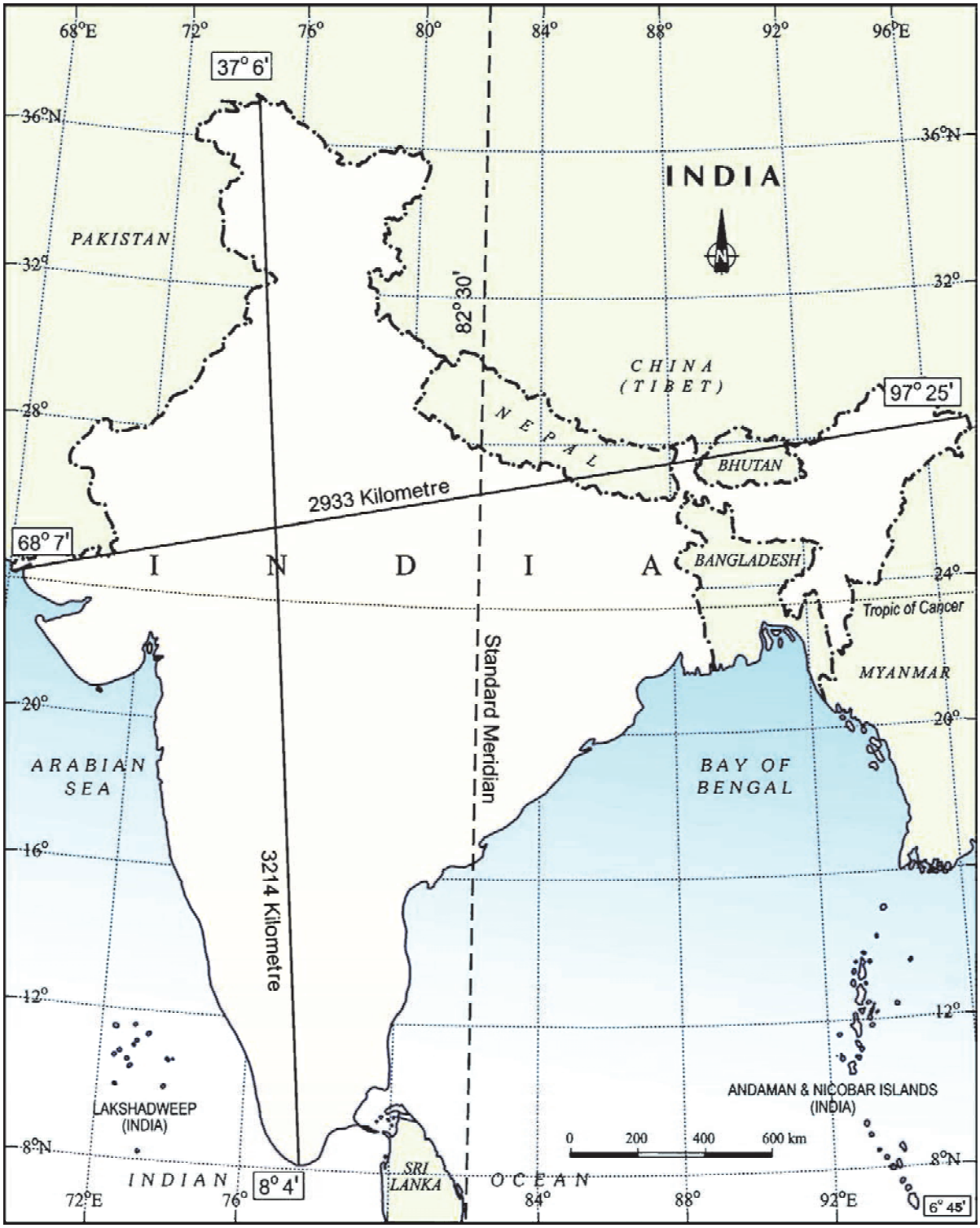
It is clear from Map 2.1 that the Indian subcontinent is a unique region of the Asian continent. Its geographical location and topography give it a distinct climate that is called the monsoon climate. Imagine if there was no high and extended Himalayan mountain range to the north and no expanse of seas on both sides of the peninsula to the south, what rainfall would the subcontinent receive? What would save it from the biting cold wind blowing southwards from the North Pole? If there were no Himalayas, there would be no mighty rivers flowing (Indus, Ganges, Yamuna, etc) and no extensive plains created by these rivers, the Indian subcontinent would be transformed into a barren desert under such conditions.

The fertile Indus and Ganges river valleys gave birth to ancient civilisations. Historians say that humans left Africa 67,000 years ago in search of food and water. They travelled through West Asia to reach the Indian subcontinent. The point to ponder is how did they find a way into the subcontinent that is so naturally impregnable from all sides? They came through the mountain passes and river valleys in these high and impenetrable ranges. The most famous of these passes are the Khyber and Bolan passes (see Figure 2.1). These north-western passes opened up routes to Tibet. People also reached the north-eastern regions of the Indian subcontinent through the eastern passes and through the Shan plateau, settling in the Brahmaputra plains. Many people reached India by sea through the Makran coast to the south. The point is that wherever geographical conditions create barriers for people, they also create new opportunities.

Different kinds of people kept coming to the Indian subcontinent at different times, bringing their cultures with them. Some of them assimilated themselves into the communities already living here while others maintained their separate identities. Their diverse cultures, religious beliefs and professions inter-mixed and influenced each other over time. So cultural pluralism flourished in the Indian subcontinent even as a common cultural thread was woven by the ancient civilisations that evolved.

1.1 Location, Extent and Neighbouring Countries

India extends from $8^0$4’ North to $37^0$6’ North latitude and the $68^0$7’ East to $97^0$25’ East Longitude. It is the seventh largest country in the world by geographical extent. The total area of the country is 3.29 lakh sq km. This is 2.47 percent of the total land mass of the earth. India is the second most populous country in the world, accounting for around 17.2 percent of the total human population of the planet. The country is divided into 28 states and 8 union territories.



Map 2.3: India

Answer the following questions with the help of Map 2.3 and Reference map 1:

1. **In which sea or bay are the Andaman and Nicobar Islands situated?**
2. **In which sea or bay is Lakshadweep situated?**
3. **Which other states does Chhattisgarh share its borders with?**

4. **Which continent is India situated in?**
5. **Which latitude passes through the middle of India?**
6. **What is India's total length from Kashmir to Kanyakumari and breadth Gujarat to Arunachal Pradesh?**
7. **Which states of India does the Tropic of Cancer pass through?**
8. **Which countries does India share its boundaries with?**
9. **What is the symbol used in the map to mark the boundaries between India and its neighbouring countries?**
10. **Which seas and oceans surround India?**

The Tropic of Cancer ($23^0 30'$ north latitude) passes through the middle of India and divides the country into two almost equal halves. Latitude affects the duration of the day and night. There is a 45-minute difference between the duration of day and night in South India. This difference increases as we move towards the north. Why does this happen?

The sun shines directly over the Equator for most of the year. So the length of day and night are the same near the Equator. But as we move north or south of the Equator, the angle at which the sun's rays fall on the earth's surface increases. This causes the length of the night and day to differ. The difference increases as we move closer to the poles.

Similarly, the time also changes as we move from west to east. The difference depends on the longitude. The local time in Gujarat, which is located on the western edge of India, is two hours behind the local time in Arunachal Pradesh, which is located on the eastern edge of the country. The eastern longitude $82^0 30'$ passes through almost the middle of the country. This is the Prime Meridian of India. Indian standard time is calculated on the basis of the time at this meridian.

The South Asian Association of Regional Coordination (SAARC) was formed to improve ties - political, economic and cultural – between the nations of South Asia. India shares boundaries with all the SAARC countries, except for Afghanistan and the Maldives. So it is located at the centre of the SAARC nations. India has had border disputes with its neighbouring countries from the time it gained independence, especially with Pakistan and China. These disputes are about where the actual boundary lies with these countries. India also has problems with Pakistan, China and Bangladesh over sharing the water of rivers that flow to or from these countries. Such disputes over water resources need to be settled in a rational and mutually beneficial manner.

1.2 The Cultural Landscape

Culture weaves the fabric of our lifestyles, ideas, dress, food, music and dance, religious beliefs, philosophies, sculpture, arts, architecture, languages and literature. From Kashmir to Kanyakumari and Gujarat to Arunachal Pradesh, India is a unique and diverse country. This cultural pluralism is our heritage.

The Indian constitution lists 22 scheduled languages but India has around 1,600 spoken languages. These languages are spoken in different regions and by different communities within the country.

India has followers of almost all the religions and religious communities in the world. The major ones are Hindus, Muslims, Christians, Sikhs, Buddhists, Parsis, Jains and Jews. Apart from them, there are many

tribes who have their traditional belief systems. This mix of people of different faiths adds colour to India's cultural diversity.

People have been coming to the Indian subcontinent from prehistoric times. They gradually spread across the country, drawn by its geographical diversity and history. The peasant communities settled in the fertile plains to farm the land. The hunting and pastoral communities migrated to the remote mountainous regions. It is in these regions that most of India's scheduled tribes live. There are practically no tribal communities living in the plains. The country has more than 600 scheduled tribes. They include the Gonds, Bhils, Santhals, Oraons, Sahariyas, Nagas, Miris, Nishis, etc.

India's cultural diversity is unparalleled. In such a pluralistic environment, we should all learn to respect each other's culture, no matter which faith, language or community we belong to.

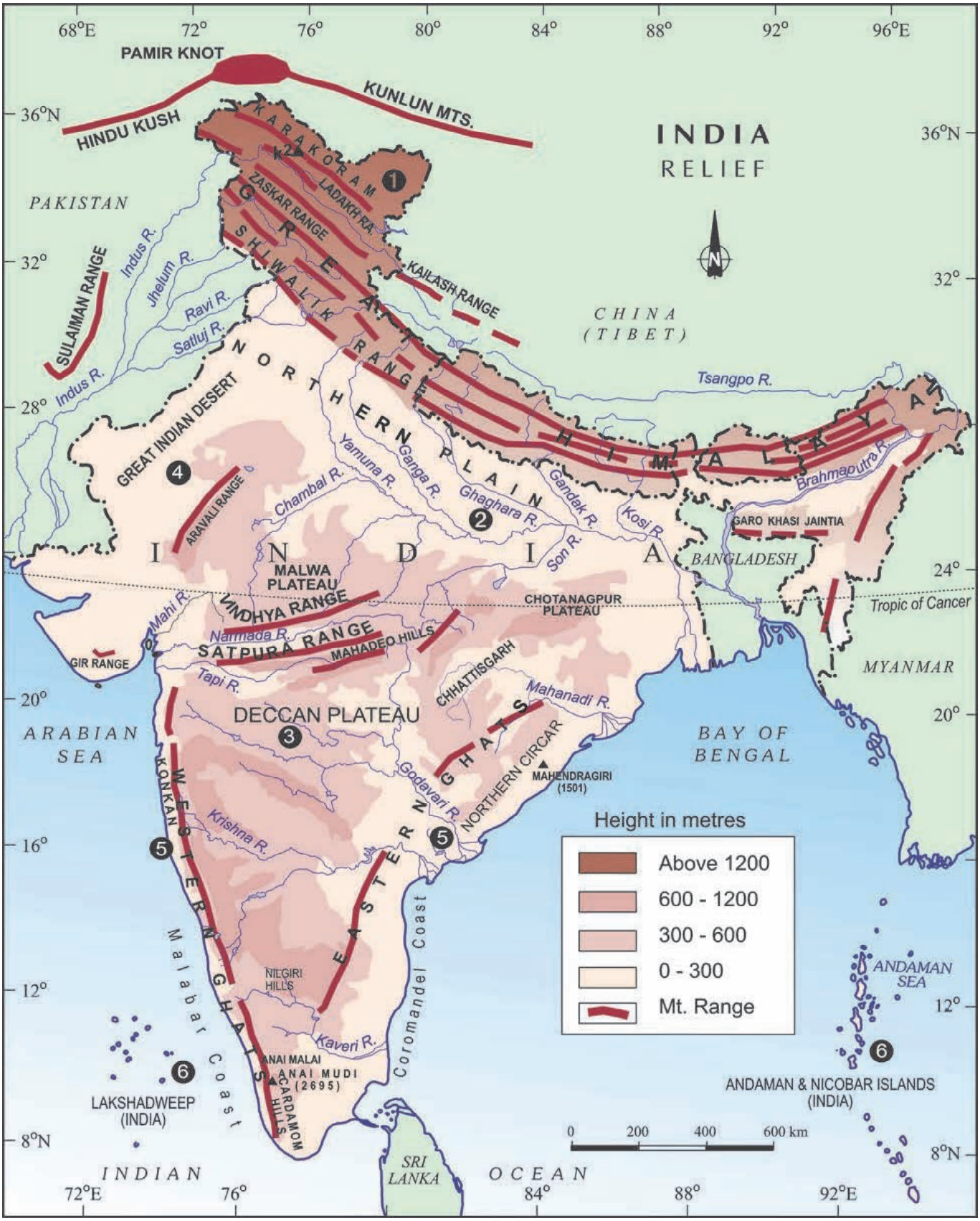
EXERCISES

1. Fill in the blanks:

1. People say that if there were no Himalayas or Hindu Kush mountain range, the Indian subcontinent would have been a vast ……
2. The Indian subcontinent has high, impregnable mountain chains to the west and east. But there are many narrow ……like the …… and Bolan in this difficult mountainous terrain.
3. India's latitudinal spread is from northern latitude …… in the south to latitude …… in the north, and the …… spread from west to east is from eastern longitude $68^0 7'$ to $97^0 25'$.
4. India is the second most populous country in the world and is home to around …… percent of the world's population.

2. Questions with short answers:

1. What are the names of the perennial rivers originating in the Himalayas?
2. What protects us from the freezing cold winds blowing southwards from the North Pole?
3. Name the neighbouring countries that share boundaries with India.
4. What is the significance of SAARC?
5. Which is the prime meridian (longitude) of our country?
6. How many languages are spoken in your state? List them.



Map 2.4: India Physical map

2.1 The Physical Features of the Indian Subcontinent

We learnt about the natural divisions of India in the previous section. We also learnt that the Indian subcontinent is a distinct landmass in the Asian continent in terms of its topography and culture. But are the surface features of the subcontinent the same everywhere? In this chapter, we shall discuss the diverse geographical features of the subcontinent and their special characteristics. We shall learn about how these features originated and how humans changed the face of the land and its environment by their activities. To understand how these activities changed the land, we need to find out how people lived and how they used natural resources for their livelihoods and needs in the different regions in which they settled. For example, they adopted agriculture as their means of livelihood in the fertile river valleys of the Indus, Ganges and Brahmaputra. In the Chota Nagpur plateau, they gathered forest produce and developed mining industries in addition to farming. In the Thar Desert and the northern hilly regions, many communities adopted a pastoral lifestyle. In the coastal regions, the main occupation was fishing.

Science and technology have contributed to changing the geographical and economic landscape of the country. The environmental impact of some of these changes is now creating roadblocks in human progress. We need to understand the social, economic and political dimensions of these problems if we wish to resolve them.

The Himalayas emerge from the Pamir Knot, located to the north of the Indian subcontinent. Many other high mountain ranges extend from this knot, including the Hindu Kush, Karakoram, Kunlun and Tien Shan ranges. The Vindhyachal and Satpura ranges are situated on the northern boundary of the peninsular plateau, while the Aravalli range is to the north-west. To the west lie the Sahyadri Mountains and to the east lie the low hills of the Eastern Ghats, as well as the eastern coastal plains.

Do all of these feature look the same? Were they all created at the same time?

India's topography can be divided into the following five regions based on the differences in structure, types of rocks and physical features:

1. The north and north-eastern mountain ranges
2. The extensive plains of the north
3. The peninsular plateau
4. The coastal plains and island groups
5. The Indian deserts

Let us take a closer look at these geographical regions:

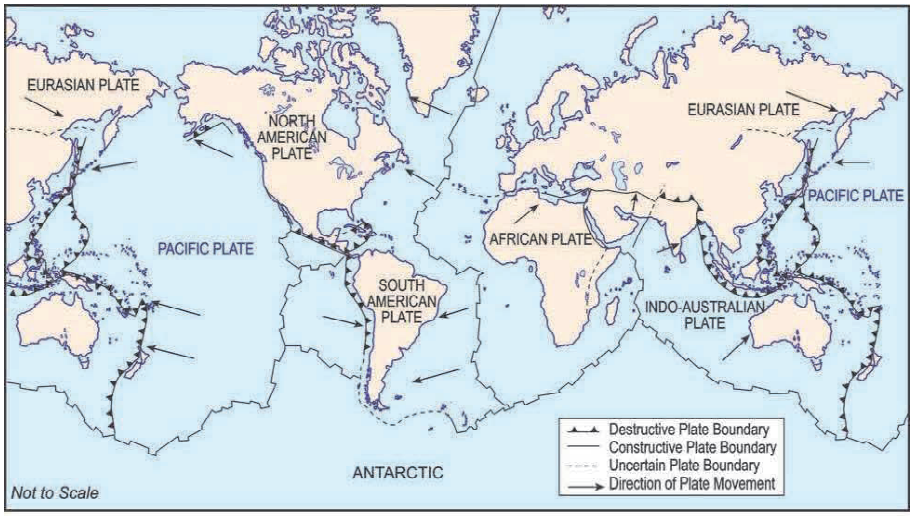
2.1.1 The North and North-eastern Mountain Ranges

The Birth of the Himalayas

Two kinds of natural forces play a primary role in forming the face of the earth and its features. They are internal and external forces – forces born inside the earth and forces born outside the earth. Earthquakes

Figure 2.2: A peak in the Himalayas

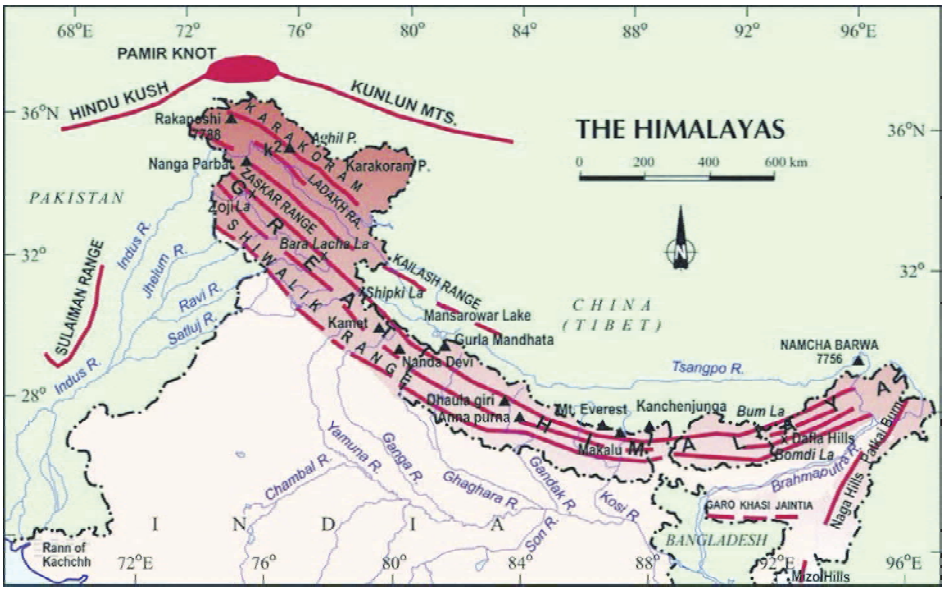
and volcanoes occur because of forces born inside the earth. They create different land-forms on the earth's surface. There are also many processes going on continuously on the earth's surface that are slowly changing the shape of land forms. They include the effects of wind, rain, snow, water and temperature. These are the external forces.



Map 2.5 The earth's plates

Do you know that the earth's crust (outer shell) is broken up into segments that are called plates? There are six major plates and several minor ones. One of the major plates is the Indian plate. The forces in the earth's interior cause these plates to glide. This gliding motion is so gradual that we can only imagine it, not feel it, not even in a lifetime. It is said the plates move only by a few centimetres in a year.

Millions of years ago, the Indian plate was located south of the Equator. It was a huge plate. But it broke into several pieces, one large piece being the Australian plate, which moved towards the south-east. The Indian plate moved towards the north, where it encountered the Eurasian plate. A huge sea, called the Tethys Sea, was located between these two plates. The rivers of the European and Indian plates deposited their sediments in this sea. The accumulated sediments slowly began to rise due to high pressure from below. This was how the Himalayan Mountains were formed around 5.5 crore years ago. The Himalayas are said to be the world's newest mountain range. The Aravallis are an ancient range. So the peaks of the Himalayas were once lapped by the waves of the Tethys Sea. The evidence is in the fossils of marine animals that can be found in the Himalayas even today. Meanwhile, the Indian plate continues to glide.



Map 2.6 The Himalayan mountain range

The Himalayas consist of several parallel mountain ranges. The major ones are the Trans-Himalayas, Greater Himalayas, Lesser Himalayas and Sivalik Hills. The Zanskar, Ladakh and Karakoram ranges are part of the Trans-Himalayas. Spreading from west to east, the Greater Himalayas, or Himadri range, reaches

Figure 2.3: A three-dimensional view of the Kashmir Valley

its greatest heights inside Nepal, with nine of the world's 14 highest peaks situated there. These peaks, which include Dhaulagiri, Cho Oyu, Mount Everest, Makalu and Kangchenjunga, rise to an altitude exceeding 7,900m. Among them, Mount Everest rises to a height of 8,848m.

The Lesser or Middle Himalayas, also known as the Himachal Mountains, form the middle section of the Himalayan range, extending across northern Pakistan, northern India, Nepal, Sikkim, Bhutan and Arunachal Pradesh. The average height of these mountains is 3,700-4,500m. The Shivalik Hills form the lowest region of the Himalayas, the southern section sloping steeply towards the plains. The Doon Valley, a flat valley or basin, lies in the north of these hills. Dehradun is a prominent city located within this valley. The beautiful Kashmir Valley is located between the Himadri and Pir Panjal ranges. It is an inter-mountain valley (intermontane basin). The serpentine Jhelum River flows through the vast, freshwater Wular Lake in the Kashmir Valley.

We know that the north and north-eastern mountain ranges make a unique contribution to India's environment and the lives of the people. The rivers of northern India originate in these mountains and have created the extensive Indus-Ganges-Brahmaputra plains. These perennial rivers are the lifeline of the densely-populated plains of the north. It is in the Indus-Ganges plains that ancient civilisations developed. Many major rivers originate from the Himalayas. The largest among them are the Ganges, Brahmaputra and Indus. Teesta and Manas are tributaries of the Brahmaputra. The Jhelum, Chenab, Ravi, Beas and Sutlej rivers are in the Indus river system while the Yamuna, Kali, Karnali, Rapti, Gandak, Gomti and Kosi rivers belong to the Ganges river system.

Answer the following after reading the paragraph above:

1.	**Which is the largest river system?**	**Ganges/Indus**
2.	**Which river flows in a western direction?**	**Rapti /Ravi**
3.	**Which river system has the least number of tributaries?**	**Brahmaputra/Indus**
4.	**Which of these river systems does the Mahanadi belong to?**	**Brahmaputra/Ganges/None**

Glaciers - Rivers of Ice

Figure 2.4: A glacier

In extremely cold regions and high mountains, it doesn't rain - it snows. Snow falls like soft cotton-wool on the ground and solidifies because of air pressure, part of it turning into hard ice. This snow-mixed-with-ice flows down the slope. This shifting mass of ice is called a glacier.

Glaciers flow through valleys just like rivers, so they are rivers of ice originating from the snow-capped mountains. There are many glaciers in the Himalayas, the biggest of which is Gangotri. It is 32km long. The Khumbu glacier is located in the Everest region of Nepal. It is the most popular path to climb the world's highest mountain. The Himalayan glaciers have started to melt at a faster rate in recent times because of rising atmospheric temperatures, and they continue to shrink.

The Kashmir Valley

The Kashmir Valley is situated at a height of 1,850m above sea level and is surrounded by mountains. It is also called the Jhelum Valley. The Jhelum River carved this 135km-long and 32km-wide plain amidst the mountains. How did it create this vast plain so high up in the mountains? This is a question scientists have been trying to answer. They say there was once a lake there. Its water flowed through a crevice into the Jhelum River when an earthquake split the mountains. The remains of this ancient lake is Kashmir's present Dal Lake. Srinagar, the capital of Jammu and Kashmir, is situated near the Dal Lake in the valley.

Famous for its natural beauty across the world, Kashmir has always been a draw for international tourists. They come to India in large numbers to visit the valley. The Dal Lake is dotted with floating houses-on-boats that are called 'house boats' or 'Shikaras'. They are a key tourist attraction and a major source of income for the local people. Apart from agriculture, the valley has several local industries, such as carpet weaving, walnut wood furniture, Kashmiri pashmina shawls, saffron, etc.

Karewa: The Kashmir Valley is surrounded by high mountains. It is a saucer-shaped plain, as we can see in Figure 2.5. Thousands of years ago, there was a very big lake here which was fed by the water of rivers and streams flowing down from the surrounding mountains. Over the years, these rivers and streams deposited their sediments (silt, clay etc) in the lake. When the Pir Panjal range began to rise because of internal processes within the earth, the water of the lake drained out. Plateau-like terraces or table-lands were formed on the surrounding mountains. Called *karewas*, or *vudras* in the local language, these terraces are very fertile. The priceless spice saffron

Figure 2.5: Floating houses-on-boats in Dal lake

(*zafran*, *kesar*) is grown on these terraces. When the saffron plant flowers, the stigmas are removed. They are used to prepare many medications. They are also used as a spice to prepare delicious dishes. Kashmiri saffron is famous the world over.

Figure 2.6: Saffron flower and Saffron

Ladakh: a village in the cold, high altitude desert

To the east of Jammu and Kashmir lies Ladakh, a high altitude desert. It is not a hot desert like the Thar, but a dry and cold desert. This vast, dry plain of ice spreads far and wide over the rocky terrain between the high mountains. Very little rain falls in this region.

Let us explore a village in Ladakh where Kim lives. The village is called Phey. Situated on the banks of the Penjila River, it has 80 houses on the mountain slope of the Zanskar Valley. The small houses made of stone, gravel and bricks are built on fertile land. They are known as *khangpas*. Their roofs are flat, and are used to store fodder for the livestock. People live together in small clusters in this region because of the harsh geographical conditions.

The people in Kim's village wear warm woollen clothes called *goncha* throughout the year. The climate is dry and the village faces a shortage of water. Have you ever walked on a frozen river? The Penjila River freezes during winter so people can walk on it. The frozen river forms a path that reduces the distance to the neighbouring villages. Living conditions in Ladakh are quite different from Chhattisgarh. People here have very small farms because the terrain is rocky and uneven. They grow peas, cabbage, cauliflower, potatoes, wheat and millets. Most of what they grow is for household consumption, not to sell in the market. This kind of farming where you grow only what you need at home is called 'subsistence' farming.

Because of the low rainfall, shortage of water, plus the hard climate and soil, the land is not cultivated throughout the year. Farming is done mostly from the end of summer in May to the beginning of October. When the glaciers melt during summer, the water is channelized to irrigate the fields. In winter, the villagers bring water from a spring a kilometre away. They sometimes thaw the ice to get water for their household needs. People also keep animals such as yak, deemo, zo, zomo, horses, donkeys, sheep and goats. The zo and zomo are hybrids of cows and yaks. Deemo is a female yak.

The yak and zo are used to plough the fields. The deemo, zomo, sheep and goats provide milk, from which cheese and butter are made. Some families take the sheep and goats of the village to the higher altitude pastures during summer. They return when it becomes too cold at these altitudes during winter. This migration with livestock as the seasons change is called trans humance, when there is no farming, the sheep are sheared and women weave clothes from the wool. The people live in a harmony with nature, not letting any available material go to waste.

What are the differences between farming in Chhattisgarh and Ladakh?

Uttarakhand: a Mountain Village

The village of Barsu lies at a height of 2,500m on the way to Gangotri in Uttarkashi district of Uttarakhand. A twisting and turning road takes you to this mountain village. It has only 20-25 houses. There is very little flat land so the houses are built on the mountain slopes. So they are small and mostly made of wood and mud plaster. The roofs are inclined and have slate tiles so the rainwater and snow cannot collect. Some houses have flat roofs on which people dry maize during winter and store fodder for their livestock.

Figure 2.7: A mountain village

Figure 2.8: Terraced fields

The Himalayas have very little cultivable land. Farming is done in the wide valleys or on the gentler mountain slopes. People generally live close to wherever such land is available. That is why you find small, widely dispersed settlements in the Himalayas. The population is thin and dispersed because of the lack of cultivable land. The terrain is rocky and the climate is temperate. It snows at least once during winter. Rainfall is also average. There is considerable soil erosion when it rains. The terraced fields help to prevent soil erosion.

Where else did you learn about such terraced fields?

People in the Himalayas cultivate rice, maize, vegetables and fruits in their terraced fields. The yields of cereals is not very high but you will be surprised to know that vegetables flourish here. You may have heard of the *pahadi aloo* (potato) and capsicum (Shimla *mirch*). Similarly, apples, plums, apricots, pears and cherries are the fruits grown on the mountain slopes. These fruits are grown on an extensive scale in plantations and sent to markets far and wide.

The region is mostly covered by evergreen forests. The trees do not shed their leaves together. People feed the leaves to their livestock and burn the wood as fuel. The produce of the farms is enough for household consumption. People also work as labourers and collect herbs in the forests for their livelihood. In the absence of employment avenues, the young people go to the cities to work in factories. The women do the household work and also work in the fields.

Animal Husbandry

The villages around Barsu are mostly populated by the Jad (shepherd) community. They rear sheep and goats. The villagers say they take all their sheep to graze in the upper reaches of the Himalayas in April when the tender and sweet summer grass grows, sometimes travelling close to the Chinese border. They know exactly which mountains fall within India, and which fall on the China border. They have accumulated a lot of knowledge and experience of the Himalayan terrain, vegetation and climate during their wanderings. They often have to endure the wrath of nature, so they carry everything they need to eat and live with them.

They start descending from the mountains in July-August and return home by November. The mountain grass is suitable for grazing, especially for sheep. Sheep are raised in the western Himalayas for their meat and wool. This is why sheep rearing is a major occupation. There is no grass when the region freezes in winter. So where do the sheep graze then?

When winter sets in, the shepherds take their flocks to the lower reaches of the Himalayas. The cold is less severe here and fodder is available. Their villages are in this region. They have their homes here, where they also do farming. During the cold season, people spin wool and weave blankets in their homes.

Why is fodder available only in the lower regions of mountains during winter? Explain.

Figure 2.9: Bugyal – alpine meadows where there is enough grass for the sheep to graze

There are several tribes living in the Himalayas who migrate seasonally with their livestock. Prominent among them is the Bhotiya tribe of Garhwal and Kumaon, who graze sheep, goats and cattle. The Bakarwal tribe of Kashmir only rears goats, while the Gujjars of Jammu, Himachal Pradesh and Uttarakhand rear buffaloes. Other pastoral tribes include the Changpas of south-eastern Ladakh and the Kinnaura tribes of Kinnaur in Himachal.

Industry and Other Occupations

Snowfall is heavy in the upper reaches of the Himalayas. The melting snow flows down the mountain side in small streams and rivulets. The swiftly flowing water is carried in large pipes to run turbines to generate electricity.

Cement-manufacturing plants are also being set up to use the limestone found in the Himalayas. The limestone quarries and cement factories generate employment for the local people. The availability of cement makes it easier to build bridges, dams, houses, hydroelectric stations, etc. But the fragile Himalayan environment has not been kept in mind while developing such projects. As a result, the limestone quarries are causing landslides, with the rubble of landslides causing additional problems. The cement dust from the factories pollutes the air, damaging crops and vegetation and affecting the health of the people.

Traditional handicrafts, which include weaving garments and shawls on hand looms, embroidery, decorative wood carvings, etc provide employment to a large number of people. Beautiful decorative items are also made from papier mâché. These are all small household industries. They are on the verge of closing down because the markets are flooded with machine-manufactured products. But the government is now taking steps to encourage these industries. As a result, these hand-crafted products are reaching distant markets, generating demand. They now sell at a remunerative price. In recent years, small food-processing plants have been set up to process fruits grown in the region. The products include fruit juices, preserves, pickles, etc.

What are the possibilities of setting up new factories in the Himalayas?

Tourism

Pilgrimage and tourism have attracted a large number of people from other regions to the Himalayas. The tourism sector has been flourishing in the mountain regions for the past several years. Tourists come in large

numbers from within and outside of the country to enjoy the natural beauty of the Himalayas and to visit places of pilgrimage. Many hotels have opened and local transport has been developed to cater to the tourist traffic. Thus, tourism has also generated many job opportunities. The important pilgrimage spots in the Uttarakhand include Badrinath, Kedarnath, Gangotri, Yamunotri, Hemkund Sahib, etc.

Explain how road construction has supported the growth of the tourism industry.

Figure 2.10: A landslide

Landslides: a Serious Problem

The rocks in the Himalayas are not firm or hard. When the forests are cleared, the steep mountain slopes crumble. Deforestation is now a serious problem in the region. Very often, entire villages are submerged in the rubble of landslides, causing extensive damage to human life and property. Roads get blocked by the falling rocks, affecting transportation. Many times, landslides have even blocked rivers, causing lakes to form. But the loose rubble crumbles under the pressure of water, causing these temporary lakes to suddenly flood the lower mountains reaches. Deforestation of the mountains also causes severe flooding in the plains. Can you explain why this happens?

The Eastern Himalayas

Locate and name the states in the eastern Himalayas in the political map of India.

Which river valley do these mountainous states surround?

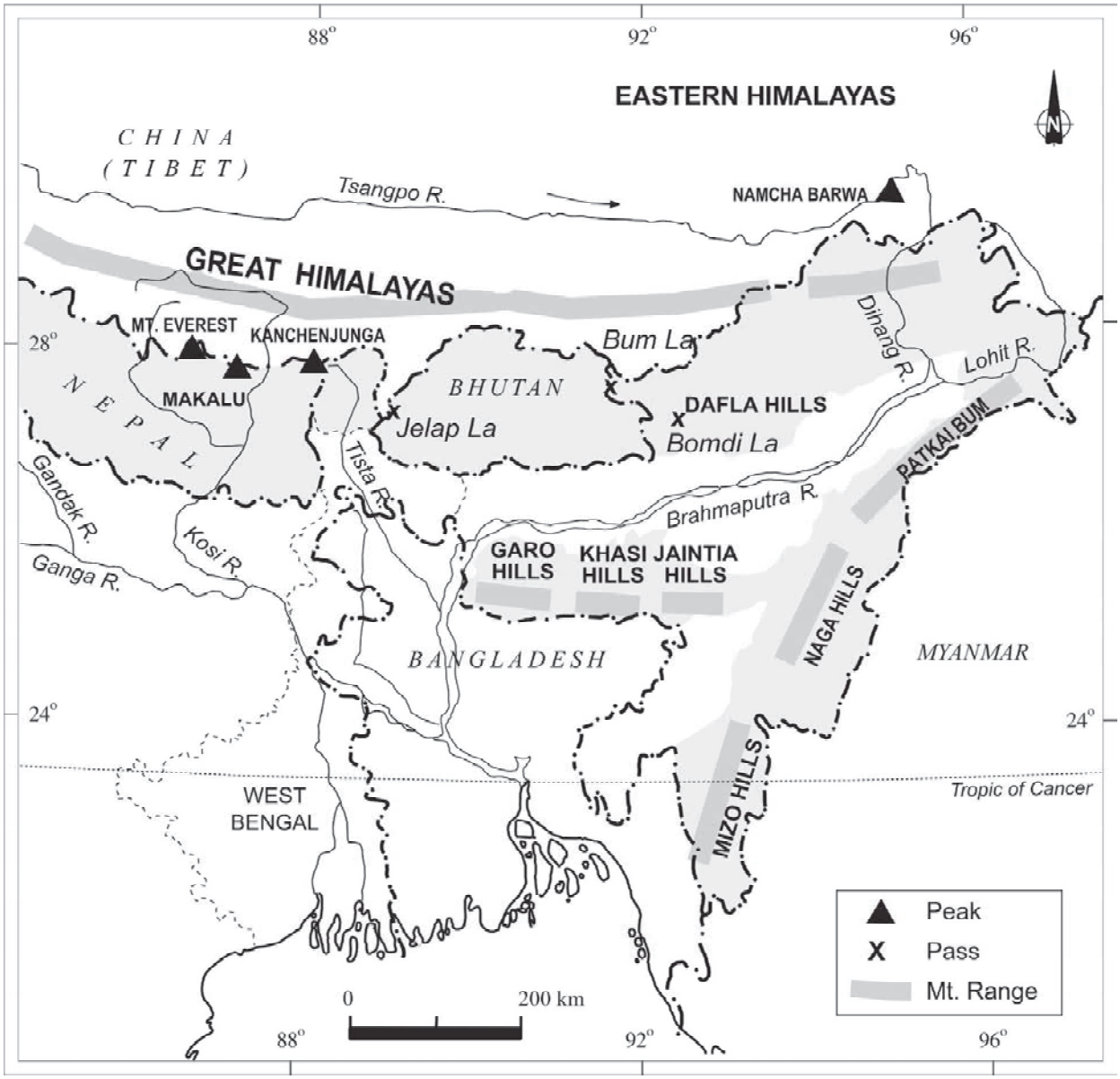
Which states does the Brahmaputra river valley extend into?

Many tribes live in the eastern Himalayan states. They include the Nagas, Mizos, Bodos, Mishmis, Monpas and Taraos. Let us take a look at how they live and the livelihoods they pursue.

Map 2.7 shows that the eastern Himalayas lie close to the Bay of Bengal. The moisture-laden winds blowing from the bay bring heavy rainfall to the region. It is among the wettest places on earth. Most areas receive more than 300 cm of rainfall annually.

The highest rainfall in the world occurs in Mawsynram in Meghalaya. The average annual rainfall here is 1187cm. We get 100-120cm of rainfall annually in the place where we live. That means Mawsynram gets more than ten times the amount of rain.

Figure 2.11: A habitation in Arunachal Pradesh



Map 2.7: The eastern Himalayas

Locate Mawsynram in Map 2.7

It may surprise you to know that, barring two to three months, it rains all year round in the eastern Himalayas. It begins to rain in the north-east when the temperature starts to climb in other parts of India in the month of March. The downpour is intense from May to September. The only months when there is a let up in the rains are December, January and February.

Due to the continuous downpour in the summer, temperatures never climb too high in the eastern Himalayas. The high altitude also ensures it never gets too hot. But in winter, it is freezing cold. Some areas even have snowfall.

The forest cover is dense in the eastern Himalayas because of the heavy rainfall. Even as trees are cut, new trees sprout rapidly. Cane and bamboo, as well as spices like bay leaf, large cardamom and cinnamon grow extensively in these forests.

What differences can you see between the climate and forests of the eastern and western Himalayas?

The steep slopes of the eastern Himalayas and the heavy rainfall make farming a difficult task. The heavy rain washes away the soil if the slopes are tilled. The problem is resolved by terrace farming in western Himalayas. Terraced fields can also be seen in the eastern Himalayas but most people there practice another kind of farming. It is called *jhum* cultivation. To find out how *jhum* cultivation is done, let us visit a village in Arunachal Pradesh.

This small habitation in Arunachal Pradesh nestles on flat land atop high mountains. It has about 20-30 houses. And what do these houses look like? Take a look at Figure 2.11. Bamboo stilts support a platform on which one long room with a verandah is built. It looks as if the bamboo stilts prop up the houses on the mountain slopes. The ground in the region is always moist because of the heavy rain so it abounds in snakes, scorpions, spiders and snails. The houses are built on stilts to keep out these insects and reptiles. Fruit trees, vegetables, tea and coffee are grown in enclosures near the homes.

This is a Nishi village. All the tribals in the village are related to each other. They belong to one clan but live in separate houses.

Going out to farm

It is December and the cold is severe. There is very little rain during this month. So water is scarce in winter. The rain water drains out swiftly down the steep slopes, leaving the upper regions facing a water shortage. Potable water is fetched from distant brooks flowing in the deep valleys.

The village of this Nishi clan has two or three mountains nearby that belong to the clan. They own the forests as well. The mountain slopes are their farms. Another clan cannot farm the land, which belongs to the village clan. Since it is owned by the clan, no individual can claim ownership of any piece of land.

Every year in December, the villagers choose a part of their land in the mountains to farm. So what happens to the land they farmed the previous year? It is left fallow for seven or eight years so the forest can regenerate. Bamboo, shrubs and other trees begin to sprout. It may again be farmed after a gap of seven-eight years.

Because the previous year's farm is left fallow, a new patch in the forest has to be cleared for farming. The villagers look for a new patch. After roaming the forests and discussing for long, they decide to farm the southern slope of the nearby mountain this year.

The next task, taken up the following day, is to clear the forest patch. This is hard work. The men fell the trees and prepare plots for each household. In this way, plots are prepared for everyone in stages. No outside labour is hired to do the job. Anyway, there is no labour available in the region. When felling the trees, the stumps are left intact. The stumps and roots prevent soil erosion.

Figure 2.12: Preparing for jhum *cultivation*

Once the trees are felled, they are left in the field to dry. The dry trees are burnt in March-April, before it begins to rain. The land is covered with ash and the remnants of half-burnt trees. The ash mixes with the soil after one or two spells of rain. This is how the field is prepared for *jhum* cultivation.

Ploughs are not used to till the steep slopes because the rain washes away the loosened topsoil. So you do not find ploughs in this region.

It is now April. There are light showers. Heavy rain comes in May. Sowing must be completed before that. Everyone, men and women, go to the fields carrying hoes and baskets full of seeds. Sowing begins from the lower slopes of the land. A small hole is made in the earth with the hoe and a few seeds are dropped in the hole and covered with soil.

When it rains heavily, weeds sprout rapidly with the crops. Weeds are a big problem because they grow fast. So the fields have to be weeded four or five times.

In *jhum* cultivation, crops consumed in the home are grown together. So rice, maize, millets, sesame, green beans, onions, tobacco, cotton, sweet potato, chilly and pumpkin are sown together in the field. Each crop is harvested as it ripens. The crops ripen in succession from August to December.

How is soil erosion prevented in *jhum* cultivation?

Where and how is this kind of farming practiced in Chhattisgarh? Try and find out.

Apart from growing a variety of crops in *jhum* cultivation, the villagers gather fruits and tubers from the forests. This work is done by the women. Generally, fruit trees are not cut when preparing the field for for *jhum* cultivation, so their fruit is plucked as they ripen.

The men also hunt in the forests. Meat is an important part of their diet. But there are few animals in the forests today. That's why there are many prohibitions on hunting.

People in the eastern Himalayas mostly eat rice, vegetables, meat and fruits. They grow most of what they need in their *jhum* farms or their enclosures. They hunt and collect fruits in the forests. Oil, sugar and salt are brought from outside, so they are expensive and consumed in small quantities. Animals are reared for their meat.

Challenges of *Jhum* Cultivation

The growing demand for timber and the expanding timber trade is leading to the rapid depletion of forests. The population is also rising as the forests disappear. There is now not enough forested land to practice *jhum* cultivation. In the past a *jhum* patch would remain fallow for up to 20 years. Today, the time span is 4-5 years. So forests are getting degraded because they cannot regenerate properly. Moreover, taking up *jhum* cultivation on a patch within 3-4 years results in a poor harvest.

Many people believe that *jhum* cultivation is destroying forests and the tribals in the region should switch to terrace farming. This way, farming could stabilize in one place and new forests would not have to be cleared every year.

But it is difficult to construct terraces on the steep slopes. It is back-breaking work and very expensive. Also, the topsoil erodes when making terraces, so yields are low in the first few years of farming. And the heavy rainfall in the region erodes even the soil of the terraces. This is why people still practice *jhum* cultivation in many areas of the eastern Himalayas.

What kind of changes are taking place in *jhum* cultivation? How do they impact the forests?

Tribal Development in the North-east

Laws have been framed to restrict people from visiting the eastern Himalayan region without official permission. Buying land there is out of the question. Thus, outsiders have not been able to take over the local land, forests and other natural assets. The tribes in the region have been able to develop independently. Education has played a large role in this development. Educated tribal men and women have reached top-level posts in the region and work in different states of the country.

Because there are no heavy industries or commercial agriculture in the north-eastern states, new means of livelihood are limited. People's incomes are quite low. Farmers sell very small quantities of their produce. That's why they don't have the money to buy many things.

Tea Plantations

Tea is consumed not only in Indian cities but in its villages. Most of our tea comes from the eastern Himalayas. There are huge tea plantations in the lower hill regions of Assam. The new leaves of the tea bushes are hand plucked, then shred and dried in machines. Tea is the key commercial crop of Assam.

Figure 2.13: A tea plantation

EXERCISES

1. Which of the following states do not fall within the Himalayas?

   a) Madhya Pradesh b) Uttar Pradesh c) Sikkim d) Haryana e) Punjab

2. Why do Himalayan rivers have water all year round?
3. Why do the shepherds in the Himalayas take their flocks to the upper reaches of the mountains during summer?
4. "The population in the mountain regions is sparse and widely dispersed." Explain the meaning of this sentence.
5. What is grown on the mountain slopes?
6. How has road construction changed farming and tourism in the Himalayas?
7. Why are there landslides in the Himalayas?
8. Why do mountain regions have limited means of livelihood?
9. Why are the forests in the eastern Himalayas so dense? What trees grow in these forests?
10. Describe in your own words how *jhum* cultivation is done - from clearing the forest patch to harvesting the crops.
11. What are the problems in practicing *jhum* cultivation nowadays?
12. What factors helped the tribes of the north-eastern states to progress so rapidly?

2.1.2 The Vast Northern Plains

The vast plains of the north are a prominent geographical feature of the Indian subcontinent. They spread across Pakistan, India and Bangladesh. To the west lies the Indus River valley, in the middle is the Ganges River valley and to the east is the Brahmaputra River valley. That's why it is also called the Indus-Ganges-Brahmaputra plains. They formed after the Himalayas were created. We call the plains a gift of the Himalayas. They have always been the cradles of civilisation and culture. They offer all facilities for earning a livelihood, that is why a large percentage of India's population lives here.

Topographically, the vast plains are similar, but they harbour immense diversity. Rainfall is not uniform across the region. Rice is the main crop in the eastern plains while wheat is the main crop in the western plains (western Uttar Pradesh, Haryana and Punjab).

Some interesting facts

1. **The huge plain is around 2,400km long and 150-480km wide.**
2. **It covers a total area of 7,75,000sq km.**
3. **The Harappan civilisation developed in this plain.**
4. **Majuli Island in Assam is the biggest riverine island in the world.**

The Formation of the Plain

We learnt in the previous chapter that the Himalayas were formed by geological disturbances at the bottom of the Tethys Sea. A long narrow trough between the Himalayas and the Decca plateau is all that remains

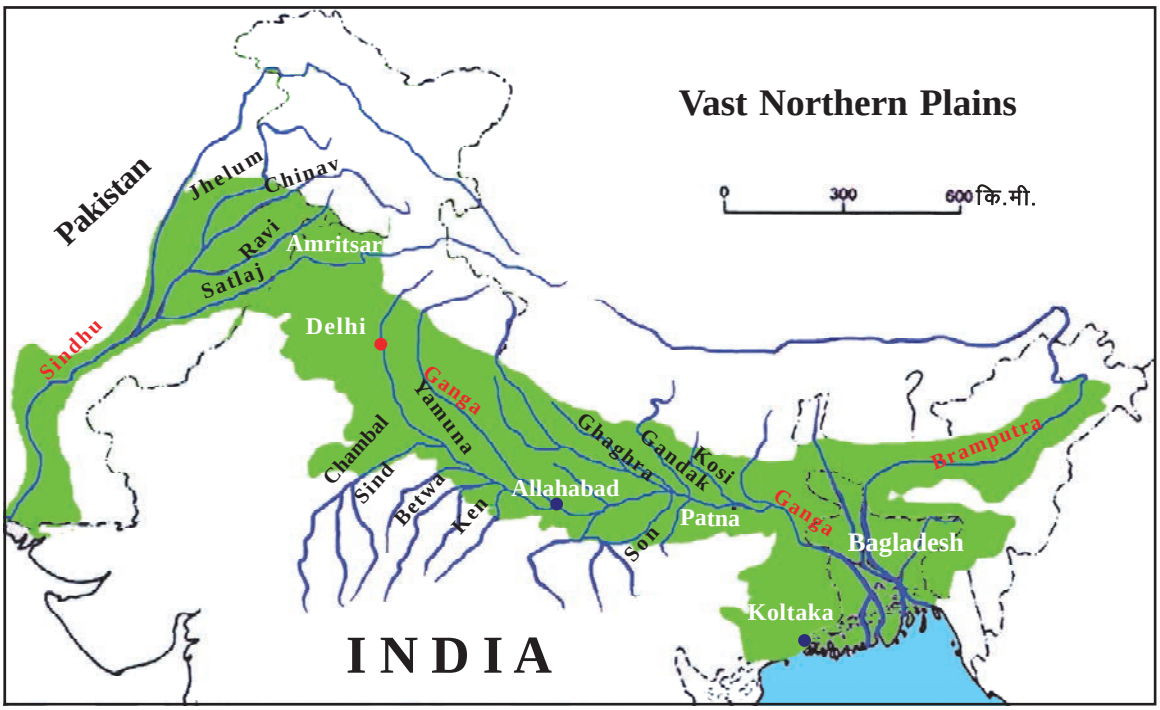


Figure 2.8: The plains of the Indus, Ganges and Brahmaputra

of the Tethys Sea. With the passage of time, the rivers flowing from the Himalayas – Indus, Ganges, Brahmaputra, etc - and the rivers flowing in the northern peninsular plateau deposited their sediments to create this vast, fertile plain. Even if you dig to a depth of a thousand feet in this plain you will only find sediment. So imagine how many years it must have taken to form this plain?

Physical Divisions of the Plain

The vast northern plain is divided into three sections:

1. The Indus-Sutlej plain
2. The Gangetic plain
3. The Brahmaputra plain

1 The Indus-Sutlej Plain

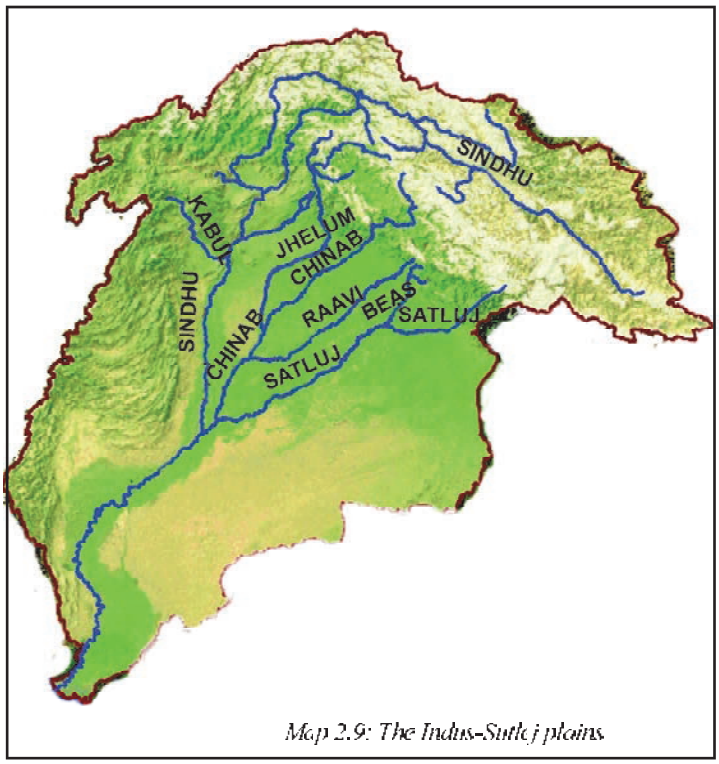
The Indus-Sutlej Plain was created by sediments deposited by the Indus and its tributaries, Sutlej, Beas, Ravi, Chenab and Jhelum. A major portion of the plain lies in Pakistan. In India, it covers the states of Punjab and Haryana, hence it is called the Punjab-Haryana plain. It is flat and fertile. The rivers of the region have created different landforms, such as *bet* and *doab* (land between two rivers). Numerous irrigation facilities have been developed here because of the perennial rivers and productive land. This network of canals and tube-wells helped usher in the Green Revolution in this region. The prominent cities include Amritsar, Chandigarh, etc.

Local names of some land forms

***Bet*: Flood-affected area**

Doab*: Land between two rivers, such as Bist and Bari *doab

***Punjab*: Land of the five rivers**



Map 2.9: The Indus-Sutlej plains

Irrigation and the Green Revolution

After Independence, India adopted a new agricultural policy that led to the rapid development of the irrigated regions of Punjab, Haryana and western Uttar Pradesh. Agricultural production increased manifold as a result of intensive agricultural practices based on the use of short duration, HYV (high yielding variety) seeds, irrigation, fertilisers, pesticides, etc. Per hectare yields rose even on small sized farms'. The new agricultural techniques helped farmers harvest two crops a year. This increased their income and there was prosperity all round.

The Green Revolution helped India become self-sufficient in food-production. Besides wheat, crops like millets, maize, cotton and sugarcane are also cultivated. Nowadays, rice is grown in some parts of this region.

Discuss:

The plains of Punjab and Haryana receive scant rainfall. Yet their agricultural production is high. What made this possible?

What is the main source of irrigation here?

Is the area where we live a plain or a plateau? Where is it easier to dig a well and why?

How do the rivers in Punjab and Haryana have water all year round when the rainfall is so low?

Canals reach the river water over a wide area. It is easy to construct canals in the plains because the rivers flow almost at the level of the surrounding fields. The banks of the river are breached to build canals. The water flows to the fields through these canals. Since the land is not undulating, canals can carry water to distant fields.

A high dam was built across the Sutlej River at a place called Nangal. It is called the Bhakra-Nangal dam. Punjab's canal network was laid after the dam was constructed. Bhakra-Nangal also produces hydroelectricity. As a result, homes were electrified and the region could also industrialise.

2. The Gangetic Plain

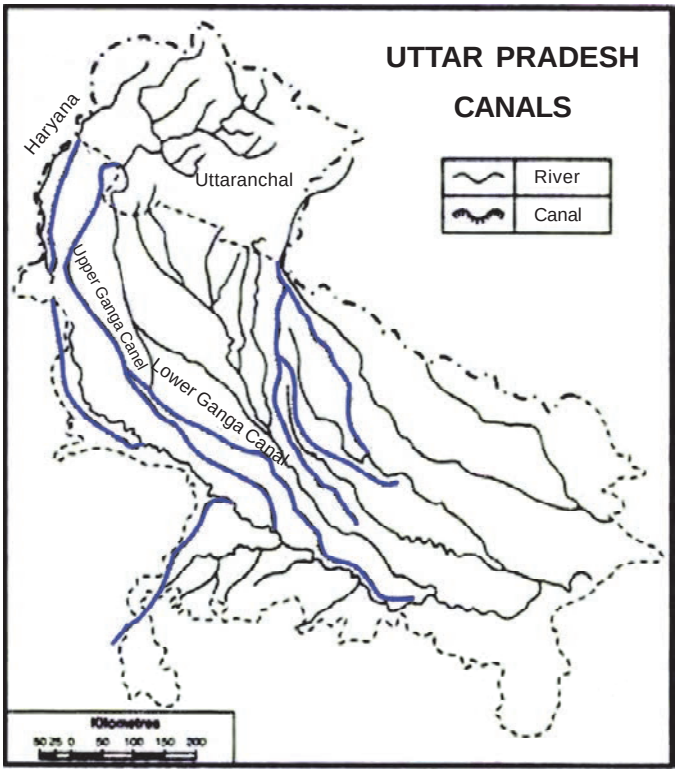
This plain was formed by sedimentary deposits of the Ganges and its tributaries (Yamuna, Gandak, Ghaggar, Kosi, etc). It spreads across a large area of Delhi, Uttar Pradesh, Bihar and West Bengal. Groundwater is found at shallow depths. The monsoon winds bring ample rainfall to the region. At times, the rivers flood, causing extensive damage. Irrigation facilities are more widespread in the western plains of the Ganges and Yamuna. This permits more than one crop to be grown in a year. This intensive agriculture is the reason why the region is densely populated. Agra, Mathura, Meerut, Delhi, Varanasi, Allahabad, Kanpur, Lucknow, Patna, Kolkata, etc are the cities that have developed on these plains.

The sediments deposited by the rivers have created different kinds of land forms. The plain can, thus, be divided into *bhabar*, *terai*, *bangar* and *khadar*.

***Bhabar*:** The Himalayan rivers deposit coarse gravel and small rocks at the foot of the Shivalik Mountains. This layer of gravel is called *bhabar* (see Figure 2.14). The river water flows under the gravel deposits in this region.

***Terai*:** The rivers that disappear in the *bhabar* belt resurface in the plains, their water spreading far and wide. This turns the land into a vast swamp that is called *terai*. Agriculture was developed in this region after independence.

***Bangar*:** These areas of old river sediments form a large part of the northern plains. The flood waters do not reach up to here. Hence, they are less fertile, so coarse grains are grown. These areas are called *bangar*.



Map 2.10: The rivers and canals of Uttar Pradesh

Figure 2.14: A bhabar *belt*

***Khadar*:** The rivers deposit a new layer of silt in the flood plains every year during the rainy season. These deposits are called *khadar*. They are very fertile. This soil spreads across eastern Uttar Pradesh, Bihar and West Bengal. The predominant crops grown here are sugarcane, wheat, paddy, jute, pulses and oilseeds.

Figure 2.15: An oxbow lake

***Oxbow* lakes:** These lakes are formed in the bends of meandering rivers. When the river floods, it breaches its banks and flows straight, leaving its serpentine course. The land in the river bends is flooded to form '*oxbow*' lakes.

3. The Brahmaputra Plain

This plain extends in a narrow strip along both banks of the Brahmaputra River from Sadiya to Dhubri in the eastern state of Assam. It was formed by the silt deposited by the Brahmaputra and its tributaries. The soil is very fertile. Since the rainfall is high in the region, jute and rice are grown extensively. The upper slopes of the plain have vast tea plantations.

The plain is surrounded by mountains on three sides to the north, east and south. Extensive flooding of the Brahmaputra and its tributaries, plus heavy sediment deposits in the river channel, cause the river to meander into many branches. Many

Map 2.10: The Brahmaputra River

Figure 2.16: A Sundari tree in the Sundarbans

islands have been formed in the river by these sediment deposits. They are called riverine islands. The main city in the Brahmaputra plain is Guwahati. The Brahmaputra joins the Ganges in West Bengal to form the world's largest river delta, known as the Sundarbans delta. It is named after the Sundari trees that grow in abundance on this marshy land.

Delta: When a river reaches the end of its course before draining into the sea, it is called an 'old age river'. The gradient is gentle and the river current is extremely mild. So it cannot carry the sediment load. The sediment is deposited on the river beds and banks, creating obstacles to the river's flow. As a result, the river changes course into many smaller distributaries before draining into the sea. The triangular land mass formed by the river during this process is called a 'delta'.

Fill in the characteristics of the features listed below for each river plain:

S No	Point	Indus-Sutlej plain	Gangetic plain	Brahmaputra plain
1	Soil			
2	Rivers			
3	Crops			
4	Prominent cities			

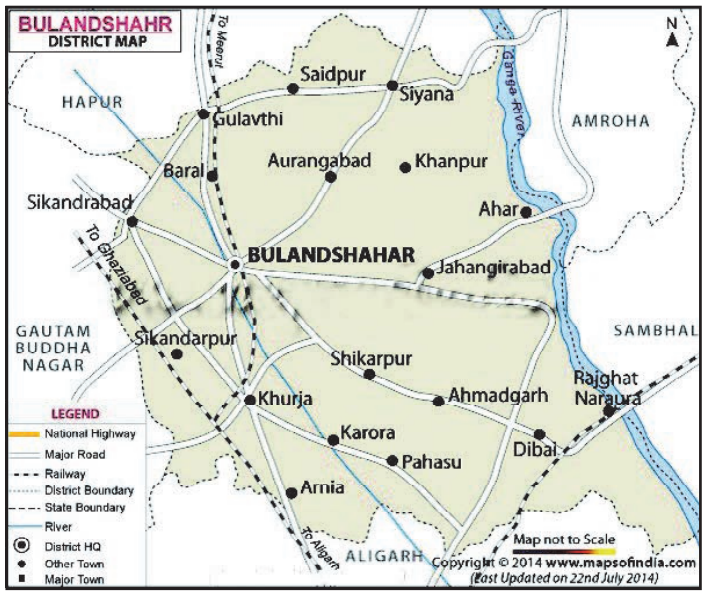
Map reading: Draw or indicate the following in a map of India:

1. **The rivers responsible for forming the great plains of India.**
2. **Ten major cities located on the banks of rivers in these plains.**
3. **Colour India's great plain in green.**
4. **Draw the delta created by the Ganges and Brahmaputra rivers.**

The Northern Plains and its People

The plains of the Ganges and Yamuna lie in western Uttar Pradesh. An ancient village called Mirpur is located in Bulandshahr district. (The original name of this village was changed by Gilbert Etienne who wrote a book *Food and Poverty* based on a study of this village.) This village nestles on the alluvial sediment deposited by the rivers. Agriculture is the livelihood of 75% of its population. Rainfall is adequate and groundwater is available at a depth of 28-30ft.

The geographical conditions of the plains are suitable for intensive farming. The land is farmed throughout the year and three crops are grown. Most of the people living here depend on the fertile land for their livelihood.



Map 2.12: Bulandshahr district

Rice, millets like *jowar* and *bajra*, black gram (*urad dal*), etc are the chief crops grown during the kharif season. A good crop of wheat, mustard and potatoes is harvested during the rabi season.

Of these crops, *jowar* and *bajra* are fed to the livestock. Wheat is sold in the market at Bulandshahr. The key commercial crop of this area is sugarcane. In every village, farmers owning 4-5 acres of land grow sugarcane in part of their land. The cane is sold to the nearby sugar mills. It is used to produce both sugar and jaggery. Some people also own mango and guava orchards.

The local people keep livestock in addition to farming. The big farmers keep livestock for domestic consumption of milk and ghee. Those with small holdings sell the milk to dairies to augment their household income. They also sell dung to the well-off farmers for cash or fodder and work as farm labourers. The dung is used as manure.

High Population Density

The northern plains are densely populated. Let's take another look at Mirpur village to see how the face of this old community has been changing:

Table 1: Mirpur village – land and population

Year	Population	Agri. land	Total land	Irrigated land (ha)
1861	451	228	276	59
1921	731	264	276	131
1961	1,227	260	276	192
1981	1,848	250	276	250
2011	2279	245	276	245

Source: Based on Gilbert Etienne's Food and Poverty

150 years ago in 1861, most of the land in the village was farmed. By 1921, the remaining forests were cleared for farming. Since then, there has been no increase in the cultivated area i.e. for the last 90 years. In 1921 each hectare supported nearly three people (731 people/276 hectares = 2.6 people/hectare. In 2011, the number was over eight people (2,279 people/276 hectares = 8.25 people/hectare). This shows the population density of the region went up almost three times in 90 years. How could the same acreage of land support so many more people? Let us find out.

The population of villages like Mirpur has risen considerably. It was 731 in 1921, 1,848 in 1981 and 2,279 in 2011.

The plains have productive soil and good irrigation. We had learnt about the irrigated areas of Punjab-Haryana and western Uttar Pradesh. Look at the figures of Mirpur village. It had irrigation facilities in the past. But only a fourth of the village acreage was irrigated 150 years ago. The irrigated area increased almost two-fold from 1921 to 1981. Today, all the cultivable area is irrigated. We know that two to three crops can be grown with irrigation and the production also increases. For these reasons, the northern plains are farmed intensively and are densely populated.

Cultivating more than one crop on the same land in a year is called multiple cropping. This is the easiest way to increase the productivity of the land.

The Mirpur farmers grow three crops a year because of their well-developed irrigation system. Fifty years ago, a small portion was irrigated by drawing water from a well with a Persian wheel. Now people irrigate large tracts of land with electricity-driven tube wells and diesel engine pump sets. Earlier, the government had installed some tube wells. But farmers soon began drilling their own tube wells themselves.

Figure 2.17: Irrigation from a tube well

Such irrigation facilities are not available in all the villages of India. Compared to the plains, irrigation is facilities are few in the Deccan plateau. Around only 40 percent of the total cultivated acreage in the country is irrigated today. The rest depends on rainfall. Natural resources like land and water have been utilized intensively to increase crop yields and production. But the resources have not always been judiciously used. Experience shows us that the fertility of the soil is decreasing because of excessive use of chemical fertilisers and pesticides. The groundwater level continues to drop as farmers continue to install more and more tube wells. Falling groundwater levels force them to drill deeper to get water. In such a situation, the poor and marginal farmers are being pushed to face harsher challenges.

Talk to a sugarcane juice vendor and find out where he gets the sugarcane from. How much profit does he make?

What is the reason for multiple cropping?

Identify the irrigated areas on the wall map or in your atlas. Does our region fall in the irrigated category?

Land distribution in Mirpur

We have learnt how important land is for farming. Unfortunately, there is not enough land for everyone engaged in agriculture. Mirpur has a population of 2,279 (2011 census). The village has 401 families belonging to different castes. One-third of these families (131) are landless. Around 50 families are middle to big farmers with more than two hectares each. Some of these big farmers own more than 10 hectares. As many as 220 families farm small plots of less than two hectares. They don't earn enough from these marginal holdings to sustain themselves.

Table 2: Land distribution in Mirpur

Category of farmer	Size of land	Number of families	Percentage of families
Medium and big farmers	More than 2 hectares	50	11.11%
Small farmers	Less than 2 hectares	220	48.88%
Landless labourers	No land	131	29.11%

Why do many families continue farming such marginal holdings?

The classification of Indian farmers according to size of holdings is given in the table below:

Table 3: Land distribution in India

Category of farmer	Size of holding	% of farmers	% of total land (farm area)
Medium and big farmers	More than 2 hectares	15%	55%
Small farmers	Less than 2 hectares	85%	45%

The table shows that around 85% of farmers in India are marginal farmers but they own less than half the total cultivated area.

Organisation of production

Let us now try to understand the entire agricultural production process in Mirpur. Land, water and labour are the essential factors for production. Farming demands hard physical work. Most small farmers take the help of family members to work their farms. Medium and big farmers employ labourers in their fields.

The labourers who work in the fields belong to either landless families or families owning very little land. They are paid in cash or in kind (produce). At times, they are given food, the cost of which is adjusted against their wages.

There is intense competition for wage labour among the landless families in Mirpur. So people are willing to work for low wages. With big farmers using machinery like tractors, threshers and harvesters on their farms, the scope for manual labour is getting more limited.

Modern agricultural practices need HYV seeds, irrigation, fertilisers and pesticides. This requires capital investment. Most small farmers take loans from big farmers, moneylenders or fertiliser and seed dealers to buy these inputs. The interest rates on these loans is extremely high.

Medium and big farmers usually earn a profit from farming, so they have the required capital to invest for seeds, fertilizers, pesticides, wage labour, etc.

All the big farmers in the village own tractors. They use them to plough and sow their farms and also hire them out to the small farmers. Most of them own threshers and harvesters as well. Such farmers also have several tube wells to irrigate their fields.

Dairying and other occupations

Dairying is a common occupation of many families in Mirpur. People use monsoon grasses and the straw of *bajra* and *jowar* as fodder for their buffaloes. They sell milk in the nearby town of Jahangirabad. Two businessmen have established milk collection centres in the town, from where the milk is sent to faraway locations such as Bulandshahr and Delhi. Apart from dairying, the villagers pursue many other occupations to earn their livelihood.

Around 50 people are presently engaged in building construction in Mirpur. Mishrilal has bought an electricity-driven sugarcane crushing machine to produce jaggery. He buys sugarcane from other farmers and sells the jaggery to traders in Jahangirabad. He doesn't earn a big profit from his business.

There are only a handful of traders in Mirpur. They buy goods from the wholesale markets in the city and retail them in the village. Small shopkeepers mostly sell rice, wheat, sugar, tea leaves, oil, biscuits, soap, toothpaste, batteries, candles, notebooks, pens, pencils, and even clothes.

Some families living near the bus stand have set up small shops there. They sell food items and soft drinks. Their women and children also help in running the stalls.

Some shop owners buy goods in the village and sell them in other large villages and towns. Those operating flour mills buy wheat from the farmers and sell the flour (*atta*) in the town markets. We saw that most Mirpur residents are self-employed - as farmers, shop owners, vendors, etc - while some others work as labourers. Most of the people in India are self-employed in this way.

Modes of transportation

Various modes of transport ply on the road connecting Mirpur to Jahangirabad. They include rickshaws, *tongas*, jeeps, tractors, trucks, bullock carts, etc. Many people earn their livelihood by working in the transportation sector.

EXERCISES

1. Write True or False for the following statements:
   a) The entire Indus-Ganges plains lie in India.
   b) Some parts of India lie within the Indus-Ganges plains.
   c) The Indus-Ganges plains are a part of the vast northern plains.
   d) The Ganges is the most important river of the northern plains.
2. Why is irrigation needed in the Punjab-Haryana plains? How do the farmers benefit from irrigation?
3. Why is it easy to construct canals in western Uttar Pradesh?
4. What are the differences between our region and the village of Mirpur?
5. What are the similarities and differences between *terai* and delta?
6. What are the differences between an ox-bow lake and the ponds in your village or town?
7. Water is a natural resource needed for production. But it is being excessively used for agricultural production. Explain this statement.
8. What are the differences between the occupations of people in Mirpur village and your own village?

PROJECT WORK

1. The Census Department conducts a survey of India's population once every 10 years. It fills out a census form that requires the details listed below. Complete this census form with details of your own village or a neighbouring village:
   a) Place ……
   b) Total area of the village …….
   c) Utilised land (in hectares) …….
      Agricultural land ……..
      …… land that is not available for farming (area used for homes, roads, ponds, pasture.) Irrigated land ……...
      Unirrigated land …….

d) Facilities:

Educational ……..……

Medical …….

Market ……..

Electricity supply ……...…….

Communication services …….....

Nearest city ……

2. Talk to any two labourers from your locality, (either agricultural labourers or construction workers). Find out how much they earn in a day. Are they paid in cash or kind? Do they find work every day? Are they indebted?

3. Talk to elders in your locality and find out what differences they have seen in irrigation facilities and agricultural production over the past 30 years.

2.1.3 The Peninsular Plateau

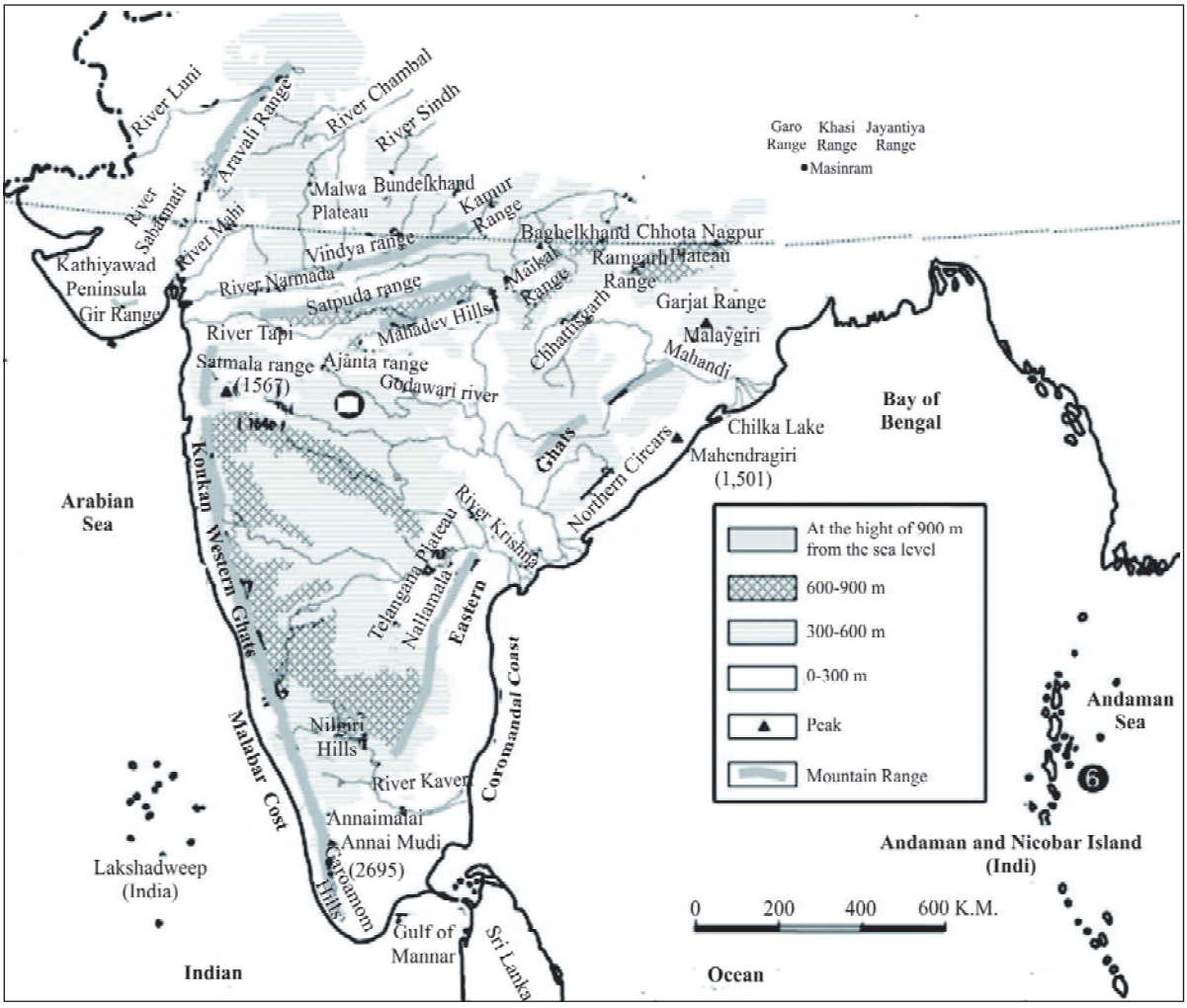
A large part of India lies on a plateau that is known as the Peninsular Plateau. It spreads from the Aravalli Mountains and Kutch in the north-west to cover the entire southern peninsula. From west to east, it runs almost parallel to the Yamuna and Ganges, extending to the Rajmahal Hills in the east and the Shillong Plateau in the north-east. The peninsula's geological structure reveals that some parts of the plateau to the north have been covered by the sediments of the Indus and Ganges. That's why we see glimpses of this ancient plateau in the plains region.

We learnt about the Indian plate in the last chapter. India's huge peninsular plateau forms the Indian plate. It is also known as Gondwanaland. It is South Asia's ancient geological land-mass. It spreads over an area of 16 lakh sq km. It is composed of hard rock, which includes both igneous as well as metamorphic rocks (granite, basalt, gneiss, schist, etc). Barring some peripheral areas, the sea has not encroached on the plateau.

Scientists say that the Indian plate or Gondwanaland slowly glided northwards to encounter the Eurasian plate several lakhs of years ago. When it reached its present position, its western portion was subducted (forced down) where the Arabian Sea is seen today. The subduction caused the peninsular plateau to rise to its present height.

The surface topography of the plateau today is the result of erosion over the ages. The erosion was greater in areas where the rock was comparatively soft and less in areas where the rock was hard. This process, which continued for lakhs of years, resulted in the creation of an undulating landscape. The hilly areas are composed of hard rock which is being slowly eroded even today. That's why if you take a close look at the mountain peaks in the region, you will notice that they are rounded, not pointed like in the Himalayas.

You can see highly eroded terrain and high mountains along the boundaries of the plateau, such as the Sahyadri and Aravalli hills. The geological processes occurring in the earth's interior created faults or fissures in the plateau many lakhs of years ago. The Narmada and Tapti rivers flow in a rift valley created by a fault. The peninsular plateau was unstable at the time the Himalayas were being formed, creating these fissures and causing the land to rise in some places. The Palni and Nilgiri hills are examples of rising land masses.



Map 2.13: India's peninsular province

The lava traps of the Deccan were formed by lava from volcanoes that was deposited on the earth's surface. These lava deposits give the region the name of the black soil province. The gradient of the peninsular plateau is towards the south-east. That's why most rivers originating from here drain in the Bay of Bengal.

The peninsular plateau is a more geologically stable region than the Himalayas or the northern plains, but it does also experience earthquakes. Examples include the Latur earthquake of 1993 in Maharashtra and the Bhuj earthquake in Gujarat in 2001.

Do you know?

1. **Geology, or geological science, is a branch of science that studies the earth, its internal structure, nature and materials.**
2. **A flat land mass (table-land) that is at a higher level compared to a plain is called a plateau.**
3. **Igneous rocks are formed when the lava emanating from volcanoes solidifies. They are the hardest of all rocks.**
4. **Rocks that have changed in appearance because of temperature and pressure are called metamorphic rocks.**

Geographical features of the great Indian peninsula

This vast peninsular plateau can be divided into two regions:

1. The central highlands
2. The Deccan plateau

1. The Central Highlands

The central highlands lie to the north of the Vindhyachal range, with the Aravalli Hills forming its north-western border. Between the Vindhyas and Aravallis lies the Malwa plateau, to the north is the Bundelkhand plateau, to the east is the Baghelkhand plateau, while the Chota Nagpur plateau is in the far-east. The gradient of the highlands is towards the north-east as seen in the flow of its major rivers (Chambal, Betwa, Son).

Do you know?

The Western Ghats are one of the ten biodiversity hotspots in the world. They harbour 7,400 species of flowering plants, 139 species of mammals, 508 species of birds, 179 species of amphibians and 288 species of freshwater fish.

The Anaimudi peak (2,695m) in the Anaimalai Hills of the Western Ghats in Kerala is the highest mountain peak in South India. Kodaikanal is a hill station in the Palni Hills. Ooty (Udhagamandalam) is a famous hill station and tourist spot of South India situated in the Nilgiri Hills of the Western Ghats.

Each plateau of the central highlands has its own characteristics. The Malwa plateau has black soil, which is also called black cotton soil. Bundelkhand is an undulating plateau, with its western part covered by forests. The Baghelkhand region is surrounded by hills, the Vindhyas and Kaimur Hills making up a large part of the plateau. The Chota Nagpur plateau is similar, with the Rajmahal Hills to its north-east, Hazaribagh Hills to its north and Kolhan Hills to its south.

Do and learn

Look at the physical map of India. Now look at the features listed in the table. What are the differences between these features in the Himalayan mountain region and the central highlands of the peninsular plateau?

S No.	Feature	Himalayas	Central highlands
1.	Direction of slope		
2.	Rivers		
3.	Minerals		

The Chota Nagpur plateau is the richest in mineral wealth among all the regions of the central highlands. Coal, iron ore, mica, bauxite, limestone, dolomite and feldspar are found in the plateau's Damodar Valley.

2. The Deccan Plateau

This plateau lies between the Western Ghats and Eastern Ghats, extending from the southern bank of the Tapti River to the Nilgiri Hills in the south. It covers 7 lakh sq km and is triangular in shape. The states of

Maharashtra, Madhya Pradesh, Chhattisgarh, Odisha, Andhra Pradesh, Telangana, Karnataka, Tamil Nadu and Kerala fall either partly or fully in this region. One side of this triangle passes through the Eastern Ghats, connecting the Nilgiri Hills to the Rajmahal Hills. The second side is formed by the Satpura, Mahadeo and Maikal hills. The Sahyadri Hills, which are also called the Western Ghats because they are located in the west, forms the third arm. The Sahyadris have wide sections at a lower altitude that are called *ghats*. They provide a passage for transportation between the plateau and the coastal regions. From north to south, the three famous *ghats* in the Western Ghats are Thalghat, Bhorghat and Palghat.

The Eastern Ghats run parallel to the eastern coast from the Mahanadi Valley to the Nilgiri Hills, a distance of 800km. The Western and Eastern Ghats meet in the south at the Nilgiri Hills. The Mahanadi, Godavari, Krishna and Kaveri rivers flow eastwards, cutting through the Eastern Ghats and draining into the Bay of Bengal. They form fertile deltaic plains.

The north-east section of the peninsular plateau is known as the Chhattisgarh basin. The gradient of this basin is eastwards. It falls within the Mahanadi flood plains that are covered with the rich silt deposits of the rivers. Plateaus lie to its north and north-east, known locally as the Jashpur Plateau, Dharamjaigarh Plateau and Raigarh Plateau. The Chhuri Hills extend over the north-west, while the Maikal Hills lie to the west. The Bastar highland, known as Dandakaranya, lies south of this basin. The Bailadila and Dalli Rajhara regions are rich in high-quality iron ores. Limestone and dolomite are also found in abundance.

The Indravati River flows through this region, which is also well-known for its subterranean caves such as Kutumsar, Kailash and Dandak caves.

Do you know?

1. **The Kutumsar Cave is a subterranean cave. These caves have subterranean features (speleothems) like stalactites, stalagmites, columns, etc. Stalactites are columns of limestone hanging from the ceiling of the caves, while stalagmites are columns that rise from the floor of the caves. When the two meet, they join to form columns. These speleothems are found in limestone-rich areas.**
2. **The Chitrakote Falls are on the Indravati River. During the monsoon season, these falls are 1,000m wide. In summer, their span is around 350m.**
3. **Pat is a plateau with a layered (terraced) structure. Examples include Mainpat, Jarangpat, Jashpurpat, Samripat, etc.**

The peninsular plateau does not end at the Rajmahal Hills. A part extends to the north-east into what are locally known as the Shillong Plateau, Karbi Anglong Plateau and North Cachar Hills. A fault separates them from the Chota Nagpur Plateau. The rocks that connect them to the main plateau are submerged by the Gangetic alluvium. Three important hill ranges that extend from west to east across Meghalaya are the Garo, Khasi and Jaintia hills. Mawsynram, the place with the highest rainfall in the world, is situated here.

Look at the physical map of India and identify the states into which the great Indian plateau extends.

What is the meaning of ghat?

Deccan Traps

Lakhs of years ago, lava flowing out of fissures in the earth east of the Western Ghats solidified to create the region known as the Deccan lava traps. Back soil was formed in this region, which extends over 51,000sq km. Several minerals are found here that are soil nutrients and are essential for agriculture.

Do you know?

Three gold mines are located in the Deccan plateau:

1. **Kolar gold fields, Karnataka**
2. **Hutti gold fields, Karnataka**
3. **Ramgiri gold fields, Andhra Pradesh**

90 percent of India's minerals, 60 percent of its cotton, 70 percent of its cotton textiles, and nearly 65 percent of its sugar are produced in the peninsular plateau.

Peninsular industrial complexes:

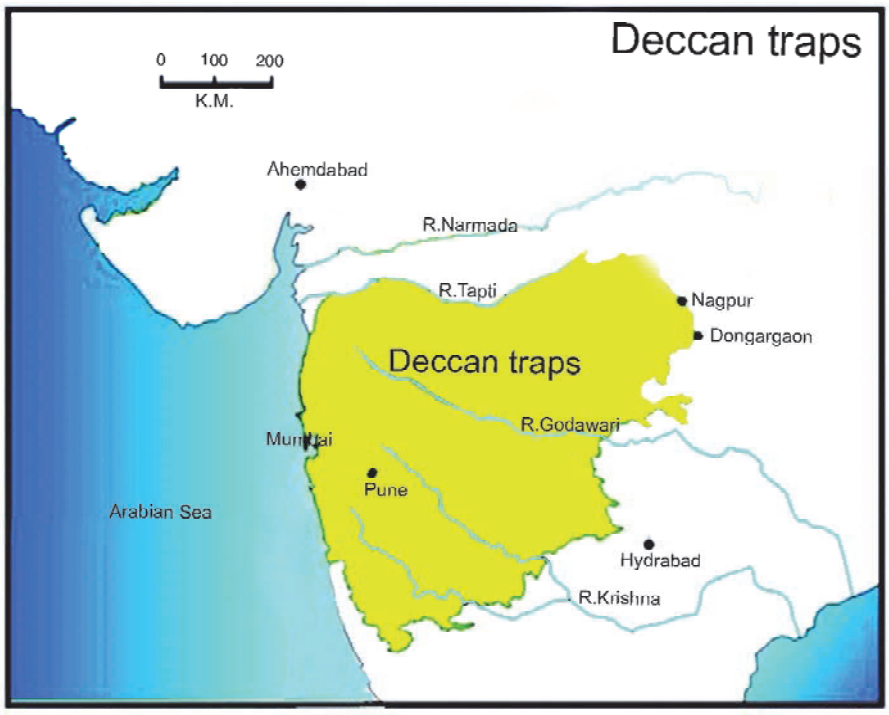
1. **Damodar Valley industrial complex**
2. **Bengaluru-Coimbatore-Madurai industrial complex**

Minerals and Mining in the Plateau

The Indian plateau is rich in mineral resources. Many minerals are found here, so mining and industry have developed in the region. It contains huge deposits of coal, iron, bauxite, manganese, etc. It can be said that most of India's minerals are sourced from the plateau.

How is mining done? How does labour work in the mines? How are the minerals extracted and how are they used? Let us tour a mining area to find out. Jharkhand's largest coal mines are in the Jharia coal fields in Dhanbad district. Jharia contains huge underground coal reserves.

Tunnels have been dug deep into the earth to extract coal. The mine manager told us that there is an extensive network of long tunnels underground. Hundreds of miners wearing steel helmets work here to extract the coal. He said it is pitch-dark in the mines so light is needed to work down below. We saw some workers carrying battery-powered lamps while others had the



Map 2.14: The Deccan traps

lamps fitted into their helmets. The helmets protect them from rocks falling from the tunnel roof while they are extracting coal. Pillars and beams made of wood and iron are used to prop up the roof and prevent it from collapsing.

Coal is hard like a rock. Explosives are used to break up the rock-like coal into smaller pieces. These pieces are filled in baskets and emptied in trolleys that run on rails. The trolley is pulled up to the surface along the mine shaft by iron chains. The coal is sent from the pit head to the washery, where it is washed.

It is dangerous working underground in a coal mine. Accidents often happen. In 1975, the walls of a mine shaft in Dhanbad's Chasnala mine collapsed. Water flooded the shaft, leading to the death by drowning of 400 miners.

During British rule and the first 20 years of independence, the mines were operated by private companies and their contractors. In this period, safety measures in the mines were inadequate. After the government took over the mines, calamities like Chasnala occur less frequently. But the miners are constantly exposed to coal dust in the shafts, which affects their lungs, causing many lung-related diseases. Miners endanger their health doing such hazardous work for low wages.

We visited the miners' tenements. We found out that almost all the miners were from the neighbouring regions, not from Jharkhand. They were mostly from Bihar, regularly returning to their villages during the holidays.

Why is it that the miners are from faraway places and not from the local region? We found out that before the mines were opened, *adivasis* lived in these forests. They had their homes and fields, which were the source of their livelihood. The *adivasis* were displaced from their homes and the forests were cleared when the contractors began opening and operating the mines. They hired migrant workers to mine the coal.

How would the development of mines and industries have affected the lives of the displaced *adivasis*? Discuss in class.

Also, find out in what ways clearing the forests to open mines has affected the environment.

Many minerals other than coal are mined in the peninsular plateau, such as iron ore, manganese, bauxite and limestone. Thus, the raw materials needed for metal-based industries are abundantly available in India's plateau. Electricity is needed to run factories. Coal is used to generate electricity. So many coal-based thermal power plants have been set up here. In addition, hydroelectricity is also generated in large dam projects.

Figure 2.18: A coal mine

EXERCISES

A) Choose the correct alternative:

1. Which geographical region of India do you live in?
   a) Gangetic plain b) Coastal plains
   c) Thar Desert d) Southern peninsular plateau
2. From which geographical region of India are the most minerals obtained?
   a) Gangetic plain b) Himalayan region
   c) Peninsular plateau d) None of these
3. Which of these places is in the peninsular plateau?
   a) Nainital b) Kodaikanal
   c) Mussoorie d) None of these
4. What is the name of South Asia's oldest landmass?
   a) Gondwanaland b) Laurasia
   c) Thar d) Sivalik
5. Which is India's oldest landmass?
   a) Gangetic plain b) Deccan plateau
   c) Kashmir Himalayas d) Sivalik Hills
6. Which rivers flow in a rift valley?
   a) Ganges and Yamuna b) Narmada and Tapti
   c) Mahanadi and Subaranarekha d) Krishna and Kaveri

B) Match the pairs:

Group A	Group B
1. Kolar gold fields	1. Mahanadi
2. Lifeline of Chhattisgarh	2. Karnataka
3. Hillstation of Chhattisgarh	3. Tapti
4. West-flowing river	4. Mainpat

3. What is the meaning of 'ghat'?
4. Why are the peaks of hills in the peninsular plateau not as pointed as the Himalayan mountain peaks?
5. How is the peninsular plateau different from the Gangetic plain?
6. How did the black soil of the peninsular plateau form?
7. Why don't miners wear cloth hats when extracting coal?
8. How did the Chasnala coal mine take place?

2.1.4 The Coastal Plains and Island Groups

The coast is where the sea meets the land. In this picture you can see the vast sea and a sandy beach. But in some places, there is no beach and the sea laps the rocky slopes of mountains. The coastal region attracts tourists because of its natural beauty.

Figure 2.19: The sea coast

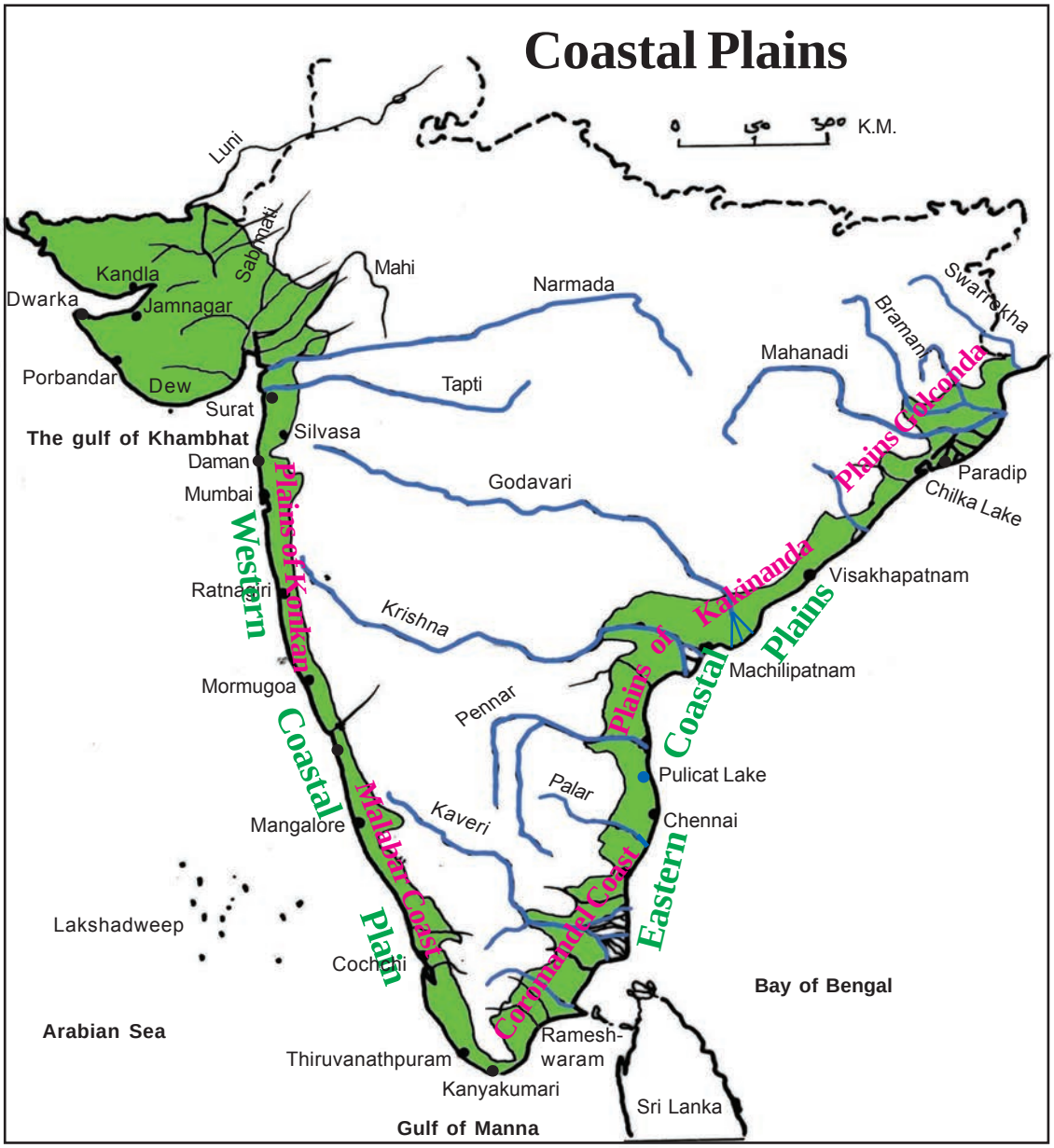
Look at Figure 2.19. There are narrow plains along the sea coast on both sides of the peninsular plateau. These are called the coastal plains. The western coastal plain lies to the west of the Sahyadri Range. It stretches from Kutch and Kathiawar in Gujarat to Mumbai and Goa, and continues till the southern tip of Kerala. The eastern coastal plain connects the Ganges-Brahmaputra delta to Mahanadi, Godavari, Krishna and Kaveri deltas and then stretches on till Kanyakumari. The two plains meet at Kanyakumari. The western plain is narrower compared to the eastern plain.

The formation of these two plains and their geographical features are different from each other. Let us find out why they differ.

Usually, a coastal plain is created by the following processes:

1. Geological activity and forces in the earth's interior cause the coastal areas to submerge under the sea or cause land beneath the sea to emerge. These processes are called submergence and emergence.
2. Rivers deposit their sediments, which accumulate over lakhs of years to form plains.
3. The sea level changes continuously.

Let us now examine the special characteristics of the western and eastern coastal plains.



Map 2.15: The coastal plains

1. The Western Coastal Plain

This plain is situated in between the Arabian Sea and the Western Ghats. It was created by submergence of land. Sedimentary deposits on this submerged land over lakhs of years gradually built up this coastal plain. That's why it is a narrow coastal strip. Its average breadth from east to west is around 64km. It has a steep gradient. So the rivers flow parallel to each other across the plain. They are short and swift so they do not carry much sediment. What sediment they carry is deposited in the deep sea, not at the mouth of the river. Thus, the mouth of these rivers, called the estuary, is open and sediment-free.

The stretch of the coastal plain from Daman to Goa is called the Konkan plain. It is quite rugged. The Mumbai harbour is on this coast. From Goa to Mangaluru, it is called the Karnataka or Mysore plain. From Mangaluru to Kanyakumari (Cape Comorin) it is called the Malabar plain.

Figure 2.20: The backwaters

A striking geographical feature of the Malabar plain is its long and narrow backwaters. They form because the sea deposits sand at the mouth of the rivers. The saline water of the sea and the fresh water of the rivers mix in the backwaters. People who live here fish and travel by boat. The Kochi harbour is located in these backwaters.

The wet tropical climate is suitable for human habitation. Plantations of rubber, cinchona, coffee, spices, coconut and cashew are found here. Sugarcane and rice are cultivated in the low-lying fields, while tea is grown on the upper slopes of the hills. This region has a long history of maritime trade with the Arab countries. Vasco da Gama sailed here with his fleet in 1498. The Portuguese established their trading post and rule in Goa.

The northern section of this plain is known as the Gujarat plain. It covers the coastal areas of the Kutch and Saurashtra peninsulas and the interior plains of Gujarat. The Banas, Mahi, Sabarmati, Narmada and Tapti rivers flow here. The Kutch-Saurashtra plain is semi-arid and its sandy soil is saline. It floods and becomes swampy during the rainy season. The region began to develop rapidly after crude oil or petroleum was discovered here.

2. The Eastern Coastal Plain

The eastern coastal plain is situated between the Eastern Ghats and the Bay of Bengal. It spreads from the Ganges-Brahmaputra delta in the north to Kanyakumari in the south. It originated from the geological process of land emergence. Its average width varies from 160km to 480km. Large rivers flowing from the peninsula deposit their sediment on the plain, which has a gentle gradient. The rivers have formed large, wide deltas at their mouth, the Mahanadi, Godavari, Krishna, Kaveri and Pennar deltas being the major ones.

Erosion by the sea has created a huge lagoon in this coastal plain known as the Chilika Lake. The waves in the deltaic areas have also created lagoons surrounded by sand dunes, Pulicat Lake being a beautiful example.

The northern section of the eastern coastal plain falls in Odisha state. The Mahanadi River has carved a vast and fertile delta where rice and jute are grown. Chilika Lake, also located here, is famous for its prawns and shrimps, which are exported to many countries.

The middle section of the eastern plain forms the Andhra Pradesh coastal region. It is called the Kakinada

plain. The Godavari and Krishna rivers have formed large deltas. Pulicat Lake and Vishakhapatnam harbour are located here.

The southern part of the eastern coastal plain spreads over coastal Tamil Nadu. It is known as the Coromandel Coast. The Kaveri and Pennar rivers flow through the plain and have formed deltas. Chennai harbour is on this coast.

Economic and Cultural Importance of the Coastal Plains

India's coastal plains have always been important from a historical, economic, cultural and strategic point of view. The plains are very fertile. In the wider stretches, rice, sugarcane and coconut are grown. The coastal areas have coconut, betel nut (*supari*), rubber, banana and spices, as well as large-scale production of salt. The hill slopes have plantations of cashew, coffee, tea and spices.

Fishing is a widespread occupation. Both freshwater and salt water fish are found in abundance where the rivers meet the sea. Related industries like fish canning, fish oil extraction, etc have grown in the region. Pearling is also done, with oysters bred along the shoreline, especially on the Gujarat coast.

The coastal plains are rich in mineral resources. Valuable minerals found in the sandy areas include monazite, ilmenite, zircon, rutile, sillimanite, etc. Some of these minerals are used to produce atomic energy. Offshore oil has also been found in sufficient quantities. India's biggest offshore oilfield Mumbai High and the onshore deltaic Kaveri oilfield are situated in the coastal region.

The coastal plain are vital for trade and commerce. India's biggest ports such as Kandla, Mumbai, Mormugao, Cochin, Thiruvananthapuram, Chennai, Vishakhapatnam, Paradip, etc are located in the coastal region. Most of our country's international trade is carried out through these ports.

The plains are historically and culturally important, the famous places and sites including Rameswaram, Kanyakumari, Kanchipuram, the temples of Madurai, Saint Francis Xavier church etc. Merchants and traders from Arabia, Portugal, the Netherlands and France established their trading posts along these coasts.

What's more, the coastal plains are rich in natural beauty and are known for their salubrious climate that promotes health and wellness. Tourists visit the region in large numbers every year. The population density is high here.

Find the following in the political and physical maps of India:

1. **Which states does the western coastal plain touch?**
2. **Which states does the eastern coastal plain touch?**
3. **Name the ports - from north to south – that are located along the eastern coastal plain.**
4. **Name the ports – from north to south – that are located along the western coastal plain.**
5. **In which states are the following ports located?**
   - a) **Mumbai ……..**
   - b) **Cochin ……**
   - c) **Paradip……**
   - d) **Chennai ……**
   - e) **Thiruvananthapuram ……**
   - f) **Mormugao ……..**
   - g) **Vishakhapatnam …….**

Life on the Sea-shore

India and its island groups have a 7,500km long shoreline. Many villages are located on the coast. One of them is Dharmadam on the Malabar Coast in Kerala. This coastal village, which lies in the midst of coconut groves, has Hindu, Muslim and Christian communities. It had a flourishing sea trade with faraway countries from ancient times. So it saw a constant give-and-take of people, cultures and religions. The early influence of Islam and Christianity in India was first seen along the western coast.

Which is the cheapest mode of transport: the railways, air travel or travel by sea?

Fishing is a major occupation of people living near the sea. Besides fish, they catch oysters, mussels, crabs etc. Every part of the coconut tree, which grows in abundance here, is used in one way or the other. Food is cooked in coconut oil. The coconut husk is used to make rope. The trunk of the coconut tree is used to construct huts and buildings. Nowadays, all the houses are made of brick and mortar. Earlier, the trunks were used to support the roofing tiles.

Figure 2.21: A catamaran with a haul of fish from the sea

Apart from fishing, people cultivate rice on their farms. They also grow vegetables like pumpkin and fruits like watermelon, which are sold in the local village markets. Bananas are widely cultivated, their leaves serving as plates for eating. People also rear cows, buffaloes and goats.

Tourism flourishes in the coastal areas. People enjoy visiting the sandy beaches.

David and Sudip live in Dharmadam. They are fishermen but they are poor because they don't own fishing boats or fishing nets.

Sudip's mother wakes him up at three in the morning and serves him some *kanji* (rice gruel). Sudip drinks the *kanji* and is ready by four o'clock to go fishing. His friend David waits for him at the sea-shore. Both work for Rajan on his boat. Rajan is not rich, but he owns a boat worth Rs30,000 and a fishing net worth Rs2,000. The three of them fish in the sea on the boat, which is called a catamaran.

Catamaran

The catamaran (Tamil: Kattumaram) is made by tying five to seven long wooden planks together with ropes. The fishermen use this rudimentary sailing craft to venture out to sea. The logs are cut and shaped with an axe in the shade of a sail by the shore. Most of the small fishermen use catamarans to fish. They can't venture too far out to the sea compared to boats.

When they reach the shore, several fishermen help them to push the catamaran into the water. The sails, nets, etc are securely fastened to prevent the waves from washing them away. They unfurl the sail after some time. At night, the wind blows from the land towards the sea. The wind helps them to sail out to sea. The wind changes direction in the afternoon, blowing towards the land. It helps them to return to the shore with their catch.

Figure 2.22: A catamaran

It is not an easy task to take a boat out to sea. It is hard work to row the boat, align the sail in the direction of the wind, cast the heavy net and haul in the catch. Fishing at sea is not just tough but dangerous, too. There is no guarantee that fishermen who venture out to sea will return home. They can be caught in a storm or their boat could hit a submerged rock and break into a hundred pieces. Sometimes, they fall prey to carnivorous fishes that attack humans.

The boats are anchored when they are 2-3km out at sea. The fishermen spread their nets and cast them in the water. The nets are hauled in after one or two hours, after which the boats are ready to return. It is 12 noon or 1 o'clock by the time they return to the shore. Many fisherwomen wait on the beach for the boats to arrive.

Sudip's and David's mothers also wait with their baskets. The women run to the boats the moment the catch is unloaded. The auctioneers also arrive. Usually, the catch is auctioned on the beach itself. The auctioneers get part of the catch as their fee. The women and traders buy the fish and sell it in the market.

A trader makes a beeline to Rajan's boat. Rajan had taken a loan from him for his sister's wedding. The condition was that Rajan would sell his catch at a cheap rate to him. Rajan and his mates suffer a loss in the transaction but if they sell the catch to somebody else then the trader would either not give them the money or demand immediate repayment of the loan.

The trader packs the fish in ice and sells it in faraway cities, or even abroad, for a huge profit.

Figure 2.23: The catch being auctioned on the shore

Rajan divides the money the trader gives him into four equal parts. Sudip and David get one part each and Rajan keeps two parts. One part is for his labour and the other for his boat and net.

The catch is very lean during January-February. There is no certainty the fishermen will net anything even after a hard day's effort during these months. This situation continues until April. It is a difficult for workers like Sudip and small fishermen like Rajan. They face a lot of hardship, borrowing money from the traders to manage their household expenses.

Fish is available in plenty between May-June and September. It is during this time that the fishermen try to repay their loans.

What differences do you see between the boats that ply in rivers and the catamarans?

How is the fishermen's catch sold?

Why could Rajan not auction his catch?

Big and Small Fishermen

In the agricultural sector, we have small, medium and big farmers and farm labour. It is similar in the fishing community. Labourers like Sudip don't own catamarans, boats or fishing nets. They work for fishermen who own boats. More than half of India's fishing community are labourers. Big fishermen own several boats, catamarans and large nets. They employ 50-60 workers to operate their boats and cast their nets. They retain half the catch and share the rest between the workers.

Anthony is a big fisherman. He owns a number of catamarans, boats and different kinds of nets. He employs around 50-60 workers on his boats. Most of them have borrowed money from him so they work for lower wages. Anthony had amassed a lot of money.

Figure 2.24: Trawler

Mechanised Fishing Boats (Trawlers)

Forty years ago, the government announced that it would give loans and subsidies to anyone who wanted to buy mechanised fishing boats or trawlers. In those days, the cost of a trawler and new nets was Rs2 lakhs. Antony invested Rs1 lakh and took a loan of Rs1 lakh to acquire a trawler. Only two other people in the village could arrange the finance to buy trawlers. Anthony profited a lot from his trawler. To begin with, he needed fewer workers. Earlier, he employed 50-60 workers. Now he needs just 6-7 workers. Most of the workers are his relatives, with his nephew being the captain. Trawlers can fish in the deep the sea so they net a bigger catch. They can venture out even in strong winds and heavy swells. When the catch is lean near the shore, they can venture far out to sea in search of a better catch.

Why do labourers work for lower wages for big fisherman like Anthony? Are there any labourers in your village or town who are compelled to work under similar conditions? What can be done to ensure they get fair wages?

Who were the people who could buy trawlers?

What are the advantages of fishing with a trawler?

Figure 2.25: Fishermen carrying a large net

Prawns are found 3-4km from the shore. The demand for prawns in foreign markets has risen sharply over the past 20-25 years – so has the price. Big businessmen buy prawns from the fishermen for their fish processing plants. The prawns are cleaned and boiled in water with salt. They are then chilled in freezing rooms and exported to fetch a good price.

Anthony's trawler used to fish 10-12km out at sea. But when the demand for prawns began rising, he, too, wanted to cash in on the profits. Prawns are found 3-4km from the shore so he ordered his trawler to begin fishing in this zone. But this is where small fishermen like Rajan cast their nets. Many other traders and industrialists bought trawlers to fish for prawns. The number of trawlers fishing in this zone rose as a result. The small fishermen found their catch was falling. Many would return empty-handed from their fishing trips. The situation began to worry them and their workers. They found that they had to borrow money every other day to manage their household expenses. They found themselves getting trapped in debt in the hands of the traders and moneylenders.

Why did the trawler owners want to fish for prawns?

Why did the small fishermen need to borrow more money because of the trawlers?

"Have you ever heard of a shortage of fish in the sea? These big boats trawl all the fish. There is nothing left for us."

How can small fishermen curb the activities of big fishermen like Anthony? Discuss in class.

When machines were first used for fishing, many people thought the fishing industry would grow and the condition of the fishing community would improve. But what happened in reality?

1. **Did fish production rise?**
2. **Who were the people who suffered?**
3. **Who were the people who profited?**
4. **How can this situation be rectified?**

Why did the catch fall in the seas?

There are some other important reasons why the stock of fish in the seas is declining.

1. Pollution

Many large factories have been set up along India's coasts. These factories use many types of harmful

chemicals. The waste water containing these chemicals is discharged in the sea. The fish die because of these harmful chemicals that mix with the sea water.

2. Shortage of fresh water

Sea water is saline. The water of rivers reaching the sea is fresh. The river waters also carry rotting vegetation to the sea. Many different types of plants called plankton grow in this nutrient-rich water. Fish survive on plankton. Many dams have been constructed on the rivers flowing through the Deccan plateau over the past 40 years. Hence, the flow of river water with its decaying vegetation has diminished. Think about how this must be affecting the marine fish.

The Islands

India has several island groups located in the Bay of Bengal and the Arabian Sea. The two large island groups are: 1) Andaman and Nicobar Islands and 2) Lakshadweep Islands.

1. Andaman and Nicobar group of islands

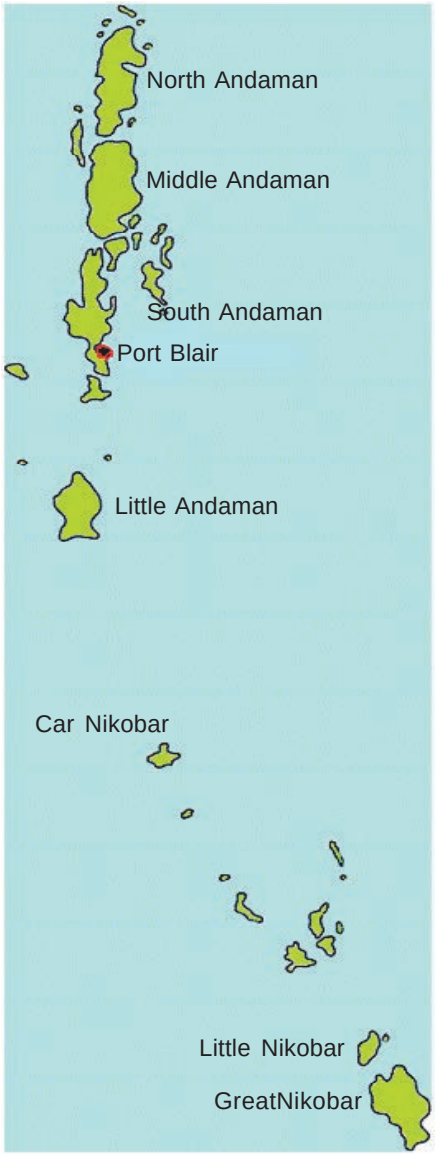
The Andaman and Nicobar Islands spread along the length of the Bay of Bengal from north to south. The islands in the group include North Andaman, Middle Andaman, South Andaman and Little Andaman. The northern part of the Nicobar group is called Car Nicobar and the southern part is Great Nicobar. There are many smaller islands in addition to these.

Check the location of the Andaman and Nicobar Islands in Reference map 1.

The Andaman and Nicobar Islands are the peaks of mountains submerged in the sea. That's why the coast of these islands is rugged and the terrain is rough. Some parts have small plains while there are hills and plateaus in other areas. Some islands have an abundance of coral along their coastline. In some locations, there are underground caves. Havelock Island is famous for its coral while Baratang Island is famous for its underground caves. Geological formations such as stalactites, stalagmites and columns can be seen in these caves.

One has to travel by ship to reach the islands. Port Blair is the capital of the Andaman and Nicobar Islands group. It has a lovely beach that is a tourist attraction. The famous 'Cellular Jail' is located here. During British rule, Indian freedom fighters were punished with banishment from India and imprisoned in this jail. Today this jail is a national monument.

Port Blair and the areas around it are densely populated. The rest of the Andaman and Nicobar islands is sparsely populated. One gets to see both prehistoric and modern civilization on the islands. The *adivasis* still live in the midst of thick jungles. The Jarawas, Onges, Great Andamanese, Nicobaris and Shompens



Map 2.16: The Andaman and Nicobar Islands group

are the prominent tribes. They live in remarkable consonance with their environment. The government is trying to protect these tribal communities and their culture.

The islands face an acute potable water problem. Although it rains heavily, most of the rain flows into the sea. The *adivasis* use natural methods to store fresh water. One method is to split bamboos to store rainwater.

The abundance of wood in the forests has seen the development of the local timber industry, with a large saw mill located in Chatham Island of the Andaman Island group. India's only active volcano is located in Barren Island. There is also a mud volcano, located 4-5km from Andaman's Rangat town, which oozes a continuous slurry of fine mud.

2. Lakshadweep Islands Group

Check the location of the Lakshadweep group in the map. It lies in the southern Arabian Sea, to the west of Kerala's Malabar Coast. The islands cover an area of 32sq km. Prior to 1973, the group was called the Laccadive, Minicoy, and Aminidivi Islands. Today, it is known as the Lakshadweep group. It consists of around 36 islands, with Lakshadweep being the biggest. The islands, part of a mountain chain, were formed by the deposition of coral fossils over lakhs of years. Sand, gravel, boulders, algae, etc were also deposited during this time. Scientists believe the island group is actually a remnant of the Aravalli range. Its capital is Kavaratti.

Map 2.17: The Lakshadweep

Both the island groups have a moist tropical climate. So one finds dense, evergreen tropical forests here. The important tree species include mahogany, ebony, rosewood, palm, bamboo, etc. Tidal vegetation is found along the shoreline. Coconut trees are also plentiful. Bananas, vegetables, some cereals and spices are cultivated here. Boats, steamers and other vessels ferry people from one island to the next. The islands are sparsely populated, with some being uninhabited. Only 10 islands in the Lakshadweep group are inhabited.

Apart from these two island groups, there are several smaller islands along the Indian coast. The major ones in the Bay of Bengal include Gangasagar Island, New Moore Island, Sriharikota and Rameswaram. In the Arabian Sea, they include Elephanta Island, and Salsette Island, on which the Mumbai metropolis spreads.

EXERCISES

1. Why do you think the traders from other countries established their trading posts on the coastal plains?
2. Compare the eastern and western coastal plains.
3. The coastal plains are important for economic and cultural reasons. Explain.
4. Why are the coastal plains so densely populated?
5. What did the fishermen living in the coastal plains require for fishing in the seas? How did they acquire these things?
6. Describe the daily routine of small fishermen in your own words.
7. What dangers do the fishermen face while fishing at sea?
8. In which months are the fish catch large? Explain with reasons.
9. What are the advantages and disadvantages of using trawlers for fishing?
10. Describe the forests of the Lakshadweep Islands in your own words.

2.1.5 The Indian Desert

We read the chapter 'The Thar Desert of India' in class VIII. Suppose you are sent for a year to a village in Jaisalmer. Based on what you learnt, discuss in class the differences you would see compared to your own locality. Also, discuss the reasons for these differences.

Answer the following with the help of Map 2.18:

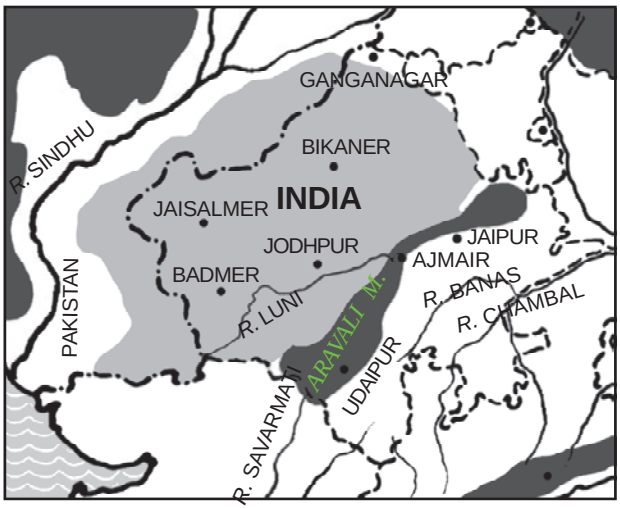
1. The Thar Desert spreads across which Asian countries?

2. Which two rivers is the Thar Desert situated between? In which direction do these rivers flow?

3. Where is the source of the Luni River?

Resources and Economy

We know that living in the Thar Desert is difficult. You will be surprised to know that this vast desert is the most densely populated among all the world's deserts, despite its adverse environment and shortage of resources. The traditional handicrafts of the region such as tie-and–dye designs on fabric (*bandhej*), lac bangles, stitching and dyeing of clothes, enamelled jewellery, stone engraving, etc, are widely known. The handicraft industry is presently going through a challenging phase.



Map 2.18: The Thar Desert

The people of Marwar and Gujarat's Kutch and Kathiawar regions have been known for centuries for their business acumen. Most people earn their livelihood from farming and animal husbandry. Thar is India's largest wool-producing region. The wool is considered to be of the best quality for the carpet industry. Bikaner is Asia's largest wool market.

Thar is an arid region that has no forests. The government and the people have undertaken several initiatives to stop the desertification of the region. This has given a new impetus to agro-forestry over the past several years.

Khejri is an important local tree that is useful for both humans and animals. Its leaves provide nutritious green fodder for livestock. Its wood is used to construct buildings and make camel carts, ploughs etc. Its roots fix nitrogen in the soil. Another valuable tree is *rohida*, which provides fodder and also binds the soil with its roots. It is used in agro-forestry to stop the expansion of the desert. Its wood is used to make furniture, while its bark has medicinal properties.

Figure 2.26: The khejri tree

The Rajasthan canal

The Rajasthan canal is known as the Indira Gandhi canal. It is one of India's mega projects. It starts from the Harike barrage in Sultanpur. Sri Ganganagar district saw tremendous growth in agriculture after the canal was constructed.

The history of canal construction

The region experienced a terrible drought in 1899-1900. The Maharajah of Bikaner, Ganga Singh, prepared a plan to bring water from the Sutlej River to irrigate this drought-affected land. He also established the district of Ganganagar.

Map 2.19: The Indira Gandhi canal

Work on digging the canal began after India gained independence. It was named the Indira Gandhi canal in 1985. It carries water to the sandy regions of Rajasthan, including Barmer, Bikaner, Churu, Hanumangarh, Jaisalmer, Jodhpur and Ganganagar. Punjab and Haryana also get water from the canal. Farming has made this once-arid region prosperous.

Many other changes have also occurred with the development of irrigated agriculture.

The construction of the canal has thus brought many beneficial changes to the region. But it has also raised numerous problems and challenges. One big challenge is cleaning the sand from the desert that is constantly blown into the canal, blocking the flow of water. Sand from the fields of the farmers also blankets the areas around, spreading desertification. Another serious problem is that the canal water seeps into the groundwater, making it more saline and creating problems for farming. These problems in farming are causing farmers to migrate to cities for employment. Cattle herdsmen and shepherds also face a problem – farmers do not permit them to graze their flocks on their irrigated land. A scientific solution needs to be found for these problems that could benefit all the people of the region.

Different types of minerals are found in the Thar region. They include ilmenite in Bikaner and Barmer, limestone in Jaisalmer and Jodhpur, gypsum in Bikaner, granite in Barmer, and oil and natural gas in Jaisalmer and Bikaner. Do you know that the white marble quarried at Makrana in Nagaur district was used to construct the Taj Mahal? Jodhpur is famous for its sandstone and Jalore for its granite.

The oil struck in Jaisalmer and Barmer is the biggest oilfield discovered in India in the last 25 years. The unprecedented opportunity to produce electricity from oil and gas, windmills and solar energy is opening up new vistas of economic development in Rajasthan. The state, and especially Thar, is a popular international tourism destination. This has spurred the growth of the hotel and transportation sectors as well.

Map 2.20: Map of Rajasthan

A Village in the Thar Desert

Jaisalmer is located to the far west of Rajasthan. Raju's village Luna is 90km from here, close to the international border between India and Pakistan. There is no other village after it, save for a small hamlet called '*Ratan Singh ki dhani*'. All you can see are a few small houses and nothing else but sand all around.

The climate is extremely dry and there are occasional sand storms. Thar is a hot desert. The temperature soars high during the day but one begins to shiver when night falls. Why do you think this happens? There are no permanent water sources here and the rainfall is too low for forests to grow. The sandy landscape is dotted with just one or two *khejri* trees here and there.

Locate Luna village in Map 2.20. Ensconced in Thar, this village of 200 houses is like a poem written in the desert sands. It is the largest village in the area and just a little distance from the border. Meghwal, Sodha Rajput and Muslim families live here. Almost all the homes are round earthen huts (see Figure 2.27). Some modern houses made of stone have come up in the last few years. All three communities have their own settlements that are called *vaas*. They are situated far from each other and are known by the names of their

community elders. Each *mohalla* (neighbourhood) has its own common meeting place or *baithak*. There are 15 *mohallas* in the village so there are 15 *baithaks* as well.

Figure 2.27: A village in the Thar Desert

There are not many sources of livelihood for the villagers. Ground water is available at a depth of 350-425m but the water is saline. People depend on the government tube-wells for potable water. The houses built these days have rainwater harvesting systems. Water is the most precious resource in the desert. People are more careful protecting water than even their lives.

The clouds arrive in July, August and September but float away without bringing rain. Sometimes it rains, but the raindrops evaporate before they touch the earth. Also, it doesn't usually rain over the whole region. There could be showers in one village, while the neighbouring village is completely dry. It rains for only 10-15 days in a year, and the average annual precipitation never exceeds 25cm.

A few years back, water was piped 45km from Keriya village to Dhabri village for distribution. Some people conserve water in small wells even today. You can see in Figure 2.28 how people keep their wells locked. It shows how precious water is in the desert.

Most people earn their livelihood by manual labour or animal husbandry. It isn't possible to do much farming. Just a handful of families engage in rain-fed farming for 5-6 months in the year. The main crops are *jowar* and *bajra*, which require little water for growth. People also sell *matire* seeds (a fruit similar to melon) from which oil is extracted.

Sheep, goat, cattle and camel are the livestock. The animals are usually bred for sale. Milk and ghee are used only for household purposes. People have now started selling milk. The dairy van comes daily to the village to collect milk. Until a few years ago, people used to take their livestock to the annual cattle fair held at Balotra in Barmer district.

The herders take their livestock up to 10-15km from the village to graze. Cows and camels graze on their own, but sheep and goat have to be tended. Apart from their houses in the village, people have their own *dhanis* where they go with their livestock. If you roam the desert, you will see these *dhanis* spread out far apart across the desert.

Water conservation and management

Water is a natural resource that is necessary not just for humans but for plants and animals. In today's industrial and economic environment, with its consumerist culture, population explosion, and irrigated agriculture, we are seeing water being exploited at a rapid rate. It is now becoming crucial to conserve water on a local and global scale.

Methods of water conservation

Every citizen, society and government needs to come together to take steps to conserve water. We need to protect our water sources from being despoiled by domestic and industrial waste. People should not bathe or wash clothes near drinking water sources, idols containing poisonous chemicals should not be immersed in water bodies, and weeds growing in water should be removed.

Figure 2.28: Wells for storing water in the Thar Desert

Water can be redistributed from high rainfall areas to low rainfall areas via canals to reduce water disparity between regions. At the same time, measures like water storage, population control, improved irrigation techniques, expansion of forest cover, judicious use of ground water and water recycling can help augment our water reserves.

Traditional water conservation methods

Since ancient times, lakes, ponds, tanks, wells, etc have been built by the combined efforts of the state and the public to alleviate the problem of water scarcity. Examples include constructing lakes periodically, repairing existing ones, diverting the course of rivers and linking lakes to conserve water.

Figure 2.29: Rajasthan's famous cultural and architectural world heritage site Chand Baori (step-well) is an exceptional example of water storage

Have any lakes been constructed in your village? If yes, then collect information about them.

Make a list of water sources in villages/cities and in your neighbourhood that were used in the past and are still being used.

Today, traditional water conservation methods can help us face the challenges of growing population and dwindling water resources. These water sources are being ignored at present. Many old water tanks and stepped wells (*bawadias*) and lakes have been encroached or filled over. These could have served to solve our present water crisis.

Figure 2.30: Small cylindrical underground well (tanka)

Tanka is a traditional water storage method of the Thar region. *Tankas* are small underground wells into which rainwater from the rooftops of buildings and other locations constructed to collect water is directed. They are usually 6m deep and 2-3m wide. The outer walls of the *tanka* have filters to clean the in-flowing rainwater. Many houses in desert cities like Barmer, Jaisalmer and Bikaner have *tankas*.

Figure 2.31: Modern water conservation method

March 22 is celebrated every year as Water Conservation Day. Many techniques to conserve water are being adopted in view of the growing water crisis in modern societies. These include constructing dams and canals, implementing drip and sprinkler irrigation, treating polluted water and recycling waste water, spreading public awareness about water conservation, etc.

Roof-top rainwater harvesting is a recently developed method that is especially useful in low rainfall regions. In this method, a hose pipe carries the rainwater that collects on the roof of a building to an underground tank. This water is later used for household needs.

There is a local folk song:

ekek[;k (e/kefD[k;k) Qyk L;w jl lw ,d&,d d.k pwx j 'kgn jk <j yxk ldw gw rk d Egw ek.kl cknyk jw cjlw jl uw uh lgt ldk?

(Bees suck every drop of nectar from the flowers to build a hive, so can we humans not secure the nectar raining down from the clouds?)

EXERCISES

1. Water Conservation Day is celebrated on:

   a) March 22 b) June 15

   c) January 26 d) The day it rains

2. By growing which tree do Thar farmers stand to gain the most economically?

   a) *Khejri* b) *Babul*

   c) Plum d) Teak

3. Where did the marble to build the Taj Mahal come from?

   a) Tajpur b) Makrana

   c) Mughal Gardens d) Agra

4. Why is livestock taken 10-15km into the desert to graze?

5. Which trees are found in Thar?
6. Which traditional industry is the Thar Desert famous for?
7. Explain what is meant by water crisis. What methods can help to resolve it?
8. What is the roof-top rainwater harvesting method?

Answer the following questions based on the information contained in the table:

Deserts of the world

Hot deserts			Cold deserts		
Name	Location	Area in km^2	Name	Location	Area in km^2
Sahara	North Africa	90,00,000	Antarctica	Antarctica	1,40,00,000
Arab	West Asia	23,30,000	Gobi	East Asia	10,00,000
Kalahari	South Africa	9,00,000	Patagonia	South America	6,20,000
Great Victoria	South Africa	6,47,000	Great Basin	North America	4,92,000
Syria	West Asia	5,20,000	Karakoram	Asia	3,50,000
Chihuahua	North America	4,50,000	Colorado	North America	3,37,000
Great Sandy	Australia	4,00,000	Kyzylkum	Central Asia	3,00,000
Sonoran	North America	3,10,000	Takla Makan	East Asia	2,70,000
Thar	South Asia	2,00,000	Atacama	South America	1,40,000
Gibson	Australia	1,56,000	Namib	South Africa	81,000

Source: : http://en.wikipedia.org/wiki/List_of_deserts_by_area

9. Which is the world's largest hot desert?
10. Where does the Thar Desert stand among the world's deserts?
11. Which continent has no hot deserts?
12. Which continent has the most number of hot deserts?
13. Add the areas given in the table to find out which cover a greater area - cold deserts or hot deserts.
14. Formulate two additional questions based on the information contained in the table that are not covered in the questionnaire.
15. Locate the deserts listed in the table in the world map.

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