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INDIA – SIZE AND LOCATION

India is one of the ancient civilisations in the world. It has achieved multi-faceted socio-economic progress during the last five decades. It has moved forward displaying remarkable progress in the field of agriculture, industry, technology and overall economic development. India has also contributed significantly to the making of world history.

LOCATION

India is a vast country. Lying entirely in the Northern hemisphere (Figure 1.1) the main land extends between latitudes $8^{\circ}4'N$ and $37^{\circ}6'N$ and longitudes $68^{\circ}7'E$ and $97^{\circ}25'E$.

The Tropic of Cancer ($23^{\circ} 30'N$) divides the country into almost two equal parts. To the southeast and southwest of the mainland, lie the Andaman and Nicobar islands and the Lakshadweep islands in Bay of Bengal and Arabian Sea respectively. Find out the extent of these groups of islands from your atlas.

Do You Know?

- The southernmost point of the Indian Union– 'Indira Point' got submerged under the sea water in 2004 during the Tsunami.

Size

The land mass of India has an area of 3.28 million square km. India's total area accounts for about 2.4 per cent of the total geographical

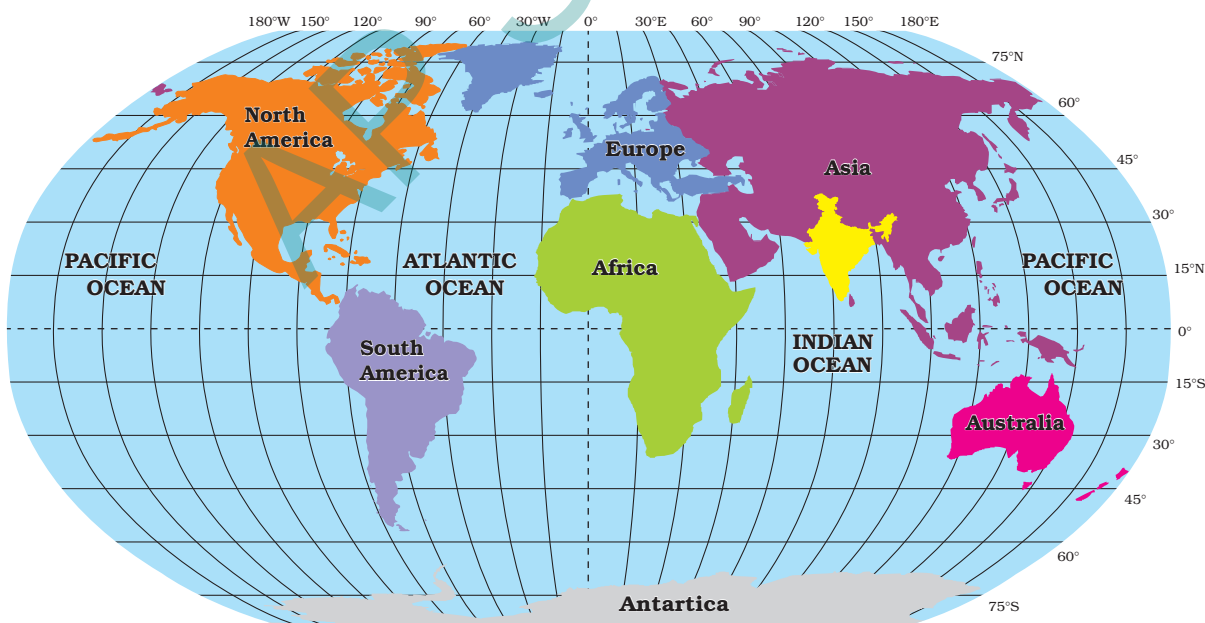


Figure 1.1 : India in the World

area of the world. From Figure 1.2 it is clear that India is the seventh largest country of the world. India has a land boundary of about 15,200 km and the total length of the coastline of the mainland, including Andaman and Nicobar and Lakshadweep, is 7,516.6 km.

India is bounded by the young fold mountains in the northwest, north and northeast. South of about 22° north latitude, it begins to taper, and extends towards the Indian Ocean, dividing it into two seas, the Arabian Sea on the west and the Bay of Bengal on its east.

Look at Figure 1.3 and note that the latitudinal and longitudinal extent of the mainland is about 30° . Despite this fact, the east-west extent appears to be smaller than the north-south extent.

From Gujarat to Arunachal Pradesh, there is a time lag of two hours. Hence, time along the **Standard Meridian of India** ($82^{\circ}30'E$) passing through Mirzapur (in Uttar Pradesh) is taken as the standard time for the whole country. The latitudinal extent influences the duration of day and night, as one moves from south to north.

Find out

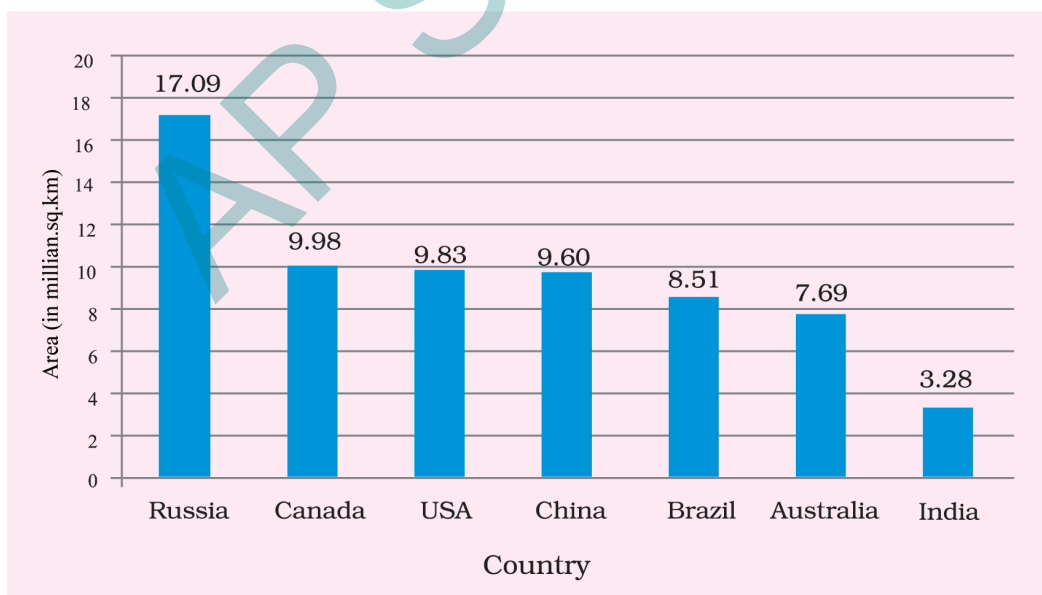
- Why $82^{\circ}30'E$ has been selected as the Standard Meridian of India?
- Why is the difference between the durations of day and night hardly felt at Kanniyakumari but not so in Kashmir?

INDIA AND THE WORLD

The Indian landmass has a central location between the East and the West Asia. India is a southward extension of the Asian continent. The trans Indian Ocean routes, which connect the countries of Europe in the West and the countries of East Asia, provide a strategic central location to India. Note that the Deccan Peninsula protrudes into the Indian Ocean, thus helping India to establish close contact with West Asia, Africa and Europe from the western coast and with Southeast and East Asia from the eastern coast. No other country has a long coastline on the Indian Ocean as India has and indeed, it is India's eminent position in the Indian Ocean, which justifies the naming of an Ocean after it.

Do You Know?

Since the opening of the Suez Canal in 1869, India's distance from Europe has been reduced by 7,000 km.



Source : United Nations Demographic Year Book 2015

Figure 1.2 : Seven Largest Countries of the World

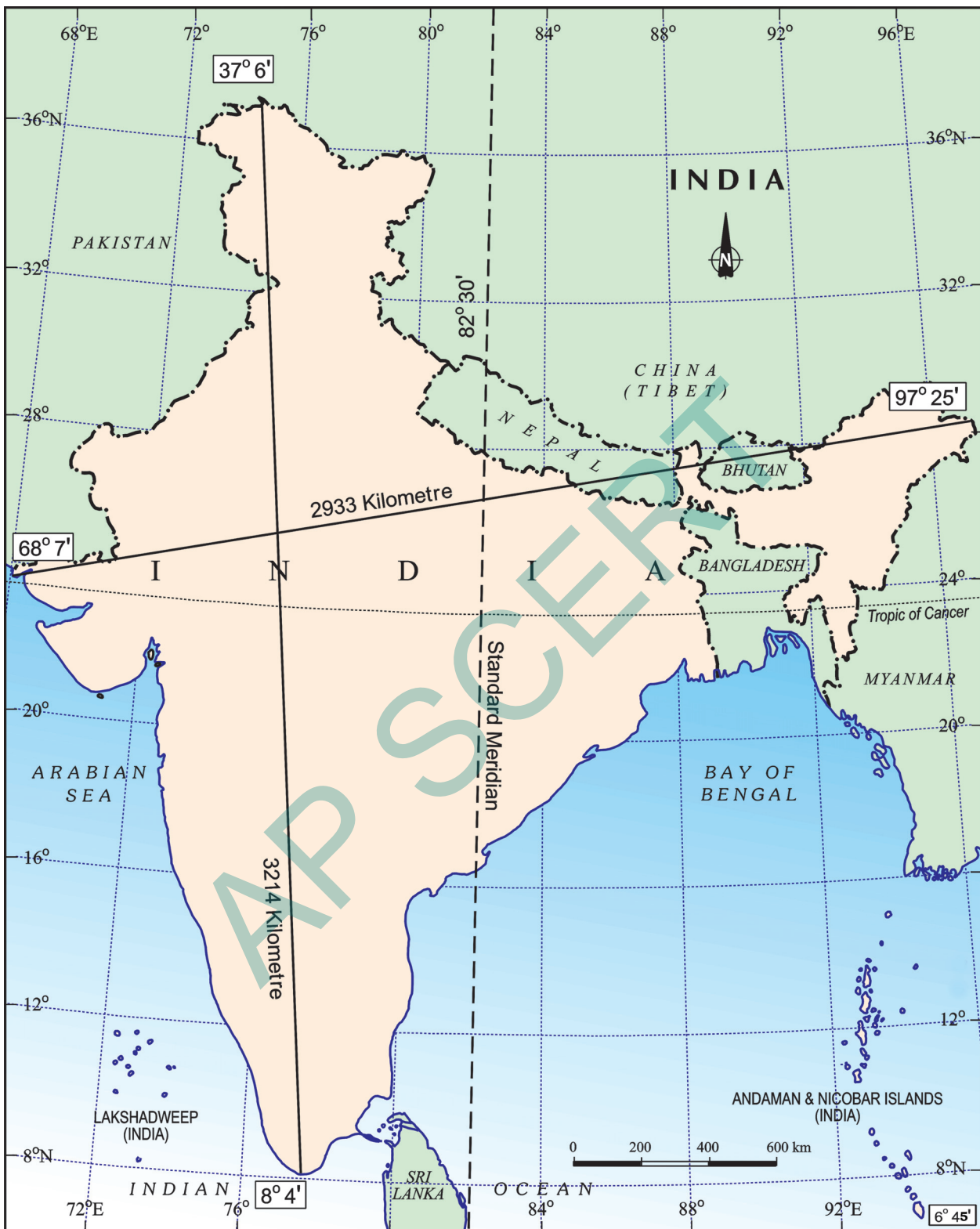


Figure 1.3 : India : Extent and Standard Meridian

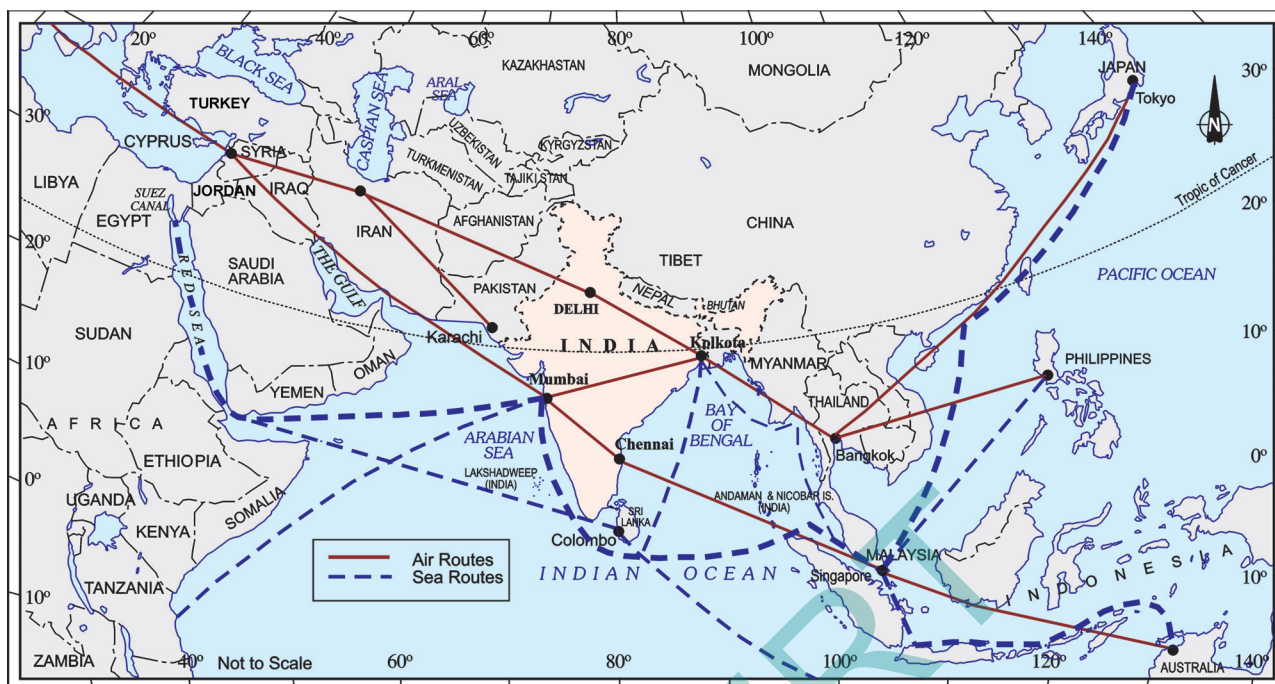


Figure 1.4 : India on International Highway of Trade and Commerce

India's contacts with the World have continued through ages but her relationships through the land routes are much older than her maritime contacts. The various passes across the mountains in the north have provided passages to the ancient travellers, while the oceans restricted such interaction for a long time.

These routes have contributed in the exchange of ideas and commodities since ancient times. The ideas of the *Upanishads* and the *Ramayana*, the stories of *Panchtantra*, the Indian numerals and the decimal system thus could reach many parts of the world. The spices, muslin and other merchandise were taken from India to different countries. On the other hand, the influence of Greek sculpture, and the architectural styles of dome and minarets from West Asia can be seen in different parts of our country.

INDIA'S NEIGHBOURS

India occupies an important strategic position in South Asia. India has 28 states and Eight Union Territories (Figure 1.5).

Find out

- The number of Union Territories along the western and eastern coasts.
- Area-wise which is the smallest and which is the largest state?
- The states which do not have an international border or lie on the coast.
- Classify the states into four groups each having common frontiers with (i) Pakistan, (ii) China, (iii) Myanmar, and (iv) Bangladesh.

India shares its land boundaries with Pakistan and Afghanistan in the northwest, China (Tibet), Nepal and Bhutan in the north and Myanmar and Bangladesh in the east. Our southern neighbours across the sea consist of the two island countries, namely

Do You Know?

Before 1947, there were two types of states in India — the provinces and the Princely states. Provinces were ruled directly by British officials, who were appointed by the Viceroy. Princely states were ruled by local, hereditary rulers, who acknowledged sovereignty in return for local autonomy.



Figure 1.5 : India and Adjacent Countries

Sri Lanka and Maldives. Sri Lanka is separated from India by a narrow channel of sea formed by the **Palk Strait** and the **Gulf of Mannar**, while Maldives Islands are situated to the south of the Lakshadweep Islands.

India has had strong geographical and historical links with her neighbours. Look at the physical map of Asia in your atlas, and note how India stands apart from the rest of Asia.

Do You Know?

School Bhuvan is a portal providing map-based learning to bring awareness among the students about the country's natural resources, environment and their role in sustainable development. It is an initiative of Bhuvan — NRSC/ISRO based on NCERT syllabus. You can explore various maps of India related to the secondary stage on https://bhuvan-app1.nrsc.gov.in/mhrd_ncert/

EXERCISE

1. Choose the right answer from the four alternatives given below.
 - (i) The Tropic of Cancer does not pass through
 - (a) Rajasthan
 - (b) Odisha
 - (c) Chhattisgarh
 - (d) Tripura
 - (ii) The easternmost longitude of India is
 - (a) $97^{\circ} 25' E$
 - (b) $68^{\circ} 7' E$
 - (c) $77^{\circ} 6' E$
 - (d) $82^{\circ} 32' E$
 - (iii) Uttarakhand, Uttar Pradesh, Bihar, West Bengal and Sikkim have common frontiers with
 - (a) China
 - (b) Bhutan
 - (c) Nepal
 - (d) Myanmar
 - (iv) If you intend to visit Kavarati during your summer vacations, which one of the following Union Territories of India you will be going to
 - (a) Puducherry
 - (b) Lakshadweep
 - (c) Andaman and Nicobar
 - (d) Daman and Diu
 - (v) My friend hails from a country which does not share land boundary with India. Identify the country.
 - (a) Bhutan
 - (b) Tajikistan
 - (c) Bangladesh
 - (d) Nepal
2. Answer the following questions briefly.
 - (i) Name the group of islands lying in the Arabian Sea.
 - (ii) Name the countries which are larger than India.
 - (iii) Which island group of India lies to its south-east?
 - (iv) Which island countries are our southern neighbours?
3. The sun rises two hours earlier in Arunachal Pradesh as compared to Gujarat in the west but the watches show the same time. How does this happen?
4. The central location of India at the head of the Indian Ocean is considered of great significance. Why?

MAP SKILLS

1. Identify the following with the help of map reading.
 - (i) The island groups of India lying in the Arabian Sea and the Bay of Bengal.
 - (ii) The countries constituting Indian subcontinent.
 - (iii) The States through which the Tropic of Cancer passes.
 - (iv) The northernmost latitude in degrees.
 - (v) The southernmost latitude of the Indian mainland in degrees.
 - (vi) The eastern and the western-most longitude in degrees.
 - (vii) The place situated on the three seas.
 - (viii) The strait separating Sri Lanka from India.
 - (ix) The Union Territories of India.

PROJECT/ACTIVITY

- (i) Find out the longitudinal and latitudinal extent of your state.
- (ii) Collect information about the 'Silk Route'. Also find out the new developments, which are improving communication routes in the regions of high altitude.



PHYSICAL FEATURES OF INDIA

You have already learnt earlier that India is a vast country with varied land forms. What kind of terrain do you live in? If you live in the plains, you are familiar with the vast stretches of plain land. In contrast, if you live in hilly region, the rugged terrain with mountains and valleys are common features. In fact, our country has practically all major physical features of the earth, i.e., mountains, plains, deserts, plateaus and islands.

The land of India displays great physical variation. Geologically, the Peninsular Plateau constitutes one of the ancient landmasses on the earth's surface. It was supposed to be one of the most stable land blocks. The Himalayas and the Northern Plains are the most recent landforms. From the view point of geology, Himalayan mountains form an unstable zone. The whole mountain system of Himalaya represents a very youthful topography with high peaks, deep valleys and fast flowing rivers. The northern plains are formed of alluvial deposits. The peninsular plateau is composed of igneous and metamorphic rocks with gently rising hills and wide valleys.

MAJOR PHYSIOGRAPHIC DIVISIONS

The physical features of India can be grouped under the following physiographic

divisions (Figure 2.2):

- (1) The Himalayan Mountains
- (2) The Northern Plains
- (3) The Peninsular Plateau
- (4) The Indian Desert
- (5) The Coastal Plains
- (6) The Islands

The Himalayan Mountains

The Himalayas, geologically young and structurally fold mountains stretch over the northern borders of India. These mountain ranges run in a west-east direction from the Indus to the Brahmaputra. The Himalayas represent the loftiest and one of the most rugged mountain barriers of the world. They form an arc, which covers a distance of about 2,400 Km. Their width varies from 400 Km in Kashmir to 150 Km in Arunachal Pradesh. The altitudinal variations are greater in the eastern half than those in the western half. The Himalaya consists of three parallel ranges in its longitudinal extent. A number of valleys lie between these ranges. The northern-most range is known as the Great or Inner Himalayas or the *Himadri*. It is the most continuous range consisting of the loftiest peaks with an average height of 6,000 metres. It contains all prominent Himalayan peaks.

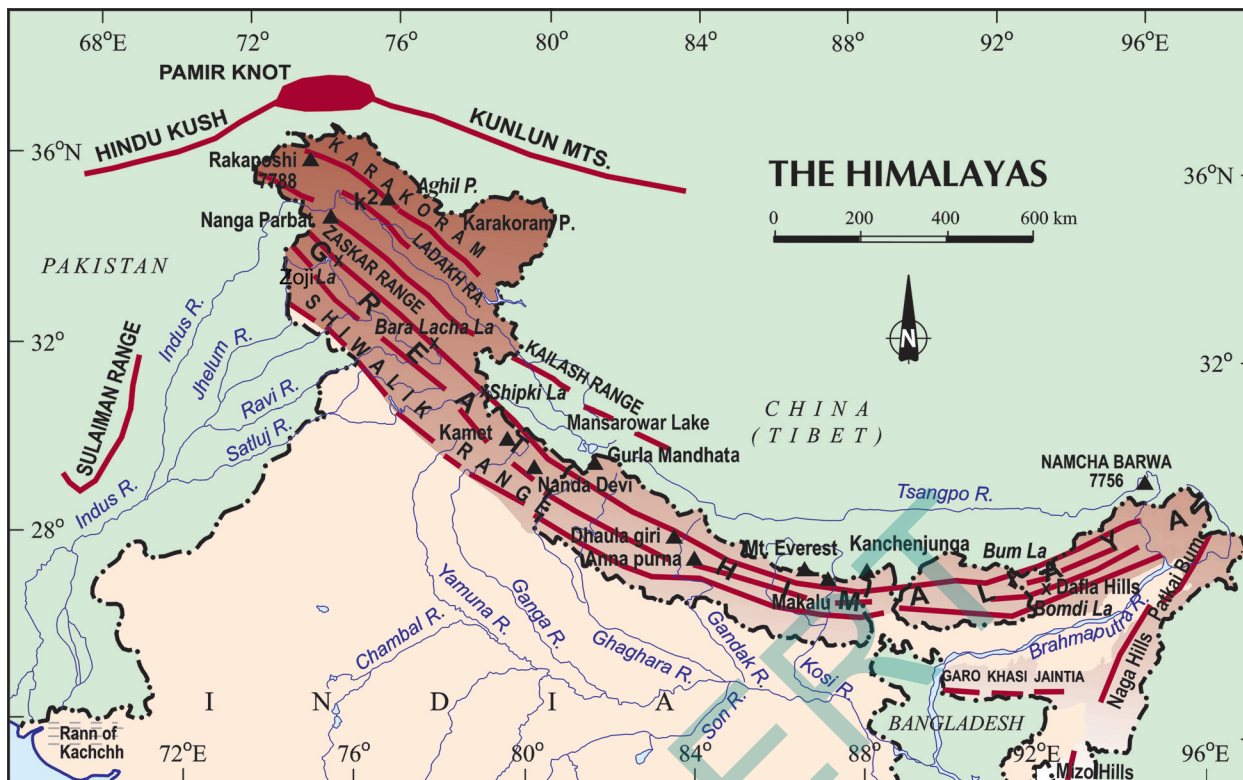


Figure 2.1 : Himalayas

Some Highest Peaks of the Himalayas

Peak	Country	Height in metres
Mt. Everest	Nepal	8848
Kanchenjunga	India	8598
Makalu	Nepal	8481
Dhaulagiri	Nepal	8172
Nanga Parbat	India	8126
Annapurna	Nepal	8078
Nanda Devi	India	7817
Kamet	India	7756
Namcha Barwa	India	7756
Gurla Mandhata	Nepal	7728

The folds of the Great Himalayas are asymmetrical in nature. The core of this part of Himalayas is composed of granite. It is perennially snow bound, and a number of glaciers descend from this range.

Find out

- The names of the glaciers and passes that lie in the Great Himalayas.
- The name of the states where the highest peaks are located.

The range lying to the south of the Himadri forms the most rugged mountain system and is known as *Himachal* or lesser Himalaya. The ranges are mainly composed of highly compressed and altered rocks. The altitude varies between 3,700 and 4,500 metres and the average width is of 50 Km. While the *Pir Panjal* range forms the longest and the most important range, the *Dhauladhar* and the *Mahabharat* ranges are also prominent ones. This range consists of the famous valley of Kashmir, the Kangra and Kullu Valley in Himachal Pradesh. This region is well-known for its hill stations.

Find out

- Location of Mussoorie, Nainital, Ranikhet from your atlas and also name the state where they are located.

The outer-most range of the Himalayas is called the **Shivaliks**. They extend over a

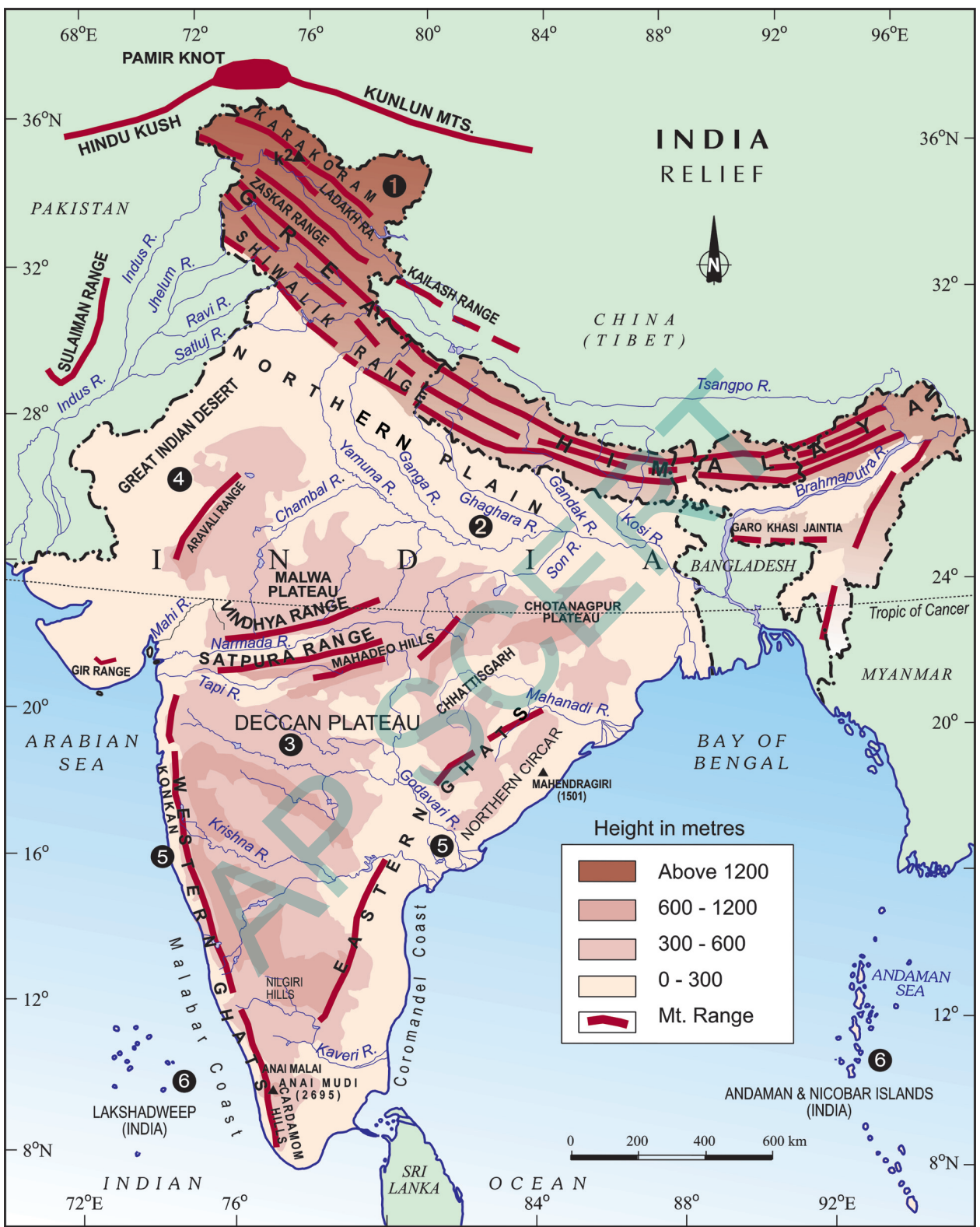




Figure 2.3 : The Himalayas

width of 10-50 Km and have an altitude varying between 900 and 1100 metres. These ranges are composed of unconsolidated sediments brought down by rivers from the main Himalayan ranges located farther north. These valleys are covered with thick gravel and alluvium. The longitudinal valley lying between lesser Himalaya and the Shiwaliks are known as Duns. Dehra Dun, Kotli Dun and Patli Dun are some of the well-known Duns.

Besides the longitudinal divisions, the Himalayas have been divided on the basis of regions from west to east. These divisions have been demarcated by river valleys. For example, the part of Himalayas lying between Indus and Satluj has been traditionally known as Punjab Himalaya but it is also known regionally as Kashmir and Himachal Himalaya from west to east respectively. The part of the Himalayas lying between Satluj and Kali rivers is known as Kumaon Himalayas. The Kali and Teesta rivers demarcate the Nepal Himalayas and the part lying between Teesta and Dihang rivers is known as Assam Himalayas. There are regional names also in these broad

categories. Find out some regional names of the Himalayas

The Brahmaputra marks the eastern-most boundary of the Himalayas. Beyond the Dihang gorge, the Himalayas bend sharply to the south and spread along the eastern boundary of India. They are known as the *Purvachal* or the Eastern hills and mountains. These hills running through the north-eastern states are mostly composed of strong sandstones, which are sedimentary rocks. Covered with dense forests, they mostly run as parallel ranges and valleys. The *Purvachal* comprises the *Patkai hills*, the *Naga hills*, the *Manipur hills* mizo hills.



Figure 2.4 : Mizo Hills

The Northern Plain

The northern plain has been formed by the interplay of the three major river systems, namely — the Indus, the Ganga and the Brahmaputra along with their tributaries. This plain is formed of alluvial soil. The deposition of alluvium in a vast basin lying at the foothills of the Himalaya over millions of years, formed this fertile plain. It spreads over an area of 7 lakh sq. km. The plain being about 2400 km long and 240 to 320 km broad, is a densely populated physiographic division. With a rich soil cover combined with adequate water supply and favourable climate it is agriculturally a productive part of India.



Figure 2.5 : The Northern Plains

The rivers coming from northern mountains are involved in depositional work. In the lower course, due to gentle slope, the velocity of the river decreases, which results in the formation of riverine islands.

Do You Know?

Majuli, in the Brahmaputra river, is the largest inhabited riverine island in the world.

The rivers in their lower course split into numerous channels due to the deposition of silt. These channels are known as *distributaries*.

The Northern Plain is broadly divided into three sections. The Western part of the Northern Plain is referred to as the Punjab Plains. Formed by the Indus and its tributaries, the larger part of this plain lies in Pakistan. The Indus and its tributaries — the Jhelum, the Chenab, the Ravi, the Beas and the Satluj originate in the Himalaya. This section of the plain is dominated by the *doabs*.

Do You Know?

'Doab' is made up of two words — 'do' meaning two and 'ab' meaning water. Similarly 'Punjab', is also made up two words — 'Punj' meaning five and 'ab' meaning water.

The Ganga plain extends between Ghaggar and Teesta rivers. It is spread over North India in Haryana, Delhi, U.P., Bihar, partly Jharkhand and West Bengal. In the East, particularly in Assam lies the Brahmaputra plain.

The northern plains are generally described as flat land with no variations in its relief. It is not true. These vast plains also have diverse relief features. According to the variations in relief features, the Northern plains can be divided into four regions. The rivers, after descending from the mountains deposit pebbles in a narrow belt of about 8 to 16 km in width lying parallel to the slopes of the Shiwaliks. It is known as *bhabar*. All the streams disappear in this *bhabar* belt. South of this belt, the streams and rivers re-emerge and create a wet, swampy and marshy region known as *terai*. This was a thickly forested region full of wildlife. The forests have been cleared to create agricultural land and to settle migrants from Pakistan after partition. Locate Dudhwa National Park in this region.

The largest part of the northern plain is formed of older alluvium. It lies above the floodplains of the rivers and presents a terrace-like feature. This part is known as *bhanger*. The soil in this region contains calcareous deposits, locally known as *kankar*. The

newer, younger deposits of the floodplains are called *khadar*. They are renewed almost every year and so are fertile, thus, ideal for intensive agriculture.

The Peninsular Plateau

The Peninsular plateau is a tableland composed of the old crystalline, igneous and metamorphic rocks. It was formed due to the breaking and drifting of the Gondwana land and thus, making it a part of the oldest landmass. The plateau has broad and shallow valleys and rounded hills. This plateau consists of two broad divisions, namely, the Central Highlands and the Deccan Plateau. The part of the Peninsular plateau lying to the north of the Narmada river, covering a major area of the Malwa plateau, is known as the Central Highlands. The Vindhyan range is bounded by the Satpura range on the south and the Aravalis on the northwest. The further westward extension gradually merges with the sandy and rocky desert of Rajasthan. The flow of the rivers draining this region, namely the Chambal, the Sind, the Betwa and the Ken is from southwest to northeast, thus indicating the slope. The Central Highlands are wider in the west but narrower in the east. The eastward extensions of this plateau are locally known as the *Bundelkhand* and *Baghelkhand*. The Chotanagpur plateau



Figure 2.6 : A Waterfall in Chotanagpur Plateau

marks the further eastward extension, drained by the Damodar river.

The Deccan Plateau is a triangular landmass that lies to the south of the river Narmada. The Satpura range flanks its broad base in the north, while the Mahadev, the Kaimur hills and the Maikal range form its eastern extensions. Locate these hills and ranges in the Physical map of India. The Deccan Plateau is higher in the west and slopes gently eastwards. An extension of the Plateau is also visible in the northeast, locally known as the Meghalaya, Karbi-Anglong Plateau and North Cachar Hills. It is separated by a fault from the Chotanagpur Plateau. Three prominent hill ranges from the west to the east are the Garo, the Khasi and the Jaintia Hills.

The **Western Ghats** and the **Eastern Ghats** mark the western and the eastern edges of the Deccan Plateau respectively. Western Ghats lie parallel to the western coast. They are continuous and can be crossed through passes only. Locate the Thal, Bhore and Pal Ghats in the Physical map of India.

The Western Ghats are higher than the Eastern Ghats. Their average elevation is 900–1600 metres as against 600 metres of the Eastern Ghats. The Eastern Ghats stretch from the Mahanadi Valley to the Nigiris in the south. The Eastern Ghats are discontinuous and irregular and dissected by rivers draining into the Bay of Bengal. The Western Ghats cause orographic rain by facing the rain bearing moist winds to rise along the western slopes of the Ghats. The Western Ghats are known by different local names. The height of the Western Ghats progressively increases from north to south. The highest peaks include the Anai Mudi (2,695 metres) and the Doda Betta (2,637 metres). Mahendragiri (1,501 metres) is the highest peak in the Eastern Ghats. Shevroy Hills and the Javadi Hills are located to the southeast of the

Eastern Ghats. Locate the famous hill stations of Udagamandalam, popularly known as Ooty and the Kodaikanal.

One of the distinct features of the Peninsular plateau is the black soil area known as Deccan Trap. This is of volcanic origin, hence, the rocks are igneous. Actually, these rocks have denuded over time and are responsible for the formation of black soil. The Aravali Hills lie on the western and northwestern margins of the Peninsular plateau. These are highly eroded hills and are found as broken hills. They extend from Gujarat to Delhi in a southwest-northeast direction.

The Indian Desert

The Indian desert lies towards the western margins of the Aravali Hills. It is an undulating sandy plain covered with sand dunes. This region receives very low rainfall below 150 mm per year. It has arid climate with low vegetation cover. Streams appear during the rainy season. Soon after they disappear into the sand as they do not have enough water to reach the sea. Luni is the only large river in this region.



Figure 2.7 : The Indian Desert

Barchans (crescent-shaped dunes) cover larger areas but longitudinal dunes become

more prominent near the Indo-Pakistan boundary. If you visit Jaisalmer, you may go to see a group of barchans.

The Coastal Plains

The Peninsular plateau is flanked by stretch of narrow coastal strips, running along the *Arabian Sea* on the west and the *Bay of Bengal* on the east. The *western coast*, sandwiched between the Western Ghats and the Arabian Sea, is a narrow plain. It consists of three sections. The *northern* part of the coast is called the *Konkan* (Mumbai – Goa), the central stretch is called the *Kannad Plain*, while the *southern* stretch is referred to as the *Malabar coast*.



Figure 2.8 : The Coastal Plains

The plains along the Bay of Bengal are wide and level. In the northern part, it is referred to as the *Northern Circar*, while the *southern* part is known as the *Coromandel Coast*. Large rivers, such as the Mahanadi, the Godavari, the Krishna and the Kaveri have formed extensive delta on this coast. Lake Chilika is an important feature along the eastern coast.

Do You Know?

The Chilika Lake is the largest salt water lake in India. It lies in the state of Odisha, to the south of the Mahanadi delta.

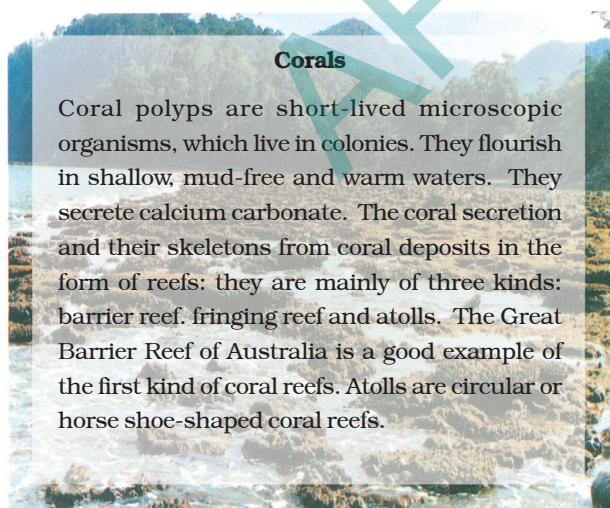
The Islands

You have already seen that India has a vast mainland. Besides this, the country has two groups of islands. Can you identify these island groups?



Figure 2.9 : An Island

Locate the Lakshadweep Islands group lying close to the Malabar coast of Kerala. This group of islands is composed of small coral islands. Earlier they were known as Laccadive, Minicoy and Amindive. In 1973, these were named as Lakshadweep. It covers small area of 32 sq km. Kavaratti island is the administrative headquarters of Lakshadweep. This island group has great diversity of flora and fauna. The Pitti island, which is uninhabited, has a bird sanctuary.



Corals

Coral polyps are short-lived microscopic organisms, which live in colonies. They flourish in shallow, mud-free and warm waters. They secrete calcium carbonate. The coral secretion and their skeletons form coral deposits in the form of reefs: they are mainly of three kinds: barrier reef, fringing reef and atolls. The Great Barrier Reef of Australia is a good example of the first kind of coral reefs. Atolls are circular or horse shoe-shaped coral reefs.

Now you see the elongated chain of islands located in the Bay of Bengal extending from north to south. These are Andaman and Nicobar islands. They are bigger in size and are more numerous and scattered. The entire group of islands is divided into two broad categories – The Andaman in the north and the Nicobar in the south. It is believed that these islands are an elevated portion of submerged mountains. These island groups are of great strategic importance for the country. There is great diversity of flora and fauna in this group of islands too. These islands lie close to equator and experience equatorial climate and has thick forest cover.

Do You Know?

India's only active volcano is found on Barren island in Andaman and Nicobar group of Islands.

A detailed account of the different physiographic units highlights the unique features of each region. It would, however, be clear that each region complements the other and makes the country richer in its natural resources. The mountains are the major sources of water and forest wealth. The northern plains are the granaries of the country. They provide the base for early civilisations. The plateau is a storehouse of minerals, which has played a crucial role in the industrialisation of the country. The coastal region and island groups provide sites for fishing and port activities. Thus, the diverse physical features of the land have immense future possibilities of development.

EXERCISE

1. Choose the right answer from the four alternatives given below.
 - (i) Consider the following statements:
Assertion(A): India is called a peninsula.
Reason(R): A peninsula is a landmass bounded by sea on three sides and connected to the mainland on one side.
Choose the correct answer from the options given below:
(a) Both A and R are true and R is the correct explanation of A.
(b) Both A and R are true but R is not the correct explanation of A.
(c) A is true but R is false.
(d) A is false but R is true.
 - (ii) Mountain ranges in the eastern part of India forming its boundary with Myanmar are collectively called
(a) Himachal (c) Purvachal
(b) Uttarakhand (d) None of the above
 - (iii) The western coastal strip, south of Goa is referred to as
(a) Coromandel (c) Kannad
(b) Konkan (d) Northern Circar
 - (iv) The highest peak in the Eastern Ghats is
(a) Anai Mudi (c) Mahendragiri
(b) Kanchenjunga (d) Khasi
2. Answer the following questions briefly.
 - (i) What is the *bhabar*?
 - (ii) Name the three major divisions of the Himalayas from north to south.
 - (iii) Which plateau lies between the Aravali and the Vindhyan ranges?
 - (iv) Name the island group of India having coral origin.
3. Distinguish between
 - (i) *Bhangar and Khadar*
 - (ii) Western Ghats and Eastern Ghats
4. Which are the major physiographic divisions of India? Contrast the relief of the Himalayan region with that of the Peninsular plateau.
5. Give an account of the Northern Plains of India.
6. Write short notes on the following.
 - (i) The Indian Desert
 - (ii) The Central Highlands
 - (iii) The Island groups of India

MAP SKILLS

On an outline map of India show the following.

- (i) Mountain and hill ranges – the Karakoram, the Zaskar, the Patkai Bum, the Jaintia, the Vindhya range, the Aravali, and the Cardamom hills.
- (ii) Peaks – K2, Kanchenjunga, Nanga Parbat and the Anai Mudi.
- (iii) Plateaus, Chotanagpur and Malwa
- (iv) The Indian Desert, Western Ghats, Lakshadweep Islands

100%

APSS



DRAINAGE

The term **drainage** describes the river system of an area. Look at the physical map. You will notice that small streams flowing from different directions come together to form the main river, which ultimately drains into a large water body such as a lake or a sea or an ocean. The area drained by a single river system is called a **drainage basin**. A closer observation on a map will indicate that any elevated area, such as a mountain or an upland, separates two drainage basins. Such an upland is known as a **water divide** (Figure 3.1).

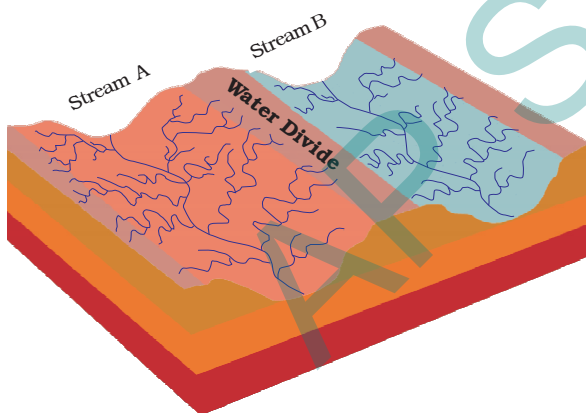


Figure 3.1 : Water Divide

Do You Know?

The world's largest drainage basin is of the Amazon river

Find out

- Which river has the largest basin in India?

DRAINAGE SYSTEMS IN INDIA

The drainage systems of India are mainly controlled by the broad relief features of the subcontinent. Accordingly, the Indian rivers are divided into two major groups:

- the Himalayan rivers; and
- the Peninsular rivers.

Apart from originating from the two major physiographic regions of India, the Himalayan and the Peninsular rivers are different from each other in many ways. Most of the Himalayan rivers are **perennial**. It means that they have water throughout the year. These rivers receive water from rain as well as from melted snow from the lofty mountains. The two major Himalayan rivers, the Indus and the Brahmaputra originate from the north of the mountain ranges. They have cut through the mountains making gorges. The Himalayan rivers have long courses from their source to the sea.



Figure 3.2 : A Gorge

They perform intensive erosional activity in their upper courses and carry huge loads of silt and sand. In the middle and the lower courses, these rivers form meanders, oxbow lakes, and many other depositional features in their floodplains. They also have well-developed deltas (Figure 3.3).

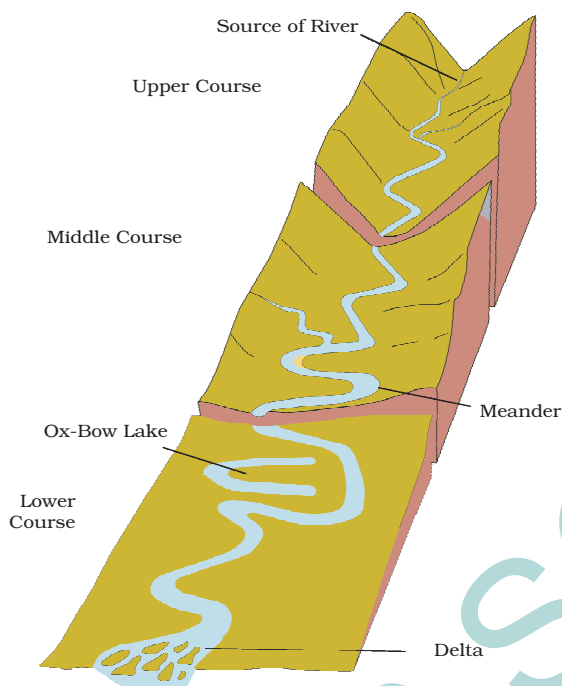


Figure 3.3 : Some Features Made by Rivers

A large number of the Peninsular rivers are seasonal, as their flow is dependent on rainfall. During the dry season, even the large rivers have reduced flow of water in their channels. The Peninsular rivers have shorter and shallower courses as compared to their Himalayan counterparts. However, some of them originate in the central highlands and flow towards the west. Can you identify two such large rivers? Most of the rivers of peninsular India originate in the Western Ghats and flow towards the Bay of Bengal.

The Himalayan Rivers

The major Himalayan rivers are the Indus, the Ganga and the Brahmaputra. These rivers are long, and are joined by many large and important tributaries. A river along with its tributaries may be called a **river system**.

The Indus River System

The river Indus rises in Tibet, near Lake Mansarowar. Flowing west, it enters India in the Ladakh. It forms a picturesque gorge in this part. Several tributaries, the Zaskar, the Nubra, the Shyok and the Hunza, join it in the Kashmir region. The Indus flows through Baltistan and Gilgit and emerges from the mountains at Attock. The Satluj, the Beas, the Ravi, the Chenab and the Jhelum join together to enter the Indus near Mithankot in Pakistan. Beyond this, the Indus flows southwards eventually reaching the Arabian Sea, east of Karachi. The Indus plain has a very gentle slope. With a total length of 2900 km, the Indus is one of the longest rivers of the world. A little over a third of the Indus basin is located in India Ladakh, Jammu and Kashmir, Himachal Pradesh and Punjab and the rest is in Pakistan.

Do You Know?

• According to the regulations of the **Indus Water Treaty (1960)**, India can use only 20 per cent of the total water carried by the Indus river system. This water is used for irrigation in Punjab, Haryana and the southern and the western parts of Rajasthan.

The Ganga River System

The headwaters of the Ganga, called the 'Bhagirathi' is fed by the Gangotri Glacier and joined by the Alaknanda at Devaprayag in Uttarakhand. At Haridwar, the Ganga emerges from the mountains on to the plains.



Figure 3.4 : Major Rivers and Lakes



Figure 3.5 : Confluence of Bhagirathi and Alaknanda at Devprayag

The Ganga is joined by many tributaries from the Himalayas, a few of them being major rivers, such as the Yamuna, the Ghaghara, the Gandak and the Kosi. The river Yamuna rises from the Yamunotri Glacier in the Himalayas. It flows parallel to the Ganga and as a right bank tributary meets the Ganga at Allahabad. The Ghaghara, the Gandak and the Kosi rise in the Nepal Himalaya. They are the rivers, which flood parts of the northern plains every year, causing widespread damage to life and property, whereas, they enrich the soil for agricultural use.

The main tributaries, which come from the peninsular uplands, are the Chambal, the Betwa and the Son. These rise from semi-arid areas, have shorter courses and do not carry much water in them. Find out where and how they ultimately join the Ganga.

Do You Know?

- The *Namami Gange Programme* is an Integrated Conservation Mission approved as a 'flagship programme' by the Union Government in June 2014 to accomplish the twin objectives of effective abatement of pollution, conservation and rejuvenation of the national river, Ganga. You may explore about this project at <http://nmcg.nic.in/NamamiGanga.ssp#>

Enlarged with the waters from its right and left bank tributaries, the Ganga flows eastwards till Farakka in West Bengal. This is

the northernmost point of the Ganga delta. The river bifurcates here; the Bhagirathi-Hooghly (a distributary) flows southwards through the deltaic plains to the Bay of Bengal. The mainstream, flows southwards into Bangladesh and is joined by the Brahmaputra. Further downstream, it is known as the Meghna. This mighty river, with waters from the Ganga and the Brahmaputra, flows into the Bay of Bengal. The delta formed by these rivers is known as the *Sundarban Delta*.

Do You Know?

- The Sundarban Delta derived its name from the Sundari tree, which grows well in marshland.
- It is the world's largest and fastest growing delta. It is also the home of Royal Bengal tiger.

The length of the Ganga is over 2500 km. Look at Figure 3.4; can you identify the type of drainage pattern formed by the Ganga river system? Ambala is located on the water divide between the Indus and the Ganga river systems. The plains from Ambala to the Sunderban stretch over nearly 1800 km, but the fall in its slope is hardly 300 metres. In other words, there is a fall of just one metre for every 6 km. Therefore, the river develops large meanders.

The Brahmaputra River System

The Brahmaputra rises in Tibet east of Mansarowar lake very close to the sources of the Indus and the Satluj. It is slightly longer than the Indus, and most of its course lies outside India. It flows eastwards parallel to the Himalayas. On reaching the Namcha Barwa (7757 m), it takes a 'U' turn and enters India in Arunachal Pradesh through a gorge. Here, it is called the Dihang and it is joined by the Dibang, the Lohit, and many other tributaries to form the Brahmaputra in Assam.

Do You Know?

- Brahmaputra is known as the Tsang Po in Tibet and Jamuna in Bangladesh.

In Tibet, the river carries a smaller volume of water and less silt as it is a cold and a dry area. In India, it passes through a region of high rainfall. Here the river carries a large volume of water and considerable amount of silt. The Brahmaputra has a braided channel in its entire length in Assam and forms many riverine islands. Do you remember the name of the world's largest riverine island formed by the Brahmaputra?

Every year during the rainy season, the river overflows its banks, causing widespread devastation due to floods in Assam and Bangladesh. Unlike other north Indian rivers, the Brahmaputra is marked by huge deposits of silt on its bed causing the riverbed to rise. The river also shifts its channel frequently.

The Peninsular Rivers

The main water divide in Peninsular India is formed by the Western Ghats, which runs from north to south close to the western coast. Most of the major rivers of the Peninsula, such as the Mahanadi, the Godavari, the Krishna and the Kaveri flow eastwards and drain into the Bay of Bengal. These rivers make deltas at their mouths. There are numerous small streams flowing west of the Western Ghats. The Narmada and the Tapi are the only long rivers, which flow west and make estuaries. The drainage basins of the peninsular rivers are comparatively smaller in size.

The Narmada Basin

The Narmada rises in the Amarkantak hills in Madhya Pradesh. It flows towards the west in a rift valley formed due to faulting. On its way to the sea, the Narmada creates many picturesque locations. The 'Marble rocks', near Jabalpur, where the Narmada flows through a deep gorge, and the 'Dhuadhar falls, where the river plunges over steep rocks, are some of the notable ones.

Do You Know?

- The Narmada river conservation mission has been undertaken by the government of Madhya Pradesh by a scheme named *Namami Devi Narmade*. You may visit their website. <http://www.namamidevinarmade.mp.gov.in> to learn more about it.

All tributaries of the Narmada are very short and most of these join the main stream at right angles. The Narmada basin covers parts of Madhya Pradesh and Gujarat.

The Tapi Basin

The Tapi rises in the Satpura ranges, in the Betul district of Madhya Pradesh. It also flows in a rift valley parallel to the Narmada but it is much shorter in length. Its basin covers parts of Madhya Pradesh, Gujarat and Maharashtra.

The coastal plains between Western Ghats and the Arabian Sea are very narrow. Hence, the coastal rivers are short. The main west flowing rivers are Sabarmati, Mahi, Bharathpuzha and Periyar. Find out the states in which these rivers drain the water.

The Godavari Basin

The Godavari is the largest Peninsular river. It rises from the slopes of the Western Ghats in the Nasik district of Maharashtra. Its length is about 1500 km. It drains into the Bay of Bengal. Its drainage basin is also the largest among the peninsular rivers. The basin covers parts of Maharashtra (about 50 per cent of the basin area lies in Maharashtra), Madhya Pradesh, Odisha and Andhra Pradesh. The Godavari is joined by a number of tributaries, such as the Purna, the Wardha, the Pranhita, the Manjra, the Wainganga and the Penganga. The last three tributaries are very large. Because of its length and the area it covers, it is also known as the *Dakshin Ganga*.

The Mahanadi Basin

The Mahanadi rises in the highlands of Chhattisgarh. It flows through Odisha to reach

the Bay of Bengal. The length of the river is about 860 km. Its drainage basin is shared by Maharashtra, Chhattisgarh, Jharkhand, and Odisha.

The Krishna Basin

Rising from a spring near Mahabaleshwar, the Krishna flows for about 1400 km and reaches the Bay of Bengal. The Tungabhadra, the Koyana, the Ghatprabha, the Musi and the Bhima are some of its tributaries. Its drainage basin is shared by Maharashtra, Karnataka and Andhra Pradesh.

The Kaveri Basin

The Kaveri rises in the Brahmagiri range of the Western Ghats and it reaches the Bay of Bengal in south of Cuddalore in Tamil Nadu. The total length of the river is about 760 km. Its main tributaries are Amravati, Bhavani, Hemavati and Kabini. Its basin drains parts of Karnataka, Kerala and Tamil Nadu.

Do You Know?

- The river Kaveri makes the second biggest waterfall in India, known as Shivasamudram Falls. The hydroelectric power generated from the falls is supplied to Mysuru, Bengaluru and the Kolar Gold Field.

Find out

- The name of the biggest waterfall in India.

Besides these major rivers, there are some smaller rivers flowing towards the east. The Damoder, the Brahmani, the Baitarni and the Subarnrekha are some notable examples. Locate them in your atlas.

Do You Know?

- 71 per cent of the world's surface is covered with water, but 97 per cent of that is salt water.
- Of the 3 per cent that is available as freshwater, three quarters of it is trapped as ice.

LAKES

You may be familiar with the valley of Kashmir and the famous Dal Lake, the house boats and *shikaras*, which attract thousands of tourists every year. Similarly, you may have visited some other tourist spot near a lake and enjoyed boating, swimming and other water games.

Imagine that if Srinagar, Nainital and other tourists places did not have a lake would they have been as attractive as they are today? Have you ever tried to know the importance of lakes in making a place attractive to tourists? Apart from attraction for tourists, lakes are also useful to human beings in many ways.

Find out

- Lakes of large extent are called seas, like the Caspian, the Dead and the Aral seas.

India has many lakes. These differ from each other in size and other characteristics. Most lakes are permanent; some contain water only during the rainy season, like the lakes in the basins of inland drainage of semi-arid regions. There are some lakes which are the result of the action of glaciers and ice sheets, while others have been formed by wind, river action and human activities.

A meandering river across a floodplain forms *cut-offs* that later develops into *ox-bow* lakes. Spits and bars form lagoons in the coastal areas, e.g. the Chilika lake, the Pulicat lake and the Kolleru lake. Lakes in the region of inland drainage are sometimes seasonal; for example, the Sambhar lake in Rajasthan, which is a salt water lake. Its water is used for producing salt.

Most of the freshwater lakes are in the Himalayan region. They are of glacial origin. In other words, they formed when glaciers dug out a basin, which was later filled with snowmelt. The Wular lake in Jammu and Kashmir, in contrast, is the result of tectonic activity. It is the largest freshwater lake in India. The Dal lake, Bhimtal, Nainital, Loktak and Barapani are some other important freshwater lakes.



Figure 3.6 : Loktak Lake

Apart from natural lakes, the damming of the rivers for the generation of hydel power has also led to the formation of lakes, such as Guru Gobind Sagar (Bhakra Nangal Project).

Activity

Make a list of natural and artificial lakes with the help of the atlas.

Lakes are of great value to human beings. A lake helps to regulate the flow of a river. During heavy rains, it prevents flooding and during the dry season, it helps to maintain an even flow of water. Lakes can also be used for developing hydel power. They moderate the climate of the surroundings; maintain the aquatic ecosystem, enhance natural beauty, help develop tourism and provide recreation.

ROLE OF RIVERS IN THE ECONOMY

Rivers have been of fundamental importance throughout the human history. Water from rivers is a basic natural resource, essential for various human activities. Therefore, riverbanks have attracted settlers from ancient times. These settlements have now become big cities. Make a list of cities in your state which are located on the bank of a river.

Using rivers for irrigation, navigation, hydro-power generation is of special significance — particularly to a country like India, where agriculture is the major source of livelihood of the majority of its population.

RIVER POLLUTION

The growing domestic, municipal, industrial and agricultural demand for water from rivers

National River Conservation Plan (NRCP)

The river cleaning programme in the country was initiated with the launching of the *Ganga Action Plan* (GAP) in 1985. The *Ganga Action Plan* was expanded to cover other rivers under the National River Conservation Plan (NRCP) in the year 1995. The objective of the NRCP is to improve the water quality of the rivers, which are major water sources in the country, through the implementation of pollution abatement work.

Source: <http://nrpd.nic.in/nrcp.pdf> as on 25.07.17

naturally affects the quality of water. As a result, more and more water is being drained out of the rivers reducing their volume. On the other hand, a heavy load of untreated sewage and industrial effluents are emptied into the rivers. This affects not only the quality of water but also the self-cleansing capacity of the river. For example, given the adequate streamflow, the Ganga water is able to dilute and assimilate pollution loads within 20 km of large cities. But the increasing urbanisation and industrialisation do not allow it to happen and the pollution level of many rivers has been rising. Concern over rising pollution in our rivers led to the launching of various action plans to clean the rivers. Have you heard about such action plans? How does our health get affected by polluted river water? Think about “life of human beings without fresh water”. Arrange a debate on this topic in the class.

EXERCISE

1. Choose the right answer from the four alternatives given below.
 - (i) Why do some lakes in India have water only during the rainy season?
 - (a) They are seasonal lakes.
 - (b) They are formed by glaciers.
 - (c) They are always fed by rivers.
 - (d) They are permanent in nature.

- (ii) The river Narmada has its source at
 (a) Satpura (c) Amarkantak
 (b) Brahmagiri (d) Slopes of the Western Ghats
- (iii) Which one of the following lakes is a salt water lake?
 (a) Sambhar (c) Wular
 (b) Dal (d) Gobind Sagar
- (iv) Which one of the following is the longest river of the Peninsular India?
 (a) Narmada (c) Godavari
 (b) Krishna (d) Mahanadi
- (v) Which one amongst the following rivers flows through a rift valley?
 (a) Mahanadi (c) Krishna
 (b) Tungabhadra (d) Tapi
2. Answer the following questions briefly.
- What is meant by a water divide? Give an example.
 - Which is the largest river basin in India?
 - Where do the rivers Indus and Ganga have their origin?
 - Name the two headstreams of the Ganga. Where do they meet to form the Ganga?
 - Why does the Brahmaputra in its Tibetan part have less silt, despite a longer course?
 - Which two Peninsular rivers flow through trough?
 - State some economic benefits of rivers and lakes.
3. Below are given names of a few lakes of India. Group them under two categories – natural and created by human beings.
- | | |
|---------------------|-----------------------|
| (a) Wular | (b) Dal |
| (c) Nainital | (d) Bhimtal |
| (e) Gobind Sagar | (f) Loktak |
| (g) Barapani | (h) Chilika |
| (i) Sambhar | (j) Rana Pratap Sagar |
| (k) Nizam Sagar | (l) Pulicat |
| (m) Nagarjuna Sagar | (n) Hirakund |
4. Discuss the significant difference between the Himalayan and the Peninsular rivers.
5. Compare the east flowing and the west flowing rivers of the Peninsular plateau.
6. Why are rivers important for the country's economy?

Map Skills

- On an outline map of India mark and label the following rivers: Ganga, Satluj, Damodar, Krishna, Narmada, Tapi, Mahanadi, and Brahmaputra.
- On an outline map of India mark and label the following lakes: Chilika, Sambhar, Wular, Pulicat, Kolleru.

Project/Activity

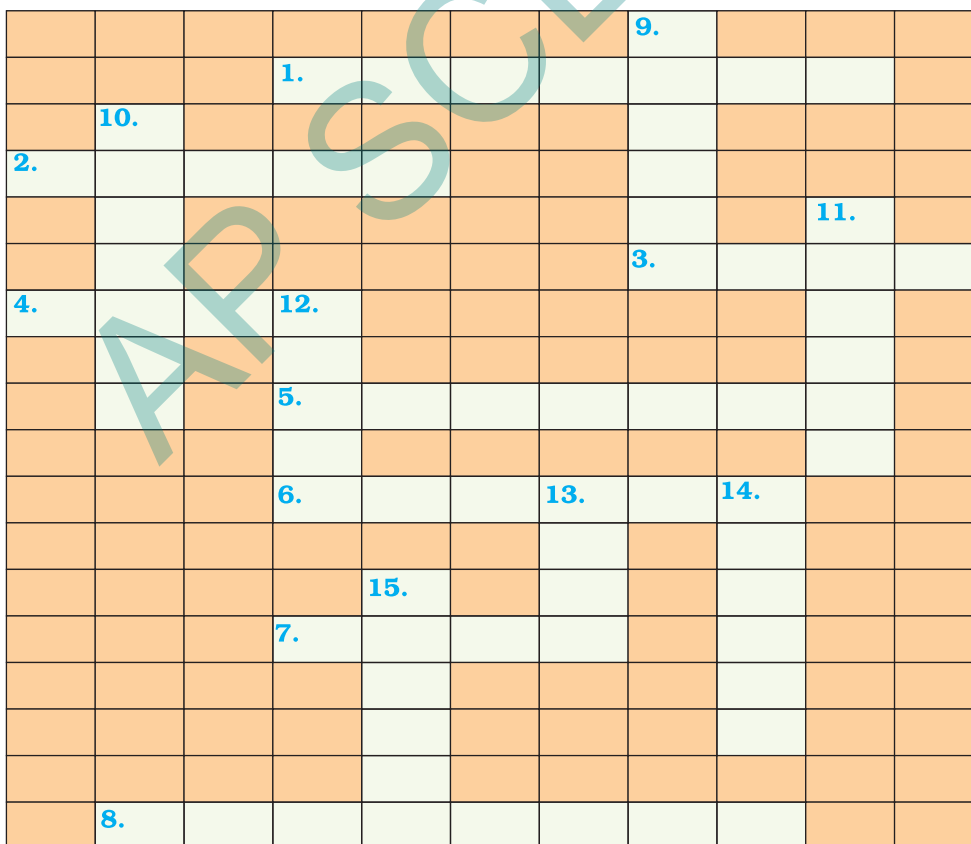
Solve this crossword puzzle with the help of given clues.

Across

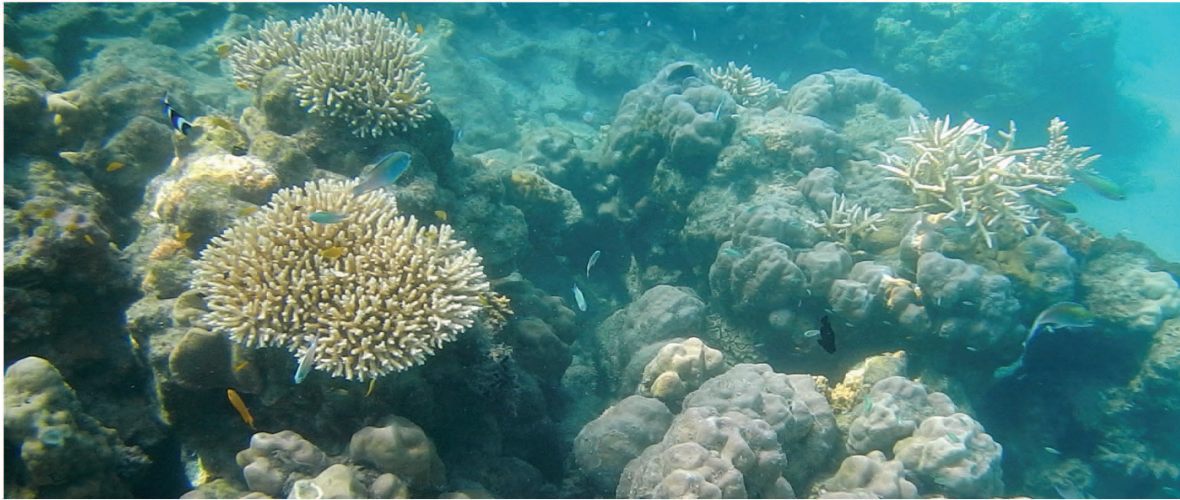
1. Nagarjuna Sagar is a river valley project. Name the river?
2. The longest river of India.
3. The river which originates from a place known as Beas Kund.
4. The river which rises in the Betul district of MP and flows westwards.
5. The river which was known as the "Sorrow" of West Bengal.
6. The river on which the reservoir for Indira Gandhi Canal has been built.
7. The river whose source lies near Rohtang Pass.
8. The longest river of Peninsular India?

Down

9. A tributary of Indus originating from Himachal Pradesh.
10. The river flowing through fault, drains into the Arabian Sea.
11. A river of south India, which receives rainwater both in summer and winter.
12. A river which flows through Ladakh, Gilgit and Pakistan.
13. An important river of the Indian desert.
14. The river which joins Chenab in Pakistan.
15. A river which rises at Yamunotri glacier.



Coral Reefs



Kolleru Lake



Anaimudi (Highest Peak in South India)

