

17

INDIA - PHYSICAL FEATURES

17.1 INTRODUCTION

Historically, India is an ancient country, known as *Bharatvarsh*. Surrounded by the sea on three sides, it is separated from the rest of Asia by a lofty mountain chain. Hence, it has become an independent entity called the Indian subcontinent. In size, India is the seventh largest country in the world.

India is a vast country characterized by great diversity in its physical features. The lofty mountains to the north have rugged topography, majestic snow clad peaks and large ice fields. To their south lie extensive low-lying fertile plains and further south are the dissected plateaus. All these form the part of a single country, India. In this lesson, we will study the location and extent of our country and the physical features such as the mountains, plateaus and plains, drained by rivers big and small.

17.2 OBJECTIVES

After studying this lesson you will be able to :

- describe the location of India in terms of latitude and longitude;
 - describe with the help of a map and a globe, the importance of the location of India in terms of neighboring countries, continents, hemispheres and the Indian Ocean;
 - compare India with other countries in terms of area;
 - describe the main characteristics of major physiographic divisions;
 - show the major relief features and rivers of India on an outline map of the country;
 - compare the Himalayan rivers with those of the peninsular India;
 - conclude that India's rich and diverse culture is the result of its varied physical features;
 - explain how different physiographic divisions are economically complementary to each other.
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17.3 LOCATION, EXTENT AND BOUNDARIES OF INDIA

A huge land mass of South Asia is flanked by new fold towering mountains on the northwest, north and northeast. The Arabian sea lies to its southwest, the Bay of Bengal to its southeast and the Indian Ocean to its south. This well defined South Asian landmass is called Indian sub-continent. This sub-continent consists of the countries of India, Pakistan, Bangladesh, Nepal and Bhutan not excluding Sri Lanka, an island narrowly separated by the Palk Strait. India alone covers about three fourths of the area of this sub-continent and has common frontier with each one of them. She along with her five neighbours forms a clearly identifiable geographical unit, with certain common cultural parameters. Since old times, the country has been known by various names such as *Aryavarta*, *Bharat*, *Hindustan* and lately India. The Indian Ocean or *Hind Mahasagar* has also been named after India - the only country to be so. According to the Constitution of India, the country is known as *Bharat* or India.

India lies wholly in the Northern Hemisphere. The Indian mainland extends between 8°4' N. and 37°6' N latitudes and from 68°7' E to 97°25' E longitudes. Thus the latitudinal and longitudinal extent of India is of about 29 degrees. It measures about 3,214 km from north to south, and 2,933 km from east to west. Though the latitudinal and longitudinal extent is almost the same, the actual distances do differ considerably. Why is it so? This is because the east-west distance between two successive meridians of longitude along the equator is at its maximum - 111 km. This, however, goes on decreasing as one moves from the equator to the poles, where it is zero. This is because all the meridians of longitude merge in a single point at the poles - both North and South. On the other hand, the north-south distance between any two successive parallels of latitude along any meridian of longitude remains uniform i.e. 111 km. The following table may further clarify this point :

Degrees of Latitude	0	10	20	30	40	50	60	70	80	90
Distance in kms	111	109.6	104.6	96.4	85.4	71.7	55.8	38.2	19.4	0

A glance at the globe should suffice to convince you of this point.

The northern most point of the Indian mainland lies in the state of Jammu and Kashmir and the southern most point is Kanyakumari in Tamilnadu. However, the southern most point of the country as a whole lies further south in Andaman and Nicobar Islands. It is now called Indira Point. It is situated at 6°30'N. latitude. The westernmost point of India lies in Gujarat and the eastern most in Arunachal Pradesh.

Let us see the impact of such large latitudinal extent upon the lives of the people of India. The northern parts of the country are quite far off from the equator. Therefore, the rays of the sun strike those parts more obliquely. Consequently, this part of the country receives lesser amount of insolation and has cold climate unlike the southern parts. Secondly, the difference between the length of day and night in southern most part of India is much less - only about 45 minutes as they are situated near the equator. This difference between day and night in the northern parts of India steadily goes on increasing till it becomes as much as 5 hours.

The Tropic of Cancer passes almost half way through the country. Thus half of the country to the south of the Tropic of Cancer is situated in the Tropical or Torrid zone and the other half lying north of the Tropic of Cancer falls in the Sub-tropical zone.

The earth takes 24 hours to complete one rotation about its axis. The Sun rises first in the east and then in the west because the earth rotates from west to east. The earth's longitudinal expanse of 360° is thus covered in 24 hours, at the pace of 15° per hour. As the longitudinal extent of India is nearly 30° , the real time difference in India between its eastern and western extremities is roughly of the order of two hours. While at the eastern extremity of India the day may have just broken out, the western extremity would take nearly another two full hours to do so.

To iron out this big chunk of time difference, India, like all other countries of the world, follows the local time of its relatively central meridian as the standard time for the whole country. For the convenience of all, each country chooses its standard meridian in a multiple of $7^\circ 30'$. Accordingly, the standard meridian of India has been chosen to be $82^\circ 30' E$.

The north-central part of India is broad while the southern part tapers down towards the Indian Ocean in the south. Thus, the northern part of the Indian Ocean has been divided into two, by the sheer presence of Indian Peninsula. The western part of northern Indian Ocean is called the Arabian Sea while the eastern part is called the Bay of Bengal. The total length of the coastline of India including the island groups is about 7,516.6 km. The Palk Strait separates Indian mainland from Sri Lanka. Structurally, Sri Lanka is an extension of the peninsular block of India.

India has a highly favourable geographical location for the promotion of international trade. She stands almost at the centre of the Eastern Hemisphere and at the head of the Indian Ocean, spanning Africa, Asia and Australia. The country lies on the international air and sea routes connecting Southeast Asia, the Far-East and Oceania on one hand and the Western Europe, West Asia, Africa and North America on the other. India stands between the industrialized countries of West Europe and the densely populated countries of South-East Asia and the Far-east. The oil rich Persian Gulf is also not very far from India. Countries around this gulf supply more than half of the mineral oil entering into international trade. All these factors have made the location of India strategically as well as commercially highly important.

17.4 SIZE

India accounts for 2.42 per cent of the world's total land area; whereas it sustains 16 per cent of the world population. You will know more about it in lesson No. 26 on population of India. The land frontiers of India measure 15,200 km. Pakistan, Afghanistan, China, Nepal, Myanmar and Bangladesh share common boundaries with India. The kingdom of Bhutan is situated in the Eastern Himalayas. It is a small country and the responsibility of its defence rests with India. Most of our boundary with Pakistan and Bangladesh is almost man-made. There is no mountain range or river to form a natural boundary. The international boundary of India

passes through a variety of landforms - barren desert lands, lush green agricultural fields, gushing rivers, snow clad mountains as well as densely forested mountain ranges. The defence of such an international boundary passing through various kinds of terrains is certainly a difficult job. An Indian soldier is, therefore, exposed to various types of extremely hostile conditions on the course of his duty. Sometimes he is posted to the icy cold glaciers. At times he has to bear the wrath of the burning sun and he has to face the hot sands of the desert. Often he is posted in the marshy, riverine, rainy and thickly forested tracts of the northeast. Our country has to spend crores of rupees daily for the defence of such a long and inhospitable boundary that passes through various kinds of terrain.

- * India stands at the head of the Indian Ocean that spans the continents of Asia, Africa and Oceania providing further links to other continents through the Pacific Ocean and the Atlantic Ocean.
- * In the Indian subcontinent, India is the only country to share its land frontiers with every member country of the subcontinent.
- * In area India is the seventh largest country in the world but in population it stands next only to China.
- * The variation in local time between the eastern and western extremities of India is of the order of two hours. This has been minimised to a certain extent by adopting 82°30' E longitude as the Standard Meridian of India.

INTEXT QUESTIONS 17.1

1. Name the countries which share the common land frontiers with India.
2. Between which latitudes and longitudes is India situated?
3. Which is the southern most point of India? Select the correct alternative.
(a) Kanyakumari (b) Rameshwaram
(c) Indira Point (d) Kavaratti
4. Which is the Standard Meridian of India? Select the correct alternative.
(a) 68°7' E (b) 97°25' E (c) 82°30' E (d) 80°E
5. Broadly by how many hours does the local time of the eastern most point of India differ from that of the westernmost point?

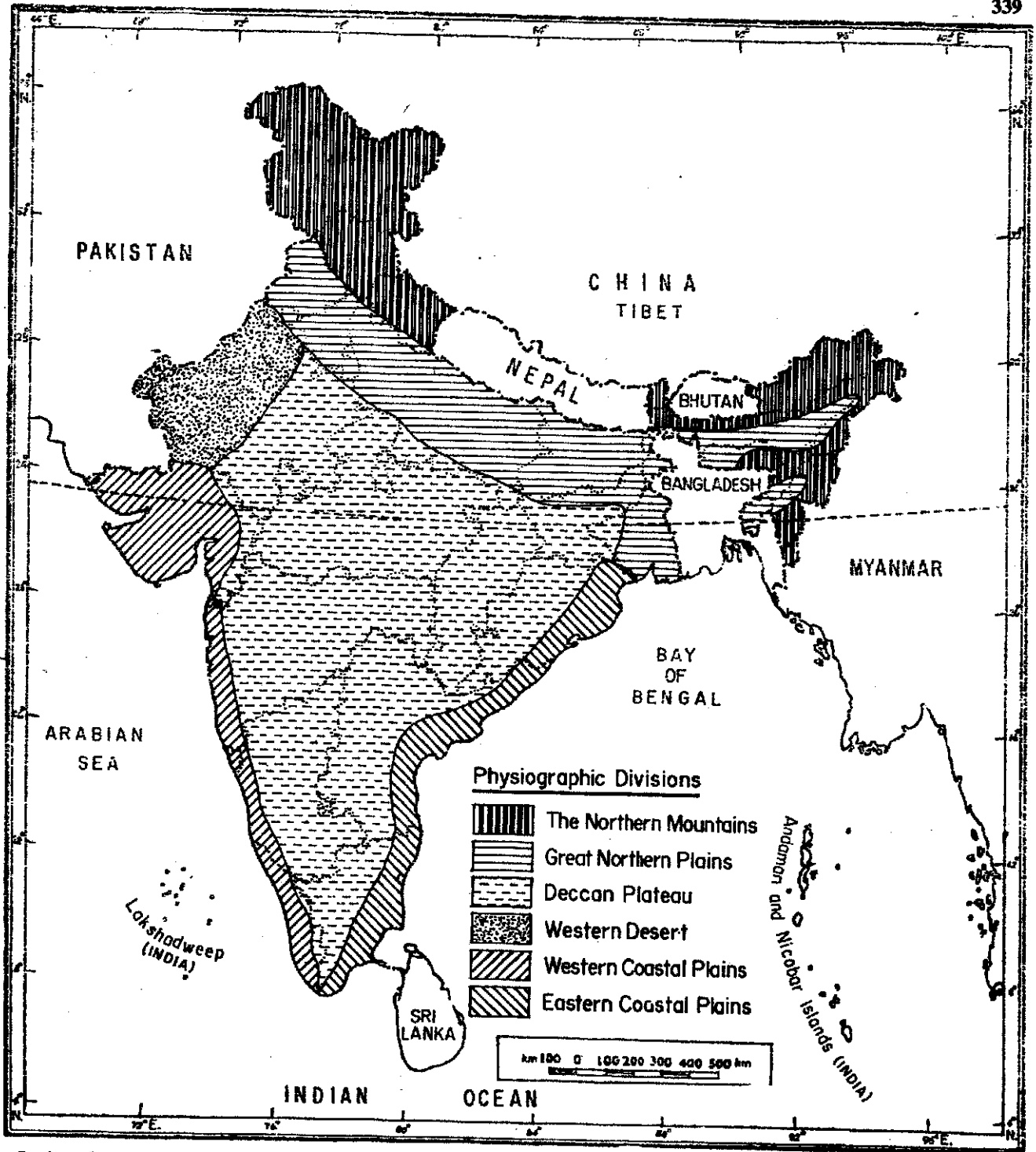
17.5 PHYSIOGRAPHIC DIVISIONS OF INDIA

India is a land of physical diversities. Almost all types of picturesque and breath taking landforms are found here. According to one estimate, 29.3 per cent of area of India is occupied by mountains and hills, 27.7 per cent by plateaus and 43 per cent by plains.

From a physiographical point of view, India can be divided into following four regions :

1. Great Northern Mountains 2. Great Northern Plains
3. Great Indian Plateau and 4. Coastal Plains and Islands.

Let us know more about these physiographic divisions.



Based upon Survey of India outline map printed in 1979.

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

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

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*Printed at the 101 (H.L.O.) Printing Group of Survey of India.

*Price: Twenty-five Paise.

*These may be deleted when printing a map based on this outline map.

17.6 THE GREAT NORTHERN MOUNTAINS

They include the mountains and plateaus of northern Kashmir, the Himalayas proper and the hills of Arunachal Pradesh, Nagaland, Manipur, Mizoram, Tripura and Meghalaya. They are divided into three groups. They are

- (i) The Himalayas
- (ii) The Trans-Himalayas
- (iii) Purvachal or the hills of the North-East.

(i) The Himalayas

This is the highest mountain range of the world. It extends in the shape of an arc for a distance of 2500 Km from west to east along the northern boundary of India between the Indus gorge in Jammu and Kashmir in the west and Brahmaputra gorge in Arunachal Pradesh in the east. The breadth of the Himalayas ranges between 400 km. in the west to 150 km in the east. The area covered by this mountain system is about 5 lakh square km. It has three major ranges. These ranges are separated by deep valleys and plateaus. The southern slopes of Himalayas facing India are steeper and those facing the Tibetan side are generally gentler. In the east, Himalayas rise almost abruptly from the plains of West Bengal and Assam. That is why two of the highest peaks of Himalayas, Mt. Everest (in Nepal) and Kanchenjunga are not very far from the plains. On the other hand, the western part of Himalayas rises rather gradually from the plains. Hence, the higher peaks in this part are farther from the plains and a number of ranges lie between the plains and high peak. The high peaks of this part such as Nanga Parbat, Nanda Devi and Badrinath are very far from the plains.

Three parallel ranges can be identified in the Himalayas. These are

- (a) Himadri,
- (b) Himachal and
- (c) Siwalik

(a) Himadri (Greater Himalaya) : This is the northern most and the highest range of the Himalayas. This is the only range of the Himalaya which maintains its continuity from west to east. The core of this range is made up of granite rocks and flanked by metamorphic and sedimentary rocks. The extent of this range is between the Nanga Parbat peak (8126 m.) in the west and Namcha Barwa peak (7756 m.) in the east. The average height of this range from sea level is 6100 metres. Over 100 peaks have a height of more than the average height of the range. The highest peak of the world, Mount Everest, (8848 m) is situated in this range. Kanchenjunga, Makalu, Dhaulagiri, Annapurna are some of the other peaks having a height of more than 8000 metres. Kanchenjunga is the highest peak of Himalayas in India.

The Himadri range is snow clad throughout the year. There are a number of large and small glaciers. After melting of snow and ice, their water falls in the rivers of northern India making them perennial throughout the year. Gangotri and Yamunotri are good examples of such glaciers.

The Himadri range can be crossed through some passes like Zojila, Shipkila, Niti, Nathula etc.

(b) **Himachal (Lesser or Middle Himalayas)** : is located southwards of Himadri. The breadth of Himachal range is 60 to 80 km. and the height varies from 1000 metres to 4500 metres. Some of the peaks of this range have a height of more than 5000 metres. This range is highly dissected and uneven. Rocks in this zone have been metamorphosed due to violent thrusts and compression. Therefore, this range mainly consists of metamorphic rocks. The gentle slopes of the eastern part of this range are covered with dense forests. The south facing slopes of other parts of this range are very steep and generally devoid of any vegetation. The north facing gentle slopes of this range are covered by dense vegetation.

Pir Panjal in Jammu and Kashmir and Dhauladhar in Himachal Pradesh are the local names of this range. The beautiful valley of Kashmir extends between the Pir Panjal and Himadri ranges. The famous valley of Kullu and Kangra are also a part of Himachal ranges.

Most of the hill towns or resort towns are located in the Himachal range. Shimla, Nainital, Mussouri, Almora and Darjeeling are some such famous hill towns. There are a number of beautiful lakes around Naini Tal.

(c) **Siwalik (The Outer Himalaya)** : The southern most range of Himalayas is known as Siwalik. The Himadri and Himachal ranges of the Himalayas have been formed much before the formation of Siwalik range. The rivers rising in the Himadri and Himachal ranges brought along with them gravel, sand and mud, which was deposited in the rapidly shrinking Tethys Sea. In course of time, the earth movements caused folding of these relatively fresh deposits of sediments, giving rise to the least consolidated Siwalik range. The average height of the Siwalik range is very low, about 600 metres only. There are some broad valleys in between the Himachal and the Siwalik ranges. These valleys are known as 'duns'. Dehradun valley is one of the best examples.

(ii) The Trans-Himalayan ranges

There are some mountain ranges to the north of the Himadri in Jammu and Kashmir. The range extending to the north of the Himadri and running parallel to it is called the Zaskar range. North of Zaskar range is the Ladakh range. The river Indus flows towards northwest between Zaskar and Ladakh range. Many scholars treat Zaskar and Ladakh ranges as parts of the Great Himalayas and include them in Kashmir Himalayas. North of the Ladakh range lie the Karakoram. The name of Karakoram in Sanskrit literature is Krishnagiri. K² (8611 m) is the highest peak of the Karakoram Mountains. This is the second highest peak of the world, next only to Mt. Everest.

In the north eastern part of the state of Jammu and Kashmir is situated the Ladakh plateau. This plateau is a very high and arid. It forms one of the remote areas of our country.

(iii) Purvachal

Purvachal is the name given to all the hills of north east India beyond Brahmaputra gorge. The average height of these hills from sea level is 500 to 3000 metres. These hills are located in Southern Arunachal Pradesh, Nagaland, Manipur, Mizoram, Tripura and Meghalaya. Mishmi, Patkoi Bum, Naga, Manipur, Mizo (Lushai) and Tripur are the major hilly ranges of this region. Meghalaya Plateau is also part of these hills of the north eastern region. This plateau includes the hills of Garo, Khasi, and Jaintia. Structurally, however, it is a part of Peninsular India.

- * The Himadri, the Himachal and the Siwalik are three major ranges of the Himalayas.
- * The Zaskar, the Ladakh and the Karakoram along with their eastern extension, Kailash in Tibet are the trans Himalayan ranges.
- * Mishmi, Patkoi Bum, Naga, Manipur, Mizo, Tripur etc. are the hill ranges of Purvachal.

INTEXT QUESTIONS 17.2

1. Select the correct alternative.
 - (i) Which is the highest mountain peak of the world?
(a) K² (b) Kanchenjunga (c) Mt. Everest (d) Namcha Barwa.
 - (ii) Which is the highest peak of the Himalayas in the Indian territory?
(a) Makalu (b) Dhaulagiri (c) Annapurna (d) Kanchenjunga
 - (iii) Which is the highest peak in India?
(a) Annapurna (b) Nanga Parbat (c) K² (d) Nanda Devi
2. Name three mountain ranges of the Himalayas
(1) _____ (2) _____ (3) _____
3. Which mountain is referred to as Krishnagiri in Sanskrit literature?

4. Name the most important Trans-Himalayan mountain range in Jammu & Kashmir along with its eastern extension in Tibet.

17.7 THE GREAT NORTHERN PLAINS

This plain extends from west to east, South of the Himalayas and north of the Great Indian Plateau. The plain extends from the arid and semi-arid areas of Rajasthan in the west upto Brahmaputra valley in the east. The area of this plain is more than 7 lakh square km. This plain is very fertile and a very sizeable part of the Indian population lives in innumerable villages and several big cities in this region.

This plain is made up of the soils brought down and deposited by the rivers flowing from the Himalayas in the North and the Great Indian plateau in the South. The rivers have been depositing their sediments in this plain over millions of years. Therefore, the alluvium in this plain is quite a few hundred metres deep. In some of the parts, the depth of the sediments is as much as 2000 to 3000 metres.

This plain is almost dead flat. Its average height is 200 metres above the mean sea level. Due to a very gentle slope towards the sea, the rivers in this plain flow very leisurely and at times even sluggishly. The slope from Varanasi upto the mouth of Ganga is only 10 cm. per km. The land around Ambala is a bit more elevated. However, it acts as a water divide between the two major river basins - the Satluj in the west and the Ganga in the east. Rivers lying eastwards of this water divide flow into the Bay of Bengal while those west of it flow into the Arabian Sea.

The relatively higher part of the plain is called *bangar*. This area is never covered with flood water of the rivers. Contrary to this, the comparatively lower area is called the *khadar*. This area is flooded by streams almost every year. Khadar area is known as *bet* in Punjab.

There is a strip of plain about 10-15 km broad along the outer slopes of the Siwaliks in Punjab, Haryana and Uttar Pradesh. This region is known as '*bhabar*'. This strip of bhabar is made of gravel and coarse sand. The smaller streams disappear under ground in the '*bhabar*' region during the summer season and their water surfaces again after crossing the bhabar. This water accumulates in the strip of plain about 15 to 30 km wide and extends to the south of bhabar. Accumulation of this water makes the land marshy. This marshy land is called the *terai*. Many parts of the terai have been reclaimed, after independence, for agricultural purposes.

The great Northern Plain can be divided into four parts : (i) Western plain (ii) North Central plain (iii) Eastern plain and (iv) Brahmaputra plain

(i) Western Plain : This region includes the Rajasthan desert and *bangar* region lying to the west of Aravali ranges. The desert is partly rocky and partly sandy. In the ancient period, the perennial streams - Saraswati and Drishadvati - flowed through this region. This region includes the fertile area of Bikaner. River Luni flows through this *bangar* region and falls into the Rann of Kutch. The famous salt water lake of Sambhar is situated in this part of the plain.

(ii) North Central Plain : This plain extends over Punjab, Haryana and Uttar Pradesh. The part of this plain extending into Punjab and Haryana has been formed by the alluvium brought by rivers Satluj, Beas and Ravi. This is a very fertile area. The part of this plain lying in Uttar Pradesh is made up of the deposits laid down; among others, by the river Ganga, Yamuna, Ramganga, Gomati, Ghagra and Gandak. This part of plain is highly fertile and has been the cradle of Indian civilization and culture.

(iii) Eastern Plains : This part of the great plains covers the middle and the lower Ganga valley lying in the states of Bihar and West Bengal. Ganga flows through the middle of this

plain in Bihar. Ghagra, Kosi and Gandak join Ganga from the north while Son joins from south. On entering West Bengal the plain widens further extending from the foot hills of the Himalayas upto the Bay of Bengal. The southern part of the plain is delta region. Ganga is divided into several distributaries in the delta region. Hooghly is the best example of a distributary of Ganga. This part of the plain is indeed very fertile and more rainy.

(iv) Brahmaputra Plain : The northeastern part of the Great Indian Plain extends into Assam. This plain has been formed by deposition of alluvium brought down by river Brahmaputra and its tributaries. Brahmaputra is highly prone to devastating floods at regular intervals. After the floods, the river generally changes its course. This process has led to the formation of various islands in the river. Majuli (1250 square kilometer) in the Brahmaputra river is the world's largest river island. This part is also very fertile. It is surrounded by hills from three sides. Bangladesh is situated on the plains and the delta jointly formed by Ganga and Brahmaputra and their tributaries.

- * The great Northern Plains have been formed by alluvium deposits brought by rivers flowing from Himalayas and the Great Indian Plateau.
- * This plain is dead flat, with almost negligible slope.
- * The plain is of two types bangar and khadar.
- * The Great Northern Plain can be divided into four parts. - Western Plain, North Central Plain, Eastern Plain and Brahmaputra Plain.

INTEXT QUESTIONS 17.3

1. What is the maximum depth of alluvium deposits in the Great Northern Plain?

2. What is meant by the term 'bangar'?

3. In which three states does the bhabar region extend?
(a) _____ (b) _____ (c) _____
4. Which two perennial rivers flowed through the Western Plain in ancient times?
(a) _____ (b) _____
5. Name four rivers flowing through the North Central Plain
(a) _____ (b) _____ (c) _____
(d) _____

17.8 THE GREAT INDIAN PLATEAU

The Great Indian Plateau lies to the South of the Great Northern Plains. This is the largest physiographic division of our country. It covers an area of about 16 lakh square km. i.e. about half of the total area of the country. It is an old rocky plateau region. The topography consists of a series of plateaus and hill ranges interspersed with river valleys. Aravalli hills mark the north-western boundary of the plateau region. Its northern and north-eastern boundary is marked by the northern edge of the Bundelkhand Plateau, Kaimur and Rajmahal

Hills. The Sahyadry (Western Ghats) and the Eastern Ghats mark the western and eastern boundaries respectively of this Great Plateau. Most of the area of the plateau has a height of more than 400 metres above sea level. The highest point of plateau region is the Anaimudi peak (2965 m). The general slope of this plateau is towards east.

The Great Plateau is the part of very ancient land mass, called Gondwana land. This plateau from the earliest times has been above the level of the sea. Therefore, it has been subjected to large scale denudation. Its mountains are generally of relic type. They are composed of very hard rocks, which have withstood the ravages of denudation more effectively than the surrounding regions. Because of their old age, all the rivers have attained their base level and have built up broad and shallow valleys. The dominant rock formations, especially those in the southern parts, are of metamorphic origin with frequent occurrences of granites.

River Narmada divides the peninsular block of India into two parts. The region lying to the north of the Narmada is called the Central High Lands and the region lying to the south of Narmada is called the penninsular plateau, more commonly referred to as the Deccan Plateau.

A glance at the map would point out that barring Narmada and Tapti all the major rivers lying to the south of the Vindhyas flow eastwards to fall into the Bay of Bengal. The westward flow of Narmada and Tapi is assigned to the fact that they have been flowing through faults or rifts which were probably caused when the Himalayas began to emerge from the Tethys Sea of the olden times.

(i) The Central Highlands : It extends between river Narmada and Great Northern Plains. The Aravallis form the west-northwestern edge of the Central Highlands. These hills extend from Gujarat, through Rajasthan to Delhi in the northeasterly direction for a distance of about 700 km. The height of these hills is about 1500 metres in southwest while near Delhi they are hardly 400 metres high. The highest peak of the Aravalli hills is Gurushikhar (1722 m) near Mt. Abu. Mt. Abu on the border of Gujarat and Rajasthan is a beautiful hill station. The region to the east of Aravallis is the highly dissected and uneven. Malwa plateau forms the dominant part of the Central Highlands.

It lies to the southeast of Aravallis and to the north of Vindhya Range. River Chambal, Betwa and Ken drain the Malwa Plateau before they join Yamuna. The part of the Central Highlands which extends to the east of Malwa Plateau is known as Bundelkhand and is further followed by Baghelkhand and the well known Chhotanagpur Plateau. Vindhya Range forms the southern edge of Malwa Plateau. The Mahadeo Hills, Kaimur Hills and Maikal Range lie towards further east. The slope of Vindhya Range towards Narmada valley is absolutely steep and forms escarpments. It only confirms that Narmada flows through a rift valley. This range has very few passes. Due to this fact the Vindhyas acted as a barrier between northern and southern parts of India for a long time in the past.

The valley of Narmada is situated between the Satpuras and the Vindhyas. River Narmada flows from east to west in this valley and falls into the Arabian Sea. This valley has been formed due to the subsidence of the land mass between the Vindhyas and the Satpuras.

(ii) **The Peninsular Plateau (Deccan Plateau)** : This physiographic division is the largest region of the Great Indian Plateau. The shape of this plateau is triangular. One of the sides of this triangle is marked by the line joining Kanya Kumari with Rajmahal Hills and this line passes through the Eastern Ghats. The second arm is marked by the Satpura Range, Mahadeo Hills, Maikal Range and the Rajmahal Hills. The third arm is marked by the Sahyadris (Western Ghats). The area of this Peninsular Plateau is about 7 lakh square km. and the height ranges from 500 to 1000 metres above sea level.

The Sahyadri Range forms the sharp edge of the Peninsular Plateau. Its long escarpments running parallel to the Arabian Sea coast are simply breath taking. Due to its location on the western margin of the Peninsular Plateau, the Sahyadri Range is also called Western Ghats. The word 'Ghat' also means a steplike mountain. Therefore, this English name of the Sahyadris is meaningful. The height of the Sahyadris increases from north to south. Anaimudi peak (2695 m) situated in Kerala is the highest peak of southern India. Anaimudi is a sort of tri-junction of the Annamalai Range, the Cardamom Hills and the Palani Hills. Kodai Kanal is a beautiful hill resort situated on the Palani Hills.

Eastern Ghats running from southwest to northeast form the eastern edge of the Peninsular Plateau. This range is known as poorvadrri also. The Eastern Ghats joins the Sahyadris at the Nilgiri Hills bordering Karnataka and TamilNadu. Udagamandalam (Ooty) situated on the Nilgiris is the famous hill station of South India and lies in Tamil Nadu. Once it was the summer resort of the Governor of Madras Presidency. The Eastern Ghats are not continuous like the Sahyadris. Mahanadi, Godavari, Krishna, Pennar and Kaveri rivers have dissected this range at many places.

The plateau region between the Sahyadris and the Eastern Ghats is known by numerous local names in different regions. Telangana which extends in Andhra Pradesh is the name of such a plateau. River Damodar flows through the Chhotanagpur Plateau. The valley of this river is famous for its huge coal deposits. Besides coal, this region is a store house of a number of many other minerals. The northwest part of the Deccan Plateau deserves special attention. It is made up of igneous rocks of volcanic origin. From the earth's highly turbulent interior, lava flowed out through huge cracks or fissure in the earth's crust. This process continued for millions of years. It is estimated that the volume of the lava flow exceeded the volume of the Himalayas. Geologists believe that this activity was closely associated with the birth of the Himalayas.

- * The shape of the Great Plateau is triangular.
- * It can be divided into two major parts. The Central Highlands and the Peninsular Plateau.
- * Aravallis, Vindhya, Sahyadris, Poorvadrri, Annamalai, Cardamom, Palani Mahadeo, Maikal and Satpuras are the major hills of the Great Plateau.
- * Chambal, Narmada, Tapi, Mahanadi, Godavari, Krishna and Kaveri are the major rivers of the Great Plateau.

INTEXT QUESTION 17.4

1. Select the correct alternative
 - (i) Which is the highest peak of southern India?
(a) Doda Betta (b) Anaimudi (c) Mahabaleshwar (d) Guru Shikhar
 - (ii) Which river flows through a rift valley?
(a) Narmada (b) Chambal (c) Godavari (d) Pennar
2. Name two rivers flowing through Malwa plateau.
(a) _____ (b) _____
3. On which hills is Kodaikanal situated?

4. Name the famous hill station situated on the Aravallis.

17.9 COASTAL PLAINS

The Great Plateau of India is surrounded by plains on all sides. In the north lies the Great Northern Plain and in south, along the east and west lie the Coastal Plains.

East Coastal Plain extends along the coast of the Bay of Bengal from Ganga Delta in the north to Kanyakumari in the south. This plain is broader than the western coastal Plains. This plain includes the deltas of the rivers Mahanadi, Godavari, Krishna and Kaveri. Chilka, Pulicat and Koluru lakes are the famous lagoons of this plain. These lakes have been formed by enclosing small parts of the Bay of Bengal behind sand bars. Lake Chilka is situated south of the delta of Mahanadi. The lake measures 75 km. in length. Lake Pulicat is situated north of Chennai city. Koluru lake is situated between the deltas of the Godavari and Krishna rivers. The east coastal plain is fertile where rice grows in plenty.

West Coastal Plain extends along the Arabian Sea from the Rann of Kutch in the north to Kanyakumari in the south. Except for the Gujarat plain, the western coastal plains are narrower than the eastern coastal plain. From southern Gujarat upto Mumbai this plain is comparatively broader, but it narrows southwards of Mumbai. Occasionally rocky domes and hills are visible in the plains of Gujarat, the Rann of Kutch and the plains of Kathiawar. The plains of Gujarat are made up of black soil. The coastal strip extending for about 500 km. between Daman in the north and Goa in the south is called Konkan. This region is highly dissected and the coast line is indented or irregular with several natural harbours. A number of small and seasonal rivers flow through this region. The coast from Goa to Mangalore is called the Karnataka coast. The coast from Mangalore upto Kanyakumari is called the Malabar coast. Here the coastal plain is wider. There are a number of long and narrow lagoons. 80 km. long Vembanad is an example of its kind. Kochi port is situated on one of the lagoons.

17.10 INDIAN ISLANDS

There are two small groups of islands. One of these situated in the Bay of Bengal, off the coast of Myanmar is known as the Andaman and Nicobar Islands. The other is known as Lakshadweep and situated in off the coast of Kerala. The Andaman Islands consists of (i) North, (ii) Middle, (iii) South and (iv) Little Andaman Islands. Port Blair is the capital city of the entire Union Territory and is located in South Andaman Island. This island group is separated by the Ten Degree Channel. To its south are situated the Nicobar Islands. They include Car Nicobar, Little Nicobar and Great Nicobar Islands from north to south. The southern most point of the Indian Union lies in Great Nicobar Island and has been named after Indira Gandhi. These islands represent a submerged chain of mountains. The Barren Island in the Andamans is India's only active volcano. These islands act as a naval and air outpost of our country in view of its strategic location. This island group faces seven countries - Bangladesh, Myanmar, Thailand, Malaysia, Singapore, Indonesia and Sri Lanka.

Lakshdweep Islands are situated in the Arabian Sea, off the coast of Kerala. All these islands are of coral origin. They have been built up by corals, the microscopic polyps. All these islands are very small in size. The largest island among these, the Minicoy, has an area of 4.5 square km. only. Kavaratti, is the capital city of this island group.

- * The West Coastal plains extend along the Arabian Sea coast.
- * The East Coastal Plains extend along the coast of the Bay of Bengal.
- * The East Coastal Plains are broader than the West Coastal Plains.
- * Lakshdweep Islands are situated in the Arabian Sea off the coast of Kerala and the Andaman & Nicobar Islands are situated in the Bay of Bengal, off the coast of Myanmar. Their location is highly strategic.

INTEXT QUESTIONS 17.5

1. Which of the coastal plains of India is broader than the other?

2. Name two lagoons on the Eastern Coastal plain.
(a) _____ (b) _____
3. Which lake is situated between the deltas of the Godavari and the Krishna rivers?

4. Name the two places associated with the northern or southern extremities of the Konkan coast respectively.

5. Which Indian group of islands is of coral origin? Select the correct alternative.
(a) Andaman (b) Nicobar (c) Lakshdweep (d) Barren

17.11 DRAINAGE SYSTEM

The drainage pattern or system of an area refers to the system of flow of surface water

mainly through the rivers and basins forms. The drainage system studies streams and the directions in which they carry the surface water of an area. The drainage system is related to a number of factors for example slope of land, geological structure, amount of volume of water and velocity of water. The surface run off of India is carried by a number of small and large rivers. The drainage system of country can be studied with reference to two parts - Northern India and Southern India.

(a) Drainage System of North India

Himalayas play an important role in the drainage system of the North India. This is because the rivers of North India have their sources in these mountains and beyond. These rivers differ from those of South India as they are still deepening their valleys rather rapidly. The debris eroded by these rivers are carried to the plains and seas and deposited there. This deposition is caused by the reduced velocity of river waters in the plains and deltas for want of necessary slope.

The Great North Indian plain has been formed by the silt brought down by these rivers. Some of the Himalayan rivers are older than the Himalayas themselves. As the ranges of the Himalayas had been rising upwards, these rivers were equally busy in downward cutting forming deep gorges and valleys. Consequently, parts of the valleys of these rivers are very deep and gorges have been formed particularly where rocks were hard and rainfall relatively low. The depth of the Indus gorge near Bunji (Jammu & Kashmir) is 5200 metres. Sutlej and Brahmaputra have also formed such gorges.

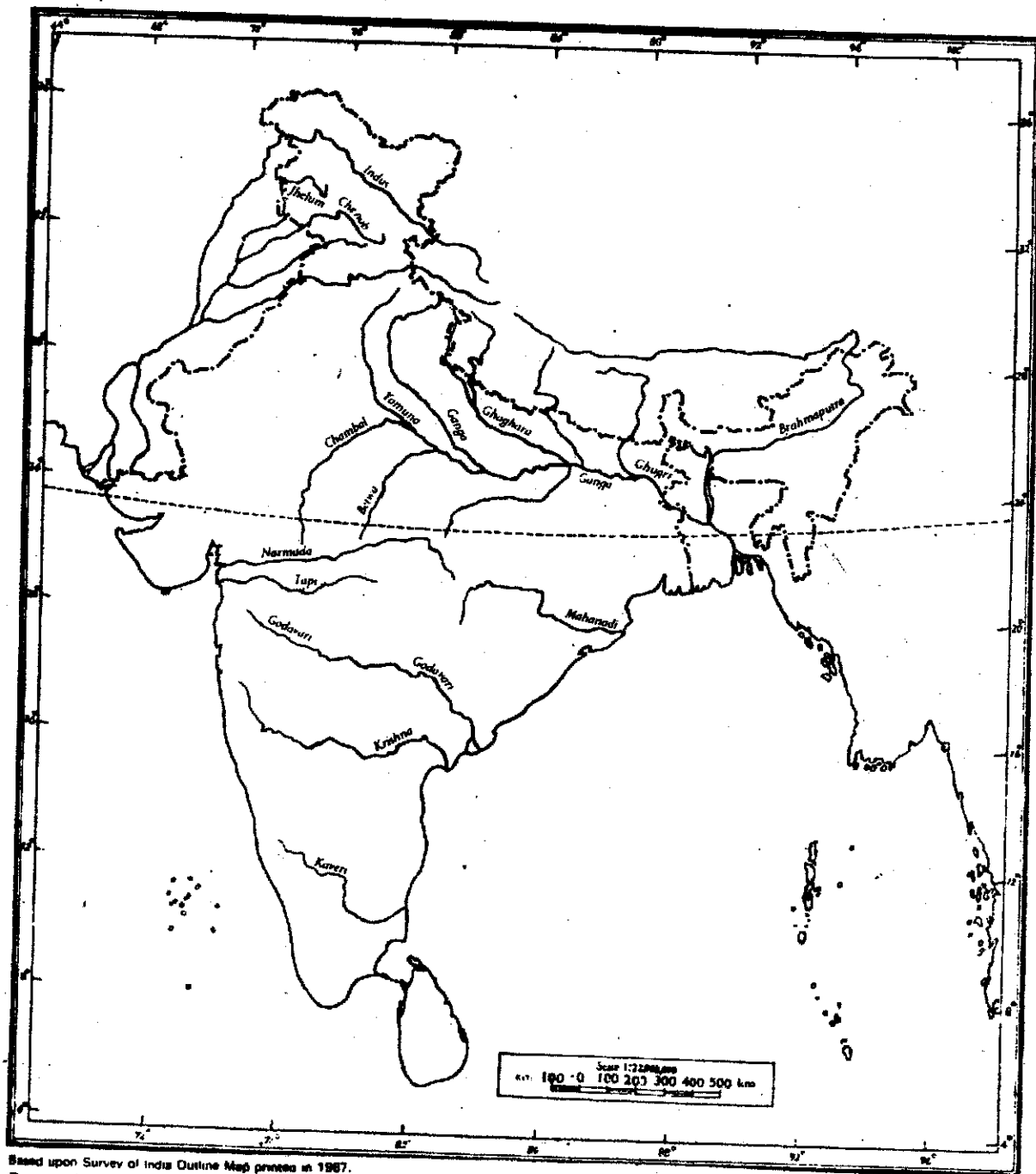
The drainage system of Northern India can be further sub-divided into three subsystems :- Indus System, Ganga System and Brahmaputra System.

The major rivers of Indus basin are the Indus, Jhelum, Chenab, Ravi, Beas and Sutlej. The Ganga basin includes Ramganga, Ghaghra, Gomti, Gandak, Kosi, Yamuna alongwith its southern tributaries, Son and Damodar rivers. The major rivers of Brahmaputra basin are Dibang and Lohit in Arunachal Pradesh and Assam, Tista in Sikkim, West Bengal and Bangladesh and Meghna, draining northeastern part of Bangladesh.

(b) Drainage System of Southern India

The Peninsular India is an ancient land mass. Therefore, the streams flowing through this region are in their old stage. They have attained their base level of erosion. Their capacity to erode valleys vertically has almost come to a negligible stage. Now these streams are eroding their sides at a slow pace. This is resulting in broadening of their valleys. Consequently, during flood their waters spread over a large area. It is believed that at the time of Himalayan orogeny, due to the movements associated with the mountain building processes, the Peninsular block had a slight tilt towards east. This is why, barring Narmada and Tapi, all the major rivers of south India flow towards east. Narmada and Tapi, both flow through fault or rift valleys. The major rivers of the drainage system of southern India are Mahanadi, Godavari, Krishna, Pennar, Kaveri and Vaigai.

The slope of the northern part of the southern peninsula is towards north. Consequently, some of the streams originating in the Vindhyas, flow towards north and join Yamuna and Ganga. Among these, Chambal, Ken, Betwa, Sind and Son are more important.



Based upon Survey of India Outline Map printed in 1987.

The territorial waters of India extend into the sea to a distance of twelve nautical miles measured from the appropriate base line.
Responsibility for correctness of internal details shown on the map rests with the publisher.

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Fig. 17.2 Major Rivers of India

The difference between the Himalayan rivers and Peninsular rivers

The rivers which have their origin in the Himalayas are perennial. These rivers are fed by the melting of ice and snow lying near the tongue of glaciers of the Great Himalayan Range (Himadri), increasing the dry weather flow of these rivers.

In the rivers of South India, the flow of water is highly fluctuating. While the rivers are in spate during the monsoons, they are almost dry during the long rainless months. Some of these rivers at many places become totally dry.

INTEXT QUESTION 17.6

1. Name any two factors, which influence the drainage system.
(a) _____ (b) _____
2. Fill in the blanks with appropriate words out of those given in the brackets :
(i) Surface run off from Indian territory flows into the _____ in the west and the _____ in the east.
(Indian ocean, Bay of Bengal, Persian Gulf, Arabian Sea)
- (ii) The two major west flowing rivers of South India are _____ and _____.
(Mahanadi, Kaveri, Narmada, Tapi)
3. Name three rivers of the Great Plateau which flow towards north.
(a) _____ (b) _____ (c) _____
4. How deep is the gorge of the Indus river near Bunji?

17.12 DIVERSITY AND COMPLEMENTARITY OF PHYSIOGRAPHIC DIVISIONS

India possesses a wide variety of land forms and relief features. Its young fold mountains of the north have very bold and sharp features. They include very long as well as tall mountain ranges, towering mountain peaks, high mountain passes and precipitous river valleys. If in one direction lie very steep slopes, on the other there are gentle slopes. If some parts are without thick forests, the others are clad with varied natural vegetation - from tropical rain forests to Alpine grasslands. They rightly boast of large snowfields, glaciers, picturesque water falls along the hanging valleys and glacial lakes like the Dal in Srinagar. The youthful Himalayan rivers prefer to jump, leap and hop forming water falls, rapids and cascades on their way. Equally awe-inspiring are its deep gorges establishing balance between steadily rising mountain ranges on the one hand and silent down cutting action of weighty trans-Himalayan rivers like the Indus, Sutlej and Brahmaputra on the other. Not even a handful of countries can boast of such a majestic and maddening beauty of youthful fold mountains. These highest and largest mountain chains of the world have enabled Indian subcontinent to develop its unique culture by acting itself as a physical barrier between the subcontinent and the rest of Asia. Perhaps even more effective is its role as a climatic divide. This physiographic division acts as a store house of snow and water, giving rise to hundreds of perennial rivers

to drain and irrigate one of the world's largest and most fertile plains. In fact the plains themselves are a gift of these mountains and rivers flowing from them. It is also a store house of hydel power, fuel wood, timber, various forest products and medicinal herbs, not excluding some strange wildlife species. No wonder, if this region is able to attract tourists from far and near, both in summer and winter.

The Northern Plains are matchless in expanse. These flat or dead level plains are mostly well drained and fairly well irrigated through the use of surface and ground water. The meandering rivers, ox-bow lakes, braided river channels and a maze of distributaries help to break the monotony of these extremely level plains. Once a forest land, it has now been brought under the plough almost fully. The lower parts of the deltas are ribboned with mangrove or tidal forests. These well watered plains, supported by highly fertile soils, produce varied crops year after year sustaining a very large chunk of the world's population. They have also been supporting equally large bovine population. They are one of the world's largest food baskets producing cereals, pulses, oil seeds, vegetables, fruits besides industrial or cash crops like cotton, jute, sugarcane and the like.

In sharp contrast with the Northern Mountains and Plains stand the hills of moderate altitude and a highly denuded rocky landscape, representing one of the oldest landmasses of the world - the peninsular block of India. Its rounded hills and flat topped ridges have a beauty of their own. The varied metamorphic and old granite rocks have given rise to hills, plateaus and foliated rocks. Further more, the basalt or Deccan Trap of Western India has its typical flat topped hills and ghat or stairlike structures. Its steep wall-like escarpments run for miles and miles without interruption overlooking the Arabian Sea. Their beauty need to be seen and to be believed. This physiographic division is known for millets and various industrial crops such as cotton, sugarcane, coffee and groundnut. More importantly, it is a store house of minerals - specially the ferrous ones and mineral fuels like coal and atomic or radio-active minerals. They have also sizeable hydel power resources. They thus provide a sound base to develop both agrobased and mineral based industries.

The coastal strips are ribboned with a coastline which is partly regular and partly indented. The latter has provided spacious natural harbours like Mumbai and Marmagao. The coastal strips and island groups have ideal conditions to tap deep and shallow water fisheries. The coastal plains in the east have very fertile deltas providing rice-bowls. If it is a coast of emergence in the eastern coast then the major part of the western coast is that of submergence. The plains are rocky and highly eroded. Rice, coconuts, rubber, tobacco and spices are some of the agricultural produce. Off-shore oil and natural gas fields have also been located. If the Lakshadweep are of coral origin, the Andaman and Nicobar Islands are the peaks of emerging mountain chain. These islands are of great strategic significance to the defence of the mainland. They face seven different countries across the seas washing their shores - Bangladesh, Myanmar, Thailand, Malaysia, Singapore, Indonesia and Sri Lanka. The islands are known for fishing, forestry and tourism.

This is how the great diversity of macro and micro relief features and land forms has contributed to enrich our culture, enhanced agricultural potential to grow almost every crop,

lay strong foundations of modern industry making all its physiographic divisions totally inter-dependent on one another.

WHAT YOU HAVE LEARNT

- The Indian subcontinent, flanked by the towering mountains in the north and girdled by the seas and the ocean in the south stands distinct from the rest of Asia. This explains why the subcontinent has been able to develop a distinctive culture of its own. India occupies a dominant position in the subcontinent as it alone claims three-fourths of the total population. Also it has fairly long common frontiers with each member of the subcontinent.
- Being located at the head of the Indian Ocean it is in a very good position to promote trade with the continents of Asia, Africa and Australia. The construction of Suez Canal has brought Europe and North America in its easy reach. India is only at a relatively short distance from the oil-rich countries surrounding the Persian Gulf.
- The latitudinal extent of the country implies marked variations in the climate of the northern and southern parts of the country. The longitudinal extents is responsible for a time lag of almost two hours between its eastern and western extremities. This, however, has been minimised by adopting 82° 30' E longitude as the standard meridian of India whose local time is taken to be the standard time for the entire country.
- In terms of area, India stands seventh in the world but in population it ranks second next only to China. It means there is tremendous population pressure on our limited land and water resources.
- The physiographic divisions of India are very bold and highly contrasting. In fact, each one of them can be presented as an ideal example of its kind - be it a mountain; a plateau or a plain. Besides adding to the diversity they also stress economic complementarity. They make all these macro regions entirely interdependent on one another, making the whole country a single economic and political entity benefiting each and every part - big or small.

TERMINAL EXERCISE

1. Write a note on India's favourable position for promotion of international trade.
2. Give a brief account of the Himadri Range under the following headings.
 - (a) Location (b) their average height and length (c) A few Major peaks
 - (d) A couple of prominent glaciers and (e) Major passes - one each from Jammu & Kashmir, Himachal Pradesh and Sikkim.
3. Differentiate between :
 - (a) Eastern coastal plains and western coastal plains.
 - (b) Western ghat and Eastern ghat.
 - (c) The Himalayan rivers and their counterparts from peninsular India.

4. Divide the Great Plateau into two physiographic divisions and describe briefly the Central High Lands under the following heading - (a) Aravalli Hills (b) Malwa plateau and its eastern extensions (c) Vindhya Range
5. Write a brief description of Northern Plains, a sub-division of Great Northern Plains of India; under the following headings. (a) Location and extent (b) Major rivers.
6. Define the following - (a) Standard Meridian of India (b) Rift Valley (c) Drainage System.
7. Locate the following in two separate outline maps of India.
Map I - (a) Himalayas, Karakoram, Zaskar Range, Ladakh Range, Mizo Hills, Sahyadry, Satpura and Vindhya Range.
Map II - (b) Sutlej, Ganga, Brahmaputra, Yamuna, Chambal, Mahanadi, Godavari, Krishna, Kaveri, Narmada and Tapi.

CHECK YOUR ANSWERS**INTEXT QUESTIONS****17.1**

1. Pakistan, Afghanistan, China, Nepal, Myanmar, Bangladesh and Bhutan
2. $8^{\circ}4'$ and $37^{\circ}6'$ N. Lat.
 $68^{\circ}7'$ and $97^{\circ}25'$ E Long.
3. (C)
4. $82^{\circ}30'$
5. About two hours
6. Seventh

17.2

- 1.1 (i) (c)
(ii) (d)
(iii) (c)
2. (1) Himadri (2) Himachal (3) Siwalik
3. Karakoram
4. Karakoram

17.3

1. 2000 to 3000 metres
2. Comparatively higher part of the plain.
3. (a) Punjab (b) Haryana (c) Uttar Pradesh
4. (a) Saraswati (b) Drishadvati
5. Yamuna, Ganga, Gomati, Ghagara, Gandak, Ramganga (Any four).

17.4

1. (i) (b)
(ii) (a)
2. Chambal, Betwa, Parbati, Kali, Sindh (Any two).
3. Palani Hills
4. Mt. Abu (Peck is Gurushikhar)

17.5

1. The East Coastal Plain
2. (a) Chilka (b) Pulicat
3. Kolleru
4. Daman (North) and Goa (South)
5. (c)

17.6

1. Slope of land, geological structure, amount of water and velocity of water (Any two)
2. (i) Arabian Sea; Bay of Bengal
(ii) Narmada and Tapi
3. Chambal, Parbati, Sind, Betwa, Ken, Son (Any three).
4. 5200 metres.

TERMINAL QUESTIONS

1. Refer to the para just before the Box given at the end of 17.3
2. Refer to the description of Himadri Range in 17.6
3. (a) East Coastal Plain West Coastal Plain
 1. Extend along the coast of Extend along the coast of
Bay of Bengal Arabian Sea
 2. Comparatively broad comparatively narrow
 3. There are deltas here No deltas of rivers.
- (b) Sahyadry (Pashchimi Ghat) Poorvi Ghat
 1. Continuous Range Broken by a number of rivers draining into the Bay of Bengal
 2. Comparatively high Low height
 3. Beautiful Hill Towns No Hill Towns
- (c) Himalayan Rivers Rivers of Peninsular India
 1. Perennial; Seasonal
 2. Origin from glaciers Origin from Springs
4. Refer to the description of Central High lands given in 17.8
5. Standard Meridian 82°30' E : The local time of the Standard Meridian is considered to be the Standard Time for the whole country.
6. Rift Valley : A valley which has been formed by the sinking of land between roughly parallel faults is called a Rift Valley.
 Drainage System : The drainage system refers to the system of flow of surface water or run off in that area. Thus the drainage system studies the streams and the directions in which they carry the surface water of an area.
7. Refer to the maps given at the end of this lesson showing physical features and location of rivers.