

India - Relief Features

In this chapter we shall study about relief features of India. In the subsequent chapters such as Climate in India; Rivers and Water Resources; The People etc we would be examining the linkages with relief features. These features are a reference point that we would need to return often during the course of this book. What are the relief features of Andhra Pradesh that you have read about in earlier classes? Explain with the help of a wall map or your atlas. As you study further use the atlas, wall maps & raised relief maps that are in the school.



Map 1: Location of India in the World

Location

- Look at the world map above, and write a few lines about India's location with reference to the places marked on this map.
- The lines of latitude and longitude are used for accurately specifying location of any place or region. Use the atlas and correct the following statement:

“India is a very extensive country and lies totally in the southern Hemisphere of the globe. The country’s mainland lies between 8 degree N and 50 degree N longitude and 68 degree S and 9 degree E latitude.”

- Why do we often use the term “Indian peninsula”?
- Examine the map 1.1 above and imagine that India is located in the Arctic Circle. How your life would be different?
- Identify Indira point on the atlas. What is special about this?
- Andhra Pradesh lies betweenandN latitudes, and and E longitudes.
- Using the scale given in your atlas estimate the length of the coast line for Andhra Pradesh.

The geographical location of India provides its vast diversity in climatic conditions. This has led to a variety of vegetation and life forms along with advantages for growing many kinds of crops. Its long coast line and location in the Indian Ocean enabled trade routes as well as fishing.

In class IX you had read about longitudes and question of time and travel. From your atlas examine the Indian longitudinal extension. For India the central longitude 82°30` E is taken as Standard Meridian which passes near Allahabad. This is the reference for Indian Standard Time (IST) and this is 5½ hours ahead of Greenwich Mean Time (GMT).

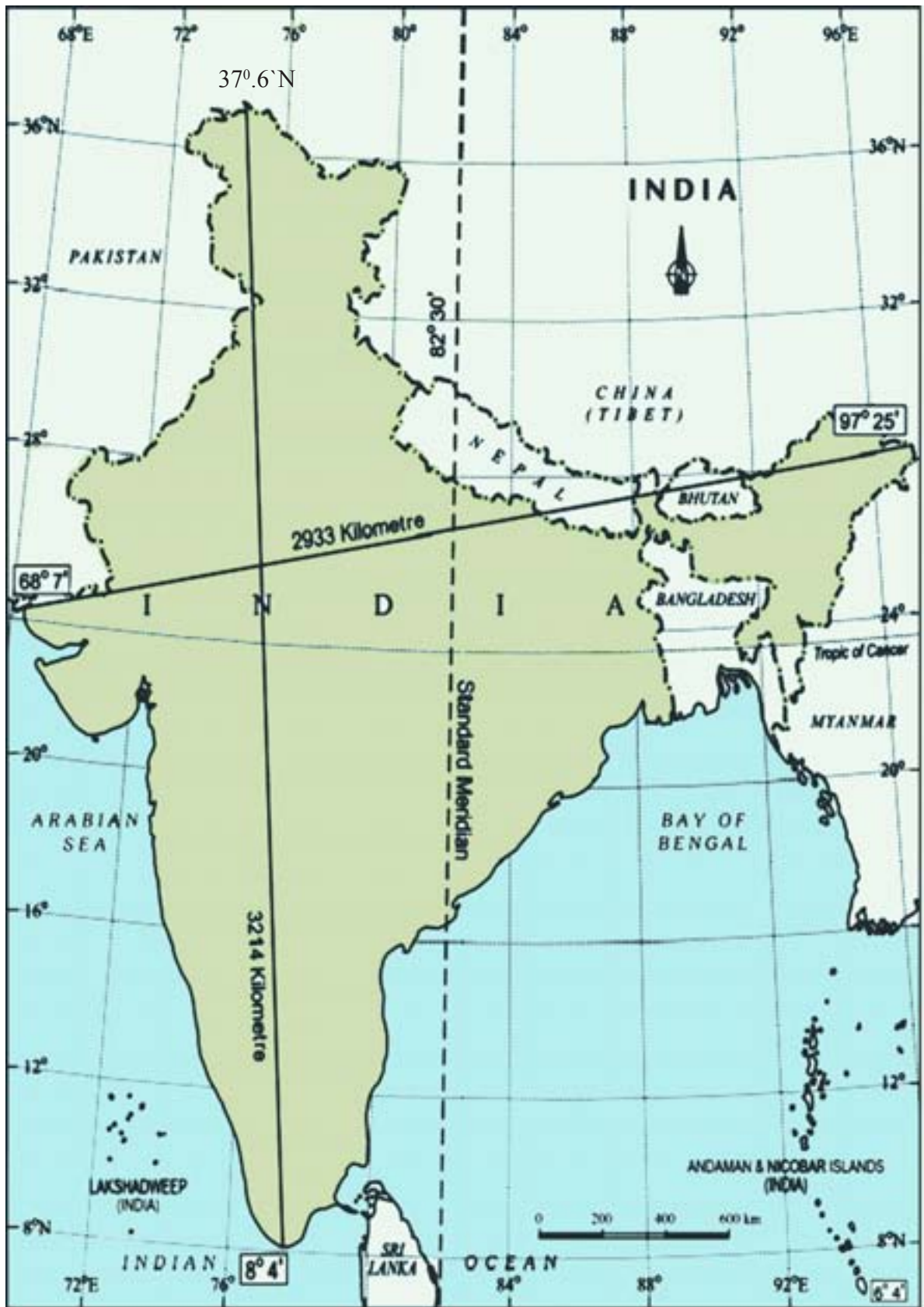
- Look at the map 2
Trace the boundary for India and colour this.
With the help of the scale given on the map, find out the total land boundary that India shares with Bangladesh.

Which of these data are for rising and setting times for the Sun at Ahmedabad and Imphal. Explain your reason.

Date	Location _____		Location _____	
	Sunrise	Sunset	Sunrise	Sunset
5 Jan	05:59	16:37	07:20	18:05



Fig.1.1: View of Himalaya’s from Tibetan Plateau. Notice the absence of trees



Map 2 : India – north-south, east-west extent and standard meridian

Geological background

Re-read movement of the Earth's crust from the class IX book. Indian landmass as part of Gondwana land originated due to geological formations and several other processes like weathering, erosion and deposition. These processes, over millions of years, have created and modified the physical features as they appear to us today.

World land forms originated from two giant lands namely Angara land (Laurasia) and Gondwana land. The Indian peninsula was part of Gondwana land. Over 200 million years ago Gondwana land split into pieces and the peninsular Indian plate moved towards North-East and collided the much larger Eurasian Plate (Angara land). Owing to the collision and immense compression force mountains evolved through a folding process over millions of years. The present form of the Himalayas is a result of this process.

The breaking off from the northern corners of the peninsular plateau led to the formation of a large Basin. In course of time, this basin slowly got filled with sediments deposited by the Himalayan rivers from north and peninsular rivers from south. This created the very extensive, flat northern plains of India. The Indian landmass displays great relief variations. The peninsular plateau is one of the most ancient land blocks on the earth's surface.

- List the Himalayan rivers and the Peninsular rivers that helped the formation of north Indian Plain.
- The formation of Himalayas was _____ million years ago while early hunter-gathering human beings emerged on earth _____ million years ago.

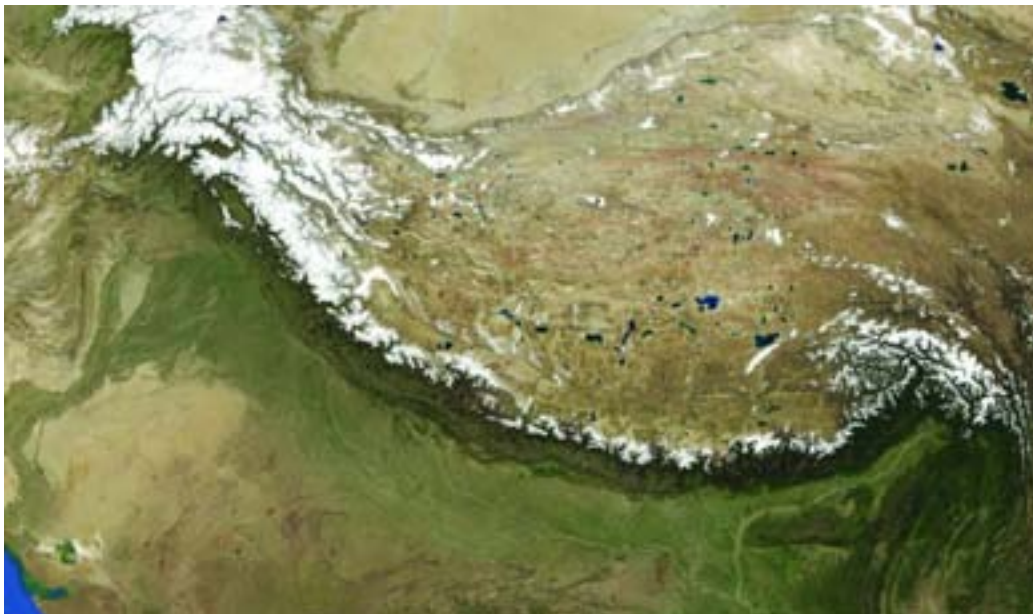


Fig 1.2 : Himalayas, Northern plain, and Thar desert as pictured by satellite

Major Relief divisions

The relief divisions of Indian landmass can be divided into the following groups:

1. The Himalayas
2. The Indo-Gangetic Plain
3. The Peninsular Plateau
4. The Coastal plains
5. The Desert
6. The Islands.

Look at the Map 2 and the raised relief map in your school. Using your finger trace the regions mentioned below:

- Follow the course of Godavari and Krishna to identify the direction of slope of Deccan plateau.
- Describe the entire course of the Brahmaputra River, with reference to landforms, heights, and countries.

The Himalayas

The Himalayan ranges run in the west-east direction in the form of an arch with a distance of about 2400 kms. Their width differs from 500 kms, in the western regions to 200 kms in central and eastern regions. It is broader in western region. There are also altitudinal variations across the regions. The Himalayas comprise three parallel ranges. These ranges are separated with deep valleys and extensive plateaus.

The northern most range is known as Greater Himalayas or Himadri. This range is the most continuous consisting of the highest peaks with an average elevation of about 6100 mts above mean sea level.

Greater Himalayas are composed of snow and ice cover. You find glaciers here. The seasonal cycle of accumulation of ice, movement and melting of glaciers are the sources for the perennial rivers. The portion of range found south of the Greater Himalayas is called “Lesser Himalayas” which has the most rugged relief. These ranges are mainly composed of highly compressed rocks. The height ranges from

- Locate the three ranges in your atlas.
- Locate some of the highest peaks in the raised relief map.

3,700 to 4,500 mts. The Pirpanjal and Mahabharata ranges form the important ranges of this region.

- Trace with your finger on the above regions in the raised relief map and on the wall map.
- Locate the following places on Indian physical map in your atlas: Simla, Mussorie, Nainital and Raniket

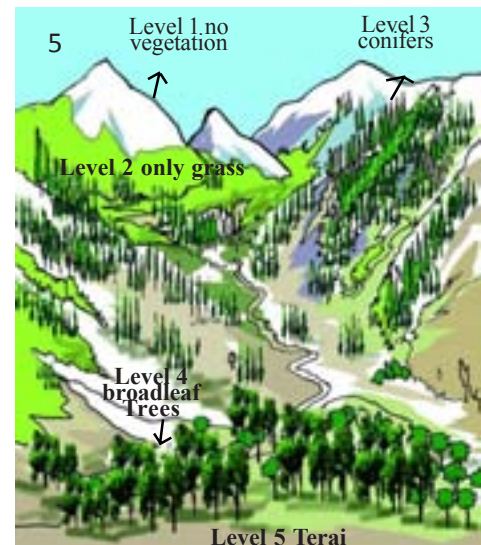
The Lesser Himalaya ranges consist of the famous valley of Kashmir, the Kangra and Kulu in Himachal Pradesh. This region is well known for many hill stations like Simla, Mussorie, Nainital, Raniket etc., and covered by evergreen forests.

Fig 1.3 to 1.6 : Various views of Himalayas from southern (Indian side). Compare these with the views from Tibetan side in Fig 1.1



The diagram below shows some typical vegetation in the Himalayas.

The mountain has been divided into five levels of elevation. Some of the main types of trees are shown here.



- 3) *The narrow steep valleys formed in Sikkim.*
- 4) *Identify terrace farming on Himalays and pebbles on drainage*
- 5) *Sketch of different levels of vegetation in the Himalayas*
- 6) *View of the Mawkdok Dympep Valley which is in Meghalaya*



The southern most range of the Himalayas are the Shivaliks. Shivaliks extend over a width of 10-50 kms, and have an altitude varying between 900 and 1100 mts. These ranges are called by different names in different regions: Jammu hills in Jammu region; Mishmi hills in Arunachal Pradesh; Cachar in Assam; etc. These parts consist of thick gravel and alluvium. The valleys lying between the Lesser Himalaya and Shivalik ranges are called as Duns - Dehradun, Kotli Dun and Patli Dun are some of the prominent Duns.

The eastern most boundary of the Himalayas is the Brahmaputra valley. In Arunachal Pradesh beyond the Dihang valley, the Himalayas take hair pin bend to the south and act as eastern boundary of India and run through the north eastern states. These divisions are known as 'Purvanchal' and mostly composed of sedimentary sand stones. Regionally the Purvanchal are known as Patkai hills, the Naga hills, Manipuri hills, Khasi and Mizo hills.

- Locate the following ranges in Indian physical map of your Atlas

Hills	State/ states
Purvanchal	
Patkai	
Naga hills	
Manipuri hills	

The formation of the Himalayas influences the climate in various ways. These act as barriers protecting the great plains of India from the cold winds of central Asia during severe winter. The Himalayas are reason for summer rains and monsoon type climate in regions that are beyond the western ghats of India. In its absence this region would have remained drier. The Himalayan Rivers have a perennial flow since these are fed by the glaciers and bring a lot of silt, making these plains very fertile.

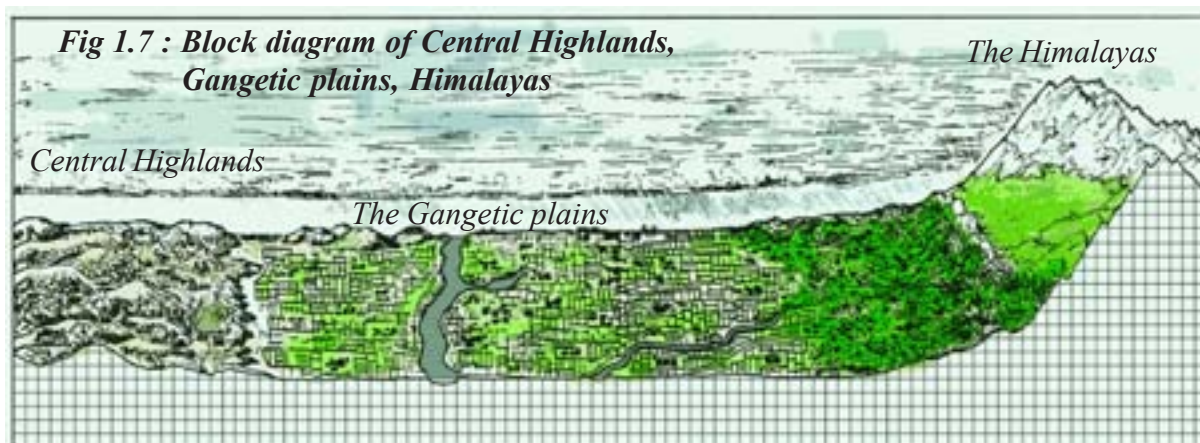
The Indo-Gangetic Plain

The interaction of the three Himalayan rivers, Indus, Ganga and Brahmaputra and their tributaries resulted in the formation of great northern plain. In the beginning (about 20 million years ago) it was a shallow basin that was gradually filled with varied alluvial soil that these rivers brought from the Himalayas.

The Indo-Gangetic Plains broadly consists of three divisions.

1. The Western Part
2. The Central Part
3. The Eastern Part

1) The western part was formed by the Indus and its tributaries, the Jhelum, the Chenab, the Ravi, the Beas and the Sutlej flowing from the Himalayas. Most of the Indus river basin is located in Pakistan leaving minor portion of Punjab and Haryana plains in India. In this region the 'Doab' features dominate the fertile land between the two rivers.



2) The central part is known as the Ganga plain. It extends from the rivers Ghaggar to Teesta. This part is mainly spread in the states of Uttar Pradesh, Bihar and partly in Haryana, Jharkhand and West Bengal. Here the river Ganga, Yamuna and their tributaries Sone, Kosi etc drain.

3) The Eastern part of the plain exists mostly in the Brahmaputra valley of Assom and the river Brahmaputra is mainly responsible for its formation.

The Himalayan rivers while flowing down deposit gravel and pebble sediments in a narrow belt of 8 to 16 kms width found parallel to foot hills of Shivaliks. This feature is known as 'Bhabar'. Bhabar is porous in nature. Small rivers and streams flow underground through Bhabar and reappear in lower areas and form a swampy and marshy region called Terai. The region had thick forest and rich variety of wild life. However, owing to migrations at the time of India's partition, most of the Terai zone has now been cleared and used for agricultural operations. South of the Terai region, fine alluvial plain regions are found.



Fig 1.8 : A Village on the Brahmaputra Valley in Assom

The Peninsular Plateau

The Indian plateau is also known as the peninsular plateau as it is surrounded by the sea on three sides. It is mainly composed of the old crystalline, hard igneous and metamorphic rock. Large amounts of metallic and non metallic mineral resources are found in the Indian plateau. It has broad and shallow valleys with rounded hills. The topography of the plateau is slightly tilted towards east and the Western and Eastern Ghats form the western and eastern edges respectively. The southernmost tip of the plateau is Kanyakumari.

The peninsular plateau consists of two broad divisions namely, the central high lands (Malwa plateau) and the Deccan Plateau. On physical map of India, adjunct to and south of the Gangetic plains and north of the river Narmada you can identify central highlands. Prominent plateaus here are Malwa plateau on the western side and towards the east there is the Chhotanagapur plateau. In comparison to the Gangetic plains the plateau region is dry. The rivers are not perennial. The irrigation for the second crop depends on deep tube wells and tanks. Identify rivers that flow in the Northern side of central high lands. Chhotanagpur plateau is rich mineral resources.

The portion of peninsular plateau lying to the south of Narmada, a triangular landmass, is called the Deccan plateau. Satpura range forms the Deccan plateau's

- Locate the following on the Indian physical map of your atlas and on the raised relief map: Malwa plateau, Bundelkhand, Bhagelkhand, Rajamahar Hills and Chhotanagapur plateau
- Using an atlas compare the relative heights of above plateaus with that of Tibetan plateau

north edge while the Mahadev, the Kaimur range and a portion of Maikal range are the eastern edges. Western Ghats, Eastern Ghats and Nilgiris form western, eastern and southern boundaries respectively.

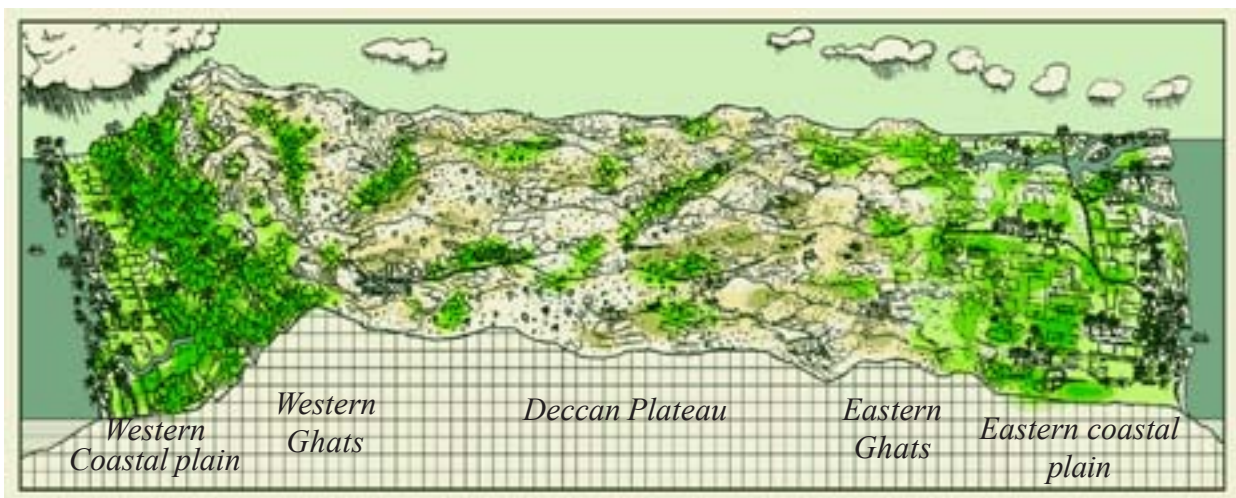


Fig 1.9 : Block diagram of Peninsular plateau

The Western Ghats lie parallel to the west coast. The structure of Western Ghats is continuous with a few passes as the gateways to the coastal plains. The Western Ghats are higher than the Eastern Ghats. Thus, for the Deccan plateau region, west-east slope is seen (Fig 1.9). The Western Ghats extend for 1600 kms. Near Gudalur the Nilgiris join the Western Ghats and they rise to over a height of about 2000 mts. The famous hill station Udagamandalam, popularly



known as Ooty, is located in Nilgiris, Doda Betta (2637 mts) is the highest peak. Western Ghats include the Anaimalai, Palani (Tamilnadu) and Cardamom (Kerala) hills. Anaimudi (2695 mts) of Anaimalai hills is the highest peak in south India.

The Eastern Ghats extend from Mahanadi valley in the north to Nilgiris in the south. However the Eastern Ghats are not continuous. Rivers that originate in Western Ghats like Godavari and Krishna cut across the plateau and join the Bay of Bengal. The average height of the Eastern Ghats rarely exceeds 900 mts. The highest peak in Eastern Ghats is Aroya Konda found at Chinthapalli (1680 mts., in Andhra Pradesh). Nallamalas, Velikondas, Palakondas and Seshachala are some of the hilly tracts of Eastern Ghats. One of the remarkable features of the peninsular plateau is black soils formed due to volcanic activity.

- Look at the raised relief map and compare the relative heights of Western and Eastern Ghats as well as Tibetan plateau and Himalayan peaks.



Fig 1.10 : Annamalai Hills in Western Ghats

The Thar Desert

The Thar Desert is located on the leeward side of Aravalis and receives very low amount of rainfall, ranging from 100 to 150 mm per year. The desert consists of an undulating sandy plain and rocky outcrops. It occupies much of western Rajasthan. It has an arid climate with very low vegetation cover. Streams appear during rainy season and disappear soon after. 'Luni' is the only river in this area. These internal drainage rivers fill into the lakes and don't reach the sea.



Indira Gandhi canal, which is the longest canal in the country (650kms), watering part of Thar desert. Hence several hectares of desert land have been brought under cultivation.

Fig 1.11 : A Settlement in Thar

The Coastal plains

The southern part of the peninsular plateau is bordered by narrow coastal strips along the Arabian Sea on the west and the Bay of Bengal on the east. The western coast starts from the Rann of Kutch and ends at Kanyakumari. It is narrower than east coast. This plain is uneven and broken by hilly terrain. It can be divided into three parts:

- 1) Konkan Coast – this is the northern part. It touches Maharashtra and Goa.
- 2) Canara – this the middle part. It includes coastal plains of Karnataka.
- 3) Malabar coast – this is the southern part, mostly in the state of Kerala.



Fig 1.12 : Sundarban Mangrove

Bay of Bengal plains are wide and have large surface structure. It stretches from Mahanadi in Odisha to Cauvery deltas in Tamil Nadu. These plains are formed by rivers Mahanadi, Godavari, Krishna and Cauvery and are very fertile. These coastal plains are known locally by different names: Utkal coast (Odisha) Sircar coast (Andhra Pradesh) Coramandal cost (Tamil Nadu).

On the physical map of India identify the delta regions. How is their height similar or different? How do they compare in relation to the Indo-Gangetic plains?

Like the Indo-Gangetic plains these deltas too are agriculturally developed. Coastal zone also enables rich fishing resources. Lakes like Chilka in Odisha and Kolleru and Pulicat (Andhra Pradesh) are other important features of the coastal plain.

The Islands



A Nicobar Bird

There are two groups of Islands - Andaman and Nicobar Islands stretched in Bay of Bengal and Lakshadweep Islands in the Arabian Sea. Andaman and Nicobar Islands is an elevated portion of submerged mountain parts running from Myanmar Mountain Arkan Yoma. In Andaman and Nicobar Islands, Narkondam and Barren islands are volcanic origin. The southernmost tip of India is found in Nicobar Island and called as Indira point which was submerged during the 2004 Tsunami. Lakshadweep Islands are of coral origin. Its total geographic area is 32 sq.kms. This group of island is famous for great variety of flora and fauna.

In conclusion it is important to note that there is vast diversity in the landforms in which Indian people live. Some areas are irrigated by the mighty rivers flowing from the Himalayas and some by the rainfed rivers from Western ghats and its forests. Many places are located in the river valleys and others in the mountains.



Fig 1.13 : Coral Reefs

Key words

Perennial	Coral reefs	Coastal plains	Peninsula	Lauraisa	Dun
Angaraland	Gondwana land	Shivalik	Purvanchal	Leeward	

Improve your learning

1. The sun rises two hours earlier in Arunachal Pradesh as compared to Gujarat in the west. But the Clocks show the same time. How does this happen?
2. If the Himalayas would have not been in its present position how would be the climatic conditions of the Indian sub continent?
3. The Himalayas do not extend into which of the following states:
Madhya Pradesh, Uttar Pradesh, Sikkim, Haryana, Punjab, Uttaranchal
4. Which are the major physiographic divisions of India? Contrast the relief of the Himalayan region with that of the peninsular plateau.
5. What is the influence of the Himalayas on Indian agriculture?
6. Indo- Gangetic plains have high density of population. Find the reasons.
7. 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 Anaimudi.
 - (iii) Plateaus - Chotanagapur and Malwa
 - (iv) The Indian Desert, Western Ghats, Lakshadweep Islands
8. Use an atlas and identify the following:
 - (i) The Islands formed due to Volcanic eruption.
 - (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 longitudes in degrees.
 - (vii) The place situated on the three seas.
 - (viii) The strait separating Sri Lanka from India.
 - (ix) The Union Territories of India.
9. How are the Eastern coastal plains and western coastal plains similar or different ?
10. Plateau regions in India do not support agriculture as much as the plain regions – what are the reasons for this?

Project

Using the raised relief map, and physical maps in your atlas make clay/ sand models of India on the ground. Use different types of sand or soil to mark different types of relief features. Ensure heights of the places are proportional and rivers are marked. Look at the vegetation map in your atlas and try to use leaves and grasses to decorate them. May be over the year you can also add other features of India into them.