1

On the Roof of the World

India is a land of mixed culture and pluralism. The evolution of this unique cultural diversity is a lengthy history. In fact it began with the primitive human groups who came to inhabit this land from far off lands in very ancient times. Later on, these people got mixed with several other human groups that had come to this land through different routes over different periods of time and whose generations have been living here over thousands of years. This diversity is evident in language, costumes, traditions, festivals, beliefs, agriculture and the like.

The geographical diversity of our country has a decisive role in the country's cultural diversity. The Northern mountains standing as a formidable fortress in the northern part, the vast and fertile plain just to the south of it, the desert land to the west, the extensive plateau in the central part, the lengthy coastal stretch along the eastern and western sides, then the islands.....

Aren't you convinced that India's topography is very diverse? This topographical diversity along with the country's special location, has contributed to the existence of monsoon climate in this region. Human life and agricultural pattern have been set in India over centuries in accordance with this diversity.

In spite of such vivid diversities, there are factors that enjoin this land and its people with a delicate thread of unity. We are going to discuss all such aspects in this textbook.

Based on topography, India can be divided as the following physiographic divisions.

1. The Northern Mountain Region
2. The North Indian Plain
3. The Peninsular Plateau
4. The Indian Desert
5. The Coastal Plains and Islands


INDIA
PHYSICAL
TIAN SHAN
PAMIR KNOT
HINDUKUSH
KUNLUN
KARAKORAM
LADAKH RANGE
ZASKAR RANGE
NORTHERN MOUNTAINS
TSANGPO
THAR DESERT
NORTH INDIAN PLAIN
Aravalli
Kaimur Hills
Rajmahal Hills
GARO
KHASI
JAINTIA
NAGA HILLS
PATKAI BUM
MIZO HILLS
Vindhyan Range
Satpura
mahadeo
Maikal
PENINSULAR
PLATEAU
WESTERN GHATS
WESTCOASTAL PLAIN
EASTERN GHATS
EASTCOASTAL PLAIN
BAY
OF
BENGAL
ARABIAN
SEA
ANDAMAN AND NICOBAR
ISLANDS (INDIA)
LAKSHADWEEP
LEGEND
Drainage
Mountain Ranges
300-600m
0-300m
600-900m
Above 900 m sea level
MAP NOT TO SCALE

Fig 1.1

The Northern mountain ranges that form the north and the north eastern boundary of the Indian subcontinent includes several mountain ranges that originate from the Pamir Knot known as 'the Roof of the World' and it extends up to Purvachal in the east.

Observe the given map (Fig 1.1) and find the location of the Northern mountains. Identify the other mountain ranges that originate from the Pamir Knot and list them.

- Kunlun
-

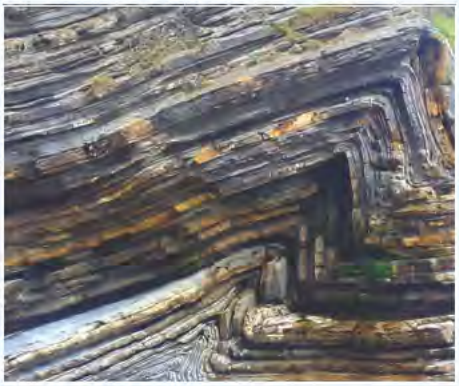
The relatively young and lofty northern mountain ranges have been formed by the folding of rock layers. The Northern mountain extends from River Indus in the west to River Brahmaputhra in the east for nearly 2400 km and has a width ranging from 150 to 400 km. The region has a peculiar landscape with several high peaks, glaciers and valleys.

Based on the topographical characteristics, the Northern mountain region can be classified into three.

1. Trans Himalayas
2. The Himalayas
3. The Eastern Hills

Fold Mountains

Fold mountains are formed due to the compression of sedimentary rock strata of the earth's crust. This process is known as folding. The Himalayas and the Alps were formed through this process.



Generally mountains are the landforms with an average elevation above 900 metres from the sea level. Observe the given map (Fig1.1) and find the major mountain ranges in India and include them in My Own Atlas.

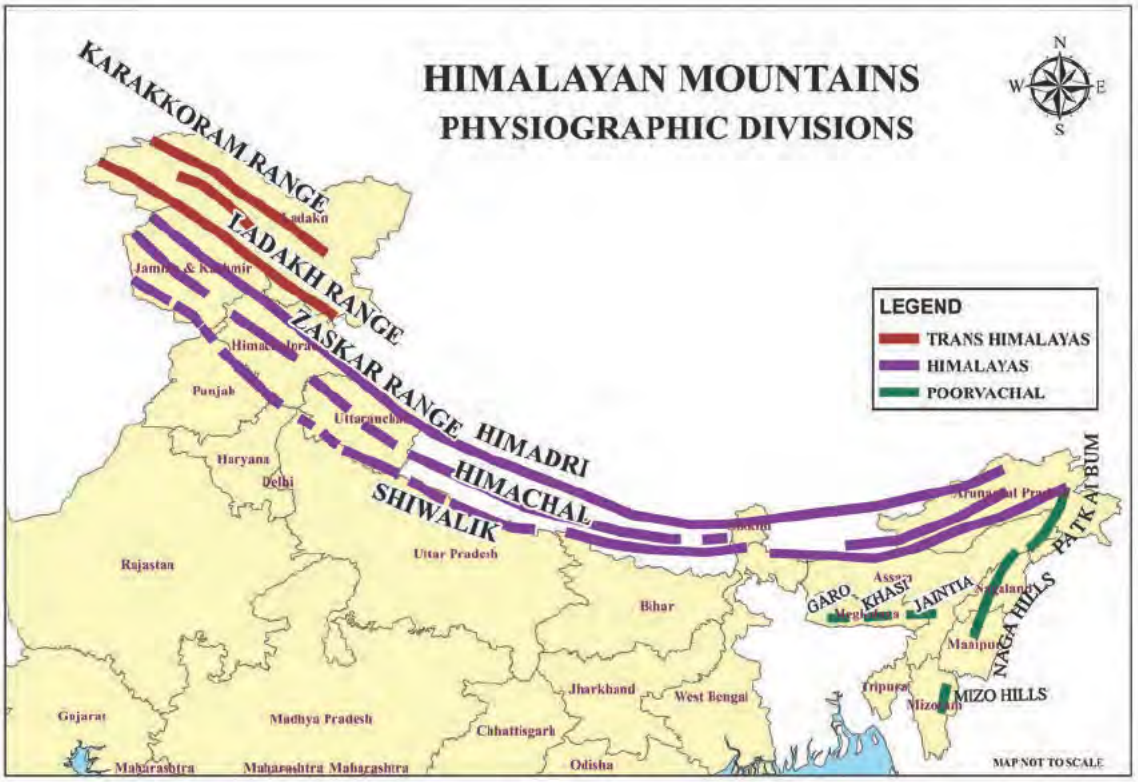


Fig 1.2

Complete the following table with the help of the given map (Fig 1.2). The index of the map will help you complete this work.

Trans Himalayas	Himalaya	Eastern Hills
• Karakoram •	• Himadri •	• Naga Hills •

Now, you have familiarised with the major mountain ranges of the Northern mountains and their location.

The northern most division of the Trans Himalayas is also known as the Tibetan Himalayas. Having an average elevation of 3000 metres, the Trans Himalayas has an approximate width of 40 km and a length of 965 km. The Karakoram range connects Himalayas with the Pamir Knot.

Don't you see three parallel ranges that extend to the south of the Trans Himalayas towards the east? These parallel mountain ranges are the Himadri, The Himachal and the Shiwaliks. These three ranges together form the Himalayas.

Observe the map (Fig1.2). Find the location of the Himadri, the Himachal and the Shiwaliks from the map and list out the states in which these ranges are situated.

The Shiwalik Range, which is the southern most of the Himalayan ranges and forms the borders of the Ganga Plains, has a width ranging from an average of 60 to 150 km. As it is the outer most part, this range is also known as the Outer Himalayas.

To the north of the Shiwaliks, is the Himachal mountain range, with an average elevation ranging from 3500 to 4500 metres above the mean sea level. This range is also known as the Lesser Himalayas and has a width ranging from 60 to 80 km.

The Himadri, which is also known as the Greater Himalayas or the Inner Himalayas, is the mountain range that lies at an average elevation of about 6100 metres above the mean sea level. The width of the range is nearly 25 km. These are snow-clad mountains.

Most of the world's highest peaks are situated in this range.

Origin of the Himalayas

Do you know that the Himalayas, which is one of the lofty mountains of the world, is still growing? What may be the reason?

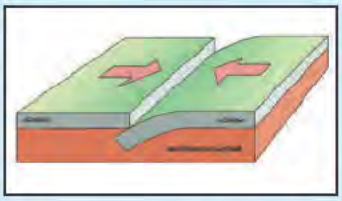
Tectonic Plates

Lithospheric plate includes the crust and the upper mantle. Lithosphere consists of fragments of varying sizes. Portions of such lithospheric parts, each with thousands of kilometres of width and nearly 100 km thickness are known as a lithospheric plates. These plates may cover the continental portion, ocean bottom or both.

This is due to plate tectonics. Tectonic plates are the crustal rock blocks of continental and oceanic parts. Asthenosphere is the zone beneath the lithosphere where the rocks are molten and are in a semi-plastic state due to the high temperature. The tectonic plates move very slowly above the asthenosphere.

Earth processes like orogenic (mountain building) are active along the plate boundaries. There are three types of plate boundaries: Convergent boundaries, Divergent boundaries and Transform (Shear) boundaries.

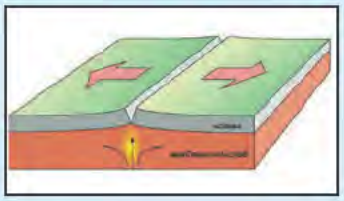
Convergent Boundary



Boundaries where plates move towards each other.

Fig 1.3 (a)

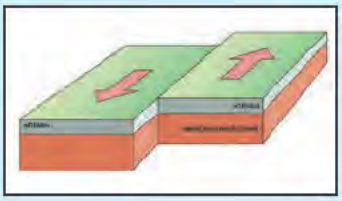
Divergent Boundary



Boundaries where plates move away from each other.

Fig 1.3 (b)

Transform Boundary



Boundaries where plates slide past each other.

Fig 1.3 (c)

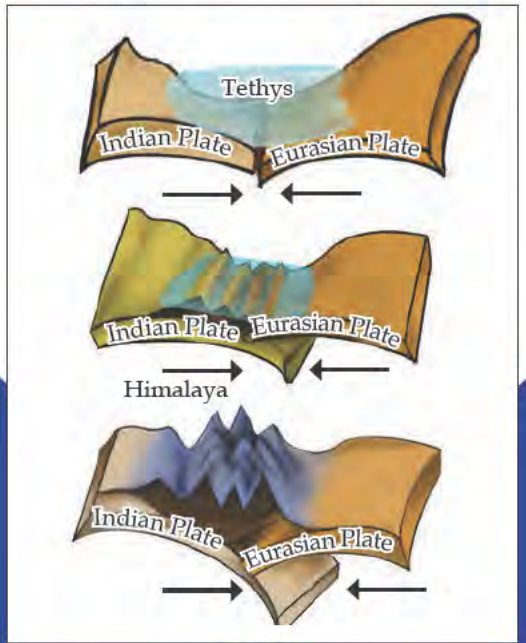


Fig 1.4
Formation of the Himalayas

Rock layers along the convergent boundary get folded due to the compression of lithosphere plates. This leads to the formation of fold mountains.

The Indian Plate which includes the Peninsular India and the Australian continent was located in the southern hemisphere about 150-160 million years ago. As it moved northwards and came close to the Eurasian Plate, the Tethys seabed situated between the two landmasses, started uplifting (Fig 1.4). This is how the Himalayas were formed.

In which plate boundary was the Himalayas formed?

Gorges

(Fig 1.5)
A Gorge across the Himalayan Range.

Deep valleys with steep sides are known as gorges. River Indus, River Ganga and River Brahmaputhra create gorges across the Himalayan ranges through erosion.

The Himalayas and its regional divisions

The rivers that originate from the Himalayas create deep gorges in their course. The regional divisions of the Himalayas have been made on the basis of these cross-cutting rivers. The regional divisions of the Himalayas are:

1. Western Himalayas
2. Central Himalayas
3. Eastern Himalayas

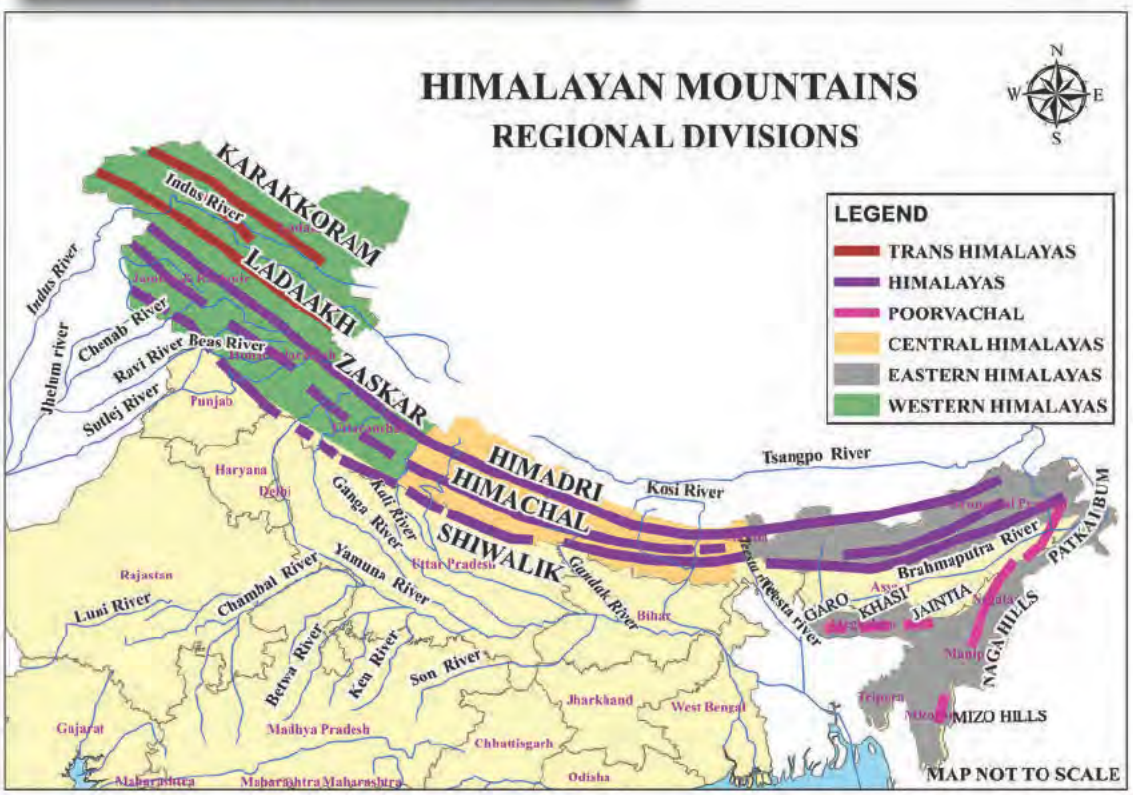


Fig 1.6

The table given below shows the three regional divisions of the Himalayas and the rivers that separate them. Mark the location of these divisions and rivers in the outline map of India with the help of the given map (Fig 1.6).

Himalayan Zone	Separating Rivers
• Western Himalayas	• Indus, Kali
• Central Himalayas	• Kali, Teesta
• Eastern Himalayas	• Teesta, Brahmaputhra

Fig 1.7
Mount K2

The Western Himalayas which stretches from the Indus river valley to the north of Jammu and Kashmir upto the Kali river valley (River Ghaghara's tributary) in the eastern part of Uttarakhand can be classified into three: Kashmir Himalaya, Himachal Himalaya, Uttarakhand Himalaya.

Kashmir Himalaya

The Kashmir Himalaya which extends over nearly 3.5 lakh sq.km in Jammu and Kashmir and Ladakh region is roughly 700 km long and 500 km wide.

The important mountain ranges of Kashmir Himalaya containing snow covered peaks, valley and hill ranges are Karakoram, Zaskar, Ladakh and Pir Panjal.

Mount K2 (Godwin Austin - 8611 metres), the second highest peak in the world, is situated in the Karakoram range.

Siachen, Boltoro etc. are the important glaciers of this region. These glaciers help the River Indus and its tributaries, such as Ravi, Jhelum and Chenab, have a luxuriant water flow throughout the year.

The freight and passenger movement on either side of the mountains is made possible through the mountain passes.

Passes are the comparatively easier natural passages in the mountainous terrains. Banihal Pass across the Pir-Panjal Range that connects Jammu with the Kashmir Valley is an example.

Siachen Glacier

Siachen Glacier is known as the world's highest battlefield.

Why are the Himalayan rivers water-rich year-round?

Mark the important passes of the Himalayas in the outline map of India and include it in My Own Atlas.

There are numerous fresh water lakes in the Kashmir Himalaya and Dal Lake is important among them. Srinagar is situated on the banks of this lake. It is an important tourist and commercial centre too. The Shikara boats and floating markets are the hallmarks of Kashmir tourism.

Fig 1.8
A Shikara Boat in Dal Lake

Gulmarg

Summer Season

Fig 1.9 (a)

Winter Season

Fig 1.9 (b)

'Margs' are meadows formed along the mountain slopes during the summer season. As these margs get covered under snow during winter, the region attracts tourists for winter games such as skiing. Sonmarg and Gulmarg are examples.

Himachal Himalaya

The major share of Himachal Himalaya is the state of Himachal Pradesh. Chenab, Ravi and Beas are the important rivers in this mountainous region.

Dhowladhar and Pir Panjal are the mountain ranges in this region. Several freshwater lakes like Chandratal and Surajtal are found in these mountain ranges. The Baralacha La Pass that connects Himachal Pradesh with Ladakh and Rohtang Pass that connects Kulu Valley with Lahul and Spiti Valleys are the important passes in Himachal Himalaya.

Fig 1.10
Chandratal Lake

Fig 1.11
Rohtang Pass

Beautiful valleys such as Kulu, Kangra and Lahul and tourist centres such as Shimla and Manali attract numerous tourists. In these places where snowfall and mild winters are experienced, hot springs can also be seen at a few places.

Fig 1.12
Kulu Valley

How are hot springs formed?

Rainwater seeps into the earth and becomes a part of the ground water. In areas where mountain building processes (orogenic processes) are active, the sub surface rock layers get heated up and these rock layers warm up the ground water. The ground water, thus warmed, rises to the surface as hot springs. Numerous hot springs can be seen in the Himalayan terrain, for eg., Nubra Valley, Manikaran, Kheerganga. Electric power can be generated using this geothermal energy. Such a geothermal power plant is functioning at Manikaran hotspring in Himachal Pradesh.

Uttarakhand Himalaya

The Uttarakhand Himalaya is part of the Himalayas which extends from River Satluj to River Kali. Its western side is known as Gadwal Himalaya and the eastern side is known as Kumaon Himalayas.

Several high peaks such as Nandadevi, Kamet, Badrinath, Kedarnath etc. are situated in the Uttarakhand Himalaya.

Fig. 1.13
Nainital Lake

The Gangotri and Yamunotri glaciers from where the rivers Ganga and Yamuna originate and freshwater lakes such as Nainital and Bhimtal are also situated in this region.

The flat valleys seen in between the Lesser Himalayas and the Shiwalik hill ranges are Duns. Dehradun in Uttarakhand state is famous among these.

The alpine summer meadows along the higher altitude mountain slopes of this region are called 'Bugyals'. The Bugyals, when get buried under snow during winter, is made use for winter tourism in many areas.

Eg:- Dayara Bugyal, Gorson Bugyal

Bugyals and Shepherds

The meadows in the Himalayas found between 3000 to 4500 metres (between the tree line and the snow line) are called bugyals in the Gadwal region.

Fig 1.14
A Bugyal in the Gadwal Region

Bugyals remain under snow during winter. When the snow melts away in summer, Bugyals are transformed into green meadows. The shepherds reach these meadows from the dry valleys with their herds during the summer season. Leaving their dry valleys, they make temporary camping sheds and live along with their livestock in the luxuriant green bugyals. With the advent of winter, they leave these hills and live in the valleys until the next season. This seasonal migration along with their domestic animals from one grazing ground to another is known as transhumance.

Fig 1.15
Teesta River

Central Himalayas

The part of Himalayas from River Kali to River Teesta is the Central Himalayas. It is also known as the Nepal Himalaya, since the majority of this region falls in Nepal. Only the Western Sikkim and Darjeeling region of the Central Himalayas are in India. The world's highest peak – Mount Everest-is in Nepal. Mount Kanchenjunga and the Nathula Pass along the India-China border are located in this region.

The swift flowing Teesta River and its stream terraces are the features of the Sikkim Himalaya.

The British, having identified the favourable conditions, started tea cultivation here during the colonial era. The Darjeeling tea produced here is internationally famous.

Find the parts of Central Himalayas in India from Fig 1.6 and mark them in My Own Atlas.

Eastern Himalayas

These are low hills as compared to the Western Himalayas, extending from River Teesta to River Brahmaputra in the east. This is also known as Assam Himalayas. The highest peak in this region is Namcha Barwa (7756 m).

Fig 1.16
Bomdila Pass

Brahmaputra, Kameng, Lohit and Subansiri are the important rivers in the Eastern Himalayas region. The Bomdila which connects Arunachal Pradesh with Lhasa, the capital city of Tibet and Diphu, which connects with Myanmar, are the important passes in this region.

Purvachal Hills

The Himalaya mountains are seen as hills of lesser elevation in the north – south direction from Arunachal Pradesh up to Mizoram. These hills having an average elevation from 500 to 3000 metres above mean sea level are known as Purvachal Hills. Of these the most important are the Patkaibum, the Naga Hills, the Mizo Hills and the Manipur Hills. Cherrapunjii and Mawsynram located here receive the highest rainfall in the world.

Fig 1.17
A Hilly Area in the Purvachal Region

Fig 1.18
Root Bridge in Meghalaya

Fig 1.18 is the picture of a root bridge, constructed by the local folk, using braided tree roots in order to cross turbulent streams. It is a clear evidence of the harmonious co-existence of people with nature.

Keibul Lamjao Floating National Park

The Keibul Lamjao National Park is situated in the largest freshwater lake of North Eastern India (Manipur). The small islands formed in the lake by the floating organic matter along with soil are called Phumdi.

The Keibul Lamjao National Park consists of several such phumdis in Loktak Lake. Each phumdi contains unique ecosystems including plants, birds and small organisms. The Loktak Lake is included in the Ramsar List of Sites for Watershed Conservation.

Phumdis in Loktak Lake

Climate

The Himalayas, forming India's northen boundary along with the other continuous mountains together makes a climatic divide between the Indian Subcontinent and Central Asia. The climate of the Himalayan mountain zone varies according to the elevation and the topography of the respective parts of the region.

Mild climate prevails along the lower mountain slopes and the Shiwalik foothills. But at higher elevations, it will be considerably low temperature and winter climate conditions at extremely high altitudes and in the Ladakh region, Pole-like extreme winter climate is experienced.

Why are there numerous hill stations in the Himalaya Mountains?

South West Monsoon rains are received along the southern slopes of the Shiwalik ranges and the North Eastern India. Snowfall is common in the higher regions of the mountains.

The Monsoon winds blowing from the Bay of Bengal get trapped in between the Assam Himalayas and the Purvachal Hills. As a result, most of its moisture reaches back to earth as rain. Hence, the North Eastern India, especially the Meghalaya Plateau, receives heavy rainfall.

Drainage System

Indus, Ganga, and Brahmaputra rivers along with their tributaries, create the Himalaya drainage system. As these rivers are rainfed and snow-fed, they are perennial (water rich) throughout the year.

These rivers have turbulent flow in their mountainous course. Flooding and channel deviation are common in the plains. These rivers create land forms such as V- shaped valleys, gorges and waterfalls.

Waterfall

Free fall of water vertically from a cliff in the course of a river or stream is called waterfall. It is caused due to the excessive erosion of the soft rocks in the course of rivers.

V- Shaped Valleys

During the course of river flow, the lateral erosion leads to the enhancement of width of the river valley and the vertical erosion leads to the depth of the valley. As a result of the whole process, river valleys with slanting sides are developed. Since they resemble the English alphabet 'V', the valleys are known as V- shaped valleys.

The Himalayan rivers are flood prone even during summer. Why?

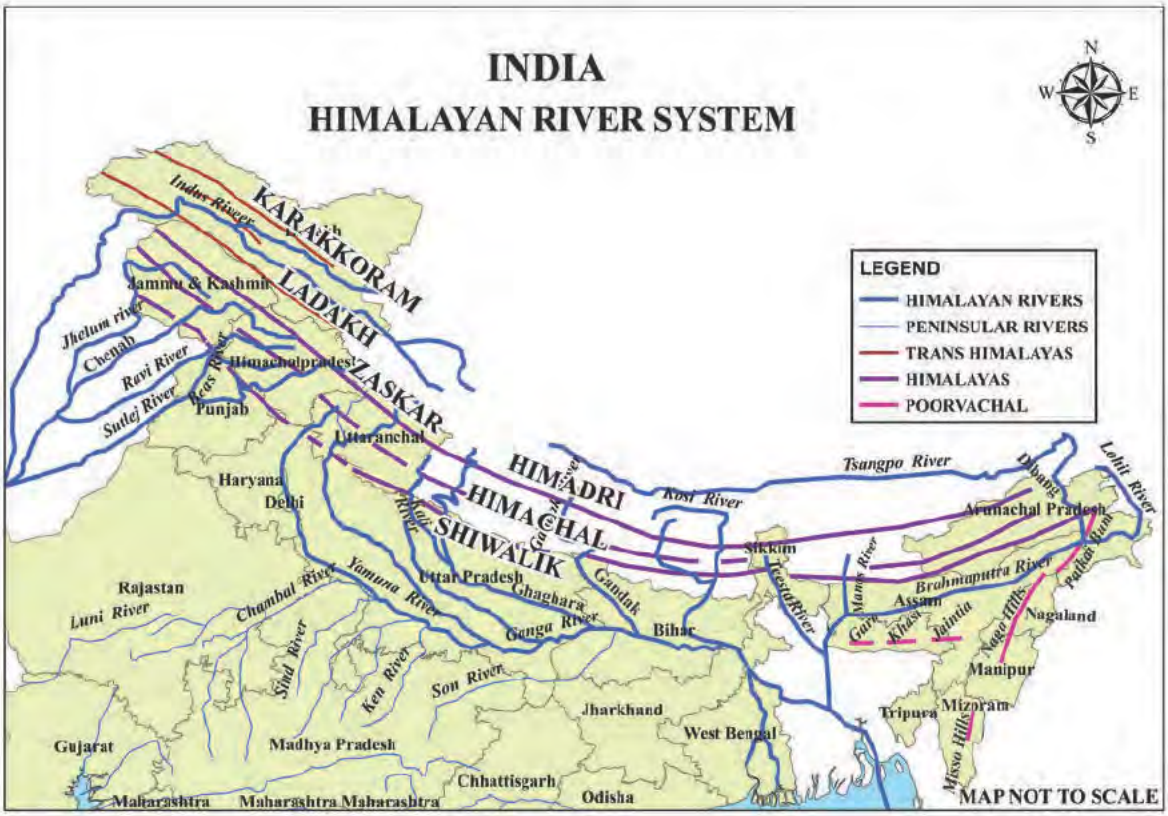


Fig 1.19

River Indus originating from Bokharchu glacier near the Manasarovar Lake and its tributaries are the important drainage system of the North Western Himalaya.	River Ganga originating from the Gangotri glaciers in Gomukh and its tributaries such as Yamuna, Ghaghara, Gandak, Kosi etc. are the important rivers of Uttarakhand and Nepal.	River Brahmaputra originating from Chemayungdung glacier near Manasarovar Lake and its tributaries such as Dibang, Lohit, Manas etc. are the drainage system of the Eastern Himalaya.

Identify the Himalayan rivers from the map (Fig 1.19) and prepare a Himalayan drainage map for 'My Own Atlas'.

Soil

Mountain soil and forest soil are commonly seen in the Himalayan terrain. The soil texture and particle size vary according to mountain environment.

Fine grained soil with high humus content are seen in the valleys, whereas in the high slopes, coarse grained soil with low humus content can be seen.

Alluvial deposition is mainly seen in the valleys. Karewas is the glacial sediment deposited in the Kashmir Valley. This humus-rich fine soil is ideal for saffron cultivation.

Fig 1.20
Saffron Cultivation

What could be the reason for the occurrence of alluvial soil in the valleys between the mountain ranges?

Natural Vegetation

Differences in factors like elevation, topography, soil type and climate lead to regional variations in natural vegetation in the Himalayan terrain.

As the average annual rainfall received is above 200 cm, more tropical evergreen vegetation is found in the Eastern Himalayas and the North Eastern Hills.

Temperature decreases with altitude and the corresponding change is also visible in the natural vegetation of the Himalayan Mountain region.

Depending on the changes in the altitude, a spectrum of natural vegetation from evergreen forests to the vegetation type of the cold climates such as Tundra can be found here.

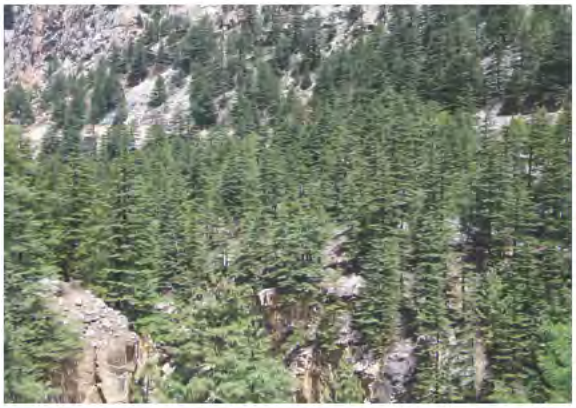


Fig 1.21
Coniferous Forest in the Himalayan region

Semi-evergreen and deciduous forests are seen in the valleys and the lower mountain slopes. Moist deciduous forests are seen at altitudes ranging from 1000 to 2000 metres. Coniferous tree varieties such as pine and deodar grow more along the mountain slopes. Shrubs such as junipers and rhododendrons grow at higher altitudes whereas in the highest altitude, alpine meadows are seen.

Wild Life

Fig 1.22
One-horned Rhinoceroses

Himalayan region is the natural habitat of several wild animals like yak, musk deer, single-horned rhinoceros and snow leopard.

Biosphere Reserves, National Parks and Wildlife sanctuaries have been established for wildlife protection in the Himalayan terrain.

Major National Parks

Western Himalaya	Eastern Himalaya
Dachigam (Jammu & kashmir)	Kanchenjunga (Sikkim)
Hemis (Ladakh)	DibruSaikhowa (Assam)
Valley of Flowers (Uttarakhand)	Kaziranga (Assam)
Corbett (Uttarakhand)	Manas (Assam)
Rajaji National Park (Uttarakhand)	Keibul Lamjao (Manipur)

Agriculture

Fig 1.23
A Terrace Farm in the Himalaya

Agriculture is sparse in the mountainous region due to the limitations of its terrain. Elevation, steepness of slope, immature soil, low temperature etc. are the adverse factors. Still the resident communities engage in different subsistence agricultural activities. They terrace the mountain slopes to cultivate suitable crops like paddy, legumes and potatoes during the rainy season and wheat, and temperate fruit crops during the spring.

Fig 1.24
An Apple Orchard in the Himalaya

Tea is a major crop along mountain slopes and valleys of Eastern Himalayas, especially in the Assam and Darjeeling regions.

The tribal population of the North Eastern Hills, on the other hand, follow traditional practices such as shifting cultivation.

Animal rearing

Animal rearing is the main occupation of those living in the Himalayan Mountains. Climate varies according to elevation and the type of animals reared also varies accordingly. Goat and cattle are kept in the valleys whereas sheep and horse are reared in the mountain slopes. At the extremely cold regions of Himachal and Ladakh, species that can resist severe cold such as yak are reared. Gujjars are the shepherd tribes who live in the mountain meadows of Western Himalayas.

Fig 1.25
Animal Husbandary

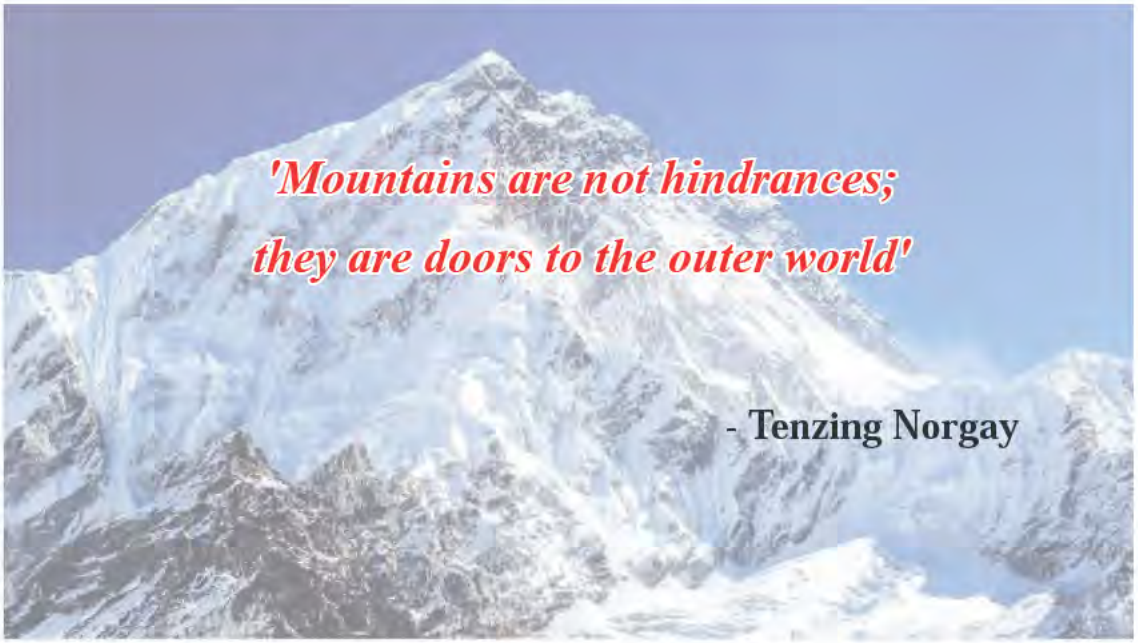
Inquire more about their life with the help of information technology.

Tourism

As the geographical conditions are favourable, the entire Himalayan region has become a zone with high economic potential for tourism. Travels associated with pilgrimage were what initiated the development of tourism in these regions. There are several pilgrim centres in this region such as Kailas, Manasarovar, Amarnath and Hema Kund Sahib. These places have been attracting travellers for centuries.

The second phase of tourism development in the Himalayan Mountain region began in the 19th century when the British identified the area's favourable climate. The resort towns such as Shimla, Darjeeling, Shillong, Almora, Ranikhet, Mussoorie and Nainital are important tourist centres.

The third stage of modern tourism development began in the Himalayan region after the conquest of Mount Everest by Sherpa Tenzing Norgay and Edmond Hillary on 29th May 1953. Today the adventure tourism sector promoting Mountaineering, Paragliding, skiing etc. has developed significantly in this region.



The Himalaya is not an obstruction; instead, it is a door kept open for the world beyond. The Himalayas open door to the paths of new knowledge, sustenance and adaptation.

Extended Activities

1. Prepare an essay on 'Human life in the Northern Mountains'.
2. Mark the mountain ranges that are part of the Northern Mountains and incorporate the same in 'My Own Atlas'
3. Prepare a pictorial wall magazine on the occupation of people in the Northern Mountains.