

MGG-003
REGIONAL GEOGRAPHY
OF INDIA



Vol. II

REGIONAL GEOGRAPHY OF INDIA

**REGIONAL GEOGRAPHY
OF INDIA****Vol.****2****BLOCK 4****SELECT MESO REGIONS OF INDIA (1-146)**

BLOCK 5**SELECT MICRO REGIONS OF INDIA (147-295)**

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MGG-003 REGIONAL GEOGRAPHY OF INDIA: INTRODUCTION

Geography is one of the oldest disciplines of inquiry in the quest of knowledge. The study of geography goes as back as to the periods of Greeks and the Romans. Subject matter of the discipline revolves around two broad themes namely physical and human geography. Equally important, geography subject is known to provide the key filaments as far as the study of any region over the Earth's surface is concerned. This course will provide a base for understanding India in terms of its complexities especially at the level of historically evolved regional identities. Apart from this, this course would also help in comprehending India better in terms of its diverse personality with regards to regional issues and provide basis for better appreciation of historically evolved concept of unity in diversity aimed for national integration. It would also help in evolving strategies for development of regions by identifying the problems and prospects of regions at various scales, ranging from macro to meso to micro levels.

This course is divided into five blocks, with each block containing three to four units.

Regional geography is one of the most important branches of study in geography and the other being systematic geography. Regional geography of India deals with the complex physical and cultural characteristics that help to shape the geographical regions at different hierarchical levels. It begins with the distinctive explication concerning the fundamentals of regions and regional method of analysis along with varying basis and schemes of delimiting regions that will enable the scholarly comprehension of changing dynamics of India's regional structure. These fundamentals of regions and regional geography are thoroughly discussed in **Block 1** spread over four Units.

The schemes of regionalisation provide a kind of roadmap and platform laden with sound strategies for a country's growth and development. **Block 2** is devoted to the study of schemes of regionalization aimed for the economic development in three Units. It covers the important themes such as Changing Dimension's of India's Regional Structure and review of major schemes as propounded by key geographers and social scientists.

Block 3 describes macro regions, by covering three macro regions dealt in three Units. These are macro region 1 (Himalaya and associated mountain ranges), macro region 2 (Indo-Ganga and Brahmaputra plains), and macro region 3 (Indian peninsula and islands).

Block 4 introduces you about the select meso regions of India, including six meso regions dealt in three Units. These are meso region 1 (Ladakh and Arunachal Himalayas), meso region 2 (Bengal delta and Indo-Ganga divide), and meso region 3 covering (Chotta Nagpur plateau and Malabar coast).

Block 5 introduces you about the micro regions of India, by covering six meso regions dealt in three Units. These are micro region 1 (Kashmir valley and Sikkim Himalaya), micro region 2 (Sunderbans delta and Assam plains), and micro region 3 (Kathiawar and Bundelkhand).

We hope that after studying this course, you will be able to describe fundamentals of regions and regional geography to explore numerous aspects of regions at varied scales.

In this quest, our warmest wishes are always with you. If you need assistance with this course, please contact us at: vishalwarpa@ignou.ac.in.

**REGIONAL GEOGRAPHY
OF INDIA****BLOCK****4****SELECT MESO REGIONS OF INDIA****UNIT 11****MESO REGIONS 1****11****UNIT 12****MESO REGIONS 2****45****UNIT 13****MESO REGIONS 3****93****GLOSSARY****145**

BLOCK 4: SELECT MESO REGIONS OF INDIA

Block 4 introduces you about the select meso regions of India, including six meso regions dealt in three Units. These are meso region 1 (Ladakh and Arunachal Himalayas), meso region 2 (Bengal delta and Indo-Ganga divide), and meso region 3 covering (Chotta Nagpur plateau and Malabar coast).

Meso regions are notionally considered as intervening regions lying between the macro and micro regions. It helps to study the physical and cultural aspects with nuanced details.

Unit 11: This Unit discusses the meso region 1 and includes Ladakh and Arunachal Himalayas. It highlights the physical and cultural setting of these two meso regions of India. In addition, it also describes the geographical regions along with problems and prospects.

Unit 12: This Unit discusses the meso region 2 and includes Bengal delta and Indo-Ganga divide. It highlights the physical and cultural setting of these two meso regions of India. In addition, it also describes the geographical regions along with problems and prospects.

Unit 13: This Unit discusses the meso region 3 and includes Chotta Nagpur plateau and Malabar coast. In addition, it also describes the geographical regions along with problems and prospects.

We hope that after studying Block 4, you will be able to comprehend the few select macro regions of India in better manner.

Our best wishes are always with you in this endeavour.

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BLOCK 1 FUNDAMENTALS OF REGIONS AND REGIONAL GEOGRAPHY

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 - Unit 2 Basis of Regionalisation
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-

BLOCK 2 SCHEMES OF REGIONALISATION

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BLOCK 4 SELECT MESO REGIONS OF INDIA

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-

UNIT 11

MESO REGIONS 1 |

Structure

- | | | | |
|------|--|-------|---|
| 11.1 | Introduction | 11.8 | Arunachal Himalayas: The Physical Setting |
| | Expected Learning Outcomes | | Geology |
| 11.2 | Ladakh: Historical Background | | Physiography/Relief |
| 11.3 | Ladakh: The Physical Setting | | Drainage and Water Resources |
| | Geology | | Climate |
| | Physiography/Relief | | Vegetation |
| | Drainage and Water Resources | | Soils |
| | Climate | 11.9 | Arunachal Himalayas: The Cultural Setting |
| | Vegetation | | Population |
| | Soils | | Settlement |
| | Physical Resource Base | | Economy |
| 11.4 | Ladakh: The Cultural Setting | | Transport and Communication |
| | Population | 11.10 | Arunachal Himalayas: The Regions |
| | Settlement | 11.11 | Arunachal Himalayas: Problems and Prospects |
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| 11.6 | Ladakh: Problems and Prospects | 11.14 | Answers |
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11.1 INTRODUCTION

Ladakh and the Arunachal Pradesh Meso regions lie in the western and easternmost parts of Himalaya, respectively. Both of these meso regions are significant in the regional geography of Himalayas. Basic criteria to delineate both of these meso regions are their location in Indian Himalayan Region, tough terrain and common international boundary with China. Ladakh also shares an international border with Pakistan. Both these meso regions have distinctive cultures, economies, and regional issues. These two meso regions have significant role in geopolitical space of our country. Indus river is lifeline of Ladakh region. Brahmaputra and Lohit rivers play same role in Arunachal

Meso region. Ladakh got the status of Union Territory (UT) of India on October 31, 2019 under the Jammu and Kashmir Re-organisation Act 2019. Prior to that, it was part of erstwhile state of Jammu and Kashmir. Ladakh is largest in terms of geographical area and second-least populous Union Territory in India. Ladakh is comprised of two districts, namely Leh and Kargil. Leh is dominated by Buddhist population, whereas Kargil has majority of Shia Muslim population. Ladakh was one district till 1979 that got bifurcated into Leh and Kargil districts. Indus, Zaskar, Drass, Suru, Hanle, Shyok and Nubra are main river valleys of Ladakh.

Arunachal Pradesh is one of 29 states of India, situated in country's northeast. The state covers an area of 83,743 square kilometres with more than 1,382,611 inhabitants (Balasubramanian, A.). The state is bordered by Assam and Nagaland in south and shares international borders with Bhutan in west, Burma in east and China in north. Itanagar is capital of Arunachal Pradesh. There are sixteen districts in Arunachal Pradesh. Largest districts in terms of population are Papumpare, Changlang and Lohit and least populated districts are Dibang valley, Upper Siang, and Tawang. Fig. 11.1 (a and b) shows political map of Ladakh and Arunachal Pradesh.

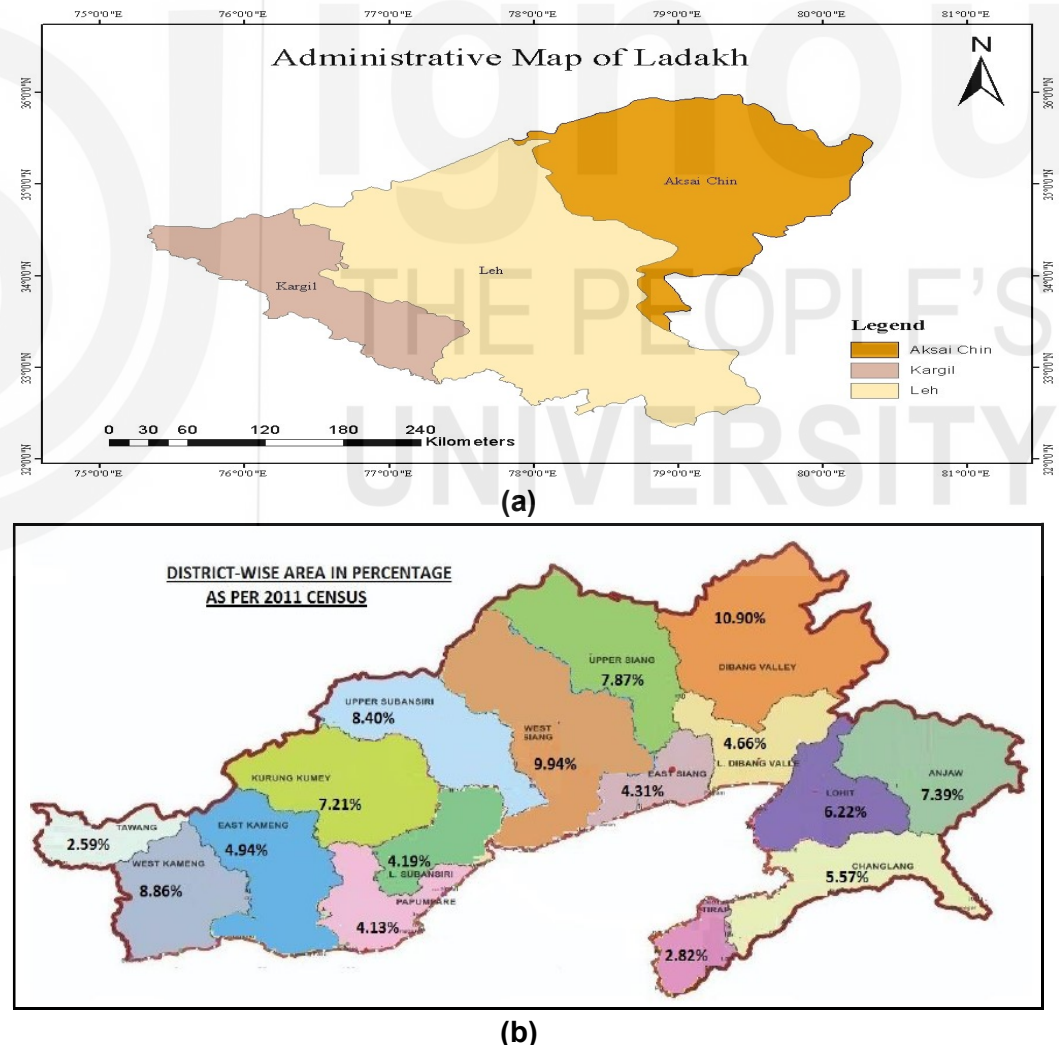


Fig. 11.1: Map of UT Ladakh (a) and Arunachal Pradesh (b).

(Source: b) Development Statistics, Atlas of Arunachal Pradesh - 2020, Directorate of Economics and Statistics, Government of Arunachal Pradesh)

Sections 11.2 to 11.11 are devoted to the study of historical background, physical setting, cultural setting and the regions, along with the problems and prospects of Ladakh and Arunachal Himalaya meso regions.

The study of this unit will enable learners to not only understand the regional geography of these two meso regions situated in two extreme corners of the Himalayas but also facilitate their further exploration on their own for their academic, personal, and professional development.

Expected Learning Outcomes

After studying this Unit, you should be able to:

- examine a brief history of Ladakh and Arunachal Himalayas regions;
- understand the nature of physical setting of Ladakh and Arunachal Himalayas regions;
- understand the nature of cultural setting of Ladakh and Arunachal Himalayas regions;
- explain the regions of Ladakh and Arunachal Himalayas; and
- comprehend the problems and prospects of Ladakh and Arunachal Himalayas regions.

11.2 LADAKH: HISTORICAL BACKGROUND

Earlier Ladakh was known by different names. It was called Maryul or low land, by some, and Khachumpa by others. Fa-Hein referred to it as Kie-Chha and Hiuen Tsang as Ma-Lo-Pho. It is said that the first Immigrants to this land appears to have been the Brokpas from Dardistan who inhabited lower reaches of Indus valley popularly known as Sham. Skit LdeNemagon, the ruler of Tibet, invaded Ladakh in 10th century AD, when the region had no central authority. King Singge Namgyal had consolidated Ladakhi Empire into a strong kingdom in 16th century. He was not only a strong monarch but also a statesman, diplomat and builder. He built historic nine-story Leh palace. He also promoted horse polo in Ladakh.

Ancient inhabitants of Ladakh were Dards of Indo-Aryan race. Immigrants from Tibet, Skardo, and nearby parts like Purang and Guge settled in Ladakh, whose racial characters and cultures were in consonance with those of the early settlers. Buddhism traveled from central India to Tibet via Ladakh, leaving its imprint in Ladakh. Ladakh for long demanded the status of Union Territory (UT). Ladakh Council was created under the Ladakh Autonomous Hill Development Council Act 2005 to suppress the demand of UT. Finally, Ladakh was established as a UT of India on October 31, 2019, after the declaration of the Jammu and Kashmir Reorganisation Act.

11.3 LADAKH: THE PHYSICAL SETTING

Ladakh meso region is further north-west extended part of great Himalayan region. Ladakh lies between 32°44' to 37°08' North latitude and 72°50' to 80°23' East longitude. Three trans-Himalayan ranges, namely the Zaskar range, the Ladakh range, and the Karakoram range, sprawl in this region. Ladakh Union Territory comprises two districts, i.e., Leh and Kargil. Leh

district is situated between Karakoram in the north and the Zaskar range in the south. It is situated along the upper part of Indus river. Kargil district lies between Great Himalayan range and Zaskar range. Kargil town is situated on the right bank of Suru river. In between these mountain ranges, beautiful valleys are inhabited, for example, Indus, Zaskar, Suru, Drass and Shyok-Nubra valleys.

11.3.1 Geology

Ladakh region has an intrinsic relationship with the evolution of the complex mountain system of North-West Himalayas. It resulted from major phases of tectonic activity that raised the sediments of the great geosyncline of the Tethys Sea to Himalayan heights. This involved the building process of lofty mountain ranges linked to the structural elements of the region.

Geographically, Ladakh comprises three trans-Himalayan ranges, viz., Zaskar range, Ladakh range and Karakoram range. Leh district is situated between Karakoram in the north and the Zaskar range in the south. Gilgit and Baltistan (Skardu) which are under the occupation of Pakistan, are located at the northern tip of South Asia, with borders touching China to the east, Afghanistan and Pakistan to the west, and Kargil district of Ladakh to the south.

The core of Zaskar range, with Great Himalayan range to the south and Ladakh range to the north, is believed to be of Cambrian metamorphic sedimentary origin, forming the basement on which all the subsequent geological formations rest.

“The pre-Cambrian rocks are widely distributed in the region, with crystalline and metamorphic rocks exposed to the northern and southern borders of Zaskar basin. South of Zaskar, basins are intruded by basic dykes and sills, dolerites, and amphibolites. The amphibolites are of para type and show zonal development in the form of veins and augens, which have resulted from high-grade metamorphism of marly impurities present in the meta sediments at the time of regional metamorphism” (Gupta, V.J. et. al., 1975).

It is, therefore, evident that Ladakh, Zaskar, and Great Himalayan ranges have been subject to considerable tectonic activity, which is responsible for the broad physiographic alignment of the area.

11.3.2 Physiography/Relief

The physiography of Ladakh comprises several mountain ranges and river valleys. In the south, Ladakh is bordered by mighty Great Himalayan range whose northern slopes fall within Ladakh region. It is followed by Zaskar range, Ladakh range, and in the north, Karakoram range.

The physiography of the Ladakh meso region can be classified on the following basis:

A. Mountain Ranges

1. Northern slopes of Great Himalayan range
2. Zaskar range
3. Ladakh range
4. Karakoram range

B. River Valleys

1. Indus valley
2. Suru valley
3. Zaskar valley
4. Shyok-Nubra valley

1. **Northern Slopes of Great Himalayan Range:** Entire Ladakh region is situated in the Trans-Himalayan Zone. North of Zaskar range lies the northern slopes of the Great Himalayan range. The average height of Great Himalaya range is around 6100 metres above mean sea level. It contains many glaciers. Zaskar range is situated to its north. Great Himalayan range forms Ladakh's boundary with Kashmir valley, Jammu Province and Himachal Pradesh. Some famous mountain passes of Great Himalayan range those connect Ladakh are Zojila (3528 metres), Umasila (5930 metres), Baralachala (4850 metres) and Shingola (5100 metres), etc.
2. **Zaskar Range:** Zaskar range is one of the main mountain ranges in Ladakh. It runs parallel to Great Himalayan range and is situated to its north. Access to the main inhabited valleys of Zaskar is through high mountain passes situated in the Great Himalayan and Zaskar ranges. Important passes in Zaskar range are Pensila (4400 metres), the main pass connecting Zaskar tehsil with Kargil, Purfila (3950 metres), Namatsela (4350 metres), Charchala (5200 metres), Shapodakla (5648 metres), connecting Leh in the north-east and Phirtsela (5250 metres). Mostly, this range presents barren, rocky surface. Its lower slopes provide some natural pastures during summer months for grazing livestock, primarily of indigenous breeds of animals like yaks, churu, churi, sheep and goats etc.
3. **Ladakh Range:** It lies to the north of Zaskar range and to the south of Karakoram range. It merges with Changthang in the east. Khardungla (5359 metres) is the highest pass in Ladakh range. Diger la and Chang la are other important passes. Ladakh range is composed of granite rocks of Ladakh batholith, which is bounded by Shyok suture zone to the north and Indus suture zone to the south. Average height of Ladakh range is 6000 metres. Climate is arid with maximum summer temperatures going up to 30°C along lower slopes. Vegetation is sparse, limited mainly to short grasses and scrubs.
4. **Karakoram Range:** Karakoram range consists of a group of parallel ranges with several spurs. Only the central part is monolithic. Width of the Karakoram range is about 240 kilometres. Length increases from 500 kilometres to 800 kilometres. Average elevation of peaks in Karakoram is around 6,100 metres. K2 is the highest peak with an altitude of 8611 metres. It is the second highest peak of the world and is followed by

Gasherbrum 8068 metres, broad peaks 8047 metres and Gasherbrum II 8035 metres. Topography is characterised by craggy peaks and steep slopes. Southern slopes are long and steep, whereas northern slopes are steep and short. Transverse valleys usually have the appearance of narrow, deep and steep ravines.

B. River Valleys

Ladakh meso region is comprised of many river valleys, and main settlements are situated in these river valleys.

1. **Suru River Valley:** Suru valley lies in Kargil district. Suru river originates near Penzila Pass. Nun (7135 metres) and Kun (7077 metres) peaks are visible from upper Suru valley. Kargil town is situated on the bank of Suru river. Other major villages in Suru valley are Sanko, Panikhar, Rangdum, and Kartse Khar etc. These villages are situated on the banks of Suru river.
2. **Zaskar Valley:** Zaskar valley is comprised of three minor valleys, i.e., Stod, Luknak and Sham valleys. Stod river, which originates around Drang Drung glacier situated on the foot of Penzi la on Zaskar side. Main villages in the Stod valleys are Akshow, Hnauling, Abran, Phay and Tungri. Luknak valley lies along Tserap Chu or Luknak river. Main villages of Luknak valley are Itchar, Raru Muney and Shunshade. Below Karsha village, Stod and Luknak rivers make a confluence and flow as Zaskar river. Central part of the valley has large villages like Padum, Karsha, Stongday, Pibiting and Ufti etc.
3. **Nubra Valley:** In fact this unit basically has Shyok river which dominates the area. Though called Nubra valley but Nubra river is a tributary of Shyok river. Many cold-desert sand dunes are visible in Nubra valley. Main villages in the sub-unit are Kardong, Khalsar, Diskit, Hunder, Tirit, Sumoor, Tegar, Panamik and Turtuk etc.
4. **Indus Valley:** This is the most important valley of Ladakh. Part of the valley is also called Leh valley. Many major settlements and Gompas (Buddhist Monasteries) are situated along right and left banks of Indus river. Leh town is situated in this valley. Leh is the centre of Ladakh Meso region, and majority of UT administration offices are situated in Leh city. Main villages of the valley are Matho, Thiksay, Shay, Chuchot, Choglamsar, Sabo, Stok, Hamis, Spituk, Phyang, Nimo, Likir, Basgo and Lamayuru, etc.

11.3.3 Drainage and Water Resources

River valleys are very important to understand the human geography of Ladakh as nearly all settlements and agricultural land is found along river valleys. Indus river is the master river of Ladakh. Habitations in Ladakh have flourished around the banks of Indus river. The river and its tributaries are the main source of freshwater in Ladakh which has great significance for settlements, agriculture and livestock rearing in this cold-desert. Indus originates near Mansarovar lake on southern slopes of Mt. Kailash (6714 metres). Total length of Indus river is 2900 kilometres. Zaskar river is one of the left bank tributaries of Indus river. It originates around Drung Drang glacier in Zaskar and has a total length of 338 kilometres. Shyok river is a

right bank tributary of Indus river. It originates from Rimo glacier and has a length of 550 kilometres. Other small tributaries of Indus river are Suru, Drass and Hanle etc., which join Indus and finally enter Pakistan. Table 11.1 shows details of major rivers of Ladakh.

Table 11.1: Major Rivers of Ladakh

Major Rivers	Source of Origin	Length (in kms.)	General Information
Indus	Near the Mansarovar Lake	2900	Main river of Ladakh, Indus festival is celebrated every year in June-July at Shay village at right bank of Indus river as a mark of Indus civilisation. Leh city is situated close to right bank of Indus river.
Shyok	Rimo Glacier	550	Right tributary of Indus river
Zaskar	Drung Drang Glacier	338	Left tributary of Indus river, Zaskar valley exists along Zaskar river.
Suru	Penzila	185	Tributary of Indus river. Kargil city is situated along the Suru river.

11.3.4 Climate

Along with rugged terrain, climate also exerts a strong influence on the society of Ladakh. Though weather is generally fine in the growing season but all outdoor economic activities come to standstill during the severe winter months. People spend most of their time indoors, with weaving as a principal economic activity. Climate has profound influence on the economy, dress, food, house-types, the way of living and social organisation of the Ladakhis.

Low precipitation in this cold desert creates acute scarcity of water during crop growing season. The shortage of water seems to have influenced social organisations of Ladakh as well. Villagers unite to conserve water and use it to their maximum advantage. They have been working as a community for constructing gravity driven irrigation channels locally called *Kuls*.

Climate acts as a severe constraint on development in areas like Ladakh. Climate of Ladakh is very complex and shows high degree of spatial and temporal variations. The variations are the result of high elevation and varying nature of physiography. It is, therefore, quite difficult to make climatic generalisations for Ladakh as a whole. At the generalised regional level, climate of Ladakh can be designated as the "High Land Type".

In spite of the limitations mentioned above, it becomes important to comprehend the spatial as well as seasonal variations in the climate of Ladakh for examining its nature as a constraint. Factors contributing to the making of climate of Ladakh include location, altitude, local relief and aspect to the sun.

Temperature

Temperature is, perhaps, the most important element of climate of Ladakh because it curtails growing season, and adds considerably to the hardship of inhabitants. Temporal and spatial variations of temperature, therefore, deserve a close scrutiny.

Table 11.2: Monthly Distribution of Temperature (°C)

Months	Drass			Leh			Kargil		
	Max.	Min.	Mean	Max.	Min.	Mean	Max.	Min.	Mean
January	-9.0	-22.2	-15.6	-2.8	-14.0	-8.4	-4.2	-13.2	-8.7
February	-6.7	-21.4	-14.05	0.8	-11.8	-5.5	-1.6	-12.1	-6
March	-2.0	-15.0	-8.5	6.4	-6.3	0.05	4.7	-5.3	-3
April	5.4	-5.2	0.1	12.4	-1.2	5.7	14.0	3.4	8.7
May	15.1	1.5	8.3	17.1	2.8	9.9	21.6	9.4	15.5
June	20.5	5.6	13.5	21.1	6.7	13.9	25.7	13.4	19.5
July	23.7	10.6	17.1	24.7	10.2	17.4	29.7	17.7	23.7
August	23.6	10.5	17.05	24.2	9.6	16.9	28.9	17.2	23.05
September	19.6	5.9	12.7	20.9	5.4	13.1	24.9	12.5	18.7
October	12.8	-1.1	5.8	14.2	-0.9	6.6	18.5	5.4	11.9
November	4.3	-8.6	-2.1	7.8	-6.6	0.6	10.4	-1.3	8.5
December	-4.0	-16.9	-10.4	1.6	-11.1	-4.6	1.2	-7.9	-3.3

(Source: Climatological Tables of Observatories in India (1931-1960))

Table 11.2 clearly reveals that temperature never exceeds 29.7°C in Ladakh. July and August are the hottest on the one hand whereas January and February are the coldest months with mean temperature of –10.9° and –8.5°C on the other hand, respectively. Drass is the coldest place having temperature below freezing point (32°F or 0°C) for five and a half months, creating very hard conditions for the inhabitants.

Thus, the cold weather commences from the last quarter of October and extends up to the first quarter of May. Drass hardly experiences hot weather in the true sense of the word, at any point of time. Leh, which is warmer than Drass, has below freezing temperatures from December to March. Other nine months are equally divided into cool and warm seasons. Maximum mean temperature for Leh is recorded in July at 17.4°C, while the lowest temperature was registered during the month of January at –8.4°C. Kargil is warmer than Drass and Leh. In general, it can be said that Drass is coldest place followed by Leh and Kargil in that order with annual mean temperatures being 2°, 5.5° and 8.9°C respectively. The monthly variations, in the mean temperatures recorded at the three stations follow almost the same trend with the annual range being 32.8°C, 32.4°C and 23.8°C for Drass, Kargil and Leh, respectively. Leh has the lowest annual range of mean temperature.

Precipitation

Table 11.3 given below reveals that amount of precipitation received is very small. Most of the precipitation is received in the form of snow. Moreover, most precipitation is confined to Drass area (64.8 centimetres) which is largely a localised phenomenon. On the other hand, Leh, located further east, is more typical of the climatic conditions prevalent over a larger proportion of the region. It receives about 9 centimetres of annual precipitation with maximum being recorded in the month of August. Precipitation in Kargil occurs mainly during six months from December to May, with the maximum recorded in the month of March.

Table 11.3: Monthly Distribution of Precipitation (in Centimetres)

Months	Drass	Kargil	Leh
January	9.73	3.35	0.97
February	9.73	3.38	0.79
March	13.82	5.46	0.71
April	10.39	4.32	0.58
May	6.15	2.49	0.56
June	1.73	0.56	0.46
July	1.60	0.79	1.19
August	1.40	0.91	1.50
September	1.75	0.25	0.69
October	1.96	0.69	0.25
November	1.24	0.33	1.02
December	5.36	1.47	0.48
Annual	64.8	23.88	9.14

The above discussion shows that Ladakh has extremely cold and arid climate. It acts as a major constraint for the economy in the region. Pastoral areas of eastern Ladakh suffer due to non-availability of natural pastures during winter months. Influence of harsh climate is more marked on agricultural sector. Agricultural activity is operated within the limits imposed by climatic constraints.

11.3.5 Vegetation

Climate is an important element for growth and distribution of natural vegetation. Ladakh has harsh climatic conditions, thus it has thin distribution and limited species of vegetation. Trees are scarce in Ladakh region, and most of these trees are willows and poplars. These trees have been planted, and long branches are cut from full-grown trees. These branches are then put in water for fortnight, planted and watered regularly. In the winter months, these saplings are bandaged and grafted to protect them from severe winter. By and large, poor rainfall and thin soil cover in Ladakh result in scanty vegetation cover. Ladakh is a rich repository of medicinal and aromatic plants. It is estimated that Ladakh region may harbor close to 1,100 species of vascular plants and ferns. As many as 23 species of flowering plants are endemic to Ladakh. Western and eastern parts of Ladakh differ significantly in terms of floral assemblage.

Table 11.4 shows the distribution of forest area in Ladakh. Out of the total geographical area, only 36 square kilometres area of Ladakh has forest cover, which accounts for 0.11 percent of total geographical area.

Many medicinal plants are found in Ladakh region and are used by people for various purposes. There are hundreds of other such plants that may be useful for pharmaceutical industry, but adequate research work is yet to be done in this area. Proper surveys and adequate research work in the field of medicinal plants are likely to improve the economy of Ladakh. Various kinds of plants are found in the region and are used to treat many diseases like asthma, stomach disorders, colds, coughs, and fevers, etc.

Table 11.4: Forest Cover of Ladakh (Area in Square Kilometres)

Name of Districts	Total Geographical Area	Forest Cover	Percentage of Total Geographical Area
Leh	45110	29	0.06
Kargil	14036	07	0.05

(Source: Jammu and Kashmir, Forest, Ecology and Environment Department, Digest of Statistics, 2017-18)

11.3.6 Soils

Soil is an important natural resource in any region, and its distribution, physical, and chemical characteristics are determined by many geographical factors. Harsh climate, poor vegetation and very rugged terrain have resulted in poor soil quality in Ladakh. Arid, cold and mountainous conditions influence depth, texture and composition of soil in Ladakh. Soil becomes an important determinant of land suitability for agriculture, especially as steep slope and ruggedness greatly limit the availability of cultivable land. Soil of Ladakh has been influenced by glacial moraines which determine its texture. Soil texture is important as it determines moisture retention capability and permeability. Soils range from gravelly and sandy loams on alluvial fans to sandy and silty loams on flood plains in Ladakh. By and large, soil texture in Ladakh is sandy loam. Sand particles are usually coarse. Soils are characterised by low organic matter and poor water retention capacity. Soil texture of Ladakh is shown in Table 11.5.

Soils of the region are quite distinct from those of other zones due to differences in climate, topography, vegetation and rocks. Soils vary considerably with terrain. Its soils are shallow to very shallow in depth. These vary widely in colour, texture, structure, and permeability depending upon topography and vegetation. Under the predominant influence of physical weathering, these soils usually consist of coarse material and are often called skeletal soils, with mixtures of rock fragments and colluvial material. Generally, soils are acidic and are subject to erosion. Major soil types are inceptisols, entisols, and ultisols. Calcareous nature of parental rocks in the form of limestone, dolomitic and shale is responsible for the genesis of soils having free CaCO_3 . River valleys are characterised by rich alluvial soil that is highly suited for agriculture. Presence of alluvial soil in the river valleys is the main factor determining agriculture and settlements in Ladakh.

Therefore, we may surmise that it is small patches of land in the river valleys and uplands, ideally suited for carrying out the pursuits of agriculture and making houses as well.

Table 11.5: Percentage Analysis of Soil in Different Locations of Ladakh

Place	Coarse	Fine Sand	Salt	Clay	Texture
Drass	0.88	19.82	53.90	25.00	SC
Kargil	6.44	61.10	3.30	20.50	LC
Leh	4.17	24.83	2.50	8.50	LS
Suru	1.00	58.55	28.50	12.00	L
Zanskar	3.77	34.83	15.00	25.50	SL

SC: Silt Clay, LC: Loamy Clay, LS: Loamy Sand, L = Loamy

(Source: Sagwal, S.S., *Ladakh: Ecology and Environment*, Ashish Pub. House, New Delhi, 1991, p.21)

11.3.7 Physical Resource Base

Ladakh region is not well endowed with mineral resources. However, some possibilities of mineral and radioactive substances have been noticed. It is stated that placer deposits of some gold were found through sand washing in Indus and Shyok rivers. Borax in Puga valley and granite, limestone and marble are present in good quantity. Minerals produced in the Union Territory of Ladakh include gypsum, limestone, magnesite, borax, and sandstones. Gypsum and magnesite are found in Leh district. Limestone is found in Khaltse block of Leh. Borax and sulphur are also found in Leh district. Sulphur deposits have been discovered in Puga valley. Puga valley also has deposition of salt domes, sandstone and limestone. Puga valley is estimated to contain a sulphur reserve of roughly 6,000 metric tonnes according to the Geological Survey of India (GSI). Borax is found only in Ladakh, in India. Sadly, exploitation of most of the mineral resources in Ladakh is not significant as it is believed to be economically non-viable.

Besides, Ladakh is also considered as a land of potential to harness renewable energy, particularly solar energy due to its peculiar physical setting and ample sunshine. Various initiatives are afoot to harness solar power to meet the region's energy needs including both domestic and commercial.

Ladakh region has beautiful rugged and mountainous natural landscape of a cold desert, dotted with high altitude glaciers and some highest motorable roads like on Khardung La and Chang La etc. Ladakh is also bestowed with beautiful lakes like Pangong Tso and Tso Moriri. All these natural resources are main sources of attraction for tourists including both domestic and international. A pioneer entrepreneur has started taking advantage of constraints imposed by harsh environment. For example: Unique formation of Ice Stupas to store water in ice state by taking advantage of freezing temperature during winter months to meet water requirements for agricultural crops. This is one classic example of conversion of water from liquid to ice state and then generating water resource at the time of its deficiency.

SAQ I

- a) In how many mountain ranges, physiography of Ladakh is classified?
 - b) Name major river valleys of Ladakh meso region?
 - c) What are the basic reasons for poor quality of soil in Ladakh Himalayan meso region?
-

11.4 LADAKH: THE CULTURAL SETTING

Culture of any place has bearing of physical conditions and historical factors related to human-nature interaction. It is even more important in the case of Ladakh which has very harsh environment that puts serious constraints on Human-Nature interaction. Impact of physical environment is clearly visible on cultural set-up of Ladakh. Language and dialects are important parts of culture of any region. Many dialects are spoken by the people of the region

but these do not have any recognised script. Ladakhi (Bhoti), Purgi, Shina, Urdu, Balti, and Zanskari are among major dialects spoken in Ladakh. Main staple food consists of sku and thupa (made of wheat) and pava, made of barley and khambir (local bread). Tourists can try Ladakhi food that is rich in flavour and includes thukpa, which is thick soup that is prepared with vegetables. *Chang* (local brew) is an important part of Ladakhi culture. Barley is important food item in Ladakh-Meso region. Population of Ladakh is composed of Buddhists, Muslims and some Christians. Festivals celebrated are Hemis Guestor, Losar, Dosmoche, Phyang Tsedup, Polo, and Navroz. According to Balti folklore, princess Gul Khatoon brought musicians and artisans with her into the region, and they propagated music and art. Daman and Tsurna are important musical instruments in Ladakh.

11.4.1 Population

Distribution of population is influenced by many factors including physiography, climate, mineral resources, soil and vegetation etc. Population in Ladakh is thinly distributed because of many physical factors. The harsh climate, mountainous physiography, limited agricultural land, fragile environment, prolonged winter season, low distribution of minerals and limited scope of industrial development in Ladakh are mainly responsible for low population. Most of population in Ladakh is concentrated in river valleys. Two main towns are Leh and Kargil, both situated in Indus valley and Suru valley, respectively. These two towns are main pockets where concentration of population is highest. These two towns are also administrative centres of Ladakh.

The population of Leh town is 30,870 in 2011 census year which is 23 percent of total population of Leh district. Its location as Central Business District (CBD), administrative centre of UT of Ladakh, development of transport, extensive flat land surface and historical reasons are main geographical factors for high distribution of population in Leh city.

The population of Kargil town is 16,388 in 2011 Census year which is 11.63 percent of total population of Kargil district. Kargil town is the administrative centre of Kargil district and historically it was halt points for the traders from Kashmir, Skardo and Leh. Distribution of population is very sparse in other areas. Padum, Diskit, Sankoo, Hanley, Khaltse and Durbok are other settlements with population-concentration.

Table 11.6 shows that total population of Ladakh was 274,289 persons in 2011 of which males and females were 156,756 and 117,533, respectively. Total population in 2001 was 2,36,539 persons with 129261 males and 107278 females. Density of population in Ladakh was 6 persons per square kilometres in 2011. Leh district has a population density of 3 persons per square kilometres in 2011 and Kargil district has 10 persons per square kilometres. Harsh climate, topography, least industrialisation, and limited land for cultivation and settlement purposes are main reasons for low population density in Ladakh. Sex ratio in the cases of Ladakh, Leh and Kargil was 720, 690, and 810 females per 1000 males in 2011, respectively. Literacy rate in 2001 was 54 percent, which rose to 74.25 percent in 2011. Decadal growth of population in Ladakh during 2001-2011 was 16 percent.

Table 11.6 also reveals district-wise demographic data for Leh and Kargil districts. Kargil had population of 140802 persons in 2011 and it was 133487 persons for Leh district. Literacy rates for Leh and Kargil were 77.20 and 71.34 percent in 2011, respectively.

Table 11.6: Demographic Characteristics of Ladakh, 2011

Population Indicators	Ladakh	Leh	Kargil
Total Population	274289	133487	140802
Males	156756 (57.15)	78971 (59.91)	77785 (55.24)
Females	117533 (42.85)	54516 (40.84)	63017 (44.76)
Sex Ratio	720	690	810
Literacy (in percentage)	74.27	77.20	71.34
Density/Km²	6	3	10
Decadal growth (in percentage)	16	13.87	18

(Sources: Census of India, 2011)

(Note: Figures in parentheses denote percentages).

11.4.2 Settlement

Location of settlement means the place where a village/town is situated, i.e., with relation to geographical factors and ecological conditions. Settlements are generally influenced mainly by three factors, i.e., physical factors, socio-cultural factors, and economic factors. Main urban centres in Ladakh are Leh and Kargil towns. Leh is administrative headquarter of Ladakh, UT and of Leh district. Kargil town is headquarter of Kargil district. The main reasons for the development of these two urban towns are their location, site and situation. Leh and Kargil towns are located on the Indus and Suru river banks respectively due to which it is best sites for the urban settlement. Other situational factors are economic, climate, availability of flat fertile land for agricultural purposes.

Besides, historical factors are also responsible for the merging of these urban centres. Other important settlements are Padum, Drass, Sankoo, Diskit, Durbok, Khaltse, Nyoma and Hanle. Many of these are administrative headquarters of sub-divisions in Ladakh.

Table 11.7: Settlement Characteristics of Ladakh Himalayan Region

Aspects	Descriptions
Leh, Ladakh	
Site	Leh is situated at an altitude of 3,500 metres (11,500 feet) on the right side of the Indus river. The terrain is characterised by rugged mountains and valleys.
Situation	Leh is located in northern India, serving as a gateway to various high-altitude regions in Ladakh and neighboring areas. It is about 420 km from Srinagar, the nearest major city.
Pattern	Leh has a compact layout, with key areas like the old town, markets, and important institutions centralised. The layout reflects a blend of traditional and modern influences.
Morphology	Leh's land use is diverse, including residential, commercial, and cultural spaces. Significant sites include monasteries, schools, and government buildings.

Kargil, Ladakh	
Site	Kargil is situated at an altitude of about 2,676 metres (8,780 feet) near the Suru river, surrounded by rugged mountains and the Zaskar range.
Situation	Kargil is located in the eastern part of Ladakh, 204 kilometres from Srinagar and about 234 kilometres from Leh. It serves as a crucial transit point for travelers heading to Zaskar Valley and other regions.
Pattern	The town has seen growth due to its strategic importance and tourism, leading to the development of infrastructure such as hotels, shops, and government offices.
Morphology	Kargil features a mix of residential, commercial, and institutional land uses, with a focus on supporting the local population and tourists. Key facilities include schools, markets, and health centers. The architecture in Kargil reflects traditional Ladakhi styles, with stone and mud-brick buildings.

Table 11.8 shows total rural and urban population of Leh and Kargil districts. Total population of Kargil district was 1,40,802 persons in 2011. It consisted of 77,785 males and 63,017 females. Rural areas of the district were inhabited by 1,24,464 people, of whom 67,703 were males and 56,761 were females. Urban area had population of 16338 people; among them were 10082 males and 6256 females. Total population of Leh district was 133487 persons in 2011. It consisted of 78971 males and 54516 females. Villages of the district were inhabited by 87816 persons, consisting of 48411 males and 39405 females. Urban areas had population of 45671 persons with 30560 males and 15111 females.

Table 11.8: Total, Rural and Urban Population in Districts of Ladakh.

	Total Population of Kargil	Rural Population of Kargil	% age	Urban Population of Kargil	% age	Total Population of Leh	Rural Population of Leh	% age	Urban Population of Leh	% age
Persons	140,802	124,464	88	16,338	12	133487	87816	65.79	45671	34
Males	77,785	67,703	87	10,082	13	78971	48411	61.3	30560	39
Females	63,017	56,761	90	6,256	10	54516	39405	72.28	15,111	28

(Source: Census of India, 2011)

11.4.3 Economy

Inhabitants of Leh are involved in primary, secondary, and tertiary economic activities for their livelihood. Traditionally, the mountainous communities have been dependent on agriculture and pastoral activities as means of livelihood. Due to arid climatic conditions, cultivation is mostly done on irrigated alluvial fans. Main crops grown consist of staples including wheat, barley, millets and some fruits such as apples, grapes, walnuts, apricots and almonds. Some vegetables like potatoes, turnips, cabbage, beans, tomatoes and carrots are also grown. Livestock rearing is a major source of livelihood, and no family, whether farmer or businessman, can live in these remote valleys without livestock. Different animals such as goats, sheep and yaks are reared in this harsh landscape. Mountainous areas provide grazing grounds for both wild ungulates and domestic animals. Most families keep mixed herds, including a

few goats, sheep and cattle. Communities very close to pastures also keep yak, which are free-ranging animal. Goat hair is used in rope-making and rug-making, primarily for domestic use. Fodder cultivation is a necessary requirement for agro-pastoral communities in order to sustain livestock during winter season, when snow covers rangelands for several months.

Apricot and apple were banned for export by the administration of erstwhile state of Jammu and Kashmir. This restriction was lifted in 2021. Apricot and apple are exported to different parts of the country and abroad after the restriction of 50 years (Outlook magazine, August 31, 2021).

Sher-e-Kashmir University of Agricultural and Technology (SKUAST), the Defense Institute of High-Altitude Research (DIHAR), and local agricultural department are promoting crop diversification by introducing a few suitable varieties of cash crops in Leh.

Limited population is involved in small-scale industry. Government sector is the main source of employment in service sector. With the introduction of tourism in 1974, the region became a hot spot for foreign and domestic tourists. Tourism has become a major source of income.

It is evident from Table 11.9, that there are total 51,873 workers (Main + Marginal workers), out of which 39,839 are male workers and 12,034 are female workers. Number of main workers is more than marginal workers. Non-workers are 88,929 in Kargil district of which 37,946 are males and 50,983 females. Overall, non-workers are in majority in Kargil district.

Table 11.9: Number of Workers and Non-workers in Kargil

	Number of Workers				Percentage to Total Population			
	Main	Marginal	Total (Main + Marginal)	Non-workers	Main	Marginal	Total (Main + Marginal)	Non-workers
Total	28,941	22,932	51,873	88,929	20.55	16.29	36.84	63.16
Male	25,174	14,665	39,839	37,946	32.36	18.85	51.22	48.78
Female	3,767	8,267	12,034	50,983	5.98	13.12	19.1	80.9

(Source: Census of India, 2011)

It can be seen from Table 11.10 that there are 75,079 total workers (Main + Marginal workers) out of which 53,265 are male workers and 21,814 are female workers. Number of main workers is more than the marginal workers. Non-workers are 58,408 in Leh district among whom 25,706 are males and 32,702 are females.

Table 11.10: Number of Workers and Non-workers in Leh

	Number of Workers				Percentage to Total Population			
	Main	Marginal	Total (Main + Marginal)	Non-workers	Main	Marginal	Total (Main + Marginal)	Non-workers
Total	57,125	17,954	75,079	58,408	42.79	13.45	56.24	43.76
Male	44,742	8,523	53,265	25,706	56.66	10.79	67.45	32.55
Female	12,383	9,431	21,814	32,702	22.71	17.30	40.01	59.99

(Source: Census of India, 2011)

Ladakh, a high-altitude region in northern India, has a unique economic landscape due to its remote location and harsh climate. The **primary industries** in Ladakh include:

1. Tourism: This is the most significant industry in Ladakh. The region attracts tourists with its stunning natural landscapes, monasteries, and adventurous activities like trekking, biking, and river rafting etc. The influx of visitors supports local businesses such as hotels, restaurants, and travel agencies. Total tourist arrivals to the UT of Ladakh reached 304,077 in 2021, out of which 303,023 were domestic tourists and 1,054 were foreign tourists.

2. Handicrafts: Ladakh is known for its traditional handicrafts, including hand-woven rugs, unique pashmina shawls, and intricate wooden carvings. These crafts are not only a cultural heritage but also a source of income for local artisans.

3. Renewable Energy: Given its abundant sunlight and high altitudinal location, Ladakh has significant potential for solar energy. There are various initiatives to harness solar power to meet the region's energy needs.

11.4.4 Transport and Communication

Transportation and communication facilities are influenced by many geographical factors. Terrain, geology, climate, forest and natural resources play major role in it. Ladakh is connected by road and air transport facilities only. Railway has not yet developed. The agencies working on Project Himank of the Border Road Organisation (BRO) are taking initiative to connect and build roads on international border of Leh and Kargil. The International Border is well connected by metal roads. National Highway 1A connects Leh and Kashmir and is 470 kilometres in length. Leh is connected to Manali through National Highway 3, which has a length of 472 kilometres. There is another national highway within Ladakh, i.e., NH 301, which connects Zaskar with Kargil and has a length of 234 kilometres. Zojila Tunnel is going to be constructed between Srinagar and Kargil. Apart from road connectivity, Ladakh is also approachable through two airports, viz., Kushok Bakula Airport at Leh and Thoise Airbase. The government has proposed to connect Ladakh with Indian Railway through Bilsapur-Leh line.

SAQ 2

Which are the important settlements of Ladakh other than Leh and Kargil?

11.5 LADAKH: THE REGIONS

Ladakh Union Territory has been divided into various regions based on homogeneity in terms of physical set-up, culture, beliefs, and dialects, etc. Following are the major sub-regions of Ladakh Himalayas:

1. Nubra Valley

Nubra is the name of a river which is tributary of Shyok river and it is also a sub-division of Leh district. Nubra valley is situated in the northern most part of Ladakh. Karakoram range is situated in the north and Ladakh range lies in the south of Nubra valley. Nubra is situated along Shyok and Nubra rivers. Main part of Nubra region is made up of broad Shyok valley which also contains sand dunes. Diskit is the main town and headquarter of the sub-division in Nubra valley. Shyok, Nubra and some of their tributaries form the drainage of the

region. Most of the villages are situated on valley floors of these rivers. Main villages of Nubra are Kardong, Khalsar, Hundur, Tirit, Sumoor, Tegar Pinchemik, Tirisha, and Panamik etc. Most of these villages lie in Leh-Central Asia and Leh Baltistan routes. Panamik was an important halting place of caravans during Leh-Central Asia trade route. The highest motorable pass, Khardung-la, connects Leh with Nubra. Double-humped camels and cold desert sand dunes are very famous in Nubra.

Besides, this valley is known to offer a unique physical landscape that attracts large number of domestic as well as foreign tourists every year. Nubra tehsil of Leh district had total population of 22,433 persons in 2011. Beautiful Hunder village is also situated in Nubra.

2. Changthang

Changthang is a high-altitude plateau situated in the eastern part of Ladakh, along China border. Changthang means eastern flat land. It is land of nomads. The nomads of this region are mainly made up of Changpa community. Main economic activities of Changpa community are rearing of sheep, Pashmina goats and yaks. Famous Pashmina wool is produced in Changthang. With the passage of time, these traditional means of livelihood are showing signs of decline due to two reasons. First one is extremely difficult working conditions under harsh environmental circumstances and second one is younger generation is searching for pursuit of better employment opportunities elsewhere. Average altitude of the region is around 4000 metres above mean sea level. Part of this area is also known as Rupsho plains. Galwan valley is situated in Changthang.

3. Central Indus Valley (Leh Region)

This valley is situated along Indus river covering Leh Town and its surrounding. Central valley has high concentration of population in Ladakh. It has Leh town which is the headquarter of Leh district and has been most important centre of overland trade as many medieval trade routes converge here. Famous Leh and Stok palaces are situated in this region. It has highest density of population in Ladakh region. Leh has main market of Ladakh. Ladakh UT headquarter is situated in Leh town. Main villages situated here are Choglamsar, Spituk, Shey, Thiksay, Stok, Sabu and Matho etc.

4. Lower Indus Valley

Lower Indus valley is the second-most-populated valley in Leh district. It includes villages of Nimu, Liker, Basgo, Saspol, Khaltse and Lamayuru etc. Famous Lamayuru monastery is situated in this valley.

5. Drass Valley

Drass, a small town in Kargil district, is situated on Srinagar-Kargil highway. This place is the second-coldest inhabited place in the world. Drass valley is known for its historical and political significance. This region became quite known due to infamous Kargil War of 1999. Tiger Hill is located in Drass valley.

6. Suru Valley

Suru Valley is a beautiful destination with green landscape and dense vegetation. It is known for its Bamiyan-type rock statue. Adventurous activities like mountaineering, rock climbing, river rafting and trekking are popular

among locals and tourists in Suru valley. Main villages in Suru valley are Sankoo, Kartse Khar, Panikhar, and Rangdum.

7. Zaskar Valley

The nomenclature of Zaskar comes from local word "Zangskar," meaning white copper. Zaskar is basically Buddhist area in predominantly Muslim Kargil district with a small Muslim population. It covers an area of around 7000 square kilometres and is situated at an elevation between 3500 and 7000 metres above the mean sea level. Its climate is very severe, and it remains cut-off from rest of the world from November to June, when only limited helicopter service is its only link with the outside world. The region remains snow-covered during winter, and movement of people comes to nearly standstill even within the region. Winter is severely cold, and nearly no outdoor activity is possible for four to five months. People live in small houses built of stone, mud and wood. Human beings and domestic animals share the same cooking and sleeping room on ground floor during winter months. Domestic animals are grazed on natural pastures in summer but have to be stall-fed during harsh winter months.

Villages are mostly situated along two main tributaries of Zaskar river. The first one called Stod, has its source near Pensi-La (4400 metres) pass. The second branch is formed by two main tributaries known as *Kurgiakh-Chu*, with its source near Shingo-La pass, and *Tsarap-Chu*, with its source near Baralacha-La pass. These two rivers unite below Purne village to form Luknak river, also named *Lingti* or *Tsarap*. Luknak-Chu then flows north-westwards along a narrow and precipitous gorge towards Padum village, where it unites with Stod river to form Zaskar river.

The natural environment of Zaskar presents a very harsh and fragile ecosystem. This region experiences heavy snowfall during winter season, caused by western disturbances. Zaskar sub-division is an underdeveloped area where existing use of natural resources is limited due to low level of technology and harsh environment presented by rugged topography and very cold climate.

SAQ 3

- a) Name major sub-regions of Ladakh meso region.
 - b) Why Nubra valley is famous?
-

11.6 LADAKH: PROBLEMS AND PROSPECTS

Geographically, Ladakh has a fragile environment. Harsh climatic conditions, less scope for industrialisation, lack of natural resources, limited agricultural land, and a shorter growing season are some major problems in Ladakh region. Ladakh region has problems with communication and transport during winter months. The area remains cut-off from rest of the world for more than four months in a year. Very limited air connectivity is available during winter months. Working season is very short, and there is a very limited growing

period for agriculture. Beside these, there are also border issues with China and Pakistan.

Ladakh has huge geographical area. Most of the land in Ladakh is barren. Beautiful landscape coupled with great Buddhist cultural environment are sources of attraction for tourists. Tourism industry is booming in Ladakh. Ladakh is a huge source of medicinal plants. It has valuable Pashmina goats. Pashmina shawls are very famous. Ladakh has tremendous scope for harnessing potential of clean and renewable energy sources like solar and geothermal energy. Puga valley is known for geothermal energy.

11.7 ARUNACHAL HIMALAYAS: HISTORICAL BACKGROUND

Arunachal Pradesh is inhabited by people of tribal origin. Ahom Kings influenced the region during 16th century. Population of the region is of Tibeto-Burmese origin. The tribes consist of Daflas, Tangins and Monpas etc., and they have been influenced by Buddhist ideals. Miri, along with Daflas and Tagin, live in the hills. Apatanis are believed to be more advanced. They are agriculturists. Beside this, Abor, who call themselves Adi, live in valleys of Arunachal Pradesh. Beside them, Membas, Ramos, and Boris form minor groups. Mishmis exist as Idus, Taraons, and Kamans. They excel in handicrafts. Today, tourism forms an important source of revenue for the state. Indigenous Arunachali inhabitants have relationships with Myanmar hill tribal groups. High mountains, thick forest, and inaccessibility have helped in the evolution of various tribal group identities living in different valleys. Monpa and Sherdukpen are main dominant tribes in the state. Ahoms held the areas until its annexation to India by the British in 1858.

Later, it became a fully integrated region of India as a Union Territory on January 20, 1972, known as North East Frontier Agency (NEFA). Arunachal became a full-fledged state on February 20, 1987, and was renamed as Arunachal Pradesh.

11.8 ARUNACHAL HIMALAYAS: THE PHYSICAL SETTING

Arunachal Himalayas is located in north-east of India. It is located between 26.28° N and 29.30° N latitude and 91.20° E and 97.30° E longitude and has an area of 83,743 square kilometres. The state shares an international border with Bhutan in the west, Myanmar in the east, and China in the north. The state also shares borders with Nagaland State to the east and Assam to the south. Most of Arunachal Pradesh is covered by mighty expanse of Himalayas.

11.8.1 Geology

Geologically, Arunachal Pradesh shows a history of evolution through tectonic activities. Mishmi Himalaya, or traditionally, Lohit Himalaya, is another name for Eastern Arunachal Himalayan Belt (EAHB). The Mishmi block is made up of three main river valleys: Siang river valley in the west, Dibang river valley in the centre and Lohit river valley in the east. Bhalukpong, Tawang, and

Zimithang are the names given to western part of Arunachal Himalaya, which contains a diverse range of lithology from Proterozoic to Pleistocene periods. A series of tectonic contacts and thrusts are identified from lower structural level to the south to higher structural level to the north. It is part of the main central thrust of Himalayas. It has various types of rocks, including schistose, muscovite, chlorite, quartzite, phyllite, and meta-volcanoes.

11.8.2 Physiography/Relief

Arunachal Pradesh's physiographic division shows the state to be primarily made up of hilly tracts nestled in eastern Himalayas. Most of Arunachal Pradesh is mountainous. Arunachal Himalayas extends from east of Bhutan to Diphu Pass in the east. Mountain ranges run in a broad southwest-to-northeast direction. Fast-flowing rivers cut through these ranges from north to south, creating deep gorges. Brahmaputra runs through deep gorge after crossing Namcha Barwa. Its terrain consists of lofty hills and ridges that separate intervening deep valleys and peaks of Great Himalayas.

Arunachal Himalaya can be divided into following physiographic divisions:

1. **Western Arunachal Himalayas:** Bhalukpong-Tawang-Zimithang is the name given to western sector of Arunachal Himalaya.
2. **Central Arunachal Himalayas:** Central Arunachal Himalayas consist of many river valleys. Dibang river valley is the main valley of central Arunachal Himalayas.
3. **Eastern Arunachal Himalayas:** Mishmi Himalaya or traditionally Lohit Himalaya, is another name of Eastern Arunachal Himalayan belt. Mishmi block is made up of three main river valleys: Siang river valley in the west, Dibang river valley in the centre, and Lohit river valley in the east.

A. River Valleys

River valleys of Arunachal Himalayas can be divided into following parts:

1. Siang River Valley

Brahmaputra river enters India in the state of Arunachal Pradesh, where it is called Siang. It is further divided into Upper Siang valley and Lower Siang valley.

2. Lohit River Valley

Lohit river valley covers Lohit district, and its headquarter is Tezu.

3. Subansari River Valley

Subansari river valley covers two districts of Arunachal Pradesh, i.e., Upper Subansari and Lower Subansari.

4. Dibang River Valley

Dibang river valley is comprised of two districts, i.e., Dibang valley district and Lower Dibang valley district.

5. Kameng River Valley

East and West Kameng districts of Arunachal Pradesh lie in Kameng river valley.

11.8.3 Drainage and Water Resources

Most rivers in Arunachal Pradesh originate in Tibetan plateau. Brahmaputra, also known as Siang river, is the main drainage system of Arunachal Himalayas. Table 11.11 shows natural drainage of Arunachal Pradesh. State of Arunachal Pradesh has five major river systems. These are Brahmaputra (Siang), Kameng, Subansiri, Lohit and Dihang. Important tributaries of river Kameng, which are turbulent and high-speed rivers, are Para, Pachi, Pachok, Pakoti, Keya Bichom, Pacha, Pakke, Papu, Passa, Narmorah and Dikalmukh. Small tributaries of Subansiri include Rangandi, Dikrong and Kamala. Tributaries of Siang river include Dibang, Burhi Dihing, Tista and Dhansari. All these are fed by snow of Himalayas. Mightiest of these rivers is Siang, called the Tsangpo in Tibet, which becomes Brahmaputra after it is joined by Dibang and Lohit in the plains of Assam.

Table 11.11: Major Rivers of Arunachal Pradesh Himalayas meso region

Name of the River	Source of Origin	Length (in kms.)	General Information
Brahmaputra	Near Mansarovar Lake	2900	Main river of Arunachal Pradesh.
Subansiri	Tibet	442	The Subansiri (Chayul Chu in Tibet) is a trans-Himalayan river and a tributary of the Brahmaputra river.
Lohit	Zeyal Chu	200	Tributary of Brahmaputra river
Dhiang	Patkai Hills	195	Tributary of Brahmaputra river
Kameng	Tawang	264	Tributary of Brahmaputra river

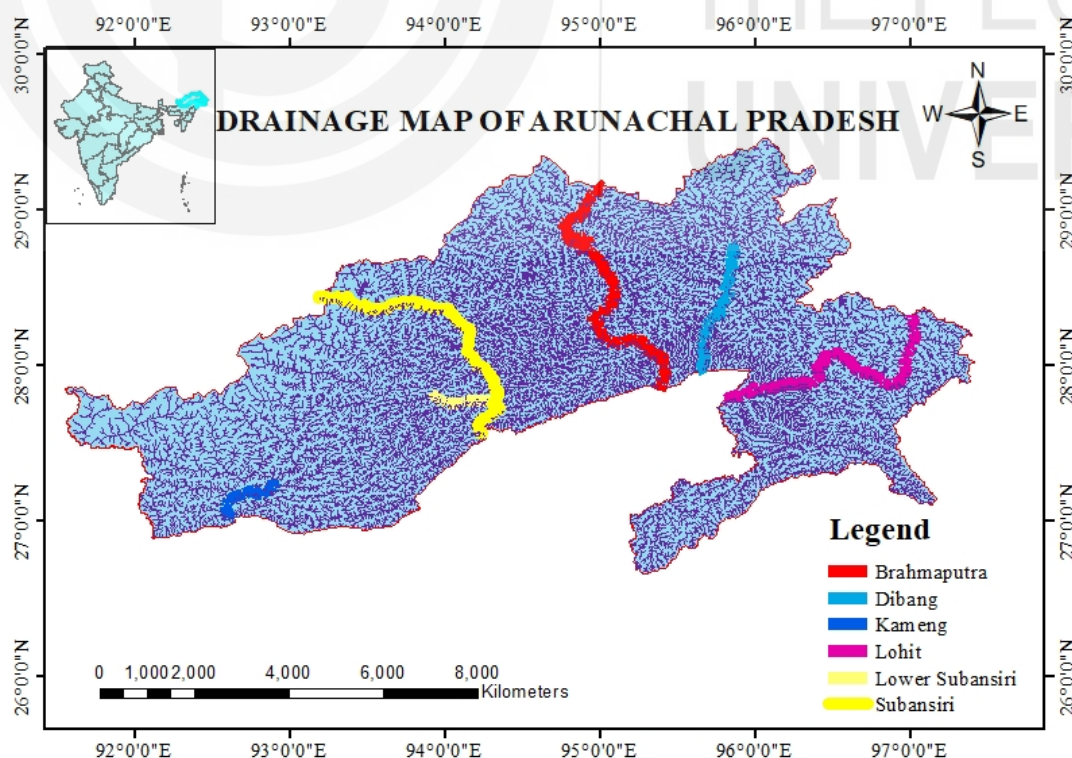


Fig. 11.2: Drainage Map of Arunachal Pradesh.

11.8.4 Climate

Arunachal Pradesh has humid hot and sub-tropical climate in foothills, windy cool and pleasant climate at lower altitude and cold climate at higher mountains. Rainfall is heavy during monsoon causing flood and landslides. Areas that are at a very high elevation in Upper Himalayas close to Tibetan border enjoy alpine or Tundra climate. Below Upper Himalayas are Middle Himalayas where people experience temperate climate. Arunachal Pradesh receives heavy rainfall ranging between 80 to 160 inches. Average temperature of Arunachal Pradesh is 25.4°C. Average temperature in this region in winter ranges from 15⁰ to 21°C, while that during the monsoon season remains between 22⁰ and 30 °C.

11.8.5 Vegetation

Vegetation of any region is affected by precipitation and temperature of that region. Arunachal Himalayas are rich in their flora and fauna. Arunachal Pradesh has various types of natural vegetation. Main vegetation types are northern tropical semi-evergreen vegetation, northern tropical evergreen vegetation, northern tropical moist deciduous forests, secondary bamboo breaks, east Himalayan sub-tropical broad-leafed forests, temperate broad-leafed forests, temperate conifer forests, sub-alpine woody shrubs and alpine meadows.

Important forest types found in the state are tropical evergreen, semi-evergreen, deciduous, pine, Alpine, grasslands, etc. It has tropical evergreens and sub-tropical pines; subtropical mixed broad-leaved and pine forests are found in lower elevations. As elevation increases, woodlands give way to mixed and coniferous temperate forests. Table 11.12 shows forest cover of the state based on interpretation of satellite data from October 2017 to March 2018. Total forest cover in Arunachal Pradesh is 66687.78 square kilometres, which is 79.63 percent of the state's geographical area. In terms of forest canopy density classes, the state has 30556.5 square kilometres of dense forest and 21095.43 square kilometres of area is under moderately dense forest. This brief analysis is based on the report of Department of Environment and Forest, Government of Arunachal Pradesh, 2020-21.

Table 11.12: Area under various forests in Arunachal Pradesh Himalayas meso region

Category	Forest cover	Dense forest area	Moderate dense forest
Area (in sq. kms.)	66687.78	30556.50	21095.43

(Source: Department of Environment and Forest, Government of Arunachal Pradesh, 2020-21)

11.8.6 Soils

Soils are formed through the interaction of five major factors: *time, climate, parent material, topography and organisms*. Soils of Arunachal Himalayan region are mostly comprised of mountainous soil and alluvial soil in river valleys. Main soils in Arunachal Pradesh are red loamy soil, laterite soil, red and yellow soil, recent alluvium and old alluvium and brown hill soil. Slash-and burn (Jhum) procedure of cultivation is practiced in large areas. Land is cultivated with mixed crops for two years and then left fallow to rejuvenate

itself naturally for 3–6 years. Burning increases soil pH, available K, and exchangeable Ca. Change in pH is temporary, as after the depletion of Ca and K from the soil, original pH is regained. Soils of Arunachal Pradesh are strongly to moderately acidic in nature (pH 4.5 to 7.2) and rich in organic matter content (0.8 to 5.2 percent OC), which declines sharply with depth. High runoff and Jhum cultivation have led to extensive soil erosion in the state. Acidic soil, rich in organic matter, with high rainfall and cold climate, favours plantations of different temperate and sub-tropical fruits like pear, peach, plum, apple, tea and cardamom, etc.; pineapple cultivation at foothill slopes; in addition to vegetables, spices, and medicinal plants.

11.8.7 Physical Resource Base

Arunachal Pradesh has significant coal and petroleum reserves, and many rivers have high hydel potential. Most of power supply is derived from hydroelectric power plants. Other mineral resources in the region include quartz, marble, limestone, dolomite, iron, and graphite. Arunachal Pradesh has significant, though largely unutilised, resource potential. Among its resources for generating energy are rivers, coal and petroleum. Most of the state's power is provided by hydroelectric plants. Efforts have been made in early 21st century to expand hydroelectric and solar power generation. Table 11.13 shows mineral resources of Arunachal Pradesh. It can be inferred from the Table that main mineral resources are copper, graphite, limestone and dolomite.

Table 11.13: Minerals Resources of Arunachal Pradesh Himalayan Meso Region

Mineral Resources	Total Resources (in '000 tonnes)
Copper	10.02
Dolomite	77837
Graphite	72758257
Limestone	482795
Quartzite	5270

(Source: Indian Minerals Yearbook, 5th Edition, 2020)

SAQ 4

- How many physiographic divisions, Arunachal Himalaya meso region has?
- Name any three river valleys of Arunachal Himalaya meso region.
- Briefly explain the climate of Arunachal Himalayan meso region.
- Briefly discuss about vegetation types of Arunachal Himalayan meso region.

11.9 ARUNACHAL HIMALAYAS: CULTURAL SETTING

Arunachal Pradesh can be roughly divided into a set of semi-distinct cultural spheres on the basis of tribal identity, language, religion and material culture. The division can be Tibetan area bordering Bhutan in the west, Thanyi area in the centre of the state, Mishmi area to the east of Thanyi area, Tai/Singpho/

Tangsa area bordering Myanmar and 'Naga' area to the south, which also borders Myanmar. In between, there are transition zones, such as Aka, Hruso, Miji, and Sherdukpen areas which provide 'buffer' of sorts between Tibetan Buddhist tribes and animist Thanyi hill tribes. Monpa, Abor, Mishmi, Nyishi, and Nagas are some of the well-known tribes occupying territories from west to east. Jhumming is practiced by majority of these groups. This practice is also known as slash-and-burn cultivation or shifting cultivation.

In the Tibetic area, one finds large number of people belonging to Monpa tribe, with several sub-tribes speaking closely related but mutually incomprehensible dialects. Major tribe is Nyishi within Thanyi area. Apatanis also live among Nyishi but are distinct. In the centre, one finds predominantly Galo people, with the major sub-groups of Lare and Pugo, among others, extending to Ramo and Pailibo areas. In the east, one finds Adi tribe with many of its sub-tribes including Padam, Pasi, Minyong, and Bokar, among others. Moving east, Idu, Miju, and Digaru make up 'Mishmi' cultural-linguistic area.

In southeast, Tai Khamtiare are linguistically distinct from their neighbours and culturally distinct from majority of other Arunachal tribes.

Tibetan Buddhism predominates in districts of Tawang, West Kameng, and isolated regions lying adjacent to Tibet. Theravada Buddhism is practiced by groups living near Myanmar border.

Tribal people in Arunachal Pradesh wear distinctive garments and headdresses. Art of weaving is especially important, and textile designs are unique to each group. Dances are an integral part of community life. Losar, Mopin, and Solung are major tribal festivals. Villagers often drink millet or rice beer, as well as tea at such festivals.

11.9.1 Population

Population density in Arunachal Himalayas is largely influenced by climate, topography, soil, vegetation, mineral resources, cultural factors and political boundaries of the area.

Table 11.14 shows demographic characteristics of Arunachal Pradesh. Arunachal Pradesh had population of 13.84 lakh persons in 2011, an increase from 10.98 lakh persons in 2001. Total population of Arunachal Pradesh in 2011 was 1,383,727 persons with 713,912 males and 69,815 females. Total population was 1,097,968 people in 2001, of whom 579,941 were males and 518,027 were females. Density of population was 13 persons per square kilometres in 2001 and 17 persons per square kilometres in 2011. Sex ratio was 893 females and 938 females per 1000 males in 2001 and 2011 respectively. Literacy rate was 54.34 percent and 65.38 percent in 2001 and 2011 respectively. Decadal population growth rates in Arunachal Pradesh were 27 percent and 26.03 percent in 2001 and 2011 respectively.

Table 11.14: Demographic Characteristics of Arunachal Pradesh (2011)

	Arunachal Pradesh	
Population Indicators	2001	2011
Actual Population	1,097,968	1,383,727

Male	579,941 (52.82)	713,912 (51.59)
Female	518,027 (47.18)	669,815 (48.41)
Sex Ratio	893	938
Literacy (in Percentage)	54.30	63.80
Decadal growth rate of population (in Percentage)	27	26.03
Density/Km²	54.34	65.38

(Sources: Census of India, 2011)

(Note: Figures in parentheses denote percentages).

Table 11.15 shows district-wise population characteristics of Arunachal Pradesh. It can be inferred from the table that Papumpare district (176,573 persons) has highest population, followed by Changlang (1,48,226 persons) and Lohit district (145,726 persons). Dibang Valley District (8004 persons) has the lowest population, followed by Anjaw (21,167 persons) and Upper Siang District (35,320 persons). Highest decadal population growth rate was recorded in Papumpare (44.73 percent). The same district also had highest literacy rate (79.51 percent) in Arunachal Pradesh. Lowest decadal growth rate is seen in Upper Siang District (5.87 percent). Tirap district has lowest literacy rate (52.19 percent) in the state. Highest density of population is in Papumpare district (52 persons per square kilometre) and lowest density is in Dibang valley (1 person per square kilometre). Kurung Kumey district has highest sex ratio of 1032 females per 1000 males whereas Tawang has lowest sex ratio with 714 females per 1000 males.

Table 11.15: Demographic Characteristics of Districts of Arunachal Pradesh (2011)

S. No.	Name of Districts*	Population	Decadal Growth Rate (%)	Sex Ratio	Literacy Rate (%)	Density of Population
1.	Papumpare	176,573	44.73	980	79.95	51
2.	Changlang	148,226	18.18	926	59.80	32
3.	Lohit	145,726	16.59	912	68.18	28
4.	West Siang	112,274	8.04	930	66.46	13
5.	Tirap	111,975	11.61	944	52.19	47
6.	East Siang	99,214	13.52	980	72.54	28
7.	Kurung Kumey	92,076	116.56	1032	48.75	15
8.	West Kameng	83,947	12.53	819	67.07	11
9.	Upper Subansiri	83,448	50.78	998	63.80	12
10.	Lower Subansiri	83,030	49.00	984	74.35	24
11.	East Kameng	78,690	37.62	1029	60.02	19
12.	Lower Dibang Valley	54,080	7.20	928	69.13	14
13.	Tawang	49,977	28.40	714	59.00	23
14.	Upper Siang	35,320	5.87	889	59.99	5
15.	Anjaw	21,167	14.19	839	56.46	3
16.	Dibang Valley	8,004	10.07	813	64.10	1

(Source: Census of India, 2011)

(Note: *As per Census Data, 2011. At present, the number of districts has become 26 in the state of Arunachal Pradesh. Rest of the ten districts are Capital Complex,

Kamle, Kra Daadi, Lepa Rada, Longding, Lower Siang, Namsai, Pakke Kessang, Shi Yomi, and Siang).

11.9.2 Settlement

Location of a settlement means the place where a village/town is situated with relation to geographical location and ecological conditions. Settlements are influenced by mainly three factors namely physical factors, socio-cultural factors, and economic factors.

Table 11.16: Settlement Characteristics of Arunachal Pradesh Himalayan Region

Aspects	Descriptions
Itanagar, Arunachal Pradesh	
Site	Itanagar is situated in the foothills of the Himalayas at an altitude of about 350 metres.
Situation	The city is well-connected by road and is about 60 kilometres from the nearest airport in Tezpur, Assam. Itanagar serves as a gateway to other parts of Arunachal Pradesh. It is also Capital of Arunachal Pradesh and is important administrative centres.
Pattern	The city has a mix of planned and unplanned areas. The layout includes residential, commercial, and administrative zones.
Morphology	The architecture reflects a blend of modern styles and traditional designs, with several structures showcasing local materials and designs influenced by indigenous cultures.
Tawang, Arunachal Pradesh	
Site	Tawang is located in the eastern Himalayas at an altitude of about 3,048 metres.
Situation	Tawang is situated in the north western part of Arunachal Pradesh, close to the Indo-China border. It is approximately 180 kilometres from the nearest major town, Bomdila, and about 400 kilometres from Guwahati.
Pattern	Tawang has experienced growth in tourism-related infrastructure due to its significance as a Buddhist pilgrimage site, leading to the development of hotels, restaurants, and shops.
Morphology	Tawang features a mix of residential, commercial, and institutional land uses, with significant areas dedicated to monasteries and religious sites, notably the Tawang Monastery, one of the largest in India.
Bomdila, Arunachal Pradesh	
Site	Bomdila is situated in the western part of Arunachal Pradesh at an altitude of approximately 2,540 metres.
Situation	Bomdila is located about 100 kilometres from the nearest major city, Tezpur, Assam, and serves as a gateway to various locations in Arunachal Pradesh, including Tawang.
Pattern	Bomdila features a compact layout, with residential areas, markets, and important institutions clustered around the main road. The layout is influenced by the hilly terrain.
Morphology	Bomdila has a mix of residential, commercial, and institutional

	spaces, with a focus on tourism. Key sites include monasteries, government buildings, and markets.
Naharlagun, Arunachal Pradesh	
Site	Naharlagun is located at an elevation of about 1,500 metres (4,921 feet) in the foothills of the Himalayas.
Situation	Naharlagun is situated just 15 kilometres from Itanagar, the capital city of Arunachal Pradesh. It is positioned strategically near the border with Assam.
Pattern	Naharlagun has a semi-planned layout, with residential and commercial areas organised around the main roads. The town's growth has been influenced by its proximity to Itanagar, leading to a blend of urban and suburban characteristics.
Morphology	The land use in Naharlagun is diverse, including residential, commercial, educational, and recreational spaces. Key facilities include schools, government offices, and shopping areas.

Table 11.17 shows rural and urban population of Arunachal Pradesh (2011). Arunachal Pradesh had a 39.27 percent urban population and 59.63 percent rural population in 2011. Main urban centres are Itanagar, Miao, Seppa, Mipi, Rupa, Wakro, Anini and Dirang Zemithang. Presently, Arunachal Himalayas has 27 notified urban areas: Tawang, Dirang, Bomdila, Rupa, Seppa, Itanagar, Naharlagun, Sagalee, Ziro, Koloriang, Daporijo, Basar, Aalo, Yingkiong, Boleng, Pasighat, Roing, Anini, Namsai, Tezu, Hawaii, Longding, Deomali, Miao, Khonsa, Changlang, and Jairampur. Out of the total population of Arunachal Pradesh, 22.94 percent of people lived in urban areas in 2001. Urban population of Arunachal Pradesh increased to 39.27 percent in 2011 and is expected to rise further. Sex ratio in urban centres in Arunachal Pradesh was 890 females per 1000 males. Average literacy rate in Arunachal Pradesh for urban areas was 82.93 percent. Out of total population of Arunachal Pradesh state, around 77.06 percent of people live in villages. Population growth rate for rural population was 22.56 percent during 2001-11. There were 953 females per 1000 males in rural areas in 2011. Average literacy rate in Arunachal Pradesh for rural areas was 59.94 percent.

Table 11.17: Rural and Urban Population of Arunachal Pradesh (2011)

Total Population	Rural	Urban
	1,066,358	317,369
Percentage	77.06	22.94
Population Growth (%)	22.56	39.27
Sex Ratio	953	890
Literacy Rate (%)	59.94	82.93

(Source: Census of India, 2011)

11.9.3 Economy

More than half of population of Arunachal Pradesh is engaged in agriculture, but only a tiny portion of land is under cultivation. Although settled agriculture, including wet-rice farming, has expanded considerably since late 20th century, yet many farmers continue shifting agriculture (*jhum*). Rice, maize, millets and buckwheat are among main crops grown in the region. Major commercial crops are oilseeds, potatoes, ginger, sugarcane and vegetables.

Table 11.18 shows work participation in terms of total workers, male and female workers, in Arunachal Pradesh in 2011. It can be seen from the table that total workers were 4,78,721 of whom 3,01,109 were males and 1,77,612 were females. Number of cultivators is highest, i.e., 2,48,120 workers, followed by other workers accounting for 2,0,5614 workers. Number of workers engaged in household industries was lowest at 4,728 workers.

Table 11.18: Work Participation (2011)

Workforce	Total Person	Males	Females
Main workers	478,721	301,109	177,612
Cultivators	248,120	130,008	118,112
Agriculture Labourers	20,259	11,921	8,338
Household Industries	4,728	2,772	1,956
Other Workers	205,614	156,408	49,206
Marginal Workers	109,386	49,164	59,772
Non-Workers	796,070	363,639	432,431

(Source: Census of India, 2011)

The Arunachal meso region's economy is primarily driven by agriculture, horticulture, and forestry. However, there are several **key areas of industry** and development in Arunachal Pradesh. These are discussed as under:

1. **Hydropower:** The state has significant potential for hydropower generation due to its mountainous terrain and numerous rivers. Several hydropower projects are underway or planned, which are expected to play a crucial role in the state's economic development.
2. **Tourism:** Tourism is a growing industry in Arunachal Pradesh, with attractions including the Tawang Monastery, stunning natural landscapes, and diverse cultural heritage. Efforts are being made to develop infrastructure to boost tourism sector to benefit the locals and augment the economy of mountainous state.
3. **Forestry and Timber:** Given the state's abundant forest resources, there is some activity in the timber and wood processing industries. Sustainable management practices are important to balance economic benefits with environmental conservation.
4. **Agriculture and Horticulture:** While not traditionally classified as industry, agriculture and horticulture are significant in Arunachal Pradesh. The cultivation of crops like rice, maize, and various fruits and vegetables, along with the promotion of organic farming, plays a vital role in the state's economy.

11.9.4 Transport and Communication

Arunachal Pradesh has remained one of the most inaccessible parts of India for many years. The state is connected to the rest of the country mainly by road and, to a limited extent, by rail. Some of the problems with road development are hilly rugged terrain. Arunachal Pradesh is not well connected with other parts of the country through highways, railways and airways. The state's airports are located at Itanagar, Daparjio, Ziro, Along, Tezu, and Pasighat. However, owing to rough terrain, many of these airports are small and cannot handle many flights. Arunachal Pradesh has many highways, including National Highway 52, which is 336 kilometres long and

was completed in 1998. It connects Jonai with Dirak, and another highway connects Tezpur in Assam with Tawang.

Table 11.19 shows national highways in Arunachal Pradesh. Main national highways are NH 229, 52B, and 52. NH 52, completed in 1998, connecting Jonai with Dirak, National Highway 229 connects Saggalee-Ziro-Doprprijo-Alang, Passighat, Namchik, Changlang, Konsa, and Kanubari. There are also national highways of small length, i.e., NH 52A, 153, and 37. Total length of these smaller highways is less than 60 kilometres.

Table 11.19: National Highway in Arunachal Pradesh Himalayan meso region

National Highway	Connectivity	Length (in kms.)
NH 52	Assam border-Pasighat-Dambuk-Roing-Paya-Tezu-Wakro-Namsai	310
NH 52 A	Itanagar-upto Assam border	42
NH 153	Assam border-Myanmar border (starting from tawang-Bomdila-Nechipu-Sneppa	40
NH 229	Saggalee-Ziro-Doprprijo-Alang and terminating at Passighat in the state of Arunachal Pradesh, Namchik, Changlang, Konsa and Kanubari	1090
NH 52 B	Terminating near Dibrugarh in the state of Assam, joining with approaches to Bogibeel bridge	450
NH 37	Saikhowaghat in Assam to join NH 52 near Roing in Arunachal Pradesh	60

(Source: Ministry of Development of North Eastern Region, 2023)

SAQ 5

- Name three major tribal festivals of Arunachal Himalaya meso region.
- Briefly describe the economy of Arunachal Pradesh Himalayas?

11.10 ARUNACHAL HIMALAYAS: THE REGIONS

On the basis of drainage system of Arunachal Himalaya, Arunachal Pradesh has been divided into following six regions as discussed below:

1. West Kameng Valley

West Kameng is a district in Arunachal Pradesh. It accounts for 8.86 percent of the total area of the state. The name is derived from Kameng river, a tributary of Brahmaputra that flows through the region. It shares international border with China in the north and Bhutan in the west, Tawang district in the northwest, and East Kameng district in the east. Its southern border is shared with Sonitpur district and Darrang district in Assam. Topography of the district is mostly mountainous. Inhabitants of the district comprise mainly Monpa (Dirang, Boot, Lish, and Kalaktang monpa), Miji (Sajalong), Sherdukpen, Aka, and Bugun (Khawa). Main settlements in West Kameng valley are Bhalukpong, Singchung, Dirang, Kalaktang, and Nafra.

2. East Kameng Valley

East Kameng valley is situated in western part of Arunachal Pradesh. Its deep gorges and narrow valleys frequently open into vast valleys, which sustain permanent agriculture. Climatic conditions of the district vary largely within short distances due to physiographic characteristics. Altitude of different administrative centres varies, ranging from 363 metres to 1906 metres. Main tribes inhabiting the district are Nyishi, Aka, Miji, and Puroik. Main settlements in the valley are Chayang Tajo, Pipu, Sawa, Gyawepurang, Bameng, Khenewa, Lada, Seppa, Bana, Debeyar, Pakoti, and Richukurang.

3. Siang Valley

Siang district is named after Siang river, which flows through this district. Four other districts in Arunachal Pradesh are also named after the river i.e., West Siang, East Siang, Upper Siang and Lower Siang. The word Siang is believed to have originated from Angsi glacier situated on northern side of Himalayas in Burang County, Tibet, from where Yarlung Tsangpo river originates.

4. Tirap Valley

Tirap is the only district of Arunachal Pradesh situated on southern bank of Brahmaputra, and in early times it was a gateway to India in the east. This valley is situated between the plains of Brahmaputra on the west and the valley of Irrawaddy on the east.

5. Lohit Valley

Name of the district is derived from Lohit river that flows here. Lohit was a part of Lakhimpur district prior to 1914. Lohit district was bifurcated into two independent districts, namely Lohit district and Dibang valley district in June 1980 under Arunachal Pradesh (Re-organisation of District) Act 1980.

Headquarter of Lohit district is located at Tezu.

There are different tribes in the district. Their traditional dances, games, and sports can be enjoyed during festive occasions. Elephant riding, angling, river rafting, hitchhiking, mountaineering, etc. are sports available in Lohit valley.

6. Subansiri Valley

Subansiri river (Chayul Chu in Tibet) is a trans-Himalayan river and a tributary of Brahmaputra river that flows through Tibet's Lhuntse County in Shannan and the states of Arunachal Pradesh and Assam. The word "Subansiri" has been taken from Sanskrit term "Subarna," meaning "gold" (Goyal et al. 2018), and Subansiri river was known as prospective mining spot for gold in ancient times. Subansiri valley can be divided into upper Subansiri and lower Subansiri valley.

SAQ 6

- Name six natural regions of Arunachal Himalayas meso regions.
 - Briefly explain the Tirap valley of Arunachal Himalayas meso regions.
-

11.11 ARUNACHAL HIMALAYAS: PROBLEMS AND PROSPECTS

Arunachal Himalayas are facing problems of structural imbalance and unequal development. Areas surrounding Itanagar Capital Region have developed in terms of railway and road connectivity. Siang and Kameng regions have experienced good development of road infrastructure. Peripheral areas have less development, and there are inter-regional disparities.

Arunachal Himalayas present an important biodiversity hotspot in north-eastern India. It has huge potential for agriculture. Arunachal Pradesh has vast potential for sericulture and organic farming. The region can also be promoted for agro-industry.

To summarise, Ladakh region is part of North West Trans Himalayas and Arunachal region is part of Eastern Himalayas. Ladakh has cold-arid climate and is a cold desert compared to humid and sub-humid climate of Arunachal. Ladakh has very limited flora as compared to dense forests in Arunachal region. Main river of Ladakh region is Indus, and it is Brahmaputra river in Arunachal. Distribution of population in Ladakh region is very thin. Arunachal region has relatively higher density in its lower areas. Ladakh region has less favourable conditions for the growth of human population as compared to Arunachal region.

11.12 SUMMARY

In this Unit, you have learnt the following:

- Ladakh was established as a union territory of India on October 31, 2019, following the passage of the Jammu and Kashmir Reorganisation Act. Prior to that, it was part of the Jammu and Kashmir state.
- Ladakh was called Maryul. Fa-Hein referred to it as Kia-Chha and Hiuen Tsang as Ma-Lo-Pho. During the 10th century AD, Skit LdeNemagon, the ruler of Tibet, invaded Ladakh, where there was no central authority.
- The physiography of Ladakh comprises mountain ranges. In the south of Ladakh, it is surrounded by the mighty great Himalayan ranges, followed by the Zaskar range and the Ladakh range, and in the north, it is covered with the Karakoram ranges. Most of Arunachal Pradesh is mountainous. Its terrain consists of lofty hills and ridges that separate deep valleys and the peaks of the Great Himalayas.
- The Indus river is the main lifeline of Ladakh. It originates from the Mansarovar lake on the northern slopes of Mt. Kailash (6714 metres). The state of Arunachal Pradesh has five major rivers, including the Kameng, Subansiri, Siang, Lohit, and Tirap. All these are fed by snow from the Himalayas.
- The population in Ladakh is composed of Buddhists, Muslims, Hindus, and Christians. A variety of dialects are spoken by the people of the region, and these do not have any recognised script.

- Inhabitants in Leh are involved in primary, secondary, and tertiary economic activities as a means of their livelihood. Traditionally, the mountain communities have been dependent on agriculture and pastoral activities as livelihood means.
- Arunachal Pradesh is one of the 29 states of India, situated in the country's northeast corner. The state covers an area of 83,743 square kilometres with more than 1,382,611 inhabitants.
- Arunachal Pradesh can be roughly divided into a set of semi-distinct cultural sphere on the basis of tribal identity, language, religion, and material culture.
- As per details from Census 2011, Arunachal Pradesh has a population of 13.84 lakhs, an increase from the figure of 10.98 lakhs in the 2001 census. The total population of Arunachal Pradesh as per the 2011 census was 1,383,727, of which 713,912 and 69,815 were male and female, respectively.
- More than half of the population of Arunachal Pradesh is engaged in agriculture, but only a tiny portion of the land is under cultivation.

11.13 TERMINAL QUESTIONS

1. Explain the main rivers of Ladakh meso region.
2. Write down main sub-regions of Ladakh meso regions.
3. Discuss the main forest types of Arunachal Himalayan region.
4. What are the prime economic activities of Arunachal Himalayan meso region?
5. Discuss the various valleys of Arunachal Himalayan meso region.

11.14 ANSWERS

Self-Assessment Questions (SAQ)

1. a) Mountain ranges of Ladakh meso region has been classified into four ranges. These are northern slope of great Himalaya range, Zaskar range, Ladakh range and Karakoram range.
b) There are four major river valleys namely Suru, Zaskar, Nubra and Indus river valleys.
c) These are primarily harsh climate, poor vegetation and very rugged terrain responsible for poor quality of soil.
2. These are Padum, Drass, Sankoo, Diskit, Durbok, Khaltse and Nyoma etc.
3. a) Major sub-regions of Ladakh Himalayan region are Nubra valley, Changthang valley, Central Leh valley, Lower Leh valley, Drass and Darkhon valley, Suru valley and Zaskar valley.
b) Nubra valley is famous for double-humped camels and sand dunes.

4. a) Arunachal is divided into three physiographic divisions, viz., Western Arunachal Himalaya, Central Arunachal Himalaya and Eastern Arunachal Himalayas.
 b) Siang, Lohit and subansiri river valleys.
 c) Arunachal Pradesh is characterised by humid hot and sub-tropical climate in foot hills, windy cool and pleasant climate at lower altitude and cold climate at higher mountains.
 d) The important forests types found in Arunachal Pradesh are tropical evergreen, semi evergreen, deciduous, pine, temperate, alpine and grassland etc. It has tropical evergreens and subtropical pines, subtropical mixed broad-leaved and pine forests are found in lower elevations.
5. a) Losar, Mopin, and Solung are major tribal festivals.
 b) Most people of Arunachal Pradesh are engaged in agriculture, but only a tiny portion of the land is under cultivation. Although settled agriculture, including wet-rice farming, has expanded considerably since late 20th century. Many of the hill peoples continue to practice shifting agriculture (*jhum*).
6. a) Arunachal Pradesh has been divided into six natural regions which include the Western parts of Kameng district, Siang valley, Tirap river valley, Lohit (Zayu) valley, Subansiri valley and Bhareli valley.
 b) Tirap valley is situated on southern bank of Brahmaputra, and in early times it used to be the gateway to India in the east. It is situated between the plains of Brahmaputra on the west and the valley of Irrawaddy on the east.

Terminal Questions

1. Refer to Section 11.3.3.
2. Refer to Section 11.5.
3. Refer to Section 11.8.5.
4. Refer to Section 11.9.3.
5. Refer to Section 11.10.

11.15 REFERENCES AND FURTHER READING

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Web Link

1. <https://arunachalpradesh.gov.in/district.html>



UNIT 12

MESO REGIONS 2 |

Structure

12.1	Introduction	12.8	Indo-Ganga Divide: The Physical Setting
	Expected Learning Outcomes		Geology
12.2	Bengal Delta: Historical Background		Physiography/Relief
12.3	Bengal Delta: The Physical Setting		Drainage and Water Resources
	Geology		Climate
	Physiography/Relief		Vegetation
	Drainage and Water Resources		Soils
	Climate	12.9	Indo-Ganga Divide: The Cultural Setting
	Vegetation		Population
	Soils		Settlement
	Physical Resource Base		Economy
12.4	Bengal Delta: The Cultural Setting		Transport and Communication
	Population	12.10	Indo-Ganga Divide: The Regions
	Settlement	12.11	Indo-Ganga Divide: Problems and Prospects
	Economy	12.12	Summary
	Transport and Communication	12.13	Terminal Questions
12.5	Bengal Delta: The Regions	12.14	Answers
12.6	Bengal Delta: Problems and Prospects	12.15	References and Further Reading
12.7	Indo-Ganga Divide: Historical Background		

12.1 INTRODUCTION

In this unit, you will study the Bengal delta and Indo-Ganga divide as meso-regions in India. Studying the Bengal delta and Indo-Ganga divide is of paramount value due to their multi-faceted significance. Bengal delta is a biodiversity hotspot, contributing to ecological balance and food security, while its vulnerability to climate change necessitates adaptation strategies. It also holds economic and urbanisation significance. On the other hand, the Indo-Ganga divide serves as a hydrological and geological divide with cultural and religious importance, impacting water resource management, disaster preparedness, and heritage preservation.

Both regions offer insights into the complex interplay of environment, society, and economy, making research in these areas crucial for sustainable development, conservation efforts, and improved livelihoods in South Asia. These two meso regions are shown in Fig. 12.1 (a and b) below.

Indo-Gangetic divide is geographically important as it is one of the important meso regions in the northern part of India. It separates the two great river systems of the Indus and Ganga. Siwalik hills bound the Divide in the North, while in the West is river Ghaggar, and in the east is the river, Yamuna. Reversal of slope takes place in the region from west to east. The State of Haryana and Union Territory (UT) of Delhi are part of this fertile alluvial plain. The plain extends to the desert region of Rajasthan in the southwest.

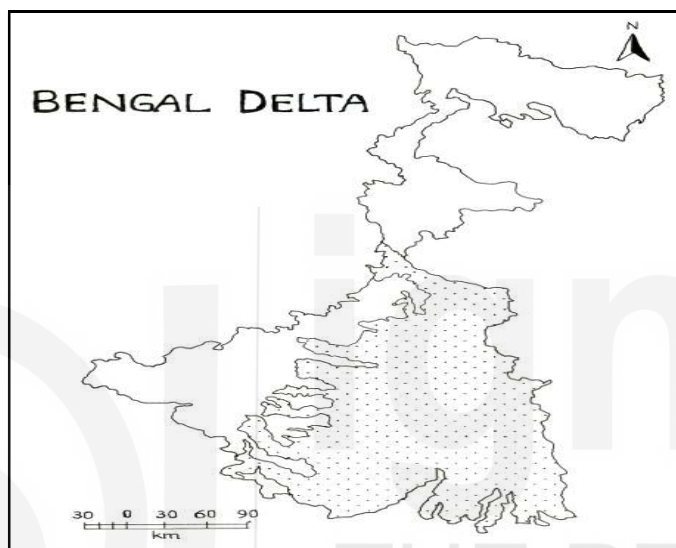


Fig. 12.1 (a): Location of Bengal Delta.

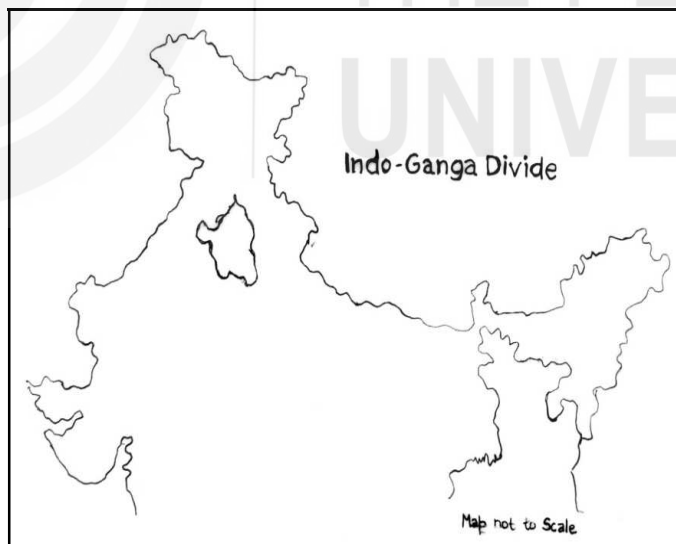


Fig. 12.1 (b): Location of Indo-Ganga Divide.

Both Bengal delta and Indo-Ganga divide are vital regions in South Asia, but these two significantly differ in terms of physiography, biodiversity, cultural significance, and economic activities. While Bengal delta is known for its ecological diversity and climatic vulnerability, the Indo-Ganga divide has historical and religious importance and is agriculturally productive.

Understanding these distinctions is essential for effective regional planning and development.

In Sections 12.2 to 12.9, you will know about these two meso region's historical background, physical setting, and cultural setting. In this Unit, we will also discuss different sub-regions within the regions and investigate the region's problems and prospects in last two Sections 12.10 and 12.11.

Expected Learning Outcomes

After studying this Unit, you should be able to:

- examine a brief history of Bengal Delta and Indo-Ganga Divide regions;
- understand the nature of physical setting of Bengal Delta and Indo-Ganga Divide regions;
- understand the nature of cultural setting of Bengal Delta and Indo-Ganga Divide regions;
- explain the regions of Bengal Delta and Indo-Ganga Divide; and
- comprehend the problems and prospects of Bengal Delta and Indo-Ganga Divide regions.

12.2 BENGAL DELTA: HISTORICAL BACKGROUND

Ganga river is extremely important in Indian literary works and cultural traditions. The Ganga is revered as a sacred river in Hindu mythology and texts, representing cleanliness, divinity and spirituality. In the ancient epic Ramayana, the Ganga is depicted as a celestial river descending from Heaven to Earth, purging mankind's misdeeds. Its waters are said to have the power to purify one's soul and bring salvation.

Proto-Australoids, Kiratas, Bharatas, and Nisadas were among the ancient tribes that lived in the region surrounding Ganga river during prehistoric times (Singh, 2016). These tribes lived on the fertile grounds along the river's banks, relying on its resources for survival.

During the post-Vedic period, the process of Aryanisation began, with the influx of Aryan tribes into the region. During this period, woods were cleared and native tribes were gradually relocated to the country's interior. The entrance of Aryans caused profound cultural, linguistic and socio-political changes in the region.

The Mughal period was another watershed moment in the history of Ganga region. Travelers and historians referred to this region as the 'Paradise of India' because of its lush foliage, fertile lands, and plenty of natural resources. The Ganga delta, with its intricate network of rivers and channels, became a hub of agricultural output and trade.

The Ganga region made significant contributions during Mughal era, particularly in the creation of excellent muslin fabrics. Muslin, woven from cotton cultivated in Ganga's lush plains, rose to prominence in worldwide market due to its high quality and craftsmanship.

Presence of European powers such as Portuguese, French, Dutch, and Britisher during 16th and 17th centuries had exerted substantial impact on Ganga region's socio-economic environment. The British established fortified city of Fort William in Calcutta (now Kolkata), signalling the start of British colonial control in India. Ganga delta became a strategic bastion for British, allowing them to maintain control over the region's commerce routes and nautical activity.

Lower Ganga plain, particularly Ganga delta, evolved a distinct biological system defined by an intricate network of rivers, distributaries, and marshlands. This ecology maintained a broad range of flora and wildlife while also facilitating cultural spread through trade, commerce, and migration.

Ganga river and its surrounding areas have had a significant impact on India's cultural, historical, and natural landscapes. From ancient mythology to colonial conquests, Ganga has been a symbol of spiritual devotion, economic prosperity, and environmental diversity.

12.3 BENGAL DELTA: THE PHYSICAL SETTING

12.3.1 Geology

This region's geology is characterised by tectonic subsidence, upliftment of Himalayan mountain ranges, and deposition of sediments by rivers in the south. The basin is surrounded by Bay of Bengal to the south, Shillong plateau to the northeast, Burmese fold on the east, and the Indian craton on the delta's west. Ganga-Brahmaputra rivers deposit the world's largest sediment annually, currently contributing about a billion tons to Bengal basin.

The rifting of the Pangaea supercontinent, which is origin of Bengal basin; the cradle of Ganga-Brahmaputra delta (GBD), began in Jurassic period. India's docking with Asia and oblique subduction beneath the Indo-Burman mountains finished the process. Chittagong-Tripura fold belt and three geotectonic provinces of the continental shelf deeper basin areas experienced the basin's sedimentation, which began practically simultaneously with the rifting (Bandyopadhyay, 2007).

Sediments deposited by Ganga, Meghna and Brahmaputra rivers in this region date to 2.4 million years ago. In Eocene and Oligocene-Miocene periods, there have been series of upliftment, rising and falling of sea levels. Subsidence of the delta is common. It is characterised by gentle folding, uplift, and tilting of the eastern part. The base is growing since Pleistocene, and the basin is located on most tectonically active Mio-geosyncline.

Sesoren (1984) has identified 'zone of weakness' in the eastern part of the Ganga delta, passing between Madhupur-Tipperra surface and following Meghna river north-east of Bengal basin and cutting Ganga tidal floodplain in the southwest. The study suggested that sediments deposited here are clay, silt and sand, etc.

12.3.2 Physiography/Relief

Lower Bengal delta covers an area of 14,054 square kilometres and comprises districts of North 24 Parganas and South 24 Parganas. Tributaries of Ganga, Brahmaputra and Meghna rivers meet and drain water in the Bay of Bengal, forming the world's significant and ecologically productive delta. The delta resembles the Greek letter 'D' (delta) and carries a large amount of water. It is 360 kilometres wide and active. Ganga delta covers a total area of 80,000 square kilometres in Bangladesh and West Bengal of India (Bagchi, 1944; Coleman, 1974; Seidensticker and Hai, 1983).

Based on physiography, it can be sub-divided into following orders as shown in Fig. 12.2:

1. Northern Plains

- a) The Duars
- b) The Barind Tract

2. Delta Proper

- a) Moribund Delta
- b) Active Delta
- c) Mature Delta

3. Rarh Plain

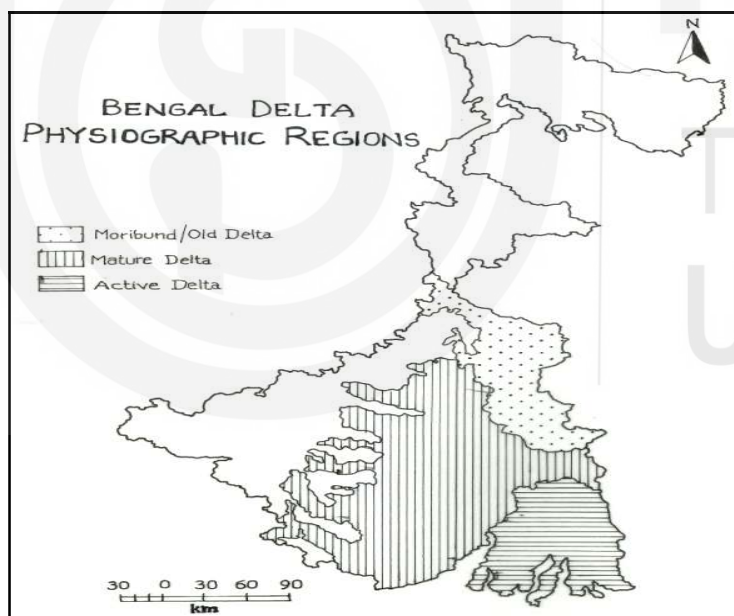


Fig.12.2: Physiographic Division of Bengal Delta.

Surface of the region is fed by Ganga and Brahmaputra rivers. Swamps, marshes, and levees are common in lower Bengal delta. There is a series of sub-surface ridges in South West tract of Hooghly-Bhagirathi basin.

Jalpaiguri, Bankura, Burdwan, Birbhum, and Midnapur lie above 150 metres, whereas parts of Cooch Behar, Dinajpur, Birbhum, Howrah, 24 Parganas, Hooghly, Malda are located at an elevation within 30 metres. Depositional features are being created in eastern part of deltaic area of Sundarbans. Northern part of the region can be designated as Duars (Darjeeling Terai) and Barind Plain (Older Alluvium). Districts of Nadia and Murshidabad have land of dead and decaying rivers.

12.3.3 Drainage and Water Resources

Ganga and Brahmaputra carry most extensive sediments as these originate in Himalayas. Brahmaputra originates in Tibetan plateau as Tsang Po and makes a bend around Namcha Barwa peak before entering India and flows through Bangladesh before draining into Bay of Bengal. Ganga originates from Gangotri glacier and flows eastward towards Bengal basin and is joined by many tributaries. Before entering Bay of Bengal, Brahmaputra and Ganga meet and make largest delta in the world known as 'Bengal delta or Ganga-Brahmaputra delta'. The distributaries of Arial Khan and Gorai help in transporting fluvial sediments into the delta. Arial Khan river supplies around 25 million tonnes of sediment every year and is joined by Lower Meghna river. Gorai river deposits 30 million tonnes of sediments into the Bay of Bengal annually.

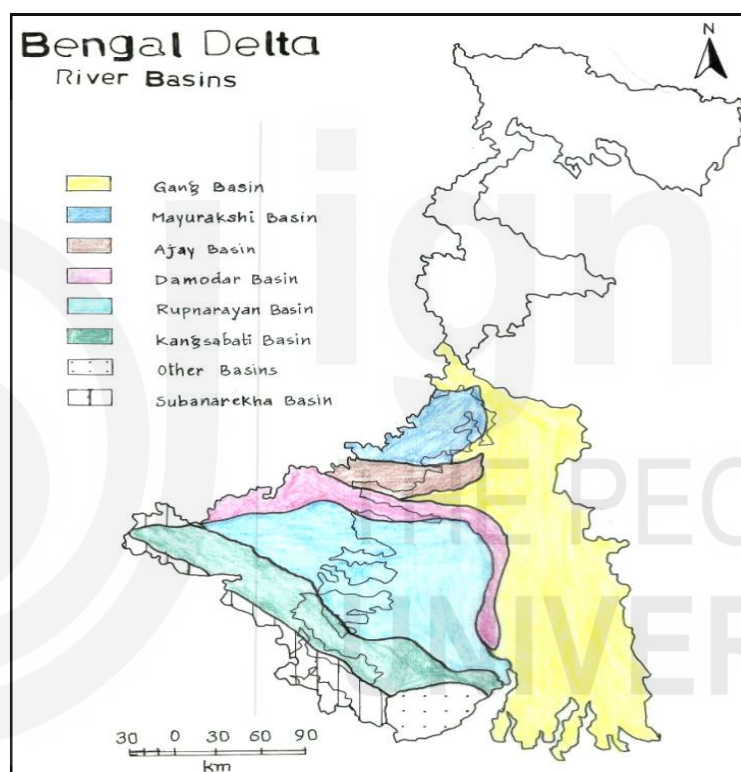


Fig.12.3: River Basin of Lower Bengal Delta.

Ganga's maximum water discharge occurs during June-November and Brahmaputra in May to November. Some of the rivers which flow in this region are Bhagirathi river, which enters West Bengal in Birbhum district and falls in Bardhaman district. Damodar river is known as '*sorrow of West Bengal*' as it perennially floods Hooghly, Bardhaman, Howrah, East and West Midnapore areas. Rupnarayan river falls in Hooghly river at Geonkhali town in West Bengal. Kangsabati river flows through Purulia and East and West Midnapore districts and joins Keleghai as Haldi river.

12.3.4 Climate

West Bengal, in eastern India, has a diverse and dynamic climate that is impacted by its geographical location and closeness to the Bay of Bengal. The state has a hot and humid monsoonal climate, which is separated into the

North Temperate Zone and the Tropical Zone. This climatic diversity causes inconsistent rainfall and temperature distribution across the regions of West Bengal.

According to the India Meteorological Department (IMD), West Bengal has four different seasons: hot, monsoon, retreating monsoon, and winter.

1. Hot Season

Hot season in West Bengal normally begins in March and lasts until mid-June. During this time, plains of West Bengal face scorching heat and severe humidity. Temperatures surge, ranging between 38°C and 40°C, making it uncomfortable for people. Nor'westers, also known as Kalbaishakhi, provide much-needed rainfall to southern West Bengal. These pre-monsoon thunderstorms provide relief from the harsh heat and aid agricultural activities in the region. Interestingly, whereas the southern sections of West Bengal bear the brunt of summer heat, northern regions have somewhat lower temperatures. Darjeeling, located in northern section of the state, has cooler climates with temperatures ranging from 15°C to 25°C, making it popular place for tourists during summer season.

2. Monsoon Season

Arrival of the southwest monsoon signals start of the Monsoon season in West Bengal, which normally begins around mid-June. Moisture-laden winds from the Bay of Bengal bring considerable rain to the state, particularly in areas such as Darjeeling, Cooch Behar, and Jalpaiguri, where rainfall might approach 250 centimetres. Average rainfall in the lowlands and plateau regions is approximately 125 millimetres. Highest temperature during the monsoon season is around 32°C, providing a little respite from the blazing heat of the preceding months. However, the monsoon season is also distinguished by intermittent pauses during which sky clears briefly, only for temperatures to climb unexpectedly. These gaps, known as monsoon breaks, are followed by renewed spell of rainfall, which adds to the region's overall amount of precipitation. The monsoon season is critical for refilling water reservoirs, sustaining agriculture, and maintaining the state's unique ecosystem.

3. Retreating Monsoon

Retreating Monsoon is the transition phase between the monsoon season and winter, lasting from the last week of September until mid-October. During this phase, the sky gets clear and the monsoon winds begin to withdraw toward the sea. The maximum temperature fluctuates between 17°C to 30°C, providing mild and pleasant weather conditions across the state. However, the minimum temperature can dip to between 6°C and 22°C, indicating the start of lower temperatures associated with the ensuing winter season. The receding monsoon also signals the entry of northeast monsoon winds, which enter West Bengal, bringing with them the possibility of depression and cyclonic occurrences, particularly in delta region of the Bay of Bengal. Such inclement weather events may seriously affect the coastal populations and infrastructural amenities, indicating the region's susceptibility to natural disasters.

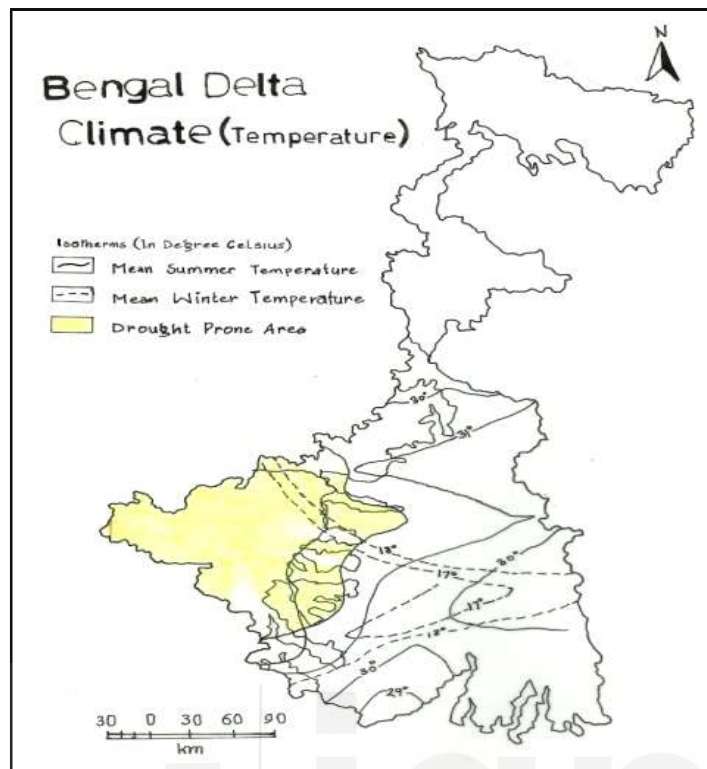


Fig.12.4: Climate of Bengal Delta Region.

4. Cold Season

Cold Season in West Bengal lasts from December to February and is marked by calm and sunny weather. January is coldest month, where temperatures range from 17°C in Jalpaiguri in the north to 21°C on Sagar Island in the south. While winters are generally pleasant throughout the state, periodic Western Disturbances in northwest India might bring light rain to the lower Bengal delta region. During this season, the highest temperatures vary from 23°C to 26°C, while the lowest temperature ranges from 9°C to 15°C. Notably, the hill resort of Darjeeling receives snowfall during the winter months, characterise by below freezing temperature values. Overall, the Cold Season provides a welcome relief from the preceding months' heat and humidity, making it an excellent season for outdoor sports and exploration for tourists in West Bengal.

In conclusion, West Bengal's climate presents a rich tapestry of seasonal variations, each contributing to the state's diverse ecosystem and cultural heritage. From the scorching summers and torrential monsoons to the mild winters and occasional snowfall in the hill stations, the region experiences a wide spectrum of weather conditions throughout the year. These climatic nuances not only shape the state's agricultural practices, economy, and infrastructure but also influence its residents' daily lives and traditions. As West Bengal continues to navigate the challenges of climate change and environmental sustainability, understanding and adapting to these seasonal fluctuations will be essential for fostering resilience and ensuring the well-being of its people. Through effective management and conservation efforts, West Bengal can harness the opportunities presented by its unique climate while mitigating the risks posed by extreme weather events. Ultimately, by embracing its climatic diversity, West Bengal can thrive as a vibrant and resilient state, rooted in its natural heritage and cultural legacy.

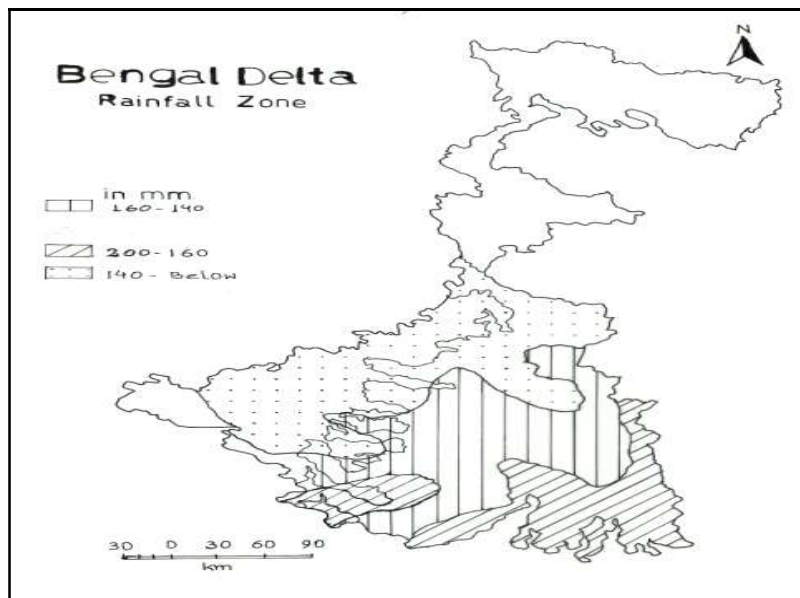


Fig. 12.5: Rainfall in Bengal Delta.

SAQ I

Briefly discuss the climatic conditions of the Lower Bengal delta.

12.3.5 Vegetation

Forest covers 12,413 square kilometres of area, accounting for 13.99 percent of total geographical area of West Bengal. The region of Lower Ganga delta has only 16 percent of forest. Much of the forest has disappeared in favour of crop cultivation to feed the inhabitants and for export. Natural vegetation of this region can be divided into the following categories:

1. Tropical Moist Deciduous Vegetation

Tropical moist deciduous forest comprises Sal, which can be found in western parts of Medinipur. It extends from the Tarai area to the entire West Bengal, except for Bengal delta's coastal part. Dry deciduous vegetation can be found in Bankura, Purulia, Burdwan, and Birbhum districts. Some of the main species are White Cedar and Kail.

2. Tropical Semi-Evergreen and Evergreen Vegetation of Coastal Areas

Tropical evergreen forests, characterised by dense foliage and high levels of biodiversity, are found in the southern coastal areas of Bankura, Birbhum, Burdwan, and Medinipur districts in West Bengal, India. These forests thrive in regions with warm temperatures, high humidity, and abundant rainfall, creating an ideal environment for lush vegetation to flourish throughout the year.

Among the various species of flora that populate these tropical evergreen forests, one of the most common is Gurjun. It is also known as the Gurjun Balsam tree or *Dipterocarpus turbinatus*. Gurjun is a tall and majestic tree species belonging to the Dipterocarpaceae family, known for its straight trunk, broad crown, and resinous sap. It typically reaches heights of upto 30 metres or more, forming a prominent canopy layer within the forest ecosystem.

Gurjun trees produce resin, extracted by tapping the tree's trunk. This tree's wood is durable and resistant to decay, making it a favourite choice for construction, furniture making, and boat building. It is also used to make incense sticks and perfumes.

Furthermore, Gurjun resin is widely used in the pharmaceutical, cosmetic, and varnish sectors. Its versatility and wide range of uses add to its economic and commercial significance.

In addition to Gurjun, tropical evergreen forests of West Bengal support various plant species, such as tall hardwood trees, lianas, epiphytes, and ferns. These forests provide critical habitat for various animal species, including mammals, birds, reptiles, and insects, adding to the region's biological richness and biodiversity.

3. Mangrove and Tidal Forest Sundarbans

There is a natural geographical border in the southern part of the state. The tidal forest of the Sundarbans is localised in South 24 Parganas at the mouth of river Ganga. The forest's name has been derived from the mangrove tree known as 'Sundari' (*Heritiera minor*). The tidal forest can be found along with coastal saline soil with peculiar roots that can be easily seen above the soil. Other plants such as Golpata, Gengwa (*Excecaria agollocha*), Hital (*Phonix palmdosa*), Baen (*Avicennia officinalis*), Bhora (*Rhizophora mueronata*), and Kaora (*Soumeratia apatata*) can also be found here. Swamp forest of Malda and West Dinajpur occurs in smaller areas of these districts.

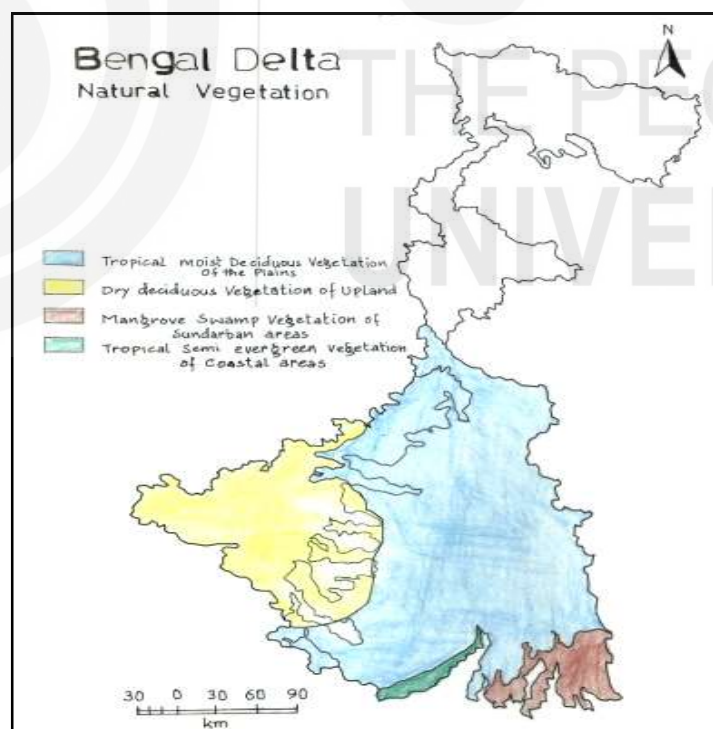


Fig. 12.6: Natural Vegetation in Bengal Delta.

SAQ 2

Briefly describe vegetation cover found in Bengal delta region.

12.3.6 Soils

Soil has a significant impact on agricultural practices and the types of vegetation. Type of soil decides the crop to be grown in the area, which lead to economic variations within regions. Department of Agriculture in 1965 classified soil into six groups. The soils of lower Bengal delta can be classified into:

1. **Alluvial Soil:** Alluvial soil is concentrated in Murshidabad, Purulia, Hooghly, Medinipur, Birbhum, and Burdwan districts. It is rich in organic matter and nutrients. Based on the parent material, it can further be sub-divided into two types:
 - **Young Alluvial Soil (Ganga Alluvium):** It is fertile soil of West Bengal known as 'Khadar'. Young alluvium is rich in organic matter and plant nutrients. It is alkaline. It covers north Bengal plain and delta region of West Bengal, excluding 24 Parganas and Medinipur districts.
 - **Old Alluvial Soil (Vindhyan Alluvium):** Old alluvium is found in the upland region and is greyish due to presence of fine sand particles. The soil here is clayey to sandy in texture, and it is neutral in reaction compared to Ganga alluvium. The old alluvium has been affected by leaching, leading to acidity and deficiency of organic matter.
2. **Saline Soil:** Saline soil can be found in districts of 24 Parganas and Medinipur. The soil is highly rich in Ca, Mg and organic matter, which make it unsuitable for rice and vegetable cultivation, and for horticulture. River interaction and tidal current have contributed to excess content of salt.

12.3.7 Physical Resource Base

West Bengal is exceptionally rich in mineral deposits. Coal is readily available in Raniganj. Other types of minerals found in this region are iron, limestone, manganese, silica, copper, arsenic, and sandstone. Thirty percent of India's mineral production is from West Bengal. Raw materials, power supply, cheap labour, coal, banking facilities are readily available. Nearby port facility and International Airport cover a huge hinterland for the region. Inland waterways are well developed and connected with many parts of India. Railway network of Howrah, Asansol, Bardhaman, Kharagpur and Bandel are well developed and connected.

West Bengal, located in eastern India, has a plentiful supply of mineral resources, making it an important contributor to India's mineral production. The state's mineral reserves include coal, fire clay, iron, limestone, manganese, silica, copper, arsenic, and sandstone, among others. These mineral riches have had a significant impact on the region's economic development and industrial progress.

West Bengal's principal mineral resource is coal, and the Raniganj coalfield is one of the country's oldest and most significant coal mining sites. The coal produced from Raniganj is an important fuel supply for a variety of businesses, including power generation, steel making, and cement production. Furthermore, the presence of coal in the region has permitted the construction of coal-based enterprises, which has added into the process of state's industrialisation and economic growth.

In addition to coal, West Bengal is well known for its fire clay deposits. Fire clay, known for its high refractory qualities, is used to make ceramics, refractories, and other heat-resistant materials. The presence of fire clay reserves has boosted the ceramics sector in West Bengal, attracting business investors and creating job possibilities.

The state also has a variety of other minerals, including iron, limestone, manganese, silica, copper, arsenic, and sandstone. These minerals are essential raw materials in a variety of industries, including iron and steel, cement, glass, and metallurgy. The abundance of these minerals in the state has aided industrial growth and investment, creating a favourable climate for development and economic advancement.

West Bengal's importance in the mineral sector goes beyond its substantial resources to include its infrastructural and logistics advantages. The state benefits from a strong transportation network, which includes well-developed railways and inland waterways that allow for efficient transit of goods and raw materials throughout the region and beyond. Howrah, Asansol, Bardhaman, Kharagpur, and Bandel are major railway hubs that play a significant role in connecting West Bengal to major industrial areas and ports, enabling seamless transit of materials and finished products with value addition.

Furthermore, West Bengal's geographical location allows access to adjacent port facilities and international airports, which improves connectivity and trade prospects. The presence of ports such as Kolkata Port and Haldia Port facilitates effective export and import operations, meeting the needs of companies that rely on mineral resources. Furthermore, the presence of an international airport in Kolkata provides easy air access, boosting trade and commerce with both domestic and foreign markets.

The availability of critical infrastructure and support services enhances the state's favourable business environment. West Bengal has a consistent electricity supply, economical labour, and well-established banking facilities, creating a favourable environment for industrial investment and growth. These qualities, together with the wealth of mineral resources, place West Bengal as a preferred destination based on mining and manufacturing activities.

Furthermore, developing inland waterways improves the state's connectivity with other parts of India, allowing for cost-effective shipping of bulk commodities. West Bengal's large river network (Ganges, Hooghly, and Brahmaputra rivers), acts as major arteries for trade and commerce, connecting the state to the hinterlands and neighbouring regions.

West Bengal's mineral-rich environment and strong infrastructure and logistical advantages contribute significantly to India's mineral production. The abundance of coal, fire clay, and other minerals has aided the region's industrial and economic development. West Bengal's strategic location, well-developed transportation network, and friendly business environment continue to attract investment and position it as a prominent participant in the mineral sector. However, sustainable natural resource management and appropriate mining techniques are critical to the state's long-term development and environmental stewardship.

SAQ 3

Write a short note on physical resource base of the delta region of West Bengal.

12.4 BENGAL DELTA: CULTURAL SETTING

The cultural setting of any place is the reflection of its physical conditions and historical factors seen in terms of human-nature interaction. Due to its peculiar geographical location (between the foothills of eastern Himalayas and northern portions of Bay of Bengal), Bengal delta has remained a frontier region and acted as a melting pot of cultural inter-mixing evident from its cosmopolitan manifestation. Its composite cultural setting is a result of age-old political setting (characterised by domination and independence) and economic interactions. It is understood that language and dialects forms two important aspects of cultural setting of any geographical region.

The name of Bengal or more popularly *Bangla* in regional parlance is taken from the ancient kingdom of Vanga or Banga. This region has witnessed the settlement of diverse ethnicities such as Dravidian, Tibeto-Burman, and Austro-Asiatic people (India, 2024).

12.4.1 Population

Population in lower Bengal delta is unevenly distributed. The region had population of about approximately 9.13 crores (9,1347,736) in 2011 with total area of 88,752 square kilometres. Population density was 1,028 persons per square kilometres (2011) with sex ratio of 950 females per 1000 males. Sex ratio was above 950 females per 1000 males in the districts of Darjeeling, Paschim Medinipur, Hooghly, Murshidabad, Bankura, Purulia, South 24 Parganas, Jalpaiguri, Dakshin Dinajpur, Birbhum, and North 24 Parganas. Around 31.87 percent of people lived in urban areas, which accounts for 14,964,082 males and 14,128,920 females in 2011. The urban population has increased by 31.87 percent during 2001-11. Rural population is highest in the district of Bankura (91.67 percent), negligible in Kolkata which is most urbanised district with 100 percent urban population.

- **Population Distribution Pattern**

Topography is the main reason for uneven distribution of population. Northern part of the state is mountainous and there is infertile plateau in the west. The lower delta plain is rich in organic matter with alluvial soil in the states' southern districts. According to 2011 Census, Dakshin Dinajpur and Darjeeling were sparsely populated due to soil infertility and absence of large industries. North 24 Parganas and South 24 Parganas are densely populated as these are agriculturally rich and lie in the industrial belt.

- **Literacy**

Overall literacy in the state was 68.64 percent in 2001 and 76.3 percent in 2011. Female literacy in 2001 was 59.61 percent and 74.54 percent in 2011. Male literacy rate was 77.02 percent in 2001 and 81.69 percent in 2011 which

was higher than national average. Kolkata had the highest female literacy of 84.98 percent in 2011. Purba Medinipur had highest male literacy rate of approximately 93.14 percent and the lowest being Malda district with 66.65 percent (2011). Economically northern districts of West Bengal are well developed compared to districts like Purulia, Uttar Dinajpur and Malda. Thus, literacy rates are higher in northern districts of the state.

• Rural and Urban Population

West Bengal is an agricultural state with 6,22,13,676 persons living in rural areas (Census 2011). Highest rural population is in Bankura, Cooch Behar, Purba Medinipur, Uttar Dinajpur, and Paschim Medinipur, and the lowest can be seen in Kolkata, Howrah, North 24 Parganas, Bardhaman, and Darjeeling. The total urban population in West Bengal was 2, 91, 34,060 persons in 2011. Areas in southern part of the state and along western borders have higher rural population, and urban population is concentrated on eastern side.

Table 12.1: District-wise Population of West Bengal by Rural and Urban Areas, 2011

Districts	Rural	Urban	Total
Bankura	3295613	300679	3596292
Bardhaman	4644079	3079584	7723663
Birbhum	3054019	448368	3502387
Kolkata	0	4486679	4486679
Howrah	1776970	3064668	4841638
Hugli	3388395	2131994	5520389
Purba Medinipur	4500770	593468	5094238
Paschim Medinipur	5228308	714992	5943300
Murshidabad	5697224	1405206	7102430
Nadia	3730897	1437591	5168488
North 24 Parganas	4275724	5807128	10082852
Puruliya	2554584	373381	2927965
South 24 Parganas	6065179	2087997	8153176

(Source: Census of India, 2011)

12.4.2 Settlements

In geography, settlement means the place where a hamlet, village or town or cities of various sizes are situated. Geographical factors and ecological conditions determine the internal morphology, size and functions of settlements. Besides, settlements are also influenced by socio-cultural factors, institutional and economic factors etc. In Bengal Delta, due to plain topographic features, settlement is shaped and influenced by centuries old wave of colonialism, cultural tapestry, knowledge and wisdom passed down through generations.

Alongside, the rich availability of mineral resources has also provided thrust for the emergence of towns and cities of various sizes. The successive waves of industrial development have led to the urban agglomeration, with advantage of historical interaction (trade and development of earliest educational institutions etc.,) and frontier location in the Indian sub-continent. Table 12.2 shows brief characteristic of few key settlement units.

Table 12.2: Settlement Characteristics of Bengal Delta

Aspects	Descriptions
Asansol	
Site	Asansol is situated at an altitude of 111 meters on the banks of the Ganges river. It is the second largest city in West Bengal.
Situation	Asansol is located between Damodar and Ajay rivers in the Chota Nagpur plateau. It is located about 211 kilometres from Kolkata, the capital city of West Bengal.
Pattern	Asansol's settlement pattern has been shaped by the geographical and historical factors along with industrial development. The core urban pocket has a compact layout, with key areas like the old town, markets, residential and important institutions centralised. The layout reflects a blend of traditional and modern influences expanding along transportation networks.
Morphology	The morphology of settlement has been influenced by industrial development, urban growth and diverse land use. It includes residential, commercial, and cultural spaces. It represents a mix of colonial layout and modern planned areas like markets and institutions, schools, and government buildings.
Darjeeling	
Site	Darjeeling is situated at an altitude of about 2045 meters. It is the northernmost region of the Indian state of West Bengal. Teesta is the major river.
Situation	Darjeeling is located in the eastern Himalayas, nearly 645 kilometres from Kolkata. It serves as a crucial transit point for travellers heading to surrounding mountainous regions.
Pattern	Settlement pattern has been shaped by geographical and historical factors. Besides, its mountainous topography and colonial past has also played significant role. Linear pattern is visible along the roads and clustered pattern is concentrated surrounding agricultural fields as well as tea estates. Its settlement pattern is also shaped by hill station and tourist destination, besides its historical and geographical factors.
Morphology	Darjeeling features a mix of residential, commercial, and institutional land uses, with a focus on supporting the local population. Key facilities include schools, markets, and health centres. It showcases the amalgamation of British style architecture as well as Tibetan influence (particularly in the architectural design of Monasteries).
Kolkata	
Site	Kolkata is situated at an altitude of about 9 meters.
Situation	Kolkata is located in the eastern India.
Pattern	The town has seen growth due to its historical advantages, geographical and socio-economic factors. It is characterised by the growth of modern planned settlements towards the outskirts whereas transformation in old town areas.
Morphology	It is one of the oldest and historically significant cities of India. Its morphology represents a combination of historical, cultural and socio-economic influences. Kolkatta is mixture of both colonial architecture with modern high-rising residential areas, informal settlements, and industrial zones. The rivers flowing through the metropolitan city of Kolkatta plays a major role in its development. At present, there are challenges due to growing population density and creation of infrastructural amenities. Kolkata continues to evolve its urban character.

According to Census 2011, urban agglomerations (Population of 1 lakh or above) are Kolkata, Asansol, Siliguri, Durgapur, Bardhaman, Baharampur, Howrah, Kharagpur, English Bazar, Shantipur, Dankuni, Ranaghat, Haldia, Krishnanagar, Dhulian, Raiganj, Nabadwip, Medinipur, Balurghat, Basirhat, Chakdaha, Darjeeling, Purulia, Jangipur, Alipurduar, Bangaon, and Cooch Behar. Major cities in West Bengal are shown in Table 12.3 and are as follows:

Table 12.3: Population of Major Cities in Lower Bengal Delta

Districts	Population, 2011
Asansol	1243414
Baharampur	304487
Bankura	137386
Baranagar	245313
Barasat	287435
Bardhaman	346639
Barrackpore	152783
Bishnupur	67783
Bolpur	80210
Chandannagar	166867
Chinsurah	179931
Contai	92226
Durgapur	580990
Haldia	200827
Howrah	1370448
Kalyani	100,575
Kharagpur	207984
Kolkata	4496694
Krishnanagar	182010
Medinipur	169264
Murshidabad	44019
Nabadwip	125543
Purulia	126815
Ranaghat	234449
Sainthia	44601
Serampore	181842
Suri	67864
Tamluk	65306

(Source: Census of India, 2011)

SAQ 4

Briefly explain the population pattern of the Bengal delta.

12.4.3 Economy

• Agriculture

The share of agriculture in West Bengal's GDP is 21 percent. It employs 57 percent of the workforce of the state in 2024 (India, 2024).

Lower Ganga delta is mainly suitable for agriculture, which supports 71.23 lakh farm families. Landholding size in this region is around 0.77 hectares. Intensity of cropping is 184 percent, with 92 percent of arable land. Flat land and high fertility of soil are favourable for agriculture accounting for 75 percent of workers in this sector. Pisciculture is also well developed in this region. West Bengal is major fish-producing and consuming state in India. It is also leading producer of rice and jute.

Schemes like *Paramparagat Krishi Vikas Yojana (PKVY)* promote organic agriculture in the state with small and marginal farmers' help. *Department of Agriculture* introduced *Krishak Bandhu (Death Benefit)* to farmer family members who died due to untimely death as a means of social security since 1st January 2019 (Economic Review, 2020-21). Recent focus is on small and marginal farmers, women empowerment in agriculture sector, Public-Private partnerships and NGOs' involvement, etc.

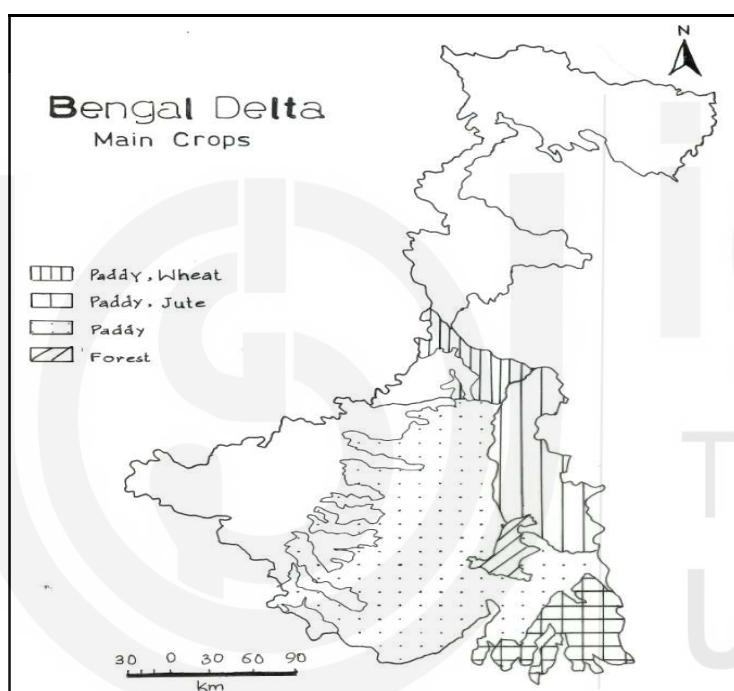


Fig. 12.7: Crops grown in Bengal Delta.

- **Irrigation**

Irrigation refers to artificial means for moisture supply to crops by canals, tube wells, and tanks. Region of lower Gangetic delta receives good amount of rainfall, and agriculture is rainfed. But due to uncertainty of monsoon and uneven distribution of rainfall, some parts of the region need timely supply of water which is met through irrigation. It ensures double cropping and even multi-cropping system. Mayurakshi Reservoir Project, which was completed in 1985, is one of the best irrigation projects in the country that operates in Murshidabad, Burdwan and Birbhum. According to Economic Review (2020-21), a fund of 409.36 crores has been released to bring 31,285 hectares of area under irrigation.

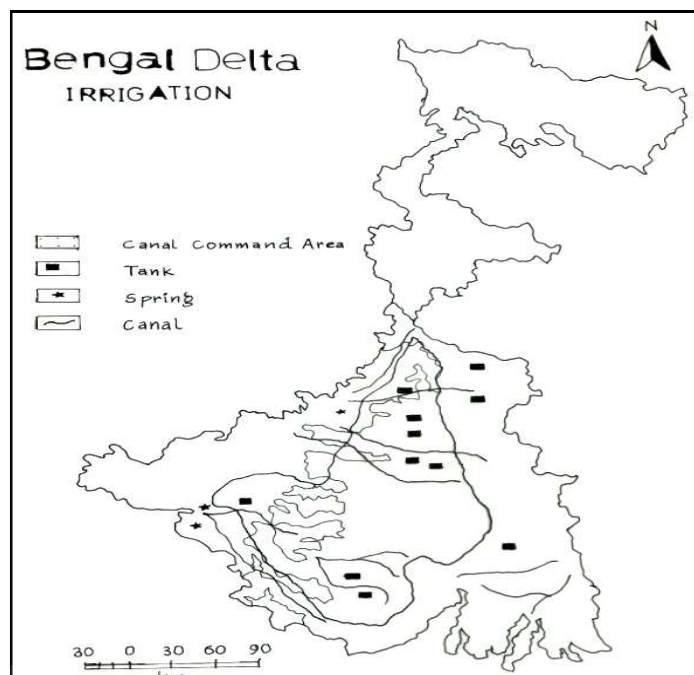


Fig.12.8: Irrigation in Bengal Delta.

- **Land Use, Land Utilisation, Cropping Pattern and Yields**

Rice is a major crop, accounting for more than 75 percent of the net cropped area. Total rice production in West Bengal was 15.57 million tonnes in 2019-20. Aman, Aus and Boro are three rice crops grown in the delta plains of West Bengal. Yield of Kharif (Aus + Aman) rice was 2817 kilogram per hectare, Boro Rice is 3630 kilogram per hectare, and total area under rice cultivation was 5490.975 hectares in 2019-20. Boro is least significant in terms of area under cultivation. Crop rotation is a common practice that ensures cropping intensity of crops. Other important crops are maize, pulses, oilseeds, potatoes and jute. Total jute production is 7901.396 Bales, which is reducing year after year (Economic Review 2020-21). Around 1, 32,745 acres of cultivable land had been brought under cultivation by various irrigation schemes such as Kangsabati Reservoir Project and Mayurakshi Reservoir Project in 2020-21.

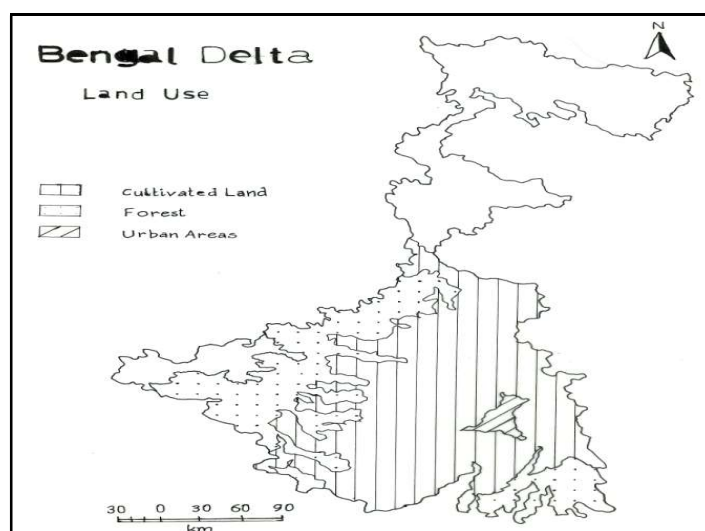


Fig. 12.9: Land Use Pattern in Bengal Delta.

● Industrial Development

Focal industries of the state include iron and steel, tea, leather, jute, minerals, cement, textiles, rubber, petroleum, gems and jewellery etc.

The region has easy access to the mineral belt of India and raw material for other industries. Kolkata was industrially rich after independence, but it lost its position due to policy failures. According to Economic Survey of 2006-2007, total registered factories were 13210 in 2004. First jute mill in India was established at Rishra in West Bengal near Hooghly river bank. Major industries are located in Hooghly-Asansol-Durgapur belt in these districts.

Kolkata is primary business centre in Eastern India. Some major industries in this region are jute, textiles, tea, paper, glass, timber, leather, electronics, bicycles and aluminum, etc. State of West Bengal implemented macro-economic policies for the growth and development of industry. Many institutions, business houses, and countries are keen to invest in this region because of metal and non-metal industries' vast potential. Industries with an investment of more than Rs.10 crore in 'Machinery' are treated as large industries. Some significant textiles factories are located in 24 Parganas and Nadia districts.

Jute factories are located at Hooghly and Howrah. Metal-based industries are concentrated in Howrah, 24 Parganas and Burdwan. Durgapur is considered as 'Ruhr of India', and important iron and steel factories are located at Burnpur-Hirapur-Kulti and Durgapur. India's first cotton textile industry was established at Fort Gloster near Kolkata. Some significant cotton textiles factories are located at Sodepur, Srirampur, Belgharia and Howrah etc. Paper factories are situated in Titagarh, Kankinara, Naihati, Halishahar, Tribeni, Chakdaha, Raniganj, and Asansol. This region is well developed in aluminium sector, leather industry, and footwear industry, accounting for more than 2.5 million workers.

Besides, due to its diverse culture and unique geographical setting, it has rich assemblage of tourism potentials. These are UNESCO world heritage sites of Sunderbans mangrove delta and Darjeeling Himalayan Railway, tea plantations, beaches, mountains and wildlife etc. It also has many religious circuits and spot that attracts pilgrims from different nook and corners of the region (both inside and outside).

● Foreign Trade

West Bengal exported goods worth around 9.49 billion USD in 2019-2020 (Economic Survey, 2019-20). Metals, agricultural products, chemicals, plastic, jewellery, tea and marine products etc., were export items. Prominent countries of bilateral trade include Bangladesh, United Arab Emirates, Singapore, and Hong Kong.

12.4.4 Transport and Communication

Water transport and surface borne transports are reasonably good options and most comfortable mode of transportation for movement of goods in this region. Britishers, Portuguese, and Arabs used sea routes to enter India. Britishers developed railways in Bengal in 1862. Perennial rivers like Ganga

and Brahmaputra linked the delta region's interior parts and ports with railways and roadways.

West Bengal, located in eastern India, has a well-developed transportation infrastructure that includes roads, airplanes, rivers, and trains. The region's strategic location on the Bay of Bengal has historically made it a maritime commercial hub, with rivers such as the Ganga and Brahmaputra connecting the delta region's interior regions to ports and railways. Throughout the years, numerous civilisations, including the British, Portuguese, and Arabs, used sea channels to reach India, establishing the framework for the region's transportation network. Modes of transportation in Lower Ganga delta can be divided into:

1. Roadways

West Bengal has a total road length of 92,023 kilometres and road density of about 103.69 kilometres per 100 square kilometres. National highway 34 is the region's longest national roadway, measuring 438.3 kilometres. State Highway 4, which connects Jhalda to Digha, is the longest state highway. The substantial road network allows for the transportation of products and persons inside the state and beyond, which contributes considerably to economic development and transport connectivity.

2. Airways

Netaji Subhas Chandra Bose International Airport in Kolkata is a significant air transportation hub that connects various parts of India to the world. It transports roughly 1.2 million foreign passengers and around ten million domestic passengers, creating job opportunities and increasing tourism in the region. Other notable airports are Kazi Nazrul Islam Airport in Durgapur, Malda Airport, Behala Airport, and Balurghat Airport. Helicopter services are also available at Gangasagar, Malda, Balurghat, Santiniketan, and Durgapur, providing easier access to remote places.

3. Waterways

Kolkata Port, one of the region's most important ports, promotes marine trade and business. Boat transport is especially successful in the Sundarbans, where rivers are critical lifelines for local residents. Given the high maintenance costs involved with highways and railways, inland waterways provide a less expensive option for delivering commodities. The span of Ganga from Allahabad to Haldia has been recognised as National Waterway 1, which would promote aquatic transportation. The Kolkata Port Trust oversees port facilities at the Kolkata and Haldia ports, guaranteeing smooth operations. Ferries play an important role in linking southern half of the state, particularly the Sundarbans, to the mainland, and are principal form of transit for local populations.

4. Railways

West Bengal has India's largest suburban rail network, with around 4,481 kilometres. The region is served by two zones: Eastern Railways and South Eastern Railway. West Bengal also has a tram network managed by the Calcutta Tramways Company Limited (CTC), making it the only part of India

having a tramway system. Kolkata Metro Rail Service, the country's first underground railway network, operates in Kolkata, offering commuters with a speedy transit option.

West Bengal's transportation infrastructure is critical to facilitating trade, business, and connection both within the region and abroad. From the large road network that connects distant areas of the state to the international aviation links provided by Netaji Subhas Chandra Bose International Airport, all modes of transportation contribute to the region's economic development and progress. Additionally, the use of rivers for cargo transport, as well as efficient management of railway and tram networks, demonstrates the state's dedication to offering diverse and accessible transportation options for its citizens. As West Bengal evolves as an economic powerhouse, its strong transportation infrastructure will continue to play an important role in propelling regional progress and prosperity.

SAQ 5

- a) Write short note on major industries of Bengal delta region.
 - b) Discuss the various modes of transportation in Bengal delta region.
-

12.5 BENGAL DELTA: THE REGIONS

The Lower Ganga plain can be divided into many divisions according to the various physiographic characteristics. Authors like Bagchi (1944), Rashid (1977), and Brammer (1989) identified various regions of Bengal delta.

Bagchi (1944) identified the deltaic region into three parts. These are as under:

1. Moribund Delta

- a) Murshidabad Plain
- b) Nadia Plain

2. Mature Delta

- a) Burdwan Plain
- b) Howrah-Hooghly Plain
- c) Midnapur Plain

3. Active Delta

- a) Northern
- b) Southern

Lower Ganga delta is a low-lying region comprising Murshidabad, Howrah, Nadia, 24 Parganas, Kolkata and Hooghly. Some prominent features here are chars, levees, swamps, bils, and dangs, etc. One of this region's main features is the urbanised and agriculturally industrialised with dead and decaying rivers.

Moribund Delta or 'dead delta' comprises of Murshidabad, Nadia, Kustia (Bangladesh) and Jessore (Bangladesh) districts. This part is agriculturally rich, but recently rivers have changed their channels, and the previous channels have dried up, causing siltation and formation of land. People are also engaged in household industries along with paddy cultivation. Murshidabad plain is more urbanised and it is divided into eastern and western parts, while Nadia plain has many industries.

Mature Delta is an area between Moribund and Active delta lying to the west of Bhagirathi-Hooghly belt. Burdwan plain dominates in Aman paddy, and Hooghly-Howrah plain in Jute. Many workers are engaged in manufacturing. Midnapur plain is least developed.

Bagchi's 'Active Delta' occupies south-eastern part of the land characterised by active streams, high level of urbanisation, and development. Northern part is dominated by agricultural land (Aman-Jute region), whereas Sundarbans' tidal forest dominate the lower delta (southern).

Rashid divided Ganga delta into five types in 1977 as under:

- a) Moribund Delta
- b) Mature Delta
- c) Active Delta
- d) Central Delta Basin
- e) Immature Delta

He separated the Central delta basin based on physiography from Bagchi's Mature delta. He even tried to separate Sundarbans from deltaic part, and his Active delta comprises eastern coast of Ganga delta.

Brammer (1989) has classified the deltaic region into active Ganga floodplain. These are high Ganga river floodplain, Ganga tidal floodplain, Gopalganj-Khulna bils, Arial bil and Young Meghna estuarine floodplain. He tried to regionalise the deltaic region based on morphology and classified the region based on fluvial activities.

The divisions are as follows:

- a) Old delta,
- b) Mature delta,
- c) Young delta, and
- d) Tidal delta.

The older part is similar to Moribund delta of Bagchi's classification; mature delta comprises the central and eastern part of lower Gangetic plain. The tidal delta is located at southern edge of mature delta comprising Sundarbans forest region. Young delta occupies the south-eastern part of estuarine floodplains of Meghna and Padma rivers.

12.6 BENGAL DELTA: PROBLEMS AND PROSPECTS

The Ganga-Brahmaputra delta region, which spans sections of Bangladesh and India, is one of the most productive and heavily populated areas on the

planet. Because of its fertile alluvial soils and plentiful water resources, this deltaic terrain has served as the birthplace of several agricultural civilisations. However, throughout time, intense farming practices, dam construction, deforestation, and water diversion have substantially altered the region's natural dynamics, posing a number of environmental difficulties and risks.

One of the most pressing challenges in the Ganga-Brahmaputra delta is drainage channel congestion caused by significant sediment deposition. This overcrowding has hampered the navigability of tidal waterways, hampering transit and aggravating flooding during monsoon season. Furthermore, intensive agricultural techniques, such as excessive irrigation and the use of artificial fertilizers, have exacerbated the problem by changing the natural flow of water and raising salt levels of soil.

Climate change is a major hazard to the Ganga-Brahmaputra delta region, affecting rainfall patterns, temperature regimes, and river flows. Temperature and precipitation changes can affect the frequency and intensity of floods, droughts, and cyclones, making deltaic settlements more vulnerable. Furthermore, rising sea levels caused by global warming pose a significant risk to coastal areas, resulting in saltwater intrusion, coastline erosion, and habitat loss.

The 1970s saw the construction of infrastructural projects like the Farakka Barrage, which aggravated the region's environmental concerns. The diversion of freshwater from the Ganga river has exacerbated salinity in the Sundarbans, one of the world's largest mangrove ecosystems. The Sundarbans, which are home to a rich flora and fauna, including the famed Sundari and Goran trees, have suffered from disease and habitat loss as a result of the changing hydrological regime.

Deforestation of mangroves for shrimp farming, salt farming, and agriculture has also contributed to the loss of biodiversity and livelihoods of people who rely on these ecosystems for survival. The reduction in mangrove cover has resulted in fall in marine fish productivity, hurting both local economies and food security. The disappearance of species like marsh crocodiles, water buffalo, and guar highlights the severity of the region's ecological disaster.

The Ganga-Brahmaputra delta's biodiversity is further threatened by anthropogenic activities such as oil spills, excessive fishing, industrialisation, and urbanisation. Pollution from industrial and urban areas has damaged water quality, threatening aquatic life and human health. Natural disasters like cyclones and storm surges worsen the vulnerability of coastal communities, leading to loss of lives and livelihoods.

To overcome the Ganga-Brahmaputra delta's numerous issues, sustained efforts must be directed toward shoreline management, biodiversity conservation, and sustainable developmental practices. Mangrove intensification, sustainable aquaculture, and flora and fauna conservation are all critical steps toward restoring the region's ecological equilibrium. Community-based initiatives, which involve local stakeholders and indigenous knowledge systems, can be critical in building resilience and adaptive ability in the face of environmental change.

To summarise, the Ganga-Brahmaputra delta region is at crossroads, dealing with severe environmental concerns compounded by human activity and climate change. Urgent action is required to protect the unique biodiversity, ecological integrity, and livelihoods of the millions of people who rely on these critical ecosystems. By using a holistic and sustainable approach to the Ganga-Brahmaputra delta, it has the potential to emerge as a model for resilient and inclusive growth, promoting peaceful cohabitation between the environment and human populations for future generations.

12.7 INDO-GANGA DIVIDE: HISTORICAL BACKGROUND

The territory comprising the Indo-Ganga divide has a history as old as civilisation itself, dating back to the beginnings of human settlement on the Indian sub-continent. This fertile divide or split between the Indus and Ganga river basins has been a cradle of human civilisation, witnessing the emergence and fall of innumerable kingdoms, empires, and civilisations over the centuries.

The story begins in pre-historic times, with evidence indicating that the Indus Valley Civilisation, one of the world's earliest urban civilisations, found spread across the Indo-Ganga divide. Archaeological digs have unearthed Indus Valley monuments in modern-day Uttar Pradesh and Haryana, demonstrating the amount of cultural trade and interaction in this ancient territory. The ruins of Harappa and Mohenjo-Daro stand testimony to this ancient civilisation's superior urban design, trading networks, and social organisation, which laid the groundwork for subsequent regional advancements.

The Indo-Ganga division is also mentioned in ancient Indian epics and scriptures, particularly the Mahabharata, which describes the famed Kurukshetra battlefield. Kurukshetra, located in this region, is very important in Hindu mythology and history, since the epic war between the Pandavas and Kauravas shaped the direction of ancient Indian culture. The Mahabharata era, considered to be around 900 B.C., was a watershed moment in Indian history, marked by epic tales of courage, valour, and moral quandaries that continue to resonate with people even today.

Over the years, different dynasties and kingdoms rose and fell, leaving their imprint or mark on geography and culture of the Indo-Ganga divide. The Mauryan Empire, led by Emperor Ashoka, ruled over wide portions of the Indian sub-continent, establishing Buddhism and leaving a legacy of peace and tolerance. The Gupta Empire, often known for the Golden age of India, saw a flourishing stream of art, science, and literature, with seminal academic figures or personalities such as Aryabhata and Kalidasa making enormous contributions to human knowledge and culture.

The Middle ages saw the rise of great empires and sultanates, as well as the entry of foreign invaders and settlers. The Delhi Sultanate, founded by the Turkic monarch Qutub-ud-din Aibak, wielded power across the Indo-Ganga divide, ushering in a new period of Islamic governance and cultural interchange. The Mughal Empire established by Babur in the early 16th century, expanded control over the region, transforming it into a hub of

political and cultural activity. Mughal rulers like Akbar, Jahangir, and Shah Jahan patronised the arts, architecture, and literature, leaving behind a rich historical heritage of architecturally superior monumental buildings such as Taj Mahal, Agra Fort, and Red Fort, which continue to fascinate people's imaginations worldwide.

Throughout history, Indo-Ganga division has been a hotbed of diplomatic and political activity, attracting traders, intellectuals, and diplomats from faraway nations. The region's strategic location at interaction of the East and West encouraged trade and cultural interchange, cultivating a cosmopolitan mentality as well as a sense of tolerance and inclusion. The majesty of its cities, the richness of its cultural legacy, and the diversity of its people have transformed the Indo-Ganga divide into a melting pot of civilisations, where the past and present seems to be intersecting in a tapestry of continuity and change.

History of the Indo-Ganga divide is a story of persistence, creativity, and adaptability that spans millennia of human endeavour and achievement. The ancient civilisations from the Indus Valley, the glory days of the Mauryan and Gupta empires, the magnificence of the Mughal era to the complexity of medieval India, this region has seen the rise and fall of numerous dynasties, cultures, and civilisations. Today, as we stand on the shoulders of our forefathers, we are reminded of the Indo-Ganga divide's enduring heritage, a land stepped into the realm of history and culture while ever-evolving and dynamic in its pursuit of development and enlightenment.

12.8 INDO-GANGA DIVIDE: PHYSICAL BACKGROUND

12.8.1 Geology

Haryana-Delhi plains are part of Indo-Gangetic plains formed due to flexing of the Indian Plate against the Asian Plate during the continent-continent collision. The collision created Himalayan mountain chain. It is not surprising that Indian Plate is still under-thrusting Asian Plate under these mighty Himalayas (Molnar and Tapponier 1977; Seeber et. al., 1981; Ni and Barazangi 1984; Molnar 1984). It created Indo-Gangetic peripheral foreland basin in early Miocene period, which is on the flexed Indian Plate lithosphere (Lyon-Caen and Molnar 1985; Singh 1987). The basin further expanded in middle Miocene, where sediments from Himalaya started getting deposited as a result of fluvial processes (Singh 1996). The plain is dotted with several distinct regional geomorphic features identified on the basis of their location, type of sediment, slope, and drainage pattern formed in late Quaternary when changing climatic conditions were witnessed. These were further modified in later periods, and are still evolving. Geographical age of the plain is approximately estimated to be between 65 to 2.6 million years ago.

Geological structure of this region is new. This region is the creation of river alluvium descending from Shivaliks. On the northern border lies the Malwa region built up during the end of Cretaceous period. Delhi range forms the southern boundary; it is an extension of Aravalli range, which is made up of

world's most ancient rocks of Cuddapah group. This region acts as a water divide between mighty rivers, Indus and Ganga. Its general slope is towards the south and southwest.

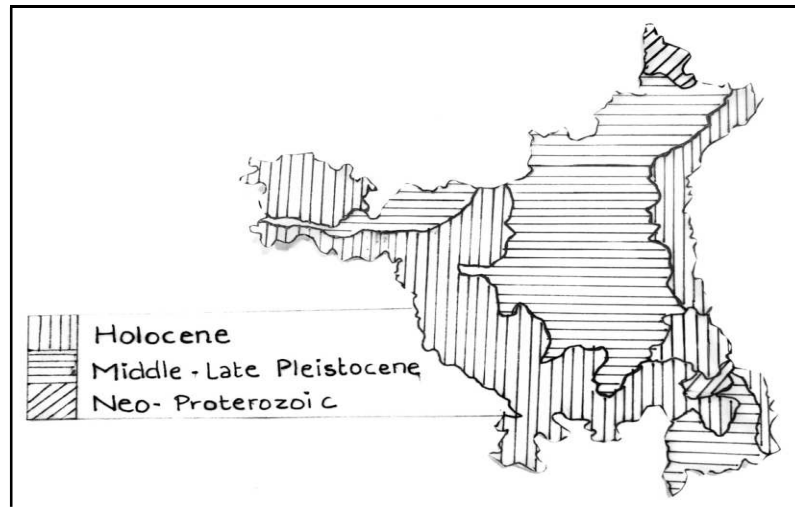


Fig. 12.10: Geology of Indo-Ganga Divide.

12.8.2 Physiography/Relief

This region is of recent origin and formed of sediments brought by Himalayan rivers (Fig. 12.10). The plain is bounded by Malwa (North) of Punjab, Rajasthan desert (South) and Delhi ridge (East). Delhi ridge separates this region from Ganga plains. Height of the plains varies from 200 metres in the southeast to 300 metres in the North. The region has two regional slopes, westward towards Indus river and southward towards Rann of Kachchh.

Main topographic feature of these plains is Bet and is found in Khadar belt. Most of the region is drained by small seasonal streams known as *chos*. The south-western part of the plain is semi-arid and eventually merges into Rajasthan desert.

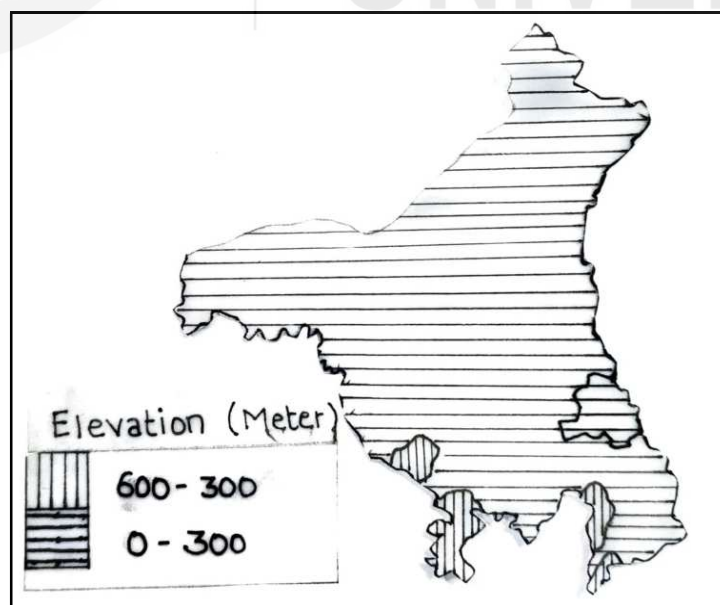


Fig. 12.11: Physiography/Relief of Indo-Ganga Divide.

12.8.3 Drainage and Water Resources

- Rivers**

Main river of the region is **Yamuna**, which originates from Yamunotri, Bandarpooch glacier, in Uttarakhand. Rivers of Indo-Ganga divide region has been shown in Fig. 12.12.

Saraswati river, a small ephemeral stream originating in Siwalik hills and flowing through paleochannel of Yamuna, is tributary of Ghaggar river. **Tangri river**, originating in Shivalik hills, is also tributary of Ghaggar river.

Tangri rises in Morni hills (offshoot of Sivalik hills) and confluences with Markanda river at Haryana-Punjab border north of Sadhpur Viran. **Ghaggar-Hakra river** is an intermittent and seasonal river which is known as Ghaggar before Ottu barrage. **Markanda river**, another tributary of Ghaggar river, flows through Sirmaur, Ambala and Kurukshetra districts.

Some worth mentioning seasonal rivulets of southern Haryana are **Sahibi**, also called Najafgarh drain in Delhi; **Dohan river**, tributary of Sahibi; **Krishnavati river**, former tributary of Sahibi river, and the **Indori river**, the longest tributary of Sahibi river.



Fig. 12.12: Rivers of Indo-Ganga Divide.

- Lakes**

The region is dotted with numerous water bodies of which lakes that deserve special mention including Badkal (now completely dried-up due to mining activities) and Surajkund in Faridabad district, Blue Bird lake in Hisar district, Tilyar lake in Rohtak, Damdama lake in Gurugram, Hathni kund in Yamunanagar, Karni lake in Karnal, Brahma Sarovar and Sannihit Sarovar in Kurukshetra.

- **Dams**

Some of the important dams include Kaushalya dam, Tajewala barrage, and Hathnikund barrage on Yamuna river; Ottu barrage on Ghaggar river and Anagpur dam (Faridabad district).

- **Canal System**

An efficient canal system in the region has enabled this region to become *Granary of India* and *Nucleus of the Green Revolution*. There are 8 major and minor canal systems. These are as under:

1. Western Yamuna Canal: This canal off shoots from right bank of Yamuna river at Tajewala (Haryana) constructed by Feroze Shah III during 14th century and remodelled by the British in 1873. It has a total length of 3229 kilometres along with its distributaries. It irrigates an area of about 4.88 lakh hectares in Karnal, Rohtak, Jind, Sonapat, Ambala, Hisar and Kurukshetra districts of Haryana. Four branches of this canal are Delhi, Sirsa, Hansi, and Butana.

2. Canals of Bhakra-Nangal Project: Bhakra Canal System, largest in the country, is first such project which was completed soon after Independence in 1954. It gets water from Bhakra Dam in Himachal Pradesh irrigating approximately 15 lakh hectares of land covering the districts of Hisar, Rohtak and Karnal of Haryana. Main canal is 174 kilometres long and its length increases upto 3,360 kilometres with distributaries. Nangal canal (64 kilometres long) originates from Nangal dam and acts as a feeder canal to Bhakra canal irrigating about 26.4 lakh hectares of agricultural land in the districts of Karnal and Hisar in Haryana and some parts of Rajasthan.

3. Gurgaon Canal: This canal takes off from river Yamuna near Delhi and provides irrigation facilities to agricultural land in Gurugram and Faridabad districts and some parts of Rajasthan.

SAQ 6

- Write a short note on physiography of Indo-Ganga divide.
 - What is canal system? Describe the canals associated with Bhakra Nangal Project.
-

12.8.4 Climate

The Indo-Ganga divide region has a wide range of meteorological conditions, classified into three types: sub-humid, semi-arid, and arid. This vast geographical area experiences significant seasonal variations in temperature, precipitation, and weather patterns, which influence the region's agricultural practices, ecosystems, and livelihoods.

1. Sub-humid Climate

Parts of the Indo-Ganga divide region have a sub-humid climate, which is distinguished by moderate rainfall and comparatively greater humidity levels than semi-arid and dry areas. The annual temperature in these locations normally ranges from 20°C to 40°C, with fluctuations depending on

topography and proximity to water bodies. The summer months of May and June are hot and dry, with temperatures frequently exceeding 40 Degrees Celsius. Locally known as "loo," these hot, dry winds can be harsh and uncomfortable, interfering with daily living and agricultural activity.

Rainfall is the principal source of moisture in sub-humid locations, and the monsoon season provides much-needed relief from the burning heat. The southwest monsoon normally arrives in July, bringing heavy rain that lasts through August and September. Monsoon rain is critical for replenishing groundwater reserves, nourishing crops, and maintaining ecosystems. However, the irregular nature of monsoon rainfall can occasionally cause floods, especially in low-lying areas and river basins.

Sub-humid regions get relatively pleasant winters, with milder temperatures and occasional rainfall. Western depressions or disturbances may deliver occasional showers during the winter months, adding to the soil's overall moisture content. Winter rainfall is especially useful for Rabi crops like wheat, barley, and mustard, which require enough moisture to germinate, thrive and attain maturity for better production.

2. Semi-arid Climate

Parts of the Indo-Ganga divide region have a semi-arid climate, defined by low rainfall and significant evaporation. These areas get less precipitation than sub-humid zones, resulting in aridity and water scarcity. Semi-arid zones have an annual temperature range comparable to sub-humid environments, but with lower humidity and greater daytime temperatures.

May and June are exceptionally hot and dry in semi-arid regions, with temperatures frequently exceeding 40°C. The prevailing warm breezes enhance the heat, creating pain and thirst in the people. Rainfall is limited and sporadic, falling largely during the monsoon season from July to September. While monsoon rains can bring some respite, they are frequently insufficient to meet agriculture and residential water needs.

The winter months in semi-arid regions are distinguished by low temperatures and little precipitation. Western disturbances may cause intermittent rainfall, although the region remains dry throughout the winter season. Agriculture in semi-arid locations relies largely on irrigation and water management systems to deal with water scarcity and maintain crop productivity.

3. Arid Climate

The most extreme climatic conditions in the Indo-Ganga divide region occur in dry places, when rainfall is scanty and temperatures can be harsh. Arid regions receive little precipitation throughout the year, resulting in desert-like conditions with scanty vegetation and limited agricultural productivity.

The summer months in desert zones are extremely hot, with temperatures frequently exceeding 45°C. The extreme heat, combined with low humidity levels, provides tough living circumstances for humans and presents obstacles for agriculture and livestock husbandry. The low winds further intensify the aridity, bringing pain and health problems for the locals.

Rainfall in desert locations is sparse and intermittent, with rainfall falling during the monsoon season, but in tiny amounts. Western disturbances rarely deliver rain to arid regions, worsening drought and degradation. Agriculture in dry zones is exceedingly difficult, requiring drought-tolerant crops and creative water saving strategies to survive.

The climate of Indo-Ganga divide region varies greatly, including sub-humid, semi-arid, and desert zones. Sub-humid locations receive moderate rainfall and have milder temperatures, whereas semi-arid and arid regions endure water scarcity, high heat, and limited agricultural potential. Understanding the region's different climatic conditions is critical for implementing appropriate water management strategies, agriculture, and climate adaption methods.

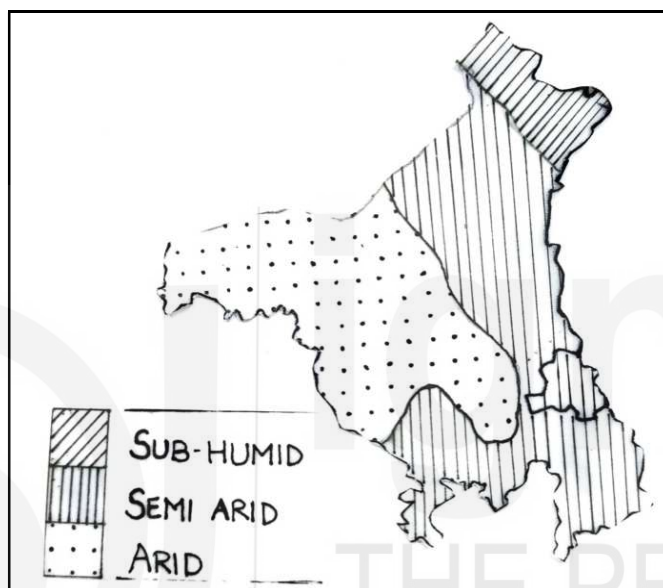


Fig. 12.13: Climate of Indo-Ganga Divide.

12.8.5 Vegetation

The Indo-Ganga split region has a diversified flora, with distinct species of vegetation adapted to the region's varying climatic conditions. From dry deciduous forests to desert vegetation and pockets of tropical moist deciduous forests, this region is home to a diverse diversity of tree species that perform important ecological roles and give vital resources to local inhabitants.

1. Dry Deciduous Vegetation

The northern half of Indo-Ganga split is dominated by dry deciduous woods, which have trees that shed their leaves to store water during the dry season. These forests grow in locations with moderate rainfall and a distinct dry season, adapted to the hard climatic conditions of the region. Shisham (*Dalbergia sissoo*), Kikar (*Acacia nilotica*), and Babul (*Acacia arabica*) are three common tree species found in dry deciduous woodlands. These trees thrive in semi-arid and arid areas along the Indo-Ganga divide due to their deep root systems, which allow them to tap groundwater reserves during droughts. Dry deciduous forests support a varied range of fauna, including deer, antelope, and several bird species, adding to the region's ecological richness and biodiversity.

2. Desert Vegetation

Desert vegetation dominates the western edges of the Indo-Ganga split region, which is adapted to arid and semi-arid settings with little rainfall and high temperatures. Desert vegetation is limited, consisting mostly of drought-tolerant shrubs and xerophytic plants that can withstand extreme desert conditions. Common desert tree species include Khejri (*Prosopis cineraria*) and Babul (*Acacia arabica*), which are well-adapted to the desert's high heat and low water availability. These trees help to stabilise sand dunes, prevent desertification, and provide shade and refuge for desert wildlife. Despite the harsh conditions, desert vegetation maintains an astonishing diversity of life, including desert-adapted species like camels, desert foxes, and a variety of reptiles and insects.

3. Tropical Moist Deciduous Forests

While dry deciduous and desert flora dominate much of the Indo-Ganga split, the north-eastern section contains patches of tropical moist deciduous forests. These forests grow in locations with more rainfall and better climatic conditions, supporting a varied range of tree species and luxuriant vegetation. Common trees in tropical moist deciduous forests include Eucalyptus (*Eucalyptus* spp.), Teak (*Tectona grandis*), and Sal (*Shorea robusta*), among others. These forests are distinguished by their deep canopy cover, lush understory vegetation, and great biodiversity, which provides home for plant and animal species. Tropical moist deciduous forests are important ecosystems that regulate local climate, maintain soil fertility, and provide ecosystem services such as carbon storing, water purification, and pollination.

Overall, the Indo-Ganga divide region has a varied range of flora types, including dry deciduous forests, desert vegetation, and tropical moist deciduous forests. Each of these vegetation types contributes significantly to the region's biological dynamics by providing habitat for wildlife, controlling climate, and sustaining local livelihoods. Conservation efforts to protect the biodiversity and ecological integrity of the region's forests are critical to ensure the long-term viability of this ecologically valuable area. By protecting these unique ecosystems and implementing sustainable land management methods, we can preserve the Indo-Ganga divide region's natural heritage for future generations.

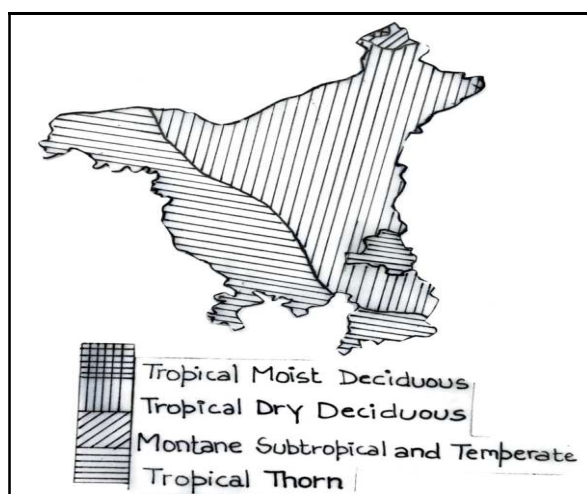


Fig. 12.14: Natural Vegetation of Indo-Ganga Divide.

12.8.6 Soils

The Haryana-Delhi plains, located in north-western India, have a broad range of soil types that influence agricultural productivity, land use patterns, and environmental dynamics. These plains, which are predominantly made up of alluvial soils, vary in soil composition, texture, and fertility across different geographical locations.

1. Alluvial Soil

The major soil type in the Haryana-Delhi plains is alluvial soil, which formed over millions of years as a result of silt deposition transported by rivers such as the Yamuna, Ghaggar, and their tributaries. Alluvial soils are often nutrient-rich and agriculturally suitable, making them ideal for crop cultivation. These soils are distinguished by their fine texture, superior drainage capabilities, and high amounts of organic matter, making them suitable for a variety of crops such as wheat, rice, sugarcane, and legumes. The fertility of alluvial soils varies with proximity to river channels, depth of deposition, and soil management practices.

2. Light Sandy Loams

Light sandy loam soils are common in the southern Haryana-Delhi plains, especially in areas near the Aravalli hills. These soils have a sandy texture, which improves drainage but may result in lower water retention and fertility than alluvial soils. Light sandy loams are ideal for drought-tolerant crops like millets, pulses, and oilseeds, which thrive in drier climates and shallow soils. However, adequate soil conservation and management measures are required to minimise erosion and preserve soil fertility in sandy loam locations.

3. Fertile Red Loam

The western part of the Bangar, a region in the Haryana-Delhi plains, is notable for its fertile red loam soils. Red loam soils have a reddish-brown tint because of presence of iron oxides and organic debris. These soils are extremely productive and well-drained, making them ideal for a wide range of crops such as wheat, barley, cotton, and pulses. Red loam soils are appreciated for their high nutrient content, excellent water retention capacity, and favourable soil structure, all of which contribute to the region's high agricultural output.

4. Limestone and Gravel-rich Soil

The northern and eastern regions of the Haryana-Delhi plains have soils rich in lime and gravel. These soils can vary in composition, with some regions having larger amounts of limestone or gravel deposits. Soils rich in lime and gravel are less fertile than alluvial or red loam soils because they have lower water retention and nutrient-holding ability. However, with correct soil management procedures and amendments, such as addition of organic matter and fertilizers, these soils can be used for agriculture, albeit with some issues regarding soil fertility and structure.

The Haryana-Delhi plains include a varied range of soil types, including fertile alluvial soils, sandy loams, red loams, and limestone-gravel rich soils. Each soil type has distinct qualities, benefits, and drawbacks that influence agricultural techniques, land use patterns, and environmental sustainability throughout the region. Understanding the soil variety of the Haryana-Delhi plains is critical for developing effective soil conservation and land management methods that will ensure the long-term productivity and resilience of this agriculturally vital area.

12.8.7 Physical Resource Base

While the Haryana-Delhi plains region is well-known for its agricultural output, it lacks a strong mineral basis in comparison to the rest of India. However, substantial mineral deposits can be found throughout the region, particularly in places linked with the Aravalli range and districts such as Ambala, Mahendragarh, and Gurugram.

1. Iron Deposits

The southern portion of the Aravalli range, which extends into Haryana, contains considerable iron reserves. These deposits are predominantly concentrated in Ghonta, Dhanoli, and Narnaul. Iron-ore in these places typically has a metal percentage of roughly 57 percent. Despite the presence of these reserves, Haryana's iron ore production is less important than that of other mineral-rich Indian states. Challenges such as poor-grade ore quality, insufficient infrastructure, and environmental concerns may have contributed to the region's low iron-ore production.

2. Limestone Deposits

Haryana is also noted for its abundant limestone deposits, particularly around Ambala and Mahendragarh. Limestone is an important raw material utilised in a variety of sectors, including cement production, construction, and agriculture. The presence of limestone resources in Haryana is a major resource for the local building sector and helps to drive the state's economic development. Ambala and Mahendragarh districts are well-known for their limestone quarries, which extract the mineral for use in cement mills and other industrial applications.

3. Slate Deposits

In addition to limestone, slate deposits can be found in select areas of Haryana, particularly in the Mahendragarh and Gurugram districts. Slate is metamorphic rock known for its strength, adaptability, and aesthetic appeal. Slate quarries in Mahendragarh and Gurugram extract this mineral, which is used in roofing tiles, flooring, cladding, and other construction uses. The presence of slate deposits in Haryana creates prospects for the local construction sector and adds to the state's building material supply chain.

While the Haryana-Delhi plains do not have a mineral base as rich as other mineral-rich regions in India, such as Chhattisgarh or Jharkhand. The presence of iron, limestone, and slate deposits highlights the region's geological diversity. However, sustainable and responsible extraction practices, combined with effective environmental management and regulatory oversight, are required to ensure that mineral exploitation in Haryana is

carried out in a way that minimises environmental impacts while maximising socio economic benefits for local communities.

To summarise, while the mineral resources of the Haryana-Delhi plains are not as abundant as in other parts of India, the existence of iron, limestone, and slate deposits demonstrates the region's geological significance and resource potential. Further exploration, appropriate mining techniques, and strategic development initiatives can help unleash the economic potential of these mineral riches while maintaining environmental sustainability and socio-economic development in the region.

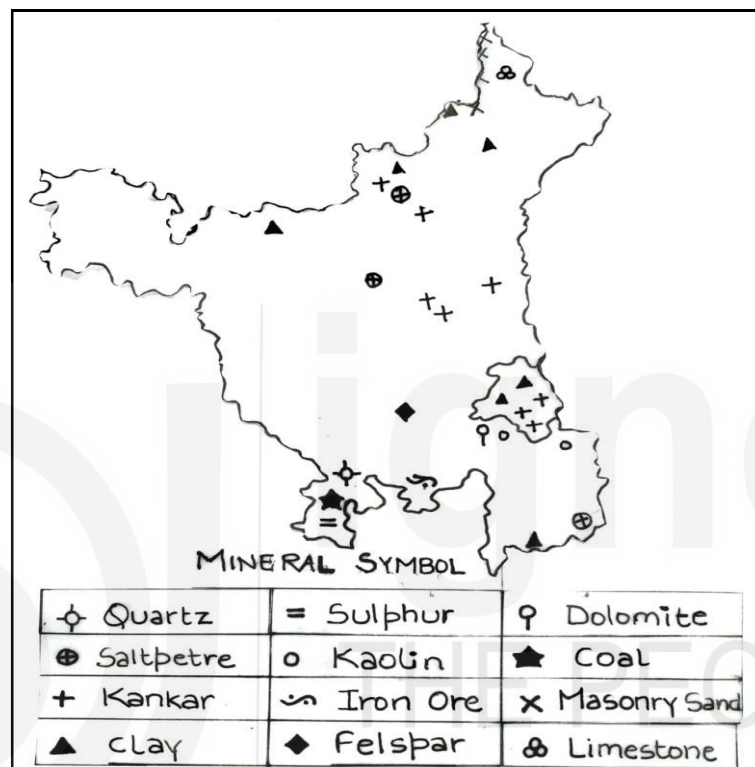


Fig. 12.15: Minerals in Indo-Ganga Divide.

SAQ 7

- Briefly discuss the climatic conditions of the Indo-Ganga divide.
- On the given map show the following minerals – Saltpetre, Kankar, Silica, Potash and Clay.

12.9 INDO-GANGETIC DIVIDE: CULTURAL SETTING

Historical factors have tremendously helped to shape the cultural landscape of Indo-Ganga Divide. Here the cultural setting remained a cradle of both Indian culture and civilisation. It has witnessed the rise and fall of many dynasties including regional, national and international. In such complex cultural web of historical conquests to attain control over the land, politics and natural resources, many kingdoms and dynasties have ruled this heartland.

This meso region of Indo-Ganga Divide has undergone significant political and historical transformations and thus helped to shape the composite culture as seen during contemporary times. Many regional language and ethnic communities have flourished with the passage of time, lending the region a cosmopolitan character.

12.9.1 Population

The Indo-Gangetic divide is among one of the most populated areas receiving more rainfall and has better irrigation facilities. Northern and eastern districts of the region are wetter and richer in sweet and potable underground water than the semi-arid south-western districts. These, therefore, have attracted people to settle throughout history. Delhi, the capital city of the country and one of the mega metropolitan cities in India, lies in this region. Besides, Jagadhri-Yamuna nagar, Faridabad, and Gurugram are important industrial centres of the region.

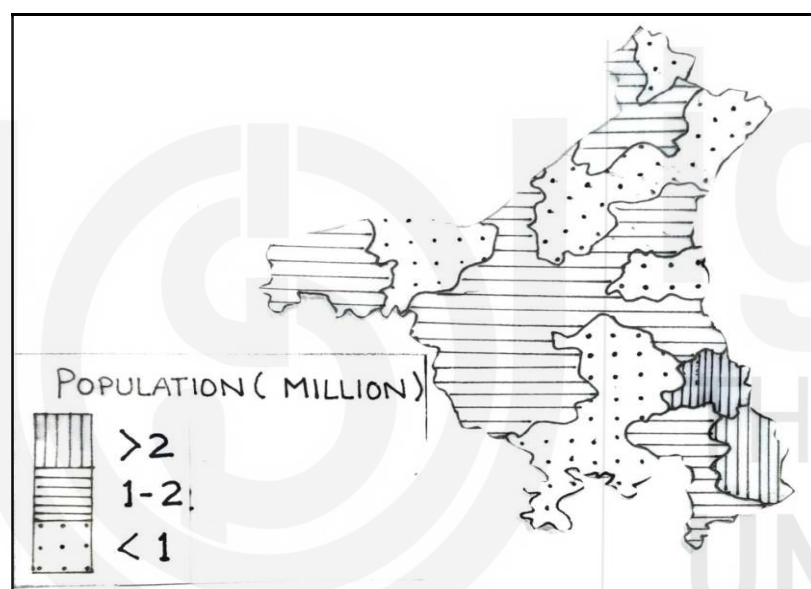


Fig. 12.16: Population of Indo-Ganga Divide.

12.9.2 Settlements

The key characteristics of settlements of few important locations of Indo-Ganga Divide are shown in Table 12.5.

Table 12.5: Settlement Characteristics of Indo-Ganga Divide

Aspects	Descriptions
Delhi	
Site	Delhi is situated at an altitude of 200-250 meters on the banks of the Yamuna river. It is a landlocked geographical region.
Situation	Delhi is located in northern India, serving as a gateway to various neighbouring regions. It is a metropolitan region.
Pattern	It represents diverse and complex settlement pattern due to geographical location and historical factors. Delhi's layout represents key areas like the old town, markets, and important institutions. The layout reflects a blend of historic, traditional,

	planned and modern influences.
Morphology	Delhi's land use is diverse, reflecting ancient heritage structures and modern growth, besides agriculture. It has grown from a walled city to metropolitan city. It includes ancient, densely populated pockets in central parts and planned developments in the newer districts. Significant sites include govt. Institutions, markets, schools, and government buildings. It represents complex and multilayered city landscape.
Haryana	
Site	It lies at varying altitude of 200 metres to 1200 metres. It is bounded by 4 states and 2 union territories on its border. Four states are Punjab, Rajasthan, Uttar Pradesh, Himachal Pradesh, and two UTs are Delhi, and Chandigarh.
Situation	Haryana is located in the northern part of India. It is a landlocked state.
Pattern	The town has seen growth due to development of infrastructure, particularly road and rail networks. Besides, agricultural and industrial development has also led to mushrooming of towns and cities of various sizes. It is witnessing suburban development due to adjoining million plus and metropolitan cities.
Morphology	Haryana features a mix of residential, commercial, and institutional land uses. Its morphology is a reflection of agricultural land use, industrialisation coupled with rising urbanisation and proximity to National Capital Region (NCR). The architecture in Haryana reflects amalgamation of traditional and modern styles, with flat roof brick buildings.

Approximately 35 percent of the population resides in cities and towns (2011). Roughly 65 percent of population is rural in spite of the fact that some large cities of northern India are situated here such as Delhi, Faridabad, Rohtak, Panipat, Hisar, Sonapat and Karnal etc (Table 12.6). The distribution of class-wise towns in Haryana is given in Table 12.7.

Table 12.6: Major Cities

Cities	Population (2011) (in millions)	Category
Delhi	11,007,835	Mega City
Faridabad	1,414,050	Million Plus City
Gurugram	876,824	Class I
Rohtak	373,133	Class I
Panipat	294,150	Class I
Karnal	286,974	Class I
Sonipat	277,053	Class I
Yamunanagar	216,677	Class I
Panchkula	211,355	Class I

(Source: Census of India, 2011)

Table 12.7: Class-wise Distribution of Number of Towns/Cities in Haryana (2011).

CLASSES	HARYANA
Class I (1,00,000 and above)	20
Class II (50,000 to 99,999)	11
Class III (20,000 to 49,999)	45
Class IV (10,000 to 19,999)	34
Class V (5,000 to 9,999)	36
Class VI (Less than 5000)	8
Total	154

(Source: Census of India, 2011)

The wetter northern and eastern areas of the Indo-Gangetic split have traditionally been preferred for habitation due to their pleasant climate and proximity to water supplies. These places have good soil, making them ideal for agriculture, as well as lush foliage and significant groundwater supplies. Throughout the years, different groups and civilisations have thrived in this region, creating a rich tapestry of cultural history and historical landmarks. The availability of irrigation water has been critical in supporting huge populations and a variety of vocations such as farming, trading, and craftsmanship.

12.9.3 Economy

Wheat is the main crop. It is cultivated mainly on irrigated land. Eastern districts of Haryana State are important producers of wheat. It is leading crop of Haryana with 35 percent of cropped area. Productivity of wheat was 2602 kilograms per hectare in 2004-05 which increased to 3057 kilogram per hectare in 2011-12. Gram is grown mainly in semi-arid south-western part of this region. A few showers during winter are enough for successful growth of gram. It is the chief Rabi crop in un-irrigated areas. Hisar and Sirsa districts (Haryana) are important producers accounting for nearly 40 percent of the total gram produced in Haryana. Cotton is another important crop grown mainly in relatively dry but canal-irrigated districts of Sirsa, Hisar and Jind. Rice, the most important crop of Kharif season has more than half of the area covered. Assured irrigation by tube-wells and canals have established paddy as an important crop in the region.

• Dairy

Cattle and dairy products are very important in Haryana-Delhi plain. Cattle and buffalo breeding are subsidiary occupation here. Haryana breed of bulls and Murrah breed of buffaloes are famous in semi-arid south-western districts. Buffaloes of Murrah breed yield relatively large quantities of rich milk which is supplied even to far-off cities namely Mumbai, Kolkata and Nagpur etc. Modern dairy industries for producing milk products have recently been set-up in Rohtak district.

• Irrigation

Alluvial plains of Haryana-Delhi have become prosperous because of tube-wells and canal irrigation. Areas near rivers are served by canals. The region has a high percentage of irrigated area with approximately 90 percent of total

sown area under irrigated in 2016-17. Well irrigation is more prominent in the districts lying along the right bank of Yamuna canal in Haryana.

● Industrial Development

The Indo-Gangetic split region has grown as a major industrial powerhouse, with a varied mix of large-scale and small-scale industries serving to a variety of sectors. The region's large-scale industries include vehicle manufacturing, cotton textiles, sugar production, fertilizers, bicycles, light engineering goods, and paper making.

Cities like Gurugram and Faridabad have emerged as important hubs for automobile and machine tool manufacturing. These cities are home to vast industrial complexes and production operations of major automotive corporations that produce a diverse range of automobiles, components, and machinery for both domestic and international markets. The automobile industry in this region contributes significantly to India's overall industrial production and exports, hence fuelling economic growth and job creation.

Ambala is the largest manufacturer of scientific apparatuses in the region, producing high-quality instruments, laboratory equipment, and research tools for educational institutions, research laboratories, and industries across various sectors. The Indo-Gangetic divide region also supports a thriving ecosystem of small-scale industries.

Overall, the Indo-Gangetic divide region's industrial landscape reflects its various economic activities, with a mix of large-scale manufacturing facilities and small-scale businesses generating growth and innovation in a variety of industries. By creating a conducive business environment, encouraging innovation and technology adoption, and investing in infrastructure and skill development, the region can increase its industrial competitiveness and sustain long-term economic growth.

12.9.4 Transport and Communication

Roadways

Many important routes pass through Delhi. Grand Trunk route passes through Delhi-Karnal and Ambala. Average density of metalled roads in Haryana is 52 kilometres per 100 square kilometres. Some National Highways are Delhi-Amritsar (NH 1), Delhi-Fazilka (NH 10), Chandigarh-Manali (NH 21), and Ambala-Shimla (NH 22). Recently, Kundli-Manesar-Palwal (KMP) Expressway was inaugurated in November 2018. Government has taken measures to improve connectivity and seven major roads in Haryana are to be developed as important National Highways. These roads are:

- Ghaziabad-Noida-Faridabad-Sohna (75 kilometres)
- Nuh-Mandkola-Palwal-Jewar-Bulandshahr (60 kilometres)
- Sohna- Ballabgarh-Tigaon-Gautambudh Nagar-Deota-Sikandrabad (85 kilometres)
- Palwal-Aligarh (83 kilometres)
- Hodal-Bhiruki-Hasanpur-Kashipur-Kushak-Barauli-Ghori-Dadota-Mohna-Arwa-Chandpur-Manjhawali (65 kilometres)

- Faridabad (Kheri Bridge) Jasana-Cheersi- Manjhawali-Atta Gujran-Dankaur Yamuna Expressway (25 kilometres), and
- Kaithal-Pehowa-Kurukshetra-Radaur-Yamuna Nagar (75 kilometres).

Railways

Haryana and Delhi have well-developed railway networks that serve as important transportation routes for both people and freight. The region's major railway centres include Delhi, Ambala, and Rewari, all of which play critical roles in supporting railway operations, passenger services, and freight transit.

Delhi, the national capital, is at centre of the region's railway network, serving as a vital hub for both Northern Railways Zone 1 and the Delhi Metro. Northern Railways Zone 1, headquartered in Delhi, manages railway operations throughout a large geographical area that includes Delhi and its adjacent territories. The city's strategic position and vast railway infrastructure make it an important hub for railway connections in Northern India.

In addition to Delhi, Ambala and Rewari are major railway hubs in the region. Ambala is a key railway junction that connects multiple railway lines and facilitates train movement around the country. Rewari, in southern Haryana, is another key railway hub that helps to connect the region's railways and transportation networks.

Haryana is part of Railway Zone No. 11, often known as the North-western Railway Zone. Although the North-western Railway Zone's divisional headquarters are in Jaipur, Rajasthan, Haryana's railway network is fully integrated into the zone's overall railway infrastructure. This connectivity allows for easy transportation of persons and freight within the state and to neighbouring regions.

Furthermore, the advent and extension of Delhi Metro network has increased the region's public transit alternatives. The Delhi Metro, with its wide network of rapid transit lines, has been expanded to various Haryana cities, including Gurugram, Faridabad, and Bahadurgarh. This extension of the metro system not only enhanced communication between Delhi and Haryana, but it also made travel easier for inhabitants and fostered urban development in these areas.

Airways

Indira Gandhi International Airport (IGI Airport), located in Delhi, is important international airport serving the Indo-Gangetic divide region. IGI Airport, known as one of India's busiest airports, plays an important role in facilitating both international and domestic air travel in managing large amount of passenger and freight traffic on a daily basis.

As the region's primary international gateway, IGI Airport is a significant air transportation hub, linking Delhi to major cities across the world. The airport's broad network of international flights serves a wide range of locations, increasing global connectivity and boosting trade, tourism, and diplomatic connections.

In addition to handling international aviation traffic, IGI Airport is an important hub for cargo operations, facilitating the transportation of products and commerce between India and other worldwide destinations. The airport's cutting-edge cargo facilities and logistics infrastructure allow for efficient freight handling, processing, and transportation, boosting the region's economic activity and trade dynamics.

Furthermore, IGI Airport's strategic location in Delhi has substantially reduced the pressure on other airports in the vicinity, including Chandigarh Airport. IGI Airport's role as a major air transportation hub has helped redistribute air traffic and passenger loads, reducing congestion at smaller airports and improving overall transport availability across the Indo-Gangetic divide region.

In addition to IGI Airport, Haryana is served by domestic airports that handle both passengers and cargo. Domestic airports in cities such as Hisar and Karnal promote regional air connectivity, making air travel more convenient for the state's citizens and enterprises. These airports help to enhance intra-state travel, promote economic development, and improve Haryana's transportation infrastructure.

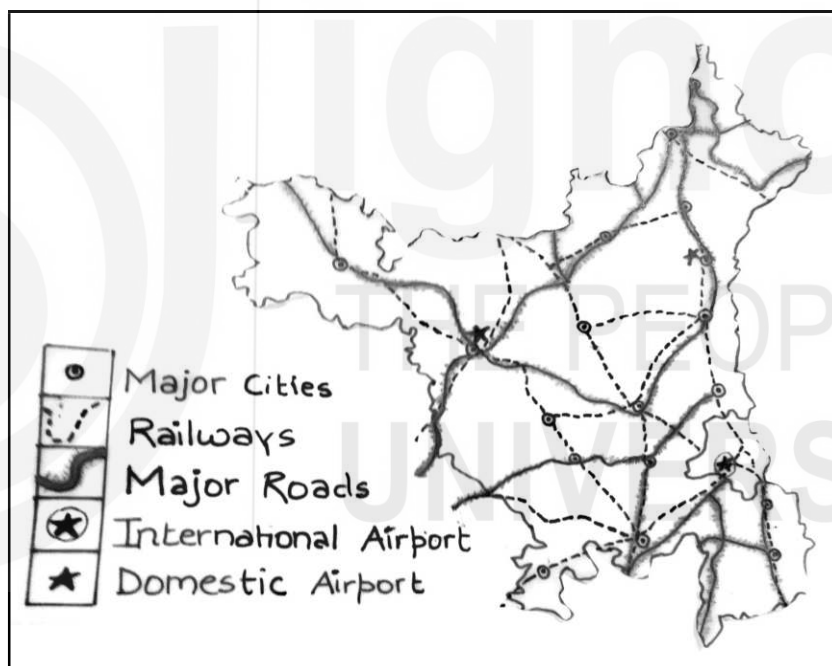


Fig. 12.17: Transport and Connectivity in Indo-Ganga Divide.

SAQ 8

Write a short note on settlement pattern of the lower Ganga delta.

12.10 INDO-GANGA DIVIDE: THE REGIONS

Agricultural researchers and enterprising farmers have ensured a prosperous agriculture in the region. The region produces marketable surplus of foodgrains. Hence, Haryana plain has become *Granary of India*.

At micro level, the region can be divided into following sub-order regions:

(a) Haryana Bagar: This sub-region lies in southern and south-eastern parts of Sirsa, Hisar and Bhiwani districts. Wind-blown sand forms a continuous strip of significant concentration of sand dunes locally known as *Bagar* meaning 'dry country' as the region resembles practically a treeless undulating arid desert.

(b) Bangar Tract: This alluvial plain is remarkably flat in Ambala, Yamuna Nagar, Kurukshetra, Karnal, Kaithal, Jind, Sonapat and north-eastern part of Hisar. Within the alluvial plain are narrow low-lying flood plains, known as *Khadar* of Yamuna, *Nali* of Ghaggar, and *Bet* of Markanda. The old alluvial plain (*Bangar*) at varying depths contains carbonate of lime, usually occurring in nodules called *Kankar*, which are from less than one centimetre to more than 5 centimetres in diameter. On the whole, the *Bangar* region is characterised by patches of saline efflorescence which is the result of mechanical composition of alluvium, gentle slope of land and capillary action during hot dry season.

(c) Southern Haryana Plain: This region comprises of Mahendragarh, Charki Dadri, Palwal, Mewat, Gurugram, Faridabad, Jhajjar, and Rewari districts of Haryana. Aravalli outliers exist in Bhiwani, Mahendragarh, and Gurugram districts. This region is known as *Ahirwal-Mewat* zone on the bases of ethnicity and ecology. Ahirs and Meos are dominant ethnic groups. Ahirwati, Mewati and Braj bhasha are major dialects of people here.

(d) Ambala Plains: These are extremely monotonous horizontal plains with an average elevation of about 200 metres above mean sea level. The plain here descends from Shivalik hills towards south-west. It is fertile plain which is mainly composed of alluvial loam, but is often intercepted by gullies.

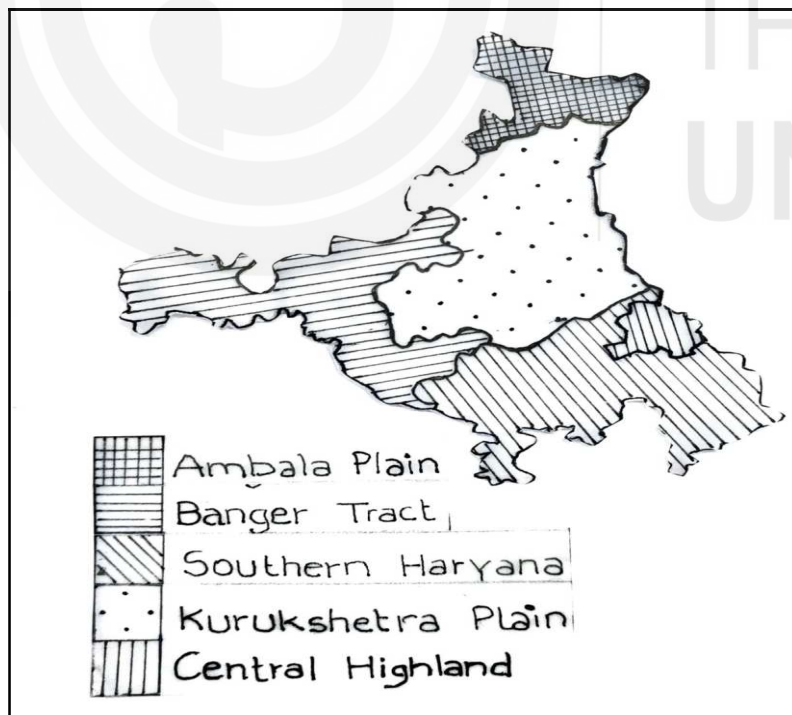


Fig. 12.18: The Regions.

SAQ 9

On the given map show the various micro-regions of Indo-Ganga divide.



12.11 INDO-GANGA DIVIDE: PROBLEMS AND PROSPECTS

The Indo-Gangetic divide region, including parts of Haryana and surrounding states is primarily rural. Over 72 percent of the population is engaged in agricultural pursuits. However, excessive extraction of underground water with the help of irrigation techniques has brought number of problems. It includes salinity, which affects soil fertility, and creates water logging. These problems have affected the agricultural output and also affect the long-term development of the region.

Salinity in soil has become a major concern due to salt deposition caused by irrigation techniques. When water is taken to the agricultural fields, it transports dissolved salts, which keeps on accumulating in the soil with the passage of time. When the water evaporates, the salts remain behind, causing soil salinity. This phenomenon creates a harmful influence on the fertility of soil. In turn, it reduces the crop growth and consequently agricultural yields.

Furthermore, waterlogging has developed as a major issue in several parts of the region. Excessive irrigation, along with inadequate drainage infrastructure, has increased the water table, allowing water to infiltrate through canals and flood agricultural area. Waterlogging not only makes the agricultural land unfit for production, but it also increases soil alkalinity.

In addition to agricultural issues, uneven growth of urbanisation has also created the imbalances in the region's overall growth trajectories. The concentration of growth in specific places has resulted in many issues. Some of the notable ones are inequities in infrastructure development, employment opportunities, and access to key services in the region.

Recognising the need for comprehensive development measures, the Haryana government has launched many programmes to promote balanced regional development and solve significant concerns in the Indo-Gangetic divide region. Several of these initiatives include:

- a) **Development of sector-specific theme parks and sub-cities along the Kundli-Manesar-Palwal (KMP) Expressway:** The goal of this project is

to develop designated zones for various industries and commercial activities along the expressway, hence promoting economic growth and job creation in the region.

- b) **The Delhi-Mumbai Industrial Corridor (DMIC) Project:** It spans roughly across 14 districts of Haryana and aims to create a high-tech industrial corridor between Delhi and Mumbai. This effort is expected to attract investment, stimulate industrialisation, and accelerate regional economic development.
- c) **Establishing an international cargo airport at Bhaini Maharajpur and Bhaini Bhairon villages:** The building of this international cargo airport aims to improve air connectivity, facilitate trade, and stimulate economic activity in the region.

These developmental initiatives demonstrate the government's commitment to support inclusive growth and tackling socio-economic difficulties in the Indo-Gangetic divide region. By investing in infrastructure, industry, and agriculture, these projects hope to harness the region's potential and offer chances for long-term development and prosperity.

12.12 SUMMARY

In this Unit, you have learnt the following:

- The delta of the Ganga and Brahmaputra is an important wetland ecosystem. The lower Bengal Delta is formed by deposition of three main rivers: Ganga, Brahmaputra, and Meghna.
- Flooding is expected in southern parts of the delta region. The deltaic region is undergoing morphological and physiographical changes due to anthropological and natural factors.
- The Lower Bengal Delta covers 14,054 square kilometres and comprises the districts of North 24 Parganas and South 24 Parganas.
- The Ganga and the Brahmaputra carry the most extensive sediments as they originate in the Himalayas and are most significant delta in the world.
- The forest cover of West Bengal is 12,413 square kilometres, accounting for 13.99 percent of the geographical area.
- The region accommodates a population of about approximately 9.13 crores (Census 2011).
- The Ganga-Brahmaputra delta region is vulnerable to climate change, causing a difference in this region's flooding pattern.
- It is a fertile alluvial plain which can be demarcated as a unique geographical unit. Khadar belt is agriculturally valuable as it is drained by many rivers resulting into an extensive canal irrigation system.
- The major rivers in this region are Yamuna and Sirsa, etc. Some of the important dams include the Tajewala barrage and Hathnikund barrage. Canals irrigate nearly 40 percent of net irrigated area in Haryana.
- The climatic condition of this region is sub-humid, semi-arid and arid. Dry, deciduous vegetation with thorny shrubs and bushes dominates the plain.

- It is the most populated region and people here grow crops like cotton, wheat and rice, etc. This region is known for its cattle and dairy products, and industries such as cotton textiles, sugar, fertilizers, locomotive and paper, etc.
- The salinity in the soil, water logging and excessive use of fertilizers and pesticides has degraded the quality of the soil.
- Large-scale industries such as cotton textile, woollen textile, sugar, and small-scale industries like sports goods, handloom and hosiery etc are present in this region.
- This region is divided into micro levels such as the Bangar tract, Haryana bagar, Ambala plain and southern Haryana plain.
- This plain region is well connected with roadways, railways and air networks.
- About 35 percent of the population lives in cities whereas 70 percent lives in rural areas.

12.13 TERMINAL QUESTIONS

1. Write any five common problems that Lower Bengal delta is facing today.
2. Briefly mention drainage and water resources of the Bengal delta region.
3. Discuss the regional scheme of Lower Bengal delta.
4. Explain how soil of the Haryana-Delhi plain affects physical and cultural setting of the region.
5. Write a short note covering both the meso regions:
 - a. Settlement
 - b. Economy
6. What are the challenges and prospects of Indo-Gangetic divide as a meso region?
7. Explain the micro level division of Haryana-Delhi plain.

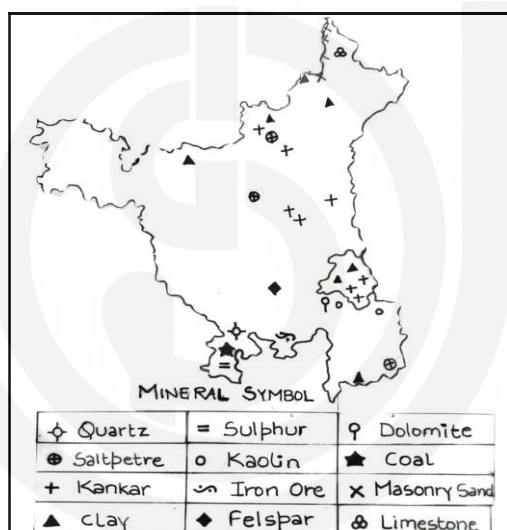
12.14 ANSWERS

Self Assessment Questions (SAQ)

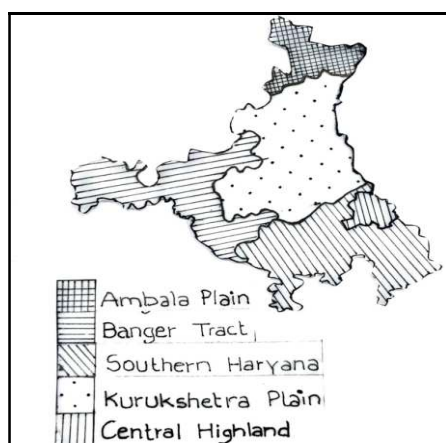
1. West Bengal or Bengal delta region is characterised by diverse and dynamic climate. The prominent one is hot and humid monsoonal climate. It has four well defined seasons as per India Meteorological Department (IMD).
2. Bengal delta region is known to have diverse types of vegetation namely tropical moist deciduous, tropical semi-evergreen and evergreen vegetation along with mangrove and tidal forests.
3. Physical resource base of Bengal delta region is quite diverse. It has mineral resources of coal, fire clay, iron, limestone, manganese, silica, copper, arsenic etc. Raniganj coal field is important mining area and also oldest of India.

4. Population pattern is influenced by topography. Northern regions are sparsely populated as compared to southern region.
5. a) Major industries are located in Hooghly-Asansol-Durgapur district, with first Jute mill of India at Rishra. These are textiles, tea, paper, glass and electronic etc.
b) This region is endowed with all modes of transportation including roadways, airways and waterways.
6. a) Physiography of Indo-Ganga divide is of recent origin formed by sediments brought by Himalayan rivers.
b) Canal systems refer to the passageway to transport water from surplus to deficit regions. Bhakhra Nangal is first and largest canal system of India.
7. a) Climate of Indo-Ganga divide region is characterised by sub-humid, semi-arid and types.
b) Settlement pattern of this region is influenced by pleasant climate and proximity to water bodies.

Map of Saltpetre, Kankar, Silica, Potash and Clay



8. The common settlement patterns found in Bengal delta are mostly liner, semi-linear and clustered. There are marked variations which exist in the settlement pattern of deltaic regions and slightly elevated regions of Bengal delta.
- 9.



Terminal Questions

1. Refer to Section 12.6.
2. Refer to sub-Section 12.3.3.
3. Refer to Section 12.5.
4. Refer to sub-Sections 12.8.6, 12.8.7 and 12.9.
5. Refer to sub-Sections 12.9.2 and 12.9.3.
6. Refer to Section 12.11.
7. Refer to Sections 12.10.

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UNIT 13

MESO REGIONS 3 |

Structure

- | | | | |
|------|---|-------|---------------------------------------|
| 13.1 | Introduction | 13.8 | Malabar Coast: The Physical Setting |
| | Expected Learning Outcomes | | Geology |
| 13.2 | Chotanagpur Plateau: Historical Background | | Physiography/Relief |
| 13.3 | Chotanagpur Plateau: The Physical Setting | | Drainage and Water Resources |
| | Geology | | Climate |
| | Physiography/Relief | | Vegetation |
| | Drainage and Water Resources | | Soils |
| | Climate | 13.9 | Malabar Coast: The Cultural Setting |
| | Vegetation | | Population |
| | Soils | | Settlement |
| | Physical Resource Base | | Economy |
| 13.4 | Chotanagpur Plateau: The Cultural Setting | | Transport and Communication |
| | Population | 13.10 | Malabar Coast: The Regions |
| | Settlement | 13.11 | Malabar Coast: Problems and Prospects |
| | Economy | 13.12 | Summary |
| | Transport and Communication | 13.13 | Terminal Questions |
| 13.5 | Chotanagpur Plateau: The Regions | 13.14 | Answers |
| 13.6 | Chotanagpur Plateau: Problems and Prospects | 13.15 | References and Further Reading |
| 13.7 | Malabar Coast: Historical Background | | |

13.1 INTRODUCTION

Chotanagpur Region marks the northern part of Eastern Plateaus, which itself is the north-eastern region of Peninsular plateau. There is difference of opinion regarding the delimitation of Chotanagpur region. R. L. Singh (1971) delimits Chotanagpur between 22°0'-25°30' north latitudes and 83°47' - 87°50' east longitudes covering an area of 86, 239 square kilometres, which incorporates the present state of Jharkhand and Purulia district of West Bengal. While the physiographic map of National Atlas includes the eastern margins of Chhattisgarh, the monograph on Economic Regionalisation of

India (Census of India) includes parts of northern hills of Odisha. S. P Chatterjee considers the region coterminous with the current state of Jharkhand. We have adopted Chotanagpur region as delineated by R. L. Singh (Fig. 13.1).

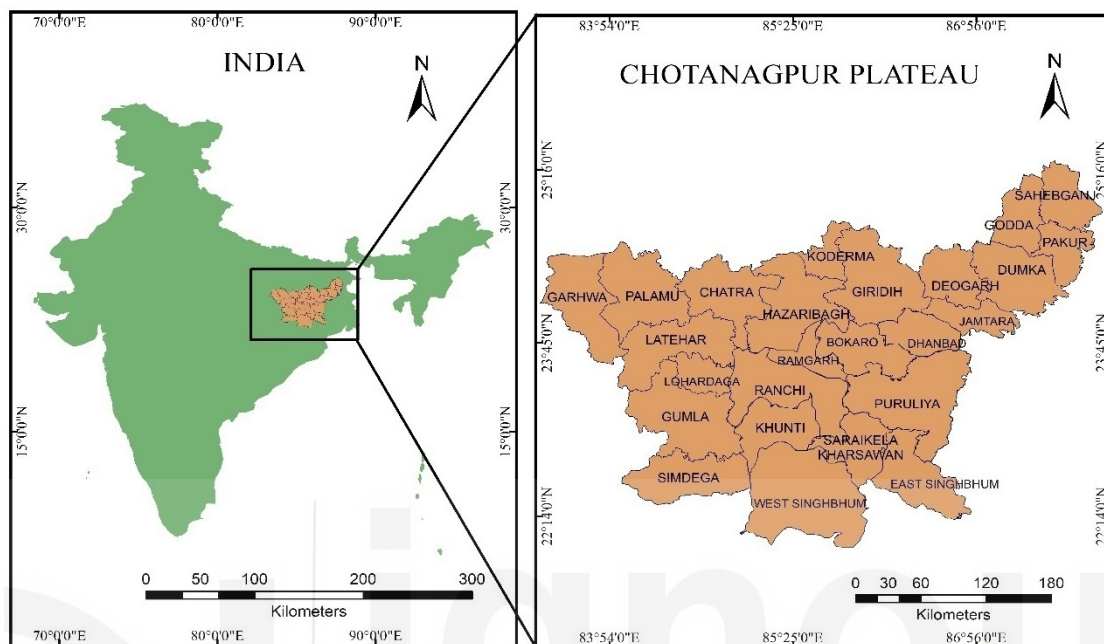


Fig. 13.1: Location Map of Chotanagpur Plateau Region.

Chotanagpur is surrounded by South Bihar plains in the north, Bengal basin in the east, Utkal plains in the southeast, Garhjat hills in the south, Upper Mahanadi basin in the southwest, Baghelkhand plateau in the west and Vindhyan Scrap Lands in the northwest. Surrounded by plains, river basins and hills, Chotanagpur region stands out as a distinct natural entity of predominantly uniform plateau topography with varying elevations. These variations are clearly displayed in its different regional units of Palamau uplands, Hazaribagh plateau, Damodar valley, Santhal Pargana uplands, *Pat* land, Ranchi Plateau, Singhbhum, and Manbhum (Puruliya) plains. The distinctiveness of the region is also manifested in its cultural as well as political characteristics. Chotanagpur has been the homeland to several aboriginal tribal communities since time immemorial such as Santhal, Ho, Kharia, Munda, and Oraon to name a few. Until the colonial interventions into the region with the desire to exploit its extremely rich mineral and forest resources, the tribes enjoyed almost complete exclusive rights of their homeland. Since then and particularly after Independence and subsequently after the formation of Jharkhand as a separate state (15 November, 2000), coinciding by and large with the natural margins of Chotanagpur, the region has been experiencing rapid changes in every sphere of its life.

The Malabar Coast region is a tiny stretch of coastline on India's south western coast. It is one of the wettest areas in south India. Spices, coir, and coconuts grow abundantly along the Malabar coast. The region has attracted both traders and tourists from within and outside the subcontinent, including China, Mesopotamia, Egypt, Greece, Rome, Jerusalem, Persia, and Arabia since time immemorial (Singh, 2014). The region comprises of all districts of Kerala, and Heggadadevankote *taluk* of Mysore, Mangalore, Bantval, Puttur,

and Sulya *taluks* of Dakshina Kannada, Madikeri and Virajpet *taluks* of Kodagu districts of Karnataka, and Panthalur, Gudalur, Udagamandalam, Coonoor and Kundah *taluks* of The Nilgiris, and Vilavancode, Kalkulam and Agastheeswaram *taluks* of Kanyakumari districts of Tamil Nadu (Fig. 13.2 (a) and (b)).



Fig. 13.2 (a): Location and Extent of Malabar Coast.

(Source: Singh, 2014)

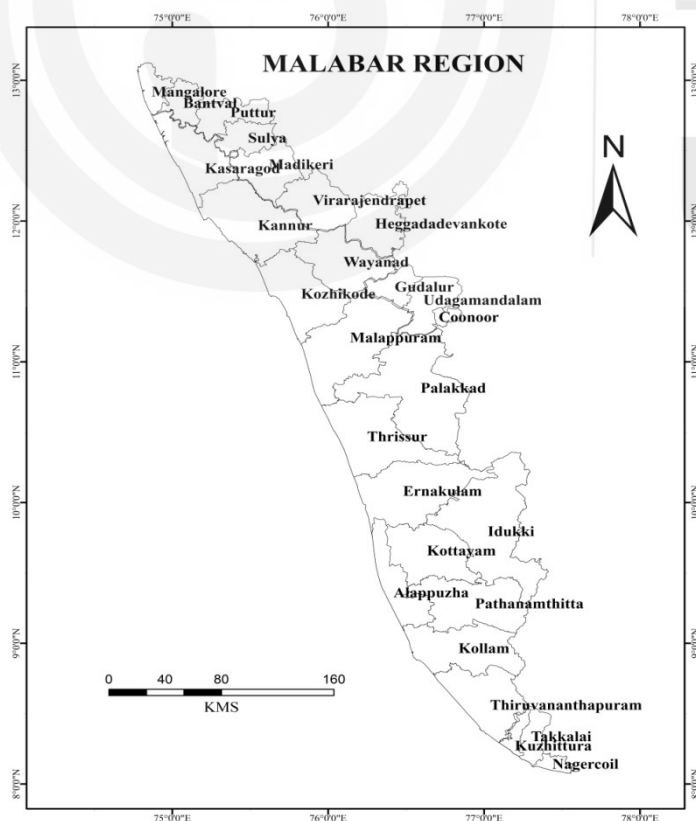


Fig. 13.2 (b): Location and Extent of Malabar Coast.

(Source: Census of India)

Sections 13.2 to 13.6 are devoted to the study of historical background, physical setting, cultural setting, and the regions along with problems and prospects of Chotanagpur plateau and Malabar coast.

Expected Learning Outcomes

After studying this Unit, you should be able to:

- examine a brief history of Chotanagpur plateau and Malabar coast regions;
- describe the nature of physical setting of Chotanagpur plateau and Malabar coast regions;
- describe the nature of cultural setting in Chotanagpur plateau and Malabar coast regions;
- explain the regions of Chotanagpur plateau and Malabar coast; and
- comprehend the problems and prospects of Chotanagpur plateau and Malabar coast regions.

13.2 CHOTANAGPUR PLATEAU: HISTORICAL BACKGROUND

As mentioned above, Chotanagpur plateau with its rugged topography and dense forest cover, provided refuge to the ancient hunters and gatherers. The agriculturally not so suitable ecological setup of the region was avoided by all the major dynasties. Until the beginning of the colonial era, the large scale agricultural economies of the surrounding plains displayed no economic interest on the resources of the region. This densely forested plateau lying between Rohtas in the west, Panchet hill in the east, and Ratanpur in Central India extending up to the borders of Odisha in the south was known as Jharkhand (jungle land) or Kokrah during the Moghul period. The region was loosely annexed by the Moghuls, whose interest remained confined to the tributes from the small princely states, namely Ramgarh, Kharagdiha, and Kendy etc., and the diamond mines of the region. The East India Company acquired Diwani rights from Sha Alam II in 1765. Gradually, effective and larger control over the region was obtained through the 1772 invasion of the region by Capt. Camac, followed by construction of roads connecting Patna to Chotanagpur and systematic survey of the region that revealed vast reserves of coal, iron and other mineral resources. This revelation prompted the colonial authorities to create road and subsequently rail infrastructure with the purpose of exploiting the large mineral and forest resources of the region. Consequentially, the region experienced unprecedented socio-economic, cultural, demographic and administrative transformation.

13.3 CHOTANAGPUR PLATEAU: THE PHYSICAL SETTING

13.3.1 Geology

"The structural base of the region is provided by a series of batholithic intrusions of granite into Dharwar strata, which was intensely metamorphosed

by orogenetic movements. The earliest floor, on which the Dharwars were deposited, has not been recognised anywhere since it was subsequently metamorphosed" (Singh, 1970, 14). Being part of the Peninsular block, Chotanagpur happens to be geologically a highly stable plateau mostly covered with granite and gneiss rocks.

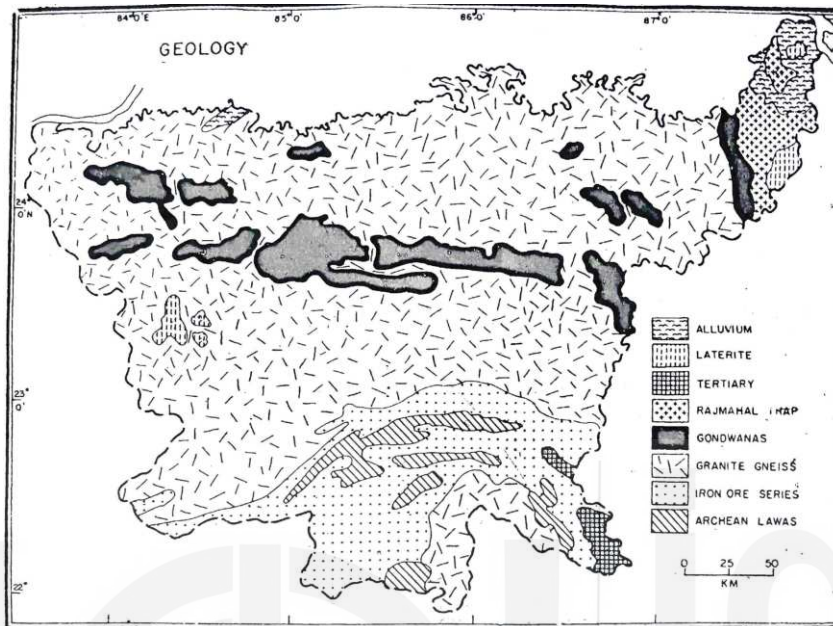


Fig. 13.3: Geology Map of Chotanagpur.

(Source: India: A Regional Geography by Singh, R. L. Reprint, 2010)

The Dharwar (phyllite, mica-schists etc.) rocks protrude in the northern and southern margins and are manifested in the iron ore and Kolhan series of Singhbhum district. Besides, the Archaean lava flows are marked in the Dalma Range. Penetration of the ancient fold mountains extends east-west across north Singhbhum and south Ranchi, and into north Dhalbhum and south Manbhum. The great shear or thrust zone runs approximately ENE-WSW and E-W for nearly 100 miles turning S-E near the eastern end. There are two other thrust zones to the north of the great shear zone running almost parallel to each other. The Gondwana rocks of Damodar valley are made up of sandstones of great thickness with some slate and clay. The *Pat* land on the western margin is covered with Deccan trap which is converted into laterite and bauxite due to weathering. Rajmahal hills in north-eastern fringe of the plateau are also covered with lava, which were probably linked with the initiation of the Himalayan orogeny. Rajmahal Traps consist of dolerites, basalt and andesites.

13.3.2 Physiography/Relief

The relief of Chotanagpur is marked with a series of plateaus descending in elevation in all directions from mid-western *Pat* land, particularly towards the east. With an average elevation of about 1,100 metres, the *Pat* lands reach the maximum elevation of 1365 metres at the Parasnath hills. To the west, the plateau merges into the plateau in the Surguja district of Chhattisgarh. General slope of the plateau is in north and southeast directions. To the east of the *Pat* land, Ranchi plateau which is the largest of all the plateaus of Chotanagpur is separated from Hazaribagh plateau by Damodar trough. Both

Ranchi and Hazaribagh plateaus have the same general elevation of 600 metres. The slope of Chotanagpur plateau is marked with sharp breaks distinguishable by steep scarps where the river courses are interrupted by waterfalls. Chotanagpur plateau descends abruptly with similar scarps and waterfalls towards Manbhum plain in the east and Chaibasa plain in the southeast. Baghmundi Highland tract with a similar elevation of 600 metres is separated from Ranchi plateau by the Subarnarekha river. South of Chaibasa Plain lies lower dissected upland of Kolhan and Porhat regions.

Subscribing to Dunn's proposition, most scholars suggest that the varying successive levels from *Pat* land to Chaibasa plain and Manbhum plain are the products of three successive uplifts of the same peneplain. The first upliftment that took place in early Tertiary times created the highest *Pat* region, followed by block-upliftment of the central Ranchi plateau and higher *Pat* during the Late Tertiary period leaving the original peneplain marked by the Chaibasa and Panch-Pargana (stretches from the south-eastern Ranchi District to some parts of West Singhbhum, Saraikela-Kharsawan and Puruliya districts) plains at the original level. The last upliftment was in the nature of a tilt so that there is no steep scarp on the outer edge of Chotanagpur.

North of Damodar trough lies Hazaribagh plateau with similar features and elevation like Ranchi plateau and is encircled by Kodarma plateau which has a lower (300 metres) general elevation and is bordered by steep scarps in the north but slopes gradually to the east. To the northwest of Hazaribagh Plateau and west of Kodarma plateau lie Palamau plateau which has highly broken relief similar to the southern dissected portion of Ranchi plateau.

North eastern part of Chotanagpur plateau is the Rajmahal Highlands comprising a chain of level lava plateaus and sculptured hills interrupted with valleys and undulating divided surface with a general elevation of 300 to 450 metres. The Permo-Triassic trough fault in-between the two main plateau blocks is drained by Damodar river. The trough exhibits a variety of topography characterized by sandstone hills such as the Panchet and Mahudi, Ramgarh Peneplain, steep sided scarps on both banks of the river and scarp edge interfluvies between pairs of rivers.

SAQ I

Chotanagpur plateau is mostly covered with which rocks.

13.3.3 Drainage and Water Resources

Chotanagpur plateau is the source region to a number of rivers and streams which exhibit different drainage patterns and drainage densities. These have a highly fluctuating regime with continuous flow only during the monsoon season. Among all, South Koel, North Koel, Subarnarekha, Damodar and Barakar rivers have developed extensive drainage basins.

Ajai, Mor, Brahmani, Gumani and several other smaller rivers draining Rajmahal Highlands flow into West Bengal Plain. A number of small rivers and streams such as Punpun, Phalgu, Sakri and Kiul flow into the South Bihar

Plain. Damodar is the most important and largest (592 kilometres) river of Chotanagpur plateau of which Barakar is the major tributary.

Flowing over the flat plateaus, rivers of Chotanagpur plateau exhibit youthful characteristics marked by steep-sided narrow valleys and gorges. The river courses are also marked by several rapids and waterfalls. Some of the prominent waterfalls are Gautamghagh (36 metres), Ghaghri (42 metres), Burhaghagh (40 metres), Sadnighagh (60 metres) in the *Pats*; Handru (73 metres), Johna, Dasam (39 metres) and Hirni (37 metres) in Ranchi plateau; Motijhara (45 metres) in Rajmahal hills; and Kakolat (24 metres) in the Hazaribagh plateau.

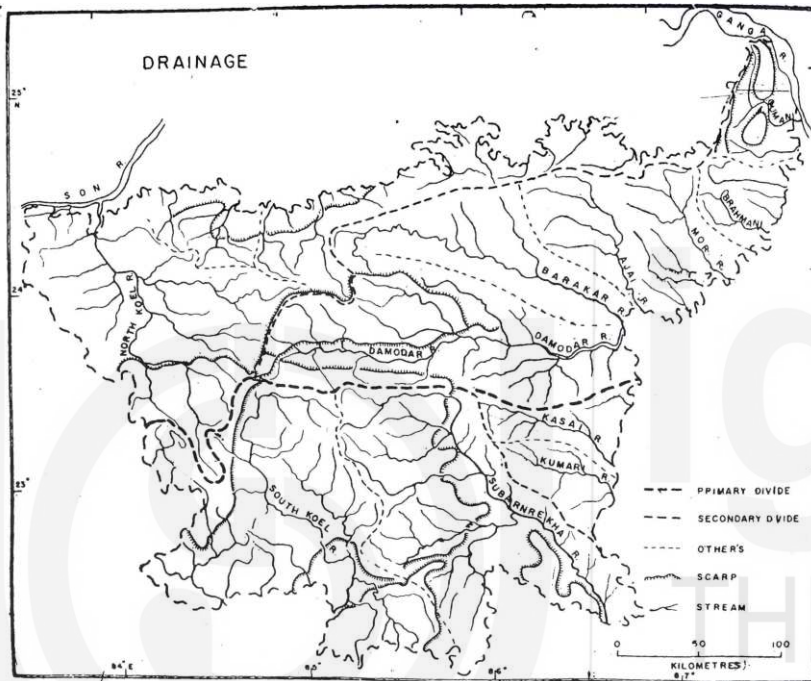


Fig.13.4: Drainage Map of Chotanagpur.

(Source: India: A Regional Geography by Singh, R. L. Reprint, 2010)

Drainage pattern of most rivers of the plateau is dendritic, which signifies lesser structural control despite the varying character and hardness of the plateau surface on which these are flowing. Nevertheless, there are several other patterns depicted by individual rivers. For example, Damodar river flowing in a trough, displays a variety of trellis pattern. Sankh river displays a barbed drainage pattern as its tributaries join it in 'boathook bends'. The higher plateau surfaces of the *Pats*, Ranchi plateau and Hazaribagh plateau have developed radial pattern. 'Angulate' pattern has developed in the Palamau plateau due to the joints in the granite-gneiss areas.

Drainage density of the rivers also varies from 65-95 kilometres in the Subarnarekha and South Koel basins to 35-65 kilometres per 250 square kilometres in the North Koel and Damodar basins. Drainage density is lowest in the Rajmahal Highlands.

SAQ 2

What is the drainage pattern of most of the rivers of Chotanagpur plateau and what does it signify?

13.3.4 Climate

Chotanagpur plateau has a typical monsoonal climate. Temperature starts rising and remains between 29°C to 32°C in May-June. Consequentially, low-pressure conditions develop in the north-eastern part of the plateau attracting wind from the west at 9.6 to 14.4 kilometres per hour. Temperature remains high all through this period, with intermittent respite caused by Norwester or KalBaisakhi rainfalls.

With the onset of south west monsoon, temperature as well as wind velocity gradually starts decreasing. By July-August, the seasonal trough of low pressure shifts south from its earlier location over Ganga plain and settles over the plateau. Moisture bearing winds blowing from the east and southeast cause heavy rainfall accounting for almost 80 percent of the annual rainfall during this season spread over June to October. The region receives an annual average rainfall ranging between 100 to 150 centimetres with notable spatial variations. Although, rainfall gradually decreases from south to north and from east to west, rainfall distribution in the region is significantly affected by the relief. Higher areas such as Netarhat in the *Pats*, Ranchi, Hazaribagh and Dhanbad generally receive much higher rainfall despite their inner location, with Netarhat in the lead. Contrarily, Chaibasa plains lying in the south eastern fringe with a much lower elevation of 300 metres, receives lower rainfall, and Puruliya is a drought prone area with high evaporation and low precipitation.

During winter months of November to February, low velocity winds of four to six km/ph blow from the northwest. The north western disturbances bring mild rains to the region during this season. Winters on the plateau are marked with bracing sunny days with relatively less muggy conditions. Although the mean temperature remains around 23°C during December, higher elevations experience as low as 16°C to 17°C. On the whole, the plateau experiences a pleasant climate all through the year excepting at lower levels during the summers of April and May.

SAQ 3

During which months/season Chotanagpur receives maximum of its rainfall?

13.3.5 Vegetation

The Plateau displays three categories of natural vegetation, such as (i) Dry Deciduous Forests; (ii) Dry Peninsular *Sal*; and (iii) Moist Peninsular *Sal*. The two hundred odd years of interventions have of course caused much depletion of the natural flora of the region excepting in inaccessible areas.

Dry deciduous forests are characteristics of river valleys of Hazaribagh Plateau and adjoining areas where annual average rainfall is lower than 125 centimetres. Important species of trees of this part includes *Amaltas*, *Semal*, *Harra*, *Khair*, *Palas*, *Mahua*, and *Asan* etc. along with bamboo and Sabai (*Kus*) grass. Flat plateau surfaces are mostly covered with grass.

Dry Peninsular *Sal* is a common variety of Hazaribagh plateau, lower Palamau and *Pat* lands. It is also seen in scattered patches over Ranchi plateau, and in Singhbhum and Puruliya districts. *Sal*, bamboo and catechu (*Katha*) are also common varieties of these forests.

Moist Peninsular *Sal* forests yield valuable timber from Teak, *Sal*, *Mahua*, *Kusum*, *Asan*, *Piar*, *Khair*, *Gambar*, *Anjan* and *Karjan* trees. These varieties are mostly found in Singhbhum district accompanied by bamboo and grass. Teak is however, the least prominent specie, confined to Saranda and Kolhan areas.

13.3.6 Soils

Chotanagpur plateau is mostly covered with red soils formed out of the gneiss and granite bed rocks. At certain locations, these soils are black in colour due to presence of highly ferruginous biotite and hornblende. These are rich in potash and lime but deficient in nitrogen, phosphoric acid and humus. Damodar valley, the *Pats* and lava surface of Rajmahal hills however, are distinctly different from this general pattern of soil distribution over the Plateau, with loose sandy soils, high level laterite, *regur* and laterite soils respectively. While the *regur* of Rajmahal hills is highly fertile with siliceous matter, kaoline, potash, magnesia and iron oxides, the laterite soil of *Pats* and Singhbhum is infertile. Overall, the depth and fertility of the soil of Chotanagpur plateau vary according to topography and rock constituents.

13.3.7 Physical Resource Base

Chotanagpur is well endowed with physical resources, particularly forests and minerals and is called the 'Ruhr of India'. However, with respect to land resources, Chotanagpur poorly matches with neighbouring plains of Bihar, Odisha and West Bengal. Excepting in river valleys and depressions, the soil cover is thin and infertile. Due to lack of proper irrigation facility, double cropping is highly limited. However, large tracts of cultivable wastes assure great scope for expansion of land under cultivation.

Despite depletion of the vegetative cover due to indiscriminate exploitation, mineral extraction and overgrazing, Chotanagpur contributes a significant proportion of the forest resources of the country. Singhbhum valley has considerable reserves of good quality timber such as *Sal*, teak, *asan*, *karam*, *kath* and *gamhar*. Large quantities of sabai grass are also obtained from Singhbhum district. Forests of Palamau district provide much of bamboo used in preparing paper pulp in the country. Other districts with rich forest reserves are Ranchi and Hazaribagh. More than two-third of the *lac* (sealing wax) production of the country comes from Chotanagpur.

Chotanagpur is one of the richest mineral reserve regions of India. It contributes cent per cent of copper and apatite production, and significant proportion of a few more minerals of India. Gondwana rocks of Damodar valley starting from Hutar fields in the west to Jharia fields in the east, and other fields in Daltonganj and Giridih contain good quality bituminous coal accounting for almost 80 percent known coal deposits in the country. Iron Ore Series of Dharwars in Kolhan area of Singhbhum district contain haematite

having more than 60 percent iron content. These occur in two narrow horse-shoe like parallel ridges of which the western side is known as the 'Iron Ore Range'. Limestone extracted from the districts of Palamau, Hazaribagh, Ranchi and Singhbhum have given rise to several cement factories in the region. Nearly 128 kilometres long and 32 kilometres wide belt in the northern fringe of Kodarma Plateau provides a large source of mica. A discontinuous 130 kilometres belt in Singhbhum district from Duarpuram near Chakradharpur through Kharsawan, Turandih, Rakha, Musabani and Bahargora is the only source of copper in the country. Parts of *Pat* land area of the western parts of Ranchi and Palamau districts, provide bauxite. It is mined near Lohardaga and transported to Muri for processing into alumina. Besides, Chotanagpur has rich reserves of asbestos, byrites, chromite, kyanite, steatite and uranium. With excellent combination of many important minerals, the Chotanagpur region has given rise to the Damodar Valley Industrial Complex, where several ferrous and non-ferrous metallurgical industries and thermal power plants have emerged. The hydro-electricity generated through the Damodar Valley Project not only supports the industrial processes of the region but also transmits power to neighbouring industrial centres of West Bengal and Uttar Pradesh. Occurrence of several important minerals, like iron ore, limestone, copper and bauxite etcetera along with ample thermal and hydro-electric power resources, provides unique opportunity for the economic progress of the region.

SAQ 4

- What types of vegetation are found in Chotanagpur region?
 - Which soils in Chotanagpur are rich in potash and lime but deficient in nitrogen, phosphoric acid and humus?
-

13.4 CHOTANAGPUR PLATEAU: THE CULTURAL SETTING

The mineral rich region of Chotanagpur, is equally rich in its diverse tribal cultures. Prominent tribal communities like the Santhals, Mundas, Oraons, Hos, and Kharias have a rich cultural heritage and maintain distinct languages, traditions, customs, and social practices. Their close connection to nature is reflected in their festivals, dance, music, and rituals. The tribal festivals, such as Sarhul, Karma, and Sohrai, are celebrated with great enthusiasm. Tribal art forms, including painting, pottery, wood carving, and metal works, have attracted attention worldwide due to their uniqueness and aesthetic appeal. The handicrafts of the region, such as Dokra (metal casting) and Paitkar paintings, are famous for their intricate designs and cultural significance. Languages spoken by the tribes, vary according to their tribal identity, as most of the tribal communities have their own dialect. The Santhali language has been included among the Scheduled Languages of India. Of late, however, most of them are acquainted with and can speak Hindi. Some of dialects of minor tribes have started dying due to gradual decrease in the number of speakers, or language shift. Economy of the region is centred around agriculture, forests, and mining activities.

13.4.1 Population

The population of the Chotanagpur (Jharkhand) has increased steadily from only 14,324,421 persons in 1961 to 35,918,249 persons in 2011 respectively. However, due to terrain conditions and forest cover, population is highly unevenly distributed. Its average density was 436 persons per square kilometres (2011), which compares very poorly with that of 1,106 persons per square kilometres in Bihar. Much of the population is concentrated in comparatively level portions of Hazaribagh and Ranchi plateaus, Rajmahal hills and Singhbhum plain, and lower portions of Damodar valley including Puruliya district (Fig. 13.5). Lower Damodar valley with greater urban-industrial activities has attracted great influx of population making it the most densely populated part of Chotanagpur.

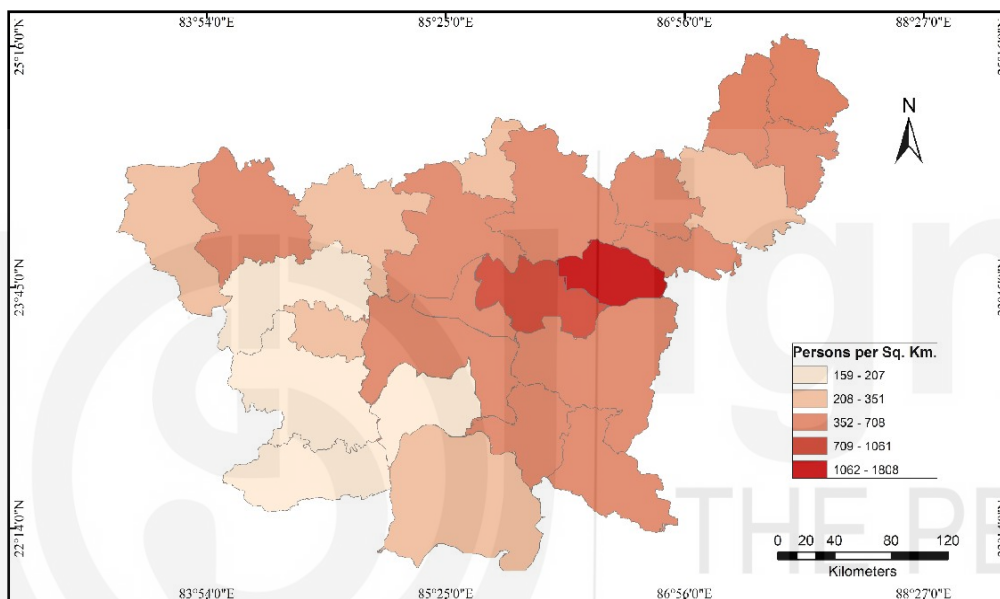


Fig. 13.5: Chotanagpur Plateau - Density of Population (2011).

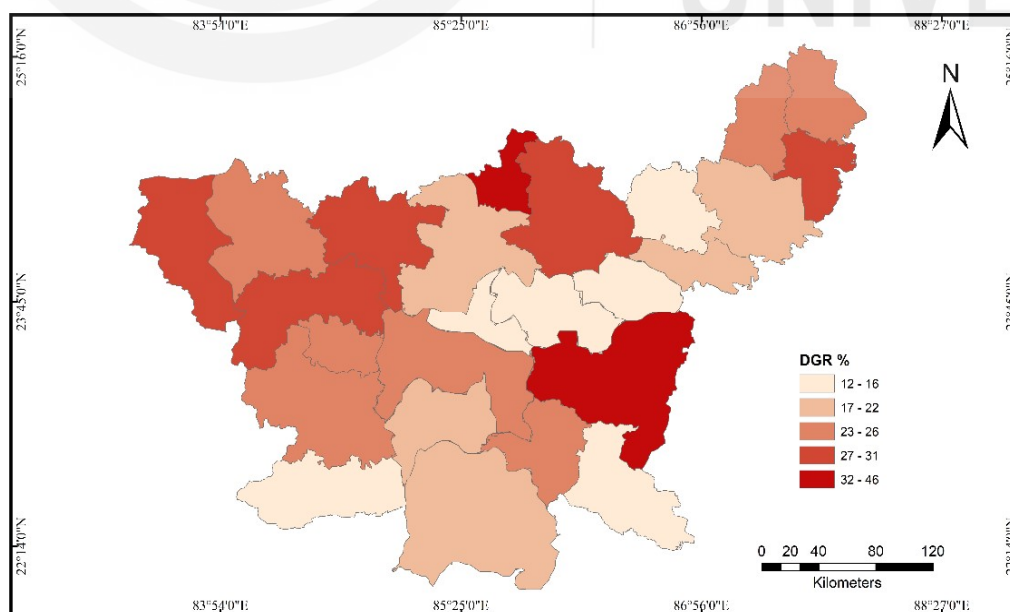


Fig. 13.6: Chotanagpur Plateau - Decadal Population Growth Rate (2001-2011).

Table 13.1: District-Wise Population Characteristics (2011).

Sl. No.	Districts/Region	Total Population	Percent to Region's Total Population	DGR (2001-2011)	Pop. Density (per km ²)	Sex Ratio		Literacy Rate		
						Total	Child	Total	Male	Female
1.	Garhwa	1,322,784	3.68	27.75	327	935	960	60.33	72.19	47.58
2.	Chatra	1,042,886	2.90	31.77	280	953	967	60.18	69.92	49.92
3.	Kodarma	7,16,259	1.99	43.42	282	950	949	66.84	79.78	53.23
4.	Giridh	24,45,474	6.81	28.41	493	944	942	63.14	76.76	48.72
5.	Deogarh	14,92,073	4.15	28.03	602	925	950	64.85	76.85	51.80
6.	Godda	13,13,551	3.66	25.35	580	938	960	56.40	67.84	44.14
7.	Sahibganj	11,50,567	3.20	24.01	588	952	960	52.04	60.34	43.31
8.	Pakur	9,00,422	2.51	28.33	514	989	975	48.82	57.06	40.52
9.	Dhanbad	26,84,487	7.48	12.00	1608	909	916	74.52	83.81	64.29
10.	Bokaro	20,62,330	5.74	16.01	1061	922	923	72.01	82.51	60.63
11.	Lohardaga	4,61,790	1.29	26.68	307	985	970	67.61	77.41	57.69
12.	Purbi Singhbhum	22,93,919	6.39	16.73	572	949	923	75.49	83.75	66.81
13.	Palamau	19,39,869	5.40	26.17	475	928	945	63.63	97.97	96.48
14.	Latehar	7,26,978	2.02	29.61	169	967	968	59.51	69.97	48.68
15.	Hazaribagh	17,34,495	4.83	20.62	488	947	933	69.75	80.01	58.95
16.	Ramgarh	9,49,443	2.64	13.10	708	921	927	73.17	82.44	63.09
17.	Dumka	13,21,442	3.68	19.42	351	977	966	61.02	72.96	48.82
18.	Jamtara	7,91,042	2.20	21.10	454	954	954	64.59	76.46	52.15
19.	Ranchi	29,14,253	8.11	24.00	572	949	938	76.06	84.26	67.44
20.	Khunti	5,31,885	1.48	22.32	207	997	964	63.86	74.08	53.69
21.	Gumla	10,25,213	2.85	23.16	191	993	963	65.73	75.55	55.90
22.	Simdega	5,99,578	1.67	16.58	159	997	969	67.99	76.08	59.92
23.	Paschim Singhbhum	15,02,338	4.18	21.75	279	1005	983	58.63	71.13	46.25
24.	Sarikela Kharsawan	10,65,056	2.97	25.47	573	956	943	67.70	79.03	55.88
25.	Puruliya	29,30,115	8.17	15.52	468	957	953	64.48	77.86	50.52
Chotanagpur		35,918,249	100.00	21.90	436	949	948	66.25	76.92	55.00
									Gap - 21.92	

(Source: Census of India, 2011)

Although, the average population growth rate of the region remained below or nearer to the National average during the first four decades after Independence (1951-61 - Region 17.57 percent/Nation 21.51 percent; 1961-1971 - Region 23.91 percent/Nation 24.80 percent; 1971-1981 - Region 22.97 percent/Nation 24.66 percent; and 1981-1991 - Region 23.64 percent/Nation 23.87 percent), it has remained constantly higher since then, of course with a declining trend (1991-2001-Region 22.49 percent/Nation 21.54 percent and, 2001-2011-Region 21.90 percent/Nation 17.70 percent). The mining and industrial districts of Chotanagpur particularly Dhanbad, Ranchi, Hazaribagh, and Puruliya attracted large number of immigrants mostly from the neighbouring Bihar plains, Odisha, Uttar Pradesh and West Bengal. However, it is worthy to note that during 2001 and 2011, population in most of the newly formed districts has grown much above the regional average of 21.90 per cent, surpassing the growth rate in the districts of major urban-industrial centres (Fig. 13.6). The change in the spatial pattern of population growth in the recent decades may be related to decentralised processes of development in the State.

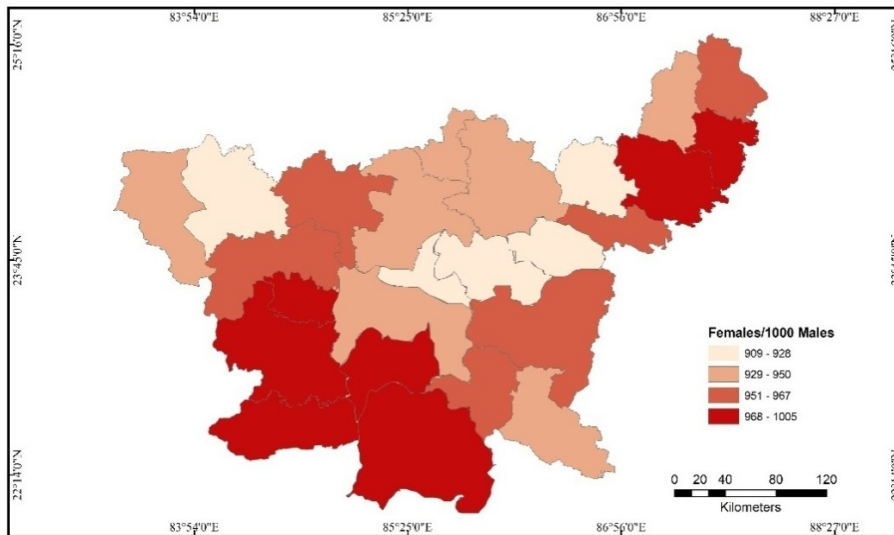


Fig. 13.7: Chotanagpur Plateau - Sex Ratio (2011).

Sex ratio in Chotanagpur has remained more balanced in comparison to the Nation as a whole. Sex-ratio of 942 females/1000 males and 949 females/1000 males in Chotanagpur was higher than the corresponding National figures of 933 and 943 in 2001 and 2011 respectively. Child (0-6 years) sex ratio of 965 in the region was much better than the Nation as a whole where it was 941 in 2001 but came down to 948 and became equal to the National average in 2011. In fact, excepting for Dhanbad (909), Ramgarh (921), Bokaro (922), Deogarh (925), Palamau (928), Garhwa (935), and Godda (938), where in-migration has been male-selective, all other districts of Chotanagpur registered higher sex ratio than the country as a whole. Some of the districts namely, Paschim Singhbhum (1005), Khunti and Simdega (997), Gumla (993), Pakur (989) and Lohardaga (985) have displayed an almost balanced sex ratio in 2011 (Fig. 13.7 and 13.8).

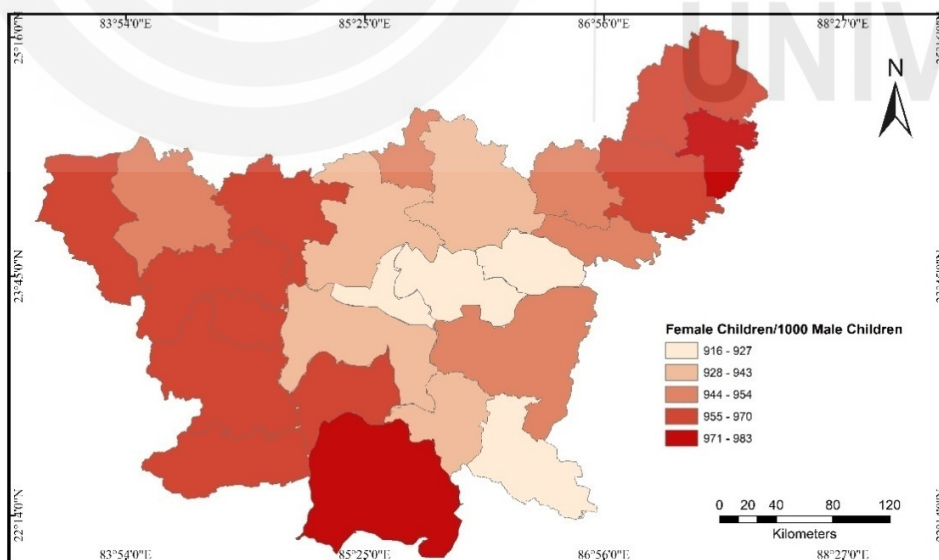


Fig. 13.8: Chotanagpur Plateau - Child Sex Ratio (2011).

Chotanagpur is one of the least literate regions of the country with only 66.25 percent literacy. Excepting for Ranchi (76.06 percent), Purbi Singhbhum (75.49 percent) and Dhanbad (74.52 percent), no other district of the region has attained literacy above the National level (74.04 percent, Fig. 13.9). It

may however be noted that, proportion of total literates in the region has increased substantially from 53.74 percent in 2001 to 66.25 percent in 2011. Progress in female literacy during the decade from 38.66 to 55.00 percent is even more encouraging.

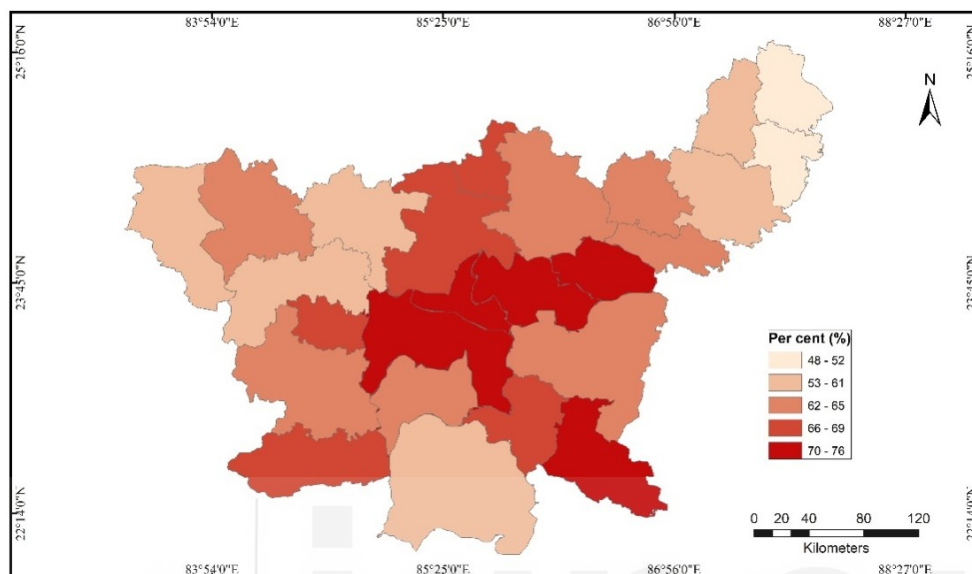


Fig. 13.9: Chotanagpur Plateau - Literacy Rate (2011).

Chotanagpur plateau had been the traditional abode of a large number of tribes since long. However, with passage of time, penetration of non-tribal segments from the adjoining plains has drastically altered the social composition of the population. The tribes constituted more than 35 percent of the total population of the region in 1951. Latest available data of 2011 show significant decline in their share to 25.57 percent. More than 90 percent of the tribal population is rural. The region houses around 30 major and minor tribes, of which Santhals (34 percent), Oraon (19.60 percent), Munda (14.80 percent), and Ho (10.50 percent) are most predominant. These four tribes along with Kharia, Bhumij, Lohra, and Kharwar constitute around 90 percent of the total tribal population. Tribal segment of Chotanagpur population is mostly concentrated in two clusters of districts, one in the southwest and the other in the northeast. The continuity of this corridor is interrupted by the east central urban-industrial districts of Bokaro and Dhanbad etc. While Dumka (43.22 percent), Pakur (42.10 percent), Sahibganj (26.80 percent), and Godda (21.26 percent) districts in the northeast have a significant proportion of tribal population, Khunti (73.25 percent), Simdega (70.78 percent), Gumla (68.94 percent), Paschim Singhbhum (67.31 percent), and Lohardaga (56.89 percent) districts in the southwest are predominantly tribal (Fig. 13.10).

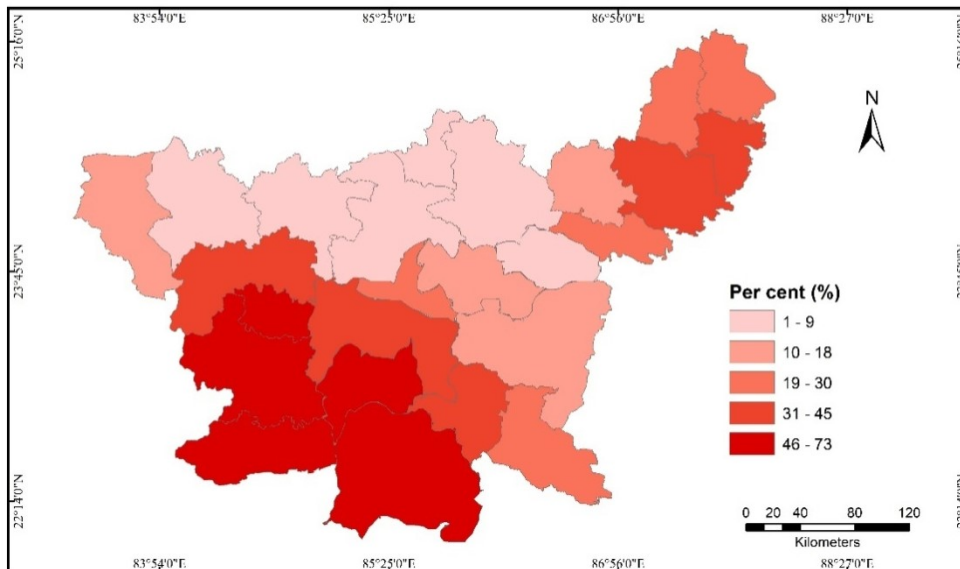


Fig. 13.10: Chotanagpur Plateau - Schedule Tribes Population (2011).

Being a traditional abode of the tribes, Chotanagpur has a smaller proportion (12.68 percent) of SC population, which is less than the National average (16.60 percent). Most of the districts adjoining Bihar plains and urban-industrial districts of Dhanbad and Bokaro (Fig. 13.11), accommodate higher proportion of SC population in their total population, indicating spillover of SC population from the neighbouring plain areas over time.

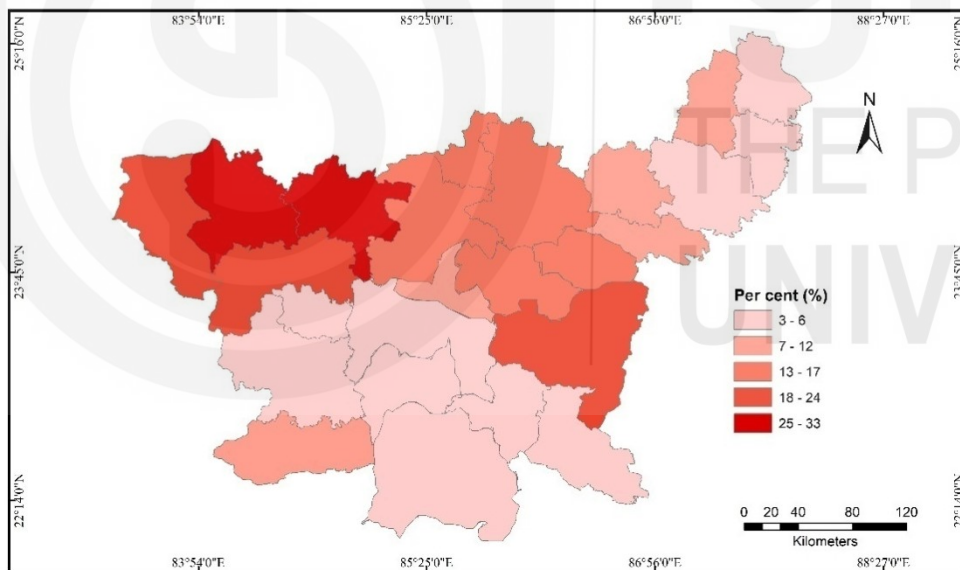


Fig. 13.11: Chotanagpur Plateau - Schedule Castes Population (2011).

Urbanisation of the Chotanagpur region is highly lopsided and is much below at 23.13 percent, compared to the National average of 31.20 percent. Excepting in a continuous stretch of six east central districts of Dhanbad (58.13 percent), Purbi Singhbhum (55.56 percent), Bokaro (47.70 percent), Ramgarh (44.13 percent), and Ranchi (43.14 percent) population in the remaining districts is predominantly rural. Together, these five urban-industrial districts accommodate closer to two-third (66.16 percent) of the region's total urban population. More than 80 percent of population in 17 out of the 25 districts live in rural areas. Urban population growth rate of Chotanagpur during 2001-2011 has been marginally higher (32.11 percent) in comparison to the National level (31.20 percent). However, it is worthy to note that almost all the less urbanised districts have recorded urban population

growth rate much higher than the National rate, with Palamau (128 percent), Latehar (97.18 percent), Pakur (87.38 percent) districts in the lead. The exceptions to this generalisation are Paschim Singhbhum (14.11 percent), Lohardaga (24.28 percent), and Simdega (26.38 percent), where the proportion of urban population in the district total population is also low.

Table 13.3: Urbanisation

Sl. No.	Districts	Urban Population 2011	Percent to Region's Total Urban Population	Percent to District's Total Population		DGR 2001-2011
				2001	2011	
1.	Garhwa	69,670	0.84	4.12	5.27	63.40
2.	Chatra	62,954	0.76	5.31	6.04	49.82
3.	Kodarma	1,41,246	1.70	17.37	19.72	62.82
4.	Giridih	2,08,024	2.50	6.43	44.18	70.00
5.	Deogarh	2,58,361	3.11	13.72	17.32	61.63
6.	Godda	64,419	0.78	3.53	4.90	74.07
7.	Sahibganj	1,59,666	1.92	10.58	13.88	62.71
8.	Pakur	67,512	0.81	5.13	7.50	87.38
9.	Dhanbad	15,60,394	18.80	52.37	58.13	24.30
10.	Bokaro	9,83,644	11.84	20.88	47.70	22.24
11.	Lohardaga	57,411	0.70	6.11	12.43	24.28
12.	Purbi Singhbhum	12,74,591	15.34	55.03	55.56	15.12
13.	Palamau	2,26,003	2.72	8.14	11.65	128.76
14.	Latehar	51,858	0.62		38.94	97.18
15.	Hazaribagh	2,75,307	3.31	23.23	15.87	43.22
16.	Ramgarh	4,18,955	5.04		44.13	24.38
17.	Dumka	90,178	1.09	6.53	6.82	52.54
18.	Jamtara	75,746	0.91		9.58	35.76
19.	Ranchi	12,57,335	15.14	35.11	43.14	32.55
20.	Khunti	44,982	0.54		8.46	53.62
21.	Gumla	65,081	0.78	5.48	6.35	63.68
22.	Simdega	42,944	0.52		7.16	26.38
23.	Paschim Singhbhum	2,18,034	2.62	16.85	14.51	14.11
24.	Sarikela Kharsawan	2,58,746	3.11		24.29	42.17
25.	Puruliya	3,73,314	4.50	11.20	12.74	46.15
Chotanagpur		83,06,375	100.00	5791703/19.66	23.13	32.11

(Source: Census of India, 2011)

Work participation rate in Chotanagpur at 32.72 percent is much lower than the National rate of 39.80 percent. However, Chotanagpur registered a much higher proportion of agricultural workers of 62.81 percent in comparison to the all-India average of 54.60 percent in 2011. Only 3.78 percent of the workers are engaged in the household industries. However, around one-third (33.41 percent) of the workers in the region have returned themselves as 'other workers' in 2011. This indicates absorption of greater proportion of workers of the region in the mining and other urban-industrial activities. However, perusal of the district level proportion of such workers reveals otherwise. Excepting in the mining and industrialised districts of Kodarma (57.26 percent), Ranchi (51.17 percent), Ramgarh (44.08 percent), Bokaro (38.51

percent), Purbi Singhbhum (38.45 percent) and, Dhanbad (23.75 percent), share of agricultural workers in other districts is more than 60 percent, touching the three-fourth mark particularly in the predominantly tribal districts. Another noteworthy point pertains to the higher share of agricultural labourers in the total agricultural workforce (Table 13.4).

Table 13.4: Work Participation - 2011

Sl. No	Districts /Region	Percentage of Total Workers (Main+Marginal) to Total Population	Agricultural Workers			Household Industry Workers	Other Workers
			Cultivators	Agricultural Labourers	Total		
1.	Garhwa	43.20	19.87	57.52	77.39	2.54	20.07
2.	Chatra	38.13	30.00	47.40	77.40	3.57	19.03
3.	Kodarma	35.94	32.29	24.97	57.26	3.08	39.66
4.	Giridh	42.38	35.70	34.99	70.69	3.14	26.17
5.	Deogarh	36.96	23.33	38.02	61.35	7.14	31.51
6.	Godda	42.04	26.19	55.74	81.93	3.39	14.69
7.	Sahibganj	42.61	22.43	42.21	64.64	8.81	26.55
8.	Pakur	44.93	26.04	37.08	63.12	4.81	32.07
9.	Dhanbad	31.46	11.50	12.25	23.75	3.07	73.18
10.	Bokaro	33.23	20.07	18.44	38.51	3.16	58.33
11.	Lohardaga	47.93	45.08	36.52	81.60	2.01	16.38
12.	Purbi Singhbhum	36.50	13.39	25.06	38.45	2.56	58.99
13.	Palamau	36.76	18.73	53.42	72.15	2.79	25.06
14.	Latehar	43.11	33.09	45.55	78.64	2.94	18.43
15.	Hazaribagh	37.74	37.04	26.33	63.37	2.47	34.16
16.	Ramgarh	32.87	29.08	15.00	44.08	2.67	53.25
17.	Dumka	47.28	30.96	48.51	79.47	3.70	16.84
18.	Jamtara	41.29	32.45	41.54	73.99	3.54	22.47
19.	Ranchi	39.22	27.78	23.39	51.17	3.36	45.46
20.	Khunti	48.88	63.96	19.02	82.98	3.56	13.46
21.	Gumla	47.55	65.90	20.09	85.99	2.62	11.39
22.	Simdega	48.14	54.75	31.26	86.01	2.78	11.22
23.	Paschim Singhbhum	46.25	35.14	38.49	73.63	3.57	22.79
24.	Sarikela Kharsawan	40.38	27.14	33.24	60.38	2.38	37.23
25.	Puruliya	42.65	21.51	39.39	60.90	7.01	32.10
Chotanagpur		14,347,734/32.72	4,083,632/28.46	4,928,257/34.35	9,011,889/62.81	5,42,722/3.78	4,793,123/33.41

(Source: Census of India, 2011)

13.4.2 Settlement

The settlements of Chotanagpur region have been shaped by the interplay of geography, colonial history, culture and economic activities. The physical geography of Chotanagpur region has played a very important role in selecting the site or the physical characteristics of the land on which a settlement is established. On the plateaus and hills, settlements are generally located on the relatively flat areas of the plateaus, or on the valley floors. Tribal communities dependent on forest resources have preferred hill tops for better defence and access to forest. Damodar, Koel, and Subarnarekha provide ideal sites for location of settlements for people engaged in agricultural activities. Ranchi and

Jamshedpur towns have prospered on the banks of Subarnarekha. With the beginning of mining activities during the colonial period, several settlements such as Dhanbad, Jharia, Raniganj, Ramgarh, and Bokaro emerged near mining sites, leading to the growth of industrial settlements.

The situation or relative location of settlements in Chotanagpur region is influenced by several factors. Occurrence of mineral and forest based resources have encouraged situation of settlements in their proximity, e.g. location of Dhanbad near coal mines. Villages of the tribes are mostly situated in culturally significant areas, where these tribes have lived since time immemorial. Khunti town is an example of tribal cultural centre. Connectivity to major cities and markets, such as Ranchi, Patna, Rourkela, Bhubaneswar, and Kolkata have also played significant role in the location of settlements. Settlements situated along major transportation routes, such as roads and railways, are better connected and have grown more rapidly due to access to markets, employment opportunities, and government services. Defence is another factor behind location of settlements of Chotanagpur region. Many of the tribal villages have chosen locations, particularly in hilly and forested areas that provide natural defence from invaders and rival groups.

The pattern or spatial distribution of settlements in Chotanagpur varies according to the topographical characteristics, socio-economic conditions, and cultural norms. Dispersed settlements in the form of small hamlets or villages are common to the hilly and forested areas due to dependence on natural resources, subsistence farming practices, and semi-nomadic lifestyle of the tribes. Clustered or nucleated settlements are specific to relatively flat and fertile areas of the Plateau, particularly along the Subarnarekha and Damodar Rivers. Villages are clustered around water sources or agricultural fields, with houses built close to each other for social interaction and mutual support. Linear settlements have grown along roads and railways particularly in the industrial and mining areas, e.g. the towns of Bokaro and Dhanbad have developed in a linear pattern along roads and railway lines. Most of the towns of Chotanagpur have developed during the colonial period. Modern extensions of these towns have a more organised grid-like pattern, with clearly defined residential, commercial, and industrial areas.

Morphology or internal structure and layout of settlements in Chotanagpur region is influenced by traditional culture, economic activities, and topographical characteristics. Traditional tribal villages and hamlets have small number of houses organised around a central open space or common area, with narrow paths connecting the houses, fields, and nearby forests. Locally available materials, such as mud, thatch, and bamboo are used to build the houses. In the agriculturally suitable areas, the villages are organised in nucleated pattern around a central temple, market, or water source. For construction of houses, mud or brick is used. The houses generally have a courtyard for storing food grains and fodder for the livestock. The morphology is typically designed to serve agricultural activities. The industrial towns have a planned layout, with industrial zones, residential areas, and commercial sectors. The roads are wider and there are green spaces and organised residential colonies. While the old city areas of Chotanagpur have a more organic layout with narrow streets, the newer extensions of these cities are more organised with wider roads and planned housing sectors, markets and transportation hubs.

Around three-fourth of the population of Chotanagpur region lives in 31,651 villages (Table 13.9). These villages are scattered all over the region with varying density per 100 square kilometres and in varying sizes. Although one finds 38 villages per 100 square kilometres in the region, the density of villages is as low as 12, 18, and 21 in the districts of Simdega, Gumla, Latehar and Garhwa respectively. On the other hand, the districts of Deogarh (98), Godda (74), Dumka (72), Sahibganj (65), Pakur and Dhanbad (63) and Jamtara (61) display much higher density of villages. The region has very small proportion (2.03 percent) of villages with population of more than 5,000 persons. Excepting in the urban-industrial districts of Dhanbad (4.93 percent), Bokaro (4.91 percent), Ramgarh (4.26 percent) and Garhwa (3.08 percent), proportion of such villages is either negligible or nil. On an average, around three-fourth (73.61 percent) of the villages in the region have population between 200 to 1999 persons. Another 17.12 percent villages are very small in population size (less than 200 persons). In other words, 90.73 percent villages of Chotanagpur have less than 2000 persons. The topographical and climatic condition of the region has given rise to mostly dispersed types of rural settlements.

Table 13.9: Rural Settlements (2011)

Sl. No.	Districts	Number of Inhabited Villages	Density of Villages (per 100 km ²)	Percentage of Villages by Population Size						
				Less Than 200	200-499	500-999	1000-1999	2000-4999	5000-9999	10000 and Above
1	Garhwa	844	21	9.95	13.74	24.53	27.73	20.97	2.73	0.35
2	Chatra	1,377	37	24.33	28.47	24.69	15.61	6.32	0.58	0.00
3	Kodarma	577	41	16.12	23.40	26.33	22.87	10.40	0.68	0.20
4	Giridh	2,558	53	17.63	27.99	28.07	17.55	7.51	0.98	0.27
5	Deogarh	2,354	98	26.64	36.96	23.62	10.24	2.46	0.08	0.00
6	Godda	1,688	74	29.27	24.41	22.92	16.23	7.88	0.30	0.00
7	Sahibganj	1,349	65	43.44	20.16	17.57	11.34	5.93	0.81	0.74
8	Pakur	1,141	63	24.89	31.64	24.72	12.27	5.26	1.14	0.09
9	Dhanbad	1,075	63	12.93	22.00	27.00	24.00	9.11	4.93	0.00
10	Bokaro	611	25	5.40	12.11	22.42	29.13	26.02	4.42	0.49
11	Lohardaga	352	24	7.39	21.31	27.56	27.27	15.62	0.85	0.00
12	Purbi Singhbhum	1,609	48	21.09	33.00	27.97	14.24	3.48	0.06	0.06
13	Palamau	1,711	42	17.30	19.99	27.64	22.79	11.22	0.99	0.06
14	Latehar	749	21	10.55	28.57	30.57	20.57	9.21	0.53	0.00
15	Hazaribagh	1,193	28	13.58	19.95	24.81	23.97	15.59	1.84	0.25
16	Ramgarh	305	26	5.57	11.47	21.64	31.15	25.90	3.93	0.33
17	Dumka	2,688	72	25.52	44.01	22.84	6.10	1.49	0.03	0.00
18	Jamtara	1,082	61	17.37	33.46	31.61	13.12	4.34	0.09	0.00
19	Ranchi	1,296	28	5.09	17.82	31.94	27.85	15.28	1.77	0.23
20	Khunti	754	29	10.88	41.11	30.24	14.46	3.32	0.00	0.00
21	Gumla	942	18	3.82	22.61	37.90	26.22	8.49	0.85	0.11
22	Simdega	449	12	3.56	21.38	29.40	29.84	14.25	1.56	0.00
23	Paschim Singhbhum	1,642	30	10.23	29.48	34.23	21.25	4.81	0.00	0.00
24	Sarikela Kharsawan	1,146	43	14.57	30.45	35.08	15.71	03.93	0.26	0.00
25.	Puruliya	2,459	39	10.74	21.47	30.42	24.93	11.59	0.85	0.00
Chotanagpur		31,651	38	5420 /17.12	8776 /27.73	8699 /27.48	5823/ 18.40	2604/ 8.23	294/0.93	35/0.11

(Source: Census of India, 2011)

The predominantly rural Chotanagpur region experienced urbanisation only with the beginning of mining and related industrial activities. There were total of 70 urban centres including only two cities of Jamshedpur and Ranchi having population of 3.28 lakh and 1.2 lakh persons respectively in 1961. During the next fifty years, the number of urban centres increased to 256 with 11 cities. Dhanbad and Ranchi have acquired the status of M5 city with more than 10,00,000 population. Together these eleven cities accommodate nearly 54.56 percent of the total urban population of the region. Adding the population of the twelve Class II towns of the region to it, this share touches almost two-third (64.36 percent) of this population. On the other hand, most of the smaller towns have recorded either low or negative growth during the last two decades. This is a clear indication of gradual concentration of the urban population in the larger urban centres of the region (Table 13.10).

Table 13.10: Urban Settlements (2011)

Sl. No.	Districts	Number of Urban Centres		Number of Urban Centres by Population Size (Class / Sub-Class)					
		2001	2011	1,00,000 and Above (I)	50,000-99,999 (II)	20,000-49,000 (III)	10,000 - 19,000 (IV)	5,000-9,999 (V)	Below 5,000 (VI)
1	Garhwa	2	3			1	1	1	
2	Chatra	1	2			1	1		
3	Kodarma	2	5		1	1	1	2	
4	Giridih	5	12	1 (Giridih - M1)			1	10	
5	Deogarh	4	2	1 (Deogarh - M2)					1
6	Godda	1	3			1	1		1
7	Sahibganj	2	8		1	1	1	4	1
8	Pakur	1	4			1		3	
9	Dhanbad	47	46	1 (Dhanbad - M5)		3	6	23	13
10	Bokaro	16	27	2 (Chas - M1 & Bokaro Steel City -M3)	1	6	5	7	6
11	Lohardaga	1	1		1				
12	Purbi Singhbhum	15	15	2 (Mango - M2 & Jamshedpur - M4)	2	6	4	1	
13	Palamau	5	9		1	2	5	1	
14	Latehar		4			1	1	1	1
15	Hazaribagh	24	17	1 (Hazaribagh - M1)			5	9	2
16	Ramgarh		24		2	4	5	10	3
17	Dumka	4	5			1	2	2	
18	Jamtara		3			2		1	
19	Ranchi	8	15	1 (Ranchi - M5)		4	4	5	1
20	Khunti		2			1		1	
21	Gumla	2	3		1			2	
22	Simdega		1			1			
23	Paschim Singhbhum	20	11		2		4	4	1
24	Saraikela Kharsawan		7	1(Adityapur - M1)		1	1	3	1
25	Puruliya	12	28	1 (Puruliya - M1)		3	4	19	1
Chotanagpur (Number / %)		172	257 (100.00)	11 (4.28)	12 (4.67)	41 (15.95)	52 (20.23)	109 (42.42)	32 (12.45)

(Source: Census of India, 2011)

Note: Class I UAs/Towns are further sub-classified into seven sub-classes, namely M1 to M7 depending on the population size of UA/City/Town. These are M7 (5,000,000 and above); M6 (2,000,000 to 4,999,999); M5 (1,000,000-1,999,999); M4 (500,000-999,999); M3 (300,000-499,999); M2 (200,000-299,999) and M1 (100,000-199,999) towns.

13.4.3 Economy

Land Use: Chotanagpur has almost equal share of land under forest cover (28.17 percent) and cultivation (32.50 percent) (Fig. 13.12 and Table 13.13). However, forest cover displays wide variation across the districts. More than 40 percent of area of Chatra (46.55 percent), Hazaribagh (46.44 percent), Latehar (44.06 percent) and Garhwa (43.44 percent) are under forests. Together, these account for (31.01 percent) of the total forest area of Chotanagpur. By adding forest area of Kodarma (38.99 percent) and Palamau (37.50 percent) districts, this share increases to almost two-fifth (39.65 percent). This is indicative of the fact that much of the land under forest cover is confined to north and northwest Chotanagpur. On the other hand, industrialised districts in east and central Chotanagpur have low forest cover (Table 13.11).

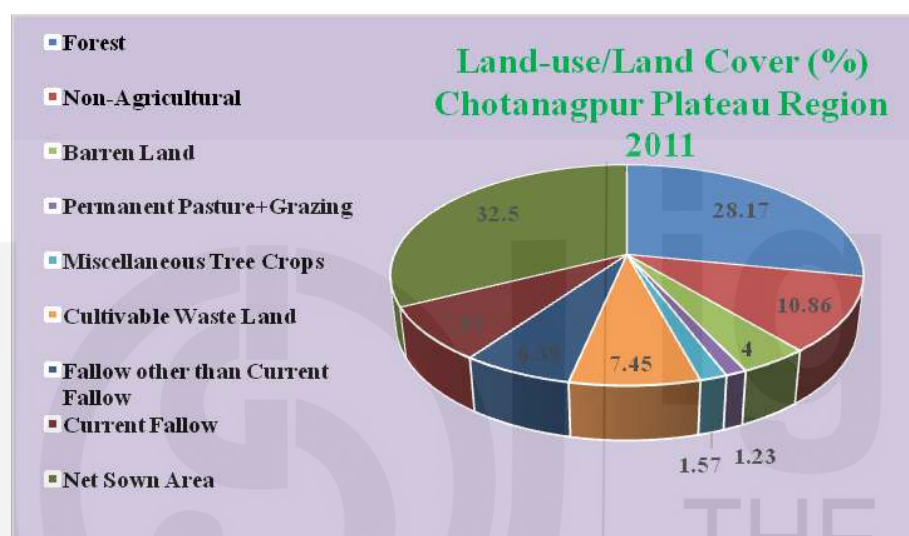


Fig. 13.12: Land Use/Land Cover (2011).

Table 13.11: Land Use (2011)

Sl. No	Districts	Total Area (in Sq. Kms.)	Percentage to Total Area								
			Forest	Non-Agricultural	Barren and Uncultivable Land	Permanent Pasture + Other Grazing Land	Miscellaneous Tree Crops	Cultivable Waste Land	Fallow other than Current Fallow	Current Fallow	Net Sown Area
1	Garhwa	4003.43	43.43	6.10	3.61	0.95	2.57	4.27	4.60	8.18	26.30
2	Chatra	3757.98	46.55	6.64	1.12	0.50	0.76	7.73	3.27	4.08	29.35
3	Kodarma	1413.33	38.99	9.78	3.78	2.05	1.46	6.28	6.24	6.54	24.88
4	Giridih	4848.70	28.01	8.28	6.04	2.91	2.95	6.50	9.09	10.94	25.28
5	Deogarh	2414.03	6.72	13.57	3.71	5.04	2.23	9.09	6.02	7.23	46.38
6	Godda	2268.9	9.11	12.81	2.70	1.89	1.42	7.88	9.09	8.14	46.96

		2									
7	Sahibganj	2085.01	10.57	17.30	4.74	1.66	1.88	11.12	7.05	8.58	37.10
8	Pakur	1801.43	7.48	9.32	6.38	4.50	3.04	7.46	13.40	19.01	29.41
9	Dhanbad	1715.10	9.44	18.79	7.04	2.32	2.58	10.56	11.93	9.59	27.76
10	Bokaro	2428.37	26.50	16.20	3.40	0.80	1.00	11.70	7.60	7.00	25.90
11	Lohardaga	1476.12	27.64	11.61	2.97	0.59	1.89	10.17	8.99	5.35	30.78
12	Purbi Singhbhum	3365.25	18.58	11.46	5.82	1.73	2.42	6.48	9.34	11.80	32.32
13	Palamau	3754.46	37.50	8.68	4.18	0.65	1.06	6.10	6.86	11.59	23.38
14	Latehar	3601.79	44.06	7.33	2.55	0.59	0.69	4.40	4.46	6.19	29.74
15	Hazaribagh	4213.58	46.44	8.54	2.92	1.09	1.05	3.48	8.42	11.52	16.55
16	Ramgarh	1151.50	29.80	15.75	3.37	1.32	0.75	5.72	7.75	9.46	26.07
17	Dumka	3710.14	8.47	12.90	6.24	4.88	2.66	10.67	6.60	7.97	39.61
18	Jamtara	1777.16	4.85	12.64	4.09	3.47	1.51	12.14	6.13	7.78	47.40
19	Ranchi	4683.53	20.42	10.14	3.98	0.62	1.32	6.51	8.30	9.14	39.57
20	Khunti	2577.86	16.49	10.63	3.36	0.59	0.37	6.29	11.37	10.04	40.85
21	Gumla	5300.88	25.44	8.53	5.83	2.34	2.77	7.30	9.11	12.47	26.21
22	Simdega	3716.47	25.66	10.27	4.97	1.17	2.79	5.06	5.78	8.03	36.27
23	Paschim Singhbhum	5389.81	21.57	14.12	5.84	1.18	0.93	7.67	6.04	6.46	36.20
24	Saraikela Kharsawan	2649.21	21.41	11.05	7.20	1.87	0.93	6.80	5.48	6.28	38.98
25	Puruliya	6076.35	10.86	17.65	0.00	0.00	0.00	14.20	0.00	0.00	57.29
	Chotanagpur	82845.48/100.00	2333.65 / 28.17	8996.38 / 10.86	3323.32 / 4.00	1015.85 / 1.23	1297.63 / 1.57	6174.29 / 7.45	5291.94 / 6.39	6483.77 / 7.83	2692.56 / 32.50

(Source: Census of India, 2011)

The percentage of net sown area varies between 16.55 in Hazaribagh and 57.29 percent in Puruliya districts. Majority of the districts however, have around one-fourth to one-third of their area under cultivation. In this case too, a clear distinction can be made between the western and eastern districts. While most of the eastern districts have around two-fifth of area under cultivation, the western districts have around one-fourth of such area. The percentage of cultivated land seems to be intimately related to availability of flat land in different districts. Culturable waste land is relatively high (6.92

percent) in the region. Its proportion is much above this average in Puruliya (14.20 percent), Sahibganj (11.12 percent), Dhanbad (10.56 percent), Bokaro (11.70 percent), Lohardaga (10.17 percent), Dumka (10.67 percent) and Jamtara (12.14 percent) districts. Grazing land and fallow land also account for significant proportions of area in the region due to limited irrigation facility, shallow soil cover and vagaries of monsoon. Land not available for cultivation is between 6 to 19 percent in the districts (Table 13.11).

Agriculture: Rice monoculture under rain fed agriculture is common to most parts excepting the eastern districts, where low lands and valley bottoms provide flat lands for cultivation. Of the three agricultural seasons of *Kharif*, *Bhadoi* and *Rabi*, the former is most prominent and devoted mostly to the cultivation of rice. The uplands are dedicated to the cultivation of wheat, oil seeds, pulses and maize etcetera. The level of technology adoption is poor leading to low output in general. Climatic conditions of the region favour cultivation of a wide range of horticultural crops such as fruits (*aonla*, banana, citrus, guava, *lichi* and mango), vegetables, flowers and plantation crops, although their productivity is low. Despite having vast inland fishery resources in the form of large number of tanks (15496 Government and 85849 Private), reservoirs (258), check dams and *aahars* (258) and 1,800 kilometres of river, the annual per capita fish availability is only 2.44 kilogram as compared to National average of 6.31 kilogram due to poor productivity. The main reason for this poor performance is because most of the tanks are very old and unsuitable for fish culture due to heavy siltation and weed infestation. Livestock raising and poultry farming are also practiced as subsidiary to agriculture. However, the cattle raised are of poor quality as they depend on natural pastures. Average milk productivity of cow is 1.59 kilogram against the National average of 3.0 kilogram per day. Similarly, the region compares very poorly with annual per capita availability of milk, meat and eggs which is 47.45 kilogram, 1.42 kilogram and 13 eggs respectively against the National averages of 96.0 kilogram, 3.32 kilogram and 51 eggs (ICAR, Available online).

Industrial Economy: The region is well endowed with a rich mineral and forest resource base necessary for industrial development. Besides, the region enjoys location-specific advantage as it is close to the vast market and ports of eastern India. These have helped the establishment of 26 mega, 106 large and medium and 18,109 micro and small mining and mineral extraction industries in the region. Organisations like Industrial Area Development Authorities, Ranchi Industrial Area Development Authority, Adityapur Industrial Area Development Authority and Bokaro Industrial Area Development Authority, State Khadi Board, Jharkhand Industrial Infrastructure Development Corporation and JHARCRAFT are making significant contribution in industrialisation of Chotanagpur. But, desired progress in areas like IT, Biotechnology, Special Economic Zone, Food Processing, Down Stream Processing etcetera is yet to be achieved. However, industrial activities in the region are highly localised to specific industrial belts like Jamshedpur-Saraikela-Chaibassa, Ramgarh-Patratu-Hazaribagh, Latehar-Chandwa, Ranchi-Lohardaga, Bokaro-Chandankiyari-Dhanbad-Giridih etc (www.ibef.org).

SAQ 5

What obstacles are faced in developing the agricultural sector of Chotanagpur?

13.4.4 Transport and Communication

As pointed out earlier, Chotanagpur remained loosely connected with the neighbouring plains until the British intervention for the exploitation of its mineral and forest resources. The main line of eastern railway was laid in 1871, followed by the south-eastern main line and Raniganj-Jharia extension in 1876-1900. The process continued with the building of the Grand Chord line connecting Dhanbad with Gaya in 1906 and the Barkakana loop passing through coalfields of Damodar valley in 1929. During the first quarter of 20th century, several extensions have been made and today most of the major urban centres like Dhanbad, Deogarh, Garwah, Ranchi, Jamshedpur, Lohardaga, Bokaro, Sahibganj and Adra are well connected with other cities and ports of the country by railways. Most of the lines have been converted into broad gauge, double track and electrified routes. Railways in Chotanagpur carry heavy traffic consisting of mineral and manufactured goods besides passengers. The Grand Chord line serves as the primary artery for the flow of coal traffic in the country while the mainline of the south-eastern railway serves three steel plants at Jamshedpur, Rourkela and Bhilai. Dhanbad is the first station in the country to have an AC double-decker express running in between Dhanbad and Howrah.

Well-developed road network criss-cross the region connecting all district headquarters. Twelve National Highways of 1,844 kilometres and several State Highways of 6,880 kilometres length serve their primary purpose of linking different urban centres of the region. Most of the National Highways and other roads have been widened to 6 or 8 lanes. The most important roads of the region include, the Grand Trunk Road running diagonally through Hazaribagh Plateau, the Garhwa-Daltonganj-Ranchi-Muri Road passing through Ranchi plateau, the Aurangabad-Daltonganj Road, the Dumka-Sahibganj road and the Nawada-Barhi-Ramgarh-Ranchi Road. Roads of Chotanagpur are interlinked by several smaller roads which facilitate inter-regional freight and passenger traffic. Air traffic to the region uses the Birsamunda Airport (Ranchi) which is the only fully operational airport of the region.

SAQ 6

- a) Which parts of Chotanagpur region have the maximum forest cover?
 - b) Which conditions have favoured Chotanagpur to emerge as one of the most important industrial regions of India?
-

13.5 CHOTANAGPUR PLATEAU: THE REGIONS

Notwithstanding its distinctively multi-level plateau topography as compared to the adjoining Baghelkhand, Garhjat hills of Odisha, Bihar Plains or Bengal

plains, the Chotanagpur region displays remarkable internal heterogeneity in terms of both physical and human characteristics. Based on differences in relief, the Chotanagpur North and Chotanagpur South emerge out as two first order regions. While the former has relatively less rugged topography with rich reserves of coal and mica, the latter has a bold multi cyclic relief, with distinct erosion surfaces differentiated by series of scarps. The two are demarcated from each other by the bold scarps of the *Pats* and the Ranchi plateau. These two first order regions can further be sub-divided into second order and third order regions based on nature of economy and relief.

1. Chotanagpur North

Areas north of the *Pat* lands and Ranchi plateau overlooking Damodar and North Koel valleys form the Chotanagpur North region. The relatively subdued relief of the Plateau with isolated hills and rugged plateau fringes, descends in all directions from the upper Hazaribagh plateau occupying the central position. Its second order regions are; (a) Palamau uplands, (b) Hazaribagh plateau, (c) Damodar valley, and (d) Santhal Pargana uplands.

(a) Palamau Uplands: To the west of Hazaribagh plateau, these uplands form a highly dissected region with varied relief, poor soils, scrub forests and poor agriculture. It has three sub-regions. These are:

(i) Western Palamau Upland: This is a tabular land sloping towards Son river in the north. It is a poorly connected region with fewer roads and railways. It is sparsely populated and economy is mostly based on subsistence agriculture. Garhwa is the main urban centre of the region.

(ii) North Koel Valley: This is the basin of North Koel river, a tributary of Son flowing in the centre of Palamau uplands. While the southern part of the Valley is broad, the northern part is interspersed with small hills. The main town of Daltonganj and Daltonganj coal fields are located in the southern part. The Valley is relatively densely populated. Rice, sugarcane and groundnut are cultivated under rain fed agriculture in its moist fertile sandy-loam soil.

(iii) Eastern Palamau Upland: This region is marked with numerous interlocked spurs projecting westward from Hazaribagh plateau. These spurs are dissected by Auranga, Amanat and Burha rivers, which join North Koel from the east. Lac collection from deciduous forests and cultivation of rice in the valleys are the main occupation of the population.

(b) Hazaribagh Plateau: It covers almost the entire Hazaribagh district and parts of the adjoining districts of Chatra, Kodarma, Giridih and Bokaro, and Gaya and Monghyr districts of Bihar. The Plateau can be further sub-divided into four third order regions. These are:

(i) Upper Hazaribagh Plateau: With an average elevation of 600 metres, it is marked by scarps on all sides. The scarps on the southern portion of the Plateau overlooking Damodar valley are dissected by numerous tributaries of Damodar river. Valleys of these streams are densely forested and permit cultivation mainly of rice in tiny patches during rainy season excepting on the flat areas around Hazaribagh town.

(ii) Lower Hazaribagh Plateau: It is the northern part of Hazaribagh Plateau with an average elevation of 300 metres. The eastern portion is drained by

Barakar river and is mostly broken. Relict hills including the Parasnath rising to 4478 feet, are common. Rice is the main crop cultivated with *marua* (a type of basil), maize and some mixed crops. Extent of uncultivable area is high due to gully erosion. Most activities including cultivation, location of settlements and roads use the interfluves.

(iii) Chatra Plateau: To the west of Lower Hazaribagh plateau is Chatra plateau. The two rivers of Lilajan and Amanat along with their numerous tributaries drain the region. Dense forests cover the highly undulating and dissected topography of the plateau. Cultivable area is relatively less. Rice, maize, pulses and oil seeds are generally grown in the tiny and scattered patches. Chatra is the main town of the region.

(iv) Northern Dissected Fringe: The topography of the region is highly rugged. Steep forested scarps, scrub forested gravel screes, deep ravines and sandy beds are characteristic features of the region. This is the region where mica is mined in valley bottoms.

(c) The Damodar Valley: The region is marked with a variety of features such as flat valleys, isolated hills, scarp fringes and miniature plateaus. Areas with resistant upper Gondwana rocks have much higher elevation than the surroundings reaching more than 600 metres, e.g. Panchet hill (630 metres) and Mahudi hill (600 metres). Soil types also vary from clay and heavy loam in lowlands to coarser and lighter sandy soils on the uplands. As the valley contains best coalfields in the country, mining happens to be the most prominent economic activity. Parts of the valley are devoted to cultivation of rice. The region has two third order regions. These are:

(i) Dhanbad Region: This is the lower valley of the region and has a large number of coal mines, various mineral based industries, the largest number of urban centres including Dhanbad, Jharia and Sindri; and has the highest density of population.

(ii) Ramgarh-Patratu Region: This is upper portion of the valley in the west, flanked by forests and rugged scarps or hill slopes. Important economic activities include coal mining, glass and cement manufacturing, and rice cultivation in the valley floors. Ramgarh is the main town in this region and Patratu is emerging as an industrial nucleus.

(d) Santhal Pargana Uplands: This is the north eastern part of Chotanagpur covering Rajmahal highlands and Rajmahal hills. Several small streams flow out of the hills in both east and west directions with wide valleys, particularly in the east, e.g., Burhait valley. While lateritic soils cover the upper surface, humus-rich clayey soils cover the valleys. Rice, maize, gram and pulses are cultivated here, at places with the help of tank irrigation. Hills are covered with dense forest with *Sal* as predominant species. The uplands have been the traditional homeland of Santhal tribe who apart from cultivation, engage in wood cutting, cattle rearing, poultry keeping and vegetable growing. The region is relatively less urbanised. Dumka, Deoghar, Godda, Pakur and Sahibganj are the main towns. The region can be sub-divided into three sub-regions. These are:

(i) Santhal Pargana Highland: This sub-region is characterised by undulating terrain and subsistence agriculture. Western part is relatively more level, where culturally important Deogarh town is located.

(ii) Rajmahal Hill: It is the least populated part due to its rocky surface, steep slopes and poor lateritic soil.

(iii) Marginal Plains: This is the most fertile and populated sub-region of the uplands. Fertility permits rice cultivation and is enriched by numerous tributary streams flowing down hills in the west.

2. Chotanagpur South

The southern part of Chotanagpur plateau is made up of three distinct erosional surfaces, which gradually descend from west to east. Its second order regions are; (a) *Pat* Land Region, (b) Ranchi Plateau, and (c) South Eastern Chotanagpur.

(a) Pat Land Region: This is an extension of Deccan Trap and has an average elevation of 900 metres. As the region receives highest amount of rainfall in Chotanagpur, major parts are covered with luxuriant forest cover of bamboo and *Sal* trees. It is relatively less accessible and the population is mostly confined to broad rice growing valleys. Hill resort of Netarhat (1071 metres), popularly known as "Queen of Chotanagpur" is located in this region. It has two sub-regions. These are:

(i) Ranchi Pat Land: This part of *Pat* land is spread over western Ranchi district, which is more urbanised, populated and accessible. Economy of the region is based on Bauxite mining near Lohardaga, and rice cultivation in the valleys.

(ii) Palamau Pat Land: Northwest of Ranchi *Pat* Land, this region is mostly covered with thick forest, and is less accessible and almost uninhabited.

(b) Ranchi Plateau: This plateau incorporating the eastern Ranchi district, is surrounded by steep scarps on all sides. The region is drained by Subarnarekha and South Koel rivers flowing towards east and south respectively. Subsistence agriculture is practiced in the river valleys which sustains relatively larger population. The plateau can be divided into three sub-regions. These are:

(i) Northern Ranchi Plateau: Ranchi city is situated in this sub-region. Several industries have come up in this region giving it a character of an industrial nucleus. Villages are located on uplands (*taur*), mostly engaged in rice, *ragi*, fruit and vegetable cultivation on terraced fields of the lowlands (*dons*). The sub-region is well connected with air, rail and, road networks.

(ii) Southern Ranchi Plateau: This plateau is distinguished for its dissected and rugged hill terrain, turbulent streams, steep hill-sides, cliffs and narrow valleys. This is a thinly populated region with scattered settlements. A few urban settlements namely Khunti, Gumla and Simdega have come up in the periphery of this densely forested plateau.

(iii) Southern Hilly Region: Southern part of Ranchi plateau is an area of tangled hills and deep valleys covered with dense forest. The region is less accessible and has only a few settlements.

(c) South Eastern Chotanagpur: This south-eastern tip of Chotanagpur covering Purbi Singhbhum, parts of Saraikela Kharsawan, Paschimi Singhbhum districts of Jharkhand and Purulia district of West Bengal, has varied relief and diverse economy. The region has five sub-regions. These are:

(i) Chaibasa Plain: This is the valley of Kharkai river, a tributary of Subarnarekha river, joining it from south-west. With a slope from south to north along Kharkai river and south-west to north-west along Garra valley, the plain has mainly agricultural economy with rice as the leading crop. Iron ore is mined at Gua and Noamundi. Chaibasa is the main town in the region.

(ii) Subarnarekha Valley: Originating near Ranchi, the valley extends from north-west to south-east. While the upper reaches are predominated by rice cultivation between numerous residual hills, the lower reaches have industries where Jamshedpur and Manbhandar towns are located. The valley has an average width of 10-16 kilometres and is also known as the mica-schist plain.

(iii) Dhanjori Highlands: In between Chaibasa plains and Subarnarekha valley lie Dhanjori highlands. Jaduguda uranium mines are located in this region.

(iv) Dalma Range: This volcanic range of Archaean period is situated to the north of Subarnarekha valley. This densely forested tract has Dalma Wildlife Sanctuary and is almost uninhabited.

(v) Purulia Upland: This is the easternmost portion of Chotanagpur. Administratively it lies in West Bengal. Sloping towards the east it finally merges with West Bengal plains. It includes Baghmundi plateau, which is an extension of Ranchi plateau. Rice dominated agriculture is the main economy of the region. Purulia is the main town.

SAQ 7

Name two first order regions of Chotanagpur.

13.6 CHOTANAGPUR PLATEAU: PROBLEMS AND PROSPECTS

Problems

Chotanagpur is called the 'Ruhr of India' or 'the mineral heartland of India' as it possesses more than 40 percent of the mineral resources of the country. Nevertheless, Chotanagpur (Jharkhand - 42.16 percent) is the second poorest region after Bihar (Bihar - 51.91 percent) Plains (Niti Aayog, 2021). According to NFHS-5 (2019-21), Chotanagpur (Jharkhand) is the second poorest region with 28.81 percent multi-dimensionally poor population after Bihar (38.76 percent). Large-scale exploitation of natural resources of the region through development of mines, industries and commercial exploitation of forests, has not benefitted the indigenous communities. Bereft of alternative economic opportunities, the rural population depend mostly on agriculture. However, lack of good quality agricultural land excepting in the valleys and depressions, thwart crop production resulting in rural poverty.

Double cropping is limited because of almost complete dependence on monsoon rains and limited irrigation facilities.

Prospects

However, scientifically planned measures of the rich resources of the region can boost the economy in the desired manner. Scientifically establishing viable soils and vegetation at mining sites with degraded soils, can help reclamation of lost fertility of soils. Similarly, treatment of water and emissions can be planned. Poverty reduction measures by generating employment opportunities and skill development would be of immense help.

Decentralisation of industries can be planned to reduce regional imbalances. Chotanagpur has tremendous tourism prospects, which can be developed to boost tourism industry in the region.

However, of late, the government is making concerted efforts to address the problem of imbalance between food and plantation crops by not only strengthening traditional crops but also crops like rubber. It aspires to achieve self-sufficiency in the production of rubber and other agricultural crops (Tharian et. al., 1988). Government initiatives are encouraging people to go for fishing. Tourism is being encouraged, and jobs are being created in the tourism industry as well. It is expected that these initiatives would help in creating employment opportunities within the region and distract people to migrate out in search of employment.

13.7 MALABAR COAST: HISTORICAL BACKGROUND

As is evidenced from the rock engravings of Edakkal Caves in Wayanad, the historical antecedents of Malabar Coast dates back to Neolithic period. According to the Puranas, the region is said to have been reclaimed from the sea by the Brahmin sage Parashuram. The region finds its mention as 'Garden of Spices' or 'Spice Garden of India' in different ancient West Asian writings including that of Sumerians, Greek historian Herodotus, geographer Ptolemy of Roman Empire and writer Pliny the Elder. Malabar Coast had trading relations with Egypt, Greece, Rome, China, Philippines, Java, and Sumatra prior to the British era. Gold, spices, sandalwood, and peacock feathers were major trade items.

Mention of Malabar Coast is also seen in Asokan inscriptions (Singh, 2014), which documents the rule of the Cheras over the region during Asokan period. The Chera rule continued till 12th century with intermittent breaks. The Cheras are credited for creating trade linkages with all major Mediterranean and Red Sea ports as well as those of the Far East. Furthermore, this region was divided into three parts, each ruled by three different dynasties. The Kolathiri dominated the northern section of Malabar, the Zamorins (*Samoothiri* in Malayalam) ruled Calicut/Kozhikode, and Valluvanand was ruled by the Valluvakonathiri.

The Portuguese navigator, Vasco da Gama arrived in Calicut on 20th May, 1498. This event opened the doors to India via sea route not only for the Portuguese but also for other European colonisers including the British

(Singh, 2014). With the support of the Arabs, the Zamorins of Kozhikode kept the Portuguese invaders at bay. From mid-18th century till the formation of Independent India, major parts of the region remained under the control of the Travancore Royal family, Hyder Ali and his son Tipu Sultan, and subsequently the British. Till Independence, Malabar Coast region remained under the British Madras Presidency and subsequently till 1956 under Independent Indian Madras state. After bifurcation of Madras state in 1956, major parts of the region remained within the administrative boundary of the newly formed Kerala state.

During the 16th and 17th Centuries, Malabar Coast emerged as a major trading region especially for the Portuguese, the Dutch and the British, and remained major supplier of silk, pepper and other spices. The region continues to retain its economic importance for the modern-day Kerala (www.keralatourism.org). External contacts for economic reasons have also influenced the culture of the region to a great extent.

13.8 MALABAR COAST: THE PHYSICAL SETTING

Malabar Coast is a recently developed 550 kilometres long and 20 to 100 kilometres wide coastline. It is very narrow in the north and south, but broad in the middle. The maximum width is marked near the Palakkad or Palghat gap. It has experienced upliftment for at least two times. Lateritic mud banks have formed near the river mouths as a result of this process. Alluvial coastland, lateritic plateau and gneissic highlands (Spate, 1972) are also found here. Eastern section of the region is marked with steep highlands, while the western part descends to a small coastal plain. Along the coastal areas, a typical form of sand dunes (locally known as the *Teris*) is found. Metamorphic and igneous rocks cover most parts of the highlands. The coastal plains contain Miocene to recent sedimentary formations, such as soft sandstone and clay shale with marl or limestone, as well as sand and peat containing gravels. Aquifers can be found 400 feet beneath the surface of the sand and gravel beds.

13.8.1 Geology

The Archeans, which are the earliest rocks, Tertiary rocks (upper Miocene to Pliocene), and the recent (Quaternary) deposits are the three main geological formations in this region. The north-south alignments can be found in majority of the rocks. The rocks can be split into two groups: Crystalline rocks and Precambrian rocks.

Major formations of the **Crystalline rocks** are:

- (i) **Dharwar Formation:** These are prevalent in Malabar region and are represented by garnetiferous-ferruginous quartzite, mica, talc, schist, and other minerals. They may be found exposed in Wayanad and Gudalur.
- (ii) **Peninsular Gneiss:** These are found in South and South-East Wayanad and have gold-bearing veins; in Thiruvananthapuram, the gneiss comprises quartz.

(iii) **Closepet granite:** Archaean intrusions have been discovered in the Malabar region. Biotite granite intrusions have been discovered in the Kalpetta hills and Sulthan Bathery.

Major formations of **Precambrian System** are:

- (i) **Basic Dykes:** These are fractured rocks having composition similar to dolerite and are primarily found in South Malabar region.
- (ii) **Residual Laterites:** These rocks are found in Kozhikode, west of crystalline rocks on Malabar's eastern limit. The Warkalli beds from Pliocene period are linked to these.
- (iii) **Recent Deposits:** These are made up of sand and silt. These deposits are typically found in backwater tracts and all along the Malabar seashore. This area is important because it contains precious mineral sands.

13.8.2 Physiography/Relief

Alluvial shore land and lateritic plateau characterise Malabar region. The Malabar region's eastern border is marked by the Western Ghats, with a break at Palakkad Gap. Malabar region's western side is largely sandy. Elevation of Western ghats is 1,500 metres above mean sea level. The ghats are on the eastern side of Kozhikode *taluk*, and after passing through the Nilambur valley, they continue south up to Palakkad Gap in Palghat *taluk*. Anaimudi with an altitude of 2,694 metres is the highest peak of the region. Others are Mukurthi (2,554 metres) summit in Nilambur region near Nilgiri hills, Anginda peak (2,383 metres) in Malappuram-Palakkad-Nilgiris district border, Vavul Mala (2,339 metres) at a trijunction of Malappuram's Nilambur *taluk*, Waynad, and Kozhikode's Thamarassery *taluk*. Sand dunes from the Pleistocene to recent periods have formed lagoons and backwaters known as *Kayals* in the region (Singh, 2014).

SAQ 8

- a) The Malabar coast region has been addressed by which name in the ancient West Asian writings?
- b) Name three main geological formations in Malabar coast region.

13.8.3 Drainage and Water Resources

The Malabar coast is home to a vast number of streams. These are usually very short in length. The streams are only 60 kilometres long on an average. Periyar, with a length of 230 kilometres, is the region's longest river (Singh, 2014). The Valapattnam river, which drains into the Arabian Sea near Kannur, is one of the important rivers in north Malabar region. Kabini river in Wayanad flows eastward, while the Bhavani river flows towards the Walluvanad *taluk*. Both rivers are tributaries of Kaveri river. The major rivers of the south Malabar region are Bharathapuzha (locally known as Nila), Chaliyar and Kadalundippuzha. These rivers of southern Malabar have tremendous influence on its culture (www.keralatourism.org). The Malabar coast is primarily made up of lakes and backwaters. The backwaters are also connected through man-made canals.

13.8.4 Climate

Climate in Malabar is hot and humid throughout the year. It receives rain from both the south-west and north-east monsoons. Summers in this area are hot to mild, with a long rainy season and a short winter season. The average annual rainfall in this area is more than 200 centimetres. Summer temperatures range from 29°C to 39°C. Persistent rain keeps the temperature low for rest of the year. Temperatures during winter months range between 14°C to 25°C (Singh, 2014). Lighter sea wind blows between March and May. "Mango Showers" or pre-monsoonal showers (also known as 'April rains' or 'Summer Showers') occur in April and May and are noteworthy in this region.

13.8.5 Vegetation

The region has a tropical monsoon rainforest as the rainfall varies from 165-330 centimetres in the coastal parts and more than 500 centimetres in the highlands. Tropical evergreen forests or rainforests are seen along the hill ranges of the region spread over the districts of Wayanad, Malappuram (Chaliyar valley at Nilambur) and Palakkad (Attappadi valley). Together it constitutes some parts of Nilgiri Biosphere Reserve. Palms can be seen all over the Malabar coast. Scrubs, bushes and bamboo can also be observed in spite of the heavy rainfall.

13.8.6 Soils

Red loams, lateritic soil and alluvium-derived soil, particularly around the coast are characteristic soils of Malabar region. Laterite soils are predominantly gravelly and sandy with low amount of clay. These soils are deep, clayey and acidic to a moderate degree. Iron and aluminium are abundant in them, while lime is scarce. These soils are highly fertile. Soil along the backwaters is saline, low in organic matter and deficient in nitrogen, phosphorus, potash and calcium, resulting in low fertility. Kuttanad is known for its peaty or *kari* soils. This soil has a lot of organic matter, and is dark, heavy, and acidic. Patches of forest soil can be seen in Palghat, Kozhikode and Kannur districts.

13.8.7 Physical Resource Base

Mineral sands are abundant in the area. With 4,681 blooming species belonging to 1,415 taxa and 188 families, Malabar has a wide range of floristic richness (Nayar, et. al. 2006). This region has also been recognised for the construction of a world-class management system of surplus water and backwaters.

SAQ 9

What types of vegetation are found in Malabar Coast?

13.9 MALABAR COAST: THE CULTURAL SETTING

Malabar Coast is a unique region of India. Separated from Peninsular India by the Western Ghats and remaining connected with the cultures on the other side of Arabian Sea since ages, the region has developed a culture of its own. Access to the West Asian cultures not only impacted the region's economy, but also brought in the earliest Christianity and Islam to the region along with their cultural traits. Although, the segment adhering to the native Hinduism account for more than half of the total population, segments practicing non-Indic religions, particularly Islam and Christianity have a significant share. Despite presence of various faith groups, there is a strong link and brotherhood in the people's minds (www.keralatourism.org). The Nairs or Naimars, the Kurgas or Kudagas, the Tulus, the Konkanis and the Kanaras are ethnic groups that have settled along the Malabar coast. They have safeguarded the language and culture of the region. The society was primarily matrilineal, with polygamy and polyandry being commonplace. Higher population density, combined with Hindu orthodoxy, has resulted in the birth of the new political thought of communism (Spate, 1972). Malabar Coast region, lying between the Arabian Sea in the west and the Western Ghats in the east, has remained a culturally noteworthy and distinct region of India. Adi Shankaracharya was born in the 8th century in this region. Kasaragod and Kannur, in northern Malabar, are culturally regarded as the epicentre of numerous traditional martial art forms. These locations are also regarded to be the epicentre of a variety of ideas that are religiously tolerant (www.keralatourism.org).

13.9.1 Population

The population of the Malabar Coast has increased from 39,366,867 persons in the 2001 to 38,216,999 persons in 2011. The region is relatively highly populated with 3.15 percent of country's population. Population is unevenly distributed across districts, with Malappuram in the lead with 10.76 percent of population of the region. It is followed by Thiruvananthapuram district with 8.64 percent, Ernakulam with 8.59 percent, Thrissur with 8.17 percent and Kozhikode with 8.08 percent of the region's population. A few more central and southern districts account for more than 6 percent of the region's total population. Population thins out on the periphery of this core region. Density of population is also two to three times higher than the regional average of 536 persons per square kilometres in the former set of districts with Thiruvananthapuram (1508 persons) and Alappuzha (1504 persons) in the lead. Density of population is much lower than the regional average in the districts of Nilgiris (26 persons), Kodagu (112 persons), Mysore (168 persons), Idukki (255 persons), Wayanad (384 persons), and Pathanamthitta (452 persons) (Table 13.12 and Fig. 13.13). The western coastal areas are densely populated, whilst the eastern highlands are sparsely populated, with much lower population density.

Table 13.12: District-Wise Population Characteristics (2011)

Sl. No	Districts/Region	Total Population	Percent of Urban Population	DGR (2001-11)	Pop. Density (per km ²)	Sex Ratio		Literacy Rate		
						Total	Child	Total	Male	Female
1.	Mysore	2,63,706	9.76	7.23	168	986	994	64.11	71.25	56.86
2.	Dakshina Kannada	18,23,060	53.83	10.41	930	1019	945	89.23	93.60	84.97
3.	Kodagu	3,48,014	16.93	1.57	112	1015	975	83.26	87.06	79.53
4.	Malappuram	41,12,920	44.18	13.40	1159	1098	965	93.57	95.76	91.62
5.	Thiruvananthapuram	33,01,427	53.66	2.10	1508	1087	964	93.02	95.06	91.17
6.	Ernakulam	32,82,388	68.07	5.69	1072	1027	961	95.89	97.36	94.46
7.	Thrissur	31,21,200	67.17	4.94	1031	1108	950	95.08	96.78	93.56
8.	Kozhikode	30,86,293	67.15	7.20	1316	1098	969	95.08	97.42	92.99
9.	Palakkad	28,09,934	24.09	7.35	627	1067	967	89.31	93.10	85.79
10.	Kollam	26,35,375	45.05	1.90	1061	1113	973	94.09	96.10	92.30
11.	Kannur	25,23,003	65.04	4.73	852	1136	971	95.10	97.19	93.29
12.	Alappuzha	21,27,789	53.96	0.88	1504	1100	951	95.72	97.40	94.20
13.	Kottayam	19,74,551	28.63	1.00	895	1039	964	97.21	97.97	96.48
14.	Kasaragod	13,07,375	38.94	8.60	657	1080	961	90.09	94.05	86.49
15.	Pathanamthitta	11,97,412	10.99	- 3.00	452	1132	967	96.55	97.36	95.83
16.	Idukki	11,08,974	4.69	- 1.80	255	1006	964	91.99	94.56	89.45
17.	Wayanad	8,17,420	3.86	4.71	384	1035	965	89.03	92.51	85.70
18.	The Nilgiris	6,26,710	62.72	- 3.37	26	1038	990	85.58	91.74	79.67
19.	Kanyakumari	17,49,448	83.99	11.76	1087	1019	965	91.85	93.69	90.06
Malabar Coast		38,216,999	18,863,333 / 49.36	5.29	536	1076/ 18,409,391 m/19,807,608 f	964/ 2,009,277 m/1,936,763 f	90.29/ 30,942,571	92.57/ 15180879	88.20/ 15761692
		Gap - 4.37								

(Source: Census of India, 2011)

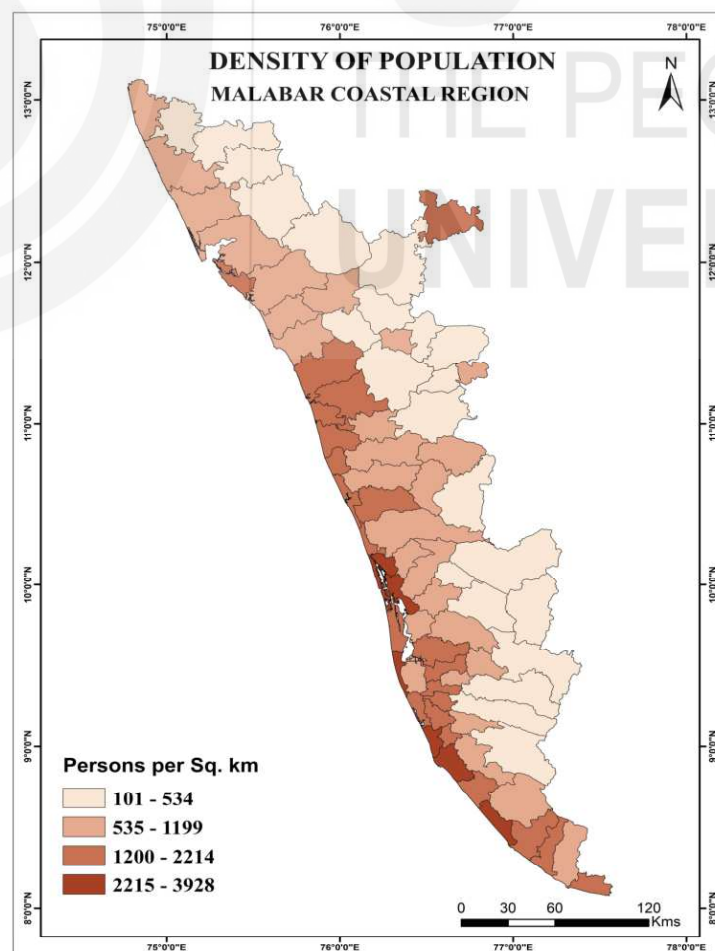


Fig. 13.13: Malabar Coast Region - Density of Population (2011).

The decadal population growth rate (DGR) in the districts of Malabar Coast was exorbitantly high in the initial post-Independence decades. However, over the decades, it has reduced remarkably. Overall population growth rate of the region was 5.29 percent during 2001-2011 which is much below the National growth rate of 17.64 percent. Excepting for the districts of Malappuram (13.40 percent), Kanyakumari (11.76 percent), and Dakshina Kannada (10.41 percent), all districts registered population growth rate lower than 10 per cent. Some districts experienced decline like Nilgiris (-3.37 percent), Pathanamthitta (-3.00 percent), and Idukki (-1.80 percent) (Table 13.12 and Fig.13.14). Lower rates of population growth, especially the negative rates may be ascribed to large-scale male selective emigration from the region.

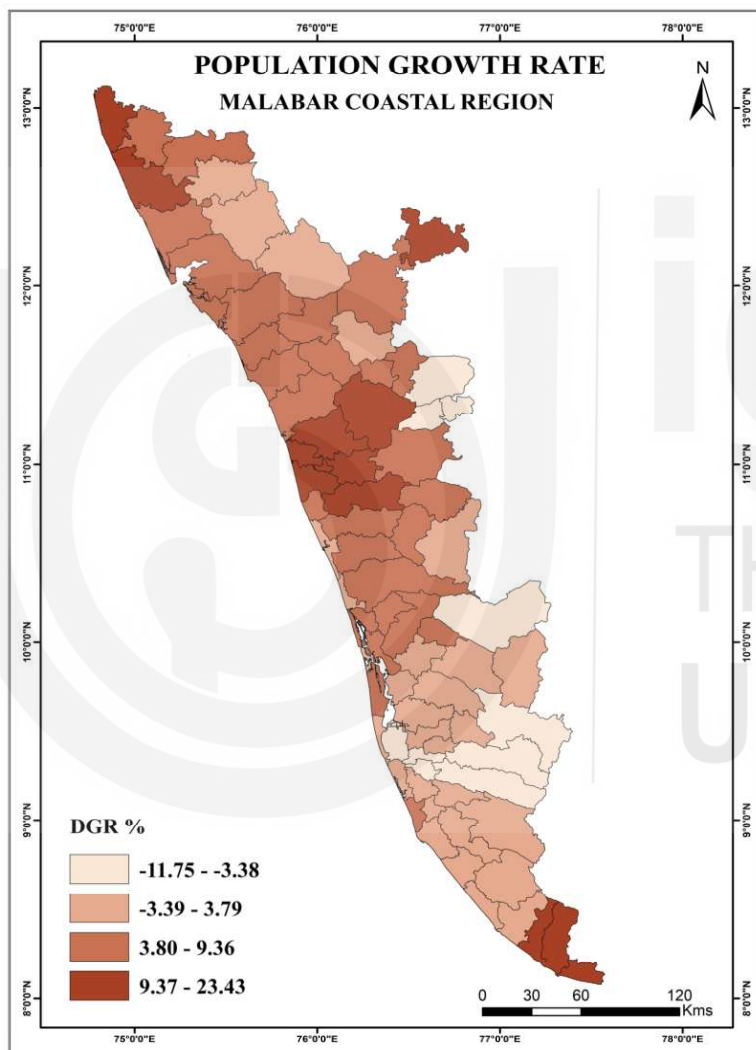


Fig. 13.14: Malabar Coast Region - Population Growth (2001-2011).

With sex-ratio of 1076 females per 1000 males, Malabar Coast displays predominance of females in its population (Table 13.12 and Fig. 13.15). Total sex ratio in the region with 1046 female per 1000 males and 1076 females per 1000 males was much higher than the corresponding National figures of 933 and 943 females per 1000 males in 2001 and 2011 respectively. In fact, excepting for Mysore (986), all districts of Malabar Coast have registered sex ratio in favour of females. Even some districts namely, Kannur (1136), Pathanamthitta (1132), Kollam (1113), Thrissur (1108), and Alappuzha (1100) have 1100 or more females per 1000 males. Performance of the region with

respect to child (0-6 years) sex ratio of 961 and 964 was better than the Nation as a whole registering 941 and 948 females per 1000 males in 2001 and 2011 respectively. However, it compares poorly with the region's overall sex ratio for the corresponding years (Fig. 13.16). This is indicative of the fact that overall sex ratio would reduce in future.

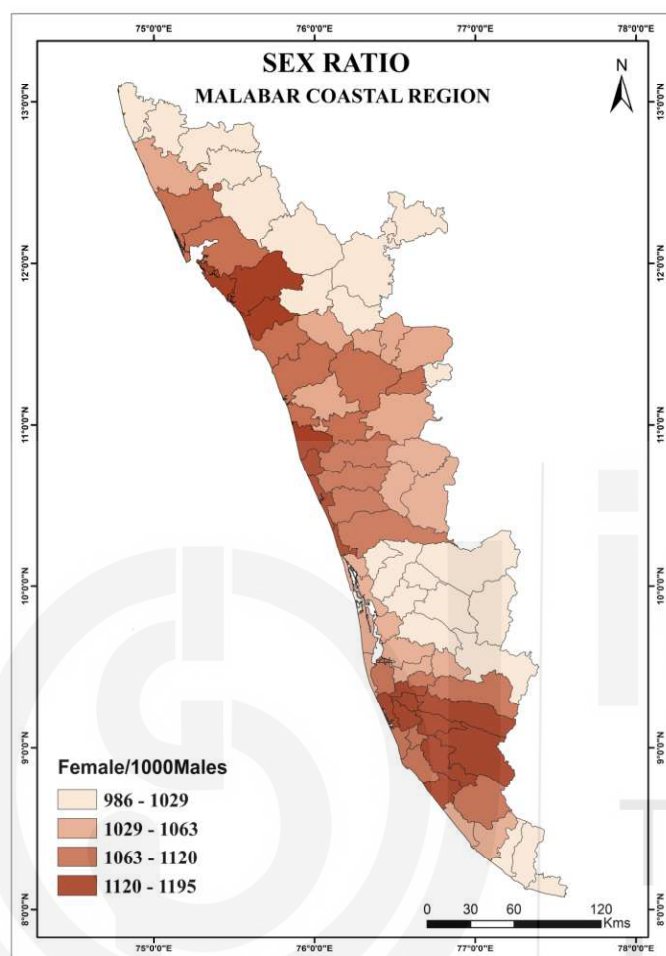


Fig. 13.15: Malabar Coast Region - Sex Ratio (2011).

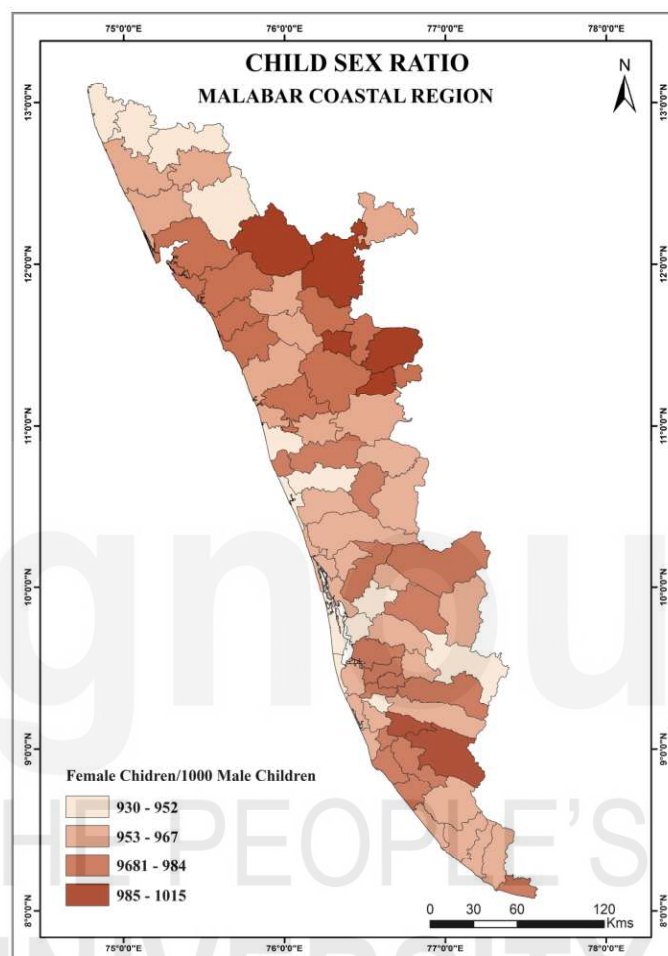


Fig. 13.16: Malabar Coast Region - Child Sex Ratio (2011).

Malabar coast is one of the most literate regions of the country with 90.29 percent adult literacy, more than 15-point percentage higher than the National average of 74.04 percent. Excepting for the district of Mysore (64.11 percent), percentage of literates in all the remaining districts of the region remains much higher than the regional average, with Kottayam (97.21 percent) at the top (Table 13.12 and Fig. 13.17). It is also heartening that the gap between male (92.57 percent) and female (88.20 percent) literacy is only 4.37, compared to 16.68-point percentage at the National level (82.14 percent and 65.46 percent). Progress of literacy in the region from 2001 to 2011 has also been impressive. The region had registered 72.72 per cent total, 78.89 percent male, and 66.91 percent female literates in 2001.

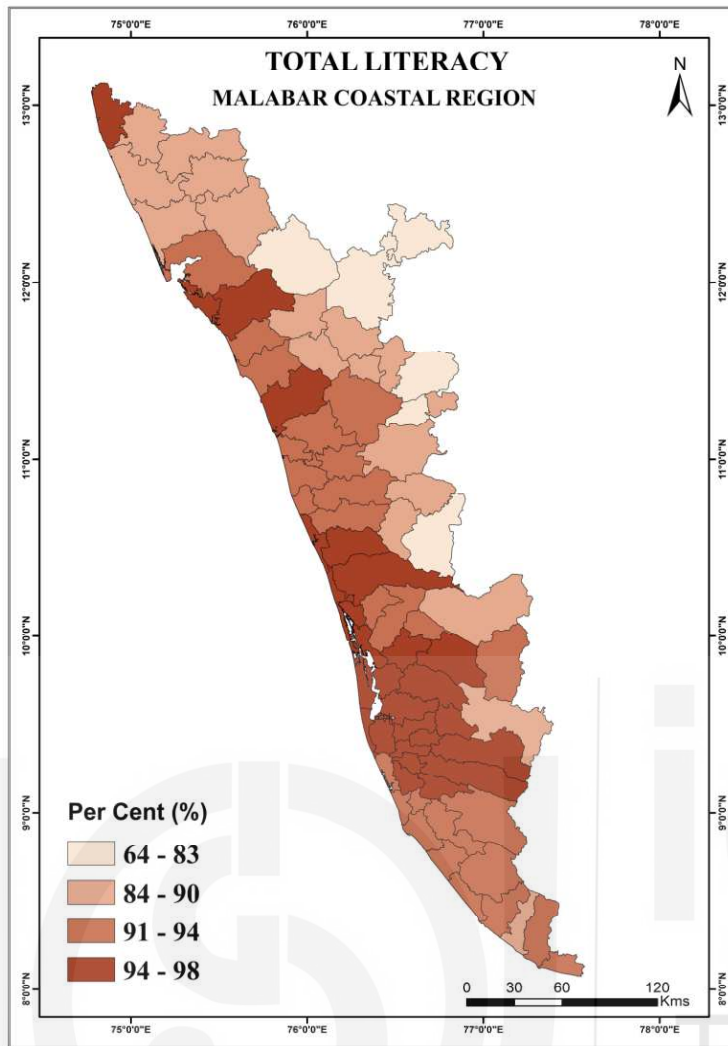


Fig.13.17: Malabar Coast - Literacy Rate (2011).

The region is also home to a number of tribes, although proportionately they account for only 1.82 percent of the region's total population (Table 13.13). Wayanad district (18.50 percent) of Kerala, and Mysore (23.61 percent) and Kodagu (13.65 percent) of Karnataka has much higher proportion of tribal population. The tribal share is between 5 to 10 percent in the districts of Kannur (8.50 percent) and Idukki (5.03 percent). The remaining districts of the region have negligible proportion of tribes in their total population. Majority of these people live in forested and hilly areas. Previously, they worked as food gatherers and firewood collectors, but now they work as farmers. The Cholanaickans are the oldest tribe found only in Malappuram area.

Table 13.13: Share of Scheduled Castes (SC) and Scheduled Tribes (ST) Population (2011)

District (<i>Tehsil</i>)/Region		Percentage to Total Population	
		Scheduled Castes	Schedule Tribes
1.	Mysore	27.78	23.61
2.	Dakshina Kannada	6.74	3.65
3.	Kodagu	11.22	13.65
4.	Malappuram	7.50	0.60
5.	Thiruvananthapuram	11.30	0.80
6.	Ernakulam	8.18	0.50

7.	Thrissur	10.39	0.30
8.	Kozhikode	6.50	1.50
9.	Palakkad	14.37	1.70
10.	Kollam	12.50	0.40
11.	Kannur	2.70	8.50
12.	Alappuzha	9.46	0.31
13.	Kottayam	7.79	1.11
14.	Kasaragod	4.08	3.74
15.	Pathanamthitta	13.70	0.70
16.	Idukki	13.12	5.03
17.	Wayanad	4.00	18.50
18.	The Nilgiris	32.88	4.23
19.	Kanyakumari	3.48	0.39
Malabar Coast		9.07/3,468,069	1.82/6,94,630

(Source: Census of India, 2011)

Scheduled Castes (SC) population have relatively higher proportion at 9.07 percent of the region's total population. Their share widely varies across the districts with the highest being in Nilgiris (32.88 percent) and Mysore districts (27.78 percent). The other districts with higher proportion of SC population than the regional average are Palakkad (14.37 percent), Pathanamthitta (13.70 percent), Idukki (13.12 percent), Kollam (12.50 percent), Thiruvananthapuram (11.30 percent), Kodagu (11.22 percent), and Thrissur (10.39 percent). Remaining districts have less than 10 percent SC population, with Kannur (2.70 percent) being at the bottom.

Table 13.14: Urbanisation

Sl. No.	Districts (Tehsil)/Region	Urban Population 2011	Percent to Region's Total Urban Population	Percent to District's Total Population		DGR 2001-2011
				2001	2011	
1.	Mysore	25,738	0.14	4.90	9.76	113.68
2.	Dakshina Kannada	981299	5.20	43.72	53.83	35.91
3.	Kodagu	58933	0.31	16.04	16.93	7.20
4.	Malappuram	18,17,211	9.63	9.82	44.18	410.21
5.	Thiruvananthapuram	17,71,596	9.39	33.75	53.66	62.28
6.	Ernakulam	2,234,363	11.85	47.56	68.07	51.27
7.	Thrissur	20,96,406	11.11	28.22	67.17	149.74
8.	Kozhikode	20,72,572	10.99	38.25	67.15	88.21
9.	Palakkad	6,76,810	3.59	13.62	24.09	89.81
10.	Kollam	11,87,158	6.29	18.02	45.05	154.77
11.	Kannur	16,40,986	8.70	50.35	65.00	35.29
12.	Alappuzha	11,48,146	6.09	29.46	53.96	84.76
13.	Kottayam	5,65,393	3.00	15.35	28.63	88.59
14.	Kasaragod	5,09,047	2.70	19.41	38.94	117.82
15.	Pathanamthitta	1,31,613	0.70	10.00	10.99	6.31
16.	Idukki	52,045	0.28	5.10	4.69	- 9.63
17.	Wayanad	31,580	0.17	3.79	3.86	6.65
18.	The Nilgiris	393065	2.08	63.33	62.72	- 4.30
19.	Kanyakumari	1469372	7.79	66.39	84.00	41.39
Malabar Coast		18,863,333	100.00	28.95	49.36	79.55

(Source: Census of India, 2001 & 2011)

Overall rural-urban share is almost balanced with 49.36 percent urban population. However, urbanisation is highly lopsided in the region (Table 13.14 and Fig.13.18). The three highly urbanised districts of Ernakulam (68.07 percent), Thrissur (67.17 percent), and Kozhikode (67.15 percent) accommodate around one-third (32.53 percent) of the total urban population of the region. Addition of the two adjoining districts of Kannur (65 percent) and Malappuram (44.18 percent), and the southern districts of Thiruvananthapuram (53.66 percent) and Kanyakumari (84 percent) to this list, increases this share to 67.75 percent. In other words, two-third of the urban population of the region is concentrated in seven out of its 19 districts. It also implies that all the coastal districts, excepting for Kodagu (16.93 percent), have very high share of urban population with Kanyakumari in the lead, while the inland western hilly districts such as Kottayam (28.63 percent), Palakkad (24.09 percent), Pathanamthitta (10.99 percent), Idukki (4.69 percent), and Wayanad (3.86 percent) are predominantly rural. Growth of urban population in Malappuram district has been exceptionally high (410.21 percent) during 2001-2011. The remaining six districts have registered growth between 35 to 150 percent. However, along with Malappuram, the districts of Kollam (154.77 percent), Kasaragod (117.82 percent), Palakkad (89.81 percent), Kottayam (88.59 percent), and Alappuzha (84.76 percent), which were less urbanised at 2001, displayed higher growth rates. On the other hand, the progress is insignificant or negative in the remaining districts. Nilgiris (-4.30 percent) and Idukki (-9.63 percent) districts have recorded decrease in the share of urban population during the decade.

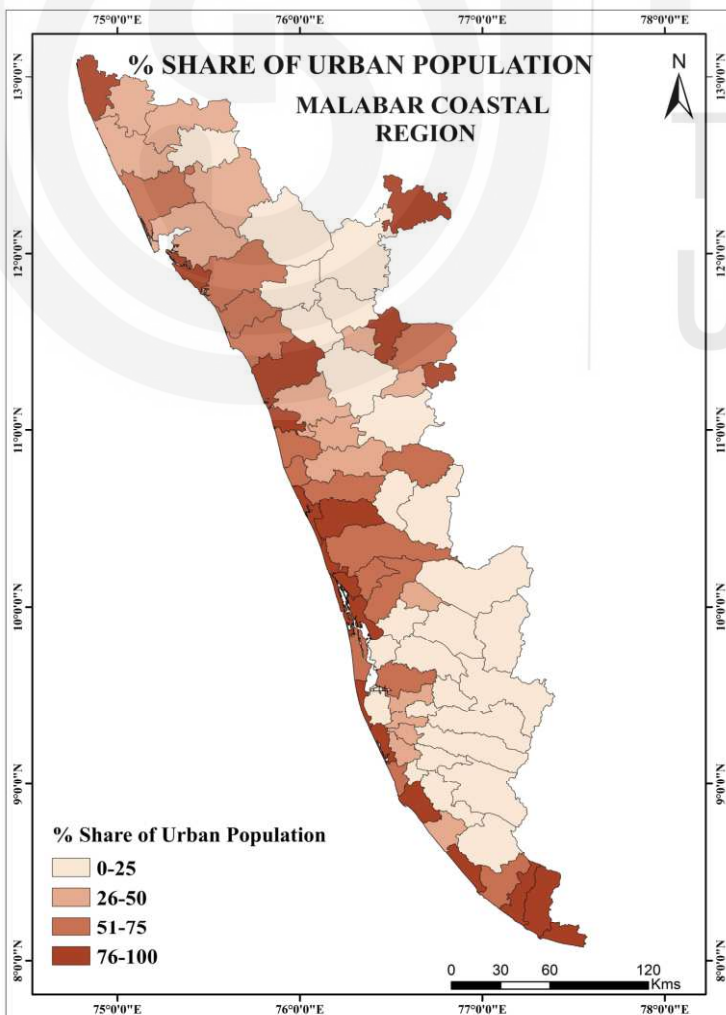


Fig.13.18: Malabar Coast - Proportion of Urban Population (2011).

Compared to the country as a whole (39.80 percent), slightly less proportion of the population of Malabar Coast region (35.88 percent) is engaged in economically gainful work (Table 13.15). However, majority (79.73 percent) of this working population has been enumerated under the 'other workers' category in 2011. Agricultural sector (16.88 percent) and household industries (3.39 percent), accommodate much smaller proportions of the workers of the region. It is only in the less urbanised and inland districts of Mysore (80.56 percent), Idukki (47.76 percent), Wayanad (45.40 percent), Palakkad (30.49 percent), The Nilgiris (28.42 percent), and Pathanamthitta (24.66 percent), the share of agricultural workers is higher than the regional average. Vice versa is the case with the other workers. The share of other workers almost touches 90 percent mark in more urbanised and littoral districts. It is also worth noting that in almost all districts the share of agricultural labourers is higher than that of cultivators.

Table 13.15: Work Participation (2011)

Sl. No	Districts (Tehsil)/Region	Total Workers (Main + Marginal)	Cultivators	Agricultural Labourers	Agricultural Workers	Household Industry Workers	Other Workers
1.	Mysore	50.72	36.88	43.68	80.56	1.45	18.00
2.	Dakshina Kannada	47.16	2.75	2.27	5.02	17.75	77.22
3.	Kodagu	50.32	3.87	3.32	7.19	0.54	92.27
4.	Malappuram	25.83	5.42	11.05	6.47	1.73	81.80
5.	Thiruvananthapuram	37.31	3.15	7.67	10.82	2.32	86.86
6.	Ernakulam	38.10	4.04	5.71	9.75	1.92	88.33
7.	Thrissur	35.11	3.81	6.75	10.56	2.54	86.89
8.	Kozhikode	30.70	2.80	6.80	9.60	1.40	89.00
9.	Palakkad	37.09	6.51	23.98	30.49	2.40	67.11
10.	Kollam	34.61	6.22	10.11	16.33	2.36	81.32
11.	Kannur	32.66	4.43	10.07	14.50	1.56	83.93
12.	Alappuzha	37.81	3.14	8.91	12.05	4.46	83.49
13.	Kottayam	37.26	6.79	8.57	15.36	2.52	82.12
14.	Kasaragod	35.41	5.13	8.37	13.50	8.37	81.21
15.	Pathanamthitta	32.80	10.54	14.12	24.66	2.82	72.52
16.	Idukki	46.56	19.54	28.22	47.76	1.33	50.91
17.	Wayanad	41.60	15.51	29.88	45.40	1.34	53.26
18.	The Nilgiris	46.65	4.68	23.74	28.42	1.06	70.52
19.	Kanyakumari	36.14	2.21	9.70	11.91	5.29	82.80
Malabar Coast		13,712,284 / 35.88	777,665 / 5.67	1,537,329 / 11.21	2,314,994 / 16.88	4,65,079 / 3.39	10,932,211 / 79.73

(Source: Census of India, 2011)

13.9.2 Settlement

The site, situation, pattern and morphology of the settlements in Malabar region are closely linked to its coastal, riverine, hilly terrain, cultural history, and economy. The settlements of the region have evolved over centuries of human adaptations to the natural environment. Characterised by different geographical settings, the region presents variety of sites or physical

characteristics of the land where the settlement is located. The narrow, flat, and low lying terrain of the coastal plains on the Arabian seaboard, providing easy access to the sea and its resources have been the suitable sites for the growth and development of major coastal settlements like Kozhikode, Kannur, and Thalssery etc. Similarly, towns such as, Ponnani and Kottakkal have flourished along the river banks and backwaters, utilizing their fresh water resources for agriculture and transportation. Away from the plains, in the foothills and plateaus of the Western Ghats, the settlements have utilized the elevated terrain, which provides cooler climate and fertile soils for agriculture, particularly plantation crops like tea, coffee, and spices. Important hill stations like Wayanad, have emerged on such sites.

Several factors seem to have played the role in the context of relative location or situation of the settlements in the Malabar region. Coastal tracts of Malabar region provide easy access to the trade centres in the Middle east, East Africa, Europe, and Southeast Asia. Throughout history, and even today, the port towns of Kozhikode and Kannur have remained great hubs for trade dealing with spices produced in the region (Vasco da Gama had reached Kozhikode on 20th May, 1498). Away from the coast, areas closer to the Western Ghats are bestowed with bountiful forest resources, fertile soil, favourable climate for plantation agriculture, and tourism provide highly suitable location for the development of settlements. Banks of the rivers and backwaters have remained attractive locations for settlements with their fresh water, suitable arable land, and inland water transport facility. Some settlements also developed near the historical trade routes, religious centres, and cultural hubs, e.g. Kozhikode.

Natural features, economic activities, and history of the region have greatly influenced the spatial distribution and organisation of human habitation across the landscape or the pattern of settlements in Malabar Coast region. All the three sub-regions of Malabar Coast clearly display three discernible patterns. Linear pattern settlements in the western lowlands, stretch along the shoreline, transportation routes such as roads, rivers, and railways, e.g. coastal towns of Kannur and Kozhikode. Settlements get dispersed in the hilly, forested areas of the Western Ghats in the east. Between these two parts of the region, especially in the foothills and fertile plains, settlements often take a clustered or nucleated form. In Malappuram and Wayanad districts, villages exhibit nucleated pattern, with houses clustered around paddy fields, a water source, market, temple, mosque, or any common facility.

The morphology or the internal structure and layout of the built environment, including the arrangement of streets, buildings, and open spaces of settlements in the region, is a blend of traditional and colonial influence. The coastal towns and villages have densely built-up areas, narrow streets, and a mixture of traditional, Arab, Portuguese, and Dutch architectural styles. The central parts of towns often have a mix of residential, commercial, and religious buildings, with a central market area. The villages in the agricultural midland-foothill portion of the region have houses characterised by a central courtyard, sloping tiled roofs, and wooden construction, particularly designed to withstand heavy monsoon rains and provide natural ventilation. Settlements in the Western Ghats portion in the east, where much of the area is under plantation or forest cover, a more dispersed and irregular morphology is seen.

Individual estates or farmhouses reflecting colonial influences are scattered across the hilly terrain, connected by winding roads. Apart from the above three types, at places where rural and urban characteristics overlap, such as in Malappuram or Kottakkal, the settlement morphology shows a combination of modern and traditional structures. While the urban areas have multi-storied buildings, wide roads, and commercial complexes, the rural areas retain traditional buildings, farmlands, and narrow streets.

Around half (50.64 percent) of the region's population lives in its 1,651 villages (Table 13.16). Villages of the region are highly scattered with around four (4.29) villages per 100 square kilometres. Excepting for the three districts of Karnataka with Dakshina Kannada (18.50) in the lead, and Alappuzha (6.28), Kasaragod (5.57), and Thrissur (5.28) of Kerala, The Nilgiri (7.23) and Kanyakumari (5.17) of Tamil Nadu, all the districts of the region have a smaller number of villages per 100 square kilometres than the regional average. Coastal districts with larger plain areas and abundance of water, offering greater economic opportunities, are marked with dispersed settlements.

Nucleated settlements are common in less favourable areas of eastern hilly districts. Settlement pattern is dependent upon specific and unique geographic features of the districts as well as socioeconomic factors, including social cohesion (Sreekumar, 1990; Ramakumar, 2018). Villages of the region are mostly large in population size. Around 60 (59.62 percent) percent of the villages have population of more than 5,000 persons. Addition of the villages with more than 2,000 persons takes this share above 75 (76.28 percent) percent. In fact, all villages of Malappuram, Thiruvananthapuram, Palakkad, and Kannur districts, have more than 5,000 population. However, a closer look reveals that this generalisation does not apply to the portion of Malabar Coast region in Karnataka.

Table 13.16: Rural Settlements (2011)

Sl. No.	Districts/Region	Number of Inhabited Villages	Density of Villages (per 100 km ²)	Percentage of Villages by Population Size						
				Less Than 200	200-499	500-999	1,000 - 1,999	2,000-4,999	5,000 - 9,999	10,000 and Above
1.	Mysore	241	15.01	20.33	15.77	25.32	26.55	12.03	0	0
2.	Dakshina Kannada	252	18.50	0	0.40	3.57	20.63	57.54	17.06	0.80
3.	Kodagu	161	5.23	0.62	3.11	26.09	39.75	26.70	3.73	0
4.	Malappuram	83	3.16	0	0	0	0	0	1.20	98.80
5.	Thiruvananthapuram	68	4.23	0	0	0	0	0	4.41	95.59
6.	Ernakulam	61	3.20	0	0	1.64	0	1.64	4.92	91.80
7.	Thrissur	8	5.28	0	0	0	1.02	25.51	35.70	37.77
8.	Kozhikode	51	3.66	0	0	0	0	1.96	5.88	92.16
9.	Palakkad	131	3.21	0	0	0	0	0	15.27	84.73
10.	Kollam	69	3.35	1.45	0	0	0	0	5.80	92.75
11.	Kannur	56	2.85	0	0	0	0	0	21.43	78.47
12.	Alappuzha	51	6.28	0	1.96	0	1.96	0	7.84	88.24
13.	Kottayam	80	4.16	0	0	0	2.50	1.25	16.25	80.00
14.	Kasaragod	93	5.57	0	0	0	5.38	26.88	32.26	35.48
15.	Pathanamthitta	64	2.42	0	0	1.56	0	0	6.25	92.19
16.	Idukki	64	1.38	0	0	1.56	1.56	7.81	12.50	76.56

17. Wayanad	48	2.30	0	0	0	2.08	0	12.50	85.42
18. The Nilgiri	26	7.23	0	3.85	0	7.69	15.38	42.31	30.77
19. Kanyakumari	44	5.17	9.09	4.55	2.27	2.27	25.00	40.91	15.91
Malabar Coast	38516.77/1,651	4.29	55/3.16	48/2.76	116/6.66	194/1.14	290/16.66	224/1.287	814/46.75

(Source: Census of India, 2011)

As noted earlier, Malabar Coast is one of the most urbanised regions of India. Excepting for the western hilly districts, most of the districts have high to very high share of urban population. Seven coastal districts of Ernakulam, Thrissur, Kozhikode, Kannur, Malappuram, Thiruvananthapuram and Kanyakumari accommodate about two-third (67.75 percent) of urban population of the region. These districts also have similar proportion (70.70 percent) of urban centres of the region. Out of the total 669 urban centres in the region, 473 are in these seven districts. This share was slightly lower in 2001, when 97 out of 167 or 58.08 percent of the region's urban centres were in these seven districts. This implies, while the increase has been remarkable in these seven districts with Thrissur in the lead, replacing Kanyakumari, the situation in other districts is no different, excepting in Kodagu, Pathanamthitta, Idukki, Wayanad, and The Nilgiris districts. Besides, the region is dotted with a large number (73.69 percent) of small towns, belonging to towns of III and IV Class categories. Interestingly, most (97.77 percent) of the towns of Thrissur, which has the highest number (135) of towns, belong to Class III to VI categories. In the entire region, only the two cities of Thiruvananthapuram (7,62,531), and Kozhikode (5,50,440) are of M4 status with 5 to 9.99 lac population (Table 13.17).

Table 13.17: Urban Settlements (2011)

Sl. No.	Districts/ Region	Number of Urban Centres		Number of Urban Centres by Population Size (Class/Sub-Class)					
		2001	2011	1,00,000 and Above (I)	50,000-99,999 (II)	20,000-49,000 (III)	10,000-19,000 (IV)	5,000-9,999 (V)	Below 5,000 (VI)
1.	Mysore -	1	2	-	-	-	2	-	-
2.	Dakshina Kannada	26	39	1 (Mangalore - M3)	2	4	6	25	1
3.	Kodagu	3	3	-	-	1	1	1	-
4.	Malappuram	5	44	1 (Malappuram - M1)	6	37	-	-	-
5.	Thiruvananthapuram	5	31	1 (Thiruvananthapuram - M4)	3	21	6	-	-
6.	Ernakulam	9	56	1 (Kochi - M3)	4	38	11	2	-
7.	Thrissur	7	135	1 (Thrissur - M3)	2	13	64	49	6
8.	Kozhikode	3	51	1 (Kozhikode - M3)	4	35	11	0	0
9.	Palakkad	4	21	1 (Palakkad - M1)	1	14	5	0	0
10.	Kollam	3	27	1 (Kollam - M3)	0	26	0	0	0
11.	Kannur	7	67	0	4	27	34	1	1
12.	Alappuzha	5	38	1 (Alappuzha - M2)	1	23	13	0	0
13.	Kottayam	4	17	0	1	15	1	0	0

14	Kasaragod	2	27	0	1	3	13	9	1
15	Pathanamthitta	3	4	0	1	2	1	0	0
16	Idukki	2	1	0	1	0	0	0	0
17	Wayanad	1	1	0	0	1	0	0	0
18	The Nilgiris	16	16	-	2	4	2	8	-
19	Kanyakumari	61	89	-	-	15	44	27	3
Malabar Coast (Number / percent)		167	669/ 100.00	9 / 1.35	33 / 4.93	279 / 41.70	214 / 31.99	122 / 18.24	12 / 1.79

(Source: Census of India, 2011)

SAQ IO

- Name the major ethnic groups of Malabar coast region.
- Which district shares the maximum proportion of population of Malabar coast region?
- What could be the probable reason of lower or negative population growth rate in Malabar coast region?
- Which districts of Malabar Coast region have registered sex ratio of more than 1100 females per 1000 males at the 2011 Census?
- Name the districts of Malabar coast region with the highest proportion of SC and ST populations.
- Which is the most urbanised district of Malabar coast region?

13.9.3 Economy

Land Use: With wide variation across the districts, the region as a whole has slightly less than one-third (30.96 percent) of area under forest cover (Table 13.18). Forest cover is mostly confined to the eastern hilly districts, with The Nilgiris in the lead with 56.89 percent of forest area. Most of the eastern districts have forest cover more than or almost matching the international standard of 33 per cent. Four districts namely Iduki (15.42 percent), Pathanamthitta (11.62 percent), Palakkad (11.09 percent), and Kodagu (10.53 percent), together account for nearly half (48.66 percent) of the total forest area of this region. On the other hand, a good number of coastal districts like Kannur (8.74 percent), Kottayam (4.08 percent), Kasaragod (3.21 percent) have very low proportion under forest cover and Alappuzha is completely devoid of forest.

Table 13.18: Rural Land Use.

Sl. No.	Districts (Tehsil)/ Region (Total Area /Km ²)	Total Rural Area (in Km ²)	Percentage to Total Rural Area								Net Sown area
			Forested Area	Non-Agricultural	Barren and Uncultivable Land	Permanent Pasture + Other Grazing Land	Miscellaneous Tree Crops	Cultivable Waste Land	Fallow other than Current Fallow	Current Fallow	
1	Mysore (1608.38)	1605.90	24.64	5.45	4.30	1.95	0.11	24.88	1.19	1.08	36.40
2	Dakshina Kannada (1959.31)	1362.03	44.85	3.74	6.81	1.00	8.03	6.19	1.63	1.20	26.55
3	Kodagu (3097.68)	3075.67	40.81	4.17	2.73	0.27	1.11	7.73	1.37	1.22	40.59

4	Malappuram (3554.46)	2623.53	13.50	14.90	0.39	0	0.12	1.69	2.02	2.82	64.56
5	Thiruvananthapuram (2187.81)	1608.46	27.22	9.22	.13	0	0.02	0.17	.19	1.68	61.37
6	Ernakulam (3063.00)	1908.45	34.25	8.79	0.20	0.00	0.05	2.83	2.39	2.40	49.06
7	Thrissur (3029.19)	1857.58	51.40	7.54	0.07	0.00	0.10	2.75	1.82	2.02	34.30
8	Kozhikode (2346.41)	1394.59	18.76	15.55	0.53	0	0.09	1.39	0.44	1.55	61.68
9	Palakkad (4475.84)	4076.11	32.45	10.16	0.32	0	0.37	3.07	2.25	3.24	48.14
10	Kollam (2487.88)	2068.54	33.91	11.82	0.10	0	80 / 0.04	0.71	0.73	1.74	50.94
11	Kannur (2971)	1963.66	8.74	13.08	0.91	0	0.09	3.20	1.54	0	72.44
12	Alappuzha (1,410.11)	811.65	0.00	15.38	0.04	0.04	0.16	0	3.86	3.85	76.67
13	Kottayam (2204.42)	1921.71	4.08	12.27	0.60	0	0.06	2.08	1.56	2.59	76.76
14	Kasaragod (1991.00)	1671.13	3.21	8.10	3.72	0	0.35	6.42	1.09	0	67.11
15	Pathanamthitta (2652.77)	2649.50	52.28	5.96	0.07	0	0.03	0.56	1.07	1.58	38.43
16	Idukki (4363.28)	4621.75	39.80	5.70	0.27	0.02	0.05	0.34	0.13	0.26	53.43
17	Wayanad (2129.66)	2085.72	38.92	5.27	0.06	0	0.05	0.52	0.38	0.83	53.97
18	The Nilgiris (24190.4)	359.68	56.89	2.11	0.59	4.31	0.59	1.49	0.55	4.03	29.44
19	Kanyakumari (1609.57)	851.11	50.47	10.22	1.36	0.00	1.58	0.21	0.29	0.03	35.84
Malabar Coast (71332.17)		3851 6.79	1192 6.10/ 30.96	3535.2 1 / 9.18	407.18/ 1.06	70.32/ 0.18	198.54/0. 52	1291.84 8/3.35	488.19 1.27	612.2 8 1.59	1998 7.09/ 51.89

(Source: Census of India, 2011)

Net sown area is 26.55 per cent in Dakshina Kannada district and 76.76 percent in Kottayam district. More than half of the districts have higher proportion of net sown area than the regional average, and most of these are the coastal districts. Around one-tenth (9.18 percent) area of the region is put to non-agricultural use. Here again one can see significant difference between the eastern hilly and western coastal districts. Most of the latter category districts have devoted higher proportion of area to non-agricultural use. Areas under the remaining types of land use are markedly insignificant in the region (Table 13.18).

Agriculture: Agriculture is the major form of economy of Malabar region, flourishing along coastal districts since long. More than 50 percent of land is under cultivation in these districts not only because of availability of suitable land, but also for demand of agricultural products. A small fraction of land which is not suitable to agriculture is utilised for pastoralism. Due to availability of sufficient moisture from the heavy rains, irrigation becomes necessary only in case of drought conditions or for multiple cropping. Agriculture is largely done using manual labour, be it cereal crop or cash crop. Major crops in this region are paddy, tapioca, pulses, sugarcane, ginger, groundnut, sesame, oilseed, *ragi* (figure millet), chilli, and vegetables. Along with the major crops,

plantation crops like coconut, pepper, cardamom, rubber, coffee, tea and areca nuts are significant all along the Malabar Coast (Singh, 2014).

Industrial Economy: Small scale and cottage Industries are common in Malabar Coast region, which are mostly scattered in Dakshina Kannada district. Mangalore is a major industrial centre. Major industries are coffee processing, cashew processing, automobile, metallurgy, textile, chemical, rice mills, oil mills, tobacco and bidi making, tile factories, paper mills, electrical goods and transport equipment. Malabar coast of Kerala has mainly agro-based and cottage industries. Major agro-based industries are cashew processing, fish product industries, tea processing, coffee processing, beedi making, and coir making. Major industrial centres are Kollam, (cashew processing), Kozhikode, Ernakulam, Kochi (fish product), and Kannur (tea, coffee and bidi) and Alappuzha (coir making).

Saw mills, furniture making and plywood as well as paper industries are significant among forest-based industries. Major industrial centres are Kozhikode (saw mills), Kannur, Kottayam, Thrissur, Palakkad, (plywood factories), Kollam (boat building) and Kochi (ship building yard).

The major mineral based industries are aluminium, cement, titanium, fertilizer, tile and brick, porcelain, ceramic, rayon and electrical goods. Major industrial centres are Aluva (aluminium and fertiliser), Kundara (aluminium, ceramic and electrical goods), Kottayam and Chavara (cement), Thiruvananthapuram (titanium), Thrissur and Kollam (tile and brick), Kannur, Kozhikode, Palakkad, and Thrissur (porcelain), Ernakulam (electrical motors, cycle parts and rayon).

Another major economy prevalent in the region is tourism. Malabar Coast region is blessed with scenic beauty and rich heritage sites. There is an array of tourist attractions in the region for which the region is called 'God's Own Country'.

13.9.4 Transport and Communication

Being a coastal region and experiencing thriving trade since long, Malabar has a well-developed transportation infrastructure. To begin with, the coastal city of Mangalore is well connected with Chennai by rail net work. Another route connects Kochi with Chennai. Ernakulam is connected with Thiruvananthapuram. Kollam on this route, is connected with Tamil Nadu through Shencottah gap. Passenger density remains higher in Kozhikode, Kollam, Ernakulam, and Thiruvananthapuram.

With regard to roadways, Mangalore is significant for passengers as well for freight transport. It is well connected with Shimoga, Bhadravati and Hassan. Important items transported through this route are salt, fish, cotton goods and building materials. Down south, maximum road density network is found between Thiruvananthapuram and Ernakulam. Other significant routes are between Kochi-Coimbatore through Palakkad and Ernakulam-Kanyakumari. Freight traffic remains more in Thiruvananthapuram, Kozhikode, Alappuzha, Ernakulam and Kollam districts.

Apart from the above, inland waterway transportation also holds significance. For example, Thiruvananthapuram and Hosdurg (Kasaragod) are well connected by canal waterways. Ashtamudi and Vambanad lakes too provide

outstanding navigation facilities. Mangalore, Kochi, Kozhikode, Alappuzha, Thiruvananthapuram are the important ports along Malabar coast. Important imports at Kochi and Kozhikode are petroleum, hardware, machinery, fertilizer and food grains, while important export items include coconut, copra, pepper, ginger, cardamom, cashew kernels, tapioca, tea, coffee and ilmenite. Thiruvananthapuram, Mangalore and Kochi are important airports in the region providing connections with major cities of India.

13.10 MALABAR COAST: THE REGIONS

The Malabar coast region is part of the fourth macro region of India, i.e., the Coastal Plains and Islands. It is further regionalised into (i) Gujarat Coastal Plains, (ii) Western Coastal Region, (iii) Eastern Coastal Region, and (iv) The Islands. The Western coastal region can be again sub-divided into (i) Maharashtra Littoral, (ii) Goa Coast, (iii) Karnataka Coast, (iv) North Kerala Coast, (v) Central Kerala Coast and (vi) South Kerala Coast. The Malabar coast region extends over 19 districts including parts of the three southern districts of Karnataka Coast region adjoining Kerala, all the districts of North, Central and South Kerala regions, and also parts of The Nilgiris and Kanyakumari districts of Tamil Nadu (Singh, 2014). On the basis of geographical characteristics, three sub-regions of the Malabar coast region can be identified. These are as under:

1. Eastern Highlands

Eastern Highlands of Malabar coast region are part of the Sahyadri mountain ranges or Western Ghats. Parts of Mysore and almost the entire Wayanad, Palakkad, Idukki and Pathanamthitta districts, and the eastern segments of all other districts in varying proportions are covered under this region. With an average elevation of about 900 metres, the region has a number of peaks reaching up to 2,000 metres, the highest being Anaimudi with an altitude of 2694 metres. Most of the rivers of the region originate from this region. The region is a great source of a number of spices such as cardamom, black pepper, clove and cinnamon, cardamom being the major one. A hill range is also called Cardamom hills which has the highest peak of the region.

2. Central Highlands

Central Highlands are a bunch of undulating hills and valleys sandwiched between the Western Ghats and the Western Coastal Lowlands. The region covers all the coastal districts of the region. Primarily, much of the area of the region is devoted to cultivation. Most farmers of the region grow cashew, coconut, areca nut and banana under intensive agriculture system.

3. Western Lowlands

This region is also known as the Coastal Plains. The region is characterised by interconnected brackish canals, lakes, estuaries and rivers. The available areas are suitable for cultivation of coconut and paddy. Kuttanad area covering parts of Kottayam, Alappuzha, and Pathanamthitta districts are considered as 'The Rice Bowl of Kerala'. Rice is grown over three seasons in this region, at places below sea level, claiming large parts of Vembanad lake, the longest lake of India and the largest lake of Kerala. This part also has lot of population engaged in fishing related activities.

SAQ II

- a) Name the three sub-regions of Malabar coast region.
 - b) Which area of Malabar coast region is called 'The Rice Bowl of Kerala and why?
-

13.11 MALABAR COAST: PROBLEMS AND PROSPECTS

Problems

Major problems of the region are centred around agriculture. There is misbalance between food crop and plantation crop production. Although the region has World ranking in the production of plantation crops, it lags much behind in food crop production, despite having favourable geographical conditions permitting crop cultivation all round the year. Besides, the problems of declining profitability of the crops (Abraham and Kumar, 2021), lack of marketing and easy credit facilities, crop failures, and uneconomic size of holdings, large scale out-migration particularly of males in the working age group have direct adverse effects on agricultural operations.

Out-migration from Malabar coast region started long back. Earlier people migrated internally in search of cultivable land, which brought forth transformation in agriculture and socio-economic development (Rani and Vijayan, 2019). Subsequently, migration of the skilled and semi-skilled labour force in search of employment, mostly to Gulf and Arabian countries (Vishwanathan, 2014 and Joseph, 2020), almost emptied the labour pool of the region. Without mechanised agriculture, dependence on migrant labour from north India has been to a great extent impacting the social fabric of the region.

Another problem of this region is related to the fisheries. Without modern equipments, much of the fishing activities are done with traditional small boats, confined to the shallow sea. Although, the region has tremendous potential for tourism industry, it has not developed in the right earnest.

Prospects

Malabar region entails number of prospects for its comprehensive development. These are related to its resources base including both natural and human resources.

Some of the notable areas include industries, tourism and agriculture. Industrial development related to Information and communication technology holds potential. In tourism sector, natural landscape and its historical significance carries potential to tap the same and benefit. In agricultural sector, the cultivation of cash crops (chiefly cinnamon), forest products with valuable timber products (like ebony, rosewood and teak etc.) and fish production (popular varieties such as sardines, tunas, mackerels, and prawns) hold good potential.

13.12 SUMMARY

In this Unit, you have learnt the following:

- **Chotanagpur** is a land locked plateau with distinctive physical and cultural characteristics.
- Geologically, this region is a part of the Peninsular Plateau. Relief is marked with a series of plateaus descending in elevation in all directions, particularly towards the north and the southeast.
- Chotanagpur is the source region to a large number of rivers and streams which exhibit different drainage patterns and densities. Damodar is the main river of the region which flows through the Permo-Triassic fault in between the two main plateaus of Ranchi and Hazaribagh.
- The region has a typical monsoonal climate with significant seasonal variations in temperature, wind velocity and rainfall.
- Three broad categories of natural vegetation, namely (i) Dry Deciduous Forests, (ii) Dry Peninsular *Sal*, and (iii) Moist Peninsular *Sal* are found in the region.
- Chotanagpur is well endowed with physical resources, particularly forests and minerals.
- Chotanagpur is one of the richest mineral resource regions of the country with huge stocks of copper, apatite, coal, iron ore, limestone, mica, bauxite, asbestos, byrite, chromite, kynite, steatite and uranium.
- Population of Chotanagpur has multiplied almost three times between 1961 and 2011.
- The region has been the traditional abode of around 30 tribes of which Santhals, Oraon, Munda and Ho account for almost 80 percent of its total tribal population.
- Occupational structure of the region reveals that agriculture provides relatively lesser opportunities.
- The percentage of cultivated land seems to be intimately related to availability of flat land in different districts.
- The rich mineral and forest resource base of the region and its location-specific advantage in terms of proximity to market and ports, has helped the establishment of several major industries within the region.
- **The Malabar Coast region** is comprised of parts of the districts of Dakshina Kannada, Kodagu, and Mysore in Karnataka, all districts of Kerala, and parts of The Nilgiris and Kanyakumari districts of Tamil Nadu.
- The Archaeans, Tertiary rocks, and the recent deposits are the three main geological formations in this region.
- This region has tropical monsoon rain forest. The Malabar region's soils include red loams, lateritic soils, and alluvium-derived soils, particularly around the coast.

- According to the 2011 census, Malappuram is the most populous district in Malabar, whereas Wayanad is the least populous district in Kerala and The Nilgiris is the least populous district in Tamil Nadu. The rural-urban share of population in the region is almost balanced with wide spatial variations.
- Agriculture related pursuits have been the backbone of the region's economy since long. The industrial landscape of the region is marked with the prominence of small scale and cottage industries.
- Transport network of all forms is well developed in the region, connecting it with places, both within and outside the country. Major problems faced by the region pertain to agriculture and out migration.
- The region has a rich resource base in terms of land, marine, forest, minerals and tourism.
- The three sub-regions of Malabar coast are endowed with distinct human and physical resources. It is one of the most literate regions of the country. The population structure is female dominated, wherein the sex ratio is in favour of the females in almost all the districts.
- Since long the region has been the major supplier of spices and many plantation crops. Although the region has great potential in terms of food crop cultivation, fishing and tourism sectors, concerted efforts are required for their proper development.

13.13 TERMINAL QUESTIONS

1. What do you perceive about the physical resource base of Chotanagpur?
2. Elucidate the characteristics of Chotanagpur in terms of different population parameters.
3. Briefly discuss the economic characteristics of Chotanagpur.
4. Divide Chotanagpur into smaller order regions and briefly explain their characteristics.
5. Briefly explain the physical setting of Malabar coast region in terms of its geology, relief, drainage.
6. Discuss about the rural and urban settlements of Malabar coast region.
7. Briefly discuss the economic characteristics of Malabar coast region.
8. Divide Malabar coast region into sub-regions and briefly explain their characteristics.

13.14 ANSWERS

Self-Assessment Questions (SAQ)

1. Chotanagpur plateau is mostly covered with granite and gneiss rocks.
2. Drainage pattern of most of the rivers of the Plateau is dendritic, which signifies lesser structural control despite the varying character and hardness of the plateau surface on which they are flowing.

3. It receives maximum rainfall from June to October months during monsoon season.
4. a) Three types of vegetation are found in Chotanagpur plateau. These are dry deciduous forests, dry peninsular Sal and moist peninsular Sal.
b) Red soil is rich in potash and lime and deficient in nitrogen, phosphoric acid and humus.
5. Main obstacle is adoption of technology leading to low output in agricultural sectors.
6. a) It is Chatra followed by Hazaribagh.
b) It is rich mineral and forest resource base.
7. Chotanagpur north and chotanagpur south.
8. a) It is 'Garden of Spices' or Spice Garden of India in various ancient west Asian writings.
b) These are earliest rocks, tertiary rocks and recent deposits.
9. Malabar coast has tropical monsoon rain forest.
10. a) The Nairs or Naimars, the Kurgas or Kudagas, the Tulus, the Konkanis and the Kanaras are the major ethnic groups that have settled along the Malabar coast.
b) The Malappuram district shares the maximum proportion of 9.87 percent of the total population of Malabar coast region.
c) Lower or negative rates of population growth may be ascribed to large-scale male selective emigration from Malabar coast region.
d) Kannur, Pathanamthitta, Kollam, Thrissur, and Alappuzha districts of Malabar coast region have registered sex ratio of more than 1100 females per 1000 males at the 2011 Census.
e) The Nilgiris district with 32.08 percent SC and Wayanad district with 18.50 per cent of ST population, are the two districts with the highest proportion of SC and ST population in Malabar coast region.
f) With 68.07 percent urban population the Ernakulam district is the most urbanised district of Malabar coast region.
11. a) These are eastern highlands, central highlands and western highlands.
b) It is Kuttanad area.

Terminal Questions

1. Refer to Section 13.3.
2. Refer to Section 13.3.
3. Refer to Section 13.4.
4. Refer to Section 13.6.
5. Refer to Section 13.8.
6. Refer to Section 13.9.2.
7. Refer to Section 13.9.3.
8. Refer to Section 13.10.

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Web Link

1. www.keralatourism.org. assessed on 20th April, 2022.

GLOSSARY

Aquifer	: It is a porous layer of rock or sediment saturated with water.
Bangar	: Bangar is the older alluvial floodplains.
Chang	: It is a kind of local brew made from barley.
Deciduous	: Refers to trees and shrubs that seasonally shed their leaves.
Deciduous Forest	: A deciduous forest is a type of forest dominated by trees that lose their foliage at the end of the growing season.
Exorbitant	: Unreasonably high.
Jhum Cultivation	: Jhum cultivation is a traditional agricultural process that involves clearing the land from trees and other vegetation, burning it, and then cultivating it for a set period of time.
Kankar	: It denotes the nodular calcium carbonate of less than one centimetre to more than 5 centimetres in diameter.
Mineral Sand	: Sands containing economically important 'heavy minerals' are called mineral sands. These minerals are much heavier than quartz, which is common mineral found in sand. The economically important minerals found in mineral sand are, zircon, rutile, leucoxene, ilmenite, monazite, xenotime, magnetite, and garnet.
Norwester	: Also called Kalbaishaki is a local rainfall and thunderstorm which occurs in India and Bangladesh.
Orogeny	: A process in which a section of the Earth's crust is folded and deformed by lateral compression to form a mountain range.
Patland	: Pats are Mesas. Mesas are isolated flat topped hills with steep slopes on all sides.
Region	: Region, in the social sciences, a cohesive area that is homogeneous in defining criteria and is distinguished from neighbouring areas or regions by those criteria.
Sex ratio	: It is the ratio of males to females in population.
Shear	: Break off or cause to break off, owing to a structural strain.
Upliftment	: When vertical rise occurs on the Earth's surface due to natural causes like warping, or epeirogeny (relatively slow and gentle uplift), it is called upliftment. Earth's surface also gets uplifted due to

orogeny (sudden upliftment caused due to earthquake and mountain building).

