

**REGIONAL GEOGRAPHY
OF INDIA****BLOCK****5****SELECT MICRO REGIONS OF INDIA****UNIT 14****MICRO REGIONS 1****151****UNIT 15****MICRO REGIONS 2****195****UNIT 16****MICRO REGIONS 3****237****GLOSSARY****295**

BLOCK 5: SELECT MICRO REGIONS OF INDIA

Block 5 introduces you about the select micro regions of India, including six micro 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 covering (Kathiawar and Bundelkhand).

This Block will include the study of key themes like physical and cultural setting, regions along with problems and prospects.

Unit 14: This Unit discusses the micro region 1 and includes Kashmir valley and Sikkim Himalaya. It highlights the physical and cultural setting of these two micro regions of India. In addition, it also describes the geographical regions along with problems and prospects.

Unit 15: This Unit discusses the micro region 2 and includes Sunderbans delta and Assam plains. It highlights the physical and cultural setting of these two micro regions of India. In addition, it also describes the geographical regions along with problems and prospects.

Unit 16: This Unit discusses the micro region 3 and includes Kathiawar and Bundelkhand. It highlights the physical and cultural setting of these two micro regions of India. In addition, it also describes the geographical regions along with problems and prospects.

We hope that after studying Block 5, 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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REGIONAL GEOGRAPHY OF INDIA

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UNIT 14

MICRO REGIONS 1 |

Structure

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14.1 INTRODUCTION

In Block 4, you have studied and learned about select meso regions of India. In Block 5, you will study and learn about select micro-regions of India. In Unit 14 of Block 5, we are dealing with Kashmir Valley and Sikkim Himalaya. These two regions are representative micro-regions from Western and Eastern Himalayas respectively. Kashmir Himalaya has not only been an important section of Himalayas but has always been at the cultural crossroads as well as geo-strategically significant region between India, Pakistan, and China.

Similarly, physiographic, cultural and geostrategic dimensions of Sikkim Himalaya make it important to understand it in a more nuanced manner. Probing the social fabric of the two regions, including matters linked to ethnicity, peopling, and local governance, is imperative for understanding the problems and prospects handled by people living in the two micro-regions. Furthermore, both regions have rich historical background; therefore, understanding historical events, rulers, and cultural exchanges those have shaped Jammu and Kashmir as well as Sikkim adds to comprehensive understanding of India's past. Understanding historical and geopolitical context is crucial for grasping the intricacies of disputes in the highlands and their consequences for regional stability and development planning.

The former state of Jammu and Kashmir occupies an important strategic position sharing its border with Afghanistan in the North-West, Pakistan in the West, and China and Tibet in the North and East. It extends over a major part of western Himalayas which has important peaks and passes. The former state as a whole covered an area of 2,22,800 square kilometres, but with the declaration of Cease-Fire Line (1-1-1949), 83,808 square kilometres of the area got illegally occupied by Pakistan and subsequently 41,500 square kilometres of the area has been occupied by China.

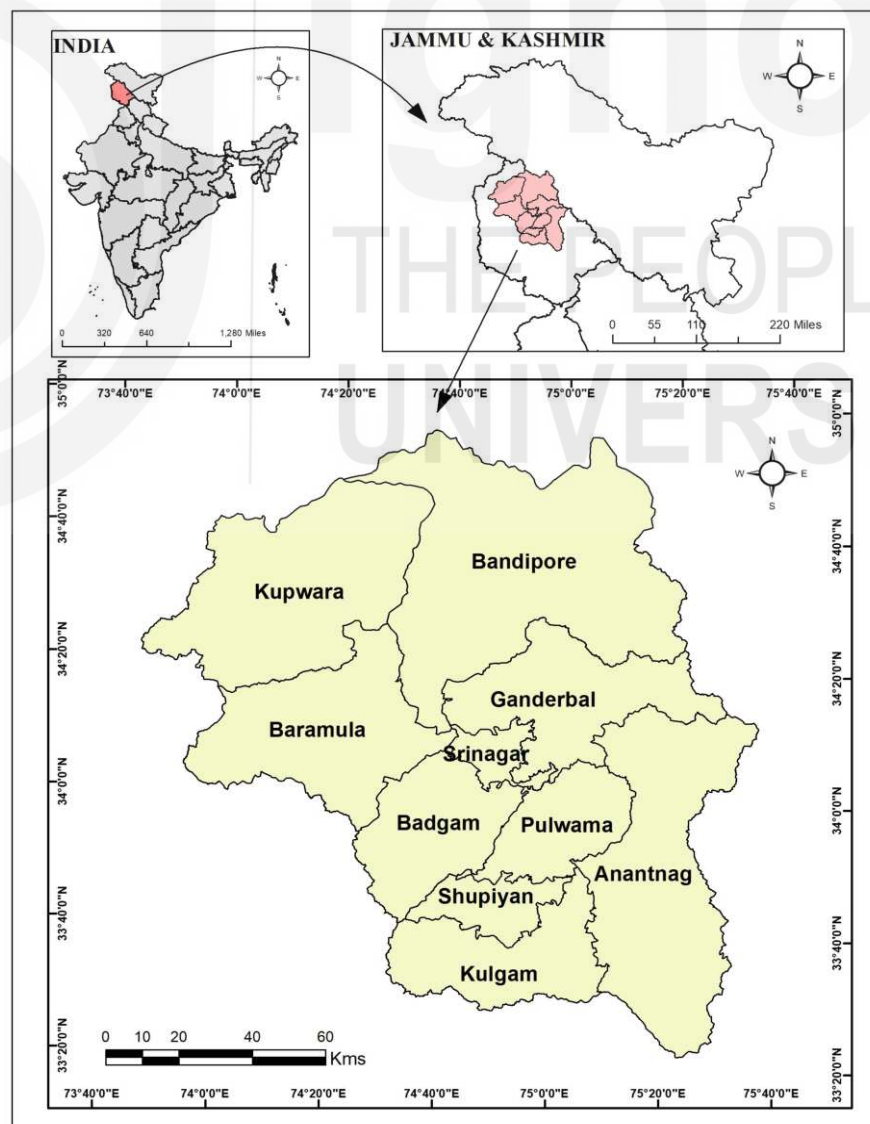


Fig. 14.1: Location Map of Kashmir Valley.

Do you know?

The Govt. of India passed the *Jammu and Kashmir Reorganisation Act, 2019* on 31st of October 2019 which separated the erstwhile state of Jammu and Kashmir into two Union Territories, namely Union Territories of Jammu and Kashmir and Union Territories of Ladakh.

Section 14.2 describes the historical background of Kashmir valley. Sections 14.3 to 14.6 are devoted to the study of Physical Settings, Cultural Settings, and Regions, along with the Problems and Prospects of Kashmir valley. Section 14.7 is devoted to the study of the historical background of Sikkim Himalaya. Sections 14.8 to 14.11 are devoted to the study of Physical Settings, Cultural Settings, and Regions, along with the Problems and Prospects of Sikkim Himalaya.

Expected Learning Outcomes

After studying this Unit, you should be able to:

- examine a brief history of Kashmir Valley and Sikkim Himalaya regions;
- describe the nature of physical setting of Kashmir Valley and Sikkim Himalaya regions;
- describe the nature of cultural setting in Kashmir Valley and Sikkim Himalaya regions;
- explain the regions of Kashmir Valley and Sikkim Himalaya; and
- comprehend the problems and prospects of Kashmir Valley and Sikkim Himalaya regions.

14.2 KASHMIR VALLEY: HISTORICAL BACKGROUND

Tradition tells us that the history of Kashmir begins with Kashyapa, chronicled in the famous works, *Rajtarangini* of Kalhana Pandit (A.D. 1079-1151). According to him, the region was known as Kashyapamar which gradually changed to Kashmir. It was mostly inhabited during summer because of severe winter, the climate in winter was so cold and snowfall used to be heavy that habitable parts of the valley consisted mostly of mountain slopes, which were occupied by nomads only who migrated along with their herds of cattle southward. It was Kashyapa who brought the major radical change from nomadism to settled life.

According to *Rajtarangini*, village Pandrethan, which is about 4 kilometres to south-east of Srinagar was then known as Puranadhistana or Srinagri founded by Ashoka the Great. The name Srinagar means city of Sri or Lakshmi (Goddess of Wealth). It was during his period that many people adopted Buddhism in Kashmir.

Famous Chinese Pilgrim, Huen Tsang, visited the valley of Kashmir in 7th century; he found agriculture as settled occupation of its inhabitants. The Moghuls are said to have introduced village-level revenue system in Kashmir during 16th century. Payment of land revenue was introduced by Todar Mal during the rule of Akbar, He also built fort known as Hari Parbat as a famine

relief measure. Shalimar Garden was laid out during the time of Jahangir. He introduced Chinar tree plantations in the valley which was brought from Iran. He also encouraged afforestation and developed some cottage industries.

Modern History of Kashmir starts with Dogra dynasty when Maharaja Gulab Singh got the Jagir of Jammu from Maharaja Ranjit Singh in 1820. Raja Gulab Singh became the full-fledged Raja of Jammu in 1822. Kashmir was sold to Gulab Singh on 16th March 1846 by the British Colonial Ruler under the treaty of Amritsar for Rs. 7.5 million. Maharaja Gulab Singh integrated Jammu with Kashmir.

Peace prevailed during Dogra rule which helped open the valley for trade and tourism. Roads to mountain interior across Pir Panjal and Jhelum valley road to Kohala were built during this period. There was considerable trade carried between India and Yarkand across the trade route through Leh to Tibet and Central Asia. All wool for shawls in Kashmir came from Ladakh and Tibet.

The political entity of former Jammu and Kashmir State was built by Maharaja Gulab Singh and maintained by his successors Ranbir Singh, Pratap Singh; and Hari Singh signed the Instrument of Accession of Jammu and Kashmir to the Indian Union on 26th October 1947.

14.3 KASHMIR VALLEY: PHYSICAL SETTING

With geographical area of 15520.3 kilometres, Kashmir valley of Union Territory (UT) of Jammu and Kashmir is situated between 33° and 35° north latitude and 73° and 76° East longitude. It is an old lake basin of about 135 kilometres in length and thirty-two kilometres in width. The valley is approximately 1,620 metres above mean sea level and is drained by upper Jhelum river. Mountains with 3,600 to 4,800 metres height surround the valley. Some portions of the UTs of Jammu and Kashmir and Ladakh (Pakistan-occupied Kashmir, Gilgit-Baltistan, and Akshai Chin) are occupied by Pakistan and China.

Nevertheless, Jammu and Kashmir present a multi-lingual, multi-religious, and multi-racial province where each group has its own distinct and peculiar cultural ethos, further deepened by geographical divisions created by formidable mountain ranges. Thus, the former Jammu and Kashmir state comprises three main regions, namely, Jammu, Kashmir, and Ladakh.

Kashmir Region

Kashmir region or valley is a significant part of the UT. This valley is an ancient lake basin, which is 140 kilometres long and 32 kilometres wide. Average elevation of the valley is 5,300 feet above mean sea level. Tall mountains that surround the valley rising to 16,000 feet ensure pleasant weather even during summer months. Its rich alluvial soil is well-drained by rivers and streams and yield good crops of rice, saffron, vegetables and a variety of fruits. Kashmir region comprises ten districts, namely, Anantnag, Kulagam, Shupiyen, Ganderbal, Bandipura, Baramulla, Budgam, Kupwara, Pulwama, and Srinagar. *Anantnag* is the southernmost district of the valley. It shares its border with the district Pulwama in the west and from south to east it is attached to Rajouri, Udhampur and Doda districts. It borders Kargil district

of Ladakh UT in the north. The district is criss-crossed by a network of perennial rivers, streams and waterfalls. Total geographical area of the district is 3,984 square kilometres divided into five tehsils, namely, Pahalgam, Anantnag, Doru, Kulgam and Bijbehara. Literacy rate is 44.10 percent. Agriculture and livestock rearing are the main sources of livelihood. The district is also well known for traditional handicrafts like Gabbas and wooden crafts. The district, enriched with perennial streams with clean water has developed commercial fishing activities with a scattering of trout farms. The sericulture industry has earned a good name among all the small household industries in the district.

14.3.1 Geology

The foreland base is almost a peneplain. The Autochthonous belt includes rocks of Carboniferous to Eocene age having undergone recumbent-type folding. Kashmir Nappe is mainly composed of pre-Cambrian Salkhala series overlain by the Dogra slates.

The great basement complex of Himalayas consists of three elements: i) the Metamorphosed sedimentary Archaeans, ii) Intrusive granite and Gneisses of the later period, and iii) remnants of Archean granites, gneisses, and schists. These crystalline rocks mainly occur in the Zaskar range and the region lying farther north e.g., in Gilgit, Baltistan, and Ladakh.

Rocks of Dharwar, the oldest sedimentary system, have been designated as the Salkhala series in Kashmir area. These consist of slates, phyllites, schists, quartzites, crystalline limestone and dolomites, and occur between the central crystalline axis of Himalayas and outer ranges. The Great Himalayan range, situated on the east of Kashmir valley, is largely composed of Salkhala converted into paragneiss. Nanga Parbat massif is wholly built of the series. South of this range, the Salkhala show a lesser degree of metamorphism and thus clearly reveal their sedimentary characters. The Dogra slates occurring in the southwest flanks of Pir Panjal represent rocks of Vindhyan system.

Fossiliferous Palaeozoic rocks of Kashmir are found in north of the alluvial part of the valley. Cambrian and Ordovician rocks have outcropped in the central parts of the anticline as a result of denudation. During the Carboniferous period, Kashmir area was converted from a region of quiet marine sedimentation into great vulcanicity. The Trias is the best and most fully developed in Mesozoic systems. All Tertiary systems are fully represented in outer mountains, and Tertiary beds are also found in Indus valley beyond Kashmir Himalaya.

14.3.2 Physiography/Relief

Valley of Kashmir lies between Pir Panjal range and the western end of Great Himalayan ranges. Pir Panjal range forms its southern and south-western boundary and separates the valley from Jammu Himalayas. The Great Himalayan range lying to the east of Kashmir valley separates it from Ladakh. This range has peaks reaching more than 6000 metres in altitude.

This range acts as a climatic divide making adjoining Ladakh region a cold desert.

The main valley floor consists of flat area surrounded by low flat-topped hills popularly called Karewas. In fact, the whole valley earlier formed a huge lake called Kashmir lake. This lake got drained out due to the development of faults near Baramulla through which now Jhelum river flows. Lot of sediments were being deposited in that lake by streams flowing from the surrounding mountains. As expected, deposition of sediments was more on the margins of the lake. After the lake drained out due to tectonic activity, these lacustrine deposits emerged as low flat-topped hills, and are called Karewas. These are made up of fine silt and are quite suitable for growing saffron and other crops requiring low quantity of water.

Remnants of earlier lakes survived in lower parts as can be seen in the form of Dal lake, Nagin lake, and Wular lake etc. Presently, the valley is drained by Jhelum river and its many tributaries. Jhelum originates at Verinag as a Spring and flows through the flat areas of the valley making many meanders. Meander formation by Jhelum river takes place as the valley floor which is extremely flat provides a local base-level. The river enters Wular lake from one side and exits from other side and finally leaves the valley through fault valley in Baramulla district. Jhelum river has many tributaries in Kashmir valley. Important tributaries are Sind, Lidder, Rambi Ara and Veshaw etc.

14.3.3 Drainage and Water Resources

Situated in the lap of Himalayas, Kashmir valley is drained by rivers namely Jhelum, Kishen Ganga, and Liddar etc.

Jhelum river is the main waterway of valley of Kashmir. It rises from spring called Verinag and subsequently several tributaries join Jhelum and makes it navigable from Khannabal to Wular lake. Its total length in the valley is 177 kilometres. Kashmir has several lakes. Important lakes of the region are as follows:

Wular Lake in Kashmir is the largest freshwater lake in India. It is about 16 kilometres long and 9.6 kilometres wide with ill-defined shores. This lake lies between Bandipore and Sopore at a distance of 75 kilometres.

Dal Lake is a beautiful lake in Srinagar. It is 8 kilometres long and 6.4 kilometres wide. It is flood-lung of the Jhelum. Famous Mughal gardens are situated around this lake. Floating gardens found in this lake grow a large variety of vegetables (Fig. 14.2).

Anchar Lake is a swampy area. The Sind Nullah enters this lake from one side and flows out from the other. It is about 8 kilometres long and 3 kilometres wide. Gandarbal is a famous township on its northwest bank.

Mansbal Lake is at a distance of 29 kilometres from Srinagar and is situated at Sopore. It is 5 kilometres long and 1 kilometre wide. It is connected with Jhelum by a canal near Sumbal.

Harwan Lake is situated at a distance of 21 kilometres from Srinagar. It is 278 metres long, 137 metres wide, and 18 metres deep. This lake is a source of water supply to Srinagar city.

Hokarsar Lake lies on Baramulla road about 13 kilometres from Srinagar. It is about 5 kilometres long and 1.5 kilometres wide. Willow trees grow in abundance around its banks.

Konsarnag or Vishno Pad Lake is situated in Pir Panjal range at a height of 13124 feet (4000 metres) above mean sea level to the south of Shopian. It is about 5 kilometres long and 3 kilometres wide and is the source of river Vishav. It is at a distance of 34 kilometres from Shopian.

Gangabal Lake is situated at a height of 11713 feet (3,570 metres) near the peak of Harmukh mountain. **Sheshnag Lake** is situated near Vavjan, en route to Shri Amarnath cave. It is at a distance of 28 kilometres from Pahalgam.

Neelang Lake is situated in tehsil Budgam at a distance of 10 kilometres from Nagam. It is bounded by dense forest. There are two more lakes, namely *Tarsar* and *Marsar* that lie on the northern slope of the Harmukh mountain. Marsar lake is the origin of canal Sharab Kohl that provides water to the fountains that operate in the Mughal Gardens. Marsar Lake is joined by Lidar, which is one of the largest tributaries of Jhelum. *Sokh* and *Dokh* are two frozen lakes situated at Harmukh mountain. These are said to be two teardrops of Parvati – one a warm drop indicating happiness and another cold one showing grief. Most lakes situated on higher mountain slopes have glacial origin.



Fig. 14.2: Dal Lake.

(Source: Unit Writer)

14.3.4 Climate

From the alpine (Ladakh region) to the sub-tropical (Jammu region) are extreme variants of climate in Jammu and Kashmir region owing to its location and topography. Temperature in the region varies spatially. While the climate in the Kashmir valley is rather moderate unlike Ladakh which has very harsh cold weather conditions and Jammu also can be very hot during summer months. It has four distinct seasons: Spring (March to May), Summer (June to August), Autumn (September to November) and Winter (December to February).

The monsoon generally approaches the region by 1st week of July and lasts till 15th of September. It is more active in the Jammu region rather than Kashmir valley. Precipitation in the winter months is higher than that of the monsoon period in Kashmir valley which receives lot of snow during this season.

14.3.5 Vegetation

Vegetation is always influenced by climate, soil, and altitude. Since Jammu and Kashmir mark the presence of diversity in terms of their physical phenomenon, there is diversity in terms of vegetation. For instance, altitude rises from the outer plains of Jammu Province to the loftiest mountain ranges of the Inner Himalayas, creating a variety of natural vegetation between the inner Himalayas to the mountains and the outer plains of the Jammu region.

In other words, Raina (2002) writes that Forests are one of the most important resources of Jammu and Kashmir. It is spread over 20,236 square kilometres of the demarcated area, accounting for 20 percent of the total geographical area of the state on this side of the Line of Control (LOC). More than 99 percent of forest area is confined to the province of Jammu and Kashmir only, with the largest area of 5848 square kilometres in the district of Doda and the smallest area of 481 square kilometres in the district of Budgam. Over 19,236 square kilometres are under coniferous softwood (Pine) and 946 square kilometres under non-coniferous softwood. In the coniferous category, Fir accounts for 3355 square kilometres, Kail for 1874 square kilometres, Chir for 1773 square kilometres, and Deodar for 1122 square kilometres. Forests require an abundance of moisture in the soil. So, they are found in areas where there is sufficient rainfall or along the banks of rivers where sufficient amount of water is available.

Further, the Union Territory of Jammu and Kashmir's forests are mainly found where annual rainfall is about 100 centimetres. However, scrub forests are found, where rainfall is even less than 100 centimetres. The valley of Kashmir has deciduous vegetation. The Chinar, Poplar, Deodar, Fir, Pine, Kail, Partal, Mulberry, Walnut, and other fruit trees grow throughout the valley. Baramulla and Anantnag districts have respectively 71 percent and 60 percent of their areas under forests. Big forests in the valley provide timber and firewood. Grassy meadows in the forest provide fodder for the cattle. Medicinal herbs such as belladonna, hyoscyamus, digitalis, menthol, artemisias, polygala, podophyllum, rubus, trillium, hops, and kuth grow in these forests. Industries like paper, sports goods, furniture, wood carving, herbal drugs, the silk industry, the manufacturing of agricultural implements, and the construction of railway sleepers depend on resources of these forests.

14.3.6 Soils

Soils in Kashmir are loamy and there is little clay content except the valley floor which was earlier under the lake. There is sufficient organic matter and nitrogen content in the alluvium of Kashmir valley as a result of plant residue, crop stubble, natural vegetation and animal excretion. Valley of Kashmir has many types of soils like Gurti (clay), Bahil (Loam), Sekil (Sandy), Nambaal

(Peats), Surzamin, Lemb, Floating Garden soils and Karewa soils (Raina 2002, 22).

Gurti (Clay Soil): It is fine-textured, highly water-holding clayey soil found in Kashmir valley. Generally speaking, it becomes hard when dry, sticky when wet, and heavy. Despite having inadequate drainage and aeration, it is mineral-rich. Because clay soil holds water well and are, therefore, suitable for crops requiring plenty of water. Thus, it is well suited for paddy farming.

Bahil (Loam Soils): Bahil signifies loam soils. This soil type has composition of sand, silt and clay. Variety of crops can be grown on this soil due to rich nutrients, water-holding capacity and good drainage.

These two soil types can be used to grow a wide range of crops including foodgrains, legumes, fruits and vegetables.

Sekil (Sandy Soil): This soil is coarse textured with high capacity for drainage and contains big particles. However, it has low utility due to low water holding and nutrient retention capacity. Less water requiring crops are usually grown with the help of fertiliser and irrigation on sandy soils.

Nambaal (Peaty Soil): Nambaal soil is rich in organic matter and is found in those parts of the valley that are marshy or wet. This soil has high organic content, acidic, dark and spongy. Peaty soil is generally unsuitable for conventional farming. But certain types of crops tolerant of acidic and wet conditions along with wetland vegetation can be grown.

Surzamin (Reddish-Brown Soil): This soil is typically found in upland areas. The translation of "Surzamin" is "red land". The distinctive colour of this soil is usually caused by high iron oxide content. Its texture may range from loamy to clayey. Depending on their depth and fertility, Surzamin soil can sustain crops including maize, wheat, and some temperate fruit trees. However, such soil is less productive as compared to alluvial soil.

Lemb: Lemb soil is found in the valley's terraced plains and foothills where farming is done. This soil is appropriate for terraced farming because it has adequate drainage, moderate fertility, and is composed of silt, sand and clay. Variety of crops, such as maize, barley and fruits can be grown on Lemb soil. This soil is also used for growing some fruit crops and vegetables in terraced fields.

Floating Garden Soil: This type is special to Kashmir valley. It is used for making floating gardens in lakes, especially in Dal lake. To construct floating beds, layers of soil, organic materials, and aquatic weeds are layered. Rich organic matter and nutrients found in the soil used in floating gardens make it ideal growing medium for flowers and vegetables. Floating gardens are a creative and traditional way for farmers to use the surface of lakes for cultivation. These are used to cultivate vegetables like tomatoes, cucumbers and leafy greens etc.

14.3.7 Physical Resources Base

The Union Territory of Jammu and Kashmir has varied mineral wealth along with physical diversity. Some of the important mineral resources listed by (Raina 2002) are as follows:

1. Lignite: It is an inferior quality of coal which is found in the valley of Kashmir at Nichahama, Baramulla, Handwara, Chowkibal, Ferozepur nullah, Nagbal, Tangmarg, Raithan, Badgam tehsil, Laligang, and Lolab valley. Lignite is black-brown coal that is intermediate in coalification between peat and sub-bituminous coal which has a calorific value of less than 8300 BTU*/lb (British Thermal Unit per Pound), on a moist mineral-free basis. According to the report of the Geological Survey of India (GSI), there are lignite coal deposits of about 5 crores and 60 lakh tons in the valley. Drilling operations were started first in the Nicahhom- Chowkibal area where the reserves were estimated at 4.5 million tons to a depth of 40 metres. Lignite is used as a fuel in the valley of Kashmir.

(Note: British thermal unit refers to the amount of heat to be absorbed by a 1 lb-mass to increase its temperature by 1° Fahrenheit).

2. Limestone: Both the Union Territories i.e., Jammu, Kashmir, and Ladakh have deposits of different ages and grades of Limestone. Limestone of Kashmir is of high quality and is used in the manufacturing of cement at Wuyan and Khrew. These deposits exist in Anantnag, Achhabal, Doru, Verinag, Biru, Sonamarg, Ajas, Wuyau, Khrew, and Loduv. It is also used as building stone and mortar.

3. Copper ores: Copper ores are found at Aishmuqam, Shubbar area (Anantnag), Lashtil hill spurs (Baramulla), Handwara, Sumbal, Kangan, and Lolab valley in the province of Kashmir.

4. Iron-ore: The deposits of iron ore occur in Sharda (Karnah tehsil), Khrewa, Haral (Handwara), Uri tehsil, Garez (Sopore tehsil), and Lolab valley in Kashmir.

5. Gypsum: It is used for making plaster of Paris and chalk sticks. The Kashmir division has gypsum deposits at Lachhipora, Baramulla, Anantnag, Liddipora, and Kathia Nullah (Uri). There is a total reserve of about 4 million tons of gypsum in the UT of Jammu and Kashmir.

6. Ochre: It is used in paints and varnishes etc. There are extensive deposits of ochre in Nur Khan, Ratasar, and Jhaggi in the Uri tehsil of the Baramulla district of Kashmir division. About 4 lakh tons of ochre has been found in the State, so far.

7. Zinc and Nickel are found at Buniyar (Baramulla).

8. Fuller's Earth is used in the manufacturing of country soap and for filling paper. It is found in Rampur near Baramulla.

9. Slate Stone is found in abundance in the valley of Kashmir.

10. Graphite is used in the manufacturing of lead pencils and is found in Bararipora, Uri, Karnah, Malogam, and Piran in the province of Kashmir.

11. Sulphur is found in spring water. It is found at Anantnag and Khrewa. The estimated deposits of sulfur in the State are about 2,00,000 tonnes.

12. Marble: Large deposits of marble have been found at Drugmalla, Zirahama, Oura, and Trehgam in Kupwara district of Kashmir. It is light brown to a dirty grey in colour. This is being commonly used as building material these days.

SAQ I

- Name the three main regions of the former Jammu and Kashmir state and briefly describe their essential features.
- Highlight the main features of climate.
- Name any five mineral resources of Kashmir valley.

14.4 KASHMIR VALLEY: CULTURAL SETTING

Land of Kashmir is known not just for its complex and diversified physical landscape but it is also diversified in terms of cultural landscape. Presence of people with different cultures and customs was well reflected in the words of Husain (1998) where he writes that "the mosaic of the ethnicity of Jammu and Kashmir is complex and the race structure cannot be explained without understanding the pre-historic movements of people. In the process of peopling of the region, Dards in the northwest, Ladakh in the east, Gujjars in the south and Paharis in the southeast have closely influenced existing ethnicity of the people". Further he opines that "the immigrants from territories of Turkmenia, Tazakistan, Uzbekistan, Kazakhstan, Georgia, Azerbaijan, Turkey, Iraq, and Afghanistan influenced racial composition of the state".

Table 14.1: Language Spoken in Kashmir Valley, 2011 (%)

Districts	Kashmiri	Pahari	Gujar	Hindi	Punjabi	Others
Anantnag	85.10	11.46	1.21	0.58	0.55	Nil
Baramulla	82.11	9.88	3.45	1.58	1.26	Nil
Budgam	94.78	Nil	3.01	0.69	Nil	Nil
Bandipore	77.95	4.44	8.82	1.27	Nil	9.62
Ganderbal	68.92	2.61	18.68	1.31	Nil	5.65
Kulgam	91.91	Nil	6.32	Nil	Nil	Nil
Kupwara	71.14	14.12	9.21	2.72	0.68	Nil
Pulwama	91.30	0.68	3.96	1.25	1.38	Nil
Shupiyan	87.99	1.78	8.80	0.54	Nil	Nil
Srinagar	94.13	Nil	0.66	1.88	0.66	Nil

(Source: Indian Language Profile, Census 2011)

Kashmiri, an Indo-Aryan language, along with Gujar language are spoken in all ten districts of the valley. Kashmiri language is the main language of the valley; Kashmiri speakers constitute above 94 percent in Budgam and Srinagar districts which is the highest. Contrary to this, Ganderbal has only about 68 percent of Kashmiri speakers. It is due to the fact that Ganderbal is a tribal dominant district with 99.8 percent of tribal population where Gujar language is spoken by almost 19 percent of population.

Similarly, Kupwara, Anantnag, Baramulla and Bandipore are the main districts where Pahari languages are spoken. Pahari is the second most prominent language of the valley. The Pahari language speaking parts of the valley often has a significant population of ethnic communities such as the Gujjars and Bakarwals, who conventionally spoke Pahari languages. It is linked to the movement of tribal communities across generations leading to the creation of Pahari-speaking populations in the area. It is to be noted here that Pir Panjal range has historically served as somewhat of a barrier leading to distinct linguistic and cultural personality between Kashmir valley and the neighbouring Jammu region. While the traditional swathe of tribal community movement shaped the spatial cultural diversity within the valley as well. While Hindi is understood by majority of the population, however, it is still minor language of the valley. Other languages include Afgani, Gujari, Shina and Balti. As evident from Table 14.1, Bandipore and Ganderbal are linguistically two most diverse districts of Kashmir valley. Linguistic diversity of these districts can be attributed to the migration histories of various tribal communities of the districts. Tribal communities traditionally were not sedentary agriculturists. Hence, the amalgamation of various languages among them has not been a surprising phenomenon.

Streamlining major ethnic groups of the region as per area of their concentration, Husain (1998) argues that Kashmiris are mainly concentrated in bottom of the valley; Dards occupy the valley of Gurez, Hanjis are confined to water bodies of Kashmir; Gujjars and Bakarwals are living and oscillating in the Kandi areas. Moreover, there are numerous small ethnic groups like Rhotas, Gaddis, and Sikhs which have a significant concentration in isolated pockets of the erstwhile state creating diversities of an ethnic and cultural mosaic in the state.

Table 14.2: Distribution of Religious Groups in Kashmir Valley (in percentage)

Districts	Islam	Hinduism	Christianity	Buddhism	Jainism	Sikhism	Others	Religion not stated
Anantnag 2001	98.51	0.99	0.02	0.01	0.00	0.47	0.00	0.00
Anantnag 2011	97.99	3.04	0.15	0.01	0.00	1.47	0.00	0.18
Baramulla 2001	97.55	1.3	0.06	0.06	0.00	1.04	0.00	0.00
Baramulla 2011	95.15	3.04	0.15	0.01	0.00	0.57	0.00	0.08
Budgam 2001	98.09	1.04	0.01	0.01	0.00	0.84	0.00	0.00
Budgam 2011	97.65	1.34	0.20	0.01	0.00	1.34	0.00	0.06
Kupwara 2001	97.37	1.96	0.08	0.03	0.03	0.53	0.00	0.01
Kupwara 2011	94.59	4.27	0.20	0.01	0.00	0.24	0.00	0.29
Pulwama 2001	97.61	0.93	0.1	0.01	0.00	1.35	0.00	0.00
Pulwama	95.59	4.27	0.20	0.01	0.00	1.68	0.00	0.15

2011								
Srinagar	94.66	4.06	0.04	0.04	0.03	1.08	0.00	0.01
2001								
Srinagar	95.19	3.44	0.22	0.02	0.01	0.98	0.00	0.14
2011								
Bandipore	97.39	2.15	0.15	0.01	0.00	0.16	0.00	0.08
2011								
Ganderbal	97.69	1.88	0.14	0.01	0.00	0.16	0.00	0.12
2011								
Kulgam	98.49	1.01	0.11	0.01	0.00	0.64	0.00	0.29
2011								
Shupiyan	98.52	1.17	0.16	0.00	0.00	0.07	0.00	0.08
2011								

(Source: Directorate of Economics and Statistics, Jammu and Kashmir (2019-2020))

The proportion of Muslim population has decreased (Table 14.2) to some extent in most of the districts except in Srinagar during 2001 and 2011. However, even after small decline, Islam continues to be overwhelming religion of the valley. Hindu population on the other hand has increased in some districts between 2001 and 2011 due to return of handful Hindu families (Kashmiri Pundits) post their exodus due to separatists-initiated violence targeting non-Muslim population after 1990s.

However, another reason responsible for such proportionate increase appears to be related to the bifurcation of districts leading to carving out four new districts. Hence, it did have effect on the change in share of religious groups. Kashmir valley has a long history deeply rooted in Hinduism and Buddhism, which later gave way to dominant Muslim presence starting from 14th century. Spread of Islam was substantial, and it became the dominant religion in the region. Christianity, which arrived in India through European missionaries primarily in 16th century, did not have the same historical roots or influence in Kashmir valley. Kashmir valley's geographical isolation, owing to its hilly topography, has historically limited the influx of external influences, including Christian missionaries. And, perhaps the valley's unique cultural and religious identity remained largely insulated from the broader missionary activities that were more prominent in coastal and accessible regions of India. There is a small increase in Christian population between 2001 and 2011 as well. This increase can as well be attributed to rather stable situation returning to the Kashmir valley as compared to previous decades. Interestingly, Sikh population has decreased between 2001 and 2011 while Jainism is barely present only in Kupwara and Srinagar districts. Proportion of others and religion not stated population also remains very low. The religion not stated category primarily includes those individuals of Kashmir valley who preferred not to declare their religion or are a-religious.

14.4.1 Population

Total population of Kashmir valley was 68,88,475 persons in 2011. District-wise share of males varied from lowest of 44.87 percent in Kulgam to highest of 54.48 percent in Kupwara (refer Table 14.2). Total population was 4,358,271 persons in 2001 and share of males varied from lowest of 51 percent in Baramulla to highest of 54.33 percent in Srinagar. Population growth during this decade was 23.64 percent while in the previous decade, it was 29.04

percent. Population density of Jammu and Kashmir as per Census, 2011 was 433 persons per square kilometres. While Anantnag district was the third most populous district in 2011, it registered highest population growth in the state.

Table 14.3: Districts-wise Population of Kashmir Valley

Districts	2001			2011			1991-2001	2001-2011
	Total Population	Male Population	Female Population	Total Population	Male Population	Female Population	Population Growth Rate	
Anantnag	778408	52.34	47.66	1078692	51.89	48.11	32.8	37.5
Baramulla	853344	51	49	1008039	52.38	47.62	31.3	26.3
Budgam	607181	51.77	48.23	629309	51.81	48.19	30.1	21.2
Kupwara	650393	52.48	47.52	870354	54.48	45.52	39.6	34.6
Pulwama	441275	51.48	48.52	123138	52.47	47.53	26.4	29.2
Srinagar	1027670	54.33	45.67	123629	52.64	47.36	29.5	23.6
Bandipore**	-	-	-	392232	52.95	47.05	31.3	26.3
Ganderbal**	-	-	-	266215	53.36	46.65	29.6	36.3
Kulgam**	-	-	-	297446	44.87	55.13	32.8	7.3
Shupiyan**	-	-	-	424483	51.27	48.73	26.4	25.8

(Source: Directorate of Economics and Statistics, J & K (2019-2020))

(Note: ** Bandipore, Ganderbal, Kulgam and Shupiyan are four newer districts which were carved only in 2007. Bandipore was given the status of separate district out of Baramulla, Ganderbal emerged out of Srinagar district, Kulagam was made a new district out of Anantnag and Shupiyan was carved out of Pulwama district).

Table 14.4: Sex Ratio, Population Density and Literacy, Kashmir Valley

Districts	2001		2011		Literacy (%)
	Sex Ratio	Density of Population	Sex Ratio	Density of Population	
Anantnag	911	294	927	302	62.69
Baramulla	905	255	885	238	64.63
Budgam	931	459	894	554	56.08
Kupwara	906	273	835	366	64.51
Pulwama	942	467	912	516	63.48
Srinagar	841	540	900	625	69.41
Bandipore	-	-	889	1137	56.28
Ganderbal	-	-	874	1148	58.04
Kulgam	-	-	951	1035	59.23
Shupiyan	-	-	951	853	60.76

(Source: Directorate of Economics and Statistics, Jammu and Kashmir (2019-2020))

Ganderbal followed by Bandipora and Kulagam were most densely populated districts in 2011. Kulgam and Bandipore, like Ganderbal have higher population densities owing to mixed factors, including agriculture potential as these districts are blessed with fertile areas which are conducive to agricultural and horticultural activities. Thereby, these are the reasons responsible for supporting higher density of population. Economic activities have been diverse in these districts as traditional agriculture has been coupled with horticulture as well as small scale industries. These factors together made it possible for relatively larger population to sustain in relatively smaller area. Further, benefits of infrastructure and good connectivity of road and transport suited the area. Thus, urban centres in Kulgam and Bandipore have developed over

time, providing better access to services and civic amenities. Urbanisation tends to increase population density as people move to towns and cities for better opportunities. Interestingly Ganderbal, Pulwama followed by Bandipura has experienced higher population growth rate but lower literacy rates. Kupwara (Fig. 14.3) followed by Ganderbal, Badi pore and Baramulla districts registered the lowest sex ratio (Table.14.4). While economic factors, cultural preferences can influence it, health care access and migration pattern can also be responsible reasons for it. These factors further coupled with the proximity of sensitive border sections affected the population parameters across the districts in the state. Ganderbal and Srinagar have almost similar identical figures for male and female population and growth rate for 1991-2001. It is because of the reason that these districts used to be one single district as Srinagar which was separated later on as pointed out earlier in the year 2007. Similarly, the figures of population growth for 1991-2001 and male and female population has been almost the same for Pulwama and Shupiyam, Kulagam and Anantnag as well as for Bandipore and Baramulla districts. This is because of the fact that as common (same) districts not too varied social, economic and administrative conditions existed within the districts leading to rather similar figures, which were worked out later.

Sex ratio in the districts such as Anantnag, and Srinagar has improved. It may indicate changes in socio-economic conditions, improvement in health care etc., as well as urbanisation and employment related migration coupled with better literacy rate, might lead to a better gender ratio. Gender imbalances can also be influenced by social and economic factors. On the contrary, the sex ratio has declined in districts like Baramulla, Budgam, and Pulwama. It may be due to male in-migration and socio-cultural practices such as gender selective abortion and neglecting female health care. However, further investigation needs to be done to understand the reasons better. Kupwara's lower sex ratio may be attributed to factors such as high proportion of male migration for employment opportunities, healthcare challenges, and possibly cultural practices. The region's exposure to conflict and displacement issues also impacts demographic trends. Kulgam and Sopheyan have one of the higher sex ratios, possibly due to better healthcare and socio-economic conditions that contribute to a more balanced gender ratio.

Table 14.4 shows increasing population density in these districts except Baramulla district which registered decline in population density between 2001 and 2011. As per previous studies, it appears to be the combined effect of land-use change, which led to remarkable decrease in forests, plantation, water bodies and agriculture owing to first general increase in population density and subsequently its decline. On the other hand, availability of fertile land for agriculture in Kulgam and Ganderbal, adequate irrigation facilities in Bandipore due to its location near Wular lake; hence, better economic opportunities along with education, health care services, and infrastructural development in Srinagar contributed to high density of population in these districts.

The land use change studies in Baramulla district (Jammu and Kashmir) reveal a remarkable decrease in forests, plantation, water body and agriculture because of the growing population, conversion of land from natural to anthropogenic purposes.

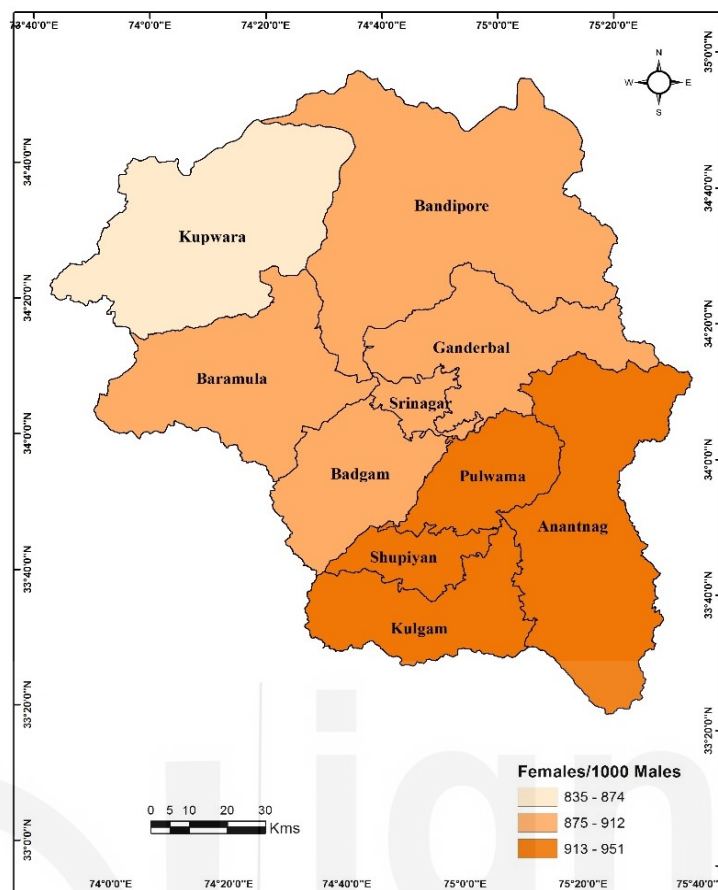


Fig. 14.3: Sex Ratio of Kashmir Valley.

Kupwara, Badgam, Ganderbal, Kulagam and Shupiyan districts registered zero percent of scheduled caste groups as per 2011 Census. As far as scheduled Tribes are concerned, Bandipore, Ganderbal, Kulagam, Shupiyan, Badgam and Kupwara have more than 99 percent. Kulagam, Bandipore and Shupiyan have the least percentage of scheduled castes. This is owing to cultural and religious composition of the Kashmir valley. Majority of the population in these districts is Muslim. Scheduled Castes are predominantly associated with Hindu communities; hence, in regions with a Muslim majority, the percentage of SCs is naturally lower.

Table 14.4: Distribution of Social Group in Kashmir Valley, 2020-2021

Districts	Schedule Castes		Schedule Tribes	
	2001	2011	2001	2011
Anantnag	0.33	13.59	99.67	86.41
Baramulla	0.45	3.77	99.55	96.23
Budgam	3.15	0.37	96.85	99.63
Kupwara	0.14	0.52	99.86	99.48
Pulwama	0.45	1.75	99.55	98.25
Srinagar	2.29	10.68	97.71	89.32
Bandipore	-	0.52	-	99.98
Ganderbal	-	0.19	-	99.81
Kulagam	-	0.08	-	99.92
Shupiyan	-	0.20	-	99.80

(Source: Periodic Labour Force Survey, 2020-2021)

Ganderbal, Bandipore, shupiyan and Kulgam are four least populated districts in the Kashmir valley. Along with Kupwara, these are among the least developed districts in the context of urbanisation and economy. While Badgam, Pulwama and Srinagar comprise densely populated part of Kashmir valley (Fig. 14.4). Bandipur and Ganderbal comprise of districts with least population density owing to these being more forested and comparatively rugged.

There has been increase in Schedule Caste population as well as a small decline in Schedule Tribe population across various districts of Kashmir valley (Table 14.4). This increase seems to be owing to the combined factors of welfare programmes and actions which aimed at welfare of scheduled caste communities as well as bifurcation of districts and to carve out newer districts in the year 2007.

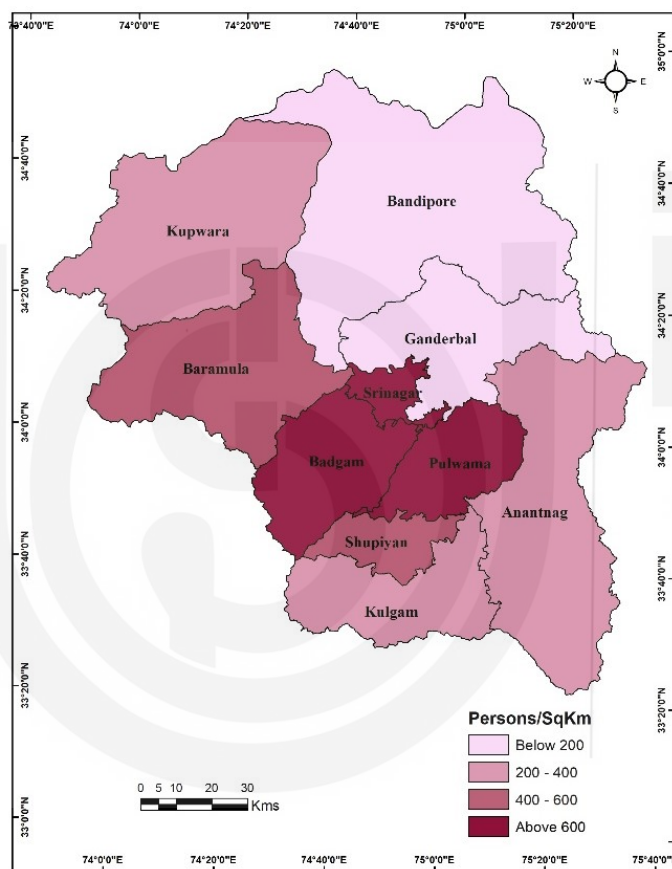


Fig. 14.4: Population Density of Kashmir Valley.

14.4.2 Settlement

Human settlement means a cluster of houses of any type or size where human beings live. Well, the types and sizes of houses are determined by various factors. Some of the factors responsible for varying settlement patterns include physical features like topography, altitude, climate, availability of water, and fertile land whereas there are some fundamental social and cultural factors rooted in building a different form of settlement. These are social structure, caste, religion, and fundamental economic conditions.

Population size of the former state of Jammu and Kashmir in a general preview of the rural and urban population carries the essence of rural and urban settlements. Jammu and Kashmir had population of 1.25 crores in 2011, out of

which 27.38 percent of people lived in urban areas whereas a large section consisting of 72.62 percent of people lived in villages. Rural life is ideally interwoven with everyday engagement with the land and livestock whereas urban life navigates through offices and factories. Availability of resources in rural and urban areas determines their use which in turn reflects in everyday rhythm of life.

Meanwhile, rural settlements are characterised by a far-off extension of built-up area which is generally opposite to urban settlements. Dispersed or isolated hamlet, semi-clustered and clustered are some general types of rural settlements where extent of built-up area and inter-house distance varies with one another. A clustered settlement means closely spaced houses in a village while isolated settlement means far distanced houses in a village which is the pattern generally seen in high altitudinal areas.

14.4.3 Economy

Majority of population of Jammu and Kashmir UT is dependent on agriculture for their sustenance. Climatic conditions of Kashmir valley are ideal for horticulture, floriculture and sericulture practices. The valley has been endowed with plenty of water resources. Rim of the valley is mountainous which is ideal for livestock rearing. The rim area also has sizeable forest resource. A large number of industries including tiny, small, medium, and large have been established in the region. Industrial areas with space, electricity, water, drainage and other such facilities have been established. Banking sector has also been active in addition to SIDCO (Small Industries Development Corporation); SFC (State Financial Corporation) and DICs (District Industries Centres) in the region. Economy of Kashmir is fast growing. Saffron farming in Pampore and apple orchards in areas like Shopian constitutes part of significant primary economic activities in the region.

Table 14.4: Types of Households as per their Employment

Districts	Types of Household			
	Self-Employed	Regular Wage/Salary Earning	Casual Labour	Others
Kupwara	19.17	27.67	43.47	9.68
Badgam	46.65	36.94	15.78	0.63
Baramula	32.92	35.81	29.74	1.53
Bandipore	36.47	30.48	32.10	0.95
Srinagar	48.75	41.59	5.40	4.26
Ganderbal	50.54	25.75	20.42	3.30
Pulwama	71.96	25.48	2.55	0.00
Shupiyan	82.77	8.76	8.47	0.00
Anantang	55.47	27.71	16.32	0.51
Kulgam	60.67	32.45	5.81	1.07

(Source: Periodic Labour Force Survey, 2020-2021)

Shupiyan district followed by Pulwama and Kulgam have maximum ratio of self-employed households (Table 14.4) while Kupwara district has least self-employed households with about 19 percent. It can be attributed to Kupwara being the frontier district of Kashmir valley which houses dense forest. Hence,

the district has highest percentage of households with casual labour force. Further, Kupwara district has lowest sex ratio among all the districts in Kashmir valley.

Table 14.5: Sectors of Economy, Kashmir Valley

Districts	2001 Primary Sector	2011 Primary Sector	2001 Secondary Sector	2011 Secondary Sector	2001 Tertiary Sector	2011 Tertiary Sector
Anantnag	51.88	55.77	8.82	4.19	39.29	40.04
Baramulla	44.94	39.36	12.13	4.96	42.93	55.68
Budgam	45.61	42.79	21.82	13.54	32.57	43.67
Kupwara	51.24	39.92	18.15	3.47	30.61	56.61
Pulwama	55.57	44.5	7.68	5.63	36.75	49.87
Srinagar	12.12	5.56	13.40	4.94	74.48	89.51
Bandipore	-	40.93	-	13.72	-	45.35
Ganderbal	-	34.34	-	7.56	-	58.09
Kulgam	-	61.95	-	3.87	-	34.19
Shupiyan	-	66.41	-	3.87	-	29.72

(Source: Directorate of Economics and Statistics, Jammu and Kashmir (2019-2020))

As evident from Table 14.5, the valley has been largely dependent on primary sector. Agriculture has been the mainstay of people of Kashmir valley. On the one hand, dependence on primary and secondary sectors of economy has decreased during 2001 to 2011 whereas proportion of tertiary activities has increased. This can be attributed to improved political situation in the valley leading to better education and hence higher dependence on tertiary sector.

The valley in many ways provided ideal conditions for primary sector. It comprises of agriculture, horticulture and other related activities due to availability of fertile soil, water resource and favourable climate which employed sizeable proportion of the population. Thus, primary sector is responsible for providing livelihood opportunities to large population base.

Political uncertainties and conflicts in valley had undesirable bearing on secondary activities leading to out-migration of the workforce. With security as a prominent concern and employment opportunities outside the valley has principally affected the secondary sector. Therefore, there is significant decline in the dependence on secondary sector for employment across the valley. And, once such trend in the secondary activity sets into motion, the entire economic activities orient themselves towards tertiary sector whereas primary and secondary sectors continue to register declining percentages. Tourism led service sector has been the major driver of upswing in the tertiary sector of the economy. The valley has registered increasing proportion of holiday makers and pilgrims owing to the peaceful condition returning in the valley during this time period.

Table 14.6: Area under Food Crop 2021-2022 (in 000 Hectares)

Districts	Paddy	Maize	Wheat	Bajra/ others	Pulses	Oilseeds	Fodder	Vegetables	Total
Anantnag	22.67	11.08	0.00	0.00	0.34	13.94	7.14	2.37	57.54
Baramulla	20.61	20.03	0.00	0.06	1.38	0.18	0.51	3.97	46.73

Budgam	24.22	7.20	3.13	0.00	0.59	3.13	4.64	4.41	47.32
Kupwara	16.96	18.68	0.00	0.04	0.00	0.00	0.00	1.59	37.27
Pulwama	13.99	1.70	0.35	0.00	0.22	9.73	9.29	2.64	37.93
Srinagar	2.76	0.07	0.00	0.00	0.32	0.22	0.08	1.50	4.94
Bandipore	11.65	6.60	0.00	0.18	1.79	1.55	0.53	0.52	22.81
Ganderbal	7.66	3.97	0.00	0.05	0.00	3.65	0.00	2.52	17.83
Kulgam	12.79	3.55	0.00	0.00	0.35	6.98	0.00	1.92	25.50
Shupiyan	0.16	0.51	0.00	0.00	0.01	0.29	0.96	0.57	2.50

(Source: Directorate of Economics and Statistics, Jammu and Kashmir (2022-22))

The districts like Anantnag, Baramulla and Budgam focus on diverse agricultural practices. However, Srinagar which is urban district shows limited agricultural production.

Table 14.7: Area under Fruits Crop 2021-2022 (Area in Hectares)

Districts	Fruit Crops						
	Apple	Pear	Apricot	Peach	Plum	Cherry	Citrus
Anantnag	36.09	1.04	0.41	0.28	0.25	0.19	0.00
Baramulla	43.90	2.97	0.24	0.12	0.00	0.49	0.02
Budgam	37.44	4.93	0.06	0.00	1.58	0.02	0.00
Kupwara	39.25	0.96	0.12	0.08	0.10	0.23	0.01
Pulwama	36.27	2.52	0.22	0.17	0.27	0.14	0.00
Srinagar	28.92	4.96	0.59	1.38	3.16	5.58	0.00
Bandipore	98.14	0.04	0.01	0.01	0.01	0.02	0.00
Ganderbal	30.10	1.63	0.39	0.80	1.00	4.51	0.00
Kulgam	72.26	2.34	0.35	0.44	0.44	0.45	0.00
Shupiyan	44.12	0.80	0.09	0.06	0.08	1.22	0.00

(Source: Directorate of Economic and Statistics, Jammu and Kashmir (2022-23))

Horticulture has been a key economic sector which makes-up for significant employment opportunities in Kashmir valley. Apples are mainly grown across the districts along with other commercial varieties of temperate fruit crops like walnut, pear, plums and cherry etc. While apples and pears are high value crops, paddy, vegetables and saffron are significant crops around Srinagar district owing to fertile alluvial soil and temperate climate with warm summers and cold winters making it ideal for rice and vegetable cultivation. Baramulla district is known for maize, paddy, apples, pears etc., owing to topography varying from low lying area to hills with rich loamy soil suitable for fruit orchards and cereal crops. In Anantnag and Pulwama, rice, maize, saffron, vegetables and apples are grown owing to the availability of well-drained soil and irrigation amenities from rivers and associated streams.

Likewise, Kupwara has maize, rice, pulses, and vegetables as primary crops due to blend of plains and hills supporting diverse cropping pattern. Climate-wise, Kupwara is suitable for both (Kharif) summer and (Rabi) winter crops. Shupiyan district is rich in loamy soil with suitable altitude for fruit orchards, Therefore, apples, walnuts, rice, maize are main produce of the district. Similarly, Ganderbal, Kulagam, Budgam and Bandipore has rich alluvial soil because of lacustrine deposition and various streams depositional work; with adequate irrigation and relatively moderate climate supporting rice, maize, vegetables and apple crops, the area is agriculturally significant.

14.4.4 Transport and Communication

Geographical factors govern transport and means of communication in Kashmir. There has been great progress in transport and communication systems in the valley except in some mountainous parts. Roads are the main means of transportation. Government of India has constructed two tubes of Jawahar Tunnel near Banihal at a height of 2200 metres above sea level to make traffic possible between valley of Kashmir and rest of the country even in winter. Jhelum river in Kashmir are also navigable. Mules and ponies are used as means of transportation in higher areas where roads are not so common, Srinagar also has a commercial airport.

SAQ 2

- a) Briefly discuss population density of Kashmir valley.
- b) Highlight the main features of economy in Kashmir valley
- c) Name major modes of transport in Kashmir valley.

14.5 KASHMIR VALLEY REGIONS

Kashmir Himalaya as a region has been further sub-categorised into three First-order regions as discussed below:

1. **Mountain slopes** which have low population density and mainly dominated by grazing activity. These are largely inhabited by Gujjars and Bakerwals who use the pastures on slopes during summer months. Here farming is limited to lower areas either on flat tracts of land or by building agricultural terraces. This region can be further sub-divided into two second order regions:

a. Southern Slopes of Great Himalayan Range: Situated to the north and west, these slopes are higher in altitude and present more rugged topography. Here conditions are quite harsh in winter months. Thus, population density is very low. However, it has some places of tourist interest like Sonamerg and Pahalgam. Higher parts of the mountain range contain some glaciers. It is well known for place of Hindu pilgrimage 'Amarnath Cave' which is accessible through Sind Nalla valley from Baltal side and through Lider valley from Pahalgam side. Amarnath Cave attracts Hindu pilgrims from all over the country. This mountain range provides access to Ladakh region through Zoji la pass and has great strategic significance.

b. Northern Slopes of Pir Panjal Range: It is situated to the south and west of Kashmir valley. This mountain range has great significance as main transport links with rest of the country are connected through this range. Important mountain passes like Banihal Pass and Pir Panjal Pass are situated in this range. Famous Mughal Route passes through it. In fact, Pir Panjal Pass provided historically important route to Kashmir. Similarly, Banihal Pass was very important as Jammu-Srinagar Road passed through it. However, now Jawahar Tunnel has been built bypassing the Banihal pass. Presently, railway link is also being built to link Jammu Province with Kashmir valley. This link is nearly complete

which shall make access to Kashmir easy. It has relatively better living conditions compared to Great Himalayan slopes, thus supports more concentration of Gujjars and Bakerwals. Lower slopes are also well known for apple orchards. Famous tourist place Gulmarg is also situated in this range.

- 2. Karewas:** These are flat-topped low hills of lacustrine origin. These emerged at the peripheral area of the erstwhile lake which got drained out due to faults occurring because of tectonic activity. Their concentration is more on the south and western parts of the valley. Due to their origin in the lake, these are made of very fine silt and are very fertile. Only problem is lack of water availability due to height. Thus, Karewas are suitable for crops requiring less water but good sunshine. It is due to this that very good quality saffron is cultivated on some Karewas. Some almond orchards are also found on some of these Karewas.
- 3. Valley Floor:** This is the most important region of Kashmir valley as land is flat with thick fertile soil and easily available water. This region is very suitable for cultivation and is most densely populated. Most of the traditional handicrafts like paper-mache, pottery and wood carving etc., are found here. This region is also known for world famous wool industry related to shawl weaving and rug making. Due to presence of many lakes, this region is also important for tourism. All major urban centres of Kashmir valley are also found in this region. Valley floor can also be divided into three second order regions:
 - a. Southern Valley Floor:** It is more accessible as the major Jammu-Srinagar Route passes through this part. It has acquired greater importance now due to recent building of rail network. It has many fruit orchards especially apple orchards and has good agricultural activity. Jhelum river originates in this area at a place called Veri Nag which has emerged as an important tourist attraction.
 - b. Srinagar Region:** This is the most important and highly urbanised part of Kashmir valley. Most of the major industries including household industries are concentrated here. Srinagar being the summer capital of the region has major offices and other government institutions. Presence of Dal and Nagin lakes with Shikara boats and House boats make it major tourist hub. Moreover, Srinagar is also base location to visit other tourist places like Gulmarg, Sonamarg and Pahelgam etc.
 - c. Northern Valley Floor:** This area is relatively more rugged and is not so much exposed to tourism except in the case of Gulmarg. Wular lake, the largest lake of Kashmir valley, is another tourist attraction. It being situated on the Line of Control with Pakistan, makes it strategically very important. Jhelum river exits from Kashmir through a Gorge in this region.

SAQ 3

Briefly describe any two ethnic groups.

14.6 KASHMIR VALLEY: PROBLEMS AND PROSPECTS

Kashmir valley is one of the most popular tourist destinations. It works out as a boon as well as a bane to the area. It has continued to be an internationally commended tourist destination. Every year, a huge number of tourists from all parts of the world visit the tourist spots of Jammu and Kashmir. The tourism sector contributes about 6.98 percent to the combined gross domestic product (GDP) of the Jammu and Kashmir as well as Ladakh UTs. Tourism is one of the major industries of the UTs. This industry employs lakhs of people directly and indirectly. Hoteliers, houseboat owners, transporters, travel agencies, traders, guides, porters, boatmen, handicrafts small-scale industrial units, and many others earn their livelihoods because of this industry. Private and public sector agencies provide necessary facilities to tourists and every year, the number of tourists is increasing.

The tourism industry is the most animated tertiary activity and a multi-billion industry. This industry is the outcome of the combined efforts of various sub-industries or sectors which provide tourism-related services. Tourism is a collection of activities, services, and industries that deliver a travel experience comprising transportation, accommodation, eating and drinking establishments, retail shops, entertainment, business, and other hospitality services provided for individuals or groups traveling away from home. All these components are tourism products. Tourism does not exist alone as it consists of certain components, three of which may be considered basic. These three basic components of tourism are transport, locale, and accommodation.

Consequently, any problem in these sectors would eventually harm tourist inflow in the Kashmir valley in particular and the two UTs in general. Realising the incredible scope of this industry in the growth of an economy, it is necessary to highlight some problems that are bottlenecks in the way of tourist flow to give a boost to the tourism industry in the two UTs, Kumar (2018). He further states:

A. Problems of Peace and Security

The first and foremost problems of any destination across the globe that create hindrances in the tourist inflow are disruption, violence, political insurgency, etc. The tourism industry is the consequence of peace.

B. Infrastructural Problems

i) **Problems of Accessibility:** Tourists look for comfort and hassle-free travel.

ii) **Problems of Accommodation:** It plays a central role in tourism. Travelers and tourists need lodging for rest, sleep, luggage storage, etc., while they are on tour. Tourists look for clean hygienic and well-maintained accommodation with a comfortable bed, clean linen, and sanitary facilities with adequate hot and cold water supplies.

iii) **Problems of Amenities:** It refers to the facilities available at the destination that help in meeting the needs and wants of tourists. Tourist amenities include food and beverage facilities, drinking water, a good

communication network, local transport, ATMs, proper garbage and sewage disposal systems, medical facilities, electricity, etc.

iv) Problems of Attractions: Sightseeing is the main reason for undertaking a trip to a particular destination. Attractions are classified into four categories entitled as natural attractions, human-made attractions, cultural attractions, and social attractions.

v) Problems of Activities: Most tourists travel to a particular destination for enjoyment and entertainment and like to go for water sports fishing, nature trails, etc. Most of the visitors found a lack of these facilities at different destinations which made them bored and calamitous.

vi) Problems of Worse Relationships: After 1989, tourist arrival decreased sharply and was even closer to zero in 1990-1997 because of warlike situations between India and Pakistan on the Kashmir issue. Till we do not have stable relations with our neighbors, the tourism industry will not be stable.

vii) Problems of Affordability: Tourists should be able to afford the trip in terms of transport cost, accommodation charges, entrance fees attractions, length of stay, etc. So, tourism marketers must sell their tourism products at reasonable rates.

viii) Problems of Marketing: It is a market that responds to the needs of respondents at a destination. Most of the visitors face the problem of cheating and contamination at the marketplaces of this destination. So, the marketing mechanism should be transparent, responsible, and accountable.

ix) Problems of Guides and Escorts: Most of the tourists face the problem of guidance and feel annoyed during their trip. So, it is incumbent upon tourism marketers to provide trained and knowledgeable guides to the visitors.

x) The Problems of Frisking: Most of the visitors face the problem of frisking at different destinations by security persons which causes them a sense of threat. So, it is incumbent upon the authorities to make the destinations visited by tourists places of peace and prosperity.

xi) Problems related to Health and Hygiene: The most serious problems at a destination are the problems related to health and hygiene such as bad sewer and waste disposable system, lack of cleanliness, lack of pure water supply, etc. Therefore, both government and private organisations must develop these facilities at different destinations and provide a clean environment for visitors.

xii) Problems of Basic Facilities: Problems of basic facilities at destinations relate to electricity, water supply, quality of food, quality of accommodation, sewer and drainage system, security, and environment. So, it is incumbent upon the government and tourism marketers to provide a better quality of all these basic facilities to the visitors at different destinations.

Tourism is the consequence of peace. If there is peace, tourism will have an automatic boost not only in Jammu and Kashmir but also in Ladakh UT. It is a known fact that the economy of Jammu and Kashmir is faced with disturbances and armed conflicts. Therefore, governments must provide a conducive environment for tourism. Infrastructural facilities should be developed in a

public-private partnership (PPP) model. Private sectors should be highly encouraged by providing incentives to them to develop the hospitality industry and construction of roads. It is incumbent upon the government and tourism marketers to consider the above-mentioned multifarious problems as soon as possible to boost tourist arrival in the Kashmir valley.

14.7 SIKKIM: HISTORICAL BACKGROUND

Introduction

Sikkim is 22nd state of India which joined Indian Union in 1975. It is also 2nd smallest state of India in terms of geographical area. It is situated in Eastern Himalayas between Latitudes 27°04'45"N to 28°07'45" N and 88°00'45"E to 88°35'15"E longitudes. Shaped like a thumb, it is situated below the world's third-highest mountain peak namely Kangchenjunga (8586 metres).

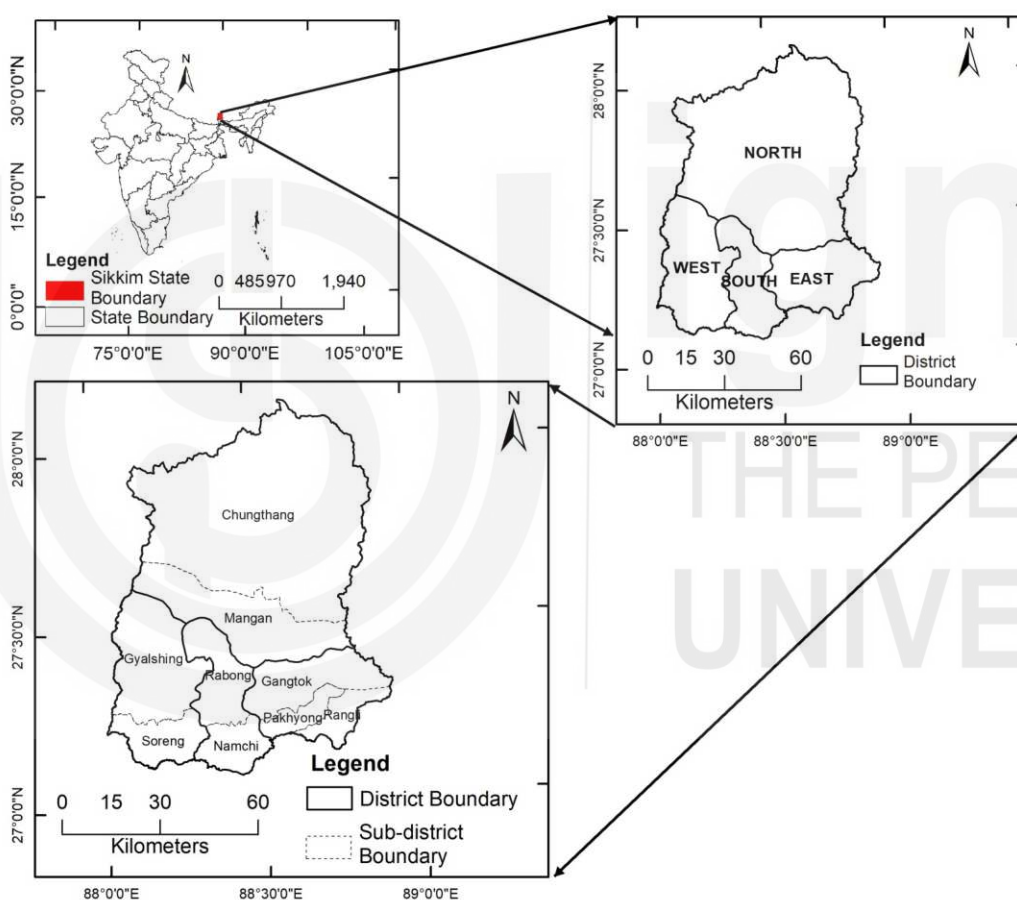


Fig. 14.5: Location Map of Sikkim in India.

Sikkim is a small state with geographical area of 7096 square kilometres, measuring approximately 114 kilometres from north to south and 64 kilometres from east to west. However, its geostrategic position is such that it shares international border with three countries. Nepal in the west separated by the Singali-la range, Cho la range separates Sikkim from Tibet (China) in the north and Bhutan is in the East. River Rangit and Rangpo form border in the south separating it from the state of West Bengal. Most of Sikkim is mountainous with altitudes varying between 300 metres above sea level to over 8500 metres at Kangchenjunga Peak. The state comprises six districts namely Gangtok, Mangan, Namchi, Gyalshing, Pakyong and Soreng.

(Note: It has been so because the state government declared six districts through a gazette notification which came into force from December 21st, 2021 onwards. Therefore, district-wise data is available only according to the pre-existing districts, which used to be four earlier).

Not much has been written about the early history of Sikkim, hence it remains uncontested to this day in certain ways. Before the procurement of Darjeeling by the East India Co. in 1835, Darjeeling formed a part of Sikkim and for a brief period of Nepal. While Kalimpong used to be ruled by Bhutanese and Sikkim in succession till mid-19th Century.

With the consecration of the first *Chogyal* (righteous King) who initiated the process of state formation, the year 1642 is accepted as beginning of modern history of Sikkim. Phuntsog Namgyal was the first king of Sikkim. He was coronated at Yuksom in 1642. According to a legend, coronation of Phuntsog Namgyal as first king took place at the direction of three Buddhist monks who came from Tibet. These monks entered Sikkim from different directions and met at a place which was named 'Yuksom' meaning 'the three monks' (Kharel and Bhutia, 2013). The monks came to establish Buddhism in Sikkim and so they did with the establishment of monarchy. Dubdi Monastery built by Lhatsun Chenpo was the first royal chapel. With the establishment of defined geographical boundary, administrative setup and military institution, the king reigned as sovereign authority with robust support from the kingdom of Tibet for 12 generations (Kharel and Bhutia 2013, 73). Phuntsog Namgyal divided the kingdom into 12 Dzongs (districts) and selected twelve Kazis (Bhutia chiefs) and twelve Lepcha Chiefs (Governor) to administer the twelve districts. His tenure marked the formation of a council called "Lho-Men-Tsong-Sum" a convention of the tribal leaders living in the place. "Lho" or Lhopas represented the Bhutia tribe, Members or Monpas as Men represented Lepchas and Tsong represented the Limboo tribe as subjects of the king. This convention tried to unite all the tribes as a family.

Tensing Namgyal succeeded his father in 1670 as the second Chogyal who shifted the capital from Yuksom to Rabdentse in the same year. It was his third wife who coined the word "Sukhim" (new house) which later on came to be known as Sikkim. He was succeeded by Chagdor Namgyal in 1700.

Gyurmed Namgyal, son of the third king succeeded soon after his father's death. He was more into religious activities than into war. His death led to a young child named Namgyal Phuntsog taking over as his heir. Further, he was succeeded by Tenzing Namgyal in 1780 as the sixth ruler. His tenure witnessed war between Sikkimese forces and Gurkhas between 1780 and 1788 which resulted in capturing of the then Sikkim's Capital Rabdentse by Gurkha forces (Kharel and Bhutia, 2013). Next in line, Tsugphud Namgyal succeeded his father in 1793. After he succeeded his father, he faced regular attacks by Gurkha forces. Kharel and Bhutia (2013, 80) narrate that the Gurkha incursion continued and penetrated as far as Chungthang under the commandership of Jayanti Khatri. Further, they stationed themselves at Darjeeling and Nagari creating their administration extending the borders of Nepal up to Teesta in the east. This incursion came to an end with the Anglo-Nepalese War of 1814.

The English East India Company was interested in developing trade with Tibet and the gateway was suitable through Sikkim. A peace negotiation was concluded between the British and Nepal at Sagauli on 24 March 1816. Another treaty was signed on February 10, 1817, which was known as the Treaty of Titalia whereby boundary between Sikkim and Nepal was delineated along the Mahananda and Mechi rivers and the Singali-la range and other neighbouring countries. In the meantime, year 1814 marked the shift in Sikkim's capital from Rabdentse to Tumlong. Tension arose during the period of Treaty of Titalia and Treaty of Sagauli. G.W Lloyd and J.W Grant visited Sikkim in 1828 to resolve this issue and Darjeeling under the deed of grant took place in 1835 as compensation for the cession. Another treaty of Tumlong was signed in 1861 by which Sikkim became a British protectorate.

Sidekeong Namgyal was signatory of the treaty of Tumlong. The major achievement was that under the renewed agreement annual rent for Darjeeling was raised from Rs. 9000 to Rs. 12000. He was succeeded by Thutob Namgyal in 1874 as the 9th king. His tenure witnessed the Anglo-Chinese convention of 1890 after the armed clash between Tibetans and the Britishers. As a result, Chinese acknowledged the British protectorate over Sikkim while Britishers accepted Chinese delimitation of Sikkim-Tibet boundary as the crest of the mountain range which made Sikkim lose Chumbi valley. In the meantime, Thutob Namgyal was detained and John Claude White, the then-British political officer became the virtual ruler of Sikkim and the state capital was shifted from Tumlong to Gangtok in 1894.

Following the death of Thutob Namgyal, Sidkeong Tulku ascended to the throne in 1914 as the tenth king of Sikkim. But his major contribution was during the time of King Thutob Namgyal. He looked after the departments of forest, monasteries and education. He died the same year when he became king and was succeeded by Tashi Namgyal.

Sir Tashi Namgyal was one of the pioneers of modern Sikkim, his contribution is way beyond as combined with the rest of the kings in Sikkimese history. Critical changes in the sphere of social, economic, and political dynamics paved the way forward for developing Sikkim. Abolition of forced labour, illegalisation of public gambling, prohibition on the use of unpaid labour, establishment of transport service known as Sikkim Nationalised Transport (SNT), reforms of administration by bringing all-party agreement in 1951 for an elected executive council to govern the state of Sikkim are few to quote. Further, the nature of liberating the state subjects and the programs conducted had fundamental linkages with development that was going on in India. Above all, the creation of Sikkim Subject Certificates to his subjects-domicile citizens of the state, viz Bhutia, Lepcha, and Tsongas in 1961, and the required amendments in following years uphold the ethno-political significance even today. His contribution remains incomplete without mentioning "the Indo-Sikkim treaty" of 5th December 1950 where Sikkim agreed to be the protectorate state of independent India wherein the Indian Administration agreed to offer all forms of security.

He was succeeded by Palden Thondup Namgyal in year 1962. He was the last king of Sikkim. There is not much to say about his contribution except that he submitted before the waves of democracy launched by his subjects.

However, he brought some reforms and changes in education and health sectors establishing new schools and hospitals. He died in 1982 but before that the history of Sikkim as a sovereign monarchy of 333 years was replaced by the dawn of democracy in 1975.

38th Amendment bill was tabled in Indian parliament to add another union as a state. Sikkim became the 22nd state of the Indian Union on 16th May 1975, whereby B.B. Lal became the first governor and Kazi Lendhup Dorji became the first elected Chief Minister of the state. Meanwhile, Sikkim was accorded special status with Article 371(F). Since then, the state has enjoyed the flavours of democracy till now.

14.8 SIKKIM HIMALAYA: THE PHYSICAL SETTING

Being located in the Eastern Himalayas, Sikkim has very rugged topography and formidable physical features. Geographical area of 7096 square kilometres of the state has varied elevation ranging from 300 metres to 8500 metres. This varied elevation has created four distinct types of physiographic units including lower hills, upper hills, alpine and snow-covered land in the state. Such diversity of elevation has resulted in the emergence of different climatic conditions and vegetation. Sikkim state is enclosed by lofty ranges and spurs of the greater Himalayas with varying heights on three sides. Sikkim Himalaya makes the westernmost section of the Eastern Himalaya.

In the north, Great Himalayan range stretches in convex form while Singali-la range is situated in the west, which is a spur of the great Himalayas extending from north to south separating Sikkim from Nepal. Donkya range, forming the eastern boundary of Sikkim, is much segregated with only two gaps, Nathu la and Jelep la which provide the traditional trade routes between Sikkim and Tibet. In the continuity of Donkya range is the western shoulder of Doklam plateau which is a trijunction between India, Bhutan and Tibet's Chumbi valley. South-western spur of Mount Gipmochi separates Sikkim from Bhutan. Jaldakha river originating below Jelep-la pass cuts into Mount Gipmochi's southern spur.

14.8.1 Geology

General geology of Sikkim represents Khangchendzonga or Darjeeling group of rocks. In other words, the broad lithological units of Sikkim comprise central crystalline complex comprising migmatites, gneisses, high-grade schists and amphibolites. As Kharel and Bhutia (2013, 24) cited that the Daling group of rocks lies immediately south of the former group. It comprises low-grade meta-sedimentaries such as phyllites, schists, and quartzites. Further, to the south of this granitised meta-sedimentary sequence lies the Gondwana group of rocks comprising Rangit pebble slate and Damuda sandstones and shales with coal bands. Shiwaliks are overlain by quaternary in the duar plains in West Bengal.

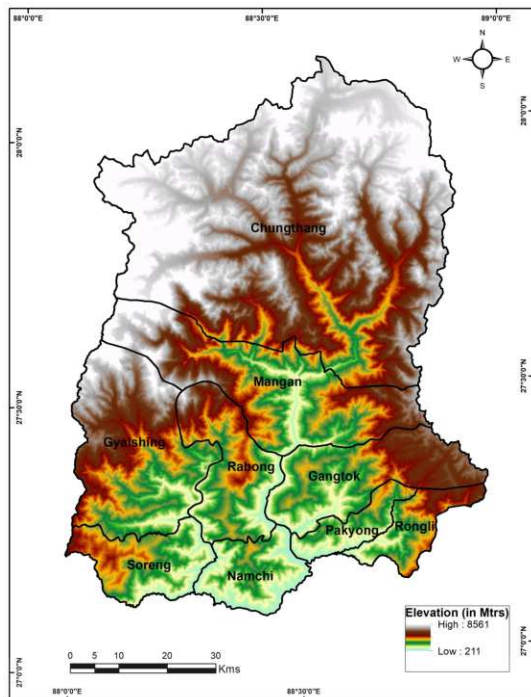


Fig. 14.6: Elevation, Sikkim

14.8.2 Physiography/Relief

Sikkim Himalaya is essentially a mountainous section that encompasses the lesser and central Himalayas. Southern side is relatively lower in altitude and fairly cultivated while the northern side sees a rise in elevation with series of mountain ranges. It has a varied elevation ranging from 300 metres to 8540 metres which generally increases from south to north. Though it is made up of young mountains in terms of its geological niche, Kharel and Bhutia (2013, 5) write that major portion of the state is covered by Precambrian rocks.

Northern, eastern and western portions of the state are constituted of hard massive gneissic rocks capable of resisting denudation whereas the central and southern portion is formed of comparatively soft, thin, slaty, and half-schist ore rocks that denude easily.

Generally, the trend of the mountain ranges is east-west wherein Singali-la and Chola ridges are some of the prominent ones. North-south trending ridges in Sikkim separate river courses of Teesta and Rangeet.

Further, Kharel and Bhutia (2013, 6) write that topography of northern part, where rocks are of sedimentary origin, is characterized by barren, reddish-brown molds and hillocks with broad flat bottomed valleys, typical of the Tibetan plateau. These hillocks or molds are seen protruding out from the main Himalayan ranges, gently merging with broad plains of Tibetan plateau. Further south is an east-west trending ridge between trans-Himalayan zone and lesser Himalayas. Khangchendzonga is its western limit and Lama Angdang the easternmost point. What lies in between these two is a series of high peaks, valleys, gorges and glaciers.

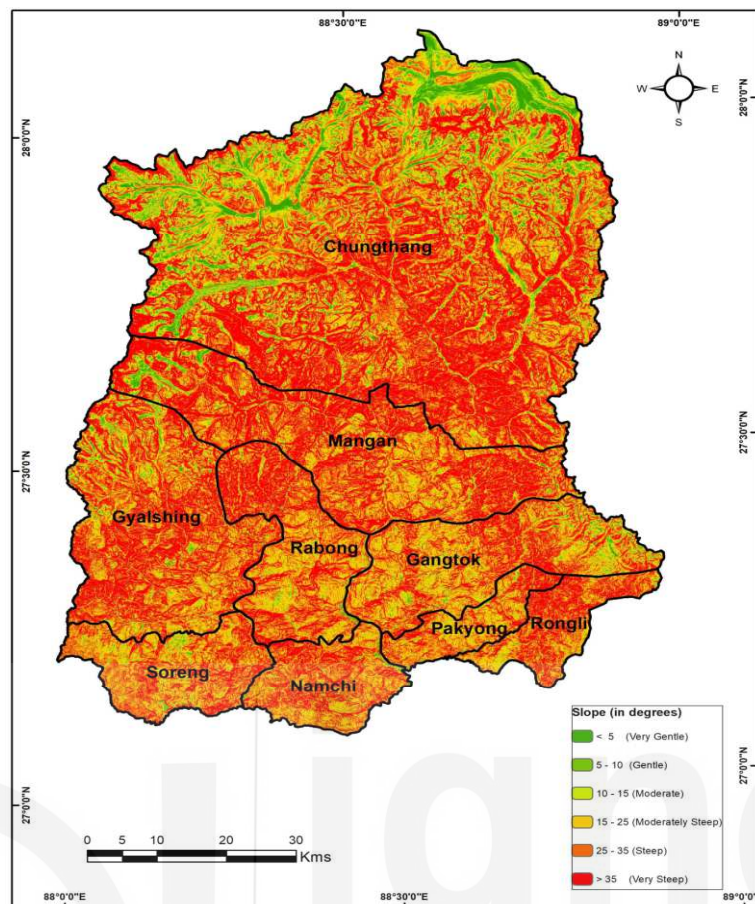


Fig. 14.7: Slope, Sikkim.

Sikkim has been physiologically divided into four zones, namely-

Lower hills: Ranging between 300 metres (984 feet) to 1,000 metres (3,281 feet) metres and have hilly topography with flat cultivated patches.

Middle hills: It ranges between 1,000 metres (3,281 feet) to 2,000 metres (6,562 feet) metres. Major forest areas are found in this zone.

Mountain zone: It ranges between 2,000 metres and higher upto about 4500 metres.

Above 4500 metres usually remains snow-covered/frozen zone and devoid of vegetation.

Fig. 14.7 shows that northern areas of Sikkim have the gentler slope despite having highest average altitude in the region. This is so because part of Sikkim beyond *Thangu* village in the north is extension of Tibetan plateau which is wide open table land.

14.8.3 Drainage and Water Resources

Sikkim Himalaya has glaciers in its northern and western parts which give birth to Teesta as a major drainage river system. Rangeet being a major tributary is another important river in the tiny state of Sikkim. Teesta originates from glacial lake Cho Lamu in northeastern corner of the state and is joined by several tributaries on its way down. Rangeet, Rangpo, Rongli, Rang Chu, Lachung Chu, Ranikhola, Rora Chu, Rakchum Chu and Geilkhola are some important tributaries. Rangeet river originates from Rathong glacier

and meets Teesta at the border between Sikkim and West Bengal. Together, Teesta and Rangeet form rivers the main channels of drainage and run nearly along north-south extent of the state. There are almost 227 perennial lakes/wetlands at different altitudes and numerous natural springs which are both perennial as well as seasonal.

14.8.4 Climate

Low hill type: This type of climate prevails between 300-900 metres above sea level. It is also known as *warm tropical type* which is suitable for growing sub-tropical fruits like lemon, oranges, guava and banana etc. Larger part of land at this altitude is under plough for paddy farming. Maize, oilseeds, ginger, pulses, vegetables are other notable crops. Winters here are reasonably warm while summer are warmer with relatively lesser rainfall than the mid- hills areas.

Mid hill type (*cool tropical/moist tropical*) of climate is found between 900-1800 metres. This climate is best suited for oranges cultivation while black cardamom along with maize, paddy, oilseeds, pulses, ginger and vegetables are other prominent crops. Winter is usually dry but heavy summer precipitation normal here.

Mountain type climate is found in narrow zone of 1800-2800 metres above sea level. This zone, also known as *warm temperate zone*, is principally suited for black cardamom cultivation. Maize, peas, millets, vegetables etc., are other significant crops. Sporadic drizzles are experienced during winter months but substantial rain occurs during summer.

Mid-mountain type of climate (*cool temperate zone*) prevails between 2800-3800 metres above sea level. Precipitation here falls in the form of snow and rain. It often snows here between December to February while it gets copious rains during June-July months. Seed potato growing is best suited here alongwith temperate fruits. This climate is also suited for cultivating cabbage, peas, carrots and radish etc. Lachen, Lachung, Phadamchen, Zuluk, Ravongla, Damthang, Okhrey, Hilley, Bhareng and Ribdi are the important settlements in this zone.

High mountain type of climate prevails between 3800-4500 metres above sea level and is also known as sub-*alpine* climate. This zone has rather dense vegetation with tall trees of rhododendron, junipers, maple and primula flowers. Winter begets harsh cold condition here. Peas, Potato and cabbage are the only notable crops cultivated here during summer. Thangu, Lachen and Lachung and Dzongri are main settlements in North and west Sikkim.

Alpine type of climate prevails in areas with an elevation of 4500-5500 metres above mean sea level. It is a zone of harsh winter conditions with heavy snowfall where agriculture is not possible. Vegetation, if any, is primarily in the form of some herbs and grasses.

Snow Peak Type (*Frigid zone*): lies above 5500 metres mean sea level.

Highest temperature in Sikkim Himalaya is recorded in the months of July and August while lowest temperature is seen during December and January.

14.8.5 Vegetation

Sir Joseph Dalton Hooker categorized vegetation of Sikkim into three major types- Tropical, Temperate, and Alpine. According to him, tropical zone covers lower valleys stretching from lower elevation up to 1500 metres, whereas the temperate zone ranges from 1500-4000 metres and the alpine zone extends above it till snowline. This classification was reclassified in recent times into six categories, namely:

Tropical Semi-Deciduous Forests range between 300-900 metres with Sal as the dominant representative.
Tropical/moist and Broad-Leaved Forest between 900-1800 metres. Macaranga, Schima, Eugenia, Sapium, Castanopsis are prominent tree species
Temperate Broad-Leaved Forests ranging between 1800-2800 metres. Oak, Hemlock, Rhododendron and Burberies Lillie's etc.
Temperate Coniferous and Broad-Leaved Forests between 2800-3800 metres. Important species-Junipers, rhododendrons
Sub-alpine Vegetation between 3800-4500 metres. Bushes of Junipers, rhododendron, birch
Alpine Zones range above 4500 metres which are signified by seasonal herbal plants.

14.8.6 Soils

Sikkim has a wide range of variations in terms of altitude and temperature, terrain and slopes, geology and vegetation that influence formation of different kinds of soils. As major part of Sikkim lies on Darjeeling gneiss, soil developed from this rock is brown clay, generally shallow and poor in lime magnesia, phosphorous and nitrogen. However, it is quite rich in potassium. The texture of the soil is loamy sand to silty clay loam. Depth of soil varies from 30 to 150 centimetres.

Further, a survey conducted by National Bureau of Soil Survey and Land Use Planning, Calcutta Regional Centre in 1981 proposed eight sub-groups and fifteen soil series found in Sikkim.

Table 14.6: Soil Types

Sr. No.	Soil Sub-Groups	Soil Series
1	Typic haplumbrepts	Markong, Hilley
2	Lithic Haplumbrepts	Gompa
3	Typic Dystrochrepts	Lingtse, Losep, Namthang
4	Litic Dystrochrepts	Machong
5	Umbric Dystrochrepts	Thekabong, Chatrikola, Padamchen
6	Lithic Udorthents	Putuli, Simkara, Nandugaon
7	Aquic udifluents	Majitar
8	Ultic hapludalfs	Tariku

(Source: www.sikkimagrinet.org)

14.8.7 Physical Resources Base

Falling in central crystallines and daling groups of rocks, Sikkim has limited mineral base with average quality of minerals. Coal, graphite, dolomite, limestone, talc, sillimanite and asbestos are a few of non-metallic minerals.

Some of the important deposits include Rangpo-copper deposits, Dikchu copper deposits and Pachekhani deposits, while traces of copper mineralisation are found in Temi, Reshi, Jungdum, Sumbuk, Rothak, Rinchengpong, Sisni, Dong Busty, Namthang, Parbing and Ratopani (Kharel and Bhutia 2013, 30). Besides, Singh (2012) opines that forestry and hydel power provide two most important resource bases for the state. Sikkim covers just 0.2 percent of the geographical area of India, but it harbours more than 26 percent of flowering plants reported in the country and is known to be an important phytogeographical reserve of the country. Species-wise, it has about 4500 Flowering plants, 550 Orchids, 36 Rhododendrons, 16 Conifers, 28 Bamboos, 362 Ferns and their allies, 9 Tree Ferns, 30 Primulas, 11 Oaks, over 424 medicinal plants, 144+ Mammals, 550 types of Birds, 48 Fishes and over 600 type of Butterflies and also 28 numbers of Mountains/Peaks, more than 38 Glaciers, 227 High altitude lakes and wetlands and over 104 rivers and streams. Such diversity of resources has resonated with the ecotourism industry.

SAQ 4

- List the main types of vegetation of Sikkim Himalaya.
- Briefly discuss physical resource base of Sikkim Himalaya.

14.9 SIKKIM HIMALAYA: CULTURAL SETTING

Nested in the lap of mighty Mt. Khangchendzonga, Sikkim is home of different ethnic communities. Like diverse physiography, vegetation, climate and altitude; there is significant diversity of communities namely **Bhutia, Lepcha, and Nepali**. Besides, Lepcha, Bhutia and Nepali stand out as umbrella terms where "different yet similar" communities in terms of culture and religion are integrated as one. Re-reading the recent past of monarchical Sikkim also highlights the presence of different plains people living in Sikkim making it richer in terms of diversity of cultures in the state.

The cultural tapestry of Sikkim Himalaya can be viewed with its multi-ethnic and multicultural population. Bhutias, Lepchas, and Nepalis are the major communities.

Bhutias form prominent ethnic group of Sikkim Himalayas. They have Tibetan roots and follow Vajrayana Buddhism. They are said to have migrated to Sikkim from Kham region of Tibet. They started making the state their home in smaller numbers in 8th century. Thirteenth century registered advent of many clans of Bhutias in the region. They played a crucial role in establishing Namgyal dynasty in Sikkim which continued to rule Sikkim till 1975 when Sikkim became part of India. They speak *Drenjongke* which is

about seventy-five percent mutually intelligible with the Dzongkha language of Bhutan and the Tibetan language. Historically, they have been involved in animal husbandry and agriculture in higher mountainous areas and over time they got engaged in trade, business and Government services. Their tradition and culture have been an integral part of Sikkim's identity.

Nepali is the largest community of the region and has a history of migration to the state which dates back to the 19th century and earlier. Many Nepalis migrated to Sikkim for employment opportunities when the region was under British influence. Some communities within the larger Nepali fold such as Limbus and Magars are said to have been present in the state for long and cannot be referred to as communities which arrived in the later history of Sikkim. Main language spoken by the community is *Gorkhali* or *Khaskura*. Today, this language is the main lingua franca of the state spoken by all communities of Sikkim. They have played a significant role in the democratic process of Sikkim. They are known for diversified occupations ranging from agriculture, trade and business to government service. Culturally, they have substantial influence on the cultural mosaic of Sikkim. Rai, Chhetri, Newar, Tamang, Gurung, Bahun, Sunuwar, Bhujel, Kami, Thami and Dami, etc. are prominent groups among Nepalis. Sherpa are also considered within Nepali fold. However, many Sherpas prefer to identify themselves as a sub-group of Bhutias.

Lepchas are considered the first inhabitants of Sikkim Himalayas. Lepchas call themselves *Rong* and their language with distinct script is also known as *Rongring*. They form smallest ethnic group of Sikkim. The term Lepcha has been accorded to them by their Nepali-speaking neighbours which meant 'unintelligible speakers'. Being the indigenous community of Sikkim, they have their own language, culture and traditions. Historically, they were primarily hunter and gatherers; hence, have been profoundly connected to Nature. Their ritual specialists are called *mun-bongthing* from which they derive the name of their religion *Mun-Bongthingism*. However, majority of them have adopted Buddhism and Christianity since the time Bhutias and Christian missionaries arrived in the region

Other Communities: Even though in much smaller number, Tibetans, Marwaris, Biharis and Bengalis are the most recent entrants in the state. These four communities are primarily been engaged in businesses and service sector.

Even though some communities entered the state later than others, the reality at present is that Bhutia, Lepcha and Nepali are bonafide citizens of Sikkim and Darjeeling-Kalimpong Hills and hence are Indian citizens. The coexistence of all diverse communities contributes to the unique social fabric of the state.

14.9.1 Population

Sikkim is second smallest state of India in terms of its geographical area and is smallest in terms of population. Sikkim had population of 6.11 Lakhs persons in 2011, an increase from 5.41 Lakh persons recorded in 2001. Total population of Sikkim was 610,577 persons in 2011, out of which males and females were 323,070 and 287,507 respectively. Population was 540,851 in

2001 with 288,484 males and 252,367 females. Population growth during 2001-2011 was 12.89 percent. This growth rate was much lower compared to previous decade which was 32.98 percent. Population of Sikkim accounted for 0.05 percent of India's total population in 2011.

Eastern and southern blocks of Gangtok and Namchi have highest population density (Fig. 14.8) as these areas have larger towns which function as administrative and nodal centres. Chungthang and Mangan blocks are largest with least population and are relatively remoter, hence have least population density. Soreng and Pakyong blocks are moderately populated. Gyalshing and Rabong blocks are relatively larger and are away from larger towns of the state. These have low population density.

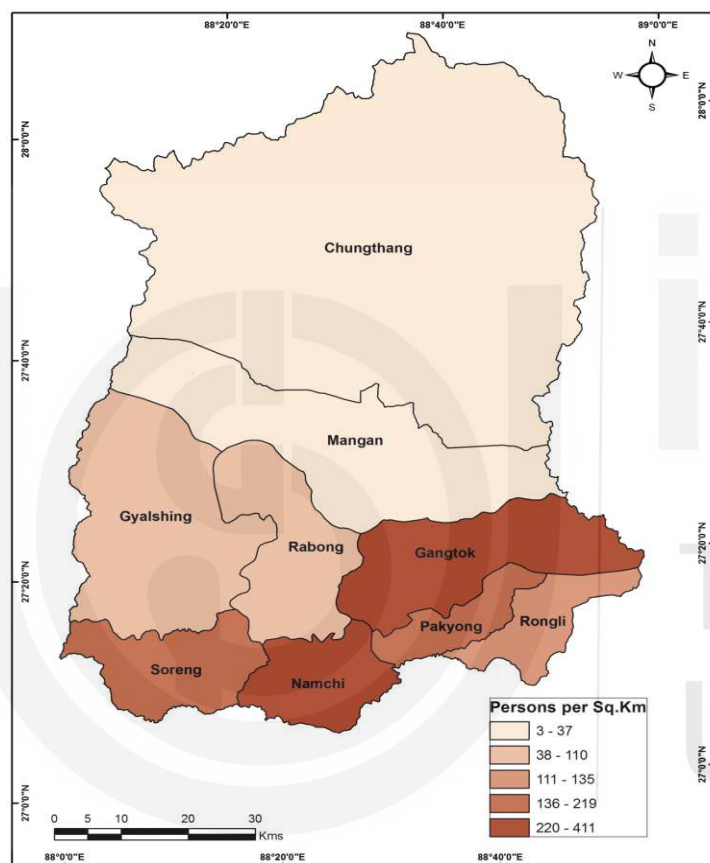


Fig. 14.8: Population density, Sikkim

Table 14.7: Population Growth in Sikkim at each Census from 1901 to 2011

Census Years	Total Persons (in numbers)	Males (in numbers)	Females (in numbers)
1901	59,014	30,795	28,219
1911	87,920	45,059	42,861
1921	81,721	41,492	40,229
1931	109,808	55,825	53,983
1941	121,520	63,289	58,231
1951	137,725	72,210	65,515
1961	162,189	85,193	76,996
1971	209,843	112,662	97,181
1981	316,385	172,440	143,945
1991	406,457	216,427	190,030
2001	540,851	288,484	252,367
2011	610,577	323,070	287,507

Unlike the fall in population growth rate, Sikkim has experienced high growth in literacy which was 82.20 percent in 2011, male literacy was 87.29 percent while female literacy was 76.40 percent. Density of population of Sikkim was 86 persons per square kilometres which was lower than the national average of 382 persons per square kilometres in 2011. Sex ratio in Sikkim shows far from desirable figure with 889 females per 1000 males as against national figure of 940 females in 2011.

Table: 14.8: Percentage Distribution of Persons by Social Groups in Sikkim, 2020-2021

Districts	Social Group			
	ST	SC	OBC	Others
North Sikkim	66.16	0.65	33.19	0.00
East Sikkim	44.04	8.02	47.34	0.60
South Sikkim	30.99	2.64	60.01	6.36
West Sikkim	24.20	5.94	63.87	5.98
Total	32.82	5.32	57.37	4.49

(Source: Periodic Labour Force Survey, 2020-2021)

As evident from Table 14.8, North Sikkim has highest proportion of Scheduled tribe population while West Sikkim has the least. Similarly, West Sikkim followed by South Sikkim has the largest number of other backward castes (OBC). Scheduled castes population is more in East and West Sikkim in comparison to North and South Sikkim.

Table 14.9: Percentage distribution of Persons by Religion in Sikkim

S. No.	Religion	Percentage
1	Hindu	57.75
2	Buddhists	27.38
3	Christians	9.91
4	Islam	1.6
5	Sikh	0.30
6	Other religion	2.66
6	Religion Not stated	0.29

(Source: Census, 2011)

Table 14.9 shows that Hinduism, Buddhists and Christianity are major religions of the state. While Muslims accounts for almost and half percent of the state's population. Predominant in West and South Sikkim, Islam is a much newer faith in the state and is smaller numerically. Followers of other religion are noteworthy in the state as it is slightly above two and half percent. This has been on account of indigenous belief system of some the communities like Many Limbus prefer to state that they follow their own religion 'Yumamism' follow *Mundhum*, a collection of oral scriptures that contain their rituals, and religious practices etc. Similarly, some Lepchas are still Animists and Nature worshipers and prefer to follow the Lepcha spiritual practices guided by their shamans known as Mun (female) and Bongthing (male).

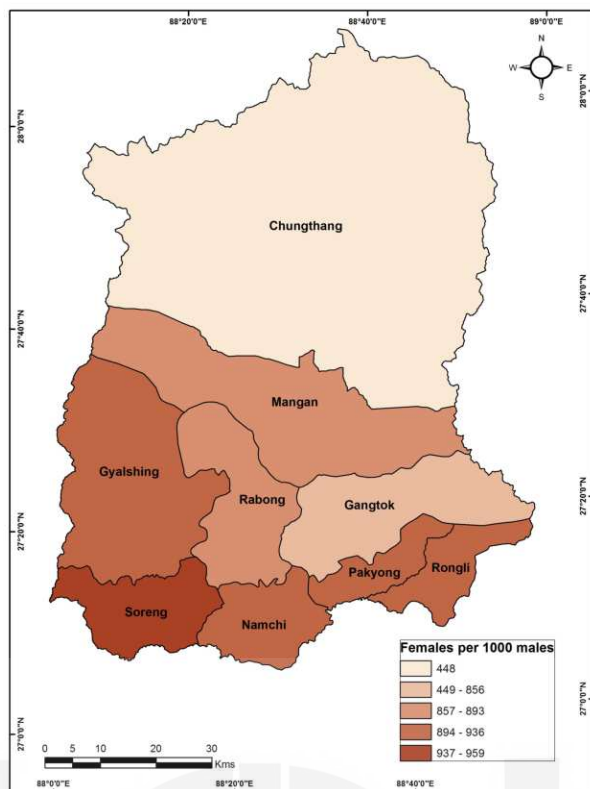


Fig. 14.9: Sex Ratio, Sikkim.

As we can see from Fig. 14.9, C.D block Gangtok has highest population whereas sex ratio in Chungthan followed by Gangtok is lowest. This is because Gangtok being administrative capital and largest urban centre of Sikkim has attracted lot of migrants for work and education. Often such in-migration is sex selective in favour of males. Gangtok despite having better infrastructure and amenities does not attract family of migrants owing to higher cost of living. Chungthang on account of being relatively remoter and higher in elevation registers out-migration of population to the nearby Mangan block.

14.9.2 Settlement

Settlement consists of spatial arrangement of houses in an area. The arrangement is affected by physical and cultural elements wherein topography, climate, soil quality, land fertility and water availability along with political and economic factors help to shape the arrangement. There are different types and ways of classifying settlements. One such way is by analysing rural and urban populations which have been used in this case.

Around 25.15 percent of people of Sikkim lived in urban areas as against 74.85 percent living in rural areas. Total urban population was 153,578 persons comprising 80,273 males and 73,305 females. Male population in rural areas of Sikkim was 242,797 and female population was 214,202. Rural settlements are dispersed and semi-dispersed and inter-house distance is relatively more. Some different settlement forms can be observed due to topographic variations. Urban settlements in Sikkim are compact with houses being very close to each other. These have acquired various forms resulting from the presence of physical and cultural elements like roads which create the linear settlements. Such type of settlements is very common in Sikkim.

14.9.3 Economy

Despite being the least populated and second smallest state of Indian Union, Sikkim's Human Development Report 2014 highlights significant economic growth and sectorial contribution. As per the report in 2012–13, Sikkim reported a per capita income (net state domestic product) of Rs 142,625. Furthermore, the report showed that Sikkim's real per capita income grew at an annual average rate of around 15 percent between 2004–05 and 2011–12, which is highest among Indian states and more than twice the national average of 6.7 percent per annum.

Table 14.10: Percentage distribution of Persons by Type of Household in Sikkim, 2020-2021

Sector	Household Type					Total
	self-employed in agriculture	self-employed in non-agriculture	regular wage/salary earning	casual labour in non-agriculture	others	
Rural	30.01	13.49	48.21	7.07	1.21	100.00
Urban	0.00	37.89	50.13	8.80	3.18	100.00
Total	21.70	20.25	48.74	7.55	1.76	100.00

(Source: Periodic Labour Force Survey, 2020-2021)

Table 14.10 shows that maximum number of self-employed households is in non-agriculture sector in urban centres which number nine in the state. On the other hand, share self-employed workforce in agriculture in rural areas is slightly less than that of non-agriculture workforce of urban areas. There is no self-employed household in agriculture in urban areas which shows all agricultural activity to be confined only in rural area. There seems to be over dependence on regular salaried earning in Sikkim as such households account for almost 50 percent of all households for both urban and rural areas. While households providing casual labour force are only in non-agriculture sector and are less than 9 percent for both rural and urban areas.

Seventy-five percent of Sikkim's population lives in rural areas. Over 60 percent of the population is directly or indirectly dependent on agriculture and allied sectors, while the rest depends on manufacturing and service sectors for a living. Agricultural practices along with cattle rearing are core source of livelihood of rural Sikkim. Along with cultivation of rice, maize and buckwheat, Sikkim is also known for cash crops. Sikkim is the largest producer of black cardamom (4,500 metric tonnes). Its share is 88 percent of India's total production. Casual labour force in the rural and urban areas are getting very low wages.

Table 14.11: Economic Classification of the Population of Sikkim (1971-2011)

S. No.	Categories	1971	1981	1991	2001	2011
1	Population	209843	316385	406457	540851	607688
2	Main workers	111609	147436	164392	212904	230397
a)	Cultivators	-	88610	97834	101200	117401
b)	Agricultural Labourers	-	4887	13793	9081	25986
c)	Workers in the household	-	1586	1309	3168	5143

	Industry					
d)	Other workers	-	52353	55785	99455	159608
3	Marginal workers	-	5378	4329	50139	77741
4	Non-workers	98236	163571	237736	277808	-
5	Decadal Change	-	-	-	-	-
i)	Main workers	-	-	-	48512	17493
a)	Cultivators	-	-	-	3366	16201
b)	Agricultural labourers	-	-	-	(-) 4712	16905
c)	Household industry workers	-	-	-	1859	1975
d)	Other workers	-	-	-	43670	60153
ii)	Marginal worker	-	-	-	45810	27602
iii)	Non-workers	-	-	-	40072	NA

(Source: Provisional Results of Census 2011)

As stated above that 60 percent workforce is engaged in agriculture and allied activities but gradual shift is taking place in the contribution of other sectors towards Sikkim's gross domestic product. The report highlights an increase in the share of industry in GDP from 29 to 55 percent and decline in the share of agriculture from 18 to 8 percent, and in-services from 53 to 38 percent between 2004 and 2012.

The growth in Sikkim's Gross State Domestic Product is attributed to the sectorial change that came from the commissioning of power projects over the Eleventh Plan period, 2007–2012. Along with this the organic mission in agriculture sector, particularly floriculture and horticulture has also performed relatively well during this Plan period. Coupled with these were mushrooming of investments in pharmaceutical companies in different parts of the state. Key pharmaceutical companies such as Sun Pharma, Cipla, and Zydus, Cadila etc have set up manufacturing units in Sikkim. Furthermore, increase in the inflow of tourists and booming tourism is showing an impressive growth.

14.9.4 Transport and Communication

Sikkim situated in northeastern part of India is under-developed in terms of transport network. Only mode of transportation is road. Building of road network has gained extra momentum with the advent of tourism. Building of alternate roads along with connecting rural places with district headquarters have been taken up on priority. An airport has also been inaugurated in Pakyong district. Roadways stand out as the basic mean of transport in the absence of other means of transportation. However, with the coming in of internet, there is continuous quest to connect places with internet and expand Wi-Fi connectivity.

SAQ 5

Briefly describe the cultural setting of Sikkim Himalaya.

14.10 SIKKIM HIMALAYA: REGIONS

Sikkim is one of the northeastern states of India bordering Bhutan, Nepal and Tibet (China) on eastern, western and northern sides respectively. Sikkim is the second smallest state of Indian Union and has diverse physical features; one such is the presence of Mt. Khangchendzonga, the third-highest peak which is also a guardian deity in local ethnic culture. Sikkim is home to various kinds of unique flora and fauna with a mosaic of different glacial and mountainous landscapes.

In general, altitude in the region increases from south to north. Change in altitude also significantly influences climate as well as vegetation. Southernmost part of the region is lowest in height and has largely broad-leaved natural vegetation. As against this the northern most part of the region is highest, very rugged with many glaciers. In the light of these features, Sikkim can be divided into three first order regions as;

1. **Southernmost Foothill Region:** As stated above, it is lowest part of the region in terms of altitude. This part is relatively more suitable for agriculture and also for some tropical fruits and vegetables. This region mainly comprises of southern parts of West and South districts. There are large numbers of settlements here but mostly rural in nature. It has also experienced lot of influence of plains due to its proximity to West Bengal Duars. However, transport network is better developed and lot of commercial farming has also taken place.
2. **Middle Sikkim:** It comprises of Central and some northern parts of West and South Districts and most of East District. This region is most important in terms of urbanisation, location of industry and hydro-electric power. The region is also important for growing spices especially black cardamom, temperate and citrus fruits, floriculture. Most important overland trade route popularly called Chumbi Valley route linking Kalimpong with Lhasa passes through this region. This region is also most important part of the state in terms of tourism. It has more concentration population of the state. This region can be further sub-divided into two second order region;
 - a) **Eastern Middle Sikkim:** It is most important part of Sikkim due to the location of Gangtok which is capital of the state. Most educational, industrial and tourism related activities have developed in and around Gangtok.
 - b) **Western Middle Sikkim:** This part is also well developed in terms of horticulture and spice farming. However, the imposing impact of Gangtok is not present in this sub-region.
3. **Northern Sikkim:** It comprises North district and northern most part of West and South districts. It is highest part of the State, more rugged and very cold. Not much suitable for agriculture but traditionally animal rearing is practiced here. It experiences snowfall during winters and is dotted with glaciers and glacial lakes. It most thinly inhabited region of Sikkim and has no large settlements. However, some adventure tourism is being developed in this part.

SAQ 6

Name first order regions of Sikkim Himalaya.

14.11 SIKKIM HIMALAYA: PROBLEMS AND PROSPECTS

Being situated in the lap of Himalayas, Sikkim has a unique mountainous landscape presenting harmonious relationship between nature and culture. This unique blend of culture rooted in sustainable use of resources with least exploitation has been hallmark of Sikkim. Meanwhile, after becoming a state of India in 1975, the idea of development flourished rampantly in all spheres. The development process which started with the hope of bringing prospects and prosperity also brought many problems.

List of problems and prospects stands long but certain fundamental points are discussed here. Tourism, production of so-called clean and green energy through dams, organic farming and establishment of footloose industries has been proliferating in the recent past. Scenic natural landscape and local ethnic cultures have been attracting tourists in large numbers. However, the limited development of infrastructure has resulted in mismanagement of resources. Often tourists are found expressing their views about overcrowding of shrines and places of wilderness. Along with this, problems related to disposal of garbage, traffic congestion and rising prices of commodities are being faced by the region.

Furthermore, with limited employment opportunities in the state, the construction of hydropower projects was seen as an important step to overcome the problem. Sikkim is stated to have potential of generating energy of more than 5000 Mega Watt, which has remained unexploited till recent times. But now, power projects have started mushrooming in the state. However, new development is also posing problems of environmental degradation and of cultural exploitation. Environmental degradation is becoming major issue as number of hydro-Electric dams has been built close to protected wildlife sanctuaries and national parks. Cultural issues came into focus because Lepchas, the ethnic tribe of Sikkim, worship Teesta River which they treat as their Goddess and construction of dams on this river has emerged as a sentimental issue. Furthermore, the construction of dam has impacted the habitat of Lepchas as part of their land is getting submerged. Hence, the construction of dams for clean and green energy is seen both as boon as well as bane in the state.

Sikkim government has tried to revolutionise agricultural by introducing organic farming. But this effort is facing problems due to low technical know-how and limited human resources. However, organic farming is seen as important area in the state where there is a limited possibility for mass agricultural production.

Similarly mixed bag of prospects and problems was seen with the development of footloose industries, especially pharmaceutical companies. It results in low employment of locals as most workers are outsiders resulting in

lot in-migration in the tiny state. This point acquires a greater importance as geographical area and population size of the state are small and the region is very sensitive due to its geostrategic location and political position. Besides, development and extension of road network to connect rural as well as border areas need to be undertaken with priority. Railway network is also important for better connectivity with rest of India.

14.12 SUMMARY

In this Unit, you have learnt the following:

- The state of Jammu and Kashmir is primarily seen as a milieu of micro-regions, comprising Jammu province, Ladakh region, and Kashmir valley. These three regions not only hold diverse entities in terms of physical features like altitude, climate, and vegetation but also in terms of ethnic and cultural diversity.
- Like other Himalayan states, this region also embarks upon the long written or mythological histories which are rooted in virtual- facts, friction, and folklore.
- The geographical location of the region along with its brief history.
- The physical setting of the region includes geology, relief, drainage, climate, and vegetation along with soils and resource base.
- Comprehensive details about the cultural setting encompassing population, types of settlement, along with the significance of transport and communication, problems and prospects of the region and the economy.
- Sikkim Himalaya is a part of the Eastern Himalayas and has various unique flora and fauna along with cultural diversity.
- The mighty Himalayas, have undulating terrain, valleys, and gorges with small flatlands, diverse altitudinal variation, climate variation, soil types, and geological structure.
- Further, population dynamics, the economy of the state, the ever-increasing tourist inflow, the environmental and social implications of dams and hydel power projects along with the mushrooming of companies and rising influx for gaining a critical and comprehensive understanding of the Sikkim Himalayas.

14.13 TERMINAL QUESTIONS

1. Discuss in brief the significance of studying Kashmir and Sikkim Himalayas micro regions.
2. Discuss the various types of climates found in Kashmir valley.
3. Discuss the cultural setting of the Kashmir region.
4. Discuss the geographical and geological aspects of the Sikkim Himalaya.
5. Discuss the economy of the state of Sikkim.
6. Critically examine the problems and prospects of Sikkim Himalaya.

14.14 ANSWERS

Self-Assessment Questions (SAQ)

1. a) Three names are Jammu, Kashmir, and Ladakh. They are quite distinct from each other in terms of physical and cultural settings.
b) The main features of climate are its diverse types varying from that of alpine (Ladakh region) to the sub-tropical (Jammu region) type due to its location and topography.
c) Five Mineral resources are: Lignite, Limestone, Copper ores, Iron-ore and Gypsum.
2. a) Srinagar, Badgam and Pulwama have highest population density, whereas Bandipore and Ganderbal have lowest population density in Kashmir valley.
b) Majority of population of Kashmir valley is dependent on agriculture for their sustenance. Besides, horticulture, floriculture and sericulture are also practiced by the people of Kashmir valley.
c) Roads are the main means of transportation, due to geographical factors.
3. Dogras refers to a distinctive ethnic group of the Jammu Division belonging to the Aryan race and Dards belong to the Aryan group.
4. a) Sir Joseph Dalton Hooker categorized the vegetation of Sikkim Himalaya into three major types - Tropical, Temperate, and Alpine.
b) Coal, graphite, dolomite, limestone, talc, sillimanite and asbestos are a few of non-metallic minerals.
5. Sikkim is the home of different ethnic communities namely Bhutia, Lepcha, and Nepali.
6. Southern Most Foothill Region, Middle Sikkim and Northern Sikkim.

Terminal Questions (Answers)

1. Refer to Section 14.1.
2. Refer to Section 14.3.4.
3. Refer to Section 14.4.
4. Refer to Section 14.7.
5. Refer to Section 14.8.
6. Refer to Section 14.9.

14.15 REFERENCES AND FURTHER READING

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Web Links

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3. <https://koausa.org/geography/doc/geography.pdf>
4. <http://sikkimforest.gov.in/soer/Introduction.pdf>
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UNIT 15

MICRO REGIONS 2 |

Structure

15.1	Introduction Expected Learning Outcomes	15.8	Assam Plains: The Physical Setting
15.2	Sundarbans Delta: Historical Background		Geology
15.3	Sundarbans Delta: The Physical Setting		Physiography/Relief
	Geology		Drainage and Water Resources
	Physiography/Relief		Climate
	Drainage and Water Resources		Vegetation
	Climate	15.9	Soils
	Vegetation		Physical Resource Base
	Soils		Assam Plains: The Cultural Setting
15.4	Sundarbans Delta: The Cultural Setting		Population
	Population		Settlement
	Settlement		Economy
	Economy		Transport and Communication
	Transport and Communication	15.10	Assam Plains: Regions
15.5	Sundarbans Delta: Regions	15.11	Assam Plains: Problems and Prospects
15.6	Sundarbans Delta: Problems and Prospects	15.12	Summary
15.7	Assam Plains: Historical Background	15.13	Terminal Questions
		15.14	Answers
		15.15	References and Further Reading

15.1 INTRODUCTION

In this unit, you will study the Sundarbans delta and Assam plains as micro-regions of India. You will know about the region's historical background, physical setting, and cultural setting. This unit will also discuss about different sub-regions within the region and discuss the region's problems and prospects. Study of Sundarbans delta and Assam plains is of paramount importance due to their unique ecological, physical, and socio-economic significance. These regions are renowned as biodiversity hotspots, harbouring a diverse array of plant and animal species, including several that are endangered or rare. Furthermore, these areas are particularly susceptible to the impacts of climate

change, with rising sea levels, extreme weather events, and shifting rainfall patterns posing significant threats. By studying these two regions, students are expected to gain valuable insights into the effects of climate change and may develop strategies for adaptation and mitigation.

Moreover, the Sundarban delta and Assam plains play pivotal roles in sustaining livelihoods through agriculture, fisheries, and forestry, supporting millions of people. Investigative studies in these areas help in sustainable resource management practices that are essential for the long-term well-being of local communities. These are also susceptible to natural disasters such as floods, cyclones, and erosion, making it crucial to study them in order to understand the dynamics of these events and develop strategies to minimise their impact on communities. These regions are not only ecologically significant but also culturally and socially important, with diverse ethnic communities and traditions. Research in this regard helps to preserve cultural heritage and promotes social cohesion.

Additionally, Assam plains and Sundarbans delta provide essential ecosystem services, including water purification, carbon sequestration, and support fisheries, all of which are vital for sustainable development and for overall well-being of the region. Their importance extends to infrastructure development, as these are critical for transportation and trade, necessitating careful planning and construction of infrastructural projects like roads, bridges, and ports etc. Furthermore, Sundarbans delta is a prime example of transboundary cooperation between India and Bangladesh, illustrating how shared natural resources can be managed collaboratively on an international scale.

In short, comprehensive study of Assam plains and Sundarbans delta is significant for gaining holistic understanding of intricate interplay between natural and human systems, enabling well-informed decision-making for conservation, climate resilience and sustainable development in these ecologically and culturally rich regions.

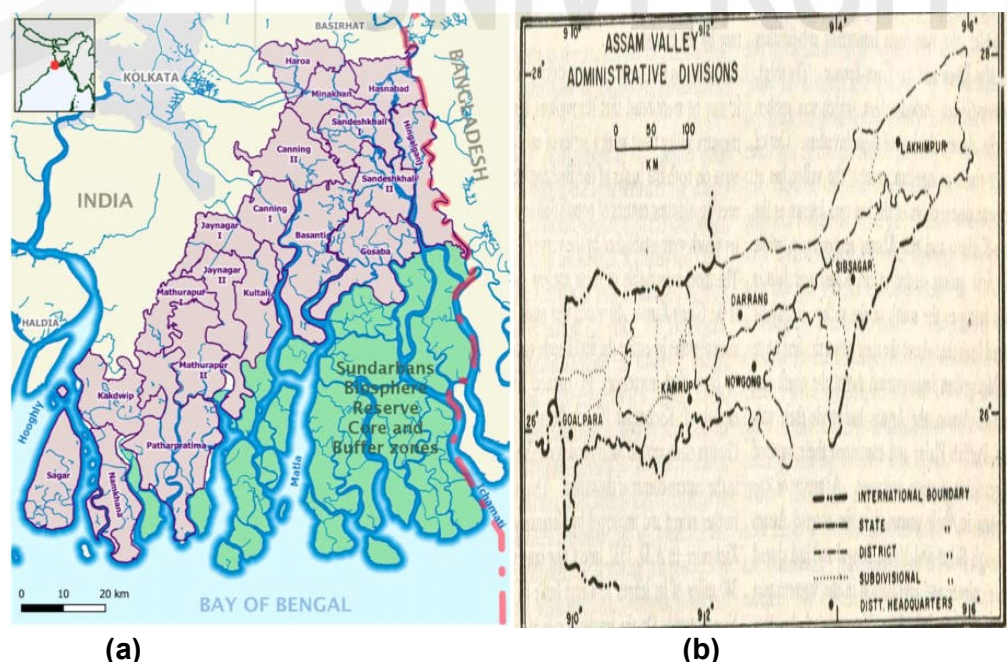


Fig. 15.1: Location Map of Sundarbans Delta and Assam Plains.

(Source: (a) <https://www.mdpi.com/2073-4441/13/4/528>) and (b) Singh, R.L. India: A Regional Geography)

Expected Learning Outcomes

After studying this Unit, you should be able to:

- examine a brief history of Sundarbans delta and Assam plains regions;
- discuss the nature of physical setting of Sundarbans delta and Assam plains regions;
- explain the nature of cultural setting in Sundarbans delta and Assam plains regions;
- describe the regions of Sundarbans delta and Assam plains; and
- comprehend the problems and prospects of Sundarbans delta and Assam plains regions.

15.2 SUNDARBANS DELTA: HISTORICAL BACKGROUND

The Bay of Bengal and the lush plains of the delta have long been important places for human settlement and population growth. This region, which includes parts of Bangladesh, the eastern Indian state of West Bengal and Odisha, is known for its abundance of natural resources and strategic placement along maritime trade routes. Despite its geographical importance, the region has remained somewhat remote from the political heart of the Indian sub-continent, which is focused in Delhi. This geographical isolation has had a significant impact on the region's cultural landscape, allowing indigenous art, culture, and craftsmanship to flourish. Away from the influences of centralised power, people of the Bay of Bengal and the delta have developed their unique artistic traditions, which have gained international appreciation. Dacca muslin, for example, is a high-quality cotton fabric known for its craftsmanship. Dacca Muslin, created by employing complicated weaving techniques, became a highly sought-after commodity in the global market, signifying the peak of technical competence and artistic expertise. The region's reputation for manufacturing such magnificent piece of textiles contributed to its international recognition as a cultural and commercial hub.

Moreover, the Bay of Bengal and the delta region are notable for their rich ecological systems, typified by varied ecosystems, including mangrove forests, rivers, and marshlands. Among the most iconic inhabitant of this region is the Royal Bengal Tiger, a symbol of strength and grandeur. This majestic predator, as well as several other species of flora and animals, calls the Sundarbans, the world's biggest mangrove forest, a home. The region's fragile environmental balance promotes robust biodiversity, making it a popular destination for wildlife photographers and conservationists. However, anthropogenic factors such as deforestation, pollution, and climate change put the Bay of Bengal and its delta's delicate ecological balance at risk. Attempts to preserve and safeguard the region's natural resources are critical to ensuring the survival of its distinct ecosystems and the animals that rely on them.

To summarise, the Bay of Bengal and the rich plains of delta have long been important hubs of human civilisation, fostering the development of art, culture, and handicraft. Despite their relative remoteness from political power centres, these areas have survived as hotbeds of innovation and biodiversity, making a lasting stamp on the world stage.

15.3 SUNDARBANS DELTA: PHYSICAL SETTING

15.3.1 Geology

Sundarbans Delta's geology is characterised by deposition of sediments brought by rivers. The delta is surrounded by Bay of Bengal to the south, Bengal plains in the north, Assam plains on the east, and Indian peninsular block on the west. Ganges-Brahmaputra rivers deposit world's largest fan deposits with a volume of 1.25×10^7 cubic kilometres.

Development of lower Gangetic delta dates back to 125 million years when Indian plate collided with Burmese and Eurasian plates, which led to the formation of Himalayas, Ganges and Brahmaputra river system. Formation of the delta started actively in Tertiary and Quaternary periods. Sediments deposited in this region date back to 2.4 million years brought by Ganges, Meghna, and Brahmaputra rivers. The study shows that the sediments deposited here are clay, silt and sand etc. Rapid delta formations have resulted in uneven thickness and width of the horizons in the estuarine mouths facing the Bay of Bengal. Lithological logs of boreholes of Sundarbans include a thick clay blanket (15.24 metres to 76.20 metres) at the top and are underlain by presence of very coarse sediments containing medium to small gravels of rock fragments and quartz of Quaternary age.

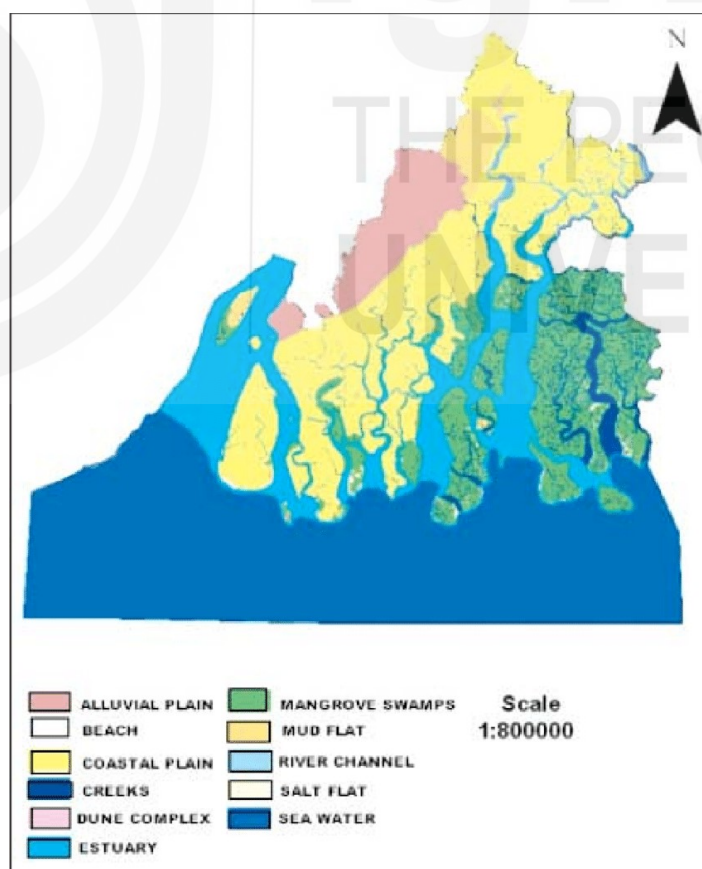


Fig. 15.2: Geology of Sundarbans Delta.

(Source: Geomorphological study of Sundarban deltaic estuary - Scientific Figure on ResearchGate. Available from: https://www.researchgate.net/figure/Geomorphological-map-of-Indian-Sundarbans_fig2_235678081)

15.3.2 Physiography/Relief

Physiography of Sundarbans is primarily characterised by deltaic formations, which encompass a complex network of water channels and other land features. These include numerous drainage lines with associated surface and underwater levees, splays, tidal flats, as well as marshes above the mean tide level, tidal sandbars, islands interconnected by tidal channels, underwater distal bars, and sediments of proto-delta clays and silts.

Origin of Sundarbans landscape is relatively recent, having been formed through gradual accumulation of sediments resulting from soil erosion in Himalayas. Over geological time, geologists have observed south-eastward tilt of Bengal basin that took place particularly during Tertiary period. This geological process has been further influenced and accelerated by tidal actions from Bay of Bengal.

Foundational composition of the region mainly consists of sediments from Quaternary Era, which include mixture of sand and silt combined with marine salt deposits and clay. This unique combination of sediment types and geological processes has shaped intricate and dynamic landscape of Sundarbans delta.

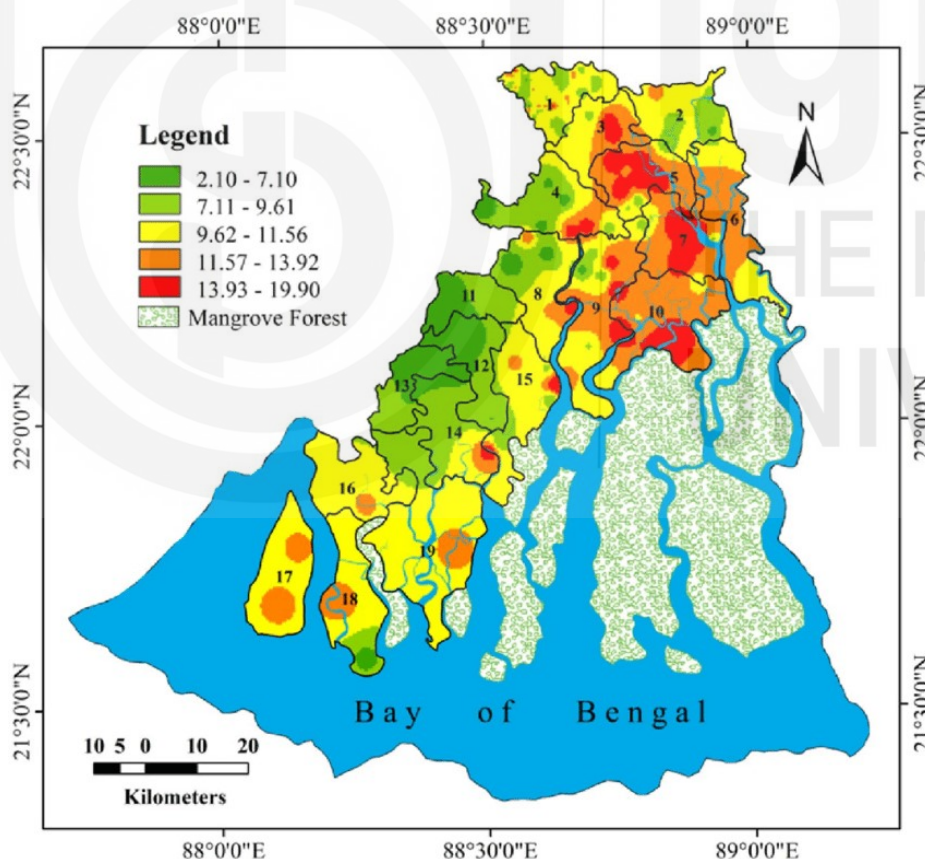


Fig. 15.3: Physiographic Divisions of Sundarbans Delta.

(Source: Application of GIS-based analytic hierarchy process and frequency ratio model to flood vulnerable mapping and risk area estimation at Sundarban region, India - Scientific Figure on Research Gate. Available from: https://www.researchgate.net/figure/Content-of-clay-in-soil_fig4_332237439)

15.3.3 Drainage and Water Resources

Sundarbans delta has been formed mainly by two perennial rivers, Ganga and Brahmaputra. Before entering the Bay of Bengal, these two mighty rivers meet Meghna river and make the largest delta in the world known as Sundarbans delta or Ganges- Brahmaputra delta. Ganges water's maximum discharge occurs during June-November and that of Brahmaputra's in May and November. During southwest monsoon, Rupnarayan river falls in Hooghly river at Geonkhali town in West Bengal.

Kangsabati river flows through Purulia along with East and West Midnapore districts and joins Keleghai to be known as Haldi river. Ganga tidal plain (West) between rivers Hooghly and Baleswar, Ganga tidal plain (East) between rivers Baleswar and Tetulia and Meghna deltaic plain running from river Tetulia to Chittagong coastal plain are morphological zones of this lower part of the delta. At junction of the delta and Bay of Bengal sits world's largest mangrove patch covering an area of approximately 10,300 square kilometres, 60 percent of which is in Bangladesh and remaining area is in India.

Drainage systems of Sundarbans delta are as under:

- Ichamati and Kalindi rivers in the east;
- Bhagirathi and Hooghly rivers in the west;
- Dampier Hodges line in the north; and
- Bay of Bengal in the south.

1. Eastern Boundary - Rivers Ichamati and Kalindi:

- Eastern boundary of Sundarbans delta is defined by Ichamati and Kalindi rivers, which flow into the Bay of Bengal.
- These rivers originate in Indian state of West Bengal and meander through the deltaic region, eventually merging into the Bay of Bengal.
- Flow of freshwater from these rivers influences hydrology of the delta, affecting both salinity levels and distribution of aquatic life.

2. Western Boundary - Rivers Bhagirathi and Hooghly:

- To the west, Sundarbans Delta is bounded by Bhagirathi and Hooghly rivers, which are distributaries of mighty Ganges river (Ganga).
- Bhagirathi-Hooghly system forms a vital part of Ganges Delta, and it is a major source of freshwater inflow into Sundarbans.
- The Hooghly river is significant for Kolkata, a major city in West Bengal, and serves as a vital shipping channel.

3. Northern Boundary - Dampier Hodges Line:

- Northern boundary of Sundarbans delta is marked by the Dampier Hodges Line, which separates the delta from the adjacent mainland.
- This line essentially demarcates limit of tidal influence from the Bay of Bengal, with the deltaic region being inundated by tidal waters during high tide.

4. Southern Boundary - Bay of Bengal:

- Southern boundary of Sundarbans delta is Bay of Bengal, a vast expanse of saltwater.
- Interaction between freshwater from the rivers and saline waters from the Bay of Bengal creates a unique ecosystem characterised by brackish water and extensive mangrove forests.

Drainage system of Sundarbans delta plays a crucial role in shaping the region's ecology. Daily tidal cycles from Bay of Bengal results in inundation of large delta areas with salt water during high tide, creating a dynamic estuarine environment. This unique blend of freshwater and saline water has given rise to the distinctive mangrove ecosystem for which Sundarbans is renowned.

Additionally, the drainage system has a significant impact on the livelihood of local population. It particularly impacts the people engaged in the fishing and agricultural activities. It also presents challenges. Notable ones are salinity intrusion into agricultural land and vulnerability of communities to natural disasters such as cyclones and storm surges.

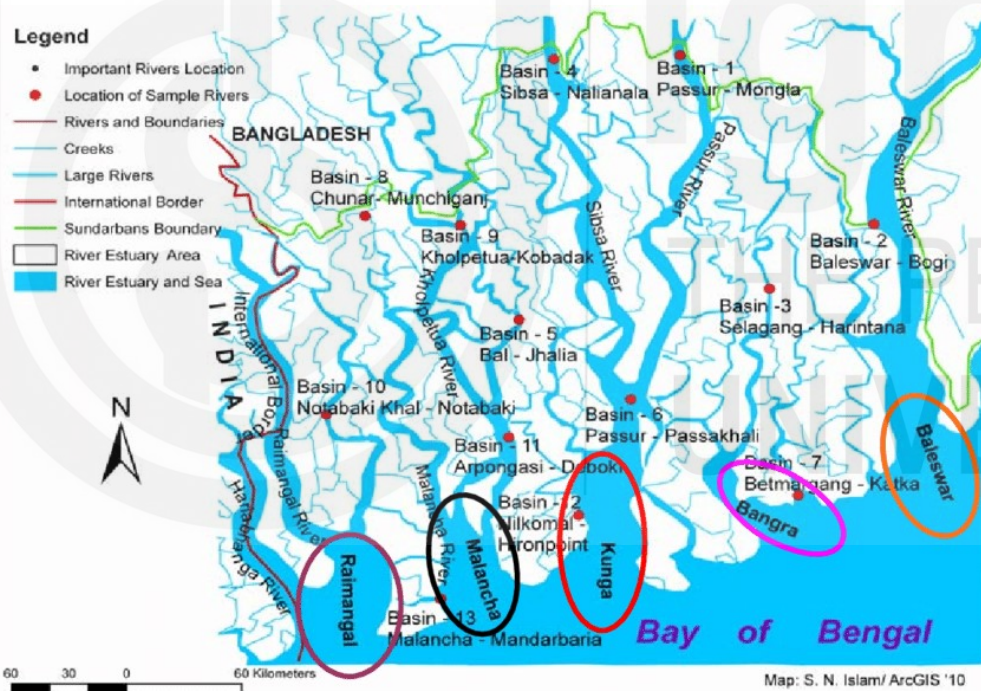


Fig. 15.4: Drainage Map of Sundarbans Delta.

(Source: Burman, D., Mondal, M.K., Khan, Z.H., Sutradhar, A.K., Kamal, F.A. (2019). Soil and Water Resources of Sundarbans. In: Sen, H. (eds) The Sundarbans: A Disaster-Prone Eco-Region. Coastal Research Library, vol 30. Springer, Cham. https://doi.org/10.1007/978-3-030-00680-8_6)

15.3.4 Climate

This region is characterised by hot and humid monsoonal climate. Distribution of monsoon rainfall and temperature is uneven in Sundarbans delta. According to India Meteorological Department (IMD), the region has four distinct seasons. These are discussed as under:

1. Hot season

The region's hot season normally lasts from March to mid-June, including the summer months when temperatures soar and humidity levels climb, resulting in steamy conditions across the delta. This period is distinguished by high heat and humidity, making it difficult for inhabitants to escape the sweltering conditions.

During the hot season, temperatures in the region typically range between 38 and 40°C, with certain locations experiencing even greater levels of heat. The delta, with its low-lying terrain and proximity to the Bay of Bengal, bears the brunt of the blazing heat. The combination of excessive heat and humidity can make outdoor activities uncomfortable and hard, leading individuals to seek refuge indoors or in covered regions to avoid the oppressive circumstances.

The hot season presents numerous challenges to the region's residents, notably in terms of health and well-being. Extreme heat can raise the risk of heat-related disorders such as heatstroke, dehydration, and heat exhaustion, particularly among susceptible populations like the elderly, children, and outdoor workers. Adequate water, keeping indoors during peak heat hours, and wearing lightweight, breathable clothing are all necessary considerations to reduce health hazards or problems of the hot season.

Furthermore, the hot and humid conditions that prevail at this time of year might have an impact on agricultural activity and crop productivity. Crops may suffer from heat stress and water constraints, resulting in lower productivity and crop failures in some locations. Farmers may need to deploy irrigation measures and select heat-resistant crop varieties to reduce negative impact of hot season on agricultural production.

2. Monsoon Season

The monsoon season normally begins with the southwest monsoon arriving in mid-June, signaling a substantial shift in weather patterns. This seasonal phenomenon delivers intense moisture-laden winds from the Bay of Bengal, causing extensive rainfall over the region. The monsoon season is distinguished by high humidity, weak changeable surface winds, and a gloomy sky, resulting in a muggy and uncomfortable environment for residents.

The southwest monsoon brings substantial rains, which are critical for replenishing water sources, nourishing agricultural crops, and sustaining the region's ecosystems. The Bay of Bengal serves as a moisture reservoir, providing enough moisture to feed the monsoon rains, which are critical to the region's agriculture-based economy. However, extra moisture in the air causes high humidity levels during the monsoon season, worsening discomfort and making living circumstances difficult for locals.

The Sundarbans, the world's biggest mangrove forest and a UNESCO World Heritage Site experiences most dramatic effects of the monsoon season. The Sundarbans delta has extremely high humidity levels, with average humidity levels surpassing 80 percent annually. Throughout the rainy season, humidity levels can reach up to 96 percent, creating suffocating circumstances that are

uncomfortable for both humans and wildlife. The region's high humidity and constant rainfall make living conditions exceedingly uncomfortable, causing health hazards and hardships for residents.

Despite the discomfort caused by extreme humidity, the monsoon season serves a key role in supporting unique ecosystems of the Sundarbans delta. The region's typical annual precipitation varies from 1500 to 2000 millimetres, with most rainfall occurring between June and October. This intense precipitation is critical for preserving delicate balance of the mangrove ecosystem, which supports a rich flora and fauna, including the famed Royal Bengal Tiger and birds, reptiles, and marine species.

However, the monsoon season offers its own set of obstacles and disruptions. The constant rain can cause flooding, erosion, and landslides, especially in low-lying and vulnerable places. Infrastructure damage, agricultural loss, and interruption of transportation networks are typical during periods of heavy rains, impacting the livelihoods and well-being of the region's residents. Furthermore, the unexpected arrival of heavy rains might catch inhabitant's off-guard, demanding emergency preparedness and response actions to lessen the effects of natural disasters.

Despite problems of monsoon season, there are periodic intervals in the rain, known as monsoon breaks, when the sky clears temporarily, and providing brief respite from the relentless downpours. However, these intervals are frequently brief, and the reprieve is rapidly broken by a sudden rise in temperature, resulting in increasing humidity levels and discomfort once more.

3. Retreating Monsoon

The retreating monsoon season represents a period of change in the region's weather patterns and climatic conditions. Residents notice a shift in the prevailing weather patterns as monsoon winds gradually subside, revealing brighter skies and milder temperatures. This season normally lasts from the last week of September to mid-October, marking the conclusion of the monsoon season and the arrival of more mild weather conditions.

Clear skies are a notable aspect of the retreating monsoon season. The lack of significant rains and cloud cover allows for more sunlight and visibility, resulting in a pleasant and comfortable environment for people. The lower humidity levels lead to a more pleasant living environment, providing relief from the oppressive circumstances of the monsoon season.

Temperatures vary moderately during the retreating monsoon season, with maximum ranging between 17°C to 30°C and minimum between 06°C to 22°C. These comparatively mild temperatures provide respite from the intense heat of the previous hot season and heavy rainfall of the monsoon season, making outdoor activities more pleasurable and comfortable for locals.

Despite relatively excellent meteorological conditions, the retreating monsoon season presents obstacles, particularly in coastal locations like Sundarbans. This region is vulnerable to catastrophic cyclonic conditions throughout this season, normally lasting from September to November. Low-pressure

depressions in the Bay of Bengal frequently develop into powerful cyclones, bringing with them strong winds, heavy rain, and storm surges.

The Sundarbans, with its low-lying terrain and extensive mangrove trees, is especially vulnerable to the effects of cyclonic disturbances. High winds, torrential downpours, and storm surges can cause extensive flooding, infrastructure damage, and loss of life. Human communities in the Sundarbans must remain watchful and prepared for onset of cyclonic conditions, making evacuation plans and taking the required safeguards to reduce the effect of these natural disasters.

Efforts to upgrade infrastructure, improve early warning systems, and increasing disaster planning and response capacities are critical for increasing resilience and decreasing vulnerability to cyclonic storms in the Sundarbans and adjacent coastal areas. Furthermore, conserving and restoring mangrove habitats can help lessen the effects of storm surges and coastal erosion by acting as natural barriers against cyclones' destructive forces.

4. Cold Season

Cold season begins in December and ends in February in the delta. Sundarbans delta does not have severe winters like North India. Under the influence of Western Disturbances in northwest India, slight rainfall also occurs in Sundarbans delta. Maximum temperature is around 23°C to 26°C, and minimum temperature remains around 9°C to 15°C.

Sundarbans delta also has different feature of tides. In Sundarbans, high tides and ebb tides occur twice daily, and water current reverses direction every six hours. Spring tides occur between March and April and cause greatest rise and fall in the water level. Tidal water height in inter-tidal zones ranges from 0.96 metres to 5.8 metres.

Tidal interactions in the estuary system in and around the Indian Sundarbans is characterised by the seasonal changes. It is marked by lowest strength of flood tide over ebb tide during post-monsoon season. The flood tide exerts more effect than the ebb tide during pre-monsoon season.

15.3.5 Vegetation

The region has a very vast forest cover as the temperature in Sundarbans suits dense vegetation. The delta has 16 percent of area under natural vegetation. Much of forest has disappeared for crop cultivation to feed inhabitants and export the produce. The natural vegetation of this region can be grouped or categorised into:

1. Tropical Moist Deciduous Vegetation

Tropical moist deciduous vegetation is a type of forest ecosystem characterised by a diverse tree species that shed their leaves seasonally with changing climate. These forests are found in regions with high rainfall and distinct spells of dry and wet seasons, such as in the Indian sub-continent.

The Sal tree (*Shorea robusta*) is a significant species found in tropical moist deciduous woods. Sal trees are endemic to the Indian sub-continent and are

especially numerous in the north, ranging from Tarai region to the southern slopes of northern plains. These trees are recognised for their tall stature (up to 30 metres or more) and broad, spreading crowns.

The Sal tree is highly appreciated due to its commercial and ecological importance. Wood of this tree is valued for its strength, durability, and resistance to decay, making it popular for construction, furniture manufacturing, and other wood working applications. Furthermore, Sal woods provide significant habitat for a varied range of plant and animal species, contributing to overall biodiversity of the region.

In addition to Sal trees, tropical moist deciduous forests support a diverse range of tree species such as Teak, Mahogany, Ebony, and Rosewood. These woods have a diverse understory of shrubs, herbs, and grasses, which provide habitat and food for variety of animals.

The climate of tropical moist deciduous forests is distinguished by high temperatures and plentiful rainfall, which ranges from 1000 to 2000 millimetres per year. Wet season is usually in the summers and dry season is in winters. This periodic change in rainfall and temperature causes deciduous trees to lose leaves in a cyclical pattern, helping them to store water and energy during droughts.

Tropical moist deciduous forests have an important role in maintaining ecological balance and offering ecosystem services such as carbon sequestration, soil stabilisation, and water management. These forests also benefit local populations by providing timber, non-timber forest products, and employment opportunities in agriculture, beekeeping, and ecotourism sectors.

However, tropical wet deciduous forests are undergoing threat from deforestation, habitat fragmentation, and unsustainable logging methods. Human activities including agriculture, infrastructure development, and urbanisation are encroaching on forested areas, causing habitat loss and degradation. Climate change is also creating problems to these ecosystems, as changes in rainfall patterns and temperatures alter the distribution and health of forest plants.

Efforts to maintain and sustainably manage tropical wet deciduous forests are critical for preserving biodiversity, mitigating climate change, and sustaining local livelihoods. This includes measures like protected area designation, reforestation and afforestation programmes, community-based natural resource management, and sustainable land-use practices. By preserving these valuable ecosystems, we can assure their survival for future generations to enjoy and benefit from.

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

Tropical semi-evergreen and evergreen vegetation in coastal locations is a distinct ecosystem distinguished by lush foliage, dense canopy cover, and a varied range of plant species that flourish in the warm and humid temperature of coastal regions. These woods are often located in places with significant rainfall and relatively steady temperatures throughout the year, providing ideal circumstances for year-round growth and greenery.

Tropical evergreen forests are common along the coasts of India's Bankura, Birbhum, Burdwan, and Medinipur districts, contributing significantly to the region's natural scenery. These forests are recognised for their high biodiversity and number of plant species, many of which are adapted to the damp and humid conditions found in coastal areas.

Gurjun trees (*Dipterocarpus* spp.) are among the most prevalent tree species in this region's tropical evergreen woods. Gurjun trees are huge, towering evergreens with lush foliage and robust, straight stems. They are members of the Dipterocarpaceae family and are well-known for their excellent timber, which is appreciated for its strength, durability, and rot resistance.

In addition to Gurjun trees, tropical evergreen forests of coastal locations have a diverse range of other tree species such as Teak, Mahogany, Rosewood, Ebony, and Bamboo. These woods have a dense understory of shrubs, vines, and epiphytes, resulting in a multilayered canopy that provides habitat and food for a wide variety of species.

Coastal locations with tropical evergreen woods have a year-round climate of high temperatures, plentiful rainfall, and high humidity. Precipitation is normally heaviest during the monsoon season, which lasts from June to September and brings strong or good amount of rainfall to the region, replenishing water sources. This regular flow of rainfall keeps the woodlands lush and bright, even during the dry season.

Tropical evergreen forests promote biodiversity, regulate climate, and provide ecosystem services such as carbon stocking, soil stabilisation, and water management. These woods also provide valuable habitat for the diverse range of plant and animal species, including mammals, birds, reptiles, amphibians, and insects.

Deforestation, habitat fragmentation, and unsustainable logging methods pose risks to tropical evergreen forests in coastal locations, as they do to other forest ecosystems. Human activities including agriculture, infrastructure development, and urbanisation are encroaching on forested areas, causing habitat loss and degradation. Climate change is also creating problems to these ecosystems, as changes in rainfall patterns and temperatures alter the distribution and health of forest plants.

Efforts to maintain and sustainably manage tropical evergreen forests are critical for preserving biodiversity, mitigating climate change, and sustaining local livelihoods. This includes measures like protected area designation, reforestation and afforestation programmes, community-based natural resource management, and sustainable land-use practices. By protecting these valuable ecosystems, we can assure their survival and the well-being of the people and species who rely on them.

3. Mangrove and Tidal Forests

Tidal forest acts as natural geographical border. The region's natural flora has evolved and developed particular mechanisms to adapt to hostile environment due to excessive salt in soil and water, tidal effect, recurrent inundation and wind action. Mangrove vegetation is a form of halophytic vegetation. Tidal

forest of Sundarbans is localised in South 24 Parganas at the mouth of river Ganges. The name of forest has been derived from mangrove tree known as 'Sundari' (*Heritiera minor*). Tidal forest can be found along with coastal saline soil with peculiar roots that can be easily seen growing above the soil. Other plants such as Golpata, Gengwa (*Excecariaagollocha*), Hital (*Phonixpalmdosa*), Baen (*Avicennia officinalis*), Bhora (*Rhizophora mueronata*), and Kaora (*Soumeratiaapatata*) can also be found here. Swamp forest of Malda and West Dinajpur occur in smaller areas of the districts.

Botanical diversity of Sundarbans may be captured in terms of:

True Mangrove species = 26

Mangrove associates = 29

Back Mangrove species = 29

Family = 40, Genera = 60, and Species = 84

15.3.6 Soils

Sundarbans are produced by the silt deposits carried down by rivers. Additional alluvium deposits have made the soil extremely fertile. Amount of silt deposition by rivers increases during monsoon season, when intense torrential rain washes down lot of soil particles from this region's enormous catchment area.

Tidal stream and severe sea waves prevent clay from settling along the coast. Soil here is largely made up of sand brought in by inflowing tides from shallow ocean floor. Strong wind moves this sand further up the land, where tidal streams exist. Ocean water reaches tidal streams and wetlands during high tides, causing the soil to become saline. Salinity of surface soil and adjacent water bodies varies greatly throughout the year and is influenced by volume of fresh water flowing through existing river system and monsoon rain.

Normally, four types of soil are found in the Sundarbans. These are as follows:

- a) Saline soil
- b) Saline Alkaline soil
- c) Non-Saline Alkali soil
- d) Degraded Saline Alkali soil

All types of basic minerals are found in the soil except zinc.

15.3.7 Physical Resource Base

Sundarbans delta is potential source of cheap energy and has splendid opportunity for tourism sector to flourish and boom. It has potential to offer exotic tourism. Sundari trees provide base for indigenous woodwork as well as for setting-up of large scale forest-based industry and paper mills. These enhance scenic view of the natural landscape and provide ground for preservation of wildlife in the region. The region has potential for harnessing tidal power. There are varieties of fauna present in water of the region which has helped in establishing some famous Wildlife Sanctuaries and National parks in this region. These are known for diverse variety of species of wildlife. Important among these are as below:

- **Sajnekhali Sanctuary:** 362 square kilometres
- **Lothian Island Sanctuary:** 38 square kilometres
- **Haliday Island Sanctuary:** 06 square kilometres
- **Sundarbans Tiger Reserve:** 2600 square kilometres
- **Sundarbans National Park:** 1330 square kilometres

SAQ I

- Name drainage systems of Sundarbans delta.
 - Name four main types of soil of Sunderbans.
-

15.4 SUNDARBANS DELTA: THE CULTURAL SETTING

Due to its unique location in the Bay of Bengal, it is very rich biodiversity hotspots characterised by Sundari trees, a specific product of mangrove vegetation. It is a cluster of tiny islands spread across the two countries of India and Bangladesh. There are 54 islands. Sunderbans is one of the largest active delta in the world, formed by the sedimentation of river Ganges and its tributaries. This macro region is one of the most backward regions of the State. It is predominantly inhabited by Scheduled Castes and Scheduled Tribes population. It is characterised by tough terrain, (mostly inhospitable and inaccessible), making life hard to inhabitants.

The cultural setting of Sunderbans delta showcases a rich ethnographic tradition. Aboriginal people here have developed distinct cultural practices, showing adjustments to the tune of physical environment (characterised by harmonious relationship). Such rich tradition has been passing down through the successive generations. Its rich cultural tapestry revolves around the worship of local deities and inanimate objects, to protect the forest resources and ward-off the evil spirits. In this Unit, we are describing the population of Indian part of Sunderbans, which is nearly 40 percent of the total geographical area. Rest of the area nearly 60 percent comes under the Peoples Republic of Bangladesh.

15.4.1 Population

Population in Sundarbans delta is very unevenly distributed. People of the region have very unsettled habitat which keeps changing with weather conditions. People have rough and difficult life. Population of North and South Pargana districts mostly shows this pattern. North 24 Parganas and South 24 Parganas are densely populated districts and are agriculturally rich with concentration of industrial units. Some farmers are also engaged in jute cultivation. Sundarbans delta is the only jute-cultivating area of India. Its southern part along with western border has high concentration of rural population.

Sundarbans used to be very sparsely populated until the 19th century. Only a few scattered human sites dating back to 18th century have been found. The first permanent human habitation began in 19th century in this geographically isolated meso region. Initially, it was marked by the clearing of forest in low-lying sections and construction of circular embankments. This was most likely prompted in 1771 by a British collector general's intention to partition Sundarbans into plots and lease them out to potential landlords for timber production and for revenue collection. Poor agricultural population from Bengal and neighbouring states were brought in by landlords to clear forest and begin developing the property. Over the course of a century, northern edge of the mangrove forest shrunk by around 10-20 kilometres to the southeast. British government declared all unleased mangrove lands under protection and conservation by 1876.

Sunderbans Delta in West Bengal state of India comprises of nineteen administrative blocks covering two districts. These two districts are North 24-Parganas and South 24-Parganas. The six administrative blocks namely Haroa, Hasnabad, Hingaljanj, Minakhan, Sandeshkhali-I and Sandeshkhali-II are located in North 24-Parganas district. Rest of thirteen administrative blocks namely Basanti, Canning-I, Canning-II, Gosaba, Joynagar-I, Joynagar-II, Kakdwip, Kultali, Mathurapur-I, Mathurapur-II, Namkhana, Patharpratima and Sagarare located in the South 24-Parganas district. There are 54 islands in this region, inhabited ones out of more than hundred odd islands. It covers about 9629 square kilometres of geographical area. Out of this, 4493 square kilometres area is inhabited by the indigenous peoples and the rest is covered under Reserve Forest, one the richest biodiversity hotspot on the planet Earth. The total number of *mouzas* (refers to a type of administrative unit consisting of one or more settlement units) under this macro region is 1093 (<https://www.sundarbanaffairswb.in/home/block>).

Table 15.1: Demographic Characteristics of Sunderbans Delta, West Bengal, India

Sr. No.	Districts	TP	MP	FP	TL	TML	TFL	TSC	TST	TW	Cult	AL
1.	North 24 - Pargana	1116733	571709 (51.20)	545024 (48.80)	705778 (63.20)	392738 (68.70)	313040 (57.55)	400848 (35.89)	131896 (11.81)	418660 (37.49)	49015 (4.39)	103225 (9.24)
2.	South - 24 Pargana	3309526	1692424 (51.14)	1617102 (48.86)	1173011 (35.44)	80031 (2.42)	2140343 (64.67)	1199489 (70.87)	940854 (58.18)	1243503 (37.57)	154624 (4.67)	224331 (6.77)
3.	Sunderbans (Total = 1+2)	4426259	2264133 (51.15)	2162126 (48.85)	1573859 (35.56)	211927 (4.79)	2846121 (64.30)	1592227 (70.32)	1253894 (58)	1662163 (37.55)	203639 (4.60)	327556 (7.40)

(Source: <https://www.sundarbanaffairswb.in/home/block>); (Figures in parentheses denotes percentages to total population).

(Note: TP = Total Population, MP = Male Population, FP = Female Population, TL = Total Literates, TML = Total Male Literates, TFL = Total Female Literates, TCS = Total Scheduled Castes, TST = Total Scheduled Tribes, TW = Total Workers, Cult = Cultivators, AL = Agricultural Labourers)

Table 15.1 shows the demographic characteristics of Sunderbans delta and its two districts namely North 24-Pargana and South 24-Pargana.

15.4.2 Settlement

In geographical terms, a settlement refers to a specific location where a group of people live and interact, often forming a community. Settlements can vary in size and complexity, from small village and town to a large city. Their characteristics can easily reveal the nature of settlements, factors influencing their location, and type of settlements. Due to its peculiar location, site and situation of settlements are mainly determined by the availability of relatively clear piece of land under the dense foliage of trees.

Pattern of settlements reveals clustered form. These are mainly found along the riverbanks, wherever fertile piece of land is available for tillage. Settlements are mostly rural in character comprising both permanent and semi-permanent structures whereas urban areas are confined to nodal administrative units. It exhibits mixed use characterised by institutional, residential and commercial etc. Locally available material is brought into use for construction of houses and buildings. Settlements are prone to the vagaries of climate change often seen manifesting in terms of cyclones and erosion of riverbanks etc. It makes the agrarian population vulnerable.

Reserve forest covers approximately 45 percent of Sundarbans. The remainder has been restored and inhabited. As a result, demand for land is extremely strong. The region is densely populated because of its fertile land. Sundarbans is primarily a rural region. There are very few are urban settlements in entire Sunderbans delta region as per 2011 Census.

Out of 13 administrative blocks of South 24 Parganas district, only six blocks have urban population. First one is Canning - 1 Block (around 40.4 percent of total population lives in urban areas while 59.6 percent lives in rural areas). Second one is Canning-II Block (around 4.4 percent of total population). Third block is Joynagar - 1 (around 17.6 percent of total population lives in urban areas while 82.4 percent lives in rural areas). Fourth block is Joynagar - 2 (with less than 5 percent of urban population). Fifth block is Mathurapur - I Block (around 13.2 percent of total population lives in urban areas while 86.8 percent lives in rural areas). Sixth block is Basanti (around 2 percent of total population lives in urban areas while 98 percent lives in rural areas). Rest of seven blocks have predominantly cent percent rural population.

Out of six administrative blocks falling under North 24 Parganas district, only three blocks has variable proportion of urban population. First block is Hasnabad (around 3.1 percent of total population lives in urban areas while 96.9 percent lives in rural areas). Second block is of Hingalganj (around 8.6 percent of total population lives in urban areas while 91.4 percent lives in rural areas). Third one is Minakhan Block (around 3.6 percent of total population lives in urban areas while 96.4 percent lives in rural areas). Rest of three blocks have predominantly cent percent rural population.

A sizable proportion of the population is comprised of Scheduled Castes and Scheduled Tribes (STs) as depicted in Table 15.1. There are various government schemes to serve the vulnerable minority population groups to deal with the issues of geographical isolation, natural hazards and disasters.

15.4.3 Economy

Sundarbans delta is mainly suitable for agriculture and supports large rural population with small landholdings. Intensity of cropping is 184 percent with 92 percent of arable land. Flat land with high fertility of soil is favourable for agriculture accounting for 75 percent of workers in this sector. Despite the new alluvium's productivity, soil salinity poses a severe threat to the region's agricultural development. Embankments are being constructed around cultivated plots to address this problem. These agricultural fields need to be equipped with suitable drainage to control amount of salinity. Such areas are commonly referred to as 'abad'. Main crops planted in such 'abad' fields are 'Aman' paddy and jute, with the former accounting for around 96 percent of the cropped area. Khesari, tobacco, various fruits such as watermelon and vegetables particularly chilly are grown on elevated land. Agricultural specialists who studied the soil type and climatic conditions believe that the location is suited for growing coconut. Experiments are also being conducted for cultivation of groundnut, cotton and sunflowers.

One of the region's most important cash crops is beetle leaves (pan). Though, agriculture employs majority of people in this region, productivity per acre is significantly lower than other districts of West Bengal due to saline soil, lack of irrigation facilities, adverse meteorological conditions and some other factors. There is inadequate mechanisation, excessive use of fertilizers, and low marketing facility, but still yield is noteworthy.

Irrigation facilities in Sundarbans delta face many challenges due to its complex ecosystem and geographical characteristics. Sundarbans is vast mangrove forest intersected by labyrinth of rivers, tidal waterways with tidal fluctuations. As a result, traditional irrigation systems found in other regions are not suitable here. So, the focus is primarily on adapting agricultural practices in tune with the natural conditions of the delta. Here are some important aspects of irrigational facilities in Sundarbans delta:

1. Tidal Water Management:

- Sundarbans is characterised by tidal system where rivers and water channels experience regular ebb and flow with tides.
- Tidal water management is essential for controlling flow of brackish water into agricultural fields. This involves constructing embankments and sluice gates to regulate inflow of saltwater during high tides.

2. Paddy Cultivation:

- Paddy (rice) cultivation is dominant agricultural activity in Sundarbans. Farmers often utilise natural tidal cycles for rice cultivation.
- Fields are strategically located to take advantage of both freshwater during high tide and natural drainage system during low tide.
- Traditionally, paddy fields are designed to hold freshwater during high tide and release it gradually during low tide.

3. Rainwater Harvesting:

- Rainwater harvesting is an important supplementary source of freshwater for agricultural use.

- Farmers collect and store rainwater in ponds and reservoirs during monsoon season, which can then be used for irrigation during drier periods.

4. Salt-Tolerant Varieties:

- Farmers often use salt-tolerant rice varieties of crops that can withstand brackish water conditions in areas prone to salinity intrusion from Bay of Bengal.
- These varieties are adapted to local environment and can produce reasonable yield even in saline soil conditions.

5. Government Initiatives:

- Governments in both India and Bangladesh have initiated projects to improve agricultural practices in Sundarbans.
- These projects often include construction of embankments, promotion of salt-tolerant crop varieties, and distribution of improved agricultural tools and techniques.

6. Community-Managed Systems:

- Communities have developed their own systems for managing water resources and irrigation in some areas.
- These systems may involve collective efforts to construct and maintain embankments, tidal sluice gates, and water channels.

Irrigation facilities are unique and adapted to challenging environment of Sundarbans delta. These reflect harmonious co-existence of agriculture with natural tidal cycle and the need to adapt to salinity, making it a distinctive example of agriculture in a fragile ecological setting.

● Cropping Pattern

Rice is important crop. Aman paddy/rice is cultivated during the monsoon season and harvested in the autumn season. Cropping pattern is marked by both opportunities and constraints due to its peculiar geographical setting. Cropping pattern and yield of crops is influenced by geographical and socio-economic factors along with infrastructural amenities. Maize, pulses, oilseeds, sunflower, mustard, vegetables, and fruits are some other important crops grown here. Agriculture faces many challenges such as salinity, flooding, pests attack, and waterlogging etc., in low-lying agricultural areas.

● Fishing

Local people rely heavily on fishing and pisciculture for living. Numerous rivers and creeks with tidal salty water and sweet water flushing permit waterways in and around Sundarbans to develop as natural and abundant reservoirs of fish. Aside from that, fish aquaculture schemes have been implemented. Huge quantities of fish and edible crab obtained in these locations make their way to

Calcutta markets via Canning, Basanti, Hingalgunj, Sajnekhali, Hasnabad, and Raidighi, among other places. Supply from Sundarbans meets at least 15 percent of Calcutta's fish requirements. Hilsa, Bhetki, Bhangor, Parse, Kharsula, Tangra, Mangur, Topse, Gule, Pabda, and Pomphret are among the 34 most common types of fish found here.

Dried fish is sent to markets in West Bengal, Bangladesh and other neighbouring states. Prawn culture is quite common in Sundarbans. Prawn seedlings are collected when river water flows across reclaimed fields during high tide. Galda and Prawns (Bagda) have a ready market in other countries as well. The region is home to a variety of prawns. Shark oil hunting is also prevalent. Frasergunj near Bakkhali, has an oil extraction factory. Lower Sundarbans are rich in saltwater fish. Nets and hooks are used in fishing. Usage of fine fishing nets destroys prawn seeds on a vast scale even though it is currently prohibited.

India has its jute growing area in Sundarbans delta which got reduced after the partition of India. First jute mill in India was established at Rishra in West Bengal near Hooghly riverbank. Major industries are located in Hooghly-Asansol-Durgapur districts. Kolkata is the primary centre for business in Eastern India. Some of the major industries in this region are jute, textiles, tea, paper, glass, timber, leather, electronics, bicycles and aluminium, etc. Some significant textile factories are located in 24-Parganas and Nadia districts. Jute factories are located at Hooghly and Howrah. Metal-based industries are concentrated in Howrah and 24-Parganas. Lime industry is one of the region's oldest occupations. Lime is mostly derived from bivalve shells. These are obtained from estuary waters or mud flats. The region has rice milling, salt making, handloom, carpentry, hatchery, pottery, and other small-scale enterprises. Animal rearing is another growing business in the region. Government development activities include aggressive encouragement of breeding of cattle stock, pigs, goats, ducks and poultry.

Though heavy industries such as jute and cotton mills, heavy chemicals, engineering goods, automobiles, ship builders, paper mills, and so on have been established in both the districts of South and North 24 Parganas, which is part of Sundarbans region. But no significant industries have been established in the proper deltaic area of Sundarbans, on account of geomorphological features.

15.4.4 Transport and Communication

The region's transportation and communication infrastructure is critical to promoting connection both inside and across India. The presence of multiple National Highways (NHs) and State Highways (SHs) guarantees seamless connection throughout the country, allowing commodities, people, and services to travel freely. These roads are lifelines for industries, enterprises, and consumers, providing critical last-mile connectivity and facilitating economic activity.

Roadways are an important part of the region's transportation network, helping to facilitate trade and business. However, the expense of maintaining roads and railways in the region is relatively high due to physical factors or

variables such as poor weather, frequent flooding, and difficult terrain. As a result, different modes of transportation, such as Inland waterways and other modes of transportation, have emerged as cost-effective solutions for moving goods and people.

Inland waterways, particularly in the Sundarbans delta, provide a more cost-effective and efficient mode of transportation than roads and railways. Kolkata Port, one of the region's major ports, is an important hub for maritime trade, processing a large volume of cargo and facilitating international shipping. Due to presence of abundant water bodies and mangrove trees, boat transport is principal form of transit in the Sundarbans delta.

The Sundarbans delta is known for its intricate network of rivers, creeks, and estuaries, which makes it ideal for boat transportation. Local people's primary form of communication for commuting and transferring goods is diesel-powered country boats. However, these boats contribute to environmental contamination by contaminating the water with oil spills from diesel engines, disrupting aquatic ecosystems. Addressing this issue necessitates improving the efficiency and sustainability of boat transportation, such as encouraging the use of cleaner fuels or introducing eco-friendly technologies.

In addition to boat transportation, the Sundarbans delta is linked by railway, offering yet another vital form of transportation for residents and companies. Railway stations in Hasnabad, Haroa, Canning, Joynagar, Mathurapur, Kakdwip, and Namkhana serve as important transportation centres or nodes, connecting the delta region to rest of the country's rail network. The railway infrastructure promotes the transportation of passengers and goods, hence promoting economic growth and regional connections.

Overall, the region's transportation and communication infrastructure supports economic activity, facilitates trade and commerce, and improves accessibility for citizens. However, environmental contamination and high maintenance expenses must be addressed in order to preserve the transportation network's long-term viability and efficiency. By investing in infrastructure development and implementing eco-friendly technology, the region may improve spatial connection with outside world and support long-term growth and development.

SAQ 2

Which are the major industries in Sunderbans delta?

15.5 SUNDARBANS DELTA: REGIONS

Sundarbans delta can be divided into many regions according to the biosphere reserve division.

The deltaic region is divided into three parts:

1. **Core Zone**
2. **Buffer Zone**
3. **Transition Zone**



Fig. 15.5: Sundarbans Biosphere Reserve (core, buffer and transition areas).

(Source: Conservation and Conflicts in The Sundarban Biosphere Reserve, India - Scientific Figure on Research Gate. Available from: https://www.researchgate.net/figure/The-Sundarban-Biosphere-Reserve-SBR-is-divided-into-core-buffer-and-transition-areas_fig1_281576871)

Some prominent features here are chars, levees, swamps, bils and dangs, etc. One of this region's main features is rural and agriculturally industrialised areas with dead and decaying rivers. Sundarbans delta has also been known as Sundarbans Biosphere Reserve which holds world's largest mangrove forest. The reserve area is comprised of blocks from North 24-Parganas and South 24-Parganas. The core area or zone is where no anthropogenic activities (except research) are allowed in order to preserve the niche of flora and fauna found there. The buffer zone or area offers fewer restrictions and acts as a division between the core and the transition zone. The transition zone is a densely populated area with mono-cropping agricultural practices. The core zone of Sundarbans Tiger Reserve is the same as core of the biosphere reserve. The zones have varying salinity according to their distance from saline water. The core area being closer to Bay of Bengal has high salinity.

The British Government declared this forest area as protected area in 1878. Entire forest of Sundarbans got included in the reserve forest category by 1943.

SAQ 3

Name the major regions of Subderban delta.

15.6 SUNDARBANS DELTA: PROBLEMS AND PROSPECTS

Sundarbans delta region is vulnerable to climate change, causing a difference or disturbance in this region's flooding pattern. Climate change causes severe impact on geomorphic processes operating here. Change in temperature and rainfall is also affecting river flow and discharge. This region faces problems like habitat loss, rapid population growth, rising sea level, water rights, soil fertility, change in river channels, increasing water pollution and low fishing. Increasing salinity poses threat to the Sundarbans, which was emerged after the construction of Farakka Barrage in 1970s, reducing Ganges river's freshwater flow.

Mangrove forest is found in abundance in this region. However, the practice of shrimp farming, salt making and for agricultural purposes are affecting fish production on account of depletion of mangrove vegetation. It is incurring loss of biodiversity and livelihood of large number of people dependent on mangroves. It has also led to extinction of marsh crocodiles, water buffalo or Guar in Sundarbans region.

One of the significant threats to loss of biodiversity in Sundarbans delta is because of oil spills, excess fishing, industrialisation, urbanisation, natural calamities, and global warming. Sundarbans have been severely impacted by extensive boating and over fishing, dredging, unplanned tourism and heavy port activities, such as operation of mechanised boats, extraction of sand from riverbed and construction of coal power plants.

There are numerous endangered species in Sundarbans, which include two types of river dolphins and a rare bird, the masked finfoot. Because of these environmental threats, endangered species are considerably more vulnerable. Most recent dangers to the ecology are also due to the impact of India's declining population of Royal Bengal Tigers. Two coal-fired power stations proposed to be constructed within a few miles of the forest are likely to pose a serious threat to Sundarbans. The first is 630 Megawatt facility known as 'Orion power plant'. This project is likely to come up before Rampal power plant with 1,320 Megawatt capacity. Rampal power station will be among India's largest thermal power projects spread over 1834 acres just 14 kilometres away from Sundarbans. This calls for the urgent need to focus on coastline management, preservation of biodiversity and mangrove intensification. There is a dire need for nurturing the sustainable aquaculture practices and conservation of flora and fauna to keep the rhythmic cycle of natural bounties undisturbed.

Sunderbans is probably one of the only largest and richest mangrove ecosystem in the world. It helps to rejuvenate the entire spheres of biodiversity. Besides it has great potentials for eco-tourism, development of small and micro enterprises as well as local fisherman community. For example, some of the key areas are furniture manufacturing, large-scale fisheries and shrimp production. Sunderbans delta also has unique ecological value of local to global significance.

15.7 ASSAM PLAINS: HISTORICAL BACKGROUND

History of Assam Plains as a region is tapestry interwoven with threads of ancient civilisations, dynastic rules, cultural amalgamation and colonial influence. This geographically diverse area, nestled in northeastern part of India, boasts of history dating back to millennia. It was known as Kamarupa in ancient time and was inhabited by a mix of indigenous tribes and ethnic groups. The region's historical roots can be traced through references in ancient Indian texts such as Mahabharata and Puranas.

During the early medieval period, Assam plains witnessed rise of dynasties like Varman dynasty, which laid the foundation for cultural and religious growth of the region, with both Buddhism and Hinduism gaining prominence. Subsequently, Ahom dynasty, originating from present-day Myanmar, ascended to power in 13th century and ruled Assam for several centuries. The Ahom era marked a period of significant development, as the kingdom reached its zenith in 17th century. Assam thrived culturally, architecturally and economically during this time, with flourishing economy and establishment of trade routes with neighbouring territories.

However, the colonial era brought about profound changes in the region. British East India Company's expansion into India in 19th century led to Assam's incorporation into British India. The region was annexed by British in early 19th century following the First Anglo-Burmese War. The colonial period saw introduction of tea cultivation, which remains a major industry in Assam to this day.

Assam became an integral part of newly formed independent India following India's independence from British rule in 1947. It faced numerous challenges in post-independence era, including political and ethnic conflicts. Most notably among these was Assam Movement of 1979-1985, which aimed to address issues related to immigration and land rights. Assam continues to be a cultural mosaic with diverse tapestry of traditions, languages and communities. It has been a centre for political and cultural activities in north-eastern India, shaping the broader history and identity of the region.

15.8 ASSAM PLAINS: THE PHYSICAL SETTING

15.8.1 Geology

Assam plains have evolved through the deposition of alluvium going upto 1500 metres in thickness upon the sag formed during the period of the rise of the Himalayas. It is very well defined between the Boundary Fault on the north and the Naga thrust (fault) in the south. This plain is wide in Upper Assam, but its width narrows down in the middle part where the river encounters the granite-gneissic projection of Mikir hills. The plain again widens towards the west until it merges with the North Bengal plain.

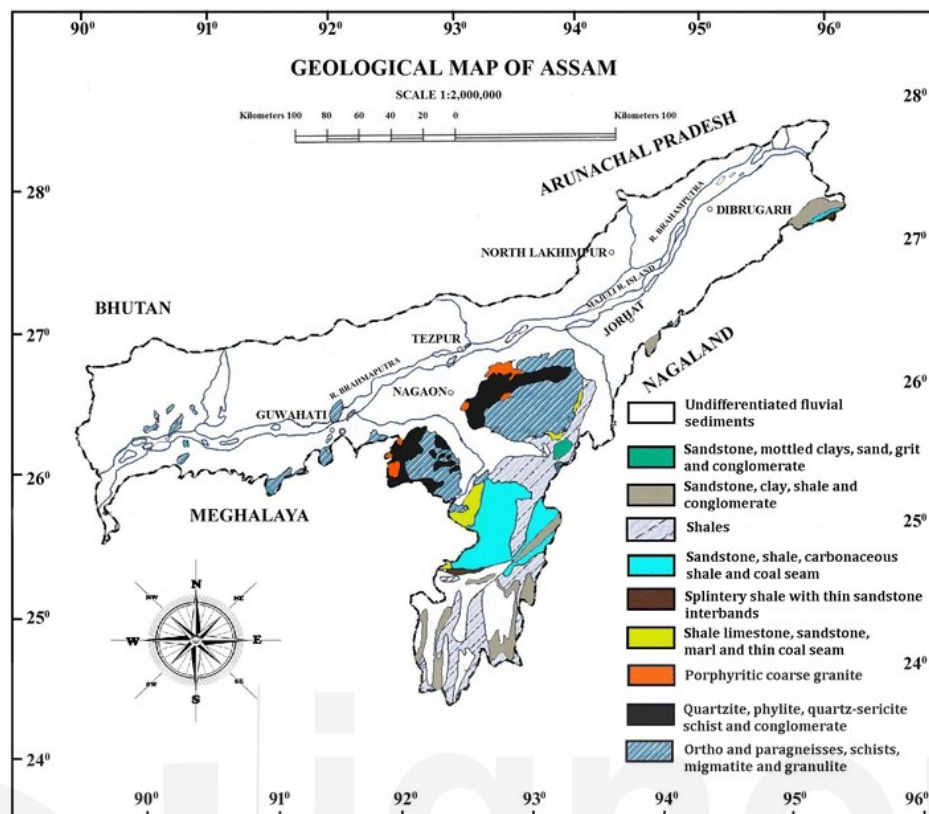


Fig. 15.6: Geological Map of Assam Plains.

(Source: Seasonal disparity in the co-occurrence of arsenic and fluoride in the aquifers of the Brahmaputra Flood Plains, northeast India - Scientific Figure on Research Gate. Available from: https://www.researchgate.net/figure/Geological-base-map-of-Assam-modified-from-Geological-Survey-of-India-showing-the_fig1_313639253)

15.8.2 Physiography/Relief

It is known that Assam plains have been built through aggradational work of Brahmaputra river and its tributaries. These are almost flat plains with very low slope. It stretches from a place named Sadiya at northeast corner to a place named as Dhubri in the west corner. Assam plain is demarcated from its surrounding ranges/regions by 150 metres contour. The rivers are well marked by meandering course that leads to the formation of bils (uplands of marshy areas) and oxbow lakes and huge marshy tracts. Coarse alluvial debris in northern fringe of Assam valley has given rise to Tarai or semi-Tarai conditions where water trickles down, resulting in wet soil and dense forest cover.

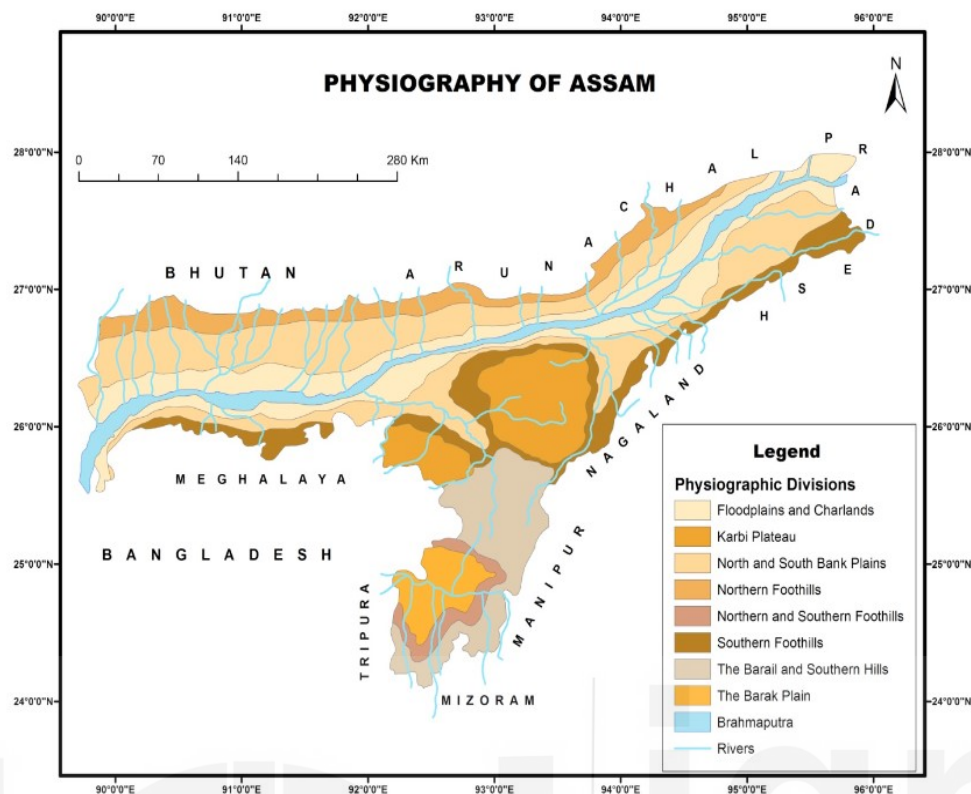


Fig. 15.7: Physiography of Assam.

(Source: Tahir, M. Assam: A Geographical Profile)

15.8.3 Drainage and Water Resources

Brahmaputra river is the dominant drainage system of Assam plains. It is joined by Dibang from the north and Lohit from the east. Afterwards, these two rivers collectively flow as mighty Brahmaputra. It is known to bring flood during every monsoon season downstream in the plain regions. It runs between the sandy banks resulting into the formation of a number of divergent channels which later on re-joins the mainstream river. Brahmaputra river is heavily loaded with silt, making its flow slow. In its course, the minor obstructions may facilitate the formation of almond-shaped bank, which may get washed away in every successive season due to the flood or it may grow leading to the formation of a char (fluvial feature). There are 33 major tributaries of Brahmaputra river. On an average, its width is 5.46 kilometres. It attains maximum flow in a place Guwahati. Average discharge is 4,420 cumec during dry season and average yearly flow is around 20,000 cumecs. Brahmaputra river is marked with steep gradient before it enters India. Average slope is around 2.82 metres per kilometres.

In Assam valley, a substantial drop marks the slope to the tune of approximately 0.1 metre per kilometre. As a result, the river channel gets braided. Different segments of the river channel are joined several times as it flows through Assam from Kobo to Dhubri. It is joined by nearly 20 major tributaries from north bank side and by 13 from south bank side in its course through the valley of Assam. The phenomenon of Braiding further accentuates with the joining of numerous tributaries as these are laden with huge amount of silt.

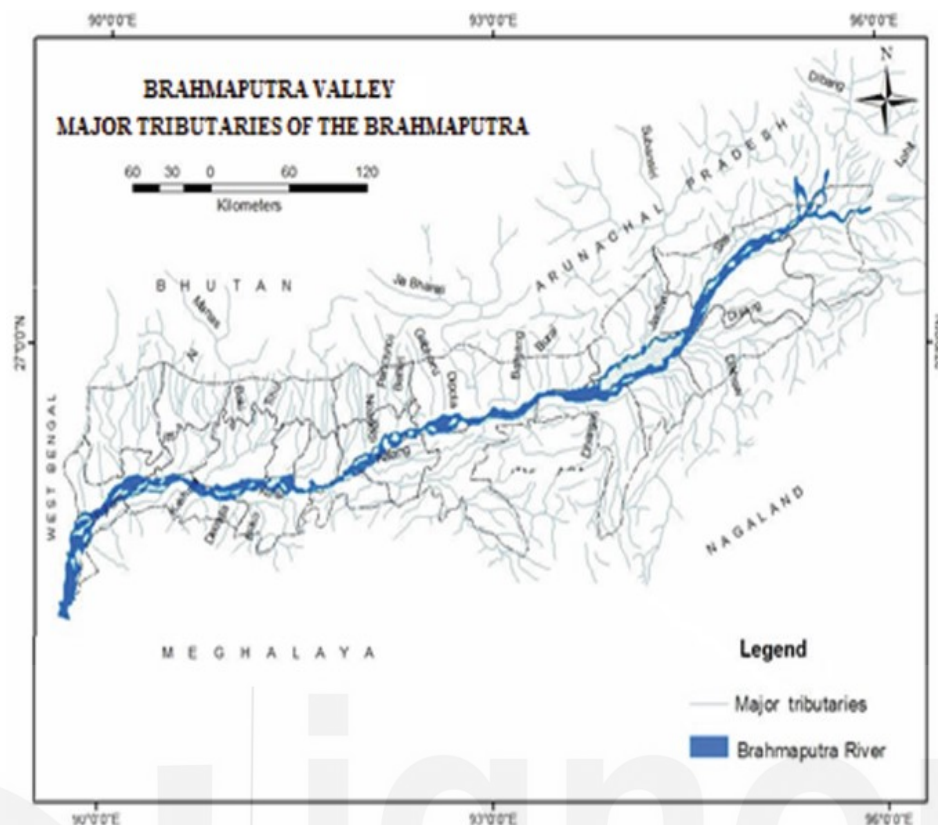


Fig. 15.8: Drainage Map of Assam Plains.

(Source: Bhagabati, A.K., Deka, N. (2021). Wetland Resources in the Brahmaputra Valley, Assam: Characteristics, Use, and Sustainable Development. In: Thakur, B., Thakur, R.R., Chattopadhyay, S., Abhay, R.K. (eds) Resource Management, Sustainable Development and Governance. Sustainable Development Goals Series. Springer, Cham.
https://doi.org/10.1007/978-3-030-85839-1_13)

Characteristics of north bank tributaries are discussed as below:

- Have very steep slopes and shallow braided channels for a long distance from the foothills, and in some cases all the way up to outfall.
- Carry huge silt discharge and have boulders, pebbles and coarse sandy beds.
- Have frequent floods.

Characteristics of south bank tributaries are discussed as below:

- Have somewhat low gradient and deep meandering course practically all the way from foothills.
- Silt load is relatively low.

Aside from these major tributaries, several minor streams drain directly into the river.

15.8.4 Climate

The Assam plains, located in north-eastern India, have a monsoonal climate, with different seasons offering a variety of weather throughout the year. From hot summers to cold winters, Assam plains' climate is determined by their geographical location, topography, and closeness to the Bay of Bengal.

The region has a hot and humid monsoon climate, which is typical for the Indian sub-continent. The distribution of rainfall and temperature in the Assam plains is uneven, with differences dependent on elevation, proximity to water bodies, and local terrain. According to the India Meteorological Department (IMD), Assam plains can be categorised into four distinct seasons: the hot season, monsoon season, retreating monsoon, and cold season.

1. Hot Season

The hot season in the Assam plains normally lasts from March to mid-June, coinciding with the start of summer. During this time, temperatures soar and humidity levels rise, resulting in hot and sultry weather throughout the region. Temperatures can reach 38°C to 40°C, making it difficult for inhabitants to deal with the extreme heat. High humidity exacerbates the soaring heat, adding to the misery felt by those who live in the area.

As the hot season develops, the monsoon season begins, defined by the arrival of southwest monsoon winds from the Bay of Bengal.

2. Monsoon Season

By mid-June, the region gets significant rain as moisture-laden winds move across the Assam plains, providing relief from the summer heat. The monsoon season is distinguished by extremely high humidity levels, weak changeable surface winds, and a gloomy sky, resulting in a moist and humid atmosphere suited to rain. Monsoon rains replenish water sources, nurture agricultural lands, and help to sustain the region's ecosystems.

4. Retreating Monsoon

Following the monsoon season, the region enters the receding monsoon phase, which normally lasts from the last week of September until mid-October. During this time, the sky clears and rainfall intensity reduces as the southwest monsoon winds start retreating. Maximum temperatures range from 17°C to 30°C, with minimum temperatures ranging from 6°C to 22°C, indicating the start of cooler weather conditions. The retreating monsoon season is distinguished by bright skies and milder temperatures, offering relief from the monsoon season's heavy rains.

4. Cold Season

Finally, the Assam plains experiences cold season beginning in December and lasting until February. The winters in the region are generally mild and sunny, with January being the coldest month. During this season, temperatures range from 5°C to 17°C, with colder temperatures in higher elevation places. While winters are generally moderate compared to other parts of the country, inhabitants may still face chilly mornings and nights, necessitating the usage of thick clothes and heating appliances to stay warm.

Overall, climate of the Assam plains varies seasonally, with each season bringing its own set of weather patterns and circumstances. From the scorching heat of summer to heavy rains of the monsoon season and the chilly breezes of winter, the Assam plains provide a diverse and dynamic climate that impacts the lives and livelihoods of its inhabitants. Understanding and adjusting to seasonal fluctuations is critical for both inhabitants and policymakers seeking to preserve the region's long-term growth and resilience in the face of climatic unpredictability and change.

SAQ 4

- Write a short note on geological and physiographic setting of Assam plains.
- Briefly discuss climatic conditions of Assam plains.

15.8.5 Vegetation

The region used to have very vast forest cover as temperature of the region suits dense vegetation. Much of forest has been cleared for crop cultivation. Tropical moist deciduous forest comprising Sal trees can be found in northern parts of Assam plains. It extends from Tarai region to the south of northern plains. Tarai tract is found on fringe of the valley particularly in Goalpara, Kamrup and parts of Darrang districts.

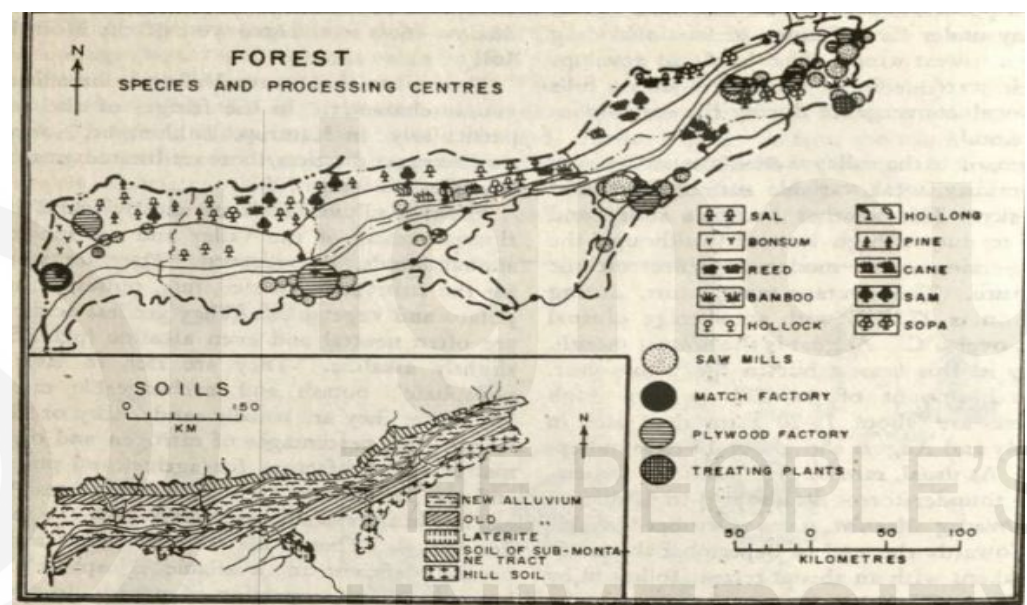


Fig. 15.9: Vegetation Map of Assam Plains.

(Source: R.L. Singh, India; A Regional Geography)

15.8.6 Soils

The soil composition of the Assam plains is largely alluvial. It has pockets of lateritic soil occurring in some specific regions, particularly confined to the edges of the plains. Understanding the distribution and attributes of different soil types is critical for agricultural practice and land use planning in the area.

Alluvial soil, which is common in the Assam lowlands, is formed by the deposition of silt, clay, and sand transported by rivers and streams over time. This soil type is commonly found in areas next to rivers and is prone to annual floods, which promotes soil renewal and replenishment. Alluvial soil is one of the most significant agricultural soils because of its fertility and suitability for growing variety of crops.

Crops like rice, jute, pulses, mustard, potatoes, and vegetables thrive in new alluvial soil. This soil is less acidic than old alluvium and high in essential nutrients. These includes phosphate, potash, and calcium. Recurrent flooding

of the river keeps replenishing the soil nutrients. This way soil remains fertile and conducive to growth and productivity of crops.

Old alluvial soil is characterised by low pH and is acidic. It is most commonly found in regions where rivers change their course over the period of time. This soil type is less fertile than new alluvium and is rendered unsuitable for the cultivation of most crops. However, the acidic nature of old alluvial soil makes it suitable for tea plantation, especially in Upper Assam. Tea plants flourish in acidic soil conditions. The unique qualities of old alluvium make it a good soil for tea plantations. It contributes to the region's well-known tea business and enterprises.

Aside from alluvial soil, pockets of lateritic soil can be found on the outskirts of the Assam plains, particularly in districts like Kamrup, Lakhimpur, Nowgong, and Sibsagar. Laterite soil has low fertility and nutrient content, making it of little agricultural value. Lateritic soil is often unsuitable for cultivation due to its undesirable properties and is sometimes left uncultivated or used for other purposes such as grazing or forestry.

Finally, the Assam plains' soil composition has a considerable impact on regional agricultural techniques and land use patterns. Alluvial soil, with its fertility and appropriateness for a wide range of crops, is the primary soil type and serves as the foundation of agricultural activity in the region. Understanding the distribution and qualities of different soil types is critical for sustainable land management and agricultural growth in the Assam plains.

15.8.7 Physical Resource Base

Assam plains drained by Brahmaputra provide extensive area for settlements and agricultural use. Extensive area has been covered by wood in many forest-based industries. Assam plain is rich in many minerals but oil and gas deposits are dominant types. The region has one of oldest oilfields in India at Digboi. The region has potential for hydropower generation. Major contributors to its economy are tea and oil. Mineral exploration in the plains is mostly focused on crude oil, natural gas, coal, limestone and sillimanite. Petroleum is a significant component of the economy, and it is primarily operated by Oil India Limited and Assam Oil Company.

Other minerals mined include gravel, sand, kaolin, quartz, silica, building stone and iron-ore. Assam plains' economy also benefits from economic minerals found throughout the state such as clay, iron ore, copper, feldspar, gold and gypsum. Assam plains is yet to establish its position as storehouse of numerous significant minerals such as petroleum, natural gas, coal, limestone, and other minor minerals such as magnetic quartzite, kaolin, sillimanites, clay and feldspar.

SAQ 5

- Briefly discuss vegetation of Assam plains.
 - Write a short note on physical resource base of Assam plains.
-

15.9 ASSAM PLAINS: THE CULTURAL SETTING

Assam plains are also known as land of 'Red Rivers and Blue Hills'. One academic perspective relates the origin of the word 'Assam' to the Sanskrit word 'Asoma', which means peerless or unparalleled. Another academic perspective states it to be related to the Kingdom of 'Ahoms', who ruled Assam for nearly 600 years, before Britishers annexed Assam. In this quest, Assam has witnessed the interface and amalgamation of diverse cultures, from domestic as well as international borders. Prominent cultural groups or races such as Austric, Mongolian, Aryan and Dravidian have immensely contributed in shaping the composite culture of Assam plains. Besides, Assam also used to be known as Pragjyotisha or place of eastern astronomy during the epic period and later as kingdom of Kamrupa. The earlier epigraphic evidence of kingdom of Kamrupa is found in the Allahabad pillar inscription of king Samudragupta (India, 2024).

The present day cultural setting of Assam plains can be seen in terms of mixing of composite cultures.

15.9.1 Population

Population of the Assam lowlands is mostly centered around Brahmaputra river. This region acts as the region's lifeline, providing water for irrigation, transportation, and other critical activities. Understanding the region's demographic composition is spatial economic for planning and carrying out various development efforts and social welfare programmes.

According to 2011 Census of India, Assam's total population was roughly 3.12 crore inhabitants. This accounted for roughly 2.58 percent of India's overall population at this point of time, demonstrating the state's strong demographic presence in the national context. Assam's population is diversified, with ethnic, linguistic, and cultural groupings contributing to the state's unique social fabric.

According to data, Assam's total population in 2011 was 15,939,443 males and 15,266,133 females, with males accounting for a slightly higher proportion than females. The region's sex ratio, which is calculated as the number of females per 1000 males, was found to be 958 females to 1000 males. Sex ratio provides information about gender composition of the population and is a good indicator of gender balance in a given area.

The relatively balanced sex ratio in Assam reflects more equitable distribution of males and females in the population. However, it is important to note that variances in the sex ratio can occur among different regions and communities within the state, driven by factors such as cultural norms, socio-economic position, and access to healthcare and education.

Several variables influence population concentration along the Brahmaputra river and its tributaries, including historical settlement patterns, resource availability, and economic opportunity. Guwahati, Dibrugarh, Jorhat, and

Tezpur are among the most heavily populated areas in the Assam lowlands, functioning as commercial and administrative hubs.

In addition to the Brahmaputra river, fertile alluvial soil of the plains has historically drawn settlers and sustained agricultural operations, contributing to the dense concentration of population in these regions. Population density, on the other hand, tends to decline in more isolated and hilly locations where access to resources and infrastructure is limited.

Overall, the demographic profile of Assam plains reflects the region's diverse and dynamic population, shaped by a combination of historical, geographical, and socio-economic factors. By understanding and analysing population trends and characteristics, policymakers and stakeholders can better address the needs and priorities of the region, ensuring inclusive and sustainable development for all inhabitants.

15.9.2 Settlement

The Assam lowlands have a distinct demographic environment defined by grouped rural communities and a smaller urban population. As of 2011, this region's total rural population was 26,807,034 people, substantially outnumbering the urban population of 4,398,542. This demographic distribution highlights the Assam plains' largely agrarian nature, with agriculture and related activities providing a key source of income for bulk of the population.

Rural settlements in the Assam plains are mainly grouped or cluster of villages, reflecting the region's agrarian culture and close-knit communities. These settlements are frequently located near rivers, fertile agricultural land, or forested areas, giving residents access to critical resources for survival and livelihood. Clustering of villages fosters social cohesion, community engagement, and mutual support among residents, fostering a sense of brotherhood and shared identity. The vast Brahmaputra valley with its extensive alluvial deposits like those of the Ganga and the Indus valley provide suitable setting for the rural and urban settlements.

Rural settlements, in general, are nucleated or agglomerated being often arranged in an array either along the high levees of the Brahmaputra and its tributaries where the valley is considerably wide above the flood plains or along the transport arteries following the foot of the Meghalaya. The contact points appear as the more favourite sites as they have attracted the commercial plantations like tea. At the road junctions cross-and fan-shaped developments are observed. In the vicinity of the Kaziranga Wild Life Sanctuary, the flood plain of the Brahmaputra is too wide, almost up to the foot of Mikir hills, and the settlements have grown along the Kaziranga-Jorhat road in a linear fashion. The pattern continues till the Dhansari valley is reached, with the only interruption in the vicinity of Bokakhat, where the settled area widens to the south.

Urban settlements: The urban settlements are distributed far apart from one another in the midst of rural settlements and they act as nerve centres for the variety of essential functions of the surroundings region. All the urban settlements in the valley are invariably concentrated in close proximity of the river Brahmaputra which has long been acting as the carrier of commerce and culture of Assam. In fact, they have clung to the river, growing either on the

bank itself or at some distance away by the side of railways, State or National Highways (all of these practically running parallel to each other from the western to the eastern end), giving thereby a linear pattern.

Rural population of the Assam plains are engaged in various agricultural activities, such as agriculture, animal husbandry, fishing, and forestry. Agriculture is known as backbone of the rural economy, with products or commercial crops including rice, maize, lentils, tea, and jute grown extensively throughout the region. Livestock rearing, which includes cattle, poultry, and goats, is also common in rural regions, giving additional revenue and nutritional assistance to people.

Despite the prevalence of rural villages, the Assam plains also have a number of large metropolitan areas. Basirhat, Guwahati, Silchar, Dibrugarh, Jorhat, Nagaon, Tinsukia, and Tezpur were among the major urban settlements having populations of more than one lakh in 2011. These urban centres serve as economic, administrative, educational, and healthcare hubs, attracting migrants from rural areas seeking better living conditions and job possibilities.

Guwahati, Assam's main city is a significant urban centre and the gateway to India's north-eastern region. Guwahati, with its strategic location on the banks of Brahmaputra river, is an important trade, commerce, and transportation hub that connects the Assam lowlands with rest of the country. This city is known for its lively market places, educational institutions, cultural landmarks, and contemporary infrastructure, making it a popular urban destination.

Other urban hubs, including Silchar, Dibrugarh, and Tezpur, make substantial contributions to this areas, economy and growth. These cities function as regional, commercial, educational, and healthcare hubs, providing citizens with necessary services and job opportunities. Furthermore, urbanisation in the Assam plains has resulted in the construction of contemporary amenities such as housing complexes, shopping malls, entertainment centres, and transit networks, all of which are aimed to improve urban people' quality of life.

The Assam lowlands have a dynamic demographic environment, with concentrated rural communities and densely populated metropolitan areas. While rural settlements are foundation of the region's agricultural economy, metropolitan centres are critical in driving economic growth, innovation, and urban development. By strengthening collaboration between rural and urban communities, authorities may promote inclusive and sustainable development in the Assam plains, assuring wealth and well-being for all populations. Major urban centres in the region are:

Table 15.2: Major Urban Centres

Cities	Population (2011)
Basirhat	144,891
Guwahati	962,334
Silchar	229,136
Dibrugarh	154,296
Jorhat	153,889
Nagaon	148,496
Tinsukia	126,389
Tezpur	102,505

SAQ 6

Briefly explain population pattern of Assam plains.

15.9.3 Economy

- **Agriculture**

The Assam plains are known to support a thriving agricultural industry. It is on account of the fertile alluvial tracts which get rejuvenated by the material brought down by the Brahmaputra river floods every year. It provides source of livelihood for a huge proportion to its inhabitants. One of the primary sources of livelihood is crop cultivation for large proportion of people who live in the plains. They grow a variety of crops including both food and cash crops.

Food crops include rice, maize, and pulses. These are widely grown throughout the Assam plains due to favourable agro-climatic conditions and fertile soil offered by the alluvium deposited every successive year by the Brahmaputra floods. These crops are the local population's primary diet and contribute considerably to food security in region.

In addition to food crops, the Assam plains are well-known for growing cash crops. Important ones are tea, jute, sugarcane, and areca nut. Tea, in particular, has a distinct place in the regional economy. It is one of the most important cash crops of Assam. The distinct flavour and scent of Assam tea have garnered it fame. It is in demand in both domestic and international markets. Tea contributes significantly to both trade and economy of the region.

Additionally, the ideal climate and soils of Assam plains makes possible the cultivation and growth of a variety of horticultural crops. Notable horticultural Crops such as bananas, oranges, pineapples, Assam lemon, cashew nuts, black pepper, ginger, turmeric, and other aromatic plants are also grown. Horticultural crops enhance the agricultural diversity of this region. Besides, it also provides additional source of income for rural farmers and farming communities.

Despite the abundance of agricultural land in the Assam plains, almost one quarter is rendered unsuitable for cultivation. This encompasses massive areas buried under the water during annual floods caused by the Brahmaputra river and its tributaries. Besides, extensive stretches of swamps and marshes also hampers the availability of cultivable land. The portion of land covered under Bamboo plants land is also not available for cultivation.

Irrigation

Irrigation facilities in Assam plains are important for agriculture. Assam plains are characterised by fertile alluvial soil and abundant rainfall. However, the region also faces seasonal variations in rainfall and therefore, irrigation becomes essential to ensure consistent agricultural productivity. Irrigation facilities in Assam are:

1. River Irrigation

- Numerous rivers, including Brahmaputra, Subansiri, Dhansiri, and other crisscross vast swathes of Assam plains. These rivers provide a natural source of irrigation water.
- Canals and embankments are constructed to divert water from these rivers up to agricultural fields. These canals are known as 'borrow channels,' and these play crucial role in maintaining moisture level in soil.
- Traditional methods, such as bamboo and wooden pipes, are often used to distribute river water to the agricultural fields.

2. Tanks and Ponds

- The region has a network of tanks, ponds and reservoirs that store rainwater during monsoon season. This stored water is then used for irrigation during dry spells.
- These tanks, known as "beels" or "haors," are especially common in floodplains of Brahmaputra river and its tributaries.
- The water from these tanks is often drawn using manually operated pumps or through traditional methods.

3. Tube Wells and Borewells

- In areas where river water or rainwater is insufficient, tube well serve as common source of irrigation.
- Farmers install tube wells to extract groundwater. These wells are equipped with electric or diesel pumps to lift water to the surface.
- The depth of tube wells varies depending on the water table, and their usage is particularly prevalent in areas not served by network of canal irrigation.

4. Lift Irrigation

- Lift irrigation system is used in some parts of Assam plains where water sources are at lower level as compared to agricultural fields.
- This system uses pumps to raise water from rivers or reservoirs to higher level from where it can flow through channels to irrigate crop fields.

5. Government Schemes and Projects

- Government of Assam along with Central government of India has initiated various irrigation projects to improve water management and increase agricultural productivity.
- These projects often include construction of check dams, embankments and canals to efficiently distribute water to agricultural fields.

6. Traditional Water Management Practices

- Local communities in Assam plains have developed traditional water management practices over centuries. These include community-managed systems for distributing water to crop fields during growing season. In the past, tribal's of Assam such as Kacharis and Mech used to practice gravity irrigation in foothill areas. Agricultural fields in drier season, particularly during Rabi crop, are irrigated. Champamati flow irrigation project is one such scheme.

In short, Assam plains rely on combination of natural water sources, traditional practices and modern irrigation infrastructure to support agriculture. Management of these resources is vital for food security, rural livelihood and overall economic development of this region.

Industrial Development

The Assam plains have a diverse industrial environment, including traditional handloom silk manufacturing, mineral-based businesses, and forestry activities. These industries contribute significantly to the region's socio-economic growth by creating jobs, earning cash, and supporting the local economy.

One of the most significant part of the Assam plains' industrial sector is the manufacturing of Assamese handloom silk, which includes kinds like Eri, Muga, and Pat. These kinds of silk are well-known for their quality and artistry, and are produced commercially throughout the region. Handloom silk manufacturing not only preserves traditional weaving skills, but also employs several artists and weavers, thereby benefiting the local economy and carrying forward the cultural legacy.

In addition to handloom silk manufacturing, the Assam plains support mineral-based industry, albeit on a limited scale. Coal mining, both open-cast and underground, is a significant activity in the region, contributing to the energy sector and promoting industrial development. Assam is also noted for its oil and gas assets, including Digboi, India's oldest oilfield, which is still operational today. These mineral resources are critical for satisfying the region's energy needs while also supporting economic growth.

Furthermore, the Assam plains are home to a diverse range of industries, including beekeeping and coke production, as well as oil refining and gas distribution. Quarrying and stone-crushing enterprises are also common, utilising the area's abundant natural resources. The lowlands' dense forest cover has attracted enterprises like sawmills, plywood manufacturing, furniture production, cabinet making, and cane work. These industries use timber, bamboo, and other forest products to generate revenue and create job possibilities.

Bamboo, regarded as best natural engineering material on the planet, is abundant on the Assam plains and supports a variety of enterprises. Social forestry programmes are ongoing to encourage afforestation and integrate forest dwellers and periphery communities with sustainable forestry methods. These projects help to protect the environment while also empowering local communities and promoting socio-economic growth.

Furthermore, the Assam plains are noted for their agricultural diversity, which includes a large range of citrus fruits farmed and sold in local markets. Bamboo farming, in particular, has enormous potential for economic growth and sustainable development due to its diverse applications in a variety of industries, including building, handicrafts, and furniture manufacturing, etc.

Finally, the Assam plains' industrial environment includes a diverse range of operations, including traditional handloom silk manufacturing, mineral-based enterprises, and forestry-related endeavours. These industries help to drive

economic progress, preserve cultural legacy, and ensure environmental sustainability, emphasising the significance of balanced and sustainable industrial development in the region.

15.9.4 Transport and Communication

Water transport and surface transport are reasonably good options and comfortable modes of transportation for the 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 provide waterways. Assam plains act as a passage for the northeast and are very crucial for India's defence. Main modes of transportation in the region can be divided into:

- **Roadways**

The Assam lowlands have a well-developed network of National Highways (NHs) and State Highways (SHs), which act as major arteries connecting the region with rest of India. These roads serve an important role in facilitating the transportation of goods, people, and services, which contributes to the region's socio-economic development.

The region's major national highways, totalling around 3900 kilometres, allow seamless communication both inside the Assam lowlands and with adjacent states. These highways act as lifelines for industries, enterprises, and consumers, providing last-mile connectivity and facilitating efficient transportation logistics.

NH 61, for example, is an important national highway that connects Nagaland, one of India's north-eastern states. NH 61 connects Assam and Nagaland, allowing the transportation of commodities and people between the two regions. This highway not only fosters regional integration, but it also helps to drive economic development in Assam and Nagaland by facilitating trade, business, and tourism.

The presence of well-maintained National Highways improves accessibility and mobility in the Assam plains, promoting the expansion of industries such as agriculture, manufacturing, and tourism. These highways also serve an important role in providing connectivity to urban centres, rural areas, and remote villages, thereby breaking down geographical barriers and promoting equitable development.

Furthermore, the region's roadway infrastructure facilitates emergency services, crisis management, and public transportation, protecting people's safety and well-being. Furthermore, highways assist the movement of critical goods such as food, medicine, and gasoline, particularly during times of crisis or natural disaster (for example during Covid Pandemic in 2020).

Finally, the wide network of National Highways in Assam lowlands, particularly NH 61, which connects to Nagaland, demonstrates the value of roads in improving connectivity, supporting economic growth, and stimulating regional development. By investing in the maintenance and growth of these roads, governments can reinforce the region's socio-economic fabric and improve inhabitants' quality of life.

• Airways

The Lok Priya Gopinath Bordoloi International Airport in Guwahati serves the lowlands of Assam. This airport serves as the region's principal international gateway, supporting both domestic and international aviation traffic. With modern facilities and amenities, it offers passengers a smooth journey experience.

In addition to the international airport, the Assam lowlands are served by various domestic airports, including Silchar, Rupsi, Dibrugarh, and Jorhat. These airports connect the region to major cities and villages around the country side, providing easy air travel alternatives for both business and leisure.

These domestic airports serve an important role in improving connectivity and accessibility throughout the Assam plains, especially in remote and hilly areas where other forms of transportation are limited. By providing efficient air services, they help the region's economic development and tourism potential, as well as facilitate emergency medical care and disaster relief operations. Overall, the presence of these airports improves connectivity and mobility in the Assam plains, promoting the region's growth and development.

• Waterways

Assam plains have wide network of inland waterways. Main National waterway of this part is NW 2 which is Sadiya-Dubri stretch of Brahmaputra river. National waterways of Assam plains are:

National Waterways	Rivers
NW 6	Aai river
NW 16	Barak river
NW 18	Beki river
NW 30	Dihing river
NW 31	Dhansiri and Chathe rivers
NW 32	Dikhow river
NW 33	Doyang river
NW 57	Kopili river
NW 62	Lohit river
NW 82	Puthimari river
NW 95	Subansiri river
NW 38	Gangadhar river
NW 50	Jinjiram river
NW 102	Tlwang river

• Railway

Assam-Bengal railway was one of the major railway companies in British India. This region is a zonal division of the Northeast Frontier Railway. The North Frontier Railway (NFR) is an important railway zone in India that manages and operates train services in the country's north-eastern area. NFR, founded in April 1958, has played a critical role in connecting the isolated and steep terrains of the north-eastern states with rest of the India, facilitating transportation, trade, and economic development in the region.

The NFR encompasses Assam, Arunachal Pradesh, Nagaland, Manipur, Mizoram, Tripura, Meghalaya, and parts of West Bengal and Bihar. The landscape in these places varies greatly, from dense woods and hills to plains and river valleys, posing distinct obstacles to railway operations and infrastructure development.

One of the key goals of NFR is to improve connection and accessibility in the north-eastern region, which has historically lacked suitable transportation infrastructure. NFR's substantial rail network connects major cities, towns, and outlying places, facilitating the flow of passengers and commodities throughout the region.

NFR operates numerous major railway lines, including the Lumding-Silchar portion, the Rangiya-Murkongselek segment, and the Guwahati-Dibrugarh section, among others. These routes pass through difficult terrain, including steep grades, abrupt curves, and river crossings, necessitating unique engineering solutions and maintenance procedures to ensure safe and efficient rail operations.

In addition to passenger and freight services, NFR supports regional development programmes and promotes tourism in the North-eastern states. The railway network connects important tourist locations such as Kaziranga National Park, Darjeeling, and the hill stations of Meghalaya and Arunachal Pradesh, which benefits the region's economy and facilitates cultural exchange.

SAQ 7

- Discuss various modes of transportation in Assam plains.
 - Briefly explain agriculture and irrigation pattern in Assam plains.
 - Write a short note on industrial development of Assam plains.
-

15.10 ASSAM PLAINS: REGIONS

Assam plains have been divided into many divisions according to various physiographic characteristics. These are discussed as below:

1. Upper Assam Plains

Upper Assam plains include districts of Lakhimpur and Sibsagar and major parts of Tezpur tehsil of Darrang district. Major tea growing area is confined in this part. This part offers forest cover and mineral oil. Rice occupies newer alluvium part while older alluvium is dominated by tea plantation. Its two sub-divisions are:

- Upper Assam Plains North
- Upper Assam Plains South

2. Lower Assam Plains

The region has various swamps and marshes on the right bank side. Though, Brahmaputra no longer forms an effective barrier between the northern and southern parts owing to river bridge at Guwahati, yet it can be sub-divided into two parts. These are:

- a. Lower Assam Plains North
- b. Lower Assam Plains South

15.11 ASSAM PLAINS: PROBLEMS AND PROSPECTS

Assam plains have been affected by high influx of immigrants from Bangladesh. The plains have lost most of their forest cover due to high population pressure and with increasing economic activities. Most common water-induced hazards in Assam's plains include floods, flash floods, river-bank erosion and sand casting (the deposition of enormous amounts of sand by flood water). Floods strike Assam plains every year because it is located in the north-eastern region of India on foothills of eastern Himalayas; flash floods are also common. Sand casting, while not a new phenomenon, has been increasingly becoming more destructive since mid-1980s to 1990s, particularly in eastern Brahmaputra valley's northern bank. All these dangers have an impact on every part of the plains significantly affecting land, lives, and livelihood of communities. Floods and flash floods both leave people homeless and displaced, crops are destroyed, public property is damaged, and development infrastructure is harmed. Victims who become penniless experience stress and shock.

Furthermore, annual cycle of the danger undermine people's resilience and exacerbate the poverty spiral. Hundreds of villages with agriculture, towns, and thousands of hectares of fertile land are gone because of periodic shifts in the river course and erosion of riverbanks.

Assam plains hold immense potential in many spheres. It includes renewable energy, tourism, and natural resources along with agriculture etc. In renewable energy, solar energy, biomass, wind energy, small hydro and waste-to-energy are main areas. Strengthening of cultural tourism to showcase its festivals, cuisine, and music are chief potential attractions in tourism sector. Strengthening of infrastructure development may provide boost to harness local products. Oil reserves and natural gas are source of natural resources. Assam plains carry immense potential to harness its forest based resources by further strengthening forest based industrial development. It is also a biodiversity hotspot and comes under the Eastern Himalayas, part of a priority global 200 eco region, identified by the World Wildlife Fund (India, 2024). Its vast agriculture resources also hold potential to bring the marshy and swampy area under cultivation with the help of reclamation process.

15.12 SUMMARY

In this Unit, you have learnt the following:

- Assam plains and Sundarbans delta provide a region that plays a very important role in the Nation's economy and defence. The region is rich in fertility and it sustains huge population of the country.
- Growth of industries in the region due to the availability of its waterway has helped in the rapid industrialisation of the region since the British era.

Though the region faces some challenges, it is not delayed that it cannot be mended.

- The Sundarbans offer the largest mangrove forest in the world and protect the land from every year from cyclonic storms. They are also home to exotic flora and fauna as Sundarbans delta has fresh and saline water at the same time. The region attracts researchers from all around as they offer biological, disaster and sociological studies, etc. The region covers a vast area of India which is spread over two states of the country.
- The Ganges and the Brahmaputra carry most extensive amount of sediments as they originate in the Himalayas and form most significant delta in the world known as Sundarbans delta.
- The region accommodates a huge rural population which is mainly dependent on agriculture for their livelihood.
- The region is vulnerable to climate change, causing a difference in this region's flooding pattern and affecting the lives of humans as well as fauna and flora.

15.13 TERMINAL QUESTIONS

1. Write about the common problems the Sunderbans region faces today.
2. Mention the drainage and water resources of the Assam plains region briefly.
3. Discuss the regions of the Assam plains.

15.14 ANSWERS

Self-Assessment Questions (SAQ)

1. a) Drainage systems of Sundarbans delta are Ichamati and Kalindi rivers in the east, Bhagirathi and Hoogly rivers in the west, and Dampier Hodges line in the north.
b) Four main types of soil are found in the Sundarbans are as follows:
 - i. Saline soil
 - ii. Saline Alkaline soil
 - iii. Non-Saline Alkali soil
 - iv. Degraded Saline Alkali soil.
2. Major industries in Sunderban delta are jute, textiles, tea, paper, glass, timber, leather, electronics, bicycles and aluminium, etc.
3. The deltaic region is divided into three parts namely Core Zone, Buffer Zone and Transition Zone.
4. a) Geological setting is influenced by the collision of the Indian and Eurasian tectonic plates. Accumulation of fertile alluvial deposits is found along the Brahmaputra river. Physiographic setting is mostly composed of flat topography, good for agriculture, dominated by the Brahmaputra river and its fluctuating path. It is vulnerable to seismic activity because of its proximity to the Himalayan plate border.

- b) The Assam Plains have a monsoonal climate with considerable rainfall during the wet season (June-September) and warm winters. Summers are hot and humid, with temperatures reaching 30°C. The region's environment is good for crops like rice and tea, and it often undergoes seasonal flooding due to high monsoonal rains and the changing course of the Brahmaputra river.
5. a) The Assam Plains feature a broad range of vegetation, including tropical rainforests with species like sal and teak, wetlands and marshes, vast tea plantations, and riverine and floodplain vegetation. Grasslands and bamboo groves are also notable features. This diversified vegetation sustains a large assortment of plants and fauna in the region.
- b) The Assam plains region boasts a vast physical resource base. It is abundant in fertile alluvial soils, which support agriculture, particularly rice and tea growing. The Brahmaputra river is major source of water supply for cultivation and transportation. The region also possesses considerable quantities of petroleum and natural gas, contributing to its economic importance. The existence of various woods and wetlands adds to its natural resource value, sustaining biodiversity and local livelihoods.
6. In the Assam plains, the population demonstrates diversity along with a mix of many nationalities, cultures, and histories. Majority are Assamese, although many other communities inhabit the region creating a rich social fabric where traditions and customs meet.
7. a) In the Assam plains, transportation modes include road networks connecting major cities and towns, river travel along the Brahmaputra and its tributaries, and rail services for both passengers and freight. Additionally, air travel is assisted by smaller airports like Guwahati and Dibrugarh.
- In the Sundarbans Delta, transportation mostly relies on waterways due to the region's extensive network of rivers and canals. Traditional boats and ferries are widespread for local transit, while larger vessels and steamers serve to freight transport. Limited road and rail infrastructure connects various portions of the delta to the mainland, aiding terrestrial mobility.
- b) In Assam plains, agriculture thrives with a concentration on rice farming, tea, and jute. Irrigation relies on the Brahmaputra river, with huge network of canals to accommodate. Sundarbans delta's distinctive scenery comprises paddy fields, fish farming, and mangroves so lush. Tidal irrigation supports growth when the rivers and tides peacefully combine.
- c) In Assam plains, industrial development is centred on oil and tea. Refineries and tea processing units are contributing to the economy.
- Sundarbans delta, on the other hand, sees less industrial might. With a focus on fishing and eco-tourism, its natural beauty takes flight.

Terminal Questions

1. Refer to Sections 15.11 and 15.7.
2. Refer to sub-Sections 15.8.3 and 15.3.3.
3. Refer to Section 15.10.

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UNIT 16

MICRO REGIONS 3 |

Structure

- | | | | |
|------|--|-------|--|
| 16.1 | Introduction
Expected Learning Outcomes | 16.8 | Bundelkhand: The Physical
Setting
Geology
Physiography/Relief
Drainage and Water Resources
Climate
Vegetation
Soils
Physical Resource Base |
| 16.2 | Kathiawar: Historical
Background | 16.9 | Bundelkhand: The Cultural
Setting
Population
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| 16.3 | Kathiawar: The Physical
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Geology
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16.1 INTRODUCTION

The northern segment of Gujarat has two peninsulas, known as Kuchchh (Bhuj) and Kathiawar (Saurashtra) regions. The former lies in the northwest between India-Pakistan border in the north and Gulf of Kuchchh in the south. The section is concerned with the latter, which includes the western portion of the Saurashtra Peninsula extending between Gulf of Kuchchh in the north and Gulf of Khambhat (Cambay) in the south-east. The entire region is bounded by Arabian Sea on the west. Kathiawar and Saurashtra plateaus however, are not entirely synonyms. Historically, the latter extends beyond the former. Kathiawar derived its name after the Kathia community, which once ruled the region.

Arabian Sea forms its western and southern boundaries while the Rann of Kutch lies on its north. It comprises of 8 districts (Fig. 16.1), viz., Amreli, Bhavnagar, Jamnagar, Junagadh, Porbandar, Rajkot, Surendranagar, and Diu (2011). Consequent to reorganisation of these districts after 2011, and formation of four new districts of Botad, Dev Bhoomi Dwarka, Gir Somnath and Morbi, the region has now 12 districts. The major cities of the region are Rajkot, Jamnagar, Bhavnagar, Surendranagar, Porbandar, Junagadh and Wadhwan. Diu lies off the coast and is separated by a lagoon.

Covering 63,609 square kilometres area, these 12 districts accommodate 15,496,105 persons. In terms of area, Rajkot and Surendranagar are the largest with 17.62 and 15.07 percent area respectively, followed by Amreli and Bhavnagar districts with around 11 percent area each. Diu district of Daman and Diu Union Territory is the smallest in terms of area (40 square kilometres). Among the districts of the mainland, Porbandar (2,316 square kilometres) is the smallest, which was a part of Junagadh district till 1997, followed by Botad (2,400 square kilometres) which was bifurcated from Bhavnagar in 2013. Gir Somnath district is spread over 3,775 square kilometres and was also a part of Junagadh district till 2013. Thus, Junagadh district was one of the bigger districts of the region prior to the bifurcation.

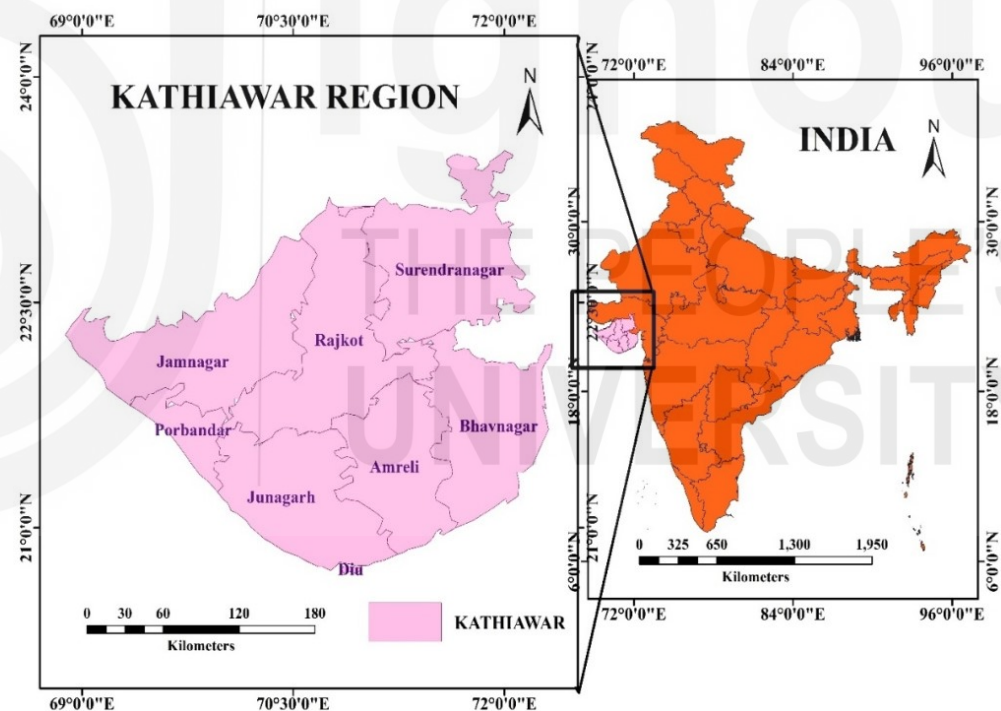


Fig. 16.1: Location Map of Kathiawar Region.

(Source: Census of India, 2011)

The Bundelkhand name has come from the Bundela dynasty who ruled this region from the middle of the 14th century onward. Bundelkhand region lies between 24.00° and 26.30° north latitudes, and 78.10° and 81.30° east longitudes (Fig. 16.2). Encircled by the Indo-Gangetic plains in the north, the Vindhyan ranges in the northwest, Malwa plateau in the south and Vindhya hills (Panna Ajaigarh range) in the east, the Bundelkhand region is placed at the heart of India. Spread over 70,860 square kilometres of area, this physical entity of Bundelkhand, includes 13 districts of Madhya Pradesh and Uttar Pradesh (Table 16.1 and Fig. 16.3).

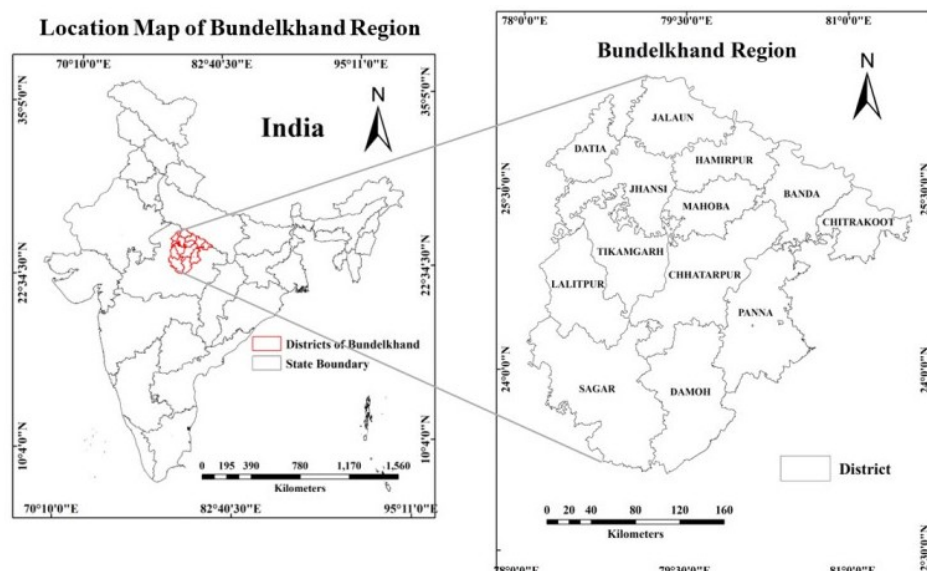


Fig. 16.2: Location Map of Bundelkhand Region.

(Source: Census of India, 2011)

Table 16.1: District-Wise Area of Bundelkhand Region (2011)

Sl. No.	State/Districts	Total Area (in square kilometres)	Area (in percent)
1.	Banda	4,408	6.22
2.	Chitrakoot	3,216	4.54
3.	Hamirpur	4,021	5.67
4.	Jalaun	4,565	6.44
5.	Jhansi	5,024	7.09
6.	Lalitpur	5,039	7.11
7.	Mahoba	3,257	4.60
Uttar Pradesh Bundelkhand		29,530	41.67
8.	Chhatarpur	8,687	12.26
9.	Damoh	7,306	10.31
10.	Datia	2,902	4.10
11.	Panna	7,135	10.07
12.	Sagar	10,252	14.47
13.	Tikamgarh	5,048	7.12
Madhya Pradesh Bundelkhand		41,330	58.33
Bundelkhand		70,860	100

(Source: District Census Handbooks, 2011.)

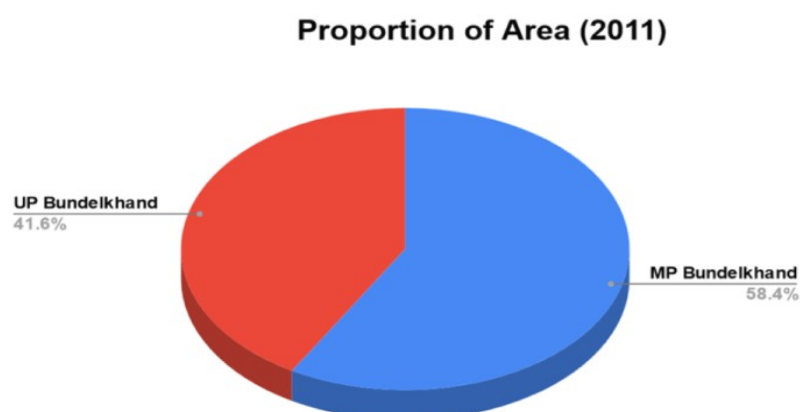


Fig. 16.3: Proportion of Area of Bundelkhand Region in Two States.

Expected Learning Outcomes

After studying this Unit, you should be able to:

- examine a brief history of Kathiawar and Bundelkhand regions;
- understand the nature of physical setting of Kathiawar and Bundelkhand regions;
- understand the nature of cultural setting in Kathiawar and Bundelkhand regions;
- explain the regions of Kathiawar and Bundelkhand; and
- comprehend the problems and prospects of Kathiawar and Bundelkhand regions.

The present Unit of Block 5 is designed to present the regional personality of the two select micro regions of Kathiawar and Bundelkhand in terms of their physical and cultural settings as well as their sub-regions (Sections 16.2 to 16.11). However, to understand the present characteristics of these two regions, it is necessary to throw some light on their historical background.

16.2 KATHIAWAR: HISTORICAL BACKGROUND

Kathiawar, a region known for its long history and revered as a sacred land of abundance, was named "Saurastren" by Romans. After the settlement of the *Kshatriya* tribe "Kathis" during the 15th century in the region following their expulsion from Kuchchh, the Marathas named it as "Kathiawar".

Historically, the region has not been governed by a singular ruler and there are traces of numerous small and large kingdoms. The archaeological evidences provide glimpses of the history of Kathiawar from prehistoric times to the early period of Mahabharata, as seen through the lens of the Indus Valley Civilisation. It is evident from the Ashoka stone at Junagadh that the region was under the control of the Maurya dynasty during the third century BC. Until 155 BC, the region seemed to be in a state of peace under the rule of Pushya Mittra. Later, Menander (150 BC) conquered and incorporated Saurashtra. The Sunga dynasty came to an end in 72 BC, and around this time, the Sakas occupied Saurashtra and established a new Saka dynasty known as the 'Satraps' or 'Kshatrapas'. The 'Kshatrapas' engaged in conflicts with the Andhra Kingdom, and subsequently, the region came under the rule of the Guptas. The history of Saurashtra experienced a significant transformation in the year 470 AD, with the demise of Skanda Gupta and the ascent of Bhattarka from the Maitraka clan, who established a dynasty that endured for a period of 300 years. Throughout this era, numerous Walabhi kings such as Bhattarka, Dharasena-I, Dronansentra, and Dhruvasena, governed over the region.

After the fall of the Walabhi dynasty, the history of Saurashtra went through a transformation. Numerous outsiders arrived and established their own dynasties in different parts of the Kathiawar peninsula. The Rajputs, specifically the Jethwas and Chaoras played a significant role in the region, with the Jethwas settling in Morvi, Nawanagar, and Porbandar, and the Chaoras in Okha. However, it was the Chaoras who successfully repelled Mohammed Ghazni's attack on the temple of Somnath in 1025 AD. The arrival of Kathis in Saurashtra from Sind and Kuchchh in the 11th century AD

remains unclear, although their settlement in the region is confirmed. Despite facing invasions between 1178 and 1241 AD, during the 15th century, Saurashtra maintained its prosperity and trade relations with foreign countries due to its important ports.

Portuguese arrived in Saurashtra via Diu in 1510 AD and took control of Mangrol by 1531 AD. They established themselves in Diu and fortified it as a crucial outpost to defend against invaders. History of Saurashtra transitioned during the 18th century with the decline of Mohammedan rule and the rise of Maratha raids. During the latter half of the 18th century, three significant individuals played important roles in Saurashtra: Marji Dewan of Junagadh, Meraman Khawas, and Wakhatsinghji Gohel of Bhavnagar. The British arrived in the region in 1818 and gained control by 1820. Kathiawar experienced a devastating earthquake in 1819, followed by attacks from the Kathis, who then assumed control. The districts were eventually placed under the British Kathiawar Political Agency in 1859, and further developments occurred in subsequent years, including the establishment of Rajkumar College in 1870 and the construction of railways in 1879.

In brief, the region was ruled by Kshatrapa dynasties in early centuries but after the decline of Gupta empire, it was seized by Valabhis in the 5th century. Subsequently, it suffered from Muslim attacks including the attack on Somnath by Mahumud of Ghazni. Later by 1820, British rule was established.

16.3 KATHIAWAR: THE PHYSICAL SETTING

16.3.1 Geology

The oldest rock formations found in the region are 25 million years old. These are highly fossiliferous clays, limestone and agate bearing conglomerates of Miocene system of Tertiary group. Pleistocene systems are noted in the coast, northwards from Gopnath extending beyond Porbandar Jura cretaceous. These are the oldest rock formations of the Kathiawar Peninsula, found around Dhrangadhra on the north-eastern corner. Umia series sandstone with conglomerate layers and some shale bands are also noted in this part which is spread over around 2,600 square kilometres area. Iron bands of red clay-shale also occur at many places in this north-eastern segment. Wadhwan sandstones are found on the south-east of Umia series. Overlying them are sandstones with some argillaceous layers. These are considered to be equivalent to Nimar sandstones of middle or upper cretaceous period. Deccan traps are found over the entire region except the coastal parts where rock formations are of recent times. Even the north eastern part has Jura cretaceous rock foundations of basalts, dolerites, felsites, trachytes, diorites and obsidian.

Girnar hills are the result of basaltic flow. Laterite rocks occur along Deccan trap and the largest one is near Bhavnagar. Limonitic limestone, sandstone, grit, conglomerate, and yellowish clay and marl with gypsum are found in isolated pockets between Bhavnagar and Jamnagar along the margins of Deccan traps. Dwarka belts are found near Dwarka and Navanagar. These consist of limestone and yellow bed. Miliolite limestone of Pleistocene era is found near Porbandar. The recent alluvium consists of

consolidated shore sand, tidal mud flats, raised beaches, coral reef and fresh water alluvium.

16.3.2 Physiography/Relief

Kathiawar region is an irregular highland. Elevation in the central part varies between 150 to 300 metres. The highest point which is in this part is above 300 metres. The altitude decreases towards the coast and reaches between 25 to 75 metres. Mandav, Barda and Girnar are three prominent hill ranges of the region. Barda hill lies in Porbandar district, 15 kilometres off the coast. The hill has an elevation of 307 metres and is famous for wildlife sanctuary. It joins Alech hills towards the east. These hills are more or less flat-topped and attain maximum height of 298 metres. Girnar hills have originated from volcanic eruption and are believed to be older than the Himalayas. The highest point of 1,117 metres is marked at Gorakhnath peak. These hills are also known as Revatak Parvat consisting of more than five summits lying in Junagadh district.

Other important hills are Sarkala (643 metres), Nandivela (529 metres), Rojmal (494 metres), Sasa (480 metres), and Kanara (326 metres). East of Rajkot, northern part of Saurashtra plateau attains highest point at Chotila (340 metres). These highlands are also known as Mandav hills. On the south of the highland, lies Gir Ranges.

The hills of Kathiawar belong to either of the two systems viz., hills running northeast or southwest. The north-eastern series begin from the east of Kotha-Pitha and stretching northwards branch-off into two parts. One is the Mandav Hills going north to Chotila, finally merging with the plains of Dhrangadhra. The other chain known as Thanga Chain lies south of Rajkot and culminates in the Barda hills. The two outliers viz., Kotda-Pitha and Kotda-Sangani form the central highland region and fall in north-western part of Rajkot district. Botad and Gadhada Hills lie here. Height of hills in this part ranges between 110 and 300 metres. The north-eastern series of Kathiawar hills are sterile. In some parts, these are barren, thinly covered by low bushes, shrubs and cactus.

Kundla, Palitana and Sihor which are part of the south-western system, lie on the southern part of Bhavnagar district. These hills are between 300 and 450 metres high and Nandivela with the height of 529.43 metres is the highest peak.

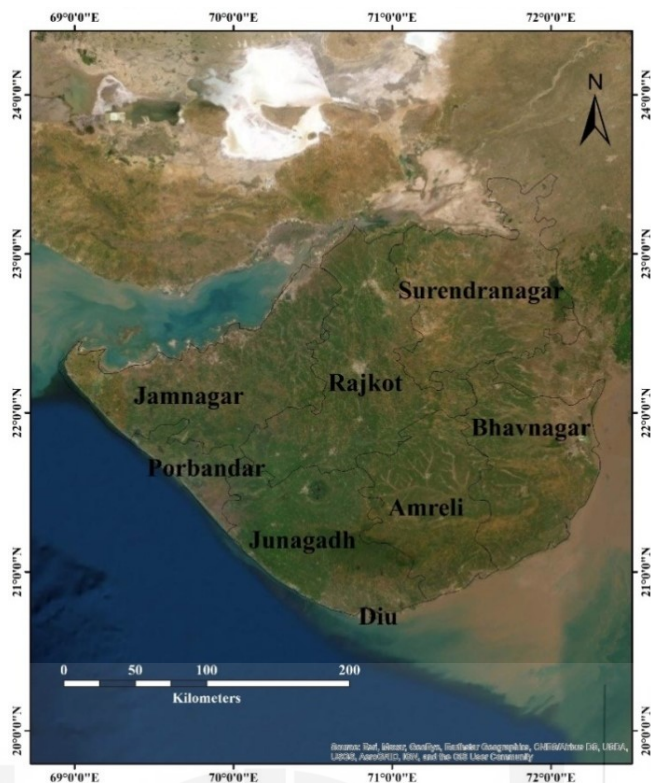


Fig. 16.4: Physiographic View of Kathiawar Region.

(Source: Landsat-8/Copernicus Satellite Images, 2023 (Google World Imagery))

16.3.3 Drainage and Water Resources

The coastal areas forming the outer part of the region have lower elevation, hence all rivers rising from higher Saurashtra plateau radiate in all directions and thus make a radial pattern. As the rivers of the region rise in the Central Highlands, they flow for a short distance before joining the sea. Sani, Bhadar, Minsar, Madhuwati, Meghal, Saraswati and Shingodha join Arabian sea, while Malan, Bagod, Shetrunji, Kalubhar and Ghelo join the western flank of Gulf of Khambhat. **Sani** river rises near Jepura village (Jamnagar district). River Ozat originates near Visavadar (Junagadh district) at an elevation of about 90metres and flows for 125 kilometres before joining the Arabian sea. Abajal and Popatdi rivers are its right bank tributaries, and Uben and Utavali join it from the left bank. **Bhadar** (200 kilometres), originates near Vaddi (Aniali village) in Central Highlands at an elevation of 261 metres on the north-west of Jasdan in Rajkot district. It flows westwards for 198 kilometres before joining Arabian sea at Navi Bandar near Porbandar. **Minsar** River also known as Dal Minsar is a tributary of Ozat. It rises near Minsar (Porbandar district) and flows for 100 kilometres, draining a catchment area of 1,180 square kilometres. **Madhuvanti** river originates from Girnar mountain and flows for 33 kilometres through Mendarda and Kesod *talukas* of Junagadh district to meet the Arabian sea. **Meghal** river flows in southern Kathiawar for 80 kilometres over a catchment area of 472 square kilometres. It originates from Kanada hills at an elevation of 300 metres in Gir forest and joins Arabian sea close to Chorwad town (Junagadh district).

Saraswati rises from Aravalli ranges near Ambaji at an elevation of 520 metres. Its total length is 360 kilometres and catchment area is 370 square kilometres. It passes through Sidhpur and Patan to join Rann of Kutch. The

river has disappeared but has been detected by Remote Sensing and appears at different places like Sidhpur in northern Gujarat and Somnath in Kathiawar. **Shingoda** river rising from Jamawada village, Una *taluka*, Junagadh district, has a catchment area of 281 square kilometres. **Malan** river originates from Mordhara hills at an elevation of 200 metres, and flows for 44 kilometres covering 332 square kilometres of catchment area before joining Arabian sea. **Shetrunji** river rising from the north-eastern side of Gir hills near Dhari in Amreli district at an elevation of 253 metres, is one of the major rivers of the region. It flows for 227 kilometres before joining Gulf of Khambhat near Sartanpar. It drains a catchment area of 5,636 square kilometres, with Shel, Khari and Talaji as right bank tributaries and Satali, Thebi, Gagario, Rajavat and Kharo as left bank tributaries.

River **Ghelo** rises from Jasdan hills at an elevation of 305 metres. South of Somnath, it receives waters of another stream and finally joins Arabian Sea. Total length of the river is 118 kilometres and catchment area is 622 square kilometres. **Kalubhar** river, also known as **Sonpari** river, originates near Chamardi village in Bhavnagar district at an elevation of approximately 85 metres. It flows for 94 kilometres covering 1,965 square kilometres of catchment area before joining Gulf of Khambhat. **Bagod/Bagad** river originates at Rabarika in Bhavnagar district at a height of 252 metres and joins Arabian sea. **Aji** is a major river and originates at Dardhara and meets Little Rann of Kuchchh. The length of the river is 102 kilometres with catchment area of 2,130 square kilometres. Lalapari is the right bank, and Dondi and Nyari are its left bank tributaries. **Machchhu** river originates from Madla hills at a height of 220 metres and flows for 110 kilometres to join the Little Rann. The total catchment area of the river is 2,515 square kilometres.

The western coasts of Kuchchh and Kathiawar have a large number of creeks. Kuchchh coast has more creeks, including the biggest of all, Sir Creek (96 kilometres). Meda, Brancawaa, Bedi Bunder and Ghughadwa are some important creeks of Kathiawar region. **Meda** creek is an estuary which is located near Miyani, Tukda Miyani and Lamba. It is also near Chandrawada and Rawal. **Brancawaa** Creek is located near Malala village in Diu. **Bedi Bunder** and **Ghughadwa** creeks are off the coasts of Jamnagar and Porbandar respectively. **Ghughadwa** creek is a tidal creek.

16.3.4 Climate

Three well defined seasons viz., summer, winter and rainy are experienced in Kathiawar. Rainfall occurs from July to October. Temperature remains high during summer season spread over March to June, and low during winter extending from November to February.

Much of average annual rainfall amounting to less than 750 millimetres is received during southwest monsoon season, with significant spatial variations. Maximum of 1,001 to 1,500 millimetres of rainfall is received in the Gir forest area which has higher elevation and dense forest cover. Annual average rainfall remains between 751 to 1,000 millimetres in Junagadh and Gir Somnath districts. The remaining areas such as Surendranagar (578 millimetres), Rajkot (663 millimetres), Morbi (519 millimetres), Jamnagar (639 millimetres), Devbhumi Dwarka (640 millimetres), Porbandar (698

millimetres), Botad (578 millimetres), Bhavnagar (598 millimetres) and Amreli (639 millimetres) receive between 501 to 750 millimetres of rain.

Temperatures during summer months usually remain around 30°C and ranges between 22°C to 24°C during winter months. During summers, the highest average maximum temperature is more than 30°C except for the coastal belt. Bhavnagar, Amreli, Junagadh, Porbandar and Rajkot districts form a continuous belt with temperature of 36°C to 38°C.

16.3.5 Vegetation

Junagadh district ranks first in the region with maximum proportion (4.77 percent) of area under forest. Forested area in all the districts is less than 5 percent. Very dense forest is found only in Junagadh district. Remaining districts have open forest and scrub. Junagadh district also ranks first with the largest area (157.86 square kilometres) under scrubland. There is direct relationship between rainfall and vegetation types. Tropical Dry Deciduous Forest is found in Amreli, Junagadh and Jamnagar districts, where the rainfall is between 600 to 1200 millimetres. This forest has tall trees which shed their leaves during dry winter and autumn months. Districts of Rajkot, parts of Bhavnagar and Junagadh receive less than 600 millimetres of rainfall, hence, their vegetation type is Tropical Thorny Forest. This type of forest has stunted growth of thorny bushes.

The region is rich in biodiversity. Largest ecologically important site, which is the home of Asiatic lions, is Sasan Gir in Junagadh district. It was notified in 1975. Other important ecological sites of the region are Velvander Blackbuck National Park in Bhavnagar district, Khijadia Bird Sanctuary (1981) in Jamnagar district, Marine National Park, and Gaga Wildlife Sanctuary (1988) in Devbhumi Dwarka district, Barda Wildlife Sanctuary (1979) in Porbandar district, Hingolghadh Wildlife Sanctuary (1980) in Rajkot district, Porbandar Bird Sanctuary (1988) in Porbanar district, Panuja Wildlife Sanctuary (1989) and Mityala Wildlife Sanctuary (2004) in Amreli district.

A large number of coral species are found along the coast of Jamnagar and southern coast of Kachchh. Pirotan, Nardla, Ajad and Positara are some of the coral islands in the north of Jamnagar and south of Kachchh.

16.3.6 Soils

Entire Kathiawar region has shallow medium black soil. Depth of soil ranges between shallow (25 to 50 centimetres) to moderately shallow (50 to 75 centimetres) categories. Soils of the northern part are shallower than the southern segment. However, the only exception is Gir area where the depth of soil is 10 to 25 centimetres. Shallow and shallow medium black soil of the region has originated from basaltic trap. Shallow black calcareous soil is found in southern districts of Porbandar, Junagadh, Amreli, Bhavnagar, Gir Somnath and southern Rajkot. Shallow medium black soil is noted in northern part spreading over Dev Bhoomi Dwarka, Jamnagar, Surendranagar, northern Rajkot, southern Morbi and parts of Botad district. Eastern coastal parts of Botad and Bhavnagar districts have poorly drained medium black soils.

16.3.7 Physical Resource Base

Kathiawar region is endowed with limited land, forest and mineral resources. Climatic conditions, poor quality and less thickness of soil, unfavourable terrain conditions and absence of proper irrigation infrastructure work as constraints in attaining maximum agricultural efficiency. Although a variety of cereals, pulses, oilseeds and horticulture crops are cultivated in the region, double cropping is highly limited. The region also compares poorly with Gujarat plains in terms of agriculture. Forest cover is extremely low in most parts of the region and is dominated by scrub.

Bauxite, Limestone, Lignite, Fire Clay, Chalk, Dolomite, Gypsum, Marle, Perlite and Quartz/Silica Sand are some of the minerals found in the region. Chalk, Marle and Perlite are exclusively found in Kathiawar region. Bauxite is mined in Jamnagar and Porbandar districts. All districts excepting Surendranagar have reserves of Limestone. Lignite and Dolomite are found in Bhavnagar district. Fire Clay is available in Rajkot and Surendranagar districts. Quartz/Silica Sand is mined in Rajkot and Surendranagar districts. Mining of Gypsum is confined to Rajkot district. Jamnagar, Porbandar and Rajkot districts are sole producers of Chalk in the country. Similarly, Amreli, Jamnagar, Junagadh and Porbandar districts are supplier of Marble, and Rajkot district is exclusive supplier of Perlite in India (Indian Minerals Year Book (Part I): 2018 & Statistical Abstract of Gujarat, 2016).

SAQ I

- Which are the oldest rock formations of Kathiawar and where are these found in the region?
- What is the drainage pattern of most of the rivers of Kathiawar region?
- Where does in Kathiawar maximum rainfall occur and why?
- Which minerals of the country are exclusively available in Kathiawar region?

16.4 KATHIAWAR: THE CULTURAL SETTING

Located on the north western seaboard of India, and closer to the 'fertile crescent' or the cradle of civilization in western Asia, parts of North Africa and south eastern Europe, Kathiawar is characterised by its unique diverse culture, historical significance, and economic activities. Its rich history dating back to ancient times, indicated by the archaeological excavations at Dwarka, Bet Dwarka, Kindar Kheda, Pindara, Somnath and sites in Gulf of Khambhat, has given birth to vibrant culture that reflects a blend of Hindu, Jain, and Muslim influences. The region's rich heritage of handcrafted textiles with exceptional embroidery style including *Bandhani* (tie-dye) textiles, silver jewellery has passed down through generations, also stands scrutiny to the region's cultural and historical significance. The people of the region speak Gujarati, with Saurashtri and Kathi dialects. Folk traditions, festivals, and cuisine such as *Dhokla*, *Thepla* and *Undhiyu* are the speciality of the region and form an integral part of the cultural identity. The region's economy is

primarily based on agriculture. Major crops include chickpea, groundnut, cotton, variety of millets and wheat. Kathiawar is major oilseed producing region of the country and occupies a predominant position in the State in terms of overall agricultural production. Cultivation of horticulture crops, particularly mango and coconut is also important in parts of Kathiawar. Fishing and salt production are important economic activities along the coastal tracts. The region has major industrial clusters in Rajkot and Jamnagar districts. Jamnagar is the largest producer of brass items in India, and is the home to the Reliance Industries Limited and Tata Chemicals Limited. The region has great tourism potentiality with several historical sites, wildlife sanctuaries including the Gir National Park, and several prominent religious centres such as Dwarka, Somnath and Palitana.

16.4.1 Population

Kathiawar has a total population of 15,496,105 persons which is 25.64 percent of total Gujarat population. However, the population is distributed highly unevenly across districts of the region. Rajkot district with around 38 lakh persons has highest population accounting for almost a quarter (24.55 percent) of total Kathiawar population. While Bhavnagar (18.60 percent), Junagadh (17.70 percent) and Jamnagar (13.94 percent) districts have population between 20 to 30 lakh persons, Surendranagar (11.33 percent) and Amreli (9.77 percent) districts have between 15 to 18 lakh persons. Porbandar (3.78 percent) is smallest district of the region in terms of population.

Table 16.2: District-Wise Population Characteristics (2011)

Sl. No	Districts/ Region/ State	Total Population	Percent to Region Total Population	DGR	Pop. Density (per square kilometres)	Sex Ratio		Literacy Rate		
						Total	Child	Total	Male	Female
1.	Amreli	1514190	9.77	8.60	205	964	886	74.25	82.21	66.09
2.	Bhavnagar	2880365	18.60	16.63	287	933	891	75.52	84.39	66.08
3.	Jamnagar	2160119	13.94	13.44	308	939	904	73.65	81.50	65.33
4.	Junagadh	2743082	17.70	10.75	311	953	907	75.80	84.38	66.86
5.	Porbandar	5,85,449	3.78	9.06	258	950	902	75.78	83.45	67.75
6.	Rajkot	3,804,558	24.55	20.02	340	927	862	80.96	87.07	74.43
7.	Surendranagar	1,756,268	11.33	15.90	168	930	896	72.13	82.11	61.45
8.	Diu	52,074	0.33	17.77	1335	1031	929	83.46	91.21	76.06
Kathiawar		15,496,105	25.64 of State Total	14.94	241 (308 State)	939	889	76.16	83.66	59.73
									Gap - 23.93	

(Source: Census of India, 2011)

The average population density per square kilometres in the region is relatively lesser with 241 persons compared to state average of 308 persons. Population density in Rajkot district (340 persons) is not only higher than the state average but also the highest in the region. While Junagadh (311 persons) and Jamnagar (308 persons) districts compare well with the State average, Bhavnagar (287 persons) and Porbandar (258 persons) districts lag much behind. The lowest density is seen in Amreli (205 persons) and Surendranagar (168 persons) districts (Fig.16.5).

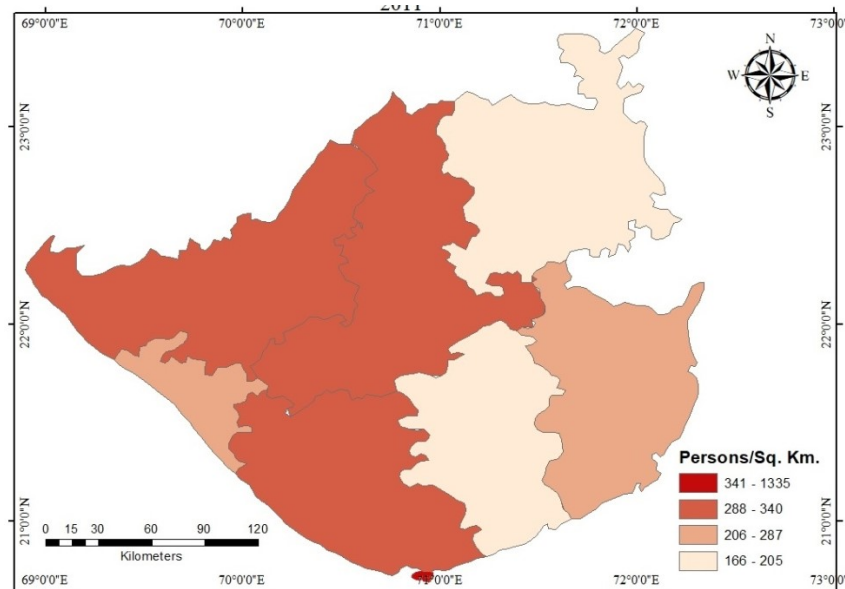


Fig. 16.5: Density of Population of Kathiawar Region.

Rajkot (20.02 percent) district has recorded population growth rate higher than the State average (19.28 percent) between 2001 and 2011. The districts of Diu (17.77 percent), Bhavnagar (16.63 percent), and Surendranagar (15.90 percent) have recorded relatively higher growth rates. It should be noted that the rapidly industrialising districts of Jamnagar (13.44 percent) and Junagadh (10.75 percent) have moderate growth rates. Lowest growth rates are noted in Porbandar (9.06 percent) and Amreli (8.60 percent) districts (Fig. 16.6).

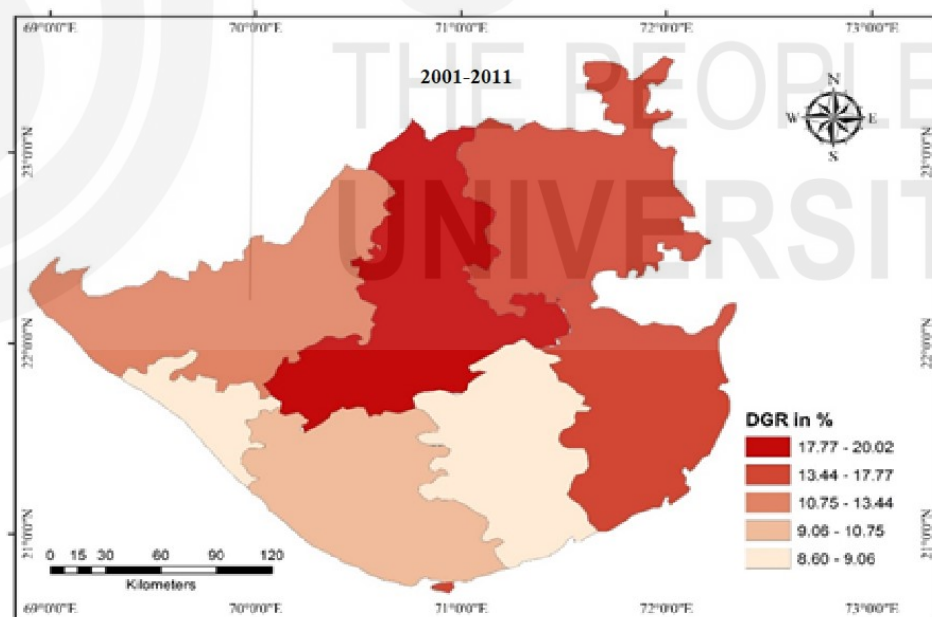


Fig. 16.6: Population Growth Rate of Kathiawar Region.

Population structure of Kathiawar has remained more balanced in comparison to the Nation as a whole. Total sex ratio in Kathiawar of 943 and 939 females per 1000 males was higher than the corresponding figures of Gujarat State 919 and 920 females for 2001 and 2011. The scenario displays wide variations at the district level both in terms of decadal change as well as spatial pattern (Fig. 16.7). Diu had highest sex ratio (1,118 and 1031 females). Amreli districts with sex ratio (987 and 964 females) at the two census years have experienced the

maximum decline. Junagadh (954 and 953 females) and Porbandar (946 and 950 females) are the other two districts with sex ratio higher than the regional average. The remaining four districts of Jamnagar (940 and 939), Bhavnagar (937 and 933), Rajkot (930 and 927) and Surendranagar (924 and 930) have similar or lower sex ratio than the region as a whole. Increase in sex ratio is observed only in case of Porbandar and Surendranagar districts. However, with respect to child (0-6 years) sex ratio, performance of the region (884 and 889) has remained by and large similar to the State as a whole (883 and 890) in the last two Censuses. Although minor, the increase in child sex ratio is heartening both at state and region levels. Among the districts of the region, Bhavnagar (881 and 891), Junagadh (903 and 907), Porbandar (898 and 902), Surendranagar (886 and 896) and Rajkot (854 and 862) districts have recorded increase in child sex ratio during 2001 and 2011. Diu (960 and 929), Jamnagar (898 and 894) and Amreli (892 and 886) are the only three districts where child sex ratio has declined over the two decades.

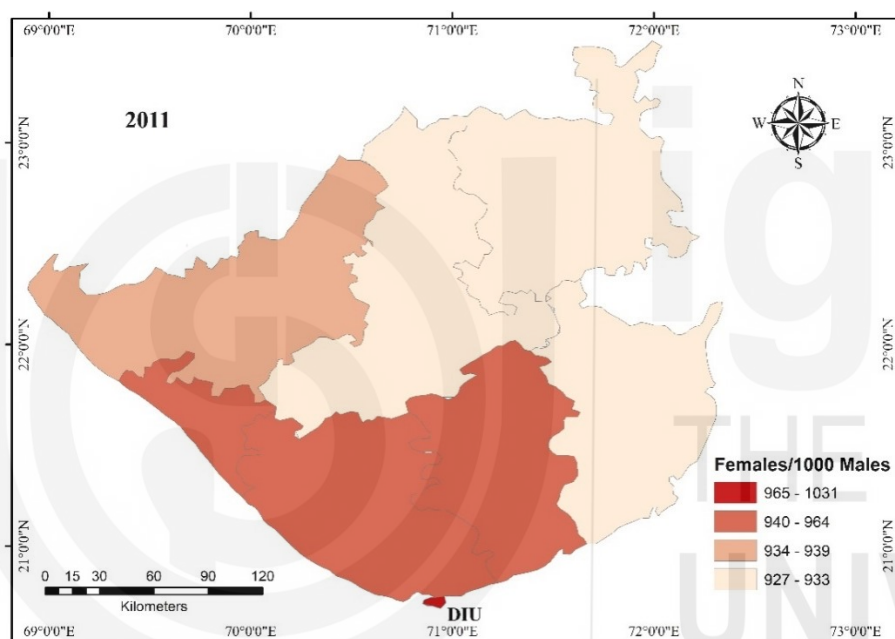


Fig. 16.7: Sex Ratio of Kathiawar Region.

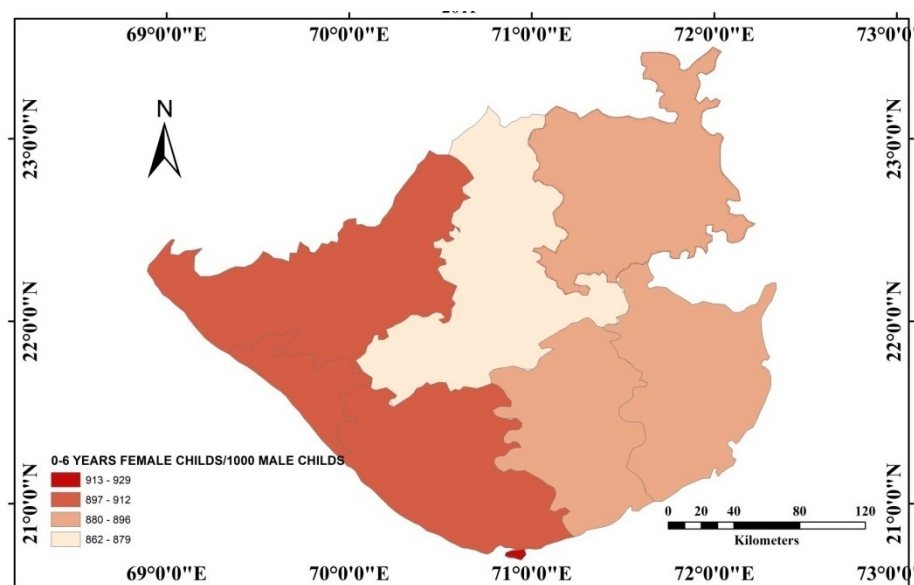


Fig. 16.8: Child Sex Ratio of Kathiawar Region.

Gujarat (78.03 percent) is also ahead of the Nation as a whole (74.04 percent) in terms of literacy rate. Percentage of literates in Kathiawar region (76.16 percent) as a whole too surpasses the National average. However, its performance compares poorly with the State average. Excepting for Diu (83.46 percent) and Rajkot (80.96 percent), remaining districts of Junagadh (75.80 percent), Porbandar (75.78 percent), Bhavnagar (75.52 percent), Amreli (74.25 percent), Jamnagar (73.65 percent) and Surendranagar (72.13 percent) have lower literacy than the State average (Fig. 16.9). With least literacy, Jamnagar and Surendranagar districts are even below the National level literacy rate. Between 7 to 10 point percent increase in the proportion of literates has been recorded during the last two censuses in all the districts of the region. Although, female literacy (Fig. 16.10) is yet to cross 70 percent mark in all the districts excepting in Diu (76.06 percent) and Rajkot (74.43 percent), there has been an appreciable increase of around 10 percent in this rate between 2001 and 2011 in all the districts of the region. The least literate district of Surendranagar has registered the maximum increase in female literacy from 48.10 to 61.45 percent during the decades in reference.

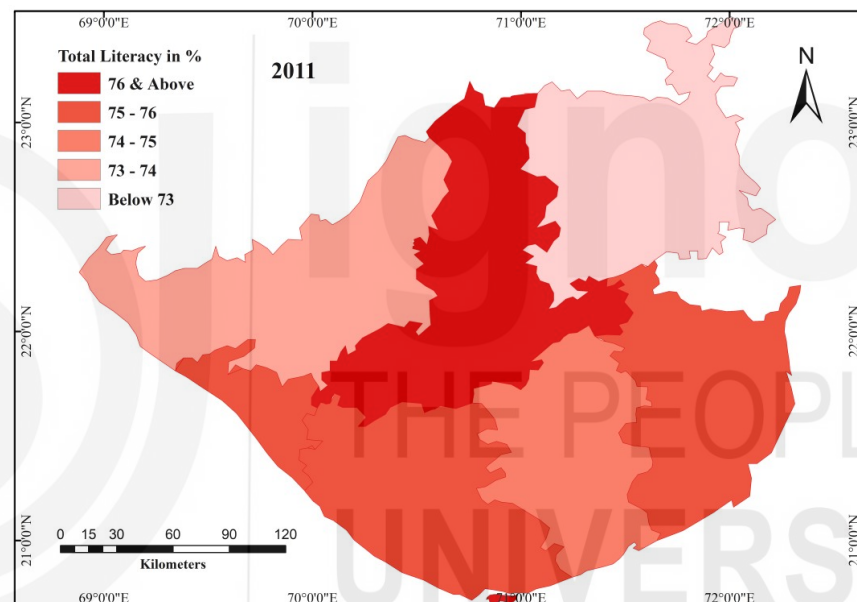


Fig. 16.9: Total Literacy of Kathiawar Region.

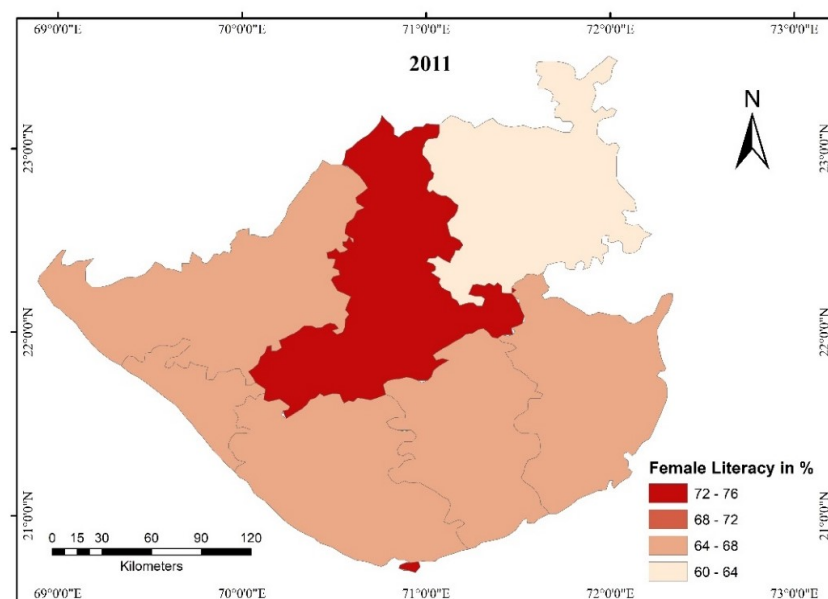


Fig. 16.10: Female Literacy of Kathiawar Region.

Population adhering to all the major religious groups in the country is found in the Kathiawar region. Hindus dominate the social mosaic in much higher proportion (89.47 percent) than the National average of 79.80 percent in all the districts of the region. Porbandar (93.90 percent), Amreli (93.15 percent) and Surendranagar (92.26 percent) districts have Hindu population above 90 percent. However, proportion of Hindus remain lesser than or closer to the State average of 88.57 percent in the remaining districts of Bhavnagar (84.58 percent), Junagadh (87.37 percent), and Jamnagar (83.81 percent) and Rajkot (89.30 percent). Christians, Buddhists, Jains and Sikhs have very insignificant proportion. Muslims account for 9.53 percent of Kathiawar's total population. The Muslim share varies between 5 to 15 percent in the districts of the region. Muslim share is higher than the State (9.67 percent) and National (14.20 percent) averages in the district of Jamnagar (14.85 percent), and the State average in both Bhavnagar and Junagadh districts (12.21 percent in each).

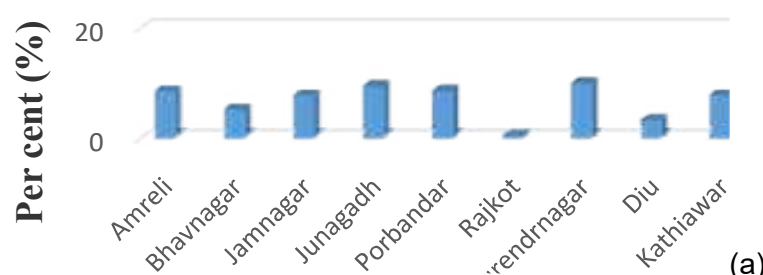
Scheduled Castes (8.10 percent) and the Scheduled Tribes (1 percent) account for much less proportion of Kathiawar population compared to their respective National averages of 16.60 and 8.60 percent, respectively. Traditionally being a non-tribal region, the small proportion of ST population in Kathiawar region may be of the migrants. Highest and lowest proportions of ST population are seen in Porbandar (2.23 percent) and Rajkot (0.06 percent) districts. The SC share (8.10 percent) in the region is however higher than the State average (6.74 percent). It varies between 10.22 percent in Surendranagar and 0.76 percent in Rajkot district.

Table 16.3: Share of Scheduled Castes (SC) and Scheduled Tribes (ST) Population (2011)

Districts/Regions		Percentage to Total Population	
		SC	ST
1.	Amreli	8.78	0.48
2.	Bhavnagar	5.45	0.32
3.	Jamnagar	8.05	1.12
4.	Junagadh	9.69	2.03
5.	Porbandar	8.85	2.23
6.	Rajkot	0.76	0.06
7.	Surendranagar	10.22	1.22
8.	Diu	3.58	0.24
Kathiawar		8.09/1252959	1.00/154822

(Source: Census of India, 2011)

District-Wise Share of SC Population - 2011



(a)

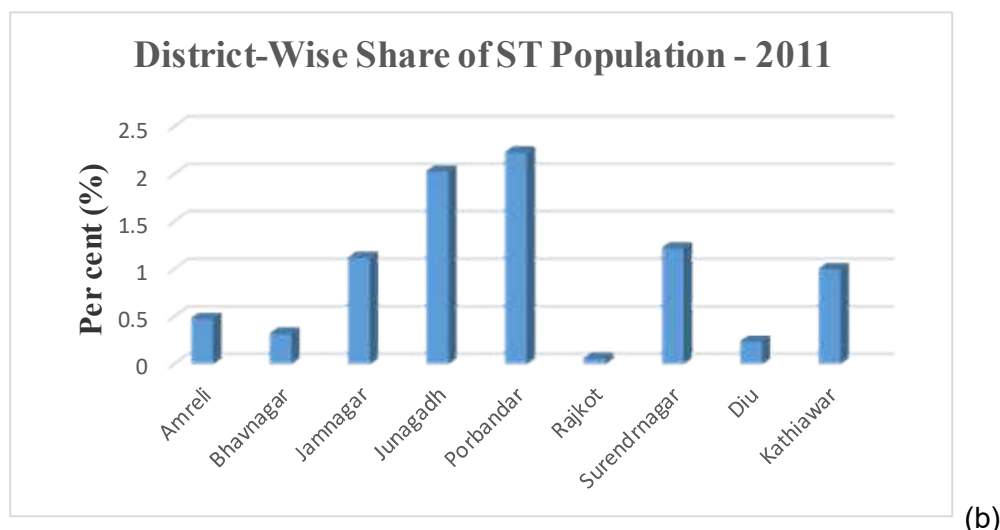


Fig. 16.11 (a) and (b): District-Wise Share of SC and ST Population in Kathiawar Region.

Gujarat state as a whole is one of the most urbanised states of India with 42.58 percent urban population, much above the National average (31.16 percent). Kathiawar region also has a very high share of urban population (41.73 percent) with wide variation across its districts. With a significantly higher proportion (58.19 percent) of urban population, Rajkot district is more urban than rural. Four coastal districts of Porbandar (48.72 percent), Diu (46.07 percent), and Jamnagar (44.95 percent) and Bhavnagar (41.10 percent) are also relatively more urbanised with share of urban population being higher than or close to the State average. Percentage of urban population is much less than the State average in Amreli (25.53 percent), Surendranagar (28.29 percent), and Junagadh (33.00 percent) districts.

Table 16.4: Levels of Urbanisation

Sl. No.	District	Urban Population 2011	Percent to Regions Total Urban Population	Percent to District Total Population		DGR 2001-2011
				2001	2011	
1.	Amreli	3,86,635	6.00	22.50	25.53	23.54
2.	Bhavnagar	11,82,401	18.35	37.90	41.10	26.45
3.	Jamnagar	9,71,065	15.07	43.90	44.95	16.12
4.	Junagadh	9,06,412	14.08	29.10	33.00	27.39
5.	Porbandar	2,85,674	4.43	48.69	48.72	9.30
6.	Rajkot	22,14,050	34.36	51.30	58.18	36.18
7.	Surendranagar	4,96,916	7.71	26.60	28.29	23.47
8.	Diu	23,991	0.37	48.80	46.07	11.18
Kathiawar		6,467,144	100.00	5,107,043	41.73	26.63

(Source: Census of India, 2011)

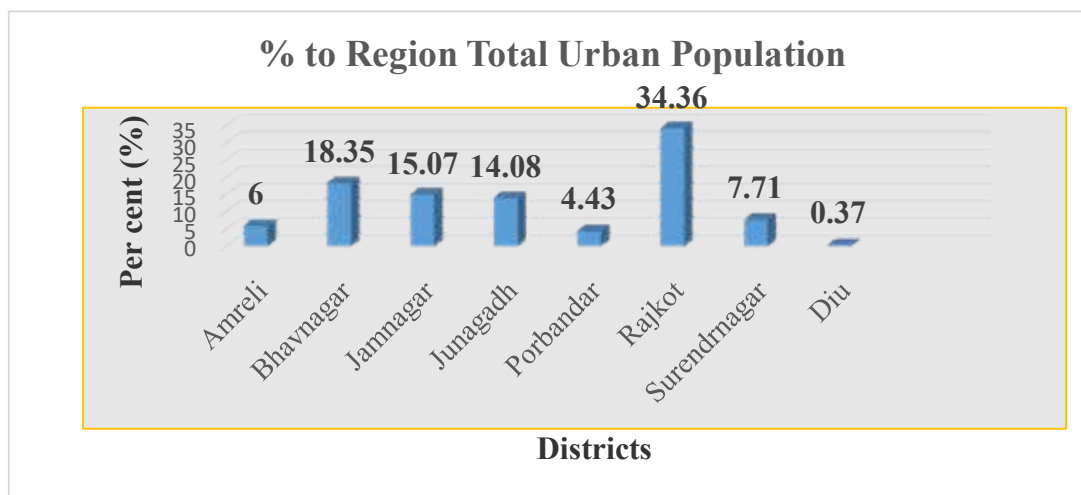


Fig. 16.12: District-wise Share of Regions Total Urban Population in Kathiawar Region.

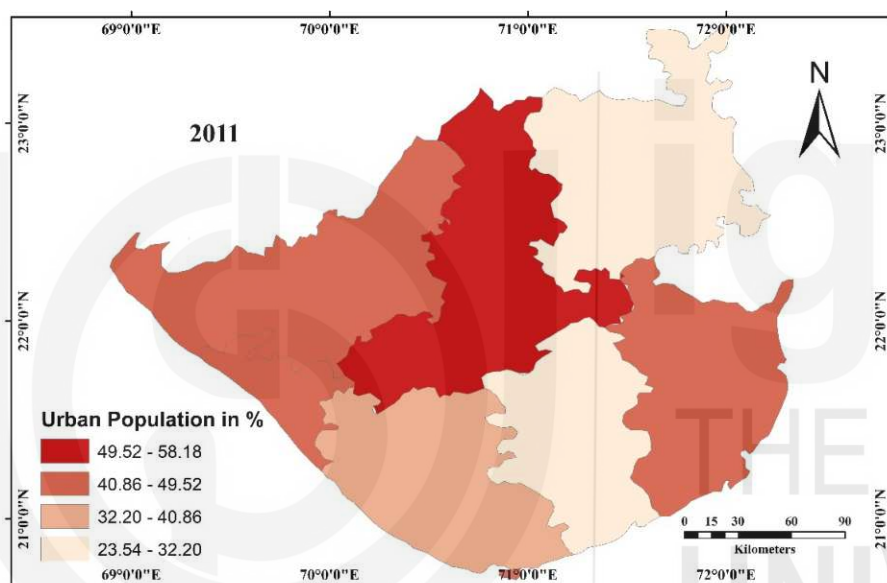


Fig. 16.13: District-wise Proportion of Urban Population in Kathiawar Region.

Agricultural sector accommodates slightly more than half (52.27 percent) of working population of the region, which was lower than all India average of 54.60 percent in 2011. This indicates that there is a relative balance between different sectors of economy in the region. However, perusal of district level proportion of workers reveals otherwise. Proportion of agricultural workers in more urbanised districts of Rajkot (38.11 percent), Jamnagar (48.56 percent), Bhavnagar (49.18 percent), and Porbandar (49.60 percent) are lesser than the regional average. However, it is heartening to note that in all districts of the region excepting Surendranagar and Bhavnagar, the share of cultivators is higher than agricultural wage earners. This is indicative of the positive situation, where a larger proportion of agricultural population of the region has access to productive resource, i.e., land. Household industries accommodate only 1.30 percent of workers of the region, which does not vary much across districts. Proportion of other workers varies between 30 to 60 percent in the districts with Rajkot (60.28 percent) and Jamnagar (50.10 percent) being in lead position. However, the district of Diu stands out as an exception with a very high proportion of other workers (93.42 percent).

Table 16.5: District-Wise Work Participation in Kathiawar Region (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.	Amreli	43.40	35.32	31.95	67.27	0.93	31.80
2.	Bhavnagar	39.95	20.15	29.03	49.18	1.56	49.26
3.	Jamnagar	39.23	31.19	17.37	48.56	1.34	50.10
4.	Junagadh	40.97	32.69	29.72	62.41	0.86	36.73
5.	Porbandar	39.49	28.42	21.18	49.60	1.03	49.37
6.	Rajkot	38.88	23.62	14.49	38.11	1.61	60.28
7.	Surendranagar	41.20	25.60	37.44	63.04	1.32	35.64
8.	Diu	30.25	2.99	1.85	4.84	1.75	93.42
Kathiawar		6,228,389 /40.19	1,696,316 /27.24	1,559,550 /25.04	3,255,866 /52.27	81,027 /1.30	2,891,496 /46.42

(Source: Census of India, 2011)

16.4.2 Settlement

The site, situation, pattern and morphology of settlements in Kathiawar region are shaped by its topography, history, climate, maritime traditions, and socio-economic activities. The site or the physical characteristics of the land of the settlements in Kathiawar vary according to various geographical features.

Settlements along the coastal plains are sited on relatively flat terrain, providing favourable conditions for the development of ports, pursuance of maritime trade, and fishing activities. The hilly and rocky terrain of the Gir Hills in the south and Vindhyan ranges in the north east, are marked with smaller, dispersed settlements in the foothills. Though the region is generally arid, rivers like Sabarmati and Shetrunji, step wells and reservoirs have also influenced the settlement locations. Settlements in the arid and semi-arid parts are typically located where ground water or seasonal rivers provide water for sustenance and are spaced much apart from each other.

Situation of settlements, which refers to their relative location or connection to other places and features is influenced by many factors in Kathiawar. The region's coastal location with maritime linkages with West Asia, eastern Africa, littoral areas of India, Sri Lanka, and Southeast Asia, has given rise to major port towns of Porbandar, Dwarka and Veraval etc. Trade routes since the ancient times passed through the region and towns like Bhavnagar and Junagadh benefited from their location on these trade routes. Religious and cultural centres like Dwarka and Palitana have been attracting several devotees from all over the country since ages. Hill tops of the region provided natural defence for development of fortresses and royal capitals, like in Junagadh.

The spatial distribution and arrangement or pattern of settlements in Kathiawar vary according to topography, water availability, and historical factors. While linear settlements parallel to the shoreline or main roads are common to the coastal tracts, the arid and semiarid plains of Kathiawar are marked by clustered/nucleated settlements in close proximity to water sources. Such nucleated settlements are typical to the more fertile parts of the region, where agriculture plays a key role in the local economy. Dispersed

settlements are found in the hilly and rocky areas especially near the Gir forest. Rugged terrain and scarcity of water of these areas permit only the growth of farmsteads or small hamlets at considerable distances.

Both traditional and modern influences have impacted the internal structure and layout of the built environment or morphology of settlements in Kathiawar. Traditional structures and layout are typical to the villages of Kathiwar, where houses are grouped around a central open space, such as a temple or community gathering area. Urban areas have a mix of traditional and modern layout, at places manifesting the influence of colonial era. While older parts of the urban centres are densely built, with narrow streets and traditional markets, the newer areas are more spacious, with wider roads and modern residential and commercial buildings.

Nearly 58.28 percent of Kathiawar population lives in its 4,658 villages. The villages are widely distributed across the region with only nine villages per 100 square kilometres and in varying sizes. Lower village densities across the region varying between 13 villages in Junagadh and 6 villages in Surendranagar per 100 square kilometres may be ascribed to unsuitable ecological conditions of the region. It has significant proportion of barren and uncultivable land accounting for 10.37 percent of total land. Even villages with large population of more than 5,000 are not very common. Almost 85 percent of the villages accommodate between 500 to 5,000 persons. Villages with less than 500 persons, are also much less in region. Exceptions are Porbandar and Diu districts with 16 percent villages with less than 200 persons and 75 percent villages with 5,000 to 9,999 persons respectively.

Table 16.6: Rural Settlements (2011)

Sl. No.	Districts / Region	Number of Inhabited Villages	Density of Villages (per 100 square kilometres)	Percentage of Villages by Population Size						
				Less Than 200	200-499	500-999	1000-1999	2000-4999	5000-9999	10000 and Above
1	Amreli	614	8	1.00	10.00	18.00	40.00	28.00	3.00	1.00
2	Bhavnagar	783	10	2.00	7.00	17.00	36.00	32.00	6.00	1.00
3	Jamnagar	697	7	5.00	11.00	25.00	34.00	21.00	4.00	1.00
4	Junagadh	901	13	6.00	5.00	17.00	36.00	30.00	6.00	1.00
5	Porbandar	179	9	16.00	8.00	16.00	34.00	21.00	4.00	1.00
6	Rajkot	833	8	1.00	7.00	21.00	38.00	29.00	3.00	1.00
7	Surendranagar	647	6	1.00	6.00	19.00	40.00	30.00	4.00	0.00
8.	Diu	4	15	0.00	0.00	0.00	0.00	25.00	75.00	0.00
Kathiawar		4,658	9	159 / 3.42	339 / 7.28	890 / 19.12	1724 / 37.01	1303 / 27.97	207 / 4.44	36 / 0.77

(Source: Census of India, 2011)

Gujarat in general and Kathiawar in particular has long since experienced the process of urbanisation in association with prosperous economic history. Long coastline of Kathiawar with numerous sea ports has played a significant role in this context. There are total of 101 urban centres in the region including 12 cities, of which Rajkot in M5 category is the largest. More than 80 percent of the urban centres belong to I to IV class size. Number of urban centres has grown from 77 to 101 during the last two census decades. New towns have been added in almost all the districts, Bhavnagar district has experienced birth of largest number of new towns during this period.

Table 16.7: Urban Settlements (2011)

Sl. No.	Districts/Region	Number of Urban Centres by Population Size (Class)							
		Total		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)
		2001	2011						
1	Amreli	9	10	1 (Amreli = M1)	1	5	3	-	-
2	Bhavnagar	13	21	2 (Bhavnagar = M4 and Botad = M1)	3	3	6	6	1
3	Jamnagar	12	16	1 (Jamnagar = M4)	1	8	4	1	1
4	Junagadh	11	15	2 (Junagadh = M3 and Veraval = M1)	3	5	4	1	-
5	Porbandar	4	6	1 (Porbandar = M1)	-	2	2	1	-
6	Rajkot	20	23	4 (Gondaland Jetpur Navagadh = M1; Morvi = M2; Rajkot = M5)	3	2	8	5	1
7	Surendranagar	7	9	1 (Surendranagar = M1)	2	4	2	-	-
8.	Diu	1	1	-	-	-	-	-	1
	Kathiawar	77	101	12 (11.88) (MI = 7; M2 = 1; M3 = 1; M4 = 2; M5 = 1)	13 (12.87)	29 (28.71)	29 (28.71)	14 (13.87)	4 (3.96)

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.

16.4.3 Economy

Land Use: 68.14 percent of land in Kathiawar is ploughed leaving very small proportion of land under forest cover. No district in the region has more than five percent land under forest. Rather saline land conditions have left large tract of land amounting to 10.37 percent as barren and uncultivable. Jamnagar (14.43 percent), Rajkot (13.08 percent) and Surendranagar (12 percent) districts have very high proportion of such land. Relatively higher proportion (7.29 percent) of land is used for grazing purposes with Junagadh (10.12 percent), Porbandar (9.73 percent), and Rajkot (9.23 percent) in the lead position.

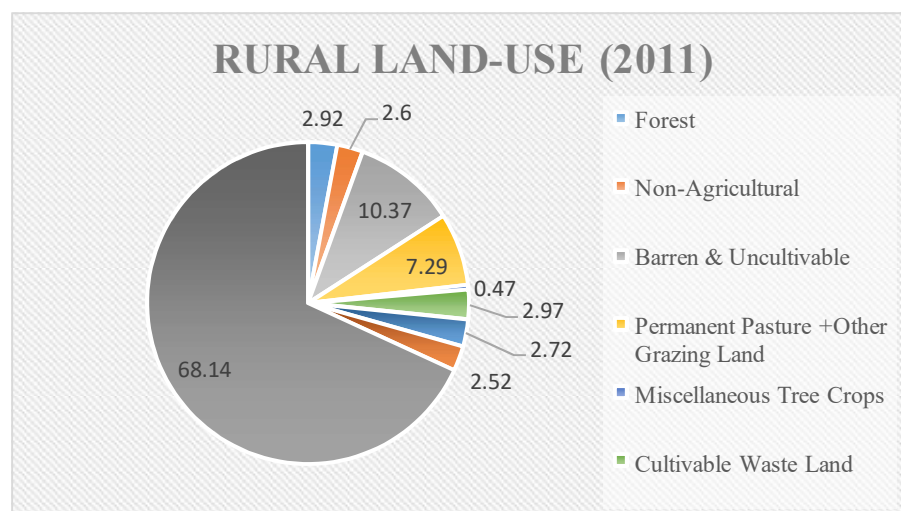


Fig. 16.14: Proportion of Rural Land-use in Kathiawar Region.

Table 16.7: Rural Land Use (2011)

Sl. No.	Districts/ (Total Geog. Area)	Total Rural Area (in Sq. Kms.)	Forest	Non-Agricultural Land	Barren and Uncultivable	Permanent Pasture + Other Grazing Land	Miscellaneous Trees Crops	Cultivable Waste Land	Fallow other than Current Fallow	Current Fallow	Net Sown Area
1.	Amreli (7397.00)	6919.55	4.38	2.40	6.90	5.71	0.23	0.98	1.40	2.42	75.58
2.	Bhavnagar (10,034.00)	7629.89	2.12	2.82	8.30	7.53	0.64	3.11	4.44	3.00	68.04
3.	Jamnagar / (14,184.00)	9674.73	2.35	4.03	14.43	6.49	0.84	4.51	4.92	2.15	60.28
4.	Junagadh (8,831.00)	7057.61	4.77	2.08	4.69	10.12	0.51	2.14	1.76	1.99	71.94
5.	Porbandar (2,316.00)	1986.35	3.06	3.49	8.46	9.73	0.18	4.65	3.30	7.54	59.59
6.	Rajkot (11,198.00)	10336.45	1.79	1.51	13.08	9.23	0.21	2.63	0.64	0.84	70.07
7.	Surendranagar (10,423.00)	10001.25	2.91	2.49	12.00	4.48	0.46	3.37	2.90	3.68	67.71
8.	Diu (38.50)	26.84	4.59	4.76	3.26	-	-	-	-	-	14.24
	Kathiawar (64421.50)	53,632.67	1568.62	1396.51 / 2.92	5561.03 / 10.37	3908.24 / 7.29	254.23 / 0.47	1593.85/2.97	1458.06/2.72	1348.75 / 2.52	36543.39 / 68.14

(Source: Census of India, 2011)

Agriculture: Kathiawar is traditionally a region of rain-fed agriculture. About 63.54 percent of cultivated land is without any irrigation facility. The radial drainage system of the region is seasonal. Major crops cultivated in Kathiawar include variety of coarse cereals, oil seeds, sugarcane and wherever possible wheat and vegetables. Bajra, jowar and maize are common among the coarse cereal crops. Pulses including *tur* (Pigeon Pea) and *chana* (Bengal Gram) are common to all parts of the region. Groundnut, sesame, cotton, rapeseed and mustards are common oil seeds. Supply of large quantities of coconut, mango, *chiku* (Sapodilla) and guava also come particularly from Amreli, Junagadh and Bhavnagar districts. Vegetables and spices are grown more or less in all the districts. Among spices and condiment crops, cumin is most important and its cultivation is concentrated in Surendranagar, Porbandar and Junagadh districts. Fennel seed and psyllium husk (isabgol) are grown in Surendranagar district. A substantial amount of area of Rajkot district is devoted to the cultivation of marigold.

Industrial Economy: Discovery of oil and gas in Gujarat in 1960s has played an important role in setting up of petroleum refineries, fertilizer plants and petrochemical complexes. Gujarat is considered as the petroleum capital of India due to presence of large refineries. Oil refinery and petrochemicals industries are situated at Dwarka and Sikka (Jamnagar). Raw material, facilities for transport and communication, cheap electricity, capital, labour, nearness to sea and wide market have contributed for the development of petrochemical industries. Other important industries are general electrical and manufacturing engineering, chemicals, drugs and pharmaceuticals, dairy, cement; ceramics, gems, jewellery, textiles, vegetable oils and soda ash.

Major agro-based products include cotton, peanuts, dates, and sugarcane. Jalalpur (Bhavnagar) is a large town of Gujarat, where several small and large textile industrial units have been established. Rajkot city is the hub of engineering manufacturing and has many companies manufacturing auto components, auto engines, and variety of machines (India Brand and Equity Report, 2008, 2017-18 and Manufacturing Sector Profile, 2015, Vibrant Gujarat - 2015).

16.4.4 Transport and Communication

Kathiawar has a transportation network encompassing express ways, national highways, state highways, district highways, district roads and rural roads. The region has around 33.06 percent of National, State and District Highways of the entire state. Rajkot (3,199 kilometres) and Porbandar (644 kilometres) districts have respectively highest and lowest length of such roads. The National Highways NH 8B (Bamanbore-Rajkot-Porbandar: 206 kilometres), NH 8E (Dwarka-Somnath-Bhavangar: 551 kilometres), and NH 8D (Jetpur-Junagadh-Somnath: 127 kilometres) connects every corner of the region. All the major centres of the region are also connected through broad gauge railway network. Rajkot railway station plays a pivotal role in this context. The region also has air connectivity with other cities of the country through Jamnagar (Air Force), Amreli, Diu, Rajkot, Bhavnagar and Porbandar Airports. Major sea ports of the region are at Porbandar, Bhavnagar, Bedi (Jamnagar), Veraval, and Jafrabad.

Table 16.8: Road Length (in kilometres), 2013

Districts/ Region	NH	SH	DH	Total (Percent to Region Total)
Surendranagar	112	830	1,500	2,442 (14.33)
Rajkot	267	1,256	1,676	3,199 (18.77)
Jamnagar	64	1,097	1,490	2,651 (15.55)
Porbandar	160	138	346	644 (3.78)
Junagadh	244	798	1,736	2,778 (16.30)
Amreli	55	1,026	1,336	2,417 (14.18)
Bhavnagar	109	781	2,026	2,916 (17.11)
Kathiawar (percent to State Total)	1,011 (31.10)	5,926 (32.42)	10,110 (33.66)	17,047 (33.06)
Gujarat	3,251	18,279	30,032	51,562

(Source: Statistical Abstract of Gujarat State - 2015, Directorate of Economics and Statistics Government of Gujarat, Gandhinagar)

SAQ 2

- What is the performance of Kathiawar district in terms of literacy?
- What is the average population size of urban centres of Kathiawar?
- What type of agriculture is traditionally practiced in Kathiawar and why?
- What factors have favoured the development of petrochemical industries in Kathiawar region?

16.5 KATHIAWAR: THE REGIONS

R. L. Singh and K. R. Dikshit have proposed the schemes of regionalisation for Kathiawar. Both the schemes of regionalisation are for the entire State. Singh has considered morphology, drainage, climate, natural vegetation, deserts and the Ranns for his scheme. According to his scheme, Kathiawar can be divided into following three sub-regions:

i) Kathiawar North (Jamnagar, Porbandar, Rajkot, and Surendranagar districts): The Kathiawar North sub-region is considered to be one of the most prosperous regions in western India, both in terms of its geographical location and its economic activities. Situated on the western coast, this sub-region serves as a significant hub for the import and export of chemical and petroleum products, owing to its abundance of rich and easily accessible ports. These ports not only facilitate efficient trade but also contribute to the region's overall economic growth. Furthermore, the Kathiawar North sub-region benefits from a well-developed transportation infrastructure, with well-connected road networks, railway systems, and air routes. As a result, cities such as Jamnagar, Rajkot, and Porbandar have emerged as major ports and economic centres within this region, playing a vital role in driving its economic progress and providing essential services to its residents.

ii) Kathiawar Core Region (Surendranagar, Southern parts of the Rajkot and Northern part of the Amreli and Bhavnagar Districts): This central/landlocked part of the Kathiawar region encompasses the high land areas and is the source of a multitude of seasonal and perennial rivers. From economic standpoint, this sub-region is currently undergoing establishment of several Industrial complexes. The town of Surendranagar is strategically situated along the Ahmedabad and Dwarka highway as well as the train route. Agriculturally, the sub-region is endowed with most of the arable lands in Kathiawar region. However, due to the scarcity of water and absence of proper irrigation infrastructure, the prosperity of agriculture is significantly hindered, necessitating implementation of various initiatives by the State Government to stimulate agricultural progress. Within this region, the important urban centres are Surendranagar, Jasdan, and Botad.

iii) Kathiawar Southern Coastal Regions (Junagadh, Diu, Amreli and Bhavnagar Districts): The vulnerable coastal region of Western Coastal India is the southern coastal Kathiawar. Within the Kathiawar region, this particular sub-region is known for its physical diversity. The coastal areas of Kathiawar are characterised by highly saline soil, while the interior parts feature undulating terrain. This region is currently facing a range of challenges, including water scarcity, difficult topography, and limited connectivity. However, despite these obstacles, there are several opportunities for development in this region. These include the presence of pilgrimage centres such as Somnath and Palitana, ports like Alang, Victor, Mangrol, and Ghogha, as well as tourism centres like Diu, Palitana, Gir forests, and various beaches. Additionally, the eastern parts of this region play a significant role in salt production in the country. Major towns in this region include Somanath, Bhavnagar, Diu, Mangrol, Una, Veraval, Amreli, and Junagadh.

Dikshit has demarcated the regions on the basis of surface configuration, climate, economic activities and cultural traditions. He divides the region into 6 regions:

- i. Northern Lowlands of Saurashtra
- ii. Porbandar-Veraval Coast
- iii. Southern Coastal Arc of Saurashtra
- iv. Gohilwad Coast
- v. Kathiawar Plateau
- vi. Peninsular Neck of Saurashtra

SAQ 3

Give R. L. Singh's regionalisation scheme of Kathiawar.

16.6 KATHIAWAR: PROBLEMS AND PROSPECTS

Problems

The Kathiawar region is plagued by a number of issues, including water shortage, salinity-related changes in land quality, migration, and lack of micronutrients, to mention a few. Nonetheless, this region also offers promising opportunities in its diversified agriculture, fisheries, SAUNI yojana, tourism, industries and the renewable energy sectors.

The difficulties of the region have been addressed by the Gujarat Government through several policies and projects to foster regional growth. However, the region still requires more investment to realise all of its potential.

Aridity: Much of the region is semi-arid or desert, due to insufficient and unpredictable rainfall. Excessive surface run-off thwarts conservation of the small amount of rain received. Crop cultivation restricted only to Kharif season, thus suffers tremendously. Availability of limited water poses serious vulnerability to economy, human activities and to the way of life. The situation worsened after the region experienced persistent drought since 2001. Due to insufficient irrigation infrastructure, the arid region has been experiencing a severe agrarian crisis. To mitigate the situation, more than 10,000 check dams were built in the areas that experienced protracted drought (Shagun, 2019).

Cropping Pattern: Agricultural pattern in North Kathiawar region significantly changed earlier towards water-intensive crops. Sorghum, pearl millet and cotton were this region's three main crops during the 1960s. Between 1991 and 2001, the cropping pattern changed to pearl millet dominance, and then to sesame, before changing again in 2008-09 to wheat, which has since become the crop that is most widely grown. At present, groundnut has replaced other crops as the primary crop in this area.

In Southern Kathiawar, where groundnut was the main crop for fifty years, agricultural patterns have also changed in favour of water-intensive crops. Sorghum and pearl millet were the other top crops between 1961 and 1971. The two crops were replaced by wheat respectively in 1981, and 1991. In 2001, a change in the cropping pattern was noticed as pearl millet once again

emerged as the favoured crop and cotton lost ground to it. Another change in planting patterns occurred in 2008–2009 as wheat and cumin replaced cotton.

The change in the cropping pattern can be attributed to Kathiawar's diminishing water tables, which is particularly pronounced in the north of the region. It should be mentioned that between 1990 and 2010, extensive groundwater extraction led to a sharp decline in North Kathiawar's water tables (Singh and Nair, 2012).

Salinity: Salinity and soil alkalinity are major issues at the moment in Gujarat state in general and Kathiawar region in particular. These problems came up as a result of high-water table, dry and semi-dry climate, sea water intrusion, salinity of desert materials, inadequate drainage, and salt deposition from wind-blown particles (Yadav et.al, 2022). Salinity is a significant issue in Kathiawar's coastal regions. Villages lying within 20-25 kilometres of sea shore are suffering from salinity ingress (Rao, 2012). Moreover, it is brought on by natural salinity, tidal influence, irrigation with saltwater and seawater intrusion as a result of significant groundwater depletion. Increased land degradation would result from unchecked infiltration, and salinity ultimately has an impact on the yield of cash crops. Groundwater contamination in this area is a result of excessive groundwater withdrawal for agriculture and rapid industrialisation. Crop production and soil productivity have both declined due to contaminated water. Because of over irrigation, salinity problem has spread to Kathiawar's core region as well.

According to Coastal Salinity Prevention Cell (2012), inadequate drainage, excessive irrigation, irrigation with saline water and salt production are all possible causes of inland salinity. Salinity is also a result of the prolonged cultivation of water-intensive crops on the shallow, black calcareous soils of South Kathiawar (Singh and Nair, 2012).

Due to excessive salt, the quality of the available groundwater is sometimes unfit for human consumption. Several irrigation wells in coastal regions of Amreli, Bhavnagar, Porbandar, Jamnagar, Junagadh, and Rajkot are now unusable due to excessive groundwater withdrawal from coastal aquifers that has resulted in seawater seeping in (Bhatia, 1992). Dependence on groundwater as principal source of irrigation has reduced groundwater supplies notably in the North Kathiawar region.

Deficiency of Micronutrients

Modern agricultural methods and soil salinization brought on by increased groundwater mining and salinity incursion may be due to lack of micronutrients in the soil of the region (Singh, et. al. 2008). Micronutrient status has declined as a result of increased fertilizer and water use in crops. State wide, there is severe copper deficit. There is a severe iron deficit in sections of South Kathiawar. The micronutrients are sufficient throughout North Kathiawar, with the exception of a little iron shortage.

Migration: Since other regions are relatively better developed, with better educational and employment prospects, out-migration is common from Kathiawar region. Although, Bhavnagar and Amreli have a sizable skilled labour pool in diamond cutting and polishing, these workers migrate in considerable numbers to Surat in search of better employment prospects (GIDB, 2006).

Prospects

Diversified Agriculture: By creating companies based on fresh and agro-horticultural products and gaining competitive advantage from its specialised position in numerous agricultural commodities, such as groundnuts, sesame, castor, and mango, Kathiawar has a huge potential to establish a thriving agrarian economy. Gujarat is a leading groundnut producer accounting for 27 percent of National groundnut production, of which 93 percent comes from Kathiawar region.

Variety of tropical and sub-tropical fruits and vegetables are grown in Kathiawar region, which makes its agriculture considerably diverse. Because horticultural crops yield larger returns than conventional crops, farmers are more inclined to choose horticultural crops. The three most important fruit-producing districts of Bhavnagar, Junagadh, and Amreli account for about 32 percent of the State's total area under mango.

Well-known *Kesar* mango is grown in this region. Horticultural crops are essential to human life because they provide nutritional security, better land use, high productivity, and more financial return. These crops also support the development of numerous ancillary businesses, offer abundant employment possibilities, and contribute to the improvement of people's economic conditions (GIDB, 2006).

Fisheries: Marine fisheries are of major relevance in the state of Gujarat in view of its rich resources as well as expanding output scenario. The state has 1,260 kilometres of shoreline and around 1,65,000 square kilometres of continental shelf, of which 64,800 square kilometres are in the 0-50 metres depth range, convenient for use of both manual and mechanical boats. In terms of marine fish production, Gujarat ranks first (Ujjania et. al., 2021). The development in gear design, addition of synthetic fibre to the gears, mechanisation, and motorization of the harvesting industry were the main causes of the increase in fish landing. Trawl nets contribute more than 50 percent of the marine fish landings along the Kathiawar coast almost every year. The demersal fishes make up the majority of the marine fish landings. Overall, this region is experiencing an increase in both demersal and pelagic fish output. Junagadh, Amreli and Jamnagar are significant fishing districts in the region. The most significant fish landing location for the entire region is Veraval (Pillai and Menon, 2000).

Industrial Centres: Since 1999, the location of industries has changed, with 21 percent of them now being located in coastal Kathiawar. This sector relies heavily on capital (Hirway, 2000). Chemical, food product, and non-metallic mineral products are the principal industrial products of the region. Depending on the geography, many such industries can be set-up in the Kathiawar region.

SAUNI Yojana: One of the initiatives created to maximise the use of water from the Narmada River is the Saurashtra Narmada Avtaran Irrigation Yojana (SAUNI). It was done to direct Narmada river flood waters that were overflowing into Saurashtra. The project is broken up into 4 linkages that include 115 dams in Rajkot, Jamnagar, Morbi, Surendranagar, Amreli, and Junagadh, among other places (Joshi et. al. 2018).

Tourism: In comparison to the manufacturing sector, the tourism industry in Kathiawar creates a lot of jobs while requiring relatively less capital investment, while also directly benefiting the local community. Although Kathiawar has a lot of tourist-related locations, its potential does not seem to have been fully realised. There are several attractions in the area, including well-known pilgrimage sites like Somnath and Dwarka, numerous historic Buddhist, Jain, Hindu, and Muslim monuments, National parks, and sanctuaries that are home to endangered species like Asiatic Lion (Gir in Junagadh). Together with Mandvi (a sea beach destination), Sasan Gir (a National forest park), Girnar/Junagadh (a heritage destination), Somnath, and the marine National park near Jamnagar are popular tourist destinations. The entire area has the potential to be transformed into a tourist circuit for historical and adventure tourism (GIDB, 2006).

SAQ 4

Mention the issues that pose problem in Kathiawar.

16.7 BUNDELKHAND: HISTORICAL BACKGROUND

Bundelkhand is a region with a common history and language, related dialects, a set of shared cultural practices, folklore and a social-religious-cultural identity rooted in a shared past and cultural formation. Despite the fact that the two parent states have left their distinct stamp on the respective districts that make up the region, it has managed to retain its identity as a region particularly in terms of power relations, control and dominance in society as well as political formations. There are similar characteristics that run through this region, and it stands out as a separate cultural and linguistic zone.

The Bundela dynasty, which dominated the region from the middle of 14th century, gave it its name. Despite the fact that there is no discernible pattern to the region's history, most parts of Bundelkhand have been under a common rule at various times, and this has instilled a sense of pride in the Bundeli people. It has a long legacy of poetry and literature that extols bravery. The region claims ties to Mahabharata's major clans and is rich in legends about it. It is the pride of ruling clans of Chandelas and their long rule, which has been marked by great distinctions in literature, music, sculpture, and architecture as well as Bundelas and their Kingdom of Orchha, and many other feudatories. Their stories have been inscribed in folklore since time immemorial, often giving divine origin to them.

According to Indian mythology, Dandaka, son of Ishwaku founded kingdom of Bundelkhand. His ancestors founded Chedi kingdom, which is referenced in Mahabharata epic, and they took part in Mahabharata's great battle. Bundelkhand was ruled by Vakatakas followed by Kalachuris, and Mauryas. While various dynasties governed the region, it was frequently ruled by larger empires such as Mauryas, Guptas, Vakatakas, Huns, Nagas, Gurjara-Pratiharas, Gonds, Mughals, Marathas and the British. Administratively, it did

not develop any particular characteristic. The tendency to form local Samanta was nourished by many rulers and during periods of domination by distant kingdoms, thereby sowing seeds of strong feudal culture in this region. The territory was taken over by the British in 19th century.

The region's linguistic and cultural ties are distinct and strong. Bundeli or Bundelkhandi is a shared dialect with rich literature and common inspiring history, which includes singing of famous *Alha*. Besides, *Achri* - a folk song dedicated to the mother goddess, as well as singing *Hori*, *Phag*, *Kajri*, *Lamtera*, *Pahunai*, *Got*, *Kacchiyahi*, *Khayal*, *Tambura Bhajans* and other kinds of cultural expressions are parts of the region's traditional culture.

Except for the general aspect of being located in central India, south of the Indo-Gangetic plain and north of the Deccan plateau, there are no particular geographic elements that unite the region. The physio-cultural entity of Bundelkhand was split in 1956 to become parts of Uttar Pradesh and Madhya Pradesh.

16.8 BUNDELKHAND: THE PHYSICAL SETTING

Northern and central part of Bundelkhand is characterised by undulating plains falling below 300 metres covering around 67 percent of the area (Singh, 1993). The remaining 23 percent of the geographical area lies at height mostly between 300 to 450 metres, with certain areas of the Vindhyan table land in the west and south rising to 600 metres. Bundelkhand is a rocky region, mostly with non-arable land. There are some sub-regions like Bundelkhand plains in the north, Bundelkhand upland in centre and south, and Vindhyan (Sagar and Damoh) plateaus in down south. Malwa plateau is located in Sagar district, while the Vindhyan plateau is located in Damoh district.

16.8.1 Geology

Bundelkhand is an old landmass made up of horizontal rock beds that rest on a stable base. Topography is rough, with low rocky outcrops, narrow valleys and plains. Major geological elements found across the region are granite of various types of Lower Pre-Cambrian/Archaean period. Minerals of economic significance can be found in some Dharwarian and Vindhyan rocks (Fig. 16.14). There are also high-quality sandstone, shale, and limestone as well as alluvial deposits of clay, silt and sand, and the famous pink Archaean gneiss rocks. The alluvial materials have been deposited by Betwa, Dhasan and Ken rivers. These rivers have formed spectacular ravines in the north and deep gorges in the south. These ravines and gorges are non-arable as these continue to expand. This is a growing threat to nearby farmlands.

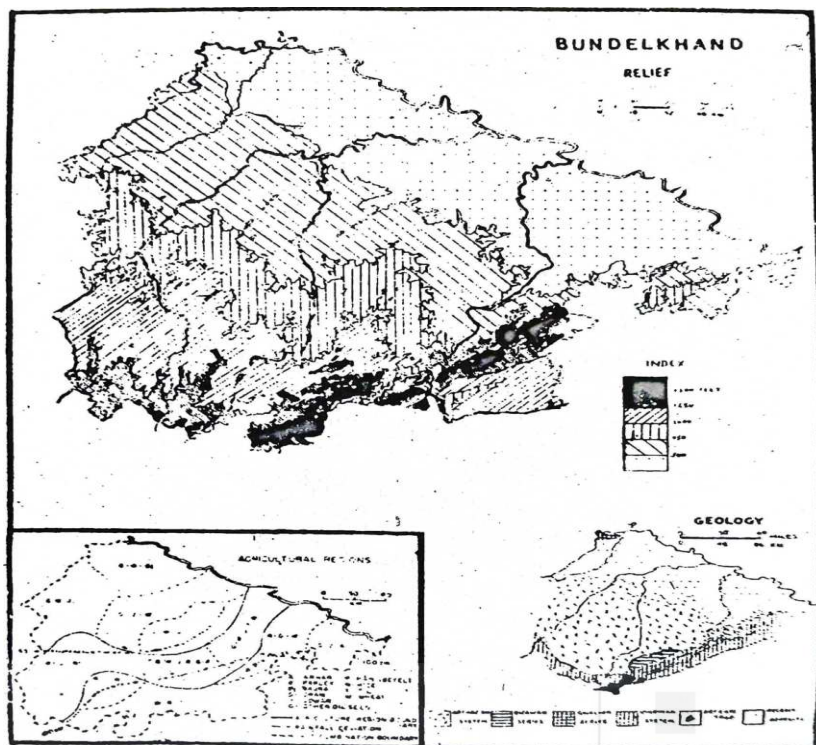


Fig. 16.15: Geology of Bundelkhand Region.

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

16.8.2 Physiography/Relief

Bundelkhand topography is smooth and undulating in character, that Spate (1972) termed it as 'senile topography'. Only exceptions are southern marginal areas, which still retain features of a dissected plateau. Entire region is marked by subdued topography that tends to grade into a perfect level plain towards the north. Hypsometric curve of the region shows that about 67.7 percent of the area is under 300 metres and only 3.6 percent is above 450 metres, while the rest is between 300 to 450 metres.

Northern 1/3rd of plain area is uneventfully flat and stands in strong contrast to the Vindhyan tableland, which rises in three well-marked escarpments roughly delineated by 300, 375 and 450 metres contours. The south-central granite country, providing basement for the entire structural region, varies in elevation from 300 to 366 metres. Everywhere it shows a gently undulating surface with occasionally flat-topped hills. Monotony of low relief of the granite country is frequently broken by quartz and dolerite dykes.

Main streams of the region, namely Betwa, Dhasan and Ken especially in the south, often descend through magnificent waterfalls carving out steep gorges and precipitous rocky banks. Some of these waterfalls are 60 metres high. These streams in the alluvial plain in the north, engage themselves in active erosion on a very large scale to form some of the most extensive and fantastic ravine lands.

Average elevation of Vindhyan range does not exceeds 600 metres. This range actually begins from Seondha **tehsil** of Datia district in the northwest and reaches Narwar due south. In the west, Vindhyan range is very

narrow and is cut-up into isolated hills. Vindhyanal extends to Lalitpur where Betwa river has cut a magnificent gorge.

Bundelkhand plain also known as Trans-Yamuna plain is made of soft and unconsolidated materials brought down by tributaries of Yamuna, Chambal, Betwa, and Ken. Its average elevation is 150 metres. Topographically, the whole plain is divisible into three belts of varying width. The southern belt is a transitional area. The central belt has perfect drainage extending up to southern bank of Yamuna. The third belt is narrowest and is confined along the bank of Yamuna in the form of high ground which represents the level of ancient flood plains. However, at present it is badly cut up into deep ravines. Such ravines also extend along the tributary streams of Yamuna.

16.8.3 Drainage and Water Resources

Numerous rivers of Yamuna river system drain Bundelkhand region (Fig. 16.16). Yamuna defines the northern boundary, Kali Sindh defines the western boundary, and Narmada defines the southern boundary. Yamuna is the longest river of Bundelkhand region. It causes destruction along its steep southern bank, consuming land as it flows forward. Betwa, Ken, Pahuj, Baghain, and Paisuni rivers are the main tributaries of Yamuna river, which flow from west to east. Dhasan, Jamni, Birma, Sonar, Katne, Bewas, and Kopra are some other tributaries that flow in the area. Sindh and Chambal rivers go through the west. Betwa contributes around 50 percent of water available in Bundelkhand uplands and plain sub-regions, while Ken contributes about 25 percent of it. Both rivers are inter-state rivers that originate in Madhya Pradesh and run through Uttar Pradesh before joining Yamuna river.

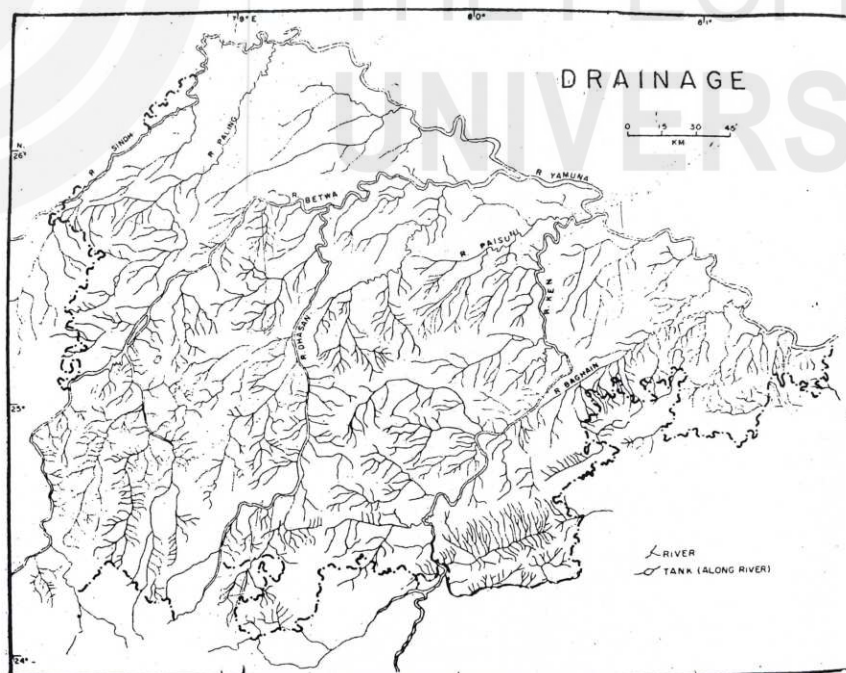


Fig. 16.16: Drainage of Bundelkhand Region.

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

The well-known water bodies of Bundelkhand are Pahuj Reservoir, Barwa Sagar, Barwar lake, Siaori lake, Pachawara lake, Dakwan and Parichha

Reservoirs, Arhar Tal, Manikpur Tal, Majhgawan Tal, Bela Tal, and Raipura Sagar (Singh, 1993). Despite the presence of a number of rivers, the region remains mostly dry and susceptible to drought. Irrigation potentials of these rivers have not been fully exploited.

16.8.4 Climate

Bundelkhand is located in hot and semi-arid climatic zone and temperature can reach 40^o Celsius during summer months and can go as low as 1^o Celsius in winter months. Temperature is highest in May and June, moderate in October, lowest in December and January. Mean annual average temperature is more than 25°C. However, mean monthly values differ significantly from annual mean, creating wide temperature range. Average temperatures in the summer remain around 30°C. From June to September, the monsoons bring temperatures down to around 22°C to 25°C, with relative humidity ranging between 70 to 80 percent. Banda is the hottest place in the region, which recorded 52°C in June, 1995. Hot breezes are common during summer months. Rainfall is distributed unevenly, with approximately 90 percent of the rains falling in 50-60 days of monsoon months. Average annual rainfall is 800-900 millimetres. However, most of the rainfall is lost to runoff. Wettest months of year are July and August and driest months are November and April. There is some rain during winter months which provides water for Rabi crop but it needs to be supplemented with irrigation. Drought and drought-like conditions are common in summer while floods are common during monsoon season. Dry plains in the north receive less rainfall than south-eastern parts of the region.

16.8.5 Vegetation

Much of the original vegetation of Bundelkhand has been lost due to extensive deforestation and encroachments for various purposes. Only small areas of dry miscellaneous and thorn forests of *Dhak*, *Teak*, *Mahua-Chiranji*, *Khardai*, *Khai*, and *Thar* trees remain. Bundelkhand's flora is tropical dry deciduous in nature. Scrub forest of *Siari*, *Katai*, *Gunj*, *Bel*, *Ghout* and scrub brushes make up majority of vegetation, with extensive stretches of land categorised as "wasteland". Acacia trees like *Babuand*, *Khair*, *Palash*, *Ber*, *Tendu*, *Mahua*, *Semal* and *Khardai* grow along the riverbanks in Bundelkhand plain sub-region area of Banda, Hamirpur and Datia districts. Beside the above-mentioned species, teak trees are also found in southern Bundelkhand upland sub-region of Panna, Chhatarpur and Tikamgarh. Trees locally known as *dhawda* (or *dhak*), *tinsa*, and *bija* are found in Damoh and Sagar plateaus.

Tendu tree is abundant in Panna and Chhatarpur districts. Leaves of this are used for making *beedis*, thus, providing seasonal income to people living in and around forests. *Mahua* is another valuable tree for individuals who live near woodlands. Bundelkhand has very little timber production. Teak forest is found only in isolated places in Sagar and Damoh districts. Bamboo can also be found in small areas across the region. Firewood is sourced from forests and scrub-lands. People living in hilly portions of Bundelkhand such as Kols in Patha area of Chitrakut, tribal communities living in and around forest of Panna district, and Sahariyas of Lalitpur district, depend largely on *Mahua* flowers, fruits and seeds, *Tendu* leaves and firewood. *Tendu* leaves are the

most valuable forest product in Bundelkhand, and are collected and sold by state agencies in both Uttar Pradesh and Madhya Pradesh. Medicinal plants and products such as *Harra*, *Gond*, *Imli*, *Khair*, *Chiraunji*, *Babul*, *Anjan*, and *Salbeaj* are among the other forest products collected and sold.

The Governments of Madhya Pradesh and Uttar Pradesh have established various national parks and wildlife sanctuaries in Bundelkhand region for protection and conservation of forest resource and wild life. Between 1975 and 1997, six sanctuaries covering 1924 square kilometres area, including Panna National Park and Tiger Reserve, were established in MP Bundelkhand. Three sanctuaries covering 310 square kilometres area were established in UP Bundelkhand between 1990 and 1997. Among all the sanctuaries of the region, Nauradehi Sanctuary established in 1975 (Sagar district) spans the maximum of 1,197 square kilometres area, followed by Panna National Park and Tiger Reserve (Panna district) established in 1981 over 543 square kilometres area. Among the three sanctuaries of UP Bundelkhand, Ranipur Wildlife Sanctuary in Lalitpur district established in 1977 is the largest spanning 230 square kilometres. All national parks and wildlife sanctuaries of Bundelkhand are naturally endowed with rich forest resources and have high eco-tourism prospects.

16.8.6 Soils

The following three broad categories of soils are found in Bundelkhand (Fig. 16.17).

(1) Upland Soil or Rocky Soil: This soil is mostly found on Vindhyan plateau. It is known as *Patha* in Banda district and includes poorer forms of *Parua*, *Mar* and *Kabar* soil. Texture of this soil varies between clay loam to sandy loam.

(2) Lowland Soil: This soil can be further divided into (2a) Black soil (*Mar* and *Kabar*), and (2b) Red and yellow soil (*Parua* and *Rankar*). This is most important soil of Bundelkhand. Black soil, *Mar* and *Kabar*, which may reach up to the depth of 40 inches, is found only in low-lying areas. Red soil in western Bundelkhand, particularly in Jhansi district has developed over granite and gneiss, while in eastern Bundelkhand this soil displays association with sandstone. *Parua* soil is alluvial and somewhat alkaline.

(3) Riverine soil (*Kachhar*, *Tari* and *Ranker*): This soil is the outcome of disintegration of different rocks transported from original area and deposited on flood plains. This is classified on basis of its location and characteristics, e.g., soil of adjoining channel is *Tari*, of the shelving banks is *Kachhar* and of higher flood plains is *Ranker*. The latter is unsuitable for cultivation due to gullying and erosion.

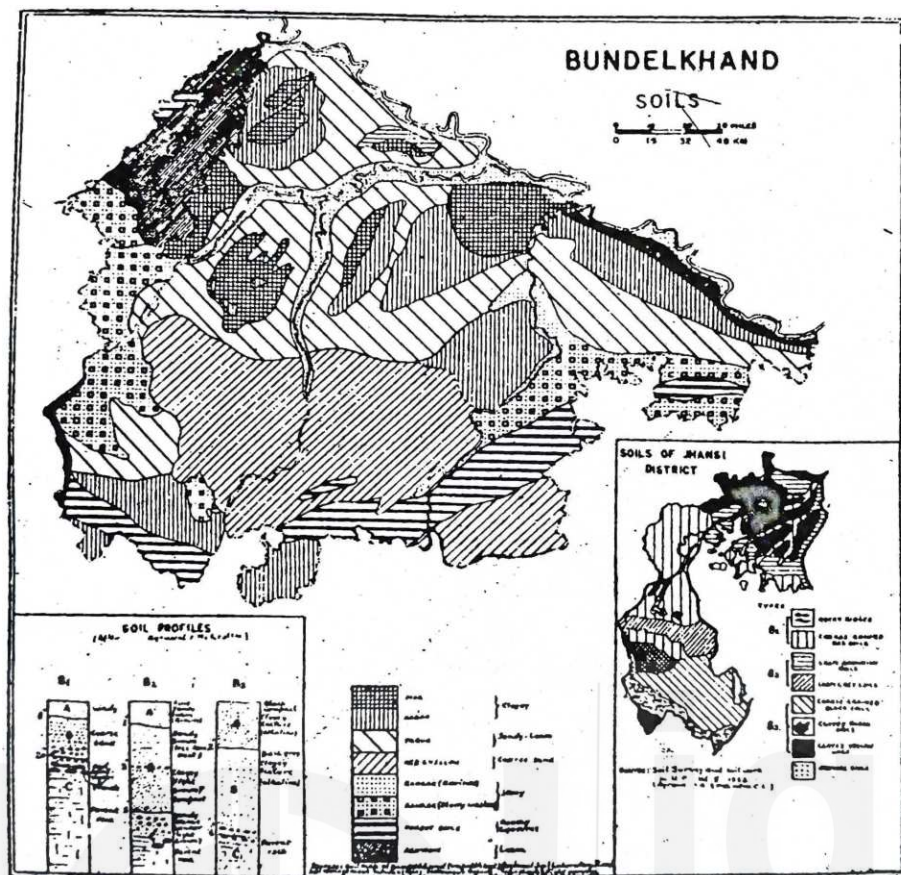


Fig. 16.17: Soils of Bundelkhand Region.

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

16.8.7 Physical Resource Base

Some of India's rare minerals are found in Bundelkhand. Panna district of Madhya Pradesh was once known for its diamond deposits particularly during mediaeval period but its importance has faded. Bundelkhand is now known for massive blocks of medium to coarse-grained pink, red, and grey granite as well as for the availability of building stone found in Jhansi, Lalitpur, Mahoba, Banda, Datia, Chhatarpur, Panna, and Sagar districts. Jhansi Red and Fortune Red stones mined in Chhatarpur are unique to this region. Sandstone in white, buff, cream, pink and red shades is found across Panna and Sagar districts. Being soft, sandstone can be easily chiseled into beautiful forms and is valuable for buildings. Sculptures of Khajurao temple in Chhatarpur district are made out of these sandstones. Lalitpur is known for Lalitpur Grey and Lalitpur Yellow variants. Stone of lower value is crushed and used for road and building construction purposes.

Districts of Sagar, Damoh and Panna are renowned for limestone and dolomite deposits. Apart from granite, other valuable resource in UP Bundelkhand is silica sand found in Chitrakoot's Mau *tehsil*. These deposits are considered to be India's best source of glass sand. Lalitpur is a major producer of low-grade iron ore, and rock phosphate which is used in fertilizer industry. Clay is found in districts of Datia, Panna, and Tikamgarh which is used in various industries. Artifacts and trinkets are made from agate pebbles found in some places in the gravels of Ken river. Different varieties of beautiful agates, popularly known as Banda stone, are found on Ken riverbed.

SAQ 5

- a) Which major geological elements are found across Bundelkhand?
 - b) Name the major rivers of Bundelkhand along with their sources.
 - c) During which months/season Bundelkhand receives maximum of its rainfall?
 - d) Name the type of soils found in Bundelkhand region.
-

16.9 BUNDELKHAND: THE CULTURAL SETTING

This central Indian region of Bundelkhand not only has great historical significance, but also rich cultural heritage. Enclosed between Yamuna River in the north and the Vindhya and Satpura Ranges in the south, Bundelkhand region displays a distinct cultural identity, despite being spread over two major states of Uttar Pradesh and Madhya Pradesh. The legacy of the Bundela dynasty is manifested in its several forts, palaces, and temples. The region houses the UNESCO heritage site of the Khajuraho temples, and notable historical sites of Kalinjer, Jhansi and Orchha fortresses. The warrior past of the region is also reflected in its folk traditions, music, dance, and art forms. Bundelkhand's folk dance forms of *Rai* and *Alha* are very popular. The traditional songs of the region narrate tales of heroism, love, and devotion. Handicrafts, including pottery, textile weaving, and metalwork, are also notable economic activities in the region. People speak Bundeli, a dialect of Hindi. Economy of the region is predominantly agrarian. Wheat, barley, pulses, and oilseeds are grown under dry farming system depending on monsoon rains. Besides, quarrying of some mineral resources, such as limestone, sandstone, and granite provide employment opportunities. Employment in the Beedi manufacturing industries is specific to the Madhya Pradesh part of the region.

16.9.1 Population

Bundelkhand region accommodates 18,335,044 people (1.51 percent of India) within its 70,860 square kilometres area (2.15 percent of India). Out of this, MP Bundelkhand accounts for 58.33 percent area and 47.2 percent population and UP Bundelkhand accounts for 41.67 percent area and 52.8 percent of population. Of the total population, 9,726,274 persons or 53.05 percent are males and 8,608,770 or 46.95 percent are females. Sagar (2,378,458 persons) and Datia (7,86,754 persons) respectively were most and least populated districts of Bundelkhand in 2011 (Table 16.12).

Table 16.12: District-wise Population Characteristics of Bundelkhand Region (2011)

Sl. No	Districts/ Region	Total Population	Percent to Region Total Population	DGR	Pop. Density (per square kilometres)	Sex Ratio		Literacy Rate		
						Total	Child	Total	Male	Female
1.	Banda	17,99,410	9.81	19.80	408	863	902	66.70	77.80	53.70
2.	Chitrakoot	9,91,730	5.41	23.70	308	879	907	65.00	75.80	52.70
3.	Hamirpur	11,04,285	6.02	10.19	275	1095	886	68.80	79.80	55.90
4.	Jalaun	16,89,974	9.22	16.20	370	865	881	73.70	83.50	62.50
5.	Jhansi	19,98,603	10.90	14.50	398	890	866	75.10	85.40	63.00
6.	Lalitpur	12,21,592	6.66	24.90	242	906	916	63.50	75.00	50.80
7.	Mahoba	8,75,958	4.78	15.50	269	878	892	65.30	76.00	53.10
Uttar Pradesh Bundelkhand		9,681,552	52.80	17.33	328	877	892	69.26	79.90	57.09
8.	Damoh	1,264,219	6.90	16.63	173	910	928	69.73	79.27	59.22
9.	Datia	7,86,754	4.29	18.46	271	873	856	72.63	84.20	59.41
10.	Panna	1,016,520	5.54	18.67	142	905	914	64.79	74.14	54.44
11.	Sagar	2,378,458	12.98	17.63	232	893	925	76.50	84.80	67.00
12.	Tikamgarh	1,445,166	7.88	20.13	286	901	892	61.40	71.80	50.00
13.	Chhatarpur	1,762,375	9.61	19.51	203	883	900	63.70	72.70	53.60
Madhya Pradesh Bundelkhand		8,653,492	47.20	18.47	210	894	907	68.69	78.09	58.15
Bundelkhand		18,335,044	100.00	18.01	259	885	899	68.99	79.06	57.59

(Source: District Census Handbooks, 2011)

Population Density

Despite significant population growth, the region has low population density per square kilometres (259 persons per square kilometres), which is much lower than National average (382). Both the MP (210) and UP (328) segments of the region have lower population density compared to their respective state averages (236 and 829 respectively). Highest population density was recorded in Banda district (408) and lowest density in Panna district (142). Overall, the districts of MP Bundelkhand have lower population density than districts of UP Bundelkhand (Table 16.12 and Fig.16.18).

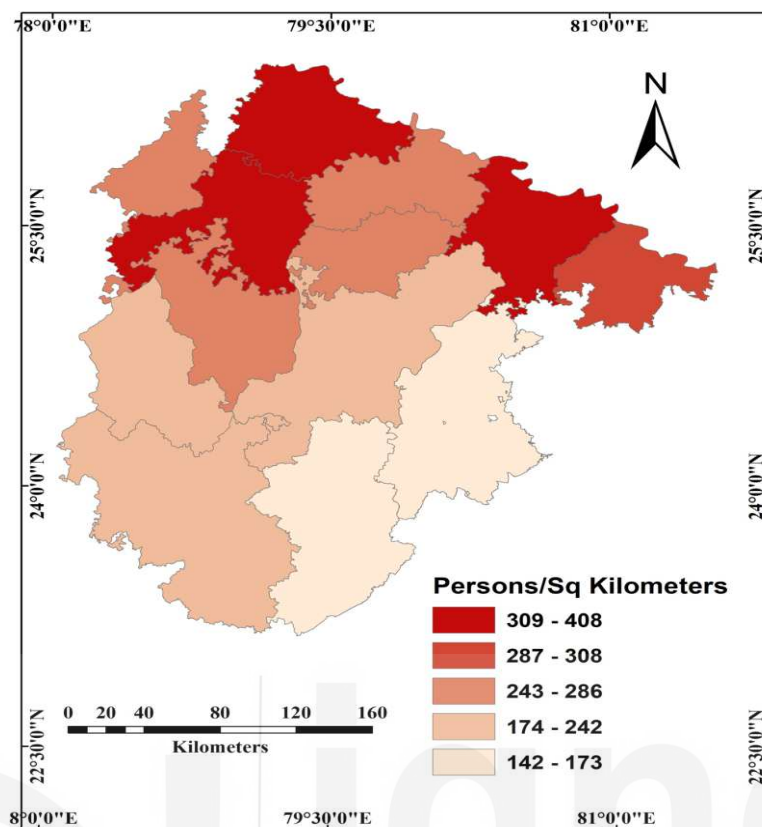


Fig. 16.18: Density of Population of Bundelkhand Region.

Population Growth

Decadal growth rate of population (DGR) of Bundelkhand at 18.01 percent was almost similar to the National figure of 17.6 percent during 2001-2011. Highest and lowest DGRs were reported in Lalitpur and Hamirpur districts respectively. Banda, Chitrakoot, Lalitpur, Chhatarpur, Datia, Panna, Sagar, Tikamgarh had higher DGR and Hamirpur, Jalaun, Jhansi, Mahoda and Damoh district had lower DGR than the National DGR. DGR of MP Bundelkhand is higher than UP Bundelkhand (Table 16.12 and Fig.16.19).

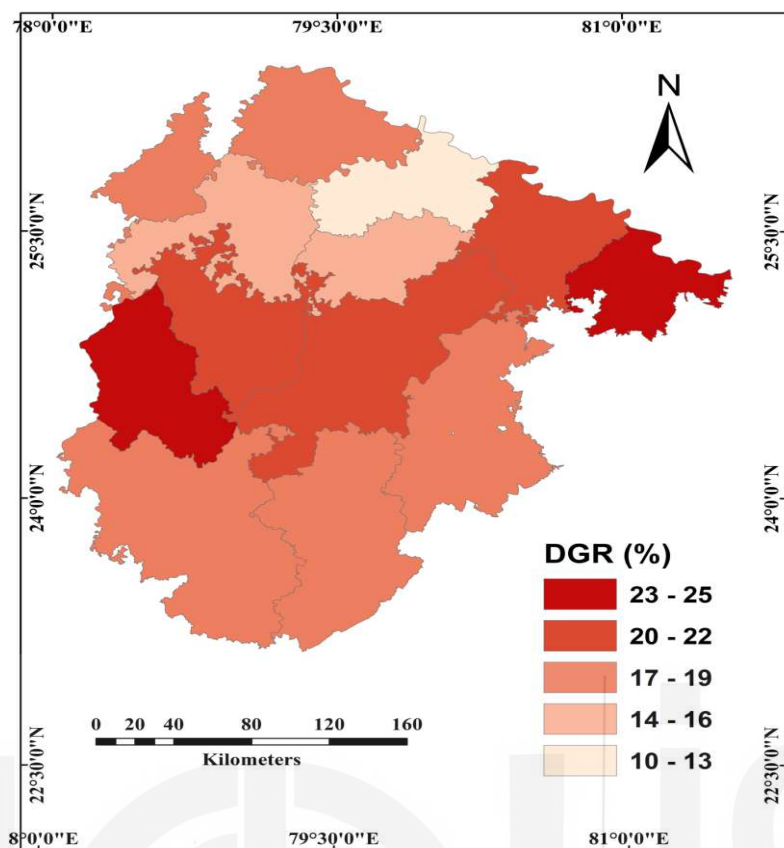


Fig.16.19: Population Growth of Bundelkhand Region.

Sex Ratio

Males outnumber females in Bundelkhand region (Table 16.12). Although improvement has been noted from 873 in 2001 to 885 females per thousand males in 2011, sex ratio is still quite low in the region. Excepting Hamirpur district (1095), where the ratio is in favour of females, no other district of the region surpasses the National average of 940 females per 1000 males. Most of the districts have sex ratio below 900, and lowest is in Banda district (863) (Fig. 16.20). Future prospects are also gloomy as child sex ratio has significantly declined from 914 in 2001 to 899 in 2011 (Fig. 16.21). During this decade, Tikamgarh, Chitrakoot, Jhansi, Datia, Panna, Hamirpur and Chhatarpur experienced the highest decline in child sex ratio. Discriminatory practices against females in Bundelkhand, arising out of patriarchal social ethos may be responsible for this.

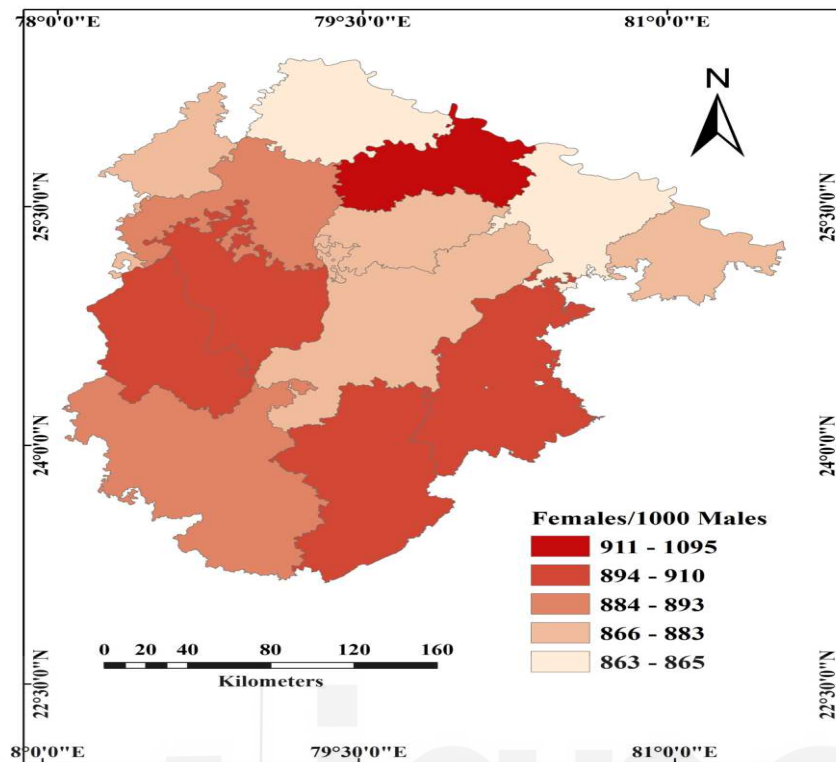


Fig. 16.20: Sex Ratio of Bundelkhand Region.

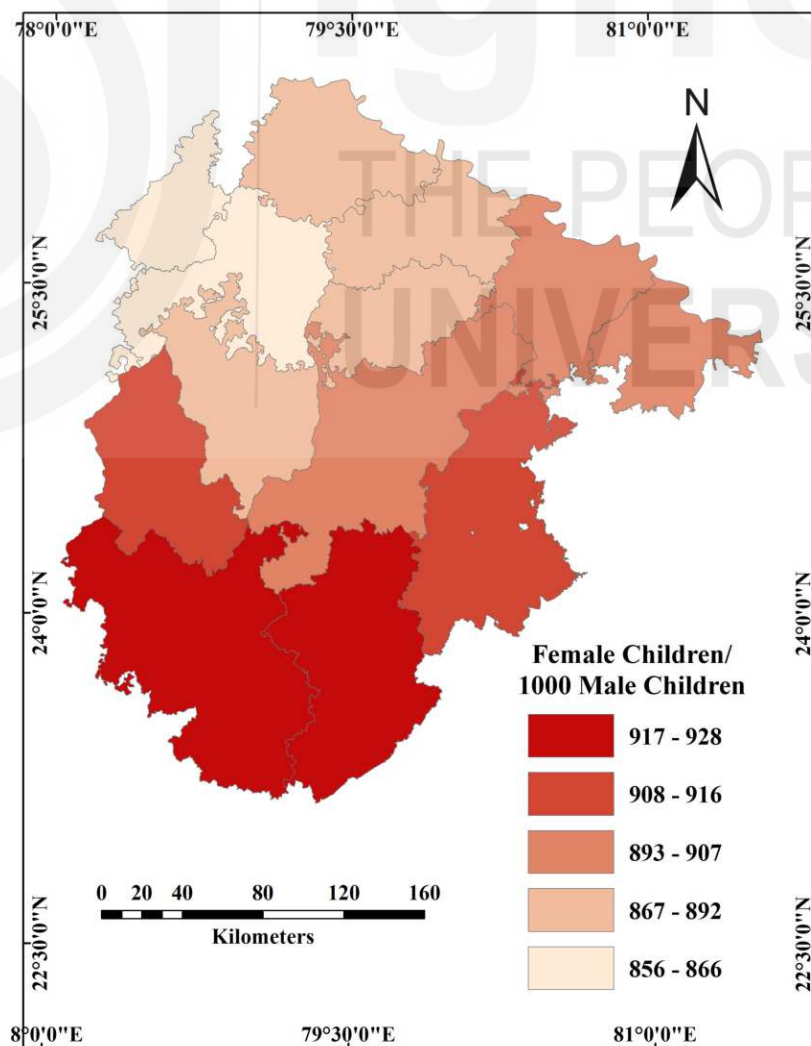


Fig.16.21: Child Sex Ratio of Bundelkhand Region.

Literacy

Literacy is one of the most important indicators of development. It is directly related to socio-economic development. In the context of literacy, Bundelkhand region (68.99 percent) is much behind National average (74.04 percent). Excepting for most urbanised districts of Sagar (76.50 percent) and Jhansi (75.10 percent), all the districts registered lower literacy rate than the Nation as a whole. While Jalaun (73.70 percent) and Datia (72.63 percent) are somewhat nearer to the National average, Tikamgarh with 61.40 percent literacy is farthest from it.

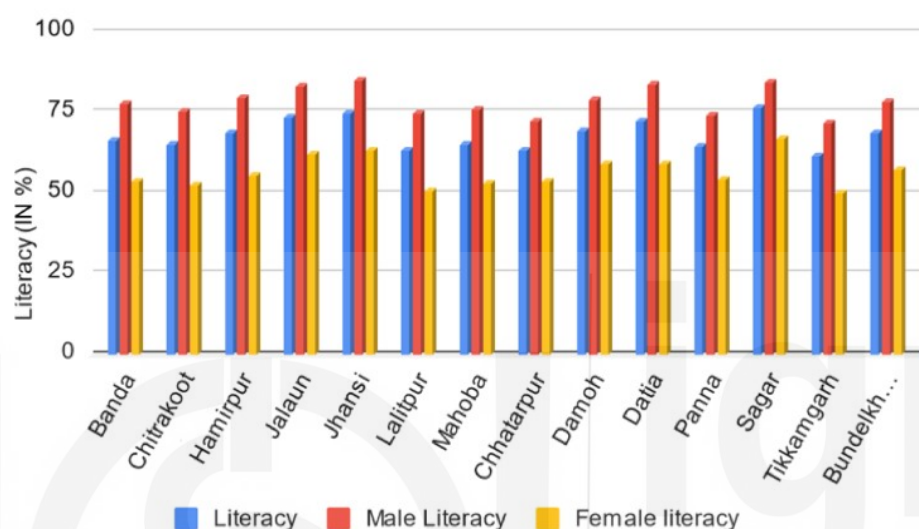


Fig. 16.22: Literacy Rate of Bundelkhand Region (2011).

Female literacy in Bundelkhand was 57.59 percent which was lower than that of India of 65.46 percent in 2011. While Tikamgarh had lowest (50 percent) and Sagar presented highest (67 percent) female literacy. Excluding Sagar, all districts of Bundelkhand had female literacy lower than the National average (Fig 16.22). This is clear indication of lack of development in the region.

Table 16.13: Share of Scheduled Castes (SC) and Scheduled Tribes (ST) Population (2011)

Districts/Region		Percentage to Total Population	
		SC	ST
1.	Banda	21.55	0.01
2.	Chitrakoot	26.89	0.04
3.	Hamirpur	11.43	0.01
4.	Jalaun	15.98	0.02
5.	Jhansi	16.51	0.09
6.	Lalitpur	9.41	1.37
7.	Mahoba	12.10	0.01
Uttar Pradesh Bundelkhand		16.55	0.20
8.	Damoh	19.49	13.15
9.	Datia	25.46	1.91
10.	Panna	20.46	16.81
11.	Sagar	21.09	9.33
12.	Tikamgarh	25.02	4.70
13.	Chhatarpur	23.00	4.18
Madhya Pradesh Bundelkhand		22.22	8.27
Bundelkhand		19.23	7.80

(Source: Census of India, 2011)

Squeezed between non-tribal population dominated Gangetic Plains in the north and the Central Indian Tribal Belt in the south, tribal share in the population of Bundelkhand is relatively small (7.80 percent). Their presence in Uttar Pradesh portion of the region is almost negligible. However, in Madhya Pradesh part, share of tribal population (8.27 percent) is almost similar to the National average (8.60 percent). Three south-eastern districts of Panna (16.81 percent), Damoh (13.85 percent) and Sagar (9.33 percent) show relatively higher share of tribal population, which is higher than the National average but lower than Madhya Pradesh average (20.3 percent). Sahariya, Khairwar, Saur, Gond, Saonr (Savare), Bharia Bhumia, Bhil and Kol are main tribal communities of Bundelkhand.

Bundelkhand has higher proportion (19.23 percent) of Scheduled Castes (SC) population than the country as a whole (16.6 percent). Share of SC population varies between 9.41 percent in Lalitpur and 26.89 percent in Chitrakoot districts. While SC population account for one-fifth to one-fourth of the district population in the districts of Madhya Pradesh, their share remains below one-fifth level in all the districts in Uttar Pradesh portion excepting in Chitrakoot district (Fig.16.23).

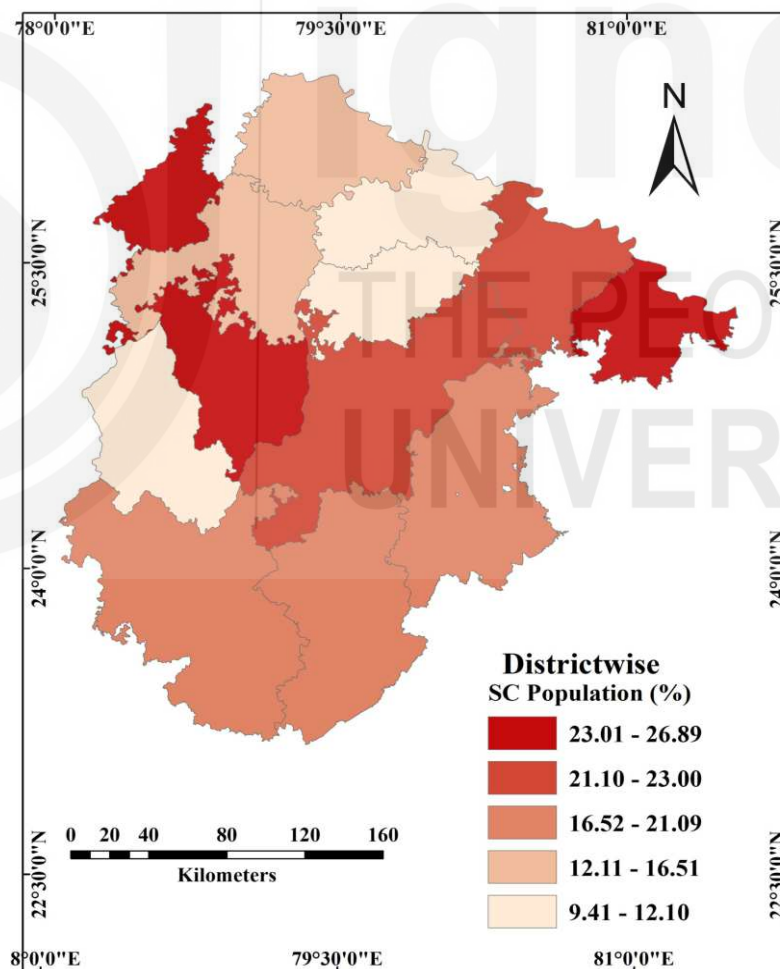


Fig. 16.23: District-Wise Proportion of SC Population in Bundelkhand Region.

Table 16.14: Urbanisation

Sl. No.	Districts/ Region	Urban Population 2011	Percent to Region Total Urban Population	Percent to District Total Population		DGR 2001-2011
				2001	2011	
1.	Banda	2,75,755	6.71	16.25	15.32	13.00
2.	Chitrakoot	96,332	2.34	9.55	9.71	25.82
3.	Hamirpur	2,09,848	5.11	17.49	19.00	20.74
4.	Jalaun	4,18,900	10.19	23.41	24.79	23.02
5.	Jhansi	8,33,484	20.28	40.79	41.70	17.10
6.	Lalitpur	1,75,378	4.27	14.52	14.36	23.55
7.	Mahoba	1,85,381	4.50	20.42	21.16	19.68
Uttar Pradesh Bundelkhand		2195078	53.40	22.39	22.67	19.07
8.	Damoh	250,551	6.10	18.85	19.82	22.61
9.	Datia	181,982	4.43	20.71	23.13	32.30
10.	Panna	125,335	3.05	12.63	12.33	15.85
11.	Sagar	708,796	17.24	29.22	29.80	19.95
12.	Tikamgarh	249,873	6.08	17.68	17.29	17.46
13.	Chhatarpur	399,016	9.70	21.99	22.64	23.04
Madhya Pradesh Bundelkhand		1915553	46.60	21.60	22.14	21.39
Bundelkhand		4110631	100.00	22.02	22.42	20.14

(Source: Census of India, 2011)

Urbanisation of the Bundelkhand region is highly lopsided at 22.42 percent which is much below National average of 31.20 percent. Almost four-fifth (77.58 percent) of its population is rural by residence. Excepting in Jhansi district (41.70 percent), the share of urban population is much below the National average in all the districts. Chitrakoot district is least urbanised with 9.71 percent people living in urban areas (Fig. 16.24). Urban population growth rate at 20.14 percent of Bundelkhand also compares poorly with that of the Nation at 31.20 percent as recorded in 2011.

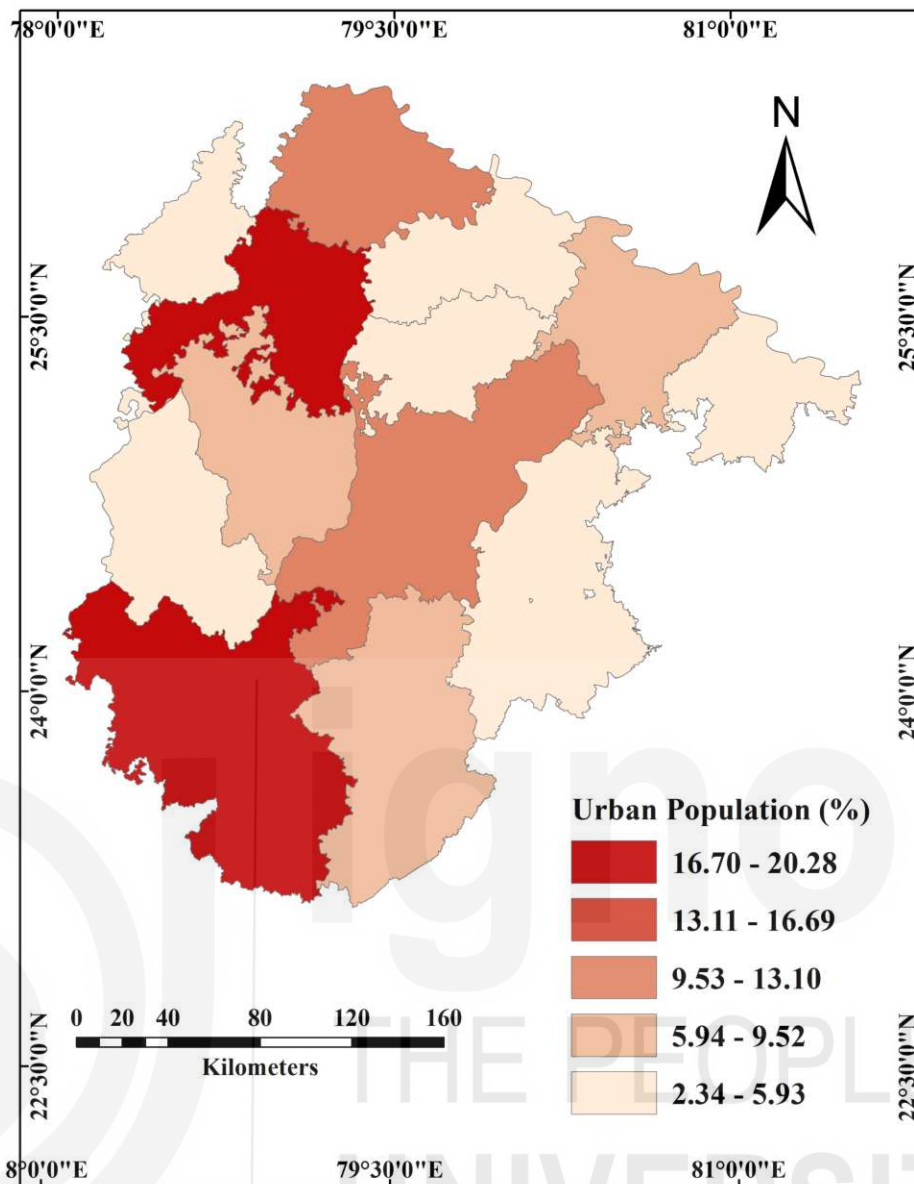


Fig.16.24: District-Wise proportion of Urban Population in Bundelkhand Region.

Table 16.15: 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.	Banda	39.00	35.88	38.97	74.85	2.72	22.43
2.	Chitrakoot	48.32	40.61	38.23	78.84	3.18	17.97
3.	Hamirpur	40.18	29.37	40.90	70.27	4.48	25.25
4.	Jalaun	36.73	31.67	39.15	70.82	4.21	24.97
5.	Jhansi	40.77	28.09	30.44	58.53	5.97	35.50
6.	Lalitpur	41.20	53.16	26.10	79.26	2.96	17.79
7.	Mahoba	39.92	32.67	37.30	69.97	3.87	26.16
Uttar Pradesh Bundelkhand		39.54	35.25	35.49	70.74	4.04	25.22
8.	Damoh	45.45	19.95	43.54	63.49	11.73	24.79

9. Datia	40.82	47.61	29.19	76.80	2.13	21.07
10. Panna	42.50	31.35	46.03	77.38	2.82	19.79
11. Sagar	42.30	20.24	37.63	57.87	13.96	28.17
12. Tikamgarh	45.35	46.67	34.16	80.83	2.38	16.78
13. Chhatarpur	42.66	40.20	31.71	71.91	3.51	24.58
Madhya Pradesh Bundelkhand	43.23	32.47	36.98	69.45	7.19	23.36
Bundelkhand	7569149 / 41.28	2564127 / 33.88	2742017 / 36.22	5306144 / 70.10	423584 / 5.60	1839421 / 24.30

(Source: Census of India, 2011)

Work participation rate in Bundelkhand with 41.28 percent workers is relatively higher than National rate of 39.80 percent. Agricultural sector accommodates close to three-fifth at 70.10 percent of total workers of the region, which is much higher in comparison to the Nation as a whole of 54.60 percent. This shows poor development of urban-industrial sector in the region. This observation is true in case of all districts, excepting Jhansi (58.53 percent) and Sagar (57.87 percent) districts, where the share of agricultural workers is close to the National average. There is similarity in the share of cultivators and agricultural labourers in almost all districts, excepting for a few. Household industries provide limited work opportunities in the region. Excepting in Sagar (13.96 percent) and Damoh (11.73 percent), share of household industry workers remain closer to or less than five percent in all districts. Proportion of other workers is relatively high in all districts varying between 15 to 35 percent.

16.9.2 Settlement

Topography, history and agricultural practices have noticeable impact on the site, situation, pattern and morphology of settlements of Bundelkhand region. Topography in particular has greatly influenced the physical characteristics or the site of the land on which the settlements are located. Natural defence provided by the hills and rocky plateaus of the Vindhyan Ranges have been properly utilised to locate forts and royal settlements in the historical past, like at Orchha and Chanderi. Rugged terrain and limited agricultural potential of the hilly areas permit small and scattered settlements. Larger settlements and towns like Jhansi and Chhatarpur are found along the Yamuna, Betwa, Ken, and Dhasan Rivers. In the water scarcity areas, step wells and tanks have played a crucial role in determining the location of settlements around and closer to them, as they provide a reliable source of water.

Situation or relative location of settlements in the region is influenced by several factors. Majority of the settlements have preferred location nearer to rivers and other sources of water. Settlements along the Betwa and Ken rivers have historically been more prosperous and larger in size. For the sake of defence, many settlements were located on hilltops or at places surrounded by natural defence. For example, Jhansi and Kalinjar are located where the natural landscape provided strategic advantage of defence. Many settlements are found to have developed around cultural and religious centres, e.g. near Khajuraho, Orchha, and Mahoba. Certain settlements like Chanderi have flourished along trade routes connecting north India with the Deccan.

Topography and availability of water have influenced the spatial distribution or pattern of settlements across Bundelkhand. Clustered/nucleated patterns of settlements with clustered houses and denser populations are characteristic to the areas with fertile land and access to water. Along the banks of the rivers, settlements follow a linear pattern. The town of Orchha is a typical example of linear pattern, which stretches along the banks of Betwa River. Medieval fortified settlements of Jhansi and Kalinjar have a radial pattern, where the urban settlements developed in concentric circles around the central fortification.

Morphology or the internal structure, layout, and organisation of the built environment within the settlements of Bundelkhand reflects a combination of historical, cultural, and environmental factors. Villages of the region are generally nucleated around a central water source or temple with narrow lanes and a common space. Houses are built in close proximity to each other for protection and social interaction using locally available raw materials such as mud, thatch, and stone. Walls of the houses are thick for protection from the harsh climate. Settlements closely tied to agriculture reflect a functional morphology with houses built near the fields, with pathways leading directly to the farmland. The houses have spaces for livestock, grain storage, and open courtyards for drying crops. Towns of the region display different morphology, particularly in their older parts. The fortified towns of Jhansi, Kalinjar, and Orchha have the fort or palace at the centre of the settlement, with houses and markets radiating out from there. They have surrounding walls and gates to control access to the settlement, and narrow and winding streets to confuse invaders. The market towns like, Mahoba and Chhatarpur have a central market place, which form the heart of the settlement surrounded by residential areas. The religious and cultural towns, such as Khajuraho, have a unique morphology centred around religious structures. Their layout is designed to accommodate pilgrims and tourists, with guesthouses, shops, and other infrastructure built around them to serve visitors.

Around four-fifth (77.58 percent) population of the region live in 11,102 villages. The villages are scattered all over the region without much of variation in density of villages per 100 square kilometres of area. Although one finds 18 villages per 100 square kilometres on an average in the region, the density of villages varies between 12 in Hamirpur and 24 in Sagar districts. Majority (69.68 percent) of the villages of the region are moderate in size with 500 to 4,999 inhabitants. The percentage of villages with more than 5,000 population in all districts is negligible and nearer to the regional average of 2.40 percent, excepting in Banda district (10.05 percent). Rather, villages with smaller population (less than 500), account for 27.92 percent of total of villages in Bundelkhand. Topographical and climatic conditions of the region have given rise to mostly dispersed types of rural settlements. A variety of rural settlements are found in Bundelkhand region. While rectangular pattern of rural settlement is common along highways and canals, hollow rectangular pattern is seen around water bodies like ponds or lakes. Generally, dispersed pattern of rural settlements is characteristic of dry, ravine infested areas of Bundelkhand.

Table 16.16: Rural Settlements (2011)

Sl. No.	Districts/ Region	Number Of Inhabited Villages	Density of Villages (per 100 square kilometres)	Percentage of Villages by Population Size						
				Less Than 200	200-499	500-999	1000-1999	2000-4999	5000-9999	10000 and Above
1	Banda	657	15	5.78	7.91	16.74	28.01	31.51	8.68	1.37
2	Chitrakoot	562	18	8.19	13.52	22.42	30.60	21.53	3.38	0.36
3	Hamirpur	497	12	8.25	10.46	17.10	29.98	30.18	3.22	0.80
4	Jalaun	942	21	6.16	16.03	28.66	31.00	16.24	1.70	0.21
5	Jhansi	745	16	4.70	10.60	25.10	33.56	22.82	2.95	0.27
6	Lalitpur	691	14	7.96	11.58	26.05	32.85	18.09	3.04	0.43
7	Mahoba	435	13	7.59	14.25	22.30	29.65	23.45	1.84	0.92
Uttar Pradesh Bundelkhand		4,529	16	6.76	12.19	23.29	30.98	22.70	3.51	0.57
8.	Damoh	1,176	23	13.70	27.55	31.46	19.81	6.63	0.85	0.00
9.	Datia	586	21	8.19	21.33	33.11	26.28	10.41	0.68	0.00
10.	Panna	947	22	12.57	25.02	29.99	22.07	9.08	1.27	0.00
11.	Sagar	1,901	24	13.68	26.25	32.72	19.15	7.20	0.84	0.16
12.	Tikamgarh	878	20	7.97	14.12	26.20	32.00	17.55	2.16	0.00
13	Chhatarpur	1,085	13	9.12	16.13	27.10	29.68	16.31	1.66	0.00
Madhya Pradesh Bundelkhand		6573	20	11.52	22.58	30.33	23.78	10.54	1.20	0.05
Bundelkhand		11,102	18	9.57 / 1,063	18.35 / 2,036	27.46 / 3,049	26.72 / 2,966	15.50 / 1,721	2.14 / 238	0.26 / 29

(Source: Census of India, 2011)

As noted earlier, Bundelkhand has low urbanisation. There were only 115 towns in the region in 2001 to which 13 more towns got added by 2011. Of 128 towns, only eight were cities with population of more than 1,00,000 persons, including the largest two cities of Jhansi (M4 - 5,05,693 persons) and Sagar (M2 - 2,74,556 persons). Around 18.98 percent urban population of the region lives in these two cities. Other six cities are Orai (1,90,575), Banda (1,60,473), Chhatarpur (142,128), Damoh (1,39,561), Lalitpur (1,33,305) and Datia (1,00,284). Taken together, the eight Class I cities account for 40.05 percent of the region's urban population. The remaining (60 percent) urban population is spread over smaller towns of the region, majority (107 or 83.59 percent) of which have less than 50,000 (Class III to V) population (Table 16.17). This is indicative of the fact that the region has low level of urbanisation, low urban growth, small number of large urban centres, and large proportion of the urban population confined to the Class I cities.

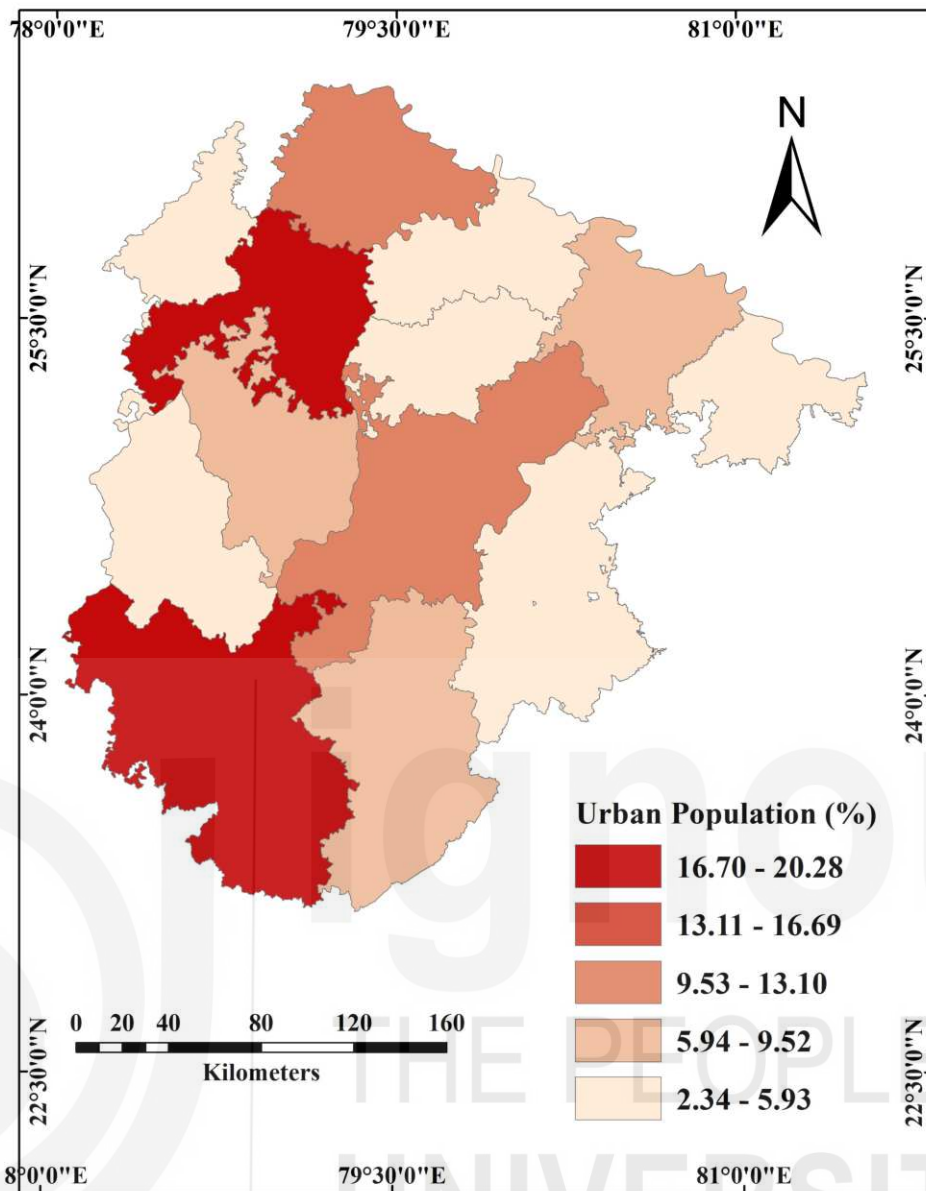


Fig.16.24: District-Wise Proportion of Urban Population in Bundelkhand Region

Table 16.17: 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 - 49,999 (III)	10,000 - 19,999 (IV)	5,000 - 9,999 (V)	Below 5,000 (VI)
1.	Banda	8	8	1 (Banda - M1)	-	1	4	2	-
2.	Chitrakoot	3	4	-	1	-	2	1	-
3.	Hamirpur	7	7	-	1	3	1	2	-
4.	Jalaun	10	10	1 (Orai - M1)	3	-	3	3	-
5.	Jhansi	18	19	1 (Jhansi - M4)	1	5	7	5	-
6.	Lalitpur	4	6	1 (Lalitpur - M1)	-	-	1	3	1
7.	Mahoba	5	5	-	1	3	1	-	-
Uttar Pradesh Bundelkhand		55	59	4 (M1 = 3; M4 = 1)	7	12	19	16	1
8.	Damoh	6	9	1 (Damoh - M1)	-	2	2	4	-

9.	Datia	4	5	1 (Datia - M1)	-	3	1	-	-
10.	Panna	6	6	-	1	-	4	1	-
11.	Sagar	17	20	1 (Sagar - M2)	2	8	3	5	1
12.	Tikamgarh	12	13	-	1	2	6	4	-
13.	Chhatarpur	15	16	1 (Chhatarpur - M1)	0	5	8	2	0
Madhya Pradesh Bundelkhand		60	69	4 (M1 = 3; M2 = 1)	4	20	24	16	1
Bundelkhand		115	128	8 (M1 = 6; M2 = 1; M4 = 1)	11	32	43	32	2

(Source: Census of India, 2011)

16.9.3 Economy

Land Use: A significant proportion of land (70 percent) of Bundelkhand is under cultivation. However, there is wide variation between its two parts lying in two different states. While UP Bundelkhand has more proportion (71.12 percent) of net sown area with less (4.73 percent) forest cover, MP Bundelkhand has less (58.04 percent) net sown area with more (10 percent) forest cover. All UP Bundelkhand districts, excepting Chitrakoot (55.91 percent) and Lalitpur (63.35 percent), have more than 70 percent net sown area, where Banda district leads with 79.51 percent. None except Datia (71.72 percent) district of MP Bundelkhand has more than 70 percent net sown area, with Chhatarpur (46.54 percent) being at the bottom. Forested area is very negligible (5.18 percent) in Bundelkhand region, although there is small variation between UP Bundelkhand (4.73 percent) and MP Bundelkhand (10 percent). It is only in districts of Chitrakoot (14.08 percent), Damoh (12.10 percent), Panna (11.63 percent), Lalitpur (10.52 percent), Chhatarpur (10.51 percent), and Sagar (10.11 percent) the forest cover is more than 10 percent. Not much of variation is noticed across the region in terms of other land uses (Table 16.18).

Table 16.18: Rural Land Use (2011)

Sl. No.	Districts/ Region (Total Area in Sq. Kms.)	Total Rural Area (in Sq. Kms.)	Percentage to Total Rural Area								Current Fallow	Net Sown Area
			Forest	Non-Agricultural Land	Barren & Uncultivable Land	Permanent Pasture + Other Grazing Land	Miscellaneous Tree Crops	Cultivable Waste Land	Fallow other than Current Fallow			
1.	Banda (4,408)	4,348	1.37	7.67	1.05	0.15	0.43	2.99	2.93	3.90	79.51	
2.	Chitrakoot (3,216)	3,187	14.08	11.36	1.56	0.28	1.37	5.55	5.16	4.73	55.91	
3.	Hamirpur (4,021)	3,988	5.86	8.60	2.25	0.29	1.21	1.86	2.24	4.25	73.44	
4.	Jalaun (4,565)	4,491	4.84	8.81	1.22	0.18	1.20	1.20	1.70	4.37	76.48	
5.	Jhansi (5,024)	4,744	4.57	9.60	2.58	0.21	1.05	4.22	2.21	2.36	73.20	
6.	Lalitpur (5,039)	4,998	10.52	8.28	2.22	0.58	2.03	7.73	2.93	2.36	63.35	
7.	Mahoba (3,144)	3,116	4.58	10.77	1.54	0.28	1.85	3.68	3.05	3.11	71.14	
Uttar Pradesh Bundelkhand (29,530)		28872	4.73	10.64	1.56	0.28	1.80	3.70	3.03	3.14	71.12	

8.	Damoh (7306)	5132	12.10	6.61	9.81	6.82	0.16	2.11	1.76	1.27	59.36
9.	Datia (2902)	2738	7.00	5.82	2.90	2.72	0.65	2.54	4.19	2.46	71.72
10.	Panna (7135)	4395	11.63	8.53	3.60	2.53	0.31	9.67	3.99	4.49	55.25
11.	Sagar (10252)	7933	10.11	5.77	2.20	8.67	0.25	1.34	2.48	1.75	67.43
12.	Tikamgarh (5048)	4401	6.60	7.05	8.21	3.69	0.35	5.11	7.46	5.95	55.58
13.	Chhatarpur (8687)	8324	10.51	5.73	11.12	8.72	0.55	6.36	5.72	4.75	46.54
Madhya Pradesh Bundelkhand (41330)		32923	10.00	6.43	6.69	6.41	0.37	4.45	4.20	3.42	58.04
Bundelkhand (70,860)		61795	5.18	10.28	2.00	0.81	1.68	3.76	3.13	3.16	70.00

(Source: Census of India, 2011)

Agriculture Economy: Agriculture is backbone of Bundelkhand's economy. Before the coming in of British administration in the region, numerous minor traditional activities were supported by the ruling elite, which gradually faded out after 1857. At present, major proportion (70.10 percent) of the worker population is engaged in agricultural sector. Wheat, paddy, pulses and oil seeds are the major crops grown in this region. Sugarcane, cotton and citrus fruits are grown as cash crops on a small scale, but these crops contribute significantly to agricultural economy of the region.

Irrigation is one of the most important factors of cultivation. About 35.50 percent of arable land of Bundelkhand is under irrigation. MP Bundelkhand and UP Bundelkhand have 42.50 and 29.60 percent irrigated area respectively. Datia (67 percent), Jalaun (54 percent) and Tikamgarh (51 percent) have very high proportion of their gross cropped area under irrigation, while Chitrakoot (25 percent) and Damoh (26 percent) districts lag much behind in this context.

Industrial Economy: Bundelkhand's economy has only lately begun to grow. Despite modest expansion in industrial and service sectors, economy still remains heavily dependent on primary sector, particularly for employment. Beedi production is single most important source of non-agricultural employment in the region, specific to MP Bundelkhand. Districts with some notable manufacturing activity are Jhansi in UP Bundelkhand, and Damoh, Sagar and Panna in MP Bundelkhand. There are no industrial clusters in Bundelkhand, no unique industries with a competitive advantage, and no such cluster growth is expected in the near future. The most obvious area with the maximum potential is tourism.

16.9.4 Transport and Communication

Bundelkhand region has reasonable road connectivity. It is connected with NCR Delhi, Gwalior and other major cities of south, west and central India through National Highways (NH). NH-27 runs east to west connecting Jhansi with other parts of the country. Major NHs in Bundelkhand are NH-25, 75, 76, and 86. All large towns and district headquarters of the region are connected

to one or other of these highways. Bundelkhand Expressway was proposed by UP Government in 2017. It will be 4-lane wide and 296 kilometres long road. It will connect Kudrail village of Etawah to Chitrakoot. This expressway is expected to accelerate economy of UP Bundelkhand region.

Railway network in Bundelkhand totals to about 1,045 kilometres. North-south rail network passes through Bundelkhand accessing Jhansi and Lalitpur. Three important railway routes pass through Bundelkhand region, of which Delhi-Kanpur-Jhansi-Bhopal is most busy and important, connecting the region with both north and south India. Important railway stations on this route are Orai, Jhansi and Lalitpur. Total length of this route in Bundelkhand region is 250 kilometres on which about 80 express/mail trains run every day. The other two are Katni-Damoh-Jhansi-Vidisha-Ratlam and Gwalior-Jhansi-Banda-Manikpur-Prayagraj routes. The region is devoid of aviation link. Air passengers use the nearby airports at Bhopal, Kanpur, Lucknow and Gwalior.

SAQ 6

- a) Which part of Bundelkhand has lower population density?
 - b) The prospect of which industry is the highest in Bundelkhand.
 - c) The Bundelkhand Expressway proposed by UP Government in 2017, will connect which places.
-

The term 'region' is defined as; (a) an area or zone of indeterminate size on the surface of the Earth, whose diverse elements form a functional association; (b) one such region as part of a system of regions covering the globe; or (c) a portion of one feature of the Earth, as in a particular climate region or economic region (Johnston et al., 2005).

16.10 BUNDELKHAND: THE REGIONS

Bundelkhand is a distinct micro region of India with distinct geomorphic, climatic, social, cultural and economic homogeneity. However, detailed investigation of these characteristics permits further delineation of the region into sub-regions (Fig. 16.25) as mentioned below.

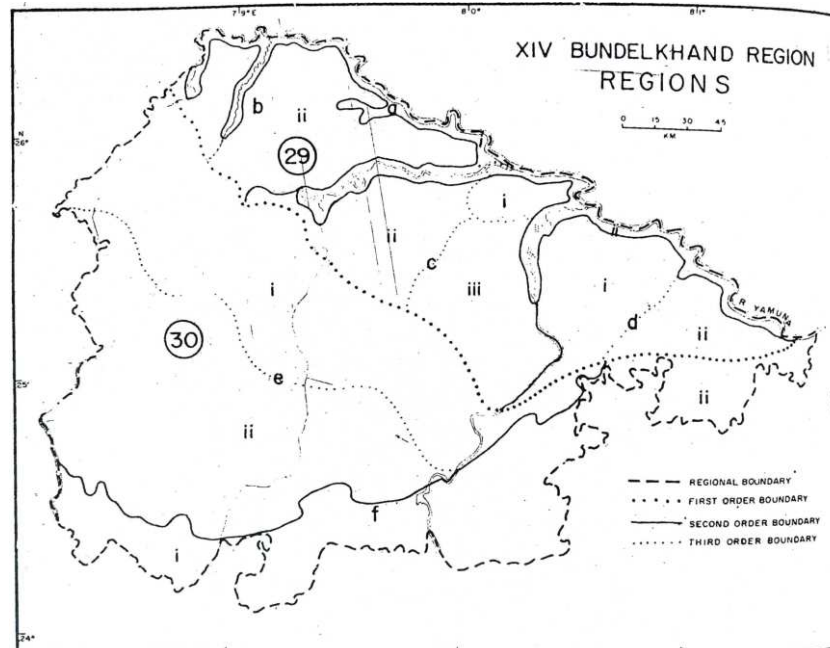


Fig. 16.25: Regions of Bundelkhand.

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

1. Bundelkhand Upland

This first order region stands in strong contrast to the second first order region of Bundelkhand, i.e. Bundelkhand plain, in terms of surface features, soil characteristics and presence or absence of water bodies. Variation in these characteristics within the region permits its delineation into two second order regions of (a) Bundelkhand Gniessic Region, and (b) Bundelkhand-Vindhyan Plateau.

(a) Bundelkhand Gniessic Region is spread over Datia, Jhansi, Tikamgarh and Chhatarpur districts. It is the nucleus of Bundelkhand in terms of geology and it has been peneplanated two times in its geological past. In western part of this region, sedimentation processes have been done by Vindhyan and Bijawar sediments. It has two third order regions.

(i) The first third order region is Bundelkhand Gniessic Peneplain lying in between the Plain in the north and the Gneissic plateau in the south, displays both plain and gneissic plateau characteristics. Features of the region include crumbled dykes, granite rock pieces and gneissic boulders half buried under alluvium. Black soils of the region permit cultivation of *jowar*, wheat and gram. With tank irrigation in the eastern part and canal (Betwa canal) irrigation in the western part, a variety of crops are cultivated, including rice in the western part.

(ii) Bundelkhand Gneissic Plateau: The region in most parts is unsuitable for crop cultivation due to undulating surfaces and rocky wastelands with massive granites and gneisses exposed at many places. Black soil has been formed *in-situ* with great depth in depressions, where pernicious weed, *Kans*, grow in rainy season. Large chunks of rocky wastelands and rough surface with the number of shallow water bodies are general characteristics of this area. Rice, wheat, *jowar* and sesame are cultivated wherever possible. Cultivation of sesame is confined to eastern part.

(b) The Bundelkhand Vindhyan Plateau in southernmost part of Bundelkhand is divided into two third order regions.

(i) Vindhyan Hill Ranges lie in deep south and south-eastern margins of Bundelkhand descending towards both north and south in steep scarps. The region is marked with flat-topped hills of Panna, Ajaigarh and Vindhyanchal, with dense forest cover. Lalitpur, Mehroni and Ajaigarh tehsils have reserved forests. Economy of the region is mostly based on forest resources, particularly collection of *Tendu* leave for *Beedi* making.

(ii) On southeastern tip of Bundelkhand is **Banda Chitrakut Plateau**, locally known as *Patha*. Ascent to the Plateau from Banda Plain in north, through an imposing scarp termed as *Ari*, is very sharp. This region is sparsely populated due to geographical challenges but has great prospects in terms of tourism as there are several sites of scenic beauty, historic and religious importance.

2. Bundelkhand Plain

This region is also known as Trans-Yamuna plain and it is a low-lying elongated tract. Yamuna river makes its northern boundary and due to imperfect drainage and small tributaries, this region suffers in rainy season. Climatic and topographical differences permit delineation of the region into four second order regions of (a) Ravine belt, (b) Jalaun plain, (c) Hamirpur plain and (d) Banda plain, which can be further delineated into ten (10) third order regions.

(a) Ravine Belt: This region is only two to three kilometres broad covering areas along Yamuna river and the lower reaches of its tributaries - Betwa and Ken. Gully erosion has created badland topography in this region, which poses great obstacles for development of road network. People mostly grow a variety of cereals along with pulses and vegetables. Based on intensity of ravines, the region is divided into three third order regions.

(i) Yamuna Ravine Tract West: Ravines created by Sind and Pahuj rivers in the west are part of this region.

(ii) Yamuna Ravine Tract East: This region refers to ravines created by Ken river in the east.

(iii) Betwa Ravine Tract: This is central part of the Ravine belt.

(b) The Jalaun Plain covers western tract between Sindh and Betwa rivers. About 80 centimetres average annual rainfall makes the region dry. The *Kabar*, *Mar* and *Parua* are fertile soils, suitable for pulses, wheat and *bajra* cultivation. The region is divided into two third order regions.

(i) Sindh-Pahuj Tract in western Jalaun plain permits only dry farming due to aridity, sandy soil and meager irrigation facility.

(ii) Benefitting from Kuthond and Hamirpur branches of Betwa canal, **Pahuj-Betwa Tract** displays considerable agricultural prosperity. Population is dense and settlements are evenly distributed in the region.

(c) **Hamirpur Plain** is relatively better off than Jalaun plain, but behind Banda plain in terms of wetness. Black soil is found in this region. This region can be divided into three sub-regions.

(i) Northern most part of Hamirpur plain is **Turi Basin**. This is an oblong depression created by an abandoned course of Ken river where Turi stream flows now. Silts brought by annual floods make the region very fertile.

(ii) **Rath Tract** in western part of the region is by and large a plain area. Gram, wheat and *jowar* crops are cultivated with the help of irrigation of Dhasan canal system.

(iii) **Maudaha-Maundi Tract** is no different from Rath Tract excepting for its hummocky surface and historical-cultural characteristics. This was the core area of Bundelas, and Mahoba was their capital. Large number of forts and fortresses on the hummocks stand scrutiny to its history. Cultivation of cash crop particularly betel, with the help of tank irrigation is peculiar to the region.

(d) **Banda Plain** covers a triangular area surrounded by Ken in the west, Ravine belt in the north and Chitrakut plateau in the south-east. Two sub-regions of the region are clearly demarcated from each other by Baghain river.

(i) **Banda Plain West Region**, well endowed with very fertile *Kabar*, *Mar* and mixture of *Kabar* and *Parua* soils as well as with regular supply of irrigation water from Ken canal, is one of most productive regions of Bundelkhand. Double cropping and absence of fallow land distinguishes the region from others. Rice and wheat are predominant crops of *Kharif* and *Rabi* seasons respectively.

(ii) **Banda Plain East**, on the other hand is over-drained by numerous deep-channeled streams. Impoverished soils permit cultivation of coarse cereals only.

SAQ 7

- a) What are the characteristic differences between the two first order regions of Bundelkhand?
 - b) Name the regions of Bundelkhand.
-

16.11 BUNDELKHAND: PROBLEMS AND PROSPECTS

Problems

1. Bundelkhand is a major drought prone area. As economy is mainly based on agriculture and forestry, scarcity of water and lack of institutional intervention have slowed down development process in the region. Consequentially, migration, incidences of suicides and putting children to work are frequently reported. The area between the northern plains and rocky soils of Vindya range is unfit for both agriculture and industry,

- excepting Jalaun district which is partially suitable for water consuming crops. The situation has further worsened due to cultivation of cash crops, mining activities and deforestation.
2. The basic infrastructural facilities like educational, economic, transport and communication are not only very poorly developed but also unevenly distributed in the region.
 3. Emanating from the general scarcity of water, the region encounters consistent crisis of safe drinking water. Almost 30 percent of the population do not have easy access to safe drinking water. Significant proportion of population suffers from malnutrition, especially among the scheduled communities.
 4. Education and employment are in worst condition in this region. Migration is one of the major problems due to high unemployment and lack of economic avenues.
 5. The economy of the region is mostly dependent on livestock raising and crop cultivation, which is extremely vulnerable to climate change impacts such as warmer temperatures, water scarcity and greater weather variability.
 6. Caste based inequality in customs and practices are acute in Bundelkhand compared to other parts of India. For example, members of the lower castes do not have permission to cross house of an upper-caste without bowing their heads or removing their footwear, and sit in front of people belonging to upper castes. Although such rigid traditional customs are on the decline, particularly in urban centres and amongst some people, by and large the system still prevails.

Prospects

1. Bundelkhand's location in central India provides a potential for the region to emerge as a transport and warehousing hub. Government of India has innovative financing and buy back schemes for agriculture warehousing/storage facilities and both State Governments should focus on this sector.
2. Small scale and sustainable mineral mining are other remedies for possible growth of this area. Livestock management and development of fisheries are the other potential sectors which need to be considered.
3. Several projects to link rivers of the region have been proposed and Ken-Betwa river link project is on running mode. These projects are expected to enhance pace of holistic development in the region.
4. Administration needs to close the gap in the number of people required to adequately staff various services. Besides, a more participative form of governance, which reflects local needs and builds ownership should be encouraged. Both of these are quite achievable.
5. Bundelkhand is a great historic region which has several tourist sites. These sites have tremendous tourism potential.

6. There is some scope for small to medium level manufacturing, especially in agro-processing. Besides, modernisation of agriculture by using water management, micro-farm solutions and moving to high value crops can bring fruitful results.

16.12 SUMMARY

In this Unit, you have learnt the following:

- The Kathiawar region is a peninsular region in the western Indian state of Gujarat. With a land size of 47,000 square kilometres, it extends between 20° 50' and 23° 5' N latitudes and 69° 20' and 72° 10' E longitudes.
- It girdles Gulf of Khambhat in the south-east, coastal plains and Gulf of Kachchh in the north, Arabian sea in the west and south, and Bhavnagar's alluvial plains in the east border it.
- Surendranagar, Rajkot, Jamnagar, Porbandar, Junagadh, Amreli, Bhavnagar and Diu districts are all part of this region, along with four other districts that were added in 2013.
- These are Morbi (formerly part of Rajkot), Devbhoomi Dwarka (formerly part of Jamnagar), Gir Somnath (formerly part of Junagadh) and Botad (formerly part of Bhavnagar).
- The Saurashtra peninsula covers Deccan lava with a stony tableland. The area has a rough topography due to its undulating surface that is broken up by hills and different separating rivers that flow off in different directions.
- It can be noticed that three separate uplands reach parallel to one another roughly from the north-east to the south-west. The region exhibits a hot, arid to semi-arid climate.
- The aridity index runs from 20 to 40 percent, which denotes a general lack of soil moisture for a significant portion of the year. Most of the region is located below 300 metres above sea level and receives roughly 580 millimetres of annual average rainfall.
- The average yearly temperature is between 26°C and 27°C, with extremes ranging between 5°C to 46°C. The relative humidity ranges from 65 to 70 percent (Jadhav, 2010).
- Open scrub vegetation with a high percentage of scrub savannah transitioning into sparsely vegetated grasslands, mainly used for grazing animals, distinguishes this region (Government of Gujarat, 2012-13).
- The 1810 square kilometres of grasslands of the region, is 20.08 percent of the State total grassland cover (Ministry of Environment and Forests, 2011). It is home to a number of wildlife, including Asiatic lions and flamingos.
- The area is home to various significant religious and cultural sites of India and includes a mixture of agricultural and pastoral inhabitants.
- Kathiawar region has an ecological characteristic that is not very suitable for crop cultivation and forest resources. However, the region excels in industrial development particularly in machinery and petrochemical

industries. With progress of irrigation facilities, agricultural economy of the region can also be developed.

- Bundelkhand is located in the heart of India. The area of Bundelkhand is 70,860 square kilometres and it covers seven districts of Uttar Pradesh and six districts of Madhya Pradesh. By area, MP Bundelkhand is larger than UP Bundelkhand but in terms of population, UP Bundelkhand is ahead.
- On the basis of physical characteristics, Bundelkhand is a problematic micro-region according to R. P. Misra's classification. Bundelkhand's topography is smooth and undulating in character, for which Spate terms it as 'senile topography'. The northern 1/3rd plain area is uneventfully flat. Broadly, Bundelkhand can be divided into two physiographic regions, such as Bundelkhand upland and Bundelkhand plain.
- The major rivers of the region are Yamuna, Betwa, Sindh, Ken, Dhasan, Pahuj and Sonar.
- Bundelkhand is located in the hot and semi-arid climatic zone, with temperatures that can reach 40°C in the summer and as low as 1°C in the winter.
- Rainfall is distributed unevenly, with approximately 90 percent of the rains falling in 50-60 days of the monsoon months. The dry plains in the north receive less rain than the south-eastern part of the region. Average annual precipitation varies between 75 centimetres in the north to 125 centimetres in the southeast.
- Bundelkhand's flora is tropical dry deciduous in nature. Scrub forest of *Siari, Katai, Gunj, Bel, Ghout* and scrub brushes make up majority of the vegetation, with extensive stretches of land categorised as "wastelands." In Bundelkhand Plain sub-region areas of Banda, Hamirpur and Datia districts, acacias like *Babuand, Khair, Palash, Ber, Tendu, Mahua, Semal* and *Khardai* grow along the riverbanks.
- Three broad soil types are found in the region. These are; Upland or Rocky, Lowland and Riverine soils. Generally, these soils are suitable for cultivation of pulses, cotton, oilseeds and wheat. But, due to scarcity of irrigation facility, agricultural productivity is low.
- The total population in the region is 18,335,044 persons, of which 53.05 percent are males and 46.95 percent are females. The sex ratio is 885 females per 1000 males. Total literacy rate is 68.99 percent, in which male literacy is 79.06 and female literacy is 57.59 percent (Census, 2011).
- Due to lack of human resource development and geographical challenges, the region is facing migration and other problems as well as uneven distribution of resources and development. The major problems of this region are; lack of industries, roads and connectivity, proper irrigation system, educational infrastructure and uncontrolled social pollution. The development of tourism, agricultural infrastructure, educational infrastructure, connectivity and network, and establishment of industries can be the only way towards overall development of the region.

16.13 TERMINAL QUESTIONS

1. Highlighting the role of climate, explain the vegetation types of Kathiawar.
2. Discuss about the rural and urban settlements of Kathiawar.
3. Briefly discuss the economic characteristics of Kathiawar.
4. Discuss the problems and prospects of Kathiawar region.
5. Briefly explain the geology, relief and drainage of Bundelkhand.
6. Discuss the strengths and weaknesses of the physical resource base of Bundelkhand.
7. Elucidate the characteristics of Bundelkhand in terms of different population parameters.
8. Divide Bundelkhand into smaller order regions and briefly explain their characteristics.

16.14 ANSWERS

Self-Assessment Questions (SAQ)

1. a) The oldest rock formations of the Kathiawar peninsula are Jura cretaceous rocks, which are found around Dhrangadhara on the north-eastern corner.
b) Most rivers of Kathiawar region radiate in all directions and thus make a radial pattern.
c) The maximum rainfall, ranging between 1,001 to 1,500 millimetres, is received in the Gir forest area due to higher elevation and dense forest cover.
d) Chalk, Marle and Perlite are exclusively found in Kathiawar region.
2. a) Percentage of literates in the Kathiawar region (76.16 percent) as a whole surpasses the National average (74.04 percent), but compares poorly with the State average (78.03 percent).
b) More than 80 percent of the urban centres of Kathiawar belong to class I to class IV category in terms of population size.
c) Kathiawar is traditionally a region of rain fed agriculture, because it has a very small proportion of irrigated area, and most of the rivers of the region are seasonal.
d) Raw material, facilities for transport and communication, cheap electricity, capital, labour, nearness to the sea and wide market have contributed for the development of petrochemical industries.
3. (i) According to R. L. Singh, Kathiawar can be divided into:
 - a) Kathiawar North (Jamnagar, Rajkot, and Surendranagar districts)
 - b) Kathiawar Core Region
 - c) Kathiawar Southern Coastal Regions

4. The Kathiawar region is plagued by a number of issues, including water shortage, salinity-related changes in agriculture, migration, and lack of micronutrients, to mention a few.
5.
 - a) The major geological elements found across the region are granite of various types of the Lower Pre-Cambrian/Archaean period.
 - b) Major rivers are Yamuna, Kali, Sindh and Narmada.
 - c) Approximately 90 percent of the rains in Bundelkhand are received in 50-60 days of the monsoon months.
 - d) Main soil types are upland or rocky soil, lowland soil and riverine soil.
6.
 - a)
 - i. Rajkot (higher population) and Porbandar (lower population)
 - ii. District lying in MP Bundelkhand has lower population density
 - iii. Rajkot
 - iv. Rajkot followed by Amreli
 - b) It is tourism industry located around Banda Chitrakut plateau.
 - c) It will connect Kudrail village of Etawah to Chitrakoot.
7.
 - a) Differences in terms of surface features, soil characteristics and presence or absence of water bodies.
 - b) Bundelkhand upland and Bundelkhand plain.

Terminal Questions

1. Refer to sub-Sections 16.3.4 and 16.3.5.
2. Refer to Section 16.4.2.
3. Refer to sub-Section 16.4.3.
4. Refer to Section 16.6.
5. Refer to sub-Sections 16.8.1 to 16.8.3.
6. Refer to sub-Section 16.8.7.
7. Refer to Section 16.9.1.
8. Refer to Section 16.10.

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