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GEOGRAPHY

Unit - 1

India – Location, Relief and Drainage

Learning Objectives

- To understand the strategic importance of India's absolute and relative location in the world
- To know the distinct characteristics of major physiographic divisions of India
- To compare the regions of Great Indian plains
- To understand the drainage system of India
- To differentiate the Himalayan and peninsular rivers

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Introduction

India is the seventh largest country in the world and second largest country in Asia. It is separated by the Himalayas from the rest of the continent. India accounts for about 2.4 % of the total area of the world with an area of 32,87,263 sq.km. many of the India states are larger than several countries of the world.

India's Land and Water Frontiers

India shares its 15,200 km long land frontier with Pakistan and Afghanistan in the north-west, China, Nepal and Bhutan in the north and Bangladesh and Myanmar in the east.

India's longest border is with Bangladesh (4156 km)while the shortest border is with Afghanistan.(106 km)

About 6,100 km long coastline of India is washed on three sides of the country by the Indian Ocean and its two arms namely the Arabian sea in the west and the Bay of Bengal in the east. The total length of the coast line of India including the islands is 7,516.6 km. India and Sri Lanka are separated by a narrow and shallow sea called Palk Strait.

India and the World

The Indian land mass has a central location between, the East and the West Asia and the southward extension of the Asian continent. The trans Indian ocean routes which connect the countries of Europe in the west and the countries of East Asia provide a strategic central location to India. Thus it helps India to establish close trade contact with West Asia, Africa and Europe from the western coast and with South East, east Asia from the eastern coast.

India: A Subcontinent

India along with the countries of Myanmar, Bangladesh, Pakistan, Nepal, Bhutan and Sri Lanka is called a subcontinent.

This region possesses a distinct continental characteristics in physiography, climate, natural vegetation, minerals, human resources etc. Hence India is known as '**subcontinent**'.

1.1 Location and Extent

India extends from **8°4'N** to **37°6'N** latitudes and **68°7'E** to **97°25'E** longitudes. Hence India is located in the north Eastern hemisphere

The southern most point of the country is Pygmalion Point or Indira Point (6°45'N latitude) located in the Andaman and Nicobar Islands. The southern most point of main land of India is **Cape Comorin** (Kanyakumari). The northern point is Indira Col.

The north-south extent of India is **3,214** km and it extends from **Indira Col** in Jammu and Kashmir in the north to Kanyakumari in the south. The east-west extension is **2933** km and it stretches from Rann of Kutch (Gujarat) in the west to Arunachal Pradesh in the east. The Tropic of Cancer (23°30' N) passes through the middle of the country dividing it into two halves as northern temperate and southern tropical lands.

Indian Standard Time (IST)

The longitudinal difference between Gujarat in the west and Arunachal Pradesh in the east is about 30°.

Since Arunachal Pradesh is towards east, it will have sunrise about two hours earlier than the sunrise at Gujarat which is in the west. In order to avoid these differences, Indian standard time is calculated. The local time of the central meridian of India is the standard time of India. **India's central meridian is 82°30' E longitude.** It passes through Mirzapur and roughly bisects the country in terms of longitude. The IST is 5.30 hrs ahead of Greenwich Mean Time (GMT).

India has been politically divided into 28 states and 9 union territories for administrative convenience.

Find out the following

- West - East and North - South extened of India.
- Area wise which is the smallest and the largest state?
- The states which do not have an international border.

DO YOU KNOW?

Amaravati is the new capital of Andhra Pradesh. According to Andhra Pradesh Reorganization Act, Hyderabad will be the capital for both the states of Andhra Pradesh and Telangana till 2024 (For 10 years from the act passed).

1.2 Major Physiographic Divisions of India

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The majestic Himalayan peaks in the north, the beautiful beaches in the south, the great Indian desert in the west and the breathtaking natural heritage in the east make India a geographically vibrant, colourful and truly incredible country.

There is a varied nature of physiographic divisions in India. Though the country has many landforms based on the major differences, it is divided into the following five physiographic divisions:

1. The Northern Mountains
2. The Northern Plains
3. The Peninsular plateau
4. The Coastal Plains
5. The Islands

The Northern Mountains

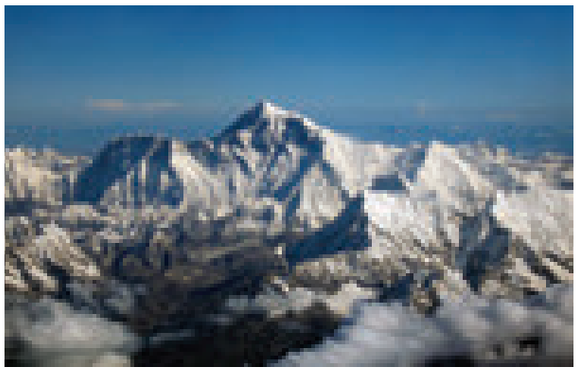
The Northern Mountains consist of the youngest and the loftiest mountain chains in the world. It was formed only few millions years ago and formed by the folding of the earth crust due to tectonic activity. It stretches for a distance of 2,500 km from the Indus gorge in the west to Brahmaputra gorge in the east. The width of the Northern Mountains varies from 500 km in Kashmir to 200 km in Arunachal Pradesh. The Pamir Knot, popularly known as the **"Roof of the World"** is the connecting link between the Himalayas and the high ranges of Central Asia. From the Pamir, Himalayas extend eastward in the form of an arc shape. The term "Himalaya" is derived from Sanskrit. It means **"The Abode of Snow"**.

The Northern Mountains that function as a great wall is grouped into three divisions.

1) The Trans-Himalayas
2) Himalayas
3) Eastern Himalayas or Purvanchal hills.

DO YOU KNOW?

Aravalli range is the oldest fold mountain range in India.



1. The Trans-Himalayas

It lies to the north of the great Himalayan range. It lies in Jammu and Kashmir and Tibetian plateau. As its areal extent is more in Tibet, it is also known as Tibetean Himalayas. The Trans-Himalayas are about 40 km wide in its eastern and western extremities and about 225 km wide in its central part. They contain the Tethys sediments. The rocks of this region contain fossils bearing marine sediments which are underlain by 'Tertiary granite'. It has partly metamorphosed sediments and constitutes the core of the Himalayan axis. The prominent ranges of Trans Himalayas are Zaskar, Ladakh, Kailash, and Karakoram.

2. The Himalayas

It constitutes the core part of northern mountains. It is an young fold mountain. It was formed by the movement of Eurasia land mass in the north and Gondwana land mass in the south. The Tethys sea found between these two land masses was uplifted by the compression and the resultant landform was the Himalayas.It consists of many ranges. The main divisions of the Himalayas are the

(i) The Greater Himalayas/The Himadri
(ii) The Lesser Himalayas /The Himachal
(iii) The Outer Himalayas/The Siwaliks

(i) The Greater Himalayas or the Himadri

The Greater Himalayas rise abruptly like a wall north of the Lesser Himalayas. The Greater Himalayas are about 25 km wide. Its average height is about 6,000 m. The Greater Himalayas receive lesser rainfall as compared to the Lesser Himalayas and the Siwaliks. Physical weathering is less effective over the Greater Himalayas as compared to the other ranges. Almost all the lofty peaks of Himalayas are located in this range. The notable ones are Mt. Everest (8,848

m) and Kanchenjunga (8,586 m). Mt.Everest is located in Nepal and Kanchenjunga is located between Nepal and Sikkim. This range is the most continuous of all ranges. It is region of permanent snow cover. So, it has many glaciers. **Gangothri, Yamunothri and Siachen** are some of them.

- Himalaya is the home of several high peaks.
- However, it holds the record of having the maximum number of highest peaks among any mountain range in world.
- Out of 14 highest peaks in this world, Himalayas holds 9.

(ii) The Lesser Himalayas or The Himachal

It is the middle range of Himalayas. Height of this range varies from 3, 700 to 4,500 m. Its width varies upto 80 km. The major rocks of this range are slate, limestone and quartzite. This region is subjected to extensive erosion due to heavy rainfall, deforestation and urbanization. Pir Panjal, Dhauladhar and Mahabharat are the mountain ranges found in this part. Major hill stations of the Himalayas are located in this range. **Shimla, Mussourie, Nainital, Almora, Ranikhet and Darjeeling** are the familiar ones.

- The major passes in the Himalaya are Karakoram pass (Jammu and Kashmir), Zojila pass, Shipkila pass (Himachal Pradesh), Bomdila pass (Arunachal Pradesh), Nathula pass and Jhelepla pass (Sikkim).
- The Khyber pass which connects Pakistan and Afganisthan, and Bolan pass in Pakistan are theimportant passes of the Indian subcontinent

(iii) The Outer Himalayas/The Siwaliks

The Siwaliks extend from Jammu and Kashmir to Assam. It is partly made by the debris brought by the Himalayan rivers. The altitude varying between 900-1100 metres average elevation of this range is 1000 m. The width of Siwaliks varies from 10 km in the east to 50 km in the west. It is the most discontinuous range. The longitudinal valleys found between the Siwaliks and the Lesser Himalayas are called Duns in the west and Duars in the east. These are the ideal sites for the development of settlements in this region.

3. Purvanchal Hills

These are the eastern off-shoot of Himalayas. It extended in the north-eastern states of India. Most of these hills are located along the border of India and Myanmar while others are inside India. Dafla Hills, Abor Hills, Mishmi Hills, Patkai Bum Hills, Naga Hills, Manipur Hills, Mizo Hills, Tripura Hills, Mikir Hills, Garo Hills, Khasi Hills and Jaintia Hills are the hills which are collectively known as **purvanchal Hills**.

Importance of Himalayas

- Himalayas blocks southwest monsoon winds and causes heavy rainfall to north India.
- It forms a natural barrier to the sub-continent.
- It is the source for many perennial rivers like Indus, Ganges, Brahmaputra etc.
- The Northern Mountains are described as the paradise of tourists due to its natural beauty.
- Many hill stations and pilgrim centres like Amarnath, Kedarnath, Badrinath and Vaishnavidevi temples are situated here.
- It provides raw material for many forest based industries.
- It prevents the cold winds blowing from the central Asia and protects India from severe cold.
- Himalayas are renowned for the rich biodiversity.

The Great Northern Plains

This fertile plain lies to the south of the northern mountains. This plain is one of the most extensive stretches of the alluvium in the world and is deposited by the rivers Indus, Ganga, Brahmaputra and their tributaries. The length of the plain is about 2,400 km and the width varies from 240 to 320 km. Its width increases from east to west. It covers an area of over 7 lakh sq.km.

The Great Plains of India is remarkably a homogeneous surface with an imperceptible slope. They are formed mostly by the depositional process of the Himalayan and Vindhyan rivers. These rivers deposit enormous quantity of sediments deposited along the foothills and flood plains. The important characteristics featuress of sediment deposition in the plains areas as follows.

a) The Bhabar Plain

This plain is made up of gravels and unassorted sediments deposited by the Himalayan rivers. The porosity of this plain is so high that most of the small streams flow over this region disappear. Its width varies from 8 to 15 km. It is wider in the western plains (Jammu Division) than in the east (Assam). This plain is not suitable for cultivation, only big trees with large roots thrive in this region.

b) The Tarai Tract

It is a zone of excessive dampness, thick forests and rich wild life. This tract lies to the south of Bhabar plains. The width of this belt is 15-30 km. The Tarai is wider in the eastern parts of the Great Plains, especially in Brahmaputra Valley due to heavy rainfall. In many states, the Tarai forests have been cleared for cultivation.

c) The Bhangar Plains

The Bhangar represent the upland alluvial tracts of the Great Plains of India, formed by the older alluviums. The Bhangar land lies above the flood limits of the rivers. This soil is dark in colour, rich in humus content, well drained and useful for agriculture.

d) The Khadar Plains

The new alluvium tracts along the courses of the rivers are known as the 'Khadar' or 'Bet' lands. The Khadar tracts are enriched by fresh deposits of silt every year during rainy seasons. The Khadar land consists of sand, silt, clay and mud. It is highly fertile soil.

e) Delta

Triangle shaped fertile land at the mouth of Ganga and Brahmaputhra rivers is called as the Sundarban delta. It is the biggest and fastest growing delta. It is an area of deposition as the river flows in this tract sluggishly. The deltaic plain consists mainly of old mud, new mud and marsh. In the delta region, the uplands are called '**Chars**' while the marshy areas are called '**Bils**'.

On the basis of deposition of sediments by various rivers and topographical characteristics, the Northern Plains of India is divided into the following four major regions:

1) **Rajasthan Plains:** It is located to the west of Aravalli range. It covers an area of about 1,75,000 sq.km. Rajasthan plain is formed by the deposition of the river Luni and the long vanished river Saraswathi. There are several salt lakes in Rajasthan. The Sambhar salt lake (Pushkar Lake) near Jaipur is the prominent one.

   The Thar desert, also known as the Great Indian desert is a large arid region in the north western part of the Indian subcontinent that covers an area of 2,00,000 km^2 and forms a natural boundary between India and Pakistan. It is the world 7^{th} largest desert.

   The desert lies in the western part of the aravalli range and covers 2/3 of Rajastan state. There are two major divisions in the Thar desert. They are known as the Actual desert region (Marusthali) and the semi desert region (Bhangar). Many different types of sand dunes and salt lakes (Dhands) are seen here.

2) **Punjab - Haryana Plains:** It lies to the north-east of the Great Indian Desert. This plain is found over an area of about 1.75 lakh sq.km. The Punjab - Haryana plains are formed by the deposition of the rivers Sutlej, Beas and Ravi. This plain acts as water - divide (doab). The two major watershed it divides are Yamuna – Sutlej and Ganga – Yamuna.

3) **Ganga Plains:** It extends from the Yamuna River in the west to Bangladesh in the east. The total area covered by this plain is about 3.75 sq.km. River Ganga and its tributaries such as Ghaghra, Gandak, Kosi, Yamuna, Chambal, Betwa etc. constitute this plain by their sediments and make a great plain in India. It is the largest plain of India. The general slope of the entire plain (upper, middle and lower Ganga plains) is towards east and south-east.

4) **Brahmaputra Plains:** It is located mainly in the state of Assam. It is a low - level plain located in the eastern part of the Great Plains of India and is formed by the deposits of river Brahmaputra. It covers an area of about 56,275 sq.km. These plains create alluvial fans and marshy tracts.

The Peninsular Plateaus

The plateau region lies to the south of the Great Northern Plains. This is the largest physiographic division of our country. It covers an area of about 16 lakh sq.km (about half of the total area of the country). It is an old rocky plateau region. The topography consists of a series of plateaus and hill ranges interspersed with river valleys.

Aravalli hills mark the north-western boundary of the plateau region. Its northern and north-eastern boundaries are marked by the Bundelkhand upland, Kaimur and Rajmahal hills. The Western Ghats and the Eastern Ghats mark the western and eastern boundaries respectively. The altitude of a large portion of the plateau is more than 600 m from mean sea level. **The peak of Anaimudi is the highest point in the plateau**. Its height is 2,695 m and is located in Anaimalai. The general slope of this plateau is towards east. The Great Plateau is a part of the Gondwana (very ancient one) land mass. Due to the old age, the rivers in this region attained their base level and developed broad and shallow valleys.

The river Narmada divides the plateau region of India broadly into two parts. The region lying to the north of the Narmada is called the Central Highlands and the region lying to the south of Narmada is called the Deccan Plateau. All the major rivers (Mahanadi, Godavari, Krishna, Kaveri etc.) lying to the south of the Vindhyas flow eastwards and fall into the Bay of Bengal. Narmada and Tapti are the two rivers situated to the south of the Vindhyas flow westward. Their movement towards west is due to the presence of a rift valley in the region.

a) Central Highlands

The Central Highlands extend between the river Narmada and the Northern Great Plains. The Aravallis form the west and northwestern edge of the Central Highlands. These hills extend from Gujarat, through Rajasthan to Delhi in the northwesterly direction for a distance of about 700 km. The height of these hills is about 1,500 m in southwest while near Delhi the height is hardly 400 m. **Gurushikhar with 1,722 m is the highest peak of this range**.

The Western part of the Central Highland is known as the Malwa Plateau. It lies to the southeast of Aravallis and to the north of Vindhyachal Range. The rivers Chambal, Betwa and Ken drain the Malwa Plateau before they join the river Yamuna. The part of the Central Highlands which extends to the east of Malwa Plateau is known as Bundelkhand and its further extension is known as Bagelkhand. The eastern part of the Central High lands which lies in the north-eastern part of the Indian Plateau is known as Chhota-Nagpur Plateau. It covers much of Jharkhand, adjacent parts of Odisha, West Bengal, Bihar and Chhattisgarh. This region is very rich in mineral resources particularly iron ore and coal.

b) Deccan Plateau

This physiographic division is the largest part of the plateau region of India. The shape of this plateau is roughly triangular. One of the sides of this triangle is marked by the line joining Kanyakumari with Rajmahal Hills and this line passes through the Eastern Ghats. The second arm is marked by the Satpura Range, Mahadeo Hills, Maikal Range and the Rajmahal Hills. The third arm is marked by the Western Ghats. The area of this Plateau is about 7 lakh square km and the height ranges from 500 to 1000 m above sea level.

1. The Western Ghats

The Western Ghats forms the western edge of the Peninsular Plateau. It runs parallel to the Arabian Sea coast. The northern part of this range is called as Sahyadris. The height of the Sahyadris increases from north to south. Anaimudi is a sort of tri-junction of the Anaimalai Range, the Cardamom Hills and the Palani Hills. Kodaikanal is a beautiful hill resort situated on the Palani Hills.

2. The Eastern Ghats

Eastern Ghats run from southwest to northeast form the eastern edge of this Plateau. This range is also called as Poorvadri. The Eastern Ghats join the Western Ghats at the Nilgiri hills, bordering Karnataka and Tamil Nadu. The Eastern Ghats are not continuous like the Western Ghats. The rivers of Mahanadi, Godavari, Krishna, Pennar and Kaveri have dissected this range at many places.

The Coastal Plains

The Peninsula Plateau of India is flanked by narrow coastal plains of varied width from north to south. They were formed by the depositional action of the rivers and the erosional and depositional actions of the sea-waves. The Indian coastal plains are divided into the following two divisions:

1) The Western Coastal Plains

2) The Eastern Coastal Plains.

1. The Western Coastal Plain

It lies between the Western Ghats and the Arabian Sea. It extends from Rann of kutch in the north to Kanyakumari in the south and its width varies from 10 to 80 km. It is mainly characterised by sandy beaches, coastal sand dunes, mud flats, lagoons, estuary, laterite platforms and residual hills. The northern part of the West Coastal Plain is known as Konkan Plain. The middle part of this plain is known as Kanara. The southern part of the plain is known as Malabar coast which is about 550 km long and 20-100 km wide. This part of the coast is characterized by sand dunes. Along the coast, there are numerous shallow lagoons and backwaters called **Kayals** and **Teris**. **Vembanad** is a famous back water lake found in this region.

2. The Eastern Coastal Plain

It lies between the Eastern Ghats and the Bay of Bengal and, stretches along the states of West Bengal, Odisha, Andhra Pradesh and Tamil Nadu. These plains are formed by the alluvial fillings of the littoral zone by the east flowing rivers of India. The coastal plain consists mainly of the recent alluvial deposits. This coastal plain has a regular shoreline with well-defined beaches. The coastal plain between Mahanadi and Krishna river is known as the Northern Circars and the southern part lies between Krishna and Kaveri rivers is called Coromandal coast. Among the back water lakes of this coast, lake **Chilka** (Odisha) is the largest lake in India located to the southwest of the Mahanadi delta, the **Kolleru Lake** which lies between the deltas of Godavari and Krishna and the **Pulicat Lake** lies in the border of Andhra Pradesh and Tamil Nadu are the well known lakes in the east coastal plain.

The Islands

India has two major island groups namely Andaman and Nicobar and Lakshadweep. The former group consists of 572 islands and are located in Bay of Bengal, and the later one has 27 islands and are located in Arabian Sea. The islands of Andaman and Nicobar are largely

tectonic and volcanic origin. India's only active volcano is found on Barren Island in Andaman and Nicobar group of Islands.

a) Andaman and Nicobar Islands

These islands are located in an elevated portion of the submarine mountains. Since these islands lie close to the equator, the climate remains hot and wet throughout the year and has dense forests. The area of the island group is about 8,249 sq.km. The entire group of islands is divided into two. They are Andaman in the north and the Nicobar in the south. These island groups are of great strategic importance for the country. Port Blair is the administrative capital of the Andaman and Nicobar islands. The **Ten Degree Channel** separates Andaman from Nicobar group. The southernmost tip, the **Indira Point** is a part of Nicobar Island.

b) Lakshadweep Islands

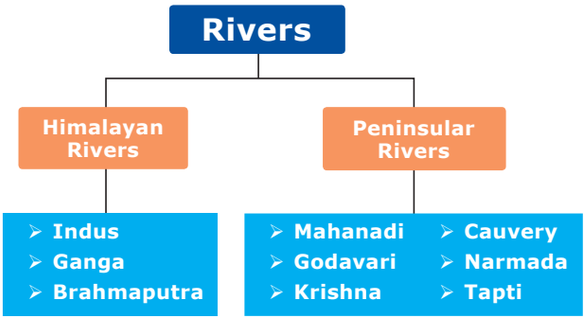
This is a small group of coral islands located off the west coast of India. It covers an area of 32 sq. km. Kavaratti is its administrative capital. Lakshadweep islands are separated from the Maldive Islands by the Eight Degree Channel. The uninhabited "**Pitt Island**" of this group has a bird sanctuary. Earlier, it had three divisions namely Laccadive, Minicoy and Amindivi. It was named as Lakshadweep in 1973.

c) Offshore Islands

Besides the two group of islands, India has a number of islands along the Western Coast, Eastern Coast, in the delta region of Ganga and in the Gulf of Mannar. Many of these islands are uninhabited and are administered by the adjacent states.

1.3 Drainage System of India

A drainage system is an integrated system of tributaries and a trunk stream which collects and drains surface water into the sea, lake or some other body of water. The total area drained by a river and its tributaries is known as a drainage basin. The drainage pattern of an area is the result of the geological structure of the respective areas. The drainage system of India is broadly divided into two major groups on the basis of their location. They are Himalayan rivers and the Peninsular rivers.



Himalayan Rivers

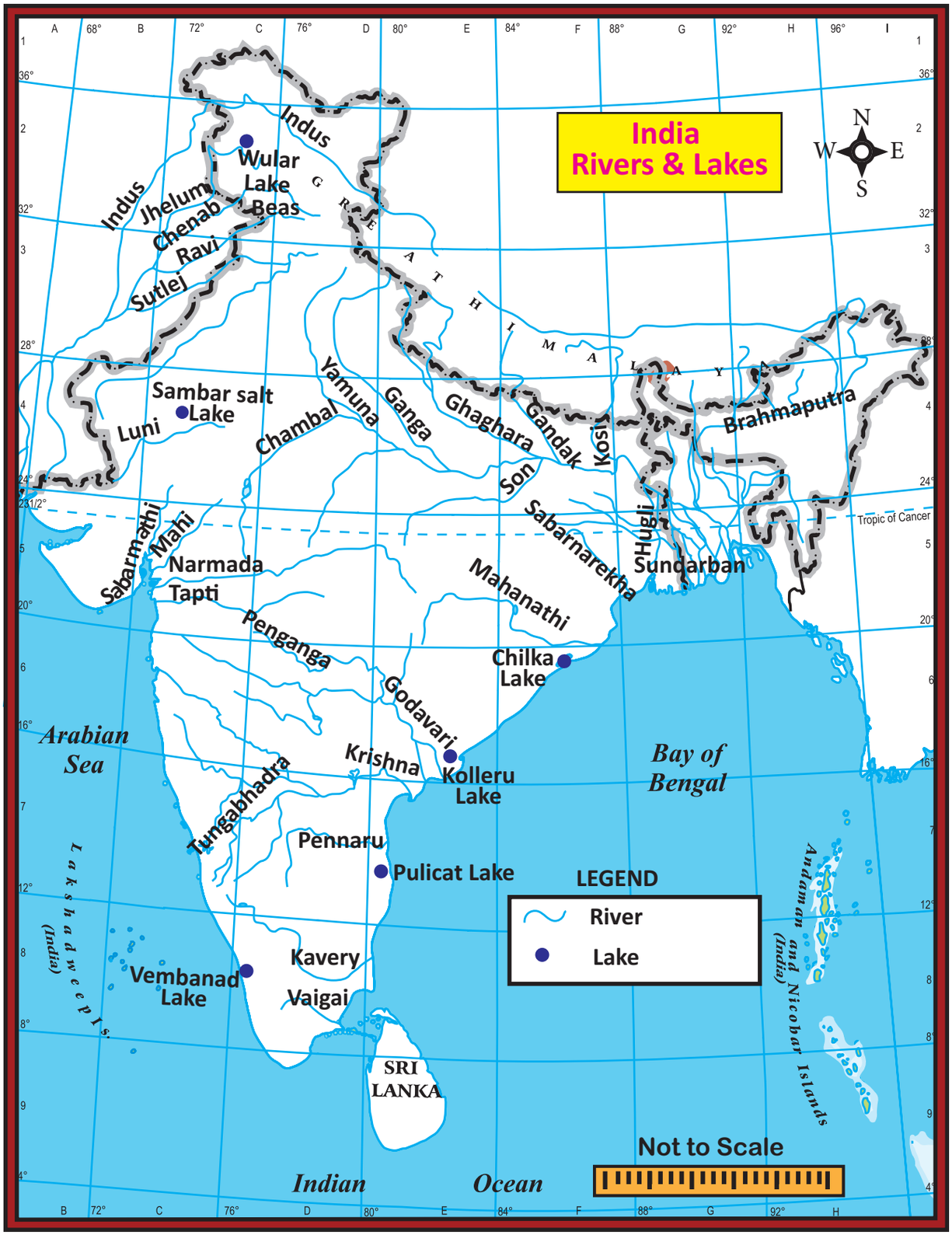
These rivers are found in north India and originate from Himalayas. So, they are also called as Himalayan rivers. These are perennial rivers.

a) The Indus River System

The Indus River is one of the largest rivers of the world. It originates from the northern slope of the Kailash range in Tibet near Manasarovar Lake at an elevation of about 5,150 m. Its length is about 2,880 km (Only 709 km is in India). The river has a total drainage area extending 11,65,500 sq km in which 321,289 sq km areas are drained in India. The river flows through the Ladakh and Zaskar ranges and creates deep gorges. The river runs through Jammu and Kashmir, turns south near Chillar and enters Pakistan. Its major tributaries are Jhelum, Chenab (Largest tributary of Indus), Ravi, Beas and Sutlej. It enters into with the Arabian Sea.

b) The Ganga River System

The Ganga River system is the largest drainage system of India. It extends over an area of 8,61,404 sq km. The Ganga plain is the most densely populated place in India and many towns are developed on the banks of this river. The river Ganga originates as Bhagirathi from the Gangotri Glacier in Uttar Khasi District of Uttarkhand state, at an elevation of 7,010 m.



The length of the river Ganga is about 2,525 km. Its major tributaries from the north are Gomti, Gandak, Kosi and Ghaghra and from south, Yamuna (largest tributary of Ganga), Son, Chambal etc. The river Ganga is known as the River Padma in Bangladesh. The combined river of Ganga and Brahmaputra creates the World's largest delta known as Sundarbans in Bangladesh before joining the Bay of Bengal.

Ganga River - Haridwar

c) The Brahmaputra River System

The river Brahmaputra originates from the Chemayungdung Glacier of the Kailash range to the east of Lake Manasarovar in Tibet at an elevation of about 5,150 m. The total area is about 5,80,000 sq km but the drainage area found in India is 1,94,413 sq km This river is known as Tsangpo (Purifier) in Tibet. The length of this river is about 2,900 km (900 km in India). It enters into India through a gorge in Arunachal Pradesh namely Dihang. It has many tributaries. Tista, Manas, Barak, Subansiri are some of them. This river is called as Jamuna in Bangladesh. After it joins with the river Ganga in Bangladesh, the river is called as Meghna.

Characteristics of Himalayan Rivers

1. Long and wide
2. Perennial in nature
3. Unsuitable for hydro power generation
4. Middle and lower courses are navigable

Peninsular Rivers

The rivers in south India are called the Peninsular rivers. Most of these rivers originate from the Western Ghats. These are seasonal rivers (non–perennial). They have a large seasonal fluctuation in volume of water as they are solely fed by rain. These rivers flow in valleys with steep gradients. Based on the direction of flow, the peninsular rivers are divided into the

1. West flowing rivers
2. East flowing rivers

East Flowing Rivers

a) Mahanadi

The river Mahanadi originates near Sihawa in Raipur district of Chattisgarh and flows through Odisha. Its length is 851 km. Seonath, Telen, Sandur and Ib are its major tributaries. The main stream of Mahanadi gets divided into several distributaries such as Paika, Birupa, Chitartala, Genguti and Nun. All these distributaries form the Delta of Mahanadi which is one of the largest deltas in India. The Mahanadi empties its water in Bay of Bengal.

b) Godavari

Godavari is the longest river (1,465 km) with an area of 3.13 lakh km^2 among the Peninsular rivers. It is also called Vridha Ganga. It originates in Nasik district of Maharashtra, a portion of Western Ghats. It flows through the states of Telangana and Andhra Pradesh before joining Bay of Bengal. Purna, Penganga, Pranitha, Indravati, Tal and Salami are its major tributaries. The river near Rajahmundry gets divided into two Channels called Vasistha and Gautami and forms one of the largest deltas in India. Kolleru, a fresh water lake is located in the deltaic region of the Godavari.

c) Krishna

The river Krishna originates from a spring at a place called Mahabaleshwar in the Western Ghats of Maharashtra. Its length is 1,400 km and an area of 2.58 lakh sq km. It is the second longest Peninsular river Bhima, Peddavagu, Musi, Koyna and Thungabhadra are the major tributaries of this river. It also flows through Andhra Pradesh and joins in Bay of Bengal, at Hamasaladeevi.

d) Kaveri

The river Kaveri originates at Talakaveri, Kudagu hills of Karnataka. Its length is 800 km. The river kaveri is called Dhakshin Ganga or Ganga of south. In Karnataka the river bifurcates twice, forming the sacred islands of Srirangapatnam and Sivasamudram. While entering Tamil Nadu, the Kaveri continues through a series of twisted wild gorges until it reaches Hogenakkal Falls and flows through a straight, narrow gorge near Salem. The Kaveri breaks at Srirangam Island with two channels, river Coleroon and Kaveri. At last, it empties into the Bay of Bengal at Poompuhar.

West Flowing Rivers

a) Narmada

This river rises in Amarkantak Plateau in Madhya Pradesh at an elevation of about 1057 m and flows for a distance of about 1,312 km. It covers and area of 98,796 sq km and forms 27 km long estuary before outfalling into the Arabian Sea through the Gulf of Cambay. It is the largest among the west flowing rivers of Peninsular India. Its principal tributaries are Burhner, Halon, Heran, Banjar, Dudhi, Shakkar, Tawa, Barna and Kolar.

b) Tapti

The Tapti is one of the major rivers of Peninsular India with the length of about 724 km. It covers an area of 65,145 sq km. Tapti river rises near Multai tank in the Betul district of Madhya Pradesh at an elevation of about 752 m. It is one of only the three rivers in Peninsular India that run from east to west - the others being the Narmada and the Mahi. The major tributaries are Vaki, Gomai, Arunavati, Aner, Nesu, Buray, Panjhra and Bori. It outfalls into the Arabian Sea through the Gulf of Cambay.

In which river the Gerosappa (jog) fall is found?

Characteristics of South Indian Rivers

1. Originate from Western Ghats
2. Short and narrow
3. Non perennial in nature
4. Suitable for hydro power generation
5. Not useful for navigation

SUMMARY

- India has been physiographically divided into five divisions. They are **Northern Mountains, Northern Great Plains, The Plateau region, Coastal Plains and Islands**.
- Northern Mountains are classified into three divisions as Trans-Himalayas, Himalayas and Eastern Himalayas.
- Northern Great Plains are divided into four as Rajasthan Plains, Punjab-Haryana Plains, Gangetic Plains and Brahmaputra Plains.
- The Plateau region of India has two divisions namely the Central Highlands and the Deccan Plateau.
- Andaman and Nicobar Islands and Lakshadweep are the two major island groups of India.
- The Drainage System of India is classified into the north Indian (Himalayan) and Peninsular rivers.
- Narmada, Tapti, Mahi and Sabarmathi rivers confluence with the Arabian Sea.
- Mahanadi, Godavari, Krishna and Cauvery are the major east flowing rivers and drain into Bay of Bengal.

EXERCISE

EGWSPV

I Choose the correct answer

1. The north-south extent of India is
   a. 2,500 km
   b. 2,933 km
   c. 3,214 km
   d. 2,814 km
2. _____ River is known as 'Sorrow of Bihar'.
   a. Narmada
   b. Godavari
   c. Kosi
   d. Damodar
3. A landmass bounded by sea on three sides is referred to as _____.
   a. Coast
   b. Island
   c. Peninsula
   d. Strait
4. The Palk Strait and Gulf of Mannar separates India from _____
   a. Goa
   b. West Bengal
   c. Sri Lanka
   d. Maldives
5. The highest peak in South India is
   a. Ooty
   b. Kodaikanal
   c. Anaimudi
   d. Jindhagada
6. _____ Plains are formed by the older alluviums.
   a. Bhabar
   b. Tarai
   c. Bhangar
   d. Khadar
7. Pulicat Lake is located between the states of
   a. West Bengal and Odisha
   b. Karnataka and Kerala
   c. Odisha and Andhra Pradesh
   d. Tamil Nadu and Andhra Pradesh

II Match the following

1. Tsangpo	—	Tributary of River Ganga
2. Yamuna	—	Highest peak in India
3. New alluvium	—	River Brahmaputra in Tibet
4. Mt. Godwin Southern part of East Austen (K2)	—	Coastal Plain
5. Coromandel Coast	—	Khadhar

III Give Reasons

1. Himalayas are called young fold moutains
2. North Indian Rivers are perennial
3. South Indian rivers are east flowing.
4. West flowing rivers do not form deltas

IV Distinguish between the following

1. Himalayan rivers and Peninsular rivers.
2. Western Ghats and Eastern Ghats.
3. Western Coastal Plains and Eastern Coastal Plains.

V Answer in brief

1. Name the neighbouring countries of India.
2. Give the importance of IST.
3. Write a short note on Deccan Plateau.
4. State the west following rivers of India.
5. Write a brief note on the island group of Lakshadweep

VI Answer in a paragraph

1. Explain the divisions of Northern Mountains and its importance to India.

2. Give an account on the major peninsular rivers of India.
3. Give a detailed account on the basin of the Ganga.

VII Map exercises

Mark the following in the outline map of India

1. Major mountain ranges – Karakoram, Ladakh, Zaskar, Aravalli, Western Ghats, Eastern Ghats.
2. Major rivers – Indus, Ganga, Brahmaputra, Narmada, Tapti, Mahanadi, Godavari, Krishna & Kaveri.
3. Major plateaus – Malwa, Chotanagpur, Deccan.

VIII Activities

1. Observe the Peninsular Plateau map of India and mark the major plateau divisions of India
2. Prepare a table showing the major West flowing and East flowing rivers of peninsular India.
3. Assume that you are travelling from West Bengal to Gujarat along the beautiful coasts of India. Find out the states which you would pass through?
4. Find out the states through which the river Ganga flows.
5. Prepare a table showing the major rivers in India and findout it's tributaries, origin, length and area.

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INTERNET RESOURCES

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2. http://india-wris.nrsc.gov.in/
3. http://ncert.nic.in/ncerts/l/iess102.pdf
4. http://www.scert.kerala.gov.in/images/text_books/chapter%204.pdf

Unit - 2

Climate and Natural Vegetation of India

Learning Objectives

- To describe the factors controlling the climate of India.
- To understand the characteristics of different seasons in India.
- To know about the rainfall distribution.
- To study the different types of natural vegetation and wild life in India.

7NTJBX

Introduction

We drink more water during summer and do not drink the same amount of water during winter. Why do we wear cotton or lighter clothes during summer season and heavy woollen clothes during cold weather season in north India? Why do not we wear woollen clothes in south India? This is because of the prevalence of varying weather conditions between north and south India.

DO YOU KNOW?

Equable climate is also called as the British climate, Which is neither too hot nor too cold.

2.1 The factors affecting the climate

Climate of India is affected by the factors of latitude, altitude, distance from the seas, monsoon wind, relief features and jet stream.

Latitude

Latitudinally, India lies between 8°4'N and 37°6'N latitudes. The Tropic of cancer divides the country into two equal halves. The area located to the south of Tropic of cancer experiences high temperature and no severe cold season throughout the year whereas, the areas to the north of this parallel enjoys sub-tropical climate.

Altitude

When the altitude increases, The temperature decreases. Temperature decreases at the rate of 6.5ºC for every 1000 metres of ascent. It is called **normal lapse rate.**

Hence, places in the mountains are cooler than the places on the plains. Ooty and several other hill stations of south India and of the Himalayan ranges like Mussourie, Shimla etc., are much cooler than the places located on the Great Plains.

Find out the temperature of Ooty (2240m) when it is 35ºC in Chennai (6.7m)

Distance from the Sea

A large area of India, especially the peninsular region, is not very far from the sea and this entire area has a clear maritime influence on

climate. This part of the country does not have a very clearly marked winter and the temperature is equable almost throughout the year. Areas of central and north India experience much seasonal variation in temperature due to the absence of influence of seas. Here, summers are hot and winters are cold. The annual temperature at Kochin does not exceed 30°C as its location is on the coast while it is as high as 40°C at Delhi, since it is located in the interior part. Air near the coast has more moisture and greater potential to produce precipitation. Due to this fact, the amount of rainfall at Kolkata located near the coast is 119 cm and it decreases to just 24 cm at Bikaner which is located in the interior part.

Monsoon Wind

The most dominant factor which affects the climate of India is the monsoon winds. These are seasonal reversal winds and India remains in the influence of these winds for a considerable part of a year. Though, the sun's rays are vertical over the central part of India during the mid-June, the summer season ends in India by the end of May. It is because the onset of southwest monsoon brings down the temperature of the entire India and causes moderate to heavy rainfall in many parts of the country. Similarly, the climate of southeast India is also influenced by northeast monsoon.

Weather refers to the state of atmosphere of a place at a given point of time.

Climate is the accumulation of daily and seasonal weather events of a given location over a period of 30-35 years.

Relief

Relief of India has a great bearing on major elements of climate such as temperature, atmospheric pressure, direction of winds and the amount of rainfall. The Himalayas acts as a barrier to the freezing cold wind blows from central Asia and keep the Indian subcontinent warm. As such the north India experiences tropical climate even during winter. During southwest monsoon, areas on the western slope of the Western Ghats receive heavy rainfall. On the contrary, vast areas of Maharashtra, Karnataka, Telangana, Andhra Pradesh and Tamil nadu lie in rain shadow or leeward side of the Western Ghats receive very little rainfall. During this season, Mangalore, located on the coast gets the rainfall of about 280 cm whereas the Bengaluru located on the leeward side receives only about 50 cm rainfall.

Jet Streams

Jet streams are the fast moving winds blowing in a narrow zone in the upper atmosphere. According to the Jet stream theory, the onset of southwest monsoon is driven by the shift of the sub tropical westerly jet from the plains of India towards the Tibetan plateau. The easterly jet streams cause tropical depressions both during southwest monsoon and retreating monsoon.

2.2 Monsoon

The word '**monsoon**' has been derived from the Arabic word '**Mausim**' which means 'season'. Originally, the word 'monsoon' was used by Arab navigators several centuries ago, to describe a system of seasonal reversal of winds along the shores of the Indian Ocean, especially over the Arabian Sea. It blows from the south-west to north-east during summer and from the north-east to south-west during winter.

Meteorologists have developed a number of concepts about the origin of monsoons. According to the Dynamic concept, Monsoon wind originates due to the seasonal migration of planetary winds and pressure belts following the position of the sun. During summer solstice, the sun's rays fall vertically over the Tropic of cancer. Therefore, all the pressure and wind belts of the globe shift northwards. At this time,

Inter -Tropical Convergence Zone (ITCZ) also moves northward, and a major part of Indian landmass comes under the influence of southeast trade winds. While crossing equator this wind gets deflected and takes the direction of southwest and becomes south-west monsoon. During the winter season, the pressure and wind belts shift southward, thereby establishing the north-east monsoon (trade winds) over this region. Such systematic change in the direction of planetary winds is known as monsoon.

Seasons

The meteorologists recognize the four distinct seasons in India. They are;

1. **Winter season (January - February).**
2. **Summer season (March - May).**
3. **Southwest monsoon or Rainy season (June - September).**
4. **Northeast monsoon season (October - December).**

1. Winter season

During this period, the vertical rays of the sun falls over tropic of capricorn which is far away from India. Hence, India receives the slanting sun's rays which results in low temperature. The cold weather season is characterized by clear skies, fine weather, light northerly winds, low humidity and large day time variations of temperature. During this season a high pressure develops over north India and a north-westerly wind blows down the Indus and Ganges valleys. In south India, the general direction of wind is from east to west.

The rain during this season generally occurs over the Western Himalayas, Tamil nadu and Kerala. Western disturbances and associated trough in westerlies are main rain bearing system in northern part of the country. The jet stream plays a dominant role in bringing these disturbances to India. Western disturbances cause rainfall in Punjab, Haryana and Himachal Pradesh, and snowfall in the hills of Jammu and Kashmir. This rainfall is very useful for the cultivation of winter wheat.

2. Summer season

During this season, the vertical rays of the sun falls over the peninsular India. Hence, there is a steady increase in temperature from south to north. It is practically hot and dry in the entire country in the initial part of this season. Weather over the land areas of the country is influenced by thunderstorms associated with rain and sometimes with hail mostly in the middle and later part.

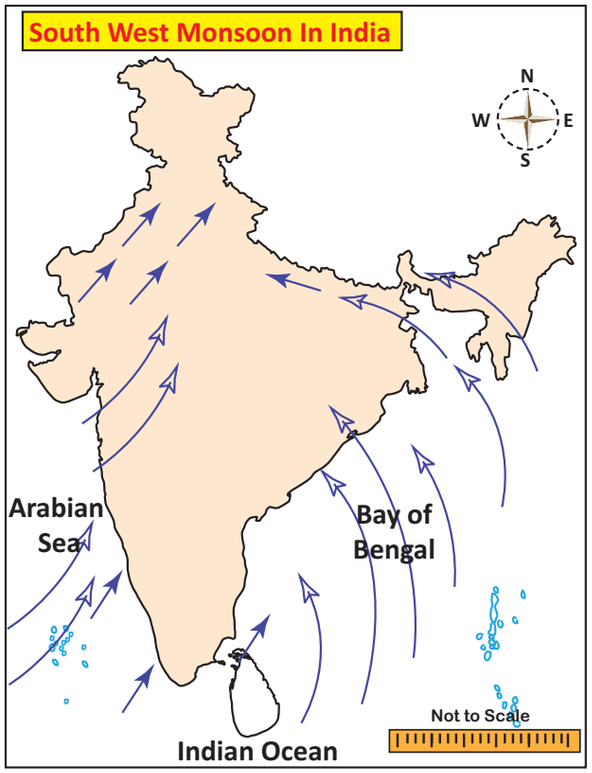
During this season, temperature starts increasing all over the country and by April, the interior parts of south India record mean daily temperatures of 30°C–35°C. Central Indian land mass becomes hot with day-time maximum temperature reaching about 40°C at many locations.

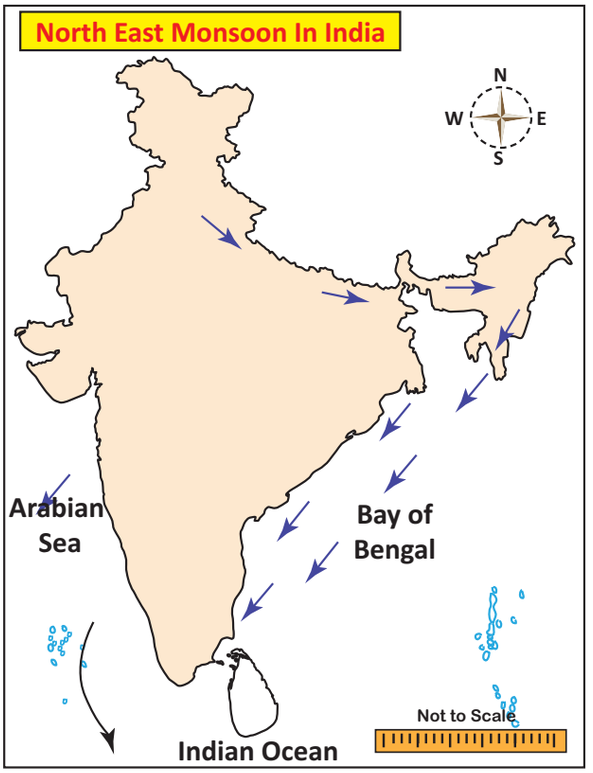
Because of the atmospheric pressure conditions, the winds blow from southwest to northeast direction in Arabian Sea and Bay of Bengal. They bring pre monsoon showers to the west coast during the month of May. There are few thunder showers called "**Mango Showers**" which helps in quick ripening of mangoes along the coast of Kerala and Karnataka.

"**Norwesters**" or "**Kalbaisakhis**" are the local storms with thunder that blow from north western part and rain lasting for short durations. It occurs over the eastern and north eastern parts over Bihar, West Bengal and Assam during April and May. They approach the stations from the northwesterly direction.

3. Southwest monsoon or Rainy Season

The southwest monsoon is the most significant feature of the Indian climate. The onset of the southwest monsoon takes place normally over the southern tip of the country by the first week of June, advances along the Konkan coast in early June and covers the whole country by 15th July. The monsoon is influenced by global phenomenon like **ElNino**.





Prior to the onset of the southwest monsoon, the temperature in north India reaches upto 46°C. The sudden approach of monsoon wind over south India with lightning and thunder is termed as the '**break**' or '**burst of monsoon**'. The monsoon wind strikes against the southern tip of Indian land mass and gets divided into two branches. One branch starts from Arabian sea and the other from Bay of Bengal.

The Arabian sea branch of southwest monsoon gives heavy rainfall to the west coast of India as it is located in the windward side of the Western Ghats. The other part which advances towards north is obstructed by Himalayan Mountains and results in heavy rainfall in north. As Aravalli Mountain is located parallel to the wind direction, Rajasthan and western part do not get much rainfall from this branch.

The Bay of Bengal branch moves towards northeast India and Myanmar. This wind is trapped by a chain of mountains namely Garo, Khasi and Jaintia are mainly responsible for the heaviest rainfall caused at **Mawsynram** located in Meghalaya. Later on, this wind travel towards west which results in decrease in rainfall from east to west. Over all about **75% of Indian rainfall is received from this monsoon**.

4. Northeast monsoon season

The southwest monsoon begins to retreat from north India by the end of September due to the southward shifting pressure belts. The southwest monsoon wind returns from Indian landmass and blows towards Bay of Bengal. The coriolis force deflects this wind and makes it to blow from northeast. Hence, it is known as Northeast monsoon or Post-monsoon season. The season is associated with the establishment of the north-easterly wind system over the Indian subcontinent. Andhra Pradesh, Tamil nadu, Kerala and south interior Karnataka receive good amount of rainfall accounting for 35% of their annual total. Many parts of Tamil nadu and some parts of Andhra Pradesh and Karnataka receive rainfall during this season due to the storms forming in the Bay of Bengal. Large scale losses to life and property occur due to heavy rainfall, strong winds and storm surge in the coastal regions. The day time temperatures start falling sharply all over the country.

Mawsynram, the place which receives highest rainfall (1141 cm) in the world. It is located in Meghalaya.

2.3 Distribution of rainfall

The average annual rainfall of India is 118 cm. However, spatial distribution of rainfall in the country is highly uneven.

The Western coast, Assam, South Meghalaya, Tripura, Nagaland and Arunachal Pradesh are the heavy rainfall areas which get more than 200 cm rainfall. The whole of Rajasthan, Punjab, Haryana, Western and Southwestern parts of Uttar Pradesh, Western Madhya Pradesh, the entire Deccan Trap or Plateau region east of Western Ghats except for a narrow strip along Tamil nadu coast receive a low rainfall of less than 100 cm. The rest of the areas receive a rainfall ranging between 100 and 200 cm.

2.4 Natural Vegetation

Natural vegetation refers to a plant community unaffected by man either directly or indirectly. It has its existence in certain natural environment. Natural vegetation includes all plant life forms such as trees, bushes, herbs and forbs etc, that grow naturally in an area and have been left undisturbed by humans for a long time.

Climate, soil and landform characteristics are the important environmental controls of natural vegetation.

On the basis of the above factors the natural vegetation of India can be divided into the following types.

Tropical Evergreen Forest

These forests are found in areas with 200 cm or more annual rainfall. The annual temperature is about more than 22°C and the average annual humidity exceeds 70 percent in this region. Western Ghats in Maharashtra, Karnataka, Kerala, Andaman-Nicobar Islands, Assam, West Bengal, Nagaland, Tripura, Mizoram, Manipur and Meghalaya states have this type of forests. The most important trees are rubber, mahogany, ebony, rosewood, coconut, bamboo, cinchona, candes, palm, iron wood and cedar. These have not been fully exploited due to lack of transport facilities.

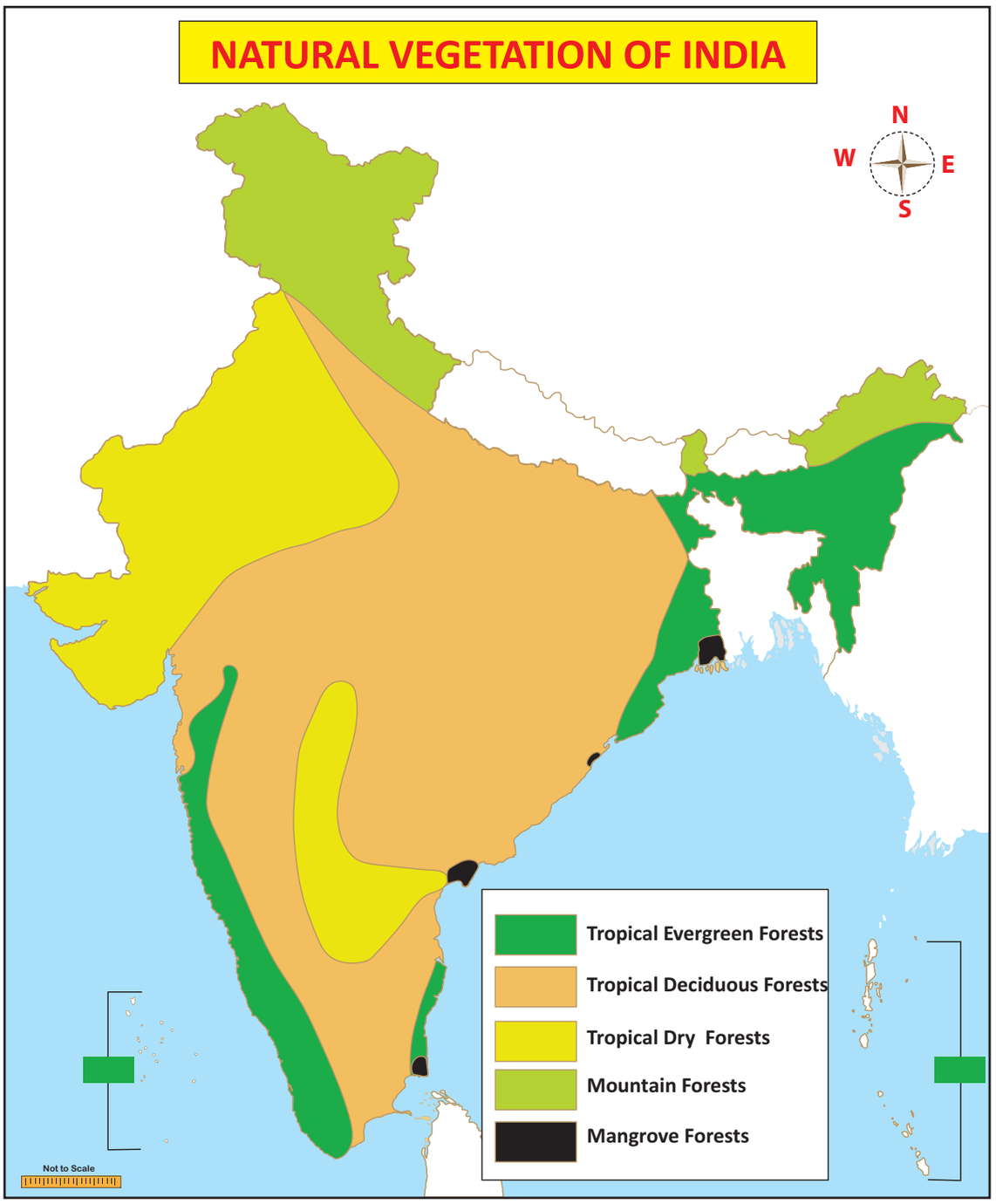
Tropical Deciduous Forest

These are found in the areas with 100 to 200cm. annual rainfall. These are called '**Monsoon Forests**'. The mean annual temperature of this region is about 27°C and the average annual relative humidity is 60 to 70 percent. The trees of these forests drop their leaves during the spring and early summer. (Sub Himalayan - Region from Punjab to Assam, Great Plains- Punjab, Haryana, Uttar Pradesh, Bihar, West Bengal, Central India - Jharkhand, Madhya Pradesh, Chattisgarh, South India - Maharashtra, Karnataka, Telangana, Andhra Pradesh, Tamilnadu and Kerala states are notable for this type of natural vegetation.) Teak and sal are the most important trees. Sandalwood, rosewood, kusum, mahua, palas, haldu, amla, padauk, bamboo and tendu are the other trees of economic importance. These forests also provide fragrant oil, varnish, sandal oil and perfumes.

Tropical Dry Forest

These are found in the areas with 50 to 100 cm. annual rainfall. They represent a transitional type of forests. These are found in east Rajasthan, Haryana, Punjab, Western Uttar Pradesh, Madhya Pradesh, Eastern Maharashtra, Telangana, West Karnataka and East Tamilnadu. The important species are mahua, banyan, amaltas, palas, haldu, kikar, bamboo, babool, khair etc.,

Desert and Semi-desert Vegetation: These are also called as 'Tropical thorn forests'. These are found in the areas having annual rainfall of less than 50 cm. They have low humidity and high temperature. These forests are found in north-west India which includes west Rajasthan, south-west Haryana, north Gujarat and south-west Punjab. They are also found in the very



dry parts of the Deccan plateau in Karnataka, Maharashtra and Andhra Pradesh. Babul, kikar and wild palms are common trees found here.

Mountain or Montane Forest

These forests are classified on the basis of altitude and amount of rainfall.

i. These are found on the slopes of the mountains in north-east states. These forests found in the altitude of 1200-2400m. Sal, Oak, Laurel, Amura, Chestnut, Cinnamon are the main trees found here. Oak, birch, silver, fir, fine, spruce and juniper are the major trees found at the altitude of 2400 to 3600m.

ii. The rainfall of this region is moderate. These forests are found in Jammu & Kashmir, Himachal Pradesh and Uttarakhand. Upto 900 m altitude semi desert vegetation is found and it is known for bushes and small

trees. In altitude from 900 to 1800m, chir is the most common tree. From 1800 to 3000m is covered with semi temperate coniferous forests.

Alpine Forest

It occurs all along the Himalayas with above 2400 m altitude. These are purely having coniferous trees. Oak, silver fir, pine and juniper are the main trees of these forests. The eastern parts of Himalayas has large extent of these forests.

Tidal Forest

These forests occur in and around the deltas, estuaries and creeks prone to tidal influences and as such are also known as delta or swamp forests. The delta of the Ganga-Brahmaputra has the largest tidal forest. The deltas of Mahanadi, Godavari and Krishna rivers are also known for **tidal forests**. These are also known as **mangrove forest**.

2.5 Wildlife

The term '**Wildlife**' includes animals of any habitat in nature. Wild animals are non-domesticated animals and include both vertebrates (fish, amphibians, reptiles, birds and mammals) and invertebrates (bees, butterflies, moths etc.). India has a rich and diversified wildlife. The Indian fauna consists of about 81,251 species of animals out of the world's total of about 1.5 million species.

Our country is home to tigers, lions, leopards, snow leopards, pythons, wolves, foxes, bears, crocodiles, rhinoceroses, camels, wild dogs, monkeys, snakes, antelope species, deer species, varieties of bison and the mighty Asian elephant. Hunting, poaching, deforestation and other anthropogenic interferences in the natural habitats have caused extinction of some species and many are facing the danger of extinction.

The Indian Board for Wildlife (IBWL)

It was constituted in 1952 to suggest means of protection, conservation and management of wildlife to the government.

The Government of India enacted Wildlife (Protection) Act in 1972 with the objective of effectively protecting the wild life of the country and to control poaching, smuggling and illegal trade in wildlife and its diversities.

To preserve the country's rich and diverse wildlife a network of **102 National Parks** and about **515 Wildlife Sanctuaries** across the country have been created.

Biosphere Reserves

Biosphere reserves are protected areas of land coastal environments

The Indian government has established **18 Biosphere Reserves** in India which protect large areas of natural habitat which often include few National Parks with buffer zones that are open to some economic uses.

Project Tiger was launched in April 1973 with the aim to conserve tiger population in specifically constituted "Tiger Reserves" in India.

Biosphere Reserves in India

Eleven of the eighteen biosphere reserves (Gulf of Mannar, Nandadevi, the Nilgiris, Nokrek, Pachmarhi, Simlipal, Sundarbans Agasthiyamalai, Great Nicobar, Kanjanjunga and Amarkantak) of India fall under the list of Man and Biosphere programme of UNESCO.

SUMMARY

- Climate of India is labelled as "Tropical Monsoon Type".
- There are four seasons in India. They are winter season, hot weather, southwest monsoon, and northeast monsoon.
- Natural vegetation refers to a plant community unaffected by man either directly or indirectly.

- Natural vegetation can be classified as tropical evergreen forests, tropical deciduous forests, tropical dry forests, desert and semi desert vegetation, mountain forests, Alpine forests, Tidal forests, etc.,
- Biosphere reserves are protected areas of land coastal environment whereby people are an integral component of a system.

EXERCISE

LA9X5G

I Choose the correct answer

1. Western disturbances cause rainfall in _____.
   a) Tamilnadu b) Kerala
   c) Punjab d) Madhya Pradesh
2. _____ helps in quick ripening of mangoes along the coast of Kerala and Karnataka.
   a) Loo b) Norwester
   c) Mango showers d) Jet stream
3. _____ is a line joining the places of equal rainfall.
   a) Isohyets b) Isobar
   c) Isotherm d) Latitudes
4. Climate of India is labelled as _____.
   a) Tropical humid
   b) Equatorial Climate
   c) Tropical Monsoon Climate
   d) Temperate Climate
5. The monsoon forests are otherwise called as _____.
   a) Tropical evergreen forest
   b) Deciduous forest
   c) Mangrove forest
   d) Mountain forest
6. Sesahachalam hills, a Biosphere reserve is situated in _____.
   a) Tamil Nadu b) Andhra Pradesh
   c) Madhya Pradesh d) Karnataka
7. _____ is a part of the world network biosphere reserves of UNESCO
   A) Nilgiri b) Agasthiyamalai
   c) Great Nicobar d) Kachch

II Match the following

1. Sundarbans — Desert and semi desert vegetation
2. Biodiversity hotspot — October - December
3. North east monsoon — Littoral forest
4. Tropical thorn forests — West Beangal
5. Coastal forests — The Himalayas

III Consider the given statements and choose the correct option from the given below ones

1. **Assertion(A):** The Himalayas acts as a climatic barrier.

   Reason(R): The Himalayas prevents cold winds from central Asia and keep the Indian Sub-continent warm.(Give option for this questions)
   a) Both (A) and (R) are true: R explains A
   b) Both (A) and (R) are true: R does not explain A
   c) (A) is true (R) is false
   d) (A) is false (R) is true

IV Choose the inappropriate answer

1. Tidal forests are found in and around____.
   (a) Desert
   (b) The deltas of Ganga and Brahmaputra
   (c) The delta of Godavari
   (d) The delta of Mahanadhi

2. Climate of India is affected by_____.
   (a) Latitudinal extent
   (b) Altitude
   (c) Distance from the sea
   (d) Soil

V Answer briefly

1. List the factors affecting climate of India.
2. What is meant by 'normal lapse rate'?
3. What are 'jet streams'?
4. Write a short note on 'Monsoon wind'.
5. Name the four distinct seasons of India.
6. What is 'burst of monsoon'?
7. Name the areas which receive heavy rainfall.
8. State the places of mangrove forests in India.
9. Write any five biosphere reserves in India.

VI Distinguish between

1. Weather and Climate
2. Tropical Evergreen Forest and Deciduous Forest.
3. North East Monsoon and South West Monsoon.

VII Give reasons

1. Western Coastal plain is narrow.
2. India has a tropical monsoon climate.
3. Mountains are cooler than the plains.

VIII Answer in detail.

1. Write about South West Monsoon.
2. Describe the forests of India.

IX Map

Mark the following on the outline map of India.

1. Direction of South West Monsoon wind.
2. Direction of North East Monsoon wind.
3. Areas of heavy rainfall.
4. Mountain forests.
5. Panna biosphere reserve
6. Agasthiyamalai biosphere reserve

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ICT CORNER

CLIMATE AND NATURAL VEGETATION OF INDIA

Steps

- Open the Browser and type the URL given below (or) Scan the QR Code.
- Scroll Down and click on 'Explore'
- Click on 'Climate' in left side menuandSelect 'Annual Rainfall'

Website URL:

https://bhuvan-app1.nrsc.gov.in/mhrd_ncert/

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Unit - 3

India - Agriculture

Learning Objectives

- To understand the nature of India's soil types and their distribution.
- To know about the importance of irrigation and multi-purpose projects in India.
- To study about the agriculture, its types and importance.
- To understand the livestock and fishing resources of India
- To comprehend the problems of farming in India.

ZVQAXZ

Introduction

Soil is one of the most important natural resources. India's varied natural environments resulted in a great variety of soils compared to any other country of similar size in the world. The rich, deep and fertile soils support high density of population through agricultural prosperity.

3.1 Soils

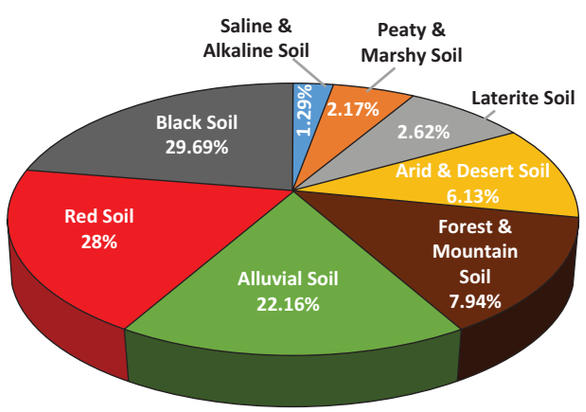
Soil is the uppermost layer of the land surface, usually composed of minerals, organic matter, living organisms, air and water. Grains in the soil are of three categories namely, clay, silt, and sand. Soils are generally formed by the weathering of rocks under different conditions. Some soils are formed by the deposition of agents of denudation. Soils can vary greatly from one region to the other.

Types of Soils

The Indian Council of Agriculture Research (ICAR) set up in 1953 divides the soils of India into the following eight major groups. They are

1. Alluvial soil
2. Black soils
3. Red soils
4. Laterite soils
5. Forest and mountain soils
6. Arid and desert soils
7. Saline and alkaline soils
8. Peaty and marshy soils

Types of Soils in India



Soil Type	Characteristics	Distribution	Crops growing
Alluvial soil	**Khadar** – light coloured, more siliceous. **Bhangar** – the older alluvium composed of lime nodules and has clayey composition. It is dark in colour. **Formation** - sediments deposited by streams and rivers when they slowly loose **Chemical properties** - rich in potash, phosphoric acid, lime and carbon compounds but poor in nitrogen **Nature** –Sandy-loam-silt-clay profile shows no marked differentiation	Ganga and Brahmaputra river valleys; Plains of Uttar Pradesh, Uttaranchal, Punjab, Haryana, West Bengal and Bihar and river mouth of east coast.	Rice, Wheat, Sugarcane and Oilseeds
Black soils	**Formation** - Derived from basalts of Deccan trap. **Colour** - black colour, due to presence of titanium, iron. **Chemical properties** - Consist of calcium and magnesium corbonates, high quantities of iron, aluminium, lime and magnesia. Rich in potash lime, Aluminium calcium and magnesium poor in Nitrogen Phosphoric acid and humus **Nature** - Sticky when wet High degree of moisture retentivity	Maharashtra and Malwa plateaus, Kathiawar peninsula, Telangana and Rayalaseema region of Andhra Pradesh and northern part of Karnataka	Cotton, Millets, Tobacco and Sugarcane
Red soils	**Formation** - decomposition of ancient crystalline rocks like granites and gneisses and from rock type **Chemical properties** - rich in minerals such as iron and magnesium. Deficient in nitrogen, humus, phosphoric acid and lime. **Nature** - Light texture, porous friable presence of limited soluble salts Clay fraction of the red soils generally consists of Kaolinitic minerals.	Eastern parts of Deccan plateau, southern states of Kerala, Tamil Nadu, Karnataka and Chota Nagpur plateau (Jharkhand)	Wheat, Rice, Cotton, Sugarcane and Pulses
Laterite soils	**Formation** - formed in the regions where alternate wet and hot dry conditions prevail. It is formed by the process of leaching **Chemical properties** - Composed mainly of hydrated oxides of iron and aluminium, **Nature** - More acidic on higher areas poor in high level, cannot retain moisture while plains they consist of heavy loam and clay and easily retain moisture	Assam hills, hill summits of Kerala and Karnataka and eastern Ghats and region of Odisha	Coffee, Rubber, Cashewnut and Tapioca

Soil Type	Characteristics	Distribution	Crops growing
Forest and mountain soils	Differ from region to region depending on climate. **Formation** - due to mechanical weathering caused by snow, rain, temperature variation **Chemical properties** - are deficient in potash, Phosphorus and lime. **Nature** - light, sandy, thin and found with the pieces of rock. Their character changes with the parent rocks. Very rich in humus. slow decomposition makes it acidic	Coniferous forest belts of Jammu and Kashmir, Himachal Pradesh, Uttarakhand and Sikkim. Eastern and Western Ghats	Coffee, tea, rice, maize, potato, barley, tropical fruits and various types of spices
Arid and desert soils	**Formation** - Due to prevalence of the dry climate, hightemperature and accelerated evaporation, the soil is dry, it also lacks humus content due to the absence of vegetative cover **Chemical properties** - Contain high percentages of soluble salts, alkaline with varying degree of calcium carbonate and are poor in organic matter; rich enough in phosphate though poor in nitrogen **Nature** - light in colour, low humus,friable structure, low in moisture	Rajasthan, Northern Gujarat and southern Punjab	Millets, barley, cotton, maize and pulses (with irrigation)
Saline and alkaline soils	**Formation** - formed due to ill drainage which causes water logging, injurious salts are transferred from subsurface to the top soil by the capillary action, it causes the salinisation of soils **Chemical properties** - liberate sodium, magnesium and calcium salts and sulphurous acid **Nature** - Consists of an excess of sodium salts and mineral fragments which are weathering	Andhra Pradesh and Karnataka. In the drier parts of Bihar, Uttar Pradesh, Haryana, Punjab, Rajasthan and Maharashtra	Crops do not grow because of excess salinisation of soils
Peaty and marshy soils	**Formation** - formed in humid regions from the organic matter. It is found in the areas of heavy rainfall and high humidity Peaty soils are black, heavyand highly acidic. **Chemical properties** - deficient in potash and phosphate. **Nature** - Contain considerable amount of Soluble salts and 10-40 per cent of organic matter; and high proportion of vegetable matter.	Kottayam and Alappuzha districts of Kerala; and coastal areas of Odisha and Tamil Nadu, Sundarbans of West Bengal, in Bihar and Almora district of Uttarakhand	Paddy, jute

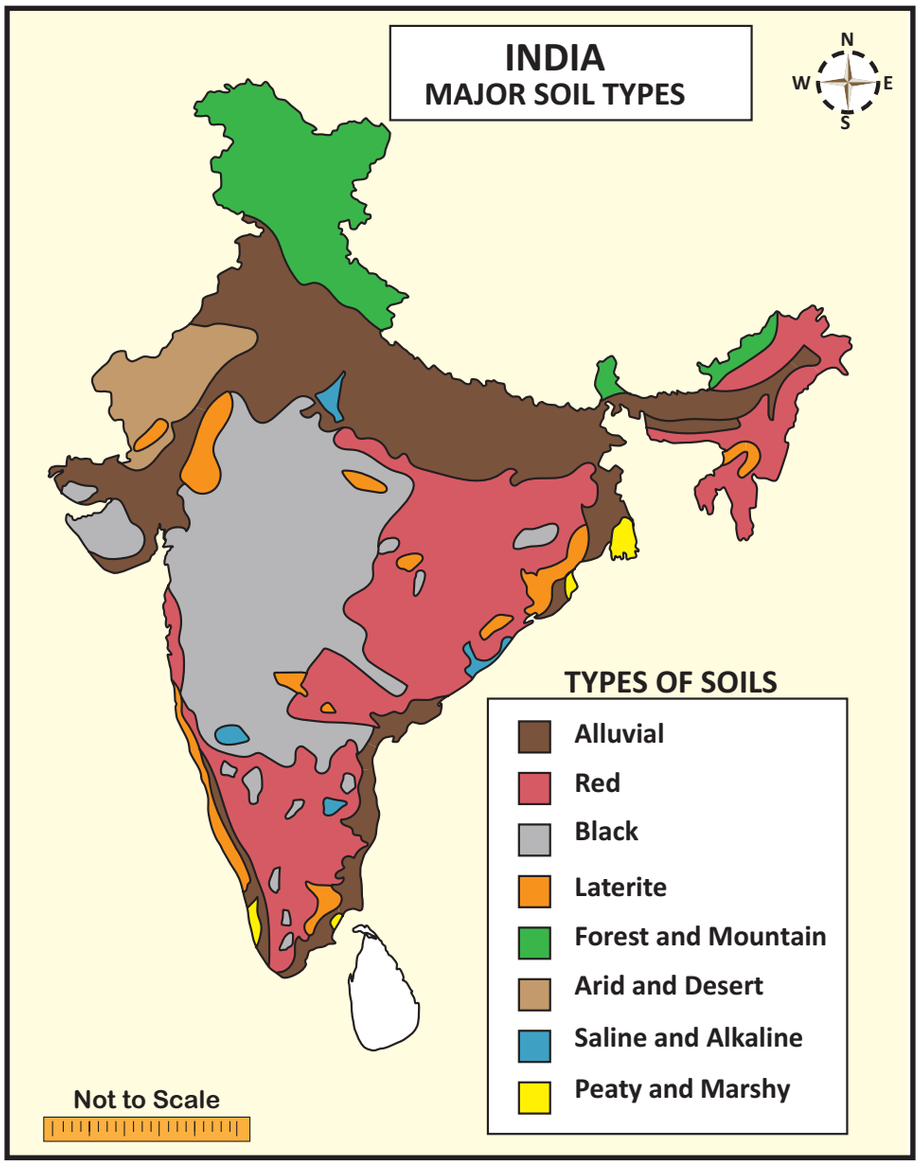
Soil degradation: Soil degradation is an acute problem in India. According to a 2015 report of the Indian institute of remote sensing (IIRS). The estimated the amount of soil .erosion that occurred in India was 147 million hectares.

The main problems of the Indian soils are i) soil erosion (sheet erosion, Rill erosion, Gully erosion, Ravine and Badland) ii) Degradation of Soil, iii) Water-logging, iv) Saline and Alkaline, and v) Salt Flats, types of soils are different erosion.

Methods of Conservation and Management of Soil

1. Afforestation
2. Constructing Dams and Barrages
3. Prevention of Overgrazing
4. Improved methods of Agricultural practices

Contour method, Rotation of crops, Contour bunding, Strip cropping, Planting of shelter belts, Adopting the techniques of sustainable agriculture are different conservation methods for better soil management.



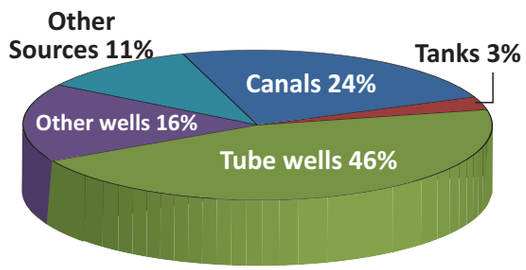
3.2 Irrigation

Watering of agricultural plants through artificial means is called irrigation. Being a hot country with seasonal and irregular rainfall, it always needs irrigation to carry out agricultural activities during dry period.

Sources of Irrigation

In India, different sources of irrigation are used depending upon the topography, soils, rainfall, availability of surface or groundwater, nature of river (whether perennial or non-perennial), requirements of crops etc. The main sources of irrigation used in different parts of the country are

- Canal irrigation
- Well irrigation and
- Tank irrigation



Area under Irrigation

a) Canal Irrigation

It is the second most important source of irrigation in our country.

Canals are the effective source of irrigation in areas of low level relief, deep, fertile soils, perennial source of water and extensive command area. The canals are of two types:

1. **Inundation Canals:** In this, water is taken out directly from the rivers without making any kind of barrage or dam. Such canals are useful for the diversion of flood water from the rivers and remain operational during rainy season.
2. **Perennial Canals:** These are developed from perennial rivers by constructing barrage to regulate the flow of water. About 60 percent of the canal irrigated area falls in the northern plains of India,

b) Well Irrigation

A well is a hole or trough, usually vertical, excavated in the earth for bringing groundwater to the surface. Well irrigation is the most important source of irrigation. It is a cheap, dependable, and popular source of irrigation in the country. Well irrigation is unavoidable in the region of low rainfall and becomes an essential one where the canals and tank irrigation are not available. Wells are of two types:

i) Open wells

ii) Tube wells

1. **Open Wells:** This type of irrigation is widely practiced in the areas where groundwater is sufficiently available. The areas are in Ganga Plains, the deltaic region of Mahanadi, Godavari, Krishna, Cauvery and parts of Narmada and Tapti valleys.
2. **Tube Wells:** Tube wells are developed in the areas of low water table, sufficient power supply and soft subsurface geological units. Tube wells are predominant in the states of Gujarat, Maharashtra, Punjab, Madhya Pradesh and Tamil Nadu.

c) Tank Irrigation

A tank is a natural or man-made hollow on the surface developed by constructing a small bund around it across a stream. It is used to collect and store water for irrigation and other purposes. Irrigation by tanks is a very old system in India. It also includes irrigation from lakes and ponds.

The tank irrigation is popular in the peninsular India due to the following reasons:

1. The undulating relief and hard rocks make difficult to dig canals and wells.
2. Natural depressions serve as reservoirs.
3. Absence of perennial rivers.
4. Impermeable rock structure which do not permit percolation.
5. The scattered nature of population and agricultural fields

Modern irrigation methods

There are many ways in Modern Irrigation. Among them mostly practiced in India are drip irrigation, sprinklers and Rain Gun and central pivot irrigation

Drip Irrigation Method

It was first developed. In this method, water is supplied in the form of drops through nassals. water can be saved upto 70%.

Springler Method

It is the simplest and easiest method of all. In this method, water is supplied to the field from the source through the pipes with have small holes. It can be used in the areas of uneven surface also.

Rain Gun

Rain gun is used to spread water like rain. It can be used to water the crops which grow upto 4 feet. It is useful to irrigate the crops like sugarcane and maize.

Central - Pivot Irrigation

It is also called water wheel and circle irrigation. It is a method of crop irrigation in which equipment roatates around a pivot and crops are watered with springlers.

Multipurpose River Valley Projects

It is a scientific management of water resources in our country. Construction of dam across rivers is aimed at many purposes. Hence, it is termed as multi-purpose river valley projects. The various purposes of a dam serves are irrigation, hydro power generation, water supply for drinking and industrial purpose, controlling floods, development of fisheries, navigation etc. Generally, majority of multipurpose projects are combination of irrigation and hydro-power which are the major aims of the projects.

4PEG4B

Pradhan Mantri Krishi Sinchayee Yojana (PMKSY)

This has been implemented to get more production by using water saving and conservation technologies.

3.3 Agriculture

Agriculture is the process of producing food for people, fodder for cattle, fiber and many other desired products by the cultivation of certain plants and the raising of domesticated animals (livestock).

Determinants of Agriculture

Agriculture in India is determined by a set of factors. Some of the important factors:

1. Physical factors: relief, climate and soil.
2. Institutional factors: Size of farm holdings, land tenure, and land reforms.
3. Infrastructural factors: Irrigation, power, transport, credit, market, insurance and storage facilities.
4. Technological factors: High yielding varieties of seeds, chemical fertilisers, insecticides and machinery.

Types of Farming

a) Subsistence Farming

A considerable proportion of farmers in the country practice subsistence farming. Farmers grow crops with the help of family members and consumes almost the entire farm produce with little surplus to sell in the market. Preference is given to food crops. In addition to the food crops, sugarcane, oilseeds, cotton, jute and tobacco are also cultivated. Traditional farming method results in low productivity.

b) Shifting Agriculture

This type of agriculture is performed by tribal people in a piece of forest land after clearing the trees through felling and burning the trunks and branches. Once the land is

Name of projects	River	Benefit States
Damodar Valley project	Damodar	Jharkhand, West Bengal
Bhakra-Nangal Project (highest gravity dam in the world)	Sutlej	Punjab, Haryana and Rajasthan
Hirakud Project (longest dam in the world)	Mahanadi	Orissa
Kosi Project	Kosi	Bihar & Nepal
Tungabhadra Project	Tungabhadra	Andhra Pradesh and Karnataka
Tehri Dam:	Bhagirathi	Uttarakhand
Chambal Valley Project	Chambal	Rajasthan and Madhya Pradesh
Nagarjuna Sagar Project	Krishna	Andhra Pradesh
Sardar Sarover Project	Narmada	Madhya Pradesh, Maharashtra, Rajasthan
Indira Gandhi Canal Project	Satlaj	Rajasthan, Punjab and Haryana
Mettur Dam	Cauveri	Tamil Nadu

cleared, crops are grown for two to three years and the land will get abandoned as the fertility of the soil decreases. The farmers then move to new areas and the process will be repeated. They cultivate some grains and vegetable crops using the manual labour. It is also called as "Slash and burn" cultivation.

Different names of shifting agriculture in different regions in India	
Name	**Place**
Jhum	Assam
Poonam	Kerela
Podu	Andhra Pradesh, Odisha
Beewar, Mashan, Penda, Beera	Madhya Pradesh

c) Intensive Farming

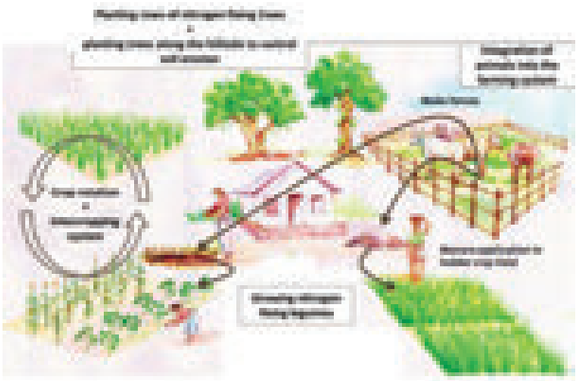
Intensive farming is an agricultural intensification and mechanization system that aims to maximize yields from available land through various means, such as heavy use of pesticides and chemical fertilizers.

d) Dry Farming

This type of farming is practiced in arid areas where irrigation facilities are lacking. Crops cultivated in these areas can withstand dry conditions. The crops grown generally with the help of irrigation are also grown under dry farming. In such circumstances, the yields are generally low. Most of the areas under dry cultivation entertain only one crop per year.

e) Mixed Farming

Mixed farming is defined as a system of farm which includes crop production, raising livestock, poultry, fisheries, bee keeping etc. to sustain and satisfy as many needs of the farmer as possible.



Mixed Farming Agriculture

f) Terrace Farming

This type of cultivation is practiced specially in hilly areas, where lands are of sloping nature. The hill and mountain slopes

are cut to form terraces and the land is used in the same way as in permanent agriculture. Since the availability of flat land is limited, terraces are made to provide small patches of level land. Soil erosion is also checked due to terrace formation on hill slopes.

3.4 Major Crops Cultivated in India

The major crops of India are divided into four major categories as follows:

1. Food crops (wheat, maize, rice, millets, pulses etc.).
2. Cash crops (sugarcane, tobacco, cotton, jute, oilseeds etc.).
3. Plantation crops (tea, coffee and rubber).
4. Horticulture crops (fruits, flowers and vegetables).

1. Food Crops

Due to its large population, Indian agriculture is largely dominated by the food crops.

Rice

Rice is an indigenous crop. India is the second largest producer of rice in the world after China. It is mainly a tropical crop, growing mainly with mean temperatures of 24°C and annual rainfall of 150 cm. Deep fertile clayey or loamy soils are suited well for rice cultivation. It also needs abundant supply of cheap labour.

Paddy Cultivation

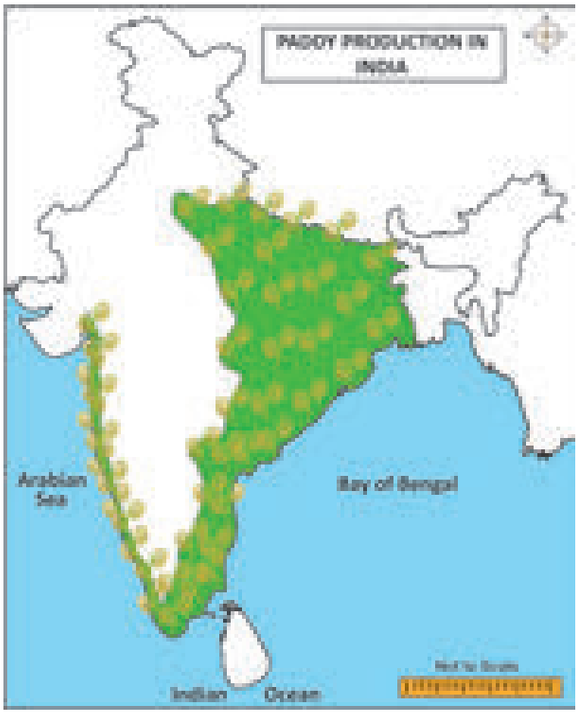
Rice in India is sown in three ways:

i) Broadcasting,

ii) Ploughing or drilling

iii) Transplanting

Due to increased use of High Yielding Variety (HYV) seeds (CR Dhan 205, AR Dhan 306, CRR 451 etc.), many of the indigenous varieties were disappeared. In 2016, the first 10 leading rice producing states are West Bengal (First in India) Uttar Pradesh, Punjab, Tamil Nadu, Andhra Pradesh, Bihar, Chhattisgarh, Odisha, Assam, and Haryana.



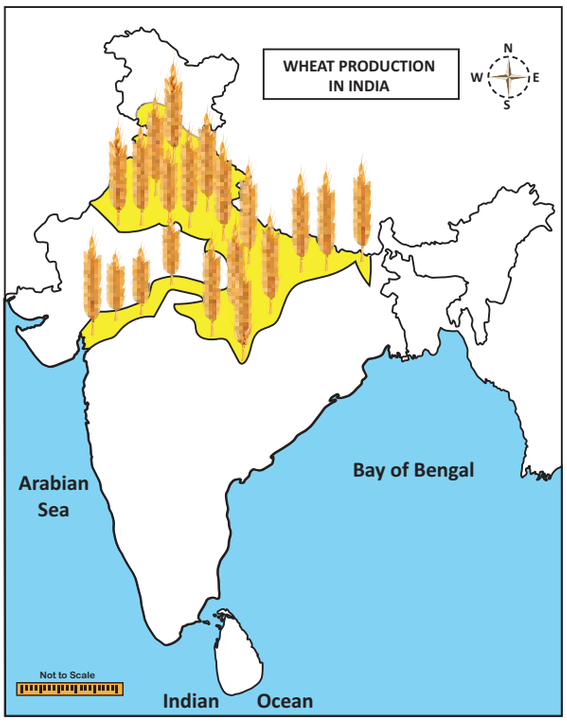
Wheat

Wheat is the second most important food crop of the country, after rice. It accounts for 22 percent of the total area and

Cropping Seasons in India		
Cropping Seasons	**Major crops cultivated**	
	Northern States	**Southern States**
Kharif Season June–September	Rice, Cotton, Bajra, Maize, Jowar, Tur	Rice, Ragi, Maize, Jowar, Groundnut
Rabi Season October–March	Wheat, Gram, Rapeseeds, Mustard, Barley	Rice, Maize, Ragi, Groundnut, Jowar
Zaid Season April–June	Vegetables, Fruits, Fodder	Rice, Vegetables, Fodder

34 percent of the total production of food grains in the country. It requires 10-15°C at the time of sowing and 20-25°C at the time of ripening of grains.

Over 85% of the India's wheat production comes from 5 states namely Uttar Pradesh, Punjab, Haryana, Rajasthan and Madhya Pradesh. Apart from these regions, the black soil tract of the Deccan covering parts of Maharashtra and Gujarat also contribute a major wheat production.



Jowar

Jowar is the third important food crop of our country. It is an indigenous plant of Africa. The plant has a tendency to grow in adverse climatic conditions. Its grains are rich in carbohydrates, protein, minerals, and vitamins. Hence, it provides cheap food to the large section of the poor population. It is also used as fodder in many parts of the country. Jowar is essentially a crop of the Peninsular India. Maharashtra, Karnataka, and Madhya Pradesh are the leading producers of Jowar.

Bajra

Bajra is an indigenous plant of Africa. This forms the staple food for poor people. Its stalks are used as fodder for cattle and for thatching purposes. Bajra is a crop of dry region. Rajasthan is the largest producer of bajra followed by Uttar Pradesh, Haryana, Gujarat and Maharashtra.

Barley

Barley is one of the important cereals of our country. Besides, being poor man's diet, it is used for making barley water, beer and whiskey. Rajasthan and Uttar Pradesh are the two leading producers of Barley.

Pulses

Pulses include a large number of crops which are mostly leguminous and rich in vegetable protein. They are used as human food and feeding cattle. They fix atmospheric nitrogen in the soil and hence are usually rotated with other crops. India is the largest producer of pulses.

2. Cash Crops

The crops which are cultivated for commercial purpose are called cash crops. These crops include sugarcane, tobacco, fibre crops (cotton, jute, and mesta) and oilseeds.

Sugarcane

It is the second largest producer in the world. This crop provides raw material for the sugar industry which is the second largest industrial category of our country. Besides providing sugar, gur and khandsari, it supplies molasses for alcohol industry and bagasse for paper industry. India is ranked third in sugar production in the world after Cuba and Brazil. At the state level, Uttar Pradesh is the leading producer of sugarcane followed by Maharashtra, Karnataka, Tamil Nadu and Gujarat.

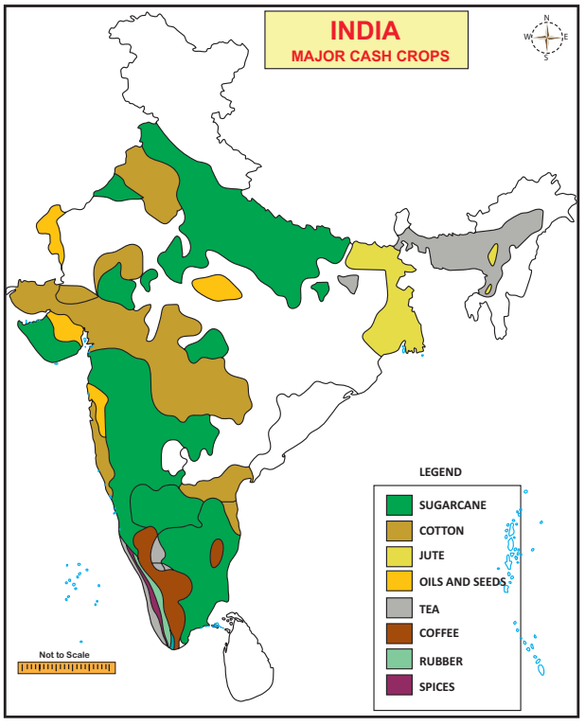
Cotton

Cotton is the most important cash crop of India. It provides raw material to the largest industry of India. India ranks second next to China in the production of cotton.

About 79% of the total area and production in the country were contributed by four states viz., Gujarat, Maharashtra, Andhra Pradesh and Punjab.

Jute

It is a tropical fibre crops, grows well in the alluvial soil. It provides raw material for Jute industry. It is used for manufacturing of gunny bags, carpets, hessian, ropes and strings, rugs, clothes, tarpaulins, upholstery etc. West Bengal is the leading state both in cultivation and production of jute. The other cultivators of jute are Bihar, Assam and Meghalaya.



Oil Seeds

Oil seeds, the premier source of fat in the Indian diet are derived from number of crops like groundnut, rapeseed, mustard, sesame, linseed, sunflower, castor seed, cotton seed, niger seed etc. These provide oil and oilcake which are used for making lubricants, varnish, medicine, perfume, candles, soaps, manure and cattle feed. Gujarat is India's largest oilseeds producing state. In groundnut production, India is the second largest producer in the world after China.

3. Plantation Crops

Plantation crops are cultivated for the purpose of exports. These are cultivated in large estates on hilly slopes. Tea, coffee, rubber and spices are the major plantation crops of India.

Tea

Tea is an evergreen plant that mainly grows in tropical and subtropical climates. Tea is a labour intensive and grows faster under light shade. Tea plants require high rainfall but its root cannot tolerate water logging. Two major varieties of tea are cultivated in India. They are

i) BOHEA - originated from China

ii) ASSAMICA - from India

A number of hybrid varieties have been developed by mixing these two. India is the second largest producer of tea after China in the world. Assam is the larger producer of tea in India. Other states are Tamil Nadu, Kerala and West Bengal.

Coffee

Coffee is grown in shade and it grows effectively in the altitudes between 1,000 and 1,500 m above mean sea level. There are two main varieties of coffee. They are

i) Arabica (High quality-cultivated more in India)

ii) Robusta (Inferior quality).

India is the 7th largest producer of coffee globally. Karnataka is the leading producer of coffee in India. It produces 71% in India, and 2.5 % in the world (source; coffee board of India-2018).

Rubber

Rubber plantation were first established in Kerala in 1902. It needs hot and wet climatic conditions (temperature above 20°C and rainfall above 300cm). Most of the land under rubber belongs to small land holders. The major rubber growing areas are Tamil Nadu, Kerala, Karnataka and Andaman and Nicobar Islands.

Spices

India has been world famous for its spices since ancient times. These spices mostly used for flavouring or tampering cooked food and for preparing medicines, dyes etc. Pepper, chillies, turmeric, ginger, cardamom, clove and areca

nut are the major spices cultivated in India. Kerala is the leading producer of spices in India.

4. Horticulture Crops

It refers to the cultivation of fruits, flowers and vegetables. Fruits and vegetables are important supplement to the human diet, as they provide essential minerals, vitamins, and fibres required for maintaining health. India is in the second position in the production of fruits and vegetables.

3.5 Livestock

Livestock is an integral component of the farming system in India. The livestock sector is socially and economically very significant due to its multi-functional outputs and contribution to socio-cultural security. It also helps to improve food and nutritional security by providing nutrient-rich food products, generate income and employment and act as a cushion against crop failure, provide draught power and manure inputs to the crop subsector.

Cattle

Cattle constitute 37.3 percent of livestock population in India. India has second largest cattle population after Brazil at World level. Cattle population in India belongs to different breeds. These include:

1) Milch Breed

2) Draught breed

3) Mixed or General breed.

Goats

The goat is the poor man's cow providing milk, meat, skin and hair. It is the main source of meat for the country.

Buffaloes

Buffaloes are an important source of milk supply for India. Uttar Pradesh has the highest number of buffaloes (28.2%) followed by Rajasthan (9.6%) and Andhra Pradesh (7.9%).

Livestock Census: First Livestock Census in India was conducted with the title of Dairy Cattle Census in 1919.

How is livestock census conducted in Tamil Nadu?

State Government is conducting Livestock Census with the help of Department of Animal Husbandry at state level and Regional Joint Director at Distric level under the guidelines of Government of India Ministry of Agriculture and farmers welfare, Department of Animal Husbandary Dairying and Fisheries.

Dairy, Meat and Wool Production

According to 2016-17 Census held by State /UT Animal Husbandry Department, Uttar Pradesh, Rajasthan and Madhya Pradesh.

While looking at the meat, Uttar Pradesh is the leading producer following Maharashtra and West Bengal.

The leading state in the wool production is Rajasthan followed by Karnataka

3.6 Fisheries

Fisheries in India are a very important economic activity and a flourishing sector with varied resources and potentials. Fishing in India is a major industry in its coastal states, employing over 14 million people. It produces about 3 percent of World's fish and occupies second place among the fish producing nations of the world after China. It also helps in augmenting food supply, generating employment, raising nutritional level and earning valuable foreign exchange. In India, fishing is categorised into two types: They are

1. Marine or Sea Fisheries

2. Inland or Fresh Water Fisheries

Fisheries

1. **Marine or Sea Fisheries:** It includes coastal, off-shore and deep sea fisheries mainly on the continental shelves. Kerala leads in the marine fish production in India.
2. **Inland or Fresh Water Fisheries:** Rivers, lakes, canals, reservoirs, ponds, tanks etc. are the sources of fresh water fresh water fisheries. About 50 percent of the country's total fish production comes from the inland fisheries and Andhra Pradesh is the leading producer in India.

In India, the important varieties of fishes caught by the fisherman are Cat fish, Herrings, Mackerels, Perches, Eels, Mullets etc.

3.7 Major issues faced by farmers in india

Small and fragmented land-holdings

The problem of small and fragmented holdings is more serious in densely populated and intensively cultivated states in India.

High Costs of Inputs

Good quality seeds are out of reach for many small and marginal farmers due to their high price.

Infertile Soil

Indian soils have been used for growing crops over thousands of years without caring much for replenishing. This has led to depletion and exhaustion of soils resulting in low productivity.

Lack of Irrigation

Only one-third of the cropped area falls under irrigated area. To make agriculture reliable, irrigation facility has to be developed.

Lack of mechanization

In spite of the large scale mechanization of agriculture in some parts of the country, most of the agricultural operations in larger parts are carried on by human hand using simple and conventional tools.

Soil erosion

Large tracts of fertile land suffer from soil erosion by wind and water.

Agricultural marketing

Due to the absence of sound marketing facility, the farmers have to depend on local traders and middlemen for the disposal of their farm products which is sold at low price. Besides, there is a fluctuation in the prices of agriculture products.

Inadequate storage facilities

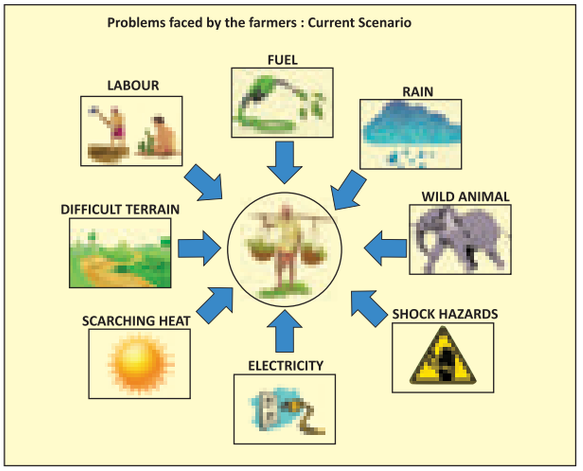
Storage facilities in the rural areas are either totally absent or grossly inadequate. Under such conditions the farmers are compelled to sell their products immediately after the harvest irrespective of the condition of market.

Inadequate transport

One of the main handicaps with Indian agriculture is the lack of cheap and efficient means of transportation.

Scarcity of capital

Agriculture is an important industry which requires a huge capital. The role of capital plays a major role in the purchase of advanced farm machineries and equipments.



List of important Agricultural Revolutions in India	
Revolution	**Related Product**
Yellow Revolution	Oil seed Production (Especially Mustard and Sunflower)
Blue Revolution	Fish Production
Brown Revolution	Leather / Cocoa / Non-Conventional Products
Golden Fibre Revolution	Jute Production
Golden Revolution	Fruits / Honey Production / Horticulture Development
Grey Revolution	Fertilizers
Pink Revolution	Onion Production / Pharmaceuticals / Prawn Production
Evergreen Revolution	Overall Production of Agriculture
Silver Revolution	Egg Production / Poultry Production
Silver Fibre Revolution	Cotton
Red Revolution	Meat Production / Tomato Production
Round Revolution	Potato
Green Revolution	Food Grains
White Revolution	Milk Production

SUMMARY

- Soil is the finest particle found on the earth surface.
- The main sources of irrigation found in India are canal irrigation, well irrigation and tank irrigation etc.
- Kharif, Rabi, and Zaid are the three cropping seasons of India.
- The agricultural crops of India can be divided into food crops, cash crops, plantation crops and horticultural crops.
- Fishing in India is categorized into marine fishing and inland fishing

EXERCISE

WWB7QD

I Choose the correct answer

1. The soil which is rich in iron oxides is _____.
   a) Alluvial b) Black
   c) Red d) Alkaline

2. Which of the following organization has divided the Indian soils into 8 major groups?
   a) Indian Council of Agricultural Research
   b) Indian Meteorological Department
   c) Soil Survey of India
   d) Indian Institute of Soil Science

3. The soils formed by the rivers are:
   a) Red soils b) Black soils
   c) Desert soils d) Alluvial soils

4. _____ dam is the highest gravity dam in India.
   a) Hirakud dam
   b) Bhakra Nangal dam
   c) Mettur dam
   d) Nagarjuna Sagar dam

5. _____ is a cash crop.
   a) Cotton b) Wheat
   c) Rice d) Maize

6. Black soils are also called as:
   a) Arid soils b) Saline soils
   c) Regur soils d) Mountain soils

7. The longest dam in the world is _____.
   a) Mettur dam b) Kosi dam
   c) Hirakud dam d) Bhakra-Nangal dam

8. Which crop is called as "Golden Fibre" in India?
   a) Cotton b) Wheat
   c) Jute d) Tobacco

II Consider the given statements and choose the right option given below

1. **Assertion (A):** Horticulture involves cultivation of fruits, vegetables, and flowers.
   Reason (R): India ranks first in the world in the production of mango, banana, and citrus fruits.
   (a) Both (A) and (R) are true and (R) explains (A)
   (b) Both (A) and (R)are true: (R) does not explain (A)
   (c) (A) is correct (R) is false
   (d) (A) is false (R) is true

2. **Assertion (A):** Alluvial soil is formed by the deposition of eroded and decayed materials brought by the rivers.
   Reason (R): Paddy and wheat are grown well in the soil.
   (a) Both (A) and (R) are true and (R) explains (A)
   (b) Both (A) and (R)are true and (R) does not explain (A)
   (c) (A) is correct (R) is false
   (d) (A) is false (R) is true

III Pick the odd one out

1. a) Wheat b) Rice
   c) Millets d) Coffee
2. a) Khadar b) Bhangar
   c) Alluvial soil d) Black soil
3. a) Inundational canals
   b) Perennial canals
   c) Tanks
   d) Canals

IV Match the following

1.	Sugar bowl of India	-	Mahanadi
2.	Coffee	-	Golden revolution
3.	Tehri	-	Karnataka
4.	Hirakud	-	Uttar Pradesh and Bihar
5.	Horticulture	-	Highest dam in the India

V Answer in brief

1. Define soil.
2. Name the types of soil found in India.
3. State any two characteristics of black cotton soil.
4. Define Agriculture.
5. State the types of agriculture practices in India.
6. Name the seasons of agriculture in India?
7. Mention the plantation crops of India.
8. What do you mean by livestock?
9. Write a brief note on the categories of fisheries in India?

VI Give reasons

1. Agriculture is the backbone of India.
2. Rain water harvesting is necessary.

VII Distinguish between the following

1. Rabi and Kharif crop seasons.
2. Inundational canal and perennial canal.
3. Marine fishing and Inland fishing.
4. Alluvial soils and Black soils.

VIII Answer in a paragraph

1. State any five types of soil in India and explain the characteristics and distribution of soil.
2. What is Multipurpose projects and write about any two Multipurpose projects of India.
3. Bring out the characteristics of Intensive and Plantation farming.
4. Examine the geographical conditions favourable for the cultivation of rice and wheat.

IX Hot questions

1. Can you imagine a world without agriculture?
2. Can you give solutions for the prevailing water disputes in South India?

X Map exercise

1. Demarcate the major tracts of alluvial soils.
2. Delineate the main regions of black soil.
3. Locate the Hirakud dam, Mettur dam and Damodar dam.
4. Shade the regions of jute cultivation..
5. Mark any three tea and coffee growing areas.
6. Demarcate the regions of desert soil.
7. Locate the fishing hubs: Tuticorin, Chennai, Cochin, Mumbai, Machilipatnam
8. Demarcate: Cauveri delta, Godavari delta

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Unit - 4

India - Resources and Industries

Learning Objectives

- To learn about the resource and its types.
- To understand the concept of renewable and non- renewable resources.
- To identify the different types and distribution of industries in India.
- To analyse the problems of Indian industries.

IAUTWU

Introduction

Any matter or energy derived from the environment that is used by living things including humans is called a natural resource. Natural resources include air, water, soil, minerals, fossil fuels, plants, wild life etc. Many natural resources are used as raw materials. They play a vital role in the economic development of any region. Natural resources are classified on several basis. Based on continued availability, the resources are categorised into two types. Renewable Resources are those which have natural regeneration after their utilisation.

Solar energy, wind energy, biogas, tidal energy, wave energy etc. are the renewable resources. Non- Renewable resources are the sources that cannot be replaced again after utilisation. Coal, petroleum, natural gas etc. fall under this category.

4.1 Minerals

Mineral is a natural substance of organic or inorganic origin with definite chemical and physical properties. The process of extracting mineral from the earth is known as mining. The mines near the earth crust are known as open pit mines while the deep mines are known as shaft mines.

DO YOU KNOW?

The organisations associated with minerals in India are

1. The Geological Survey of India Headquarter is at Calcutta
2. Indian Bureau of Mines Headquarter at Nagpur
3. Non-Ferrous Material Technology Development Centre NFTDC, Hyderabad.
4. The Ministry of Mines is responsible for the administration of all mines and minerals (Development and Regulation Act, 1957).

Types of Minerals

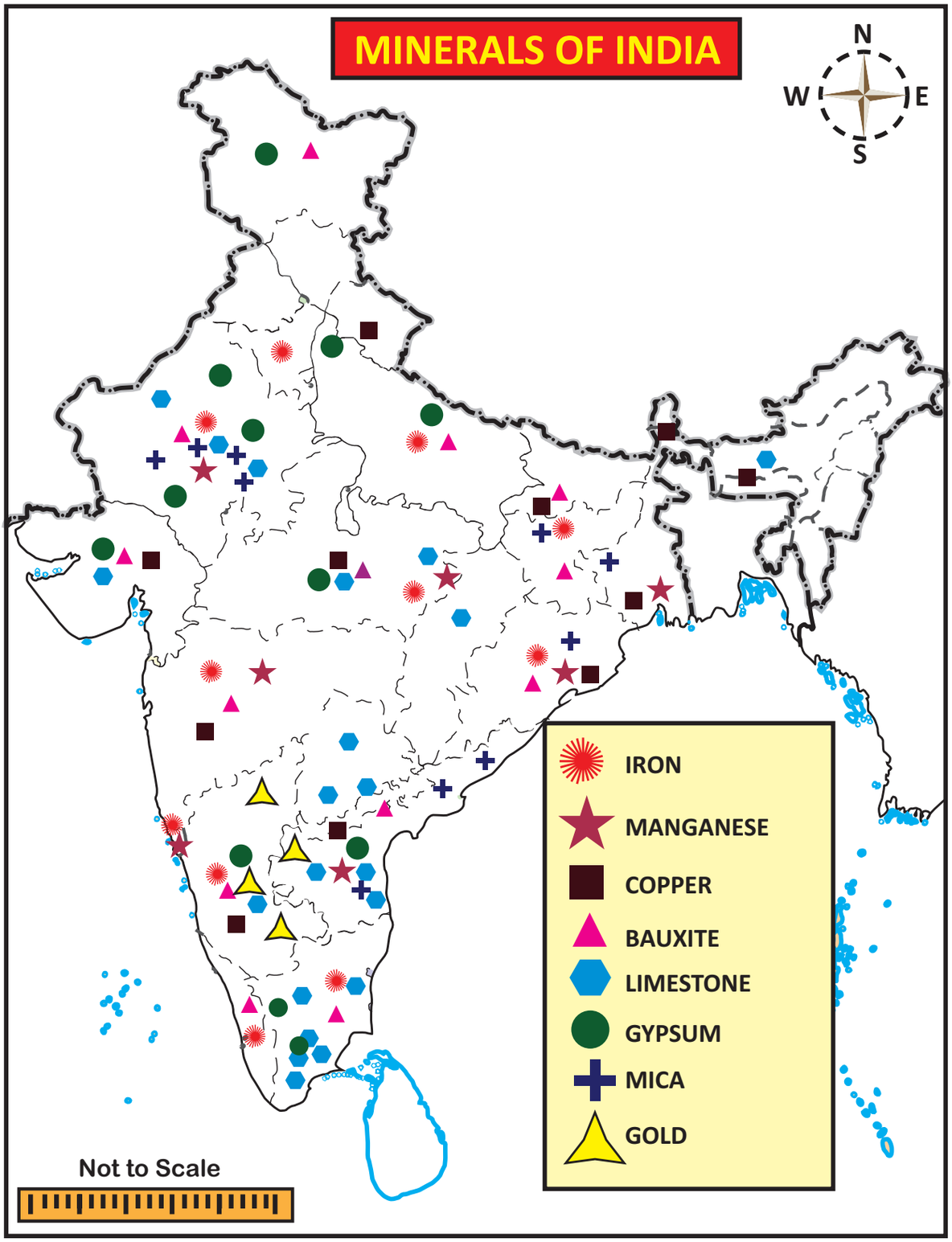
On the basis of chemical and physical properties, minerals are broadly grouped under two categories. They are metallic and non-metallic minerals.

a) Metallic Minerals

Metallic minerals are the minerals which contain one or more metallic elements in them. Metallic minerals occur in rare, naturally formed concentrations known as mineral deposits. These deposits consist of a variety of valuable metals such as iron, manganese, copper, bauxite, nickel, zinc, lead, gold etc.

1. Iron ore

Iron ore is the most widely distributed elements of the earth crust, rarely occurs in a



The iron is usually found in following form.

Form of Iron ores	Iron Content (%)
Magnetite	72.4%
Hematite	69.9%
Goethite	62.9%
Limonite	55%
Siderite	48.2%

free state. It enters into the composition of many rocks and minerals especially from igneous and metamorphic rocks. The total recoverable reserves of iron ore in India are haematite and magnetite

Jharkhand is the leading producer of iron ore with 25% the country's production. Singhbhum, Hazaribagh, Dhanbad and Ranchi districts are its major producers. Odisha with 21% production ranks second. Sundargarh, Mayurbhanj, Sambalpur and Keonjhar districts are its major producers. The magnetite production of Chhattisgarh is 18% (Rajgarh and Bilaspur are its leading districts) and the Karnataka is 20% (Chikmangalur, Chitradurga, Shimoga and Dharwad districts are its major producers). Andhrapradesh and Tamil Nadu produce about 5% each. Kurnool, Guntur, Cuddapah and Anantapur districts in Andhra Pradesh and Salem, Namakkal, Tiruvannamalai, Tiruchirappalli, Coimbatore, Madurai and Tirunelveli districts in Tamil Nadu are notable for the production of iron ore.

SAIL (Steel Authority of India Limited): The Ministry of Steel is responsible for planning and development of iron and steel industry in India.

2. Manganese

Manganese is a silvery grey element. It is very hard and brittle in nature. It is always available in combination with iron, laterite and other minerals. It is an important mineral used for making iron and steel and serves as basic raw material for alloying. It is the most important mineral for making iron and steel. Nearly 10 kg manganese is required for manufacturing one ton of steel. It is also used in the manufacturing of bleaching powder, insecticides, paints and batteries.

MOIL- Manganese Ore India Limited state-owned manganese-ore mining company headquartered in Nagpur. With a market share of 50%. It was the largest producer of manganese ore in India.

Manganese deposits occur mainly as metamorphosed bedded sedimentary deposits. The largest deposits of manganese is found in Odisha followed by Karnataka, Madhya Pradesh, Maharashtra, Goa, Andhra Pradesh, Jharkhand, Rajasthan, Gujarat, Telengana and West Bengal together constitute about 2% of the India's manganese resource. India is the fifth largest producer of manganese in the world.

3. Copper

Copper is the first metal that prehistoric man has started using for many purposes. Being flexible, it can be made into utensils of any shape. Brass and Bronze are obtained when the copper alloys with zinc and tin respectively. Copper has been commonly used for making cooking utensils and other objects of common utility. In modern days, it is extensively used in vast variety of electrical machinery, wires and cables

Largest reserves of copper ore is in the state of Rajasthan followed by Jharkhand and Madhya Pradesh. The states of Andhra Pradesh, Gujarat, Haryana, Karnataka, Maharashtra, Meghalaya, Nagaland, Odisha, Sikkim, Tamil Nadu, Telangana, Uttarakhand

Hindustan Copper Ltd is a Government-owned-corporation in the central public Enterprise under the Ministry of minies, India.

and West Bengal account for 7.9% of the total copper reserves of India.

4. Bauxite

Bauxite is an important ore from which aluminium is extracted. It is found in the rock consisting mainly of hydrated aluminium oxides. Bauxite is widely distributed as surface deposits in the areas of laterite soil. Being light in weight and tough, aluminium is used in the manufacture of aircraft s and automobile engines. Bauxite is also used in the manufacture of cement and chemicals.

Bauxite is an oxide of aluminium; the name has been derived after the French word Le Baux.

The main bauxite deposits occur in Odisha, Gujarat (Junagadh, Amreli and Bhavnagar districts), Jharkhand (Ranchi and Gumila districts), Maharashtra (Sindhu durg and Ratnagiri), Chhattisgarh (Ballarpur and Durg districts), and Tamil nadu.

National Aluminium Company Limited, abbreviated as NALCO, (incorporated 1981) has units in Odisha at places like Angul and Damanjodi. It was incorporated as a public sector enterprise of the Ministry of Mines, Government of India in 1981.

नालको NALCO

b) Non-Metallic Minerals

These minerals do not contain metal in them. Mica, limestone, gypsum, nitrate, potash, dolomite, coal, petroleum etc are the non-metallic minerals.

Mica

In ancient time, Mica was used in ayurvedic medicine. Mica became very popular with the development of electrical industry. Abhrak is a good quality mica. It is translucent, easily splitable into thin sheets, flat, colourless, elastic and incompressible. Mica is used in making of insulating properties, as it withstands high voltage and has low power loss factor. Since it is a non conductor of electricity, it is exclusively used in electrical goods. It is also used in making of lubricants, medicines, paints and varnishes.

The major deposits of mica are found in Andhra Pradesh, Rajasthan, Odisha and Jharkhand.

Lime Stone

Limestone is associated with rocks composed of either calcium carbonate or the double carbonate of calcium and magnesium or mixture of both. Limestone also contains small quantities of silica, alumina, iron oxides, phosphorous and sulphur.

Limestone is used in the industries of chemicals for soda ash, caustic soda, bleaching powder, paper, cement, iron and steel, glass and fertilizers. The major producing areas: Karnataka, Andhra Pradesh, Telangana, Rajasthan, Madhya Pradesh, Tamil Nadu, Meghalaya, Gujarat and Chhattisgarh

Gypsum

Gypsum is a hydrated sulphate of calcium which occurs as white, opaque or transparent minerals in beds of sedimentary rocks such as limestone, sandstone and shale. Gypsum is used in the manufacture of cement, fertilizers, wall board, plaster of paris and in soil conditioning. Rajasthan, Tamil nadu, Gujarat, Himachal Pradesh, Karnataka, Uttarakhand, Andhra Pradesh and Madhya Pradesh are the major producers.

4.2 Energy Resources

The resources from which the electricity generated are called energy resources. Electricity is an important component of our life. No day to day activity takes without the use of this energy. It is also the key factor for all economic activities and industrial development. Energy resources can be

classified into renewable and non-renewable. Coal, petroleum, natural gas and nuclear minerals are the sources of non renewable energy. Water, sun light, wind, bio gas, tides etc., are the sources of renewable energy.

Non-Renewable Energy Resources

a) Coal

Coal is an inflammable organic substance composed mainly of hydrocarbons.

Coal is available in the form of sedimentary rocks. It is used in the generation of thermal power. It has close association with the industrial development of any country. Since it is a valuable one, it is called as "**Black Gold**". Based on carbon content, it is classified in to the following types.

Anthracite: 80 to 90%

Bituminous: 60 to 80%

Lignite: 40 to 60%

Peat: less than 40%

Coal is an important source of energy in India with its varied and innumerable uses. It can be converted into gas, oil, electricity and thermal power. Besides, it forms a basic raw material for the production of chemicals, dyes, fertilizers, paints, synthetic and explosives.

Indian coal is mostly associated with Gondwana series of rocks and is primarily found in Peninsular India. The states of Jharkhand, odisha, West Bengal and Madhya Pradesh alone account for nearly 90% of coal reserves of the country. About 2% of India's coal is of tertiary type and is found mostly in Assam and Jammu & Kashmir.

Coal India Limited (CIL) is an Indian state-controlled coal mining company headquartered in Kolkata, West Bengal.

Jharkhand is the largest coal producing state in the country followed by odisha, Chhattisgarh, West Bengal, Madhya Pradesh, Andhra Pradesh and Maharashtra.

Indian lignite (brown coal) deposits occur in the southern and western parts of Peninsular India particularly in Tamil nadu, Pudhucherry and Kerala.

The Ministry of coal has over all responsibility of determining policies and strategies in respect of exploration and development of coal resource in India. Coal India Limited (CIL), NLC India Limited (NLCIL) and Singareni Collieries Company limited (SCCL) are its public sector under takings.

b) Petroleum (or) Crude oil

The word petroleum has been derived from two Latin words petro (meaning – Rock) and oleum (meaning oil). Thus petroleum is oil obtained from rocks of the earth. Therefore, it is also called mineral oil. Petroleum is an inflammable liquid that is composed of hydrocarbons which constitute 90-95% of petroleum and the remaining is chiefly organic compounds containing oxygen, nitrogen, sulphur and traces of organ metallic compounds.

The Ministry of Petroleum and Natural Gas (MOP&NG) is a ministry of the Government of India. It is responsible for the exploration, production, refining, distribution, marketing, import, export, and conservation of petroleum, natural gas, petroleum products, and liquefied natural gas in India.

India - Oil refinery

Western coast offshore oil fields	Eastern coast offshore Fields
1. Mumbai high oil fields (largest 65%)	Bharmaputra valley (Dibrugarh and Sibsagar districts of upper Assam.)
2. Gujarat coast (2nd largest)	Digboi oil feilds (oldest fields in country)
3. Basseim oil feild, south of Mumbai high	Nahoratiya oil fields (south west of digboi)
4. Aliabet oil feild, south of Bhavanagar	Moran-Hugrijan oil field (Southwest of Nahoratiya)
5. Ankleshwar	Rudrasagar-Lawa oil feilds (sibsagar districts of assam)
6. Cambay-Luni Region	Surma valley (Badarpur, Masimpur, Patharia)
7. Ahemedabad-Kalol Region	Offshore of Andaman and Nicobar, Gulf of mannar, Baleshwar coast, Punjab, Haryana and Uttar Pradesh.

Petroleum is used as a source of power and fuel for automobiles, aeroplanes, ships and locomotives. Lubricants, kerosene, vaseline, tar, soap, terylene and wax are its by products. Oil in India is obtained from both from on-shore and off-shore areas.

c) Natural Gas

Natural gas usually accompanies the petroleum accumulations. It is naturally occurring hydro carbon gas mixture consisting primarily of methane, but commonly includes varying amounts of other higher alkanes and sometimes a small percentage of carbon dioxide, nitrogen and hydrogen sulphides. It is formed when layers of decomposed plants and animals are exposed to intense heat and pressure over thousands of years. It is used as a source of energy for heating, cooking and electricity generation. It is also used as fuel for vehicles and as a chemical feedstock in the manufacture of plastics and other commercially important organic chemicals.

GAIL (formerly known as Gas Authority of India Limited) is the largest state-owned natural gas processing and distribution company in India. It is headquartered in New Delhi.

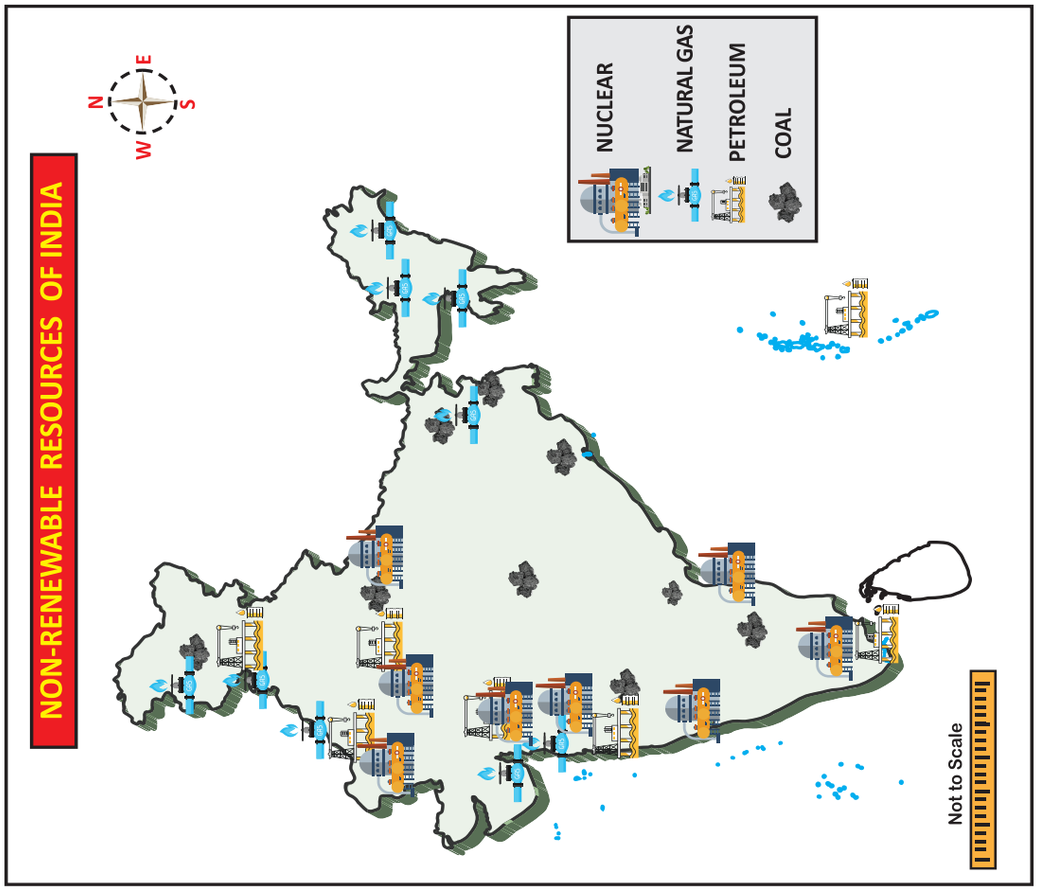
India has a very large proportion of tertiary rock and alluvial deposits particularly in the extra peninsular India. These sedimentary rocks, which were once under the shallow seas, hold the possibility of harbouring oil and gas deposits. The highest concentration of natural gas is found in the Mumbai high and basseim oil fields. Gujarat, Assam, Neypaltur, Mangmadam in Thanjavur district in Tamil nadu, Tripura, Rajasthan, Arunachal Pradesh, Punjab, West Bengal are the other areas where natural gas reserves have been discovered.

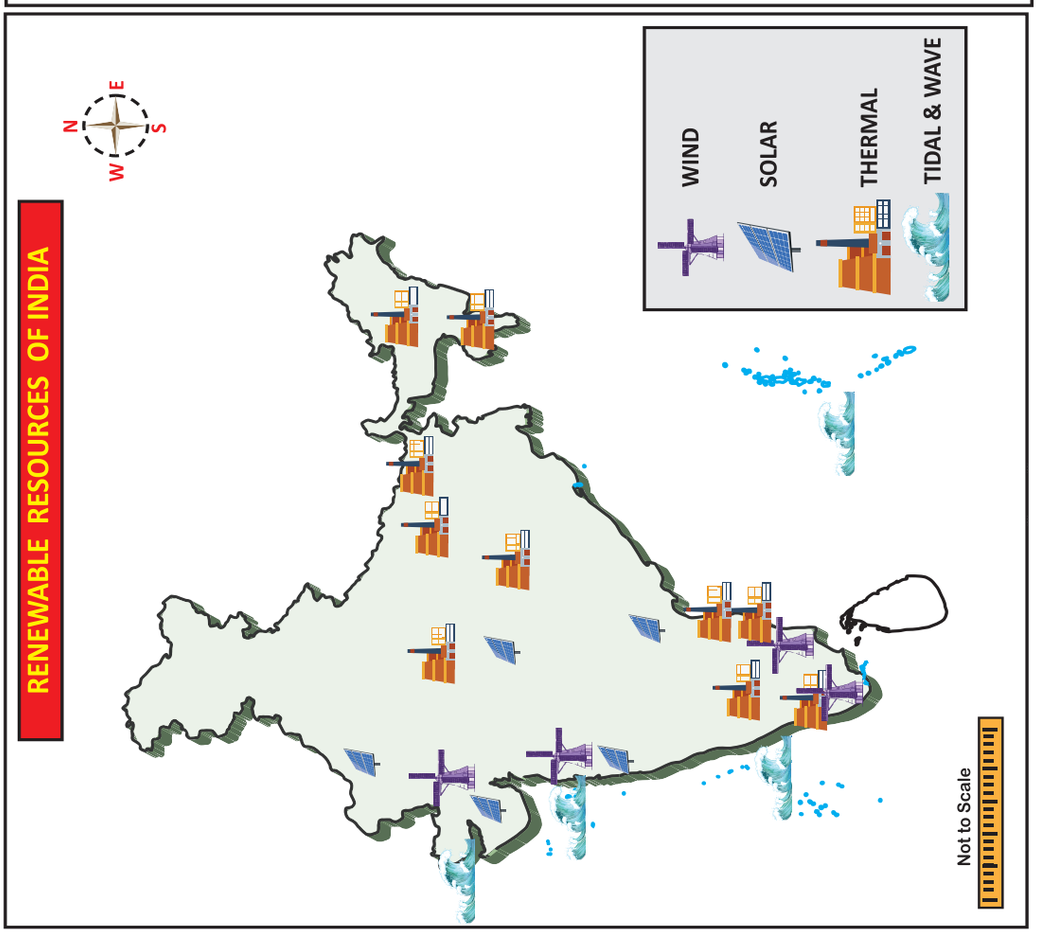
Compressed natural gas (CNG) (methane stored at high pressure) is a fuel which can be used in place of gasoline, diesel fuel and propane/LPG. In comparison to other fuels, natural gas poses less of a threat in the event of a spill, because it is lighter than air and disperses quickly when released. Biomethane – cleaned-up biogas from anaerobic digestion or landfills – can be used. Natural gas run vehicles are increasingly used in Delhi, Ahmedabad, Mumbai, Pune, Kolkata Lucknow, Kanpur, Varanasi, etc.

Conventional Energy Sources

a) Thermal power

Thermal power is generated using fossil fuels like coal, diesel, petroleum and Natural





gas. National Thermal Power Corporation [NTPC] was established in 1975. At present NTPC has 13 coal based super thermal power projects and 7 gas / liquid fuel based combined cycle projects in the states of Assam, Bihar, Jharkhand, Chhattisgarh, Mizoram and West Bengal. Neyveli, Mettur, Thoothukudi and Ennore (Chennai) are the important thermal power stations in Tamil nadu.

b) Nuclear power

The energy released during nuclear fission or fusion is used to generate electricity. Nuclear energy is generated mainly from the minerals of Uranium and Thorium. The first nuclear power station was setup at Tarapur near Mumbai in 1969. Later atomic reactors were installed at Rawatbhata (335 MW), near Kota in Rajasthan (100 MW), Kalpakkam (440 MW) and Kudankulam (2,000 MW) in Tamil nadu and Narora (235 MW) in Uttar Pradesh, Kaiga in (235 MW) in Karnataka and Kakarapara (235 MW) in Gujarat.

The Nuclear Power Corporation of India Limited (NPCIL) is an Indian public sector undertaking based in Mumbai, Maharashtra. It is wholly owned by the Government of India and is responsible for the generation of nuclear power for electricity.

Renewable Energy Resources

a) Hydro power

Power generated from water is termed as hydroelectricity. Hydro power is the energy harnessed from running water. Hydro power is considered as one of the most economic and non-polluting sources of energy. It contributes nearly 7% of global electricity production. The cost of production of hydroelectricity is relatively low, making it a competitive source of renewable energy. It is also a flexible mode of power generation as the quantity of production can either be increased or decreased very quickly adapting to changing demands.

DO YOU KNOW?

The first hydro-electric power station in India was established at "Darjeeling" in 1897.

National Hydroelectric Power Corporation is located in Faridabad, India

b) Solar Energy

Solar Power is the conversion of sunlight into electricity, either directly using photovoltaics (PV) or indirectly using concentrated solar power (CSP). Concentrated solar power systems use lenses or mirrors and tracking system to focus a large area of sunlight into a small beam. Photovoltaics convert light into an electric current using the photovoltaic effect.

Solar Energy Corporation of India Limited is a Government of India Enterprise.Its head quarter is located at New Delhi.

The mass objectives of the solar thermal energy programme, being implemented by the Ministry of Non-Conventional Energy Source (MNES) are market development, commercialisation and utilisation of heat energy requirement of different applications in domestic, institutional and industrial sectors. Solar power is used in water heaters, refrigerators, drying, street lighting, cooking, pumping, power generator, photovoltaic cells, salon parts etc. Andhra Pradesh, Gujarat, Rajasthan, Maharashtra and Madhya Pradesh are the major solar power producers.

c) Wind Energy

Wind energy is extracted from air flow using wind turbines. It is a cheap and pollution free source of energy. Power from wind mills are used for pumping water and to sail propel ships. Wind power is plentiful, renewable, widely distributed, clean and produces no greenhouse

gas emissions during operation. These plants occupy only a less space.

DO YOU KNOW?

Tamil nadu has the largest installation of wind turbines in the country in the Aralvoimozhi area near Kanniyakumari is the largest concentrations of wind farm capacity at a single location in the world.

The development of wind power in India began in 1986 with first wind farms were set up in coastal areas of Gujarat (Okha), Maharashtra (Ratnagiri) and Tamil nadu (Thoothukudi) with 55 KW Vestas wind turbines. The capacity has significantly increased in the last few years. India has the fourth largest installed wind power capacity in the world.

The National Institute of Wind Energy (NIWE), Chennai was established in Tamil Nadu in 1998 as an autonomous institution under the administrative control of the Ministry of New and Renewable Energy. NIWE main activities include resource assessment testing and certification.

d) Biomass Energy

Bio energy may be obtained through bio-degradable materials like animal dung, kitchen wastes, water hyacinth, agricultural residues and city wastes etc. It is clean and cheap source of energy. Energy derived from biomass is mostly used for domestic purposes.

e) Tidal and wave Energy

There are two main sources of ocean energy. They are Ocean tides and Ocean waves. The Gulf of Cambay is the best suited area for tidal energy. This is followed by Gulf of Kachch (1,000MW) and sunderbans (100MW).

An wave energy power plant of 150 KW(maximum) has been installed at vizhinjam near Thiruvananthapuram. An another plant of this kind has been set up near Andaman& Nicobar Islands.

4.3 Industries

It refers to the activities which converts the raw materials into finished products. This sector is called as the value addition sector. On the basis of the source of raw materials, Industries are classified into the Agro based industries, Forest based industries and Mineral based industries.

Agro based industries

These industries draw their raw materials from agricultural sector. The following part discusses the agro based industries in India.

a) Cotton Textile Industry

Textile is a broad term which includes cotton, jute, wool, silk and synthetic fibre textiles. This sector in India is the second largest in the world.

DO YOU KNOW?

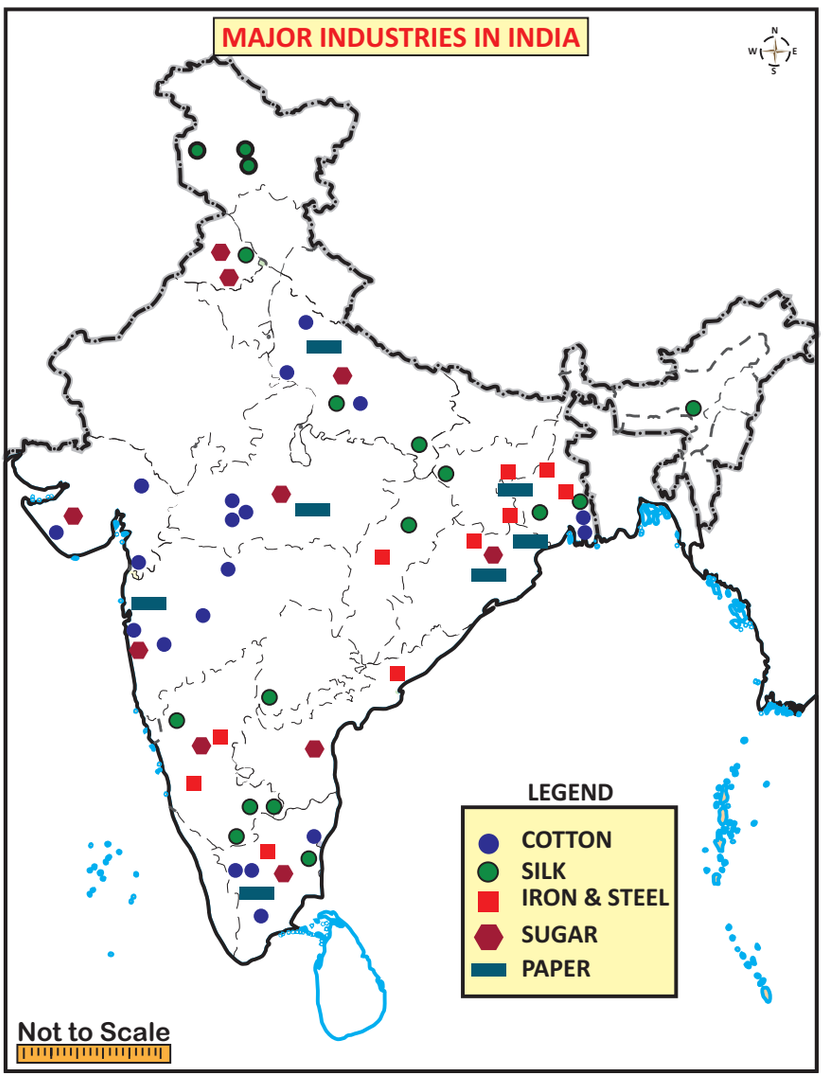
The first cotton textile mill was established at Fort Gloster near Kolkata in 1818.

Traditional sectors like hand loom, handicrafts and small power-loom units are the biggest source of employment for millions of people in rural and semi urban areas.

Currently, India is the third largest producer of cotton and has the largest loom arc and ring spindles in the world. At present, cotton textile industry is the largest organized modern industry of India.

Ginning is the process of separating cotton seed from cotton.

The higher concentration of textile mills in and around Mumbai, makes it as "**Manchester of India**". Presence of black cotton soil in



Maharastra, humid climate, presence of Mumbai port, availability of hydro power, good market and well developed transport facility favour the cotton textile industries in Mumbai.

The major cotton textile industries are concentrated in the states of Maharashtra, Gujarat, West Bengal, Uttar Pradesh and Tamil nadu. Coimbatore is the most important centre in Tamil nadu with 200 mills out of its 435 and called as "**Manchester of South India"**. Erode, Tirupur, Karur, Chennai, Thirunelveli, Madurai, Thoothukudi, Salem and Virudhunagar are the other major cotton textiles centres in the state.

b) Jute Textiles

Jute is a low priced fibre used mainly for making package materials like gunny bags. Today jute is blended with cotton and wool to produce textiles. This is the second important textile industry in India after cotton textiles. Jute is the golden fibre which meets all the standards of goods packing with its natural, renewable, bio degradable and eco-friendly products.

The first jute mill in India was established at Rishra near, Kolkata in 1854 by the English man George Auckland. India tops in the production of raw jute and jute goods and second in the export of jute goods next to Bangladesh. Jute production includes gunny bags, canvas, pack sheets, jute web, carpets, cordage, hessians and twines. Now jute is also being used in plastic furniture and insulation bleached fibres to blend with wool. It is also mixed with cotton to make

National jute board is headquarter at Kolkata.

CSTRI is the only research institute in the country dedicated to the Research & Developmental activities related to silk technology. CSTRI was established in the year 1983 by the Central Silk Board, Ministry of Textiles, Govt. of India having head quarter at Bengaluru

carpet and blankets. The major jute producing areas are in West Bengal and concentrated along the Hooghly river within the radius of six kilometre of Kolkata. Titagarh, Jagatdat, Budge-Budge, Haora and Bhadreshwar are the chief centres of jute industry. Andhra Pradesh, Bihar, Uttar Pradesh, Assam, Chhattisgarh and Odisha are the other jute goods producing areas.

c) Silk Industry

India has been well known for the production of silk since the ancient times. India is the second largest producer of raw silk next only to China.

Karnataka is the largest producer of silk. Other major producers of silk are West Bengal, Jammu Kashmir, Bihar, Jharkhand, Chhattisgarh, Uttar Pradesh, Punjab, Assam and Tamil nadu states.

DO YOU KNOW?

Office of the Development Commissioner for Handlooms was set up as an attached non-participating office on 20th November, 1975 under the Ministry of Commerce. At present it is functioning under the Ministry of Textiles, headquarters at Udyog Bhawan, New Delhi.

d) Sugar Industry

Sugar can be produced from sugar cane, sugar-beets or any other crop which have sugar content. In India, sugar cane is the main source of sugar. At present this is the second largest agro based industry of India after cotton textiles. India is the world's second largest producer of sugar cane after Brazil. Sugar industry is decentralized and located near the sugarcane growing areas as they are weight loosing and bulky to transport.

Uttar Pradesh is the largest producer of sugar, producing about 50% of the country's total. Other major producers are Maharashtra, Uttar Pradesh, Karnataka, Andhra Pradesh, Tamil nadu, Bihar, Punjab, Gujarat, Haryana and Madhya Pradesh states. These states account for more than 90% of the sugar mills and sugar production.

Forest based industries

Forest provide us with different types of material which are used as raw material for certain industries like paper, lac, sports goods, plywood etc.

a) Paper industry

Paper Industry produces numerous types of papers that comes in various use such as sheet paper, paper boxes, tissues, paper bags, stationery, envelopes and printed-paper products such as books, periodicals, and newspapers. In India the Soft wood is the principal raw material used for making paper especially newsprint and high class printing papers. Paper is the pre-requisite for education and literacy and its use is an index of advancement in these two fields as well as the overall well being of the society.

Paper Industry in India

DO YOU KNOW?

The first paper mill of India was started in 1812 at Serampore in West Bengal.

The first successful effort was made in 1867 with the setting up of the Royal Bengal paper mills at Ballyganj near Kolkata. The raw materials for paper industry includes wood pulp, bamboo, salai and sabai grasses, waste paper and bagasse. West Bengal is the largest producer of paper in the country followed by Madhya Pradesh, Odisha and Tamil nadu.

National Newsprint and Paper Mills (NEPA) is at Nepanagar in Burhanpur District of Madhya Pradesh.

Mineral based industries

Mineral based industries use both metallic & non metallic minerals as raw materials. The major mineral based industry of country is the iron steel industry

a) Iron and steel industries

Iron and steel industry is called a basic metallurgical industry as its finished product is used as raw material by host of other industries. Several industries like engineering, heavy machines and machine tools, automobile, locomotives and railway equipment industries use iron and steel as their primary raw material. Due to this, the steel producing capacity of a country is generally taken as an indicator of its level of industrial development.

The first attempt to produce iron and steel unit was set up at Porto Novo in Tamil nadu in 1830.

The modernization of the industry was started in 1907 with the establishment of Tata Iron and Steel Company at Sakchi, now called Jamshedpur. Iron and steel industry of India is mainly concentrated in the states of Jharkhand, West Bengal and Odisha. Proximity to the coal fields of Jharia, Raniganj, Bokaro and Karanpura and the iron ore mines of Mayurbhanj, Keonjar and Brona are responsible for this. This area also has sufficient deposits of limestone, dolomite, manganese and silicon which are required for the industry.

Automobile Industry

India is set to emerge not only as a large domestic market for automobile manufacturers, but also as a crucial link in the global automotive chain. It is one of the most dynamic industrial groups in India.

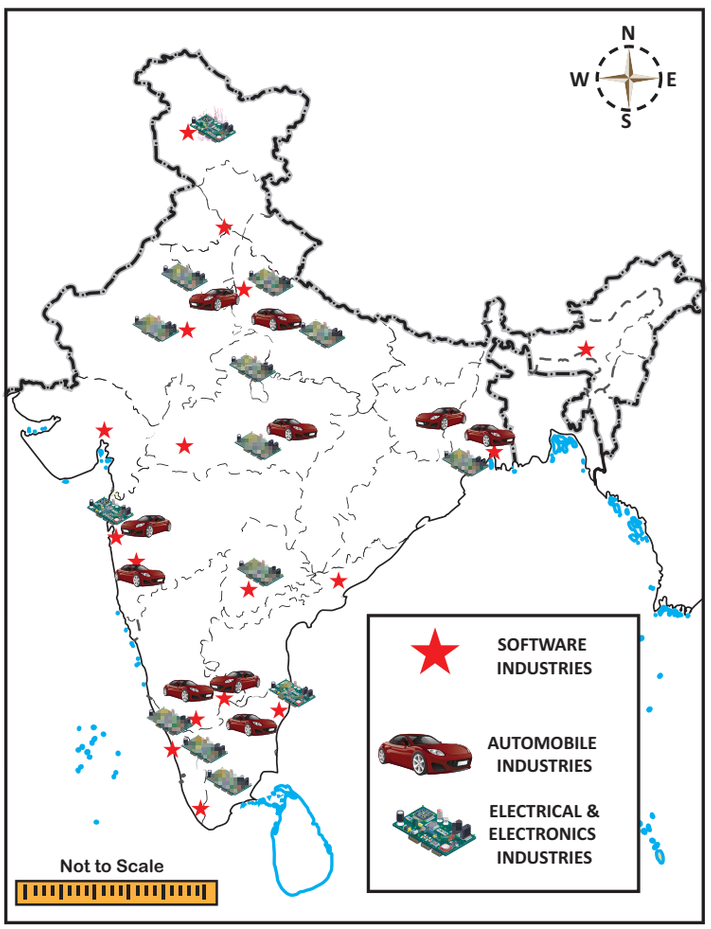
The first automobile industry of India was started in 1947. The industry is the Premier Automobiles Ltd located at Kurla (Mumbai). It was followed by the Hindustan Motors Ltd at Uttarpara (Kolkata) in 1948. At present, India is the 7th largest producer of automobile manufacturers which include two wheelers, commercial vehicles, passenger car, jeep, scooty, scooters, motor cycles, mopeds and three wheelers. Major centres are at Mumbai, Chennai, Jamshedpur, Jabalpur, Kolkata, Pune, New Delhi, Kanpur, Bengaluru, Sadara, Lucknow and Mysuru.

Chennai is nicknamed as the "Detroit of Asia" due to the presence of major automobile manufacturing units and allied industries around the city.

Tata Motors, Maruti Suzuki, Mahindra & Mahindra and Hindustan Motors are the largest passenger car manufacturers of Indian companies in the country. Presence of foreign car companies such as Mercedes Benz, Fiat, General Motors, Toyota and the recent entry of passenger car manufacturers BMW, Audi, Volkswagen and Volvo makes the Indian automobile sector a special one. Tata Motors, Ashok Leyland, Eicher Motors, Mahindra & Mahindra and Ford Motors are the major Indian companies which manfacture commercial vehicles. MAN, ITEC, Mercedes-Benz, Scania and Hyundai are the foreign companies engage in the manfacture of commercial vehicles. Two-wheeler manufacturing is dominated by Indian companies like Hero, Bajaj Auto and TVS.

S.No	Name of Industry	Place	Establishment Year	Product
1	Tata Iron and Steel Company(TISCO)	Jamshedpur, Jharkhand	1911	Pig Iron
2	Indian Iron and Steel Company (IISCO)	Burnpur,Hirapur, Kulti, West Bengal	1972	Pig Iron & Crude steel
3	Visweshwaraya Iron Steel Ltd(VISL)	Bhadravati,Karnataka	1923	Alloy and Sponge steel
4	Hisdustan Steel Ltd (HSL) Collaborated with Russia	Bhilai, Chattisgarh	1957	Railway Equipments and Ship Building
5	Hindustan Steel Ltd(HSL) Collaborated with Germany	Rourkela,Odisha	1965	Hot and Cold rolled sheets, Galvanized sheets and electrical plates
6	Hindustal Steel Ltd(HSL) Collaborated with United kingdom	Durgapur,West Bengal	1959	Alloy steel, Construction materials and railway equipments
7	Hisdustan Steel Ltd(HSL) Collaborated with Russia	Bokaro, Jharkhand	1972	Sludge and Slog
8	Salem Steel Ltd	Salem, Tamil Nadu	1982	Stainless Steel
9	Vijayanagar Steel Plant	Tornagal,Karnataka	1994	Flat steel and Long Steel
10	Visakhapatnam Steel Plant(VSP)	Visakhapatnam, Andhra Pradesh	1981	Hot Metal

MAJOR ELECTRICAL & ELECTRONICS, SOFTWARE AND AUTOMOBILE INDUSTRIES IN INDIA



Electrical and Electronic Industries

Heavy electrical industries manufacture equipment used for power generation, transmission and utilization. Turbines for steam and hydro power plants, boilers for thermal power plants, generators, transformers, switch gears etc. are the chief products of this industry. The most important company in the field of heavy electrical is Bharat Heavy Electricals Ltd (BHEL). It has its plants at Hardwar, Bhopal, Hyderabad, Jammu, Bengaluru, Jhansi and Tiruchirappalli. This Industry covers a wide range of products including television sets, transistor sets, telephone exchanges, cellular telegram, computers and varied equipments for post and railway, defence and meteorological department.

Bengaluru is the largest producer of electronic goods in India, hence it is called as the "Electronic Capital of India". The other major producers of electronic goods centers are Hyderabad, Delhi, Mumbai, Chennai, Kolkata, Kanpur, Pune, Lucknow, Jaipur and Coimbatore.

Make in India program was launched in 2014 to put India on the world map as a major hub for global design and manufacturing.

Software Industry

India is home to some of the finest software companies in the world. The software companies in India are reputed across the globe for their efficient IT and business related solutions. The Indian Software Industry has brought about a tremendous success for the emerging economy.

In India, software industry began in 1970 with the entry of Tata Consultancy Services (TCS). Along with this, L & T, Infotech, i-Flex, Accenture, Cognizant, GalexE Solutions India Pvt Ltd and ITC Infotech are the major software industries in the country. At present, there are more than 500 software companies all over India. It exports software service to nearly 95 countries in the world.

The main centres of IT parks are located in Chennai, Coimbatore, Thiruvananthapuram, Bengaluru, Mysuru, Hyderabad, Visakhapatnam, Mumbai, Pune, Indore, Gandhi Nagar, Jaipur, Noida, Mohali and Srinagar.

Major challenges of Indian Industries

Industries in India face many problems. Some major problems are listed below.

- Shortage and fluctuation in Power Supply.
- Non- availability of large blocks of land.
- Poor access to credit.
- High rate of interest for borrowed loan.
- Non- availability of cheap labourers.
- Lack of technical and vocational training for employees.
- Inappropriate living conditions nearby industrial estates.

Challenges of Indian Industries

SUMMARY

- Natural resource - raw materials obtained naturally from the earth.
- Renewable resource – the resources that can be replenished.
- Non renewable resource - the energy that cannot be replenished easily.
- Agro based industry – the industries that depend on agriculture for their raw materials.
- Mineral based industries – the industries that use minerals as raw materials.
- Forest based industries – the industries run with the help of forest products.

EXERCISE

Q47YCF

I Choose the correct answer

1. Manganese is used in_____.
   a) Storage batteries
   b) Steel Making
   c) Copper smelting
   d) Petroleum Refining
2. The Anthracite coal has _____.
   a) 80 to 95% Carbon
   b) Above 70% Carbon
   c) 60 to 70% Carbon
   d) Below 50% Carbon
3. The most important constituents of petroleum are hydrogen and
   a) Oxygen b) Water
   c) Carbon d) Nitrogen
4. The city which is called as the Manchester of South India is
   a) Chennai b) Salem
   c) Madurai d) Coimbatore
5. The first Nuclear Power station was commissioned in
   a) Gujarat b) Rajasthan
   c) Maharashtra d) Tamil nadu
6. The most abundant source of energy is
   a) Bio mass b) Sun
   c) Coal d) Oil
7. The famous Sindri Fertilizer Plant is located in
   a) Jharkhand b) Bihar
   c) Rajasthan d) Assam
8. The nucleus for the development of the chotanagpur plateau region is
   a) Transport
   b) Mineral Deposits
   c) Large demand
   d) Power Availability

II Match the following

1.	Bauxite	-	Cement
2.	Gypsum	-	Aircraft
3.	Black Gold	-	Electrical goods
4.	Iron ore	-	Coal
5.	Mica	-	Magnetite

III Answer the following Questions briefly

1. Define the resource and state its types.
2. What are minerals and state its type?
3. State the uses of magnesium.
4. What is natural gas?
5. Name the different types of coal with their carbon content.
6. Mention the major areas of jute production in India.

7. Name the important oil producing regions of India.

IV Distinguish between

1. Renewable and non-renewable resources.
2. Metallic and non-metallic minerals.
3. Agro based industry and mineral based industry.
4. Jute industry and sugar industry.
5. Conventional energy and non- conventional energy.

V Answer the following in a paragraph

1. Write about the distribution of cotton textile industries in India.
2. Describe the major challenges of Indian industries.

VI On the outline map of India mark the following

1. Iron ore production centres.
2. Centres of Petroleum and Natural Gas production.
3. Coal mining centres.
4. Areas of cultivation of cotton.
5. Iron and Steel industries.

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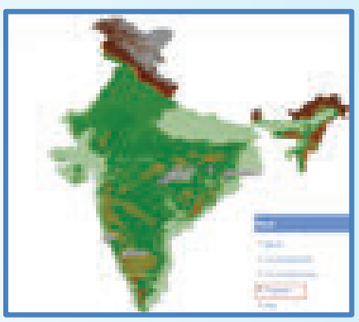
ICT CORNER

India - Resources and Industries

Visit **school Bhuvan?**

School Bhuvan visualizes natural resources, environment and their sustainable development in India.



Steps

- Open the Browser and type the URL given below (or) Scan the QR Code
- Scroll Down and click on 'Explore'
- Click on **'Thematic Serious 2'** in top menuandSelect **'Mineral'**

Website URL:

https://bhuvan-app1.nrsc.gov.in/mhrd_ncert/

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Unit - 5

India - Population, Transport, Communication & Trade

Learning Objectives

- To understand the growth and distribution of population in India
- To know about the Human Development in India.
- To learn the transport systems of India.
- To understand the communication system of India.
- To assess the nature of trade in India.

4PNC5Y

Introduction

The study on human population is one of the most important aspects in geography of any region. The human population has many components but the most fundamental are its number, composition, distribution and density. Therefore, it is essential to study these components. The study on these aspects also would reveal the workforce of the country.

5.1 Population

The total number of people residing in a country at a specified period of time is called the **'Population'** of that country. India is the second most populous country in the world next only to china. India covers only 2.4 percent of the land area of the world, but is the home of about 17.5 percent of the world's population. It shows that the proportion of population of India is far higher than the proportion of its area. Thus, a little more than one out of every six persons in the world is from India.

Census

Population census is the total process of collecting, compiling, analysing or otherwise disseminating demographic, economic and social data pertaining, at a specific time, of all persons in a country or a well-defined part of a country. It happens in an interval of ten years. The data collected through the census are used for administration, planning, policy making as well as management and evaluation of various programmes by the government.

DO YOU KNOW?

In India the first census was carried out in the year 1872. But the first complete and synchronous census was conducted in 1881. And the 2011 census represents the fifteenth census of India.

Distribution and Density of Population

The term **'Population Distribution'** refers to the way the people are spaced over the earth's surface. The distribution of population in India is quite uneven because of the vast variation

in the availability of resources. Population is mostly concentrated in the regions of industrial centres and the good agricultural lands. On the other hand, the areas such as high mountains, arid lands, thickly forested areas and some remote corners are very thinly populated and some areas are even uninhabited. Terrain, climate, soil, water bodies, mineral resources, industries, transport and urbanization are the major factors which affect the distribution of population in our country.

Uttar Pradesh is the most populous state in the country with a population of 199.5 million followed by Maharashtra (112.3 million), Bihar (103.8 million) West Bengal (91.3 million) and the combined Andhra Pradesh and Telangana (84.6 million). These five states account for about half of the country's population. Sikkim is the least populous state of India(0.61 million). Delhi with 16.75 million population tops among the Union territories.

The uneven distribution of population in the country is the result of several factors such as physical, socio-economic and historical ones. The physical factors include relief, climate, water, natural vegetation, minerals and energy resources. Socio-economic factors consists of the religion, culture, political issues, economy, human settlements, transport network, industrialization, urbanization, employment opportunity etc.

Density of population

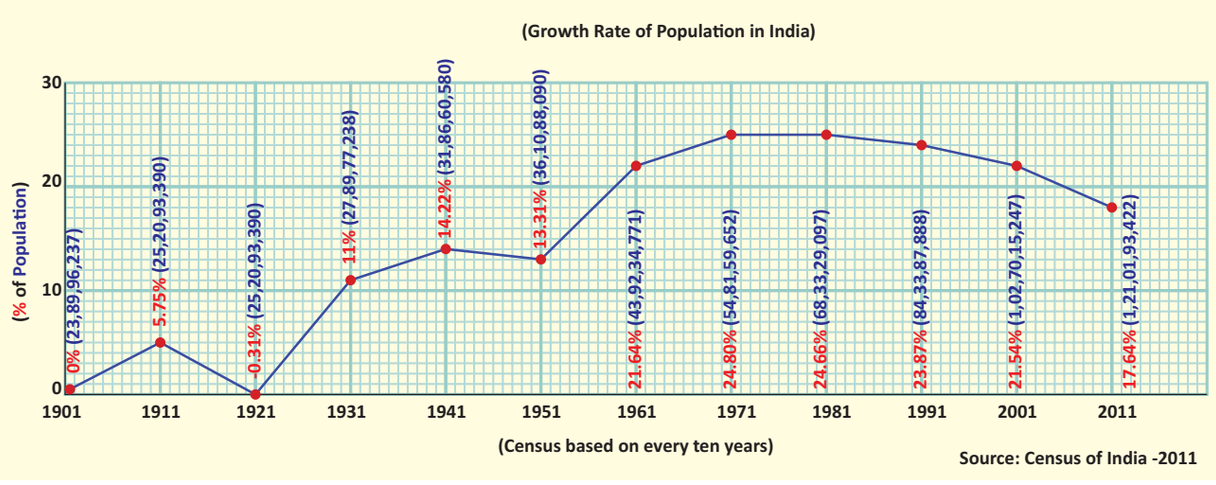
It is expressed as number of persons per sq km. According to 2011, the average density of population of India is 382 persons per sq.km. India is one of the most thickly populated ten countries of the world. The most densely populated state of India is Bihar and the state with least population density is Arunachal Pradesh. Among the union territories, Delhi is the densely populated one with 11,297 per sq.km, while Andaman and Nicobar Islands have the lowest density of population.

Population Growth and Change

Population change refers to an increase or decrease of population of an area from one period to another period. Population growth is influenced by the birth rate, death rate and migration. These three make the changes in population.

Birth rate refers to the number of live births per thousand people in a year and the Death rate refers to the number of deaths per thousand people in a year. The rapid decline in death rate is the major cause of the rapid growth of population in India.

The following table shows the decadal growth rate of population from 1901 to 2011.



5.2 Migration

It is the movement of people across regions and territories. It can be internal (within a country) or international (between the countries). Internal migration does not change the size of population of a country but it influences the distribution of population in a nation. It plays an important role in changing the composition and distribution of population. In India, the mass migration is from rural to urban. Unemployment and under employment in the rural areas are the push factors and the employment opportunity and higher wages in the urban areas caused by the industrial development are the pull factors of migration in the country.

Population composition

Population composition refers to the characteristics such as age, sex, marital status, caste, religion, language, education, occupation etc. The study of composition of population helps us to understand the social, economic and demographic structure of population.

Age composition

The age composition of population refers to the number of people in different age groups in a country. Population of a nation is generally grouped in to three broad categories. In India, the children who has less than 15 years of age constitute 29.5% and the people above 60 years constitute 8.0%. So, the dependent population in India is 37.5%and the independent population (16-59 yrs) is 62.5%. It shows that our country has enormous manpower.

Sex Ratio

Sex ratio is defined as the number of females per 1000 male population.

> The sex ratio in our country is always unfavourable to females. Give reasons.

According to 2011 census, the sex ratio of the country is 940 females per 1000 males. This suggests that the size of female population is lower than males. It is 1084 in Kerala and 1038 in Puducherry. The lowest sex ratio is recorded in the union territory of Daman and Diu(618).

Literacy Rate

The people who are able to read and write are known as **literates**. It is an important indicator of quality of people. The percentage of literate people to the total population is termed as **literacy rate**. There has been a steady improvement in the literacy levels in India. India's literacy rate as per 2011 census is 74.04%. From this, the literacy rate of male is 82.14% and the female is 65.46%. It shows that still there is a vast gap (16.68%) between the male and female literacy rates. Kerala ranks first in the country with a literacy rate of 93.91% followed by union territory Lakshadweep with 92.28%. The lowest literacy rate is found in Bihar (63.82 %).

Occupational structure

The economically active part of a country's population is enumerated during the census operations and stated as workers. Workers are placed under three fold categories in census record. They are main workers, marginal workers and non-workers. According to the Census of India, all those who had worked for the major part of the preceding year (at least 6 months or 183 days) are recorded as main workers. Those who worked for less than six months are recorded as marginal workers and the people who have not worked at all comes under non workers.

Population Dynamics

Human population dynamics is a field that tracks factors related to changes in the size of population and its characteristics. Predicting population changes is an important aspect of population studies.

Problems of over Population

In India, growing pressure of Population on resource base, created many socio-economic, cultural, political, ecological and environmental problems. The Population problems vary in space and time and differ from region to region. Some of the major

issues created by the overpopulation in our country are overcrowding, unemployment and under employment, low standard of living, malnutrition, mismanagement of natural and agricultural resources, unhealthy environment etc.

5.3 Urbanization

The process of society's transformation from rural to urban is known as urbanization.

IB4PYH

Urbanization in India

The level of urbanization is measured in terms of percentage of urban population.

Goa is the most urbanized state. Himachal Pradesh is the least urbanized state. Among the Union territories, Delhi is the most urbanized region followed by Chandigarh. Among the major states, Tamil Nadu continues to be the second most urbanized state with 48.4% percent of urban population followed by Kerala and Maharashtra.

Impact of Urbanization

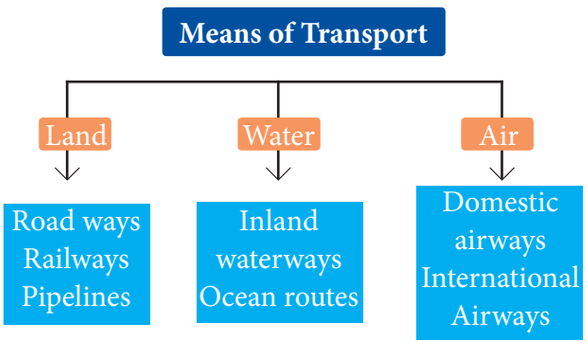
Urbanization and population concentration go hand – in – hand and are closely related to each other. Rural to urban migration leads to population explosion in urban areas. Metropolitan cities like Mumbai, Kolkata and Delhi have more population than that can accommodate.

The following are the **major problems of urbanization** in India.

- It creates urban sprawl.
- It makes overcrowding in urban centres.
- It leads to shortage of houses in urban areas.
- It leads to the formation of slums.
- It increases traffic congestion in cities.
- It creates water scarcity in cities.
- It creates drainage problem.
- It poses the problem of solid waste management.
- It increases the rate of crime.

5.4 Transportation

Transport is a system in which passengers and goods are carried from one place to another. Transport system is considered as the **lifeline of a country**. Earlier man travelled on foot or used animals for transport. With the discovery of wheel, transport was made easier and gradually different means of transport were developed. There are three major means of transport in the world.



Roadways

Roads play an important role in carrying goods and passengers for short, medium and long distances. It is highly suitable for short distance services. It is comparatively easy and cheap to construct and maintain roads. Road transport system can establish easy contact between farms, fields, factories and markets and can provide door to door transport services. Roads are the most universal mode of transport. Indian roads are cost efficient. It is used by all sections of people in the society.

In India the densest road network is found in the northern plains where it is relatively

DO YOU KNOW?

Shershah suri built the shahi (Royal) road to strengthen and consolidate his empire from the Indus valley to the Sonar valley in Bengal. This road from Kolkata to Peshawar was renamed as **Grand Trunk**(GT) road during the British period. At present, it extends from Amristar to Kolkata.

easy to construct roads. In mountainous area, it is quite difficult to construct roads. Road density is the highest in Kerala and lowest in Jammu &Kashmir.

For the purpose of construction and maintenance, roads are classified into National Highways (NH), State Highways (SH), District Roads, Rural Roads (Village roads), Border Roads and International Highways.

1. Classification of Roads in India

a) National Highways (NH)

National Highways form the most important system of road transportation in India. These highways are running through length and breadth of the country connecting capitals of states, major Ports, rail junctions, industrial and tourist centres. Ministry of Road Transport and Highways of India, is responsible for the development and maintenance of National Highways in India. The longest National highway is NH-44 which runs from Varanasi in Uttar Pradesh to Kanniyakumari in Tamil Nadu covering a distance of 2369 km. The shortest national highway is NH-47A, which runs from Ernakulum to Kochi port (Willington Island) covering a distance of 6 km.

National Highways Authority of India (NHAI) was established in 1995. It is an autonomous body under the Ministry of Surface Transport.

b) State Highways

The state highways are usually roads that link important cities, towns and district headquarters within the state and connect them with national highways or highways of neighbouring states. These roads are administered and financed by state governments.

c) District Roads

District Roads provide connectivity between the district and taluk headquarters with the state highways and national highways. District Roads are constructed and maintained by the Public Works Department of the states.

d) Rural Roads (Village Roads)

These roads are vital for providing links in the rural areas. It links the different villages with their neighbouring towns. They are maintained by Village Panchayats.

e) Border Roads

These are the roads of strategic importance in border areas. They are constructed and maintained by Border Roads Organization. It was established in 1960 for the development of the roads of strategic importance in the northern and northeastern border areas. Border Roads Organization has constructed world's highest road joining Chandigarh and Leh in Ladakh. This road runs at an average altitude of 4,270 meters.

f) Golden Quadrilateral

Golden Quadrilateral 5,846 km long road of 4/6 lanes connects, India's four metropolitan cities: Delhi-Kolkata-Chennai-Mumbai-Delhi. This project was launched in 1999.

Hots

What are the highlights and benefits of the Golden Quadrilateral Highways?

g) North–South and East-West Corridors

North-South corridor aims at connecting Srinagar in Jammu and Kashmir with Kaniyakumari in Tamil Nadu (including Kochi-Salem Spur) with 4,076km long road.

India - Roadways

The East-West corridor has been planned to connect Silchar in Assam with the port town of Porbandar in Gujarat with 3,640km of road length. The two corridors intersect at Jhansi.

h) Expressways

These are multi-lane good quality highways for high speed traffic. Some of the important expressways are; (i)Mumbai-Pune Road, (ii) Kolkata-Dumdum Airport road (iii) Durgapur-Kolkata road and (iv) Yamuna expressway between Delhi and Agra.

Mumbai-Pune Road

i) International Highways

These are the roads that link India with neighbouring countries for promoting harmonious relationship with them. These highways have been constructed with an aid from world bank under an agreement with the Economic and Social Commission for Asia-Pacific (ESCAP). These roads connect important highways of India with those of the neighbouring countries such as Pakistan, Nepal, Bhutan, Bangladesh and Myanmar.

Railways

Indian railway system is the main artery of the country's inland transport. Railways cater to the needs of large scale movement of traffic, both for freight and passenger, thereby contributing to economic growth. Railways are considered as the backbone of the surface transport system of India. It promotes national integration by bringing people together. It also promotes trade, tourism, education etc. Railways help in the commercialization of the agriculture sector by facilitating the bulky movement of perishable goods. Its role in transporting raw materials to industries and finished goods to markets is invaluable. Indian railways network is the largest in Asia and second largest in the world.

For operations and management, the Indian Railways is organized into 17 zones.

S. No.	Zone	Headquarters
1.	Northern Railway	New Delhi
2.	North-Western Railway	Jaipur
3.	North-Central Railway	Allahabad
4.	North-Eastern Railway	Gorakhpur
5.	North-East Frontier Railway	Guwahati
6.	Eastern Railway	Kolkata
7.	East coast Railway	Bhubaneswar
8.	East-Central Railway	Hazipur
9.	West-Central Railway	Jabalpur
10.	Central Railway	Mumbai (VT)
11.	Western Railway	Mumbai (Churchgate)
12.	Southern Railway	Chennai
13.	South-Central Railway	Secunderabad
14.	South Eastern Railway	Kolkata
15.	South-Western Railway	Hubball
16.	South East Central Railway	Bilaspur
17.	Konkan Railway	Navi Mumbai

On the basis of width of the track, the Indian railways fall under four categories.

1. Broad gauge (1.676 meter width)
2. Meter gauge (1 meter width)
3. Narrow gauge (0.762 meter width)
4. Light gauge (0.610 meter width)

DO YOU KNOW?

- The first sub-urban railway was started in 1925 in Mumbai.
- Gatiman Express is the fastest operational train in India. This train connects New Delhi and Agra and touches 160 km/h.

a) Metro Railways in India

There are 8 cities with metro rail connectivity in India. They are Kolkata (West

Bengal), Chennai (Tamil Nadu), Delhi, Bengaluru (Karnataka), Gurgaon (Haryana), Mumbai (Maharashtra), Jaipur (Rajasthan) and Kochi (Kerala). The metro in Kolkata is the first one in India. It is also called as Mass Rapid Transit System (MRTS). As of September 2018, India has 507 km of operational metro lines and 381 stations.

DO YOU KNOW?

The state of Meghalaya has no railway network.

Pipeline transport

Pipelines provided a very convenient mode of transport to connect oil and natural gas fields, refineries and to the markets. In the past, these were used to transport water to cities and industries. Now solids can also be transported through a pipeline when converted into slurry. The initial cost of laying pipeline is high but subsequent running cost is minimum. It can be laid through difficult terrain as well as under water. It ensures steady supply of goods and reduces the transshipment losses and delays.

Oil field in upper Assam to Kanpur, from Salaya in Gujarat to Jalandhar in Punjab and gas pipeline from the Hazira in Gujarat ot Jagadispur in Uttar Pradesh.

Waterways

A waterway is an important mode of transport for both passenger and cargo traffic in India. It is the oldest and also the cheapest means of transport and most suitable for carrying heavy and bulky materials from one country to another. It is a fuel-efficient and eco-friendly mode of transport. The water transport is of two types-

1. Inland Waterways
2. Ocean water ways(sea routes).

a) Inland Waterways

India has an extensive network of inland waterways in the form of rivers, canals, lakes and backwaters. It depends upon the depth and width of the waterways and the continuity of the water flow. For the development, maintenance and regulation of national waterways in the country, the Inland water ways Authority was setup in 1986.

The major national waterways are:

National Waterway 1

It extends between Haldia and Allahabad, measures 1620 km and includes the stretches of the Ganga-Bhagirathi-Hooghly river system.

National Waterway 2

This waterway includes the stretch of the Brahmaputra river between Dhubri and Sadiya a distance of 891 km.

National Waterway 3

This waterway extends between Kollam and Kottapuram in the state of Kerala. It is the first national waterway in the country with 24 hour navigation facilities along its entire stretch of 205 km.

b) Oceanic Routes

Oceanic routes play an important role in the transport sector of India's economy. About 95% of India's foreign trade by volume and 70 percent by value moves through ocean routes.

Coastal shipping plays an important role in transport of bulk goods in India. Shipping is not only the most economical mode of transport, it is also an environment friendly mode. The sea and oceanic routes are mainly used for international trade and are connected through ports. There are 13 major and 200 minor or intermediate ports in India. The major ports are administered by the Central Government and minor ports are managed and administered by various state governments. The major ports on the east coast are Kolkata (including Haldia Dock), Paradip, Visakhapatnam, Chennai, Ennore and Tuticorin. The major ports on the west coast are Kandla, Mumbai, Nhava Seva (Jawaharlal Nehru Port), New Mangalore, Marmagao and Kochi.

India has four major shipyards.

1. Hindustan shipyard in Vishakhapatnam
2. Garden Reach workshop in Kolkata,
3. Mazagaon Dock in Mumbai
4. Kochi Shipyard in Kochi

India is the second largest ship owning country in Asia and ranks 16th in the World.

Air Transport

Airways are the quickest, costliest, most modern and comfortable means of transport, Air transport facilitates connectivity on a national, regional and international scale. It has made accessibility easier by connecting difficult terrains like high mountains and sandy deserts. It carries passengers, freight and mail. Air transport plays a key role in times of emergency as well as in the event of natural and man-made calamities like floods, epidemics and wars.

Air transport in India made a beginning on 18th February, 1918 when Henry Piquet carried a mail from Allahabad to Naini. In 1953, eight different airlines which were in operation in the country were nationalised.

Domestic Airways fly within the boundaries of a country and **International Airways** connect major cities of the world. The Indian Air lines and Air India are the two airline services run by the government of India. **Indian Air lines** provides the domestic air services and **Air India** provides international air services. Presently, there are 19 designated international airports available in the country.

Hots

Why is air travel preferred in the north eastern states?

Pavan-Hans Helicopter Ltd

Pavan-Hans Helicopter Ltd has been providing Helicopter support services to the petroleum sector, including ONGC and oil India Ltd. It is a public sector company based in New Delhi. Its operations are based at the Juhu Aerodrome in Vile Parle (West) Mumbai. Pavan-Hans is a Mini Ratna–I category public sector undertaking. It often provides services to various state governments particularly north east India and Inter Island, Ferry services in Andaman & Nicobar Islands, services to Lakshadweep Island etc.,

Airports Authority of India (AAI)

Airports Authority of India (AAI) was constituted in 1995. It provides security to Indian Airports. AAI under the ministry of Civil Aviation is responsible for creating, upgrading, maintaining and managing civil aviation infrastructure in India.

5.5 Communication

Communication is a process that involves exchange of information, thoughts and ideas. Technology does wonders in communication fields. Communication is categorized in to personal and mass communications.

Personal Communication

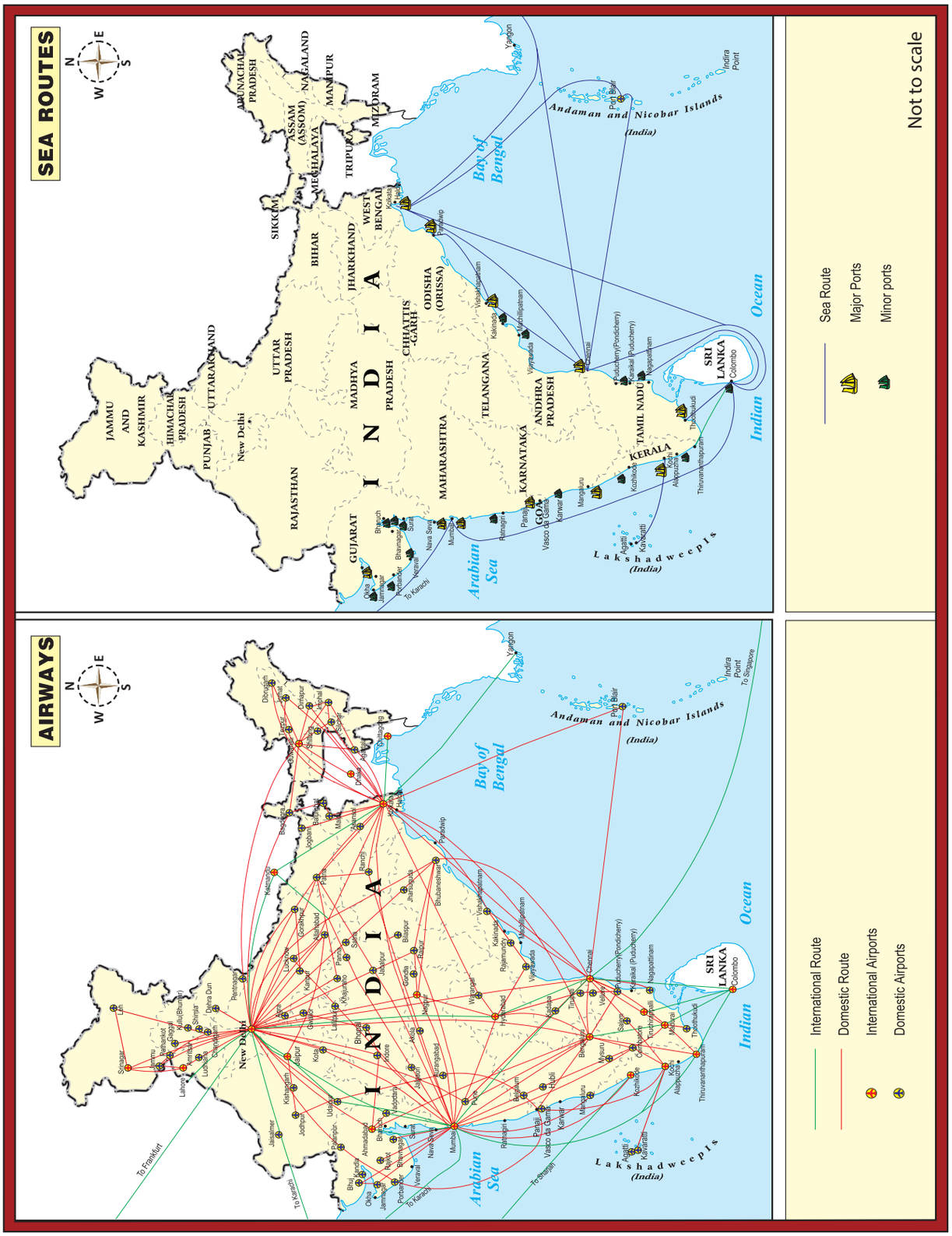
The exchange of information between the individuals is called personal communication. It includes post and telegraph services, telephone, mobile phone, short message services, fax, internet, e-mail etc. Personal Communication system enables the user to establish direct contact.

The Indian postal network is the largest in the world with 1,55,000 post offices. Of these more than 1,39,000 post offices are located in rural areas. The postal service was opened to the public in the country in 1837. The first Indian postal stamp was issued in 1852 in Karachi. Collecting and delivering mail is the primary function of the department of posts. It introduced the Quick Mail Service in 1975. The Quick Mail Service functions on the basis of the system of PIN (Postal Index Number) code which was introduced in 1972. The premium products include the Money order, e-money order, Speed Post, Express Parcel Post, Business Post, Media Post, Satellite Post, Retail Post, Greeting Post, Data Post, Speed Net and Speed Passport Services.

India has one of the largest telecommunication networks in Asia. Apart from the urban areas more than two-thirds of the villages in India have already been covered with **Subscriber Trunk Dialing (STD)** telephone facility, while International communication can be made through **ISD (International Subscriber Dialing).** There is an uniform rate of STD facilities all over India. Telephone is a form of oral communication. It is considered very essential for the growth of commerce. It is the most preferred form as it provides instant communication. Mobile phone, fax and internet are the other personal communication used in the country.

Mass Communication Systems

Mass Communication enables millions of people to get the information at the same time. It is a great way to provide education as well as entertainment. It helps in creating awareness among the people regarding various national policies and programmes. The Mass Communication Systems can provide the information to people in two methods. They are Print Media and Electronic Media.



Electronic Media: Radio broadcasting in India was started in 1923 by the Radio club of Bombay. Since then it gained immense popularity and changed the social and cultural life of people. It was named as All India Radio (AIR) in 1936 and again it was renamed as Akashwani in 1957. It broadcasts a variety of programs related to information, education and entertainment. Special news bulletins are also broadcasted on special occasions like session of parliament and state legislatures.

Television broadcasting has emerged as the most effective audio-visual medium for disseminating information and educating the masses. Television network in India is known as Doordarshan (DD) which started Common National Program (CNP) services and it is extended to the backward and remote rural areas.

Internet (contraction of **interconnected network**) is the global system of interconnected computer networks that use the Internet protocol suite to link devices worldwide. **Social media** are interactive computer-mediated technologies that facilitate the creation and sharing of information, ideas, career interests and other forms of expression via virtual communities and networks.

Print Media: Newspapers are the most common but powerful means of communication come under print media. India has many newspapers which carry information on local, national and international events to the people.

Satellite Communication

The use of Satellite in getting a continuous and synoptic view of larger area has made this communication system very vital for the country. Satellite images are used for weather forecasting, monitoring of natural calamities, surveillance of border areas etc. The communication through satellites emerged as a new era in communication in our country after the establishment of **Indian Space Research Organization (ISRO)** in 1969.

Satellite system in India can be grouped into two

1. The Indian National Satellite System (INSAT)
2. The Indian Remote Sensing Satellite System (IRS).

The INSAT, established in 1983, is a multipurpose system for telecommunication, meteorological observation and for various other programs. The INSAT series are used for relaying signals to television, telephone, radio, mobile phone. It is also useful in weather detection, internet and military applications.

The INSAT series, GSAT series, KALPANA-1, HAMSAT, EDUSAT are the major communication satellite used for communication purpose. GSAT–7A is the recent launch (December 19, 2018) for communication programs. INSAT-1B launched on 30th August 1983 is the first communication satellite in INSAT series.

5.6 Trade

Trade is an important phenomenon that decides the economic growth of a country. Trade is an act (or) process of buying, selling or exchanging of goods and services. The primitive method of trade was known as the Barter system where goods were exchanged for goods. Later on, money was introduced as a medium of exchange in buying and selling of goods. The difference in value between the imports and exports is called balance of trade. The situation in which the value of exports exceeds the value of imports is termed as favourable balance of trade and the reverse position is termed as unfavourable balance of trade.

Types of Trade

Trade in general, is of two types. They are

1. Internal trade
2. International trade

The trade carried on within the domestic territory of a country is termed as **Internal trade.** It is also called as **Domestic trade** or **Local trade.** Land transport (roadways and railways) plays a major role in this trade. Local currency is used in internal trade. It helps to promote a balanced regional growth in the country.

Trade carried on between two or more countries is called **International trade.** It is also called as external trade or foreign trade. Export and Import are two components of International trade. Export means goods and services sold for foreign currency. Import means goods and services bought from overseas producers. Waterways and Airways play a vital role in this type of trade. Foreign currency is involved in international trade. The trade between any two countries is called **Bilateral trade.** The trade between more than two countries is called **Mutilateral Trade.**

Hots

Find out the major trade blocs which are useful for multilateral trade.

Exports

The major exports of India are tea, marine products, ores and minerals, leather products, gems and jewels, sports goods, chemicals and related products, plastics and rubber articles, articles of stones, plaster, cement, asbestos, mica, glass ware, paper and related products, base metals, optical, medical and surgical instruments, electronic items, machinery, office equipments, textiles and allied products.

Imports

The major imports are petroleum products, pearls, precious stones and semi-precious stones, gold and telecom instruments.

Activity

Find out the countries which have trade realtionship with India

SUMMARY

- The total number of people residing in a country at a specified period of time is called the size of population of that country.
- The growth of population is determined by the birth rate, death rate and migration of people.
- The process of society's transformation from rural to urban is known as urbanization.
- Communication is classified into the personal and mass communications.
- Trade is an exchange of goods and services. Internal and International trades are its types. Import and exports are the components of an International Trade.

EXERCISE

WWK3S1

I Choose the correct answer

1. The scientific study of different aspects of population is called
   a) Cartography b) Demography
   c) Anthropology d) Epigraphy

2. _____ transport provides door to door services.
   a) Railways b) Roadways
   c) Airways d) Waterways.

3. The length of Golden Quadrilateral superhighways in India is
   a) 5846 km b) 5942 km
   c) 5630 km d) 5800 km

4. The National Remote sensing Centre(NRSC) is located at _____.
   a) Bengaluru b) Chennai
   c) Delhi d) Hyderabad
5. The transport useful in the inaccessible areas is
   a) Roadways b) Railways
   c) Airways d) Waterways
6. Which of the following is associated with helicopter service?
   a) Air India b) Indian Airlines
   c) Vayudoot d) Pavan Hans
7. The major import item of India is
   a) Cement b) Jewells
   c) Tea d) Petroleum

II Match the following

1	Border Road Organisation	-	Satellite communication
2	INSAT	-	Impact of Urbanization
3	Mazagaon Dock	-	1990
4	Urban sprawl	-	Mumbai
5	Konkan Railways	-	1960
		-	Hyderabad

III Answer the following Questions briefly

1. What is migration? State its types.
2. Write any four advantages of railways.
3. Write a note on Pipeline network transport in India
4. State the major Inland waterways of India
5. What is communication? What are its types?
6. Define "International trade".
7. State the merits of Roadways.

IV Distinguish between

1. Density of population and Growth of population.
2. Personal communication and mass communication.
3. Print Media and Electronic Media.
4. Roadways and Railways.
5. Waterways and Airways.
6. Internal trade and International trade.

V Answer the following in a paragraph

1. What is urbanization? Explain its problem.
2. Explain the importances of satellite communication in India.
3. Classify and explain the roadways in India.

VI On the outline map of India mark the following

1. National Highway NH-44
2. Major seaports in India.
3. Major International Airports in India.
4. Densely populated state of India.
5. State of highest literacy in India
6. Railways zones of India.

REFERENCE BOOKS

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2. Surender Singh and Jitender Saroha (2014) Geography of India, New Delhi: Access publishing
3. Census of India (2011) Provisional Population Totals, "Urban Agglomerations and Cities".

INTERNET RESOURCES

1. *www.Commerce,gov.in*
2. *www.konkan Railway.com*
3. *www.Community.data.gov.in*

Unit - 6

Physical Geography of Tamil Nadu

Learning Objectives

NTME8G

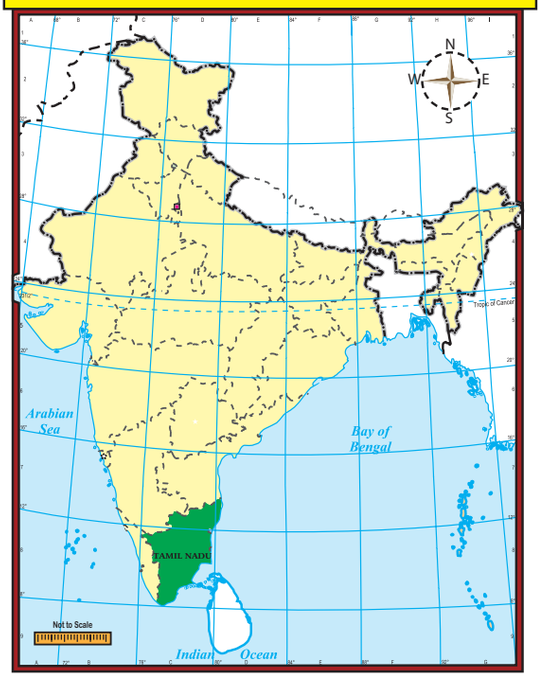
- To know the history of formation of the state
- To study the major physiographic divisions of the state
- To understand the nature of climate, soils and natural vegetation
- To familiarise the students with the geographical conditions of their living places
- To know the major natural disasters and their occurrences in Tamil Nadu

Introduction

The study of one's own region is the first step to become a global citizen. The purpose of studying our local territory is to understand life in our environment. In the last five lessons, you have learnt about various geographical characterstics of our country. In this lesson and those that follow, we shall learn about the geography of Tamil Nadu. You will get to know about the etymology, history of formation, location, size, physical divisions, rivers, climate, soil and natural vegetation of Tamil Nadu in this chapter.

Its exquisite physiography and climate makes our state unique in India. It has long and sunny beaches, waterfalls, hills, forests and varied flora and fauna.

LOCATION OF TAMIL NADU IN INDIA



DO YOU KNOW?

As per, the States Reorganisation Act, 1956, state boundaries were reorganised on some linguistic basis.

- Name the first state of India created on linguistic basis.
- Why was the capital of Tamil Nadu renamed?

6.1 Location and Size

Tamil Nadu is one of the 28 states of India, located in the southern most part of the country. It extends from 8°4'N to 13°35'N latitudes and from 76°18'E to 80°20'E longitudes. Its extremities are

- in eastern - Point Calimere
- in western - hills of Anaimalai
- in northern - Pulicat lake
- in southern - Cape Comorin

It covers an area of 1,30,058 sq.km and is the 11th largest state in India. It covers 4% of the area of our country.

Boundaries and Neighbours

Tamil Nadu is bounded by the Bay of Bengal in the east, Kerala in the west, Andhra Pradesh in the north, Karnataka in the northwest and Indian Ocean in the south. Gulf of Mannar and Palk Strait separate Tamil Nadu from the Island of Sri Lanka, which lies to the southeast of India. The state has 940 km long coastline, the second-longest in India after Gujarat.

Administrative Divisions

Already we have learnt that the state of Tamil Nadu had only 13 districts at the time of its formation. After that, the state was reorganised several times for the administrative convenience. At present there are 37 districts in Tamil Nadu, including the newly created districts such as Kallakurichi, Tenkasi, Chengalpet, Ranipet and Tirupathur. The administrative divisions of the state are given in the following table.

Activity

- Find out the coastal districts of Tamil Nadu with the help of a map.
- Mark the districts of Tamil Nadu which share their boundary with the states of Andhra Pradesh, Karnataka and Kerala separately.

Divisions	Numbers
Districts	37 (32+5)
Revenue Divisions	76
Taluks	226
Firkas	1,127
Revenue Villages	16,564
Municipal Corporations	15
Municipalities	125
Panchayat Unions (Blocks)	385
Town Panchayats	561
Village Panchayats	12,618
Lok Sabha Constituencies	39
Assembly Constituencies	234

Physiographic Divisions

Let's see the major physical features of Tamil Nadu and their characteristics.

Tamil Nadu is located on the Peninsular Plateau, known as Deccan Plateau. It is also a part of the ancient Gondwana land that broke away 135 million years ago during Cretaceous Period. Tamil Nadu is divided into the physical divisions of Western Ghats, Eastern Ghats, Plateaus, Coastal and Inland plains.

6.2 Western Ghats

Western Ghats extend from the Niligris in the north to Marunthuvazh Malai at Swamithope in Kanyakumari district in the south. Height of the Western Ghats ranges from 2,000 to 3,000 metres. It covers an area of about 2,500 sq.km. Though the Western Ghats is a continuous range, it has some passes. The passes are Palghat, Shencottah, Aralvaimozhi, and Achankoil. The Niligris, Anaimalai, Palani hills, Cardamom hills, Varusanadu, Andipatti and Agasthiyar hills are the major hills of Western Ghats .

TAMIL NADU - POLITICAL

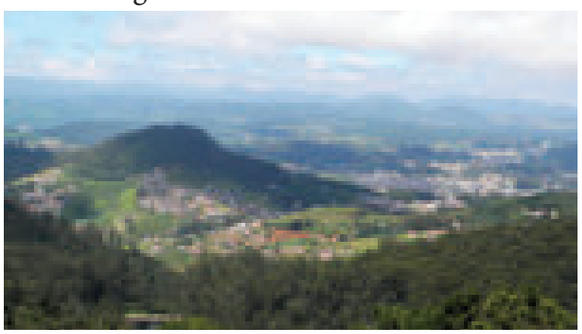
DO YOU KNOW?

All districts of Tamil Nadu except the Chennai, The Nilgiris and Kanyakumari were bifurcated at different points of time.

Between which latitude and longitude, is your school located?

Nilgiri Hills

The Nilgiri hills is located in the Northwestern part of Tamil Nadu. It consists of 24 peaks with more than 2,000 metres height. Doddabetta is the highest peak (2,637 metres) of this hills followed by Mukkuruthi (2,554 metres). Ooty and Coonoor are the major hill stations located on this hills. It has more than 2,700 species of flowering plants and the state animal Nilgiri Tahr is found in this hill.



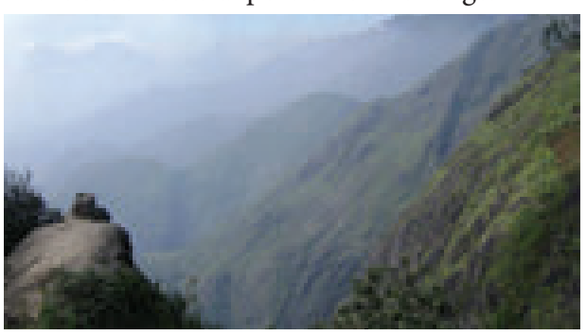
Doddabetta

Anaimalai

Anaimalai is located in the border of Tamil Nadu and Kerala. It is located to the south of Palghat Gap. Anaimalai Tiger Reserve, Aliyar Reserved Forest, Valparai hill station, Kadamparai hydroelectric Power Plant are located on this hills. Aliyar and Tirumurthy dams are located at the foothills of this range.

Palani Hills

Palani hills are the eastward extension of the Western Ghats. These hills are located in Dindigul district. Vandaravu (2,533 metres) is the highest peak in the Palani hills. Vembadi Shola (2,505 metres) is its second highest peak. The hill station of Kodaikanal (2,150 metres) lies in the south central portion of the range.



Palani Hills

Peaks in Western Ghats	Height(m)
doddabetta	2,637
Mukkuruthi	2,554
Vembadisolai	2,505
Perumalmalai	2,234
Kottaimtalai	2,019
Pagasura	1,918

Cardamom Hills

These hills are also known as Yela Mala hills located in the southwestern part of Tamil Nadu. It acquires its name from the cardamom spice, which is commonly grown here. Pepper and coffee are the other crops cultivated over the hills. They meet the Anaimalai hills in the northwest, the Palani hills in the northeast and Varusanadu and Andipatti hills in the southeast.

Varusanadu and Andipatti Hills

Another eastward extension of Western Ghats is Varusanadu and Andipatti hills. Megamalai (the highway mountain), Kalugumalai, Kurangani hill station, and Suruli and Kumbakarai waterfalls are found on these hills. Srivilliputhur Grizzled Squirrel Wild life Sanctuary is located in the southern slope of these hills in Virudhunagar district. Vaigai river and its tributaries originate in this region.

Pothigai Hills

Its major part lies in Tirunelveli district with its southern slope in the Kanyakumari district. Pothigai hills are called with different names such as the Shiva Jothi Parvath, Agasthiyar hills and Southern Kailash. These hills feature richest biodiversity in the Western Ghats. This area is known for its rich evergreen forest, waterfalls and ancient temples. Kalakkad Mundanthurai Tiger Reserve is located in this region.

Mahendragiri Hills

This continous range is situated along the border of Kanyakumari and Tirunelveli districts and is a part of the southern range of the Western Ghats. Its average height is 1,645 metres.

6.3 The Eastern Ghats

Unlike Western Ghats, Eastern Ghats is a discontinuous and irregular one. It is dissected at many places by the rivers, which drain into the Bay of Bengal. Its height ranges from 1,100 to 1,600 metres. These hills separate the plains from plateaus. Javadhu, Servarayan, the Kalrayan, Kollimalai and Pachaimalai are the major hills of the Eastern Ghats of Tamil Nadu and are located in northern districts of the state.

Javadhu Hills

Javadhu hills are an extension of the Eastern Ghats spread across parts of Vellore and Tiruvannamalai districts and separates these two districts. Many peaks with the height of 1,100–1,150 metres are located in this range. Melpattu is its highest peak. Many parts of this range are covered with bluish grey granites. It is noted for its fruit bearing trees, medicinal herbs and sandalwoods. Due to illegal logging, sandalwood trees are disappeared now.

Kalvarayan Hills

The name 'Kalvarayan' comes from the word 'Karalar', the ancient name of the present tribes. It is another major range of hills in the Eastern Ghats of Tamil Nadu. This range, along with the Pachaimalai, Aralvaimalai, Javadhu and Servarayan hills, separates the river basins of Cauvery and Palar. The height of this hill ranges from 600 to 1,220 metres.

Servarayan Hills

It is a mountain range located near the Salem city with the height ranging from 1,200 to 1,620 metres. The name of the range comes from a local deity, Servarayan. The highest peak in the southern part of the Eastern Ghats is located in this range. The peak is Solaikaradu and its height is 1,620 metres. The hill station Yercaud, which is known as poor man's Ooty, is located on this range. Servarayan temple is its highest point (1623 metres).

Peaks in Eastern Ghats	Height(m)
Shervarayan temple	1,623
Mazhamalai	1,500
Urgamalai	1,486
Kuttirayan	1,395
Muganur	1,279
Valsamalai	1,034

Why are mountain heights measured from mean sea level and not from ground level?

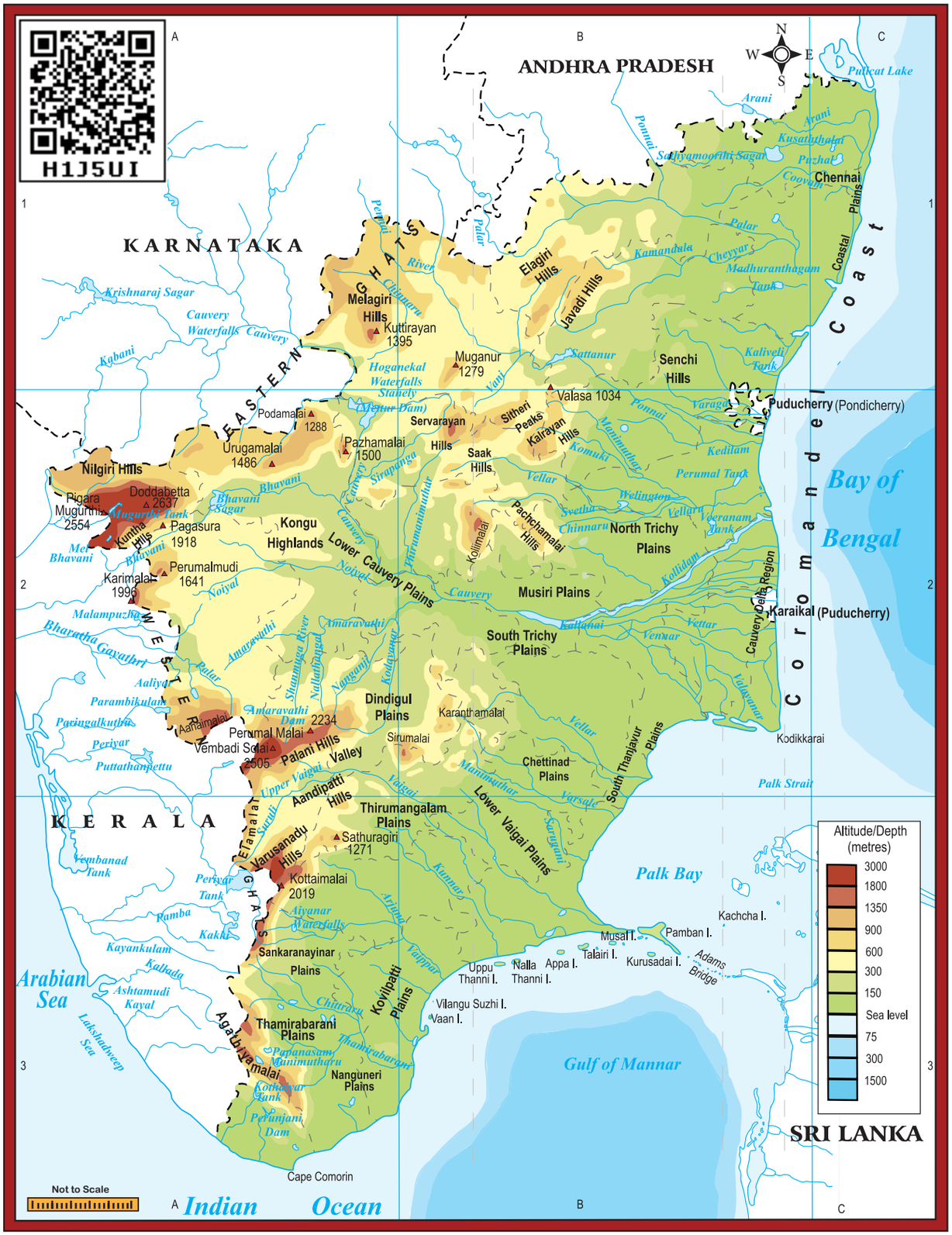
Major hills in Tamil Nadu

Districts	Hills
Coimbatore	Maruthamalai, Velliangiri and Anaimalai
Dharmapuri	Theertha malai, Chitteri and Vathalmalai
Dindigul	Pazhamalai and Kodaikanal
Erode	Chenni hills and Sivan hills
Vellore	Javadhu, Yelagiri and Rathinamalai hills
Namakkal	Kolli hills
Salem	Servarayan, Kanjamalai and Chalk hills
Kallakurichi	Kalvarayan
Villupuram	Gingee hills
Perambalur	Pachaimalai
Kanyakumari	Marunthuvazhmalai
Tirunelveli	Mahendragiri and Agasthiyarmalai
The Nilgiris	Nilgiri hills

Kolli Hills

It is a small mountain range located in Namakkal district. It covers an area of about 2,800 sq.km. It rises up to 1300 metres. This is a mountain range that runs almost parallel to the east coast of South India. Arpaleeswarar temple located on this range is an important pilgrim centre. It has the largest cover of evergreen or shola forest when compared to other parts of the Eastern Ghats. Several coffee plantations, fruits, flowers and silver-oak estates are found in this region.

TAMIL NADU - PHYSICAL



Pachaimalai

It is the lowest hill range, spreads over the districts of Perambalur, Tiruchirapalli and Salem. In Tamil language, pachai means green. The vegetation in this range is greener than the vegetative cover of the other hills in this region. Hence it is named as '**Pachai malai**'. Jackfruit is a popular seasonal agricultural product of this hills.

6.4 Plateaus

Plateaus of Tamil Nadu are located between the Western Ghats and the Eastern Ghats. It is roughly triangular in shape and covers an area of about 60,000 sq.km.

Bharamahal plateau is a part of the Mysore plateau situated in the northwestern part of Tamil Nadu. Its height ranges from 350 to 710 metres. Dharmapuri and Krishnagiri districts are located in this region.

Coimbatore plateau lies between the Nilgiris and Dharmapuri districts. Its height varies from 150 to 450 metres. This region includes Salem, Coimbatore and Erode districts. Moyar river separates this plateau from the Mysore plateau.

Rivers like Bhavani, Noyyal and Amaravathi, which originate from Western Ghats, form valleys in this region. Many intermontane plateaus are found in the region of the Nilgiris. Sigur plateau is one such plateau.

Madurai plateau found in Madurai district extends up to the foothills of the Western Ghats. Vaigai and Thamirabarani basins are located in this zone.

6.5 Plains

The plains of Tamil Nadu may be divided into two, namely

1. Inland plains
2. Coastal plains

Inland plains are drained by the rivers Palar, Ponnaiyar, Cauvery and Thamirabarani. Cauvery plains is one of the most important fertile plains of the state. The plains of Cauvery is found in Salem, Erode, Karur, Tiruchirapalli, Pudukottai, Thanjavur, Tiruvarur and Nagapattinam districts.

Coastal plains of Tamil Nadu are also called Coromandel or Cholamandalam (land of Cholas) plain, which extends from Chennai to Kanyakumari. It is formed by the rivers that flow towards east drain in the Bay of Bengal. It is more than 80 kilometres wide at some places. Though it is an emerged coast, some parts are submerged into the sea. The sand dunes formed along the coast of Ramanathapuram and Thoothukudi districts are called **Teri**. Coral rocks are found at the head of Gulf of Mannar in the east coastal plain.

Beaches

The Coromandel Coast along the Bay of Bengal consists of many beautiful and exotic beaches. The golden sands of Tamil Nadu beaches are scattered with palm and casuarinas groves. Marina and Elliot beaches of Chennai, Kovalam beach in Kanchipuram and Silver beach in Cuddalore are some of the famous beaches in Tamil Nadu.

6.6 Drainage

Rivers of Tamil Nadu are its lifeline. Though it has many rivers, the rivers of Cauvery, Palar, Ponnaiyar, Vaigai and Thamirabarani are the notable ones. Most of the rivers of Tamil Nadu originate from Western Ghats and flow towards east and drain into the Bay of Bengal. All the rivers of the state are non-perennial except Thamirabarani. It is perennial as it is fed by both the southwest and northeast monsoons.

Cauvery

The river Cauvery originates at Talacauvery in the Brahmagiri hills of Kodagu(coorg) district of Karnataka in the Western Ghats. Total length of Cauvery river is 805 km. About 416 km of its course falls in Tamil Nadu. It serves as the boundary between Karnataka and Tamil Nadu for a distance of 64 km. It forms Hogenakkal waterfalls in Dharmapuri district. Mettur Dam, also called

as the Stanley Reservoir, is located across this river in Salem district. A tributary called Bhavani joins Cauvery on the right bank about 45 km from the Mettur Reservoir. Thereafter, it takes easterly course to enter into the plains of Tamil Nadu. Two more tributaries, Noyyal and Amaravathi, confluence the river on the right bank at Thirumukkudal 10 km from Karur. The river is wider in this region, where it is called as 'Agandra Cauvery'.

In Tiruchirappalli district, the river branches into two parts. The northern branch is called Coleroon or Kollidam and the southern branch remains Cauvery. From here, the Cauvery delta begins. After flowing for about 16 km, the two branches join again to form the '**Srirangam Island**'. The Grand Anaicut, also called as Kallanai was built across the river Cauvery. After Kallanai, the river breaks into a large number of distributaries and forms a network all over the delta. The network of distributaries within the delta of Cauvery in the coast is called as the '**Garden of Southern India**'. It merges into Bay of Bengal to the south of Cuddalore.

DO YOU KNOW?

Pamban, Hare, Krusadai, Nallathanni Theevu, Pullivasal, Srirangam, Upputanni, Island Grounds, Kattupalli Island, Quibble Island and Vivekananda Rock Memorial are some major islands of Tamil Nadu

Palar

The Palar river rises beyond Talagavara village in the Kolar district of Karnataka. The Palar drains an area of 17,871 sq.km, out of which nearly 57% lies in Tamil Nadu and the rest in the states of Karnataka and Andhra Pradesh. Ponnai, Goundinya Nadhi, Malattar, Cheyyar and Kiliyar are its major tributaries. Its total length is 348 km, out of which 222 km of its course falls in Tamil Nadu. It flows through the districts of Vellore and Kancheepuram before entering into Bay of Bengal near Kuvattur.

Then Pennaiyar/Then Ponnaiyar

It originates from the eastern slope of Nandi Durga hills in eastern Karnataka. It drains an area of 16,019 sq.km, of which nearly 77% lies in Tamil Nadu. It flows for a distance of 247 km in the southeasterly direction in the districts of Krishnagiri, Dharmapuri, Vellore, Tiruvannamalai, Cuddalore and Villupuram. It branches into two, viz. Gadilam and the Ponnaiyar near Tirukoilur Anaicut. Gadilam joins the Bay of Bengal near Cuddalore and Ponnaiyar near the Union Territory of Puducherry. Chinnar, Markandanadhi, Vaniar and Pambar are its tributaries. Heavy rain at the river's source cause sudden but short-lived floods. The river is extensively dammed for irrigation, especially in Tamil Nadu. There are reservoirs at Krishnagiri and Sathanur across this river. The **Ponnaiyar** is considered sacred by Hindus and festivals are held during the Tamil month of Thai (January–February).

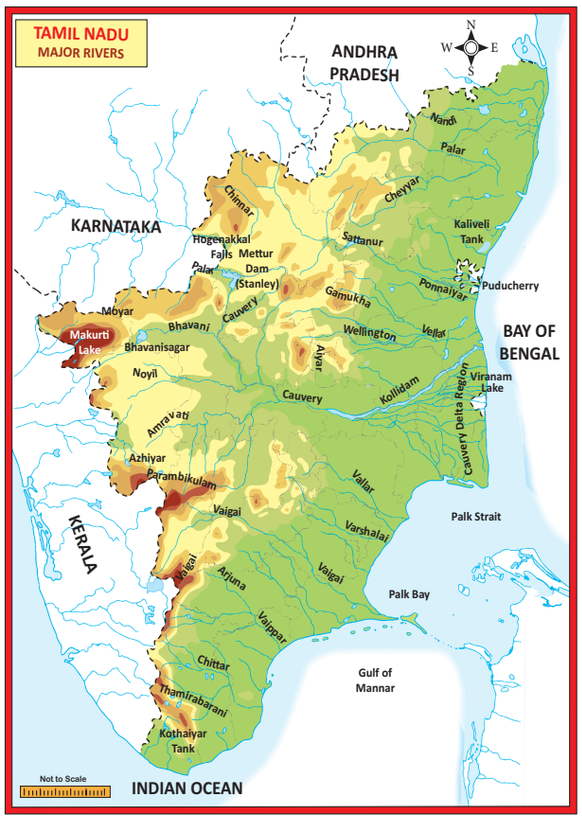
Vaigai

Vaigai river rises from the eastern slopes of the Varusanadu hills of Western Ghats of Tamil Nadu. It drains an area of 7,741 sq.km, which lies entirely in the state of Tamil Nadu. It flows through the districts of Madurai, Sivaganga and Ramanathapuram. Its length is 258 km. It discharges its water into the Ramnad Big Tank and some other small tanks. The surplus water from the tanks is finally discharged into Palk Strait near Ramanathapuram.

Thamirabarani

The name is interpreted as Thamiram (copper) and Varuni (streams of river). The water of this river gives a copper like appearance due to the presence of dissolved suspended red soil. It originates from a peak in Pothigai hills on the Western Ghats above Papanasam in the Ambasamudram taluk. The origin of the river is associated with Sage Agasthiyar. It courses through the districts of Tirunelveli and Thoothukudi and finally flow into the Bay of Bangal near Punnaikayal in Thoothukudi district. Karaiyar, Servalar, Manimuthar, Gadananathi, Pachaiyar, Chittar

and Ramanathi are its main tributaries. It is the only perennial river in South India.



Major waterfalls in Tamil Nadu

District	Waterfalls
Dharmapuri	Hogenakkal
Thirunelveli	Kalyanatheertham, Courtallam
Theni	Kumbakkarai and Suruli
Namakkal	Agayagangai
The Nilgiri	Catherine and Pykara
Salem	Kiliyur
Virudhunagar	Ayyanar
Coimbatore	Vaideki, Sengupathi, Siruvani and Kovaikutralam
Tiruppur	Tirumurthy
Madurai	Kutladampatti
Kanyakumari	Tirparappu, Kaalikesam, Ulakkai and Vattaparai

6.7 Climate

You have already learnt that the Tropic of Cancer divides India roughly into two equal parts and the state Tamil Nadu lies to the south of Tropic of Cancer, which is near the Equator. As it receives vertical sunrays, the temperature of the state is relatively high throughout the year. Though the state falls within the hot climatic zone, the east coast of Tamil Nadu enjoys tropical maritime climate. The Bay of Bengal and Indian Ocean influence the climate of the coastal regions.

While the east coast experiences tropical maritime climate, the western region of the state enjoys the mountainous climate. Low altitude and distance from the sea are the reasons for high temperature and dry conditions in the central part of Tamil Nadu. The migration of vertical sun's rays leads to the formation of different seasons in Tamil Nadu as follows.

Seasons of Tamil Nadu	
Season	**Period**
Winter Season	January-February
Summer Season	March- May
Southwest Monsoon	June-September
Northeast Monsoon	October –December

Winter Season

During January and February, the vertical rays of the sun fall between the Tropic of Capricorn and the Equator. Hence, Tamil Nadu and India on the whole receive slanting rays from the sun. So, the weather is slightly cooler during these months. Winter temperature in Tamil Nadu varies from 15°C to 25°C. However, in the hill stations, the winter temperature drops below 5°C occasionally. Some valleys in the Nilgiris record even 0°C. This drop in temperature leads to the formation of thick mist and frost. This season is practically dry.

Summer Season

The apparent migration of the sun towards north during March, April and May results in the reception of vertical sun's rays by South

India. Thus there is a steady rise in temperature from the equator. Hence, Tamil Nadu located to the south of Tropic of Cancer, experiences high temperature. Generally the temperature varies from 30°C to more than 40°C. During this season particularly in the month of May, southern part of the state receives some rainfall from pre-monsoon showers (Mango/ Blossom showers) and some parts experience convectional rainfall.

1. What is Agni Nakshatram?
2. Group the districts of Tamil Nadu into low, moderate and heavy rainfall regions.

Southwest Monsoon

The intense heating of the landmass of the north by the sun during March to May creates a well-developed low pressure in North India, which draws wind from the Indian Ocean. This results in the formation of southwest monsoon. During this season, Tamil Nadu is located in the rain shadow region for the wind, which blows from the Arabian Sea. As a result, Tamil Nadu receives only a meagre rainfall from this monsoon. Rainfall during this season decreases from west to east. Coimbatore plateau receives an average of 50 cm rainfall. However, the southern districts like Kanyakumari, Tirunelveli and The Nilgiris record 50–100 cm rainfall during this period. The rainfall is scanty in the eastern part of the state.

Northeast Monsoon

The northeast monsoon season commences from the month of October and lasts till mid-December. The high pressure created over Central Asia and northern part of India becomes the source for the northeast monsoon winds. The apparent migration of the sun from Tropic of Cancer to the Tropic of Capricorn causes a change in receiving temperature and air pressure during this season. It makes the wind to blow towards Bay of Bengal from North India and get deflected by Coriolis force and takes the northeast direction. Hence it is known as northeast monsoon. As the northeast monsoon is a part of returning of southwest monsoon wind, it is also called as the retreating monsoon. This is the main rainy season for Tamil Nadu, accounting for its 48% of annual rainfall. Coastal districts of the state get nearly 60% of their annual rainfall and the interior districts get about 40–50% of the annual rainfall during this season.

Tropical cyclones are common during this season. Cyclone originating from the Bay of Bengal bring heavy rainfall to the east coastal regions of Tamil Nadu. More than 50% of the state's rainfall is received from tropical cyclones during this period and east coastal region receives 100 to 200 cm of rainfall. The rainfall received by the central and northwestern parts is 50–100 cm. The cyclones sometimes disturb the cultivation of crops and cause severe damage to life and property.

Chinnakallar near Valparai is the 3rd wettest place in India and the wettest place in Tamil Nadu.

6.8 Soils of Tamil Nadu

The soils in Tamil Nadu are broadly classified into five types according to their characteristics. They are 1. alluvial soil, 2. black soil, 3. red soil, 4. laterite soil, 5. saline soil.

Alluvial Soil

Alluvial soils are formed by the deposition of silt by the rivers. It is found in the river valley regions and the coastal plains of Tamil Nadu. Generally this type of soil is found in the districts of Thanjavur, Tiruvarur, Nagapattinam, Villupuram, Cuddalore, Tirunelveli and Kanyakumari. It is also found to a small extent along the river valleys in few interior districts.

Black Soil

Black soils are formed by the weathering of igneous rocks. It is also known as regur soil. As cotton grows well in this soil, it is also called as black cotton soil. Black soils are found extensively in the districts of Coimbatore, Madurai, Virudhunagar, Tirunelveli and Thoothukudi.

Red Soil

Red soils cover over two-thirds of the total area of Tamil Nadu. They are found particularly in the central districts of the state. It is dominantly found in Sivagangai and Ramanathapuram districts.

Laterite Soil

This soil is formed by the process of intense leaching. Laterite soils are found in some parts of Kancheepuram, Tiruvallur and Thanjavur districts and some patches over the mountainous region in the Nilgiris.

Saline Soil

Saline soils in Tamil Nadu are confined to the Coromandel coast. Vedaranyam has a pocket of saline soil. However, the tsunami waves on December 26, 2004 brought a lot of sand and deposited it all along the east coast of Tamil Nadu. The tsunami made the coastal areas unsuitable for cultivation to a considerable extent.

6.9 Soil Erosion

Soil is a non-renewable resource. It is very difficult to replace the soil once it gets degraded. Deforestation, overgrazing, urbanisation and heavy rain are responsible for soil erosion in Tamil Nadu. Soil erosion reduces the fertility of soils, which in turn reduces agricultural productivity. So, it is necessary to take intensive care to conserve the soil resources.

6.10 Natural Vegetation

Natural vegetation refers to the forest cover. Landforms, nature of soil, temperature and rainfall are the major factors that control the distribution of natural vegetation. As per National Forest Policy, 1988, a minimum of one-third of the total geographical area must be under forest cover. The total forest cover of Tamil Nadu is far lower than this. According to the Tamil Nadu State of Forest Report - 2017 assessment, the area under forest in the state is 26,281 sq.km, which constitutes 20.21% of the total area. Tamil Nadu constitutes 2.99% of India's forest cover. The forest types in the state varies from wet evergreen to scrub forests.

Forest Types

The forest in the state is broadly divided into five types as follows

Tropical Evergreen Forest

This forest type is found in the regions that receive heavy rainfall. It is a dense, multi-layered forest. It is found in the upper slopes of Western Ghats of Tirunelveli, Kanyakumari, the Nilgiris and Coimbatore districts. The major tree species of this forest are cinnamon, Malabar ironwood, panasa, java plum/jamun, jack, kindal, ayani and crape myrtle. The semi-evergreen type of forest in the state is found over the regions of sub-tropical climate over the Eastern Ghats. The prominent regions are Servarayan, Kollimalai and Pachaimalai. Species of Indian mahogany, monkey teak, woolly cassia, jack and mango trees are common in this region.

Montane Temperate Forest

It is found in sheltered valleys of Anaimalai, Nilgiris and Palani hills over a 1000 metres altitude. They are known as '**Sholas**'. The trees in this forest are evergreen and usually short. Nilgiri champa, wights litsea and rose apple are the common trees found in this forest.

Tropical Deciduous Forest

This type of forest lies in the margin of semi-evergreen and evergreen forests. The trees in this forest shed their leaves during the dry season. The trees reach up to a height of 30 metres. Some trees of this forest are silk cotton, kapok, kadamba, dog teak, woman's tounge, axlewood and siris. Bamboos are also common in this type of forests. Some trees of this forest are economically important.

Mangroves Forest

This type of forest is found in the coastal areas, river deltas, tails of islands and over sea faces where accretion is in progress. The vegetation is typically evergreen, moderate in height and has leathery leaves. The vegetation of this forest is adapted to survive in tidal

Pichavaram mangrove forest is located near Chidambaram, Cuddalore district. This is the second largest mangrove forest in the world covering about 1,100 hectares (11 sq.km) of area. It is separated from the Bay of Bengal by a sandbar. It consists of species like Avicennia and Rhizophora.

mud and salt water. Asiatic mangrove, white mangrove, wild jasmine/Indian pivot etc. are some of the notable trees of this forest. Pichavaram, Vedaranyam, Muthupet, Chatram and Thoothukudi are the places in Tamil Nadu where the mangrove forest is found to a considerable extent.

Role of Mangroves in Coastal Zone Management.

Mangroves helps in the prevention of coastal erosion from waves and storms. It also protects coral reefs and sea grass meadows from being smothered in sediments.

Tropical Thorn Forest

Thorn forest in Tamil Nadu is found where there is a little rainfall. These forests are found from plains up to 400 meters altitude. The common trees of this forest are rusty acacia, wheel, neem and palm. Shrubs are common vegetation in this type of forest. This type of forest is found in the districts of Dharmapuri, Ramanathapuram, Virudhunagar and some parts of interior districts.

Districts with prominent forest cover in Tamil Nadu

District	Area (sq km)
Dharmapuri	3,280
Coimbatore	2,627
Erode	2,427
Vellore	1,857
The Nilgiris	1,583
Dindigul	1,662

6.11 Wild life

Animals and birds live in forests constitute the wild life. Tamil Nadu has a variety of wild animals, birds and reptiles. hills are an ideal refuge for elephants, bisons, tigers, deer and monkeys.

Several Wildlife sanctuaries and National Parks have been set up to protect the animal life in the state.

S. No	Biosphere Reserves in Tamil Nadu
1	Nilgiri Biosphere Reserve
2	Gulf of Mannar Biosphere Reserve
3	Agasthiyarmalai Biosphere Reserve

Tamil Nadu is a state with varied climate, landforms and resources. This makes our state a distinct one among the Indian states. In Tamil Nadu, If the available resources are utilised rationally, it may continue to be at top in the country. So, it is the duty of the every individual to strive towards achieving this goal.

6.12 Natural Disasters in Tamil Nadu

A sudden natural catastrophe that causes great damage or loss to lives and properties is called as disaster.

According to United Nations office for Disaster Risk Reduction, Disaster Risk Reduction(UNDRR) is the concept and practice of reducing disaster risks through systematic efforts to analyse and reduce the causal factors of disasters. This includes reducing exposure to hazards, lessening the vulnerability of people and property, wise management of land and environment, and improving preparedness and early warning for adverse events.

Here we will discuss about the natural disasters in Tamil Nadu and the measures to be adopted before, during and after different disasters.

Tamil Nadu Wildlife Sanctuaries & Bird Sanctuaries

Landslide

A collapse of a mass of earth or rock from a mountain or cliff is called landslide. Water is the most common trigger of a **landslide.** Nilgiris in Tamil Nadu is identified as one of the most vulnerable districts in the country and landslides pose a major threat in this area. The other regions which are prone to land slides are Coimbatore and palani hill of Dindigul district where Kodaikanal hill station is located.

Risk Reduction Measures

Before: Create awareness; stay alert and awake; monitor the news updates; make evacuation plan; listen for any unusual sounds that might indicate moving debris such as trees cracking, boulders knocking and consider leaving the place of landslide if it is safe to do so.

Landslide

After- Stay away from the slide area; listen to local radio or television stations for the latest emergency information; watch for flooding, which may occur after a landslide or debris flow; check for injured and trapped persons near the slide, without entering the direct slide area.

Flood

Flood is a common one in the coastal districts of Tamil Nadu during northeast monsoon. The recent flood occurred in the state was in 2015.

Risk Reduction Measures

Before: Know about relief centres and evacuation routes; keep emergency phone numbers and important information; fold and roll up things on to higher ground.

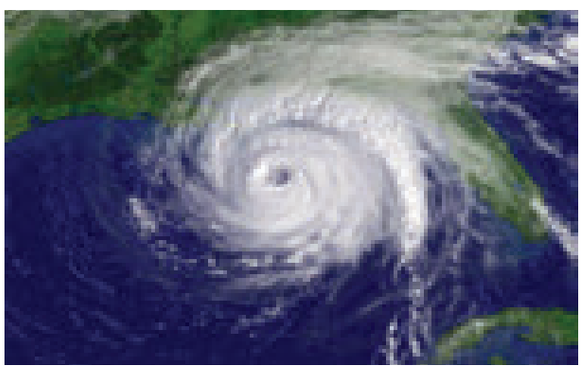
During: Be quick, keep safe and ensure that children and elderly are safe by leaving the house to a higher ground; turn off all electrical appliances and gas; leave the area before its get too late; do not drive through the water; stay away from power lines or broken power transmission cables and try to keep away from flood water.

After: Make sure to get back inside your house, keep all power and electrical appliances off before it is okay to put them on and wear appropriate dress before cleaning house which is necessary to clean the contamination.

Flood

Cyclone

The coastal regions of Tamil Nadu are often hit by the tropical cyclones formed in Bay of Bengal during northeast monsoon. Occurrence of flood, losses to lives and properties are the recurring one in the state. Based on the cyclone hit areas, the state of Tamil Nadu can be divided into five zones namely very high, high, medium, low and very low cyclone prone zones.



Cyclone

Risk Reduction Measures

Before: Ignore rumours, stay calm, don't be panic; Keep your mobile phones charged to ensure connectivity; use sms; listen to radio; watch TV; read newspapers for weather updates. Keep your documents and valuables in water proof containers; prepare an emergency kits with essential items for survival; secure your house; carry out repairs; don't leave sharp objects loose; untie cattle/animals for their safety. Fishermen should keep a radio set with extra batteries handy; keep boats and rafts tied up safely and don't venture out in the sea.

During: Take care of the old and young, keep all family members inside the house; switch of all electrical appliances, stay in an empty room, movable items should be kept securely tied; try to help your neighbours but, don't go out during cyclone.

After: Those who shifted to the cyclone centre must remain there till instructions are received; strictly avoid loose electrical wires after the cyclone; beware of snakes and other animals immediately after the cyclone; clear debris and carcasses from/near the premise after the cyclone and report losses truthfully and accurately to the authorities.

Drought

Tamil Nadu is water deficit state. It is almost a regular one and not a seasonal one. It depends mostly on northeast monsoon for its rain. Its failure ends in disastrous.

To manage the water deficit, rain water harvesting and water conservation methods have to be implemented strictly.

Drought

Some methods of water conservation are:

Protection of water from pollution; redistribution of water; rational use of groundwater; population control; renovation of traditional water sources; use of modern irrigation methods; increasing forest cover; changing crop pattern; flood management and use of geothermal water are some of the major water conservation methods.

Fire Accident

Tamil Nadu is a tropical state. The high temperature during summer leads to occasional forest fire in deciduous and thorn forests.

VLZIN2

Forest Fire

Risk Reduction Measures

Before: Create defensible space to separate your home from flammable vegetation and materials (30 feet); follow all local fire and building codes; keep all trees and shrubs trimmed. Use approved fire resistant materials; make evacuation plans with family members which include several options with an outside meeting place.

During: Listen to radio; watch tv; read newspapers for updates; if adequate water are available fill buckets with water. turn a light on a room in case of smoke; turn off gas and electrical appliances and be ready to evacuate all family members.

After: Check with fire officials before attempting to return to your home; use caution when re-entering a burned area - flare ups can occur; check grounds for hot spots and check the roof and exterior areas for sparks and embers.

Tsunami

Though Tsunami is not a common one in India, its incident in 2004 alerted India and the state of Tamil Nadu on this aspect.

Tsunami

Risk Reduction Measures

Before: if you live in a coastal area, know about tsunami risk and local warning arrangements; develop household emergency plan; know where the nearest high ground is and how you will reach it.

During: Take your get away kit, don't travel areas at risk; move immediately nearest high ground; if you can't escape tsunami, go to an upper storey of the building or climb onto a roof or tree or grab a floating objects; never go to the shore to watch tsunami and listen to local radio stations as emergency management.

After: Continue to listen to the radio; don't return to the evacuation zone until authorities have given all clear; check yourself for injuries and get first aid and help others.

6.12.7 Earthquakes

India is a vast country which experiences many earthquakes at different periods. Generally high risk zones of the country are located in the north and central parts. The state of Tamil Nadu is located in the moderately low risk zone.

Risk Reduction Measures

During: Take cover under a strong table or any other piece of furniture and remain under cover until the shaking stops.

After: Proceed cautiously once the earthquake has stopped and always avoid roads, bridges that might have been damaged by the earthquake.

For the management of disasters in the state, the following forces and organizations are in service.

State/Union Territories organizations	District Organizations
1. State Disaster Management Authority (Chairman-Chief Minister)	1. District Magistrate (Chairman-District Collector)
2. Relief/ Disaster Management Department	2. Revenue Department
3. Police	3. Civil Administration,
4. Forest Department	4. Local Police,
5. Fire and Civil Defence Services	5. Civil Defence,
6. Health Services	6. Fire & Emergency Services,
7. Transport Department	7. Home Guards (also Local Community, Non-Governmental Organisations, Voluntary Agencies) etc.
8. Public Works Department	
9. Veterinary Services	
10. Food & Civil Supplied Department.	

SUMMARY

- Physical geography is the branch of geography dealing with the different physical aspects such as landforms, drainage, climate, soil, natural vegetation etc.
- Tamil Nadu is broadly classified into three physical divisions namely mountains (Western and Eastern Ghats), plateaus (Bharamahal, Coimbatore and Madurai) and plains (inland and coastal).

- Cauvery, Palar, Ponnaiyar, Vaigai and Thamirabarani are the major rivers of Tamil Nadu.
- Soils of Tamil Nadu are classified into five types according to their characteristics. They are alluvial, black, red, laterite and saline.
- The forest cover of Tamil Nadu is 20.21% of its geographical area. Evergreen, deciduous, mangrove, thorny and montane temperate are its major forest types.
- Disaster Risk Reduction is reducing risks through systematic efforts.
- Natural disasters are earthquakes, volcanoes, landslides, cyclones, droughts and forest fires.

EXERCISE

A8FWGK

I Choose the correct answer

1. The latitudinal extent of Tamil Nadu is
   a) 8°5′N to 13°35′N
   b) 8°5′S to 13°35′S
   c) 8°0′N to 13°5′N
   d) 8°0′S to 13°05′S
2. The longitudinal extent of Tamil Nadu is
   a) 76°18′ E to 80°20′E
   b) 76°18′ W to 80°20′W
   c) 86°18′ E to 10°20′E
   d) 86°18′ W to 10°20′W
3. The highest peak in Tamil Nadu is
   a) Anaimudi
   b) Doddabetta
   c) Mahendragiri
   d) Servarayan
4. Which of the following passes is not located in the Western Ghats of Tamil Nadu?
   a) Palghat
   b) Shencottah
   c) Bhorghat
   d) Achankoil
5. Which one of the following rivers is flow into the Arabian Sea?
   a) Periyar
   b) Cauvery
   c) Chittar
   d) Bhavani
6. The district with largest mangrove forest cover in Tamil Nadu is
   a) Ramanathapuram
   b) Nagapattinam
   c) Cuddalore
   d) Theni
7. Retreating monsoon wind picks up moisture from
   a) Arabian sea
   b) Bay of Bengal
   c) Indian Ocean
   d) Timor sea
8. Which of the following district is affected by sand dunes to a large extent?
   a) Theni
   b) Madurai
   c) Thanjavur
   d) Ramanathapuram
9. The district which has the largest forest cover in Tamil Nadu is
   a) Dharmapuri
   b) Vellore
   c) Dindigul
   d) Erode

II Fill in the blanks

1. The plateau which lies between the Nilgiris and Dharmapuri districts is _____.
2. _____ is the highest peak in the southern most part of the Eastern Ghats.
3. The riverine Island of Srirangam is located between _____ and _____ branches of cauvery.
4. _____is the Tamil Nadu state animal.

III Match the following

1.	Winter season	- Pre-monsoon
2.	Summer season	- June to September
3.	Southwest monsoon	- March to May
4.	North east monsoon	- January and February
5.	Mango Shower	- October to December

IV Assertion type Question

1. **Assertion (A):** Tamil Nadu does not receive much rainfall from southwest monsoon. **Reason (R):** It is situated in the rain shadow area of the Western Ghats.
   a) Both (A) and (R) are true and (R) explains (A).
   b) Both (A) and (R) are true but, (R) does not explain (A).
   c) (A) is true but, (R) is false.
   d) (R) is true but, (A) is false.

V Answer the following in brief

1. State the boundaries of Tamil Nadu.
2. What is 'Teri'?
3. How is coastal plain formed?
4. Name the major islands of Tamil Nadu.
5. Name the tributaries of river Thamirabarani.
6. Define : Disaster Risk Reduction.
7. During cyclone, how does the Meterological department warn the fishermen?

VI Distinguish between the following

1. Thamiraparani and Cauvery

VII Give reasons for the following

1. Eastern Ghats are not a continuous range.
2. Tamil Nadu receives low rainfall during southwest monsoon.
3. Cuddalore is a multiprone disaster zone.

VIII Answer the following in a paragraph

1. Describe the nature of the plateau region of Tamil Nadu.
2. Write an account on river Cauvery.
3. Explain the characteristic features of summer and winter seasons of Tamil Nadu.
4. Bring out the types and distribution of soils in Tamil Nadu.
5. What are the Risk reduction measures taken before and after cyclone.

IX Map study

1. Mark important rivers, distribution of soil and forest types on different Tamil Nadu maps.

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4. Mathew, M. (2018). Manorama Yearbook – 2018 (English Version), Manorama Company Ltd., Kottayam.

INTERNET RESOURCES

1. http://www.tn.gov.in/ta/Tamil Nadustate
2. https://www.forests.tn.gov.in
3. http://www.india-wris.nrsc.gov.in/wrpinfo/index.php?title=Major_Rivers_Flowing_in_Tamil_Nadu
4. http://www.environment.tn.nic.in/
5. http://agritech.tnau.ac.in/

ICT CORNER

Tamil Nadu: Disasters And Awareness

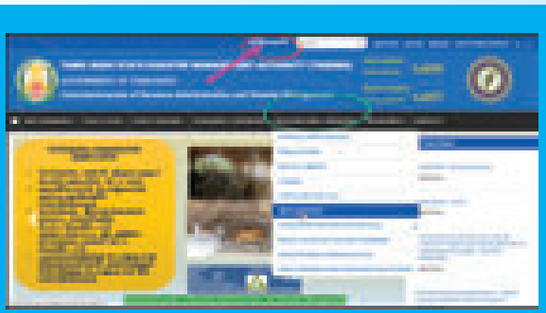
Through this activity you will learn about Disaster Management Activities in Tamil Nadu.

Step – 1 Open the Browser and type the URL given below (or) Scan the QR Code.

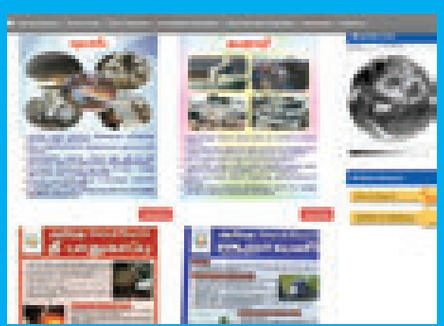
Step – 2 Change 'Language' in Top menu and go to 'Media and Public Awareness' and select 'Infographics'.

Step – 3 Click on 'Download' to view details of precautions by Tamil Nadu State Disaster Management Authority

Step-1



Step-2



Step-3

Website URL:

https://tnsdma.tn.gov.in/

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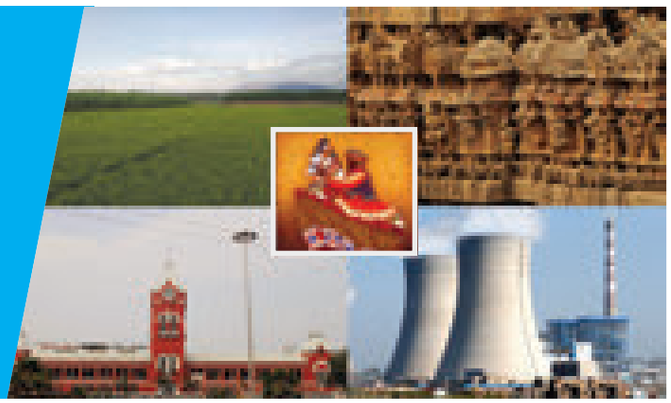
* Pictures are indicatives only.

* If browser requires, allow Flash Player or Java Script to load the page

Unit - 7

Human Geography of Tamil Nadu



Learning Objectives

NTWAA4

- To understand the agricultural factors, major crops and their distribution in Tamil Nadu
- To learn about the water resources of Tamil Nadu
- To study the mineral and industrial resources of Tamil Nadu
- To analyze the population and its composition in Tamil Nadu
- To learn about the man made disasters in Tamil Nadu

Introduction

Human geography refers to the study of ways of development of human societies and their operation in relation to their physical environment. This chapter focuses on the distribution, characteristics and utilisation of different resources in Tamil Nadu. We have studied earlier that the earth is endowed with a variety of natural resources such as landforms, rivers, soil, natural vegetation, water and wildlife. These resources are useful only when they are utilised. Human beings use these resources using their intelligence and skill. Thus, the human beings are the most significant resource on the earth surface. They turn all these natural resources into useful products with their skills and abilities.

7.1 Agriculture

The word **"agriculture"** is derived from the Latin words **"ager and cultura"**, which means field and growing. Agriculture is a practice of farming that includes the cultivation of crops, rearing of animals, birds, forestry, fisheries and other related activities. Agriculture is the major occupation in Tamil Nadu. Agriculture has been the mainstay of the state's economy since independence with more than 65% of the population depends upon this sector for their living. Agriculture provides employment for rural people on a large scale. There is a strong link between agriculture and economic growth. Paddy, millets and pulses are the principal food crops of the state. Sugarcane, cotton, sunflower, coconut, cashew, chillies, gingelly, groundnut, tea, coffee, cardamom and rubber are the major commercial crops.

7.2 Geographical determinants of Agriculture

Landform, climate, soil and irrigation are the factors that determine the growth of agriculture.

Landform

Tamil Nadu is a land of diverse landscape comprising of hills, plateaus and plains. Among them the plains are most suitable for agriculture. The plains with alluvial soil enhances agricultural productivity. Example: Plains of cauvery. Agriculture in the plateau is moderate and is poor on the hills.

Climate

Tamil Nadu is situated in the tropical zone, which is nearer to the equator. The state experiences a tropical climate. Hence, the temperature in Tamil Nadu is relatively high almost throughout the year. So, only the tropical crops are cultivated. Water is another limiting factor of agriculture. Northeast monsoon is the major source of rainfall for Tamil Nadu. Therefore, the major cropping season begins with this season. The rainfall in this season and the irrigation facilities affect agriculture to a large extent.

Soil

Soil is one of the most essential elements of agriculture. It provides essential minerals or nutrients for the growth of crops and vegetation. The regions of river valleys and the coastal plains are the most agriculturally productive regions of the state as they are covered with fertile alluvial soil.

Irrigation

Monsoon rainfall in the state is highly irregular. Further it is seasonal. Hence, irrigation becomes necessary for successful cultivation of crops in the state. In the dry regions, rain-fed crops are cultivated.

Types and regions of Agriculture Practices in Tamil Nadu

Farming type	Area practiced
Subsistence intensive agriculture	Practiced all over Tamil Nadu with few exceptions.
Plantation Agriculture	Hill slopes of Eastern and Western Ghats.
Mixed farming	Banks of River Cauvery and Thenpennai.

7.3 Cropping Seasons in Tamil Nadu

Farmers select different crops for different seasons of cultivation. It is based on the temperature and availability of moisture in the soil. Accordingly, the state has the following cropping seasons.

Name	Sowing	Harvesting	Major crops
Sornavari (chittirai pattam)	April-May	August-September	Millets and cotton
Samba (Adipattam)	July-August	January-February	Paddy and sugarcane
Navarai	November -December	February-March	Fruits, vegetables, cucumber and watermelon

7.4 Distribution of major crops in Tamil Nadu

Paddy

Paddy is the most important staple food crop of Tamil Nadu. Ponni and kichadi samba are the major varieties of paddy grown in Tamil Nadu. Though it is cultivated all over Tamil Nadu, its cultivation is highly concentrated in Thanjavur, Tiruvarur, Tiruvallur, Kancheepuram, Villupuram, Cuddalore and

Paddy Cultivation

DO YOU KNOW?

The Tamil Nadu Rice Research Institute (TRRI) is an Indian research institute working in the field of rice under Tamil Nadu Agricultural University (TNAU).It is situated at Aduthurai, in Thanjavur district, it was established in April, 1985 in TNAU to meet the research requirements of the region with the help of existing Agricultural Colleges and Research centres and perform lead function for rice and rice based cropping system research.

Tirunelveli districts. It ranks third in the production of rice among the states of India. The deltaic region of river cauvery (the undivided Thanjavur district) is the major rice-producing region of Tamil Nadu. So, this region is rightly called as the **"Granary of Tamil Nadu."**

Millets

Millets form staple food of nearly one-third of human population of Tamil Nadu. Sorghum/jowar (cholam), ragi (kezhvaragu) and bajra (kambu) are the major millets. These are grown not only in drier areas but also in the coastal plains. Sorghum is grown in the Coimbatore plateau and Kambam valley. Ragi is grown in Coimbatore, Dharmapuri, Vellore and Cuddalore districts. Bajra is mostly cultivated in Ramanathapuram, Tirunelveli, Karur, Perambalur and Salem districts.

India observed 2018 as national year of millets. FAO has decided to observe 2023 as the International year of millets.

Pulses

Pulses are the major source of protein. Bengal gram, black gram, green gram, cowpea and horse gram are the important pulses grown in Tamil Nadu. Pulses are grown in a wide range of climatic conditions mostly in drier regions with or without irrigation. Mild cool climate and a low to moderate rainfall are best suited for these crops. Pulses serve as excellent fodder. Pulses are grown in almost all districts in the state except Chennai, Nilgiris and Kanyakumari. Coimbatore leads in the production of Bengal gram. Vellore and Kanyakumari districts produce red gram.

Tiruvarur, Nagapattinam and Thoothukudi districts are the principal producers of green gram and black gram. Horse gram is widely cultivated in Dharmapuri and Krishnagiri districts.

Oil Seeds

Groundnut, gingelly castor, coconut, sunflower and mustard are some of the oilseeds that are grown in Tamil Nadu. Apart from its use in food preparation, it is used in industries as a lubricant, in the manufacture of varnish, soaps, candles, cosmetics and pharmaceuticals. Groundnut is the major oilseed of the state. The cultivation of groundnut is mostly concentrated in Vellore, Tiruvannamalai, Villupuram, Salem and Pudukottai districts. It is also grown to some extent in Dharmapuri, Cuddalore, Perambalur and Madurai. Erode, Ramanathapuram, Sivagangai and Virudhunagar districts are its minor producers. Coconut is grown in Coimbatore, Thanjavur and Kanyakumari districts.

Second Green Revolution (Eco-Farming or Organic Farming)

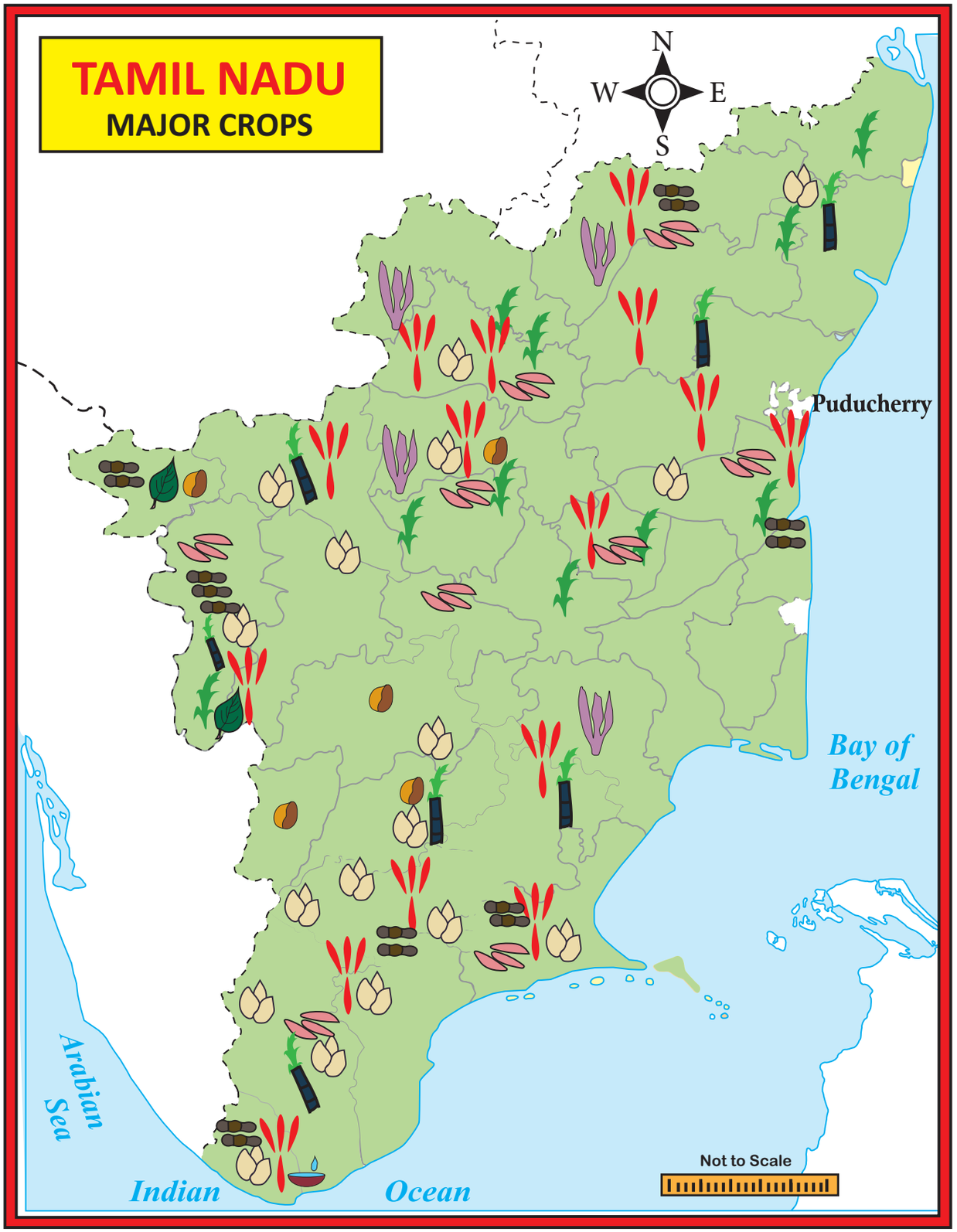
In organic farming synthetic fertilizers, pesticides, growth regulator and livestock feed additives are not used. This type of farming rely on crop rotation, crop residues, animal manure, off-farm organic wastes and biological pest control to maintain soil productivity. This farming method is being adopted by very few farmers in the state.

Sugarcane

It is one of the major cash crops of the state. It is an annual crop. It requires high temperature and heavy rainfall. It grows well in the tropical region. Major sugarcane-producing districts are Tiruvallur, Kancheepuram, Vellore, Cuddalore, Tiruchirapalli, Coimbatore, Erode and Tirunelveli.

Cotton

Cotton is a fibre and cash crop. It requires black soil, long frost-free condition and warm and humid weather for its cultivation. Humid weather in the early stages and hot, dry weather during harvest period is suitable for this crop. It is predominantly cultivated in Coimbatore plateau and Vaigai-Vaippar river basins. It is also cultivated in Madurai, Ramanathapuram, Virudhunagar, Tirunelveli, Thoothukudi, Salem and Dharmapuri districts.



LEGEND

PADDY	SUGARCANE	RAGI	COTTON	OIL SEEDS
PULSES	MILLETS	TEA	COFFEE	RUBBER

TANTEA (TANTEA-Tamil Nadu Tea Plantation Corporation Limited) is one of the Biggest Black Tea Producers in India with high quality clonal tea. Its plantation spreads over nearly 4500 hec.

Plantation crops

Tea, coffee, cashew, rubber and cinchona are the major plantation crops of the state. Tamil Nadu ranks second in area and production of tea in India next to Assam. Tea plantations are found in the hills of the Nilgiris and Coimbatore. The Nilgiris is the notable regions for tea plantations. Coffee plants are grown in the hills of Western Ghats as well as Eastern Ghats. It is also found in the hilly slopes of Dindigul, Madurai, Theni and Salem districts. Yercaud, Kolli Hills and Kodaikanal are notable for coffee plantations. Tamil Nadu stands second in area and production of coffee next to Karnataka. Rubber plantations are significant in Kanyakumari. Pepper is confined to the warm and wet slopes of Eastern and Western Ghats of Tamil Nadu. Cashew is extensively cultivated in Cuddalore district.

To promote organic farming a central scheme named 'National Project on Organic Farming' was launched Apart from general things (creating awareness, promoting organic fertilizers, training, capacity building etc.), the scheme provides financial assistance through Capital Investment Subsidy Scheme for agro-waste compost production units, bio-fertilizers/bio-pesticides production units, development and implementation of quality control regime, human resource development etc.

7.5 Livestock/Animal Husbandry

Livestock has remained an integral part of socio-economic fabric of rural people.

Goat

Goat is also known as **'poor man's cow'** in India. It forms a very important component

Tamil Nadu Dairy Development Corporation Ltd. was transformed into the newly registered Tamil Nadu Co-operative Milk Producers Federation Limited Popularly known as "**Aavin**".

in dry land farming system. In the marginal or undulating lands unsuitable for rearing of other types of cattle like cow or buffalo, goat is the best alternative. With very low investments, goat rearing can be made into a profitable venture for small and marginal farmers.

Sheep

Sheep is used for multiple purposes like wool, meat, milk, skins and manure, and forms an important component of the rural economy, particularly in the arid, semi-arid and mountainous areas of Tamil Nadu. It provides a dependable source of income to the shepherds through the sale of wool and animals.

Fishing

Since Tamil Nadu is a coastal state, fishing is one of the major occupations in the state. With widespread reservoirs and rivers, inland fishing also is also seen to a considerable extent.

Marine Fishing

An area of 41,412 sq.km of continental shelves of the state favours coastal fishing and Tamil Nadu is one of the leading states in marine fish production. Marine fishing is also called inshore fish or neritic fishing, carried out in oceans and seas. Large mechanised boats are used for fishing. In ocean or seawaters, fishing within few kilometres from the shoreline is called inshore fishing and the fishing far from the shore typically 20–30 miles out in water hundreds and thousands of feet deep is called off-shore fishing. The fish varieties caught are sharks, flying fish, counch, catfish, silver bellies, and crabs. Chennai, Kanyakumari, Tirunelveli, Nagapattinam, Thanjavur and Ramanathapuram districts contribute about 40% to marine fish production in the state. Their coastal location favours fishing in these regions.

Inland Fishing

Inland fishing is carried out in lakes, rivers, ponds, estuaries, backwaters and swamps. Oysters and prawns are cultured in original nurseries. Catamaran, diesel boats and floating nets are used in fishing. Tamil Nadu Fisheries Department has introduced several programmes for the betterment of fishing. Vellore district leads in the production of inland fish production with 10% of state's production. Cuddalore, Sivagangai and Virudhunagar districts stand second with 9% of inland fish catch each.

7.6 Water Resource

Water is the precious gift of nature to humankind and millions of other species living on the earth.

3FCN3M

Tamil Nadu constitutes 4% of India's land area and is inhabited by 6% of India's population, but has only 2.5% percent of India's water resources. More than 95% of the surface water and 80% of the ground water have already been put into use.

Surface Water Resources	Numbers
River Basin	17
Reservoirs	81
Tanks	41,127
Tube wells and other wells	4,98,644
Open wells	15,06,919
Total (Million Cubic metres)	2046788 MCM

Multipurpose River Valley Projects

Multipurpose river valley projects are basically designed for the development of irrigation for agriculture and hydropower generation. However, they are used for many other purposes as well.

Mettur Dam

The Mettur Dam was constructed in a gorge, where river Cauvery enters the plains. It is one of the oldest dam in India. It provides irrigation to Salem, Erode, Karur, Tiruchirappalli, Thanjavur, Tiruvarur and Nagapattinam districts farmlands.

Mettur Dam

Bhavani Sagar Dam

The Bhavani Sagar Dam is located 80 km away from Coimbatore city in the district of Erode. It has been constructed across the river Bhavani. This dam is one of the biggest earthen dams in the country.

Amaravathi Dam

The Amaravathi dam is situated 25 km away from Udumalpet in Tirupur district. The dam has been constructed across the river Amaravathi, a tributary of Cauvery. The dam was built primarily for irrigation and flood control. A small hydropower station has also been installed recently.

Krishnagiri Dam

Krishnagiri dam is situated at a distance of 7 km from Krishnagiri towards Dharmapuri.

Sathanur Dam

Sathanur Dam was constructed across the river Thenpennai in Chengam taluk. It is in the midst of Chennakesava hills. It irrigates the land in Thandrampet and Tiruvannamalai blocks. There is also a large crocodile farm and a fish grotto. Parks are maintained inside the dam for tourists and the gardens are used by the film industry.

Mullaiperiyar Dam

Mullaiperiyar dam was built by the British administration in 1895. It has been constructed on the Periyar river, which originates from Thekkady hills of Kerala. The dam was built mainly for watering the farming land of Tamil Nadu, which is perennially drought-prone.

Vaigai Dam

This dam built across the river Vaigai near Andipatti. The dam with a height of 111 feet can store water up to 71 feet. It is located 7 km from Andipatti and 70 km from Madurai. This dam was opened on 21 January, 1959.

Manimuthar Dam

Manimuthar dam is located about 47 km from Tirunelveli.

The Papanasam Dam

It is also known as Karaiyar dam and is located about 49 km away from Tirunelveli. The dam is used to irrigate Tirunelveli and Thoothukudi districts.

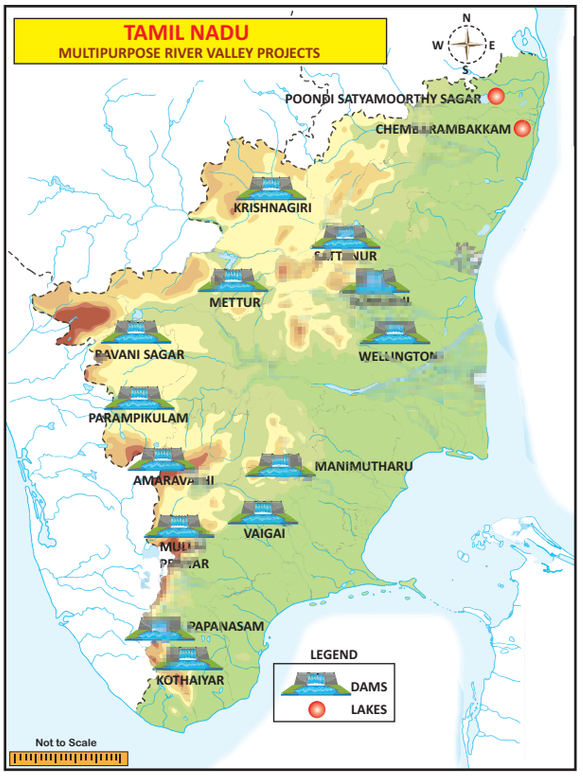
Parampikulam Aliyar Project

It is a joint venture of Tamil Nadu and Kerala states. It envisages the construction of seven interconnected reservoirs by harnessing the water of seven rivers, which include major rivers of Parambikulam and Aliyar.

Parappalar project is located near Ottanchatram. Its storage capacity is 167 million cubic feet of water. It is about 75 km from Madurai and is in Palani taluk.

Water Resource Management

Water resource management is the activity of planning, developing, distributing and managing the optimum use of water resources. The demand for water in Tamil Nadu is increasing at a fast rate both due to increasing population and also due to larger per capita needs triggered by economic growth. Demands from other sectors such as domestic and industries have been growing significantly. The state is heavily dependent on monsoon rains. Since the state is entirely dependent on rains for recharging its water resources, monsoon failures lead to acute water scarcity and severe droughts. So, it is important to save water for us and the future generation.



7.7 Mineral Resources

Tamil Nadu is the leading holder of country's resources of vermiculite, magnetite, dunite, rutile, garnet, molybdenum and ilmenite. The state accounts for the country's 55.3% of lignite, 75% of vermiculite, 69% of dunite, 59% of garnet, 52% of molybdenum and 30% of titanium mineral resources.

Important minerals are found in the state are as follows: Neyveli has large lignite resources. Coal is also availablein Ramanathapuram. Oil and gas are found in the Cauvery basin.

Iron deposits are found in Kanjamalai region in Salem district and Kalrayan Malai region of Tiruvannamalai district. Magnesite ores are available near Salem. Bauxite is found in Servarayan Hills, Kotagiri, Udagamandalam, Palani and Kollimalai areas. Gypsum is obtained in Tiruchirappalli, Tirunelveli, Thoothukudi and Virudhunagar districts. Ilmenite and rutile are found in the sands of Kanyakumari

beach. Limestone is available in Coimbatore, Cuddalore, Dindigul, Kancheepuram, Karur, Madurai, Nagapattinam, Namakkal, Perambalur, Ramanathapuram, Salem and Tiruvallur districts. Magnesite is obtained in Coimbatore, Dharmapuri, Karur, Namakkal, the Nilgiris, Salem, Tiruchirapalli, Tirunelveli and Vellore districts. Feldspar, quartz, copper and lead are also found in some parts of the state.

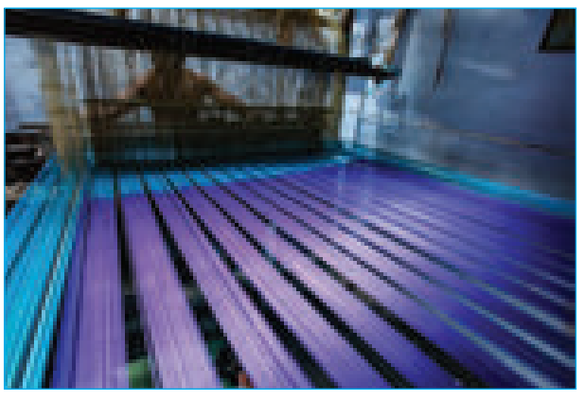
7.8 Industries

Industries use raw materials and convert them into usable product or goods. Textiles, sugar, paper, leather, cement, electrical equipment, automobiles, information technology and tourism are the major industries of Tamil Nadu.

H1T1W6

Textile Industry

Textile industry is one of the traditionally well-developed industries in Tamil Nadu. The textile mills are concentrated in Coimbatore, Tirupur, Salem, Palladam, Karur, Dindigul, Virudhunagar, Tirunelveli, Thoothukudi, Madurai and Erode. Erode in Tamil Nadu is well known for marketing of handloom, power loom and readymade garments. Coimbatore is also known as the 'Manchester of Tamil Nadu'. Coimbatore, Tirupur and Erode contribute a major share to the state's economy through textiles. So, this region is referred as **'Textile Valley of Tamil Nadu'.** Karur is known as **'The Textile capital of Tamil Nadu'.**



Textile Industry

Silk Textiles

Tamil Nadu occupies fourth position in the country in silk production. Kancheepuram silk is unique in its quality and is known for its traditional value all over the world. Kancheepuram, Arani, Kumbakonam, Salem, Coimbatore, Madurai and Tirunelveli are the important silk-weaving centres in Tamil Nadu. Ramanathapuram has some specialised areas for the manufacturing of synthetic silk clothes.

Leather Industry

Tamil Nadu accounts for 60% of leather tanning processes of India and 38% of all leather footwear, garments and components. Hundreds of leather tanneries are located around Vellore and nearby towns, such as Ranipet, Ambur and Vaniyambadi. The Vellore district is the top exporter of finished leather goods in the country. Central Leather Research Institute

GI Tag

GI(Geographical Indication)is a name or sign used on products which corresponds to a specific geographical location. It provides rights and protection of holders.

Some important GI Tags of Tamil Nadu are:

Place	Products
Arani	Silk
Kancheepuram	Silk
Coimbatore	Wet Grinder and Coracotton
Thanjavur	Paintings, Art plate, Doll and veenai
Nagercoil	Temple Jewellery
Erode	Turmeric
Salem	Venpattu(salem silk)
Bhavani	Jamakkalam
Madurai	Sungudi
Swamimalai	Bronze Icons
Nachiarkovil	Kuthuvilakku
Pattamadai	Mat
Nilgiri	Orthodox Embroidery
Mahabalipuram	Stone sculpture
Sirumalai	Hill banana
Eathomozhi	Coconut

(CLRI), a CSIR research laboratory, is located in Chennai.

Paper Industry

Tamil Nadu Newsprint and Papers Limited (TNPL) is a government of Tamil Nadu enterprise producing newsprint and printing and writing paper at its mill located at Kagithapuram in Karur district. TNPL is one of the most accomplished mills in the world, producing different varieties paper of acceptable quality primarily from bagasse and pulpwood. Other paper mills of the state are found in Pukkathurai of Kancheepuram district, Bhavanisagar, Pallipalayam, Paramathi Vellore, Coimbatore, Udamalaipet, Thoppampatti, Nilakkotai and Cheranmahadevi.

Cement Industry

Cement production and consumption continue to grow despite the general recession in the economy. India is one of the largest cement producers and ranked second in the world with an annual production capacity of 181 million tons. Tamil Nadu Cements Corporation Limited (TANCEM) is one among the major cement producers in Tamil Nadu operating two cement units: one at Ariyalur and another at Alangulam. Asbestos cement sheet plant at Alangulam and stoneware pipe unit at Virudhachalam are the other units of TANCEM. Sankar Cement, Zuari Cement, Ultratech Cement, Madras Cement and Dalmia Cement are the major private cement brands produced in Tamil Nadu.

7.9 Information Technology

According to National Association of Software and Services Companies (NASSCOM), the southern states continue to account for more than half of the country's total export of software. Tamil Nadu and Andhra Pradesh together account for 59.6% of India's total software exports. Tamil Nadu is the second largest software exporter in the country next to Karnataka.

The list of IT parks in Tamil Nadu

Tidel Park, Ascendas, Mahindra world city 4 IT & ITES SEZ TIDEL-II, IT & ITES SEZ TIDEL-III, Coimbatore SEZ - Tidel Park

Special Economic Zones

Special economic zones (SEZs) provide an internationally competitive and hassle-free environment for exports. Units in SEZ manufacture goods and provide a range of services. SEZs are located in Nanguneri, Ennore, Hosur and Perambalur. IT & ITES SEZ named TIDEL-II and TIDEL-III and Bio-Pharmaceuticals SEZ are located in Chennai and Coimbatore SEZ called the TIDEL Park–IV is located in the city.

Manufacturing & Engineering Industry

The manufacturing industry is one of the vibrant sectors of the state economy and contributes significantly to the industrial output. The manufacturing industry broadly covers manufacture of machinery and equipment, motor vehicles, basic metal and alloy industries, metal products and repair of capital goods.

Automobile Industries

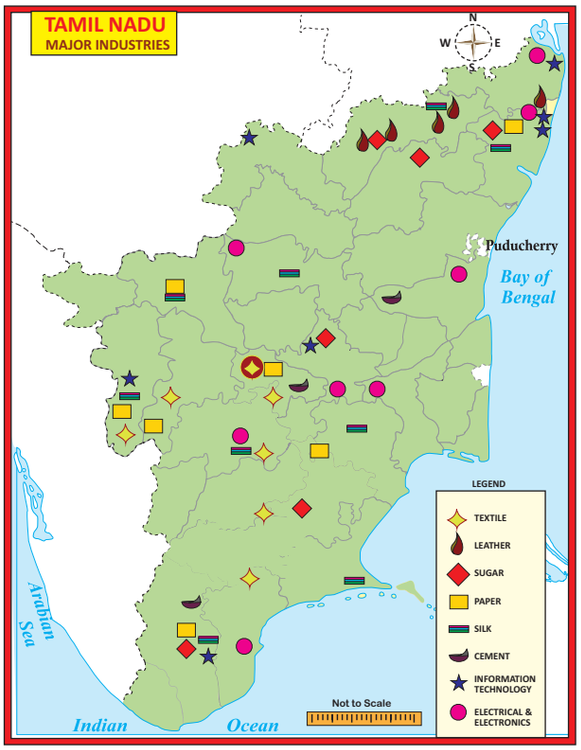
Tamil Nadu accounts for about 21% of passenger cars, 33% of commercial vehicles and 35% of automobile components produced in India. Major automobile manufacturers like Ford, Hyundai, HM-Mitsubishi, Ashok Leyland, and TAFE have their manufacturing base in Tamil Nadu.

Handlooms and Powerlooms

The handloom sector in the state is the single largest cottage industry providing livelihood to a large number of rural people and promoting export earnings. These societies mainly produce the cloth required for the scheme of 'Free Supply of Uniforms to School Children and Free Distribution of Sarees and Dhotis Scheme'.

Sugar Industry

Sugar industry in Tamil Nadu is an important agro-based industry. It plays a vital role in the economic development of the state, particularly in rural areas. The sugar industry provides large-scale direct employment to several thousands and indirect employment to several lakhs of farmers and agricultural labourers in the rural areas who are involved in cultivation of sugarcane, harvesting, transporting and other services.



Tourism Industry

Tourism is considered as an industry because of its enormous potential in creating employment for a large number of people. In recent years, the state has emerged as one of the leading tourist destinations for both domestic and foreign tourists. Tourism in Tamil Nadu is promoted by Tamil Nadu Tourism Development Corporation (TTDC). The presence of ancient monuments, pilgrim centres, hill stations, a variety of natural landscapes, long coastline, along with rich culture and heritage make Tamil Nadu the best destination for tourists.

7.10 Population

The term 'population' refers to the number of people living in a defined area. The statistical study of the characteristics of human population is called demography.

ZFXJV1

Regions of High Population

Coimbatore, Chennai, Tiruvallur, Kancheepuram, Villupuram, Dharmapuri, Salem, Madurai and Tirunelveli are the most populous districts in the state. Agriculture and industrial development are the main causes of high concentration of population of these districts.

Regions of Moderate Population

Tiruvannamalai, Cuddalore, Tiruchirapalli and Thanjavur districts have a population 30–35 lakh. Vellore, Dindugal, Virudhunagar and Thoothukudi districts each have a population of 15–20 lakh. Other than agriculture, small-scale industries and fishing along the coastal areas are the major occupations of people in these districts.

Regions of Sparse Population

The coastal districts Nagapattinam, Tiruvarur, Pudukottai, Ramanathapuram and Sivagangai have a less than 15 lakh. The Nilgiris district has a population of less than 10 lakh population.

Population Density

The state ranks 12th among the Indian states in population density. The national average density of population as per the 2011 Census is 382. Chennai is the densest district with 26,903 persons per sq.km followed by Kanyakumari, Tiruvallur, Kancheepuram, Madurai, Coimbatore, Cuddalore, Thanjavur, Nagapattinam, Salem, Vellore and Tiruchirappalli. These are the regions with high density of population. The least density of population is recorded in the Nilgiris and the other districts have moderate density of population.

Religion

Hinduism, Christianity and Islam are the major religions in the state. The Hindus constitute the largest of the population, followed by Christians and Muslims. Jainism, Sikhism and Buddhism and people of other religions also presence in the state.

Sex Ratio

The sex ratio represents the number of females per 1000 males.

The highest sex ratio is found in the Nilgiris district followed by Thanjavur district. The lowest sex ratio is reported in Dharmapuri district followed by Salem district.

Literacy Rate

The district of Kanyakumari has reported the highest literacy rate while Dharmapuri district has the lowest rate. A high level of literacy rate is also seen in Chennai, Thoothukudi, the Nilgiris and Kancheepuram districts.

7.11 Transport and Communication

Roadways

The State has a total road length of 167,000 km, In which 60,628km are maintained by state Highways Department. It ranks second in India with a share of over 20% in total road projects under operation in the **Public-Private Partnership (PPP)** model.

KUH72H

NH - 44 is the longest national highway in Tamil Nadu which runs from Hosur to Kanniyakumari (627.2 km) Via Dharmapuri-Salem-Karur-Dindigul-Madurai-Tirunelveli.

NH - 785 is the shortest national highway in Tamil Nadu which runs from Madurai to Tuvarankuruchi. (38 km).

Railways

Tamil Nadu has a well-developed rail network as part of Southern Railway, headquartered at Chennai. The present Southern Railway network extends over a large area of India's southern peninsula, covering Tamil Nadu, Kerala, Puducherry, minor portions of Karnataka and Andhra Pradesh. Chennai has a well-established suburban railway network, a **Mass Rapid Transport System(MRTS)** and is currently developing a Metro system, with its first underground stretch in operation since May 2017.

Airways

Tamil Nadu has four major international airports. Chennai International Airport is currently the third largest airport in India after Mumbai and Delhi. Other international airports in Tamil Nadu include Coimbatore, Madurai and Tiruchirapalli airports. It also has domestic airports at Tuticorin and Salem.

Waterways

Tamil Nadu has three major ports. They are in Chennai, Ennore and Tuticorin. It has an intermediate port at Nagapattinam and 15 minor ports. All the minor ports are managed by the Tamil Nadu Maritime Board, Chennai Port. This is an artificial harbour and the second principal port in the country for handling containers.

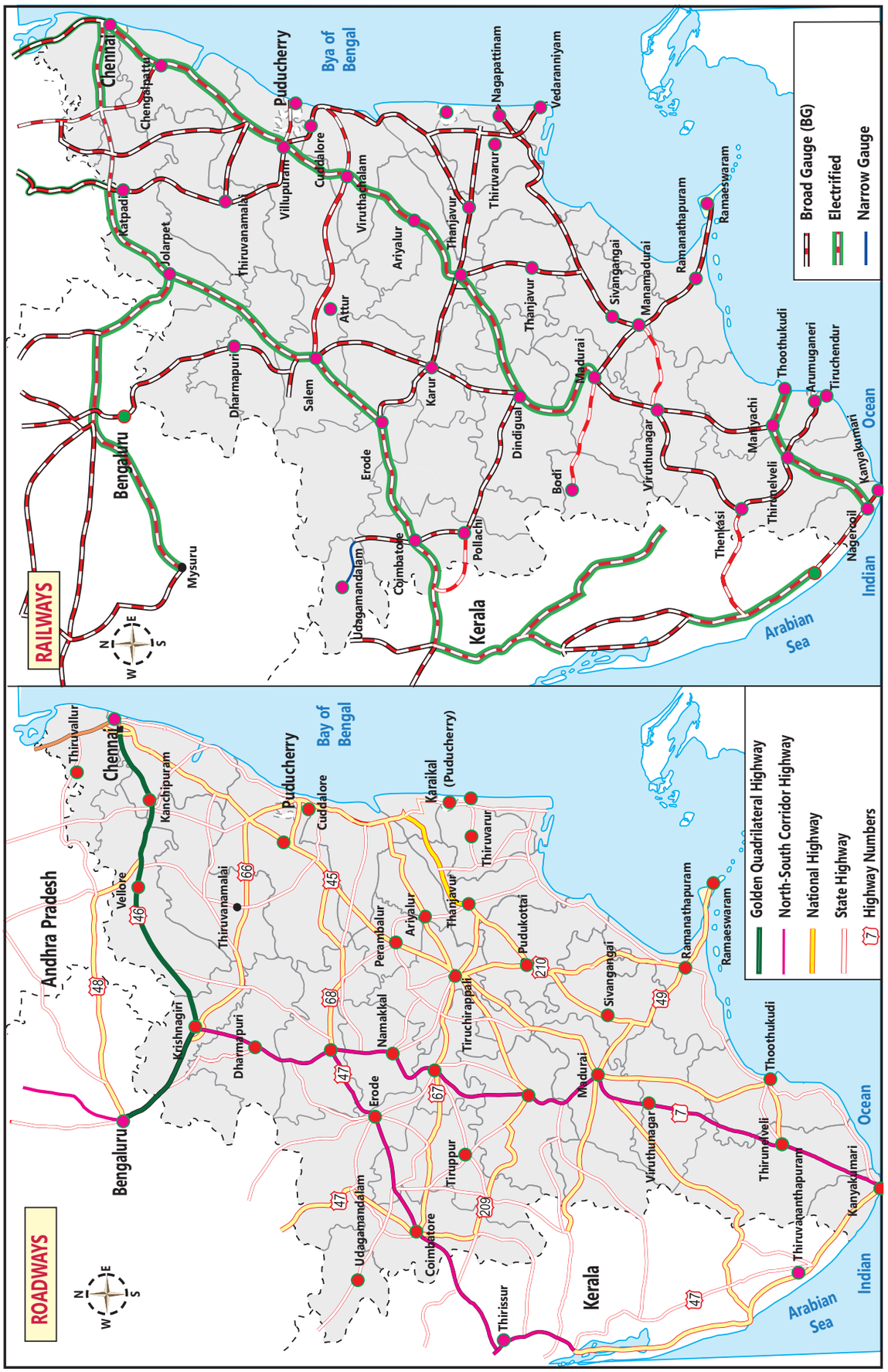
7.12 Communication

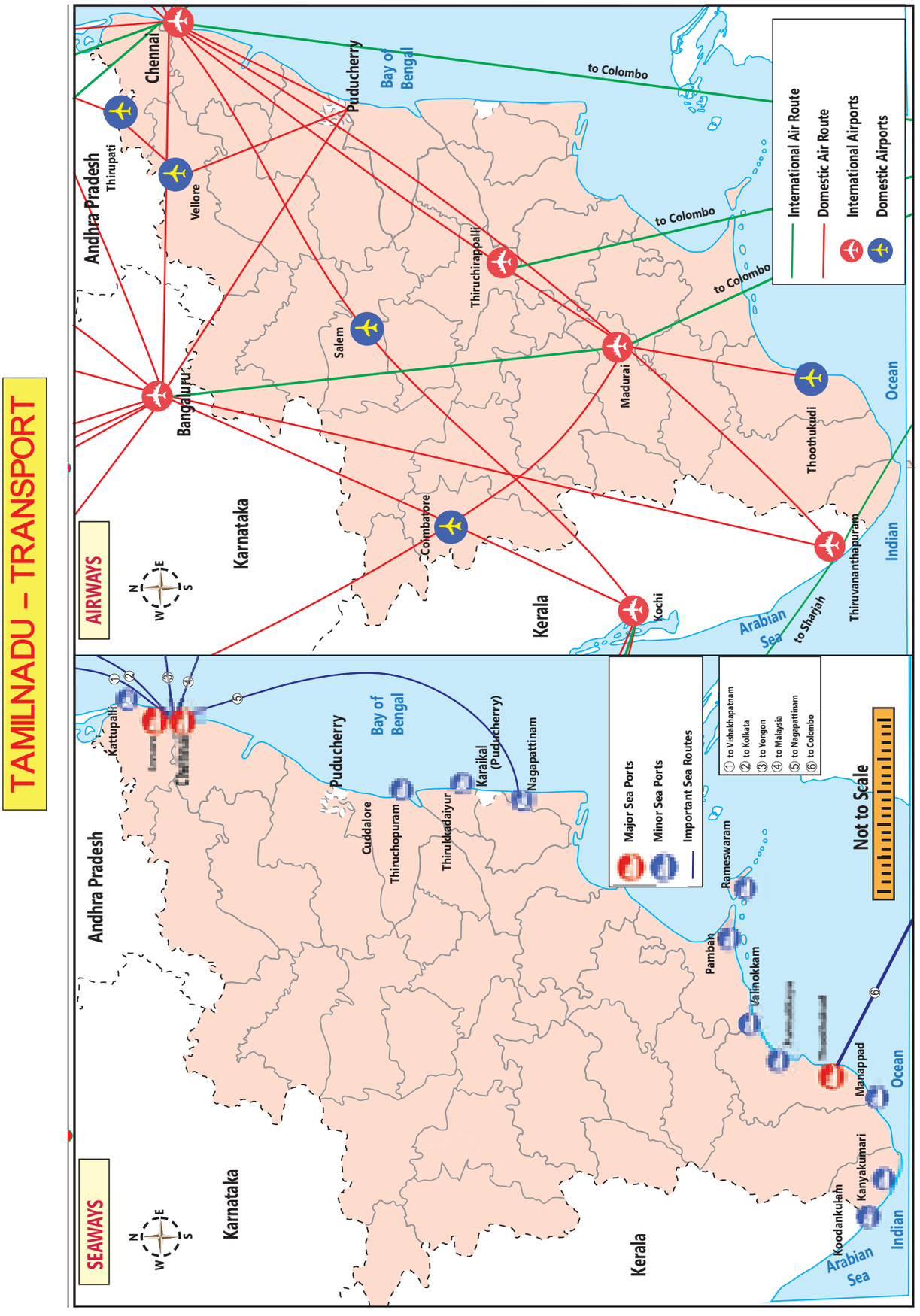
Communication is derived from the Latin word communicare, meaning 'to share'. The act of conveying or exchanging information is called means of communication. They are mass communication and personal communication.

Postal Districts and Headquarters in Tamil Nadu

Zone /districts	Head quarters
Chennai	Chennai
Western	Coimbatore
Central	Thiruchirapalli
Southern	Madurai

TAMILNADU – TRANSPORT





7.13 Trade

Export and import are the two components of trade. Export means goods and services sold for foreign currency. Tamil Nadu contributes 12.2% to the country's exports. Import refers to goods and services are brought from overseas producers. Tamil Nadu imports many goods from outside. The difference between the values of export and import is called the balance of trade.

7.14 Imports of Tamil Nadu

Machineries like transport equipment, machine tools, non-electrical machinery, electrical machinery, pharmaceutical products, petroleum, fertilizers and newsprint are its major imports. The state contributes 10.94% to the country's trade through major ports.

Major Exports of Tamil Nadu	
(i) Agricultural Products	tobacco, cereals, cotton, sugarcane, paddy, groundnut, spices and vegetables.
(ii) Leather Products	wallets, purses, pouches, handbags, belts, footwear and gloves
(iii) Gems and Jewellery	pearls, precious stones, gold jewellery, decorations and antiques
(iv) Chemicals and related products	paper, chemicals, rubber and glass.

The above discussion shows that Tamil Nadu is an important state of India in terms of size, population, resources and economic development. People in the state are well secured. The new schemes introduced by the state government periodically have enabled notable progress in various fields.

SUMMARY

- Human Geography is the branch of geography dealing with how human activity affects or is influenced by the nature.
- Tropical crops like paddy, millets, pluses, oilseeds and plantation crops of tea, coffee, cashew, rubber etc are the major crops of Tamil Nadu.
- Tamil Nadu has 55.3% of lignite, 75% of vermiculite, 69% of dunite, 59% of garnet, 52% of molybdenum and 30% of titanium.

EXERCISE

E2DXNJ

I Choose the correct answer

1. The delta which is known as Granary of South India is

   a) Cauvery delta b) Mahanadi delta
   c) Godavari delta d) Krishna delta

2. Second staple food of the people of Tamil Nadu is

   a) Pulses b) Millets
   c) Oilseeds d) Rice

3. A major hydro-electric power project of Tamil Nadu is

   a) Mettur b) Papansam
   c) Sathanur d) Thungabahdra

4. Number of major and minor ports in Tamil Nadu are

   a) 3and15 b) 4 and15

   c) 3 and16 d) 4 and15

II Fill in the blanks

1. Agriculture of Tamil Nadu constitutes _____ % of its economy.
2. Sathanur dam is constructed across the river _____.
3. _____ is the third largest airport in India after Mumbai and Delhi.
4. The difference between the value of exports and imports is called _____.

III Match the following

1.	Bauxite	–	Salem
2.	Gypsum	–	Servaroy hills
3.	Iron	–	Coimbatore
4.	Limestone	–	Tiruchirapalli

IV Questions 1-2 are assertion and reasoning type

1. **Assertion (A):** Coimbatore, Tiruppur and Erode region is called as The Textile Valley of Tamil Nadu.

   Reason (R): They contribute a major share to the states economy through textiles.

   (a) Both (A) and (R) are true and (R) explains (A)

   (b) Both (A) and (R) are true but, (R) does not explain (A)

   (c) (A) is true but (R) is false

   (d) (A) is false but (R) is true

2. **Assertion (A):** The Nilgiris is the least populated district of Tamil Nadu

   Reason (R): It is located in the western most part of Tamil Nadu.

   (a) Both (A) and (R) are true and (R) explains (A)

   (b) Both (A) and (R) are true but, (R) does not explain (A)

   (c) (A) is true but (R) is false

   (d) (A) is false but (R) is false

V Answer the following in brief

1. Explain the cropping seasons of Tamil Nadu
2. Why is Coimbatore called the Manchester of Tamil Nadu?
3. Name the important multipurpose projects of Tamil Nadu.
4. What is MRTS?
5. List out the air ports and sea ports of Tamil Nadu.

VI Distinguish between the following

1. Marine Fishing and inland fishing
2. Food crops and non- food crops
3. Surface water and ground water

VII Give reasons for the following

1. Farmers switch over from inorganic to organic farming.
2. Cities are densely populated than the villages.
3. Karur is Called theTextile Capital of Tamil Nadu.

VIII Answer the following in a paragraph

1. Write about the plantation farming of Tamil Nadu.
2. Give an account on water resources of Tamil Nadu.
3. Bring out the mineral distribution in Tamil Nadu.
4. State the densely populated regions of Tamil Nadu and account for its high density.
5. Explain the different modes of transport available in Tamil Nadu.
6. Write about Road safety rules

IX Map exercise

1. Mark the areas of major crops, minerals, dams, air ports and sea ports.

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A-Z GLOSSARY

Back waters: The part of a river which are stagnant and do not reach the sea as they are pushed by the current.

Distributary: A branch or outlet which leaves a main river and does not rejoin it, carrying its water to the sea or a lake.

Doab: A land between the two converging rivers.

Estuary: Mouth of a river where it enters the sea through a single channel with a hollow.

Perennial Rivers: The rivers which flow throughout the year and have permanent source of water.

Pass: A narrow gap through the mountains providing a route or passage way.

Peninsula: The land area covered with ocean on three sides.

Subcontinent: A large area of a continent that stands distinct from the rest of the continent and possesses almost all the characteristics of a continent.

Standard Time: The local time of central meridian of ones country.

Tributary: A river or stream which contributes its water to main river.

Climate: The weather conditions prevailing in an area in general or over a long period.

Meteorology: The branch of science concerned with the processes and phenomena of the atmosphere, especially as a means of forecasting the weather.

Season: Each of the four divisions of the year (spring, summer, autumn, and winter) marked by particular weather patterns and daylight hou.

Weather: The state of the atmosphere at a particular place and time as regards heat, cloudiness, dryness, sunshine, wind, rain, etc.

Wildlife: Wild animals collectively; the native fauna (and sometimes flora) of a region.

Soil: Soil is the uppermost layer of the land surface composed of minerals, organic matter, living organisms and water

Khadar: Newer alluvium soil found in valley flooded almost every year

Bhangar: Older alluvium soil found in30 mts above flood level

Soil erosion: Removal of top soil

Soil conservation: Prevention of soil from erosion and protecting its fertility.

Irrigation: Watering of plants through artificial means.

Multipurpose projects: Construction of dams across rivers aimed at many purposes

Agriculture: It is the process of producing food, feed, fibre and many other desired products by the cultivation of certain plants and the raising of domesticated plants

Biogas: The production of methane and carbon- di- oxide from plants and animal wastes.

Fossil fuel: Any naturally occurring carbon or hydrocarbon coal, oil and natural gas.

Ore: It is a deposit in the earth crust with one or more value minerals

Solar power: Heat radiation from the sun converted into electricity.

Thermal power station: An electricity generating plants which burns coal or oil.

Barter: A direct exchange of goods between any two parties.No money is involved in the trade.

Foreign exchange: The mechanism or process by which payments between any two places operating under different national currency systems are effected without passing of actual money or gold, etc.

Harbour: An extensive stretch of deep water near the seashore where vessels can anchor securely. It is used for exports and imports of goods.

Port: The commercial part of a harbour with the facility of loading and unloading of goods and space for the storage of cargo.

Bay: A broad inlet of the sea where the land curves inwards

Beach: A pebbly or sandy shore, especially by the sea between high- and low-water marks

Biogas: The production of methane and carbon- di- oxide from plants and animal wastes

Commercial crops: Crops which are cultivated to be sold to gain profit from sale.

Cyclone: A cyclone is a large scale air mass that rotates around a strong centre of low atmospheric pressure.

Dams: A barrier constructed to hold back water and raise its level, forming a reservoir used to generate electricity, supply water and other uses.

Delta: A triangular shaped alluvial tract formed at the mouth of a river.

Density of population: The average number of inhabitants living per sq km area

Drought: It is a natural disaster of below average precipitation in a given region resulting water shortage.

Drowning: death caused by being underwater and not being able to breath.

Endemism: The ecological state of a species being unique to a defined geographic location, such as an island, nation

Exports: Goods dispatched from one country to another.

Flood: A large amount of water that has spread from a river

Imports: Goods bought into a country from another country.

Land slide: sudden fall of mass of the rocks etc down side of the mountain

Literates: The people with the ability to read and write.

Leaching: It is a process in rainy seasons which all the soluble minerals are washed away by runoff water so the soil is infertile

Latitude: The imaginary parallel lines which run east to west on the globe.

Longitude: The imaginary vertical lines which run north to south on the globe.

Mangroves: Salt tolerant evergreen forest ecosystem found mainly in tropical and sub-tropical coastal and/or inter-tidal regions.

Manchester: An industrial city and metropolitan district in north-western England/items for the home made of cotton, linen, etc., such as sheets, pillowcases, or tablecloths.

Meteorology: The science of weather.

Mixed farming: It is a type of farming which involves both the growing of crops and the raising of livestock simultaneously in a land holding.

Monsoon: Season

Natural resources: Materials or substances occur in nature and are used for economic gain

Open Forest: Lands with forest cover having a canopy density between 10 to 40 percent.

Plantation agriculture: Well organized and managed farming with a single crop on a large scale. It is a capital intensive farming. Tea, coffee and rubber are the major plantation crops.

Plateau: An extensive elevated area of relatively a flat land.

Population: All the people living in a particular country, area, or place

Population census: Official enumeration of population along with economic and social attributes of a region at a specified interval.

Protected Forest(PF): An area notified under the provisions of the Indian Forest Act or other State Forest Acts, having limited degree of protection. In protected forest all activities are permitted unless prohibited.

Regions: An area, especially part of a country or the world having definable characteristics but not always fixed boundaries.

Reserved Forest (RF): An area constituted under the provisions of the Indian Forest Act or other State Forest Acts, having full degree of protection. In Reserved forests all activities are prohibited unless permitted.

Reservoirs: A large natural or artificial lake used as a source of water supply.

Sedimentary rock: A rock which has been formed by the consolidation of sediments.

Sex ratio: The number of females per 1000 males.

Stampede: a situation in which a large number of animals or people running in the same direction in an uncontrolled way causing injuries and deaths

Strait: A narrow passage of water connecting two seas or two other large areas of water.

Subsistence intenensive farming: It is a type of farming in which crops grown are consumed by the family with little surplus to sell.

Unclassed Forest: An area recorded as forest but not included in reserved or protected forest category.

UNESCO World Heritage Site: Representing the main ecosystem of the planet in which genetic resisources would be protected, and where research on the ecosystem as well as monitoring and training work could be carried.