

# GEOGRAPHY

## 1. India - Location and Physiography

### LOCATION

India is a large country located in South Asia with rich civilization. It has often amazed and intrigued the rest of the world by its finite variety of castes and creeds, a tradition of religious toleration, a capacity for survival and the maintenance of its timeless traditions. Its cultural influences had crossed its border from time immemorial and reached far off lands.

It acts as a bridge between developed and developing countries of the world and between the East and the West. India's strength lies in its geography as much as in its culture.

In historical times, India was known as 'Bharat' and 'Hindustan'.

The name 'Bharat' refers to the ancient, mighty king Bharat and the name 'Hindustan' is given after the river Sindhu. The Europeans afterwards started referring to this country as 'India' a derivative of the word 'Sindhu'. Today, the officially recognized name of the country is India.

### India, a subcontinent

A continent possesses distinct characteristics of diverse,

- 1) Physical features,
- 2) Climatic conditions,
- 3) Natural vegetation,
- 4) Mineral resources,
- 5) Human habitations,

### Location of India in the World



- 6) Cultural norms,
- 7) Ancient ethnic and linguistic groups and
- 8) Huge area.

All these distinctive continental characteristics are found in India. Hence, we consider India as a subcontinent.

### Location and Extent

Let us remember!

Latitudes and Longitudes help us to locate a place.

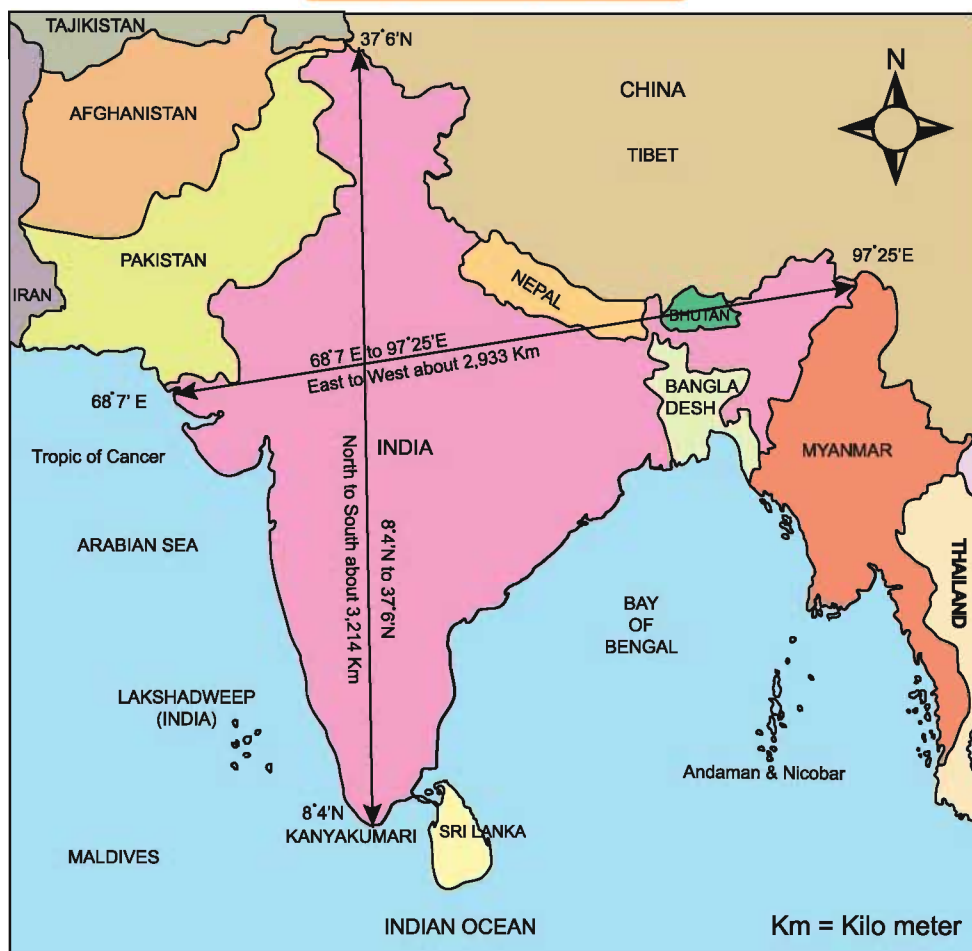
India extends from  $8^{\circ}4' N$  to  $37^{\circ}6' N$  latitudes and  $68^{\circ}7' E$  to  $97^{\circ}25' E$  longitudes. The Tropic of Cancer

$23\frac{1}{2}^{\circ} N$  runs across the country and divides it into two equal halves.

It covers an area of 32,87,263 Sq. km, with 1210 millions population (2011 Census). It stretches from **Kashmir** in the north to **Kanyakumari** in the south, for about 3,214 Km and from Gujarat in the west to **Arunachal Pradesh** in the north east for about 2,933 Km. It has coastline of about 5,516 km inclusive of the main land, Lakshadweep, and Andaman and Nicobar Islands.

India's position is favourable for trade, commerce and economic activities by connecting India with Europe through **Suez Canal** and also with China, Japan and Australia through **Malaccan strait**.

India and its boundaries



### Remember, The Size of India!

India is the second largest country in Asia; it is 4 times larger than Pakistan, 8 times larger than Japan, 12 times larger than the U.K. but 3 times smaller than the USA.

### Indian Standard Time

Longitudes help us to calculate the time of a place. The 82°30' E longitude is taken as **Indian Standard Time Meridian (IST)**, as it passes through the middle of India near Allahabad. This is 5 hours 30 minutes ahead of the **Greenwich Mean Time** (0° longitude).

After independence in 1947, the Indian Government established IST as the official time for the whole country,

### Do you know the reasons, for following IST?

The east-west extent of India is about 30 degrees of longitude. Due to this great longitudinal extent, the sun rises or sets almost two hours earlier in the eastern most than in the western most part. To avoid confusion with respect to time at different places in India, the almost centrally located longitude 82°30'E has been selected as standard meridian for the whole country. The local time of this longitude is used as the Indian Standard Time (IST).

### India and its neighbouring countries

A series of mountain ranges in the east separates India from **Myanmar**. India has the following neighbouring countries. They are: **Pakistan** in the west, **Afghanistan, Nepal, Bhutan, China** in the north, and **Bangladesh** and **Myanmar** on the east. India is bounded by Arabian sea in the southwest, by the Bay of Bengal in the east and southeast and the Indian

Ocean in the south. **Kanyakumari** or Cape Comorin constitutes the southern tip of the Indian peninsula.

**Palk Strait** separates India and Sri Lanka on the South. The Himalayas along with **Hindukush** and **Karakoram** provide a natural boundary on the north.

The Islands of **Andaman** and **Nicobar** and **Lakshadweep** are the parts of Indian Union situated in the Bay of Bengal and Arabian Sea, respectively.

### Unity in Diversity

1) India has unique **land forms** ranging from the highest peaks to the lowest plains. In the north India, **Mount Godwin Austin**, otherwise known as **Mount K2** is the highest peak of India and coastal plains are the lowest in the south India.

### Which is the highest peak?

Mount Everest is the highest peak in Himalayas, which is located in Nepal. The height is 8,848 meters. above the sea level.

- 2) The **climate** varies from the tropical to the temperate zone. **Cherrapunji** in **Meghalaya** receives the highest amount of rainfall, whereas the **Thar Desert** receives very low rainfall.
- 3) We have wet dense tropical **forest** on the Western Ghats, mangrove trees in the Sunderbans of West Bengal and the shrubs and sparse vegetation in the Thar Desert.
- 4) The diversity of the physical environment and climate has made India an **ideal habitat** for varieties of flora and fauna.
- 5) India is a **secular country** with total freedom of worship. People follow

Hinduism, Christianity, Islam, Sikhism, Buddhism, Jainism and Zoroastrianism with cultural diversities. In spite of its physical, religious and racial varieties, the 'Indian culture' unites all people. Hence India is known for her "Unity in diversity".

People shed all their differences and stand together when there is a crisis. The best examples are Kargil invasions and natural calamities like floods and Tsunami.

It is our prime duty to conserve and transmit our cultural values to the future generation of our country and it is our duty to prove ourselves as Indians.

### Political Division

India has been divided into 28 States and 7 Union Territories on the basis of the language for administrative convenience. Delhi is the National Capital as well as the Capital of Union Territory.

## India - Political Division



## INFORMATION ABOUT STATES

| S.No              | States                      | Capital            | Area in sq.km | Population | 2011 Population Density/Sq.Km. |
|-------------------|-----------------------------|--------------------|---------------|------------|--------------------------------|
| 1                 | Andhra Pradesh              | Hyderabad          | 275045        | 84665533   | 308                            |
| 2                 | Arunachal Pradesh           | Itanagar           | 83743         | 1382611    | 17                             |
| 3                 | Assam                       | Dispur             | 78438         | 31169272   | 397                            |
| 4                 | Bihar                       | Patna              | 94163         | 103804637  | 1102                           |
| 5                 | Chattisgarh                 | Raipur             | 135191        | 25540196   | 189                            |
| 6                 | Goa                         | Panaji             | 3702          | 1457723    | 394                            |
| 7                 | Gujarat                     | Gandhinagar        | 196024        | 60383628   | 308                            |
| 8                 | Haryana                     | Chandigarh         | 44212         | 25353081   | 573                            |
| 9                 | Himachal Pradesh            | Shimla             | 55673         | 6856509    | 123                            |
| 10                | Jammu & Kashmir             | Srinagar, Jammu    | 222236        | 12548926   | 56                             |
| 11                | Jharkhand                   | Ranchi             | 79714         | 32966238   | 414                            |
| 12                | Karnataka                   | Bangalore          | 191791        | 61130704   | 319                            |
| 13                | Kerala                      | Thiruvananthapuram | 38863         | 33387677   | 859                            |
| 14                | Madhya Pradesh              | Bhopal             | 308245        | 72597565   | 236                            |
| 15                | Maharashtra                 | Mumbai             | 307713        | 112372972  | 365                            |
| 16                | Manipur                     | Imphal             | 22327         | 2721756    | 122                            |
| 17                | Meghalaya                   | Shillong           | 22429         | 2964007    | 132                            |
| 18                | Mizoram                     | Aizawl             | 21081         | 1091014    | 52                             |
| 19                | Nagaland                    | Kohima             | 16579         | 1980602    | 119                            |
| 20                | Odisha                      | Bhuvaneshwar       | 155707        | 41947358   | 269                            |
| 21                | Punjab                      | Chandigarh         | 50362         | 27704236   | 550                            |
| 22                | Rajasthan                   | Jaipur             | 342239        | 68621012   | 201                            |
| 23                | Sikkim                      | Gangtok            | 7096          | 607688     | 86                             |
| 24                | Tamil Nadu                  | Chennai            | 130058        | 72138958   | 555                            |
| 25                | Tripura                     | Agartala           | 10486         | 3671032    | 350                            |
| 26                | Uttarakhand                 | Dehradun           | 53483         | 10116752   | 189                            |
| 27                | Uttar Pradesh               | Lucknow            | 240928        | 199581477  | 828                            |
| 28                | West Bengal                 | Kolkata            | 88752         | 91347736   | 1029                           |
| Union Territories |                             |                    |               |            |                                |
| 1                 | Delhi                       | Delhi              | 1483          | 16753235   | 11297                          |
| 2                 | Andaman and Nicobar islands | Port Blair         | 8249          | 379944     | 46                             |
| 3                 | Chandigarh                  | Chandigarh         | 114           | 1054686    | 9252                           |
| 4                 | Dadra and Nagar Haveli      | Silvassa           | 491           | 342853     | 698                            |
| 5                 | Diu and Daman               | Daman              | 112           | 242911     | 2169                           |
| 6                 | Lakshwadeep                 | Kavaratti          | 32            | 64429      | 2013                           |
| 7                 | Puducherry                  | Puducherry         | 479           | 1244464    | 2598                           |

## PHYSIOGRAPHY OF INDIA

Physiography means the description of physical relief features of a country. India is a land of great physical contrasts. The peninsular plateaus constitute one of the most stable and ancient land block on the earth. The Himalayas and Great Plains represent the most unstable zones. It is important to understand the varied physical features of India, which came into existence during different geological periods through and different geological processes.

### Physiographic Divisions of India

The land of India accounts for differences in geological structure. Based on the structure, India is divided into five physiographical divisions. They are:

- I. Northern mountains
- II. Northern Great Plains
- III. Peninsular Plateaus
- IV. Coastal Plains
- V. Islands

### I. Northern Mountains

The Northern Mountains are the greatest mountain ranges. The upper slopes of many of the ranges are permanently covered with snow and hence they are known as the '**Abode of Snow**' or the '**Himalayas**'. This is the highest mountain range of the world.

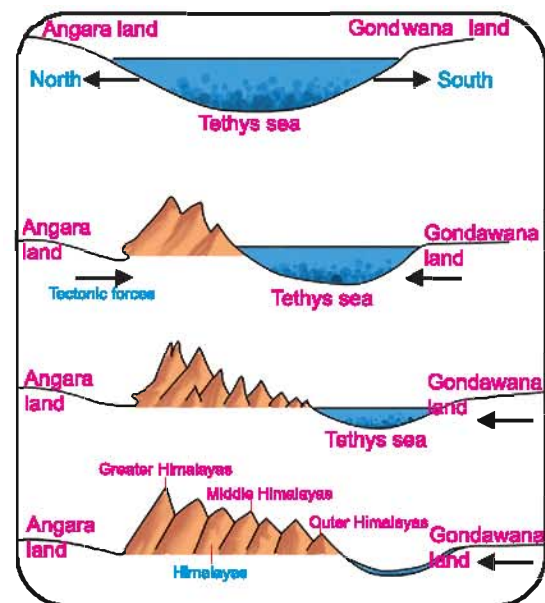
It extends, in the shape of an arc, for a distance of 2,500 km from west to east between the Indus gorge in Jammu and Kashmir in the west and Brahmaputra gorge in Arunachal

Pradesh in the east. Many of the ranges rise more than upto 8,000 metres above the mean sea level. These mountains extend through the states of Jammu and Kashmir, Himachal Pradesh, Uttar Pradesh, Uttaranchal, West Bengal, Sikkim and Arunachal Pradesh.

### Formation of Himalayas

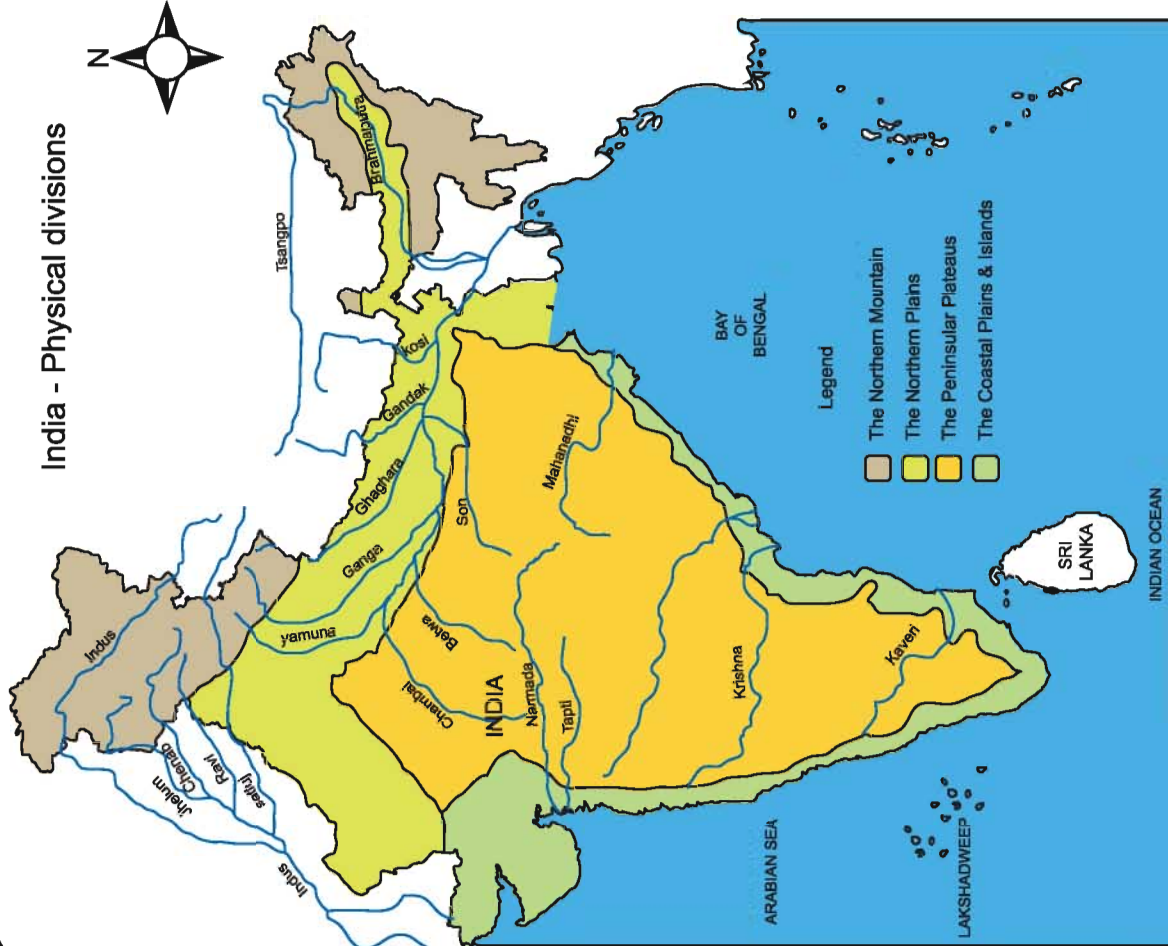
The Himalayas are not a continuous range of mountains but a series of several, more or less parallel or converging ranges separated by valleys and plateaus. Let us see how they were formed?

Millions of years ago, there was only one large land mass on the surface of the Earth and it was surrounded by oceans on all sides. The landmass was called 'Pangea', surrounded by a water body, known as 'Panthalasa'. This large land mass split up into two parts. The northern part was known as 'Angaraland' and the southern part was known as '**Gondwana land**'. The sea separating these two was called the '**Tethys sea**'.

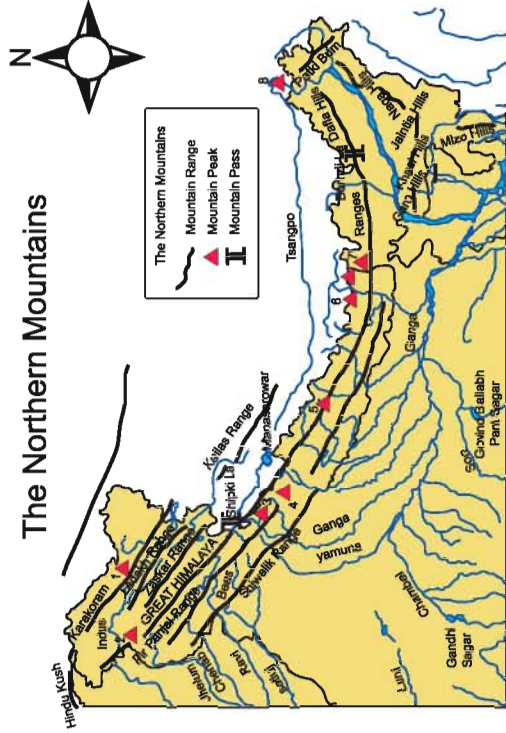


Formation of Himalayas

### India - Physical divisions



### The Northern Mountains



#### Mountain Peak

1. Mt. K2 (8611 m)
2. Nanga Parbat (8126 m)
3. Kamet (7756 m)
4. Nandadevi (7817 m)
5. Dhaulagiri (8172 m)
6. Mt. Everest (8848 m)
7. Kanchenjunga (8598 m)
8. Namcha Barwa (7756 m)

This sea stretched along an east-west direction. The river from **Angara** and **Gondwana** deposited their silts along the Tethys Sea. After a long period, the deposits due to tectonic forces uplifted to form fold mountains called the **Himalayan ranges**.

The "**Aravalli Range**" in India is one of the 'oldest' mountain ranges of the world. The Himalayas is an example of young fold mountains.

The Himalayas are further subdivided into three parts from west to east. They are:

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

### 1. **Western Himalayas**

The Western Himalayas are also known the Trans-Himalayas. The lofty Karakoram Mountains extend eastwards from Pamir Knot, which lies in the North West India. These ranges in the southwest of Kashmir form India's frontier with Afganistan and China. Godwin Austin known as K2 (8,611 metres), the world's second highest peak, belongs to this range. The 'Karakoram pass' has acquired special importance now. **Baltora** and **Siachen** are the two big glaciers, found to the south of Karakoram. There are two parallel ranges, known as the **Ladakh** and **Zaskar**. The extension of Ladakh range is '**Ladakh plateau**', and it is the highest plateau of India. It lies in the northwest of Kashmir.

### 2. **Central Himalayas**

The Himalayas, which radiate from Pamir Knot in the southeast direction is called Central Himalayas. The width varies from 400 km in the west to 150 km in the east. The height of the mountains increasing towards

east from the west. The steep slopes, the high pointed peaks and parallel ranges of the Central Himalayas indicate that Himalayas are young fold mountains. These ranges are interspersed by valleys and plateaus. There are three parallel ranges found in the central Himalayas from north to south. They are:

- i) Himadri
- ii) Himachal
- iii) Siwaliks

#### **i) Himadri**

Himadri is the northern most range of Himalayas. The average height of this range is 6,000 metres. It extends from Indus Valley in the north west to Brahmaputra in the northeast. It consists of several peaks of the world. **Mt. Everest** is the highest peak of the world with an altitude of **8,848 m**. The other peaks of Himadri are **Kanchen Junga** (8,598 m), **Nanga Parbat** (8,126 m), **Dhaulagiri** (8,167 m) and **Nanda Devi** (7,817 m). Many glaciers which are source of rivers are found in Himadri. For example, **Gangotri** and **Yamunotri** glaciers are the sources of Ganga and Yamuna rivers, respectively.

'**Passes**' are the natural gaps across the mountains. They provide route to us with neighbours. **Zojila** pass in Kashmir **Shipkila** in Himachal Pradesh and Nathula and **Jelepala** in Sikkim are the most important passes across Himadri.

#### **ii) Himachal**

Himachal lies between the Himadri in the north and **Siwaliks** in the south. It extends over a variable width of 80 km in average. The altitude varies from 3,700 m to 4,500 m. It is a highly rugged topography consisting of spurs



and dissected uplands. "Pirpanjal" in Kashmir is the longest range of Himachal region. 'Dhauladar ranges' stretches from Jammu and Kashmir across Himachal Pradesh. Kashmir valley, Khangra valley and Kulu valleys are in between these ranges. The popular hill resorts, Srinagar, Pahelgam, Gulmarg, Mussourie, Shimla and Nainital are located here. The places of pilgrim interests such as Amarnath, Kedarnath, Badrinath and Vaishnavidevi temples are the assets of the Himachal ranges.

### iii) Siwaliks

Siwaliks is the southern most range of the Himalayas. Its average height is 1,000 m. It is a discontinuous range, made up of mud and soft rocks. The narrow longitudinal valleys called 'Duns' are found in Siwaliks. The best example is 'Dehra Dun'. Along the foothills of Siwaliks, pebbles and gravels are being deposited by the rivers. 'Terai plain' is made up of deposits of fine silts in the south of Siwalik. It supports the growth of thick forests and marshy lands.

## 3. Eastern Himalayas

Brahmaputra river marks the Eastern most geographical limit of the Himalayas. These mountains along

the Eastern boundary of India is called **Purvachal**. They are of medium height. They comprise of **Patkai hills** and the **Naga Hills** in the North and the **Mizo Hills** in the south. At the centre, they take a westward turn along the Bangladesh-India border in Meghalaya. Here they consist of **Jaintia, Khasi** and **Garo** hills from East to west.

## II. Northern Great Plains

The Northern Great Plains are located at the south of Himalayas. These are formed by the deposits of Indus, the Ganga and Brahmaputra rivers. It extends over a length of 2,400km. It covers an area of over 7 lakh sq.km. Important characteristics include the soil features such as Bhabar (unassorted sediments) Terai (marshy track) Bhangar (Older Alluvium) and Khadar (newer alluvium).

The Bhabar lies along the foothills at about 8 to 16km wide. The rivers, coming from the mountains, deposit their load along the foot hills in the form of alluvial fans. The porosity of the deposits is so high that streams sink and disappears in the bhabar tract and flow underground. The area is marked by dry river courses.

India: Northern plains



The Terai is a marshy tract, where most of the underground streams of the bhabar belt reappear. The terai belt is located towards the south of the bhabar tract and is about 15km to 30km wide. It is a zone of excessive dampness. It helps to the growth of forests and variety of wildlife. Most of the Terai land has been developed into farm lands.

The **Bhangar** represents the alluvial terrace. It is formed by the deposition of older alluvium which lies above flood-limit of the plains. Bhangar is mainly composed of clay.

The **Khadar** is the newer alluvium brought by the rivers. It is deposited in the flood-plains along their banks. It is enriched by fresh deposits of silt every year during the floods.

Northern Plains can be divided into the following regions.

1. Rajasthan plain
2. Punjab – Haryana plain
3. Ganga Plain
4. Brahmaputra Plain

### 1. Rajasthan Plain

Rajasthan plain is found located in the west of Aravalli Range and it extends for about 640kms with an average width of about 300kms. It covers western Rajasthan where two thirds of this region is desert. It is about 300 metres above mean sea level. In general, the eastern part of the desert is rocky, while western part has shifting sand dunes.

This plain is drained by a number of seasonal streams, originating from the Aravalli ranges. **Luni** is an important river of this region. It flows into Rann of Kutch. In north of Luni,

there is a large area of inland drainage. It has several dry river beds.

### How does a river disappear?

Several rivers disappeared during recent geological history. Some have changed their courses and some have disappeared completely. The saraswati was a mighty river in the vedic and pre-vedic time, but disappeared gradually, due to the advancing desert area. The 'Ghaghra' is believed to be the present day successor of the saraswati river.

There are several **saline lakes** in Rajasthan plain. The largest is the **Sambhar Lake**, which is located about 65km west of Jaipur.

### 2. Punjab-Haryana Plains

The fertile plains of Punjab and Haryana lies to the northeast of the Great Indian Desert. These plains extends for about 640km from the northeast to the south west and about 300km from west to east. In the east, the **Delhi ridge** separates the Punjab Haryana Plains from the Ganga plain.

The Punjab – Haryana plains are formed by depositional activities of the sutluj, Beas, Ravi rivers. The southeastern part of the plains, bordering the Rajasthan plain, is sandy and has shifting sand dunes. The area between Ghaghra and the Yamuna rivers lies in Haryana and forms the Haryana plain. It acts as water- divide (doab) between the Yamuna and the Satej River.

### What is Doab?

The alluvial tract of land between two adjacent rivers. For example, the plains between the Ganga and the Yamuna.

### 3. Ganga Plain

The Ganga plain is the largest plain. It extends from the Yamuna river in the west upto Bangladesh in the east, covering a distance of about 1500 Km. with an average width of 300km. It covers the states of Uttar Pradesh, Bihar and west Bengal. The Ganga along its large number of tributaries, such as Ramganga, Gomti, Ghaghra, Gandak, Kosi, Yamuna etc, from the north and Son, Chambal, Betwa etc. from the south, have brought large quantities of sand and silt from the mountains and plateaus respectively, and deposited in this vast plain. The general slope of the entire Ganga plain is towards the east and the southeast. The average elevation of the plain is about 200m above the sea level.

Ganga – Yamuna Doab lies in the western part of this plain. The lowlying Rohilkhand is located in the east of the Doab. In the middle part, the flow of the rivers is sluggish and most of them keep shifting their courses. This has made the region prone to frequent floods.

The Ganga and the Yamuna rivers are sacred to the followers of the Hinduism. Thus many religious places have developed along the bank of the sacred rivers, such as, Haridwar, Mathura, Varanasi, Allahabad and so on. The religious places have developed into large cultural, educational and tourist centres.

The Kosi river, known as the "Sorrow of Bihar" has shifted its course by about 100km in the recent times.

In the lower part the Ganga and the Brahmaputra rivers divided into several channels in this region to form the largest delta in the world. The lower

part of the delta called the **Sundarbans** is covered with thick tidal and mangrove forests. The sea – facing region of the delta has a large number of estuaries, mangrove swamps, sand banks and islands.

### 4. Brahmaputra Plain

The easternmost part of the northern plains is drained by the **Brahmaputra River** and its numerous tributaries. The Brahmaputra River originates in Tibet and is locally known as **Tsangpo** (the purifiers). Before entering India, it cuts through the **Dihang gorge** and enters the Assam valley. This plain is about 720km long and about 60-100km wide. The general slope is from the northeast to the southwest. The region is surrounded by high mountains except on the west.



**Brahmaputra River-Assam**

A large number of tributaries coming from the Assam hills in the north join the main river and form '**alluvial fans**'. There are large marshy tracts in this area. The alluvial fans have led to the formation of Terai.

### III. Peninsular Plateau

The peninsular plateau is located to the south of northern great plains. It is triangular in shape and covers an area of about 16 lakh sq.km. It is surrounded by hill ranges on all sides,

such as the Aravalli, Vindhya, Satpura and Rajmahal ranges in the north, the Western Ghats in the west and the Eastern Ghats in the east.

The average height of this plateau varies between 600-900 mts above the mean sea level. The general slope is from west to east, while in the Narmada–Tapti region it is from east to west. The Narmada River divides the peninsular plateau into two unequal parts. The northern part is called the 'Central Highlands' and the southern part is called the 'Deccan Plateau'.

#### A) Central Highland

- 1) **Malwa Plateau** is bounded by the Aravali range, the Vindhya Range and Bundelkhand. It is made up of lava and is covered with black soil. The **Chambal River** and its tributaries have created ravines in the northern part of the plateau.
- 2) The **Bundelkhand** is located towards the south of the Yamuna River and is composed of igneous and metamorphic rocks. In the northern part, the Ganga and Yamuna system have deposited alluvium. The hilly areas are made up of sandstone and granite. Some rivers like **Betwa** and **Ken** have carved out deep gorges.
- 3) The **Baghelkhand** lies to the east of 'Maikala Range'. It is made up of sandstone and limestone in the west and granite in the east. The central part of the plateaus acts as water divide between the son and the Mahanadhi drainage basins.
- 4) The **Chotanagpur Plateau** is located towards the northeast. It is

drained by Damodar, Subarnarekha, Koel and Barakar river systems. The **Damodar River** flows from west to east through the middle of this region. This region has a series of plateaus and hills, such as the **Hazaribagh plateau** to the north of the **Damodar River**, **Ranchi plateau** to the south and the **Rajmahal hills** in the north eastern part.

#### B) Deccan plateau

It covers an area of about 5 lakh sq. km. It is bounded by the **satpura** and the **Vindhya** ranges in the northwest, the **Mahadev** and **Maikala** ranges in the north, the **Western Ghats** in the west, and the **Eastern Ghats** in the east. The Deccan plateau slopes from west to east. That is why the rivers like Mahanadi, Godavari, Krishna and Kaveri flow eastward and join the Bay of Bengal. The northern part, also known as the Deccan trap is made up the lava rocks and has black regur soils. In the southern part, the **Karnataka plateau** merges with the **Nilgiri Hills**. The **Telengana** plateau is drained by the Godavari, Krishna and Pennaru rivers.

#### Hill Ranges of Peninsular India

i) **Aravalli Range** is one of the oldest fold mountain systems in the world. From northeast to southwest, its extent is about 800km. In the north, the average height is about 400 metres, while in the south it is about 900 metres. **Gurushikhar** (about 1722 metres) in the Abu hills is the highest peak of the Aravalli range. The Aravalli ranges are highly eroded and dissected.

ii) **Vindhya Range** rises as an escarpment overlooking the Narmada Valley, and runs parallel to it

in the east - west direction for about 1200km. It is composed of sand stone, lime stone and shale. It acts as a watershed between the Ganga river system and the river systems of south India.

iii) **Satpura range** lies between the Narmada and the Tapti rivers. It is a series of seven hills and stretches for about 900km. A major Part of the Satpura Range has height of more than 900 meters.

### C) Western Ghats

Western Ghats are continuous range of hills running in the North-South direction and form the western edge of the Deccan plateau. Its extent is about 1600km from the Tapti valley in the north upto Kanyakumari in the south. The western Ghats rise abruptly from the western coastal plain. That is why on the western side, the rivers flow swiftly and make a number of waterfalls like the Jog falls(270mts) on the Sharavati River. The slope is gentle towards the eastern side of the Western Ghats and the main rivers like the Godavari, Krishna and Kaveri rise from the eastern slopes and flow east wards and fall into the Bay of Bengal. Thal Ghat, Bhor Ghat and PalGhat are the three important passes in the Western Ghats, which provide passage for roads and railways, between the Konkan plains in the west and the Deccan Plateau in the east.

The Eastern Ghats and Western Ghats join at the Nilgiris hills and the highest point is **Dodda Beta** (2637m). 'Udhagamandalam', a hill station, lies at the foot of the Doda Beta in the Nilgiris.

The southern part of the Western Ghats is **Palghat gap**. It is connected

the coastal plains of Kerala with Tamil Nadu by roads and railways.

The highest peak of South India is '**Anai Mudi**' (2695m) which is the nodal



**Western ghats**

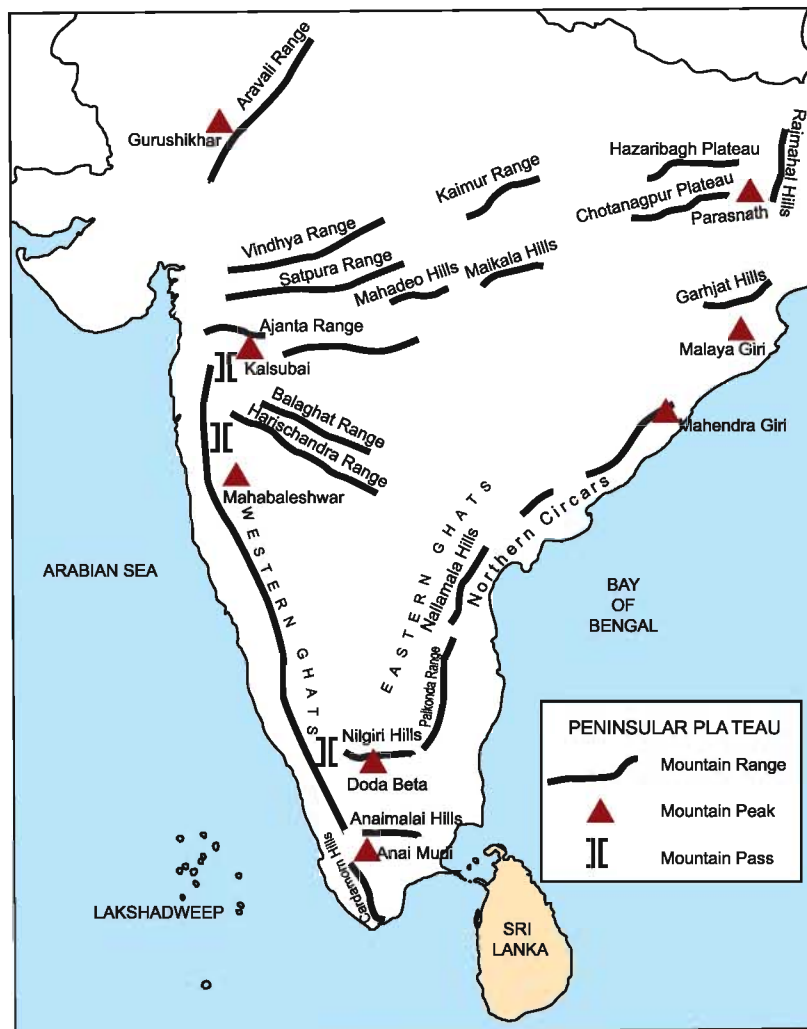
point from which hill ranges, like Anaimalai in the north, Palani in the northeast and cardamom in the south radiate. The western Ghats terminate about 20km north of cape comorin. Kodaikanal is a hill station which lies in the southern tip of the Palani hills.

### D) Eastern Ghats

They run almost parallel to the East coast. These are a series of intersected hills, lying between the Mahanadhi River in Orissa and the Vaigai river in Tamil Nadu. These hills are not continuous and almost disappear between Godavari and Krishna rivers. The Godavari valley divides the Eastern Ghats into the northern and southern parts. The northern part is about 200km wide, while the southern part is only 100km wide. '**Mahendra Giri**' (1501m) is the highest peak in the northern part. In the southern part, the '**Nallamalai range**' is the most prominent. It is composed of quartz and slate. The hills and plateaus in the southern part have low altitude further south the Eastern Ghats merge with the western Ghats at Nilgiris.

The peninsular plateau has a number of hill stations such as

## Physiography of peninsular India



Udagamandalam (Ooty), Kodaikanal, Pachaimalai, Mahabaleshwar, Khandala, Matheron and so on.

### IV) Coastal plains

The Peninsular plateau of India is surrounded by coastal plains of variable width. It extends from the 'Rann of Kutch' in the west to the Ganga-Brahmaputra delta in the east, covering a distance of about 6000Kms. The area between the western Ghats and the Arabian sea is called the **western coastal plain**. The area between the Eastern Ghats and the Bay of Bengal is called the **Eastern**

**coastal plain**. The two coastal plains meet each other at **Kanyakumari** the southernmost tip of the mainland of India.

#### a) Western coastal plains

It stretches from the Rann of Kutch in the north to Kanyakumari in the South. Except in Gujarat, the western coastal plain is quite narrow and has an average width of about 65km.

The **Gujarat plain**, lying towards the east of Kutch and Kathiawar, was formed by the Narmada Tapti, Mahi and Sabarmati river. It includes the southern part of Gujarat and the

coastal areas of the Gulf of **Khambhat**. It has a chain of saline marshes near the coast, which are flooded during high tides.

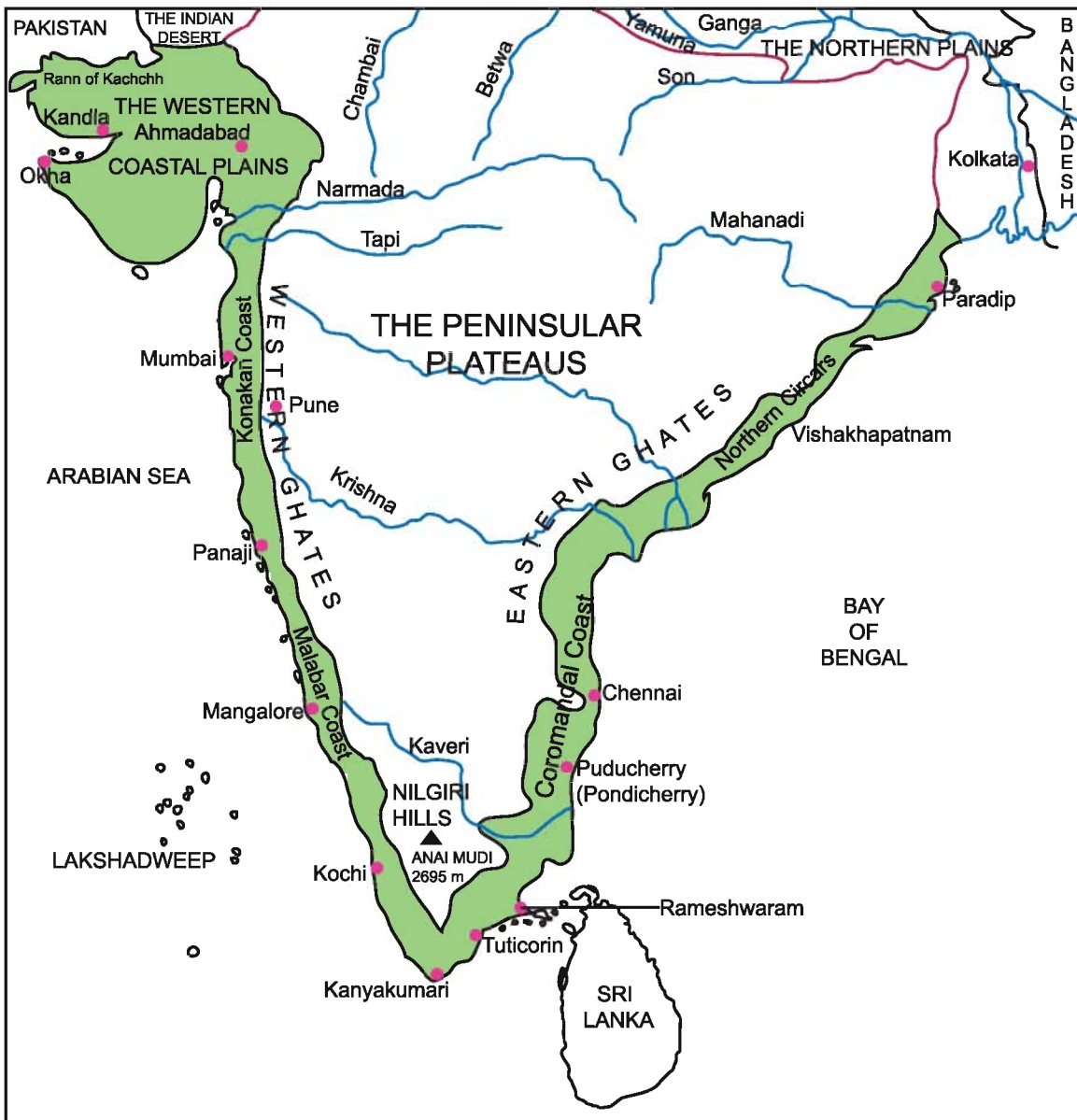
The '**Konkan Plain**' lying towards the south of Gujarat, extends upto Goa for a distance of about 500km. Its width is about 50 to 80km. It has features of marine erosion like cliffs, reefs and islands in south of Mumbai. The '**konkan coast**' has series of bays and sand beaches. The northern part of

Konkan is sandy while the southern part is rocky and rugged.

'The '**Karnataka plain**' extends from Goa to Mangalore, and has an average width of about 30 to 50km. At some places, it descends sharply along steep slope and makes waterfalls.

The '**Malabar plain**' lies between Mangalore and Kanyakumari.

### Coastal plains of India



The main characteristics of the Malabar coastal plain are the existence of lakes, lagoons, backwaters, locally called '**kayals**'. Vembanad is the largest lagoon in Kerala. Most of the backwaters are parallel to the coast line. The lagoons and backwaters are linked by canals to provide easy navigation with the help of small country boats.

### **b) Eastern Coastal Plain**

It stretches from the delta region of west Bengal to Kanyakumari. It lies between the Eastern Ghats and the Bay of Bengal. The Eastern coastal plain is more extensive and wider than the western coastal plain. A major part of this plain is formed by the alluvial deposits brought by the Mahanadi, Godavari, Krishna and Kaveri rivers. The average width is about 120km and it reaches upto 200kms in the deltaic regions. The region has a straight shoreline with well defined beaches of sand, such as the **Marina beach** in Chennai. The coastal plain between Mahanadi and Krishna rivers is known as the '**Northern circars**'. The part lying between Krishna and Kaveri rivers is called the '**coromandal coast**'.

The '**Utkal plain**' is found along the coast of Orissa and extends for about 400km and includes the deltaic region of Mahanadi river. The coast line of Utkal plain is smooth and fringed with sand dunes. **Chilka Lake** the biggest lake in India is located towards the south of the Mahanadi river delta.

The '**Andhra plain**' lies between Berhampur and Pulicat Lake.

It has been formed by the deltas of the Godavari and the Krishna rivers. The Andhra plain has straight coast and has few sites for good harbours.

'**Vishakhapatnam**' and '**Machilipatnam**' are notable examples. Kollerulake is found in Andhra plain.

The '**TamilNadu**' plain stretches from the Pulicat lake to Kanyakumari for a distance of about 992 km. Its average width is about 100 km. The fertile soil and well-developed irrigation facilities have made the Kaveri river delta the '**Granary of south India**'.

### **V) Indian Islands**



**Andaman Islands**

There are two main groups of islands in the Indian ocean. The **Andaman and Nicobar** groups in the Bay of Bengal and the **Lakshadweep** in the Arabian sea. They are located far away from the coast of the Indian Main land. The **Andaman and Nicobar** group of Islands is situated between 6°N to 14°N latitudes and between 90°E to 94°E longitudes. It consists of about 572 big, small and tiny islands, out of which only 38 are inhabited. The total area is about 8249sq.km. The Andaman island groups are separated from the Nicobar island groups by the '**Ten Degree channel**'. The extreme southern most point is the '**Indira Point**'. The Andaman is a closely knit group of islands in which only 25 islands are inhabited. In the Nicobar group only 13 islands are inhabited most of the islands are made up of



sandstone, lime stone and shale. Most of them are of volcanic origin, and some are fringed with coral reefs. The islands are mountains with maximum elevation of about 750 metres. Since the climate is hot and humid the area is covered with thick forests and coconut groves.



Lakshadweep

The Lakshadweep groups of islands are located in the Arabian Sea and have only 27 islands out of which only 11 are inhabited. The Laccadives, Minicoy and Aminidivi group of islands were renamed as Lakshadweep (literally means one lakh islands) in 1973. This islands group is widely scattered over an area of about 110sq.km. Lakshadweep is located about 200 to 500km south west of the Kerala coast. These islands are of coral origin.

### Significance of Indian Physiography

1) The presence of the Himalayas in north prevents southwest monsoon winds and cause rainfall and snowfall. If this mountain is absent, a major part of the Indian sub-continent would have been a hot and dry desert.

2) Himalayas forms a natural boundary for the sub-continent. It is

permanently frozen and is a barrier to invasion.

3) The northern plains of India are of great economic and social significance due to their fertile alluvial soils, flat level land, slow moving perennial rivers and a favourable climate, agriculture and trade have been developed.

4) Peninsular Plateau is rich in mineral resources and has huge reserves of Iron, Manganese, Copper, Bauxite mica, Chromium, Limestone etc.

5) A large number of big and small ports have been developed all along the coastal areas. These ports play an important role in the growth of national and international trade.

### DRAINAGE (Rivers and Lakes)

Rivers, with their tributary systems, are the main channels of drainage of the land surface. Rivers are beneficial to us in many ways. Besides providing water for cooking, washing and bathing, they provide water for irrigation, generation of hydel power, navigation and recreation. They also bring down alluvium from the highland areas and deposit it in the flood-plains and deltas. Alluvial soils in these areas are, therefore, extremely fertile. During each flood, new alluvium is deposited in the lands and fertility of the soil is renewed. Thus rivers are really boon to man kind.

### Birth of a River System

Usually, mountains receive heavy rainfall and hence a majority of rivers originate in mountainous areas. The sheet of water flows down the slope in the form of rills which, after uniting with others, form streams. A number of tributary streams develop to join the

## Distinction Between Himalayan Rivers and Peninsular Rivers

| Himalayan Rivers   | Peninsular Rivers  |
|--|--|
| <ul style="list-style-type: none"> <li>⊕ The Himalayan rivers like Indus, Ganga and Brahmaputra originate from the snow - covered mountains.</li> </ul>    | <ul style="list-style-type: none"> <li>⊕ The Peninsular rivers like Mahanadi, Godavari, Krishna, Kaveri, Narmada and Tapi originate from the peninsular plateaus.</li> </ul> |
| <ul style="list-style-type: none"> <li>⊕ These rivers have large basins and catchment areas.</li> </ul>  | <ul style="list-style-type: none"> <li>⊕ These rivers have small basins and catchment areas.</li> </ul>  |
| <ul style="list-style-type: none"> <li>⊕ These rivers flow through deep, nearly I - Shaped valleys.</li> </ul>   | <ul style="list-style-type: none"> <li>⊕ These rivers flow through broad and shallow valleys.</li> </ul>   |
| <ul style="list-style-type: none"> <li>⊕ These rivers are perennial in nature and receive water both from the monsoons and the melting of snow.</li> </ul> | <ul style="list-style-type: none"> <li>⊕ These rivers are seasonal as they receive water only from the monsoon rains.</li> </ul>   |
| <ul style="list-style-type: none"> <li>⊕ Due to their perennial nature, these rivers are very useful for irrigation.</li> </ul>                            | <ul style="list-style-type: none"> <li>⊕ Due to the seasonal nature, these rivers are not very useful for irrigation.</li> </ul>   |
| <ul style="list-style-type: none"> <li>⊕ These rivers are suitable for navigations as they flow over plain areas.</li> </ul>                               | <ul style="list-style-type: none"> <li>⊕ These are not suitable for navigation as they flow over uneven land in the plateau region.</li> </ul>                               |
| <ul style="list-style-type: none"> <li>⊕ These rivers form large deltas near their mouth like the Ganga-Brahmaputra delta.</li> </ul>                      | <ul style="list-style-type: none"> <li>⊕ The west flowing rivers mostly form estuaries and the form smaller deltas.</li> </ul>   |

main stream at different points along its course. This main stream is known as a river and this stream together with its tributaries constitutes a river system. The drainage system is related to a number of factors for example slope of land, geological structure, amount of volume of water and velocity of water.

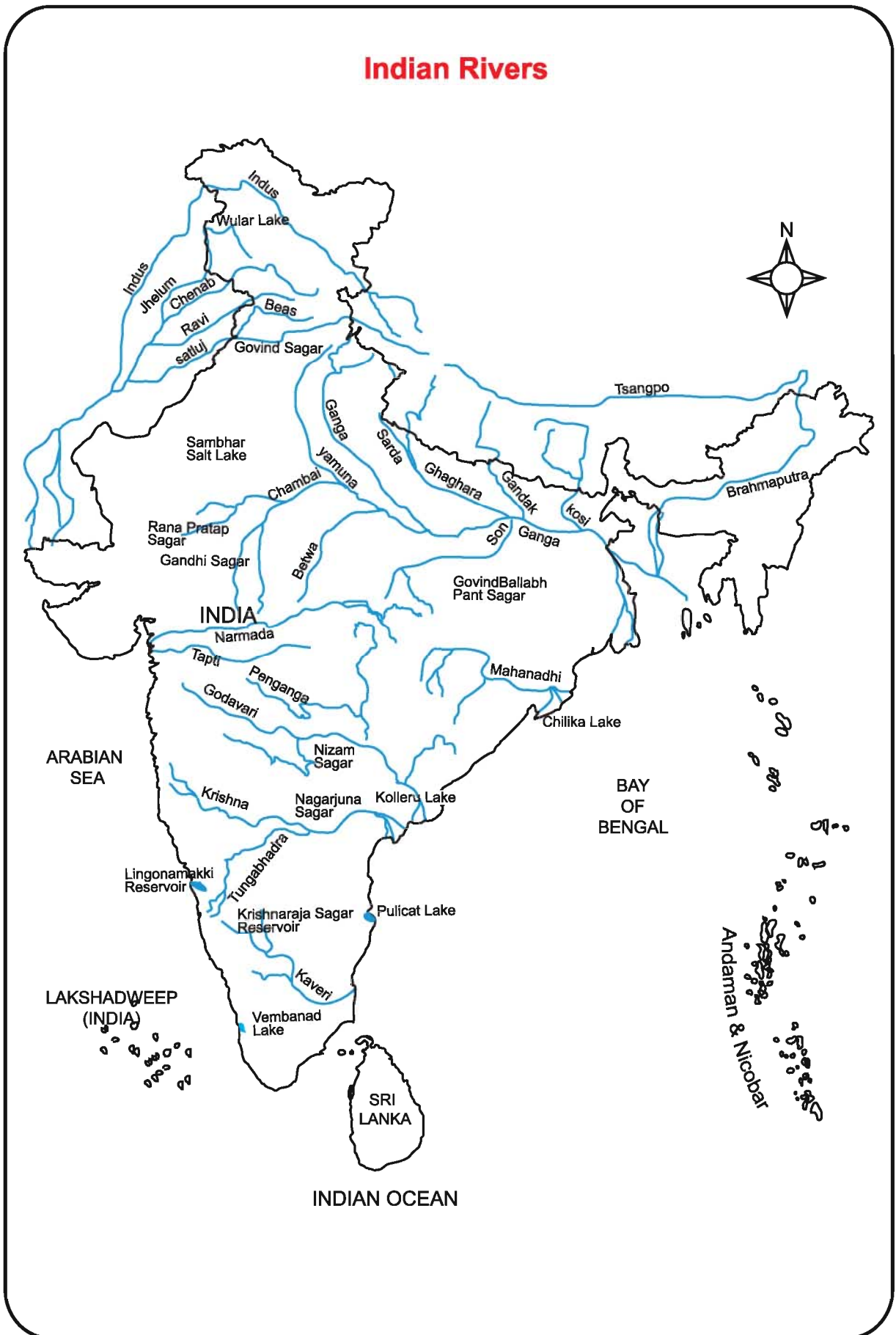
### Inland Drainage

Inland drainage is found to the west of Aravallis in Rajasthan. Luni is the only river that flows through this region. The river rises to the south-west of Ajmer in the Aravallis. After passing Govindgarh it is joined by the Sarsuti, which has its source in lake of Pushkar from this point the river is known as Luni.

The Luni receives two major tributaries originating from the Aravallis. They are Sukri and the Jawai. After flowing for a distance of about 320km it is finally lost in the marshy ground at the head of the Rann of Kachch. The river is a blessing to the arid parts of southern Rajasthan. As far as Balotra, the water of Luni is generally sweet, but at the Rann it is Saline.

The river system of India is tabulated as follows find the name of the rivers in India and their length, area, origin, end and the places benefitted.

# Indian Rivers



### River system of India

| Name  | Length (km) | Area            | Originates from                   | Ends in        | Places benefited                         |
|---|-------------|-----------------|-----------------------------------|----------------|--|
| Indus   | 3100        | 3,21,290 Sq.Km. | In Tibet Kalish Range 5080 mts.   | Arabian sea    | India and Pakistan                       |
| Ganga (Bhagirati)                               | 2480        | 3,37,000 Sq.Km  | Gangothri                         | Bay of Bengal  | Uttar Pradesh, Bihar, West Bengal        |
| Yamuna (Jamuna)                                 | 1370        | 3,59,000 Sq.Km  | Garhwal in Yamunotri              | Bay of Bengal  | Delhi, Haryana and UP                    |
| Brahmaputra                                     | 725         | 2,40,000 Sq.Km  | Lake Manasarovar                  | Bay of Bengal  | North Eastern state                      |
| Kaveri (Dakshina Ganga" or Ganges of the south) | 805         | 87,900 Sq.Km    | Hills of Coorg, Karnataka         | Bay of Bengal  | Karnataka and Tamilnadu                  |
| Godavari  | 1465        | 3,12,812 Sq.Km  | Nasik Hills                       | Bay of Bengal  | South-easterly part of Andhra Pradesh    |
| Krishna   | 1400        | 2,59,000 Sq.Km  | Near Mahabaleshwar in Maharashtra | Bay of Bengal  | Mharashtra & Andhrapradesh               |
| Narmada   | 1312        | 98,796 Sq.Km    | Amarkantak hill in Madhya Pradesh | Arabian Sea    | Madhya pradesh and Maharashtra           |
| Tapti   | 724         | 65,145 Sq.Km    | Bettul                            | Arabian Sea    | Madhya Pradesh and Maharashtra           |
| Mahanadi  | 858         | 1,41,600 Sq.Km  | Amarkantak Plateau                | Bay of Bengal  | Jharkhand, Chattisgarh, Orissa           |
| Vaigai  | 240         | 7,000 Sq.Km     | Cardaman Hills                    | Bay of Bengal  | Madurai and Ramanathapuram in Tamil Nadu |
| Periyar   | 244         | 5,398 Sq.Km     | Cardaman Hills                    | Bay of Bengal  | Tamil Nadu and Kerala                    |
| Thamiraparani                                   | 123         | 4,400 Sq.Km     | Agasthiyar Hils                   | Gulf of Mannar | Thirunelveli in Tamil Nadu               |

### River features

|              |  |
|--------------|--|
| Tributary    | A river or stream which contributes its water to main river. For example the Bhavani and Amaravathy are tributaries of river Kaveri.   |
| Distributary | A branch or outlet which leaves a main river and does not rejoin it, carrying its water to the sea or a lake. Ex: Hooghly  |
| Delta        | A triangular shaped alluvial tract, formed at the mouth of a river. For example Kaveri Delta, Ganga Delta. Delta of the Ganga is the largest delta in the world.                           |
| Estuary      | The mouth of a river where tidal effects are felt and where fresh water and sea water mix; for instance, the Thames Estuary in London and Narmada and Tapti Estuaries in Peninsular India. |

### EXERCISE

#### I) Choose the correct answer.

- 1) The Bay of Bengal is located to the \_\_\_\_\_ of India  
a) West      b) South      c) South-east      d) South-west
- 2) Palk Strait separates India from \_\_\_\_\_.  
a) Sri Lanka    b) Myanmar    c) Maldives      d) Lakshadweep
- 3) The most centrally located meridian of India passes through \_\_\_\_\_.  
a) Ahmadabad      b) Allahabad  
c) Hyderabad      d) Auranghabad
- 4) The highest peak in India.  
a) Mt. Everest      b) Mt. Godwin Austin  
c) Mt. Kanchenjunga      d) Dhaulagiri
- 5) The Source of River Ganga  
a) Yamotri      b) Siachen      c) Gangotri      d) Karakoram
- 6) The Himalayas are known as  
a) Abode of snow      b) Volcano    c) Sahyadri      d) Himadri

**II) Match the following.**

- |                               |                |
|-------------------------------|----------------|
| 1) Pilgrim centre             | Sahyadri       |
| 2) Terai Plain                | Vembanad       |
| 3) Western Ghats in Karnataka | Deccan         |
| 4) Lava Plateau               | Kedarnath      |
| 5) Largest lake in Kerala     | Marshy Land    |
|                               | Chilka Lake    |
|                               | Malwa Plateau. |

**III) Distinguish between.**

- 1) GMT and IST
- 2) Western Ghats and Eastern Ghats
- 3) East Coast Plains and West Coast Plains

**IV) Answer the following questions**

- 1) What are the main physical divisions of India?
- 2) Write any two points on the Importance of the Himalayas.
- 3) Name a few well-known holy places in the Northern Mountains of India.
- 4) Name the rivers that do not form a delta on the west coast of India.
- 5) Name the Islands belonging to India.

**V) Answer the following Questions in a Paragraph .**

- 1) 'India is a sub-continent' - Justify.
- 2) 'Unity in Diversity' Explain.
- 3) Explain the origins of the Himalayas.
- 4) Mention the Importance of Himalayas.
- 5) Write short notes on Northern Plains of India.
- 6) Write in brief about Peninsular Plateau.

**VI) On a Physical Map of India mark and name the following.**

- 1) Main Physical Divisions of India.
- 2) Thar desert and Deccan Plateau.
- 3) Rivers: Ganga, Brahmaputra, Narmada, Godavari and Krishna
- 4) Hills/Mountains: Siwalik, Karakoram, Ladakh Range, Kailash Range, Patkai Hills, Nilgiri Hills, Western ghats, Satpura and Aravalli Ranges
- 5) Mt. Everest, Mt. K2, Palk Strait, Gulf of mannar, Northern circars  
Coromandal coast, Konkan Coast, Andaman and Nicobar Islands, Gulf of Khambhat, Gulf of kutch, Chotta Nagpur Plateau, Sunderbans, Rann of Kutch, Malwa Plateau and Pamir Knot

**VII) Activity .**

**Find the answer with the help of the table:1**

- 1) Which is the largest state ?
- 2) Which is the smallest state ?
- 3) Note down the densely populated and sparsely populated states.
- 4) List out the names of seven states in north eastern India called seven sisters.

## 2. INDIA - CLIMATE

**Climate** is one of the basic elements in the natural Environment. It determines the landforms, soil, vegetation and agriculture of a place. The kind of clothes that we wear, the food we eat and the house in which we live are intimately related to climate. But the climate differs from one place to another place. The sharply contrasting relief features of India create diverse climate. The climate of North India differs from South India in respect to temperature, rainfall etc. Let us have a look at these climatic variations of India with their determining factors.

### Can you distinguish weather and climate?

Weather is a day to day conditions of atmosphere at any place in regard to temperature, pressure wind, humidity, and rainfall.

Climate is the average state of weather for a longer period of time at any place. Weather records of a minimum period of 35 years are found necessary to obtain reliable average.

Climate of a place is determined by the following factors such as

1. Latitude
2. Altitude
3. Distance from the sea
4. Wind
5. Position of Mountains

### 1. Latitude

India lies between  $8^{\circ}4' N$  to  $37^{\circ} N$  Latitudes.  $23^{\circ}30' N$  latitude tropic of cancer passes across the country. The parts of the country to the south of

tropic of cancer being closer to the Equator, experience high temperature throughout the year. The parts of the country to the north of tropic of cancer on the other hand lie in the warm temperature zone. Hence they experience low temperature particularly in winter. For example New Delhi which is located in  $38^{\circ}N$  experiences  $23^{\circ}C$  while Kanyakumari at  $8^{\circ}N$  experiences  $32^{\circ}C$ , during the month of November.

### 2. Altitude

Temperature decreases with increasing altitude from the earth surface at the rate of  $1^{\circ}C$  for every 165 meters. Hence, the places situated at the higher altitudes are cooler as compared to places in plains. For example the mean temperature of New Delhi, which is situated in plain region at an altitude of 239 meters from the sea level, is  $40.2^{\circ}C$  during the month of June, while the temperature of Simla, which is located in higher altitude of 2,205 meters is  $23.7^{\circ}C$  at the same month.

### 3. Distance from the sea

The places to the north of Tropic of cancer experience "**continental climate**", where the summer is extremely hot and the winter is extremely cold. The prevalence of the climate is due to the far off location from the sea.

The Tropical South, which is enclosed on three sides by Arabian Sea, Indian Ocean and Bay of Bengal, experiences '**Equable climate**'.



#### 4. Wind

When the winds blow from sea to the land bring warm temperature while the winds blow across the land bring dry temperature. For example,

1) The westerly winds originate in Mediterranean sea and blow in to the northwest India. They bring rain to Punjab and Haryana.

2) The Tropical cyclone wind originates in Bay of Bengal and blows along east coast of India. It causes heavy loss to life and property.

#### Jet Streams

Air currents in the upper layers of the atmosphere is known as Jet streams. It could determine the arrival and departure of monsoon winds in India.

#### 5. Position of Mountains

Position of mountains plays a vital role in determining the climate of any place. For example,

a) The great Himalayan range in the North India obstructs the bitter cold winds from central Asia to India.

b) The Himalayan range intercepts the rain-bearing southwest monsoon winds, forcing them to shed their moisture, resulting in heavy rainfall in the northeast and Indo - Gangetic Plain.

c) The Aravalli range intercepts south west monsoon winds and so western side of this range is a desert and receives very less rainfall.

EL – Nino is a complex weather phenomena that appears once every five to ten years, bringing drought, floods and other weather extremes to different parts of the world. It is also a

cause for the delay of south west monsoon onset in India.

#### Climate of India

Inspite of the great diversity and variation in Indian climate and topography, the most important factor that lends unity to the India is the fact of the monsoons. The word '**monsoon**' owes its origin to an Arabic word '**Mausim**' meaning 'season'. The term was used by seamen several centuries ago, to describe' system of alternating' winds over the Arabian Sea. These winds appear to blow from southwest for six months and from northeast for another six months. The winds which reverse their directions completely between the summer and the winter is known as Monsoon Winds. Due to these monsoon winds, India experiences **Tropical monsoon climate**.

#### The salient features of Tropical monsoon climate

1) The Monsoon winds are classified into Southwest Monsoon and Northeast Monsoon on the basis of the direction from where they blow.

2) They are caused due to the differential heating of land and sea.

3) The main feature of monsoon winds is alternation of seasons which determines the climate of the India.

#### Season

On the basis of the monsoon variation, the meteorologists recognize the four distinct seasons in India such as:

- 1) Winter (December to February)
- 2) Summer (March to May)
- 3) South west Monsoon. (June to September)

4) North East Monsoon  
(October to November).

### 1. Winter (December to February)

During winter, the sun is overhead in the Tropic of Capricorn. The land Mass becomes cold in North India where the day mean temperature remains below 21°C. No obvious difference is found in the temperature during day and night.

In the meantime high pressure develops in the northwestern part of India due to the prevalence of low-temperature. In contrast to this, a low pressure area forms in South India, that is both in Arabian Sea and Bay of Bengal. Consequently the winds blow from the high pressure area of northwest India towards South India. These winds are called the '**Retreating monsoon winds**' which blow from land to sea and do not cause much rain fall. But these winds absorb some moisture while crossing the Bay of Bengal and gives winter rainfall to Tamil Nadu and South Andhra Pradesh. This is the main characteristics feature of Retreating monsoon.

During this period, a low pressure depression originates over the Mediterranean Sea and travels eastwards across Iran and Pakistan and reaches India. This low pressure depression is called '**Western disturbance**'. The Jet stream plays a dominant role in bringing this disturbance to India. This disturbances causes rainfall in Punjab, Hariyana and Himachal Pradesh which is very useful for the cultivation of wheat. It also brings snow fall in the hills of Jammu and Kashmir.

### 2. Summer (March-May)

The summer season starts in March and continues up to May. During

this season the Sun's rays are vertical over the Tropic of Cancer. Therefore the temperature is very high in the northern parts of the India. At some places in northwest India the day temperature may be as high as 45° C. Due to this high temperature, low pressure conditions prevail over northern part of India.

Contrary to this the southern parts of India has moderate weather conditions because of its locations nearer to sea. The mean maximum temperature here varies from 26° C to 30° C. High pressure develops here due to low temperature comparatively to the north India.

Because of the atmospheric pressure conditions, the winds blow from south west to north east direction in Arabian Sea and Bay of Bengal. They bring pre monsoon showers to the west coastal areas during May. There are a few thunder showers called '**Mangoshowers**' which helps in quick ripening of mangoes along the coast of Kerala and Karnataka. North Eastern part of India also experiences local storms called '**Norwesters**'. These thunder storms are called as **Kalbaisakhi** (Calamity of the month of Baisakh) in Punjab.

Strong hot winds blow during day time over northern and northwest parts of India are called as 'Loo winds'.

### 3. South West Monsoon (June to September)

After the summer season, rainy season starts with the onset of south west monsoon. The high temperature gives rise to low pressure and by the end of May a large area of low pressure is formed over the north west part of the country. At the same time, the oceans become cool and a high

pressure area develops over the oceans. We know that wind always blows from high pressure to low pressure. Hence the winds blow from oceans towards the land of India. These winds blow from South East directions. When they cross the equator, they get deflected and blow as South West Monsoon. These winds are moisture laden winds because they originate from Indian Ocean. When they approach the Southern part of Kerala they give rain with violent thunderstorms indicating the onset of the monsoon and lightning. This phenomenon is often termed as the 'monsoon burst'.

The south west Monsoon is normally divided into two branches because of the peninsular shape of the country. They are Arabian Sea branch and Bay of Bengal branch.

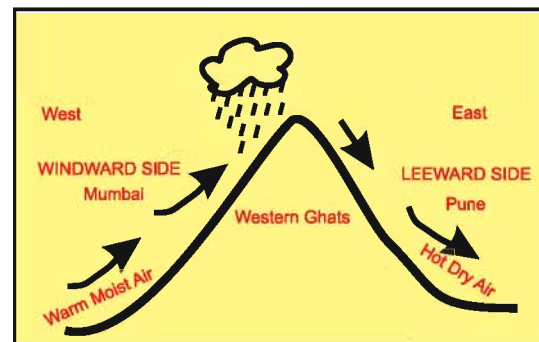
#### a. Arabian Sea Branch

The more powerful Arabian Sea branch of monsoon wind and brings heavier rainfall. Blowing from the Arabian Sea, the first part of the wind first strikes against the Western Ghats. This **moisture laden wind** is forced to ascend the slopes, condenses and gives heavy rainfall to western coastal region. Mumbai gets a heavy rainfall of over 150cms as it lies on the windward side of Western Ghats while Pune gets less than 50cms of rainfall as it lies on the leeward side (rain shadow) of the **Western Ghats**.

The second part of this wind blow through the Vindhya-Satpura ranges and strikes against the **Rajmahal** hills and cause heavy rainfall in the **Chotanagpur Plateau** region.

The third part of this wind moves towards Rajasthan where the **Aravalli Mountains** stand parallel to the

direction of this wind. Hence it is not able to strike against the mountain and does not give any rain to Rajasthan. This is the reason why a part of Western Rajasthan remains to be a desert. This wind then reaches Himachal Pradesh and combines with the Bay of Bengal branch. It gets obstructed by the Shiwalik hills and gives a good rainfall to the foot hills of this region.



Wind ward side and Lee ward side of a mountain

#### Wind ward side

The wind striking side of the mountain is called windward side of a mountain, which receives heavy rainfall.

#### Lee ward side

The other side of the mountain which is sheltered from the wind is called Leeward side of the mountain. It receives very less rain fall.

#### Rain shadow region

Rain shadow region is an area receiving relatively less rainfall due to the obstruction of mountains.

#### b. Bay of Bengal Branch

This branch of monsoon, blowing from the Bay of Bengal is 'moisture bearing wind'. It strikes against the Kasi, Garo, and Jaintia Hills. This moisture laden wind takes a sudden rise over the funnel shaped hills and

## INDIA ADVANCING SOUTH WEST MONSOON



The lines shown inside the map denote the advancement of monsoon in our country from 1st day of June to 15th day of July.

# INDIA RETREATING NORTHEAST MONSOON



causes heavy rainfall in **Cherrapunji**, which receives the highest rainfall in India. A part of this branch gets deflected by the Himalayas and moves towards the west giving rain to the Gangetic plains. As it moves further westwards, it loses its moisture content and gives scanty rainfall to Punjab and Haryana. Finally this Wind meets the Arabian Sea branch of monsoon wind at the foot hills of the Himalayas and gives heavy rainfall along the Siwaliks. Tamil Nadu remains dry during this period because it lies in the rain shadow area, of the Arabian Sea branch monsoon and it lies parallel to the Bay of Bengal branch.

#### **4. North East Monsoon (October to November)**

The South West Monsoon begins to retreat from the Northern India by second week of September because of the apparent movement of the sun towards tropic of Capricorn.

The landmass of India starts losing heat and there is a fall in the temperature. But the sea is still in warm condition. High Pressure develops over the land and low pressure over the sea. Therefore wind blows from high pressure to low pressure that is from land to sea. It is cold dry wind and gives no rainfall to land mass. But, when it crosses the Bay of Bengal, it absorbs moisture and gives heavy rain to the **Coromandal coast**. So Andhra Pradesh and Tamil Nadu get heavy rainfall during winter. There are frequent **cyclones** formed in the Bay of Bengal and they cause damage to life and property along the Coromandal coast.

### **FEATURES OF THE MONSOON**

#### **i) Uneven distribution of Rainfall during the year**

The South West Monsoon causes over 80 per cent of the rainfall over the country during June to September. The normal duration of the Monsoon varies from two to four months. Normally it withdraws from the north-west by the beginning of September and from the remaining parts of the country by the end of October and in some parts by November.

#### **ii) Influence of Mountains**

The rainfall is very much influenced by orographic features. Though the wind passes over Gujarat and Rajasthan, it brings very little rainfall due to absence of mountains. Along the west coast, the winds strike the Western Ghats and bring heavy rainfall on the windward side. For example, The **Shillong Plateau** receives heavy rainfall (annual rainfall at Cherrapunji 1,270 cm) while the central part of the Assam Valley which is situated in the lee ward side receives less rainfall (annual rainfall at Guahati 163.7 cm).

#### **iii) Tropical Cyclone**

The intensity and distribution of rainfall are determined by a series of **tropical depressions** (low pressure systems) which have their origin near the northern part of Bay of Bengal and travel across the country in west and north-westerly direction. On an average eight such cyclonic depressions may pass from the Bay of Bengal into the land area between June and September.

## Cyclone

A cyclone is a small but intense low-pressure system in Arabian sea or Bay of Bengal which produces violent winds and heavy rainfall.

### iv) Erratic nature of the Rainfall

It is difficult to make any general statement describing the rainfall in any particular state. Because the same areas which received heavy rainfall in one season may experience drought conditions in the next season. Some times the beginning of the rain may be **delayed**. There may be breaks in the monsoon rain during July and August, some times the rain **disappears** for a week or more. The Monsoon may also withdraw earlier than usual or may persist longer than usual.

### v) Monsoon rains have great effect on the country's economy

The prosperity of India depends on the success or failure of the Monsoon. Slight variations in the directions of rain-bearing winds may convert normally well-watered areas into deserts. For example, Gujarat and the Deccan plateau are particularly liable to **drought**. The Hydro electric power plants are affected severely in times of low rainfall. The supply of electricity to industries is rationed resulting in great loss in Economy.

## Rainfall during summer

The annual rainfall varies from about 1187cm to less than 25 cm. At Mawsynram, a station 16 km west of Cherrapunji in the state of Meghalaya receives 1187 cm rainfall which is the highest in the world. Less than 25 cm of rainfall is found in Thar desert in Rajasthan. The erratic nature of monsoon creates havoc at times due to unprecedented rainfall.

## WINTER RAINFALL

Winter rainfall which sets in over the Bay of Bengal in October and meets with the damp winds of the retreating summer monsoon. This current curves round over the Bay of Bengal and blows directly in to the TamilNadu coast giving that region the wettest and most disturbed weather of the whole year (mainly during October and November). **Heavy rains** accompanied by stormy winds sweep over the coastal regions causing widespread damage to standing crops and disorganizing means of transport.

Similarly, **Nagapattinam** receives an average of 100 cm out of its total rainfall of 140 cm in the cold season. The rainfall is higher along the coast than in the interior. It decreases rapidly on land so that over the **Mysore Plateau** in Karnataka receives only about 3 or 4cm.

## Distribution of Rainfall

The distribution of rainfall over the country, as we have noted earlier, is determined by two main factors. These are: (1) the **direction** of the rain bearing winds and (2) the **position** of the mountain ranges.

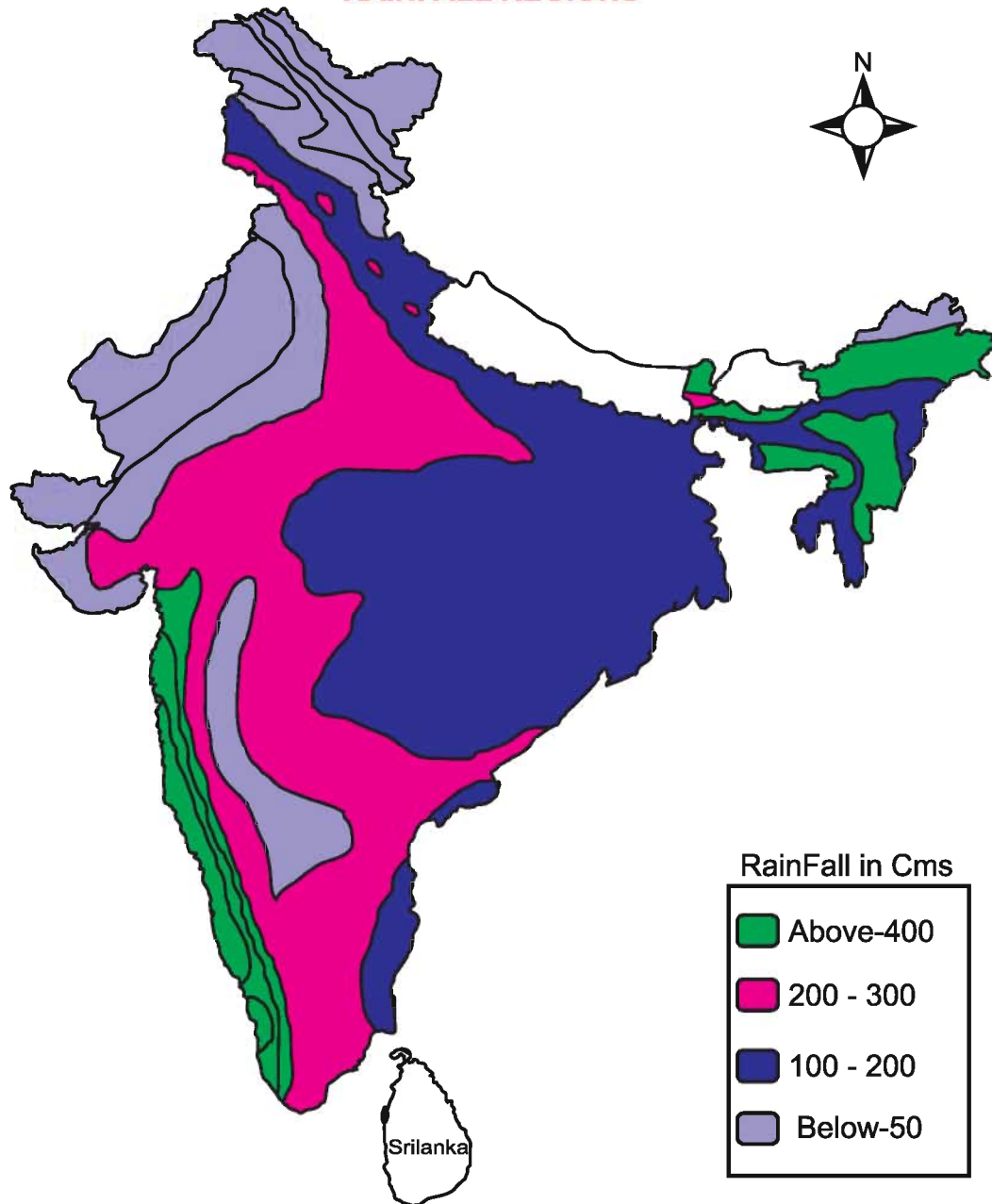
Due to these factors about 30 per cent of the area of our country receives from 15 to 80 cm; 40 per cent receives from 80 to 120 cm; 20 percent gets from 120 to 180 cm and about 10 percent receives over 200 cm.

On the basis of the amount of rainfall our country can be divided into four rainfall regions as follows:

### 1. Region of very heavy

Areas with over **400 cm** of rain are the southern slopes of the Eastern Himalayas, Assam, Bengal and the

## INDIA RAINFALL REGIONS



West Coast Region comprising the Konkan and the Malabar Coast.

### 2. Regions of heavy rainfall

Areas with rainfall between 200 to 300 cm are the Middle Ganga Valley, Western Ghats, Eastern Maharashtra, Madhya Pradesh and Orissa.

### 3. Regions of moderate rainfall

Areas with 100 to 200 cm of rainfall are the Upper Ganga valley, Eastern Rajasthan and Punjab, Southern Deccan comprising the plateau regions of Karnataka, Andhra Pradesh and Tamil Nadu.



#### 4. Regions of Scanty rainfall

Areas with **less than 50 cm** are the northern part of Kashmir, western Rajasthan, southern Punjab and regions of the Deccan in the rain shadow of the Western Ghats.

#### Water Management

Water management implies making the **best use** of available water resources for human benefit, while not only controlling its **depletion** and **degradation**, but also for our future needs.

Water is an indispensable resource and has multiple uses. Therefore, it becomes extremely important to manage our soil and water resources in an **integrated manner**. Water management must be under taken at all levels.

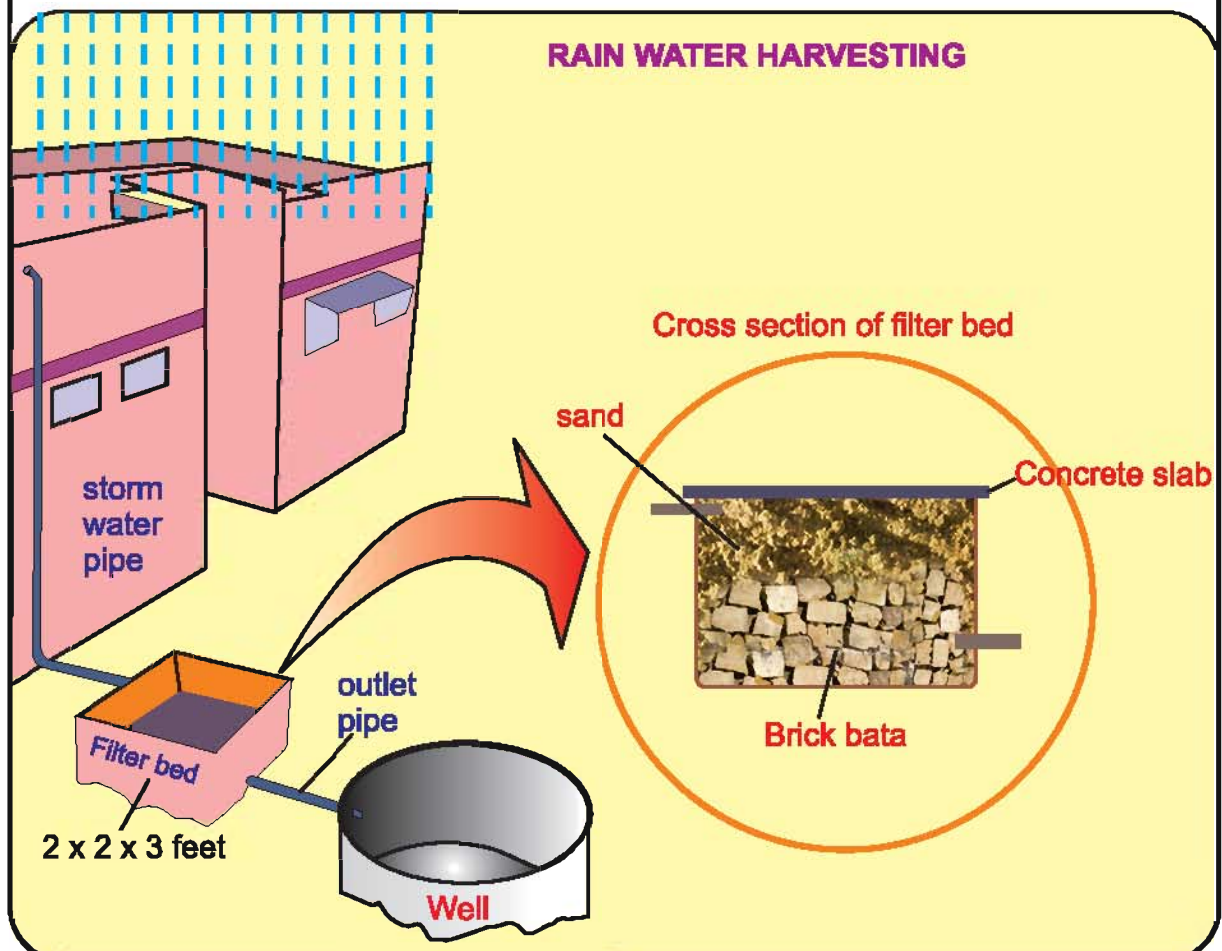
The basic requirements for water conservation activities are:

- 1) The total involvement, co-operation and participation of all **local people**
- 2) The role of **women** in managing house hold water needs.
- 3) The most important aspect in water management is to **treat** water resources an economic commodity to be used in the profitable and satisfying manner.
- 4) In the distribution of this economic (commodity) good both **equity** and **quality** must be ensured.

We can save the water through "**rainwater harvesting**" strategy.

#### Rain Water Harvesting

India experiences Tropical monsoon type of climate. It gives a



seasonal rainfall. It is not uniform and is highly erratic. Most of the time the rainfall is scanty, hence it is necessary to save available rain water. We must allow this water to penetrate into deep water table and tap this water when it is needed. In order to prevent surface run-off we must harvest the rain water for future domestic related and other activities.

Hence Rain harvesting is an activity of direct collection and storage of water for our purpose or it can be recharged into the ground for withdrawal later. Through rain harvesting we can understand the real value of rain and to make optimum use of it.

### EXERCISE

#### I) Choose the correct answer.

- 1) India experiences \_\_\_\_\_
  - a) Temperate climate
  - b) Tropical Monsoon Climate
  - c) Tropical Climate
  - d) Cold Climate
- 2) The Coastal areas enjoy \_\_\_\_\_ climate
  - a) Continental
  - b) Equable
  - c) Humid
  - d) Hot
- 3) The place that gets rain from Western disturbance is \_\_\_\_\_
  - a) Punjab
  - b) Mumbai
  - c) Allahabad
  - d) Chennai
- 4) The mountains which lie parallel to the direction of the Southwest Monsoon wind is \_\_\_\_\_
  - a) Aravali
  - b) Satpura
  - c) Vindhya
  - d) Maikala Range
- 5) The local storms in the northeastern part of India during hot weather season are called \_\_\_\_\_
  - a) Norwesters
  - b) Loo
  - c) Mango showers
  - d) Monsoon

#### II) Match the Following.

- |  |   |
|--|---|
| 1) Burst of Monsoon                    | December to February                    |
| 2) Norwesters                          | October to November                     |
| 3) Water conservation activities India | Northern and northwestern part of India |
| 4) The North East Monsoon Season       | Local storms in northeast India         |
| 5) Highest rainfall place              | June to September                       |
|  | Mawsynram in Cherrapunji                |
|  | Total involvement of local people       |

### III) Distinguish Between.

- 1) Windward side and leeward side of the mountains
- 2) South west Monsoon and Northeast Monsoon
- 3) Western disturbances and Tropical cyclones
- 4) Weather and Climate
- 5) Loo and Norwesters

### IV) Answer the following Questions.

- 1) Name the factors determining the climate of India
- 2) What do you mean by Monsoon?
- 3) What are the main features of tropical monsoon type of climate?
- 4) What are jet streams and how do they affect the climate of India?
- 5) Name the regions of heavy rainfall in India.
- 6) What do you mean by the 'burst of Monsoon'?

### V) Answer the following in a paragraph each.

- 1) Analyse any two factors, determining the climate of India.
- 2) Explain any two characteristic features of monsoon winds.
- 3) Describe any one of the branch of south west monsoon.
- 4) Describe rain water harvesting.
- 5) What is water management? Give the basic requirement of water conservation?

### VI) On the given map of India mark and name the following

- 1) Direction of southwest monsoon and northeast monsoon winds
- 2) Show areas receiving more than 200 cm of rainfall and less than 50 cm of rainfall.

### 3. INDIA - NATURAL RESOURCES

Resources form an essential requirement of our daily life. Any country can be developed shortly if it has rich and diverse resources. But a judicious use of resources only will help for a sustainable development of that country. **Over exploitation** of resources from nature will lead to an environmental issues and resource depletion. Let us learn some of the important resources of India and the need to conserve them.

#### NATURAL RESOURCE

“All materials obtained from the nature to satisfy the needs of our daily life” is known as Natural resources. Land, Air, Water, Sunlight, Soil, Minerals coal, Petroleum, Plants, Animals are some of the examples for natural resources. Human beings use these resources either directly or indirectly for their survival.

Natural Resources can be broadly classified into two types:

1. Renewable resources
2. Non-renewable resources

#### 1. Renewable resources

Renewable resources are the resources that can be reproduced again and again. For example sun light, Air and Water are continuously available but their quantity is reduced by human consumption. The time taken to renew the resources may be different from one resource to another. For example agricultural crops, takes a short time for renewal. Others like water takes a comparatively longer time while still others like forests take even longer time.

#### 2. Non – Renewable

"Non-Renewable resources are resources that cannot be replaced again after utilisation". They are formed over a very long geological periods. Minerals and fossil fuels are included in this category. Since their rate of formation is extremely slow, they can not be renewed easily for example coal and petroleum . That is why we are often advised to use these non-renewable resources judiciously.

#### Soil Resources

Soil is the most important renewable natural resource. It is the **medium** of plant growth and supports various types of living organisms on the earth.

Soil is the loose material which forms the upper layer of the earth. It has no definite and constant composition. It consists of

1. Decayed Plants
2. Animal substances
3. Minerals like Silica, Clay, Chalk and so on
4. Organic matter called Humus.

#### Soil Fertility

Soil fertility refers to the amount of nutrients in the soil, which is sufficient to support plant growth.

Soil fertility is determined by the presence of '**micro nutrients**' and '**macro nutrients**' in the soil.

Micro nutrients like sulphur, chlorine, copper, manganese, molybdenum, boron, Iron , cobalt, zinc. Macro nutrients like nitrogen, potassium and phosphorous should be

contained in the soil. The fertility of the soil increases with the increase of humus content.

### Major Types of Soil

According to their areal extent and their agricultural importance, soils of India are classified into five major groups. They are as follows:

1. Alluvial Soil, 2. Black Soil, 3. Red Soil, 4. Laterite Soil, 5. Mountain Soil, 6. Arid and Desert Soil.

#### 1. Alluvial Soil

Alluvial soil consists of sediments deposited by rivers along the river course, flood plains, delta and coastal plains. It contributes the largest share to the agricultural production of India.

Alluvial soil is divided into two types they are 1. Khadar 2. Bhangar. **Khadar** is the newer alluvium of sandy, light coloured soil, whereas Bhangar is the older alluvium of more clayey soil. The alluvial soil differs greatly in texture. It is suitable for the cultivation of rice, Wheat, sugarcane, cotton and oil-seeds. In the lower Ganga-Brahmaputra valley they are useful for jute cultivation. In this valley the alluvial soils are brought by the Sutlej, Ganga, Yamuna, Gandak, Ghaghra and other rivers. The parts of **Punjab, Haryana, U.P, Bihar** and **West Bengal** are located in this Valley have alluvial soils.

In south India Kaveri river deposits alluvial soil along its course

#### 2. Black Soil

Black soil is formed from the weathering of **igneous rocks**. It is found in the valleys of the Godavari, Krishna, Narmada and Tapti. The soil is deposited at about six meters depth. They vary in colour from deep black to

chestnut brown. It is fine-grained and generally rich in lime, iron, potash, alumina, calcium and magnesium carbonates, but lack in phosphorus, nitrogen and organic matter. It has a special property of **holding moisture**. Hence it is suitable for the cultivation of Virginia tobacco, oilseeds like linseed, sunflower, fruits and vegetables.

Black soil is more suitable for the cultivation of cotton, rice, wheat, jowar, millets, sugarcane,

Black soil is also found in the Deccan trap, comprising the greater part of Maharashtra, Gujarat, part of Madhya Pradesh, Andhra Pradesh and southern districts of Tamil Nadu.

#### 3. Red Soil

Red soil is formed from the weathering of the ancient crystalline and metamorphic rocks. The red colour is due to its very high **iron content**. The colour varies, from brown to yellow. This soil is **porous** and not retentive of moisture. It is generally poor in lime, nitrogen, phosphorus and humus but when suitable fertilizers are added, it becomes rich in fertility. Wheat, rice, cotton, sugarcane and pulses are grown in this soil.

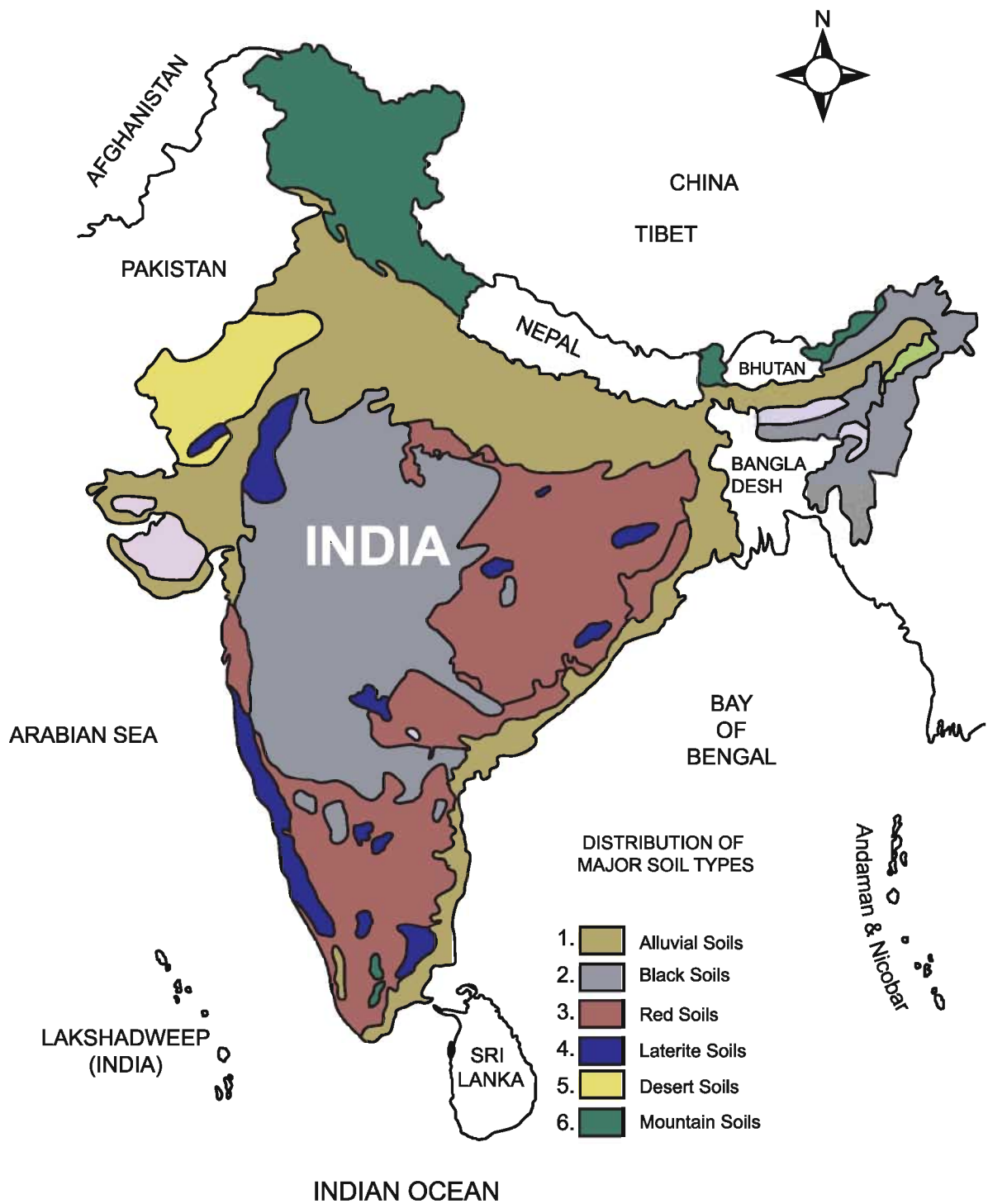
Red soil covers in most parts of Tamil Nadu, southern Karnataka, Goa, North-eastern Andhra Pradesh, Madhyapradesh and Orissa.

#### 4. Laterite Soil

Laterite soil formation takes place under typical monsoon conditions. It is mostly found in **peninsular plateau** of India.

Laterite is a porous soil from which the silica has been removed by chemical action (leaching). It is coarse in texture and red in colour owing to the presence of **iron oxides**. The crops like coffee,

# SOIL TYPES OF INDIA



Rubber, Cashew and tapioca are cultivated in this soil.

Laterite is found in Andhra Pradesh, Tamil Nadu, Karnataka, on the summits of Eastern Ghats and Parts of Orissa, Kerala and Assam.

### 5. Mountain Soil

This soil is found in the mountainous regions such as Western and Eastern Ghats, the Himachal and Siwalik regions. This soil is very rich in humus and Organic matter. Plantation crops such as tea, coffee and rubber grow well. Asam and West Bengal in Eastern Himalayas are principal growers of tea.

### 6. Desert Soil

Desert soil is found in arid zone of the north-western part of India, Rajasthan, Gujarat (Kutch region) and south Punjab.

It is sandy, alkaline and porous in nature. Though it is highly infertile, Crops are cultivated with the help of irrigation in some areas. Crops grown are wheat, rice, barley, grapes and melons.

### Soil Erosion

Soil erosion means “removal of fertile content from the soil by nature and man”. The proper use of soil resources has now become a matter of importance to all of us, because it directly affects our food production. Running water, wind, and human beings are the principal contributing factor of soil erosion. In many parts of our country, for instance, in Uttar Pradesh, Rajasthan and the Deccan vast areas have been devastated by soil erosion.

The nature of soil erosion depend much upon the texture and structure of the soil. It also depends on the conditions of climate, slope, methods of cultivation and several other factors.

### Sustainable development

Sustainable development is defined as “development that meets the needs of the present without compromising the ability of future generation to meet their own needs”. It means 'development should take place without damaging the environment, and development in the present time should not affect the needs of future generation'.

### Soil Conservation

Soil conservation is an effort made by man to prevent soil erosion in order to retain the fertility of soil. It may not be possible to stop soil erosion entirely. But steps can be taken to reduce the rate of erosion by taking preventive measures.

The following are some of the preventive measures:

- 1) Construction of dams or check dams across the river course.
- 2) Step cultivation will prevent soil erosion.
- 3) Bunds should be constructed according to contours.
- 4) Excessive grazing should be avoided
- 5) Trees reduce the force of strong winds and prevents blowing away of soil particles.
- 6) Roots of trees plants and grasses hold soil particles and strengthen the soil. Hence deforestation should be avoided to increase forestation.
- 7) Plants, grass and shrubs control the speed of flowing water. Therefore such plants should not be removed. Steps should be taken to plant the trees wherever it doesn't exist.
- 8) Avoiding application of chemical fertilizer and applying natural manure successively to the field is one of the best methods of soil conservation

### NATURAL VEGETATION

Natural vegetation is the vegetation or plant cover naturally

grown on the earth's surface. It is a result of climate, soil and biotic influences. The forest is one of the greatest natural resources available to human beings. Yet they have declined through centuries. Vast areas of forest have been cleared for cultivation of crops due to over population. This phenomena should be controlled for sustainable development of forest resources.



Forest

### India's Forest Resources

India's forest resources are unique in nature because there are a large number of species of plants, ranging from drought-resisting thorny shrub to tropical evergreen forests. The total forest area is around 63.72 million sq.km. The percentage of forests in total area of India is 19.39%, which is considered rather low when compared to the forest areas in most of the countries of the world. However, even this forest area is not evenly distributed; some states have 60 per cent area under forests while other states have only 3 per cent.

The fast shrinkage in forest area is mainly due to the growth in population which leads to increasing demands for agricultural land, urbanization, industrialisation and new town ships.

### Types of Natural Vegetation

The geographical factors which control the growth of natural vegetation in India are temperature, rainfall, topography and soil. On the basis of the above factors, the natural vegetation of India can be divided into following six types. They are:

- 1) Tropical evergreen forests
- 2) Tropical Monsoon forests
- 3) Shrub and Thorn forests
- 4) Desert vegetation
- 5) Mangrove forests and
- 6) Mountain forests.

#### 1. Tropical Evergreen Forests

The tropical evergreen forest are found in the regions where the annual rainfall is more than 200 cm. The trees in these forests are evergreen and do not shed their leaves. These forests are very dense and composed of tall trees reaching up to the height of above 60 metres. Due to dense growth of trees, the sunlight cannot reach the ground. Thus, the under growth mainly consists of, bamboos, ferns and climbers.

The important trees of these forests are Rose wood, Ebony, Mahogany, Rubber, Cinchona, Bamboo and Lianas.

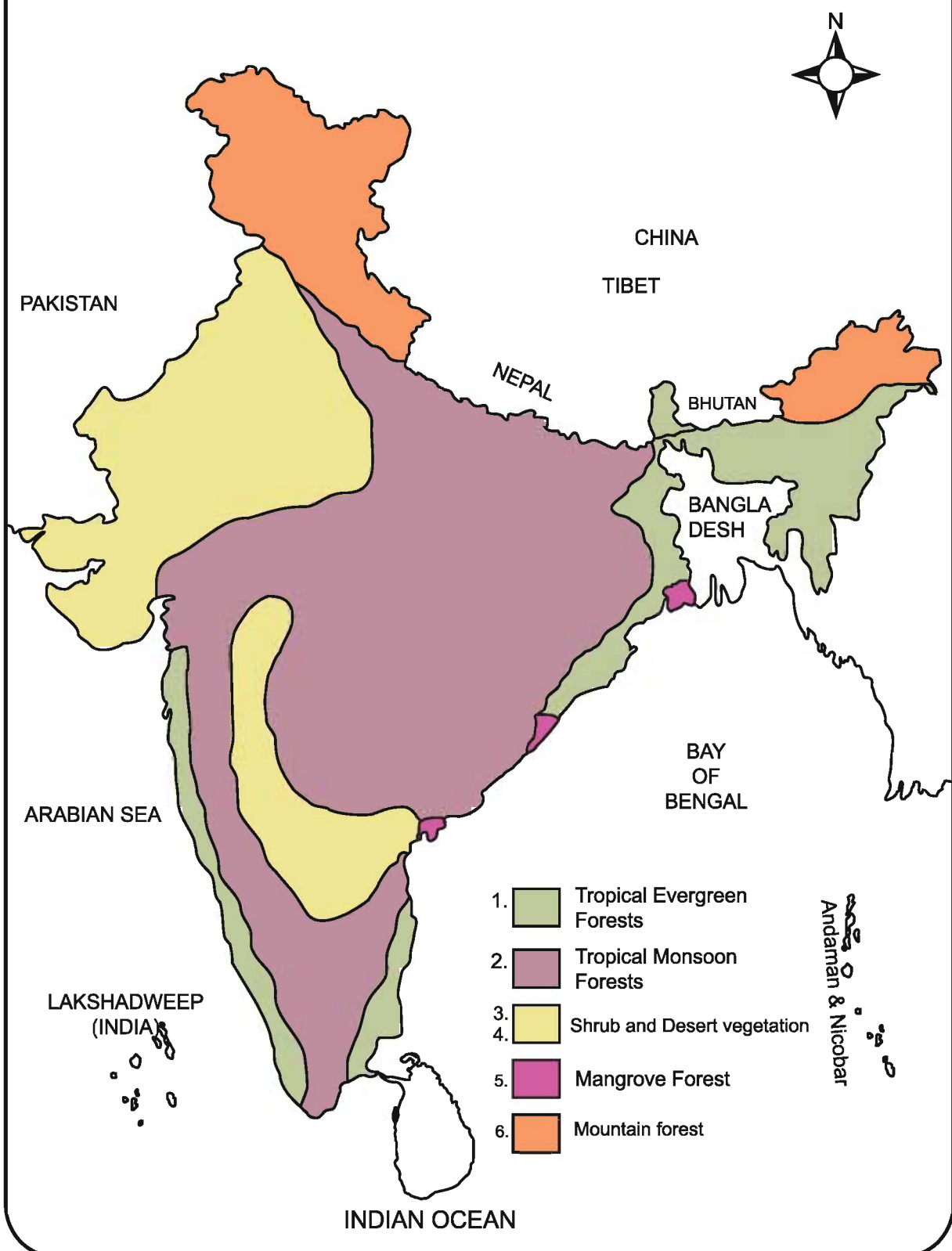
The evergreen forests are mostly found along the western side of the Western Ghats, Andaman and Nicobar Islands, lower slopes of Himalayas and some parts of Assam and Orissa.

#### 2. Tropical Monsoon Forests

These are the typical monsoon forests and are found mainly in those areas where the average annual rainfall ranges between 70 cm and 200 cm. The trees in the deciduous



# India Natural Vegetation



forests shed their leaves due to dryness for about 6 to 8 weeks during the spring and early summer. Hence these forests are called **deciduous forests**.

The tropical deciduous forests are commercially most important as they yield valuable timber and variety of other forest products. The main trees are Teak, Sal, Sisam, Sandal Wood, Wattle and Neem.

The tropical monsoon forests are commercially most exploited. These forests have also suffered from severe biotic factors such as over - cutting, over grazing and fires. The moist monsoon forests are found mainly in the North - eastern states, along the foot hills of the Himalayan Mountains, Jharkhand, West Orissa, Chattisgarh and on the eastern slopes of the Western Ghats. The dry monsoon forests are found on the peninsular plateau, plains of Bihar and Uttar Pradesh.

### 3. Shrub and Thorn Forests

These forests are found mainly in those areas where the average annual rainfall is less than 75 cm with the long dry season. The trees are scattered in these forests. They have long roots to tap water in the underground. They have thick and small leaves which retards evaporation. They have thorny thick bark.

The main trees are Acacia, Palms and Cacti. Other important trees include Khair, Babul, Palas, Khagri, and Kajuri.

It is mainly found in the north western part of the country, including semi- arid areas of Gujarat, Rajasthan, Madhya Pradesh, Uttar Pradesh,

South Western Punjab and Western Haryana. These forests are also grown on the leeward sides of the Western Ghats, covering large areas in Maharashtra, Karnataka, Andhra Pradesh and Tamil Nadu.

### 4. Desert Vegetation

It is found in regions where the rainfall is less than 25 cm.



**Desert Vegetation**

The vegetation mostly consists of thorny bushes, acacias, wild berries and babul. These trees are 6 to 10 meters high but they have long roots and are armed with hard thorns to protect themselves from animals.

The babul yields gum and its bark provides material for tanning hides and skins. These are found in Rajasthan, Kutch and Saurashtra in Gujarat, south-western Punjab and parts of the Deccan.

### 5. Mangrove Forests

Mangrove forests are found in coastal areas flooded by the tides of the sea. Some of these forests are dense and impenetrable. The trunks of these trees are supported by a number of roots which are under water at high tide. At low tide, their roots can be seen. They are found in great abundance in the deltas of the Ganga, Mahanadhi, Godavari, Krishna, and Kaveri and along the coasts of the Andaman Islands.



**Mangrove Forest**

They are also found along the west coast in a few places. In West Bengal they are called **Sundarbans**. These woods are hard, strong and durable and are used for boat building. These forests are a valuable source of fuel.

## **6. Mountain Forests**

The natural vegetation in the mountains is greatly influenced by the decrease of temperature with increase in height above sea level. The mountain forest can be broadly classified into two major categories:

1. The forests in the Himalayan ranges.
2. The forests in the Peninsular Plateau and hill ranges.

In the Himalayan mountains, the forests are found between the heights of 1,000 m and 2,000 m. The ever green broad leaf trees such as Oak, Chestnut predominate. Between the height of 1500 m and 3000 m, the coniferous trees such as Pine, Deodar, Silver fir, Spruce and Cedar are found. The coniferous forest cover the southern slopes of Himalayas and parts of North East India. At an altitude of above 3,600 m, Coniferous forest and grass lands give way to Alpine

vegetation. Silver fir, Junipers, Pines, Birches are common varieties of trees. At higher altitudes, mosses and lichens form part of vegetation



**Mountain forest**

In the peninsular India, the mountain forests are found in three areas. They are:

1. Western Ghats
2. Vindhya
3. Nilgiris

In Nilgiris, the tropical forests are locally called '**sholas**'. Such forests are also found in the **Satpura** and **Maikala ranges**. The important trees in this region are Magnolia, Laurel, Cinchona and Wattle.

## **Grass Lands**

Though the Indian grasslands are not comparable to the savanna or steppes grasslands, they do occur on wet soil ground and in the salt belt and some hilly areas. They are sub-divided into two categories.

### **1. Low-Land Grasses**

These are found in regions receiving 30 cm to 200 cm of average annual rainfall where the temperature is high during summer. These grasses are found on different soils and are suitable for cattle-breeding. They are found in the plains of northern India,

Punjab, Uttar Pradesh, Haryana, Bihar and Northwest Assam.

## 2. Upland Grasses

They are found at a height of over 1,000 m in the Himalayas and in the cleared forest areas of the Western Ghats in Karnataka region. They are found among small tracts of shola forests in the southern part of India too.



Upland Grasses

### Importance of Forests

- 1) Forests provide **valuable timber** for domestic and commercial use and raw materials for industries .
- 2) It supplies a number of **products** such as Lac, Gum, Resins, Tanning materials, Medicines, Herbs, Honey and Spices.
- 3) Export of forest products earns valuable **foreign exchange**.
- 4) Grazing cattle in the forests helps in **dairy farming**.
- 5) Many forest reserves have been developed into **tourist centres**.
- 6) Forests absorb atmospheric carbon-di-oxides and help in controlling **air pollution**.
- 7) Forests help in controlling **soil erosion**, land reclamation and flood control.
- 8) Forests helps in water percolation and thus maintain **underground water table**.

9) Forests provide **natural habitats** to primitive tribes, animals and birds.

10) Forests are the **moderators** of climate and affect temperature, humidity and rainfall.

11) Forests meet nearly 40 % of the **energy needs** of the country.

In India, much of its forests and wild life resources are maintained by the Forest Department. They are classified into two types as follows :

### Reserve Forests

About half of the total forest land has been declared as reserved forests. It is also known as **permanent forests**, It is regarded as the most valuable as far as the conservation of forests and wild life resources are concerned.

### Protected Forests

Almost one-third of the total forest area is protected forest, as declared by the Forest Department. Here, felling trees are not allowed.

### Forest Conservation and Management

The increasing destruction and degradation of forests have led to extensive soil erosion, uncertainty in rainfall and recurring floods. The Forests conservation Act of 1980 was formulated especially to check deforestation of forestlands for non-forestry purposes. In 1988, the act was amended by prescribing severe punishment to violators. The government should involve village communities and voluntary agencies for the **regeneration** of degraded forest land.

### National Forest Policy

India is one of the very few countries in the world, where a policy to

conserve forests was developed in 1894. It was modified and updated in 1952 and 1988.

### The main objectives of the policy

1. Bring 33 percent of the geographical area under forests (now it is 20% only)
2. Maintain environmental stability where ecological balance was disturbed.
3. Conserve bio-diversity of the country.
4. Check soil erosion, extension of desert land and reduction of floods and drought.
5. Increase forest cover through social forestry and farm forestry.
6. Increase productivity of timber, fuel, and fodder from the forests.
7. Involve women to encourage planting trees and stop felling of trees.

Thus, it is our prime duty to conserve our country's natural vegetation.

## MINERAL RESOURCES

The minerals are broadly classified into two. They are:

1. Metallic minerals
2. Non-metallic minerals.

### Metallic minerals

The metallic minerals contain metals such as Iron, Copper, Manganese, Bauxite and Gold. They are further divided into ferrous minerals and non-ferrous minerals.

### Ferrous minerals

Minerals having more iron content are called **ferrous minerals**. For example. Iron, Manganese, Nickel, Cobalt, and Tungsten.

### Non-Ferrous Minerals

Minerals which do not have iron contents are called as **non-ferrous minerals**. For example Gold, Silver, Copper, Bauxite.

### Non-Metallic Minerals

The non metallic minerals are minerals which do not contain metals, such as Mica, Lime Stone, Gypsum, Potash, Coal, etc. Example: Coal and Petroleum.

### Some important minerals

#### Iron ore

Iron ore is the **basic resource** for a nation's development. Iron is described as the back bone of civilization. India possesses 20% of the iron deposits of the world's total reserves.



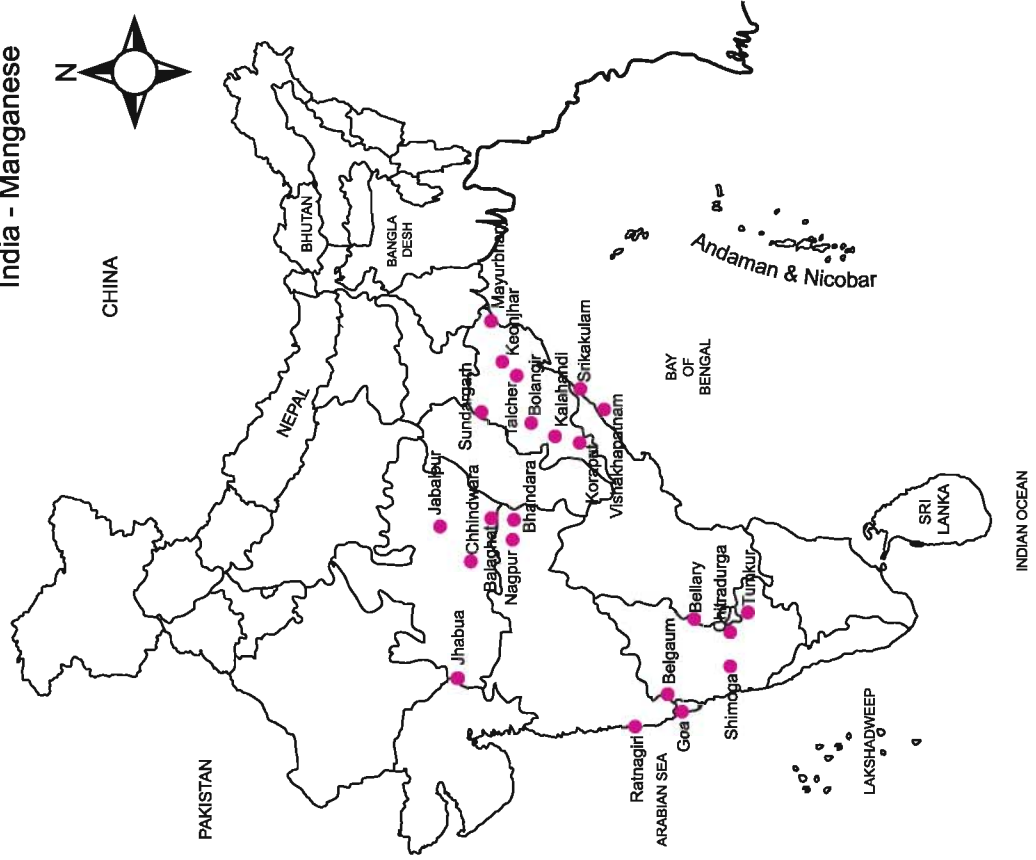
Iron Ore

It is the second largest after the reserves of Russia. The quality of Indian ore is very high. Iron producing areas in India are Durg in Chattisgarh, Singhbhum districts in Jharkhand, Mayurbhanj, Keonjhar and Sundergarh district in Orissa and other areas are Goa, Karnataka and Tamil Nadu.

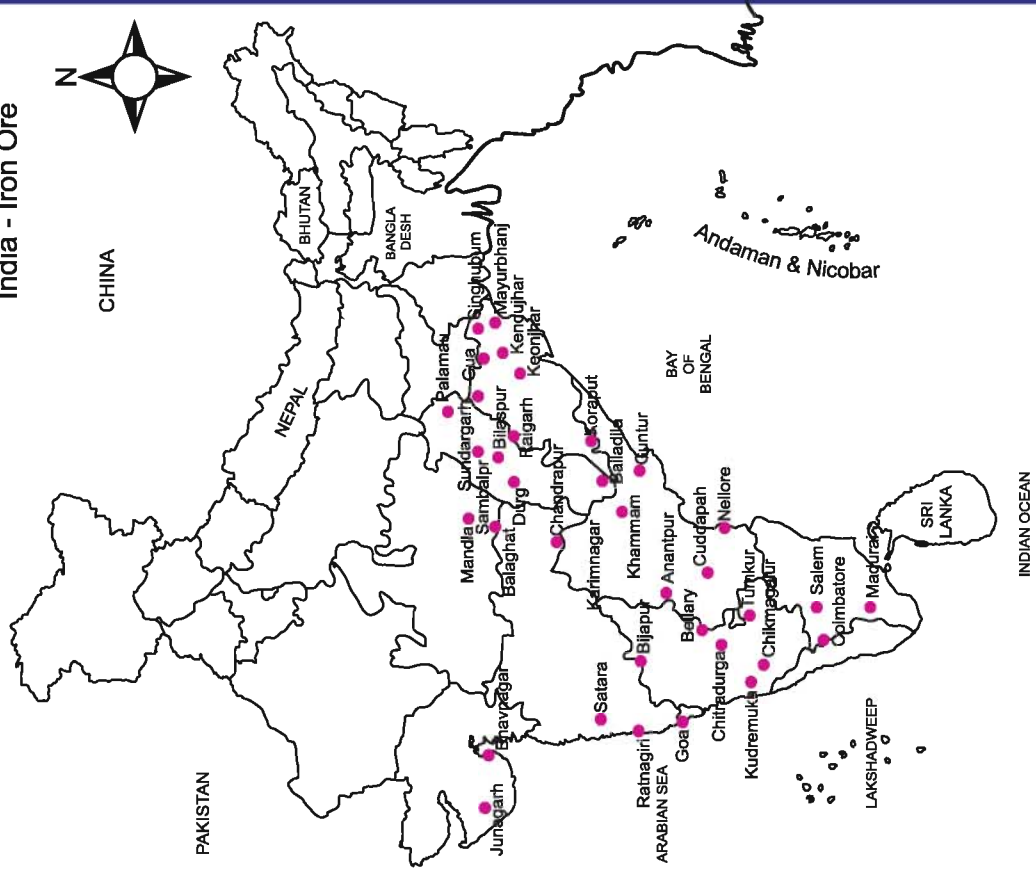
#### Manganese

India occupies fifth position in the production of manganese. It is estimated that about 20% of the

### India - Manganese



### India - Iron Ore



manganese deposits of the world are in India.



**Manganese**

Manganese plays a very important role in the iron and steel industry as it is necessary to make steel hard and rust proof. Manganese dioxide is used for the manufacture of **dry batteries**. It is also used in manufacturing bleaching powder and paints. Manganese produced areas are Balaghat in Madhya Pradesh, Keonjhar, Boonaigarh in Orissa, Bellary, Chitradurga, Shimoga in Karnataka, Tamil Nadu, Maharashtra, Gujarat and Bihar.

### **Bauxite**



**Bauxite**

It is the ore of aluminum. Aluminum is a light metal formed by the decomposition of rocks rich in aluminum silicates. Due to good conducting, great malleability and

extreme lightness it has got enormous industrial importance.

The major bauxite producing centers of India are Bilaspur in Chattisgarh, Ranchi in Jharkhand, Ratnagiri, Raigarh in Maharashtra, Sambalpur, Kalahandi in Orissa, Goa, Gujarat, Karnataka and TamilNadu (Salem, Madurai, Nilgiri).

### **Copper**

Copper is another metal found in nature as a good conductor of heat and electricity. It has an important role in the Electrical goods industry. Copper is mixed with other metals to form alloys.

Copper producing areas are Singhbhum in Jharkhand, Guntur and Nellore in Andhra Pradesh, Balaghat in Madhya Pradesh Rajasthan and Karnataka.

### **Mica**

Mica is a bad conductor of electricity and so it is used in the manufacture of **electrical goods**. India contributes about 60% of the mica production in the world. Major mica producing states of India are Andhra Pradesh, Jharkhand, Bihar and Rajasthan.

### **Conservation of Mineral Resources**

The total volume of usable mineral deposits is one percent of the earth's crust. We rapidly consuming mineral resources. But the geological processes of mineral formation are so slow and therefore they are **non renewable**.

A concerted effort has to be made in order to use our mineral resources in a planned and sustainable manner. New technologies need to be evolved

to use low grade ores at low costs, recycled metals, using scrap metals and other substitutes to conserve our mineral resources for the future.

## ENERGY RESOURCES

Energy is an inevitable resource in our day-to-day life. It is an essential component in economical and technological development. Coal, Petroleum, natural gas solar energy and wind energy are some of the sources of energy. Energy Resources can be classified into Non-Renewable and Renewable energy resources.

### Non - Renewable Energy Resources

#### Coal

Coal is the major energy resource in India. The 67% of the energy requirement of the country is met from coal. It is mainly used in Iron and steel industries. Coal is also known as '**Black Gold**'. Coal is classified into many varieties based on its quality and the amount of **carbon content** in it. They are 1.Anthracite 2.Bituminous 3.Lignite 4.Charcoal.

Many coalfields are located in the northeastern India. About two thirds of the total production of coal is made from Jharkhand, Madhya Pradesh, Chhattisgarh and Orissa. One third of the total production is obtained from Andhra Pradesh, Maharashtra, West Bengal and Uttar Pradesh.

#### Petroleum

Petroleum, known as '**Mineral Oil**', is mined from the layers of **sedimentary rocks**. India has a reserve of 4000 million tons, but only 25% of it is possible to be excavated. About 33 million tons of petroleum is mined in India annually. 63% of this is from **Mumbai High**, 18% from Gujarat and

16% from Assam. The remaining 3% is rigged from Arunachal Pradesh, Andhra Pradesh and Tamil Nadu.



**Oil drilling in Mumbai High Natural Gas**

Deposits of natural gas are seen in the earth crust either independently or along with Petroleum. About 23 billion cubic meters of natural gas is used in India. India's natural gas reserve is only 700 billion cubic meters. Most of the deposits of natural gas is found in Andhra Pradesh, Maharashtra, Gujarat, Assam and Andaman-Nicobar islands. Andaman alone has about 47.6 million cubic meters of natural gas reserve. Recently it has been found out that **Krishna - Godhavari** delta has reserves of natural gas.

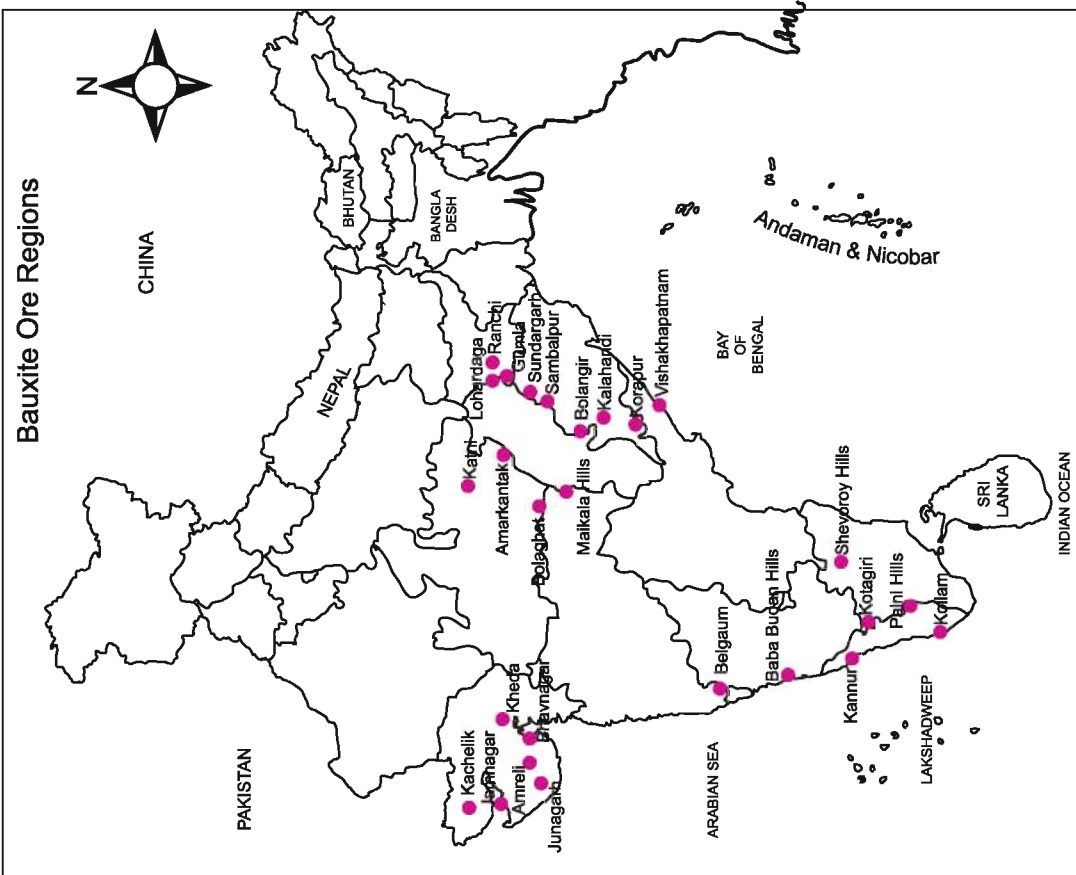
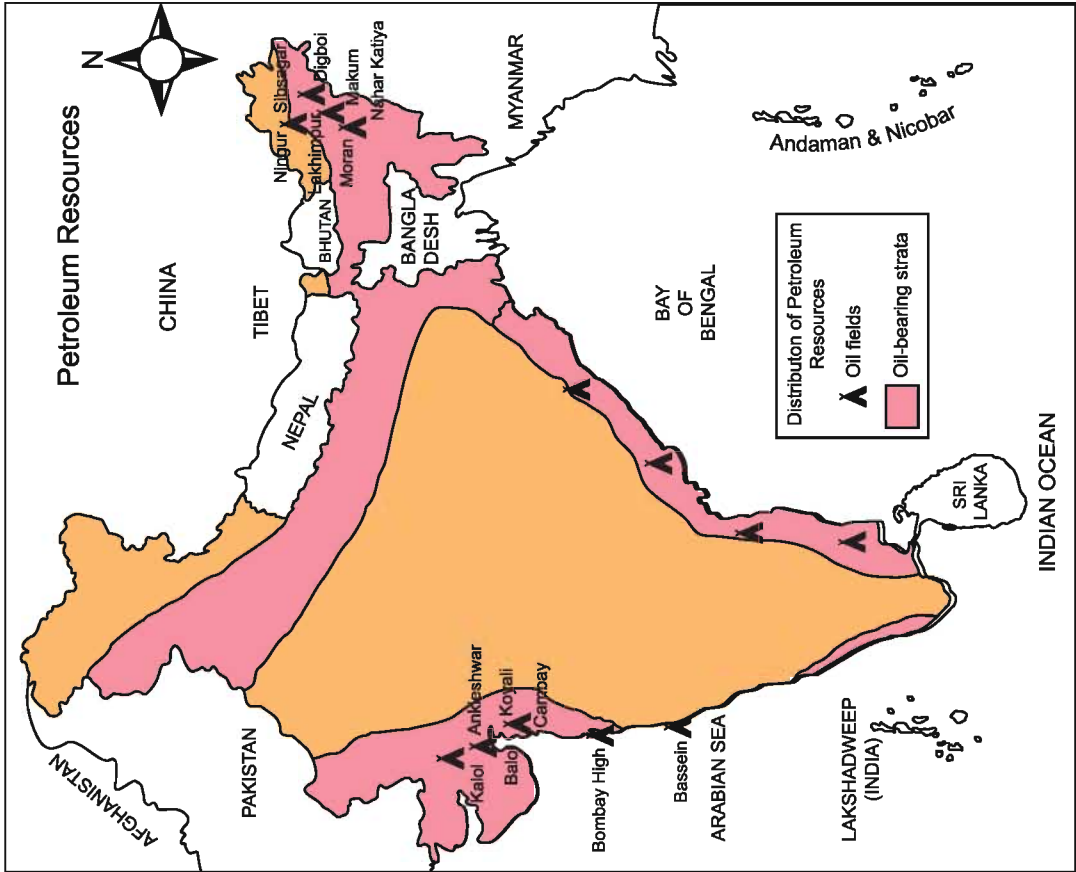
### Electricity

The role of electricity in the growth and development of a nation is very large. Electricity is mainly produced in three ways. They are 1.Thermal electricity 2.Hydro electricity 3.Nuclear electricity.

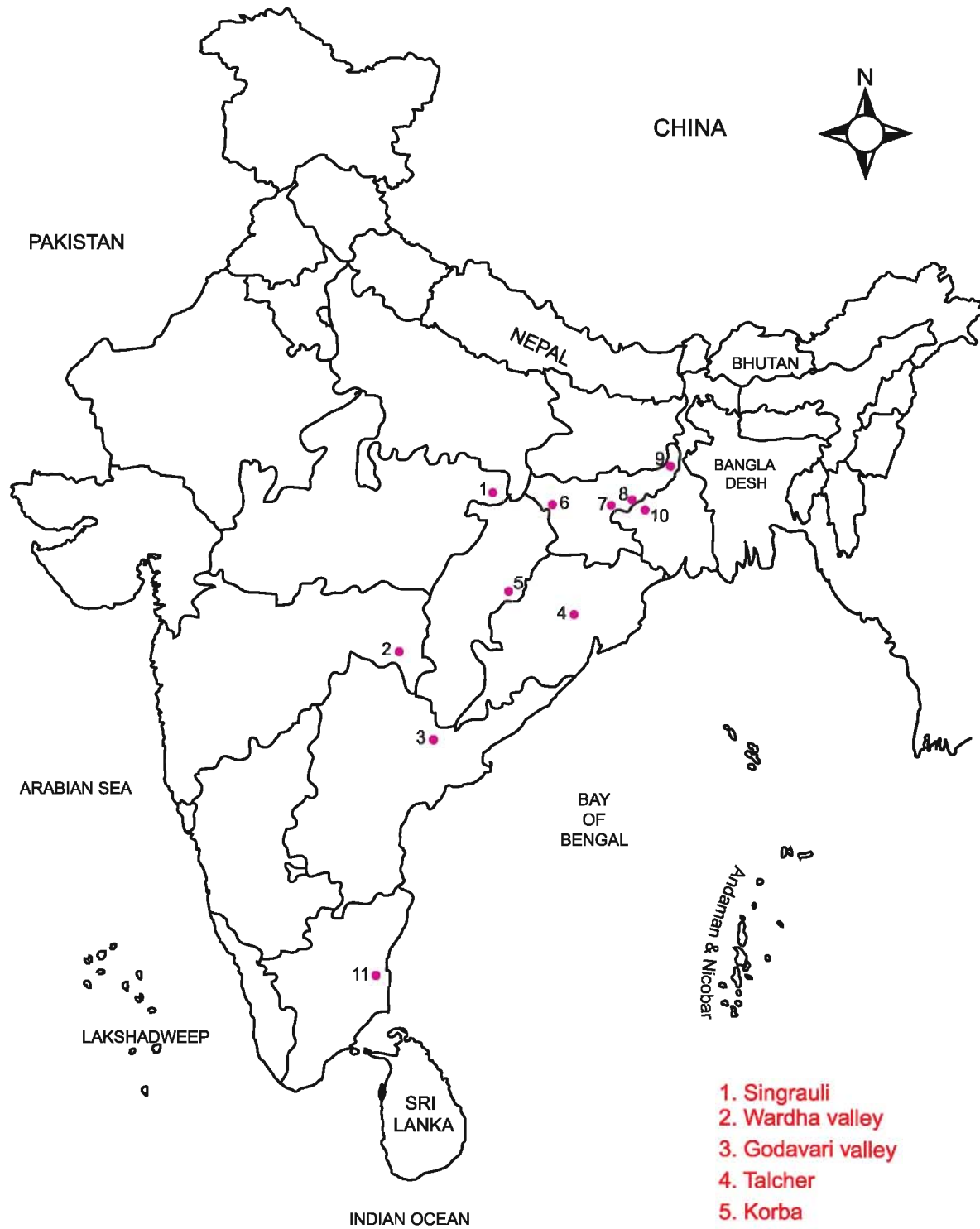
#### 1. Thermal Electricity

Thermal Electricity or thermal energy is produced using coal, petroleum, natural gas etc. The state of Assam, Jharkhand, Uttar Pradesh, West Bengal and Tamil Nadu depend mainly on thermal electricity. It is also





## India - Coal Resources



1. Singrauli
2. Wardha valley
3. Godavari valley
4. Talcher
5. Korba
6. Jharkhand
7. Bokaro
8. Jharia
9. Rajmhal
10. Raniganj
11. Neyveli

produced in Punjab, Haryana, Rajasthan, Karnataka, Kerala, Orissa and Delhi. 70% of the total production of electricity in India is from thermal power station.

## 2. Hydro Electricity

In India the first hydro electricity power station was started 1897 in Darjeeling. In 1902 another power station was established at **Sivasamudram waterfalls**, in river Cauvery. At present twenty five percent of the electricity produced in India is from hydropower. It highly influences the economic development of India. Hydro electricity is mainly produced in Himachal Pradesh, Karnataka, Kerala, Jammu & Kashmir, Meghalaya, Tripura and Sikkim. Kerala depends mainly on hydro electricity projects for the generation of electricity.

## 3. Nuclear Electricity

Nuclear Electricity is produced from minerals such as **uranium** and **thorium**. They are mined mainly from the state of Jharkhand and the Aravalli ranges of Rajasthan. Uranium is separated from the monazite, coastal sands of Kerala. 50% of the world's thorium deposit is found in India, Tharapur (Maharashtra), Kalpakkam (TamilNadu), Rawath Bhatta (Kota-Rajasthan), Narora (Uttar Pradesh), Kakrapara (Gujarat) and Kaiga (Karnataka) are the nuclear power stations in India. India produces 272 megawatt of nuclear energy annually.

## Renewable Energy Resources

As the demand for energy increases the importance for renewable resources of energy such as Sun, Wind, Tide, Biogas etc, are also increasing. The peculiarities of these energy sources are;

1. Easily available
2. Renewable
3. Environment friendly
4. Pollution free
5. Low production cost
6. Continuous availability

## Solar Energy

India, located in the tropical region, has immense potential of solar energy. Sunlight can be directly converted to electricity through the '**photo voltaic technology**'. It is possible to generate 20 megawatt of electricity through this method from 1 sq.km.area. Solar energy is most commonly used in Cooking and Lighting. The largest solar energy conversion centre in India is located at '**Madhapuri**', near Bhuj in Gujarat.

## Wind Energy



Wind energy

Wind energy producing centers are established in many parts of the country. The initial expenses for erecting the windmills are huge. Tamil Nadu, Andhra Pradesh, Karnataka, Gujarat, Kerala, Madhya Pradesh, Maharashtra and Lakshadweep have wind energy producing centres.

## Biogas

Bushes, wastes from crops, human and animal wastes are used to

produce biogas. These materials are allowed to decay in order to produce the gas. This gas is used for domestic purposes in rural areas. Biogas can give higher temperature compared with kerosene and charcoal.

### Tidal Energy

India is estimated to possess 8000 to 9000 megawatt of tidal Energy potential. The **Gulf of Khambat** is the best suited with 7000 MW potential. This is followed by Katch (1000MW) and Sundarban (100MW).

### Wave Energy

Wave energy potential in India is estimated of about 40,000MW. A wave energy power plant of 150 KW has been installed at **Vihinjam** near Thiruvanthapuram. Another 1MW wave energy plant is being setup in the Andaman and Nicobar Islands.

### Conservation of Energy Resource

Energy is a basic requirement for economic development. Every sector of the national economy such as agriculture, industry, transport, commerce and domestic needs energy inputs. The developmental plans are being implemented since Independence in all sectors. As a result, consumption of energy in all forms has been steadily rising all over the country.

In this background, there is an urgent need to develop a **"sustainable path of energy development"**. Promotion of energy conservation and increased use of renewable energy sources are the twin planks of sustainable conservation.

India is presently one of the least energy efficient countries in the world. We have to adopt a cautious approach for the judicious use of our limited energy resources.

### We can conserve energy by:

- a) using public transport systems instead of individual vehicles
- b) Switching off electricity when it is not in use,
- c) using power saving devices
- d) using non-conventional sources of energy. Because "energy saved is energy produced".

### Need for conservation of Natural Resources

We know that nature provides us all resources to satisfy our basic needs but we tend to overexploit it. If we go on exploiting the nature, there will be no more resources available in future. There is an **urgent need to conserve the nature**. Some of the needs are

1. To maintain ecological balance for supporting life.
2. To preserve different kind of species (biodiversity).
3. To make the resources available for present and future generation.
4. To ensure the survival of human race.

## EXERCISE

### I) Choose the correct answer.

- 1) The soil found in the Arid zone is known as \_\_\_\_\_.  
a) Desert soil      b) Laterite soil      c) Black soil      d) Alluvial Soil
- 2) The Monsoon forests are otherwise called as \_\_\_\_\_.  
a) Tropical evergreen forest      b) Deciduous forest  
c) Mangrove forest      d) Mountain forest
- 3) Which one of the following mineral is contained in the monazite sand \_\_\_\_\_.  
a) Oil      b) Uranium      c) Thorium      d) Coal

### II) Match the following.

- |                            |                    |
|----------------------------|--------------------|
| 1) Black soil              | Petroleum          |
| 2) Lignite                 | Cotton cultivation |
| 3) Mangrove forest         | A type of coal     |
| 4) Renewable resources     | Sundarban          |
| 5) Non renewable resources | Sun                |

### III) Distinguish between.

- 1) Tropical evergreen forest and Tropical monsoon forest
- 2) Renewable resource and Non renewable resource
- 3) Wind energy and thermal energy.

### IV) Short answers.

- 1) What do you understand by the term natural resource ?
- 2) What are the properties of fertile soil ?
- 3) Name any four main characteristics of the tropical evergreen forest ?
- 4) Give the meaning of shrub and thorn forest ?
- 5) Name the mica producing areas of India ?

### V) Answer the following in paragraph.

- 1) Write the importance of forest.
- 2) Describe the need for the conservation of natural resources ?

## 4. INDIA - AGRICULTURE

Agriculture plays a vital role in socio-economic development of India. It is a source of livelihood and food security for Indians. It constitutes large share of country's national income because more than half of India's workforce is employed in agriculture. The growth of industries and trade also depend on the growth of agriculture.

In India different agricultural patterns are practiced due to varied geographical factors. Now, we will deal about how geographical factors determine the agricultural activities and patterns of agriculture and how agriculture contributes to national economy.

Major determinant factors of agriculture:

- 1) Land form
- 2) Climate
- 3) Soil types
- 4) Water

### 1. Landform

India is a land of diverse landscape comprising of mountains, plateaus and plains. Among them the plains are more suitable for agriculture due to **rich alluvial soil** which enhance the agricultural productivity. For example plains of Ganga and Cauvery.

### 2. Climate

Most part of India lies within the tropics and enjoys **tropical monsoon climate**. The abundant solar energy, favours the growth of crops throughout the year. The seasonal rainfall added with the irrigational facilities also

contributes for the cultivation of crops in all seasons. The amount of rainfall determines the cropping pattern. For example wheat requires moderate temperature whereas rice requires high temperature for its growth. That is why wheat is cultivated in Punjab and rice is cultivated in TamilNadu.

### 3. Soil types

In spite of the growth in technology soil still continues to be one of the most important geographical factors in determining the cropping pattern. Thus rich alluvial soil favours the growth of rice and sugarcane while black soil favours the growth of cotton.

### 4. Water

Another most important factor in determining agriculture is the availability of water. India is a monsoon country with uneven distribution of rainfall. Irrigation facilities cannot be given to all parts of the nation. So crops that require abundant water are grown in areas of high rainfall or in regions covered under irrigation. To meet the food requirement of the growing population in the areas of low rainfall **dry crops** are grown.

### Types of agriculture

Four different types of farming are generally practiced in our country and they are:

1. Primitive agriculture
2. Subsistence agriculture
3. Commercial agriculture
4. Plantation agriculture.

### 1. Primitive agriculture

Primitive agriculture is practised in the forest areas where heavy rainfall occurs. A portion of forest is cleared for cultivation and crops are raised for two or three years. Then they abandon the land and shift to another part. This is still practised on a small scale in the North Eastern States, Madhya Pradesh, Orissa, Andhra Pradesh and Kerala.

Primitive agriculture is known by different names at different places such as "Jhum" in Assam, "Podu" in Orissa and Andhra Pradesh, "Mashan" in Madhya Pradesh and "Ponam" in Kerala.

### 2. Subsistence Agriculture

The predominant type of Indian agriculture is subsistence farming. In this type nearly half of the production is used for family consumption and the rest is sold in the nearby markets. The farmers concentrate on staple food crops like rice and wheat.

Example: North Ganga plain and in the south Cauvery, Krishna, Godhavari and Mahanadhi plains.

Large scale improvement has been made in Indian agriculture after independence. The farmer tries to get the maximum possible output from the available land with high input of fertilizers, manures, hybrid variety of seeds, farm machineries and irrigation facilities wherever possible. This type

Rice, the staple food of South India, occupies 44 million hectares. It is the largest rice grown area in the world. India achieved self sufficiency in rice in 1977 and regularly exports a small quantity of high-quality basmati rice.

of agriculture is also known as "intensive agriculture" and it is generally practised in alluvial plains.

### 3. Commercial agriculture

Crops in great demand are grown in Commercial agriculture. In this type crops are raised on a large scale with the view of exporting them to other countries and for earning foreign exchange. This type of agriculture is otherwise called as "Extensive agriculture". It is practised in Gujarat, Punjab, Haryana, Maharashtra and TamilNadu. Commercial agricultural products are used as raw materials in the agrobased industries. Example cereals, cotton, sugarcane, jute etc.

### 4. Plantation agriculture

In this type of agriculture, single crop is raised on a large area. The plantation has an interface of agriculture and industry. The plantations are mostly owned by the companies. Tea, Coffee and Rubber are plantation crops. These crops are grown on the hilly areas of North Eastern States of India, west Bengal,

The Nilgris, Anaimalai and Cardamom hills of South India.



Rubber Tree

## Cropping Pattern

The farmers decide the cropping pattern. The following table shows the traditional way of cropping pattern based on the climate.

| Method                              | Crops(e.g.)  |
|-------------------------------------|--|
| One crop at one time (Monocropping) | Paddy, Sugarcane, Oilseeds, Corn                                   |
| Two Crops at a time                 | Paddy, Blackgram, Wheat, Mustard                                   |
| More than two crops                 | Paddy, Blackgram, Wheat, Mustard<br>Barly, Jowar, Groundnut, Bajra |

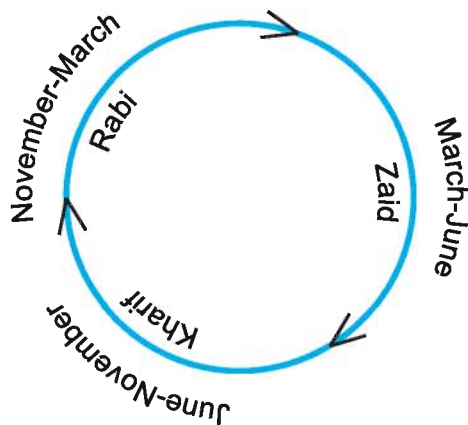
## Cropping pattern

### Agricultural Seasons of India

The agricultural activities begin with the onset of monsoon in the month of June. India have three major cropping seasons in a year, as shown in the following table

### Agricultural seasons

| Name   | Sowing Period                  | Harvest period             | Major Crops                                      |
|--------|--------------------------------|----------------------------|--|
| Kharif | June(Beginning of monsoon)     | Early days of November     | Paddy, maize, cotton, millet, jute, sugarcane    |
| Rabi   | November (Beginning of winter) | March(Beginning of summer) | Wheat, Tobacco, Mustard, Pulses, Linseed, Grains |
| Zaid   | March(Beginning of Summer)     | June(Beginning of monsoon) | Fruits, Vegetables, Water melons, Cucumber       |



### Agricultural seasons

### Production of food crops

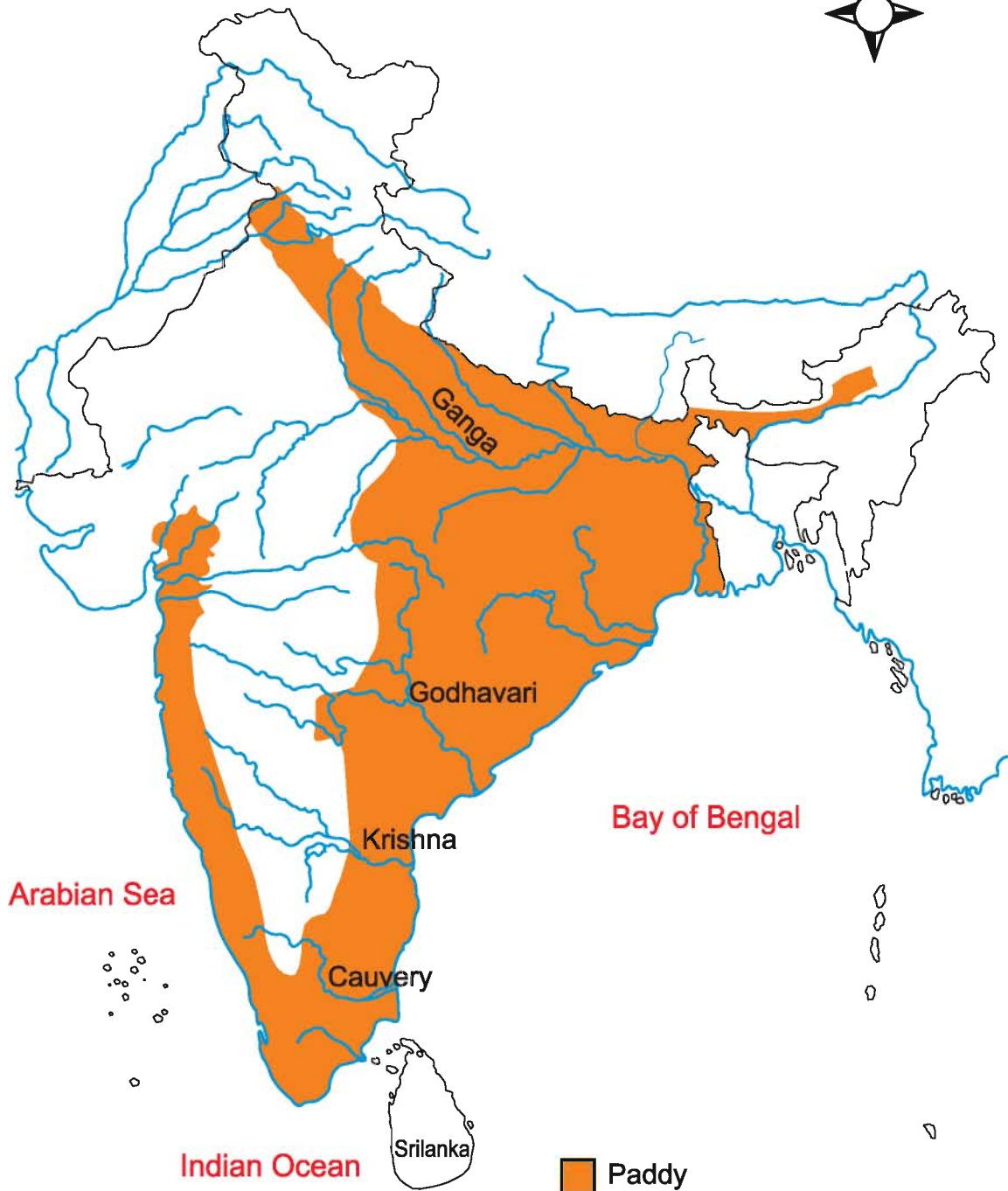
Diversity of food crops is ascertained according to the factors of temperature, rainfall and soil type. The major food crops of India are:

#### Paddy

Paddy is the most important food crop of India. India stands in second place in the production of paddy. India and China together produce about 90% of the total world production of



## Paddy growing areas



**Paddy.** In areas of less rainfall particularly in Punjab and Haryana it is grown with the help of irrigation. Cheap labour is required for sowing, weeding, harvesting and other processes. Sugandh 5, Sukaradhara-1 are the hybrid variety seeds recommended for the cultivation in the areas of Haryana, Delhi, Jammu and Kashmir and uphill of Himachal Pradesh and Uttaranchal.

The other rice producing states are west Bengal, Punjab, Uttarpradesh, Bihar and Orissa in North India and Tamilnadu and Andhra Pradesh in South India. Most of the production is consumed locally due to dense population. Rice is cultivated two to three times in a year intensively in the deltas of Mahanadhi, Godavari, Krishna and Cauvery.

The Indian Council of Agricultural Research (ICAR), was established in 1929. India's transformation from a food deficit to a food surplus country is largely due to ICAR's smooth and rapid transfer of farm technology from the laboratory to the land.

### **Paddy cultivation In Tamil Nadu**



**Paddy Field**

There is something special about paddy cultivation in Thanjavur District, the '**rice bowl**' of Tamil Nadu. The

paddy crops grown in this region are classified as Samba, Kuruvai and 'Thaladi' on the basis of the duration of paddy growth. **Samba** is a long term crop. It is grown for about five to six months. **Kuruvai** is a crop grown within three or four months. The paddy grown in the field ploughed with the stumps of the previous harvest is known colloquially as the **Thaladi**.

Although this way of cultivation of paddy is still in practice, it is now been changed with the impact of modern cropping. This has also led to great change even in harvest seasons.

### **Wheat**

Wheat is an important food Crop. It is the **staple food** for the northern and northwestern part of India. Wheat is cultivated both in winter and spring.

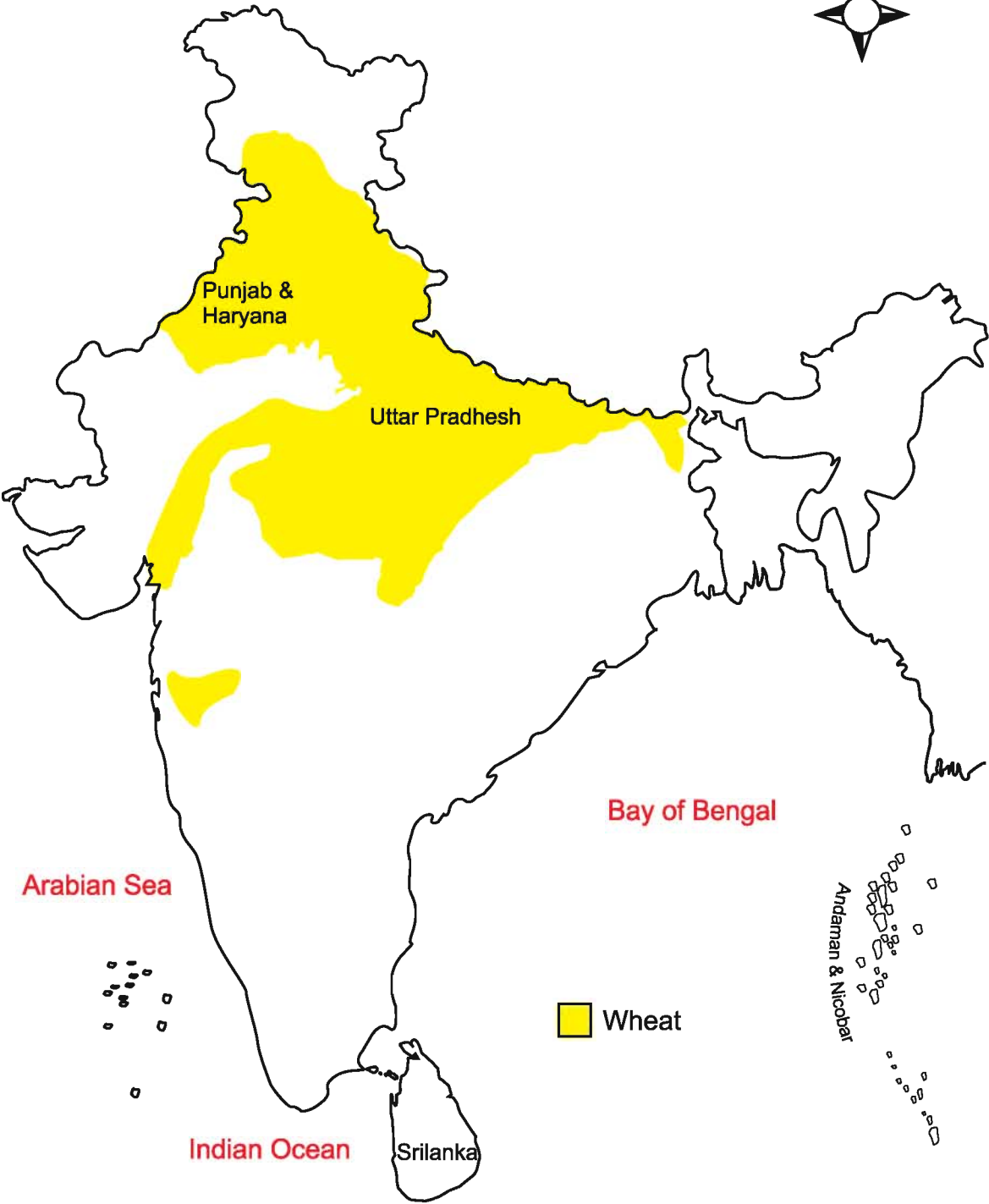


**Wheat**

Uttar Pradesh and Haryana are the major producers. Rajasthan, Madhyapradesh, Chattisgarh, Maharashtra, Gujarat, and Andhrapradesh are the other wheat producing states. The production of wheat has been increased in Punjab and Haryana due to the impact of Green Revolution. Our country is now in a position to export wheat to other countries.

Besides, paddy and wheat, **dry crops** also play vital role in the food

**Wheat growing areas**



## RAINBOW OF REVOLUTIONS

| Title             | Associated with the production of |
|-------------------|-----------------------------------|
| Green Revolution  | Agricultural Crops                |
| White Revolution  | Milk and Milk Products            |
| Grey Revolution   | Eggs and Poultry                  |
| Golden Revolution | Horticulture                      |
| Yellow Revolution | Oil Seeds                         |
| Blue Revolution   | Marine Products                   |

grain production. They grow well even in the infertile soil. They are drought resistant crops.

**Millets** as cereal crops are intermediate between rice and wheat. It includes jowar, bajra and ragi. Millets are coarse grain, and dry crops. They are cultivated in poor soils. They are rich in nutritional content higher than wheat or rice. They also provide fodder for cattle. Millets are grown in almost all the states in India, but the important producers are Madhya Pradesh, Andhra Pradesh, Tamil Nadu, Uttar Pradesh, Karnataka, Orissa, Bihar, Maharashtra and Gujarat.

### Pulses

**Pulse** crops include a large number of crops which are mostly leguminous and rich in proteins. Pulses serve as an excellent fodder though grams are the most important pulses. Other pulses are black gram, greengram, lentile, horse gram, peas etc.

Pulses are grown in a wide range of climatic conditions mostly in drier areas with or without irrigation facilities. Pulses require a mild cool weather and a low to moderate rainfall.

The most important producers are Madya Pradesh, Rajasthan, Haryana, Punjab, Maharashtra, Gujarat, Andhrapradesh and Tamilnadu.

## Cash Crops

Many other crops are also cultivated in our country in addition to the above food crops. **Sugarcane, Cotton, Jute, Tea, Coffee, Oil Seeds, Tobacco** and **Rubber** are some among them. They are mainly produced as raw materials for industries. Besides, they form export material that can earn foreign exchange. So they are known as **cash crops**. They have great influence on the Indian economy also.

### Sugarcane

Sugar Cane is a tropical crop. It grows well in the **hot humid climate**. India is the birth place of sugarcane.



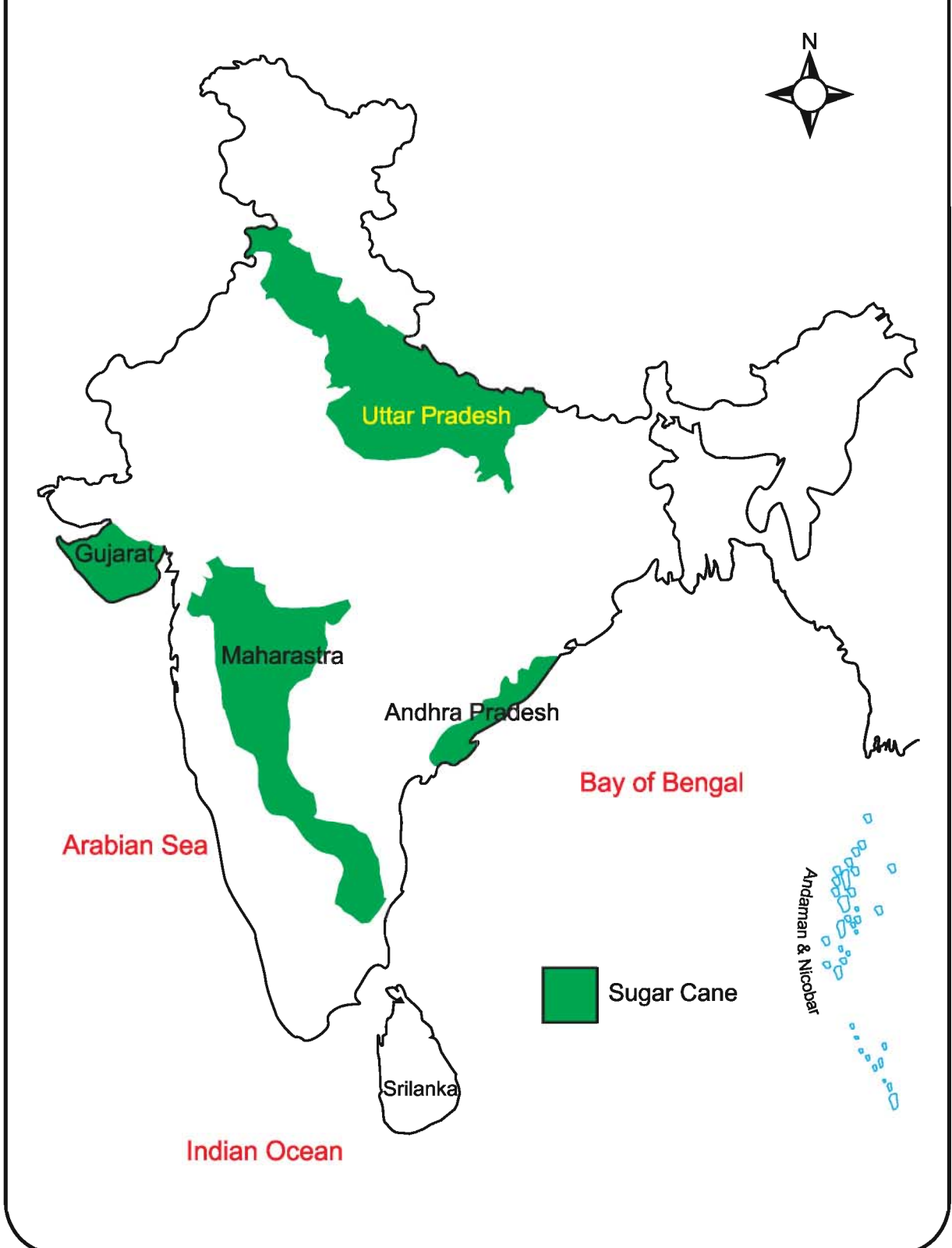
Sugarcane

It ranks second in production next to Brazil. The Major sugarcane producing states are Uttarpradesh, Tamil Nadu, Andhrapradesh, Karnataka, Gujarat and Maharashtra, Bihar, Punjab and Haryana.

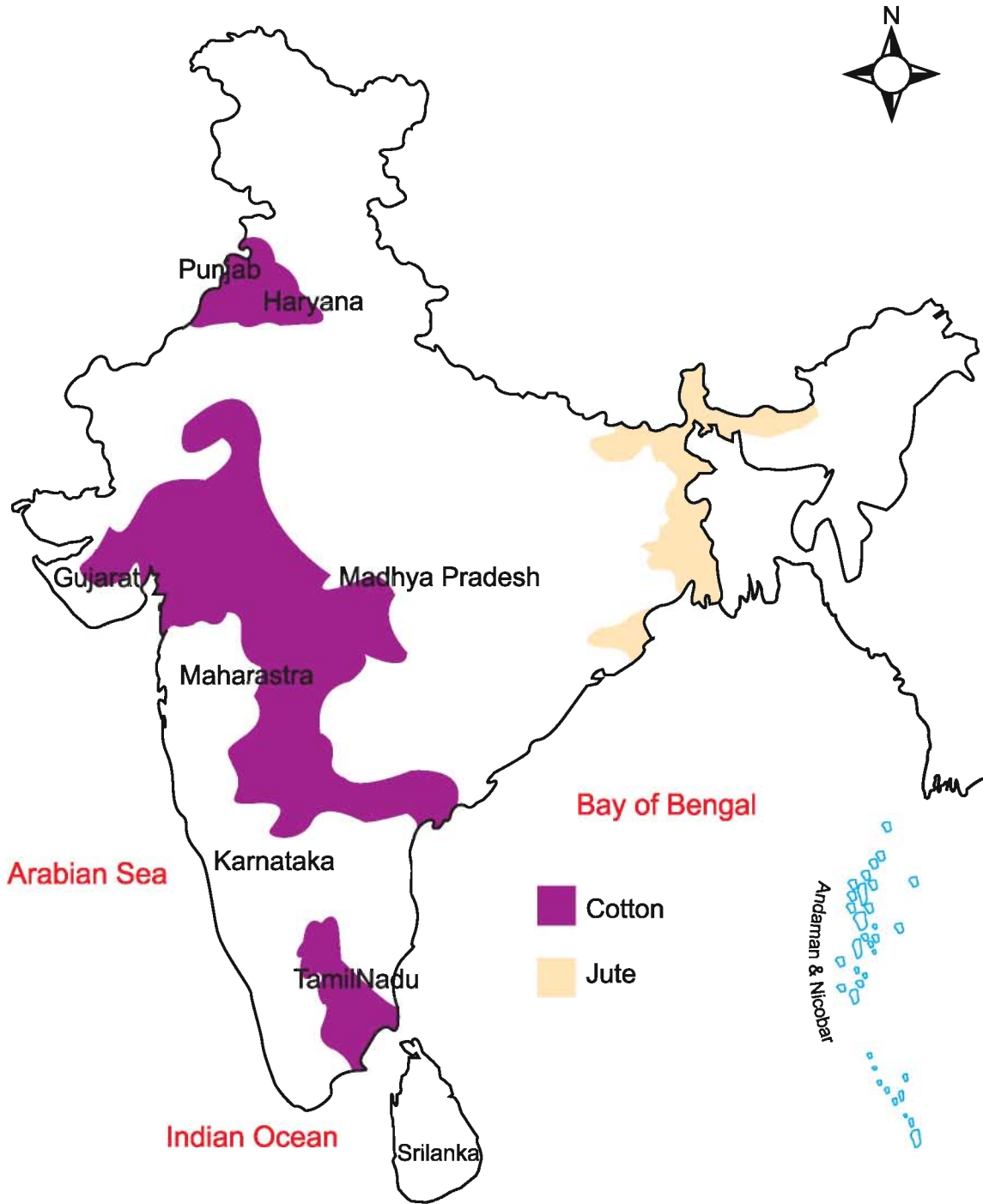
### Cotton

Cotton is a major **fibre crop** of India. It provides raw material for cotton textile industry. Cotton grows well in tropical and subtropical climate. Black soil is the most suitable soil for cotton cultivation. India has fourth position in the world cotton production. The main cotton growing states are Gujarat, Maharashtra, Andhra Pradesh, Karnataka, Tamilnadu, Madhya Pradesh, Punjab and Haryana.

## Sugar Cane Growing Areas



## Cotton and Jute Growing Areas



## Jute

Jute is also the most important fibre crop next to cotton. The fibre is the cheapest and has a commercial demand because of its softness, strength, length and uniformity. It is demanded for the manufacture of gunny bags, hessian, carpets, ropes, strings, rugs and cloth, tarpaulins, uphoistry etc.



Jute Plant

Its cultivation is restricted mainly to the Ganga Brahmaputra delta in west Bengal, Bihar, Orissa, Assam and Meghalaya. Because this crop requires hot and damp climate. The soil should be well drained fertile soil in the flood plains where soils are renewed every year.

## Tobacco



Tobacco

Tobacco is said to have been brought to India by the portuguese in 1508. Since then cultivation gradually

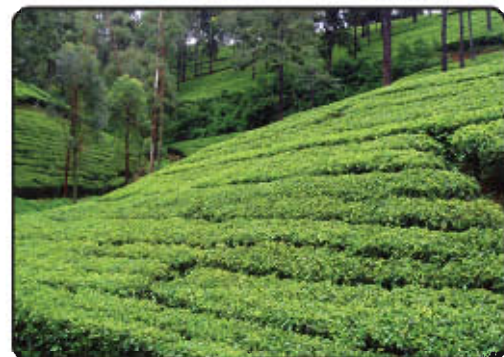
spread to different parts of the country. India is the third largest producer followed by China and U.S.A. The major tobacco producing stales are TamilNadu, Andhra Pradesh and Karnataka

## Oil Seeds

India is one of the oil seed producing countries of the world. India grows all types of oil seeds except olive and palmoil. Oil seeds are grown mainly in the tropical and subtropical regions. Indian oil seeds are. groundnut, sesamum, rape seed, mustard, linseed, sunflower seed, castor seed, coconut, soyabean etc. Oil is an impartant item of Indian food. The oil seeds are used as raw materials for manufacturing a large number of products and form cattle feed and manure. The major oil seeds producing states are Gujarat, Maharashtra, Tamilnadu, Andhrapradesh, Madhyapradesh, Orissa and Karnataka.

## Plantation Crops

### Tea



Tea Estate

It is an important beverage crop. The tea plant grows well in tropical and subtropical climates endowed with deep and fertile soil. Well drained hill slopes between 3000- 4000 feet height are suitable for cultivation. Assam, West Bengal, Kerala and Tamil Nadu are the major producers.

## Coffee



Coffee Berries

Coffee is the most important beverage crop. Indian coffee is known for its quality. Karnataka produces 60% of Indian coffee. Other coffee growing states are Kerala and Tamil Nadu.

## Rubber

Rubber is obtained from latex of rubber tree. Though India occupies sixth position in the world in once of cultivation in production of natural rubber it stands fifth in the world. Rubber plantations cover large areas in southern part of India. About 95% of the areas is confined to the lower elevations of western ghats in Kerala State and 5% is spread over Tamil Nadu, Karnataka and Andaman Nicobar islands.

## Fruits and vegetables

Fruits and vegetables are an important supplement to the human diet, as they provide essential minerals, vitamins and fibres required for maintaining health. India has the second position in the production of fruits and vegetables. Apple is mostly produced in Himachal Pradesh, Kashmir and Uttaranchal. Production of banana, is concentrated in Tamilnadu and Maharashtra. Orange is cultivated in Maharashtra, Uttaranchal, Himachal Pradesh, Tamil

Nadu and Kerala. Grape is cultivated mainly in Uttaranchal, Himachal Pradesh, Jammu and Kashmir, Maharashtra, Andhra Pradesh, Tamil Nadu and Karnataka. India contributes about 13% of the worlds production of vegetables.

## Animal husbandry and fisheries

Animal husbandry plays an important role in over all economy and in supplementing family income. It generates employment in the rural sector particularly among the landless, small and marginal farmers and women. Production of suitable cross breeds and their wider adoptions has contributed to increase in country's milk production. Poultry and eggs are increasing through genetic improvement and better management practices. The contribution of these sub sector is estimated to be about 25 percent of the total value of output agricultural sector.



Dairy Farming

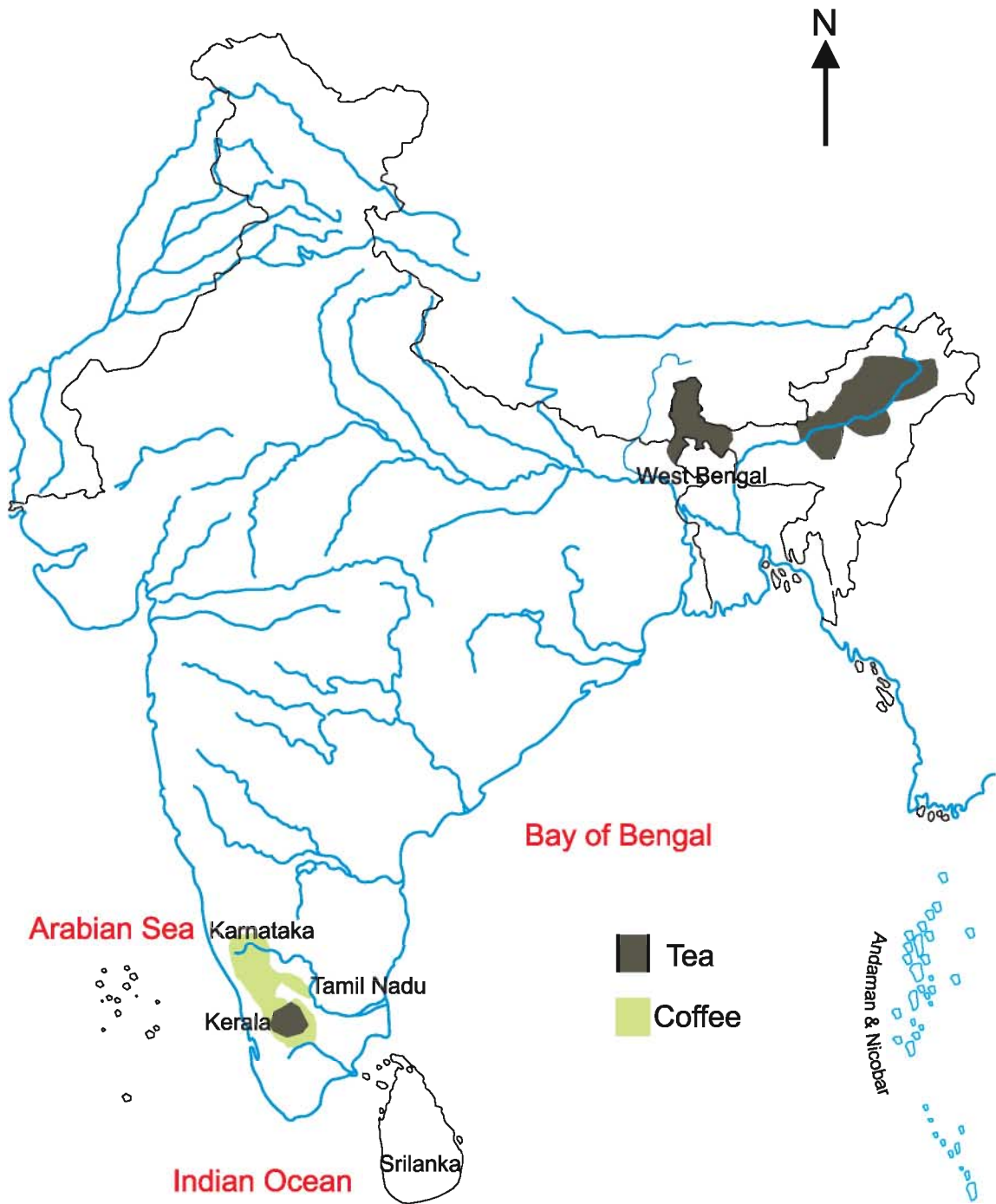
Though the overall contribution of fisheries is small, **multilayer fish culture** has resulted in a very high annual growth during the past decade.

## Development in Bio-Technology

The National Research Centre on plant Biotechnology was established in 1985 to under take research, teaching



## Tea and Coffee growing areas



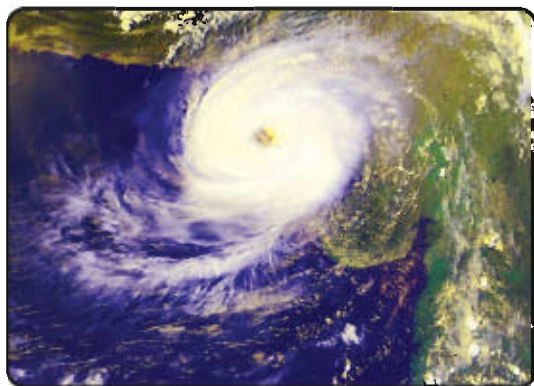
and training personnel in the modern areas of 'Molecular biology and Biotechnology'.

The benefits adopting biotechnology in agriculture are,

- Adopting Biotechnology is environmentally safe and sustainable.
- Cost of production of the farmers will be decreased.
- Water requirement for the crop is minimised.
- It makes crops more resistant to insects, pests and diseases.
- The yield of the crops per hectare can be increased.
- Farmers can get more income.

### Challenges for Indian Agriculture

1. Indian agriculture is a gamble of monsoon. Monsoons are irregular unevenly distributed and uncertain. It exerts a very unfavourable influence on agriculture.



Cyclone

2. The serious drainage problem caused by the increased construction of roads, railways and canals disturbed the natural drainage system by checking normal flow of rain water and bringing heavy floods. This results in large scale damage to kharif crop and considerable late sowing of rabi crop.

3. Rapid increase in the construction work of industries and residential buildings reduce the extent of cultivable lands.



4. Global climatic changes affect agriculture through their direct and indirect effects on the crops, soil, livestock and pests.

5. The previous strategies for more productivity cause serious problems of environmental and natural resource degradation. In future technologies must result not only in increased productivity level but also ensure the quality of natural resources. So it will lead to sustainable improvements in agricultural production.

At present we can say that India is in a comfortable position in food production.

In future India's population might increase to 1300 million approximately by the year 2020. At that time with efficient management of natural resources will meet increasing demand by adopting modern technology in farming, by increasing farmer's access to markets, improving agricultural productivity and public education.

## EXERCISE

### I) Choose the correct word.

- 1) Rice is grown well in the \_\_\_\_\_  
a) black soil            b) laterite soil            c) alluvial soil            d) red soil
- 2) Tea and coffee crops are grown well on the \_\_\_\_\_  
a) mountain slopes            b) Plain  
c) Coastal plain            d) River Valleys
- 3) The crop that grows in drought is \_\_\_\_\_  
a) rice            b) wheat            c) jute            d) millets
- 4) Cotton is a \_\_\_\_\_  
a) food crop            b) cash crop            c) plantation crop            d) dry crop
- 5) The staple food crops are \_\_\_\_\_  
a) rice and wheat            b) coffee and tea  
c) Cotton and jute            d) fruits and vegetables

### II) Match the following.

- |              |                  |
|--------------|------------------|
| 1) Wheat     | West Bengal      |
| 2) Sugarcane | Kerala           |
| 3) Apple     | Uttarpradesh     |
| 4) Rubber    | Punjab           |
| 5) Jute      | Himachal Pradesh |
|              | Tamil nadu       |
|              | Karnataka        |

### III) Distinguish between.

- 1) Commercial and subsistence agriculture.
- 2) Kharif and rabi crops
- 3) Unicropping and dual cropping

### IV) Give Short Answers.

- 1) What are the major determinant factors of agriculture?
- 2) What are the types of agriculture?
- 3) Name the agricultural seasons in India?
- 4) Why dry crops are grown?

5) Name the cotton growing areas of India?

6) What are Plantation Crops?

**V) Write a Paragraph answer.**

1) What are the benefits of adopting bio-technology in agriculture?

2) Discuss any three current challenges in Indian agriculture?

**VI) Mark the following on the Outline maps of India.**

1) Cotton growing areas

2) Jute growing areas

3) Rice growing areas

4) Tea and Coffee growing areas

5) Wheat growing areas

**VII) Activities.**

Visit a paddy field or tea plantation and make a report on the activities involved in the cultivation process.