

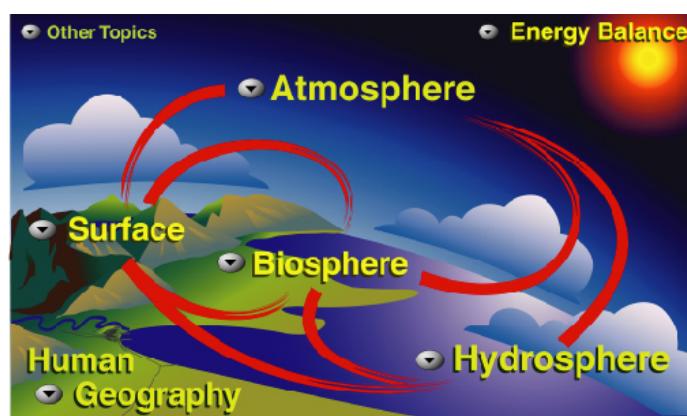
# SHAKTHII ACADEMY

## TNPSC MATERIAL

### SOCIAL STUDIES - GEOGRAPHY



### SAMACHEER KALVI



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# SHAKTHII ACADEMY

## SAMACHEER KALVI SOCIAL STUDIES - GEOGRAPHY



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## SOCIAL STUDIES - GEOGRAPHY

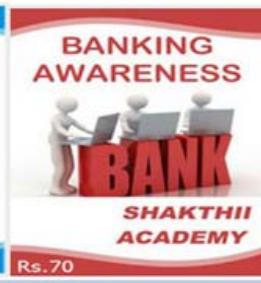
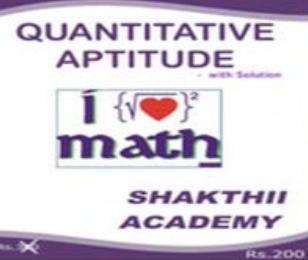
### STANDARD - SIX

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# GEOGRAPHY

## 3. THE EARTH AND THE SOLAR SYSTEM

The bright and beautiful evening gradually faded away. The setting Sun soon sank into the western horizon and went out of sight. Slowly darkness began to envelope the sky, as night was setting in stars began to appear like little lamps in the sky. Soon in the total darkness of night, millions of stars appeared twinkling like diamond studded in the canopy of deep blue sky. What a glorious sight!

A keen observation of the enchanting night sky would reveal amazing realities.

It appears that the Sun rises in the east and sets in the west. When the Sun rises, the stars become invisible. But when the Sun sets in the west stars shine are visible.

Among thousands of twinkling stars in the night sky, it is the moon that instantly captures our attention. We come to know a lot of amazing information if we observe the moon.

First, the shape of the moon keeps changing everyday. The shape of the moon waxes from the new moon to the full moon and wanes from the full moon to the new moon.

We can calculate the duration between one new moon to the next new moon or one full moon to the next full moon which as a month, thus appearing in many forms.

The moon appears along with various heavenly bodies everyday.

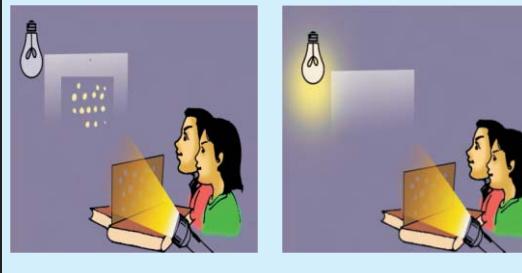
Besides the stars, planets are also seen in the night sky. Planets appear like stars. How do you think we can differentiate the planets from the stars?

### Activity

Take a paper and prick small and big holes on it with a needle. Fix a torch in the centre of the paper with its front portion touching the paper.

Switch off all lights and make the room dark. Now flash the torch-light on the wall. You will see numerous dots of light on the wall. We assume that they are the stars that shine in the sky.

Switch on all the lights in the room. This light can be compared to the sun. All dots of light (stars) will become almost invisible. Similarly stars are invisible during the day because of the bright light emitted by the Sun.



First, if you closely observe, you will be able to notice that stars twinkle. The planets glow without any flicker.

Secondly planets do not remain in the same position. If you see a planet along with a particular star today, you might find it along with another star later.

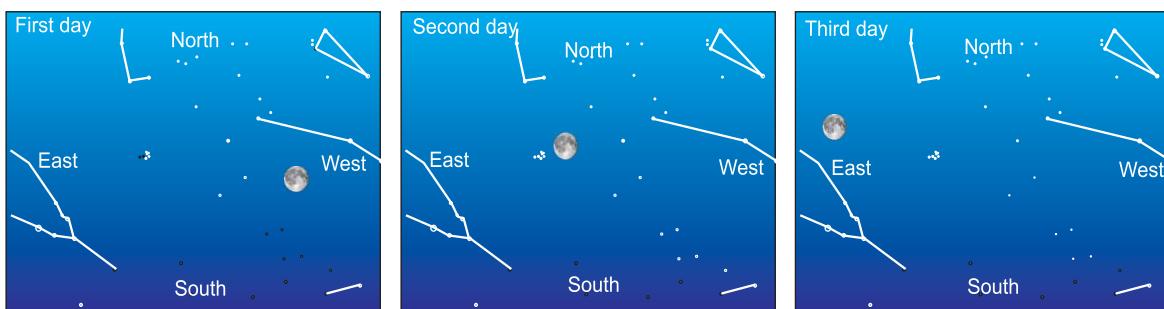
Thus the various positions of planets can be seen against the backdrop of stars.

Without the help of the telescope, i.e., with your naked eye, you will be able to see the five planets namely **Mercury, Venus, Mars, Jupiter and Saturn**.

On the other hand, **Neptune and Uranus** can be seen only through a telescope.

Before sunrise or sunset we can see Mercury and Venus for a few hours. These two planets appear only on the horizon.

**The moon moves from the west to the east for three consecutive days, with the stars as a back drop. (which can be seen in the picture below)**



Usually the upper part of the map indicates the north, the lower part indicates the south. The right side shows the east while the left side indicates the west. But in the map showing night sky, the right side indicates the west and the left side indicates the east. Directions are located accurately if the map is held overhead in a higher position.

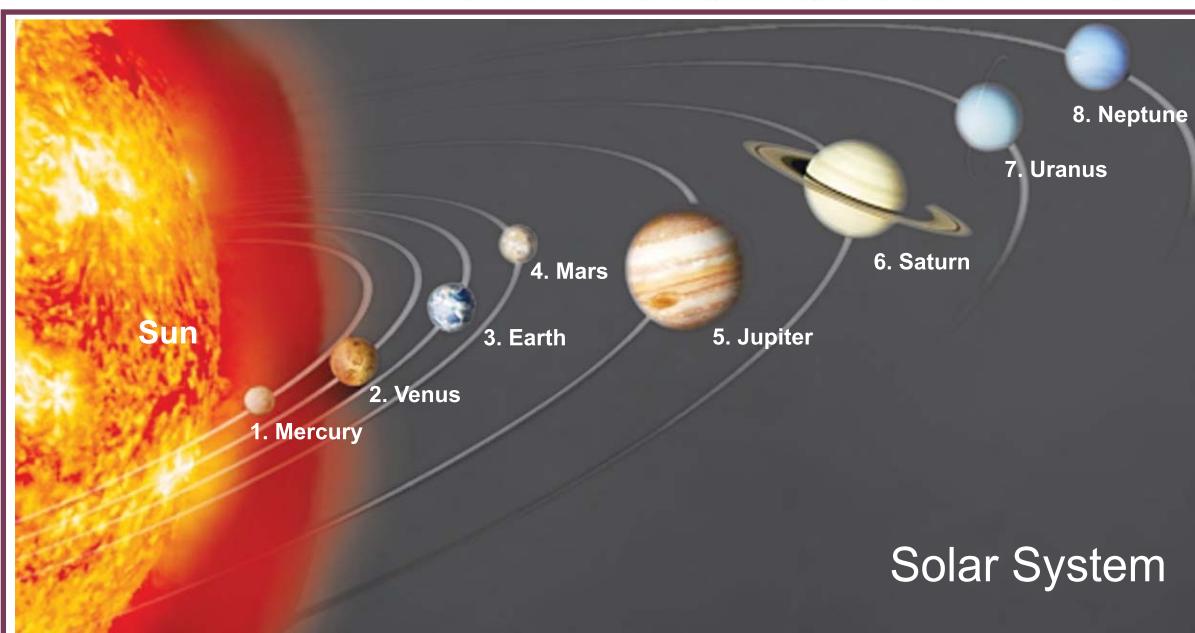
Venus rises a few hours before sunrise and therefore it is nicknamed as the '**Morning Star**'

**Mars, Jupiter and Saturn** are visible with the naked eye during the night either in the east or overhead or in the west. Thus we can see only five planets with the naked eye.

In Tamil the days of the week are named after these five planets, the **moon** and the **Sun**.

"**Seeing is not believing**" is a scientific outlook. It appears to us that the Sun and the stars rises in the east and sets in the west.

But in fact it is only the Earth that spins along its axis everyday. It appears to us that all the celestial bodies including the Sun and the stars move from east to west because the Earth spins from the west to the east.



## Social Science

It is not only because of the rotation of the Earth, but also due to the rotation of the moon and other planets, that we are able to observe their movements.

The moon revolves around the Earth, similarly the planets revolve around the Sun. Thus it appears that all the planets move with the stars as a backdrop.

### The Solar System

Solar family consists of the Sun, its eight planets, the satellites like the moon that revolve around the plants, dwarf planets, thousands of asteroids, meteoroids and comets. This is called the solar system.

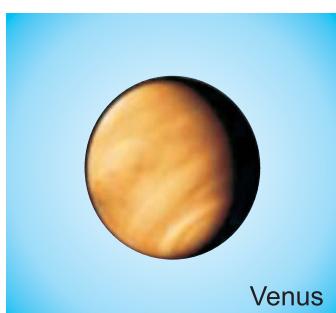
We can see the Sun, moon and the five planets that are mentioned above with naked eyes.

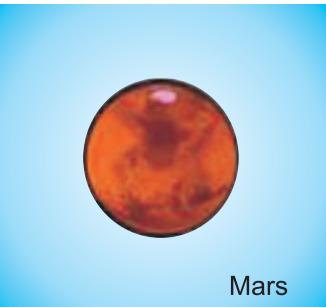
With the help of the telescope we can observe other celestial bodies like **Uranus, Neptune, Comets, Meteoroids, Asteroids, Galaxies, dwarf planets** billions of stars and other gaseous objects.

**The Solar system has eight planets.** All planets revolve around the Sun.

The Earth is also a planet. Different kinds of life including human beings are found on Earth because the **Earth's atmosphere has oxygen.**

The eight planets have been classified into solid planets and gaseous planets. **Mercury, Venus, Earth, and Mars** are called as **Solid planets**, while Jupiter, Saturn, Uranus and Neptune are gaseous planets.

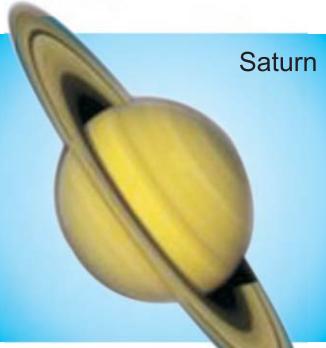




Other than the earth, all the other planets have no oxygen and other gases. Hence life does not exist in these planets.



All planets appear to move in an anti-clockwise direction if you take a bird's eye view from the north pole of the Sun. Even though they all revolve in the same direction, the duration of their revolution around the Sun differs from one another.



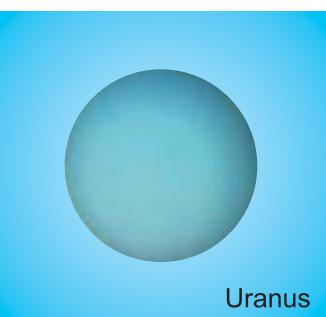
The planets which revolve around the Sun, do not deviate from their respective paths. All planets revolve around the Sun in an **elliptical path**, approximately at the same plane. The path that the planet takes to revolve around the Sun is called 'Orbit'.

### Sun

The **Sun** is the head of the **Solar family**. It is at the centre of the Solar system. It is a large gaseous ball of fire. The gravity of the Sun holds the Solar system together.

The Sun is the source of heat and light for the entire Solar family. The Earth is **approximately 150 million km** away from the Sun.

The Sun is very hot but the Earth receives only moderate heat from the Sun. The Sun is the only celestial body that **emits light** in the Solar system.



### THE RINGS OF SATURN

The rings of Saturn are visible through a telescope. These rings consist of small stones, dust and ice particles. Though only the rings of Saturn are magnificent, **Jupiter**, **Uranus** and **Neptune** also have rings.



### DWARF PLANETS

**Pluto, Charon, Ceres, Eris** were newly grouped as 'Dwarf Planets' in the year 2006. They also revolve around the Sun. They are very small in size. Their size is smaller than that of our moon. Hence they are called Dwarf planets.

No planet has the capacity to emit light because they do not have light of their own. They reflect the light of the Sun.

The time taken for the rotation and revolution of the planets around the Sun.

Planets	Duration of revolution	Distance from the Sun	Duration of Rotation
MERCURY	87.97 days	5.79 Crore Km	58.6 days
VENUS	224.7 days	10.82 Crore Km	(*)243 days
EARTH	365 $\frac{1}{4}$ days	15 Crore Km	23 hours 56 min
MARS	687 days	22.79 Crore Km	24 hours 37 min
JUPITER	11 years 9 months	77.83 Crore Km	9 hours 55 min
SATURN	29 years 5 months	142.7 Crore Km	10 hours 40 min
URANUS	84 years	287.1 Crore Km	(*)17 hours 39 min
NEPTUNE	164 years 9 months	449.7 Crore Km	16 hours

Venus and Uranus marked with the (\*) sign rotate from east to west.

All other planets rotate from the west to the east.

Source – NASA, USA

## ASTEROIDS

Thousands of asteroids are found between Mars and Jupiter. Asteroids are clusters of celestial bodies which include tiny stones and big rocks that measure about 300 to 400 km in diameter.

Some of them have Indian names such as **Vynu Pappu** the astronomer, **Sarabai** the Father of Atomic energy and **Ramanujam** the Mathematician.

## MOON

The Moon is called by **different names** in **Tamil**. The Moon is not a planet.

It is a natural satellite of the earth.

Planets	No. of Satellites that revolve around the planets
Mercury	0
Venus	0
Earth	1
Mars	2
Jupiter	63
Saturn	60
Uranus	27
Neptune	13



THE REAL APPEARANCE OF THE MOON'S SURFACE

The moon does not revolve around the Sun It revolves around the Earth. Hence it is called a **satellite**.

The moon is the satellite of the Earth. With the help of telescope and space research, it has been proved that Mars, Jupiter, Saturn, Uranus and Neptune also have a number of satellites.

The moon is a sphere which measures a quarter of the Earth's diameter. It appears very large to us because it is very close to the Earth. It revolves around the Earth **approximately** at a distance of **3,84,401 Km.**

It takes about **27.3** days for the moon to revolve around the Earth and **27.3** days for the moon to rotate on its axis.

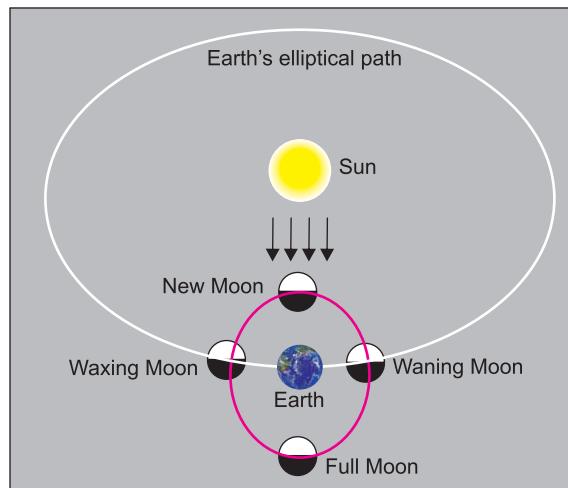
Hence from the Earth we are able to see only one side of the moon. In the year **1959** the satellite **Lunar 3** photographed the other side of the moon.

The moon does not have an **atmosphere** like the Earth. Water is not found there in the liquid form. However, moisture is present here.

Landforms such as mountains, plateaus and valleys are also found on the moon.

**Craters** are another special feature of the moon. This can be viewed through a telescope. These craters are formed due to the meteorites which fall on the surface of the moon. Some of the craters are found due to volcanic eruptions.

Where does the Moon go on a **new moon** day?



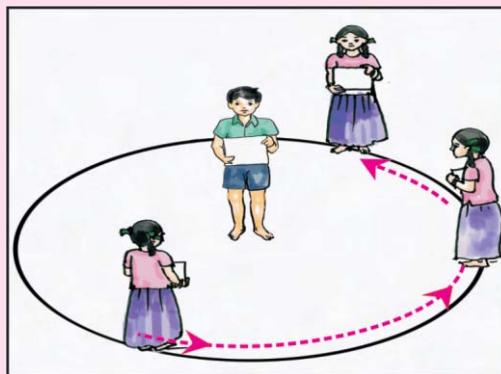
The Sun is the only illuminating celestial body in our solar system. Though the moon shines brightly during the night, it actually reflects the light of the Sun.

Like the Earth, the moon is also almost a sphere. Therefore the side that faces the Sun, shines brightly while the other side is dark.

During the revolution of the moon around the Earth, the dark side of the moon that faces the Earth is called the 'new moon'. The side of the moon that shines brightly on the Earth is called 'full moon'.

On a new moon day, the moon comes between the Earth and the Sun and on a full moon day, the moon is opposite to the Sun.

Why are we not able to see the other side of the moon?



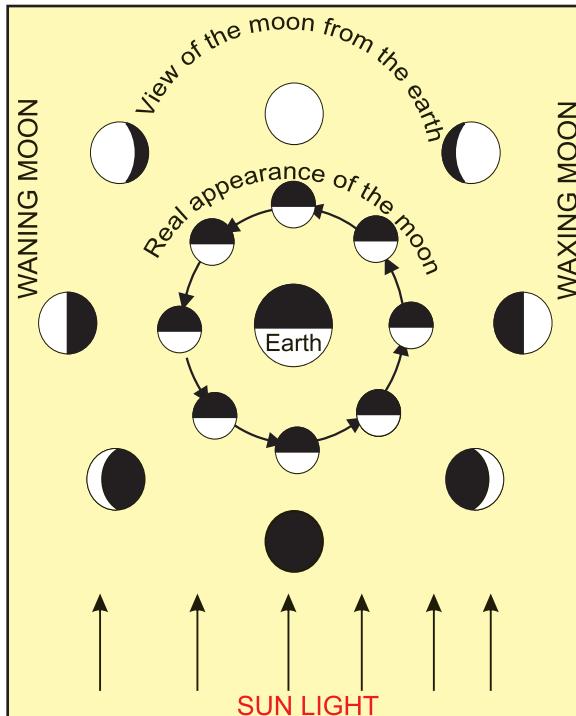
Ask a student to stand in one place. Draw a circle around him / her with a radius of two metres. Ask another student to stand on the circle. The student who stands at the centre of the circle is the Earth. Give him / her a card denoting the name "Earth".

The student who stands on the circle is the Moon. Give her / him a card denoting the name "Moon". Now, the student who represents moon should revolve around the earth facing only the Earth.

The moon is revolving around the Earth. But, does the moon rotate on its axis - Discuss.

Note the direction of the face of the student who represents the moon. The direction of the face of the moon changes on all sides when it revolves around the Earth. This is called rotation.

Hence the moon rotates on its axis. The duration of rotation and revolution of the moon around the Earth is the same.



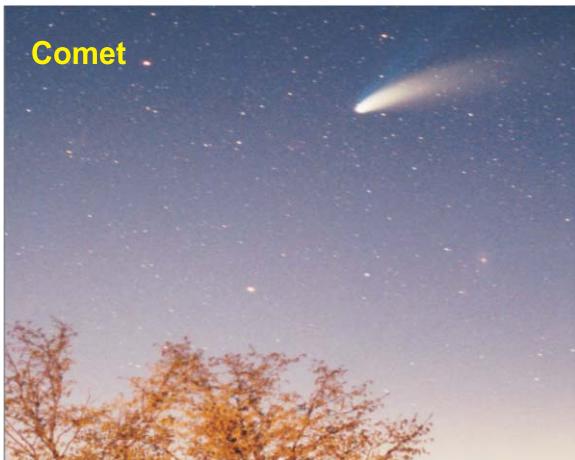
When the Sunlight falls on the moon, a day is exactly divided into two equal halves, that is one half is day and the other half is night. The day and night on the moon changes according to the phase of the moon that we view from the Earth.

### METEOROIDS

The sudden streaks of light seen on a starry night is called as Meteoroids. This can be seen when the remains of the rocky parts of the comets strike the Earth's atmosphere and streaks of light are generated. They are not stars that fall down.

What happens when you rub your palms together? Do you feel the warmth?

The same way, heat is generated. When fragments of rocks and comets from space strike the earth's atmosphere, the rocky fragments burn and shrink. This phenomena appears as a bright streak of light.



## COMET

It is exciting to see a comet in the night sky. A comet is not a star. It is a rock made of dust and ice. The long tail is seen because, as the comet comes near the Sun, the ice melts and reflects the light of the Sun.

The **tail of the comet is seen in the opposite direction of the Sun**. The tail of the comet appears because minute particles from the Sun strike the gaseous part emitted from the comet.

## UNIVERSE

Millions of constellations of stars seen in the sky is called a **galaxy**. Thousands of galaxies form the Universe. The **Universe** is vast and ever expanding. Research and experiments are still being carried out.

Milky way galaxy is one among the many galaxies.



## MILKY WAY GALAXY

The twinkling stars that are seen on a starry night are actually like the Sun, but are too far away.

Many of these stars are hundreds and thousands of times bigger than our Sun.

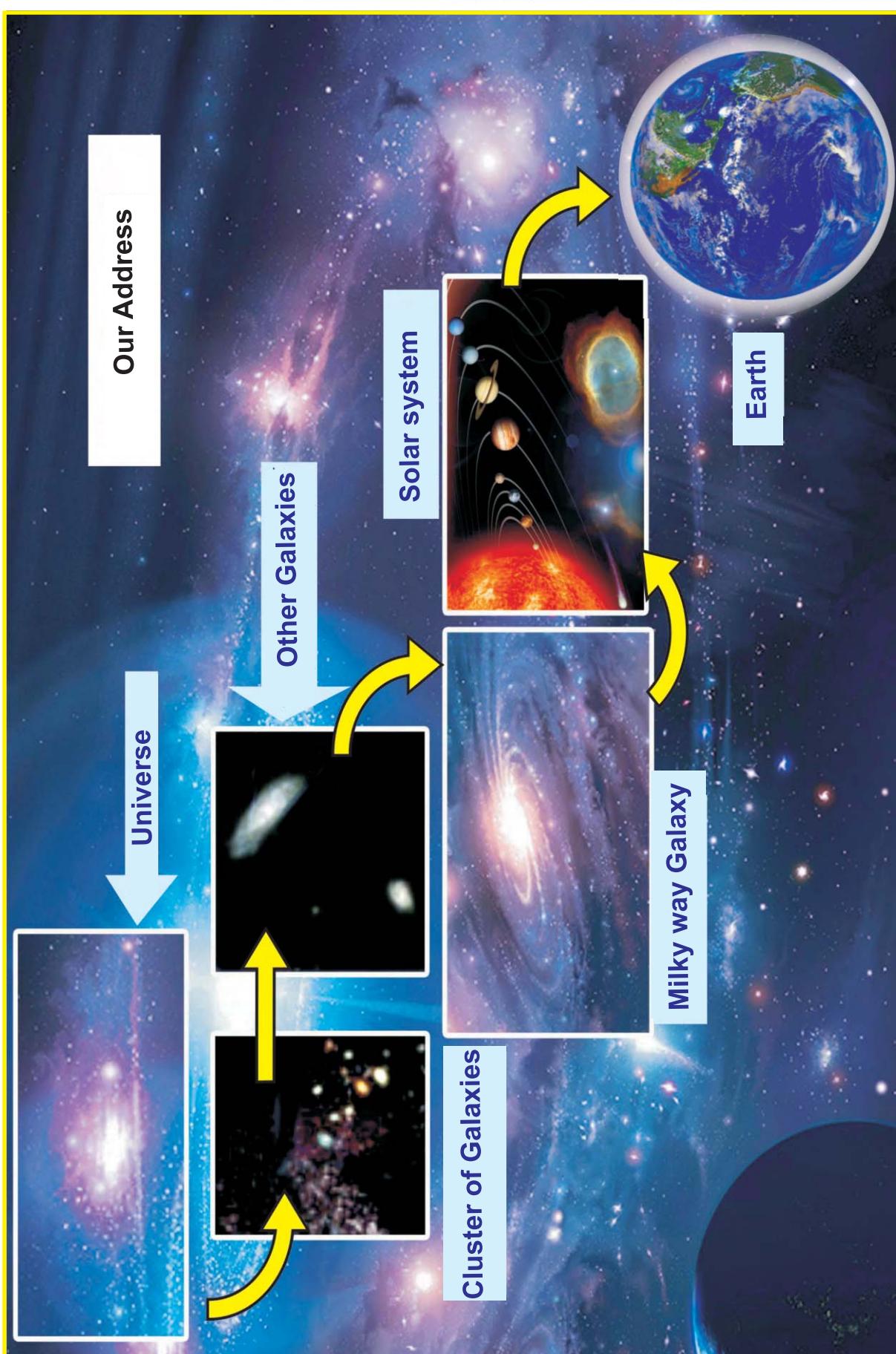
They are seen only as a small spot of light because they are too far away. Scientists have found that planets revolve around these stars.

Millions of stars, including the Sun and other celestial bodies which can be viewed with our eyes belong to the **Milky way galaxy**.



A white streak of light can be seen on a clear night for few days. Our ancestors called this as the Milky Way galaxy. In India it is we call it as "**Akash Ganga**".

Milky way galaxy is a dense cluster of stars. They appear as a tiny dot of light because they are far away. We live on the Earth, which is a part of the solar system, present in the Milky way galaxy.



## OUR ADDRESS

- We live in Tamil Nadu.
- Tamil Nadu is a state in India.
- India is one of the many countries in the world, which is on the earth.
- Earth is a planet in the Solar system.
- Solar system is a member of the Milky Way galaxy.
- Our Universe is made of many such galaxies like the Milky Way galaxy.

**Think : Where do we live in the Universe?**

## EARTH IS A LIVING PLANET

Earth is the third planet from the Sun. Mercury and Venus are very hot planets. Mars, Jupiter, Saturn, Uranus and Neptune are very cold because they are far away from the Sun.

Land, water, air and heat are available in the optimum level only on Earth. Therefore, different forms of life exist only on the Earth.

In our Solar system there is life only on Earth. There is no life on other planets. Earth is called a 'living planet' because life is found in abundance only on this planet.

### Evaluation

#### I. Choose the correct answer:

1. The planet that can be viewed only through a telescope is \_\_\_\_\_  
(a) Mercury (b) Uranus (c) Mars
2. All the planets revolve around the Sun in an \_\_\_\_\_ path  
(a) circular (b) elliptical (c)square
3. Asteroids are found between \_\_\_\_\_  
(a) Earth and Mars (b) Mars and Jupiter (c) Jupiter and Saturn

#### II. Answer the following:

1. How will you differentiate stars and planets in the night sky?
2. What does the term 'Solar system' mean?
3. Why are we not able to see the other side of the moon from the Earth?
4. Write a short note on milky way galaxy?
5. Why Earth is a living planet?

### Project

The period between the full moon and new moon is called as waning of the moon. The period between the new moon and full moon is called as the waxing of the moon. With the help of a calendar find out and tabulate the full moon and new moon days for this year. Calculate the exact duration taken for one cycle of waxing and waning of the moon.

### Formative Assessment

1. Those who have an opportunity can visit the nearest planetarium in your area.
2. Prepare an album with the pictures of the planets.
3. Prepare the models of the solar system by using clay / paper.
4. Make the students to demonstrate how the Earth revolves, rotates itself and revolve the Sun.
5. Pluto is not a planet – give reason.
6. Sky watching : Watch the sky keenly in the night and mark the position of the planets, the moon and the stars in the given sky map.
7. Crossword puzzle:
  - The nearest planet to the sun.
  - The biggest planet in the solar system.
  - The smallest planet in the solar system.
  - The farthest planet from the sun.
  - The living planet.
  - It is called as morning star.
  - Planets which revolves from east to west.
  - Hero of the solar system.
  - The natural satellite of the Earth.
  - The planet with beautiful ring.

S	M	S	A	T	U	R	N	N
O	A	E	M	O	O	N	V	E
L	V	I	R	J	A	Y	E	P
A	R	A	G	C	U	H	N	T
R	S	U	N	O	U	T	U	U
T	V	I	J	M	A	R	S	N
U	R	A	N	U	S	A	Y	E
K	J	U	P	I	T	E	R	C



# 1. Rotation and Revolution of the Earth

The Earth is always in motion. It has many movements. **Rotation** on its own axis and **Revolution** around the Sun are the two important movements of the earth.

## Rotation

The Earth takes **approximately 23 hours and 56 minutes** for one rotation on its axis. This movement is called rotation. It causes day and night.

All parts of the Earth **do not experience day and night at the same time**. The part of the Earth's surface which faces the Sun experiences day. The part of the Earth's surface which does not face the Sun experiences night.

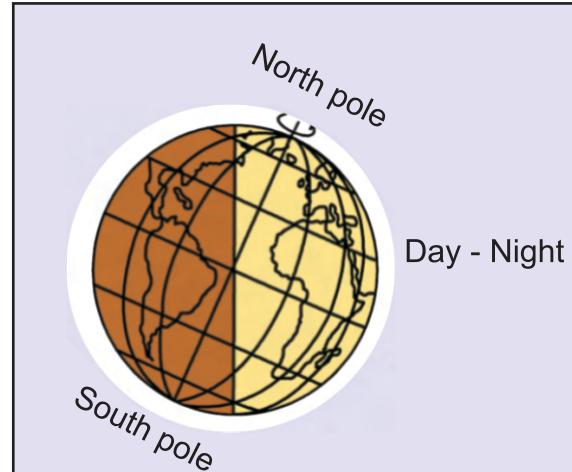
So when it is **day time in India, America** which is on the other side of the Earth experiences **night**.

### Let us do

Take a ball and keep it on the floor of a dark room. Focus the light from a torch on one part of the ball in the dark room. What do you see?

The light of the torch is seen only on the front portion of the ball. The other side of the ball is dark because light does not fall on it. It is assumed that the torch is the Sun and the ball is the Earth.

Similarly the surface of the Earth that faces the Sun has day and the surface of the Earth which does not face the Sun has night.



In ancient times, it was believed that day and night was caused due to the rotation of the Sun around the earth.

**Aryabhatta** was an ancient Indian astronomer. He explained scientifically that the Earth rotates on its own axis.

When you travel on a boat down the river the banks of the river appear to move in the opposite direction.

Similarly he said that the Sun remains in the same position, but because the Earth rotates on its own axis, it appears that the Sun moves around the Earth.

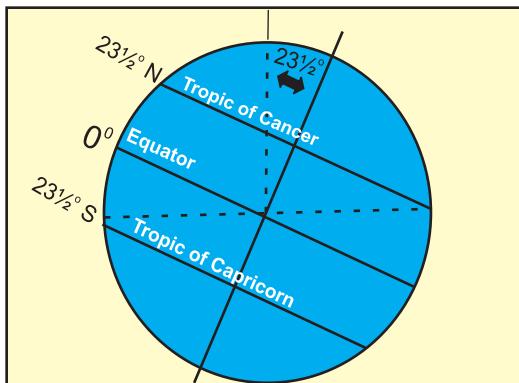
In olden days, Sunrise marked beginning of a day. At present a day begins at 12 midnight.

The Earth not only rotates on its axis but it also revolves around the Sun in an elliptical orbit.

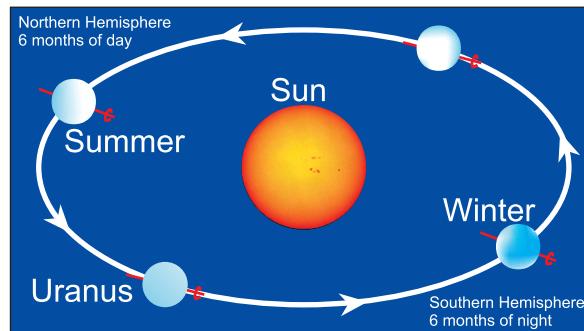
The duration taken by the Earth to complete one revolution is called a year. A year consists of 365.24 days.

How many times in a year does the Earth rotate? Calculate, discuss and check the answer with your teacher.

The Earth's axis is not a real axis drawn around the ground. Some imagine it to be real. It is only an imaginary line that connects the North Pole with the South Pole. Does this axis pass through the centre of the Earth or not? Debate it with your teacher and check your answer.



The Earth is inclined at an angle of  $23\frac{1}{2}^{\circ}$  from its vertical axis. This inclination causes seasonal changes. (see the picture)

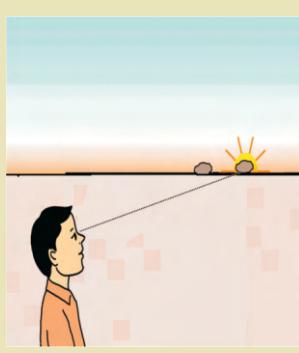


A wheel spins on its axis. This axis is the centre. Similarly when the Earth rotates, it rotates around the line that connects the North pole and the South pole. This imaginary line is called as its axis. Where is the Earth's axis located? Think – Discuss with your classmate.

**What would happen if the Earth's axis were not inclined at  $23\frac{1}{2}^{\circ}$  but were flat?**

If the Earth's axis were also flat then there would be six months of day and six months of night on earth for one revolution around the Sun.

This situation prevails in Uranus, which can be seen in the picture above.



Do the experiment and enjoy: Select a place facing the East, where the Sun rises in the morning. Select the place that exactly faces the Sun and place a stone on the wall which faces the Sun. Keep new stones every day regularly in a straight line. You will notice that the point at which the Sun rises shifts daily towards the North east or South east.

## Leap Year

### (A year with an extra day)

The Earth does not exactly take 365 days to complete one revolution around the Sun. It takes approximately 365  $\frac{1}{4}$  days to complete one revolution.

For the sake of convenience we consider only 365 days for one year. The remaining  $\frac{1}{4}$  day is added as one whole day to every fourth year. When this is added to the fourth year that year has one extra day which is called as leap year. During a leap year the extra day is added to the month of February. So in a leap year the month of February has 29 days. i.e. Divide any given year by four. If you get a remainder it is not a leap year, if the remainder is zero then it is a leap year.

Even if we consider every fourth year to be a leap year, a small mistake can happen. To avoid this mistake Pope Gregory in the 16<sup>th</sup> century made a small correction. According to this correction, it is not enough to divide the years 1800, 1900, 2000 by four, but it should also be divided by four hundred.

Thus 2000 B.C. was a leap year, but 2100 will not be a leap year, even though it is divided by four, because it will leave a remainder, when it is divided by four hundred.

### Revolution of the Earth

Day and Night are the systematic changes that take place everyday.

Similarly there are seasonal changes every year. If you observe carefully you will notice this. The four seasons are **Spring, Summer, Autumn, and Winter**. Why do seasonal changes occur?

The path which the Earth takes to revolve around the Sun is elliptical in shape.

Hence at one position the Earth is close to the Sun and at another position it is far away from the Sun.

It was wrongly believed that seasonal changes take place due to this.

Generally during July the Earth is far away from the Sun. In January it is very close to the Sun.

If seasons are caused because of this, then it should be winter in July and summer in January.

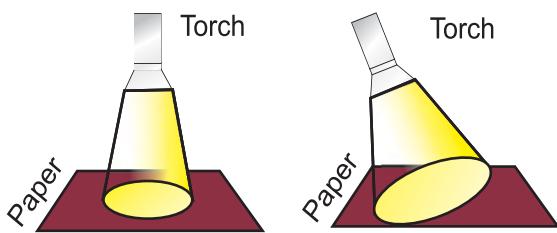
During December Tamil Nadu which is in the northern hemisphere experience severe winter whereas Australia which is in the southern hemisphere has summer.

When **we sweat out** during April and May due to summer, **Australia shivers with cold**.

Therefore it is clear that the **seasons are not the same everywhere** on the earth. If it is summer in the northern hemisphere, it is winter in the southern hemisphere and if it is winter in northern hemisphere, it is summer in the southern hemisphere. Hence there is **reversal of seasons**. We cannot say that the seasons are caused by the earth's elliptical orbit.

**Then why do seasonal changes occur?**

Seasons are caused because the earth's axis is inclined. Let us do an experiment to illustrate this.



Let us take a torch. Spread a sheet of paper on the floor. Hold the torch exactly on top of the paper and with the help of a red colour pencil draw how much of light it spreads on the paper. (diagram)

Now hold the torch at a slanting position over the paper. Even now light spreads on the paper. With the help of a blue colour pencil, mark how much light is spread on the paper.

The area covered by the light that spread on the paper when the torch was held straight was less and the area covered by the light that spread on the paper when the torch was slanting was more. Hence when light falls in a slanting position the area covered is more. You will notice that the brightness of the light that falls also varies. The light that spreads on the paper varies from point to point and becomes less.

The sunlight that falls on the North pole and South pole varies, because the axis of the earth is inclined.

When we are asked where does the Sun rise? immediately answer that the Sun rises in the east.

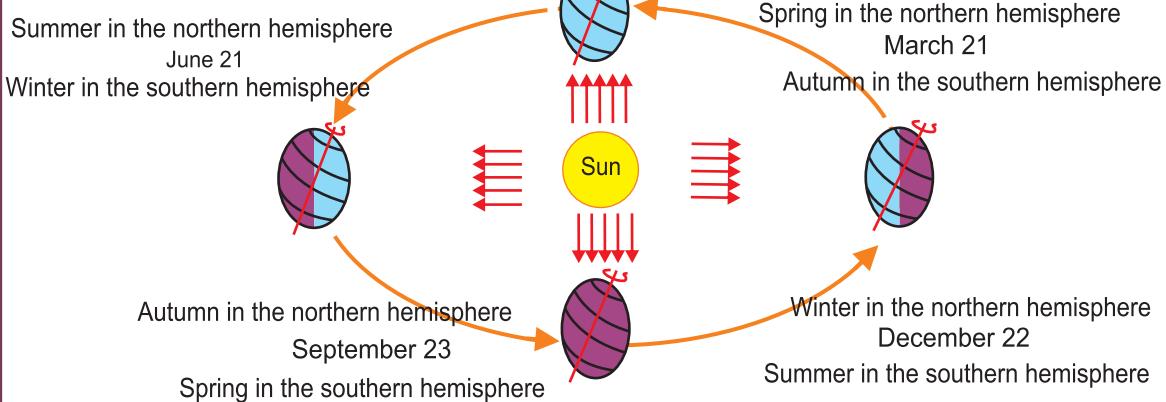
But the truth is that Sun does not exactly rise in the east everyday. In Tamil Nadu, during most of the days of the year the Sun rises either in the south east or north east.

On December 22<sup>nd</sup> the Sun which rises mostly in the south east, now starts moving towards the north. This is called **Northern movement** (Uthrayan) From then on the point at which the Sun rises moves towards the north east and on June 21<sup>st</sup> it reaches maximum of its point.

After this the points at which the Sun rises moves towards the south and this is called as **Southern movement** (Dakshinayan). Between these points, on two days the Sun rises exactly in the east.

On March 21st and Sep 23rd the duration of day and night is equal throughout the Earth - i.e. 12 hrs of day and 12hrs of night. Hence they are called equinoxes. March 21st is referred to as Spring equinox and Sep 23rd as Autumnal equinox.

## Seasons



The northern hemisphere is exposed to the Sun's light during the month of June, for six months, because the earth's axis is inclined.

After six months the southern hemisphere is exposed to the Sun's light during the month of December. The Sun is overhead at the northern hemisphere and is exposed to the Sunlight. Hence the northern hemisphere receives the direct rays of the Sun. It is summer in this region.

After six months when the southern hemisphere is exposed to the direct rays of the Sun, it is summer in the southern hemisphere.

Summer is usually associated with heat, brightness and longer days.

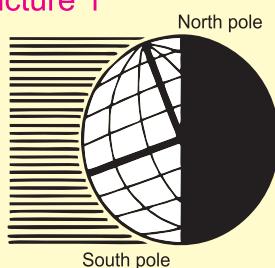
During this time Northern hemisphere receives the slanting rays of the Sun. Hence it is winter in the Northern hemisphere.

Winter is associated with cold weather early sunset, shorter days.

In December, India and England celebrate Christmas as a winter festival, whereas in Australia it is summer, so Christmas is celebrated as a summer festival in Australia.

### Day and night at the poles

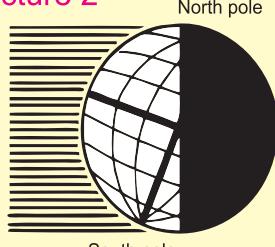
**Picture 1**



**Picture 1**

You will notice in the picture that the northern hemisphere faces the Sun during the month of June. Also observe the day and night line. You have to understand that due to the earth's rotation day and night changes occur in the equatorial region but the North pole has continuous daylight. At the same time, notice that the southern pole has continuous night.

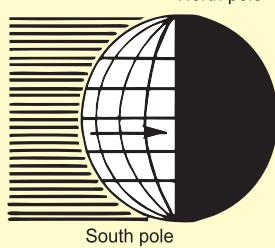
**Picture 2**



**Picture 2**

Look at the picture. When the South pole faces the Sun during December, the North pole is completely dark and the South pole has continuous daylight. The inclination of the Earth's axis not only causes seasonal changes but there is something amazing about it. At the poles there are six months of continuous daylight and six months of continuous darkness.

**Picture 3**



**Picture 3**

The Sunlight falls vertically on the earth's axis on March 21<sup>st</sup> and September 23<sup>rd</sup>. Hence on these two days, day and night is equal in both the hemispheres. The days are equal to the nights all over the Earth.

According to Tamil tradition there are six seasons, (for every two months there is one season) Ancient Tamil literature speaks about this. The six seasons are Khar, Kulir, Munpani, Pinpani, Ilavenil and Mudhuvenil. But according to the international standard, only four seasons have been recognized. The four seasons are summer, winter, autumn and spring.

### What gets heated?

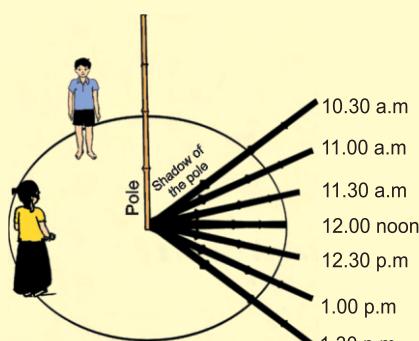
Take two black coloured papers and two thermometers. Fix the thermometer on the black coloured paper. Place one paper on the ground in a horizontal position and the other paper in a slanting position and make sure that the Sun is approximately overhead.

When the Sun is overhead the light falls vertically on the paper that is in a horizontal position. The paper that is in a slanting position receives the slanting rays of the Sun. Ensure that the shadow of the clouds and the students does not fall on both the papers.

The temperature increases in both the thermometers. After reaching a certain stage the temperature remains constant. It will take about ten minutes for this to happen. Then compare both the temperatures and find out which received more heat. Discuss and find out the relationship between this experiment and how the temperature changes according to seasons on earth. Summer is hot because the earth receives the direct rays of the Sun and winter is cold because the earth receives the slanting rays of the Sun.

### Shadow game

Fix a pole in an upright position in a playground. Get the help of your teacher to do it. The pole will cast a shadow in the morning. Mark accurately the end of the shadow with a stone. Measure the distance of the shadow and make a note of the time.



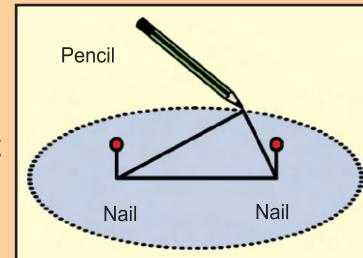
Discuss in the class where the shadow will be and how long will it be after 30 minutes. With the help of a stone, mark the end of the shadow which each student indicates. After 30 minutes find out where actually the shadow will be and measure the length of the shadow.

The Sun is exactly overhead during midday. The shadow is the shortest during midday. Not only that, the shadow of the pole will face the north. The shadow is the longest during the morning and in the evening. Notice the direction of the movement of the shadow in the clockwise direction.

### Let us draw an outline of an ellipse

Fix two nails on a board. Take a thin thread. Measure twice the distance between the two nails.

Make a knot by bringing the two ends of the thread together. Fix the thread on both the nails. Place a pencil somewhere at a point on the thread and pull it tightly. Draw a line by holding the pencil tightly. Now you will get an oval shape.



A circle has only one centre. But an ellipse has two convex centres other than the centre. The position of these two nails are the convex centres of the ellipse. We know that the Earth takes an elliptical path to revolve around the Sun.

The Sun is situated in one of the convex centres of the ellipse and not in the centre of the ellipse.

### Evaluation

#### I. Choose the correct answer :

1. The earth is inclined at an angle of \_\_\_\_\_ degree.  
a)  $23\frac{1}{2}$       b)  $66\frac{1}{2}$       c) 90
2. Rotation results in \_\_\_\_\_.  
a) Seasonal changes      b) Day and night changes  
c) Northern and Southern movement
3. In a leap year February has \_\_\_\_\_ days.  
a) 28      b) 29      c) 27

#### II. Answer the following questions :

1. Why does day and night changes happen?
2. When it is summer in the northern hemisphere, why is it winter in the southern hemisphere?
3. Why do the poles have six months of day and six months of night?

#### III. Project :

1. Identify the leap years between 1999 and 2011.
2. What will be the outcome, if the Earth rotates in the same place?
3. Find out which days of the year have the longest duration of day and night.
4. With the help of a map or a globe find out what season will India experience when Australia has winter?

1. List the seasons and their months in Tamilnadu.

Seasons	Months
Summer	
Winter	
Spring	
Rainy	

2. Find out the time with the help of the shadow of your school or your house and compare it with clock time.
3. List the festivals of summer and winter seasons.
4. Complete the following tabulation.

Seasons	Food	Dress	Precautionary Measures



## GEOGRAPHY

# 1. THE EARTH WE LIVE IN

Is there a mountain, a sea or a river in your place? Mountains, plateaus and plains are important landforms. Landforms with high peaks are called mountains.

A continuous stretch of mountains is called a **mountain range**. The highest mountain range in the world is the Himalayas.

**Study the physical map of India and locate another mountain range.**

The land that is higher than the surrounding region with a flattened top is called a **plateau**. The plateau of Tibet is the highest plateau in the world.

**With the help of your teacher locate the plateau in South India.**

A relatively flat and low lying land surface with almost no difference between its highest and lowest points is a **plain**. The area where the River Ganges flows is one of the most important plains in the world.

**Locate the plains in the banks of River Cauvery, River Tamiraparani and River Palar on a physical map.**

Chennai, Madurai, Tirunelveli, Trichy, Ooty, Kodaikanal and Theni are parts of Tamil Nadu. **Tamil Nadu is a part of India.**

**Find out the landform wherein Rameshwaram and Tiruchendur situated?**

With the help of your teacher find out whether your native place is located on a plateau or plain or on a mountainous region?

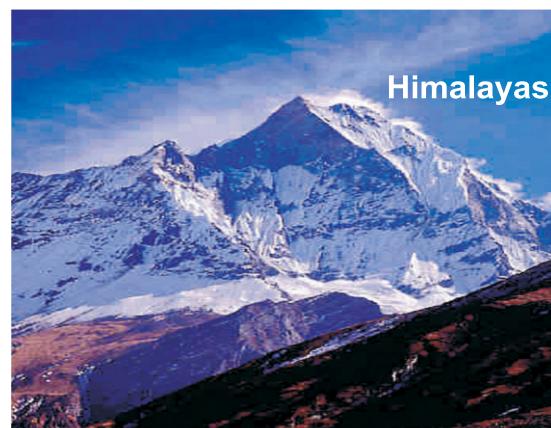
India is a part of the continent of Asia. Countries like India, China, Russia and Pakistan are situated in Asia. Countries like England, France and Germany are situated in the continent of Europe.

**There are seven continents** like Asia, Europe, North America, South America, Africa, Australia and Antarctica. **Large land masses** are called continents.

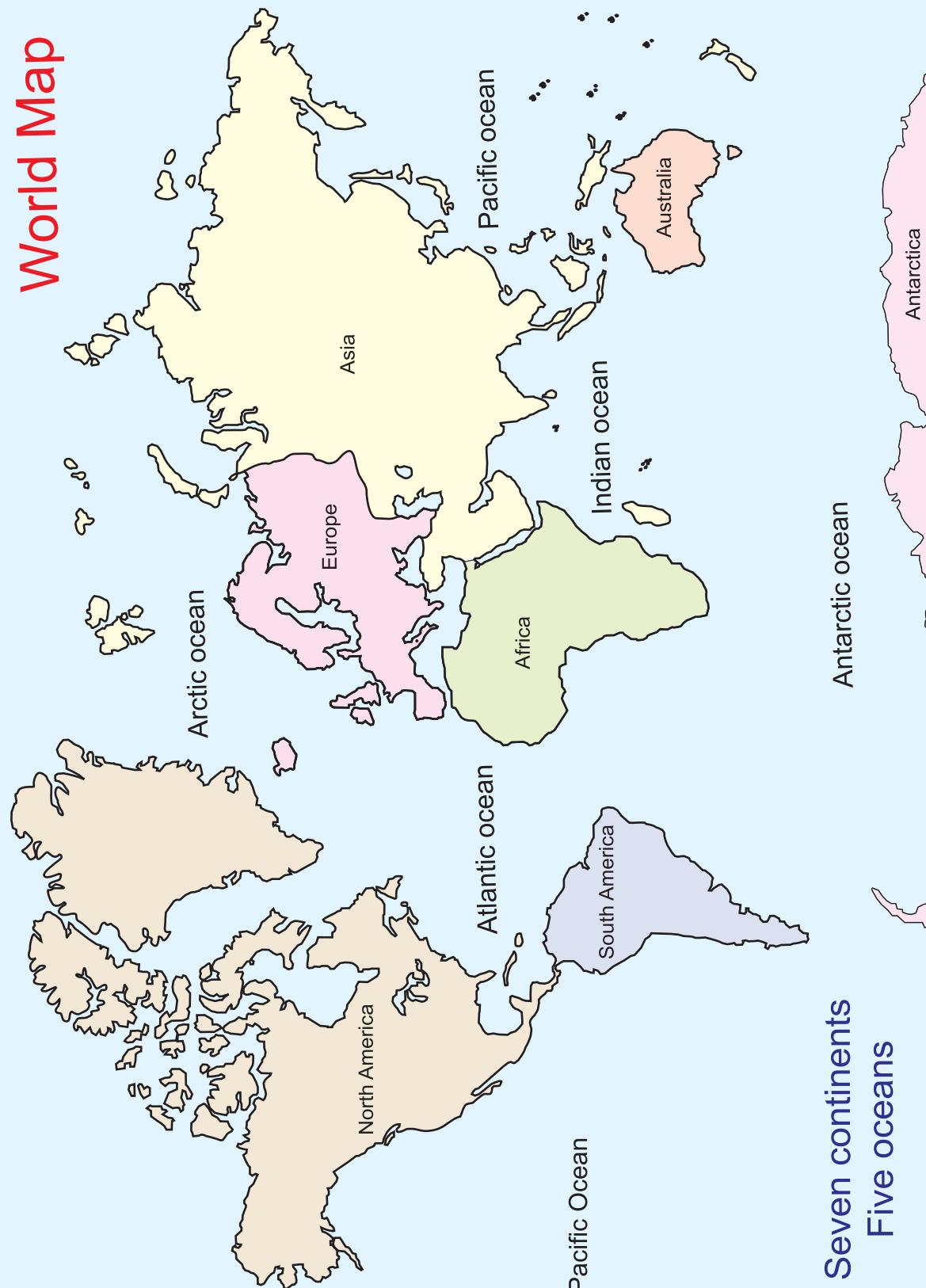
### The seven continents:

**1. Asia:** It is the largest continent. It is situated in the northern hemisphere. Our Country, **India is situated in Asia.**

The cold **Gobi desert** and the **Himalayan mountains** are located in this continent.



# World Map



Seven continents  
Five oceans



**Africa-Sahara desert**

## 2. Africa:

It is the second largest continent in the world. This continent is situated in both, the northern and southern hemisphere. The equator divides the continent into two equal halves.

**River Nile**, (6,695kms) the longest river in the world and the **Sahara**, the largest desert in the world, are found in this continent. This continent is rich in mineral resources and has dense forests.

## 3. North America:

This continent is surrounded by the Arctic ocean, Atlantic ocean and Pacific Ocean. The **Rocky mountains** situated along the west coast is a very long chain of mountains.

## 4. South America:

This continent lies almost entirely in the southern hemisphere. The **Andes**, the world's longest mountain range and **River Amazon** (6,586 kms) the world's largest river is situated in this continent.

## 5. Europe:

This continent lies to the west of Asia. The **Alps** mountain range is situated in this continent.

## 6. Australia:

Australia is referred to as '**Island continent**', because it is surrounded by oceans on all the four sides. It consists of many islands like New Zealand and Fiji. Fiji islands, Papua and New Guinea are called oceanic islands. The Great Barrier Reef, the world's largest coral reef is situated off the east coast of Australia.

## 7. Antarctica:

This continent is situated in the South Pole and is **entirely covered with snow**. It is a very cold place. **Penguins**, **Seals** and other living creatures live here.

Our Country has set up the **Dakshin Gangotri** and **Maitri** research stations. Throughout the year Indian scientists conduct many experiments in this continent.



**Antarctica - Maitri research station**

## Island:

A piece of land surrounded by **water on all sides** is called an island. Sri Lanka is an island. A group of islands is called an archipelago.

Locate an island group belonging to India.



### Oceans:

71% (two third) of the earth's surface is covered by water. A large stretch of water covering a huge area is called an **Ocean**. Just like the mountains, plains and plateaus are part of the Earth. Oceans are also a part of the earth.

There are **five oceans** on the Earth. They are the Pacific ocean, the Atlantic ocean, the Indian ocean, the Arctic ocean and the Antarctic ocean.

For our convenience oceans are divided into **seas**. The sea to the east of Tamil Nadu is called the **Bay of Bengal** and the sea to the west of Kerala is called **Arabian sea**.

Locate two other seas on the world map.

### 1. Pacific Ocean:

It is the deepest ocean in the world. The volcanic mountains surrounding the Pacific Ocean are called the **Pacific Ring of Fire**.

The deepest **Mariana Trench** is located in the Pacific Ocean. This trench is so deep that even Mt. Everest is not enough to fill it.

### 2. Atlantic Ocean:

It is the second largest ocean in the world. **Hurricanes** are very common in this ocean.

### 3. Indian Ocean:

It is the third largest ocean in the world. India receives rainfall from the **monsoons** which originate in this ocean.

### 4. Antarctic Ocean:

The ocean surrounding the continent of Antarctica is called the **Southern ocean or Antarctic Ocean**.

### 5. Arctic Ocean:

This is the smallest ocean in the world. It surrounds the North Pole. This ocean has many **icebergs**.

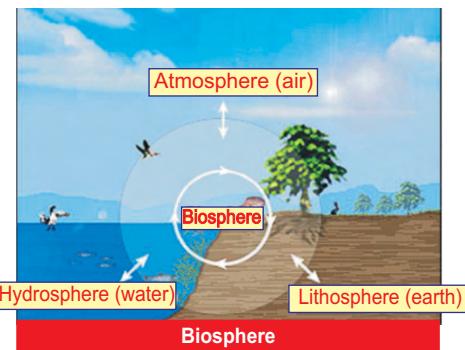
### Land, Water, Air:-

Apart from the seas, the rivers, lakes, ponds and tanks are the other water bodies. The peaks of the Himalayas, Arctic circle and Antarctic circle are **covered with snow** and not with water.

The atmosphere is filled with **water vapour**, cloud and moisture. The water on earth is found in **three forms** namely **solid, liquid and gas**. Apart from land and water, air is present in the earth.

Though we are always surrounded by **air**, we feel its **presence**, only when there is **wind and cyclones**.

The solid portion of the earth on which we live is called the **Lithosphere**. Water covers a large area of the earth's surface and this area is called **Hydrosphere**. The gaseous layer that surrounds the earth is called **Atmosphere**.



Apart from water, land and air, the life that exists here is unique to this planet. Plants, animals and millions of micro organisms are found on the land surface.

### Let us learn



Peninsula is a piece of land that is surrounded by water on three sides. India is a peninsula.



A strait is a narrow stretch of water that connects two large water bodies.

For example the Palk strait between India and Sri Lanka.



A gulf is a hollow carved out in the sea coast which lets the water reach deep inland. A bay is an inlet of the sea with a wider opening than a gulf. Examples of these are the Bay of Bengal and the Persian Gulf. Which are the gulf countries? Why are they called so? Refer a world map.



An isthmus is a narrow strip of land connecting two large land masses. The Isthmus of Panama connects North America with South America.

The zone in which living organisms exist is called as **Biosphere**. Lithosphere, Hydrosphere and Atmosphere together forms Biosphere. Hence if any one of these is **polluted**, the living organisms are affected.

Trees, plants, creepers, worms, insects, birds, animals, micro organisms and other millions of living forms exist in the biosphere. The living organisms extend upto many kilometers in the atmosphere.

Apart from many kinds of fish, plankton which serves as food for the fish are also found in the ocean.

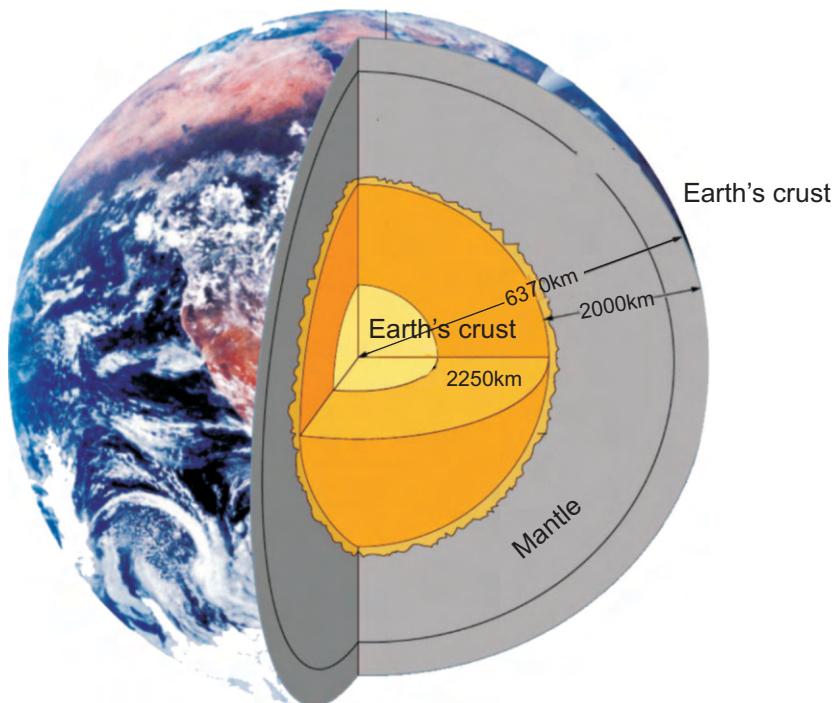
Living organisms are found at great depths where geysers are present. Worms and micro organisms are present deep in the soil. **Many species of plants and animals are present on land.**

Lithosphere, hydrosphere and atmosphere do not exist separately. They are interdependent and interact with each other. For example sea water evaporates and forms water vapour. This mixes with the atmosphere. The surface of the Earth is heated by the sun's rays, as a result of this air on the land surface gets heated.

This hot air rises upward towards the cooler atmosphere. Therefore changes take place in the atmosphere. As a result of this, air moves and causes winds and breeze.

**Land, water and air together help the plants to grow.**

#### Structure of the Earth :



When an apple is cut into two halves you can see the skin, flesh and seeds. Similarly what can you see if you cut the earth in to two halves?

The core is in the semi solid state. Nickel and iron is found in abundance in this layer. This is called as the inner core. Minerals are found in the molten stage around the core. Here the temperature is very high. It is approximately 5,000°C.

The core is surrounded by the Mantle. 85% of the Earth's minerals are found here. The entire layer consists of rocks in the solid and semi solid state. Like the skin of the apple, the Earth's outer crust is a thin layer.

The continents and oceans are found in this layer. The thickness of the Earth's crust below the oceans is 5-10 km. The thickness of the crust varies from 30 – 50 kms. on the continents.

## Evaluation

### I. Choose the correct answer

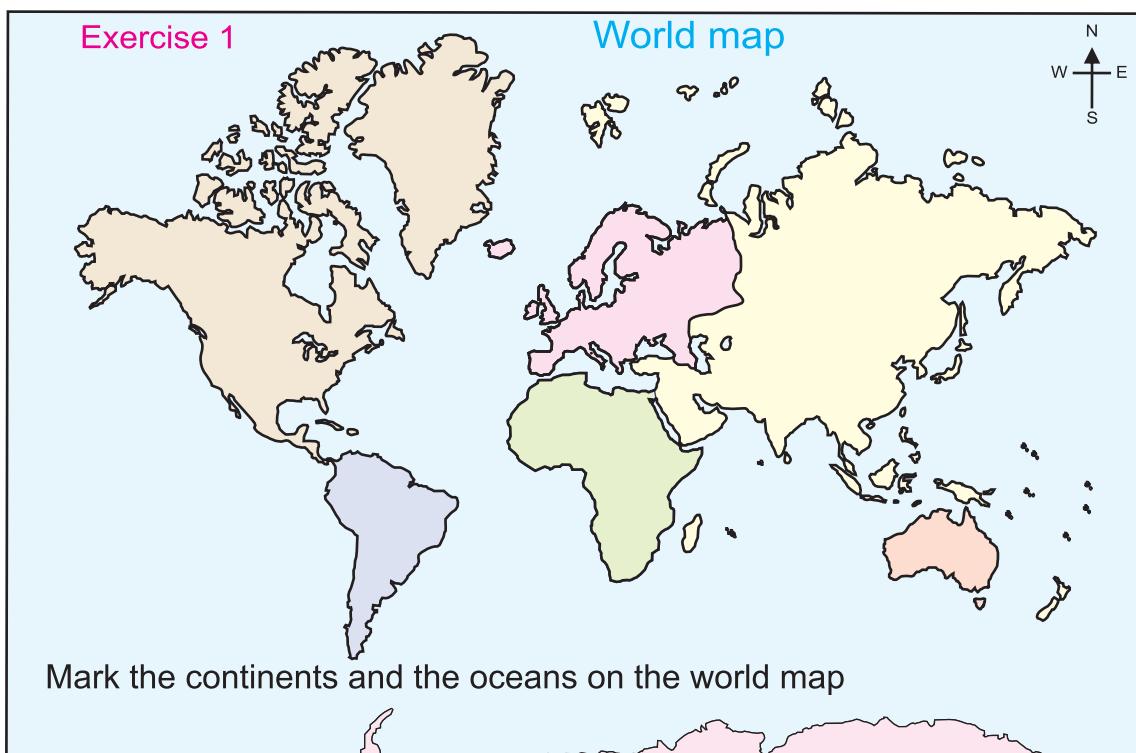
1. Land that is surrounded by water on all the four sides is called an \_\_\_\_\_.
  - a) strait
  - b) island
  - c) peninsula
2. The world's deepest Mariana trench is located in the \_\_\_\_\_ Ocean.
  - a) Pacific
  - b) Atlantic
  - c) Arctic
3. Sri Lanka is an \_\_\_\_\_.
  - a) island
  - b) peninsula
  - c) strait

### II. Answer the following questions

1. Distinguish between a plain and a plateau.
2. Define a peninsula. Give an example.
3. Why is the earth called a 'living planet'?

### III. Map skill

1. Mark the continents and the oceans on a world map.
2. Mark a few peninsulas, bays, gulfs, straits, isthmus and islands on a world map.



## FORMATIVE ASSESSMENT

1. Write the name of the following using Atlas

Islands	_____	_____	_____
Peninsula	_____	_____	_____
Gulf	_____	_____	_____
Bay	_____	_____	_____
Strait	_____	_____	_____

2. Cross word puzzle

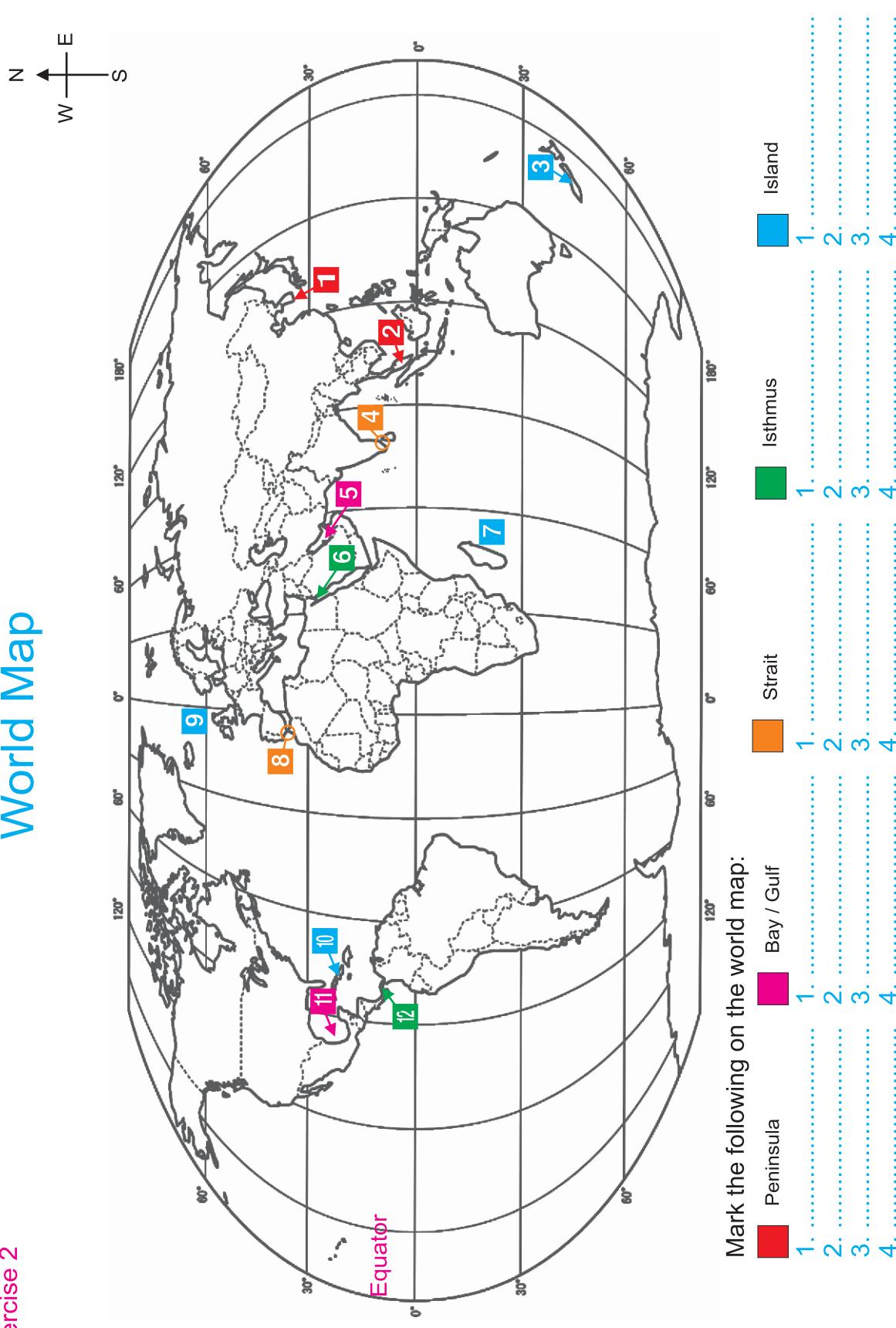
From left to right

1. The longest river
2. The largest desert
3. Island continent
4. Land surrounded by water

From top to down

5. The largest continent
6. The highest mountain range
7. The deepest ocean
8. The largest river
9. The longest mountain range
10. The largest plateau

					2		6	8	9	
3										
5					7					10
4										
		1								

**Exercise 2****World Map**

## 2. MAPS AND GLOBE

### What is the shape of the earth that we live on?

This question has interested scientists throughout history from the earliest times. In the 6th century B.C The Greek philosopher mathematician Pythagoras had said that the earth is round which was not accepted by many at that time. The Indian astronomer Aryabhata-I (476- 550 A.D) had written in his treatise Aryabhatia that the earth was like a sphere and spinning on its axis. The fact that the earth is spherical was confirmed when the earth was viewed from outer space. According to the astronauts the earth appears as a blue sphere with green and brown patches. On July 19 2013 NASA 'Distant spacecraft "Cassini" had sent pictures of the earth and moon as seen from Saturn, which is nearly 800 billion km away. In the Cassini images Earth and the moon appear as mere dots -- Earth a pale blue and the moon a stark white, visible between Saturn's rings.

The earth is spherical but not exactly a sphere. It is slightly bulged at the equator and flattened at the poles. The shape of the earth is called an “Oblate Spheroid”



### MAPS

During earlier times maps were not required because the people lived in one place. Then people started to move from place to place, either in search of food or due to the change in seasons.

Later, merchants travelled from one country to another country for trade and commerce. People used maps to travel on correct route. Migration created the need for maps.

**A map is a visual representation of an entire area or a part of it that is drawn on paper or cloth.**

There are different types of maps static or dynamic, interactive, 2 dimensional or 3 dimensional. They may represent various things like physical features of a place, political boundaries, climate, natural resources, roadways and railway lines etc.

If you went to a new city and asked your friend for directions to a cinema hall, he may say, “It is just behind the jubilee bus stop, opposite to the railway station. To make it easier for you he may draw a route map from his house to the cinema theatre. This is a map in which you may not be able to infer the actual distance. This type of map is called as a “sketch map.”

An architect or a civil engineer will represent the building by means of a diagram on a paper before construction. This is called a “blue print” and is commonly called as the “plan” of the building.

For map making certain conventions are followed.

### Direction

In a map **direction** is always indicated at the top right hand corner as shown in the figure given below.

To understand the directions in / to a place, an arrow indicating north (N) is marked on the map pointing towards the northern direction of that particular place.

How will you find out the North-south direction of a place i) during day time (ii) at night? Discuss.

### Let us do

Draw a sketch map to show the route from your home to school.

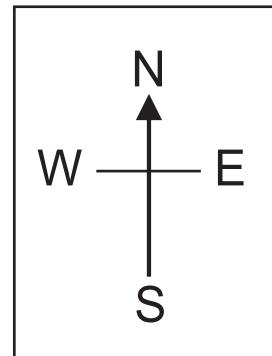
### Scale

**Scale** is indicated at the bottom of the map in the legend box.

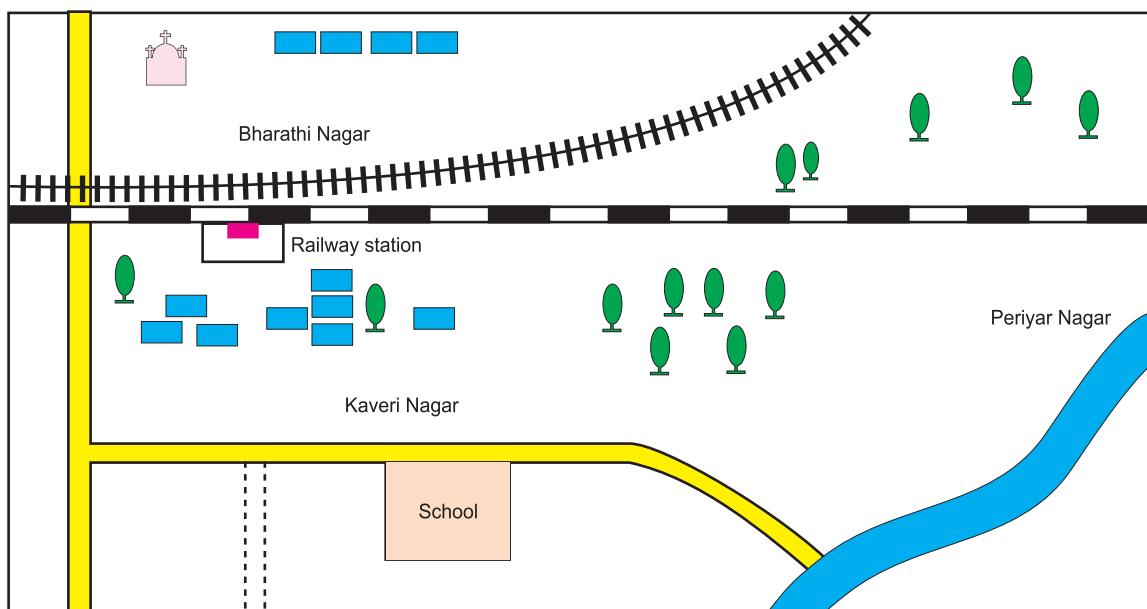
A scale is a relationship between a certain distance on a map and the actual distance on the ground...It is expressed as a ratio.

There are three ways of representing the scale.

1. Statement form
2. Representative fraction
3. linear form



Sketch Map



### For example:

(I) It may also be shown as 1 cm = 1km or 1 cm = 10 km.

(ii) if the scale on a map is shown as 1:1,00,000. It means 1 cm on the map is equal to 1,00,000 cm or 1 km on the ground .It means that if the distance between any two points on the map is equal to 1 cm, then the actual distance between the two places is equal to 1 km.

(iii) It will be shown in primary division and secondary division.

### Conventional Signs and symbols

Can we draw on the map the mountains, forests, rivers, roads, bridges, buildings, railway lines and other land features of the Earth in the same size and shape?

We draw them with the help of certain symbols. The symbols are used within the map itself. The explanation for these symbols are given on the right or left corner of the map. It would be easy if the same symbols are used everywhere, hence standard, uniform Conventional symbols are used throughout the world.

### Conventional Signs and symbols

International boundaries	
State boundaries	
District boundaries	
Railway lines	
Railway station	
River	
Well	
Temple	
Mosque	
Church	

### Classification of maps

All the objects and the information about the earth cannot be shown on the same map. Hence maps can be classified into three types.

1. Physical features like mountains, plateaus, rivers and oceans are drawn on a **Physical map**. eg. Refer the Physical map of India which is given.

2. Countries, states, districts, cities, villages and other boundaries are drawn on a **Political map**. eg. Refer the Political map of India and District map of Tamil Nadu which are given.

3. Maps that show temperature, forest, and minerals resources are drawn based on a theme, hence they are called **Thematic map**. eg. the Transport map of India and the Industrial map of Tamil Nadu which are given.

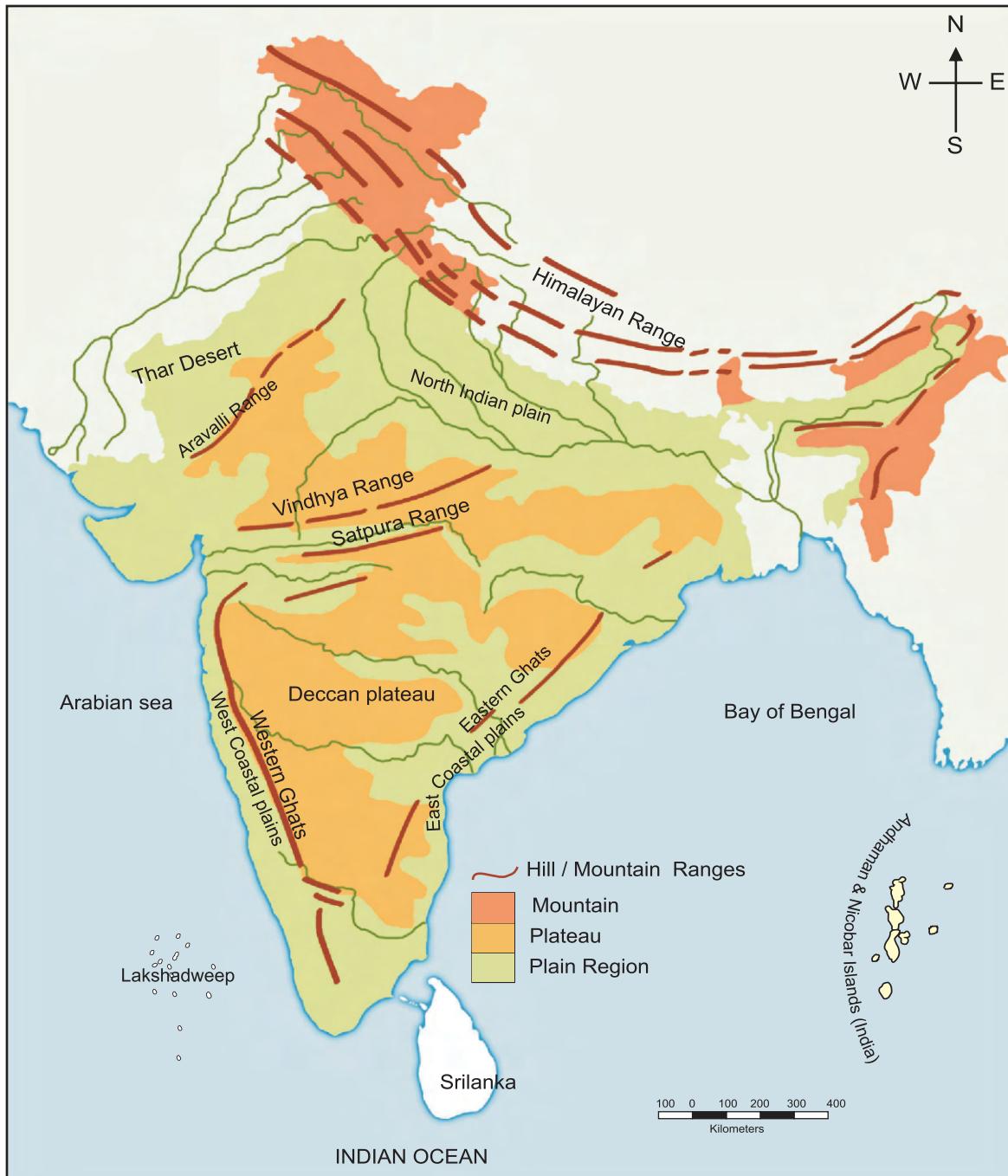
### Uses of maps

1. It is used to **locate places**.
2. It is used to **locate resources** that are found on the earth.
3. It helps the **military** to move its **troops**.
4. It helps in **planning**.
5. It helps us to know the **movement** of the **satellite** and **planets** in the sky.
6. It is used for teaching and learning in a class room.

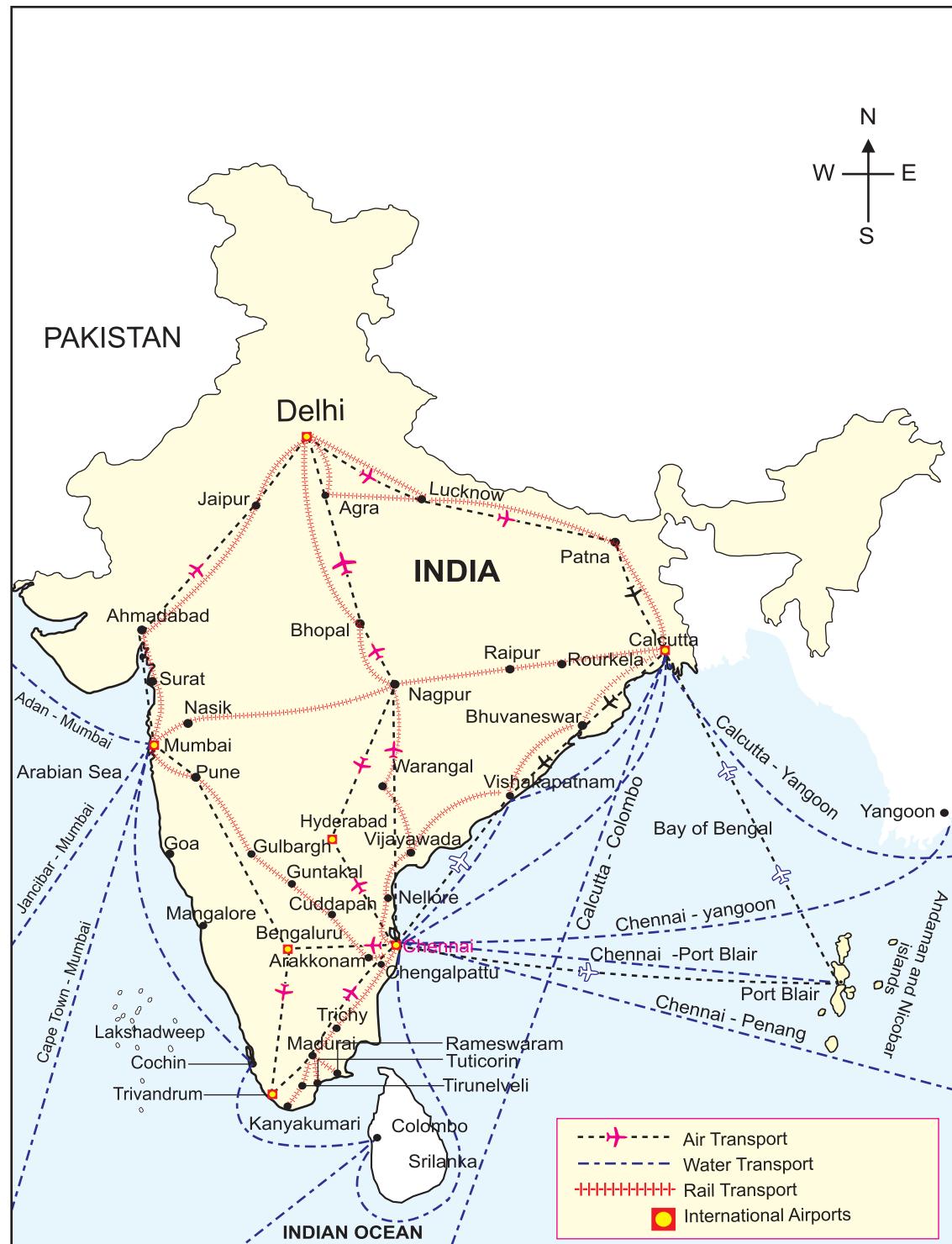
## INDIA - POLITICAL



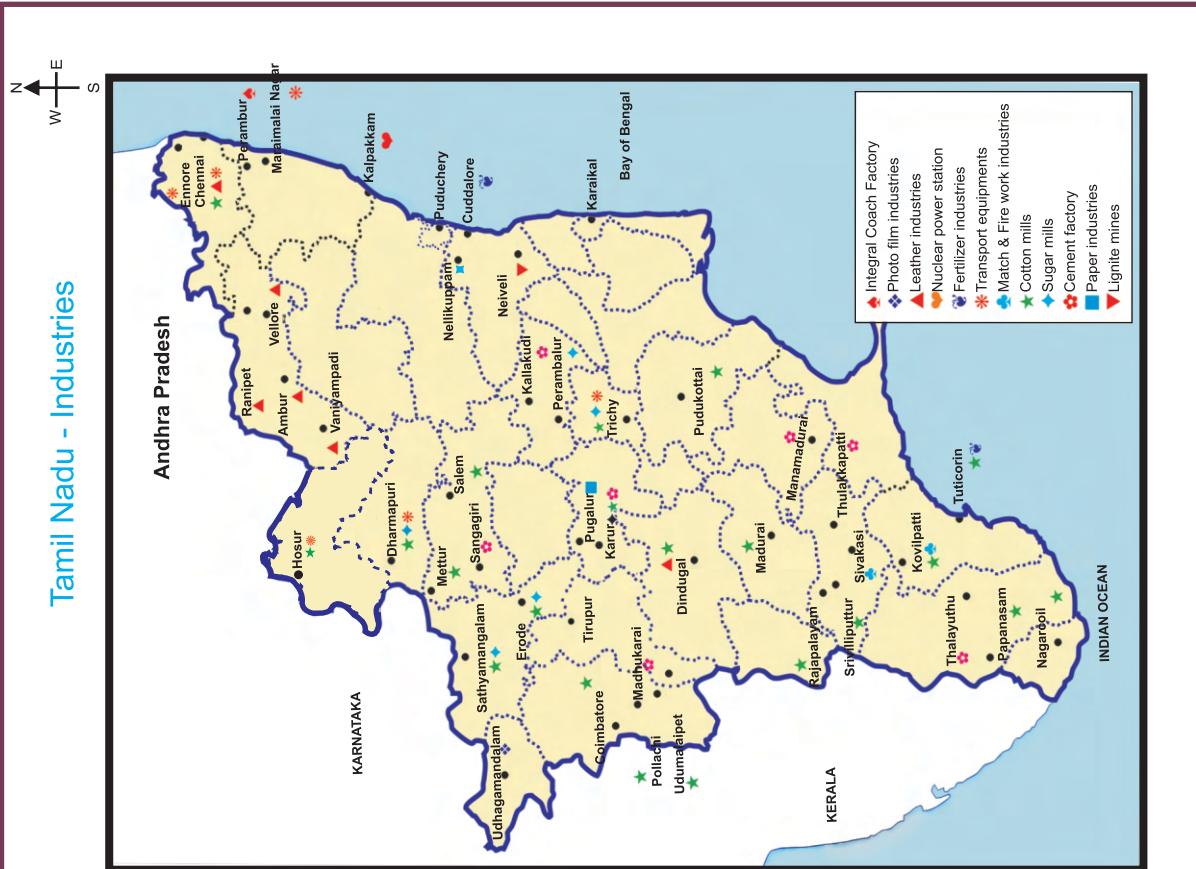
## INDIA - PHYSICAL



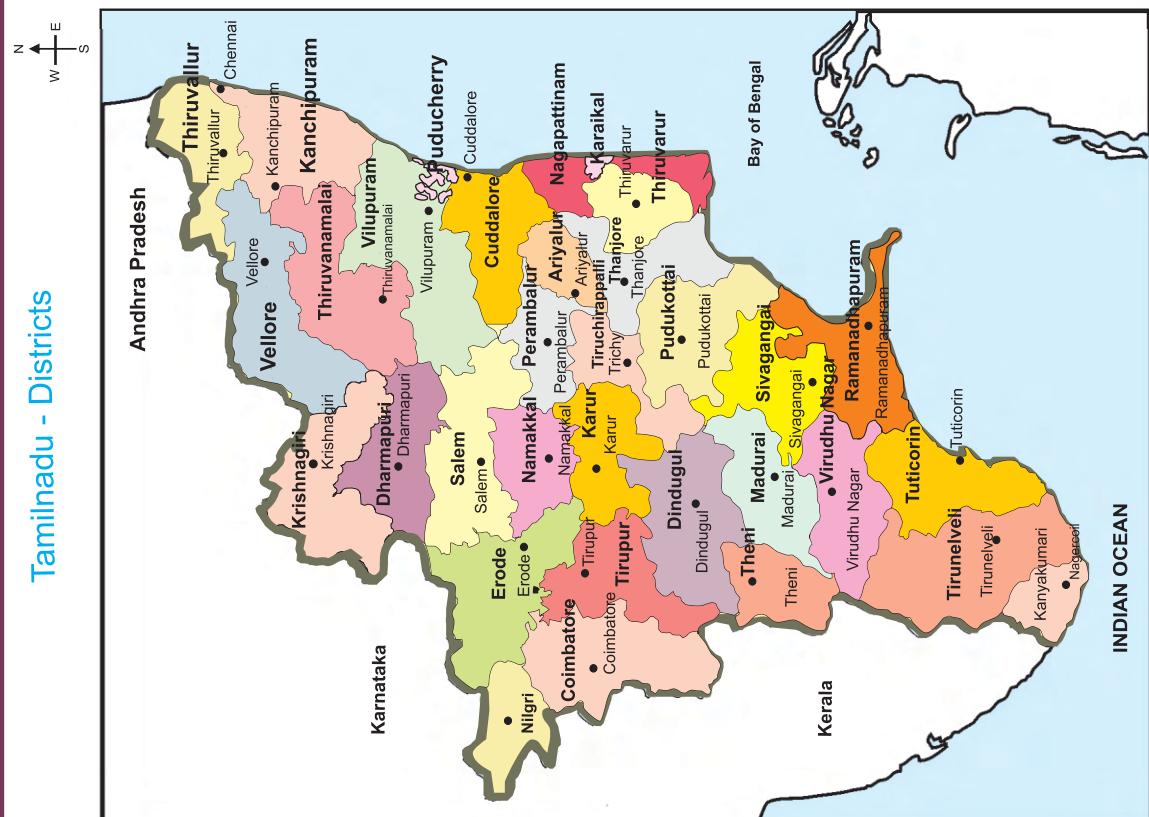
INDIA - TRANSPORT



Tamil Nadu - Industries



Tamilnadu - Districts





Globe

### Globe

A **globe** is a three dimensional representative model of the earth. On its surface continents, oceans, islands and other landforms are marked. The latitudes and the longitudes are also marked. The globe spins on an axis and its axis is a metal stick which passes through its centre. The axis is kept inclined just like the earth's axis at an angle of  $23\frac{1}{2}$  degrees.

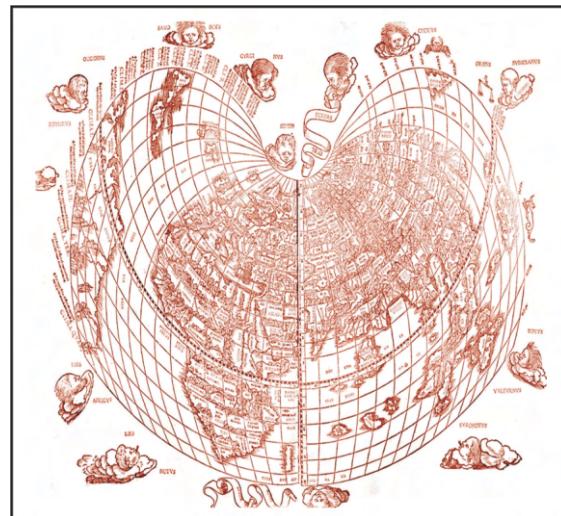
It is the most accurate map of our world. All the countries are shown in true size relative to each other. You can see how far apart different cities are, and where they are located.

### The Lines on the Earth

When we travel from one place to another we enquire what is the distance between the two places. We erect milestones on roads to show the distance (kilometre). We say that the place is 15 km towards the east.

Where is a mountain located on the earth? Where is a country located on the earth? At which point exactly is the ship that sails on the sea? How can we accurately calculate these distances?

To help us locate a place correctly imaginary lines are drawn on the surface of the earth. These imaginary lines are called **latitudes and longitudes**. Ptolemy the Greco-Roman mathematician, astronomer and a geographer was the first man to draw latitudes and longitudes on a map. Ptolemy's world map is shown below.



Ptolemy's world map

### Latitudes

**Latitudes** are imaginary lines that run horizontally from east to west on a globe or a map. Latitudes are marked by degrees numbered from  $0^\circ$  to  $90^\circ$  North and South

The imaginary line that runs through the centre of the earth is called the **Equator** which is at  $0^\circ$  degree latitude. It divides our planet into the northern and southern hemispheres. The earth's surface to the north of the equator is called the **Northern Hemisphere** and the surface to the south of the equator is called the **Southern Hemisphere**.  $90^\circ$  north is the **North Pole** and  $90^\circ$  south is the **South Pole**. And we write it as  $90^\circ N$  and  $90^\circ S$ .

## Longitudes

Longitudes are imaginary lines that run vertically from the North Pole to the South Pole.

The lines of longitude are also known as **meridians**. They converge at the poles and are widest at the equator (about 69 miles or 111 km apart). A space observatory is located at Greenwich in London. The longitude that passes through Greenwich is called the **Greenwichmeridian (or prime meridian)** and it is considered as **0°longitude**. The degrees continue 180° east and 180° west where they meet and form the International Date Line in the Pacific Ocean.

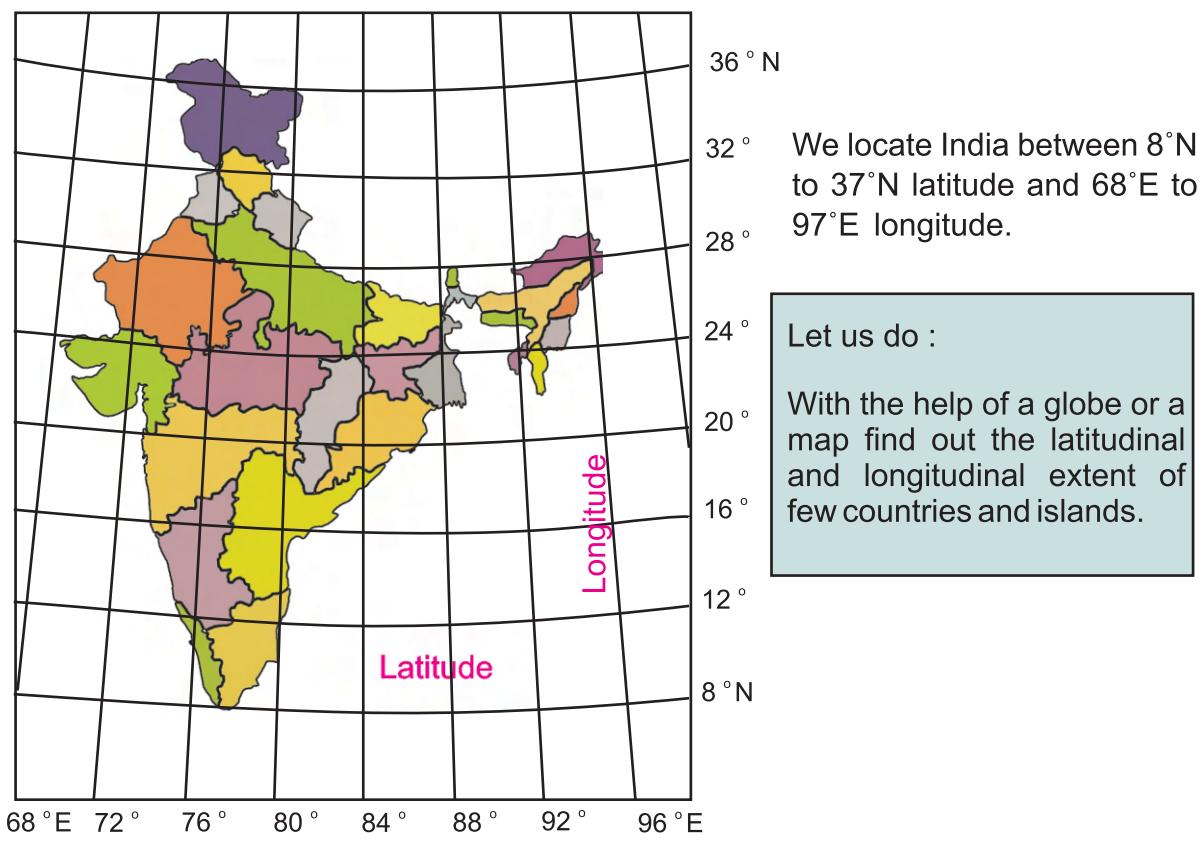
To specify latitude we need to say how many degrees it is away from the equator and in which direction north or south. For example 10 ° N latitude is the 10<sup>th</sup> line north of the equator and 10 ° S is the 10<sup>th</sup> line to the south of the equator.

Similarly 10 ° E and 10 ° W represent the longitudes to the east and west of the Greenwich meridian respectively.

A particular place is located with the help of the latitude and longitude. The location of Chennai is given as 13° 04' N, 80° 17' E... It means it is at the intersection of the latitude 13 degrees 4 min to the north of the equator and the longitude 80 degrees 17 minutes to the east of the prime meridian.

How can we locate India?

## Location of India



## Evaluation

### I. Choose the correct answer

1. The imaginary lines that are drawn from the east to the west on a globe is called \_\_\_\_\_.  
 a) Latitude  
 b) Earth's axis  
 c) Longitude
2.  $0^\circ$  Longitude is called as the \_\_\_\_\_.  
 a) Greenwich Meridian  
 b) Latitude  
 c) Earth's axis
3. Map that shows the continents, countries, capitals is called as \_\_\_\_\_ map.  
 a) Physical  
 b) Political  
 c) Thematic

### II. Answer the following questions

1. What is a map?
2. Explain thematic maps?
3. What is the latitudinal and longitudinal extent of India?

### III. Map skill

1. Look at any physical, political and thematic map with the help of your teacher and answer the following questions:  
 a) What is the scale of the map?  
 b) What is the information given?  
 c) Tabulate the explanation given about conventional signs and symbols.
2. On a political map of India mark the states and its capitals.

## FORMATIVE ASSESSMENT

1. Draw the map of your street / area using conventional symbols.
2. Observe the map drawn by Ptolemy and discuss.
3. Visualize a tour

What are the places do you want to visit in the world and what kind of transport will you use to go there?

Teacher : where do you want to go?

Student : Antarctica

Teacher : what kind of transport will you use to go there?

Student : Ship

If he sails in a ship the students will act and touch Antarctica in the wall hanging map. Countries, islands, cities, like places are introduced to students by this play way method.

# SHAKTHII ACADEMY

## SOCIAL STUDIES - GEOGRAPHY

### STANDARD - SEVEN

#### COURSES OFFERED

- **BANK CLERK/PO/SO**
- **INSURANCE**
- **TANCET-MBA**
- **GRE, GMAT**
- **IELTS , TOEFL**
- **RRB, SSC**
- **TNPSC Group II, Group II- A, Group IV, VAO**

# GEOGRAPHY

## 1. The Earth - Its Structure and Tectonic movements

The earth is a unit planet that sustains life on it. There are several theories explaining the formation of the earth. The most accepted one is the Big Bang theory.

### Do you know?

The Egyptians visualized that earth was a floating sphere on the sea.

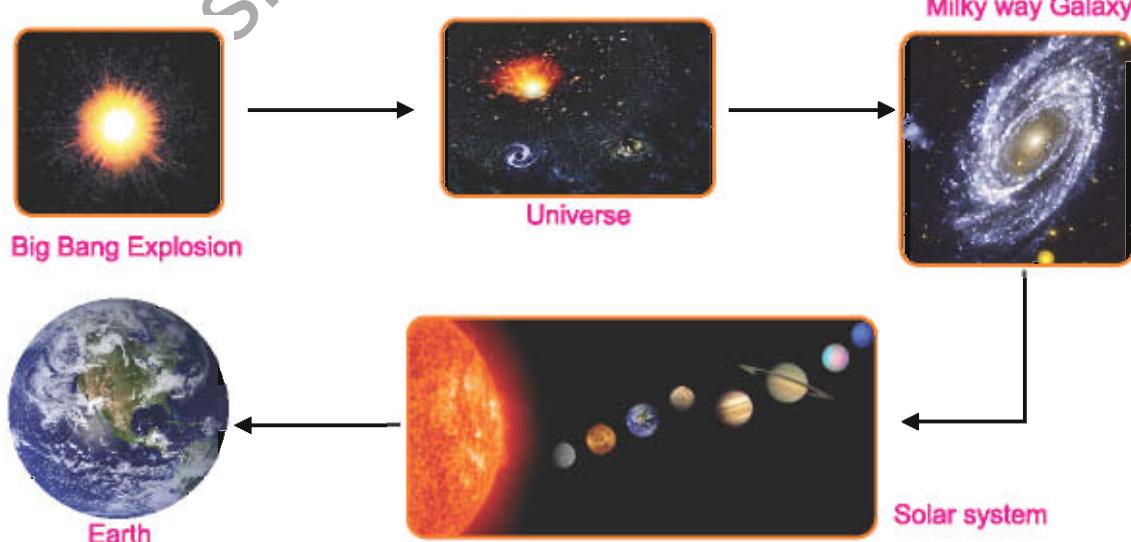
Many experts had brought out theories on the formation of Earth and other planets. Among them, "Big Bang" theory is the most accepted one. It proposes that the universe was once extremely compact, dense and hot. Around 10 billion to

20 billion years ago there was a cosmic explosion called "Big Bang". From that explosion, the Universe including our Earth was formed. An American astronomer Edwin Hubble explained that the existing Universe is being expanding. As time passes, galaxies move further and further apart. On the 30<sup>th</sup> May 2010, the scientists made a Large Hadron Collider (LHC) machine to test the Big Bang theory. It may help us to understand some of the mysteries of the formation of the Earth.

### Activity

Take a balloon and mark some points to represent galaxies. Then you blow it up and simultaneously observe the points marked on it. They move away from each other as the balloon expands.

### Formation of the Earth



## Formation of Continents and Oceans

The land and water bodies were not always distributed on the surface of the earth as they are today. A few million years ago, all the present continents were clustered together around the South Pole. This **Super continent** was called **Pangaea**. In Greek, it means "all earth". The Pangea was surrounded by a Mega Ocean called the **Panthalassa** or the **Super Ocean**. In Greek, it means "all water". The Pangea was broken into a number of plates known as the lithosphere Plates. These Plates move around very slowly, from a few Millimeters to a centimeter a year.

### Do you know?

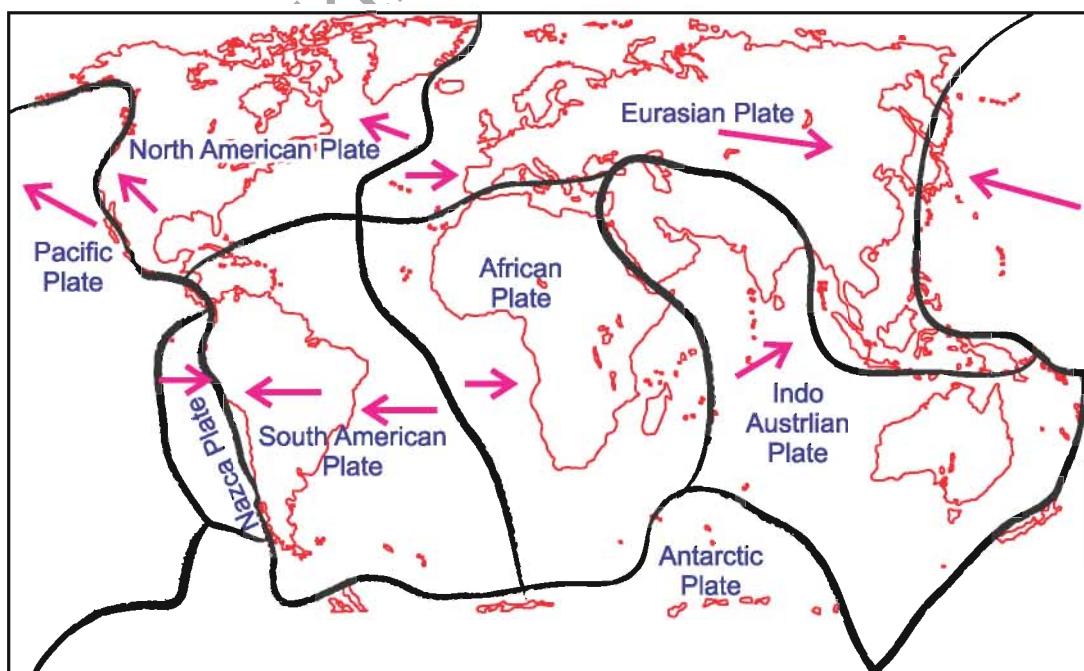
The Pacific plate is the largest plate and it covers about  $1/5^{\text{th}}$  of entire Earth's surface.

### Do you know?

The Himalayas is rising by about 5mm per year, due to the movement of Indo-Australian plate, and the plate is still moving at the rate of 67 mm/year. The scientists expect that, in another 10 million years, the plate would have travelled about 1,500 km into Asia.

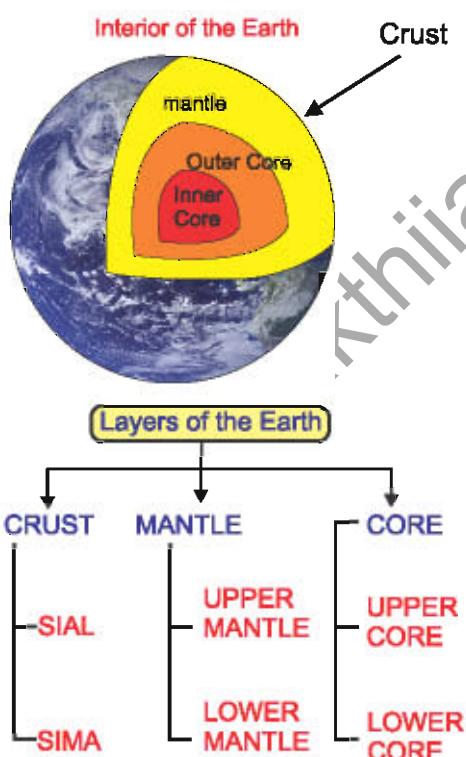
The Pangea split into seven major plates and smaller plates. The major plates were the Eurasia, Antarctica, North America, South America, Pacific, Africa and Indo-Australian plates. The smaller plates include the Arabian, Caribbean, Philippine, Cocos, Nazca and so on. These plates are continuously in motion with respect to each other.

### PLATE BOUNDARIES OF THE EARTH



## Interior of the Earth

By analyzing the seismograms recorded from many earthquakes, scientists have discovered that three main layers or shells exist within the Earth. Isaac Newton was one of the first scientists to theorize about the structure of the earth. Since then many scientists presented theories on the structure of the earth. **The part of the earth we live on is a very thin layer** compared to the interior of the earth. The interior of the earth can be divided into three major layers based on chemical composition and characteristics. They are the **crust, mantle** and the **core**.



### Do you know?

Suess, an Austrian Geologist named the crust, mantle and core as sial, sima and nife respectively.

## Crust

The uppermost layer of the earth's surface is called the "crust or lithosphere". The continental crust is composed of a layer called the "**SIAL**" which is made up of Silica and Aluminium. The oceanic crust is composed of basaltic layer called the "**SIMA**" which is made up of Silica and Magnesium. Crust is thicker on the continents and thinner on the ocean floors. The sial layer is floating on the sima layer. The average depth of sial is about 20 km and The average depth of sima is about 25 km. They average density of the crust is about 3 g/cm<sup>3</sup>

## Mantle

Mantle lies between the crust and core. It comprises about 83 % of the Earth's volume. It is made up of plates that move and create continental drift. Beyond 900 km, this layer is completely homogenous. Upper mantle is known as "**Asthenosphere**". It extends upto a depth of 700 km. Lower mantle is semisolid and is plastic in nature. The average density of the mantle is about 8g/cm<sup>3</sup>

### Do you know?

The layers of the Earth can be compared with a mango or boiled egg or cricket ball for better understanding.

## Core

The inner most layer of the earth is called the "**Core or Barysphere**". It is otherwise known as **NIFE**,

because of the presence of Nickel and Ferrous(iron). This layer produces earth's magnetic field. There are two main divisions; they are the outer core and the inner core. The particles present here resemble liquid. It may be in a solid state due to excessive pressure of the surrounding layers. The density of the core is about 12g/cm<sup>3</sup>.

### Temperature at Interior of the Earth

The experience of volcanic eruption, hot springs and mines indicate that heat increases as we move downwards into the earth. The temperature is estimated at the centre of the Earth to be as high as 5000°C. The normal temperature change is 1°C for every 32 metres of descent.

#### Do you know?

The Tethys sea was a shallow sea between the Angara and Gondwana land.

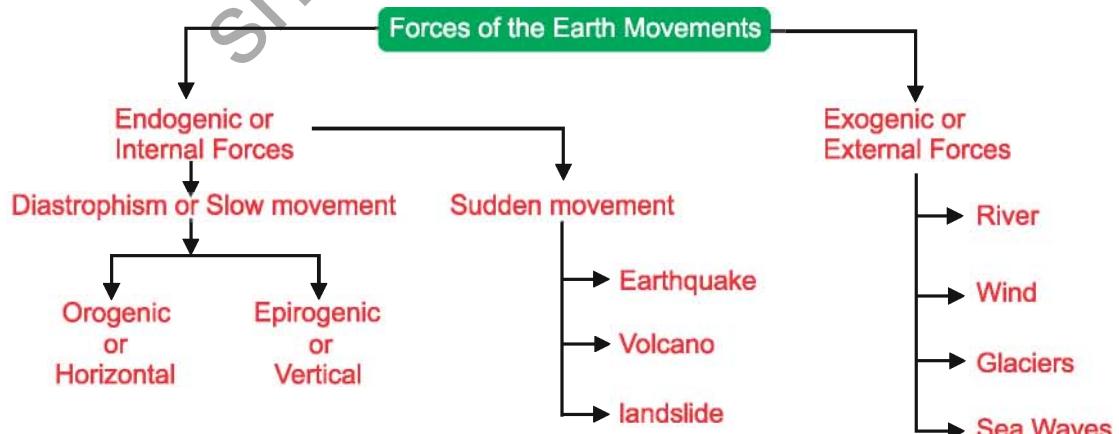
### Forces of Earth Movements

The crust of the earth is not stable. Several areas of the present land masses were once beneath the sea. Continuous changes are taking place on the surface of the earth. In ancient geological part of the place where the Himalayas lies was occupied by the shallow **Tethys** sea. A few of the changes are gradual and slow, some of them are sudden. These changes are brought on by two different forces. They are, Endogenic and Exogenic forces.

### The Endogenic or Internal Forces

It originates and acts from within the earth's crust. It gives rise to deformation and irregularities on the crust of the earth.

The earth movements which bring about vast changes within the crust of the earth are called the Endogenic or Tectonic movements. These movements are of two types:



## Slow movements or Diastrophism

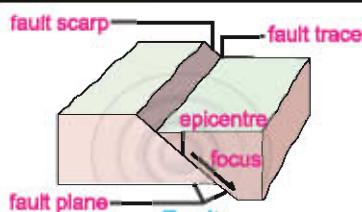
It is the general term applied to slow bending, folding, warping and fracturing. Such movements may be further divided as follows;

### Epirogenic or continental movement

The vertical movement leads to either uplift or subsidence of the earth's crust, along lines of weaknesses which are called "FAULTS". Displacement of the earth's crust takes place along the fault line. When displacement takes place along two adjoining fault lines, a portion between them may get uplifted to form a block mountain or plateau or subside to form a basin or Rift valley. Large scale vertical movements of the earth's crust are also called Epirogenic movements

#### Do you know?

The Great Rift Valley of East Africa and the Narmadha valley in India are the best examples of such basins bounded by faults.



Rift Valley-Kenya



Narmadha-India

### Orogenic or Mountain Building Movements

Horizontal movements of the earth's crust are responsible for folding and displacement of the layers of rocks. Simple folding consists of alternating upfolds called "Anticlines" and down folds called "Synclines". Such simple folds rarely occur. Most often folds get compressed to such an extent that the layers of rocks get displaced over long distances resulting in complex structure. Large scale horizontal movements are called Orogenic movements. They are responsible for the formation of fold mountains of the world – like the Himalayas.

### The Exogenic or External Forces

It originates and acts on the surface. It removes the irregularities to make a Levelled Land.

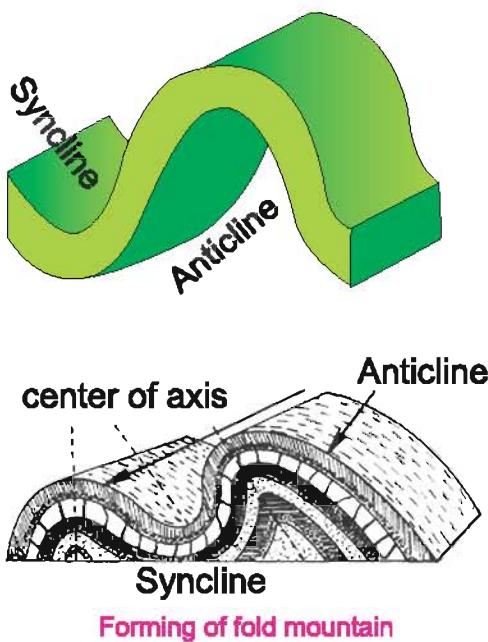
#### Activity

To make an Anticline and Syncline:

- All you require is a pile of papers.
- Place the papers on your table.
- Push the papers from both sides with your hands.

- iv) The sheets become folded and rise as a peak.
- v) you have made an Anticline and a Syncline.

List the important fold mountains of the world.



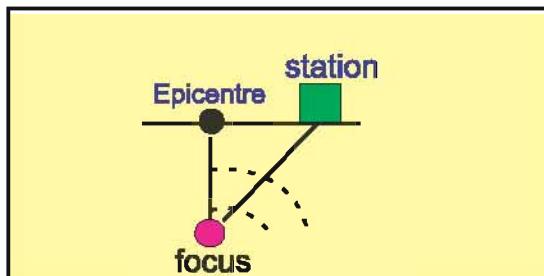
### Sudden movements

These movements bring sudden changes on and below the crust. These movements are destructive in nature. Major destructions have occurred due to sudden movement like Earthquakes and Volcanic activities.

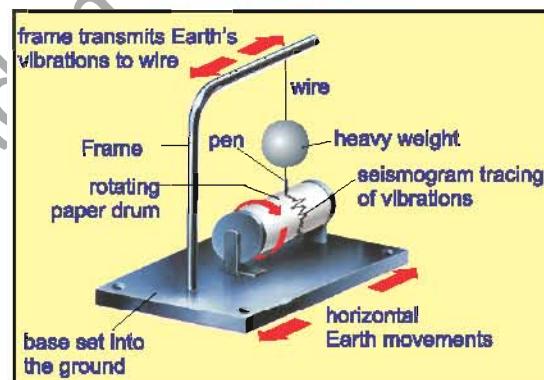
### Earthquakes

An earthquake is a sudden shake or tremble of a part of the earth's crust which results in tremors or vibrations. They are classified as **volcanic earthquakes** and the **tectonic earthquakes**. The volcanic earthquakes occur along with eruption. The Tectonic earthquakes are caused by erumbling or displacement of rocks.

The point of origin of the earthquake is called the "**Focus**". The point directly above the focus on the surface earth is called the "**Epicentre**". There are annually 8,000-10,000 earthquakes occurring in the world. An earthquake occurs for every one hour. There are many more undetected, because of their low intensity.



**Earthquake centre**



**Seismograph**

### Do you know?

The earthquake waves are recorded by the instrument known as the Seismograph. The Richter scale is used to measure the intensity of an earthquake. Its scale ranges from 0 to 9.

### Types of Earthquake Waves

Basically it is divided into **body waves** and **surface waves**.

**Body waves** are produced by the

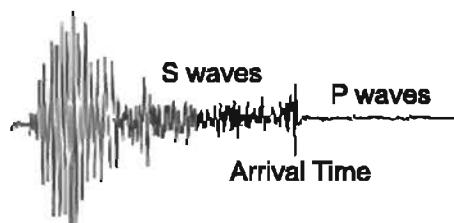
release of energy at the focus and move in all directions through the body of the earth. There are two types of body waves.

**Primary waves** or P-waves move faster and are the first to be recorded by the seismograph. It is similar to the sound waves and travel through gaseous, liquid and solid materials. The primary waves travel by the compression of earth materials forward and backward in its direction. It travels at a speed of 8 Km/sec.

**Secondary waves** or S-waves are slower than the P-waves. It can travel through solid materials. During the occurrence of secondary waves, particles oscillate in the direction of wave travel. It is similar to the movement of a rope shaken from side to side. It travels at a speed of 5 Km/sec.

**Surface waves** are the last to be recorded on the seismograph. These waves cause most of the damages on the surface. They are also known as L-waves. They travel at a speed of 4 Km/sec.

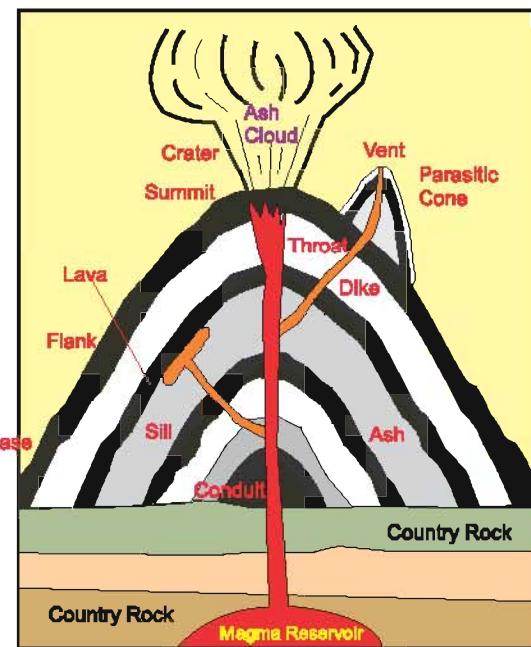
surface waves



Earthquake waves

## Volcanoes

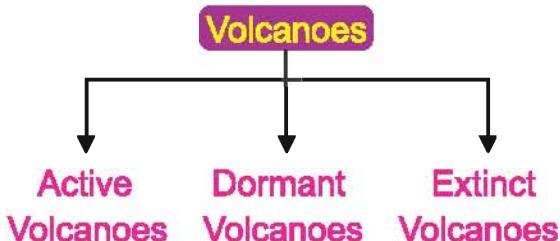
A volcano is a vent or an opening on the earth's crust, through which hot molten materials erupt from the interior. When the magma erupts out of the earth on to the surface, it is called "Lava". The eruption of materials from the interior of the earth's crust may occur with huge explosions or silently through fissures of rocks.



Cross section of a Volcano

## Types of Volcanoes

Volcanoes can be classified into three types based on the frequency of eruption. They are:



## Active Volcano

Eruptions occur at frequent intervals. Most of the active volcanoes are found along the mid-Atlantic oceanic ridges. Mauna loa in Hawaii Island is the largest active volcano in the world. The Barren Island is the only active volcano in India.



Barren Island volcano



Vesuvius in Italy

## Extinct Volcanoes

Extinct volcanoes are also called dead volcanoes. They would have erupted in the past but have stopped erupting now. Mt.Kilimanjaro in Africa and Narcondam Island near the north-east of North Andaman Island of Indian territory are some examples of extinct volcanoes. The famous Tiruvannamalai hills of Tamil Nadu and Panaka hills of Andhra Pradesh are also considered as extinct volcanoes.



Volcano in Iceland



Norcondam Island in India

## Dormant Volcanoes

They are also called **sleeping volcanoes**. These volcanoes have been active in the past, stopped ejecting lava now, but it may erupt in the future. The Vesuvius of Italy and Mauna Loa in Hawaii are the best examples.

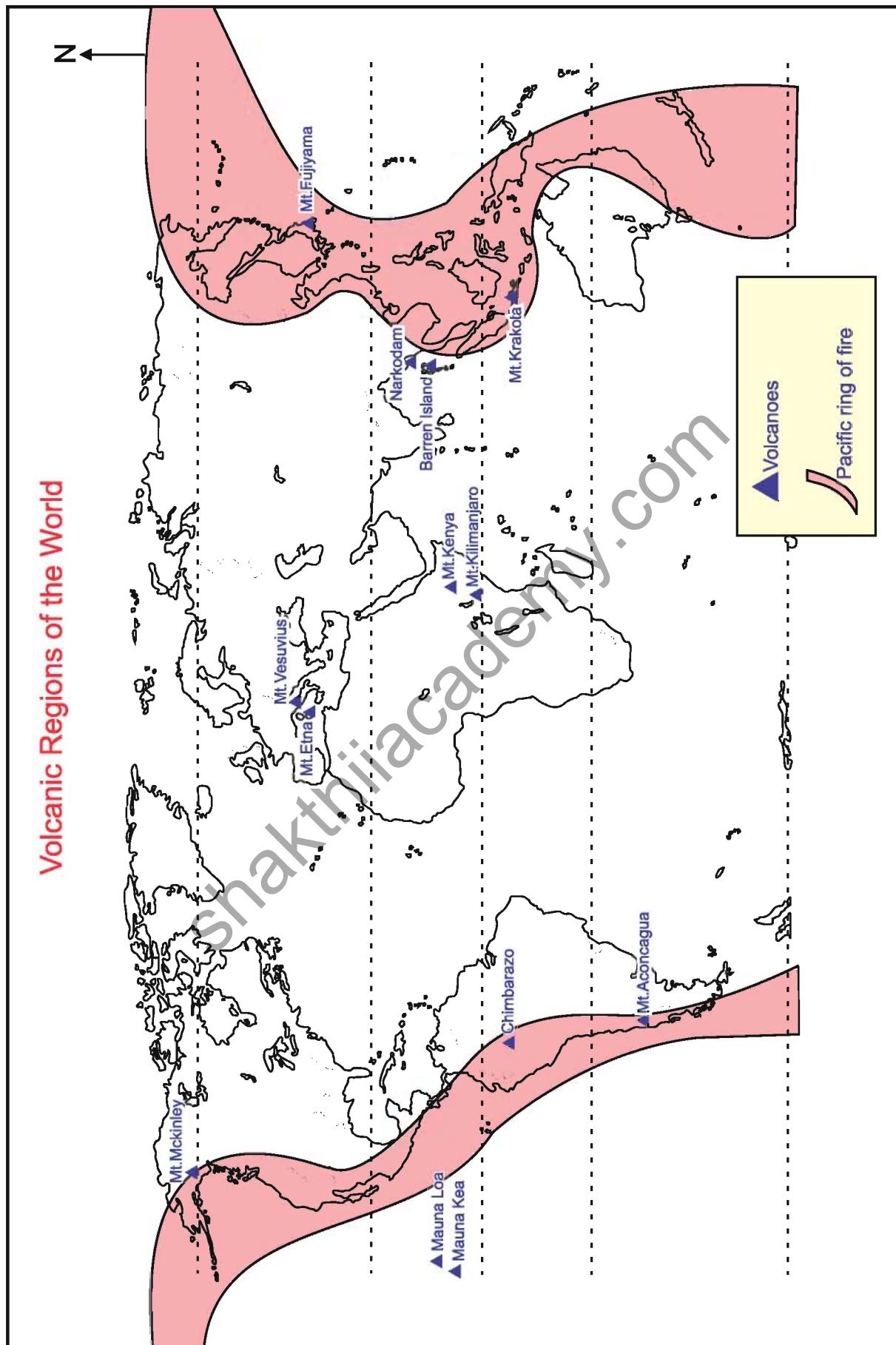
### Do you know?

The crater of a volcano filled with water is known as Crater Lake.

### Activity

On the map of world mark the Earthquake prone zones.

## Volcanic Regions of the World



## EXERCISE

**I) Choose the correct answer for the following.**

1. \_\_\_\_\_ is the only Planet that has organisms on it.  
a) Earth      b) Venus      c) Mars      d) Jupiter
2. The Pangea is broken into \_\_\_\_\_ major plates.  
a) 6      b) 7      c) 10      d) 12
3. The \_\_\_\_\_ of the Earth is not stable.  
a) Core      b) Nife      c) Crust      d) Mantle
4. Large scale vertical movements of the Earth's Crust are called \_\_\_\_\_ movements.  
a) Epirogenic      b) Exogenic      c) Focus      d) Denudation
5. The point of origin of the Earthquake is called \_\_\_\_\_.  
a) Epicentre      b) Focus      c) Centre      d) Seismic zone

**II) Fill in the blanks.**

6. The Continental Crust is composed of \_\_\_\_\_ layer.
7. The Sial layer is \_\_\_\_\_ on the Sima layer.
8. Large scale horizontal movements of the Earth's Crust are called \_\_\_\_\_ movements.
9. \_\_\_\_\_ is also known as 'L'-waves.
10. A volcano is a \_\_\_\_\_ or an opening in the Earth's Crust.

**III) Match the following.**

- |                    |        |
|--------------------|--------|
| 11. Mauna Loa      | Africa |
| 12. Vesuvius       | India  |
| 13. Mt Kilimanjaro | Hawaii |
| 14. Fujiyama       | Italy  |
| 15. Norcondam      | Japan  |

**IV) Answer the following questions shortly.**

16. Name the types of layers of the Earth.
17. Write a short note on Pangea and Panthalasa.
18. Name the major plates of the World.
19. Name the forces which affect the earth's movements.

20. What is meant by anticline and syncline?
21. What are the types of volcanoes?

**V) Distinguish between**

22. Sial and Sima
23. Crust and Core
24. Endogenic and Exogenic forces
25. Dormant and Extinct Volcanoes
26. Primary waves and Secondary waves

**VI) Answer the following questions briefly.**

27. Name the layers of the Earth and explain the crust in detail with a diagram
28. Describe the types of earthquake waves.
29. Draw the cross section of a Volcano and mark their features.
30. Draw the cross section of a Volcano and explain any one of the types of Volcano.

**VII) Map Activity:**

31. On the outline map of world mark the Pacific ring and the location of Volcanoes.

**Formative Assessment**

1. Collect information about LHC machine and write an essay on how scientists are using the LHC to test the Big Bang theory.
2. Make a model of the interior of the Earth.
3. Find out any ten rift valleys of the world and mark their location on the outline map of World.
4. Make a model of the Seismogram.
5. Volcanic eruptions are dangerous and volcanic eruptions are useful. How? Have a debate.
6. List out how people can protect themselves when earthquakes occur.

## 2. The Surface of the earth the changing face of the earth

Look around your place. Do you have any mountains, hills and plateaus near your locality? Can you guess how they formed? And will they remain the same features in future also? Do you find any changes taking place in them? Yes, there are some changes taking place, gradually.

Sometimes, we notice that some of the rocks are getting cracked or broken into pieces and we notice the steep slopes modified into gentle slopes or low lying areas are dumped with soil, sand and stones.

The climatic elements such as temperature, rainfall and frost and also the natural agents like rivers, winds, glaciers and sea waves are responsible for these changes. Changes happen not only in human life but also on the surface of the earth, which is subject to change. Let us study the changes taking place on the earth's surface, in detail.

### Weathering

Weathering is the process of disintegration or decomposition of rocks. Weathering is a complex interaction of physical, chemical and biological processes that alter the rocks of the crust. Weathering can be classified into **physical** (or **mechanical**), **chemical** and **biological** weathering.

#### A) Physical (or Mechanical) Weathering

Physical or Mechanical weathering is the process that causes the disintegration of rocks into smaller fragments without any chemical change. The primary process in physical weathering is abrasion. Physical weathering occurs by the following processes.

##### a) Thermal Stress

Rocks are made up of a combination of several minerals. The expansion and shrinking of each mineral due to changes in temperature vary from one another. The prolonged expansion and shrinking of rocks cause stress which may develop into breaking of rocks.

##### b) Frost Weathering

The mountainous areas experience frost conditions and they have this type of weathering. Sometimes, the cracks found on the rocks are filled with water due to rain. It may freeze into ice during night due to very low temperature and melts during the day time. Since ice is a solid material, it creates more pressure in the cracks of the rocks and so the cracks widen.

The continuous freezing and melting of ice causes the rocks to break into pieces. This type of weathering is said to be '**Frost Weathering**'.



**Frost Weathering**

The surface pattern on this pedestal rock is honeycomb weathering, caused by salt crystallisation.  
eg.Yehliu, Taiwan.

### c) Salt Crystal Growth

Salt crystallization, otherwise known as **haloclasty**, causes disintegration of rocks when saline solutions seep through cracks and joints in the rocks and evaporate, leaving behind salt crystals.



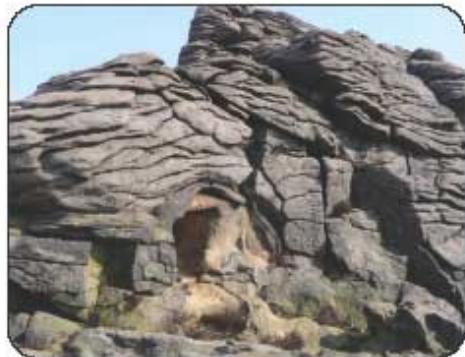
**Salt Crystallisation- Taiwan**

#### Activity

Visit nearby mountainous areas to observe processes different of weathering.

### B) Chemical Weathering

Chemical weathering refers to decomposition of rocks or the



**Himalayan Weathered Caves**

breaking of rocks due to the alterations made in the chemical composition of rocks. In this process of chemical weathering, oxidation and hydrolysis are the most common occurrences.

### a) Dissolution

Rainfall becomes acidic if atmospheric carbon dioxide or sulphur dioxide or nitrogen oxide dissolve in the rainwater. When it occurs on a limestone or chalk region, the minerals are dissolved and results in the weathering of rocks.

#### Do you know?

The Government of India banned the tanneries around Taj Mahal due to acid rain caused by these industries which affects the marble stones of this wonder of the World.

### b) Mineral Hydration

Hydration is often referred to as absorption of water. In this kind of Weathering, ions attach

themselves to other minerals present in the rock. The attachment leads to an increase in the volume of minerals, thus creating mechanical pressure, which leads to weathering.

### c) Hydration

Hydrolysis is a process affecting silicate present. In such reactions, silicates are converted into clay minerals by the hydrogen and hydroxide ions.

### d) Oxidation

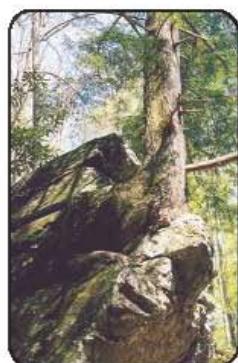
This is the process where the iron present in the rock combine with oxygen and water to form oxides. These iron oxides make the rock weak and it consequently crumbles to form smaller rock particles. This process is better known as **rusting**.



Oxidation

## C) Biological Weathering

The most common form of



biological weathering to give few growth of plants and trees in mines, quarries, buildings and roads.

This results in disintegration of rocks. Humans and burrowing animals also cause biological weathering.

### Agents of Gradation

#### Running Water (river)

A river is a natural water course, usually freshwater, originating on highlands and flowing towards an ocean, a lake, a sea or another river. River is one of the most important agents of erosion. Rivers do the work of erosion, transportation and deposition during the development of their courses.

### Landforms Associated with

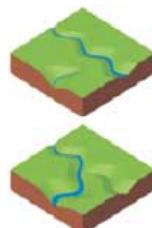
#### Rivers

#### The Mountain Course

The source of a river is usually tops of glaciated mountains. The steep slope and high velocity of the river leads to vertical erosion. Gorges and Canyons or 'V' shaped valleys are formed.

### River Capture

This is also known as the **river piracy** or **river beheading**. Its development is dependent on the different rates of headward erosion into a divide.



River Capture

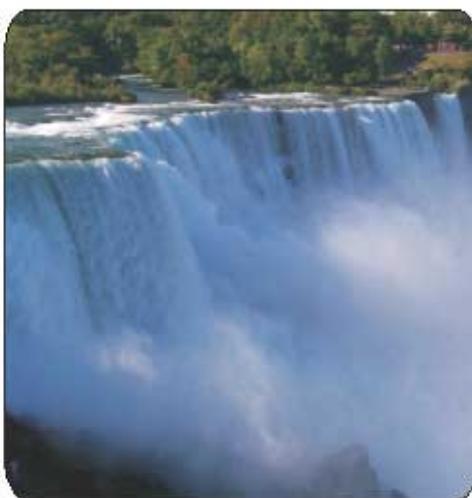
## Rapids, Cataracts and Waterfalls

Due to unequal resistance of hard and soft rocks traversed by the river,



Rapid

the outcrop of a band of hard rock may cause a jump or fall downstream, leading to the formation of **rapids**. Similar falls of greater dimension are also referred



Waterfalls

to as **cataracts**. When rivers plunge down with a sudden fall from a great height they are called **waterfalls**.

## The Valley Course

Here, lateral erosion tends to replace vertical erosion. Active erosion of the banks and the increased volume of water with load

of sediments, widens the 'V' shaped valley.

## Meanders

A meander in general is a bend in a sinuous watercourse. A meander is formed when the moving water in a river erodes the outerbanks and widens its valley, over time. The irregularities of the slope and the load of silt forces the



Meander

river to swing in loops, forming meanders.

## River Cliffs

When the river water enters the bend of the river, it dashes straight and erodes the outerbank into a steep river cliff.

## Interlocking Spurs

As the stream flows on, the



Interlocking Spurs

meanders migrate progressively outward with the interlocking spurs alternating with the undercut slopes.

### The Plain Course

Here, the work of a river is mainly deposition, building up of beds and forming extensive floodplains. The volume of water is greatly swelled by the additional tributaries that join the main stream. Coarse materials are dropped and the finer silt is carried down towards the mouth of the river. Large sheets of materials are deposited on the level plain and may split the river into several complicated channels, so that it can be described as a braided stream. Some of the major features are:

### Floodplain

River in its lower course has large quantity of sediments. During annual floods, these materials are spread over lowlying and adjacent areas. A layer of sediment is thus deposited during each flood, gradually building up a fertile floodplain. When the river flows its bed in raised by accumulation of



Flood Plain

deposits. Materials are also dropped on the sides of the river, forming raised banks called levees.

### Ox-bow Lake

In the lower course of the river, a meander becomes much more active. The outside bank or concave



Ox bow lake

bank is so rapidly eroded that the river becomes almost a complete circle. At one point of time river cuts through the narrow neck of the loop, making an Ox-bow lake.

### Delta

When the river reaches the sea, fine materials are deposited at its mouth, forming a fan shaped alluvial.



Delta

### Do you know?

The Mississippi River is the largest river system in North America. About 3,730 km long, the river originates at Lake Itasca, Minnesota. It is the fourth longest river in the world and the tenth most powerful river in the world.

feature called **delta**. The different types of delta are: **bird foot delta**, **arcuate delta**, **estuarine delta** and **cuspate delta**.

### Do you know?

The Ganges is the largest river of the Indian subcontinent, flowing east through the Gangetic Plain of Northern India into Bangladesh. The 2,510 km river rises in the western Himalayas in the Uttarakhand. The Ganges Basin drains 1,000,000 Km<sup>2</sup>. and supports one of the world's highest densities of humans. The river has been declared as India's National River.



Cliff

### c) Cave, Arch, Stack and Stump

Prolonged wave attack, on the base of a cliff, excavates holes called **caves**. When two caves approach one another, an **arch** is formed. Further erosion by waves will ultimately lead to the total collapse of the arch. The rest of the feature will remain as a pillar of rock known as **stack**. If it is further eroded, it then forms **stumps** which are only just visible above the sea level.



Cave and Stack



Arch



Stump



Bar

### Features Associated with Coastal Deposition

#### a) Beaches

A beach is sand deposition along the coast. It usually consists of loose particles of sand.

#### Do you know?

World's longest beach is the Miami in the USA followed by the Marina beach in Chennai.

#### b) Spits and Bars

The debris eroded by waves is continually moved by long shore drift and may be deposited where there is some sort of indentation. As more materials are added, they will pile up



Spit

into a ridge or embankment to form a **tongue** or **spit**, with one end attached to the land and the other end projecting into the sea. When a ridge of sand is formed across the mouth of a river or the entrance to a bay, it is called a **bar**.

### Glaciers

The ice flow is called a glacier. Glaciers are widespread in the area where temperature is below freezing point. Glaciers are found in every continent except Australia. In regions lying above the snowline, the accumulation of snow solidifies under its own pressure, which then moves slowly down the valley due to gravity. Glacier plays a combined role of erosion, transportation and deposition throughout its course. They may be grouped as: (i) Valley glaciers, (ii) Continental glaciers and (iii) Piedmont glaciers.

#### Valley Glaciers

These glaciers are formed on the mountains. They are also called as **valley** or **alpine** glaciers.



Alpine Glacier

## Continental Glaciers

The Polar Regions are vastly covered with ice. This extensive type of ice mass is called as continental glacier.

## Piedmont Glaciers



Piedmont Glaciers

When ice is accumulated along the foothills is known as piedmont glaciers.

## Landforms Associated with Glaciers

The glaciated Valley is a 'U' shaped Valley. The arm-chair shaped depression formed by plucking of glacier along the glaciated slope is called **cirque**.



Cirque

## Aretes and Pyramidal Peaks



Pyramidal Peaks

A knife like elevated ridge formed between two consecutive cirques is known as an '**'Arete'**' when a series of cirques are formed along the glaciated slope, the top summit resembles a horn. This pointed Peak is called a Pyramidal Peak or nick named as 'Matter Horn' after the Swiss Peak.

## U-Shaped Valley

A U-shaped valley is the shape left after a valley has been ove



U-shaped valley

deepened by a glacier. The original V-shaped valley is deepened after the ice has eroded the sides and bottom of the valley.

## Hanging Valley

The main valley is eroded much more rapidly than the tributary valley. After the ice has melted it looks like the tributary valley hangs above the main valley. Such tributary valleys are called **hanging valleys**.



Hanging valley.

## Glacial deposits Moraines

Moraines are made up of pieces of rock, debris, boulders and clay transported by glaciers. Further, they may be classified as **ground Moraine, lateral Moraine, Medial Moraine and Terminal Moraine.**

### Drumlins

They are the deposits of clay and debris and resembles like a half buried egg.

The other depositional features are **Outwash Plains** and **Eskers**.

#### Activity

Discuss the reasons for the melting of glacial ice and why the sea level rises.

### Wind

Wind is a predominant agent of denudation in arid and semi-arid regions, because of scarce rainfall and sparse vegetation.

### Erosional Works Done by Winds

In the desert regions, the wind forms different kinds of land forms by deflation and abrasion.

#### Pedestal Rock or Mushroom a) Rock

The sand particles carried by the winds strike rock pillars made up of hard and soft rocks. When the soft rocks are found at the bottom, they are eroded faster than the hard rocks found at the top. The prolonged erosion carves the pillar to resemble like a mushroom. They are also called **rock pedestals**.



**Mushroom Rock**

#### b) Inselbergs

These are isolated residual hills rising abruptly from the level ground. They are characterised by their very steep slopes and rounded tops.

### Landforms Associated with Wind Deposition

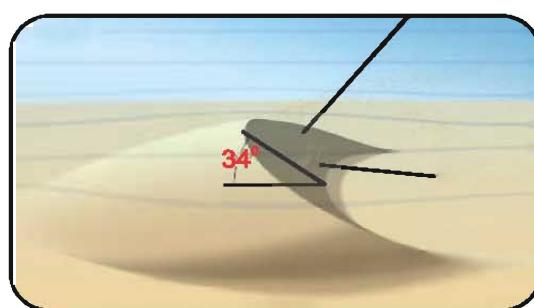
The following are some of the major features of wind deposition.

#### a) Barchan

These are crescent-shaped dunes. They are mobile sand dunes as they move in the direction of wind. The windward side of the dune has a steep slope and the leeward side has a gentle slope.

#### b) Seif or Longitudinal Dunes

They are long, narrow ridges of sand and cover over a hundred



**Barchan**

miles, lying parallel to the direction of the 'Winds'.

**Loess**

The fine dust blown beyond the desert limits is deposited on

neighbouring lands as loess. It is yellow, friable material and is usually very fertile.e.g. the Loess plains of China.

**EXERCISE****I) Choose the correct answer.**

1. Oxidation process is better known as \_\_\_\_\_.
 

a) Rusting	b) Chelating compounds
c) Thermal Shock	d) Haloclasty
  
2. Meanders are formed in the \_\_\_\_\_.
 

a) Mountain course	b) Valley course
c) Plain course	d) Delta course
  
3. Beaches are a feature of \_\_\_\_\_.
 

a) Rivers	b) Glacier
c) Winds	d) Waves
  
4. Pedestal rock is also called as \_\_\_\_\_.
 

a) Insel berg	b) Mushroom rock
c) Loess	d) Barchans
  
5. Barchan is a \_\_\_\_\_.
 

a) Depositional feature	b) Erosional feature
c) Transportational feature	d) Natural feature

**II) Fill in the blanks.**

1. Weathering can also be termed as \_\_\_\_\_.
2. Two caves that approach one another are called \_\_\_\_\_.
3. The fan shaped alluvial feature formed by a river in its lower course is called \_\_\_\_\_.
4. The Government of India has banned the location of \_\_\_\_\_ around TajMahal.
5. The fine dust particles deposited by wind beyond the desert limits are called \_\_\_\_\_.

**III) Match the following.**

- |                       |                               |
|-----------------------|-------------------------------|
| 1.Salt crystal growth | Plain course                  |
| 2.Ox-bow lakes        | Glacial Deposition            |
| 3.Spits               | Wind deposition               |
| 4.Moraines            | Haloclasty                    |
| 5.Seifs               | Depositional feature by waves |

**IV) Answer the following questions shortly.**

1. Write a brief note on weathering.
2. Name the erosional features produced by a river.
3. How are cirques formed?
4. Give a brief note on Mushroom rock.
5. What are longitudinal dunes?
6. Define the process of rusting.

**V) Distinguish between the following.**

1. Physical and chemical weathering.
2. Mountain course and plain course of a river.
3. Valley Glacier and Continental Glacier.
4. Moraines and Barchans.
5. Delta and Loess.

**VI) Answer the following questions briefly.**

1. Name the different types of weathering and explain any one in detail.
2. Name the different landforms associated with the three course of a river.
3. Write an essay on the erosional process of waves.
4. Write an essay on the depositional landforms of glaciers.
5. Describe about wind erosional features.

**Formative Assessment**

1. Prepare an album on biological weathering.
2. Make a model of land forms formed by the river on its mountain course.
3. Draw charts to show different types of deltas.
4. Make a model of land forms formed by the waves erosion.
5. Prepare an album on glacial erosion and deposition.
6. Draw charts to show the following land forms.  
Waterfalls, Meanders, Oxbow lakes, Cliff, Mushroom rocks.

## GEOGRAPHY

### 1. WEATHER AND CLIMATE

Weather and Climate are two terms which everyone uses in day-to-day life. This is because our daily routine is based on the prevailing weather conditions. Human activity of any region is determined by weather and climate. For example, in the tropical regions, paddy is cultivated as a major crop whereas, in the temperate regions, wheat is cultivated as a major crop. We wear cotton clothes in summer and woollen clothes in winter. We all like to have ice-cream, buttermilk or cool drinks in summer and we prefer to have hot coffee or tea during winter and rainy days. Not only these, but also our food habits, customs, traditions and even most of our common celebrations and festivals are associated with weather and climate.

#### Activity

Find out the celebrations and festivals which are associated with weather and climate.

#### WEATHER

Weather refers to the physical state of the atmosphere within 24-hours, described by weather elements such as temperature, atmospheric pressure, humidity, rainfall, cloudiness, wind speed and wind direction. Differences in these can occur due to the angle of the sun at any particular spot, which vary by latitude from the tropics.

#### CLIMATE

The word climate is commonly defined as the weather averaged over a long period of time and over a large area. The standard averaging period is 30 years.

#### Do you know?

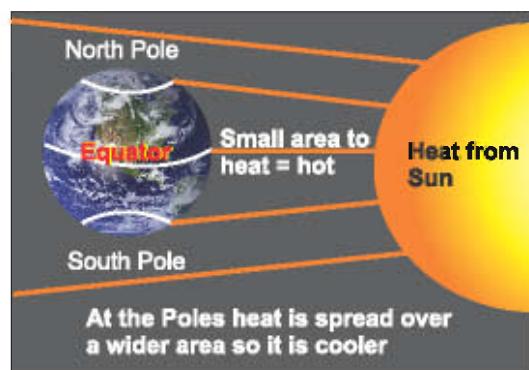
The word Climate is derived from the ancient Greek word "Klima" which means "inclination"

#### Factors determining Weather and Climate

The weather elements are modified by various factors. The following factors affect the climate of a place.

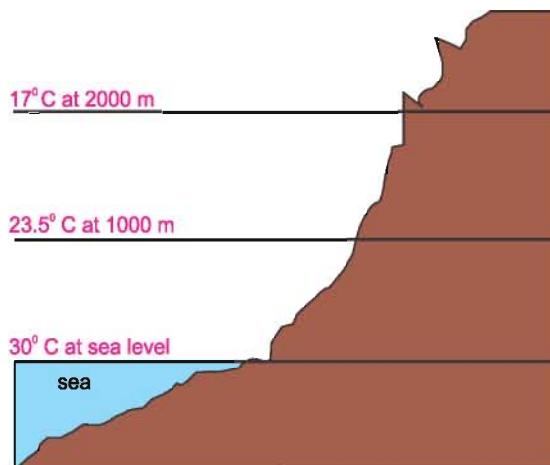
#### Latitude

The equator receives vertical sunrays which fall over a smaller area. In contrast, the polar regions receive slanting sunrays and they fall over a wider area. As a result of this, the places near the equator are hotter than the poles. For example, Madurai in Tamilnadu is hotter and Moscow in Russia is colder.



## Altitude

Did you ever visit hill stations? How did you feel the weather conditions there? The weather and climate are modified by the mountains and hills. The places located on higher altitudes are always cooler than those on the plains. It is because the atmosphere is heated from below. For example Ooty and Kodaikanal are cooler than Trichirappalli.



### Do you know?

Temperature decreases at the rate of  $6.5^{\circ}\text{C}$  for every 1000 metres high on the Earth's surface.

## Distance from the Sea

### Activity

Ask your mother to keep two vessels, one with water and another empty on the burning stove. Then you observe which one gets heated up faster.

The empty vessel is compared to the land and the other one to the sea. The sea absorbs and retains heat for long duration like the

vessel with water. The coastal areas experience the cool, wet air from the sea throughout the year which modifies the weather along the coast to have uniform weather both in the winter and summer. This condition is said to be an equable climate or maritime climate.

### Activity

Find out the weather differences between Mumbai and Delhi during summer and winter.

On the other hand, the land absorbs and loses heat quickly like an empty vessel. The interior land areas experience warm dry air. They are very hot in summer and very cold in winter. This condition is said to be extreme type of climate or continental climate.

## Ocean Currents

### Activity

Look at a map of the world and locate the hot deserts. The ocean currents are one of the reasons for the origin and occurrence of hot deserts. Discuss, why is it so?

Based on temperature the ocean currents are classified as **Warm Ocean Currents** and **Cold Ocean Currents**. Warm currents make coastal areas warm, wet and free from ice and cold currents make them cool, dry and form icebergs.

### Do you know?

The meeting places of warm and cold ocean currents are the areas of major fishing grounds because the conditions are suitable for the growth of the fish food, plankton. At that same time, these areas are dangerous for shipping as they are suitable for the formation of dense fog and low clouds.

### Direction of prevailing winds

The winds that blow from the sea contain more moisture so they are cool and wet. Example-Southwest Monsoon. On the other hand, the winds that blow from the land areas are warm and dry. Example-Northeast Monsoon. Guess - which one can cause rainfall and why?

### El Nino Effect

In our country, we hear the term "Monsoon Failure" very often. What does it mean? Why does it happen? In spite of the various reasons for the failures, we need to analyse El Nino as one of the reasons for the same. El Nino means "The Christ Child," in Spanish. It is formed around Christmas time and continues for a few months. During this period, once in five or six years, the temperature rises rapidly and a low pressure system is formed along the coast of Peru and Ecuador. It attracts winds from all directions. So, the trade winds become very weak over the Pacific Ocean and Indian Ocean and these winds are deflected

causing a prolonged dry period in India. The other effects of El Nino are experienced in other areas too. They are Bush fire and drought in Australia, famine in Indonesia and forest fires in Brazil and Southeast Asia.

### Human influence

Industrial revolution brought changes in our lifestyle. As a result of this, forest areas were cleared and now we have many types of transport facilities, concrete buildings and many industries. All these developments made our life easy and comfortable. On the other hand, their effects are felt in the name of Global warming, Green house effect and pollution, which have increased the amount of CO<sub>2</sub>. Creation of an urban heat island is also the result of human influence. The urban heat island occurs in metropolitan areas which are significantly warmer than their surrounding areas.

### TEMPERATURE

#### Do you know?

Terrestrial radiation refers to the heat energy emitted from the Earth

The sun is the source of light and heat to the earth. Earth receives only a small amount of solar radiation which takes eight minutes to reach the earth's surface. Incoming solar radiation is called insolation.

**Do you know?**

The difference between the maximum and minimum temperatures of a day is called the diurnal range of temperature.

Heat energy from solar radiation is received by Earth through three mechanisms. They are: i) **radiation in the atmosphere** ii) **Conduction over land** and iii) **Convection** in the water bodies. The Earth's atmosphere is heated more by terrestrial radiation than insolation insolation.

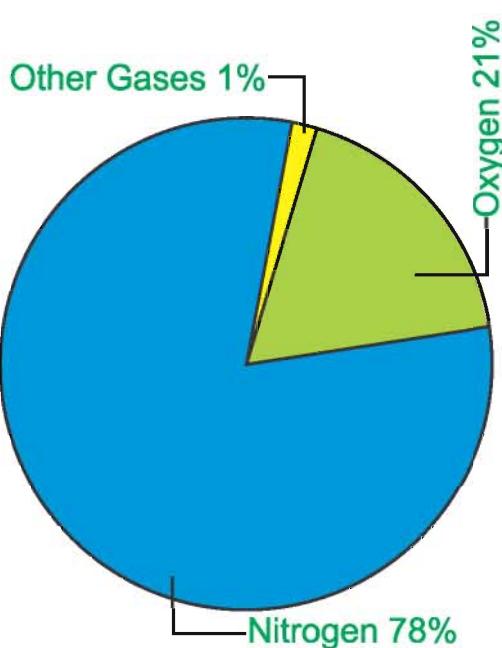
**Do you know?**

The difference between the hottest and coldest months of the year is known as the annual range of temperature.

**Earth's atmosphere**

The atmosphere of the Earth is surrounded by gases which are retained by Earth's gravity. Earth's atmosphere is made up of a combination of gases. The major components of air are nitrogen and oxygen. Argon, Neon, Helium, Krypton, Carbon di-oxide, Ozone and so on are the other gases found in little quantities. Apart from these gases the water vapour and dust particles present in the atmosphere are responsible for weather changes.

The presence of all these gases varies with quantity in the atmosphere according to heights. The air is dense near the surface and becomes thinner and thinner with increasing height. Based on the

**Components of Air**

characteristics of the atmosphere, it is divided into four major layers, as troposphere, stratosphere, ionosphere and exosphere.

**Troposphere**

Troposphere begins at the surface of the earth and extends up to 8 km at the poles and 18 km at the equator. This layer is known for all kinds of weather changes such as temperature, pressure, winds, clouds formation and rainfall. In this layer alone, the temperature decreases with increasing altitude. The **tropopause** is a thin layer that lies between the troposphere and the stratosphere.

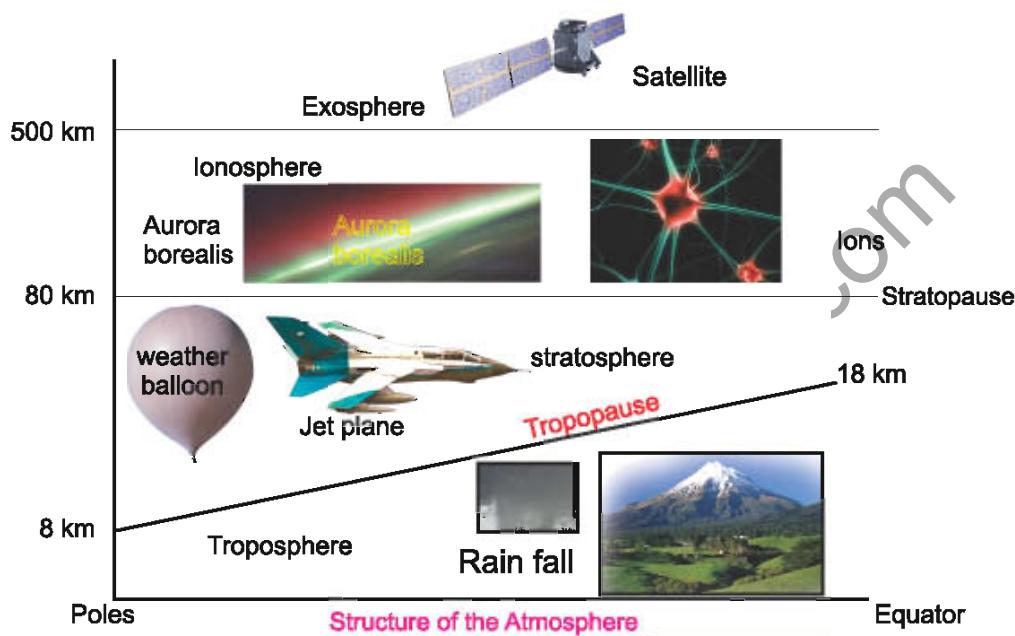
**Do you know?**

**Meteorology** is the scientific study of the atmosphere, focusing on weather processes for short term and it is the study of lower layer of the atmosphere.

## Stratosphere

Stratosphere extends approximately for about 80 km. Temperature increases with height. This is the layer where most jet planes fly. The top edge of the stratosphere is rich in ozone. It captures the ultraviolet rays of the

sun and takes the harmful effects out. Since unfiltered radiation from the sun can destroy all animal tissues, Ozone is very important for all living beings on earth. This zone is also called **isothermal layer** or **ozoneosphere**. Above the stratosphere, there is again a buffer layer called the **stratopause**.



sun and takes the harmful effects out. Since unfiltered radiation from the sun can destroy all animal tissues, Ozone is very important for all living beings on earth. This zone is also called **isothermal layer** or **ozoneosphere**. Above the stratosphere, there is again a buffer layer called the **stratopause**.

## Ionosphere

Ionosphere stretches from 80km to 500km. It is called ionosphere because, in this part of the atmosphere, the sun's radiation is ionized. It reflects the radio waves back to the earth's surface which are useful for modern communication. The colourful displays of auroras are

## Exosphere

The exosphere is the uppermost layer of the atmosphere. The main

### Do you know?

Aerology is a branch of meteorology involves observation and research of the atmosphere using air balloons, radiosondes and airplanes. Aerology concerns the observation and research of ozone, radioactivity and some components of long wave radiation. Hence, it is the study of the upper layer of the atmosphere.

gases within the Earth's exosphere are the lightest gases, mainly hydrogen and helium. The exosphere is sometimes considered a part of outer space.

You have already learnt that the temperature reduces with

increasing latitude. Based on this, the Earth is divided into TORRID, TEMPERATE and FRIGID zones.

#### **Do you know?**

The instrument used to measure the temperature is called the thermometer. The imaginary lines that join different places with same temperature on the map is called Isotherms.

### **TORRID ZONE**

The zone between the Tropic of Cancer ( $23\frac{1}{2}^{\circ}\text{N}$ ) and the Tropic of Capricorn ( $23\frac{1}{2}^{\circ}\text{S}$ ) receive vertical sunrays all-round the year. So they are hotter than the other zones.

#### **Activity**

Do you know about Summer Solstice and Winter Solstice? Find out when they occur and their features.

### **Temperate Zone**

The zone between the Tropic of cancer ( $23\frac{1}{2}^{\circ}\text{N}$ ) and the Arctic Circle ( $66\frac{1}{2}^{\circ}\text{N}$ ) is known as the Northern Temperate Zone. Similarly, the zone between the Tropic of Capricorn ( $23\frac{1}{2}^{\circ}\text{S}$ ) and the Antarctic Circle ( $66\frac{1}{2}^{\circ}\text{S}$ ) is known as the Southern Temperate Zone. These places always receive slanting sun rays. So the temperature here is lower than that of the Torrid Zone.

### **FRIGID ZONE**

The zone between the Arctic Circle ( $66\frac{1}{2}^{\circ}\text{N}$ ) and the North Pole ( $90^{\circ}\text{N}$ ), similarly between the Antarctic Circle ( $66\frac{1}{2}^{\circ}\text{S}$ ), and the South Pole ( $90^{\circ}\text{S}$ ), are called the

Frigid Zones. They always receive the slanting sunrays so these zones are cooler than other two zones.

#### **Do you know?**

There are three scales to measure temperature. They are :  
1) Celsius 2) Fahrenheit and  
3) Kelvin

Air pressure is defined as the pressure thrust by the weight of the air on the earth's surface. The average air pressure at the sea level is 1,013 millibars. The horizontal distribution of the air pressure is highly influenced by the temperature of a given place.

#### **Do you know?**

Barometer is the instrument used to measure the atmospheric pressure.

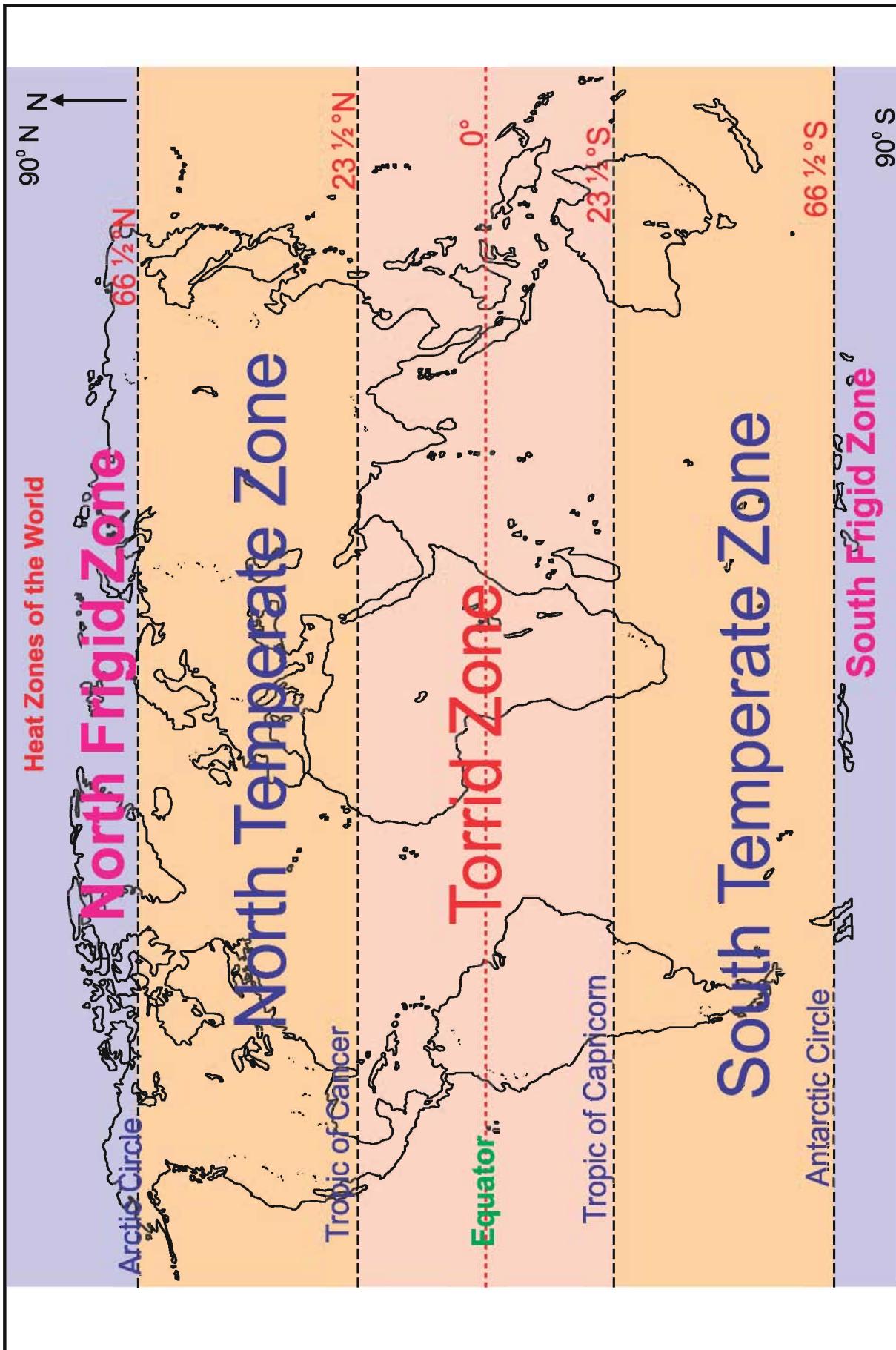
The atmospheric pressure is always inversely related to the atmospheric temperature. The high pressure belts are formed in the areas of low temperature.

### **Equatorial Low Pressure Belt**

This belt lies between  $5^{\circ}\text{N}$  and  $5^{\circ}\text{S}$ . The sunrays are vertical over here throughout the year. Since temperature is high, the air becomes lighter and ascending. It causes low pressure conditions. This zone is otherwise called as "a belt of Calm" or "Doldrums".

### **Subtropical High Pressure Belt**

This zone lies between  $25^{\circ}$  and  $35^{\circ}$  latitudes in both the hemispheres. The ascended air from the tropics is getting cooled due to low temperature so the air descends at about  $30^{\circ}$ - $35^{\circ}$  latitudes.



In ancient times, the merchants carrying horses in their ships had to throw some of them out while passing through this zone of the calm in order to lighten the ship. Hence, this zone is called "horse latitudes".

#### Do you know?

The imaginary lines joining different places with the same pressure on a map are known as isobars.

#### Subpolar Low Pressure Belt

This belt lies between 60°-65° latitudes in both the hemispheres and the air spreads outward from this zone due to the rotation of the earth so the low pressure is produced.

#### Polar High Pressure Belt

This pressure belt persists at the poles. The sunrays fall very slanting at the poles and as a result the temperature is low and heavy air accumulates and produces high pressure.

#### WINDS

#### Do you know?

Anemometer is an instrument used to measure the velocity and direction of wind. Wind vane is used to indicate the direction of the wind.

The air in horizontal motion is called wind. The air generally moves from high pressure area to the low pressure area. The speed of the wind is generally mentioned in kilometers or miles at land and in knots at sea.

#### Do you know?

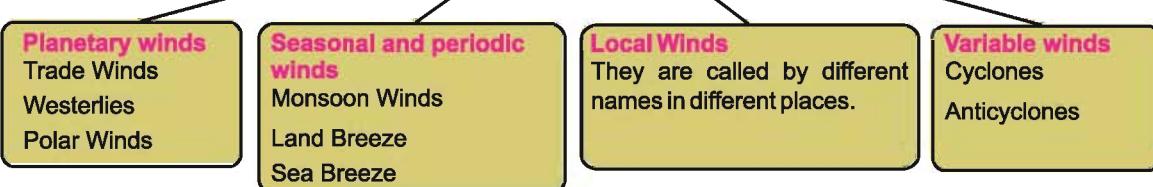
All moving objects including winds and ocean currents tend to get deflected towards right in the Northern hemisphere and left in the Southern hemisphere due to the rotation of the earth. This changeless principle is called the Ferial's Law or Coriolis force.

#### The Classification of Winds

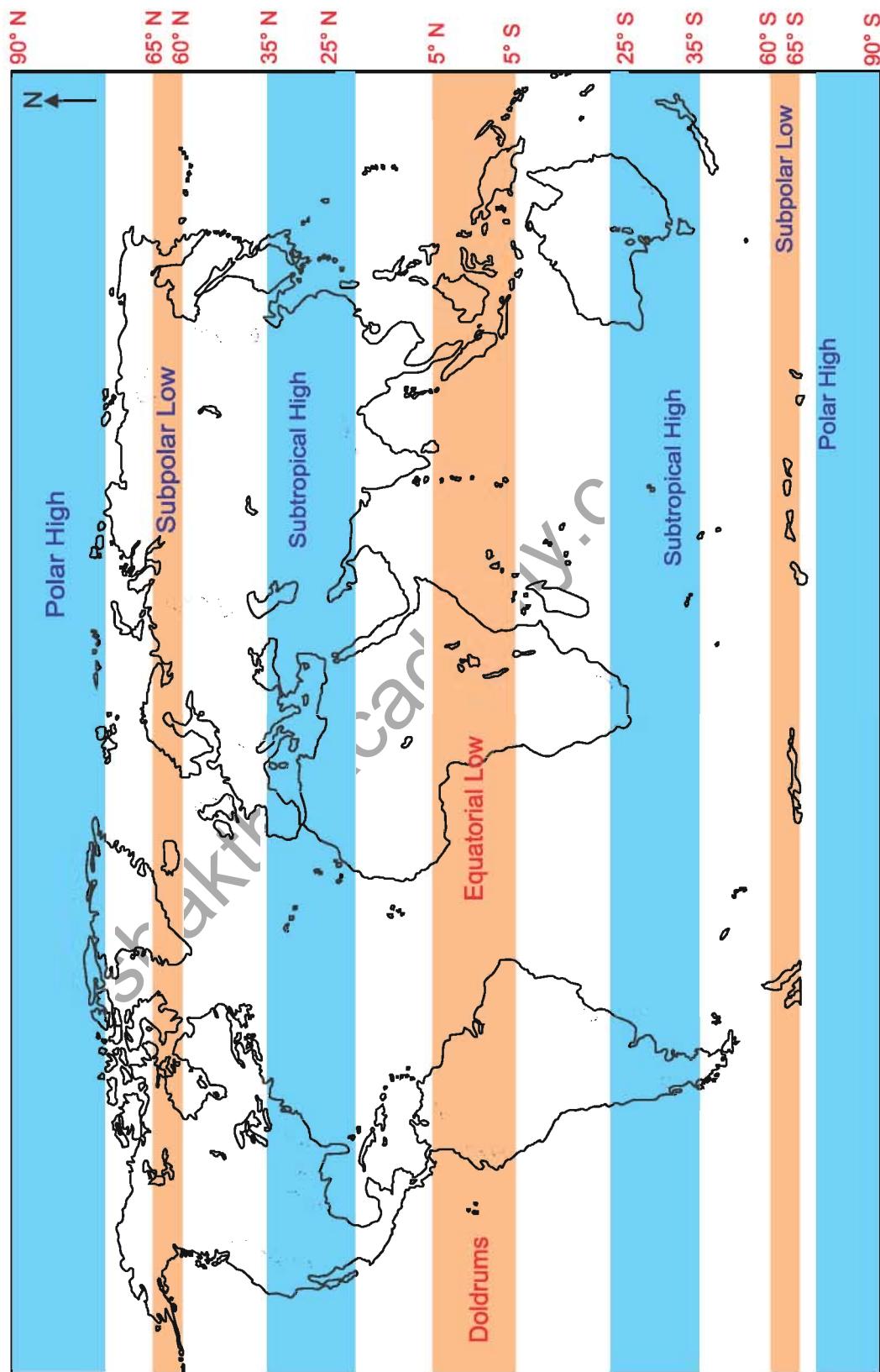
The winds are classified on the basis of the duration of winds and place of origin. They are classified into the following:

#### Planetary Winds

The winds that blow from a particular direction throughout the year are known as the **Planetary winds**. The major trade winds are given below.



## Major Pressure belts of the World



The trade winds blow within the tropics, as *Southeast trades and Northeast trades*. They are called so because once it was favourable for sailors. They are regular and constant especially over the sea. These winds get deflected due to Ferrel's law.

The Westerlies blow from the subtropical high pressure belt to the subpolar low pressure belt in both the hemispheres. In the northern hemisphere, they blow as south westerlies and in the south it blows as the north westerlies. These winds blow along the Earth's rotation from west to east.

The Polar winds blow as easterlies from polar high pressure belt to the subpolar low pressure belt. They are bitterly cold winds and they penetrate into many parts of the interior areas (Example, USA) but in India they are blocked by the Himalayas.

### Seasonal and periodic winds

These winds are mainly caused due to the differences in heating and cooling of the surface of the earth. These winds blow only at specific time.

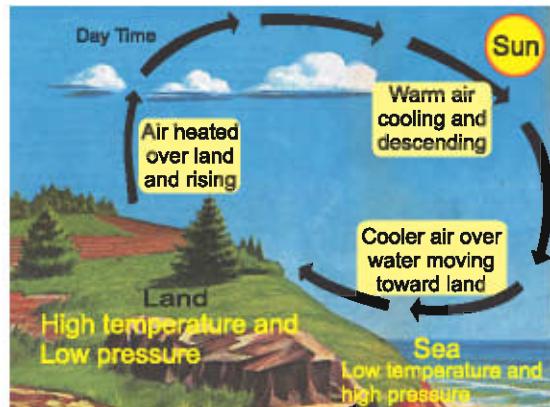
### Monsoon winds

The monsoon is derived from the Arabic word "**Mausim**", which means seasons. The monsoon winds are further divided into Southwest Monsoon and Northeast Monsoon. The Southwest Monsoon winds blow from the south Indian Ocean and South Pacific Ocean towards Asia whereas the Northeast Monsoon winds blow from the

Asian high pressure areas to the Indian Ocean and Pacific Ocean. The details of these winds will be given in higher classes.

### Sea breeze

During the daytime, the land becomes warmer than the adjoining water bodies. As a result, a low pressure on the land and a high



**Sea breeze**

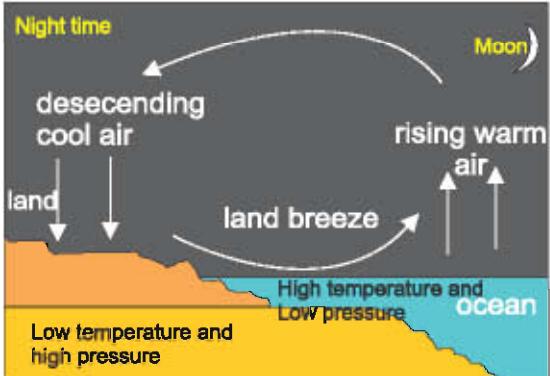
pressure on the water body is formed; this leads to the cool wet breeze from the sea to blow towards land in the late evening.

### Activity

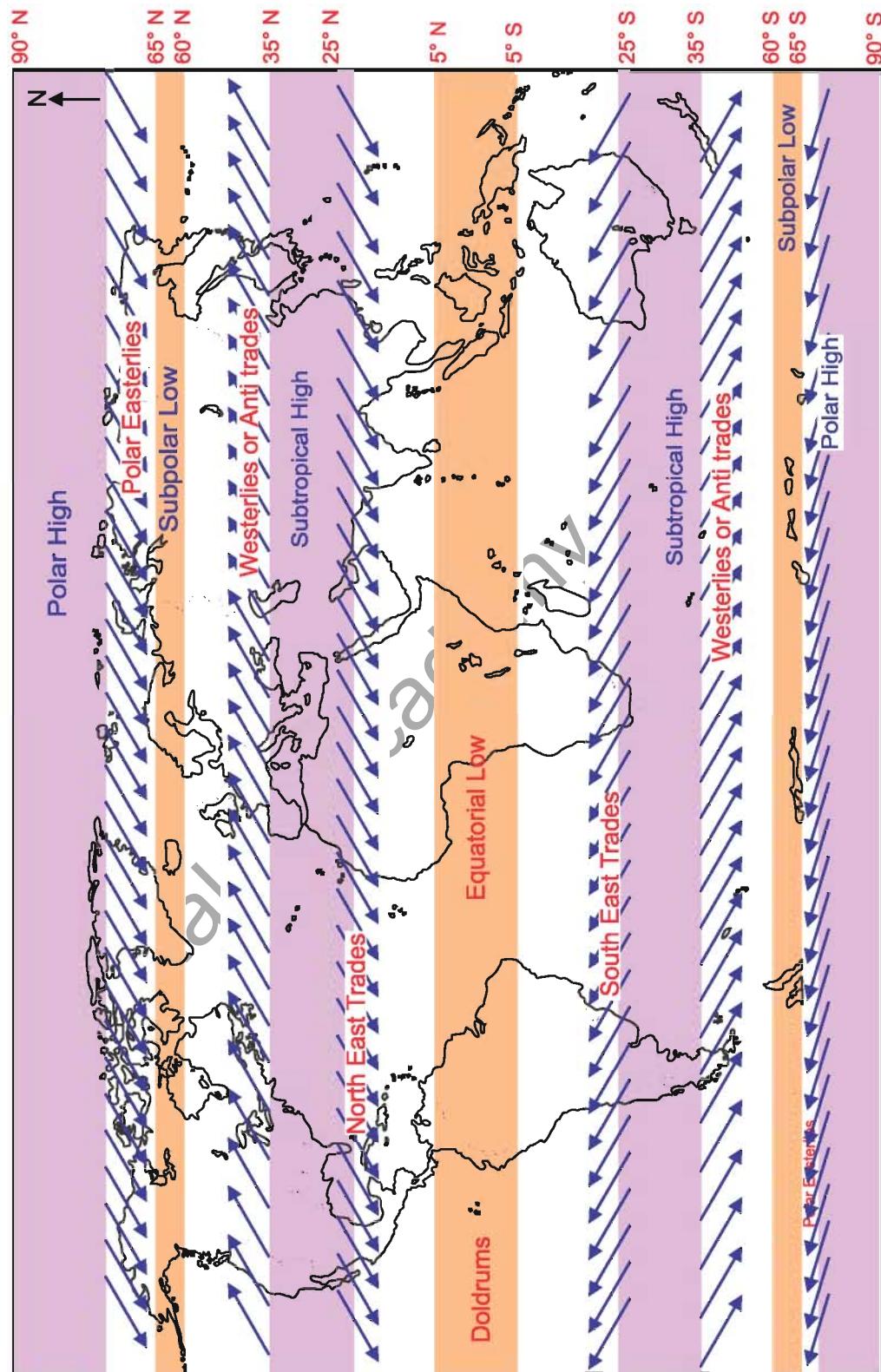
Find out why people go to the beach in the evening not in the noon during summer

### Land Breeze

During the night time the land becomes cooler than the adjoining water bodies. So there is a high



## Planetary Winds of the World



pressure on the land and the low pressure on the water body. Hence cool dry breeze blows from the land towards the sea in the early morning.

### Activity

How does land breeze help fishermen to go for fishing?

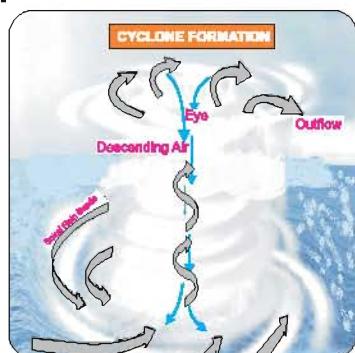
### Variable winds

The variable winds have no definite location or direction. These winds get fluctuated in direction and speed.

### Cyclones

The cyclones are the centres of a low pressure system. They attract winds from all directions.

Moreover, they are associated with heavy rain and high speed winds.



Cyclone formation



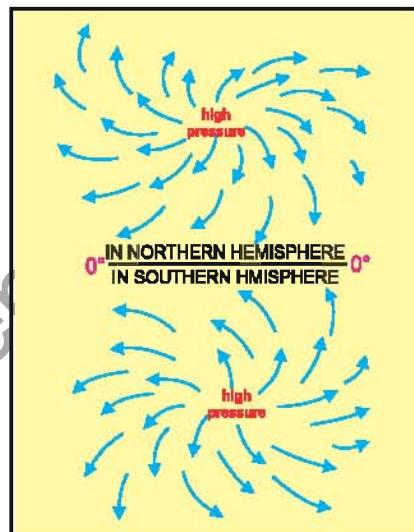
Eye of the cyclone

The centre of the cyclone is the vacuum area which is termed as "the eye of the cyclone". According to its origin and its location it is called by different names such as cyclones,

typhoons and hurricanes. They move anti-clockwise in the northern hemisphere and clockwise in the southern hemisphere. When a low pressure system is formed over water bodies, it is violent and causes rainfall.

### Anticyclones

The anticyclones are the centres of the high pressure systems from which the wind



movement takes place outward. These winds are associated with clear weather and no rainfall. The anti-cyclones move clockwise in the northern hemisphere and anti-clockwise in the southern hemisphere. They are mostly formed over the land and so they are dry.

### Local winds

These winds blow with some special characteristics over a small area and last for a short period. All these winds are mostly seasonal and are given local names. Some of the local names and the areas related to that are given below.

**WARM LOCAL LOCATION****WIND**

Brick fielder	Australia
Chinook	USA
Fohn	Northern Italy
Sirocco	Sahara desert
Loo	Thar desert in India



Stratus clouds



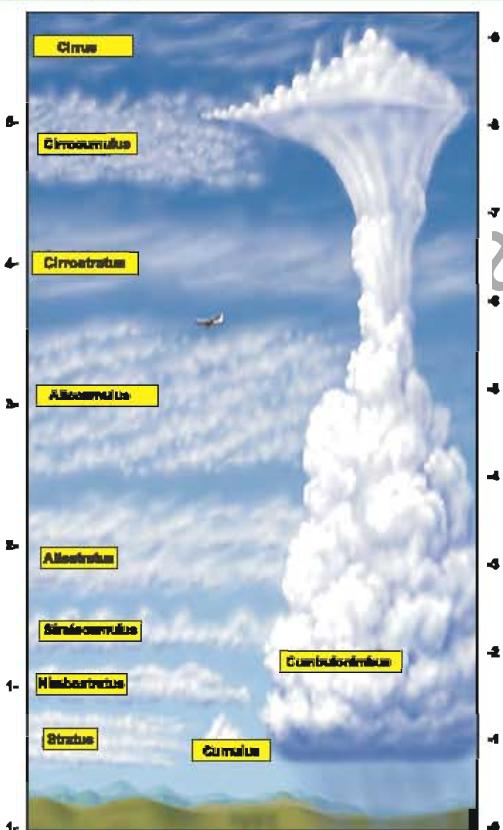
Cumulus clouds



Nimbus clouds

**COOL LOCAL LOCATION****WIND**

Harmattam	Central Africa
Mistral	Alps region
Purga	Russia
Norte	Gulf of Mexico
Pampero	Argentina

**CLOUDS**

Cirrus clouds

A cloud can be defined as a mass of small water droplets or ice crystals formed by the condensation of water vapour in the atmosphere. Clouds are formed by very minute suspended water particles present in the atmosphere. According to the shape and altitude, the clouds are classified as Cirrus, Stratus, Cumulus and Nimbus.

**Cirrus clouds** are high clouds because they are formed above 5,000 metres above sea level. They are naturally dry, consists of ice crystals and never bring rainfall. These clouds are long, fibrous, and curved, with no tufts or curls at the ends.

**Stratus clouds** are low clouds because they are formed within 2,000 metres above the sea level. They have uniform base and look like a dark grey sheet. They may cause snow and drizzle.

**Cumulus clouds** are often described as "puffy" or "cotton-like" in appearance which are medium clouds. Cumulus clouds may appear

alone, in lines or in clusters. These clouds are associated with rainfall, lightning and thunder. They are otherwise called thunder clouds. They extend up to 12,000 metres high above the sea level.

**Nimbus clouds** are vertical clouds. They are thick dark or grey or black clouds. They cause continuous rainfall so they are known as storm or rain clouds.

### Rainfall

Rainfall may be defined as the water drops that fall from the clouds to the earth. The mechanism of rainfall begins from evaporation and it continues as condensation at considerable heights. Later on, the clouds are formed which may cause Rainfall is classified into 3 types, namely:-

- Conventional Rainfall
- Relief or orographic Rainfall
- Cyclonic Rainfall

#### Do you know?

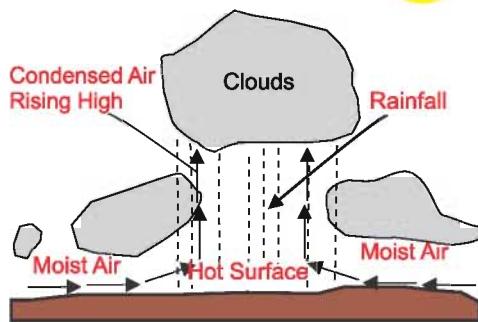
Raingauge is an instrument used to measure the amount of rainfall. The imaginary lines that join different places having same amount of rainfall on a map are known as Isohyets.

### Convectional rainfall

The equatorial regions receive vertical sunrays, and hence become hot. The hot air expands and rises vertically upwards. As the temperature reduces gradually, the air gets cooled and forms clouds. When the clouds reach the dew point, they cause rainfall. This is known as convectional rainfall. This type of rainfall is accompanied with

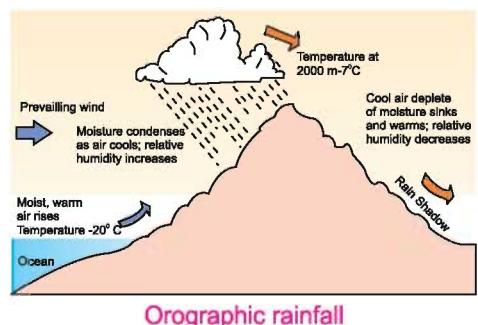
thunder and lightning. Usually, it occurs around 4'O clock, hence, it is called 4'O clock rainfall.

#### Conventional Rainfall



#### Relief or Orographic rainfall

The winds that blow from the sea contain a lot of moisture. When the moisture-laden winds from sea climb the hill slope, the winds become cool causing heavy rainfall on the windward side. Then these winds descend on the leeward side of the mountains and cause low to no rainfall.



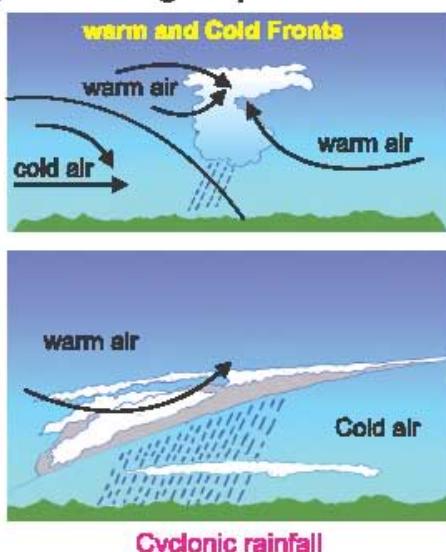
#### Do you know?

Though Kerala and Tamil Nadu lie on the same latitudes Kerala receives more rainfall because the state of Kerala lies on the windward side of the Western Ghats, but TamilNadu lies on the leeward side.

### Cyclonic rainfall

The warm air from the hot area is further heated and moves upward. Hence, a low pressure area is

developed and attracts air from the adjacent high pressure areas.



Owing to Earth's rotation, the wind gets deflected and a circular motion of winds develop. The air rises upward in the form of a funnel. The rising air gets cooled and condensation takes place. This brings heavy rainfall in the low pressure centres. Example during October, November and December, the Northeast Monsoon season period, there are a number of cyclones caused along the coast of Tamil Nadu, Andhra Pradesh and Orissa.

### Lightning

Lightning can be defined as the atmospheric discharge of electricity. It is accompanied by thunder. It travels at a speed of 96,560 miles per second.

Lightning



### Do you know?

The study or the science of lightning is called Fulminology. The person who studies lightning is referred to as a Fulminologist.

There are 16 million lightnings every year. Generally, lightning is associated with convectional rainfall, cyclonic rainfall and also clouds formed from volcanic eruption. Lightning is formed by the meeting of the positive and negative charges in the clouds containing ice. Researchers are hoping to generate electricity from lightning.

### Do you know?

Find the reason for the cancellation of 23,000 aircrafts at the time of volcanic eruption in Iceland in April 2010.

### Thunderstorm

Thunderstorms are produced by cumulonimbus clouds. They are usually of short duration. They are accompanied by lightning, thunder, strong wind gusts, heavy rain and

### cumulonimbus clouds



Thunderstorm

sometimes hail. The presence of warm and humid air in the lower layers of the atmosphere, atmospheric instability and intense convective activity are the requirements for its origin.

Since the thunderstorms are accompanied by many weather elements, Meteorologists refer them to as weather factories. The

formation of the thunderstorms ranges from 4 to 20 km.

In the tropical regions, they occur on the land in the rainy season usually in the afternoon or evening. But in the oceans, they occur during night. In the regions with a monsoon type of climate, they occur in the beginning and at the end of the summer monsoon.

## EXERCISE

### I) Fill in the blanks.

1. The Greek word 'Klima' refers to \_\_\_\_\_.
2. The temperature on the earth's surface decrease at the rate of \_\_\_\_\_ for every 1000 metres.
3. El Nino means \_\_\_\_\_ in Spanish.
4. The \_\_\_\_\_ is a metropolitan area which is significantly warmer than its surrounding areas.
5. The \_\_\_\_\_ is the boundary between the troposphere and stratosphere.
6. The Equatorial low-pressure belt is called \_\_\_\_\_.
7. The air in horizontal motion is called \_\_\_\_\_.
8. The name of the local wind which blows over Thar desert in India is \_\_\_\_\_.
9. The study of the science of lightning is called \_\_\_\_\_.
10. Thunderstorms are produced by \_\_\_\_\_ clouds.

### II) Choose the correct Answer.

1. In the tropical regions, \_\_\_\_\_ is a major crop.
  - a) Paddy
  - b) Wheat
  - c) Tea
  - d) Barley
2. During El Nino period the temperature rises rapidly once in three to eight years along the coast of \_\_\_\_\_.
  - a) Peru and Ecuador
  - b) Spain and France
  - c) India and Pakistan
  - d) China and Japan
3. The difference between maximum and minimum temperature of the day is called \_\_\_\_\_.
  - a) Terrestrial radiation
  - b) Diurnal range of temperature
  - c) Annual range of temperature
  - d) Isolation

4. \_\_\_\_\_ is an instrument used to measure the atmospheric pressure.  
a) Thermometer   b) Hygrometer   c) Barometer   d) Wind vane
5. Sub tropical high-pressure belt is called \_\_\_\_\_.  
a) Doldrums   b) Horse latitudes   c) Coriolis force   d) Belt of calm
6. In \_\_\_\_\_ layer, the sun's rays are ionized.  
a) Troposphere   b) Stratosphere   c) Ionosphere  
d) Exosphere
7. \_\_\_\_\_ clouds are associated with rainfall, thunder and lightning.  
a) Cirrus   b) Stratus   c) Cumulus   d) Nimbus
8. \_\_\_\_\_ type of rainfall is also called 4'o clock rainfall.  
a) Convectional   b) Orographic   c) Cyclonic   d) Monsoon
9. The average air pressure at the sea level is \_\_\_\_\_ millibars.  
a) 1008   b) 1020   c) 1033   d) 1013
10. The \_\_\_\_\_ clouds are vertical clouds.  
a) Cirrus   b) Stratus   c) Cumulus   d) Nimbus

**III) Match the following.**

- |                       |   |
|-----------------------|---|
| 1. Global Warming     | - Vacuum  |
| 2. Thermometer        | - Human influence                                   |
| 3. Anemometer         | - Weather factory                                   |
| 4. Eye of the Cyclone | - Instrument showing velocity and direction of wind |
| 5. Thunderstorms      | - Instrument measuring temperature                  |

**IV) Write short answer for the following.**

1. Differentiate weather and climate.
2. What are the advantages and disadvantages of meeting warm of and cold ocean currents. ?
3. List the mechanisms by which the earth receives the solar radiation.
4. What are the scales to measure temperature?
5. Differentiate Isobars and Isohyets.
6. Define Ferrel's law.
7. What are planetary winds?
8. What is lightning? How are they formed?
9. What is weather factory?
10. Differentiate equable and extreme type of climate?

## V. Brief Answers.

1. What are the factors determining weather and climate? Explain EL Nino or Human influences.
2. What are the heat zones of the Earth? Explain any one of them with a neat diagram.
3. What is called land breeze? Explain with a neat diagram.
4. What is called sea breeze? Explain with a neat diagram.
5. What are the types of rainfall? Explain convectional rainfall with a diagram.
6. Differentiate orographic rainfall and cyclonic rainfall.
7. Write a note on thunderstorms.
8. What are clouds? Write the types of clouds and explain any one of them in detail.
9. What are the layers of atmosphere? Explain any one of them with a diagram.

## VI. Map skill:

1. Draw heat zones of the earth on the outline map of world.
2. Mark the major pressure belts of the earth on the outline map of world.
3. Mark the major planetary winds of the earth on the outline map of world.

## FORMATIVE ASSESSMENT

1. Find out and write on essay on the factors determining weather of your locality.
2. Draw a chart to show Earth's atmosphere.
3. Bring out a diagram to show uses of land breeze and sea breeze.
4. Draw maps to show heat zones, major pressure belts and planetary winds of the world.
5. Have a discussion on what are the types of rainfall you receive, and when do you receive the same in your locality.
6. Name the cyclones formed in the recent years, and mention the year in which they formed, and write an essay on any one of them with the photos and pictures related to it.
7. Have a debate on "The effects of no cloud formation".
8. Find out the celebration and festivals which are associated with weather and climate in different parts on the world or in Tamil Nadu.
9. On the outline map of world mark the hot deserts and the cold ocean currents related to it.
10. Write an essay on winter solstice and summer solstice.

**GEOGRAPHY****1. DISASTER AND DISASTER MANAGEMENT**

In recent times the country has witnessed many natural calamities like floods, land-slides, tsunami and earthquakes. These disasters leave a trail of destruction and sufferings. It takes lot of time and money to rebuild and rehabilitate the people who had been affected. In this chapter you will study about what is disaster and how these disasters can be managed so that sufferings can be mitigated.

**What is Disaster**

Any event that negatively affects society or community or environment can be called as disaster.

According to UN a disaster is defined as: "a serious disruption of the functioning of society, causing widespread human, material or environmental losses which exceed the ability of affected society to cope using only its own resources"

Why do these disasters occur? Some of these events happen due to natural causes over which we have no control. But other events occur due to the fact that we have over a period of time overexploited our natural resources. This has resulted

in flash floods, land-slides, soil erosion, global warming, drought etc. Since we are also responsible for the occurrence of disaster, it is our duty to learn the sustainable use of resources to overcome the adverse effects of the various disasters.

Hazard is an exposure to risk whereas disaster is a threat to life and property of a community. Cyclone is a hazard and it becomes a disaster when the same causes loss of life and property.

The disasters are broadly classified into Natural and Man-made. The natural disasters occur due to the natural forces whereas the man-made disasters occur due to human negligence, carelessness and ignorance.

**Mitigation**

The definition of Mitigation is "to make (something bad) less severe". Disasters due to natural causes like cyclones cannot be avoided but the sufferings can be mitigated by taking steps in advance to protect life and property of people.

**Earthquake**

A sudden movement or trembling of the earth's crust is called an earthquake.

**Disaster****Natural Disasters**

Earthquakes, Volcanoes, Landslides, Avalanches, Cyclones, Floods, Droughts, Tornadoes and others.

**Man-Made Disasters**

War, fire accidents, road accidents, ship wrecks, nuclear explosions, electric accidents and others

The movement of the tectonic plates, volcanic eruptions, mass wasting, landslides, and surface fault line are the reasons for earthquake's occurrence.

Although hundreds of earthquakes occur in a year they are too weak to be detected except by an instrument called seismograph. One or two severe earthquakes do occur in one or the other parts of the world. The point where the earthquake originates is called **seismic focus** and the point directly above on the earth's surface is called the **epicentre**.

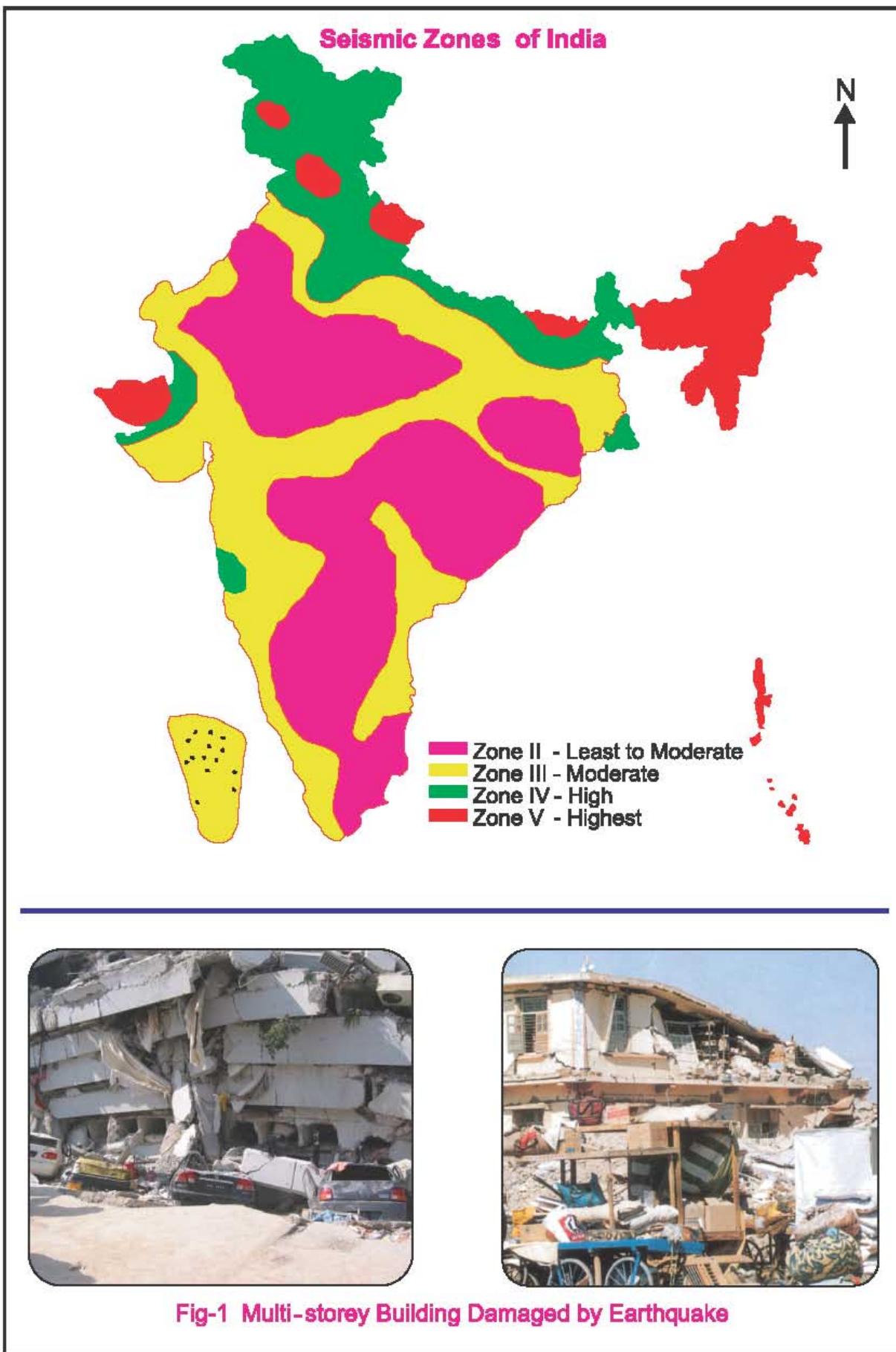
An earthquake is generally considered to be the most destructive and frightening of all forces of nature. The effect of an earthquake depends on its strength and closeness to the epicentre. Due to a strong earthquake, buildings, roads, bridges and dams may get damaged. It may cause floods,

tsunamis, land-slides, avalanches, fires ,breakdown of water supply and electrical lines, and loss of lives.An earth quake may even change the course of a river. A mild earthquake may cause cracks in buildings, roads and bridges.

On 26<sup>th</sup> January, 2001, 51<sup>st</sup> Republic Day of India, there was an earthquake in Gujarat with the magnitudes ranging from between 7.6 and 8.1 on the Richter scale. The shock waves spread to 700 km, 21 districts were affected, 6,00,000 were rendered homeless, 19,727 people died and 1,66,001 people were injured. The quake destroyed around 90% of homes, eight schools, two hospitals and a historic Swami narayan Temple.

India is divided into four seismic zones. These are listed in the following table.

Sesmic Zones	Regions	Types
V	Kashmir, Punjab, Western and Central Himalayas, Northeast Indian Region and Rann of Kutch.	Very High Damage Risk Zone.
IV	Indo-Gangetic basin, Delhi, Jammu and Bihar.	High Damage Risk Zone.
III	Andaman and Nicobar Islands, Western Himalayas.	Moderate Damage Risk Zone.
II	Deccan Plateau, Tamilnadu.	Low Damage Risk Zone.



## Mitigation

What can be done to lessen the severity of damages?

In order to minimise the damages to life and property due to an earthquake an awareness has to be created in the public especially people living in the earthquake prone areas. People should be encouraged to build earth quake resistant homes. They should be helped to check the quality of soil before building their homes. The people should be made aware of the steps they should take during an earthquake. Awareness campaigns have to be made in schools so that right from an early age they learn how to protect themselves during an earthquake.

What are the steps that one can take during an earthquake?

The most important thing one must do is to remain calm. If you are inside a building stand at the doorway, or crouch under a desk or a table away from widows or glass fixtures.

If you are outside, stay away from objects such as electric poles, trees , buildings, telephone and electrical wires. If you are in an automobile, stop at an open place away from fly overs and under passes.

Make sure to switch off gas stoves, put off candles or lamps and electrical lights to prevent fire.

If you live in multi-storied buildings do not use lifts, but instead use the staircase to get out.

## Volcanic Eruptions

Unlike earth quakes volcanic eruptions can be predicted because before a volcanic eruption there is always slight tremors, smoke and evolution of gas .

Due to volcanic eruptions 'lava flows and ' lahars' can destroy settlements and destroy forest and agricultural lands..

Mud and ash from volcanoes when mixed with rain water or melted snow form mud flows which are called as Lahars.

The ash cloud and the smoke evolved affect visibility ,thereby affecting air traffic and may also affect agricultural and other economic activities.

Though volcano eruptions cause great havoc there are some positive effects also. The ash and mud deposited provide nutrients to the soil thereby improving the fertility of the soil. The volcanic materials are used for industrial purposes. Rocks formed by lava are used for building roads. The steam and hot water released can be used to generate geo thermal energy.



Fig-2 Iceland Volcanic explosions emits ash plume

The eruption of Nevado del Ruiz of Columbia in November 13, 1985 killed 40,000 people. It wiped out the entire city of Armero. Likewise, the most recent volcanic eruption in Iceland occurred on April 14, 2010, which erupted with a large ash plume (due to magma spewed from below the ice). More than 20 countries had to shut down their airports because of the ash plume.

### Mitigation

Volcanoes rarely kill people, still people should stay away from volcanoes.

All transport facilities are to be avoided, especially air transport near volcanic regions.

Volcanic eruptions may cause earthquakes. So people should take precautionary measures.

From the snow covered mountains, the volcanic eruptions may cause melting and flooding and therefore embankments must be built.

People should be aware of the results of tilt meter which measures the expansion of a volcano.

### Tsunamis

They are killer waves or Giant waves generated by earthquakes, volcanic eruptions or underwater landslides. It can raise to 15 metres or more in height. When earthquakes occur in the sea or ocean, the sea waves rise to several meters and may reach the coast within a few minutes. The danger period of Tsunami can continue for many hours after a major earthquake.

### Do you know?

The term "Tsunami" has been coined from the Japanese word. "Tsu" means harbour and "nami" means waves.

Tsunami waves travel at a speed of 320 kilometer per hour and speed increases when it approaches the continents.



Tsunami

A killer Tsunami hit South East Asian Countries on the 26<sup>th</sup> December of 2004 killing more than 1,50,000 lives.

**Do you know?**

In India Tsunami warning centres has been set up at Hyderabad.

The emotional, economic and ecological toll of the disaster cannot be calculated. Many villages have lost entire generation. This was the biggest Tsunami to hit the world in 40 years. No one could have thought that its effects would ripple worldwide overnight.

**Mitigation**

People should be aware of the information given by the Tsunami Warning Centre located at Hyderabad in India.

People should vacate the coastal area as soon as the tsunami warning is released.

Seriously injured persons should be given immediately First Aid.

Fisherman should not go for fishing.

We should not assume only the first wave is dangerous whereas the successive waves could be more dangerous.

**Landslide**

Landslide

Land-slides may be defined as the movement of rock and debris down a slope. Debris mixed with rain water is called as mudflow or mud slide

Landslides are caused due to instability of the slope, heavy rainfall, earthquake, volcanic eruption, deforestation and also indiscriminate construction activity.



Landslide

Landslides affect agricultural production, destroy settlements, damage roads and railways and change the direction of surface run off.

**Mitigation**

If houses are built on soft soil and slide prone areas, an alternative path for sliding soil should be provided.

When there is a chance of the roads being affected by landslides or mud slide alternate routes should be planned for quick evacuation.

**Avalanche**

An avalanche can be defined as a large mass of snow or ice, descending down the mountain slope. It occurs in the high latitudes and at the high altitudes.

Avalanches are provoked by earthquakes, extreme precipitation, man-made disturbances such as loud noise, heavy movement of the skiers and use of explosives. The Avalanches become severe when more accumulation of snow takes place at the time of avalanches.

The effects of Avalanches are destruction and blockage of the roads, destroying a small hamlet, vegetation and wild life.



Avalanches



Avalanches

### Mitigation

It is difficult to check or stop the avalanches but the power of avalanches can be reduced to minimize its effects.

Hill resorts, mountain towns, roads and railways are to be avoided in the areas of avalanches.

People should be instructed not to use explosives.

People who live on hill slopes should be encouraged to plant trees around their houses.

In areas of avalanches, travelling in any mode of transport should be avoided.

### Cyclones

South Indian coastal areas are affected more by cyclones than by any other disaster. Every year, the cyclones cause a few deaths along the coromandel coast, especially in Andhra Pradesh and Orissa.

The Indian Coastal regions are among the six major cyclone prone regions of the world.

The cyclones are the strongest winds generated by the meeting of the cold and warm fronts in the centre of low-pressure systems. When they are all formed over the sea and oceans they become violent due to the fact that there are no barriers to check these winds.

The cyclone is always associated with strong winds and torrential rains. Strong winds may uproot trees and electrical poles thereby blocking roads, damaging buildings and disrupting electricity supply. Torrential rains will lead to water logging and floods affecting normal lives of people. Heavy rains will result in Soil erosion and destruction of standing crops. There also may be loss of lives due to falling of trees, collapsing of buildings and washing away of homes. Water logging for a longer period will cause the spread of water borne diseases like cholera and typhoid.



Super cyclone 1999

### Do you know?

On October 29, 1999 Super - cyclone winds with a speed of 260-300 km/hour hit the 144 km coast of Odisha with a storm surge. It caused the water of the Bay of Bengal to rise 8 metre higher than normal. The super storm entered inland beyond 250 km from shore and within 36 hrs ravaged more than 20 million hectares of land, devouring trees and vegetation, leaving behind a huge trail of destruction. The violent cyclone was like a merciless giant and broke the backbone of odisha state and killed thousands and devastated millions of hectares of land.

### Mitigation

In water logged areas temporary channels should be built to drain the water.

Temporary channels should be built to drain water.

People living in old buildings may have to temporarily shift their residence.

People should keep their important documents and jewels in a safe and secure place.

Fishermen are advised by the government not to venture into the sea for fishing.

There is always the danger of electrocution from damaged electrical wires and poles. Hence people have to be careful .

People are advised to drink boiled water to avoid spread of water borne diseases.

People should listen to radio or watch television news to know about the cyclone warnings and follow the instructions announced by the government.

### Floods

Floods are a temporary inundation or overflow of water. They are caused due to very heavy rainfall, cyclones, melting of snow, tsunami or a dam burst. Floods are common features in Tamilnadu, Andhra Pradesh, and Orissa due to very heavy rainfall during the Northeast Monsoon season and in Mumbai during the Southwest Monsoon season.

Floods destroy sewage system, pollute water, cause soil erosion, silt deposition, water logging, destruction to agricultural fields, livestock, damage to the fishing equipments, building structures and to the loss of life.

Why do floods occur every year in the north Indian rivers, when compared to the south Indian rivers? Think!

**Floods**

Floods and droughts are the two problems caused due to the vagaries of monsoon.

### Mitigation

People in low lying area should move out to safer places as advised by their governments. To avoid overflow of water, Channels have to be dug to drain out water from agricultural fields and low lying areas. Sand bags are to be placed in front of the houses such that water does not enter the homes.

Ponds and lakes should be desilted, river embankments have to be raised and the drainage system de-blocked before the onset of monsoon.

For a long term solution to repeated floods afforestation is to be encouraged and rainwater harvesting methods to be implemented.

Older students may volunteer by collecting and distributing clothes and food packets to help people who have been affected by floods.

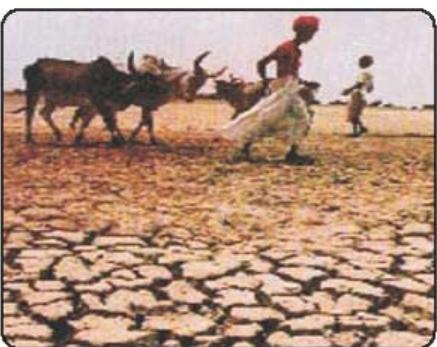
### Drought

Drought refers to the prolonged

dryness of weather due to lack of rainfall. It is difficult to indicate the time of its onset and end. According to the Indian Meteorological Department, the country is declared as drought-affected when overall rainfall deficiency is more than 10 % over a long period.

The major reason for the drought is the scarcity of rainfall. Scarcity of rain can be listed due to failure of monsoons, vagaries of monsoons, deforestation, environmental degradation, high rate of evaporation, poor land management, overgrazing and soil erosion.

The rainfed crops are mostly affected due to droughts. Other effects are: (i) scarce drinking water supply, (ii) shortage of food, (iii) lack of water to the livestock, (iv) nutrition deficiency diseases and (v) soil erosion.

**Drought**

## Mitigation

The following are the ways by which loss and suffering can be minimised

Planned land development, alternate cropping for optimal use of land, and drip irrigation method will help in increasing the farm output.

Better storage facility to store grains , proper utilisation of rain water will help in mitigating drought condition.

Fodder and drinking water for the cattle has to be ensured during drought period.

Food grains and fodder should be transported to needy areas .

Drought relief planning at village level has to be undertaken to provide quick relief the affected people.

## Tornadoes

A tornado is a violently rotating column of air that is in contact with the surface of earth and the cumulonimbus cloud(thunder cloud base).Tornadoes occur in many different shapes and sizes but the typical tornado is funnel shaped with the narrow end touching the surface of the earth.

They are caused due to extreme low pressure. They originate in land, generating a rapid whirl wind. They are formed when hot air and cold air are mixed. They cause heavy destruction to both life and property like a cyclone.

**On March 24, 1998:** Violent tornado or tornadoes killed 160 people and injured 2,000 when they streaked through 20 coastal villages on the eastern states of West Bengal and Orissa, Ten people in a boat were killed when they were thrown up to 20ft high.

Thirty-five children were crushed to death when a school building being used as a shelter collapsed at Goborghata in the Balasore district in Orissa. The tornadoes flattened 15,000 homes and left more than 10,000 people homeless.

### Do you know?

In USA, it is known as a twister, because of the twisting motion of funnel shaped cloud.



Tornadoes

## Mitigation

As soon as tornadoes warnings are heard, people need to get inside their homes or storm cellars or lie down on the ground.

If you are outside , stay in a safe place and return home when it is declared safe by the authorities.

Always follow the instructions and warnings given by the authorities.

### Disaster management

Disaster management involves awareness of the different type of disasters, disaster preparedness, prevention, relief and recovery.

People should be forewarned and educated to safeguard themselves

and their property against disasters. Awareness programmes should be organised in schools, colleges and offices. General public should be made aware through radio, newspapers and television programmes. Governments should have a plan of action to mobilise various departments to provide timely and quick relief to the affected people.

### EXERCISE

#### I) Choose the correct answer

1. The major reason for the drought is the \_\_\_\_\_.  
 (a) Scarcity of rainfall      (b) environmental degradation  
 (c) Afforestation      (d) Industry
2. Tornadoes are common in  
 (a) India      (b) Bangladesh  
 (c) China      (d) U.S.A
3. Landslides often occur in  
 (a) Desert region      (b) Forest region  
 (c) Tundra region      (d) Hilly region
4. The word Tsunami has been derived from  
 (a) Tamil      (b) French  
 (c) Japanese      (d) Latin
5. Of the following which is not a natural disaster  
 (a) Nuclear explosion      (b) Deforestation  
 (c) Forest fire      (d) Lightning

**II) Match the following**

- |                 |                        |
|-----------------|------------------------|
| 6. Tornadoes    | - Heavy rainfall       |
| 7. Molten rocks | - Rotating air         |
| 8. Landslide    | - Volcanic eruption    |
| 9. Drought      | - Tsunami              |
| 10. Earthquake  | - Scarcity of rainfall |

**III) Answer the following questions briefly**

11. What is disaster?
12. Define Mitigation.
13. What is Landslide?
14. Differentiate floods and droughts.
15. Differentiate Tornadoes and Cyclones.

**IV) Answer the following questions in detail**

1. What do you meant by disaster? Explain the natural and man made disaster.
2. Write about Tsunami and its effects on environment.
3. What are floods? List out the Mitigation measures of flood affected areas.
4. What is called drought? Write about its effects.
5. Write about the seismic zones of India.

**V) Fill in the blanks**

1. A hazard is an \_\_\_\_\_.
2. India is divided in to \_\_\_\_\_ seismic zones.
3. In India Tsunami warning centre has been set up at \_\_\_\_\_.
4. Debris flow is also known as \_\_\_\_\_.
5. Avalanches occur on the high \_\_\_\_\_ and high \_\_\_\_\_.

**VI) Map Skill**

Mark the seismic zones on the outline map of India.

## FORMATIVE ASSESSMENT

1. Write an essay on Earthquakes occurred in India during 2011 - 2012.
2. Prepare an album on “December 26, 2004 - Tsunami” to show the effects and the steps taken to rebuilt the areas.
3. Find out the reasons for the landslides, which are quite often in the Nilgiri district. Write an essay to stop the landslides with your suggestions and suitable pictures.
4. Have a discussion on cyclone - “Thane” affected areas and steps taken to develop the areas.
5. Draw a poster and advertisement boards to show the importance of “Rainwater Harvesting” to safeguard ourselves during drought.
6. Mark the seismic zones of India on the outline map.

## 2. AN INTRODUCTION TO OCEANOGRAPHY

The ocean plays a crucial role in sustaining life on Earth and is a key element in climate change. The ocean is a store house of mineral resources. Various problems are already witnessed along the coastal areas and small islands for example pollution, exhausted fishing stocks, disappearing coastlines, rising sea level, increasing surface temperatures that threaten life on the earth. Better knowledge on ocean system will help us predict some of the changes expected in the future and hopefully we can overcome all the above problems. The systematic observations of the oceans will enable us to forecast imminent disasters from storms, floods and droughts and to mitigate their effects, by warning the populations at risk.

### **Do you know?**

An ocean (from Greek Ωκεανός, "oceanos" Oceanus) is a major body of saline water and a principal component of the hydrosphere.

### **What is Oceanography?**

Oceanography is a branch of science which deals with the physical-chemical characteristics of ocean water and its depth, temperature, salinity, ocean currents, waves, tides, flora and fauna found at the bottom of the oceans.

Oceans cover about 70 % of the Earth's surface and they contain

roughly 97 % of the Earth's water. A large stretch of water covering a vast area is called an ocean.

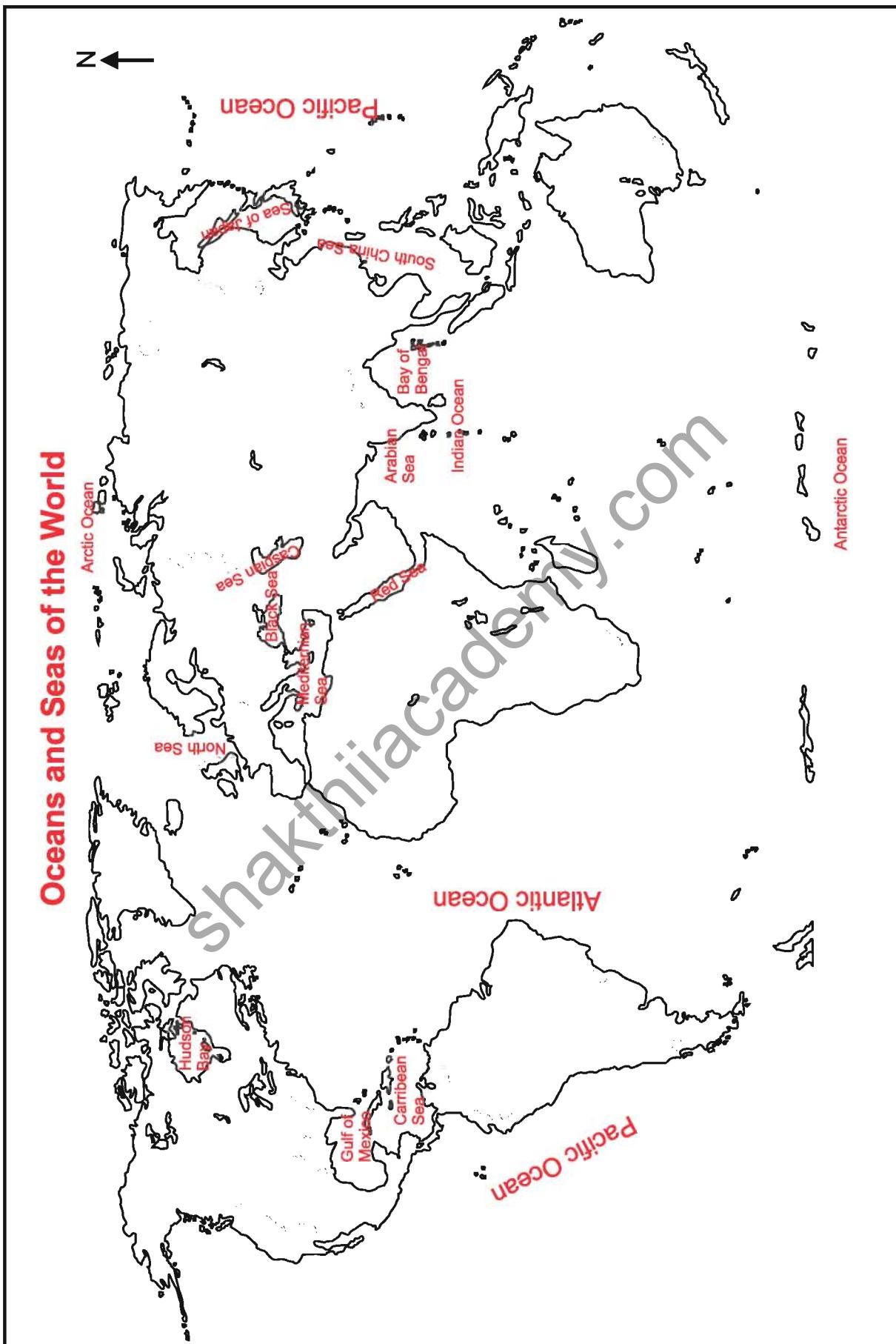
The earth is nick named "**Watery Planet**". The oceans of the Earth are unique in our Solar System. No other planet in our Solar System has liquid water (although recent findings on Mars indicate that Mars may have had some liquid water in the recent past). It is believed that the life on the Earth first originated in the seas.

The oceans of Earth serve many functions, especially affecting the weather and temperature. They modify Earth's temperature by absorbing incoming solar radiation. The ocean currents distribute the absorbed heat energy around the globe.

The Pacific, Atlantic, Indian, Arctic and Antarctic are the five well known oceans and these are connected to one another by means of seas, gulfs, bays, straits and canals.

### **The Pacific Ocean**

The Pacific is the largest and the deepest ocean. It is triangular in shape and covers 33 % of the total area of the earth's surface. Its average depth is 5,000 metres. It is bounded by Asia and Australia on the west, North America and South America to the east and Antarctica to the south.



The Challenger Deep (Mariana's Trench) in the South Pacific is the deepest in the world with 11,033 metres. There are 20,000 islands in the Pacific Ocean. New Zealand, Indonesia, Japan and Hawaii are the well known islands.

### **The Atlantic Ocean**

The Atlantic Ocean is elongated 'S' in shape and it extends over 16.5% of the total area of the earth. The area of this ocean is about 50% of the Pacific Ocean. It is bounded on the west by North and South Americas, east by Europe and Africa. The important islands found in the Atlantic Ocean are Greenland, British Isles, Newfoundland, West Indies, Cape Verde and Canaries. The Atlantic trade route is considered as the world's busiest trade route.

### **The Indian Ocean**

The Indian Ocean covers 20% of the total area of all oceans of the world. On the north, it is bounded by India, Pakistan and Iran; on the east by Australia, Sunda Islands and Malaysia and on the west by the Arabian Peninsula and Africa. On the southwest, it joins with the Atlantic Ocean near the southern tip of Africa. On the east and southeast, it meets the Pacific Ocean. The average depth of the ocean is 4,000 metres. Andaman, Nicobar, Maldives, Madagascar, Sri Lanka, Sumatra and Java are the well known islands of the Indian Ocean. This is the only ocean named after a country since the sea route was familiar for the traders from time

immemorial.

### **Antarctic Ocean**

This is the fourth largest, coldest and southern most ocean found around the continent of Antarctica. This ocean is often referred to as the "Southern Ocean". Alexander Islands, Balleny islands and Ross islands are some of the islands found in the ocean. The average depth of this ocean is about 4,500 metres and its temperature varies from -2 to 10°C. In winter, more than half of its surface is covered with ice.

### **The Arctic Ocean**

The Arctic Ocean is almost circular in shape and it surrounds the North Pole of the earth. Its total area is about 14 million square kilometres. It has an average depth of 4,000 metres. The main islands are Victoria islands, Elizabeth islands, Iceland, Spitsbergen and Novaya Zembla.

### **The Seas of the World**

There are many inlets known as seas; seas are often partly enclosed by land. The South China Sea, the Caribbean Sea, and the Mediterranean Sea are some of the major seas of the world.

### **Topography of the Ocean Floor**

The ocean floor profile begins where the water meets the land at the shoreline. The shoreline is very unstable. It changes due to wave actions and wind actions.

The topography of the ocean floor consists of i) Continental shelf ii) Continental slope and iii) Ocean

floor (abyssal plain).

The **continental shelf** is the shallow area found along the coast with a depth of 100 metres. The continental shelf is a suitable place for coastal fishing since it has rich fish food known as plankton example Grand banks (Newfoundland), Dogger Bank (U.K). This is an area known for many off shore oil fields. Example Mumbai High.

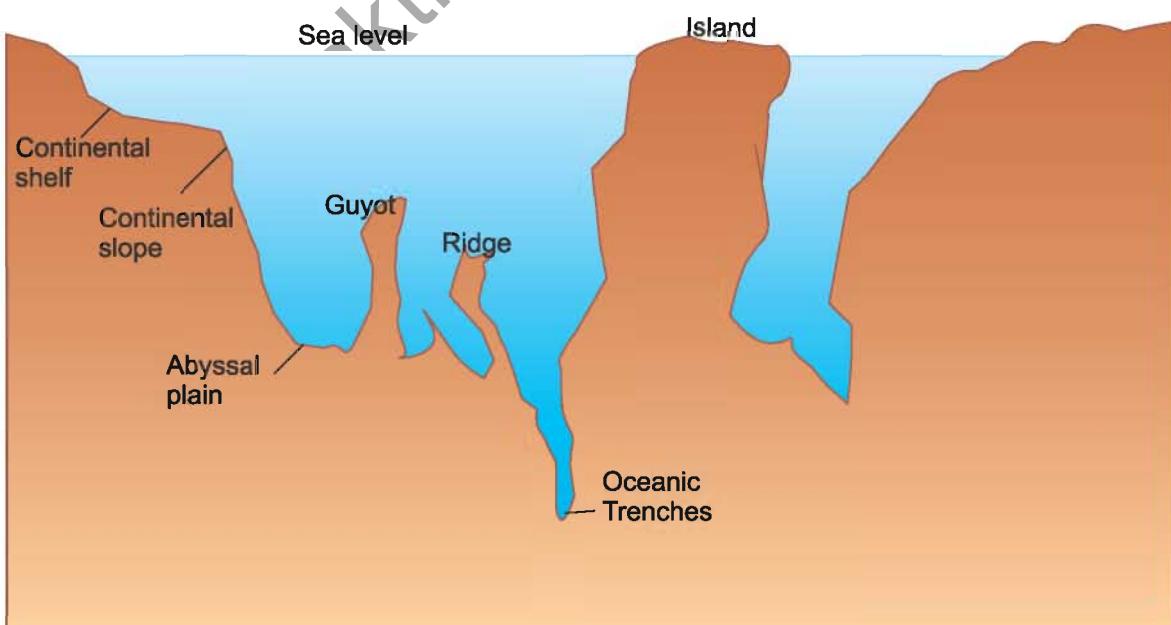
**Continental slope** is a rapid steep slope which connects the continental shelf and the ocean floor. The continental slope and continental shelf are together referred to as the "**continental margin**".

The average depth of the continental slope is about 155 metres.

The irregular coasts and the deep continental slopes are essential for the formation of natural harbours. Example: Kochi and Mumbai. The continental slope is often marked with underwater canyons, cliffs and underwater mud-slides.

The **abyssal plain** is flat to low rolling hills of the ocean floor. The abyssal plain is covered with ooze which is rotten organic materials of dead marine organisms. The **Mid-ocean ridge** is the underwater mountain range formed by the plate tectonic forces.

**Seamounts** are underwater volcanoes that grow with each eruption. If a seamount breaks the surface, it is called an **island**. Once the island is eroded and it slips underwater, it is called a **guyot**.



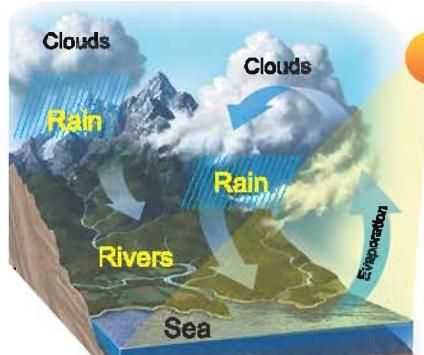
Topography of the Ocean Floor

**Oceanic trenches** are the deepest features in the ocean. Ocean trenches are created when two tectonic plates collide and the denser plate is pushed under the lighter plate.

### Hydrological Cycle

Hydrological Cycle (also known as the water cycle) is the journey that water takes as it circulates from land to the sky and back again. The Sun's heat provides energy to evaporate water from oceans and lakes. Plants also lose water through photosynthesis to the air and it is called evapotranspiration. The water vapor eventually condenses into tiny droplets and form clouds. When the clouds reach saturation point, precipitation (rain, sleet, or snow) is triggered, and water returns to the land (or sea). Some of the precipitation soaks into the ground and this water is trapped between rocks or clay layers; this is called groundwater. But most of the water flows downhill as runoff (above ground or underground), eventually returning to the seas as slightly salty water.

The most common salts in the sea water are sodium chloride,



Hydrological Cycle

magnesium chloride, magnesium sulphate, calcium sulphate, potassium sulphate, calcium carbonate and magnesium bromide.

### Why is the Sea water Salty?

As water flows in rivers it picks up small amount of mineral salts from the rocks and soils of the river beds. This mildly salty water flows into the oceans and seas. The water in the oceans only leaves by evaporating (and the freezing of polar ice), but the salt remains dissolved in the ocean - it does not evaporate. So the remaining water gets saltier and saltier as time passes.

### Activity

Did you ever taste the sea water? why is it salty?

### Salinity

Salinity is the saltiness or the dissolved salt content in **water**. The technical term for saltiness in the ocean is salinity. Salinity is generally reported in terms of parts per thousand (abbreviated  $\text{‰}$ ), the average ocean salinity is 35 grams per kilogram.

### Activity

Why does salinity differ from ocean to ocean?

The saltiest water is in the Dead Sea, Red Sea and in the Persian Gulf which have a salinity of about 40 grams per kilogram (due to very high evaporation rates and low fresh

water entry). Dead sea is the most saline of seas. The least salty seas are in the Polar Regions, where both melting polar ice and a lot of rain dilute the salinity.

### Activity

The salinity in the land locked tropical seas is higher. Why?

### Temperature of the Ocean

Temperature of the ocean water plays the most significant role in controlling its biological characteristics. The role of the sea water temperature is vital in causing the ocean currents and other movements of water. Since oceans have greater capacity for the storage of the solar energy, they play a major role in maintaining the equilibrium in the heat budget of the earth. Land surface gets heated and cooled quickly but water tends to heat up and cool down slowly. This differential heating of the land and water make distinct types of marine and continental types of climates found on the surface of the earth.

The surface temperature of the oceans is controlled by various factors such as the latitudes, ocean currents, prevailing winds and local weather.

### Waves

The water in the oceans is always moving up and down. This movement of water is called waves. Wind is the most important cause of wave generation. Most natural waves are initiated by winds.

The waves travel in some

definite direction, but water does not travel with the waves.

### Ocean currents

Ocean currents are the general movement of a mass of surface water in a fairly defined direction.

In other words, an ocean current may be defined as any persistent, dominantly horizontal flow of the ocean water. The ocean currents, like rivers, flow with certain velocity along a certain path. There are two types of ocean currents: **warm** and **cold currents**. Warm currents originate from low latitude drifts towards poles; whereas cold currents originate from high latitudes and move towards equator.

There are many factors that influence the generation of ocean currents are:

Differences in temperature;

Density of ocean water (salinity);

Winds and Atmospheric pressure;

Coriolis force;

Gravitational force;

Precipitation and evaporation; and

Melting of snow and ice.

### Tides

The rise and fall of sea water is known as tides which occur twice a day due to the gravitational pull of the moon and sun on the earth at an interval of 6 hours. When the sea water rises ,it is called high tide and the fall of sea water is called the **ebb** or **low tide**.

Spring tide occurs during the full

moon days and new moon days. During these days, Sun, Moon and Earth are in a straight line. On such days, the gravitational pull of the moon and sun are combined. At these times, high tides are very high and low tides are very low.

Neap tides occur during first and third quarter phases of the moon. During the phases of the moon, sun, moon and earth are at right angles. As a result, the gravitational pull of the moon are perpendicular to one another. During this time, the high tides are very low and low tides are very high.

### Activity

Listout the marine resources.

### Ocean's influences on human life

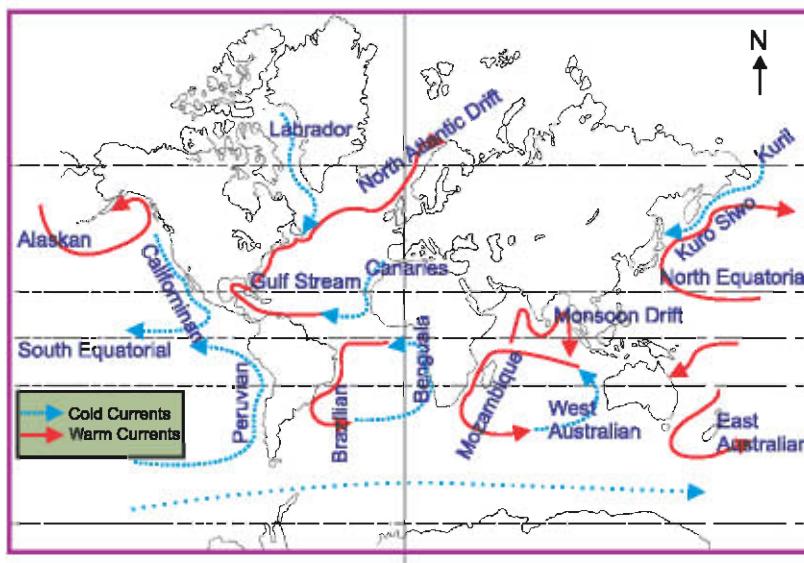
Oceans are a most important part of man's physical environment. Oceans influence man in various ways, from the climate he experiences, the oxygen he breathes and the food he eats to the economic, social, political and

military conditions under which he operates.

Oceans are being looked to as a major source of protein rich fish food. Several valuable minerals are known to be abundant in the sea including gold, silver, manganese, petroleum and pearl. Apart from the other minerals found in seawater magnesium, bromine, and sodium chloride(common salt) are also found. The ocean floor yields sand, gravel, and oyster shells for construction purposes and small quantities of diamonds are found in some submarine gravel bars.

Offshore oil and gas wells supply about 17 per cent of the world's petroleum production. Oceans also hold potential as an important alternate source of energy. Thermal energy of the oceans resulting from absorption of solar heat and from ocean currents can be converted into electricity—a process known as ocean thermal energy conversion (OTEC).

### WORLD-MAJOR OCEAN CURRENTS



**EXERCISE****I) Choose the correct answer.**

1. A large stretch of water covering a vast area is called an \_\_\_\_\_.  
 a) Ocean      b) Sea      c) Gulf      d) Bay
2. The Atlantic Ocean is elongated \_\_\_\_\_ in shape.  
 a) Triangular      b) 'S'      c) Circular      d) 'C'
3. The rise and fall of sea water due to gravitation is known as \_\_\_\_\_.  
 a) Tides      b) Ocean currents      c) Tsunami      d) waves
4. A \_\_\_\_\_ is a table top underwater mountain.  
 a) Guyot      b) Abyssal plain      c) Sea mount      d) Ocean ridge
5. The hydrological cycle is also known as \_\_\_\_\_.  
 a) Hydrogen cycle      b) Oxygen cycle      c) Water cycle      d) carbon cycle

**II) Fill in the blanks.**

1. The Earth is nick named as \_\_\_\_\_.
2. \_\_\_\_\_ is the deepest trench in the south Pacific.
3. The inlets are known as \_\_\_\_\_.
4. The abyssal plain is covered with \_\_\_\_\_.
5. \_\_\_\_\_ is the most important cause of wave generation.

**III) Answer the following questions.**

1. Define salinity.
2. What are ocean currents?
3. How are waves caused?
4. What is oceanography?
5. Name marine resources.

**IV) Answer the following questions in detail.**

1. Discuss about Indian ocean.
2. Write about continental shelf and continental slope.
3. Explain what is water cycle?
4. What are tides? Explain its types.
5. Write any five points on how do oceans influences human life.
6. Write a brief paragraph on salinity of the oceans.

**V) Map Skill**

1. Mark the oceans and seas on the outline map of world.
2. Mark the warm and cold ocean currents on the outline map of world

**FORMATIVE ASSESSMENT**

1. Mark the oceans and seas on the outline map of world.
2. Conduct a debate to indicate the advantages and disadvantages of a country having long continental shelves.
3. Make models of Topography of ocean floor and water cycle.
4. Make a chart to show the spring tide and neap tide.
5. Mark the major ocean currents on the outline map of world.

# SHAKTHII ACADEMY

## SOCIAL STUDIES - GEOGRAPHY

### STANDARD - EIGHT



## RESOURCES

### 1. RESOURCES AND THEIR TYPES

Our planet Earth is made up of three major spheres. They are the Lithosphere or land, the Hydrosphere or water and the Atmosphere or the air that envelops the Earth. These three spheres together support the Biosphere or life sphere. These spheres provide humans with all their material requirements. Any material that is found in these spheres that is useful to man is called a **resource**. Resources play an important role in the economic development of a country.

Figure 1 helps us to understand the important natural resources of the Earth.



**Figure 1 Natural Resources**

Resources can be classified into different types based on different criteria.

On the basis of **development**, resources are classified into Potential resources and Developed resources. **Potential resources** are

those resources which have not yet been utilized by humans. For example, resources of Siberia and Antarctica. **Developed resources** are the resources which are used by humans. For example coal, iron ore etc.

On the basis of **renewability**, resources are classified into non-renewable or **stock** resources and renewable or **flow** resources. Today, we are concerned about resource depletion since the economic development of a nation depends on its resources. We will now examine in detail this category of resource in view of the depleting resources worldwide.

#### **Non-renewable resources**

Non-renewable resources are exhaustible resources because nature has a fixed stock of these resources. They are consumed faster than that nature can replace them. For example, minerals are mined or extracted from the Earth's crust and once extracted they cannot be replaced. The minerals which are now being used extensively can be grouped into:

- a) Metallic minerals or minerals that contain metals in their ore form.
- b) Non-metallic minerals or minerals that do not contain metals in their ore form.

c) Power minerals or minerals from which energy can be produced.

Of these minerals, **power minerals** will be dealt with in detail as they play a very important role in the economic development of a country. It is required to run industries, homes and offices. The important power resources which are exhaustible in nature are coal, oil and natural gas and Nuclear minerals.

### Coal

Coal is called a 'fossil fuel' because it was formed many million years ago. Large forest were buried in sedimentary basins by geological processes. Over time the buried plant matter got converted into coal, due to pressure and heat.(Figure 2)

The important coal fields of the world are found in USA, Russia, Germany and the UK. In Asia, important coal fields are in China and India. In Tamil Nadu, coal is mined at Neyveli which has large reserves of lignite or brown coal. (Figure 5)

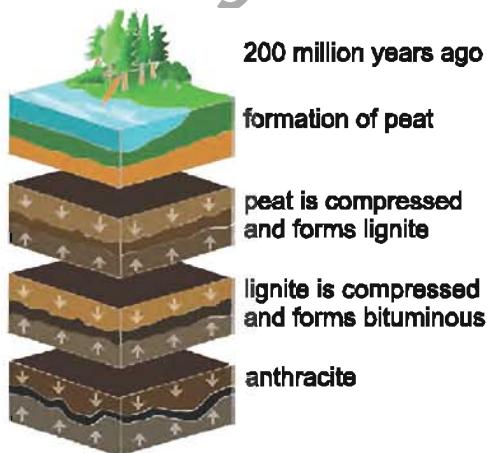


Figure 2 Formation of coal

### Oil and Natural Gas

Oil is usually found in some strata of marine sedimentary rocks like mudstone, shale, sandstone etc (Figure 3) The remains of plants and calcareous animals (shelled animals) which were buried in the Earth, were subjected to heat and pressure. They changed into oil and this is found trapped in the pore spaces of the rocks. Natural gas, which is a lighter hydro-carbon, is found in the strata above the oil.

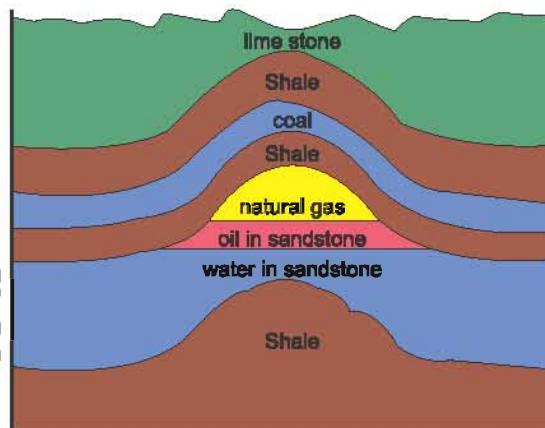


Figure 3 Formation of oil and Natural gas

Oil deposits may be found on-shore or in the land area as in South



Figure 4 Mumbai High oil Fields

**Major Coal Fields of the World**

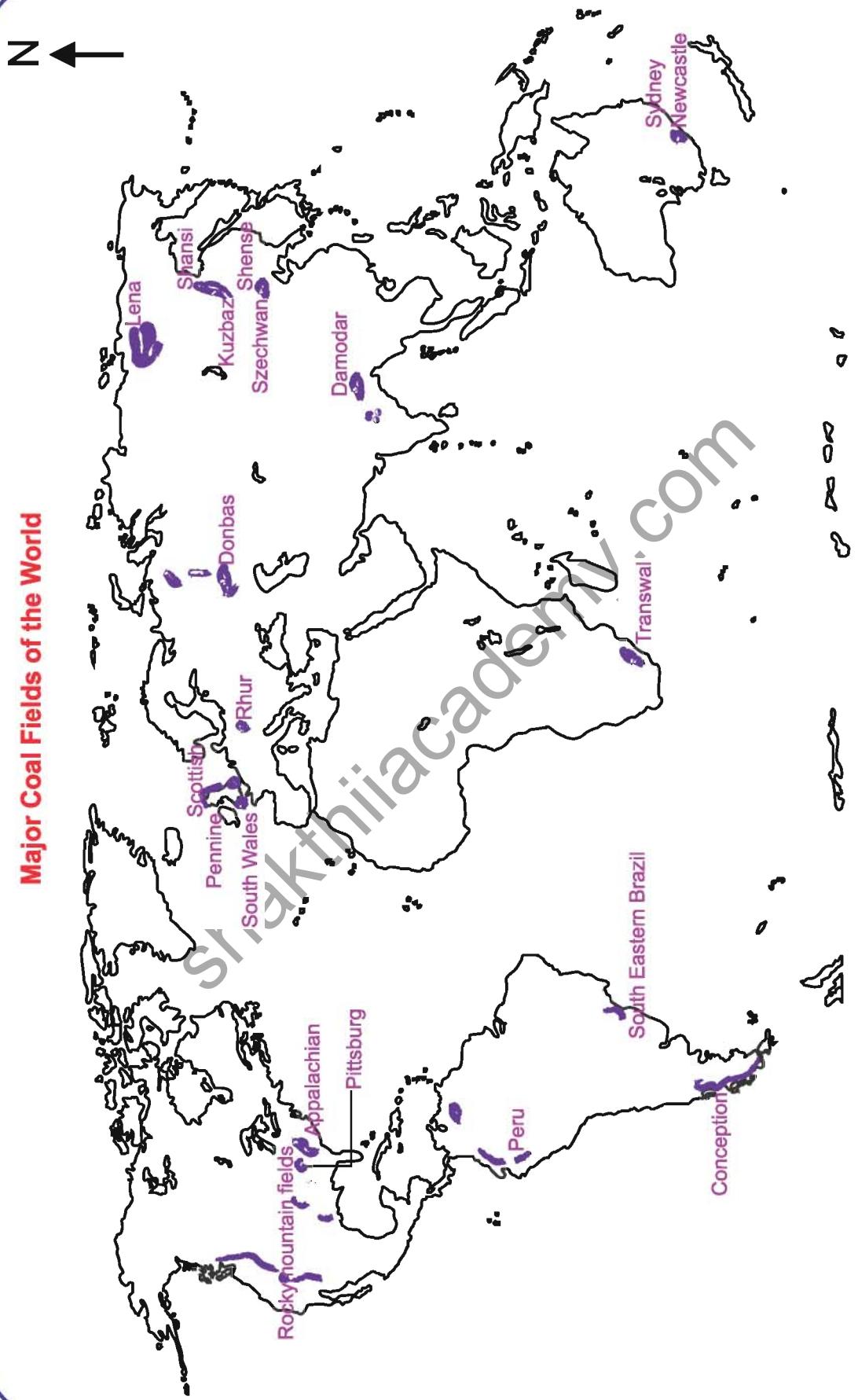


Figure 5

### Major Oil producing regions of the World

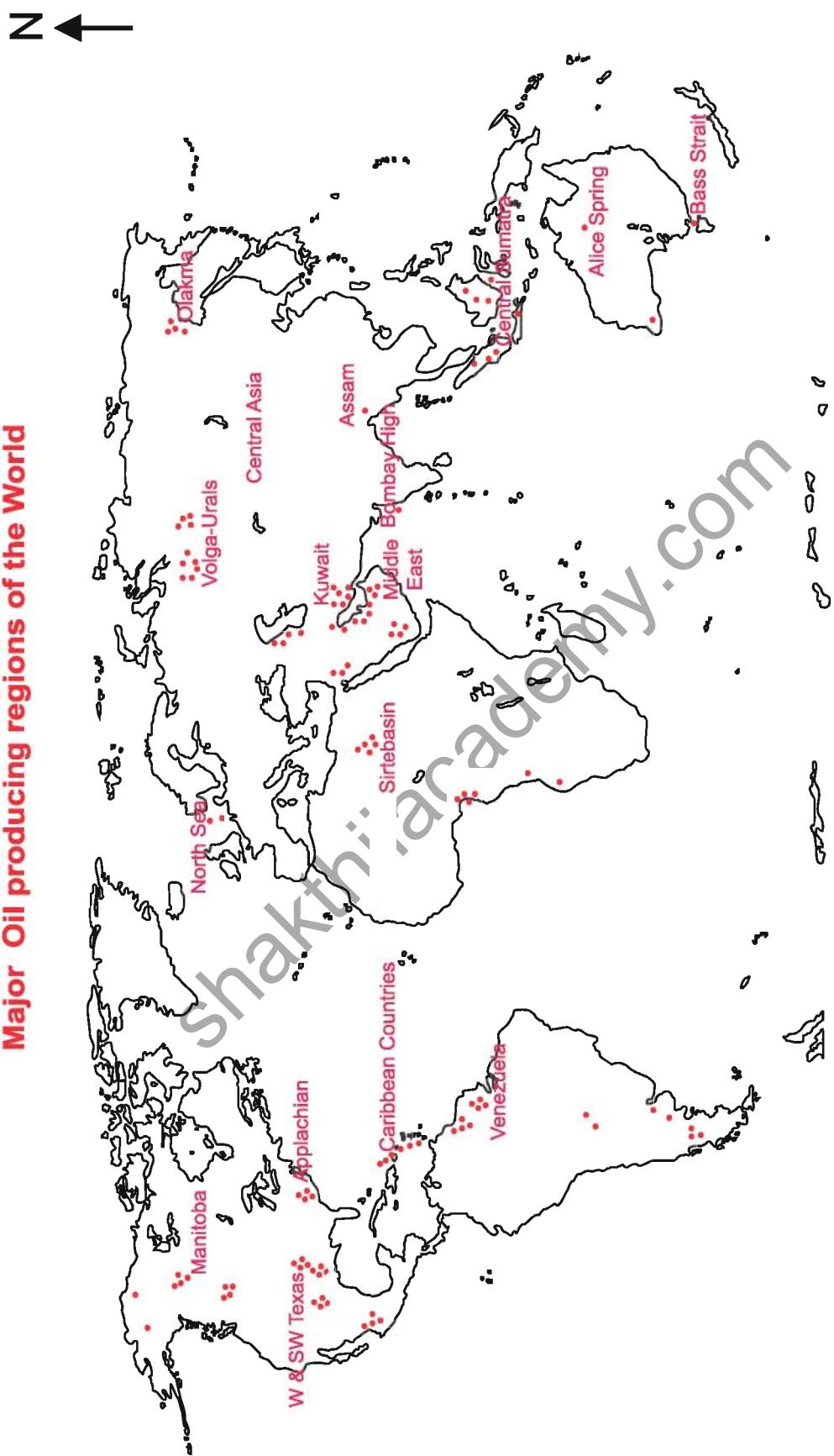


Figure 6

West Asia. It may also be found offshore in the continental shelves of the sea as in the North Sea (Figure.6). In India, major oil fields are found on shore in Assam. India's largest offshore oil field is in Mumbai High (Fig.4). Production of oil has also started developing in the Cauvery Basin.

### Nuclear Minerals

Minerals like uranium and thorium are used to generate nuclear power. Rich deposits of Uranium are found in Namibia, Kazakhstan and Canada. In India, some of the coastal sands of Tamil Nadu and Kerala are rich in illminite. The USA is the world's largest producer of nuclear power, (30 % of worldwide nuclear generation of electricity). France is the largest user of nuclear power . (over 75% of its electricity is from nuclear energy).

(Source: <http://www.world-nuclear.org>)

### Nuclear power plants in India

Madras Atomic Power Station, Rajasthan APS, Kaiga APS, Tarapore APS, Kakrapara APS, Narora APS.

(<http://www.npcil.nic.in/>)

### Renewable Resource

Renewable resources are those which are infinite or are constantly renewed by nature. They continue to be available even after a part of it is consumed. For example, wind energy. The renewable sources of power are very important today.

### Hydroelectric power

Hydro-electric power is the most developed source of renewable power. It is generated from falling water. Hydroelectric power is used extensively in many parts of the world where there are large rivers. The Three Gorges Dam across the river Yangtze in China is the largest hydro electric power project in the world ( Figure 7a and 7b). In India, the Bhakra Nangal Dam is the largest source of Hydro-electric power.

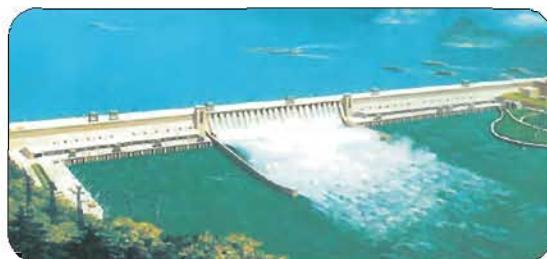


figure 7a. Three Gorges Dam across the Yangtze

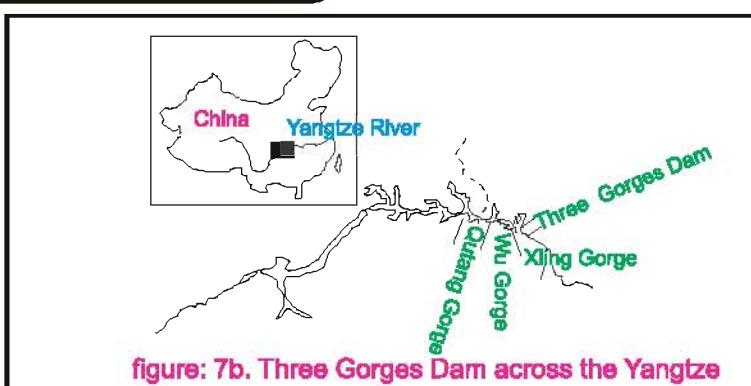


figure: 7b. Three Gorges Dam across the Yangtze

## Solar Power

Solar energy, is used to light homes, buildings and heat water. Photovoltaic cells are required to store the sun's energy. Germany is the world's largest producer of solar power.

Tropical regions have enormous potential to develop solar power. But it has not developed much because of the high cost of production. This is very expensive especially for the developing countries in the tropical regions.

## Wind Energy

Wind energy is generated by using the wind to run turbines in areas where there is a constant flow of wind. Europe is a major user of wind energy. Twenty percent of Denmark's electricity comes from wind power.

(Source: World Wind Energy Association 2010)

In India, Maharashtra and Tamil Nadu have developed wind energy.

Aralvaimozhi, a wind farm located in Kanyakumari district in Tamilnadu is the world's largest wind farm (Figure 8).



Figure 8 Windmills at Aralvaimozhi

## Biomass

The main sources of biomass are trees, crops and agricultural and animal wastes. Among these, wood fuel is the most important in the developing countries. Gobar gas or methane is generated from cow manure. Biofuels are now being produced from crops like sugarcane and Jatropha (Figure 9).



Figure 9. Jatropha plant from which biodiesel is obtained

## Conservation of Resources

Since human life and progress is dependent on the Earth's natural resources, man must learn to use these resources wisely. He must learn to manage the non-renewable resources with care, since they cannot be replaced. He must utilize the renewable resources for which extensive research and development are essential.

Man depends on resources for his living. The type of resources available in a place determines his occupation. We will see this in the following lesson.

## EXERCISE

**I) Fill in the blanks.**

1. A material which is found in nature and is useful to human is called a \_\_\_\_\_.
2. Minerals once extracted cannot be \_\_\_\_\_.
3. \_\_\_\_\_ play a very important role in the economic development of a country.
4. Uranium is a \_\_\_\_\_ mineral.
5. \_\_\_\_\_ have enormous potential to develop solar power.

**II) Choose the correct Answer.**

1. Resources already in use by humans are called \_\_\_\_\_ resource  
 a) Developed      b) Potential      c) Flow
2. Minerals are \_\_\_\_\_ resource.  
 a) Renewable      b) non-renewable      c) Biotic
3. A major user of wind energy in the world is \_\_\_\_\_.  
 a) Europe      b) South America      c) Antarctica
4. Type of coal mined in our state is \_\_\_\_\_.  
 a) Lignite      b) Anthracite      c) Graphite
5. The largest hydroelectric power project of India is \_\_\_\_\_.  
 a) Bhakra Nangal      b) Mettur      c) Damodar

**III) Match the following.**

- |                     |               |
|---------------------|---------------|
| 1. North Sea        | Nuclear power |
| 2. Aralvaimozhi     | Oil fields    |
| 3. Oil and Coal     | Yangtze       |
| 4. Three Gorges dam | Fossil fuel   |
| 5. Thorium          | Wind farms    |

**IV) Write Brief Answers.**

1. Define a) Non-Renewable Resources b) Potential Resources.
2. Write about wind energy.
3. Why should we use resources wisely?

**V) Answer the following questions in detail.**

1. Explain the formation of coal and oil.
2. Write an account on renewable resources

### Formative Assessment

#### I. Activity:

Classify the following items into two categories as Natural Resources and Human made resources and paste pictures against each item.

- |                 |                         |
|-----------------|-------------------------|
| 1. Land         | 2. Houses               |
| 3. Vegetation   | 4. Machines             |
| 5. Coal         | 6. Nuclear minerals     |
| 7. Buildings    | 8. Factories            |
| 9. Wind         | 10. Fishes              |
| 11. Computers   | 12. Rivers              |
| 13. Water       | 14. Minerals            |
| 15. Soil        | 16. Synthetic materials |
| 17. Mountain    | 18. Sea                 |
| 19. Wild life   | 20. Railway lines       |
| 21. Solar power | 22. Birds               |

#### II. Model:

Make a model and write a report.

1. Formation of coal.
2. Windmill model

#### III. Life skill:

Suppose you are going to enjoy your vacation of 15 days in another place with your family, what will you do just before you lock the door? Put  mark or  mark according to the option.

1. Ignore everything and keep moving with your family members happily to enjoy the travel.
2. Switch off all the appliances (kitchen appliances, computer etc).
3. Close all the taps and water pump connections.
4. Check the vehicles like motorbike or car especially it's fuel tank.
5. Switch off all the lights, fan and television points.
6. Ask your mother or father to check all the above.

#### IV. Map Skill:

1. Mark the important oil producing countries of the world on a world map.

#### V. Collect Pictures:

1. Collect pictures of wind farms of India and Netherlands.

## 2. RESOURCES AND ECONOMIC ACTIVITIES

Man depends on resources for his living and the natural resources are unevenly distributed over the surface of the Earth. Hence, human activities differ from place to place, depending on the available resources.

The availability of resources in different parts of the Earth has determined the different occupations of humans. These occupations include food gathering, hunting, fishing, mining, growing crops, processing, manufacturing, assembling and trading goods. Through all these actions, man attains economic gains. Therefore, these actions of humans are otherwise called economic activities.

According to the stage of evolution of these activities, they can be grouped into 5 main types such as Primary activities, Secondary activities, Tertiary activities, Quartemary activities and Quinary activities.

### Primary activities

In the first stage, humans were involved directly with the resources of nature. These are age old activities - food gathering, hunting animals, grazing, extracting minerals (mining), fishing, lumbering and cultivation of the land. These activities are called primary activities and workers involved in primary activities are called red-collar workers.

### Secondary activities

Humans are able to increase the value of resources by processing and converting the raw materials into a valuable product. Examples of such activities are the production of sugar from sugarcane, and iron and steel from its raw materials, etc. These activities are called secondary activities. Raw materials are processed with other inputs like technology, capital, transport, labour (both skilled and unskilled) power, market and government licence. Workers involved in secondary activities are called blue-collar workers.

### Tertiary activities

Trade, Transport and Communication, which are related to services that promote secondary activities, are called the Tertiary activities. Tertiary activities involve the expertise provided by the specialized skill of technicians, workers, bankers (Figure 10) etc. The workers involved with tertiary activities are called Pink-collar workers.



Figure 10. Banking in progress

### Quaternary Activities

Services rendered by professionals in education, legal aid, medicine (Figure 11 and 12), entertainment, recreation, management, research and development, which have specialized environments fall under the category of Quaternary activities. People working in these sectors are called White-collar workers. Generally, this activity is concentrated in urban centres.



Figure 11 Teachers



Figure 12 Doctors

### Quinary activities

Decision makers and policy makers at the highest level fall into this category. The decision making activity of advisors or consultants, like legal authorities and professional consultants, in private and Government sectors in all fields are included in this type of occupation. They are called as Gold-collar workers.(Figure 13) Quinary activities are seen more in metropolitan centres.



Figure 13 Gold collar workers-Judges

In the developing countries the primary and secondary activities predominate whereas in developed countries the people are involved more in tertiary, quaternary and quinary activities.

In the following lessons, we shall examine primary, secondary and tertiary activities in greater detail.

## EXERCISE

### I) Fill in the blanks.

1. According to the stage of evolution, economic activities are grouped into \_\_\_\_\_ main types.
2. In primary activity, people are \_\_\_\_\_ involved with the resources of nature.
3. Processing and converting raw materials into a finished form is called \_\_\_\_\_ activity.
4. The workers involved with tertiary activities are called as \_\_\_\_\_ collar workers.
5. In \_\_\_\_\_ countries primary and secondary activities are more than prevalent the tertiary and quinary activities.

### II) Choose the correct Answer.

1. This is a primary activity  
 a) Lumbering      b) Banking      c) Consultation
2. People working in \_\_\_\_\_ sectors are called white collar workers  
 a) Primary    b) Secondary    c) quarternary
3. \_\_\_\_\_ promotes Industrial activities.  
 a) grazing      b) transport      c) hunting
4. Quinary activities are more in.  
 a) Villages      b) schools      c) Metropolitan centres
5. Policy makers belong to the following category  
 a) Primary activity    b) Quinary activity    c) Tertiary activity

### III) Match the following.

- |                        |                       |
|------------------------|-----------------------|
| 1. Blue collar workers | Fishing               |
| 2. Entertainment       | Tertiary              |
| 3. Trade               | Secondary             |
| 4. Primary             | Skilled and Unskilled |
| 5. Labour              | Quarternary           |

### IV) Write Briefly.

1. What are primary activities?
2. Write a short note on tertiary activities
3. Write about quinary activities.

### V) Detailed answers.

1. Discuss the different types of Economic activities of man.

### Formative Assessment

#### I. Activity:

**Word jumble** : Re arrange the following letters by using the hints.

- a. NIPKALRLOC : workers involved in tertiary activities.
- b. ROUBAL : both the skilled and unskilled workers of blue collar job.
- c. DJUESG : belonged to gold collar workers.
- d. CRAUEIULTGR : red collar workers involved in farm activities.

#### II. Collect pictures:

1. Collect five pictures for each of the following activities and paste it in a scrapbook.
  - a. Tertiary
  - b. Secondary
  - c. Quinary
2. Collect pictures of an industry and prepare a table of its activities.

#### III. Debate :

“ More percentage of tertiary, quaternary and quinary activities are concentrated in developed regions of the world”

#### IV. Map skill:

In a political map of the world, mark the developed countries of the world.

## PRIMARY ACTIVITY I

### 3. TYPES OF PRIMARY ACTIVITY

In the history of human civilization, agriculture was a major landmark in the life of humans because it allowed them to have a settled life. Man was dependent on hunting, gathering, herding, lumbering, mining, fishing and agriculture for his livelihood. All these activities for which man had to depend on collecting things directly from nature are known as primary activities.

In its most primitive form, primary activity includes food gathering and hunting.

#### 1. Gathering

Food gathering is a primary activity in which people gather their requirements from nature. This includes the collection of fruits and roots from forests and sometimes includes hunting. This kind of activity is prevalent among remote, isolated tribal groups of people.

**E x a m p l e :** Bushman of Africa, aborigines (Jaravas, (Figure14) Onges) of Andaman and Nicobar.



Figure 14. Jarawas of Andaman island

#### 2. Hunting

Hunting is a primary activity in which people hunt animals for their meat and skin. This kind of activity is still prevalent among remote isolated groups of people. Example: Pygmies of Africa, the Amerindians of the Amazon basin, Eskimos (Figure 15) of Canada.



Figure 15. Eskimos

Other primary activities like herding and fishing require greater organization.

#### 3. Herding

Herding is a primary activity in which people graze a large number of animals on natural pastures. This involves seasonal migration of the nomads and their flock from one area to another in search of fresh pastures.

Today the nature of herding is different in different regions. The herders of Africa (Figure16) and central Asia still move in relation to the climatic season and the availability of natural pastures. The



Figure 16. Masai Herdsmen of Africa

Nomads	Place	Animals
Masai	Africa-Kenya, Tanzania, Arabia	Cattle
Bedouin	Arabia	Camels
Lapps	Scandinavia	Reindeer
Tauregs	Africa, S.W. Asia	Camel
Kurds	West Asia	Sheep and Goats
Rabari	India-Rajasthan	Camels

herders of North America (Figure 17), South America and Australia have large ranches where fodder is cultivated and the animals here are not dependent on natural vegetation. These ranches are able to support very large herds of animals.

#### 4. Fishing

Fishing is a primary activity along rivers and lakes and in coastal areas. Inland fishing is usually



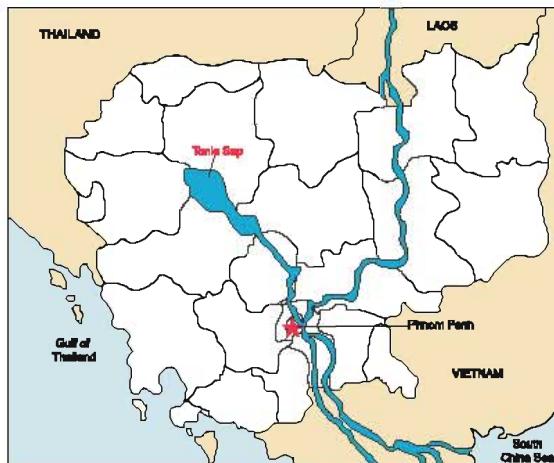
Figure 17. Cattle Ranching

simple and on a small scale. Simple fish nets are used to catch fish. Tonle Sap which is in Cambodia is the world's largest inland fishing lake (Figure 18 and 19).

Fishing in the oceans is a more complex activity. Abundant food for the fish in the form of plankton is available in the continental shelves and shallow seas. Large ships called factory ships travel in the oceans for months together. They catch, process and tin the fish on the ship itself. They use modern technology to track the fish and this has often resulted in overfishing in some parts of the world. Countries like Japan, Peru and Canada and areas like the North Sea and North West Atlantic Ocean are important fishing grounds. Besides fishing, whale and seal hunting and pearl fishing are also carried out in the oceans.

#### 5. Lumbering

Lumbering is a primary activity that extracts wood from the forests for varied uses. Timber is used for



**Figure 18. Tonle Sap – worlds Largest inland fishing lake**



**Figure 19. Floating village on the Tonle sap**

fuel, furniture making, paper and pulp industry.

Temperate forests are more extensively used for two reasons - firstly the trees have softwood and secondly large number of trees of the same type are found together.

Countries like USSR, Canada and USA have large timber resources. Two-thirds of the world's industries use in wood from the temperate forests. (Figure 20)

Tropical forests have valuable hardwood trees like teak and rosewood. But lumbering is not a major occupation here because the valuable timber trees are scattered in these forests.



**Figure 20. Lumbering in the Temperate forests**

Mining and agriculture are also primary activities but they involve more human interaction and are practised on a large scale. Therefore, we shall study these two primary activities in the following lessons.

## EXERCISE

### I) Fill in the Blanks.

1. Activities for which humans depend directly on nature are known as \_\_\_\_\_.
2. \_\_\_\_\_ is an activity in which people graze a large number of animals on natural pastures.

3. The most primitive form of primary activities are \_\_\_\_\_ and \_\_\_\_\_.
4. Temperate forests are more extensively used for \_\_\_\_\_
5. \_\_\_\_\_ in oceans is usually a more complex activity

**II) Choose the correct answer.**

1. Jaravas are aborigines of  
a) Andaman and Nicobar b) Africa c) Canada
2. Eskimos of Canada are  
a) Hunters b) Gatherers c) Herders
3. Abundant food for fishes are available near \_\_\_\_\_.  
a) Continental shelf b) Continental slope  
c) trenches
4. Two-thirds of industrial wood is obtained from \_\_\_\_\_.  
a) Temperate forests b) Tropical forests c) Tundra
5. Primary activity that is practised on a larger scale is \_\_\_\_\_.  
a) Gathering b) Hunting c) Mining

**III) Match the following.**

- |               |                  |
|---------------|------------------|
| 1. Bushmen    | Tropical forests |
| 2. Japan      | Africa           |
| 3. Teak       | Fishing grounds  |
| 4. Coniferous | Animal food      |
| 5. Fodder     | Softwood         |

**IV) Answer Briefly.**

1. Name the primary activities.
2. What is herding?
3. Name some places and people involved in food gathering activity.
4. What is inland fishing?
5. Why are temperate forests used more extensively for lumbering than tropical forests?

**V) Answer in detail.**

1. Discuss fishing activity in the oceans.
2. Write an essay on the 'types of primary activities.'

### Formative Assessment

#### I. Activity:

##### 1. Word search:

M	P	R	L	U	M	B	E	R	I	N	G	G
V	L	A	G	R	I	C	U	L	T	U	R	E
K	M	A	D	R	K	V	L	P	A	R	P	T
T	H	A	S	A	B	R	S	A	T	H	L	Y
G	E	G	A	T	H	E	R	I	N	G	A	S
S	E	A	A	M	G	A	D	V	R	T	N	I
I	E	S	N	N	D	A	E	O	N	K	K	R
J	T	L	O	I	I	H	C	T	U	I	T	P
K	H	R	V	S	Y	P	R	K	R	I	O	T
A	A	T	H	A	H	I	Y	A	E	S	N	H
V	I	J	A	Y	A	S	A	R	A	T	H	Y
Y	H	T	A	R	A	S	A	Y	A	J	I	V
R	A	T	R	T	Q	S	B	C	K	J	L	W

- a. Collection of fruits and roots from forests.  
 b. Arabian nomads who herds camel.  
 c. Activity that extracts wood from forests.  
 d. Food gatherers of Andaman and Nicobar islands.  
 e. A primary activity that involves more interaction practiced on a larger scale.  
 f. Food for the fish.
2. Make a table with the headings Nomads, Places and Animals of the world.

#### II. Discussion:

“Why is lumbering not a major activity in the tropical forests”?

#### III. Do a project work on the following

- a) Pygmies of Africa      b) Jaravas of Andamans

#### IV. Map Skill:

On a world map, mark the following

- a) Dogger Bank    b) North Sea    c) Peru    d) Japan    e) Canada

## PRIMARY ACTIVITY I

### 4. MINING

**Mining** is an important primary activity. It supports the industrial growth of a country.

**Mining** is the extraction of valuable minerals or other geological materials from the Earth. Mining of stone and metal has been an important activity from prehistoric times. Early humans used minerals to make crude implements and weapons. Today, mining is carried on a very large scale since industries use minerals extensively.

Minerals are non-renewable resources. Mining therefore is known as a **Robber industry** because the extracted materials cannot be replaced.

#### Classification of Minerals

Minerals are classified based on their mineral content and uses such as a) metallic minerals b) non-metallic minerals and c) power minerals. Metallic minerals like iron ore contain metals while non metallic minerals like limestone do not contain metals. Power minerals are non-metallic minerals which are very important fuel resources.

Metallic	Non-metallic	Power Mineral
Iron	Sulphur	Coal
Copper	Mica	Petroleum
Gold	Nitrate	Natural gas
Tin	Limestone	Uranium
Aluminum	Asbestos	Thorium

Minerals may occur in pure form or maybe mixed with other materials of the rocks as ores. The ores are mined and then refined to extract valuable elements.

Mineral ores may occur in cracks, faults or joints of rocks or as sediments. Mineral ore deposits are thus classified as occurring in veins, lodes, beds and alluvial deposits.

#### Types of Mining

There are different methods of mining to extract minerals. Mining may be on the surface or subsurface (underground) depending on the occurrence of minerals.

**Surface mining** methods include a) open cast mining b) strip mining and c) alluvial mining. It is used to mine the minerals that are found closer to the earth's surface.

**Open cast mining** involves the digging out of minerals that occur on the surface of the Earth. (Figure 21)



Figure 21. Open cast mining

**Strip mining** removes long strips of overlying soil and rock. (Figure 22)



Figure 22. Strip mining

**Alluvial mining** is used to extract minerals by panning or dredging minerals like tin and gold which are sometimes mixed with alluvium in the river bed. (Figure 23)



Figure 23. Alluvial mining for gold

**Quarrying** is the mining of construction materials like limestone from the Earth's surface.

In **underground mining**, ores are extracted from greater depths beneath the surface. Underground mining is usually more expensive than the surface mining. Safety precautions are very important in underground mining (Figure 24). For example, coal mines are often prone to catch fire because of the gases trapped underground.



Figure 24. Underground Mining

**Drilling** is a mining method used to extract minerals like Oil and natural gas. Oil rigs are used for drilling oil wells. The most familiar sights in the oil fields are the tower like features or derricks which mark the places where the oil is being drilled.(Figure 25)



Figure 25. Oil Rig with Derricks

### DISTRIBUTION OF MINERALS

#### Metallic minerals

##### Iron Ore

Magnetite, haemetite limonite and siderite are different types of iron ore, based on to the iron content of the ore. Iron ore mines are found **extensively** in U.S.A, Canada, Australia, China, Brazil, India and Kazakhstan.

### Major Iron and Copper Regions of the World

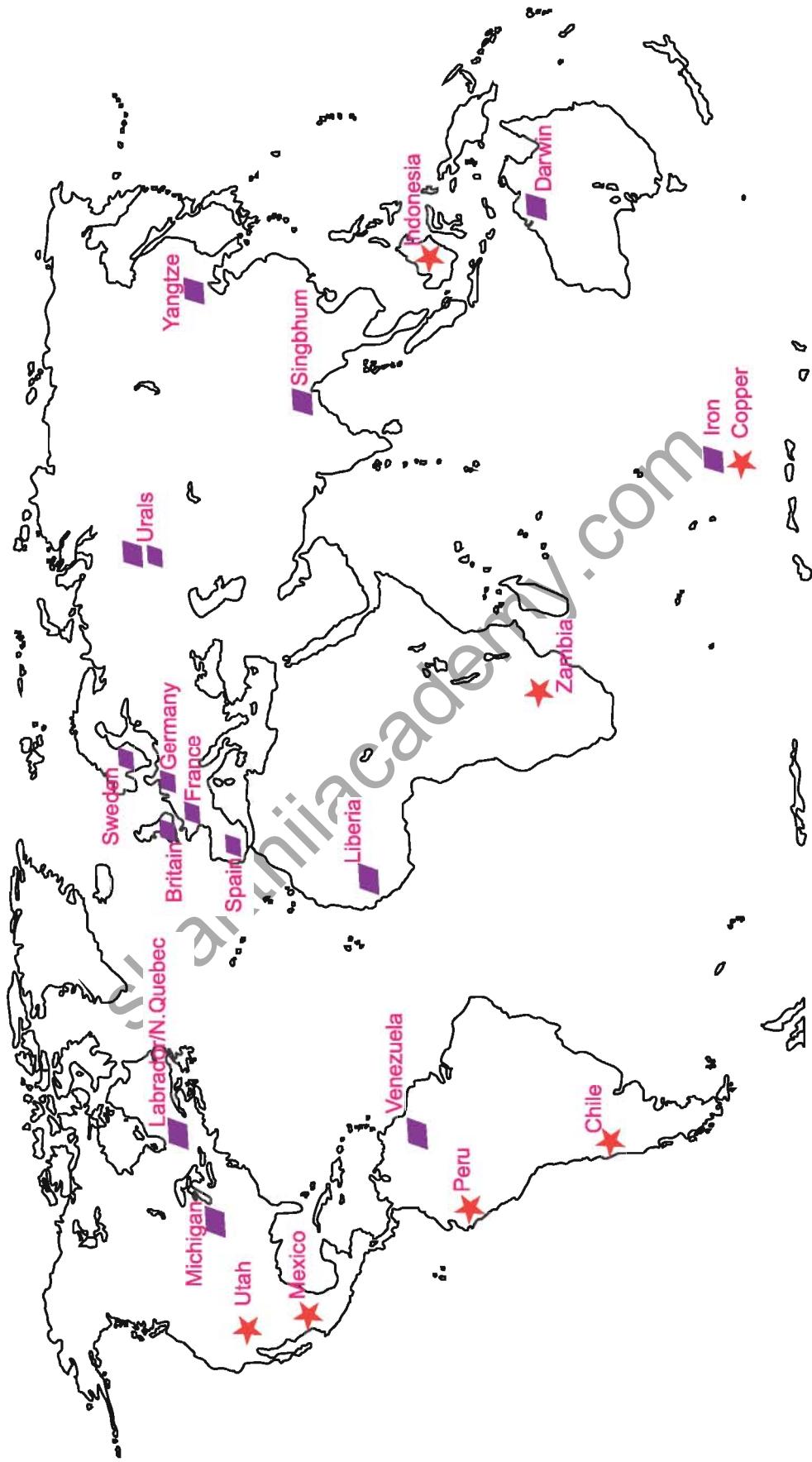


Figure 26

**Copper**

It is mined from open pits. Large copper mines are found in Utah in USA, Mexico, Zambia, Chile and Indonesia. (figure 26)

**Bauxite**

Bauxite is the ore of aluminium. Bauxite is extracted from open pit mines. Australia, Brazil, Jamaica and Guinea have large reserves of bauxite.

**Tin**

The ore is called cassiterite. The ore is obtained by alluvial mining. Tin is mined in Malaysia, Bolivia, Indonesia, China, Russia, Nigeria and Congo.

**Gold**

Gold is a precious metal that is extracted through the placer or alluvial method. Carat is the term used to denote purity of the gold. The largest producers are South Africa, Canada, USA, Australia and Ghana.

**Non-metallic Minerals**

Salt, potash, nitrates, sulphur, mica, rocksalt and phosphates are non-metallic minerals. Rubies and diamonds are also classified as non-metallic.

**Sulphur**

It is extracted through underground mining. It is a bright yellow mineral. Heavy chemical industries require sulphur to produce chemical products. The USA, Mexico, Italy and Japan are large producers.

**Mica**

Mica is a black, transparent matter that splits easily into thin sheets. Mica is used in electrical industries. The USA, India, Norway, Brazil and Russia are important producers.

**Asbestos**

Generally extracted from open pit mines. It is used to make fire proof materials. It is mined in Canada, Russia, Brazil, South Africa, Rhodesia, China, USA and Italy.

**Mineral Fuels**

The three major sources of Power resources are coal, oil and natural gas. These non-renewable minerals have been discussed in an earlier lesson.

**EXERCISE****I) Fill in the blanks.**

1. Mining is also known as a \_\_\_\_\_ industry.
2. Open cast mining is also called \_\_\_\_\_.
3. Minerals are non-renewable \_\_\_\_\_.
4. Mica is used in \_\_\_\_\_ Industries.
5. \_\_\_\_\_ are tower like features in the oil fields.

**II) Choose the correct answer.**

1. The mineral found in alluvial deposits is \_\_\_\_\_.  
a) Gold      b) Iron      c) Coal
2. The ore of aluminium is \_\_\_\_\_.  
a) Sulphur      b) Salt      c) Bauxite
3. Anthracite is the ore of \_\_\_\_\_.  
a) Iron      b) Coal      c) Gold
4. A kind of non-metallic mineral is \_\_\_\_\_.  
a) Petroleum      b) Sulphur      c) Iron

**III) Match the following.**

- |                    |           |
|--------------------|-----------|
| 1. Fuel            | Tin       |
| 2. Malaysia        | Gold      |
| 3. Alluvial mining | Quarrying |
| 4. limestone       | Chile     |
| 5. Copper          | coal      |

**IV) Answer briefly.**

1. How do minerals occur on the Earth?
2. Write a note on shaft mining.
3. Name the different types of coal.
4. What are mineral fuels?
5. What is alluvial mining?

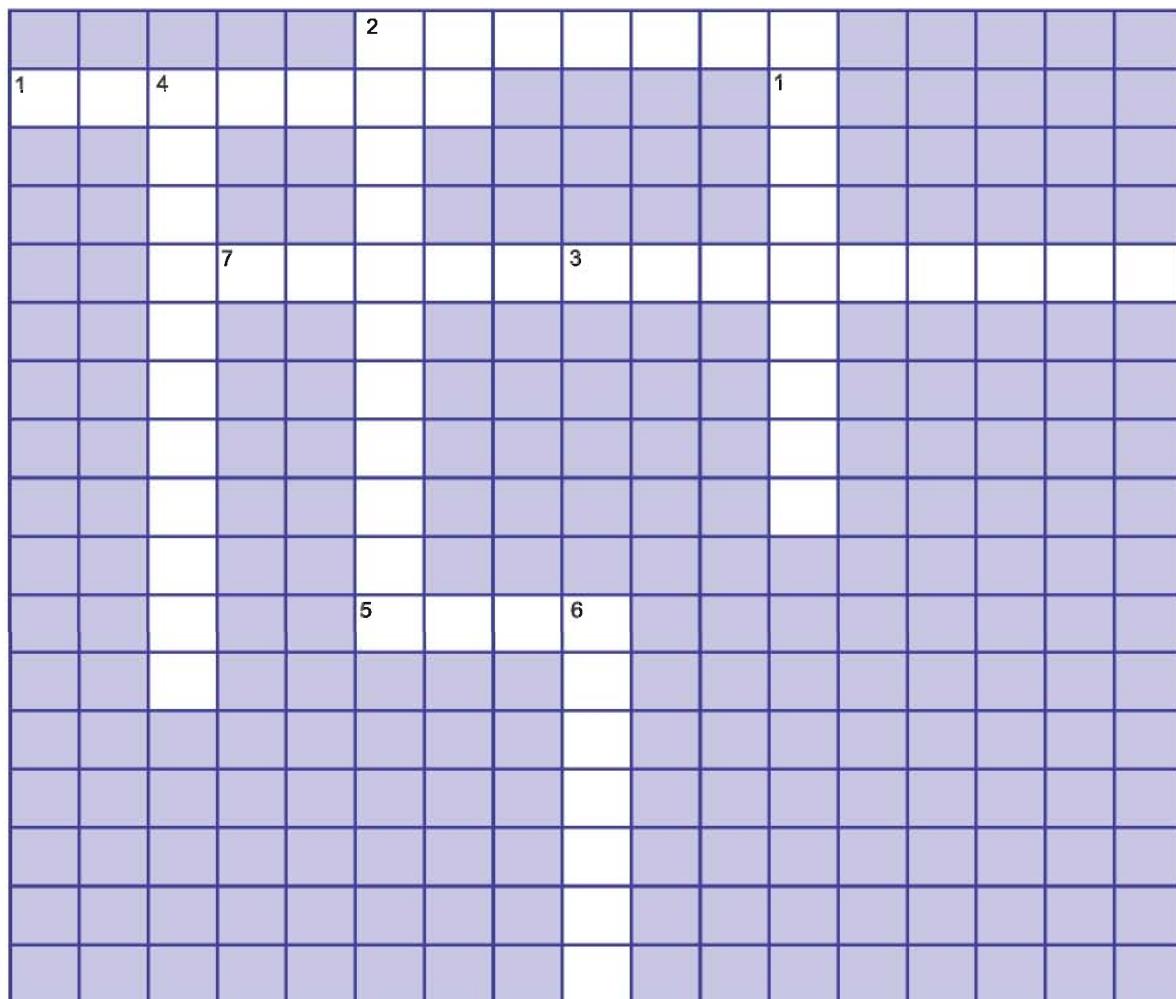
**V) Write in 200 words.**

1. Describe the types of mining.
2. Write an essay on metallic minerals.

### Formative Assessment

#### I. Activity:

Cross word puzzle: solve it with the help of the clues given below.



#### Across:

1. An ore of Aluminium (7)
3. A type of iron ore (9)
5. Mineral extracted by placer or alluvial method (4)
7. A non metallic mineral (6)

#### Down:

1. Mining closer to the surface (9)
2. Removing long strips overlying rock and soil (11).

4. Mining at greater depths (11)
6. Tower like features at the oil fields (8).

**II. Project work:**

- a. Collect pictures of different types of mining.
- b. List the minerals (metallic and non-metallic) found in different districts of our state.
- c. Do we have mining activities in our state? Do a project on any one activity and write a report on it.

**III. Map Skill:**

On the world map, mark the iron ore regions.

**IV. Discussion:**

1. Discuss the methods of conservation of fuel minerals.
2. Imagine a day without fuel in your house or in an industry - discuss.

**GEOGRAPHY**

## PRIMARY ACTIVITY II

### 1. AGRICULTURE

The earliest human civilizations developed and thrived around river valleys. This was because man began to cultivate crops and it was possible around river valleys where there was abundant water and fertile soil.

Agriculture refers to the process of preparing the land for the cultivation of crops and to the rearing of cattle. It is also referred to as farming. Agriculture is a primary activity.

Ancient River Valley Civilizations		
River Valley	Civilization	Continent
Indus	Harappa and Mohenjo-Daro	Asia
Nile	Egypt	Africa
Euphrates	Mesopotamia	Asia

Agricultural crops can be broadly grouped into food and cash crops. Food crops may be grown as subsistence crops or commercial crops. (For example - Rice, Wheat, Ragi, Maize etc). Cash crops are not consumed as food but are used as raw materials for further processing (For example - Rubber, Cinchona and Cotton).

#### Geographical factors that determine Agriculture

Major factors that affect agricultural diversity and distribution are climate, landforms, soils, availability of water and labour.

#### 1. Climate

Climatic factors like temperature and rainfall affect agriculture.

##### a. Temperature

Most plants cannot grow if the temperature falls below 6° C.

Different crops are grown in different climatic regions. For example, rice is the principal crop of the tropical region as it requires high temperature and plenty of water. Wheat is a temperate crop which grows in cool climate.

Altitude affects the temperature and so it also affects agriculture. In the high altitude areas of tropical regions, temperate crops like carrots can be grown.

Growing seasons vary from crop to crop. Some crops like cotton require 200 frost free days for their optimum growth and so are grown in the warmer seasons.

##### b. Rainfall

Moisture availability determines the type of crop and the growing season. The seasonality of rainfall is important. Crops require adequate rain for their growth but the timing of the rain affects crops differently. Seasonal variation of rainfall is important as different crops require water at different times. For example, coffee must have dry conditions before and during harvest while maize needs water during the same season.

The amount of rainfall determines the types of crops grown in an area. Rice is grown wherever the rainfall is abundant, while millet is grown in the drier regions.

### Cropping Patterns

**Uni or mono cropping**-only one crop is raised in the field at one time.

**Multiple cropping** is the practice of growing two or more crops in the same field during a single growing season. For example, in the Garhwal Himalayas, 12 or more crops are grown on the same plot, including various types of beans, grams and millets and harvested at different times.

## 2. Irrigation

Where rainfall is inadequate or unreliable, irrigation is necessary for agriculture.

### Types of Irrigation

**Ditch irrigation** is one in which water is distributed to the fields through canals (Figure 1).



Figure 1. Ditch irrigation

**Sprinkler irrigation** sprays water through sprinklers located in the fields (Figure 2).

In **Central pivot irrigation** the circular area around a pivot is irrigated, often creating a circular pattern in crops when viewed from above (Figure 3).

In **Drip irrigation** water is delivered at or near the root zone of plants drop by drop (Figure 4).



Figure 2. Sprinkler irrigation



Figure 3. Centre pivot irrigation



Figure 4. Drip irrigation

### 3. Relief

Flat land like plains, valleys, the flat top of plateaus and deltas are better suited for agriculture. For example the plains of North India are best suited for agriculture.

### 4. Soil:

The type of soil found in a region affects the kind of crops grown there. Alluvial soil is the most fertile soil and hence ideal for agriculture. Clayey soils retain water and so it is suitable for growing crops like cotton and rice. Sandy soil which allow water to seep through rapidly are more suited to grow crops like groundnuts and millets.

### 5. Other factors:

The other factors that influence the nature of agriculture practiced in an area are: size of land holdings, transport facilities, nearness to markets, availability of loans etc.

### Types of Agriculture

The type of agriculture refers to the nature of agricultural operations and the types of crop.

Agricultural types include shifting agriculture, subsistence farming, intensive subsistence farming, commercial agriculture, extensive mechanized farming and mixed farming.

#### a. Subsistence Agriculture

In this type of farming, the farmers grow just enough food for themselves and their families.

Subsistence agriculture may be of two types—simple subsistence agriculture and intensive subsistence agriculture.

**Simple subsistence agriculture** is practised by small tribal groups and is also called shifting agriculture. The farmers clear small parts of the forest by cutting and burning the trees and grow simple crops like millets and yam. After a few years, when the land becomes infertile they abandon the farms and move to another part of the forest and repeat the same process.

Shifting agriculture is called by different names in different parts of the world - Roco in Brazil, Jhumming, Bewar and Poda in India, Milpa (Figure 5), in Central America and so on.



Figure 5. Milpa

**Intensive subsistence Agriculture (Figure 6).** is found in the densely populated monsoon lands of Asia. Rice is the dominant crop. Farms are very small and the farmers cultivate it intensively using manure, high yielding varieties of seeds and family labour. The land is never left fallow. Crop yield is very high. Rice and wheat are the chief crops grown.



Figure 6. Intensive farming

### b. Commercial Farming

This type of farming is also called extensive farming. In this type of farming, crops are raised on a very large scale (Figure 7). and farming is mechanized. Wheat is the dominant crop and the yield per acre is low. Commercial farming is common in North America and Argentina in South America.



Figure 7. Extensive farming

### c. Plantation agriculture

Plantations are very large farms in tropical areas which involve heavy capital and the focus on crops like tea, coffee (Figure 8), and rubber. These are usually perennial crops where the crops yield for many years. Plantations are found in Sri Lanka, Malaysia, India, Indonesia etc.,.

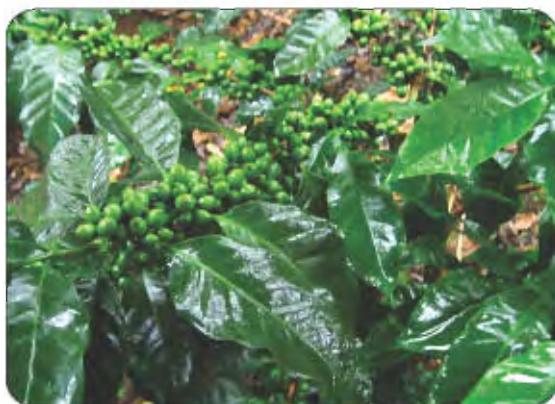


Figure 8. Coffee plantation

### d. Mixed Farming

This is a special type of farming found in the well developed parts of the world in which crops as well as livestock are raised. Such farms are common in Western Europe.

## EXERCISE

### I) Fill in the blanks.

1. Agriculture is a \_\_\_\_\_ activity
2. Crops can be broadly divided into food and \_\_\_\_\_ crops.
3. In \_\_\_\_\_ irrigation water is delivered to the roots of the plant.
4. Climatic factors like \_\_\_\_\_ and rainfall affect agriculture.
5. Raising only one crop at a time in a field is called \_\_\_\_\_.

**II) Choose the correct answer and fill in.**

1. The \_\_\_\_\_ are best suited for agriculture.
  - a) Plateaus
  - b) Plains
  - c) Mountains
2. In \_\_\_\_\_ farming, crops are raised on a large scale.
  - a) Subsistence
  - b) Shifting
  - c) Commercial
3. Shifting agriculture in Brazil is known as \_\_\_\_\_.
  - a) Jhum
  - b) Roco
  - c) Plantation
4. Rice is a \_\_\_\_\_ crop.
  - a) Temperate
  - b) Cash
  - c) Tropical
5. Where rainfall is inadequate \_\_\_\_\_ is necessary.
  - a) Irrigation
  - b) Wells
  - c) Mono crop

**III) Match the following.**

- |                             |                          |
|-----------------------------|--------------------------|
| 1. Subsistence agriculture  | Hill slopes              |
| 2. Nile valley civilization | Central pivot irrigation |
| 3. Commercial agriculture   | Egypt                    |
| 4. Circular fields          | Crops for sale           |
| 5. Tea                      | Small land holdings      |

**IV) Give short answers.**

1. Define agriculture?
2. What is meant by multiple cropping ?
3. Write a short note on alluvial soils.
4. What is plantation agriculture? Name the plantation crops.

**V) Answer each of the following in a paragraph.**

1. What factors affect agriculture? Write a short note on any 3 factors.
2. What is irrigation? Discuss the various types of irrigation.
3. Complete the table:

Subsistence	Commercial	Shifting agriculture	Plantation	Missed
Description				
Crops				
Areas				

## FORMATIVE ASSESSMENT

### I. Project Work:

- Visit and observe an agricultural field near your place.

### II. Collect Pictures:

- Collect pictures to show the various steps taken to grow a crop. Start with preparing the field, ploughing, sowing, transporting, irrigation, harvesting.

### III. Word Jumble:

Rearrange the following letters by using the given hints.

- |              |   |                      |
|--------------|---|----------------------|
| 1. LKESRPNIR | : | Method of irrigation |
| 2. VAUALLILA | : | Type of fertile soil |
| 3. OPONRCOM  | : | One type of crop     |
| 4. HCCAONIN  | : | A cash crop          |
| 5. ALMPI     | : | Shifting agriculture |

## PRIMARY ACTIVITY II

### 2.CROPS

A range of crops is grown by humans—some for food and others for fibre. Cereals form the basic diet of mankind. Cereals are grass like plants which have starchy edible seeds. The most common cereals are rice, wheat, maize and millets.

#### **FOOD CROPS**

##### **a.RICE**

Rice is the most important staple food for a large majority of the human population especially in Asia and Latin America. Rice is a tropical crop which grows well in alluvial plains and river deltas (Figure 9). The parent species of rice is native to South Asia. Rice was first domesticated in the Yangtze River valley of China.

##### **Conditions for the growth of rice**

Rice requires an average temperature of  $24^{\circ}\text{C}$  and an average rainfall of 150 cm. Where rainfall is inadequate the crop has to be irrigated. Rice requires a level surface because it is grown in stagnant water. Upland areas are terraced and levelled to create conditions for flooding. Rice can be cultivated thrice in a year in the river deltas. Alluvial soils are best suited for rice cultivation because of their high fertility. Rice is a labour intensive crop since the preparation of the field, sowing, transplanting, weeding and harvesting are done by hand.

Asia is the largest producer of rice. Asia accounts for 98%

of the world's rice production. China, India, Indonesia and Bangladesh are the top 4 producers of rice (Figure 10). In India, rice is grown extensively in all the major river valleys.



Figure 9. Rice fields - Tamilnadu

##### **b. WHEAT**

Wheat is a temperate crop and it is an essential part of the diet of the temperate regions. About 25 % of the world's farmland is devoted to wheat cultivation.

##### **Conditions for the growth of wheat**

Wheat requires warm and moist condition in the early stages of growth and dry sunny conditions in the later stages. Temperature of  $15^{\circ}\text{C}$ – $20^{\circ}\text{C}$  is ideal for wheat growth. It requires an average rainfall of 50–60 cm. It grows best in drained loamy soils. The world's best wheat comes from the soils of the temperate grasslands due to large amount of organic matter in the soil. Wheat cultivation is highly

### Major Wheat and Rice Producing Regions of the World

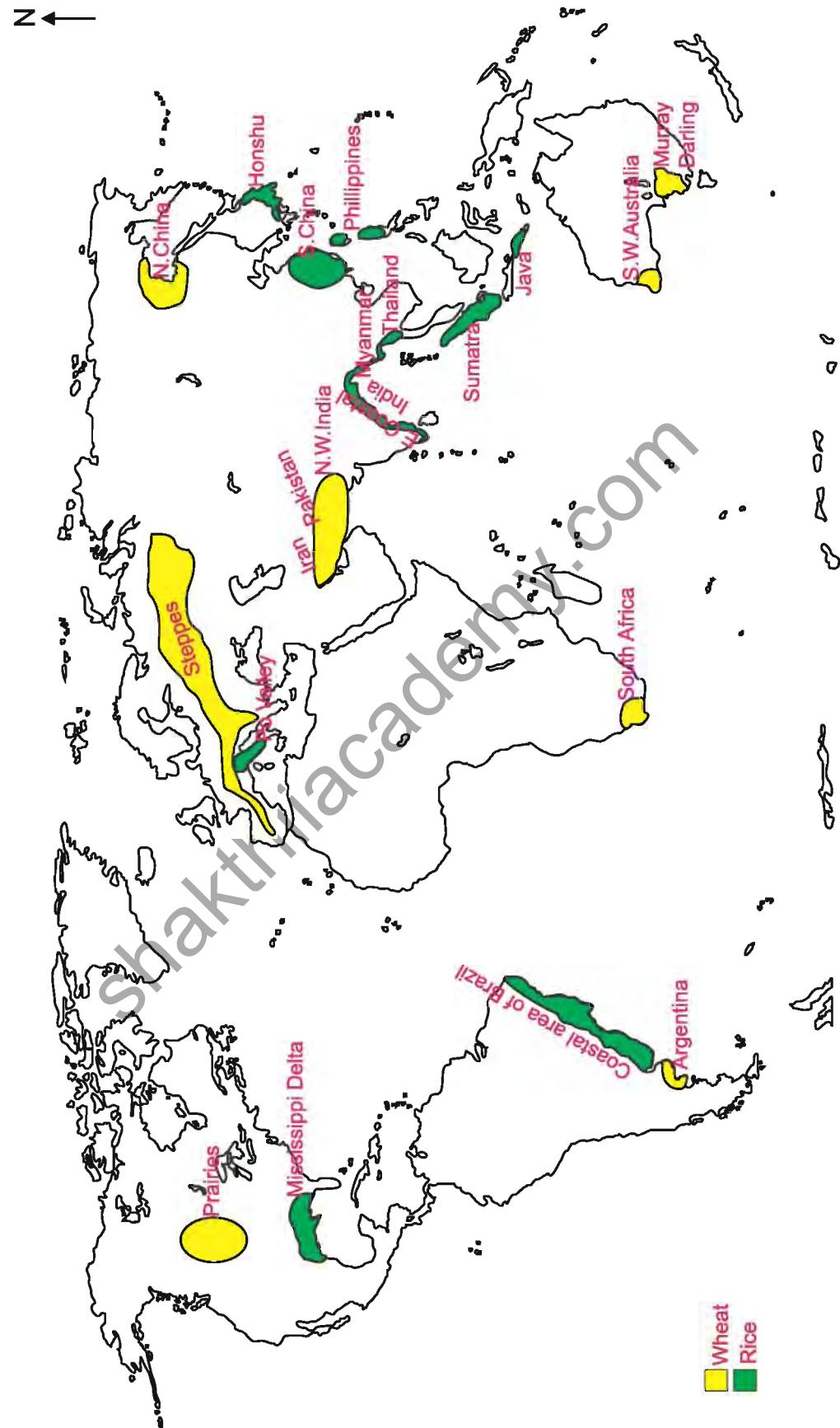


Figure 10

mechanized and requires open undulating topography (Figure 11). The world's greatest wheat producing areas are USA, China, Ukraine, Canada, Argentina, Australia, India and Pakistan. In India, U.P, Punjab and Haryana are the major wheat producing states (Figure 10).



Figure 11. Wheat fields

### FIBRE CROPS

Fibre crops include cotton, jute and flax.

#### a. COTTON

Cotton is a shrub, native to tropical and sub-tropical regions. The soft fluffy fibre grows in a ball around the seeds of the cotton plant (Figure 12). The seeds are removed from the fibre by a process called ginning.

#### Conditions for the growth of Cotton

Cotton grows well in areas having temperature between 20–30°C and rainfall of 50–100 cm. Black soil and alluvial soils are best suited for cotton cultivation. It requires cheap and skilled labour, especially for handpicking cotton bolls. Cotton is harvested mechanically in some parts of the world. The leading producers of cotton are USA, Uzbekistan, Brazil and Pakistan.



Figure 12. Cotton plant

In India, cotton producing states include Maharashtra, Gujarat, Tamil Nadu, Karnataka, Madhya Pradesh, Andhra Pradesh, Punjab and Haryana and parts of Rajasthan.

#### b. JUTE

Jute is a long soft shiny vegetable fibre (Figure 13), which can be spun into coarse strong threads. Jute is used for making jute bags, carpets and yarns. It is also known as the golden fibre.

#### Conditions for the growth of Jute

Jute requires a high temperature of 30°C and rainfall of more than 150 cm. Well-drained fertile alluvial soil is ideal for the cultivation of jute.

Cheap labour is required to obtain the fibre by retting the plant.

Retting is a microbiological process in which the plant is soaked in water for 2-3 weeks to soften the outer bark after which the fibre is removed. (Figure 13).

India and Bangladesh are the major producers of jute.



Figure 13. Retting of jute



**PRODUCTS MADE OF JUTE**

## CASH CROPS

### a. SUGARCANE

Sugarcane is a tall tropical grass which grows to a height of 3.5 m. (Figure 14). It is cultivated almost everywhere in the tropics and the subtropics.

### Conditions for the growth of sugar cane

Sugarcane requires a hot climate with an average temperature of 24°C throughout the year. It requires about 130 cm of rainfall and deep, well-drained fertile soils. It requires a large supply of cheap labour, especially during harvest.

Latin America, Southern and Eastern Asia are the main sugarcane producing regions. India, Pakistan, Indonesia and Brazil are important producers.



Figure 14. Sugarcane

### b. TEA

Tea is a beverage made from the leaves of a tropical shrub. Tea is a hardy perennial shrub. The plant is constantly trimmed to a height of 1.5m. to stimulate the growth of new leaves and to facilitate the picking of the leaves (Figure 15).

### Conditions for the growth of Tea

Tea is cultivated on the hill slopes of the tropics and the subtropics. It requires an average temperature of 21°C and rainfall of

150 cm for its growth. Severe frosts damage the crop. Tea requires well-drained soils. Tea can withstand heavy winds and sunshine and hence it is grown on the windward slopes of the hills. It is a labour intensive crop.

China, India and Sri Lanka are the major producers of tea. In India tea is grown in Assam, West Bengal, Kerala and Tamil Nadu.

With advancement in science and technology man started to process natural resources of the Earth, including agricultural crops to make new products for his use. These activities of man are called as secondary activities. This will be dealt with, in the following chapters.

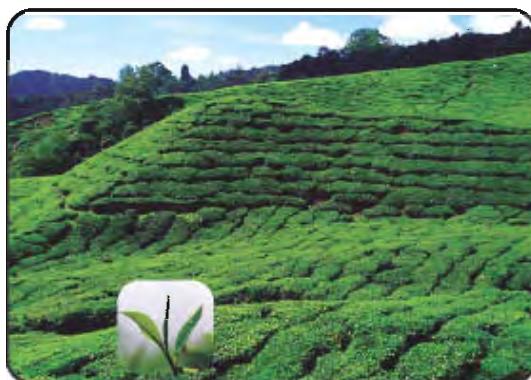


Figure 15. Tea plantation

## EXERCISE

### I) Fill in the blanks.

1. \_\_\_\_\_ form the basic diet of mankind.
2. The world's best \_\_\_\_\_ comes from the temperate grasslands.
3. Maharashtra, Gujarat and Tamil Nadu are important \_\_\_\_\_ producing states in India.
4. Rice is a \_\_\_\_\_ crop.

### II) Choose the correct answer.

1. Asia accounts for \_\_\_\_\_ of the world's rice production.
  - a) 98 %
  - b) 80 %
  - c) 75 %
2. In India, U.P, Punjab and Haryana are the major \_\_\_\_\_ producing states.
  - a) Rice
  - b) Sugarcane
  - c) Wheat
3. Tea is a \_\_\_\_\_ shrub.
  - a) Temperate
  - b) Tropical
  - c) Equatorial

4. Cotton grows well in \_\_\_\_\_ soil.

- a) Black              b) clay              c) Red

5. India and Bangladesh are the leading producers of \_\_\_\_\_.

- a) Cotton              b) Jute              c) Wheat

**III) Match the following.**

- |                        |           |
|------------------------|-----------|
| 1. Ginning             | Wheat     |
| 2. Retting             | Sugarcane |
| 3. Loamy soil          | Cotton    |
| 4. Alluvial soil       | Jute      |
| 5. Tall tropical grass | Rice      |

**IV) Give short answers.**

1. What are the requirements for the cultivation of wheat?
2. What is ginning?
3. Name the countries that produce cotton on a large scale?
4. What is retting?
5. Which countries lead in sugarcane cultivation?

**V) Answer in a paragraph each.**

1. Compare and contrast the conditions or requirements for the cultivation of rice and wheat.
2. Write a paragraph on the conditions required for the cultivation of tea.

### FORMATIVE ASSESSMENT

**I. Map Skill:**

Mark areas producing wheat, cotton and jute on a world map.

**II. Project:**

Collect a list of articles and pictures made out of jute.

**III. Word Search:**

V	A	N	I	P	M	G	I	N	N	I	N	G	T	R	Y	I	L	Y	M
R	A	G	A	R	T	H	U	P	I	T	C	H	I	S	A	R	A	T	U
D	H	A	N	A	L	A	K	S	H	M	I	M	U	T	H	U	L	I	T
A	D	R	B	N	V	L	O	N	T	H	S	G	V	N	O	R	R	Y	H
A	T	Y	R	A	T	Y	R	A	T	Y	R	A	T	Y	R	E	A	Y	U
T	T	Y	C	T	T	Y	C	T	T	Y	C	T	T	Y	C	T	T	T	L
T	R	A	N	S	P	L	A	N	T	I	N	G	T	L	Y	T	H	H	I
P	E	R	U	M	A	G	A	L	U	R	A	T	Y	R	N	I	I	J	N
Y	T	H	I	N	M	B	T	T	K	R	T	T	Y	C	P	N	K	N	G
V	I	J	A	Y	A	S	A	R	A	T	H	Y	M	S	C	G	A	F	A
A	T	Y	R	C	A	T	Y	R	A	T	Y	R	A	T	Y	R	K	G	M
T	T	Y	C	E	T	T	Y	C	T	T	Y	C	T	T	Y	C	T	I	S
A	T	Y	R	R	H	J	M	I	L	L	E	T	S	H	J	Y	R	P	P
T	T	Y	C	E	A	T	Y	R	H	J	Y	N	P	A	L	L	A	V	I
A	T	Y	R	A	T	T	Y	C	H	J	Y	A	T	Y	R	A	T	Y	R
T	T	Y	C	L	A	T	Y	R	H	J	Y	T	T	Y	C	T	T	Y	C
A	T	Y	R	S	T	T	Y	C	T	T	L	U	W	E	E	D	I	N	G
T	T	Y	C	V	I	J	A	Y	A	S	A	R	A	T	H	A	T	Y	R
A	D	R	B	N	V	L	O	N	T	H	S	G	V	N	O	T	T	Y	C
T	R	T	O	P	O	G	R	A	P	H	Y	R	A	G	H	U	M	S	C

1. Deseeding cotton.
2. Soaking process in jute.
3. Food crops like ragi, cambu, cholam.

4. Grass like edible plants.
5. Removing unwanted plants.
6. An important step in rice cultivation.
7. Different land forms on the earth surface.

**IV) Discussion:**

- a. Have a discussion in class about the food eaten at home yesterday.
  1. What were the main ingredients?
  2. Where did it come from?
  3. Why was the food different in each classmate's house?
- b. Plan a daily menu for a South Indian and a North Indian. Why is it different?

	North India	South India
Breakfast		
Lunch		
Dinner		

## SECONDARY ACTIVITY I

### 3. INDUSTRIES

The planet earth is rich in natural resources both mineral and agricultural. These resources are not useful to man in their original form. They must be processes and made into useful products.

Industry refers to any economic activity concerned with the processing of raw materials into finished products with the help of machines in a factory. This process of converting a raw material into a finished product is known as manufacturing. During the process of manufacturing value is added to the goods and it becomes useful to man.

Let us take the example of cotton. The cotton is spun into yarn, woven, dyed and printed before it becomes a product that is useful to man. Wood is converted to furniture or paper, silica to glass, gold and silver into jewelry etc.

The Industrial Revolution in the 18<sup>th</sup> and 19<sup>th</sup> centuries resulted in goods and services being produced in factories on a large scale. Coal was the first fuel to be used in industries. Today the economic strength of a country is measured in terms of its industries.

In India, industrialization developed after the country's Independence. The Five Year plans played a major role in the development of the industries in the country.

Industries require large investments and so it is very important to take many factors into consideration before setting up an industry.

#### **FACTORS AFFECTING THE LOCATION OF INDUSTRIES**

Industries cannot be developed everywhere. There are certain factors that influence the location of industries. These factors can be both geographical and human factors. This is shown in (Figure 16).

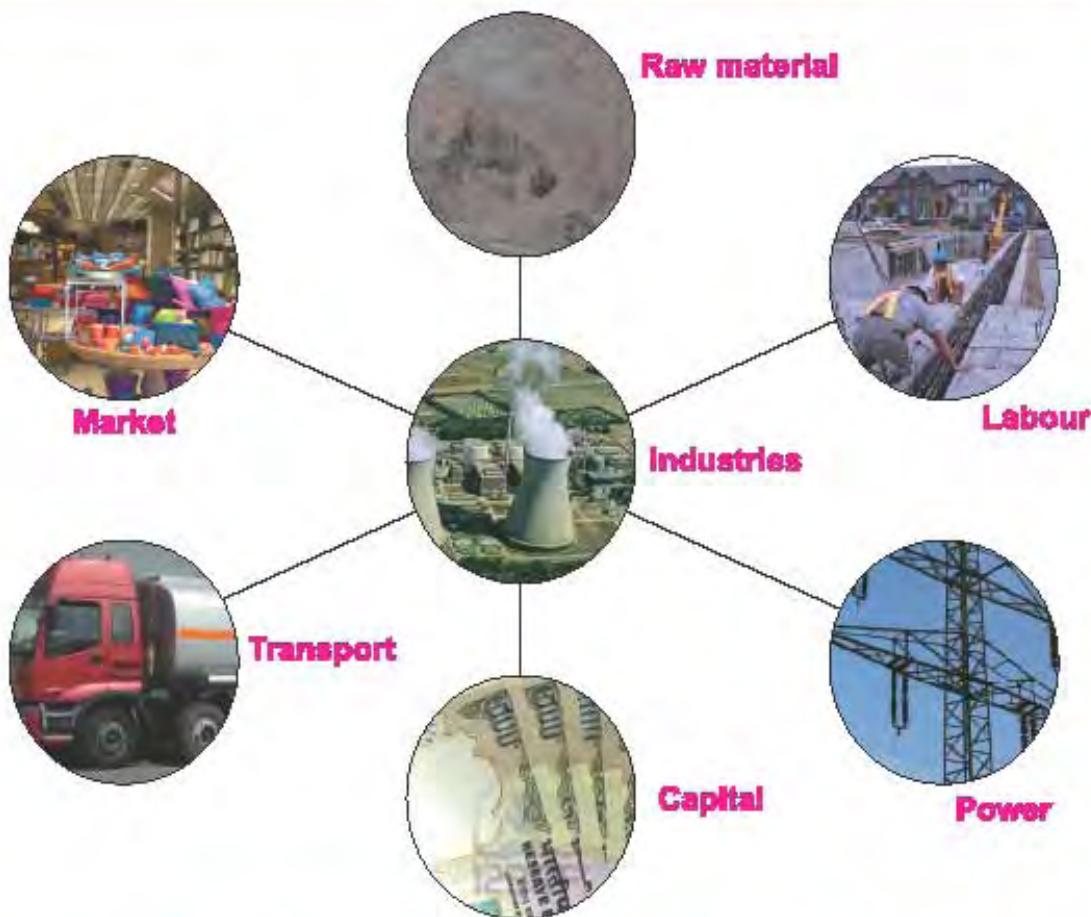
##### **1. Raw material**

Some industries require large quantities of heavy raw materials. Such industries are located near the raw materials to reduce the time and cost involved in transporting them. Iron and steel industries are always located near the coal mines or iron mines. For example, Tata Iron and Steel Industries are located near the Raniganj, Jharia and Bokaro coal fields.

##### **2. Labour**

Industries require a lot of cheap labour or manpower. Industries tend to locate in areas that have high populations. Countries like India and China have a large and cheap labour force.

Labour can be divided into skilled labour which has specific skills and semi-skilled labour which does not require specific skill. Diamond cutting industry is located at Surat because skilled workers are



**Figure 16. Factors that Influence the location of Industry**

available there while the packing industry can be located anywhere as it does not require specific skills.

### 3. Power

Power is the basic requirement to operate machinery. The industrial sector uses about 70 % of the total commercial energy available all over the world. Major sources of power for industries are thermal (coal) and hydroelectric (water). Industries are located in areas where power is easily available.

### 4. Capital

Capital or money is essential to set up any industry. This is required for getting all the necessary inputs

for the industry. Some industries require large investments of money while others are not capital intensive. Larger the industry, greater is the capital requirement. Industries develop in areas where capital is available for investment.

### 5. Transport

Transport is essential to procure raw materials from the sources to the industry and transfer the finished products to the market. Industries require fast and cost-effective modes of transport. Hence, industries are located in areas where transportation is well developed.

## 6. Proximity to Market

Certain industries are located near the market when they involve the assembling of numerous components for example, automobile industry. Industries producing perishable commodities like dairy products and fragile goods like glass are also located near markets.

One or more of the above geographical and human factors determine the location of industries worldwide. Other factors like climatic conditions and availability of water also influence the location of industries.

### EXERCISE

#### I) Fill in the blanks.

1. We cannot consume resources in their \_\_\_\_\_ form.
2. \_\_\_\_\_ and \_\_\_\_\_ factors determine the location of industries.
3. Industries using bulky raw materials are located near \_\_\_\_\_
4. Industries use \_\_\_\_\_ per cent of the world's available commercial energy.
5. Industries manufacturing fragile goods are located near \_\_\_\_\_

#### II) Choose the best answer.

1. \_\_\_\_\_ are fragile goods.  
a) Glass items      b) Vegetables      c) Cars
2. The fuel that launched the industrial revolution is \_\_\_\_\_  
a) Oil      b) Iron      c) Coal
3. The \_\_\_\_\_ is generally located near the coal mines.  
a) aluminum industry      b) iron and steel industry  
c) ship building industry
4. Diamond cutting requires \_\_\_\_\_ labour.  
a) skilled      b) unskilled      c) semi-skilled

#### III) Match the following.

- |                             |                       |
|-----------------------------|-----------------------|
| 1. Mass production of goods | semi skilled labour   |
| 2. Iron and steel industry  | market oriented       |
| 3. Jharia                   | Industrial Revolution |
| 4. Packaging industry       | coal mine             |
| 5. Assembling industry      | raw material          |

**IV) Answer the following in a sentence or two.**

- 1.What is an industry?
- 2.Name the factors that are responsible for the location of an industry?
3. Name few activities associated with the secondary sector?
4. What are the different types of labour used by industries?

**V) Answer in 100 words.**

1. How do raw materials play an important role in the location of industries?
2. What is the role of capital in the location of industries?

**VI) Answer in 200 words.**

- 1.Explain in detail the factors influencing the location and development of industries?

**FORMATIVE ASSESSMENT****I. Project:**

1. Mention the factors that have influenced the establishment of any two industries in your neighbourhood.
2. a. Identify the most important factors for the following industries.  
b. Add two more factors required for it.
 

1. Iron and Steel	:	Market / Raw material
2. Watch industry	:	Skilled labour / Land
3. Woollen textile	:	Power / Market

**II. Map Skill:**

On an outline map of India mark the following:

1. Five iron and steel plants.
2. Location of two cotton textile industries.
3. Two areas for sugar industries.
4. Ship building industry.

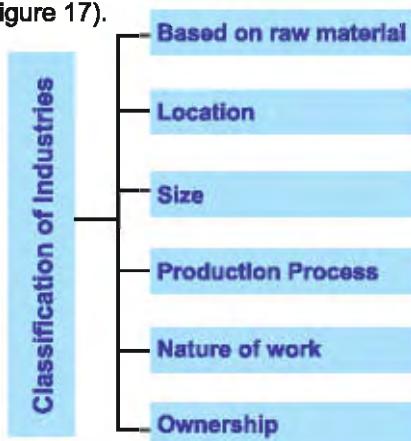
## SECONDARY ACTIVITY II

### 4. TYPES OF INDUSTRIES

Industries are very important for the rapid development of the economy of a country. They add significantly to the national income of a country and generate employment for its population.

Industries can be classified as follows

(Figure 17).



#### I) Based on raw materials

Based on the type of raw materials used, industries can be classified into the following types:

#### a) Forest based industry

In this industry, the raw materials are obtained from the forests. Examples of such industries include paper industry and furniture making (Figure 18).



Figure 18. Furniture making

#### b) Agro - based industry

These industries use raw materials obtained from agriculture to produce new products like cotton textiles, jute products and sugar.

#### c) Mineral based industry

The raw materials for these industries are mineral ores. Examples of such industries are Iron and Steel, Cement (Figure 19), Aluminium and Chemicals.



Figure 19. Cement industry

#### II) Location

Based on the location of the industry, industries may be classified into:

#### a) Raw Material Oriented

These industries are located near the raw materials because of the bulky or peculiar nature of the raw materials. For example, iron and steel industries use large quantities of iron ore and coal and so they are located near the raw material sources. Sugar industry is located

near the sugarcane fields because the sugar content decreases within 24 hours of harvesting the cane and so the cane has to be processed immediately.

### b) Market oriented

These industries are located near the markets because of the perishable nature of the products. Example:

Milk and Milk products of Diary industry

### c) Footloose industry

These industries can be located anywhere because the raw materials are small in size and light in weight. Example: Watch industry.

## III) Size of Industry

Based on the scale of operations industries are divided into:

### a) Large scale industry

These industries are large establishments which involve huge



Figure 20. Large Scale Industry

investment, the use of heavy machinery and the employment of a large number of workers. Example: Integral Coach Factory - Chennai, Tata Iron and Steel - Jamshedpur, BHEL-Trichy and SAIL- Salem. (Figure 20).

### b) Medium scale industry

These industries are medium in size and investment and are technology oriented. Example: Computer industry and electronic industry (Figure 21).



Figure 21. Electronic Industry

### c) Small scale industry



Figure 22. Handloom Production

These industries are small establishments with small investments and small labour force. It may involve domestic production. For example, hosiery, hand tools and stationery items (Figure 22).

#### **d) Cottage industry**

This type of industry is generally a household unit run by a family. Such industries produce all kinds of handicrafts handloom products, jewelry, pottery etc. The craftsmen carry on the traditional work started by their forefathers' generations ago.



Figure 23. Cottage industry - pottery

industry (Ashok Leyland) (Figure 24).

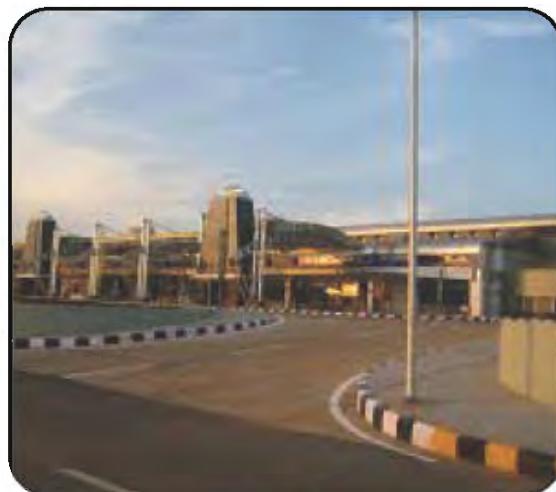


Figure 24. BHEL, Trichy

#### **b) Light Industry**

In these industries, both raw materials and finished products are light in weight. They are less capital intensive and consumer oriented. Example: hosiery, watch industry and household goods.

#### **V) Nature of work**

Under this criterion, different industries can be distinguished based on the nature of work.

They are:

#### **a) Processing Industries**

These industries process raw materials into semi-finished products. Examples of such industries are the tanning industry (Figure 25), which converts skin and hide into leather in the tanneries, ginning industry which removes cotton seeds from cotton, and smelting of metallic ores.

### Industrial Centers of the World

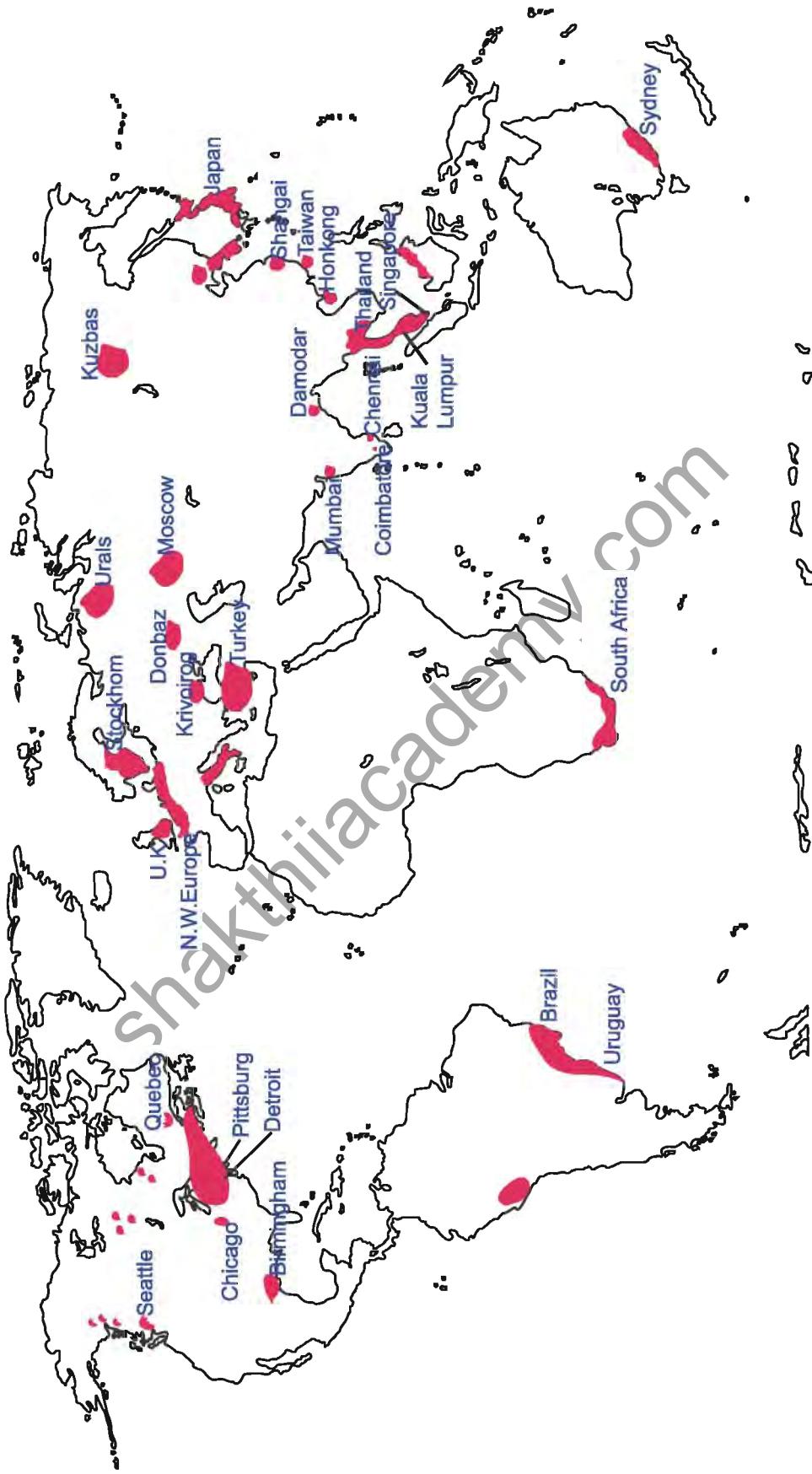


Figure 27



Figure 25. Tanning industry

### b) Manufacturing industries

These industries convert raw materials or semi-finished products into finished products. Examples of such industries are the textile industry which converts yarn into fabrics, the Iron and Steel industry which converts iron and steel into machinery and furniture industry in which timber is converted into furniture.



Figure 26. Automobile assembling

### c) Assembling industry

These industries assemble or fit together various finished products to form new products. Examples of such industries include automobile industry (Figure 26), and computer assembling.

### VI) Nature of Ownership

Based on the ownership of the industry, industries are classified into:

#### a) Public Sector

These industries are industries which are owned by the government. Example: the Steel Authority of India (SAIL) and Bharat Heavy Electricals Limited (BHEL).

#### b) Private Sector

These industries are owned by individuals or small groups. Example: Reliance.

Manufacturing industries are the chief wealth producing sectors of an economy.

The different types of industries contribute to the economic development of countries. (Figure 27). Economically advanced countries are those that have a well developed industrial sector.

### EXERCISE

#### I) Fill in the blanks.

1. \_\_\_\_\_ industries can be located anywhere because their raw materials are very light.
2. Automobile industry is an \_\_\_\_\_ industry.

3. \_\_\_\_\_ industry is located near the market.  
 4. Handloom industry is an example of a \_\_\_\_\_ industry  
 5. Processing industries convert raw materials into \_\_\_\_\_ products

**II) Choose the correct answer.**

1. \_\_\_\_\_ is an example of private sector.
  - a) Reliance      b) BHEL      c) BSNL
2. Large scale industries require \_\_\_\_\_ investment.
  - a) huge      b) medium      c) less
3. Furniture industry is \_\_\_\_\_ based industry.
  - a) forest      b) agro      c) mineral
4. Cotton textile industry is an \_\_\_\_\_ industry
  - a) cottage      b) assembling      c) agro-based
5. Sugar industry is a \_\_\_\_\_ oriented industry
  - a) raw material      b) footloose      c) market

**III) Match the following.**

- |             |                   |
|-------------|-------------------|
| 1. Ginning  | iron industry     |
| 2. Tanning  | heavy industry    |
| 3. Smelting | cotton industry   |
| 4. Capital  | handloom industry |
| 5. Weaving  | leather industry  |

**IV) Answer the following in a few sentences.**

1. Divide industries based on their location
2. How are industries classified according to size?
3. What is meant by assembling industry?
4. Give few examples of light industry?
5. What are the characteristics of cottage industries?

**V) Answer the following in 100 words.**

1. Distinguish between large -scale and small-scale industries.
2. Explain how industries are classified according to their raw materials?

**VI) Answer the following in 200 words.**

1. How are industries classified? Explain

## FORMATIVE ASSESSMENT

### **I. Project:**

1. List 10 industries found in your district under different categories.
2. List any 5 agro based industries and collect the following information for each industry. Present it in a tabular format.
  - a. Crop
  - b. Place
  - c. Production
  - d. Process
3. Make a collage on a various products made by the cottage industry in India.
4. Which is your favourite car? Where it is manufactured and write about it?

### **II. Crossword Puzzle:**

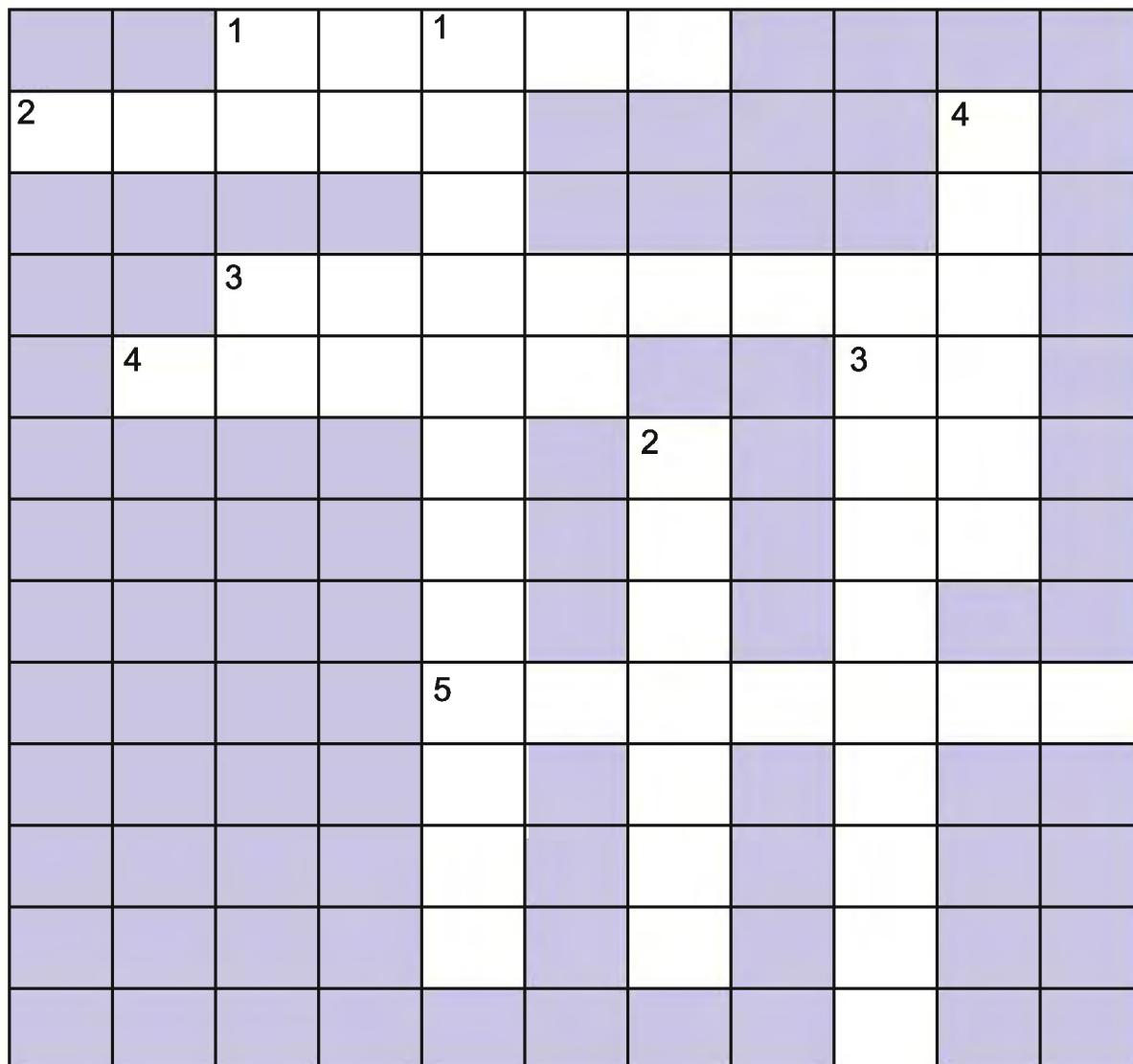
Solve the cross word puzzle with the help of given clues.

#### **Across:**

1. Industries based on market oriented, (5)
2. Industries based on forest, (5)
3. A cottage industry, (8)
4. Industries based on agriculture, (5)
5. A processing industry, (7)

#### **Down:**

1. Raw material oriented industry, (12)
2. Integral coach factory location, (7)
3. An example of manufacturing country, (9)
4. A mineral based industry, (6)



Shakthi  
Academy

## TERTIARY ACTIVITY I

### 1. TRADE

Trade is the exchange of commodities within or between countries. Trade occurs because of **surplus** of goods in one place and the **demand** for the same in another place. The difference in the natural resources of countries forms the basis of trade between countries.

The commodities entering into world trade may fall into two main categories:

1. Primary products which includes cereals, fruits and other items grown for food and industrial raw materials such as mineral ores, fiber crops like cotton, jute etc and

2. Secondary products are manufactured goods.

Trade may take place within a country (Internal Trade) and between countries (International Trade). International trade may be bilateral or multilateral. Bilateral trade is the exchange of commodities between two countries. Multilateral trade is between a number of countries.

#### Factors Affecting Trade

##### 1.Uneven distribution of natural resources

Differences in climate, geology, soil, vegetation and mineral resources result in the exchange of goods.

##### 2.Stage of industrial/economic development

Industrial countries export finished products to other less

industrialized countries. The less developed countries export industrial raw materials and food products.

##### 3.Differences in climate

Differences in climatic conditions result in different types of agricultural, animal and forest products. These are exchanged locally and internationally. Exchange of these goods takes place between different climatic regions. For example, temperate regions supply soft wood and dairy products. Tropical regions supply hardwood and tropical crops.

##### 4.Differences in population

People in different regions, produce distinctive types of goods because of their long tradition of producing certain goods like silk fabrics in China and watches in Switzerland. Densely populated countries have less international trade, since domestic consumption of products is high and there is **little** surplus. However, they may export goods that are labour intensive. For example, Tea.

##### 5.Transportation

Transportation has played an important role in the development of trade. The development of roads, oil pipelines and so on in a country facilitate international trade by transporting a variety of bulky goods to the ports.

## 6. Government Policies

International trade is influenced by political relationship. When the relationship between countries is good, then there is more trade.

Trading blocs are associations between groups of neighbouring countries for the purpose of promoting trade. For example: Association of South East Asian Trading Nations (ASEAN) and European Union (EU).

## International Trade Flows

International trade flow is controlled by geographic, economic and political conditions.

Many countries enjoy geographical advantage over other countries in the production and trade of agricultural commodities and minerals. Therefore they specialize in the trade of these commodities. For example, they import oil from the Middle East, paper and wood pulp from Canada and Sweden and rubber and tin from Malaysia.

## Trading Regions

The world's major trading regions are:

### 1. Europe

Europe is one of the most densely populated and highly industrialized regions and has the largest volume of trade (30%). The exports of this region are mainly finished and semi-finished products. Imports are mainly industrial raw materials.

## 2. North America

The USA has the largest volume of trade together with Canada and they export machinery, automobiles, chemicals and import a variety of products.

## 3. Latin America

This region covers the Caribbean islands and Central and South American countries. All of them are exporters of foodstuff and raw materials and importers of manufactured goods.

## 4. Africa

African countries are exporters of mineral ores and tropical raw materials and importers of manufactured goods.

## 5. Asia

Asian countries are rich in raw materials and minerals and export them. All Asian countries except Japan are importers of manufactured goods.

## 6. Australia

Australia exports agricultural products and minerals and imports foodgrains, petroleum and machinery.

Trade has a great impact on the economy of a country. The difference in values between imports and exports is referred to as the **balance of trade**. If the value of exports exceed imports, the country is said to have a favourable balance. When the value of imports exceeds the value of exports, the country has an adverse balance of trade.

## EXERCISE

**I) Fill in the blanks.**

1. Latin America exports \_\_\_\_\_.
2. Rubber and tin are found abundantly in \_\_\_\_\_.
3. Industrial countries export \_\_\_\_\_ to the less industrial countries.

**II) Match the following.**

- |           |                          |
|-----------|--------------------------|
| 1. China  | Middle Eastern countries |
| 2. Oil    | Mineral ores             |
| 3. Paper  | Silk                     |
| 4. Africa | Malaysia                 |
| 5. Tin    | Canada                   |

**III) Choose the correct answer and fill up.**

1. Trade within the country is called \_\_\_\_\_.  
 a) Internal trade    b) International trade    c) Open trade
2. Industrial raw materials are \_\_\_\_\_ products  
 a) Primary    b) secondary    c) Tertiary
3. Switzerland is famous for \_\_\_\_\_.  
 a) Silk    b) Watches    c) Tea

**IV) Answer in 2 or 3 sentences.**

1. What is meant by bilateral and multilateral trade?
2. What are the two main categories of commodities that enter into the world trade?
3. Why does trade occur?

**V) Answer in a paragraph.**

1. How does climate affect the trade of a country?
2. Write a short note on balance of trade.

**VI) Answer in detail.**

1. Discuss the factors that affect trade.
2. Give an account of the world's major trading regions.

### FORMATIVE ASSESSMENT

1. List any five items that are exported from and imported by Tamil Nadu.
2. On a world map mark the countries from which five important commodities are imported by India from different parts of the world.
3. Find out the currencies for the following countries.
  - i. USA
  - ii. Germany
  - iii. Srilanka
  - iv. Korea
  - v. Japan
  - vi. Brazil
  - vii. Kuwait
  - viii. Russia
  - ix. Singapore
  - x. Morocco
4. Give the expansion for the following and write a short note on:
  - i. ASEAN
  - ii. OPEC
  - iii. EUC
  - iv. WTO

## TERTIARY ACTIVITY II

### 2. TRANSPORT AND COMMUNICATIONS

Transportation is the movement of people and goods from one place to another place. A good transportation system in a region makes good use of its resources and manpower through movement and exchange resulting in economic growth. The major transport systems are discussed below

#### **ROADWAYS**

Roads are the most common mode of transportation in the world. There is a close relationship between road density, (Road density is the ratio between the total length of roads in a country to its total land area) population density (The ratio between the total number of people in a country to its total land area) and the state of economic development of a country. The greater the road connectivity, the greater the economic development.

Roads can be classified as transcontinental highways, national highways and local roads. The transcontinental highways are important as they are very long roads connecting the continents from end to end. The Trans-Canadian Highway, The Alaskan Highway, the Pan-American Express Highway and the Australian Transcontinental Highway are examples of such roads.

Increasing speed and number of road vehicles has resulted in the development of multilane national highways. These are excellent

straight roads cutting across the country through bridges and tunnels to reduce travel time. The autobahns of Germany were the first such roads.

#### **THE GRAND TRUNK ROAD IN INDIA**

The Grand Trunk Road is India's longest major road running across North India connecting Sonargaon in Bangladesh and Peshawar in Pakistan for a distance of 2500 Km.

In India, road network is densest in the coastal regions of Tamil Nadu and Kerala and also in West Bengal, Punjab, Haryana and U.P. In India roads are divided into National Highways, State Highways and District Roads.

#### **RAILWAYS**

Railways developed with the rise of industries because they were the cheapest and fastest means of transport for carrying bulky goods over long distances. Railway network is densest in the highly developed industrialized regions of Europe and North America. Japan, India, S.E. Australia, and coastal Argentina have moderately dense railway network.

The Trans-Siberian Railway is a trans-continental railway line linking Leningrad on the Baltic coast of Russia with Vladivostok on the Pacific coastline. The Trans-Canadian Railway links the East

and West coasts of Canada. The Trans -Andean Railway links Buenos Aires (Argentina) with Valparaiso (Chile). The Trans-Asian Railway links Singapore with Istanbul in Turkey running through 26 countries for a length of 18000 Km.

Indian Railway is the second largest in Asia and the 4<sup>th</sup> largest in the world. It is the densest in the Gangetic plains of U.P., Bihar and West Bengal. The Indian Railway employs the largest workforce in the world.

In large metropolitan cities of India, intracity rail lines are constructed to ease the growing traffic congestion. These rail lines are either underground rail lines or elevated above the ground. (Figure.1)

The **Mass Rapid Transit System (MRTS)** is an elevated line of the suburban railway in Chennai (Madras), Tamil Nadu. The line currently runs from Chennai Beach (Madras Beach) to Velachery, covering a distance of 25 km with 17 stations. Like the rest of the suburban railway network, the MRTS is operated by the Government-owned Southern Railways (SR).



Figure 1. MRTS Chennai

## WATERWAYS

Waterways are the cheapest means of transport. They may be divided into inland waterways and ocean transport.

### Inland Waterways

Deep navigable rivers with a perennial flow of water and navigation canals constitute the inland waterways. The most important inland waterway lies in the industrially advanced countries of Western Europe, (such as the Rhine, Rhone, Danube and Elbe) North America and Canada(Great Lakes). These waterways in combination with the railways help wider movement of goods at lower costs in the industrial regions of these countries.(Figure.2)



Figure 2. Rhine waterways

In India, inland waterways are limited to the river Brahmaputra in Assam and the Ganges and its tributaries in U.P. and Bihar.

Buckingham canal was once an important waterway in Tamil Nadu. It carried goods from Nellore to Marakkanam but sadly now it is a polluted channel.

## Ocean Transport

Ocean routes were once an important form of transport for intercontinental travel. Today, it is used mainly for transporting bulky cargo. The following are the major shipping routes of the world :

The North Atlantic route connecting the crowded countries of Europe to the Eastern coast of North America.

- The Cape of Good Hope route connecting Western and Southern Europe with South West Asia and Australia.

- The Panama Canal route connecting the west coast regions of

North and South Americas with their east coastal regions.

- The Trans-Pacific route connecting the ports of Eastern Asia to the ports on the west coast ports of North America.

- India is bounded on the east by the Bay of Bengal, on the west by Arabian sea and on the south by the Indian ocean. It has a long coast line of 6,100 km (mainland). Some of the major ports are Kolkata, Paradip, Vishakhapatnam (Figure 3 and 4 ), Chennai, Tuticorin, Cochin, Mangalore, Marmagao, Mumbai and Kandla.





Figure 4 . - Visakapatnam Port

## AIRWAYS

Airways are the fastest and costliest means of transport which carry passengers, freight and mail. Air travel has gained immense popularity because it not only saves time but also reduces tiredness involved in covering long distances. Passengers from India can reach many European countries in a day.

Commercial airlines now connect all important parts of the world and a large proportion of the world's mail is carried by airways.

## PIPELINES

Pipelines are used to transfer commodities like oil and natural gas. The oil pipelines are privately owned by oil companies. The bulk of the world's crude oil from the oil fields is transported to the refineries or shipping terminals through pipelines.

Some of these pipelines are : Big Inch line from Texas to New Jersey, (TAPS) or the **Trans-Alaska Pipeline System (Figure. 5 )** in North America. Tap line or the Trans-Arabian Pipeline from Qaisumah in Saudi Arabia to Sidon in Lebanon is runs for a distance of 1214 Km.



Figure 5. The Trans-Alaska Pipeline

## COMMUNICATION

Communication involves the transmission of words and messages. The different forms of communication are personal communication and mass communication. The first development in communication was the invention of the telegraph in 1844. The next important development was the invention of the telephone in 1875. The development of Telex (Telegraph Exchange) in 1935 enabled messages written in one place to be transmitted to distant places where they are typed out by a teleprinter.

Mass communication includes all those media designed to reach a large audience.

Mass communication can be divided into two categories-the print media (books, journals, magazines, newspapers) and the electronic media (radio, television, telecommunication, internet). In recent years, satellites have played an important role in communication both in India and the World. The Indian National Satellite (INSAT) has revolutionized communication in India in the recent years.

The development of transport and communication in a region helps increase the mobility of people, easy and fast movement of goods and transfer of ideas. This

increases trade and economic prosperity of that region. Therefore, transport and communication is important for the development of a country.

## EXERCISE

### I) Fill in the blanks.

1. The Transcontinental railway links \_\_\_\_\_ with Vladivostok
2. \_\_\_\_\_ are the cheapest means of transport.
3. Buckingham canal carried goods from Nellore to \_\_\_\_\_.

### II) Choose the correct answer.

1. \_\_\_\_\_ is a major port
  - a) Puducherry
  - b) Chennai
  - c) Cuddalore
2. Pipelines are used to carry \_\_\_\_\_.
  - a) Coal
  - b) Oil
  - c) Wood
3. Telegraph was invented in the year \_\_\_\_\_.
  - a) 1844
  - b) 1855
  - c) 1866

### III) Match the following.

- |                    |                            |
|--------------------|----------------------------|
| 1. Brahmaputra     | - North America            |
| 2. Rhine           | - Transcontinental Highway |
| 3. Alaskan Highway | - Major port               |
| 4. Visakhapatnam   | - Inland waterways         |
| 5. TAPS            | - Germany                  |

### IV) Answer in two or three sentences.

1. How are roads classified?
2. Write a note on Indian Railways
3. Name the different means of communication

### V) Answer in a paragraph.

1. Write about the major shipping routes of the world.
2. What do you know about Inland waterways?
3. Write a note on mass communication.

### V) Write a detailed answer.

1. The development of transport and communication is important for the development of a country - Discuss.

## FORMATIVE ASSESSMENT

1. List the seaports of India along the coast from north to south.
2. Project work:
  - i. Write any two important goods handled by the following seaports.  
a. Mumbai b. Visakapatnam c. Goa d. Cochin e. Kolkatta
  - ii. Which is the longest railway line in India and name the cities which it connects.
  - iii. Write a very short note on Trans - Alaskan pipeline system.
  - iv. Collect an INSAT picture from the local news paper. Can you understand weather from the photograph.
  - v. Why is air transport is preferred by the people of North East India.

## POPULATION

### 3. POPULATION GROWTH AND DISTRIBUTION

The period of economic change when man became a farmer altered the relationship between man and environment. Since then the population began to grow steadily.

#### **Population Growth**

The world population probably reached 500 million by 1650 and has since grown at an increasing rate. The world population first reached 1 billion in 1804. The second billion was added after 123 years in 1927. Since 1950, the rise in population has been rapid.

Table 1 gives you an idea of how rapidly the world population has been growing since 1804.

Year	World Population in billions	Time taken to add the next billion
1804	1	
1927	2	123 years
1960	3	33
1974	4	14
1987	5	13
1999	6	12
2011	7	12

**Table 1: Population Increase**

Economic growth progressed with industrial and agricultural development, the improvements in medical care, health, flood control,

fire protection etc helped to control the natural laws. This caused decrease in deaths and increase in births.

The growth of population or the natural increase of population depends on the birth rate and death rate. Birth rate is the number of live births in a year for every 1000 people in the total population. Death rate is the number of deaths per 1000 people.

The difference between birth rate and death rate is termed as growth rate.

The phenomenal growth in population is because of changes in the patterns of birth and death rates. When both birth rates and death rates are high, the population does not grow much in size.

When birth rates are higher than death rates, the population will increase.

When the birth rate is low and the death rate is high, the population will decline.

Different countries are at different stages of population change. Presently the developed countries of the world have low birth and death rates. Developing countries have low death rates and high birth rates resulting in very high population. They are trying to control the birth rates in order to control their large populations.

Today, there are some countries in the world with more deaths than births or an even number of deaths and births resulting in zero or negative natural population growth (Table 2).

COUNTRY	ANNUAL NATURAL DECREASE (%)
Ukraine	0.8
Russia	0.6
Germany	0.2
Japan	0
Italy	0

Table 2: Annual decrease

### Population Distribution and Density

Population distribution refers to the pattern of spread of people on the Earth. World population distribution is uneven. About 90% of the Earth's people live on 10% of the land.

Population density is defined as the number of people per sq. km. It is calculated by dividing the number of people in a country by the area of that country.

The tiny country of Monaco has a population density of 16,779 people per sq.km. However, Monaco has very high density because it is extremely small in size (1.95.sq.km). Bangladesh is considered the most densely populated country, with more than 1,069 people per sq.km. Mongolia is the world's least densely populated country with only 1.7 people per sq.km. Australia is second with 2.9 people per sq. km.

### Factors affecting the distribution and density of population

There are a range of natural factors and human factors that affects population distribution and density (Table .3)

Physical Factors	High Density	Low Density
<b>A) Physical Factors</b> <ul style="list-style-type: none"> <li>(i) Relief (shape and height of land)</li> <li>(ii) Climate</li> </ul>	<p>Lowland which is flat. example Ganges Valley in India</p> <p>Areas with favourable climate tend to be densely populated as there is enough rain and heat to grow crops, e.g. India.</p> <p>Areas rich in resources (Eg. minerals, fuel, forest, fish resources) tend to be densely populated. Eg. Western Europe.</p>	<p>High land that is mountainous; e.g. Himalayas.</p> <p>Areas with extreme climates are sparsely populated: Eg. the hot deserts such as Sahara and the extremely cold areas like Greenland.</p> <p>Areas with few resources tend to be sparsely populated e.g. The Sahel in Africa</p>

<b>Physical Factors</b>	<b>High Density</b>	<b>Low Density</b>
B. Human Factors (i) Political	Countries with stable governments tend to have high population density; example: Singapore	Countries with unstable governments tend to have lower population densities as people move away; e.g. Afghanistan.
(ii) Social	Groups of people prefer to live close to each other for security; example: USA	Other groups of people prefer to be isolated; e.g. Scandinavians
(iii) Economic	Good job opportunities encourage high population densities, particularly in large cities in both the more economically developed countries (MEDCs) (example: Tokyo) and less economically developed countries (LEDGs) (example: Mumbai)	Limited job opportunities cause some areas to be sparsely populated; e.g. Amazon Rainforest

Table 3: Factors determining population densities

Table 4: shows the distribution and density of population in different continents.

<b>Continent</b>	<b>Population (million)</b>	<b>% of World's Population</b>	<b>Density</b>
Asia	3800	60	203
Africa	840	12	65
Europe	710	11	134
North America	514	08	32
South America	371	5.3	73
Australia	21	0.3	6.4

Table 4: Distribution and density of population

The following table.5 shows a list of countries. Notice that countries having high populations may not have high density of population.

COUNTRIES	POPULATION	% OF WORLD POPULATION	DENSITY (Population per sq.km)
People's Republic of China	1,338,890,000	19.5	139
India	1,183,770,000	17.3	360
USA	309,842,000	4.5	32
Indonesia	231,369,500	3.4	121
Brazil	193,262,000	2.8	23
Pakistan	170,124,000	2.5	211
Bangladesh	162,221,000	2.4	1069
Nigeria	154,729,000	2.3	168
Russia	141,927,297	2.1	8
Japan	127,530,000	1.9	337

Table 5: Population statistics of selected countries of the world

High densities indicate a great crowding of people. We will see in the following lesson, the impact of population pressures on the land and its resources.

### EXERCISE

#### I) Fill in the blanks.

1. The rise in population has been steadily rapid since\_\_\_\_\_.
2. The birthrate is the number of live births in a year for every\_\_\_\_\_people of the total population
3. The world population reached 6 billion in the year\_\_\_\_\_.
4. \_\_\_\_\_and human factors affect the distribution of people across the world
5. Population density is calculated by dividing the number of people in a country by the \_\_\_\_\_of the country.

#### II) Choose the correct answer.

1. When birthrates are high and deathrates are\_\_\_\_\_,the population of an area will increase.  
a) High      b) Low      c) Stable

2. About 90 % of the Earth's people live on \_\_\_\_\_ % of the land.  
 a) 10                  b) 20                  c) 25
3. \_\_\_\_\_ is considered the most densely populated country  
 a) China              b) Mexico              c) Bangladesh
4. Areas with \_\_\_\_\_ climates tend to be sparsely populated.  
 a) Favourable        b) Extreme            c) Cool
5. \_\_\_\_\_ with stable government have high population density.  
 a) Afghanistan       b) Egypt               c) Singapore

### **III) Match the following.**

- |                       |   |                                      |
|-----------------------|---|--------------------------------------|
| 1. 1804               | - | Low population density               |
| 2. Monaco             | - | Least density of population          |
| 3. Low birth rate and | - | 1 billion population high death rate |
| 4. Australia          | - | Population decline                   |
| 5. Germany            | - | High population density              |

### **IV) Answer in brief.**

1. Define
  - a) Birth rate
  - b) Death rate
  - c) Population Density
2. How does the climate affect population distribution and density.

### **V) Answer in detail.**

1. Give a detailed account of the world's population growth.
2. What are the different human factors that affect population density?  
 Explain.

## FORMATIVE ASSESSMENT

1. Project work:

Collect pictures and paste them in your scrap book on the life of the people in the Himalayas and the Thar Desert. Give reasons for the low population density in these regions.

2. Write a report on the major natural disasters that affected in India in the last 10 years.

3. Map Skill:

Prepare a map of the world showing regions of high population density. Mention five reasons for the same.

## 4. POPULATION AND RESOURCES

As the population grows, the resource base is struggling to provide people with their requirements. There is a mismatch of people and resources. (Figure. 6 )



**Figure 6**

The hunter-gatherer mode of production could only support very low population densities. When agriculture began to develop, it enabled a steady growth of population.

The increased population puts a lot of pressure on the available resources like land and water. Each year, the number of human beings increases, but the amount of natural resources with which to sustain this population remains finite.

Developing countries with large and growing populations put a strain on the local environment and the limited resources. These countries that struggle to meet the growing demands for food, freshwater, timber and fuel alter the fragile environments. (Figure. 7)

Developed countries, in general, have and use more of the Earth's

resources. Population pressure in the developed countries puts a greater strain on global resources and the environment than that in less developed countries because of their very high standards of living.



**Figure 7. Growing Demands**

Large and increasing population results in great pressure on the limited resources. The overexploitation of resources results in water scarcity, deforestation, desertification, food shortages, exhaustion of minerals and pollution.

### Water

Use of water has been growing at more than twice the rate of population increase in the last century. Demand of water already exceeds supply in many parts of the world. Freshwater constitutes barely 0.03 % of the water that is available on the Earth's surface. Increasing population overexploits and pollutes the surface and underground water. The water is polluted by industries and in the developing countries 95 % of the sewage is let into rivers.

As the pressure on water resources intensifies, it leads to tensions and conflicts among users. By 2025, five billion people will be affected by severe water scarcity.

**India has 20 percent of the Earth's population, but only four per cent of its water.**

### Food supply and land availability

As population increases, food supply has to increase. In Africa and Asia, rural population nearly doubled between 1950 and 1985, with a corresponding decline in land availability.

Existing farmlands decline because of changing land uses especially near urban areas. To overcome the shortage of land People clear forests for cultivation.

### Deforestation

Eighty percent of the world's natural forests is destroyed by human development activities like logging, clearing for agriculture and grazing. Deforestation results in droughts, soil erosion, flooding, and global warming.

### Desertification

One third of the Earth's land surface (35%) is threatened by desertification. It affects a large number of people living in 110 countries. Desertification occurs in the semi-arid lands and desertification is impossible to reverse.

### Minerals

As the world's demand for minerals increase, minerals are being mined from greater and greater depths. This leads to ground pollution and lowers the water table.

### Fuel

About 80 % of the world's commercial energy comes from non-renewable fossil fuels like coal, oil and natural gas. The world's use of fossil fuels has nearly doubled every 20 years since 1900. There is a decline in the availability of these fossil fuels.

### Land Degradation

The land is degraded by a combination of human activities. The land, air and water are highly polluted. The land is affected by landslides induced by massive deforestation, soil erosion, decline in soil fertility, extensive water logging and salinization in irrigated areas, unscientific mining, quarrying, road building, and waste disposal.

### SATELLITE TECHNOLOGY AND RESOURCES

As population increases, people have to find ways and means of finding additional reserves of minerals and ground water. There is need for organized sharing of these limited resources for the benefit of human kind. This requires an understanding of the distribution and availability of natural resources over the Earth.

The development of space technology after the World Wars opened up new ways of understanding the Earth's resources. The first artificial satellite, Sputnik1, was launched by the Soviet Union in 1957. This was followed by the launch of a number of satellites by different countries for various purposes. These include Earth Observation satellites, Communication satellites, Navigation satellites, Weather Satellites and Research Satellites.

Earth Observation satellites or Remote Sensing satellites help in finding and managing resources. Remote sensing satellites play an important role in natural resources inventory,

environmental monitoring and management. Important remote sensing satellites include LANDSAT of USA, SPOT of France, KITSAT of Korea and Yaogan of China.

The first Indian Remote Sensing Satellite IRS1A was launched in 1988. This was followed by the launch of a series of other satellites like IRS- 1B, 1C, 1D, P3, P5, P6, CARTOSAT and RESOURCESAT.

The remotely sensed data provide valuable information about land resources such as geology, soil, vegetation cover, water bodies and minerals. This information helps countries to plan for a sustainable future.

## EXERCISE

### I) Fill in the blanks.

1. The \_\_\_\_\_ population puts a lot of pressure on the available resources like land and Water.
2. By 2025, \_\_\_\_\_ billion people will be affected by severe water scarcity.
3. \_\_\_\_\_ affects a large number of people living in 110 countries.
4. In the developing countries 95 % of the sewage is let into \_\_\_\_\_.
5. The first Indian Remote Sensing Satellite IRS IA was launched in \_\_\_\_\_.

### II) Choose the correct answer.

1. Freshwater of the Earth is only
  - a) 30 %
  - b) 0.03 %
  - c) 3 %.
2. Droughts, erosion and global warming are caused due to
  - a) Deforestation
  - b) Afforestation
  - c) Hunting

3. The first artificial satellite launched by the Soviet Union was \_\_\_\_\_.  
 a) Sputnik I      b) Sputnik II      c) Kitsat
4. India has 20 % of the Population but the water available is only \_\_\_\_\_.  
 a) 5 %      b) 4 %      c) 2 %
5. Water table is lowered when \_\_\_\_\_ activity increases  
 a) Mining      b) Hunting      c) Fishing

**III) Match the following.**

- |                             |                               |
|-----------------------------|-------------------------------|
| 1. Agricultural development | - Semi- arid lands            |
| 2. Desertification          | - France                      |
| 3. Commercial energy        | - Steady growth of population |
| 4. LANDSAT                  | - Coal and oil                |
| 5. SPOT                     | - USA                         |

**IV) Write brief answer.**

1. What are the results of over-exploitation of resources.
2. Write the impact of over-population on water resources.
3. What are the ill-effects of over-population in the developing countries?
4. Name the satellites used for observing the earth's resources.

**V) Answer in detail.**

1. Discuss about the utilization of resources in the developing and developed countries.
2. "Large and increasing population exerts great pressures on the limited resources"- Explain.
3. How are remote sensing satellites helpful in managing resources?

## FORMATIVE ASSESSMENT

1. Discussion:

How did the floods at uttarkhand in 2013 affect the population? was it a man made a natural disaster?

2. Project Work:

Collect the information about Remote sensing satellites of U.S.A, France and Japan.

3. In 2025 what type of food, would you prefer as an Indian.

4. Map Skill:

- i. On a map of Europe mark the major rivers of Europe and discuss their uses.
- ii. On a map of India draw the major rivers and write how are they useful for the Indian population.

# SHAKTHII ACADEMY

## SOCIAL STUDIES - GEOGRAPHY

### STANDARD - NINE

#### COURSES OFFERED

- **BANK CLERK/PO/SO**
- **INSURANCE**
- **TANCET-MBA**
- **GRE, GMAT**
- **IELTS , TOEFL**
- **RRB, SSC**
- **TNPSC Group II, Group II- A, Group IV, VAO**

# GEOGRAPHY

## 1. TAMIL NADU

**Tamil Nadu**, a state in southern India, is bordered by the states of Puducherry, Kerala, Karnataka and Andhra Pradesh. The state, lying on the southern tip of the Indian peninsula, is surrounded by the Bay of Bengal on the East, Indian Ocean on the south, Kerala and Karnataka on the West, and Andhra Pradesh on the North. The native language spoken here is Tamil which has become the official language with effect from January 14, 1958. It is the sixth most populous state of the Indian Union and a leading producer of both agricultural and industrial products.

The state extends latitudinally between 8°4' North and 13°35' North and longitudinally between 76°18' East and 80°20' East. The state of Tamil Nadu is a triangular landmass at the southeastern end of the main continent. It is the eleventh largest state in India by area (about the size of Greece).

Tamil Nadu is one of the most urbanized states of India. It is a home to many natural resources, rare flora and fauna, cool hill stations, grand Hindu temples of Dravidian architecture, beach resorts, multi religious, pilgrimage sites and few UNESCO World Heritage sites. It is one of the foremost state in the country in terms of over all development.

### Administrative Division

Total area of Tamil Nadu is about 1,30,058 sq.km., which is 4 % of the total land area of India. For the purpose of administration, the state has been

divided into 32 districts. The following table gives the names of the districts.

**Table: Districts of Tamil Nadu**

S.No.	District
1)	Ariyalur
2)	Chennai
3)	Coimbatore
4)	Cuddalore
5)	Dharmapuri
6)	Dindigul
7)	Erode
8)	Kancheepuram
9)	Kanyakumari
10)	Karur
11)	Krishnagiri
12)	Madurai
13)	Nagapattinam
14)	Namakkal
15)	Nilgiris
16)	Perambalur
17)	Pudukkottai
18)	Ramanathapuram
19)	Salem
20)	Sivagangai
21)	Thanjavur
22)	Theni
23)	Thiruchirappalli
24)	Thirunelveli
25)	Thiruvallur
26)	Thiruvannamalai
27)	Thiruvarur
28)	Thuthukudi
29)	Triuppur
30)	Vellore
31)	Villupuram
32)	Virudhunagar

### Know the facts



State Bird: Emerald Dove



State Flower: Gloriosa Lily



State Animal: Nilgiri Tahr



State Tree: Palm Tree

#### Do you know?

The southernmost point of the Indian Union—"Indira Point" got submerged under the sea water in 2004 during the Tsunami.

#### Table: Local bodies of Tamilnadu

City Corporations	10
Municipalities	125
Town Panchayats	529
District Panchayats	31
Panchayat Unions	385
Village Panchayats	12524

#### Activity

Find out which of the above local bodies you belong to?

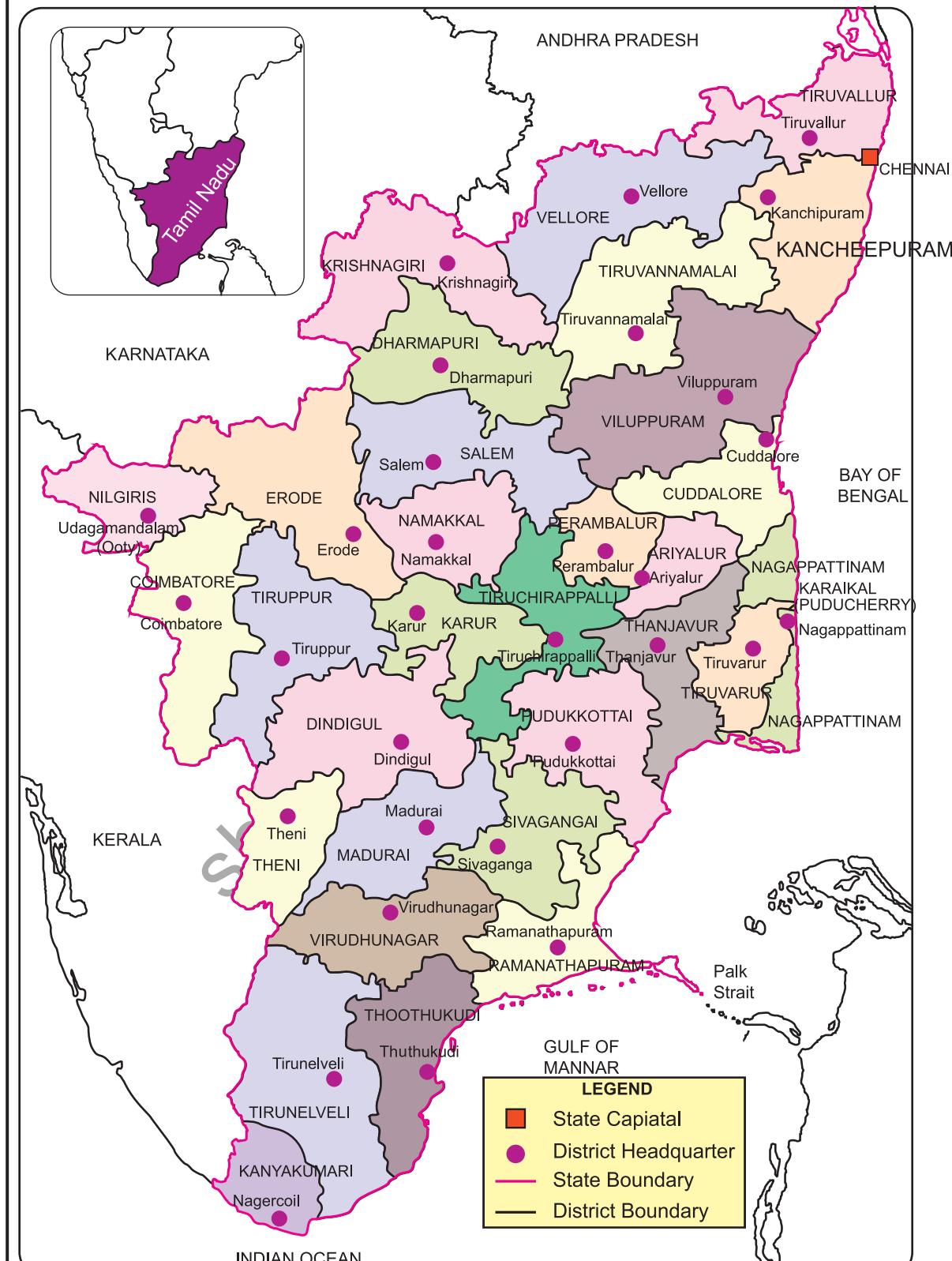
#### History of Tamil Nadu

Tamil Nadu has a very ancient history that goes back to 6000 years or

so. Though the state is a home for Dravidian culture, it also acquired Aryan culture almost a thousand years ago. It is regarded as the cradle of Dravidian culture with its cultural gear speckled all across the state in the form of magnificent temples, gateways, intricate carvings, and the society steeped in tradition.

Sangam or the Institute for the growth of Tamil language existed in three phases. The first one was at Madurai devastated by the sea and the intermediary one was at Kapadapuram and third one seated at Madurai. The Tamil language with its grammar Tholkappiyam belongs to the last sangam period. Classic works like Ettuthogai and Pathuppattu also belonged to the sangam period.

# Tamil Nadu District Map



Thiruvalluvar was the author of renowned Thirukkural. He does not mention his religion, the land on who the Thirukkural is meant for. It contains universally acceptable ideas and thoughts and is regarded as a renowned piece of world literature. Thiruvalluvar is often portrayed as a holy saint of Tamil nadu. Tamil which obtained the semmozhi status in the eighth one of its kind.

Tamil Nadu was once the home of four Tamil Kingdoms, namely, Chera, Chola, Pandya and Pallava. Their

period was known as the golden age of Tamil Nadu during which art, music as well as trade and agriculture reached their peak.

### Know the fact

The first Tamil printing press was established at Tarangambadi in Nagapattinam district by the Danish missionaries.

### EXERCISE

#### I) Choose the correct answer.

1. Tamil Nadu is the \_\_\_\_\_ largest state of India (as regards area)
  - a) 5th
  - b) 7th
  - c) 9th
  - d) 11th
2. There are \_\_\_\_\_ districts in Tamil Nadu.
  - a) 28
  - b) 30
  - c) 32
  - d) 34
3. \_\_\_\_\_ district lies on the east coast.
  - a) Nilgiris
  - b) Theni
  - c) Nagapattinam
  - d) Coimbatore
4. Tamil Nadu lies in the \_\_\_\_\_ part of India.
  - a) North East
  - b) South West
  - c) South East
  - d) North West
5. Tamil Nadu accounts for \_\_\_\_\_ of the total area of the country.
  - a) 4%
  - b) 5%
  - c) 3%
  - d) 2%

#### II) Match the following.

- |                          |                    |
|--------------------------|--------------------|
| 1. State bird            | 152                |
| 2. State Tree            | 234                |
| 3. Assembly constitution | Palm tree          |
| 4. Municipalities        | West of Tamil Nadu |
| 5. Karnataka             | Emerald Dove       |
|                          | 10                 |
|                          | Peacock            |

**III) Answer in brief.**

1. Write down the boundaries of Tamil Nadu ?
2. Name the local bodies of Tamil Nadu ?
3. Mention the Latitudinal and Longitudinal extent of Tamil Nadu ?
4. Name the oceans bordering Tamil Nadu.
5. Name any four districts that lie on the western margin of Tamil Nadu.
6. Name the coastal districts of Tamil Nadu.

**IV) Answer in a paragraph.**

1. Describe the geographical location of Tamil Nadu.
2. Given an account on the salient features of Tamil Nadu.

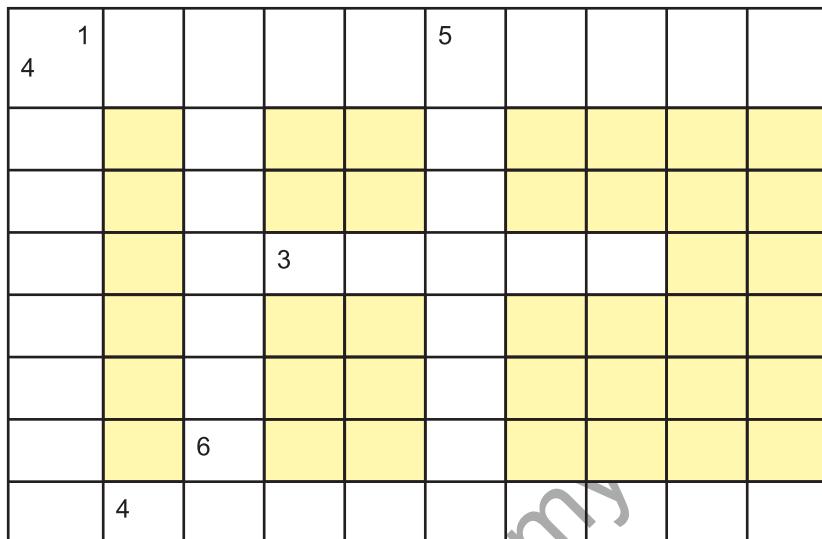
**V) Mark the following on given map of Tamil Nadu.**

On the outline map of Tamil Nadu, mark the following.

1. Kanyakumari
2. Indian Ocean
3. Bay of Bengal
4. Chennai
5. Puduchery
6. Erode
7. Pudukkottai

## **FORMATIVE ASSESSMENT**

## I. Crossword Puzzle



## Left to Right

1. District famous for Chariot
  2. Rice bowl of Tamil Nadu
  3. District known for Iron-ore
  4. District of Lord Ranganathar

Vertical

  5. District famous for Fort (top to bottom)
  6. Place famous for Jasmine Aroma (bottom to top)

## II. Life Skill

Prepare a Bio-data card under the following heading

- 1) Tamil Nadu
  - 2) Local District
  1. Name
  2. Address / Area
  3. Administrative Qualification
  4. Assets / Resources

a) Relief features

- b) Water bodies
- c) Lakes
- 5. Character / Climate
- 6. Credit / Rainfall
- 7. Family Members
  - a) Population
  - b) Vegetation
  - c) Wild life
- 8. Industries
  - a) Primary
  - b) Secondary
  - c) Tertiary
- 9. Transport
- 10. Recreation / Tourist spots

**III Map Skill**

- 1. Differentiate the coastal and Inland district of Tamil Nadu by choosing two colours.
- 2. Make the districts bordering your districts in all four directions and differentiate with colours.

**IV. Project:**

Find out the Ten Corporation of Tamil Nadu and write a report for any one of them.

## 2. PHYSIOGRAPHY OF TAMIL NADU

Tamil Nadu has a unique physiography. The hills of the Eastern and Western Ghats surround Tamil Nadu to the Northwest and West, the Bay of Bengal is found to the East and the Indian Ocean to the South. In general, the physiography of Tamil Nadu is a high land which has uneroded, western ghats on the west and low lying coastal and river plains on the east.

### **Physiography of Tamil Nadu**

Geographically Tamil Nadu may be divided into four physical divisions

- 1) The Hilly region (Western Ghats and Eastern Ghats).
- 2) The Plateau.
- 3) The Plain and
- 4) The Coastline.

### **The Hilly regions of Tamil Nadu**

The Western Ghats enters the state through the Nilgiris District and runs up to Kanyakumari district. The Western hilly region is much more complex than the Eastern Ghats. Its average height is from 1000 m to 1500m. The Western Ghats has mountain peaks namely **Doddabetta** (2637 m) and **Mukurthi** (2540 m). In the north west of Western Ghats lies the Nilgiri highland region at an height of above 2500 m. In this region, there are few peaks found at a height ranging from 1800 m to 2400 m. The highest peak of Tamil Nadu is Doddabetta. The Western Ghats and Eastern Ghats meet at the **Nilgiri hills**. From the Nilgiris of Tamil Nadu and Anaimalai hills of Kerala, an offshoot runs at a height of 1500 m to 2000 m in the east. These are called **Palani hills**. To the south of the

Palani hills there are two other ranges namely, **Varshanadu** and **Andipatti** hills running parallel to the Cardamom hills. Though the Western Ghats is a continuous range, it has a gap of 25 km at Palghat. To the south of Palghat gap, hills such as Andipatti, Elamalai and Agathiya malai are found. Kambam valley is between Thekkadi hills, Varshanadu hills and Kodaikanal hills. This Valley is considered as the green valley of Tamil Nadu. The gap in between Varshanadu hills and Agathiya malai is called the **Shenkottai pass**.

The Tamil Nadu hills separating, the plains and the plateaus have two well marked passes, namely, the **Attur pass** in the south and the **Chengam pass** in the north. This pass links the Cuddalore and Villupuram district in the plain with the Salem district on the plateau. The Palakkad gap and Shencottah gap are the only breaks in the long chain of hills that border Tamil Nadu on the west.

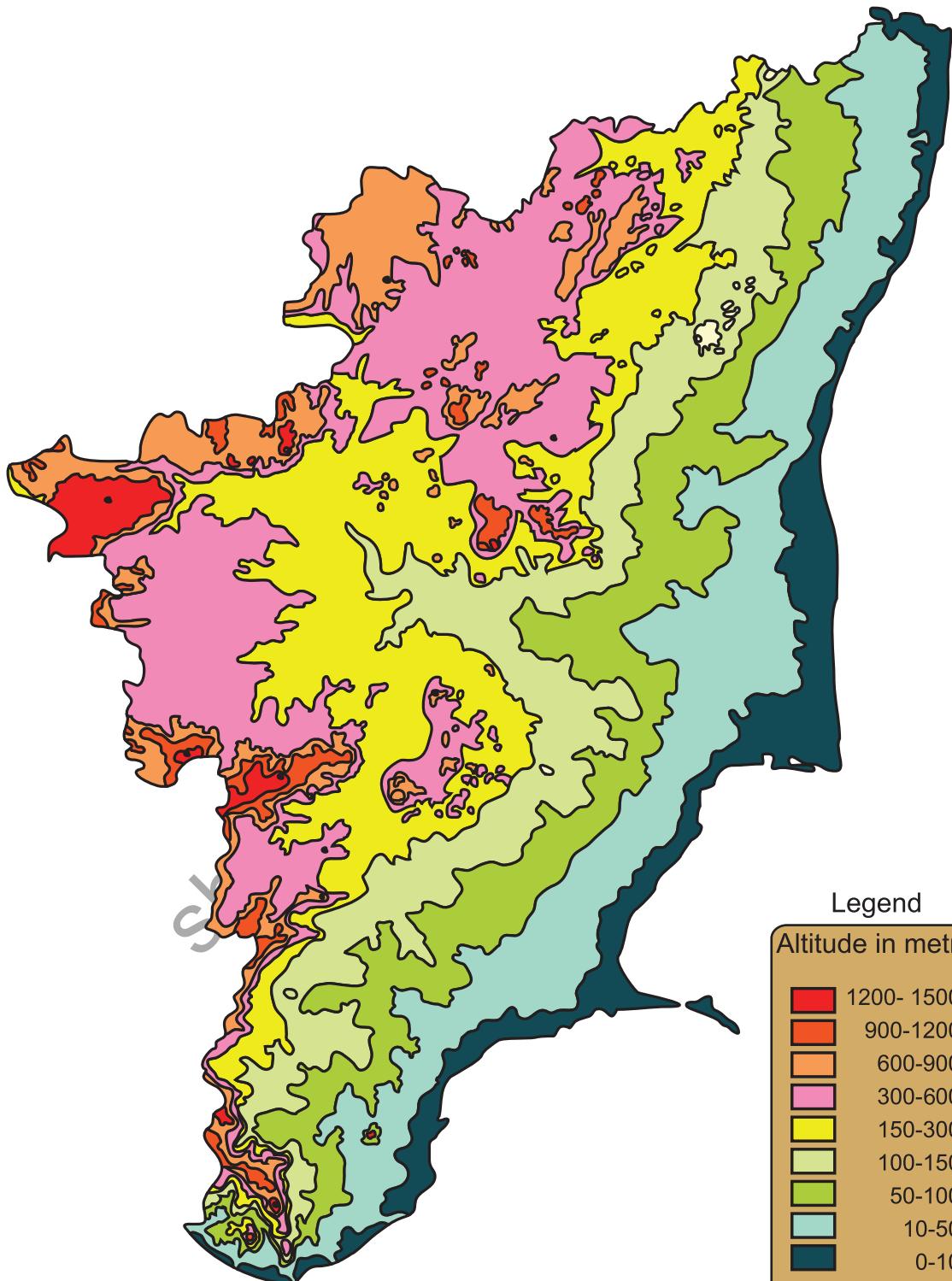


**Western Ghats**

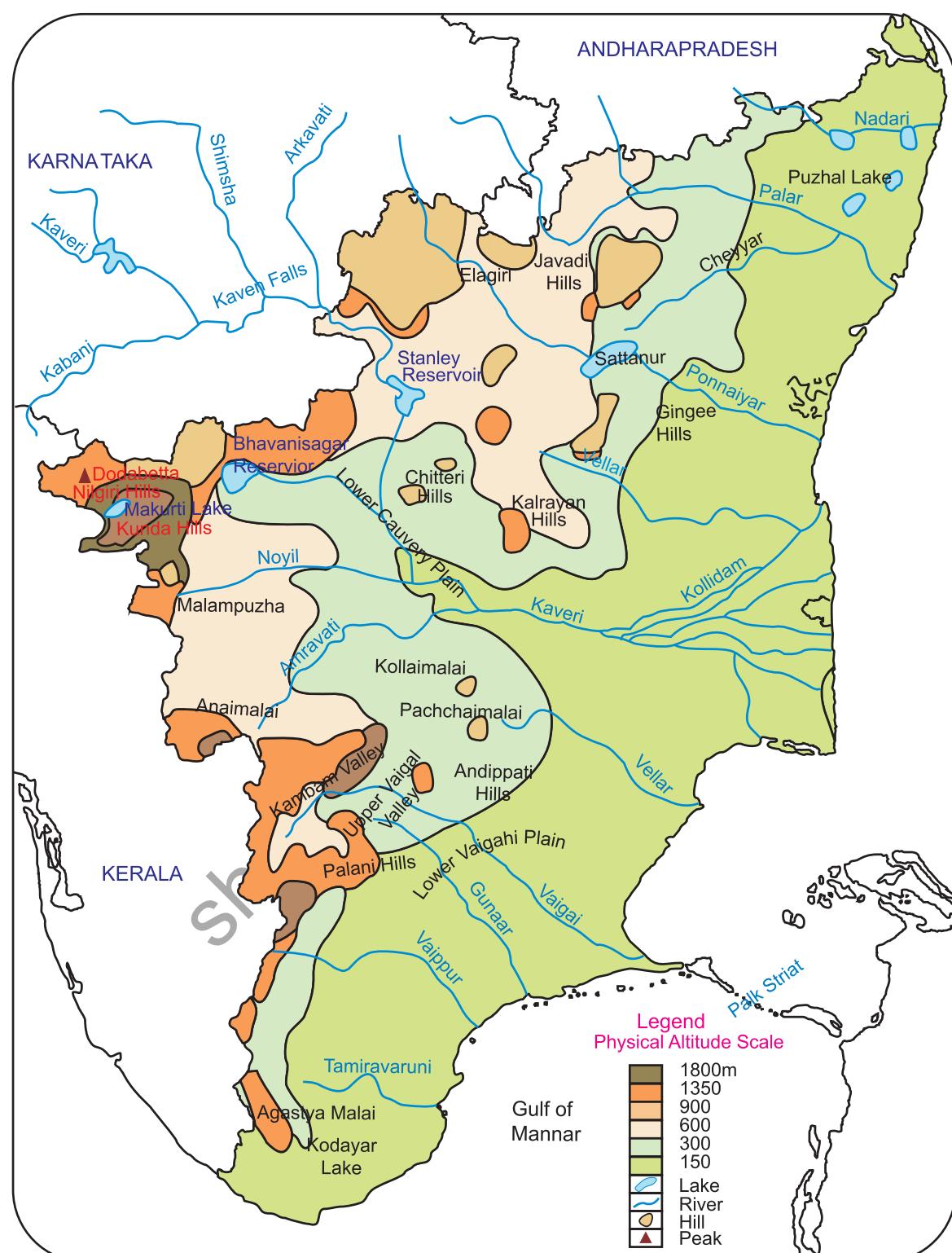
The Eastern Ghats are not continuous when compared to the Western Ghats. They are dissected into isolated hill ranges extending from northeast to southwest through the districts of Vellore, Dharmapuri and Erode. The average elevation ranges from 1100 m to 1600 m. These hillocks are called by

## Tamil Nadu

N  
▲



## Tamil Nadu Physiography



different names in different areas, such as;

- 1) Javadi Hills and Elagiri Hills in Vellore District;
- 2) Shervarayan in Salem District;
- 3) Kalvarayan in Villupuram District;
- 4) Pachaimalai in Thiruchirapalli District;
- 5) Kolli hills in Namakkal District;
- 6) Chitteri hills are in both Dharmapuri and Salem Districts;
- 7) Gingee hills in Thiruvannamalai District;

The highest hills of Eastern Ghats – Shervarayan (1,500 – 1,600 m).

The highest hills of Western Ghats- Anaimalai (2,700 m)

### Plateaus of Tamil Nadu

The Eastern and Western Ghats meet at the Nilgiris plateau. Four km from this plateau, it slopes gently downwards to about 1,800 m towards Coimbatore. It extends from the Nilgiris to Dharmapuri plateau or Bramahal plateau and lies to the west of Shervaroy uplands. This plateau is found with extreme abruptness on all sides. The Bramahal plateau in Dharamapuri district is at an elevation of 300 to 700 m which merges with the Mysore plateau in the west. The elevation of the plateau increases from east (120 m) to west (300 to 450 m). Plateaus of Tamil Nadu can be grouped into two as Coimbatore plateau and Madurai plateau. In between the plateaus isolated hills are also seen. One such isolated hills are Chennimalai of Erode district.

### Plains of Tamil Nadu

Plains of Tamil Nadu can be classified into two as coastal plains and

rivers plains. The coastal plains of Tamil Nadu extend to a length of 1000 K.M from Pulicat lake in the North to Kanyakumari in the South and have an average height of 50 metres. The notable beaches found here are the Marina and Rameshwaram beach.

### Marina Beach

Marina beach is the second longest beach in the world. It extends upto a distance of 13 km and it is one of the major tourist attractions of Chennai.



Marina Beach

### Rameswaram Beach

The beach of Rameswaram is famous for its beautiful coastal features. The sea waves rise to a maximum height of only 3 cm and the view looks like a very big river.

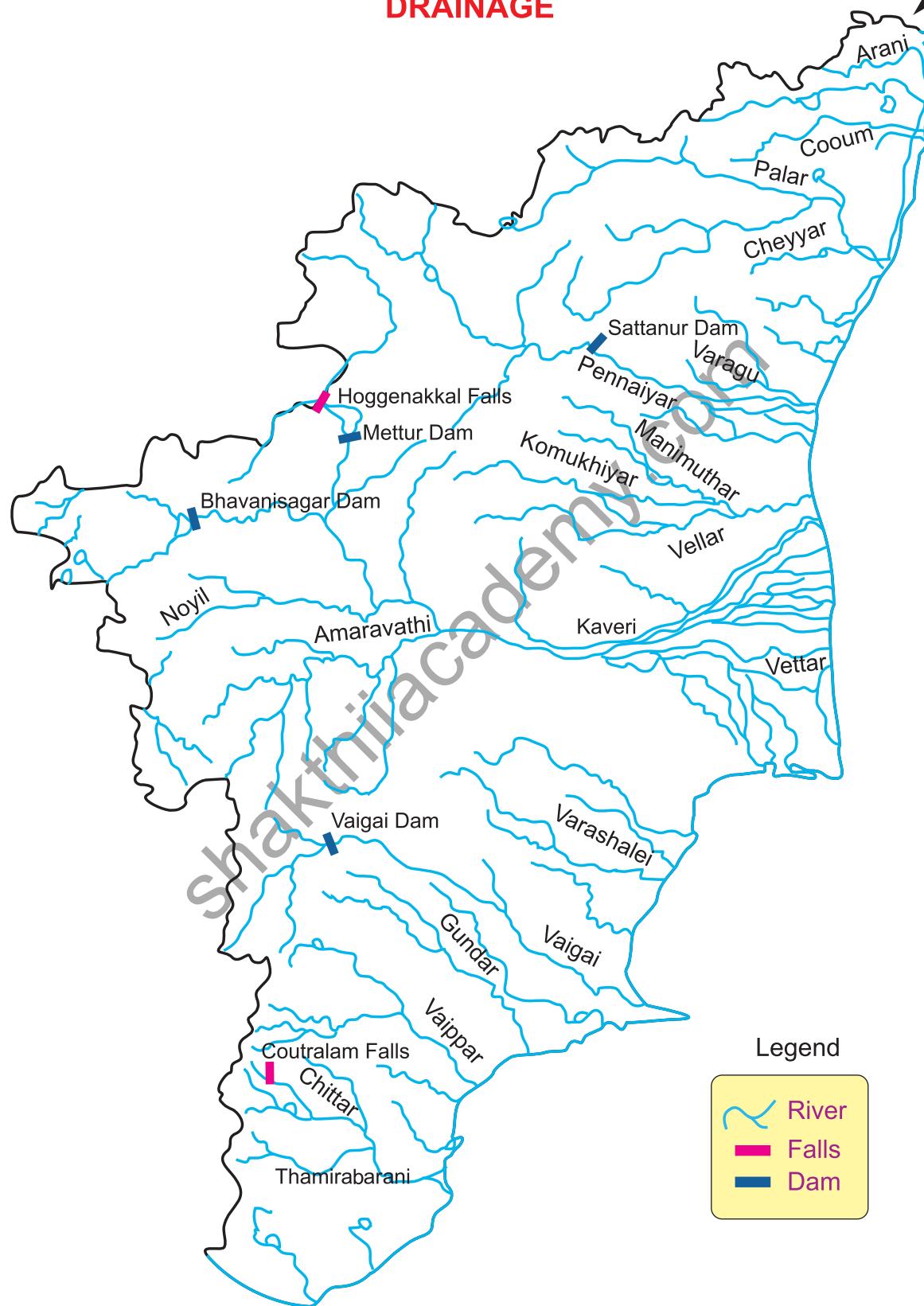


Beach in Rameswaram

The coastal plains of Thiruvallur, Kancheepuram, Cuddalore and Villupuram are together known as the **Cholamandalam plains**.

## TAMIL NADU DRAINAGE

N



### Legend

- ~ River
- Falls
- Dam

The river plains in Tamil Nadu are formed by the rivers Palar, Cheyyar, Pennar and Vellar in the north; Kaveri and its tributaries in the central region, Vaigai, Vaippar and Thamiravaruni in the south.

### Rivers of Tamil Nadu

The Northern rivers of Tamil Nadu are Araniyar, Korattalaiyar, Palar, Cheyyar, Kedilam, Manimuthar and Thenpennar. Among the rivers the Palar and Pennaiyar flow from head waters of Kolar Plateau towards the east. Cheyyar and Agaram are two tributaries of Palar. The main river of the state is Kaveri which originates in Kodagu district of Karnataka. Kaveri and its tributaries in its lower course drain the districts of Nagapattinam, Thanjavur, Thiruvarur and Thirucharapalli. The Kaveri, the Kollidam and the Vellar jointly drain central part of the Tamil Nadu. The head of the Kaveri delta is near the island of Srirangam. Kollidam branches

off from Kaveri at Grand Anaicut (Kallanai).

In the Kaveri delta, the distributaries such as Kollidam, Manniyar, Vennar, Vettar, Arasalar, Nattar, Mudikondinar, Kudamuruti and Veera Cholanar have formed a alluvial plain in a quadrangle shape. Kaveri along with its tributaries, Bhavani, Noyyal, Moyar and Amaravathi, is the most important source of canal irrigation. Towards the south of Tamilnadu, there are few rivers like Vaigai (Madurai), Vaippar (Virudhunagar), Tamirabarani (Thirunelveli), Gundar (Thoothukudi, Ramanathapuram), Chittar (Thirunelveli) and Kothaiyar (Kanyakumari). Most of the soils of the plains of Tamil Nadu are alluvial, formed by these rivers flowing east. In the southwest of Tamil Nadu is the Suruliyar river that drains a part of Madurai district.

### EXERCISE

#### I) Choose the correct answer.

1. \_\_\_\_\_ hill is located in Eastern ghats.  
a) Nilgiri    b) Kalrayan hills    c) Cardamom hills    d) Palani hills
2. \_\_\_\_\_ is the highest peak in Tamil Nadu.  
a) Anaimudi    b) Doddabetta    c) Mukurthi    d) Brahmagiri
3. The river Chittar is an important tributary of \_\_\_\_\_ river.  
a) Kaveri    b) Tamirabarani    c) Vaigai    d) Palar
4. The longest river flowing in Tamil Nadu is \_\_\_\_\_.  
a) Tamirabarani    b) Vaigai    c) Palar    d) Kaveri
5. The Noyyal and the Amaravathi are tributaries of \_\_\_\_\_.  
a) Vaigai    b) Kaveri    c) Palar    d) Periyar

**II) Match the following.**

- |                  |                        |
|------------------|------------------------|
| 1. Eastern Ghats | Madurai                |
| 2. Western Ghats | Karnataka              |
| 3. Kaveri river  | Nilgiris               |
| 4. Kodaikanal    | Shervarayan            |
| 5. Vaigai        | Coimbatore             |
|                  | Queen of hills station |
|                  | Chennai                |

**III) Answer in brief.**

1. Name the important rivers of Tamil Nadu.
2. What are the major physical divisions of Tamil Nadu ?
3. Mention the important hills in the Northern districts of Tamil Nadu.
4. Write a short notes on Marina Beach.
5. Distinguish between Eastern Ghats and Western Ghats.

**IV) Answer in a paragraph.**

1. Describe the plateau region of Tamil Nadu .
2. Write an account on the river Kaveri.

**V) Mark the following on a given map of Tamil Nadu.**

On the outline map of Tamil Nadu, mark and label the following.

- |                     |                 |                       |
|---------------------|-----------------|-----------------------|
| 1) Kaveri river     | 2) Doddabetta   | 3) Coimbatore Plateau |
| 4) Coromandal coast | 5) Vaigai river | 6) Agastya Malai      |
| 7) Nilgiri hills    | 8) Kollidam     | 9) Elagiri hills      |
| 10) Kalrayan hills  |                 |                       |

## FORMATIVE ASSESSMENT

I. Word Jumble:

a) G S A H E P N F A H T K O

The gap in between Varshanadu hills and Agathiya hills.

b) M C A L T O A U R

A famous waterfall in Chittar

c) M A W R A E R S M A

Coast without waves

d) E S H R A Y N A V R A

Eastern Ghats in Salem

e) G N R S A I M A R

Island between Kaveri and Kollidam

II. Group Activity

Collect information and discuss about the existing environment of the water resources in your district.

III. Creative Skill

Share your experience at a hill station in Tamil Nadu.

IV. Project

Prepare a Project on the role of Government and people participation in coastal protection zone.

### 3. CLIMATE OF TAMIL NADU

Physiography, nearness to sea and geographical location determine the overall climatic conditions of any region.

**Climate** refers to the sum total of weather conditions and variations over a large area in a long period of time (more than thirty years).

**Weather** refers to the state of the atmosphere over an area at any particular point of time.

The major climatic elements are: temperature, pressure, wind, humidity, clouds and precipitation.

Tamil Nadu has **tropical climate**. Two factors namely, the apparent position of the Sun and the monsoonal rain bearing winds influence the climatic conditions of Tamil Nadu. The vertical rays of Sun fall on the state twice in a year.

Though Tamil Nadu lies in the tropical region, the local weather conditions such as temperature,

humidity, clouds and wind direction along with the wind speed, change the climatic conditions to a greater extent. This is the region of climatic variation that exhibits the influence of the coastal and the interior inland locations.

The temperature of the state starts increasing in the second week of February and gradually increases in the months of March to June. The hottest part of the summer season is known as **Agni Nakshatram** (Star of Fire) or **Kathiriveyyil**. The decrease of temperature is from the second week of June to the first week of October. The month of October is the season for the retreating or northeast monsoon. From then, the temperature starts to decrease up to the month of February. In Tamil Nadu, May is the hottest and January is the coldest month. Though this is the general situation, the overall climatic condition varies among mountainous regions, plateaus, coastal and interior plains. The following table explains it clearly.

Table: Region-wise seasonal average temperature

S.No.	Geographical Locations	Weather recording stations	Temperature in Celsius		
			Summer season	Winter season	Rainy season
1	Coastal regions	Chennai	40° C	22° C	25° C
2	Interior Plains	Vellore	42° C	21° C	22° C
3	Inland regions	Thiruchirappalli	42° C	20° C	23° C
4	Hilly regions	Kodaikanal	11° C	6° C	14° C
5	Plateau	Coimbatore	32° C	26° C	21° C

The relative humidity in the state is found to be higher in winter when compared to summer. The average humidity of the air is about 68 % in the month of May, whereas it is 82 % in January. The rate of evaporation is

higher during the summer than in the winter. The state possesses thick rain bearing clouds in the months of October, November and December.

**Table: Major seasons of Tamil Nadu**

Seasons	Tamil Name	Tamil Month
Summer (April to August)	Illavenil	Chitirai, Vaikasi
	Muduvenil	Aani, Aadi
Rainy (August to December)	Khar season	Avani, Puratasi
	Khulir	Iypasi, Karthigai
Winter (December to April)	Mun Pani	Markhazhi, Thai
	Pin pani	Masi and Panguni

**The rainy seasons of the state may be grouped into three**

- 1) South West Monsoon;
- 2) North East Monsoon; and

### **Southwest Monsoon**

The southwest monsoon occurs between June and September. The districts that are benefitted by this season are the Nilgiris, Kanyakumari, western parts of Coimbatore, Dharmapuri and Salem. As the South-west monsoon starts its downpour of rain in the Western Ghats, the western parts of Tamil Nadu receive about 150 cm of rainfall, on an average. Most of the Eastern and Central parts of Tamil Nadu become rainshadow region for this season. This occurs due to the southwesterly direction of monsoonal winds in this season. In general the amount of rainfall of south west monsoon decreases from west to east. The Nilgiris district receives about 70 % of its annual rainfall followed by the Salem and Erode districts.

Kanyakumari district also receives sufficient amount of rainfall from this season.

### **Do you know?**

The word monsoon is derived from the Arabic word 'mausim' which literally means season. Monsoon refers to the seasonal reversal in the wind direction between seasons.

### **Northeast Monsoon**

The Northeast Monsoon season occurs between October and December. The coastal and interior plains of Tamil Nadu are highly benefitted by this rainy season. Normally, the Northeast monsoon rain is associated with cyclonic formation. In this season, the amount of rainfall decreases from east to west. Excepting Kanyakumari, all other interior south and western parts of Tamil Nadu receive lesser rainfall. Coastal districts such as Chennai, Cuddalore, Thiruvallur,

Kancheepuram, Villupuram, Nagapattinam, Thiruvarur and Thirunelveli districts receive about 150 to 250 cm of rainfall. Trichirapalli, Salem and Erode receives about 100 to 150 cm of rainfall.

### Cyclonic Rainfall

November is the month of cyclonic rainfall. The low pressure formations in the southern part of the Bay of Bengal intensifies, the cyclonic rainfall along the coastal districts of Tamil Nadu. An equal portion of rainfall is received from both the Northeast Monsoon and the Cyclonic rainfall in the coastal districts of Tamil Nadu.

On the basis of annual rainfall received, the districts of Tamil Nadu can be grouped into 5 rainfall regions. From the table given below it is clear that the coastal districts along with Nilgris falls under the very heavy rainfall region with an annual rainfall of more than 1400 mm. Among the districts, Kanyakumari is fortunate enough to receive rain from all the rainy seasons. Very low amount of annual rainfall is received by the Coimbatore and Tiruppur districts.

Table: Season wise percentage of annual rainfall

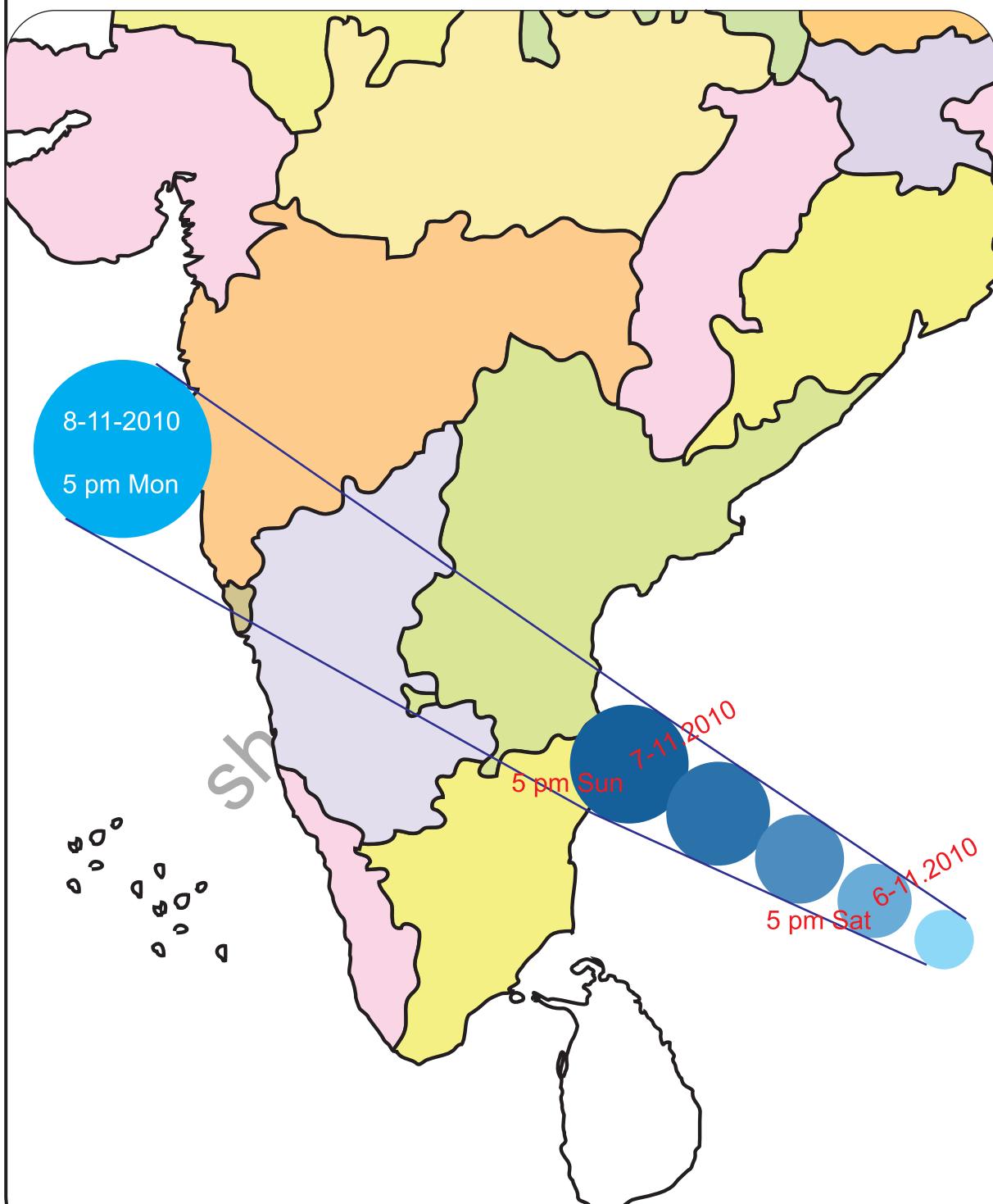
Sl.No	Seasons	Annual Rainfall (%)
1)	South West Monsoon	22
2)	North East Monsoon	57
3)	Cyclonic Rainfall	21

Table: Rainfall Regions of Tamil Nadu Distribution of rainfall (2007-2008)

Sl. No	Distribution of Rainfall	Amount of Rainfall	District
1	Very Low rainfall	Below 800 mm	Coimbatore ,Tiruppur.
2	Low rainfall	From 800 mm to 1000 mm	Namakkal, Karur, Thuthukudi, Erode, Dharmapuri, Madurai, Thiruchirappalli, Perambalur, Krishnagiri.
3	Moderate rainfall	From 1000 mm to 1200 mm	Pudukkottai, Virudhunagar, Sivagangai, Thanjavur, Salem, Ramanathapuram, Dindigul, Theni, Vellore.
4	High rainfall	From 1200 mm to 1400 mm	Thirunelveli, Thiruvannamalai, Kanyakumari
5	Very High rainfall	Above 1400 mm	Kancheepuram, Chennai, Villupuram, Thiruvallur, Thiruvarur, Cuddalore, Nagapattinam, Nilgiris.

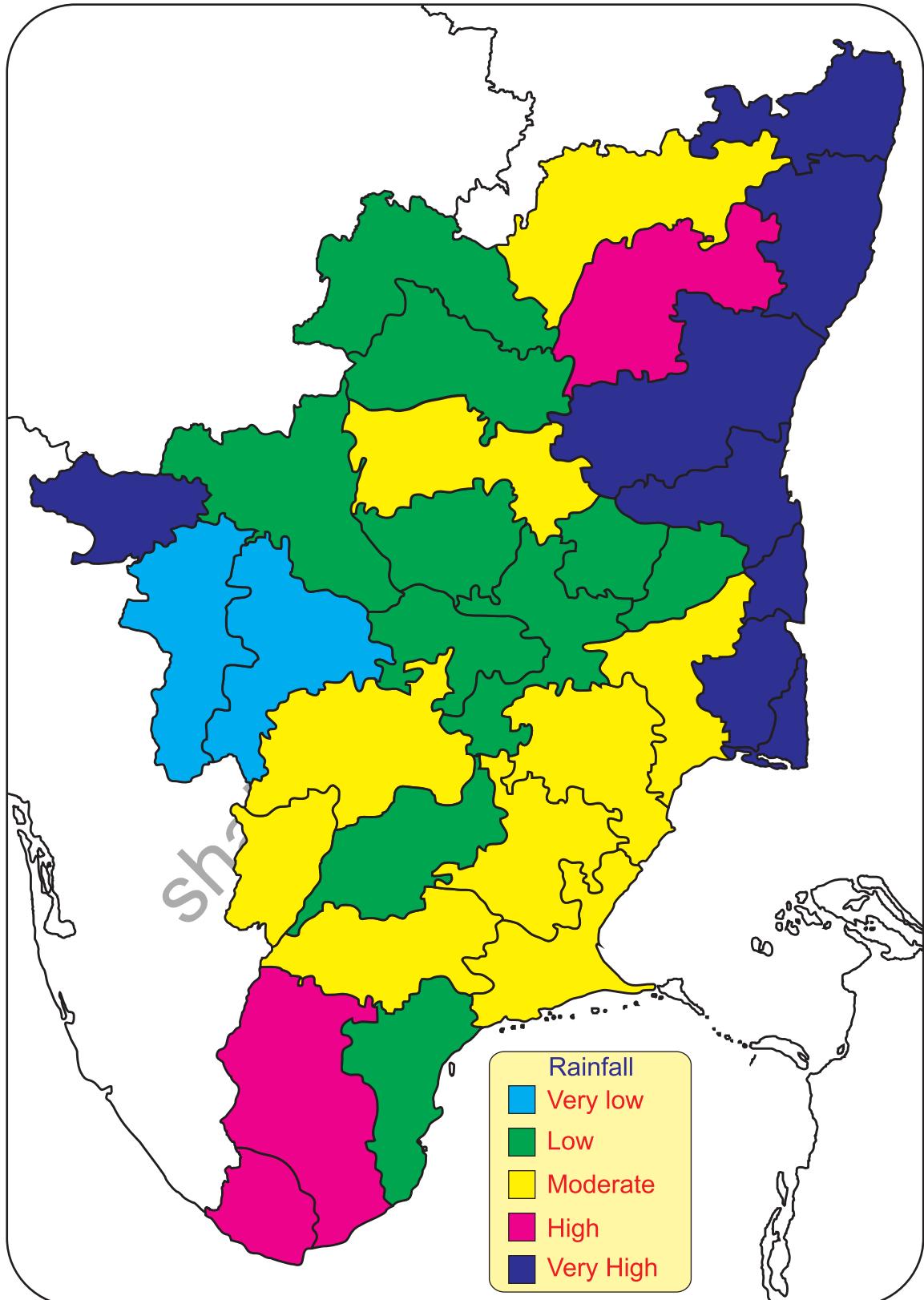
## Cyclonic Track of Jal (6-8th, Nov 2010)

N  
▲



**TAMIL NADU  
DISTRICT-WISE ANNUAL RAINFALL(2007-2008)**

N  
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## Natural Vegetation

Vegetation that grows naturally without the effort of human beings is called **Natural vegetation**. Its growth depends upon the temperature, rainfall and type of soils.

According to the National Forest Policy, a region should have 33% of its land under forest. Unfortunately, Tamil Nadu has only 17% of its land under forest. In the state, forests are confined to the Western Ghats and the Hilly regions. Among the districts, the Nilgiris possesses the highest percentage of area under forest followed by Theni, Dharmapuri and Kanyakumari districts. In the coastal regions, the dry weather and poor soil allows only casuarina tree to grow. Heavy rainfall regions show prominence of tropical evergreen forests. Javadi hills are noted for their fruit bearing trees and sandal wood.

## Distribution of Forests

The distribution of forests among different districts of the state is very uneven. Concentration of forests is mostly on the hills of the western districts and in the Javadi group of hills in Vellore district. Dense forests are also seen in Salem district. More than half of the area in the Nilgiris is under forests. Other districts hold 1 to 5 % of area under forests. Thanjavur being an alluvial plain is suitable for agriculture and it has less than 1 % of forest cover.

The forests of Tamil Nadu have different types of trees. Most of the trees in the state shed their leaves in the dry season. Tamil Nadu has large areas of sandal wood plantations, about 5,88,000 hectares. Hard wood trees are available in the forests of Coimbatore, Nilgiris and Kanyakumari.

Trees that are used as fuel are found in Madurai, Coimbatore and

Thirunelveli districts. Kanyakumari district has rubber plantations. In the Nilgiris, camphor and eucalyptus trees are grown under afforestation. In the foothills of the Western Ghats and parts of Thirunelveli and Virudhunagar districts, there are trees that are used for making matchsticks. The trees such as peepal, blue apples, jack fruit and gooseberries grow all over the state.

## Types of Forests

The Natural Vegetation can be broadly divided into five different types. They are:

- Tropical evergreen forests;
- Tropical deciduous forests;
- Thorny shrub forests;
- Mangrove forests and
- Hill forests.

## Tropical evergreen forests

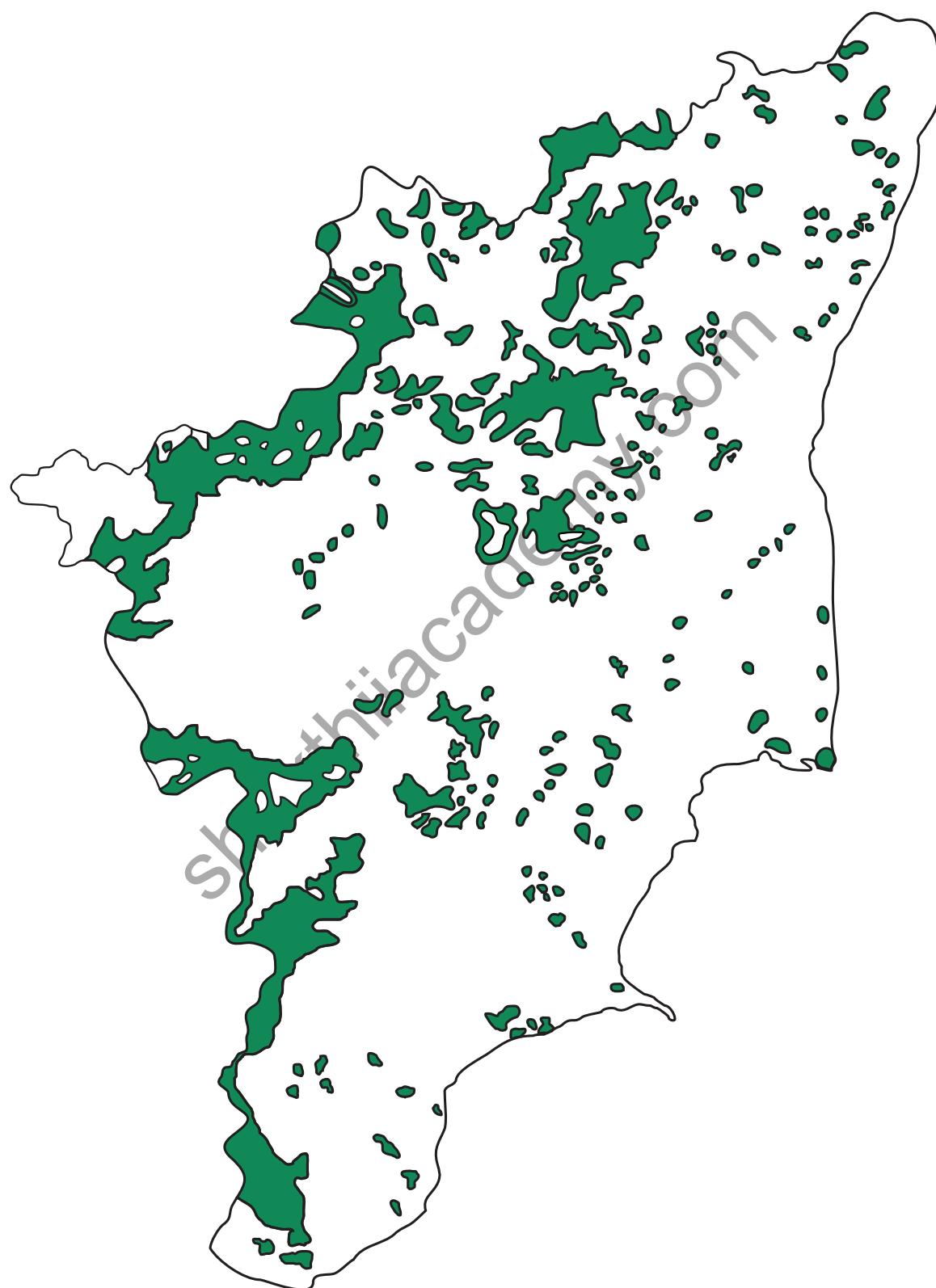
As the name implies these forests are evergreen and they never shed their leaves in a particular season. Since the leaves are present always, they are known as the **evergreen forests**. Tropical evergreen forests are distributed in the regions of heavy rainfall(above 200 cm annual rainfall). These forests are found along the slopes of the Nilgiris and Anamalai hills and the coastal areas of Tamil Nadu. The hard wood trees like **ebony**, **teak**, **rosewood** and **ironwood** are also found here. They grow to a height of 60 m.

## Tropical deciduous forests

These forests are found in the areas having rainfall ranging between 100 and 200 cm per year. They are found on the eastern slopes of the Western Ghats. These are also called as **monsoon forests**. The trees of these forests shed their leaves to avoid the loss of moisture during dry season.

**Tamil Nadu  
Areas under Forest**

N  
↗



Trees of different varieties such as, tall and short, soft and hard woods are found in these forests. Some of them are **sal, sandal wood, teak, bamboo** and **paddock**.

### Thorny shrub forests

Thorny shrub forests are found in the areas where there are long dry periods and low rainfall. This type of vegetation includes low, widely scattered trees and bushes. They are highly adaptive to dry conditions, with deep roots, thick stems and fleshy leaves.

### Mangrove forests

Mangroves are found in the tropical and sub-tropical tidal areas, which have a high degree of salinity. Mangrove trees grow along the estuaries and back waters. In Tamil Nadu, Pitchavaram, Kodikkarai and Vedaranyam, have mangrove or tidal forests. Pitchavaram has the largest swamp forest cover in the state. It is near the city of Chidambaram in Cuddalore district submerged under the back waters of the Bay of Bengal. Here, thickly wooded islands of mangroves are found covering an area of about 1,214 hectares. These forests also contain tropical evergreen trees and shrubs, belonging to the genus *Rhizophora*. In Pitchavaram



Mangrove forest in Pitchavaram

mangrove forests are found in 25 km<sup>2</sup> and Kodikkarai the forests cover about 17 km<sup>2</sup>.

### Hill forests

These forests are found along the hill slopes where the rainfall is heavy. In the hills of Anamalai and Nilgiris, different varieties of flora such as trees, shrubs, climbers and creepers are found, according to altitude.

### Forest Product

The forest products of Tamil Nadu may be divided into two: major and minor products. Major products include timber and fuel wood. Timber is used for many purposes namely:

- ▶ Building construction;
- ▶ Making for furniture;
- ▶ Boat building;
- ▶ Plywood;
- ▶ Hard wood;
- ▶ Matches;
- ▶ Pulp;
- ▶ Paper industries;
- ▶ Packing boxes;
- ▶ Wooden toys;
- ▶ Pencils; and
- ▶ Wood carving.

The minor products are bamboo, canes, leaves, grasses, essential oils, medicinal plants, resins, gums, tanning materials, spices, dyes, beeswax, honey, turpentine and lac. A large number of these products are used as raw materials for cottage industries while some serve as valuable articles of export.

**EXERCISE****I) Choose the correct answer.**

1. Tamil Nadu has \_\_\_\_\_ climate.  
 a) Tropical      b) temperate      c) Polar      d) Arctic
2. Tropical cyclones occur during the month of \_\_\_\_\_.  
 a) November      b) January      c) December      d) April
3. Teak and ebony belong to \_\_\_\_\_.  
 a) Tropical evergreen forest      b) Tropical deciduous forest  
 c) Mangrove forest      d) Hill forest
4. Tamil Nadu receives \_\_\_\_\_ rainfall during South west monsoon season.  
 a) Very high      b) Low      c) Moderate      d) High
5. Northeast monsoon winds blow during \_\_\_\_\_ months.  
 a) June to September      b) October to November  
 c) December to February      d) March to May
6. Mangrove forests are found in \_\_\_\_\_.  
 a) Vedaranyam      b) Coimbatore      c) Pudukkottai      d) Nilgiris
7. The trees of \_\_\_\_\_ forest shed their leaves during dry season.  
 a) Tidal      b) Deciduous      c) Evergreen      d) Mangrove

**II) Match the following.**

- |                     |                      |
|---------------------|----------------------|
| 1. Evergreen forest | Forest product       |
| 2. Monsoon forest   | March to June        |
| 3. Hot season       | December to February |
| 4. Cold season      | Rosewood             |
| 5. Timber           | Shed the leaves      |
|                     | Sundari Trees        |
|                     | Bamboo               |

**III) Answer in brief.**

1. List down the Geographical factors that influence the climate of Tamil Nadu.
2. Name the seasons of Tamil Nadu.
3. Define monsoon?
4. Distinguish between South West and North East monsoon.
5. Distinguish between Evergreen and Monsoon forest.
6. East coast of Tamil Nadu does not receive much rainfall during South West monsoon—Give reasons.
7. Write a short note on cyclonic rainfall.
8. Name few forest products of Tamil Nadu.

**IV) Answer in a paragraph.**

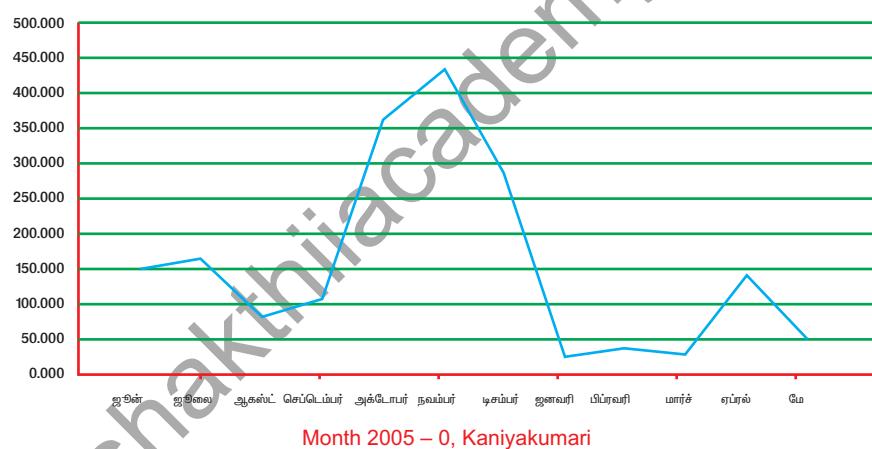
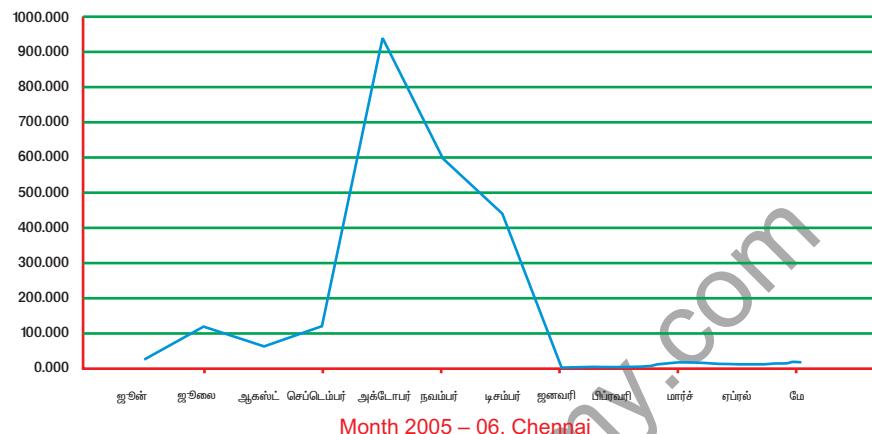
1. Describe the different kinds of natural vegetation of Tamil Nadu.
2. Give an account of the Rainy seasons of Tamil Nadu.
3. Write about the rainfall regions of Tamil Nadu.

**V) Mark the following on a given map of Tamil Nadu.**

1. Direction of Arabian sea branch of monsoons.
2. Direction of Retreating monsoons.
3. Areas of Evergreen forests.
4. District that receives of low rainfall.
5. District that receives of heavy rainfall.

## FORMATIVE ASSESSMENT

### I. Reasoning Skill



Districts	Month of rainfall		Season wise Rainfall			Hot Weather Season
	Highest	Least	South West Monsoon	North East Monsoon	Winter	
Chennai						
Kanyakumari						

Fill in the table by reading the graph and compare the rainfall and find the reason for the difference

## II Life Skill

Prepare a table with the clues given for your village / town / city and discuss the results.

1. The month having highest temperature.
2. The month having lowest temperature.
3. The month having highest Rainfall.
4. The month having lowest Rainfall.
5. Month of pleasant weather.
6. Month which you felt suffocation.
7. Month with high wind speed.
8. Month with low wind speed.
9. Month in which most of the trees shed their leaves.
10. Month in which you see dew drops./ Mist (fog)

## III. Collect Picture

Find out the local name and biological name for these flora and fauna found in any one district of Tamil Nadu. Collect pictures and paste them in your scrap book.

## IV. Word Search

C	A	U	S	A	R	I	N	A	N
O	S	D	F	G	H	J	K	L	M
I	R	A	M	U	K	A	Y	N	A
M	A	U	S	I	M	F	A	A	B
B	B	N	M	L	P	Z	U	I	V
A	S	R	Y	U	O	Q	Y	O	C
T	A	T	B	N	Z	W	T	L	X
O	X	Y	L	Z	O	E	R	P	Z
R	H	Y	Z	O	P	H	O	R	A
E	Q	W	E	R	T	Y	U	I	O

- a) Trees that grow in poor soil.
- b) District which receives rain for three seasons.
- c) Family name of trees grown in Mangrove forest.
- d) District which have least rainfall.
- e) Equal word for monsoon in Arabic language.

## 4. RESOURCES OF TAMIL NADU

### Resources

The term 'resources' refers to the natural wealth available on the earth surface for the welfare of mankind. The surrounding environment contains many natural elements like rocks and minerals on and under the surface of the earth. Water is available in the form of lakes, rivers and seas. Living organisms like plants and animals are also present. These resources can be utilized for the betterment of a country's economy. Resources may be assessed on the basis of factors such as:

1. Types of resources; and
2. Characteristics of resources.

### Let us do

List five resources you use in your home and five you use in your classroom.

Resources have three main characteristics: utility, quantity (often in terms of availability), and consumption

### Natural resources

Natural resources are essential for our survival, to satisfy human wants and needs. It may be classified in different ways.

On the basis of origin, resources may be divided into two: **Biotic** and **Abiotic**.

### Biotic Resources

Biotic resources are those obtained from the biosphere. Forests and their products, animals, birds and their products, fish and other marine organisms are examples of the biotic resources. Minerals such as coal and petroleum are also included in this

category because they are formed from the decayed organic matter.

### Abiotic Resources

Abiotic resources comprise of non-living things. Examples are land, water, air and minerals such as gold, iron, copper and silver.

On the basis of availability, resources are classified into two groups as **Renewable** and **Non-renewable resources**.

### Renewable resources

Renewable resources are those which can be replenished or reproduced without getting depleted or exhausted. Examples of these resources are light, heat and energy from the sun; wind energy; water from lakes, rivers and seas and the soils from the earth's crust.

### Non-renewable resources

Non-renewable resources are those which are formed over very long geological periods and are certain to be exhausted in course of time. Example: Coal, oil and other minerals.

Resources are finally divided on the basis of their origin. These include:

- Land resources;
- Soil resources;
- Mineral resources; and
- Water resources.

### Land Resources

Land is a basic resource as it satisfies the day-to-day requirements of human beings and animals that are obtained from the land. Human beings obtain their basic necessities of food by cultivating the land. Land is also used

for a variety of purposes. It is mainly used for construction activities of houses, industries, roads and railway lines. Apart from this land is also under forests and grasslands. Forest provide valuable timber while grasslands provide fodder for animals. As far as the land resources of Tamil Nadu is concerned, its land resources are classified into 9 land use types and are presented in the diagram given below. Among the districts of Tamil Nadu, Erode holds the largest share(10 %) of forests, followed by Krishnagiri (9.6 %), Dharmapuri(7.7 %), Thiruvannamalai (7.2%) and Vellore (7.1%).

Barren lands are more in the districts of Villupuram, Theni and Salem. Ninety per cent of the land in Chennai is utilized for non-agricultural uses such as residential and industrial uses. Non-agricultural land use is also predominantly found in the districts of Thiruvallur, Kancheepuram, Villupuram and Pudukkottai. Area under current fallow is more in Coimbatore and Erode districts whereas Thirunelveli district has more area under other fallow lands.

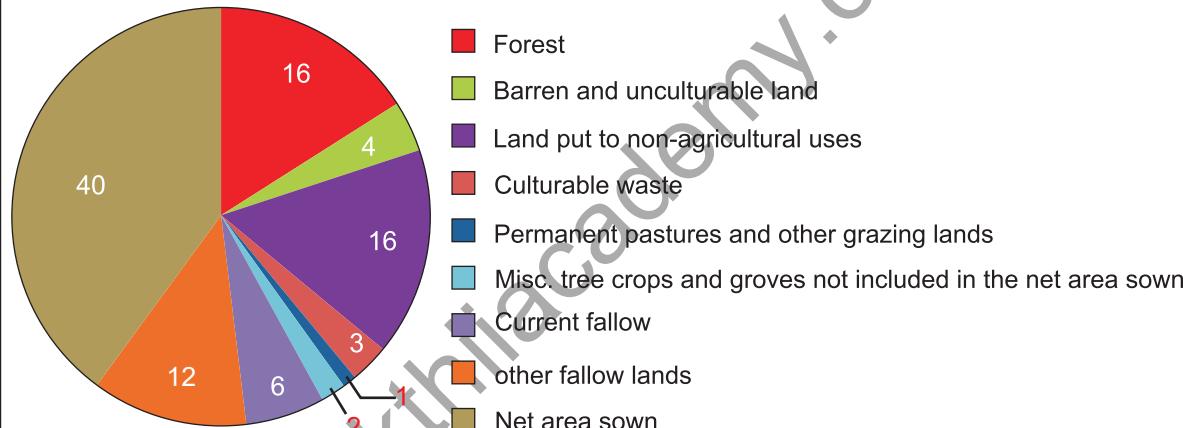


Table :Land use categories for Tamil Nadu

S.No	Category	Area	%
1	Forest	21,10,703	16.2
2	Barren and unculturable land	5,03,255	3.9
3	Land put to non-agricultural uses	21,38,679	16.4
4	Culturable waste	3,68,661	2.8
5	Permanent pastures and other grazing lands	1,10,309	0.8
6	Misc. tree crops and groves not included in the net area sown	2,74,351	2.1
7	Current fallow	7,58,840	5.8
8	Other fallow lands	15,18,008	11.7
9	Net area sown	52,43,839	40.3
<b>Geographical area</b>		1,30,26,645	100.0

### Let us do

Talk to an elderly person in your family or neighborhood and collect information about changes in the land use over the years, in the place where you live.

### Soil Resources

Soil is the loose material which forms the upper most layer of the earth, consisting mainly of very small particles. It is an essential element for the development of agriculture, as it provides essential minerals or nutrients

for the growth of vegetation. Soil forming processes are controlled by the factors such as parent rock, climate, relief, time factor, flora, fauna and micro organisms present in the soil (Fig: a and b).

Figure a: Process of soil formation

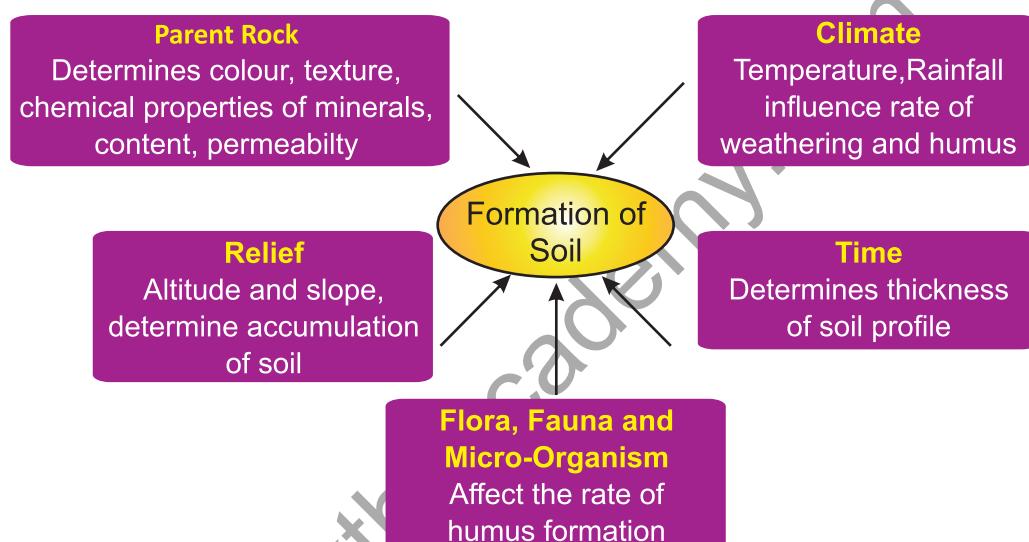
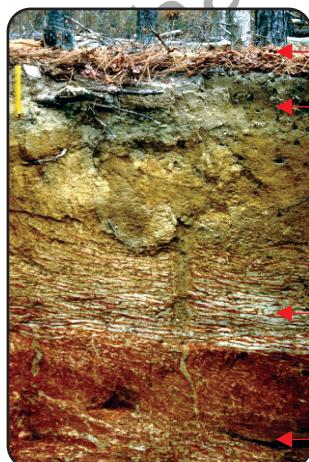


Figure b: Soil profile



Top soil with humus and vegetation

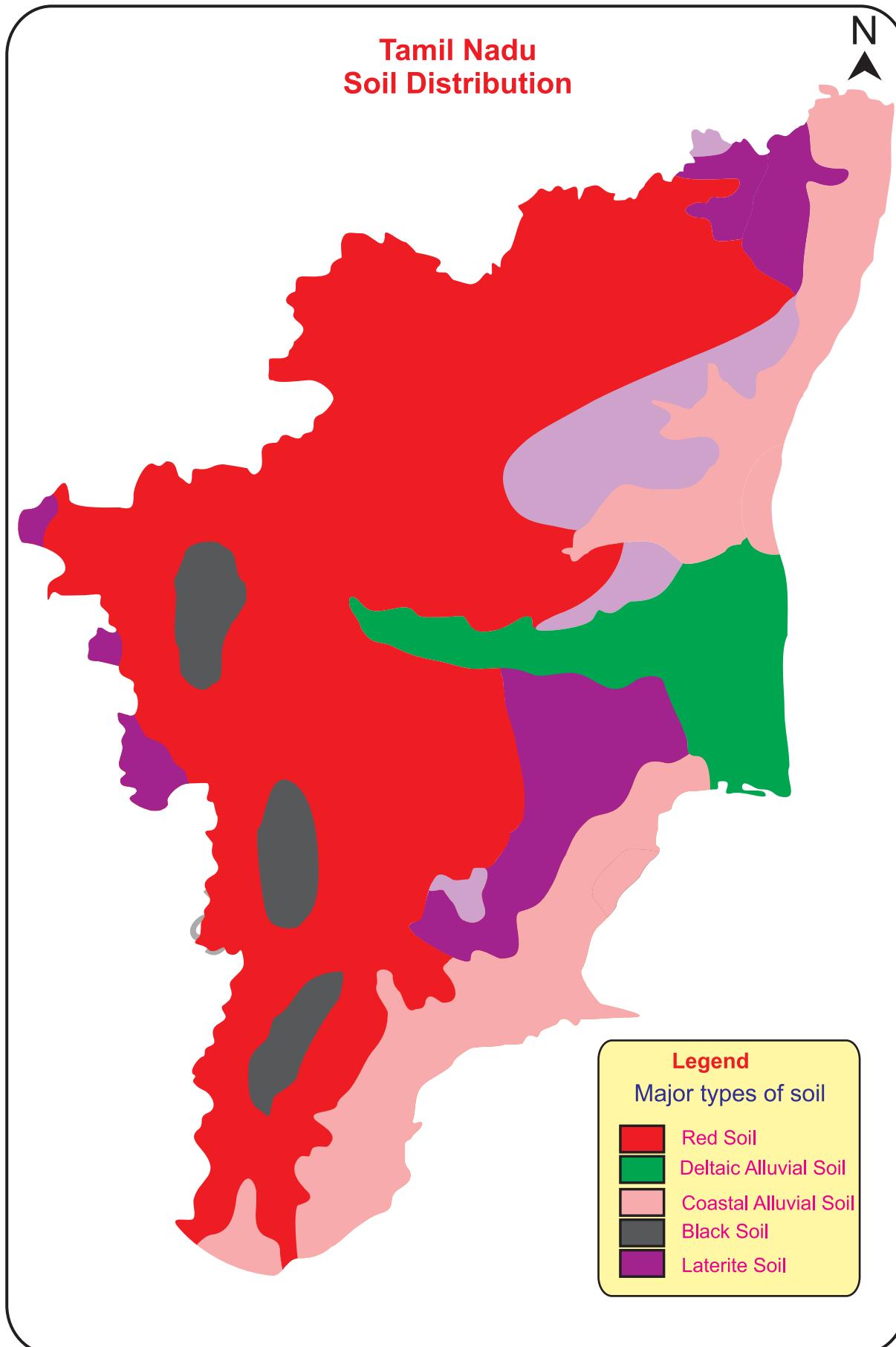
Sub soil with sand, silt and clay

Weathered rock

Parent rock

### Do you know?

It takes hundreds of years to make just one centimetre of Soil.



## Soils of Tamil Nadu

The soils of Tamil Nadu may be grouped into five types. They are classified according to their formation, size and colour. Their occurrence in the districts of Tamil Nadu is given below

Table: Types of soils in Tamil Nadu and their distribution

Sl. No	SOIL	DISTRICT
1	Alluvial soils	Thanjavur, Thiruvarur and Nagapattinam, Villupuram, Cuddalore, Thirunelveli and Kanyakumari.
2	Regur or the black soils	Coimbatore, Madurai, Virudhunagar, Thuthukudi and Tirunelveli.
3	Red Loams	Sivagangai, Ramanathapuram.
4	Laterite soils	Kancheepuram, Thiruvallur, Thanjavur, hill tops of western ghats and eastern ghats.
5	Saline soils	Predominantly in Vedaranyam, Coromandal coast and for about 10 km in all the coastal districts of Tamil Nadu.

### Activity

In Tamil Nadu soils could be either alluvial, black, red, laterite or saline. Collect a handful of different types of soil and observe. How are they different? Write down.

## Forest Resources

Tamil Nadu's wealth of flora and fauna lies in the hilly and forest regions. Some of its major wildlife sanctuaries like Mudumalai and Anaimalai (Indira Gandhi Wild life sanctuary) are situated on the hills of the Western Ghats, which have habitats for elephants, tigers, bisons and a variety of monkeys and deer. Among the 3,000 and more plant species found in Tamil Nadu, majority of them are found in the mixed deciduous forests. One of the most noteworthy flowers is the Kurinji of Kodaikanal hills which blooms once in 12 years. The state has recognised it with special status. Cinchona, a forest product, from which quinine-a drug for treating malaria is extracted. Eucalyptus which

grows abundantly in the Nilgiris is also used as medicine for curing cold and as pain reliever.

Medicinal herbs are commonly found on the Palani hills and Courtallam. Palmyrah trees are grown abundantly in Thirunelveli district, as subsidiary activity to agriculture. Its products are used as raw materials for several cottage industries. Exotic varieties of sandalwood are grown in Javadhi hills of Vellore district. The forest areas of Tiruvannamalai and Tirunelveli districts of the state are being regenerated and protected by the State Forest Department. These forests not only provide for the large economy of the state but also to the local livelihood.

### Do you know ?

'Vanamahotsava' is celebrated in October every year to highlight the importance of wild life.

World Wildlife Day      October 4

World Forest Day      March 21

World Water Day      March 22

### Water Resources

Water resources comprising of surface water (river and lakes), ground water, marine and coastal waters, support all living things including human beings. Basically, man requires safe protected water supply for drinking, cooking, washing and bathing. In the agricultural sector, the growth of plants and yield of crops are directly related to the quality and quantity of water available. Underground water is also used for the purpose of irrigation and other utilities. All industries require water either for processing or for other utilities.

Table: Water resources in Tamil Nadu

Water Sources	Numbers
Rivers	17
Lakes	15
Tanks	40319
Ponds	21205
Canals	2395
Reservoirs	71
Wells	1908695

### Do you know ?

Rainwater harvesting is the process of collecting rainwater from roof tops and directing it to an appropriate location where it is stored for ground-water recharge. On an average, one spell of rain for two hours is enough to recharge 8,000 litres of water.

### Animal Resources

Apart from foodgrains meat, poultry and dairy products are also considered as dietary components. Animals which are domesticated yield wool, fur and skin that form the basic raw materials for specific clothing, shoes and other products. The animal resources contribute a lot to the development of the economy where they are reared commercially.

Table: Livestock in Tamil Nadu

Livestock	No of animals
Cattle	91,41,043
Buffaloes	16,50,343
Sheep	55,93,485
Goat	81,77,420

### Glossary National Park

A natural area designated to protect the ecological balance of one or more ecosystems for the present and the future generations is referred to as a National Park.

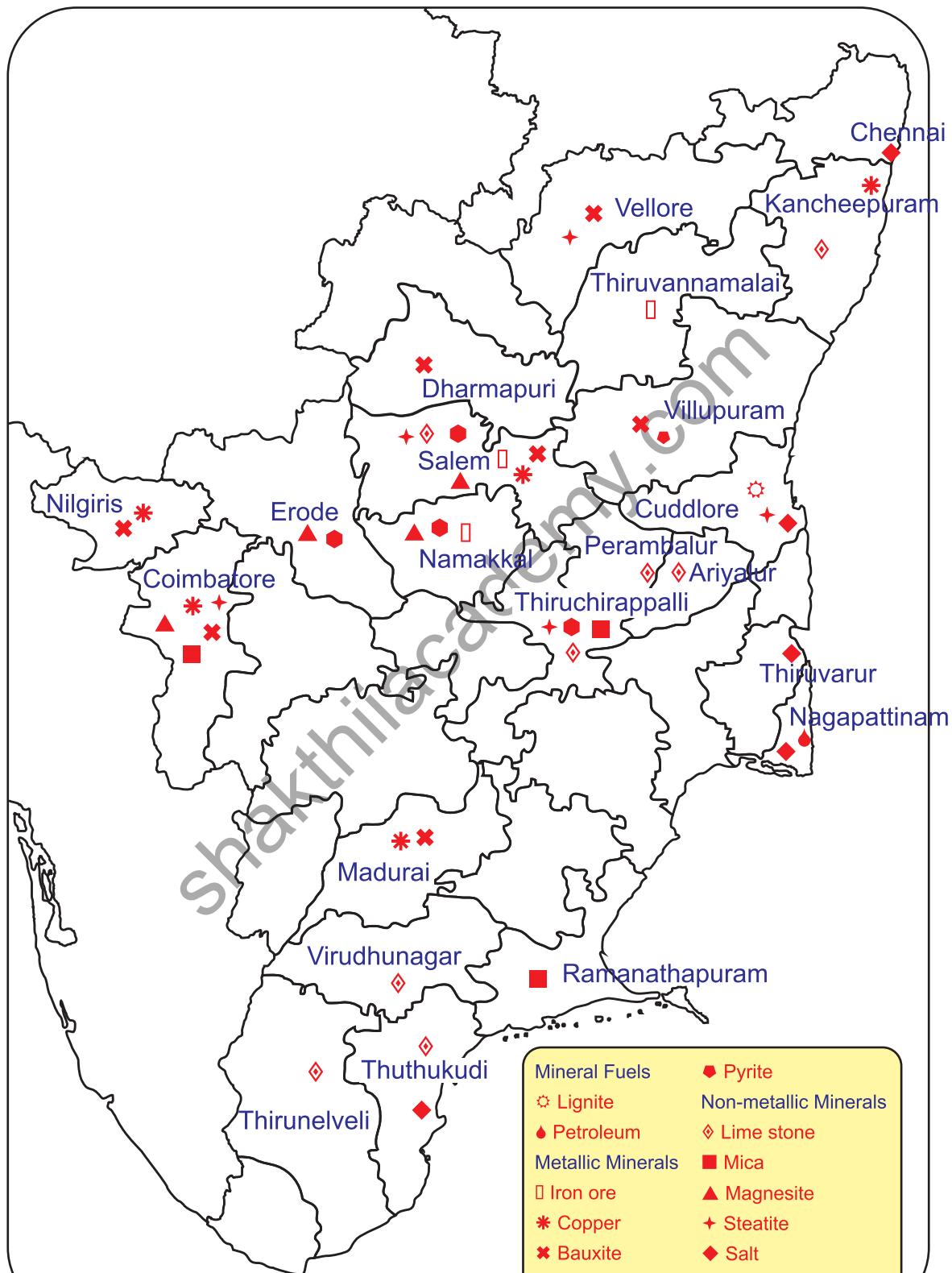
### Mineral Resources

A mineral is a substance or compound of organic or inorganic origin found on the earth's crust. Every mineral has a definite composition and distinct physical characteristics. Most of the minerals are crystalline in nature and occur widely in rocks. Rocks contain one or more minerals. Natural forms of minerals are called ores and minerals are processed from ores.

### Do you know?

The salt used in cooking and graphite in your lead pencil is a mineral.

## Tamil Nadu Minerals



The major mineral resources of Tamil Nadu include Lignite, Vermiculite, Garnet, Zircon, Graphite, Ilmenite, Rutile, Monazite and Magnesite.

### Classification of Minerals

Minerals are classified into three

categories. They are

1. Metallic Minerals;
2. Non-Metallic Minerals; and
3. Mineral Fuels.

**Table: Metallic Minerals of Tamil Nadu**

MINERALS	DISTRICT
Iron ore	Salem, Namakkal and Thiruvannamalai
Copper	Salem, Nilgiris, Coimbatore, Madurai and Mamandur
Bauxite	Salem, Nilgiris, Coimbatore, Vellore, Dhamapuri, Madurai and Vilupuram
Chromite	Salem, Namakkal, Thiruchirappalli and Erode
Pyrite	Villupuram

**Table: Non-Metallic Minerals of Tamil Nadu**

MINERALS	DISTRICT
Lime stone	Virudhunagar, Thuthukudi, Thirunelveli, Thiruchirappalli, Kanchipuram and Salem
Mica	Thiruchirappalli, Coimbatore and Ramanathapuram
Magnesite	Salem, Namakkal, Coimbatore and Erode
Steatite	Vellore, Cuddalore, Coimbatore, Salem and Thiruchirappalli
Salt	Chennai, Thuthukudi, Cuddalore, Nagapattinam and Thiruvarur

**Table: Mineral Fuels of Tamil Nadu**

MINERALS	DISTRICT
Petroleum	Thiruvarur (Panamgudi), Narimanam (Kaveri Delta Region)
Lignite	Neyveli

### Activity

With the help of an atlas, mark the distribution of iron, copper, bauxite, gold and lignite on an outline map of Tamil Nadu.

## Energy Resources

Resources from which energy can be obtained for heating and lighting are called energy resources.

The energy resources can be divided into two types. They are:

1. Conventional Power Resources; and
2. Non-conventional Power Resources.

## Conventional Power Resources

Conventional source of energy are those which have been traditionally used by mankind for a long time. It usually includes fossil fuels like coal, natural gas, oil as well as nuclear power.

### Types

The three major conventional energy sources are:

1. Thermal Power Resources;
2. Hydel Power Resources; and
3. Atomic Power Resources.

## Thermal Power Resources

Power is generated from nonrenewable energy sources such as coal, oil, and Natural gas, is known as thermal power.



Thermal Power Station-Neyveli

Thermal power is produced by heating the water. The steam thus formed spins the turbine to produce electricity.

Table: Thermal power plants of Tamil Nadu

Name of the Plant	District	Types of Fuel	Capacity in MW
Neyveli Lignite Corporation	Cuddalore	Coal	2490
North Chennai Thermal Power Unit-I	Thiruvallur	Coal	1200
Thuthukudi Thermal Power Plant	Thuthukudi	Coal	1000
Mettur Thermal Power Station	Salem	Coal	600

## Hydropower Energy

Hydro power has been with humanity for a long time. Energy in a rushing river, is captured through a wheel as mechanical energy. Originally, these water wheels powered grain mills, spinning a grindstone directly. On the whole Tamil Nadu



Hydropower station-Solaiyar

Table: Hydropower plants of Tamil Nadu

S.No.	HYDRO POWER PLANT	RIVERS	MW
1	Kundah I to V	Bhavani	500
2	Mettur Tunnel	Kaveri	840
3	Aliyar	Aliyar	60
4	Kodayar I and II	Kodayar	100
5	Sholaiyar I and II	Sholayar	95
6	Kadamparai	Kadamparai	400
7	Lower Mettur	Kaveri	120
8	Papanasam Hydro Electric Power	Papanasam	32
9	Pykara	Pykara	150
Total			2297

produces about 2,297 Mega Watts of hydro electric power by 2010 year.

### Atomic Power Station

Atomic energy is the energy produced from the fusion of atoms. It results from a nuclear reaction, a process in which two nuclei or nuclear particles collide, to produce electrical energy by nuclear reactors.



Atomic Power Station- Kalpakkam

The first Atomic Power Station of Tamil Nadu is located at **Kalpakkam** about 80 km south of Chennai. It has a comprehensive nuclear power production, fuel reprocessing, and waste treatment facility that includes plutonium fuel fabrication for fast breeder reactors (FBRs). It is also India's first fully indigenously constructed nuclear power station. It

has two units which produce about 500MW of energy.

Another Nuclear Power station is currently under construction in Kudankulam of Thirunelveli district. This station has four reactors which are expected to produce about 1,000 MW from each reactor.

### Non-conventional Power Resources

Non-conventional Power Resources are known as renewable resources. Sun is the biggest source of non-conventional energy. Energy is in the form of photons. India receives abundant sunlight for about 250-300 days in a year. Conversion of solar energy to electric energy and thermal energy takes place mainly by photovoltaic cells and through solar thermal pathways. The non-conventional energy resources are:

- Solar Energy;
- Wind Energy;
- Tidal wave Energy;
- Geo-thermal Energy;
- Bio-fuel Energy; and
- Energy from baggasse.

Excluding tidal wave energy and geothermal energy, all other types have been harnessed in Tamil Nadu and their rate of utilization is discussed below.

### Solar Energy

Solar power is generated from sunlight. This can be used as direct power with photovoltaic (PV) cells, or indirect with concentrating solar power (CSP), Sun's energy is focused to boil water which is then used to generate power.



Generation of Solar Power

Dindigul, Krishnagiri, Dharmapuri are the districts which extract energy from solar power units.

### Wind Energy

Wind power is the conversion of wind energy into a useful form of energy. It is generated using wind turbines to make electricity for wind mills and wind pumps for pumping water or drainage and used to propel ships.



Wind Farm-Aralvaimozhi

### Advantages and Disadvantages of Wind Energy

Advantages	Disadvantages
Non-polluting source	Noise pollution
Low cost of production	Wind mills are very costly to setup
Safe and clean	Disturbs radio and T.V. reception.
Inexhaustible	Diffused source, so gets wasted

The total amount of wind energy produced is about 5,208 MW per year. The following table gives the regions of wind energy production and their generating capacity.

Table: Location and capacity of Wind Farms in Tamil Nadu

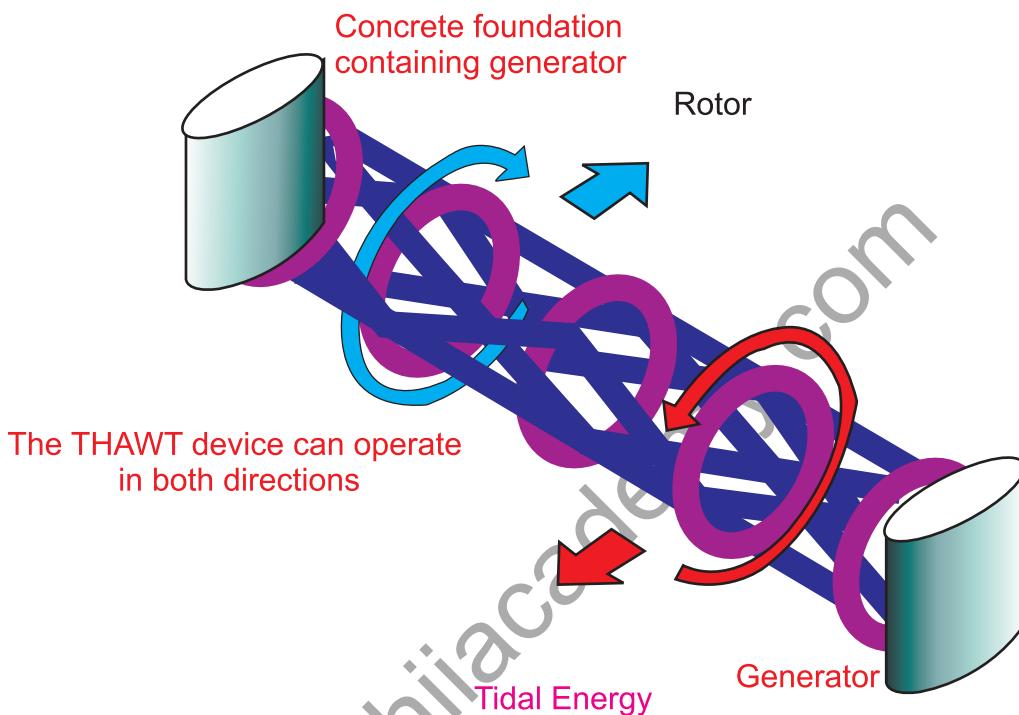
SI. No	LOCATION	CAPACITY MW
(I)	Aralvaimozhi Pass (Muppandal area) Kanyakumari/ Thirunelveli Districts.	1,658
(ii)	Sengottai Pass (Kayathar area) Thirunelveli, Thoothukudi Districts.	1,105
(iii)	Palghat Pass (Kethanur area) Coimbatore.	1,995
(iv)	Coastal area near Chennai and Rameswaram in Ramanathapuram District and other areas (Theni, Palani areas).	450
	<b>Total</b>	<b>5,208</b>

## Tidal Wave Energy

Energy generated from tides is called tidal energy. Tidal energy can be harnessed by building dams at narrow openings of the sea. During high tide the energy of the tides is used to turn the turbines installed in the dam to produce electricity.

## Advantages and Disadvantages of Wind Energy

Advantages	Disadvantages
Non-polluting	Destroys wildlife habitats
Inexhaustible	Difficult to harness.



### Do you know?

The first tidal energy station was built in France.

### Advantages of Tidal Energy

- Clean, eco-friendly and always available.
- Cheap compared to other energy sources.

### Disadvantages of Tidal Energy

- Located far away from cities and so costly to transport electricity.
- Can be generated only during windy days.

## Geo-thermal Energy

Geo-thermal power utilizes the heat in the interior of the earth for generation of power. In areas where volcanoes exist, the rocks in contact with molten magma are quite hot.

When rain water seeps into these rocks, it gets converted into steam and gushes out as a geyser. Hot springs may also occur in such areas. The steam generated can be used to generate power on a small scale.

## Bio –fuel Energy

Bio-fuels are a wide range of fuels. The term covers solid biomass, liquid fuels and various biogases. Currently, 13 plants with a capacity of 130 MW are operating in Tamil Nadu.



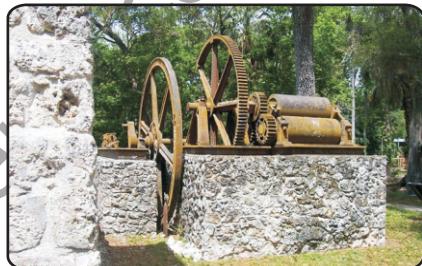
**Table: Bio-fuel Plants in Tamil Nadu**

S.No.	District	NO. OF PLANTS
1	Sivakasi	2
2	Pudukottai	2
3	Tiruvanamallai	1
4	Dindigul	1
5	Theni	1
6	Thanjavur	1
7	Madurai	1
8	Virudunagar	1
9	Thiruvallur	1
10	Kanchipuram	1
11	Krishnagiri	1

## Bio-fuel Energy

## Energy From Sugarcane Bagasse

Residual cane fibre (bagasse) is burned as fuel. In Tamil Nadu there are about 18 sugar mills producing energy of nearly 411 MW from bagasse. Table given below lists the sugar mill locations with their energy producing capacity



## TAMIL NADU ENERGY DEVELOPMENT

**Table: List of Sugar Mills with Co-generation Plants in Tamil Nadu**

S.No.	SUGAR MILLS	DISTRICT	CAPACITY MW
1	MRK Co-operative Sugar Mills Ltd	Cuddalore	7.50
2	Cheyyar Co-operative Sugar Mills	Thiruvannamalai	7.50
3	Dharani Sugars & Chemicals Ltd	Thirunelveli	15.00
4	Rajashree Sugars & Chemicals Ltd	Theni	12.00
5	Kothari Sugars & Chemicals Ltd	Theni	12.00
6	Terry Energy Ltd	Cuddalore	28.42
7	S.V. Sugar Mills Ltd	Kancheepuram	45.00
8	Subramania Siva Co-operative Mills Ltd	Dharmapuri	5.00
9	Terry Energy Ltd	Thanjavur	18.68
10	EID Parry India Ltd	Cuddalore	30.00
11	Sakthi Sugar Mills	Sivaganga	5.500
12	Arunachalam Sugar Mills Ltd	Thiruvannamalai	19.00
13	Bannari Amman Sugars Ltd	Erode	20.00

14	Auro Energy Ltd	Nagaipattinam	16.00
15	Sri Ambika Sugar Mills	Cuddalore	40.00
16	Sakthi Sugar Mills Pvt.	Erode	32.00
17	Rajashree Sugars Chemicals Ltd.	Villupuram	22.00
18	EID Parry India Ltd.	Pudukkottai	18.00
19	Kothari sugars and Chemicals	Ariyalur	22.00

**Activity**

Find the process of energy production in a Co-generation plant located in your area by visiting it.

**EXERCISE****I) Choose the correct answer.**

1. Which one of the following is not a factor of soil formation.  
a) Time      b) Soil texture      c) Organic matter      d) Inorganic matter
2. Biotic resources are those obtained from the \_\_\_\_\_.  
a) Time      b) Biosphere      c) Water      d) Wind
3. \_\_\_\_\_ determines thickness of soil profile  
a) Climate      b) Time      c) Relief      d) Wind
4. Medicinal herbs are commonly found on the \_\_\_\_\_ hills  
a) Palani hills      b) Agasthya hills      c) Anaimudi      d) Chennimalai
5. Which one of the following is a leading producer of Lignite  
a) Villupuram      b) Neyveli      c) Chennai      d) Erode
6. Which one of the following is not a producer of Iron ore  
a) Salem      b) Thiruchirapalli      c) Coimbatore      d) Chennai

**II) Match the following.**

- |                                 |            |
|---------------------------------|------------|
| 1. Mettur Thermal power station | Dharmapuri |
| 2. Wind energy                  | Medicine   |
| 3. Saline Soils                 | Villupuram |
| 4. Cinchona                     | 5,500 MW   |
| 5. Solar power                  | Vedaranyam |
|                                 | Chennai    |
|                                 | Perambalur |

**III) Answer in brief.**

1. Define Resources.
2. Define soil.
3. Which are the factors that determine formation of soil?
4. Define rain water harvesting.
5. What is National park?
6. Name the Hydel power plants of Tamil Nadu.
7. Distinguish between Conventional and Non-Conventional sources of energy
8. What are the advantages and Disadvantages of wind energy?
9. Soil is non-renewable resources - Explain.

**IV) Answer in a paragraph.**

1. Explain the different types of soil found in Tamil Nadu.
2. What are the uses of forest?
3. Give an account of the mineral resources in Tamilnadu.
4. Give an account of Thermal power Resources in Tamilnadu.

**V) Mark the following on a given map of Tamil Nadu.**

Mark the areas mining:

1. Iron
2. Copper
3. Bauxite
4. Lignite

## FORMATIVE ASSESSMENT

**I. Word Search**

C	U	D	D	A	L	O	R	E	N	G	G
O	M	V	K	T	G	I	S	Y	V	J	H
I	L	A	G	R	I	C	A	U	R	P	N
M	A	R	U	P	U	L	L	I	V	T	O
B	V	E	L	L	O	R	E	T	N	R	O
A	Y	P	A	H	S	W	M	D	R	G	P
T	H	I	R	U	N	E	L	V	E	L	I
O	H	R	V	S	Y	P	R	K	O	T	V
R	A	T	R	T	Q	S	B	C	K	J	W
E	C	N	A	R	F	D	V	R	S	L	N
K	A	L	P	A	K	K	A	M	I	O	T

- a) Lignite is mined in the district
- b) First Atomic power station
- c) The district of Kudankulam
- d) First tidal energy station in the world
- e) Highest produce district of copper
- f) Leading produce district of Pyrite
- g) District of Mettur Thermal power plant
- h) Barren land are more in this district

**II. Life Skill**

1. Find the land use categories for your district and draw Bar / Pie diagram ([tn.maps.tn.nic.in/district.php](http://tn.maps.tn.nic.in/district.php))

**III. Models**

Prepare a working model for wind energy and know its dynamics

**IV. Debate**

In present situation debate about the significance of conventional and non-conventional source of energy.

**V. Map Skill**

Find out the Correlation between the presence of minerals and physical features using maps.

## 5. TAMIL NADU - AGRICULTURE

Agriculture is the prime and traditional occupation for the people of Tamil Nadu. The practice of growing plants on a large scale for food and other purposes is known as agriculture. Agriculture includes not only cultivation of crops, but also rearing of animals, birds, forestry, fisheries, and other related activities.

### **Activity**

Find proper word for each of the following.

Cattle rearing

Rearing of birds

Rearing of silkworms

Rearing of honeybees

Growing fruits

Growing flowers

Growing grapes

(sericulture, apiculture, animal husbandry, orchard farming, viticulture, floriculture, poultry)

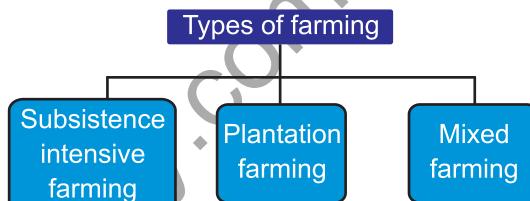
### **Activity**

Can you redefine agriculture using the terms learnt in previous activity.

About 56 % of the people of Tamil Nadu are farmers. Agricultural sector supplies food and fodder to the people and cattle, respectively. It is the source of raw material for many of the industries.

### **Types of Farming**

The methods of growing crops vary from region to region and can be classified as follows:



### **Subsistence intensive farming**

Farming that is carried on small land holdings that produce food crops for local consumption and not for external trade is known as **subsistence intensive farming**. Most farmers in Tamil Nadu practice subsistence intensive farming. With the availability of water for cultivation, farming methods are classified into three types, namely:

- 1) Wet farming;
- 2) Dry farming (*maanavari*); and
- 3) Irrigation farming.

<b>Wet farming</b>	<b>Dry farming</b>
<ul style="list-style-type: none"> <li>● Farming where water supply is available throughout the year both rainfall and irrigation is known as wet farming</li> <li>● Crops cultivated are rice and sugarcane.</li> <li>● Most river basins of Tamil Nadu practice this type of farming.</li> </ul>	<ul style="list-style-type: none"> <li>● Farming carried out only during rainy season without irrigation is known as dry farming.</li> <li>● Crops cultivated are ragi and other millets.</li> <li>● Drier regions of Vellore, Thiruvannamalai, Ramanathapuram and Thirunelveli practice this type of farming.</li> </ul>

## Irrigation farming

Irrigation farming is the practice of growing crops with supply of water through various sources of irrigation like wells, lakes, and canals. Rice, cotton and sugarcane are grown with irrigation farming in most part of Tamil Nadu.

Most of the farmers in Tamil Nadu practice subsistence intensive and irrigation farming. As the water requirement for each crop varies, irrigation plays a major role in the agricultural development of Tamil Nadu.

## Plantation farming

Plantation farming is yet another type of farming where crops are grown on large farms or estates. Plants like Tea, coffee, rubber and pepper are grown as plantation crops on the hill slopes of Tamil Nadu.

## Mixed farming

Mixed farming is one wherein land is allotted for more than one activity along with agriculture. The farmer grows two or three varieties of crops along with cattle rearing, poultry and fishing on a large land holding. This method is profitable to the farmer as it provides regular and continuous income. This type of farming is prevalent in the Kaveri delta.

## Market gardening

Market gardening includes horticulture and floriculture, (growing fruits, vegetables and flowers) in large scale for supply to the urban markets and also for export purposes. Districts such as Madurai, Nilgiris, Thiruvallur and Kancheepuram practice this type of farming.

## Cropping seasons of Tamil Nadu

Farmers select particular crops to be cultivated in a season, to suit soil

and availability of water in that season. Thus most farmers in Tamil Nadu cultivate crops in three different seasons as given below:

## Sornavari (Kharif season) (Chiththirai pattam)

*Sornavarai* is otherwise known as Kharif season. The seeds are sown during May and harvested in October. As the month of May coincides with the Tamil month, *Chiththirai* it is also known as *Chiththiraipattam*.

## Samba (Summer season) (Adipattam)

*Samba* is otherwise known as summer season. The seeds are sown in the month of July which coincides with the month Tamil month of *Aadi* and harvested in January. This season is referred to as *Adipattam* in Tamil Nadu.

## Navarai (Winter Season-Rabi) (Karthigai pattam)

The seeds are sown in the month of November and harvested in March. This season is known as *Karthigai pattam* in Tamil Nadu as the Tamil month Karthikai coincides with the month of November.

### Activity

List the dominant type of farming followed in your district and the reasons behind them.

Name the crops grown in your area and their growing seasons?

## Factors influencing agriculture

The factors influencing agriculture may be classified as physical, social and economic factors.

- Physical factors include soils, temperature, rainfall, humidity, climate and slope of land.

○ The Social factors include traditional knowledge, belief and myths of farmers, farm size and holdings and farmer's acceptance towards innovation.

○ Economic factors are market, loan assistance, Government subsidy and incentives.

### Activity

Choose the suitable crops for specific types of soils.

Soil	Crop
Red soil	
Alluvial Soil	
Laterite Soil	
Black soil	
(paddy, sugarcane, rubber, cotton)	

### Activity

List the names of crops that you have identified and correlate them with the climate of the region.

- 1)
- 2)
- 3)

### Sources of Irrigation in Tamil Nadu

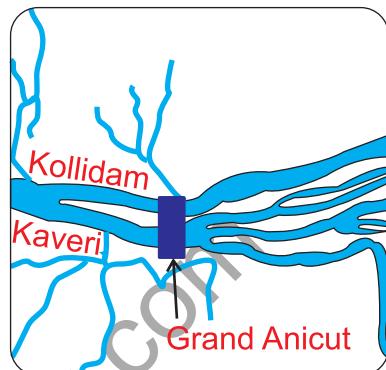
The main sources of irrigation are canals, tanks and wells.

Canals are man-made channels of water taken from a perennial river, dam or lake to supply water to the agricultural fields. Canal irrigation is the most prominent type in the basins of Kaveri and Tamiravaruni. 27 % of irrigated land in Tamil Nadu cultivates crops using canal irrigation.

### Important canals of Tamil Nadu

Arrakkottai canal, Thadapalli canal and Kalingarayan canal are

some of the noteworthy canals on river Bhavani a tributary of River Kaveri. Canals taken from Mettur dam provide irrigation for about 2.7 lakh hectares. The Grand Anicut built across the river Kaveri near Trichirappalli, diverts the water to the entire delta region through canals.



Grand Anicut on River Kaveri

River Thamiravaruni and its tributaries serve Tirunelveli district with many canals. River Tamiravaruni has nine anicuts from which the following channels, named as north and south Kodaimel Alagain canal; Nathiyunni canal, Kannadian canal, Kodagan canal, Palayan canal, Tirunelveli canal and Marudhur canal. Apart from this, Pachaiyar has nine anaicuts and Chittar has seventeen anaicuts.

### Do you Know?

Canals used for irrigation have the oldest records of two millennia in Tamil Nadu. Kallanai, built around First century, by Karikalan is still in use and considered to be the oldest water-regulatory structure in the world.

The state of Tamil Nadu is pioneer in linking rivers of the state as recommended by Ministry of Water Resources.

## Tanks

Lakes are natural water bodies. Lakes are converted into tanks by strengthening their bunds to store water for irrigation. Tank maintenance and management is a common practice associated with temples. There are about 39,202 tanks in Tamil Nadu which accounts for 19 % of the irrigated area. Tanks are concentrated in the districts of Kancheepuram, Vellore, Thiruvannamalai, Pudukottai, Ramanathapuram and Thirunelveli. At present, Ramanathapuram has the maximum number of tanks. Tanks have to be desilted regularly for better storage and supply of water. In Tamil Nadu, tanks are classified as follows; They are system tanks and non-system tanks. System tanks are linked to river/canal system of the state, with water filled through supply channels. The non-system tanks, on the other hand, are dependent on rainfall of that region. Tanks are maintained by either PWD or Panchayat.

## Do you know ?

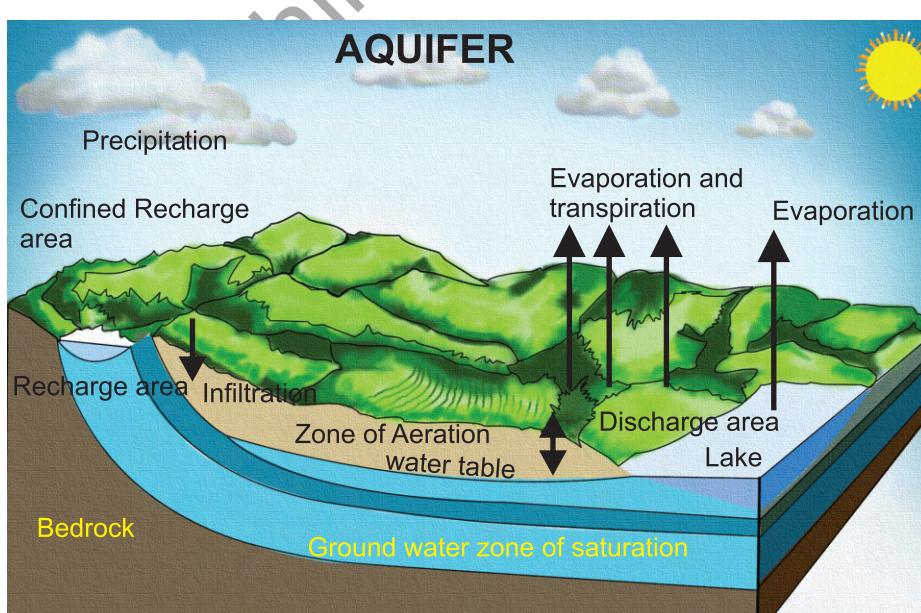
Kancheepuram is known as the land of 'thousand lakes'

Some important lakes of Tamil Nadu are found in Red Hills, Chembarambakkam, Veeranam, Madhurandhagam, Kolavai, Ambattur, Ooty and Kodaikanal.

## Well

Well irrigation is most predominant irrigation system in Tamil Nadu which utilizes groundwater. Well irrigation covers 52 % of irrigated area in the state. Wells may be classified as surface wells and tube wells.

Surface wells are also known as open wells and are dug to reach the water table lying within a few metres from the surface. Tube wells explore the aquifers of great depth with the help of electric motors. There are 1,621,391 surface wells and 2,87,304 tube wells in Tamil Nadu that are used for the purpose of irrigation.

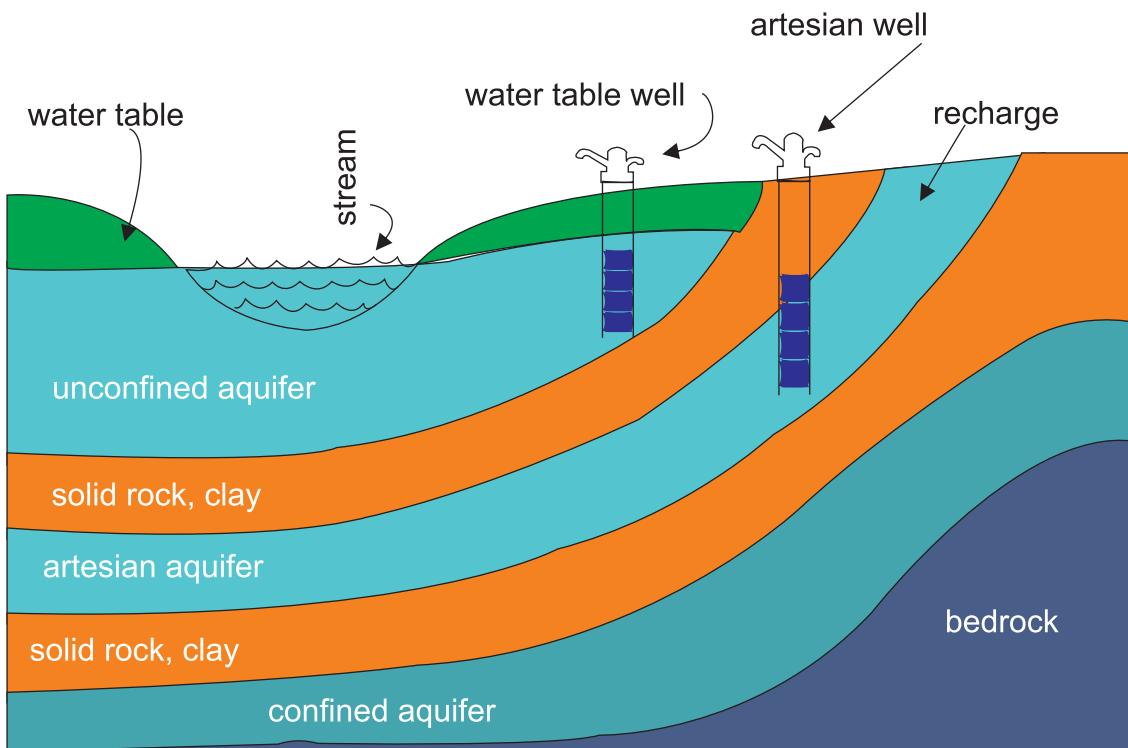


**Aquifers** are underground rock layers which store water and allow water to pass through them.

In Tamil Nadu a high potential artesian aquifer occurs in the Cuddalore, Chidambaram and Viruthachalam area. This aquifer named as Neyveli aquifer, pumps out water regularly from lignite mining area for irrigation and domestic supply.

There is a considerable amount of spring irrigation in the Kaveri and Vaigai beds. Irrigation from these springs is practised in a few places of Erode district.

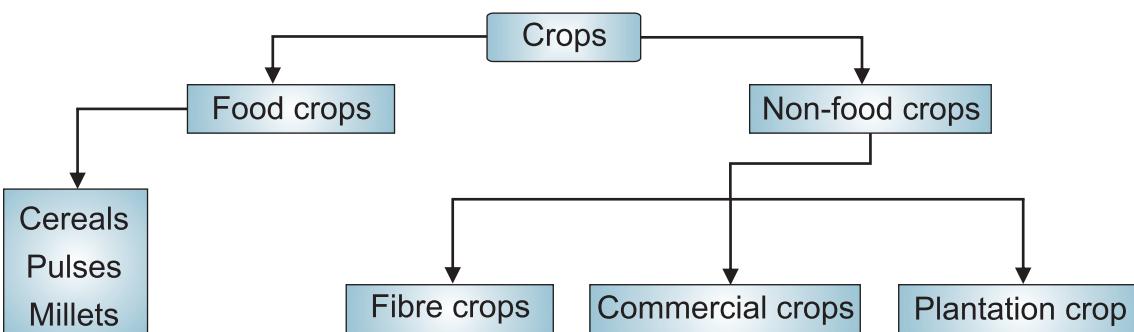
### Aquifers at different depth



### Activity

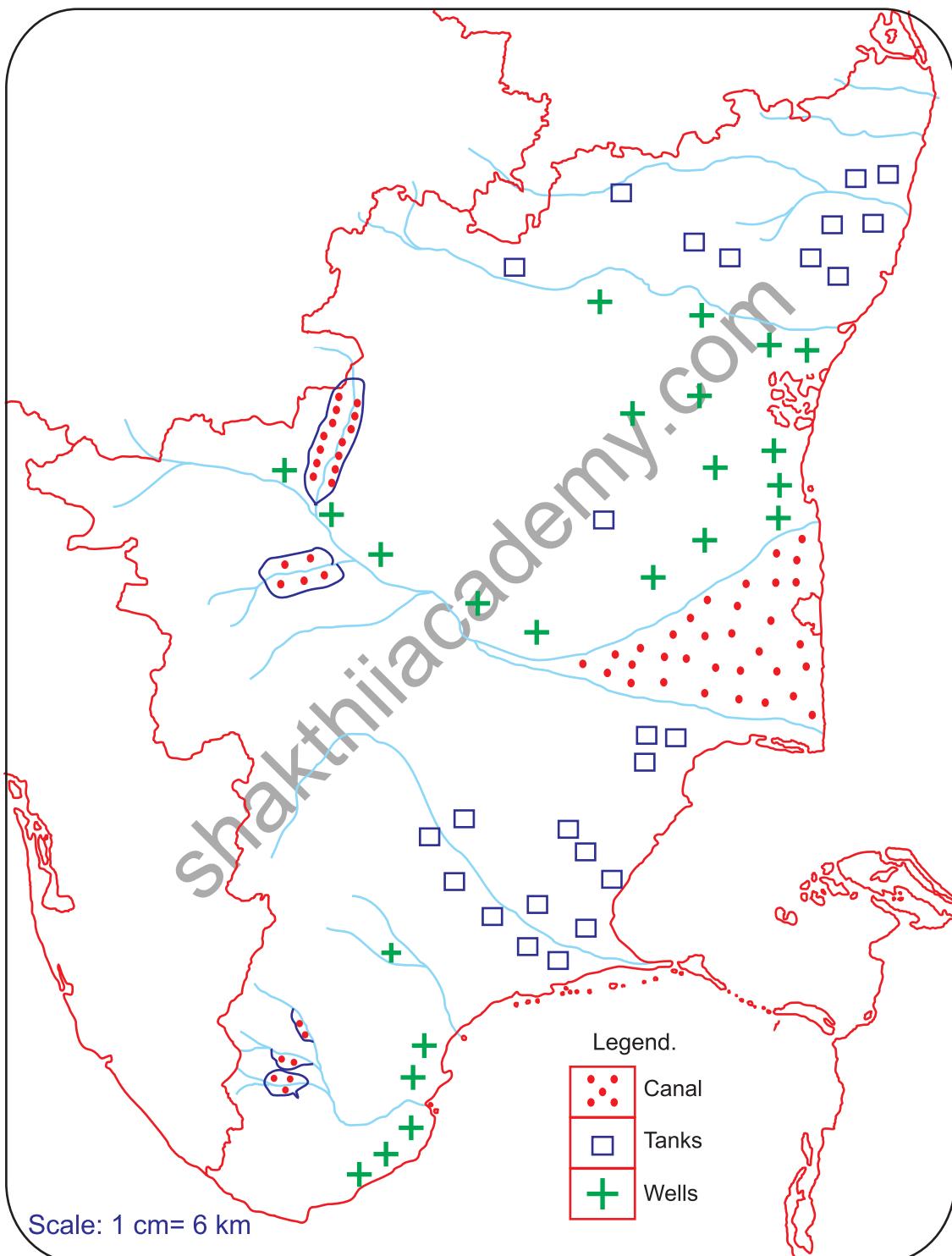
Find out the source of irrigation in your area

### Major Crops of Tamil Nadu



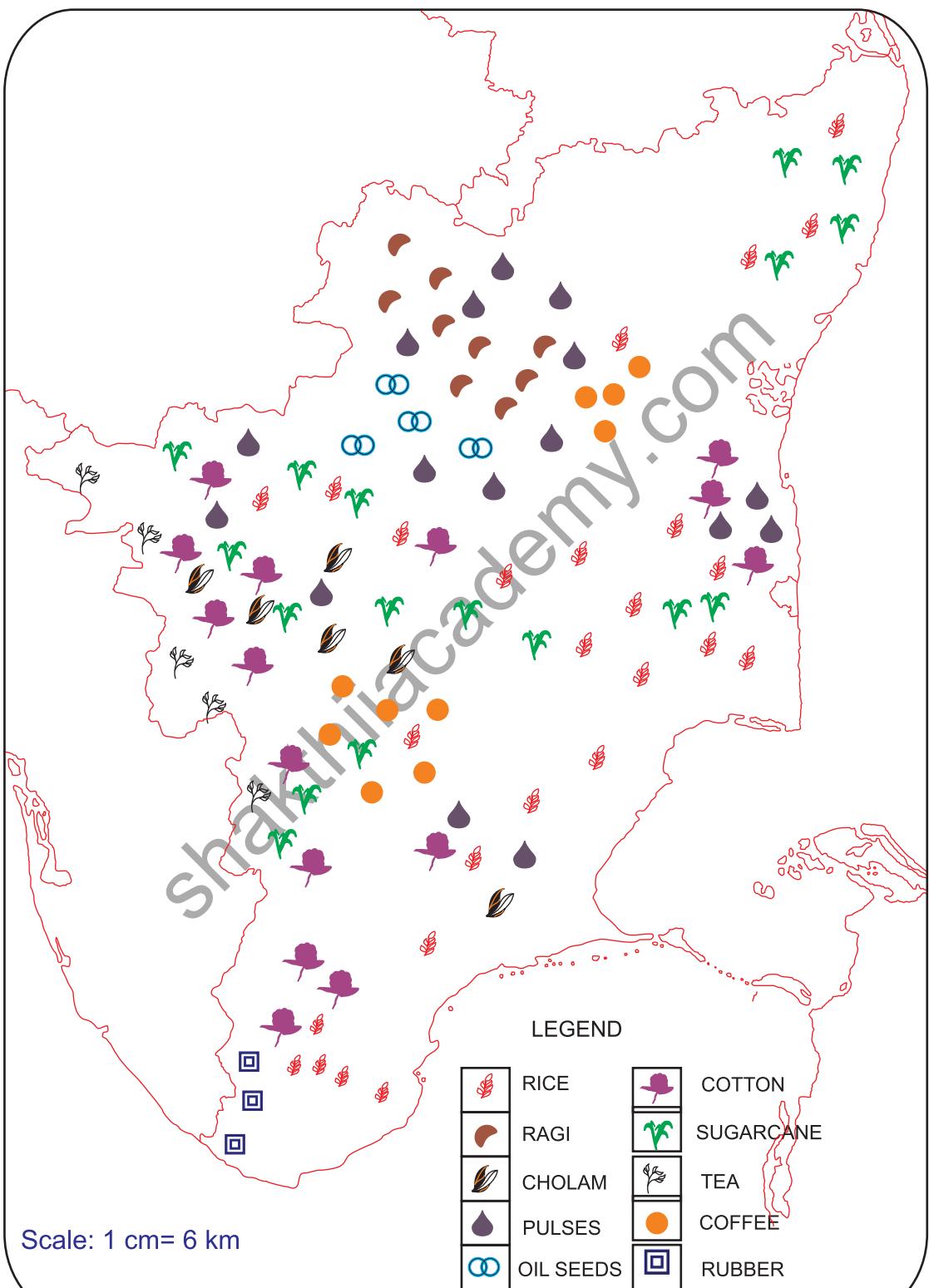
## TAMIL NADU SOURCES OF IRRIGATION

N  
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## TAMIL NADU MAJOR CROPS

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## Distribution of crops in Tamil Nadu

Each crop requires specific climatic conditions for its growth. Tamil Nadu lies entirely in the tropical zone and therefore almost all tropical crops are grown here.

### Food crops

Food crops include cereals, pulses, and millets. Among the food crops (cereals), paddy is the prime crop cultivated in all the districts of Tamil Nadu. Rice (Paddy) requires level land, high temperature and continuous supply of water for its growth. Ponni, and *Kichadi Samba*, are major varieties of paddy grown in Tamil Nadu. Jaya, IR 50 are high yielding varieties grown in Tamil Nadu. Among the districts. Thanjavur, Thiruvarur and Nagapattinam have maximum acreage as well as production of rice.

Thus Kaveri delta (especially the undivided Thanjavur district) is known

as the Granary of south India. Normally Paddy is grown in Thanjavur district in four seasons during one agricultural year.

### Activity

Find out the reason why rice can be grown in all three cropping seasons of Tamil Nadu whereas it is not possible in north India?

### Do you know?

Tamil Nadu Rice research institute is in Aduthurai. TNRH 174, developed by the Tamil Nadu Agriculture University's Tiruvur Rice Research Station (TRRS), has recorded the highest yield of 4,500 kg per acre.

Pulses that are grown in Tamil Nadu include bengal gram, red gram, green gram, black gram and horse gram.

Coimbatore leads in the production of Bengal gram, whereas Vellore and

Table: Millets of Tamil Nadu

Name of the millet	Leading districts
Cholam	Coimbatore, Dindigul and Thiruchirappalli
Cumbu	Villupuram and Thoothukudi
Ragi	Krishnagiri, Dharmapuri and Salem
Maize	Salem, Perambalur and Dindigul
Korra (thinai)	Salem and Namakkal

Table: Tamilnadu-Principal food crops – area and production 2007-2008 (in percentage)

Crops	Percentage of area	Percentage of Production
Paddy	57.8	76.6
Other food crops	22.6	20.6
Pulses	19.6	2.8
Total	100	100

Source: Department of Economics and Statistics, Chennai 6

Krishnagiri produce red gram. The districts of Thiruvarur, Nagapattinam and Toothuthukudi stand first in production of green gram. Nagapatinam, Thiruvarur and Cuddalore are noted for black gram production. Horse gram cultivation is widely seen in Krishnagiri and Dharmapuri districts.

### Activity

Find out the reason why pulses are grown after harvesting rice.

Millets are dry crops cultivated in areas having high temperature and less rainfall.

### Non-food crops

#### Fibre crops

Fibre crops include cotton and jute. Cotton thrives well in black soil and it is the major fibre crop of Tamil Nadu cultivated on large scale in the districts of Coimbatore, Thirunelveli Cuddalore and Villupuram. Mcu4, Mcu5, LRA5166 are the major varieties of cotton cultivated in the state.

### Commercial crops

Commercial crops include all those crops that are cultivated by the farmers to sell and not for their own consumption. Sugarcane, tobacco, oilseeds and spices like chillies, turmeric and coriander are examples of commercial crops.

Sugarcane is the dominant commercial crop cultivated in Tamil Nadu. It is a nine-month crop which requires fertile soil, high temperature, and stagnant water till the time of flowering. Coimbatore, Karur, Villupuram, Thiruvallur and Cuddalore district show predominance of this crop. Tobacco is yet another commercial crop of Tamil Nadu which is widely grown in Dindigul, Theni and

Madurai district. Groundnuts, sunflower, safflower (Kusumbavrai), castor and linseed are the major oilseeds cultivated in Tamil Nadu.

### Plantation crops

Tea, coffee, rubber, pepper and cashew are the main plantation crops of Tamil Nadu. Tamil Nadu ranks second in area and production of tea next to Assam. Tea estates are seen to be concentrated on the hill slopes of the Nilgris and Coimbatore districts. Tamil Nadu stands second in area and production of coffee next to Karnataka. Coffee is grown in the Western Ghats as well as Eastern Ghats. Hill slopes of the Nilgiris, Theni, Madurai and Salem are the major regions of coffee cultivation. Andipatti, Sirumalai and Shervaroy hills also grow coffee. Rubber is grown in Kanyakumari district. Pepper is confined to the warm and wet slopes of Kanyakumari and Thirunelveli district of Tamil Nadu. Cashew are extensively cultivated in Cuddalore district.

### Horticulture

Cultivating fruits and vegetables on large scale is a recent trend in Tamil Nadu. Fruits like mangoes, jackfruits, banana, guava and grapes are widely grown in groves. Krishnagiri leads in mango production, Coimbatore and Erode are known for banana production and Theni for grapes. Dharmapuri leads the other districts in acreage for horticulture. It also specializes in floriculture.

### Animal husbandry

Rearing animals for the production of milk, meat and hide is known as Animal husbandry. Tamil Nadu Cooperative Milk Producers' Federation (Aavin) produces milk and

dairy products for the state. The federation handles 26.1 million litres of milk per day, processes and supplies milk for the whole state through 7,662 societies. The milk production was 55.86 million tons during 2007-08. Per capita milk consumption is 233g/day.

The poultry hub of Tamil Nadu is Namakkal, Erode, Coimbatore and Salem. Tamil Nadu produced 8394 million eggs during the year 2007–08. Per capita availability is 128 eggs/year.

### Fisheries

Tamil Nadu ranks fourth in fishing among the states of India. Long coastline of 1,076km the broad continental shelf favour coastal fishing in Tamil Nadu.



Inland fishing

The coastline has 591 fishing villages which are spread over thirteen districts of the state. Pearl fishing is predominant in Gulf of Mannar region. Thuthukudi is the leading port in fish export. Two more major fishing harbours are Chennai, and Chinnamutthom in Kanyakumari district and four minor harbours are at Pazhayar, Valinokkam, Colachael and Nagapattinam. Thiruvarur, Nagapattinam, Thanjavur and Ramanathapuram districts together contribute 40 % of marine fish

MARINE FISHING	INLAND FISHING
Fishing carried out in the Oceans and Seas.	Fishing carried out in Lakes, rivers, Ponds, estuaries, backwaters and swamps.
Large Mechanized boats are used for fish catching.	Catamaran (small wooden boats) Diesel Boats and floating net cages are used.
Fish varieties are Sharks, Flying Fish, Caunch, Cat, Fish, Silver bellies and Carbs	Fish varieties are Catla, Rogue, mirkal, eel and calabaashu

production in the state.

The estimated marine fish production for the year 2007-08 was 393,266 tonnes (Source: Commissioner of fisheries, Chennai-6).

The state has 370 hectares of inland water, 63,000 hectares of estuaries, backwaters and swamps. Oysters and prawns are cultured in organized nurseries at Ennore and Pulicat lake for export. The estimated inland fish production for the year 2007–08 was 164,504 tonnes. Vellore district ranks first among the districts with 10 % of inland fish production of the state. Cuddalore, Sivagangai and Virudhunagar stands second with 9 % of inland fish catch.

Tamil Nadu Fisheries Department has introduced several programmes for the betterment of fishing.

- 1) Aqua culture in farm ponds and irrigation tanks.
- 2) Fish seed bank
- 3) Fish seed rearing in cages
- 4) Ornamental fish culture and

5) Fish Farmers Development Agency at Karaikal encourages farmers with a slogan “to grow fish and grow with fish”.

### Agricultural Development

Before Independence, agriculture in Tamil Nadu followed traditional method of cultivation. After Independence, there has been a steady development in all aspects of agriculture. Irrigation facilities were improved with the proper implementation of Five Year Plans in the state. Green revolution in terms of hybrid varieties and application of chemical fertilizers increased the production to a greater extent. Abolition of zamindari system, land tenuring, consolidation of farms, introduction of the land ceiling act and co-operative farming were the new agricultural reforms introduced after Independence. Recently, globalization has influenced the agricultural production positively in Tamil Nadu.

### Changing trends in agriculture

The traditional methods of agriculture is slowly being replaced by scientific and technical methods. As a result of this the merits of the traditional methods have vanished.

The Agriculture University in Coimbatore and the M.S. Swaminathan Research foundation are trying to fuse the traditional with the modern methods so as obtain maximum produce in the long run.

Some of the measures adopted are

- Micro-irrigation
- Integrated pest control management (IPM)
- Growing blue Algae and Azolla
- Precision farming through Remote sensing, Geographical Information system and Global positioning system.

### Do you know?

Increase in organic matter will increase the water holding capacity of the soil. This will support the microbial activity and hasten the nutrient absorption capacity of roots.

### Efforts Taken by Government to Improve Agriculture

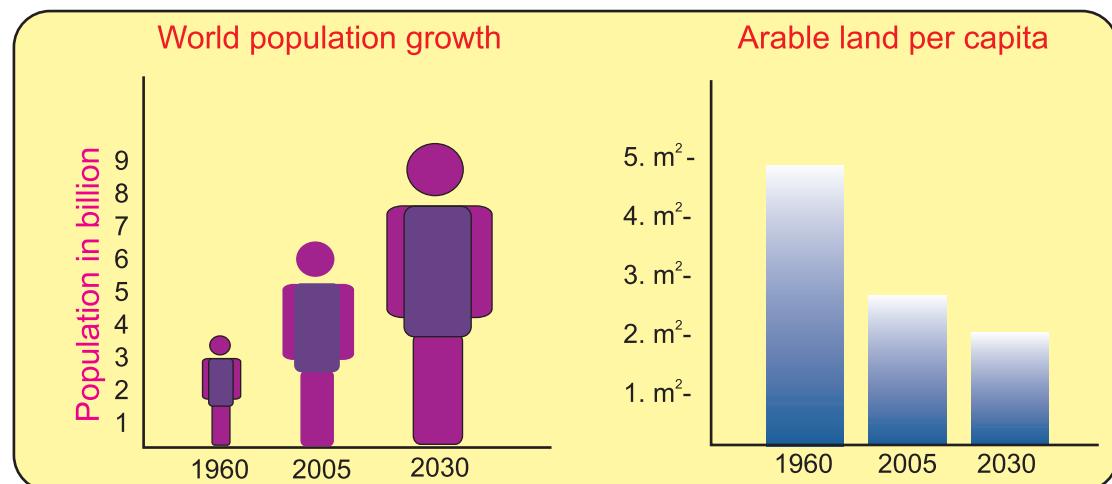
- The Government supplies quality and certified seeds to the farmers.
- Organic matter and micro nutrients are supplied at subsidised rate.
- Free electricity is provided to small and marginal farmers for about 6 to 8 hours a day.
- Government fixes the prices for agricultural products to safeguard farmers from financial crisis.
- Farmers' Market (*uzhavar santhai*) enhances the farmers ability to get better share of prices and at the same time consumers to get agricultural produce at affordable prices.
- Crop insurance scheme has been introduced.
- Government has set up Agricultural Export Zones in Nilgiris and Krishnagiri.

### Activity

Look at the picture given below and compare the size of arable land and growing population given and discuss with your friends about:

- Why should we retain arable land?(cultivable land)
- How could we retain arable land?
- What will happen to food security if we do not maintain the balance between food production and Population increase?

◎Conduct a painting competition to express your views regarding this issue.



## EXERCISE

### I) Choose the correct answer.

1. Tea, coffee, rubber, pepper and cashew are \_\_\_\_\_ crops.  
a) Food      b) Fibre      c) Plantation      d) non-food
2. Agriculture is the \_\_\_\_\_ and traditional occupation  
a) Primary      b) Secondary      c) Tertiary      d) service
3. \_\_\_\_\_ type of farming is known as *Maanaavari* in Tamil Nadu  
a) wet farming      b) dry farming  
c) Irrigation farming      d) precision farming
4. \_\_\_\_\_ type of irrigation is most predominant irrigation system in Tamil Nadu  
a) Well      b) Tank      c) Canal      d) Tube well
5. Tamil Nadu Rice Research institute is in  
a) Aduthurai      b) Cuddalore      c) Neyveli      d) Chennai

### II) Match the following.

- |                         |                             |
|-------------------------|-----------------------------|
| 1. Rearing of birds     | Apiculture                  |
| 2. Rearing of silkworms | Poultry                     |
| 3. Rearing of honeybees | Leading port in fish export |
| 4. Growing fruits       | Sericulture                 |
| 5. Thuthukudi           | Horticulture                |
|                         | Animal Husbandry            |
|                         | Viticulture                 |

**III) Answer in brief.**

1. What do you mean by subsistence intensive farming?
2. Write short notes on: a) mixed farming b) Plantation farming and c) market gardening.
3. Name the factors influencing agriculture.
4. Bring out the significance of Kallanai in Tamil Nadu.
5. Distinguish between wet farming and dry farming.
6. Distinguish between marine fishing and deep sea fishing.

**IV) Answer in a paragraph.**

1. Describe the cropping seasons of Tamil Nadu.
2. Write a paragraph about Inland fishing.
3. Write about the changing trends in agriculture in Tamil Nadu.
4. Mention the efforts taken by the government in improving agriculture in the state.

**V) Mark the following on a given map of Tamil Nadu.**

1. Granary of South India.
2. A region for cotton cultivation.
3. A region for growing tea.
4. A region for Cashew cultivation.
5. A region for sugarcane cultivation.

## FORMATIVE ASSESSMENT

### I. Group Activity

Prepare a chart and make models of the different types of agriculture practices discussed in the lesson. State the advantages and disadvantages of each.

### II. Reasoning skills

1. Compare and contrast the traditional and modern methods of cultivation of any one of crop grown in Tamil Nadu.
2. Find out the methods of irrigation used by the farmers in Tamil Nadu.

### III. Map Skill

Mark the following in Tamil Nadu map with suitable colour and symbols.

1. District that cultivates paddy on all the three agricultural seasons .
2. Region that has artesian basin
3. Region famous for Poultry
4. Major and minor fishing Ports
5. District that grows rubber

# GEOGRAPHY

## 1. TAMIL NADU - MANUFACTURING INDUSTRIES

Industry refers to the secondary type of occupation. It is the booming sector of Tamil Nadu. Tamil Nadu is ranked as third industrial state next to Maharashtra and Gujarat. The act of converting the raw materials into finished and usable products is known as **Manufacturing**. A single manufacturing unit is termed as a **Factory**. Multiple units of same kind, which are spread over a larger area are termed as an **Industry**. Lakshmi Mills and Madura Coats are example of industrial units. About 34% of the state's income comes from the industrial sector.

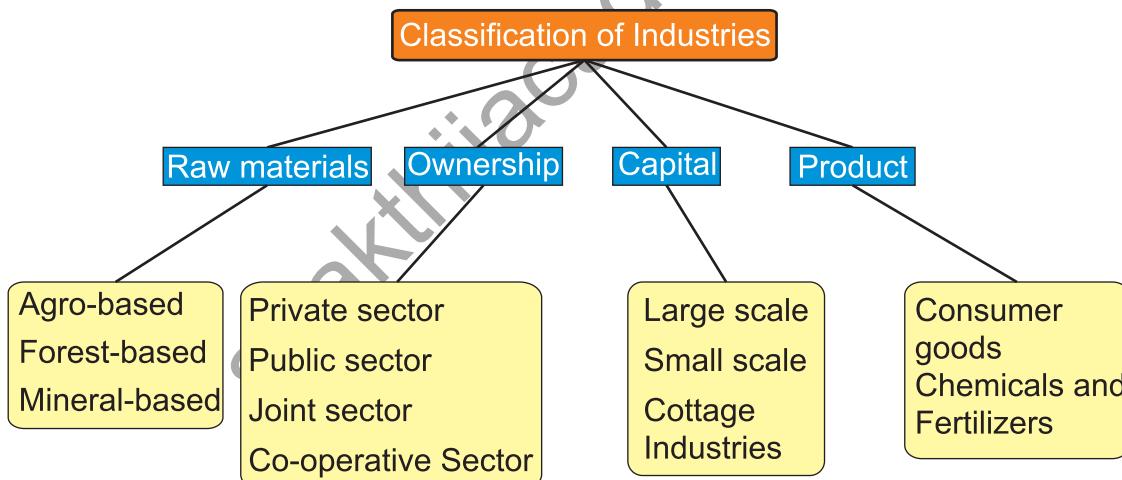
### Activity

List the manufactured items you see in the classroom. For each item, try to find the raw materials used and try to classify and group the industries, accordingly (Blackboard, desk, chair, watch....)

### Classification of Industries

Industries can be classified on the basis of:

- a) Raw materials.
- b) Ownership.
- c) Capital involved and
- d) Product.



### Classification on industries based on raw materials

An industry that uses agricultural products for manufacturing is termed as **Agro-based industry**. Cotton textiles, sugar industry and food processing industries are **Agro-based industries**.

An industry that uses forest products as raw materials are known as **Forest-**

**based industry.** Example: Paper and Pulp industry, Honey and Sandalwood product.

Industries using minerals for production are called as **Mineral-based industry**. Iron and steel industry, ceramics industry and cement industry are some of the mineral-based industries.

## Classification of industries based on ownership

A **Private industry** is one which is owned by an individual or a group of people. TVS Motors is one of the notable private industries of Tamil Nadu.

All Government-owned industries come under the **Public sector**. Tamil Nadu Newsprint Paper Limited (TNPL) is state owned public sector industry.

**Co-operative sector** is one which is owned by a group of co-operative members who supply the raw materials for that industry. Most of the sugar factories in Tamil Nadu are in the co-operative sector.

When an industry is functioning under the partnership of two organizations it is said to be **Joint sector**. The nuclear power station at Kudangulam near Thirunelveli is a joint sector between Tamil Nadu Government and the Russian Government.

## Classification of industries based on investment

The industry which has huge investment in terms of capital and infrastructure, along with huge labour and production are known as **large scale industries**. Iron and steel industry is an example for a large scale industry. A **medium-scale industry** is one that runs with investment of Rs.10 million (1-crore) to Rs.100 million (10-crore). A **small-scale industry** has been defined as the unit that has investment up to Rs.10 million (1-crore).

Small scale industrial units are those which are engaged in the manufacturing, processing or preservation of goods. Goods such as clothes, toys, furnitures, edible oils and

leather goods are produced by small scale industries.

A **Cottage industry** is one wherein very little investment is involved. The family as a whole works without any paid labourers. Locally available raw materials are used to produce the handicrafts. Volume of production and cost of production are low. Mats from grasses, (**Pattamadai mat**) toys from wood, Palm leaf containers are unique examples of goods from cottage industries of Tamil Nadu.

## Classification of industries based on products

**Consumer goods** are those goods, which reach the consumers straight from the production unit. All perishable goods like food products and dairy products are examples of consumer goods.

**Intermediate goods** are products that are produced by another manufacturer. For instance, fabrics produced from cotton is an intermediate good, the clothing made from the fabric is a consumer good.

**Basic goods** are those goods which are produced on a large scale both for export and local consumption. For example : Iron and steel industry, chemicals and textiles.

## Factors determining the location of Industries in Tamil Nadu

Location of industries in a particular place normally has many reasons for its localization. These reasons are the factors influencing the location of industries and are listed below:

- Raw materials                      • Transport and
- Energy                              • Market
- Capital                              • Labour

### Activity

Name a major industry in your area? List the reasons for its location.

Natural resources like water, minerals and energy resources determine the location of a industry. Textile industry, leather industry, and paper industry require large quantities of water and so are located close to water sources. Industries like the cement industry, ceramic industry, and petro-chemical industry are located very near to the source of the raw materials. Aluminum industry highly rely on electricity and are located near the power stations or places with adequate supply of energy.

### Distribution of Major industries in Tamil Nadu

The Major industries of Tamil Nadu are Textile industries, Sugar industries, Paper industries, Leather industries, Cement industries, Electrical equipments, Automobiles, Information Technology, Tourism industry and so on.

### Textile industry of Tamil Nadu

Tamil Nadu plays a major role in the India textile industry in terms of production and export of yarn, fabrics, knitwear and garments. Tamil Nadu contributes nearly 25% of India's share in the export of cotton, yarns and fabric. Tropical climate, availability of raw materials, demand for cotton in market, power supply from numerous power projects and abundant cheap labour are favorable factors for widespread distribution of textile industries in Tamil Nadu.

Coimbatore, Pollachi, Udumalapettai, Thiruppur, Karamadai, Erode, Bhavani, Dindigul,

Thirumangalam, Madurai, Palayamkottai, Papanasam and Theni are important centres for textile industry. Maximum units are concentrated in and around Coimbatore region. It is for this reason that it is known as '**the Manchester of South India**'.

Districts of Coimbatore, Thiruppur and Erode contribute much for the state's economy; therefore, they are referred to as '**Textile Valley of Tamil Nadu**'. Thiruppur alone contributes 70% of export of knitwear of Tamil Nadu. Erode specializes in garments and bedspreads. The city of Karur is known as the **Textile Capital of Tamil Nadu**.

### Silk Textiles

Tamil Nadu occupies the fourth place in silk textile production in our country. Kancheepuram silk is unique in its quality and is known for its traditional value all over the world. Arani, Rasipuram and Thirubuvanam are other silk centres of Tamil Nadu. Sericulture Training Institute in Hosur trains farmers to adopt sericulture along with farm work to accelerate rural industrialisation. Mettur, Madurai, and Ramanathapuram are specialized areas for manufacturing synthetic clothes.

### Sugar Industry

Tamil Nadu produces about 10% of total sugar in India. Suitable climate and soil, for high yielding varieties, continuous irrigation facility, good transport, marketing facility and regularized co-operative sector are favourable factors for the widespread sugar mills in the state. A majority of sugar units in Tamil Nadu are functioning under the co-operative sector. At present Tamil Nadu has 42

Sugar Mills, out of which 16 are under the co-operative sector, 3 owned by public sector and 23 as private mills.

Sugar factories are concentrated in Villupuram, Cuddalore, Vellore, Erode, Coimbatore, Thiruvannamalai, Thiruchirappalli, Thanjavur and Madurai districts. Jaggery, kandasari, and sugar are products from the sugar industry. The by-product bagasse (the crushed stem of sugarcane after extracting juice) is used as a raw material for paper industry. Tamil Nadu government has set up new integrated sugar complexes with different options of co-ethanol production, tissue culture lab, soil testing lab, fuel energy and bio-composting. Names of such units are given in the table.

cooking are manufactured and marketed locally as well as exported. Snacks items and biscuits are marketed on a large scale. Tamil Nadu with its long coastline offers opportunities for industries based on marine products.

### Paper industry

Tamil Nadu stands second next to Andhra Pradesh in paper production in our country. The state produces about 12% of the paper in our country. Bamboo, grass, and Bagasse from sugarcane are raw materials for paper industry. Soda, soda ash, chlorine, sulphur, woodpulp, and plenty of water are other requirements for setting up of paper industries.

**Table: Distribution of integrated sugar complexes**

Name of Mills	Taluk	District
Kothari-Sathamangalam	Ariyalur	Ariyalur
Rajshree- Semmedu	Gingee Sankarapuram	Villupuram
Dharani- Kalaianallur		
Sakthi-Modakurichi	Erode	Erode
Empee Sugars-Idaikal	Ambasamudram	Thirunelveli
Shree Ambika-Manjini	Attur	Salem
Dhanalakshmi Srinivasan-Udumbiyam	Veppanthattai	Perambalur
Bannariamman- Kolunthampattu	Thandarampattu	Thiruvannamalai

### Activity

Find out the location of integrated sugar mills of the state, in your area and mark it in a map.

Pukkathurai in Kancheepuram district, Bhavaniagar, Pallipalyam, Pugalur, Paramathi, Vellore, Coimbatore, Uduvaliapettai, Thoppampatti, Nillakkottai, and Cheranmadevi are centres of paper mills in Tamil Nadu.

### Food and Beverage Industry

Food and Beverage based industry flourish well in Tamil Nadu. Mango pulp is processed and exported. Instant food varieties and ingredients for

Tamil Nadu Newsprint and Paper Limited (TNPL) was set up with aid of World Bank in 1979 in Kakithapuram near Pugalur in Karur district. It is the

largest producer of Bagasse based paper in the world with the annual consumption of bagasse terms 1 million tonnes per annum. It caters to the need of newsprint papers throughout Tamil Nadu. IT produces 600 tonnes of newsprint paper per day. Other than newsprint, papers for telephone directory, computers, offset printing papers, copier machines are also produced and marketed by the TNPL.

### Leather industry

Tamil Nadu accounts for 70% of national tanning factories and 60% export of India. Leather industry occupies an important place because of its wide dispersal, sizeable employment and export potential. Leather industry depends on cattle wealth. It is concerned with the treatment of raw pelt of animals to make them suitable for the manufacture of various articles.

#### Do you know?

The pelt of large animals and cattle are known as 'hide' and those of smaller ones like sheep and goats are called 'skin'.

**Tanning** is a process of making leather, from the skins of animals, with the use of tannin, an acidic chemical compound. Tanning makes the skin become flexible, less water-soluble and more resistant to bacterial attack. Tannery is the term given to place where these skins are processed.

If tanning is done with vegetative matter, it is known as vegetable tanning process. Vegetable tanned hide is flexible and is used for making furniture. If tanning is done with chemicals like chromium and fatty matter, it is known as mineral tanning process or wet blur process. Chrome

tanning is faster than vegetable tanning and its produces stretchable leather which is excellent material for marking handbags and garments.



**Tanning**

Chennai, Vellore, Kancheepuram, Thiruvallur, Thiruchirapalli, Dindigul and Madurai districts have widespread centres for leather industry. Chennai, Vellore, Ambur, Ranipet, Veniyambadi, Dindigul and Thiruchirappalli are the main centers of leather industry.

### Activity

List other leather products.

### Cement industry

Tamil Nadu stands fourth in cement production. It accounts for 10% of the country's cement production. Tamil Nadu Cements Corporation Limited (TANCEM) is wholly owned by the Government of Tamil Nadu and manufactures Ordinary Portland Cement (OPC) and Super Star Cement exceeding the requirements prescribed under the Indian standards.



**Tancem-Ariyalur**

### Activity

Name few brands of cement produced in Tamil Nadu like Chettinad cement, Dalmia cement.

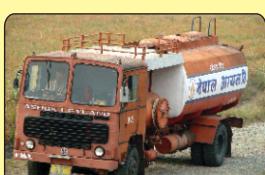
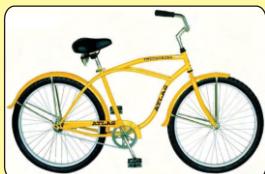
The new materials required for cement production are limestone, dolomite, gypsum, clay and coal. All of these are mined in Tamil Nadu. Major centres of cement industry are Sankari, Madukarai, Puliyur, Kunnam, Sendurai, Ariyalur, Dalmiapuram, Manamadurai, Thulukapatti, Allankulam, Sankarnagar and Thazhaiyuthu.

### Automobile industry

Tamil Nadu earns 8% of its GDP from automobile industry. This industry contributes for about 21% of passenger and cars, 33% of commercial vehicles produced in India. Chennai city is the base for 30% of India's automobile industry and 35% of its auto components. This industrial supremacy has resulted in Chennai being known as the “Detroit of Southern Asia”.

#### Activity

Find out the model of the vehicles and name the manufacturer of the vehicle.



#### Major global automobile companies

BMW, Ford, Renault-Nissan, Caterpillar, Hyundai, Mitsubishi Motors, and Michelin.

#### National automobile companies

Ashok Leyland, Bajaj, Hindustan Motors, TVS Motors, Royal Enfield, MRF, Apollo Tyres and Hero Honda, TAFE Tractors, Mahendra Tractors, Atlas bicycle, Hero bicycle.

### Chemical industry

Chemical industry includes, production of chemicals, drugs, fertilizers, petrochemicals, soaps, detergents, cosmetics, medicines, synthetic rubber and plastics. Most of

the chemical industries are clustered around Chennai (Manali), Cuddalore, Pananagudi (Nagapattinam) and Thuthukudi. The notable chemical industries of Tamil Nadu are SPIC (Southern Petrochemical Industries

Corporation Ltd) and Manali Petrochemicals Limited. SPIC is the largest producer of fertilizers in India and covers 12 states and caters to the customers through 4,000 outlets. It produces around 2 million tons of fertilizers annually.

Pfizer pharmaceutical company and Dow Chemicals are important chemical units which have research and development facility in Chennai.

### **Electrical and Electronics Industry**

Electronics is a growing industry in Tamil Nadu. Many major global telecommunications like the Nokia, Flextronics, Motorola, Sony-Ericsson, Foxcon, Samsung, Cisco, Moser Baer and Dell have chosen Chennai as their South Asian manufacturing hub. Products manufactured include circuit boards and cellular phone handsets.

Bharat Heavy Electricals Limited located at Thiruchirppalli is one among the six large units of India. It produces boilers generators and turbines used in the production of hydro-electricity.

### **Software Industry Infosys' campus at Mahindra World City near Chennai**

Tamil Nadu is the second largest software exporter (by value) in India. It has the leading BPO sector in the country next to Karnataka. Major national and global IT Companies



Infosys-Chennai

such as Verizon, Hewlett-Packard, IBM, Accenture, Ramco Systems, Computer Sciences Corporation, Cognizant Technology Solutions, Tata Consultancy Services, Infosys, Wipro, HCL, Tech Mahindra, Polaris, Aricent, Mphasis Acme Technology Pvt Ltd., Covansys, Ford Information Technology, Xansa, iSoft, iNautix, Electronic Data Systems, Bally and many others have established their branches in Chennai.

India's largest IT Park is in Chennai, jointly constructed and maintained by Ascendas India Ltd, a Singapore-based company engaged in providing business space solutions, with Tamil Nadu Industrial Development Corporation.(TIDCO).

### **Other notable industries of Tamil Nadu**

**Perambur Integral Coach Factory (ICF)** is the largest in Asia to produce railway coaches in Tamil Nadu. “Armoured Vehicles and Ammunition Depot of India” (**Avadi**) is about 23km northwest of Chennai. The Heavy Vehicles Factory produces battle tanks. Salem Steel Plant is a Public Sector company undertaken by the Government of India. Sivakasi is a big industrial centre in Virudhunagar district. It is world famous for its fireworks and safety match boxes. Sivakasi produces 90% of India's fireworks. It is also known for offset printing. Sivakasi is known as '**Little Japan**'. Neyveli, apart from the production of thermal power, has a fertilizer unit and a ceramic unit attached to it. Thanjavur and Kumbakonam are specialized in the production of bronze statues and musical instruments.

"Tamil Nadu is the first State in the country to develop a well-defined Biotechnology Policy and to set up an All Women Biotechnology Park.

Chennai is second to Mumbai for its vibrant and innovative film industry.

### Tourism industry

Tourism is considered as an industry because of its enormous potential in creating employment for a large number of people and for its substantial foreign exchange. Tamil Nadu's tourism industry is the second largest in India, with an annual growth rate of 16%. Presence of ancient monuments, pilgrim centres, hill stations, a variety of natural landscapes, long coastline, along with rich culture and heritage makes Tamil Nadu the best destination for tour lovers.



Recent attraction for Tourism

Tourism in Tamil Nadu is promoted by Tamil Nadu Tourism Development Corporation (TTDC), a Government of Tamil Nadu undertaking. Health/Medical tourism which is part of tourism industry is hosted by the leading health care centres in Chennai.

### Do you know?

State Industries Promotion Corporation of Tamil Nadu (SIPCOT) Limited, a fully government owned

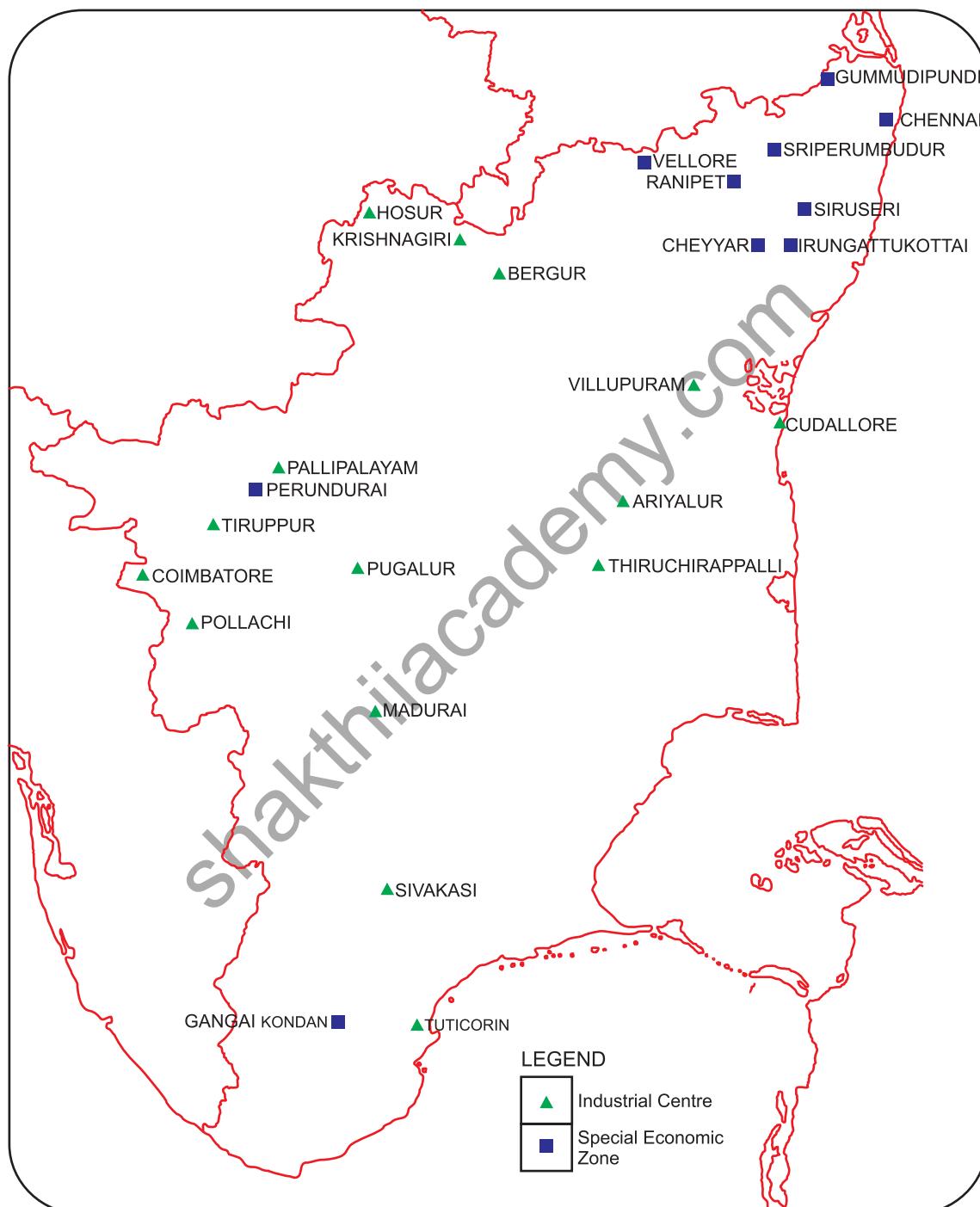
premier institution, established in the year 1972, has been a catalyst in the development of small, medium and large scale industries in Tamil Nadu.



In order to promote an industrial base for export, the state government has setup special regions as Special Economic Zones (SEZ). These regions have ample facilities for manufacturing. They are capable of attracting foreign investor, and aim at promoting trade at the international level. Tamil Nadu has set up SEZ in the following places: Srirupurudur Industrial Park, Irungattukottai Footwear SEZ and Oragadam Industrial Growth Centre in Kancheepuram district, Ranipet Leather Sector SEZ, Perundurai Engineering products SEZ, Cheyyar Automobile/Auto Ancillary SEZ, and Gangaikondan Transport Engineering Goods SEZ.

**TAMIL NADU  
MAJOR INDUSTRIAL CENTRES AND SPECIAL ECONOMIC ZONES**

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## EXERCISE

**I) Choose the correct answer.**

1. Tamil Nadu Newsprint Paper Limited (TNPL) is \_\_\_\_\_ Industry in Tamil Nadu.  
a) joint sector b) private sector c) public sector d) Co-operative sector
2. The by-product Bagasse is used as a raw material for \_\_\_\_\_ industry.  
a) sugar b) paper c) chemical d) Automobile industries.
3. SPIC is the largest producer of \_\_\_\_\_ in India.  
a) chemicals b) fertilizers c) petrol d) Fisheries
4. \_\_\_\_\_ is one wherein very little investment is involved.  
a) Large industry b) small-scale industry c) Cottage industry  
d) Medium Scale industries
5. \_\_\_\_\_ silk is unique in its quality and is known for its traditional value all over the world.  
a) Kancheepuram b) Arani c) Salem d) Thirubuvanam

**II) Match the following.**

- |               |  |
|---------------|--|
| 1. Chennai    | The Manchester of south India  |
| 2. Sivakasi   | Detroit of Southern Asia   |
| 3. Perambur   | Textile Capital of Tamil Nadu  |
| 4. Karur      | Little Japan   |
| 5. Coimbatore | Integral Coach Factory<br>Chemical Industries<br>Special Economic Zone |

**III) Answer in brief.**

1. How are industries classified?
2. What are the factors determining the location of Industries in Tamil Nadu?
3. Name the products and by-products of sugar industry?
4. List down the raw materials for paper industry?
5. What do you mean by consumer goods?
6. Write a short note on Cottage industry.
7. Give reasons for the widespread distribution of textile industry in Tamil Nadu.

8. Distinguish between Factory and Industry.
9. Distinguish between agro-based industry and mineral based Industry.
10. Distinguish between vegetable tanning and mineral tanning.

**IV) Answer in a paragraph.**

1. What do you understand by Classification of industries based on ownership?
2. Give an account for the distribution of Textile industry in Tamil Nadu.
3. Write about the paper industry in Tamil Nadu.
4. Write a note on the Sugar industry in Tamil Nadu.

**V) Mark the following places on a given map of Tamil Nadu.**

1. All centres of special Economic Zone in Tamil Nadu.
2. Mark one centres for each of the following.
  - Textiles industry
  - Sugar industry
  - Iron industry
  - Cement industry

**FORMATIVE ASSESSMENT**

1. Collect and paste pictures of the various products made by the industries of Tamil Nadu.
2. Prepare a travel brochure to increase the Tourism industry in Tamil Nadu.
3. Collect samples of the various types of paper made by TNPL and stick it in your scrap book.
4. Visit any industry in your locality and find our details like what it produces, reasons for its location, how many workers, any exports etc.

## 2. TAMIL NADU TRANSPORT AND COMMUNICATIONS

Transport and Communications play a vital role in the economic development of Tamil Nadu. Transport system helps with the easy movement of human beings and materials. It acts as the arteries and veins of national development. The transport system is of four types. **Roadways, Railways, Waterways and Airways.**

### **Roadways**

Of all the States of India, Tamil Nadu has a sound network of roads. All economic sectors of the State is interconnected and interlinked by roadways. The State Transport Corporations operate the public transport system along with private transport organizations. Compared to other States of India, Tamil Nadu State Transport Corporations operate bus services in a fullfledged, facilitating manner. Roadways may be classified into four types. They are:

- National Highways;
- State Highways;
- District roads; and
- Village Roads.

There are 24 National Highways covering a total distance of 4,500km. Golden Quadrilateral Project. To meet the ever increasing demand from public, there are seven transport corporations functioning in the State. They are given below with their area of operation:

1. Metropolitan Transport Corporation-Chennai and sub urban areas-Chennai as head quarters.

2. Tamil Nadu State Transport Corporation-Villupuram (Cuddalore, Vellore, Tiruvannamalai, Kanchipuram, and Tiruvallur districts with Villupuram as head quarters).

3. Tamil Nadu State Transport Corporation-Kumbakonnam (Thanjavur, Thiruvarur, Nagapattinam, Karaikal (Pudhucherry) Thiruchiapalli, Karur, Perambalur, Sivagangai, Ramnad and Pudukkottai districts with Kumbakonam as head quarters).

4. Tamil Nadu State Transport Corporation-Salem (Salem, Dharmapuri, Namakkal and Krishnagiri districts with Salem as head quarters).

5. Tamil Nadu State Transport Corporation-Coimbatore (Coimbatore, Tirupur, Erode and the Nilgiris districts with Coimbatore as head quarters).

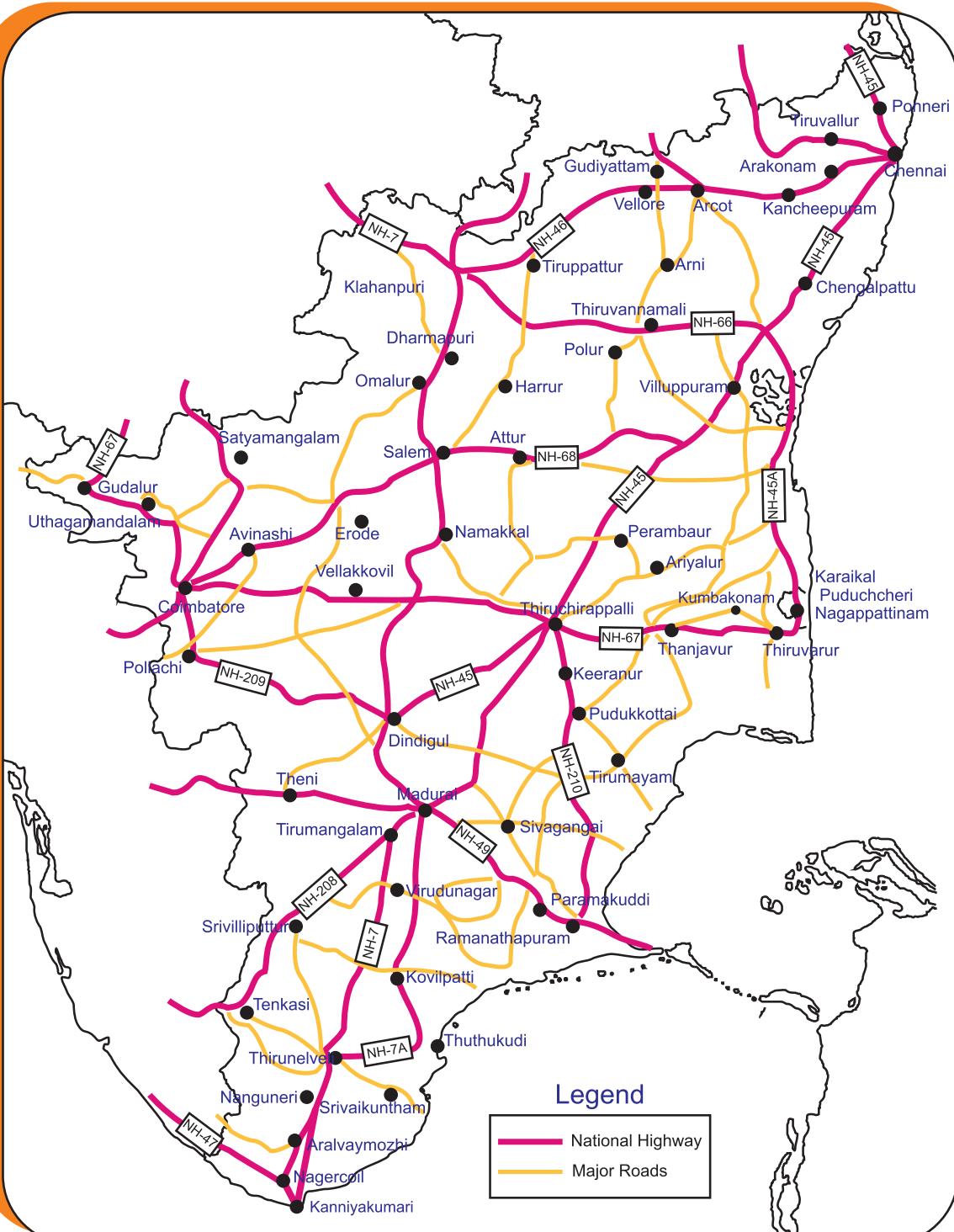
6. Tamil Nadu State Transport Corporation-Madurai (Maduri, Viridhunagar, Dindigul and Theni districts with Madurai as head quarters).

7. Tamil Nadu State Transport Corporation-Thirunelveli (Thirunelveli, Thuthukudi, Kanyakumari districts with Thirunelveli as head quarters).

**Table: Length of roads in km**

<b>Length of roads</b>	<b>(in km.)</b>
1) National Highways	4,500
2) State Highways	5,525
3) Corporation and Municipalities	17,161
4) Town Panchayat Roads	15,591
5) Village Panchayat Roads	63,538
6) Panchayat Union roads	32,791
7) Forest Roads	3,930

## Tamil Nadu Roadways



Apart from these the State has vehicular transport in the form of two and three wheeler vehicles which constitute about 83.9%. The number of registered vehicle population in Tamil Nadu had increased to 10.064 million in 2007-08. There are 64 vehicular zones in the States. Among the Regional Transport Offices, Chennai is the largest one which has – 61 centres.

### Activity

Answer the following on the road map of Tamil Nadu.

1. Find the districts through which NH 45 runs.
2. NH 208 passes through \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_ centres.
3. Name two districts through which NH 68 runs.
4. Which NH goes through your native district?

### Recent Developments in Road Transport

- Conversion of single lane of State Highways into double lane and multilane.
- The widening and improvement of road from Madhyakailash in Adyar to Siruseri on Old Mahabalipuram Road (OMR) for about 2 km was laid. This is referred to as IT Expressway and it serves as connectivity to all IT companies.
- The East Coast Road (ECR) that is built along the coast of the Bay of Bengal connects Chennai and Cuddalore via Pondicherry. It gives rise to spectacular scenic views with beaches and fishermen hamlets. Presently, the East Coast Road has been extended to Thoothukudi via Chidambaram, Nagapattinam and Ramanathapuram.

- The Golden Quadrilateral Project of the National Highway Development that runs for about 1,232 km in Tamil Nadu has been completed.

- Most of the mofussil traffic had been diverted on to the bypass roads to avoid traffic congestion.

- CMBT (Chennai Mofussil Bus Terminus), which is the largest modern bus terminus in Asia, Koyambedu, Chennai has been established.

- Bridges and flyovers have been constructed in many districts of Tamil Nadu along the National Highways. Some of the notable ones may be found in Chennai City-Chennai Airport Flyover, Perambur Flyover, Anna Flyover and Kathipara junction Flyover. In Vellore, Thindivanam and Ulundurpet to flyovers have been construction to ease vehicular traffic congestion.

- Ring roads that encircle urban areas to divert vehicular traffic to avoid traffic passing through the centre have been implemented.

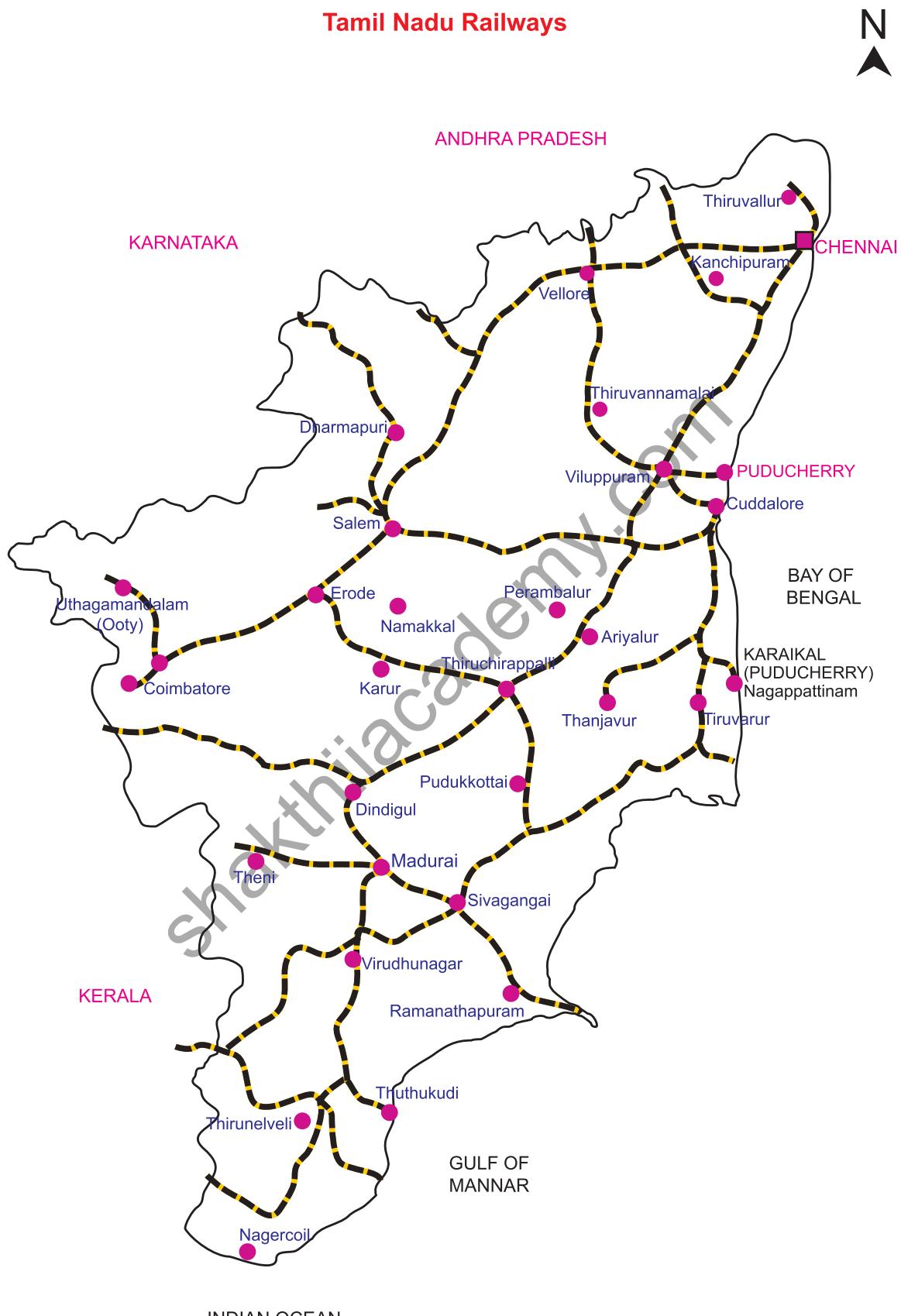
- SETC operates a variety of buses, namely, semi-deluxe, super-deluxe, video coach, ultra-deluxe, Volvo and air suspension buses within Tamil Nadu and adjacent States.

### Railways

Tamil Nadu is well served with a good network of railways as part of the southern Railways with headquarters at Chennai. Rail tracks are classified into:

- ▶ Broad gauge;
- ▶ Metre gauge;
- ▶ Narrow gauge; and
- ▶ Suburban Railway.

In Tamil Nadu the total length of railway tracks is about 5,952 km and total number of railway stations is 532



to connect all the major cities of Tamil Nadu. The Southern Railways zones have been demarcated into six divisions, namely, Chennai, Madurai, Salem, Palakkad, Thiruvananthapuram and Thiruchiappalli. Main rail junctions in the State are:

Chennai, Erode, Coimbatore, Thirunelveli, Madurai, Thiruchirappalli and Salem.

Chennai has a well established suburban railway network, with three different lines connecting Chennai with Arakonam and Chengalpattu, MRTS Railway line connects Chennai Beach to Velachery.



**Chennai Sub Urban Railway**

### Activity

Here, names of a few express trains are given. Find out the places connected by these trains. Find out whether they are weekly or daily trains.

1. From Chennai Central or Chennai Egmore Station to your native place.
2. Tamil Nadu Express.
3. Chennai-vijayawada Jan Sathabdi Express.
4. Chennai-Hubli Express.
5. Chennai-Howrah Mail
6. Chennai-Tuticorin Pearl City Express.
- Chennai-Guruvayur Express.

### Recent developments in railways

The metre gauge rails are being converted into broad gauge of which 26% of the length had been electrified.

Gauge conversion project has also been taken up from Chennai Beach to Tambaram, Chengalpattu and other suburban areas.

### Waterways

Waterways are the cheapest means of transport. It may be divided into inland waterways and seaways. The State has 1,000 km of coastline. The three major ports of Tamil Nadu are Chennai, Thoothukudi and Ennore. They play a crucial role in the provision of infrastructural support in the State. Minor Ports are anchorage ports where cargo is transshipped from the vessel to the shore. Some of the minor ports are Cuddalore, Nagapattinam, Kolachai and Rameswaram.



**Chennai Port Trust**

#### Cargo handled by major ports

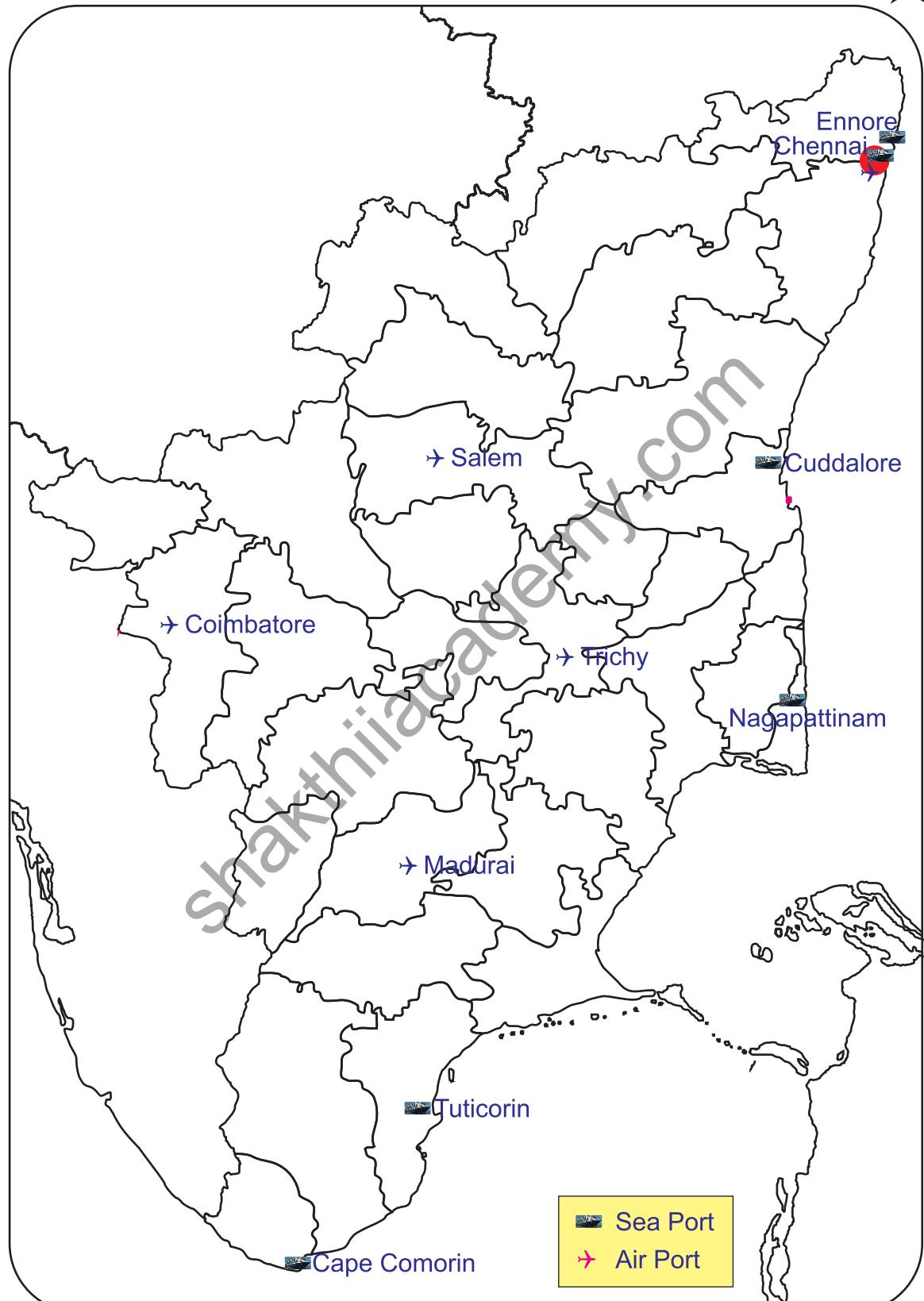
	(in million tonnes)
1.Chennai	57.15
2.Tuticorin	21.62
3. Ennore	11.56

### Projects Under Progress Sethusamudram Shipping Canal Project (SSCP)

It aims at creating a navigation channel from the Indian ocean to the Bay of Bengal through Gulf of Mannar,

**Tamil Nadu  
Major Seaports and Airports**

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Adam's Bridge, Palk Bay and Palk Strait within the Indian Border. This project is of strategic importance as it connects the neighbouring continents and countries. It also acts as a catalyst for industrial development, supr trade and commerce advance coastal shipping and generate employment.

### Do you know?

- 1) Buckingham canal that once connected Marakkanam in Villupuram with Vijayawada in Andhra Pradesh has lost its importance.
- 2) Vedaranyam canal that connects Vedaranyam and Nagapattinam and has also lost its importance.

### Airways

Airways is the fastest and costliest means of transport which can carry passengers, freight and mail. They connect local, regional, national and International cities. Tamil Nadu has a major international airport, which is named as Anna international Airport. It

is connected to 19 countries and operator more than 169 direct flights every week. This is currently the third largest airport in India after Mumbai and Delhi.

Chennai has direct air services to Sri Lanka, Dubai, Germany, Indonesia, Malaysia, England, Maldives, Saudi Arabia and Singapore. The air services that operate between Chennai and Coimbatore through Salem promote the industrial development of Salem and Mettur.

### International Airports

1. Chennai (Anna)
2. Coimbatore
3. Tiruchirappalli

### Domestic Airports

1. Chennai (Kamarajar)
2. Madurai
3. Salem
4. Thuthukudi

Airports	Cargo handled (in tonnes)
1) Anna International(Chennai)	2,27,704
2) Kamarajar Domestic (Chennai)	42,905
3) Coimbatore	1,858
4) Madurai	375
5) Thiruchirappalli	238

### Communications

The means through which ideas and information are exchanged are called “means of Communication”. They are Personal Communication and Mass Communication Networks Personal Communication includes Postal Services, Telegram, Telephone, Internets, E-mail and Fax

Mass Communication Network is carried on by the Government agencies. They are:

Print Media (books, Journals, magazines and newspapers) and Electronic Media (Radio, Television, Telecommunications, Mobile phone, E-mails, E-Commerce and Teleprinter).

## Postal Network and Telegraph

Tamil Nadu has four postal districts, namely:

Zone / Districts	Headquarters
Chennai	Chennai
Western	Coimbatore
Central	Thiruchriappalli
Southern	Madurai

The postal Department has allocated the Postal Index Number (PIN) to facilitate faster delivery of letters in the form of Air Mail Service, Railway Mail Service and Speed Post.

PIN code of Chennai Nungambakkam is 600034.

Find out the PIN code of your area.

## Postal and Telegraph offices in Tamil Nadu

Number of Post Offices alone: 12,115 Number of Post and telegraph offices: 3,504.

In India the BSNL is a major service provider. Direct calls can be made across the country and the world with STD (Subscriber Trunk Dialing), PCO (Public call office) and ISD



(International Subscriber Dialing) facilities respectively. Today, Tamil Nadu has:

Telephone exchanges- 2,408

Telephone subscribers- 33,46,906

The private basic telecom services are provided by Bharati Infotel, TATA, Reliance, Airtel, Aircel, Vodafone, Uninor.



## Telecommunications

Telecom growth has intimate relationship with the IT sector. The State has witnessed a boom in the number of PCOs and the landline segment. Rapid expansion in the telecom sector is accompanied by simultaneous significant technological



changes. Cell phones ate one such advancement in the field of technology. Event the internet can be accessed using cell phones. The world is shrinking with increasing spread of the communication network. The following are the services provided by the BSNL:



### CELLULAR SUBSCRIBERS (CUMULATIVE IN LAKHS)

Year	Tamil Nadu	All India	Percentage share to All India
2002-03	6.15	126.88	4.85
2003-04	16.28	261.5	6.2
2004-05	33.53	410.2	8.17

The total number of cellular phones in use in Tamil Nadu: **3337087**

Internet is provided to subscribers in the name of Data One Broadband.

Both postpaid and prepaid cell phone services are offered through public as well as private service providers.

### All India Radio (AIR)

Indian radio broadcasting, which was started in 1972, became All India Radio(AIR) in 1936. AIR has 15 Radio Stations in Tamil Nadu. Private Broadcasters have set up FM Radio Stations and broadcast a variety of programmes on education, agriculture and entertainment.

### Doordharshan

It is one of the largest terrestrial networks in the world. All the major live telecasts of national and international programmes bring the viewers under one roof. It transmits education all programmes for Schools and Universities through "Edusat".



### Internet and Intranet

The present world is networked with the World Wide Web, known simply as the internet and Intranet. Of the two, internet plays an important role in the field of education and transfer on



knowledge. Internet can be accessed by any individual from any part of the world.

An Internet is a private computer network. Intranets are websites that can only be accessed within a company through their internal network.

### Satellite

It is the latest means of communication which has brought revolution in communication all over the world. India's communication network is operated through two satellites, namely, Indian National Satellite (INSAT) and Indian Remote

Sensing Satellite (IRS). These two, apart from communications, assist in the prediction of meteorological events and natural resources management.

### Print Media

It is another powerful medium to convey information through various news agencies of India that are operating under the umbrella- Press Trust of India, United News of India and Press Information Bureau.

### Communication Technology and its advantages

It plays a vital part not only in personal life but also important role in business and education through satellites.

People can send and received mails using e-mail to get information on job vacancies, admission to Universities and to obtain birth and death certificates.

Shopping via internet (e-commerce) is a trend now-a-days.

Telemedicine makes it possible for people in remote areas to get correct treatment at appropriate times.



**Global Village**

Online payment of phone bills, electricity bills and online ticket booking can also be made.

D-Mat form of shares for share broking and video conferencing using video chat through webcam are also done using internet.

Communication technology has developed to such an extent that even remote villages are connected to any part of the world, making the world a global village. GPRS (General Packet Radio Service) is a way of sending data through radio waves which is currently being used to transmit voice. GPS (Global Positioning System) looks like a Mobile phone which captures signals from multiple satellites and provides information on the location of a place.

### EXERCISE

#### I) Choose the correct answer.

1. Postal and Telegraph services belong to \_\_\_\_\_ communication.  
a) personal      b) professional      c) public      d) private
2. \_\_\_\_\_ acts as arteries and veins for national development.  
a) communication      b) Transport system      c) print media  
d) Remote sensing
3. The East Coast Road is built along the coast of \_\_\_\_\_.  
a) Arabian sea    b) Bay of Bengal    c) Indian Ocean    d) Andaman Sea

4. The largest terrestrial network in the world is \_\_\_\_\_.  
a) All India Radio      b) Doordharshan      c) edusat      d) print media
5. Minor ports are known as \_\_\_\_\_ ports.  
a) Entrepot port    b) Tidal port    c) Anchorage port    d) free port

**II) Match the following.**

- |                         |                        |
|-------------------------|------------------------|
| 1. Golden Quadrilateral | Minor port             |
| 2. Cuddalore            | Private telecom        |
| 3. GPS                  | Print media            |
| 4. Magazine             | Location of place      |
| 5. Aircel               | National Highway       |
|                         | Major Port             |
|                         | Public Telecom Service |

**III) Answer in brief.**

1. Name the different types of roads found in Tamil Nadu.
2. Name some of the private telecom services.
3. Name the three major ports of Tamil Nadu.
4. What are minor Ports? Give examples.
5. Name the major international airports of Tamil Nadu.
6. Expand STD.
7. Distinguish between internet and intranet.

**IV) Give paragraph answer.**

1. What are the advantages of communication technology?
2. What are the recent prospective developments made in road transport in Tamil Nadu?

**V) Mark the following on a given map of Tamil Nadu.**

1. Rail route from Chennai to Thoothukudi.
2. Roadways connecting Chennai to Tiruchirappalli.
3. Mark the Major Sea Ports.

### FORMATIVE ASSESSMENT

1. With the help of pictures trace the development of communication from ancient to modern times.
2. Creative skill

Conduct a traffic survey during the peak hours in an important junction/in front of your school and get solutions for the existing problems.

3. Group Activity

Collect pictures and prepare an album on the topic “Transport Versus Pollution”.

### 3. DISASTER MANAGEMENT

The Earth we live is a dynamic self regulatory system. In the modern world with the best available communication facilities we are informed of extreme events that occur on any part of the world. In many circumstances events like volcanic eruption, an earthquake or a flood becomes harmful to human society. In general an event which is harmful to human society is termed as hazard. When an event affects the local people very badly beyond their capacity to retrieve to normal life then it is termed as Disaster.

**Hazard** is a dangerous event, natural or human induced that cause injury, loss of life or damage to property. Hazard is classified according to the origin as natural and man-made hazards.

A **Disaster** is an event which causes enormous physical damage to property, huge loss of life and drastic change in the environment. The economic, social and cultural life of the people is being affected and they need external help by all means from food, shelter, medicine, financial and social support to overcome the event.

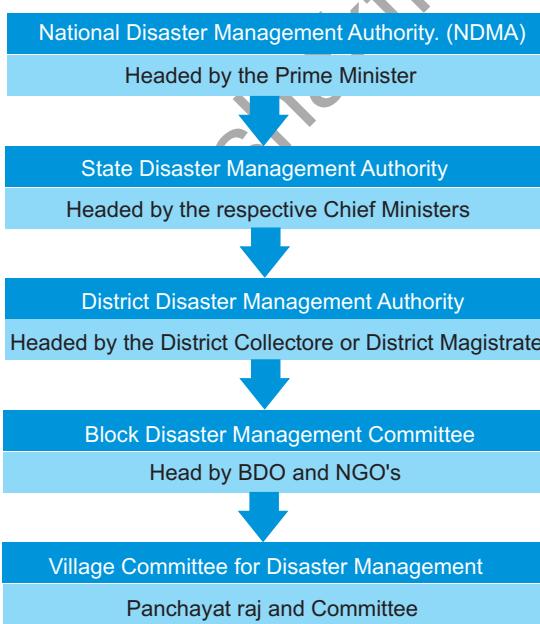
#### FORCES RESPONSIBLE FOR HAZARDS

Type of Hazard	Forces	Events
Geophysical hazard	Earth's internal force	Earthquakes, landslides, tsunami and volcano
Hydrological hazard	Surface water/glacier flow	Avalanches, flood
Meteorological hazard	Atmospheric events	Extreme temperatures, drought and wild fires
Climatological hazard	Interaction of atmosphere and ocean	Cyclones, storms, waves surges
Biological hazard	Microbes	Spread of disease, pest and plague
Man-made hazard	Human negligence	Industrial accidents, pollution, acid rain, road accidents, terrorist attack, dam failures, leakage of toxic waste, war
Socio-natural hazard	Over exploitation of environment by human.	Landslides, flood, drought

Both hazard and disaster are events which damage life and property. When intensity and the extent of damage are high it becomes a disaster. The branch that deals with preventing loss of life and property at the time of a disaster is known as **Disaster Management**. This involves enormous input of knowledge, human power, and finance with appropriate management ability.

**Disaster Management:** Disaster Management involves a continuous process of planning, organizing, coordinating and implementing measures to avoid loss of life and property. The role of the authority is to frame safe disaster management methods to protect people and property. Disaster Management cycle includes four stages namely preparedness, response, recovery and mitigation.

### Hierarchy of Disaster Management in India



**Did you Know?** India is prone to natural disasters due to its geological set up. The Indo-Australian plate is still moving at an average of 2 cm every year toward Eurasia, still pushing Tibet upwards. Thus Himalayan zone is vulnerable for earthquakes and landslide. Apart from this, floods and avalanches are also common here. The northern plains are affected by devastating floods during monsoon due to flat terrain and torrential rainfall. On the other hand North western part of India and central part of Deccan are mostly affected by drought, famine, at times flash floods and desertification.

The coastal regions of course are affected by cyclones, storm surge and rarely tsunami.

### Disaster Management cycle



### Preparedness

1. First step is to strengthen the basic information about the area like landform, slope, climatic features, population, etc.

2. To list out the types of disaster the area is prone to like earthquake affecting zone, cyclone affecting area and so on
3. To identify the local area which is most vulnerable to such disaster. Example area: On either side of Adyar river and Velachery are flood prone area within Chennai city.
4. Prepare schemes and plans to deal with the disaster. Example
  - a) Identify safe place for people to be shifted in case of disaster,
  - b) Form a volunteer group involving local people with their contact number to coordinate at the time of emergency.
  - c) Have a list of phone numbers of nearest Police station, Fire service, Government hospital for immediate correspondence.
  - d) Practise and be trained with evacuation methods once in a month for various imaginary situations

### Response

1. Alert people before the occurrence of disaster.
2. Response at the time of disaster example search, rescue and evacuate all from the site of incidence.

3. Arrange for essential items for the people; example food, shelter, medicine and others.
4. Assess the severity of disaster.

### Recovery

1. Temporary housing facility, medical care, counselling, reunite with kith and kin, financial support etc.
2. Rehabilitation and reconstruction of the damaged property.

### Mitigation

1. All activities that reduce the impact of the event is said to be mitigation.
2. The experience learnt from a situation will be a lesson for future such events.

**Activity:** *With the help of elders maps can be prepared for a disaster management for your locality. One example is given.*

1. Name of the district: **Chennai**
2. Type of landform: (*Mountainous/ plateau/ plain/ coast.*) **coastal plain**
3. List out the types of disaster the area is prone to : *landslide / cyclone / flood / flashflood/ forestfire / earthquake / others cyclone flood and tsunami.*

4. Find out from elders of your family the most affected (vulnerable) area for each type of disaster: **Banks of Adayar river and velachery.**
  5. Discuss with elders and find the reasons , ways and means to reduce the occurrence.
  6. Plan for a situation if disaster happens to hit your area in near future.
    - a) Place for people to stay : **Schools, Kalyana Mandapam, Community halls.**
  - b) Find and store the phone numbers of the local police station, fire station, ambulance service and district collectors for communication.
  - c) Have a list of volunteers : **Doctors, nurses, grocers, pharmacist** who will respond immediately for an emergency.
  - d) Form a group in your class to have the network communication.
7. Plan a network to alert people to warn them about the disaster.

Reasons	Remedies
Heavy rain	Insist flood water harvesting.
Poor drainage facility	Strengthen the drainage lines before rainy season
Encroachment along the natural water courses and water bodies	Strict action to evacuate encroachment and allot living place for the dwellers/ measures to retain natural water bodies
Lack of open spaces Concrete pavements	Create more open spaces within the compound of individual residential units.
Dumping of garbage/Risk of epidemics	Attitude of people should be changed by creating awareness on safe disposal of waste.

*8. Imagine methods to respond in the right way to save people. First safe guard yourself, know to give first aid for needy people, get trained to assist elders and disabled at home which will help you in the time of disaster.*

*9. This activity will enhance the mind to cope up the situation for any disaster if we have to face.*

*10. This will give enough courage and confidence among the people and help to react and co-operate with the officials engaged in Disaster Management.*

### **Warning systems in India**

The Department of Ocean Development in association with Department of Science and Technology (DST), Department of Space (DOS) and CSIR Laboratories, has set up an Early Warning System for Tsunami and Storm Surges in the Indian Ocean. Generation of disaster warning is a multi-institutional effort.

The table gives the Departments responsible for warning public about the disaster through proper media.

### **Warning systems in Tamilnadu**

Hotline between Indian Meteorological Department and the State Emergency Operation Centre (EOC) is established. Dissemination

## **AGENCIES AND MINISTRIES - DISASTER MANAGEMENT**

<b>Disaster</b>	<b>Agency</b>	<b>Ministry</b>
Heat wave/ Cold wave / Cyclone / Earthquake	Indian Meteorological Department (IMD)	Earth Sciences
Tsunami	Indian National Centre for Oceanic Information System (INCOIS)	Earth Sciences
Land slides	Geological Survey of India (GSI)	Mines
Flood	Central Water Commission (CWC)	Water Resources
Avalanches	Defence Research and Development Organization (DRDO)	Defence

to the districts is done through telephone and fax. IP phones are also available, which connects the State with the district headquarters, taluks and blocks of the State. Wireless radio network; both high Frequency and very high frequency are available in the State. State Control Room is set up whenever a disaster situation develops. The control room is responsible for coordinating the disaster rescue operations and reporting to the central government.

**Source:** High Powered Committee Report-1999

**Flood :** A) Floods are caused by discharge of huge volume of water in a short span of time, at a rate, such that the water cannot be carried away from the scene of discharge. Low lying flood plains, coastal plains, urban area, river confluences are prone to flood. Flood may be classified into different types according to the duration of time it prevails. Slow-onset floods take longer time to reach the peak flow, gives enough time to take preparatory measures and subside after a long time. There is more damage to property than to life.

### List of Disasters

I. Water and climate related disasters	a) Floods b) Cyclones c) Tornadoes and hurricanes d) Hailstorm e) Cloud burst f) Heat wave and cold wave g) Snow avalanches h) Droughts i) Sea erosion j) Thunder and lightening
ii. Geological related disasters	a) Landslides and mudflows b) Earthquakes c) Dam failures/ Dam bursts d) Minor fires e) Tsunami
iii. Chemical, industrial and nuclear related disasters	a) Chemical and industrial disasters b) Nuclear disasters
iv. Accident related disasters	a) Forest fires b) Urban fires c) Mine flooding d) Oil spills e) Major building collapse f) Serial bomb blasts g) Festival related disasters h) Electrical disasters and fires i) Air, road and rail accidents j) Boat capsizing k) Village fire l) Stampede
v. Biological related disasters	a) Biological disasters and epidemics b) Pest attacks c) Cattle epidemics d) Food poisoning

Death may be not by flood but because of the diseases caused by water logging. A slow onset flood may be in the duration between a week; sometimes even.

- B) Rapid-onset flood sets rapidly and last for a very short duration. Damage to life and property is comparatively higher in this case. These floods are accompanied by a rapid rise and fall in water levels.
- C) Flash floods are sudden flow of water that occur within few hours of the day with very short duration.

Flood can be classified according to the location as river floods, coastal floods, and urban flood.



NASA satellite imagery of Northern India on 17 June, showing rainclouds that led to the disaster in Uttarkhand

**Activity:** Read the passage and discuss about the causes and effects of flood in Uttarkhand in June 2013. From 14 to 17 June 2013, the Indian state of Uttarakhand and adjoining areas received about 375% more than the normal rainfall during a normal monsoon. This caused the melting of Chorabari Glacier at the height of 3800 metres, and overflow of the Mandakini River which led to heavy floods near Gobindghat, Kedar Dome, Rudraprayag district, Uttarakhand. The heavy rains resulted in large flash floods and massive landslide. Unscientific developmental activities undertaken in recent decades have resulted in high level of loss of property and lives. Roads constructed in haphazard style, new resorts and hotels built on fragile river banks and more than 70 hydroelectric projects in the watersheds of the state led to this disaster.

### Tropical Cyclone:

Cyclone is a large-scale, atmospheric low pressure system with low pressure at its centre and characterized by circular wind motion, anticlockwise in Northern and clockwise in southern hemisphere.

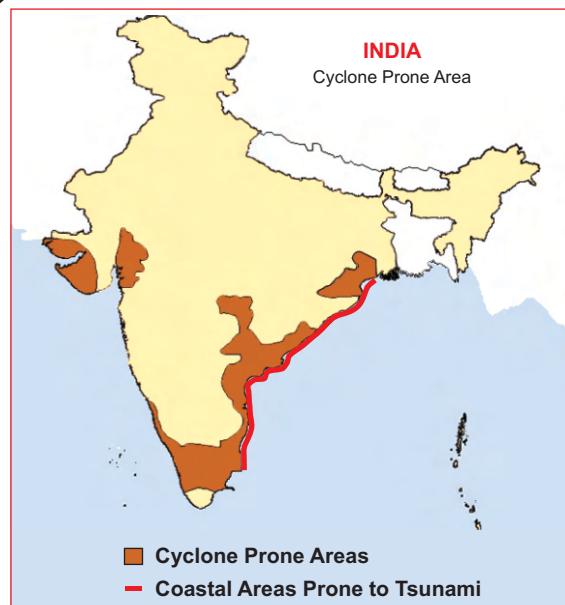
- \* Tropical cyclones are formed only on warm tropical ocean
- \* water with temperature above 27°C.

- ✿ As water evaporates and ascend, tall cumulus clouds are formed within the storm.
- ✿ The centre of the cyclone called the eye of the storm is calm and clear without clouds.
- ✿ The condensation of vapour releases more latent heat and that gives the energy for the cyclones to enhance further evaporation and formation of clouds.
- ✿ Tropical cyclones move from east to west due to the influence of trade winds.

India with a coast line of 7516 km is affected by 10% of world tropical cyclone. Thirteen coastal districts of our state are prone to be affected by cyclones. Cyclones occur in the month of May-June and in October-November. Cyclones are associated with strong squall, torrential rain, flood and storm surge. Cyclones are categorized by the speed of wind in circulation. The damage by cyclones can be mitigated by growing shelterbelts and restoring the mangrove forests where ever possible. Economic activities such as shrimp cultivation have made the coastal areas vulnerable to severe damage due to cyclone.

### **Categories of cyclone As per World Meteorological Organisation (WMO)**

<b>Categories of cyclone</b>	<b>Wind speed</b>
Low pressure Area	Less than 31 kmph (17 knots)
Depression	31 – 49 kmph (17-27 Knots)
Deep depression	50-61 kmph (28-33 knots)
Cyclonic storm	62-88 kmph (34-47 knots)
Severe Cyclonic storm	89-118 kmph (48-63 knots)
Very Severe Cyclonic storm	119-221 kmph (64-119 knots)
Super Cyclonic storm	Above 222 kmph (above 120 knots)



## CYCLONE



## Drought

Drought is defined as a period of dry weather that last long to cause serious problems like crop damage or shortage in water supply. The severity of the drought depends upon the degree of moisture deficiency, the duration, and the size and location of the affected area. Drought may be classified as follows:

**Meteorological Drought:** This type of drought occurs as a result of delayed

onset of monsoon, deficiency in rainfall creating a natural shortage of available water.

**Hydrological Drought** occurs when there is a fall in storage position in all aquifers, dams, reservoirs and tanks and results in soil moisture deficiency.

**Agricultural Drought** develops when there is insufficient moisture to support cultivation.

**Socio Economic Drought** is said to occur when human activities are affected by reduced precipitation which has a direct impact on the socio economic activities of the people.

### Did you know ?

IMD has taken initiatives to cover all blocks in Tamilnadu with Automatic Weather Stations Network.

Techniques of conservation of water like sprinkle irrigation, fertigation, pot hole irrigation, precise farming, and selection of suitable variety of crop that can withstand drought are some of the remedies that might reduce the impact of drought when it is possible to predict drought.

**Did you know?** The place of the origin of an earthquake is called "**FOCUS**". The deepest earthquake may have its focus at a depth of even 700km below the ground surface. The place on the ground surface which is perpendicular to the 'focus' is called '**EPICENTRE**'. The seismic waves move away from the source of the earthquake in the form of Primary waves ( P Waves) Secondary waves (S Waves) and Long waves or surface waves (L waves).

## Earthquake

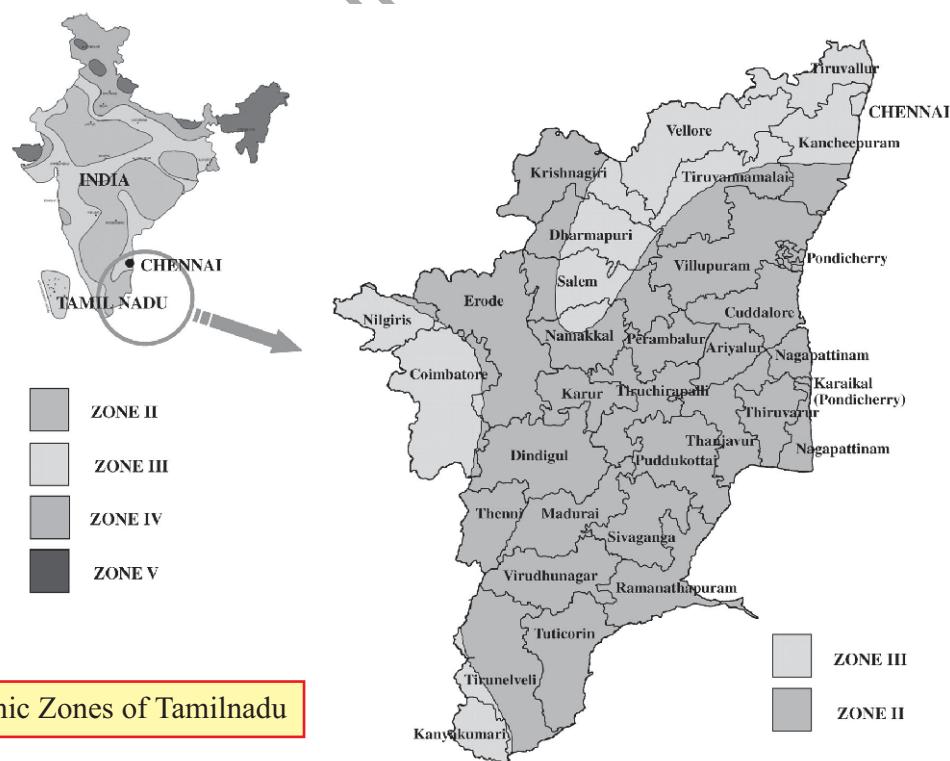
An earthquake is a tremble or shake of the earth's crust. It is caused by the endogenetic release of energy from the interior of the earth. Earthquakes may be formed due to folding, faulting, rupture of tectonic plates on the earth's crust or may also be caused due to volcanic eruptions. It is proved that human induced

earthquakes occur when large amount of water is stored behind a dam, drilling and injecting liquids into well and by mining activity in earthquake prone area. An earth quake may cause the following causalities; Tremor and rupture of earth surface, landslide, avalanche, fire, soil liquefaction and Tsunami.

### Seismic Zones of Tamilnadu

India is divided into four seismic zones, namely II, III, IV and V; Zone V is the high risk zone. Tamilnadu is classified into moderate and low risk zones. (Zone III and II).

The districts of Nilgiris, Coimbatore, Kanyakumari, Vellore, Thiruvallur, Chennai , Kanchipuram, Thiruvannamalai, Dharmapuri, Salem and parts of Tirunelveli districts are are classified as moderate risk Zone III. The rest of the districts in Tamilnadu is classified as low risk zones II.



**Tsunami:** Tsunami is arrival of a series of huge waves caused by the displacement of large volume of water from an ocean mostly due to a undersea earthquake. Apart from huge loss of life and property the environmental impact of tsunami is tremendous. It affects the quality of fresh water in the coastal aquifers. The salt is deposited on the arable land by sea water and it takes long time to restore the quality of soil. Major health problems occur after the attack of tsunami.



Life threatening waves

Development  
Programme after  
Tsunami in Tamilnadu

### Facts about tsunami

- ⌘ An underwater earthquake, a volcano eruption or a landslide mostly causes a tsunami.
- ⌘ Tsunami can travel as fast as 5000 miles per hour, without being noticed and can cross the entire ocean in less than a day.
- ⌘ When stuck in Tsunami, it is recommended to grab a floating object and allow the current to carry you.
- ⌘ The tsunami that occurred in December 2004 in the Indian Ocean is known to be the most powerful earthquake that has occurred till date.
- ⌘ Scientists can estimate an almost accurate time as to when and which part is tsunami most likely to occur. Their estimation is based on calculations like depth of water, time of the earthquake, distance from place to place etc.

### Man Made Disaster

Fire, industrial, technological, transportation, nuclear accidents, biological disaster, war, terrorists bomb blast and shooting massacres riots, are all manmade disasters.

### Fire

Disaster through Fire may occur due to electrical short circuit, accidents in chemical factory, match and crackers factory and mostly is caused by negligence of human beings. Forest wild fires are a major disaster all over the world. The environmental impact of forest fire includes emission of large amount of carbon dioxide leading to global warming, loss of bio diversity, affect hydrological cycle, reduce photosynthetic activity, and health hazards to human beings. Causes for forest fire may be Natural, intentional or an accident. Safeguarding life and property from fire and forest fire involves three basic aspects, which are: 1. Prevention 2. Detection and 3. Extinguishing. Public awareness of what to do before fire, during fire and after fire is of critical importance.

## Industrial and Technological disasters

These disasters result from accidents, failures, mishap or misuse of some kind of technology.

**The Industrial Hazards:** The storage and transportation of various hazardous materials used in industries may result in industrial hazard accidents. Recently, major disaster threats have emerged in the chemical and nuclear industries. Chemicals in the form of medicine, fertilizers and fuels help us in many ways. Some chemicals that are safe, and even helpful in small amounts, can be harmful in larger quantities or under certain conditions. Thus, chemical industry faces multiple risks involved with its production, transportation, storage, usage and disposal off the effluents containing residual chemicals.

**Did you Know?** Chernobyl (former USSR) and Japan had experienced the most hazardous nuclear disaster.

### Transportation Accident:

Transportation is the life line of the country. As Technology advances the ratio of fatal accidents also increases.

The Government is striving to build capacity development by training, education, research and creating awareness by associating with

different departments and institution under Disaster management.

### General survival techniques

- During flood forecast it is important to stock up on first aid items, non-perishable foods, 3 gallons of water per person for 3 days, battery operated radio for weather reports, extra batteries, personal hygiene necessities. Secure the cattle's in an elevated place and store their fodder and potable water. Listen to the local Radio/ TV for instructions. Cut off all the electrical supply during flood and earthquake.
- During drought period arrange fodder and drinking water for cattle in drought regions. Form hazard and risk management service groups and function effectively as per the advice of scientific community in each village.
- During earthquake go under the table, chair, kneel to the floor and protect yourself. Go near a sturdy wall, sit on the floor and hold the floor strongly and protect yourself. Use only torch lights, avoid candles and oil lamps because of fire risk, where earthquake occurred. Wear sandals while walking on rubbles.

- In case of fire accident Call the nearby police station, (No.100) or the fire service (No.101) as soon as the firebreak. If caught in a fire or smoke, escape by crawling low to the floor. If clothes are on fire, “Don’t Run; Stop, Drop and Roll”.
- In case of Industrial hazards previous knowledge of every aspect of the chemical involved will help us to act promptly to mitigate the disaster. Know the safety measures and follow the rules strictly. Handle the chemicals with care.
- Road accidents can be avoided if only legal licensed person above 18 is allowed to drive. Learn, preach, and practise safety rules during driving and walking along the road.
- At railway crossings pay attention to signal and the swing barrier. In case of unmanned crossing, get down from the vehicle and look at both the sides of the track before crossing the track. Don’t touch objects which are suspicious. Never jump from a moving train.
- On boarding the aircraft pay attention to the flight crew safety demonstration. Carefully read the safety briefing card, that is there in the seat pocket.

**Source :**

1. Disaster Management And Disaster Mitigation Department Chennai – 600 005. Tamilnadu
2. Central Board of Secondary School Education, together towards a safer India-I

**EXERCISE**

**I. Choose the correct answer:**

1. Geophysical hazard are formed due to \_\_\_\_\_ force
  - a) Earth's internal
  - b) Earth's external
  - c) Microbes
  - d) Interaction of ocean and atmosphere.
2. National Disaster Management Authority is headed by \_\_\_\_\_
  - a) Governor
  - b) President
  - c) Prime minister
  - d) Ministry of earth science.
3. All activities which reduce the impact of the event is said to be \_\_\_\_\_.
  - a) Preparedness
  - b) Response
  - c) Recovery
  - d) mitigation.

4. \_\_\_\_\_ are sudden flow of water that occur within few hours of the day with short duration.
- flood
  - flash flood
  - slow onset flood
  - rapid onset flood.
5. Super cyclonic storm has the wind speed of \_\_\_\_\_ kilometres per hour
- less than 31
  - 50–61
  - above 119
  - above 222

### **II. Match the following:**

- |                           |   |                             |
|---------------------------|---|-----------------------------|
| 1. Human negligence       | - | Sudden movement of glaciers |
| 2. Warning for Landslides | - | Meteorological hazard       |
| 3. Tamilnadu              | - | Central water commission    |
| 4. Extreme temperature    | - | Medium risk earthquake zone |
| 5. Avalanches             | - | Manmade disaster            |
|                           | - | Geological survey of India  |

### **III. Write brief answers**

- Define Disaster Management
- Write few methods to mitigate the damage by cyclones
- What are the precautions to be taken on an onset of drought?
- What are the reasons for man induced earthquakes to occur?
- Distinguish between hazard and disaster.
- Distinguish between slow onset floods and rapid onset floods.
- Mention the environmental impacts of tsunami.
- What is meant by capacity development?
- Mention the environmental impacts of forest fire.
- Write about warning system in Tamil nadu.

#### IV.Answer in a paragraph

1. How does the geological set up of India make it prone to various types of disasters?
2. Describe the Disaster Management cycle.
3. Name the agencies in India responsible for warning Natural disasters.
4. Write about the tropical cyclones.
5. Write about the survival techniques during disaster.

#### FORMATIVE ASSESSMENT

1. Name a few tropical cyclones which you have come across so far and find out the Northern Indian Ocean Cyclone names given by World Meteorological Organisation for Tropical Cyclone.
2. Organize a mock drill for earthquake at your classroom.
3. Prepare a chart for emergency service numbers (Fire, Traffic, etc.,)
4. Map Skill.

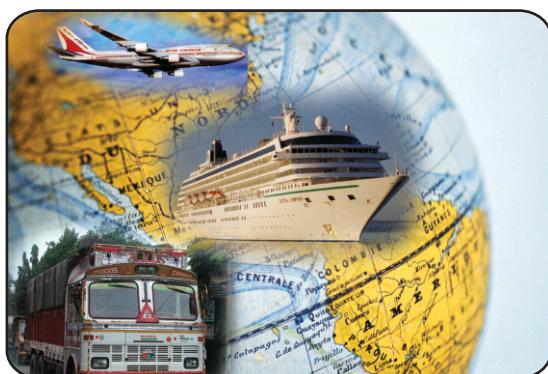
Mark the following on Tamilnadu map:

- 1.The cyclone prone area of Tamilnadu
2. A region prone to frequent landslides
3. A district prone to drought
4. Region of formation of tropical cyclone
5. Earthquake prone area in Tamilnadu

# GEOGRAPHY

## 1. TAMIL NADU - TRADE

Trade is an important phenomenon that decides the economic growth of a country. The types of goods and services that a country exports and imports provide a mirror image of the economic structure. Trade may be defined as “an exchange of goods and commodities either within the country or between countries.” In simple terms, buying and selling of commodities is called trade and it may be local, regional, national and international. The primitive method of trade was known as the **barter system** where goods were exchanged for goods. Later on, money was introduced as a medium of exchange in buying and selling of goods.



Exports refer to goods and services sold for foreign currency. A country which increases its export transactions is said to accumulate foreign exchange reserves.

### Major Exports of Tamil Nadu

- 1.Textile goods
- 2.Drugs and pharmaceuticals
- 3.Chemicals
- 4.Leather and leather goods
- 5.Engineering goods
- 6.Ores and minerals



### 7. Software and electronics.

Imports are goods and services bought from overseas producers. Almost every country of the world will try to pay for their imports through exports. Trade is not a mere exchange of goods; but it also includes exchange of service.

### Major imports of Tamil Nadu

- 1.Mineral fuel and mineral oil
- 2.Electrical machinery equipment and spare parts.
- 3.Natural and cultured pearls
- 4.Iron and steel and articles of iron and steel
- 5.Organic chemicals
- 6.Plastics and articles
- 7.Vegetable fats and oil products

Trade is of two types: (1) Internal Trade and (2) International Trade.

### Internal trade or domestic trade

Trade carried on within the domestic territory of a country is termed as internal trade. Roadways and railways play an important role in the internal trade. In this type of trade, the national currency is involved to carry on the trade.

### International trade or external trade

Trade between two or more than two countries is termed as international trade. If the trade is between two countries, it is bilateral. There is also multi-lateral trade which occurs among more than two countries. Multinational currencies are used to carry on this type of trade. Ports and harbours play an important role in International trade.



Few Foreign Currencies

### Trade in Tamil Nadu

As Tamil Nadu has well developed roadways and railways, domestic trade is efficiently handled between the districts of Tamil Nadu.

For marketing the commodities, in the state, there are several Market Committees and regulated markets, functioning in all the districts of Tamil Nadu. Market Committees are formed by the nominated members of the beneficiaries and the Chairperson for the committee is selected by the members. There are about 21 market Committees to handle the marketing of agricultural goods and to fix a genuine prices for the commodity. At present there are about 303 **Agricultural Produce Marketing Centers (APMC)** distributed all over the districts of Tamil Nadu. The APMC is further classified

into Primary, Secondary marketing centers and non-regulated marketing centers ( Agmarket statistics 2010 ). The largest number of 34 Marketing centers are found in Erode district followed by Coimbatore and Thanjavur with 21 centers.

**Uzhavar Sandhai** scheme was initiated for direct selling of fruits & vegetables at a fair price by the farmers to the consumers without any intermediaries. The 1<sup>st</sup> Uzhavar Sandhai was started at Madurai in 1999 and there are about 103 such Uzhavar Sandhais in the state. Every day on an average 1609 MT of fruits and vegetables worth of ₹ 191.77 lakhs are sold by 7526 farmers. 2,71, 685 consumers were benefitted through Uzhavar Sandhais during the year 2008-2009.

Market Complexes with storage facility are available all over the state.

Tamil Nadu Co-operative Silk Producers Federation, TANSILK an apex co-operative body, with Headquarters at Kancheepuram, purchases raw silk and supplies them to Handloom Weavers Co-operative Societies and other weaving sectors.

Industrial Co-operatives, a wing of the Department of Industries and Commerce, Government of TamilNadu is arranging to market the products of rural artisans through Handicrafts Co-operative Societies. State Industries Promotion Corporation of Tamil Nadu(SIPCOT) focuses on developing, marketing and maintaining industrial complexes / parks within the state.

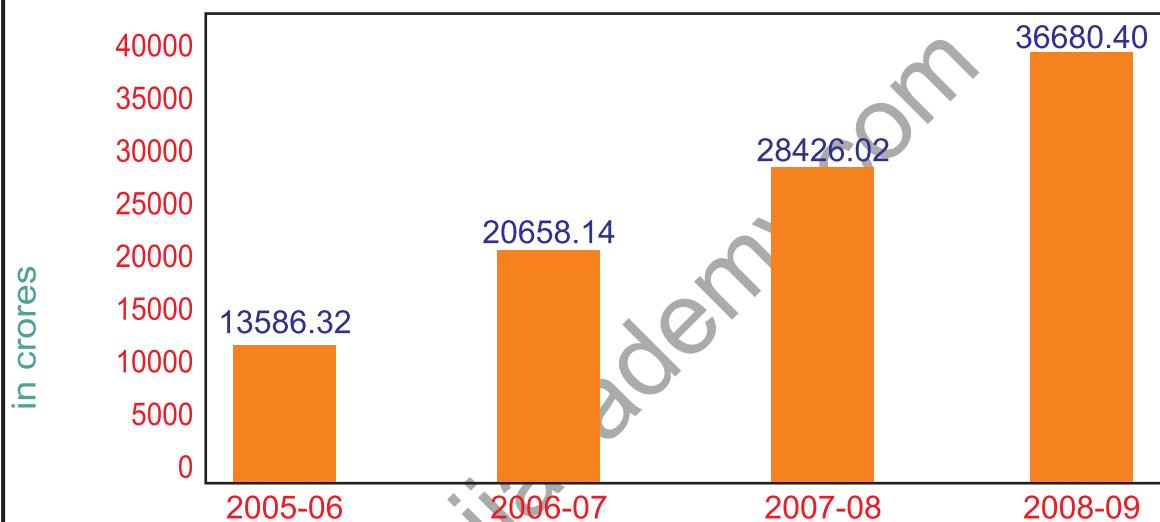
The exports of TamilNadu has been increasing at a faster rate than the overall exports of the country. The drastic rise in Information Technology (IT) companies in Tamil Nadu has

promoted the value of software export in recent years. The following are the value of software products sent abroad.



Tidel Park- Chennai

### Tamil Nadu-Major Exports 2005-2009 value in Rupees



YEAR	EXPORTS (Rs.in million)
2007/08	284,260
2008/09	366,800
<b>FOREIGN TRADE (Rs.in million)</b>	
<b>Export</b>	
By sea	602,600
By air	74,990
<b>Import</b>	
By sea	1,285,400
By air	304,950

### Importance of Trade

Trade is called an engine of growth because:

1. It helps in the flow of commodities.
2. It generates dynamic change in the export front.
3. Trade increases technology transfer from one country to another.
4. It improves the welfare of the workers.
5. It helps to increase the total production of a country.

## EXERCISE

### I) Choose the correct word.

1. Primitive method of trade was known as \_\_\_\_\_ system.  
a) value      b) barter      c) traditional      d) Money
2. \_\_\_\_\_ decides the economic growth of a country.  
a) Export      b) Import      c) Trade      d) Transport
3. In Tamil Nadu domestic trade is effectively handled between \_\_\_\_\_.  
a) States      b) Districts      c) Countries      d) Cities
4. \_\_\_\_\_ district exports crackers.  
a) Vellore      b) Virudhunagar      c) Villupuram      d) Sivagangai

### II) Match the following.

- |                        |                |
|------------------------|----------------|
| 1.Exports              | Kancheepuram   |
| 2.Imports              | Thuthukudi     |
| 3.Tidel Park           | Market centres |
| 4.Tansilk              | Madurai        |
| 5.First Uzhvar Sandhai | Chennai        |
|                        | Machinery      |
|                        | Software       |

### III) Answer in brief.

- 1.Define Trade.
- 2.Name some of the imports of Tamil Nadu.
- 3.Distinguish between import and export.
- 4.Differentiate internal from international trade.

### IV) Give paragraph answer.

- 1.Why is trade called an engine of growth?
- 2.Write a paragraph about Uzhvar Sandhai.

### FORMATIVE ASSESSMENT

1. Collect pictures of currencies of different countries and calculate its equivalent to Indian Rupees.
2. Visit a nearby supermarket and collect information on sources of their selling products and price. Make a list of the imported items.
3. What were the reasons for the failure of the Barter System.

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## 2 . TAMIL NADU - POPULATION

People of a country are the greatest assets for development. People living in an area together are known as population. The study of population is known as demography. People are considered as resources because of their ability to change available natural resources into value added products. Human potential, knowledge and energy are used for the betterment of individuals, the society and the nation. Every individual contributes to the nation's development. Therefore, the size of population and its individual capacity in terms of education, health and work force decides the pace of national development. For this reason, people of the country should be nurtured in proper manner to maintain the quality and quantity.

### Population of Tamil Nadu

As per 2011 Census, the population of Tamil Nadu was about 72,138,958 of which 36,158,871 was males and 35,980,087 was females. Tamil Nadu as a whole has 5.96 % of the total national population(India).

The Census of India, a central governmental organisation, is engaged in collecting, tabulating and publishing all statistics related to population, once in ten years.

### Demography indices

The **crude birth rate**—the annual number of live births per 1,000 people.

The **crude death rate**—the annual number of deaths per 1,000 people.

The **infant mortality rate**—the annual number of deaths of children

less than 1 year old per 1,000 live births.

The **sex ratio**—the number of females per 1,000 of males.

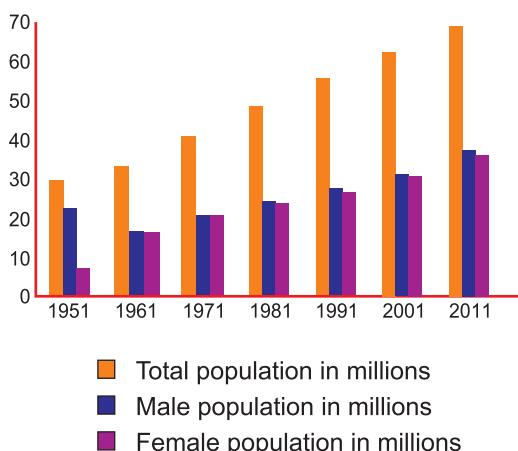
**Life expectancy**—the number of years an individual at a given age would be expected to live at present mortality levels.

The ratio between the number of children below age of five and the number of female at the reproductive age(15-45) calculated for every thousand persons in known as **Fertility Rate**. The Total Fertility Rate of the State is 1.7.

Birth and death rates for Tamil Nadu for the year 2006 is 15.9 and 7.6 per thousand population, respectively. Infant mortality rate has reached 37 to 1,000 live births by 2006.

### Growth of population

From the bar diagram given, may be inferred that the population of Tamil Nadu has doubled over a period of 60 years from 1951 to 2011.



The difference between birth and death rates gives the natural increase of population of regions. When

expressed in percentage it is known as the growth rate. The annual growth rate is 1.1 %, which is lower than that of India.

When birth rate is continuously high, a nation has to provide education and health facilities for more number of children. Other environmental problems also increase with high population. Tamil Nadu has shown a considerable rate of reduction in growth rate in recent years.

### Distribution of population

Chennai possesses the largest share of 6.4 % of the total population of Tamil Nadu. This is followed by Coimbatore, Vellore and Salem districts. Perambalur has the least population of (0.078%).

### Factors influencing the distribution of population

- Generally, plains with suitable climate support a huge population.

- Coastal plains with mild temperatures and good opportunities for economic activities support huge population.

- Job opportunities in large towns and cities attract both literates as well as illiterates.

- Dry regions generally support a small population.

- Mountainous regions with steep slopes and forest cover support a small population as well.

In general, the variations in population among different regions are identified by **population density**. Density of population is a means of finding out the number of persons living in one unit area, which is generally expressed as persons per square kilometre. It gives an idea of how crowded a region is. The following table gives the density of population in Tamil Nadu, by districts of the states.

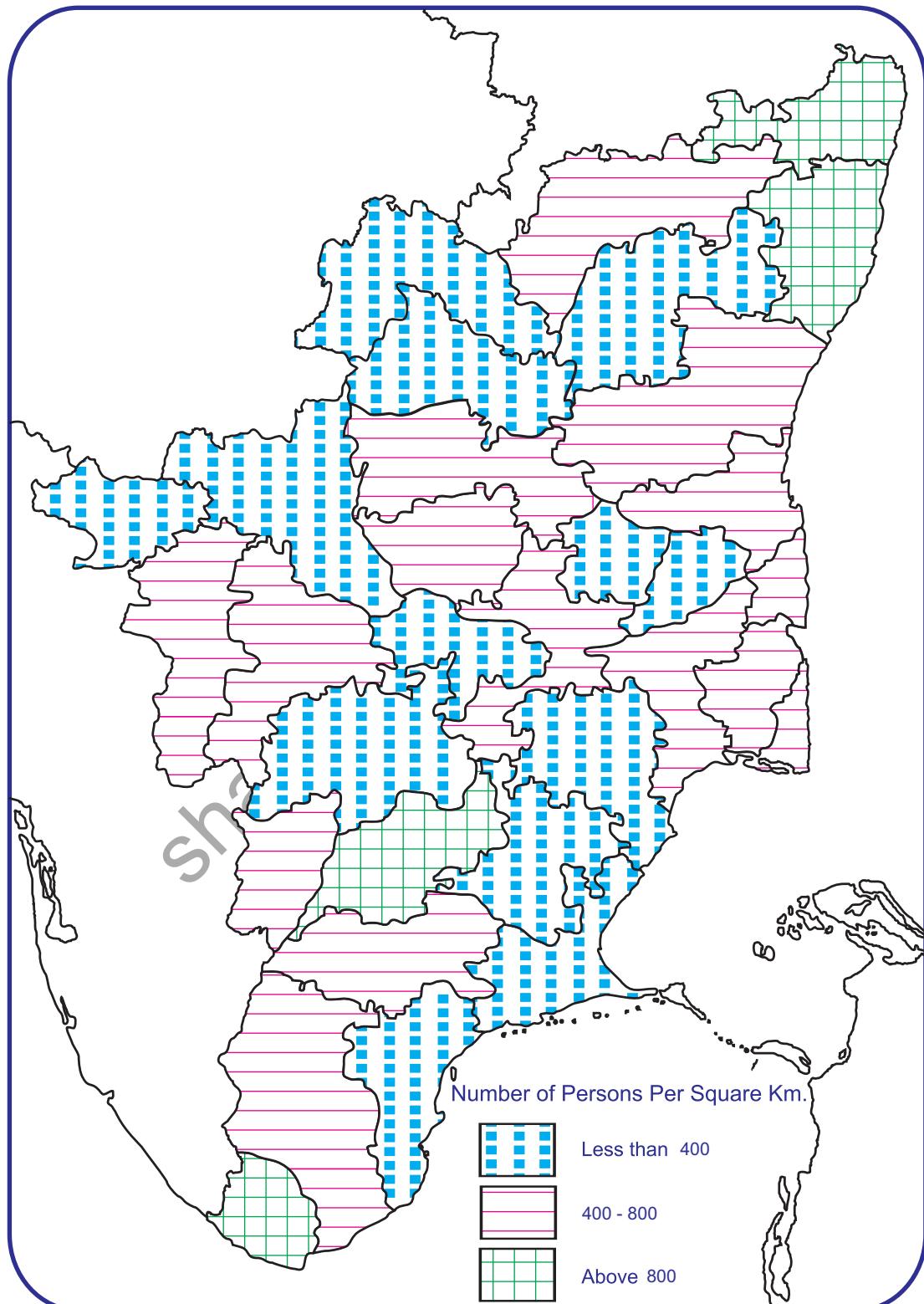
**Table: Tamil Nadu: District wise density of population**

Number of persons per square km	Density	Districts (density is given in brackets)
Less than 400	Low	Nilgiris (288), Ramanathapuram (320), Perambalur (323), Sivagangai (324), Dharmapuri (332), pudukkottai (348), Dindigul (357), Krishnagiri (370), Karur (371), Thoothukkudi (378), Ariyalur (317), Erode (397), Tiruvannamalai (399)
400-800	Medium	Theni (433), Virudhunagar (454), Tirunelveli (458), Tiruppur (476), Viluppuram (482), Namakkal (506), Thiruvarur (533), Tiruchirappalli (602), Vellore (646), Salem (663), Nagapattinam (668), Thanjavur (691), Cuddalore (702), Coimbatore (748).
Above 800	High	Madurai (823), Kancheepuram (927), Thiruvallur (1049), Kanyakumari (1106), Chennai (26903).

Source: Census of India 2011

## Tamil Nadu Population Density

N  
▲



### Activity

- With the help of the given map and the table, identify the status of population in your area.
- List the reasons for this variation among districts.

From the table, it may be understood that eight districts exhibited high population density. Seventeen districts have medium densities and five districts fall under low population density. Chennai, the capital city, a centre for administration, education, industry, trade, commerce and recreation, has the highest density of population. Sivagangai has the lowest density of population.

### Composition of Population in Tamil Nadu

As per 2001 census, 37 % of population in Tamil Nadu is below 20 years, 54% is between 20 and 60 years, and 9% is above 60 years.

Percentage of Schedule Castes and Schedule Tribes is 19 % and 1.04% respectively.

In Tamil Nadu there are about 88% Hindus, 5.5% Muslims, 6% Christians and the rest are of religions such as Sikhs, Buddhist and Jains.

The state has a sex ratio of 987 women for 1,000 men. The highest sex ratio is in Thuthukodi (1,050) and the least is in Salem (929). Fifteen districts record more females than males.

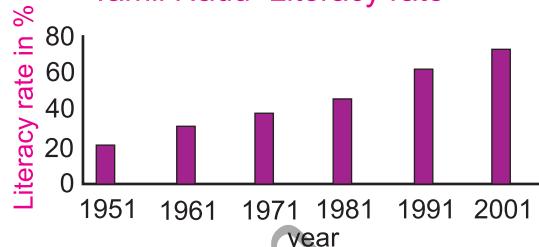
In Tamil Nadu, 56 % of the people live in rural areas and 44 % of the population live in urban centres.

### Literacy

The literacy in Tamil Nadu has greatly increased in the period 1951 to 2001. The overall literacy of Tamil Nadu is 73.5 %. Among the districts,

Dharmapuri has the least literacy of 61.39 %. Kanyakumari has the highest 87.55% of literates. Chennai, Thuthukudi and the Nilgris have 80 % literates. Among the Schedule Castes and Schedule Tribes 55 % and 35 % of them are literates.

Tamil Nadu—Literacy rate



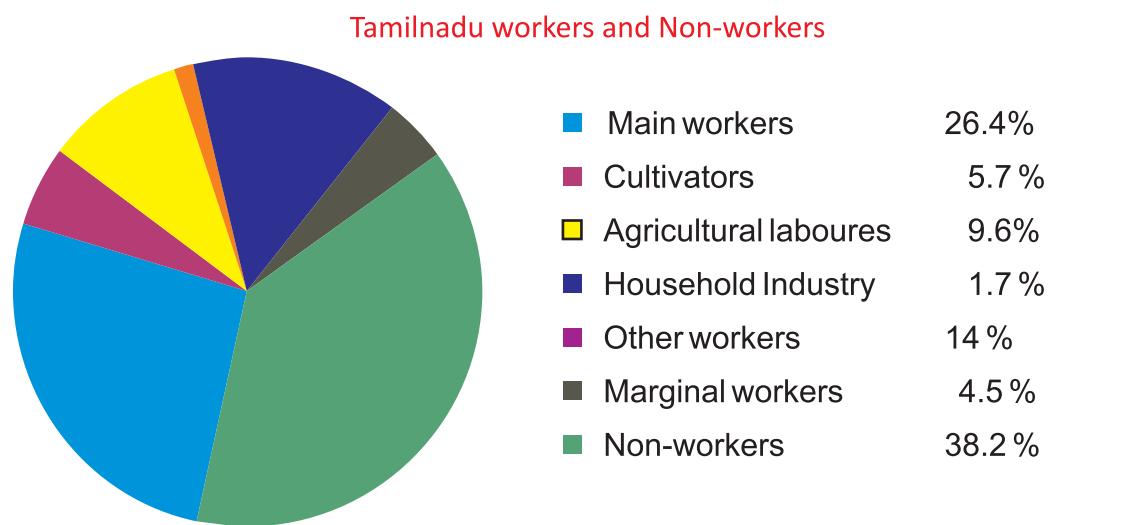
The state has considerably reduced the school dropouts. Education for all is the prime ambition of the government. Among men, 726 out of every 1000 are literates. Likewise among women 571 out of every 1000 are literates. Among the districts, Kanyakumari has the highest literacy rate with 803 for every thousand men and 758 for every thousand women

### Occupation

According to 2001 Census, the total number of workers in Tamil Nadu account for 44.67 %; non-workers accounts for 55.33 %. Among the workers, 41.5% work in the primary sector, followed by 27.7 % in the secondary sector and 30.8 % in the tertiary sector.

### Classification of workers

It may be noticed from the table that agricultural workers are seen to, be reducing in number. Construction workers and tertiary workers are increasing year after year which indicates the trend of increasing urbanization in Tamil Nadu. In the year 2000, the unemployment rate for the state was 2.4 %.

**Table: Classification of Workers and Distribution**

<b>Workers</b>	<b>1961 (in %)</b>	<b>1991 (in %)</b>	<b>2001 (in %)</b>
Cultivators	42.0	25.0	18.4
Agricultural labourers	18.4	36.0	31.1
Household, Industry, Manufacturing	13.4	03.6	05.3
Other workers	26.2	35.0	45.2

Source: Tamil Nadu Human Development Report.

### Women Development, their contribution to economy

The potential of women should be realized and recognized for the well-being of any society and development of the nation. Tamil Nadu is a pioneer state which had encouraged the empowerment of women.

Women empowerment includes:

- Women's sense of self-worth
- Right to seek and decide upon choices;
- Right to have access to opportunities and resources; and
- Right to have control on their lives, both within and outside of their homes.

#### Do you Know?

Former UN Secretary General Kofi Annan has stated: "Gender

equality is more than a goal in itself. It is a precondition for meeting the challenge of reducing poverty, promoting sustainable development and building good governance".



### Strategies Adopted by Government of Tamil Nadu for Women Empowerment

Tamil Nadu Government has implemented several welfare schemes for women empowerment.

In order to empower women, the Science City has been organizing Entrepreneurship Development Programme (EDP) and

Entrepreneurship Awareness Programme (EAP) to bring out the talents of women and to make them prove their potential.

A Self-Help Group(SHG) is a group of women, organized for eradication of poverty. They agree to save regularly and convert their savings into a common fund known as the Group Corpus. The members of the group use this common fund through a common management. In Tamil Nadu the SHGs were started in 1989 in Dharmapuri District. At present 1,40,000 groups are functioning with 2.383 million members. Tamil Nadu Corporation for Development of Women Ltd arranges credit assistance for the successful groups through various schemes implemented by State as well as

Central Government. Tamil Nadu ranks first in witnessing economic well-being of the people involved in such SHGs.

### Human resource management

Since human resources are the most valuable of the resources of the earth, the people must be carefully managed so that everyone on the earth live peacefully. Human resource management aims at developing personal qualities in an individual so that he or she may contribute in a healthier manner for the national and world peace.

### Activity

List the qualities to be developed by each individual to live and let others live peacefully.

- 1
- 2
- 3
- 4
- 5
- 6



### EXERCISE

#### I) Choose the correct answer .

1. \_\_\_\_\_ has the highest percent of literates in the state.  
a) Karur                    b) Kanyakumari            c) Chennai                    d) Perambalur
2. The district which has the lowest density of population is \_\_\_\_\_.  
a) Sivagangai              b) Nilgris                    c) Kanyakumari            d) Thiruvallur

3. Population in Tamil Nadu has \_\_\_\_\_ over a period of 60 years from 1951 to 2011.

- a) increased      b) doubled      c) decreased      d) No change

4. Mountainous regions with steep slopes and forest covers supports \_\_\_\_\_ population.

- a) medium      b) more      c) small      d) very low

**II) Match the following.**

1. The annual growth rate	44%
2. Rural population	56%
3. Literacy percentage in Tamil Nadu	1.1 %,
4. Hindus	73.5 %
5. Urban population	88% 10 % 25%

**III) Give brief answers.**

- What are the factors that influence the distribution of population?
- What are self-help groups?
- Give reasons for considering people as a resource.
- Distinguish between birth rate and death rate.
- What are the aims of human resource management?
- List the qualities to be developed by each individual to live and let others live peacefully.

**IV) Answer in a paragraph.**

- Describe the distribution of population in Tamil Nadu.
- Write about the strategies adopted by the Government of Tamil Nadu for Women Empowerment.

**V) Mark the following on the given map of Tamil Nadu.**

Mark the regions of low density of population.

Mark the regions of high density of population.

**FORMATIVE ASSESSMENT**

- What are the reasons for a high density of population in cities like Chennai, Coimbatore and Madurai?
- Make a list of reasons as to why it is essential to develop the human resource in a place.

### 3. ENVIRONMENTAL ISSUES

#### Man and Environment

Development and environment are two sides of a coin. Development is highly essential for economic growth of a country but not at the cost of the environment. Man has lived continuously in harmony with nature. Man has transformed the environment by scientific and technological revolution. In recent years human intervention in the natural process has created ecological imbalance and environmental damages. Environment is the surrounding in which living organisms live and interact. Human beings are dependant on the environment for their basic needs. Needs multiply with the increase of population. To meet these needs, all natural resources in the environment are being used at a rapid rate which leads to long term adverse effect. These adverse effects become environmental issues of the entire surrounding in which human beings live.

Major environmental issues are:-

- Urbanization
- Deforestation
- Environmental pollution and
- Global warming.

#### Urbanisation

It refers to increasing inhabitants of people with non-agricultural occupation with a higher population density than the surrounding regions. The factors influencing urbanization are, industrialization, commercialization, dense network of transport and communication. The

level of urbanization in Tamilnadu is about 44% as per census of 2001. It is the second highest urbanized State in the country. In Tamilnadu, Sriperumbudur, Kancheepuram and



Arakkonam are being urbanized due to rapid industrialization and nearness to the Chennai City and due to this they face higher rate of environmental deterioration.

Unorganised encroachment and uncontrolled growth of slums that spring up on all available chunks of vacant lands, river margins and road margins have created an adverse impact on urban environment. The Tamil Nadu Slum Clearance Board has already taken steps and constructed nearly 3000 shelter units to replace the existing slums.

**Table: Slum families along Major Waterways**

Name of the river	No of slum families
Coovum River	8266
Buckingham Canal	18423
Adyar River	6624

**Source: Census 2001.**

## ACTIVITY

Find out any slum near your area and assess the living conditions.

## Notable impacts of urbanisation

- 1) Large areas of agricultural and pastoral lands around the City are getting converted into residential and industrial areas.
- 2) Increase in traffic and traffic congestion cause environmental pollution.
- 3) Clearance of trees and bushes to meet the fuel and construction needs has reduced the green cover which in turn reduces the amount of rainfall.
- 4) Loss of habitats of animals and birds and depletion of greenery has made the urban air polluted with less oxygen content.
- 5) A rapid increase in the urban population has resulted in the breaking down of sanitary facilities and other infrastructures in cities and towns.
- 6) Land value increases and rent becomes high due to stiff competition for land.

## Deforestation

Deforestation is simply the cutting down of trees. It has seriously affected the quality of environment by increasing the temperature, decreasing rainfall, top soil erosion, loss of bio-diversity and causes flash floods. Trees play an important role in maintaining the environmental balance.

## Long term effects of Deforestation

The long term effects are climate change and loss of bio - diversity. Climate change occurs due to an increase of green houses gases such

as carbon dioxide. An increase in carbon dioxide will increase the temperature of the earth and will therefore alter the weather.



**Deforestation**

Deforestation ruins the habitat of the animals and plants causing them to die. Destruction of forest affect the beauty of an area and directly exerts an impact on tourism.

## Short term effects of Deforestation

Fast depletion of forests urges rural people to use inferior quality firewood and make them spend more time on fuel collection. Shortage of forests also force the villagers to use more commercial fertilizers in the place of organic manures. Fodder for grazing cattle diminishes resulting in decreasing number of live stock. Loss of green cover leads to soil erosion. Landslides occur due to in discriminate cutting of trees(Ooty and Coonoor).

## Activity

### List the uses of a tree

- 1)
- 2)
- 3)
- 4)
- 5)



## Bio Diversity

A wide variety of living organisms including plants, animals and micro organisms are collectively referred to as bio diversity.



**Bio diversity**

Today, human beings are largely to be blamed for their irrational activities that cause bio diversity losses.

## Loss of Bio Diversity

Extinction of plants and animals due to natural causes or human activities is called loss of bio diversity. It leads to an ecological imbalance.

Major threats to biodiversity in Tamil Nadu are:

- 1) Uncontrolled commercial exploitation of natural resources like forest, coastal areas, wetlands and habitat destruction.
- 2) Conversion of rich bio diversity sites for human settlements and industrial development.

## ACTIVITY

Areas in Pitchavaram and Muthupet with dense mangroves suffered due to human encroachment. (Guess what human activities threaten these areas)

To protect the biosphere, biosphere reserves have been set up in the Nilgiris and Gulf of Mannar.

The main objectives of the reserves are:-

1) To conserve the genetic diversity of species and to restore degraded ecosystems to their natural and original conditions.

## Do you know?

**Common household items derived from killing animals:**

1. Paint brush - from wild boar and mongoose
2. To produce 100 gm of silk - about 1500 silkworms are boiled to death
3. Silver foil - Ox-gut is used (intestine)
4. Lac - To produce 1 kg. of lac 300,000 insects are killed.

## Global Warming

Global Warming may be defined as an increase in the atmospheric temperature near the earth surface due to rise in carbon dioxide levels and the greenhouse effect.

## Causes of Global Warming

The main causes of Global Warming are,

- Emission of greenhouse gases like carbon di-oxide, methane, nitrous oxide and chlorofluorocarbon.
- Burning of fossil fuels (coal and petroleum) and aggravated deforestation.

## Effects of Global Warming

- 1) Heat waves and fluctuating weather cause diseases and warming up of Antarctic and Arctic oceans.
- 2) Sea level rise and coastal flooding due to glaciers' melting.
- 3) Coral reef bleaching due to change in ecosystem.
- 4) Frequent drought, fire and heavy snowfall.



**Melting of Glacier**

### **Control of Global Warming**

A few controlling measures are:

- 1) Switching over from non-renewable energy sources to renewable energy.
- 2) Stopping the emission of greenhouse gases.
- 3) Afforestation and encouraging people to use public transport.

### **Role of man in protecting the deteriorating environment**

It is now the duty of every citizen of the world to conserve all the resources and aim at sustainable development. Human beings need to change their lifestyle and realize that they should take special responsibility towards protection of the environment. The following are the steps to be taken for protecting our green earth from degradation.

- 1) Maintaining harmony with the nature and protecting the environment
- 2) Eco-development eco-efficiency and eco-friendly technology for the protection of natural resources.
- 3) Switching off the unused lights and electrical equipment at home and save fuel in transport.
- 4) Stabilising the population growth,

control of overconsumption of natural resources and preservation of biodiversity.

### **Pollution**

Substances released into an environment that cause harm to living organisms and built up structures are called pollution. Any substance that causes pollution is called pollutant. Pollutants are of two types: chemical and biotic. Our planet is getting choked with poisonous gases released from industries and vehicles. The problem is worse in crowded metropolitan cities. On the basis of sources, they are classified as

- 1) Air pollution;
- 2) Water pollution; and
- 3) Noise pollution

### **Air pollution**

The air which contains traces of undesirable gaseous, liquid or solid components that creates health hazard is called polluted air.



**Air Pollution**

These undesirable components in air adversely affect the health of the living beings and respiratory diseases are caused due to air pollutants.

### **Chief sources of air pollution**

- 1) Industrial wastes;
- 2) Automobiles;

- 3) Domestic wastes;
- 4) Thermo -nuclear wastes;
- 5)Volcanic wastes and forest fires.

In Tamil Nadu air pollution is heavy and widespread in urban areas due to vehicular growth, higher concentration



**Vehicular pollution**

of industries along with thermal power plants and indiscriminate burning of garbage and refuse.

#### **Effects of air pollution**

- 1) Global warming;
- 2) Acid rain;
- 3) Ozone depletion;
- 4) Smog; and
- 5) Health problems

#### **Find the chemicals by substituting the missing letters**

#### **Harmful effects of certain chemicals**

- 1) L\_\_d-can damage the working of the kidneys and intestines.
- 2) M\_\_\_y\_\_ can lead to paralysis and mental retardation
- 3) C\_\_\_\_nmo\_\_\_\_\_e\_ reduces oxygen carrying capacity of blood
- 4) \_it\_\_gen d\_\_ xi\_\_ causes irritation in the eyes
- 5) Su\_\_r \_\_\_xide\_ causes severe lung ailments
- 6) Hy\_ \_gen\_ \_phide causes sore

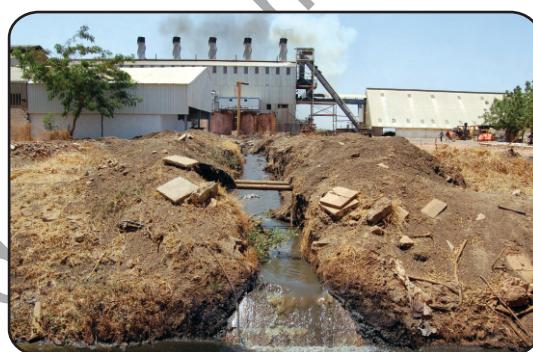
throat, takes up the iron from blood.

7) It causes acute poisoning of tissues. (hydrogen sulphide, sulphur dioxide, tin, nitrogen dioxide, carbon monoxide, mercury and lead)

#### **Water Pollution**

**Contamination of water is due to pollutants released from**

1. Sewage and domestic wastes.
2. Pesticides and agricultural run offs;
3. Industrial wastes;
4. Nuclear wastes;
5. Oil spills.



**Water Pollution**

#### **Harmfull effects of water pollution**

- 1) It destroys microorganisms in water and affects aquatic life.
- 2) It causes water borne diseases such as cholera, jaundice, dysentery and typhoid.
- 3) Damages crops, decreases agricultural production due to deterioration of soil quality and fertility.
- 4) Oil spill results in death of sea organisms.

#### **River Pollution in Tamil Nadu**

Most of the rivers of Tamilnadu are non-perennial in nature. Due to irregular supply of water the rivers are mostly used to carry effluents of

tanneries, textile bleaching, dyeing and hospital wastes.

The indiscriminate discharge of effluents from textile bleaching and dyeing units in and around Tiruppur, Erode and Karur areas have caused pollution in the river system of Noyil and Amaravathi. Effluents from tanneries is the main reason for land quality deterioration in the Palar river basin of Vellore district. Most towns located along the banks of four major rivers cause sewage pollution. The Kaveri river receives sewage from 11 towns, Palar from 6 towns, Vaigai from 5 towns and Tamiravaruni from 3 towns.

The Government imposed a total ban on setting up of highly polluting industries close to important water sources such as the Kaveri and its tributaries, Ponnaiar, Palar, Vaigai and Tamiravaruni. Tamil Nadu Pollution Control Board (TNPCB) has set up a special monitoring cell in the head office for monitoring the highly polluting industries. Ooty, Kodaikanal and Yercad lakes are monitored by GEMS (Global Environment Monitoring System). Chennai City River Conservation Project has taken up Cooum River, Buckingham Canal, Adyar River, Otteri Nallah and Mamblam Canal for cleaning up.

### Soil and land pollution

Land pollution is the contamination of land by solid wastes. Any substance that reduces the productivity of the soil and lessens the quality is known as a soil pollutant and the process is known as soil pollution.

### Sources of soil and land pollution

Land pollution is caused due to dumping and accumulation of solid wastes from agricultural, industrial and urban sources.



**Dumping of Waste on land**

The excessive use of artificial fertilizers and pesticides greatly reduce the quality and fertility of the soils.

**Table : Solid wastes generated in major cities of Tamil Nadu**

City	Tons/Day
Chennai	3500
Madurai	711
Coimbatore	710
Trichy	408
Salem	330
Tirunelveli	210

### Effects of soil pollution

Harmful chemicals enter food chain and cause harmful diseases. Pesticides affect the central nervous system, liver and damage reproductive organs.

### Noise pollution

Noise can be defined as the unwanted and undesirable sound. Noise pollution is severe in the industrialized, urbanized and thickly populated regions of Tamil Nadu. Ambient noise level in Chennai is about 75-80 decibels, Coimbatore 80-85 decibels and Madurai 70-75 decibels.

### Harmful effects of noise pollution

- 1) It causes loss of hearing, headache, mental disorder, anxiety and stress.
- 2) Excessive noise causes vibration in buildings .

- 3) Disturbs sleep which leads to irritability and nervous disorder.
- 4) The fertility of living organisms gets reduced considerably due to noise pollution.

The Tamil Nadu Government has taken several steps to protect and preserve the environment. They are:

- 1) Rehabilitation and reclamation of forest resources through afforestation.
- 2) National Green Corps: It is mainly to strengthen environmental awareness among school children. The programme was launched in 29 districts at the rate of 100 schools per district. Nearly 3 lakh children are participating in this programme.
- 3) Environmental awareness camps, competition and eco-celebration:

Special days like World Environment Day (June 5) Earth Day (April 22), Ozone Day (September 16) are celebrated every year.

- 4) Segregating solid wastes into different types on the basis of degradation through waste management.

#### 5) Electronic Waste Management

The increasing pace of IT and Electronic industries generate 70% of e-wastes and should be disposed through the authorized recyclers as approved by the TNPCB.

- 6) In order to control the emission from goods transport vehicles, vehicle emission monitoring stations are set up in Chennai by the TNPCB at Alandur, Madhavaram and Ambattur areas and in the other districts at Nilgris, Dindigul, Palani and Chengalpet. Three monitoring stations have been established at Guindy,

Vyasarpadi and Thirumangalam in Chennai to check vehicular emission. There are 46 air pollution monitoring stations in the city of Chennai.



**Electronic waste**

- 7) To create SINGARA CHENNAI, parks, flyovers, bridges, modernization of beaches and relaying of footpaths and roads, besides clearing encroachments have been undertaken.

#### Do You Know ?

House Sparrows are not found now-a-days due to electromagnetic waves from mobile towers.

Tiger population is going down rapidly due to poaching.



## EXERCISES

### I) Choose the correct answer.

1. The surroundings in which organisms live and interact is called \_\_\_\_\_.  
a) Environment      b) Ecosystem      c) Lithosphere      d) Biosphere
2. The process of clearing the forests by human is called as \_\_\_\_\_.  
a) Afforestation      b) Deforestation      c) Cultivation      d) Attrition
3. The process by which an ecosystem species become extinct is known as \_\_\_\_\_.  
a) Loss of biodiversity      b) Deforestation      c) Acid rain      d) Bio-diversity
4. The excessive use of artificial fertilizers greatly reduces the quality of \_\_\_\_\_.  
a) Air      b) Soil      c) River      d) Sea

### II) Match the following.

- |                    |  |
|--------------------|--|
| 1. Global warming  | pesticides   |
| 2. Deforestation   | air pollution  |
| 3. Automobile      | unauthorized encroachment                              |
| 4. Water pollution | $\text{CO}_2$  |
| 5. Urbanisation    | coastal flooding<br>$\text{H}_2\text{O}$<br>Congestion |

### III) Answer in brief.

1. What are the major environmental issues?
2. What is global warming?
3. What is deforestation?
4. Name some of the greenhouse gases.
5. What is pollution?
6. What is urbanization?
7. What are the main threats to biodiversity?
8. What are the sources of land pollution?

### IV) Answer in a paragraph.

1. What are the effects of global warming?
2. What are the main objectives of the biosphere reserves?
3. Mention the areas of water pollution in Tamil Nadu and what steps have been taken by the Government to stop it?

4. What steps have been taken by the Tamil Nadu Government to protect and preserve the environment?
5. What are the adverse effects of deforestation?

### FORMATIVE ASSESSMENT

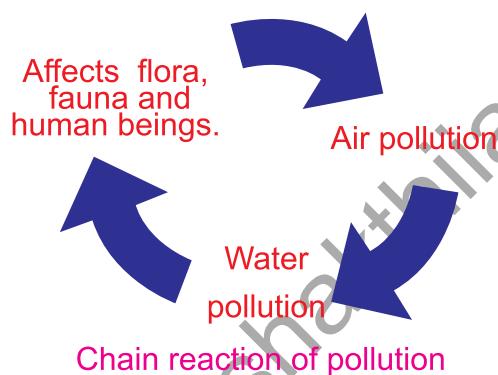
1. Collect information on various Environmental issues other than what is mentioned in your textbook.
2. Discuss the Environmental problem faced in your locality.
3. Walk around your school and note down the various causes of pollution.
  - a. Collect or draw pictures of the most polluted areas of the school.
  - b. Suggest ways to overcome the problem.

(Look for pollution due to use of plastics, emission from cars, lack of trees, Noise pollution etc.)

## 4. CONSERVATION OF RESOURCES AND SUSTAINABLE DEVELOPMENT

Nature is generous in providing a variety of resources to the people. Humans in modern civilization, with advanced development in science and technology, utilize these resources beyond permissible limits. It has lead to environmental degradation. In response to it, humans have been forced to think of conservation and preservation of all kinds of resources.

Resources are valuable and are mandatory for life. The existence and purity of one resource reflects the status of the other and finally the human beings. Therefore proper management techniques should be adopted for retaining the uniqueness of these natural resources.



### Activity

- 1) Draw a flow chart to represent the chain reaction of the ill-effects of pollution in your locality.
- 2) Find the source of pollution
- 3) Interact with other students to know the intensity of the ill-effects of such pollution.
- 4) Find few methods to reduce the ill effects.
- 5) Conduct an awareness programme regarding this, among other students and the public.

Conservation of resources means a judicious and planned use of natural resources so that the different resources are also left over to the benefit of the future generations. Preservation is to protect the resources without using it for a longer duration.

### Conservation of land resources

Soil is the most important land resource as it provides room for all human activities. In Tamil Nadu soil erosion by wind is very common in Kambam valley, parts of Thirunelveli, Thuthukudi and Ramanathapuram. Soil erosion by river flow and deforestation occur along the hill slopes of the Western Ghats. Several soil erosion control schemes have been successfully implemented by the Tamil Nadu government. Tamil Nadu Agricultural Department has set up soil testing laboratories at the village level to help farmers with the scientific assessment of soil quality and treating method. Every district has a soil research station to help the farmers in assessing the fertility of the soils. Soil conservation is done in two ways: namely restoring soil fertility and preventing soil erosion.

### Do you know?

A Soil health card is issued to the farmers to monitor the soil status. There are also 16 mobile soil testing laboratories to serve the villages in Tamil Nadu.

<b>Conservation</b>	<b>Preservation</b>
<p>1) Afforestation is one of the method to conserve forests.</p> <p>2) Drip irrigation is one method to conserve water.</p> <p>3) Seasonal shearing of fur of animals is one of the methods of conservation.</p> <p>4) Protecting animals in their habitats is also conservation.</p>	<p>1) Declaring an area as a reserve forest is preservation.</p> <p>2) Percolation tank is a technique for preserving underground water.</p> <p>3) Reproduction of endangered animals in captivity is preservation</p> <p>4) Delimiting an area for biosphere reserve is preservation.</p>

### Types of soil erosion and conservation methods



Sheet erosion



Gully erosion



Wind erosion



Intercropping



Contour ploughing

Restoring soil fertility



Terrace farming



Farm waste and garbage

$$+ \text{ circle with dots} =$$

plus beneficial bacteria and fungi



equals biofertilizer

## Conservation of Forests and Wildlife in Tamil Nadu

TamilNadu has 17% of its land area under forest cover. Forests are rain harvesters, rechargers of soil moisture, reservoirs for underground water, habitats for variety of fauna and flora, and stabilizers of environment. For constant supply of forest products in a region at least one-third of the area should be under forests.

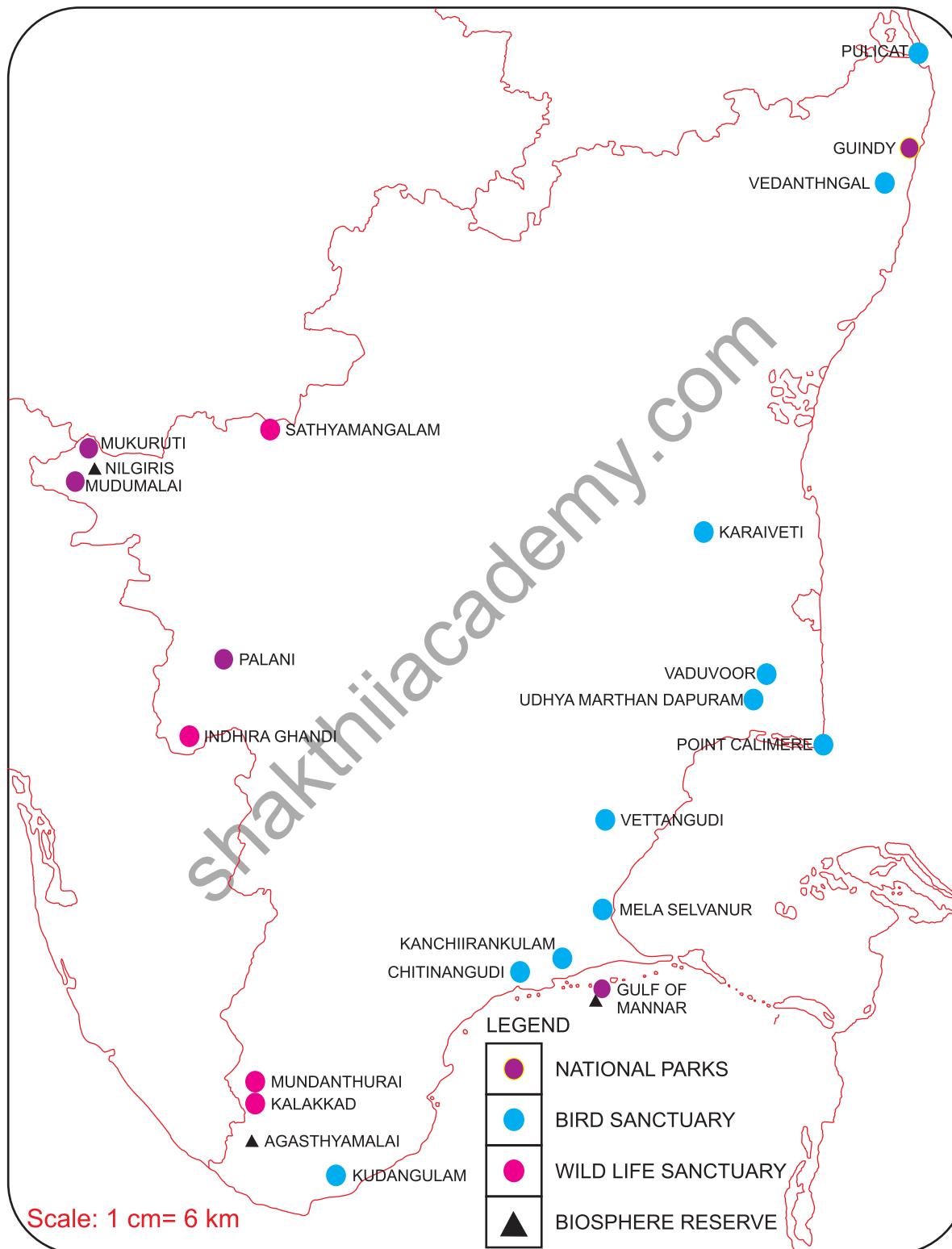
Many afforestation programmes are carried out in Tamil Nadu by both governmental and non-governmental organizations. The trees are planted along the road sides, railway tracks, river banks, and catchment areas

under social forestry schemes. The vacant lands available in villages are brought under community forest schemes. A comprehensive programme to retain the ecological balance and maintain the bio-diversity has been undertaken as Peoples' Participatory Programme in selected areas. There are 13 Bird Sanctuaries 5 National Parks and 7 Wildlife Sanctuaries in Tamil Nadu. Birds from arctic region visit the sanctuaries in Tamil Nadu every year during the winter season for breeding. Like the Project Tiger, Project Elephant has been launched by the Government to save elephants from extinction.

**Table: Bird Sanctuaries and Wildlife Sanctuaries of Tamil Nadu**

1) Chitrangudi Bird Sanctuary	Ramanathapuram District
2) Kanjirankulam Bird Sanctuary	Ramanathapuram District
3) Melaselvanur - Kilaselvanur Bird Sanctuary	Ramanathapuram District
4) Gulf of Mannar Marine National Park	Ramanathapuram District
5) Karaivetti Bird Sanctuary	Ariyalur District
6) Koothankulam Bird Sanctuary (Largest Reserve)	Thirunelveli District
7) Kalakkad Wildlife Sanctuary Tiger Reserve	Thirunelveli District
8) Mundanthurai Sanctuary	Thirunelveli District
9) Point Calimere Wildlife and Bird Sanctuary	Nagapattinam District
10) Pulicat Lake Bird Sanctuary	Thiruvallur District
11) Udayamarthandapuram Bird Sanctuary	Thiruvarur District
12) Vaduvoor Bird Sanctuary	Nagapattinam District
13) Vedanthangal Bird Sanctuary	Kancheepuram District
14) Vellode Bird Sanctuary	Erode District
15) Sathyamangalam Sanctuary	Erode District
16) Vettangudi Bird Sanctuary	Sivagangai District
17) Mudumalai National Park	Nilgiris District
18) Mukurthi National Park	Nilgiris District
19) Mudumalai Wildlife Sanctuary	Nilgiris District
20) Guindy National Park	Chennai District
21) Palani Hills National Park	Dindigul District
22) Grizzled Squirrel Wildlife Sanctuary	Virudhunagar District
23) Indira Gandhi Wildlife Sanctuary	Coimbatore District
24) Kanyakumari Wildlife Sanctuary	Kanyakumari District

## Tamil Nadu National Parks and Wild life Sanctuaries



### Activity

Name the sanctuaries located nearby in your district. List birds, animals and plants known in that sanctuary.

### Birds of Tamil Nadu

The following are the list of birds that are native to Tamil Nadu.



Spot-billed Pelican



Common spoonbilled stork

Spot-billed Pelicans, Cormorants, Egrets, Grey heron, Stork, White Ibis, Common Spoonbills Flamingos Teals, Gulls, Terns, Plovers and Stilts Little Cormorant, Darter, Indian Reef Heron, White necked stork, Black-headed Munia, White-breasted Kingfisher, Spotted Dove, Pintail Ducks, Darter Asian Openbill Stork and Night Herons. Apart from these, migratory birds such as Garganey, Teals, Shovallers also can be seen in the state.



Painted stork

### Animals of Tamil Nadu

Tiger, elephant, Nilgiri tahr hare, squirrel, dugong, sea turtles dolphin, chital black buck, grizzled giant squirrel, flying squirrel, tree shrew, panther, sloth bear, wild boar, dhole, Nilgiri languor, and lion-tailed Macaque are the common animals of Tamil Nadu.

Appiko movement synonymous to chipko movement, started in Karnataka and spread over forests of Eastern Ghats in Tamil Nadu. This is a comprehensive people's participatory movement. It aims at saving the remains of tropical wet evergreen forests in the Western Ghats. It is initiated to restore the denuded forest areas, to propagate the rational use of forest products and to relieve the pressure created on forest resources. The popular slogan for this movement is “**to save, to grow, and to use rationally**” Alternative energy sources have been popularized among the villages which have reduced firewood consumption to nearly 40% in Southern India.

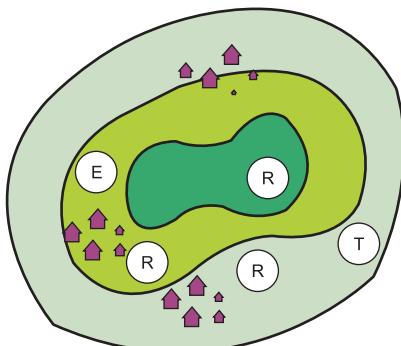
### Do you know?

The UNESCO's Man and the Biosphere Programme (MAB) was established in 1977 to promote an interdisciplinary approach in research, training and communications in ecosystem conservation and rational

use of natural resources. This resulted in forming 553 biosphere reserves in 107 countries of the world.

### Biosphere Reserves

Biosphere reserves are a series of protected areas linked through a global network, intended to demonstrate the relationship between conservation and development. It consists of;



**Model of biosphere reserve**

- Core Area
- Buffer Area
- Transition Area
- ▲ Human Settlement
- (R) Research
- (E) Education / Training
- (T) Tourism/ Research

- An inner core area which is well protected.
- A buffer zone with facilities for education training and research.
- An outer transition area for tourism and recreation.

Tamil Nadu has three such Biospheres in Nilgiris, Gulf of Mannar and Agastiyamalai.

### Do you know?

The notable governmental and non-governmental organizations that are actively engaged in conserving medicinal plants of Tamil Nadu are

- 1) FRLHT(Foundation for Revitalization of Local Health and Traditions)

- 2) Tamil Nadu Forest Department
- 3) DANIDA (Danish International Development Agency).

Tamil Nadu Forest Department has initiated two methods to conserve medicinal plants in the forests with the help of non-governmental organizations. As a part of it Medicinal Plants Conservation Areas (MPCA) have been identified to protect the endangered species of plants. There are 11 MPCAs in Tamil Nadu in the following places:

- 1) Alagarkoil
- 2) Kodaikanal
- 3) Kolli Hills
- 4) Kurumbaram
- 5) Kuttralam
- 6) Mundanthurai
- 7) Ambasamudram
- 8) Pechiparai
- 9) Thaniparai
- 10) Thenmalai and
- 11) Top Slip

Medicinal Plants Development Area (MPDA) is yet another method which aims at restoring degraded forests by raising the native plants with community participation.

There are eight such MPDAs in Tamil Nadu. They are at :

- 1) Attur
- 2) Chengalpattu
- 3) Coimbatore
- 4) Dharmapuri
- 5) Doddabetta
- 6) Madurai
- 7) Salem and
- 8) Vellore

### Activity

Name a few medicinal herbs and their usage.

Example: Thulasi is used as medicine for cough and common cold.

### Wetland conservation

Areas of marshy land not exceeding 6 m depth with or without permanent water, is classified as **wetlands**. A wetland has a prominent role in groundwater recharge. A wetland area directly or indirectly support many people and is a salient caretaker of the entire region. Tamil Nadu has such wetland areas in the following places: Point Calimere, Kazhuveli in Villupuram, Pallikaranai in Chennai, Muthupet, and Pichavaram and in a few pockets of Ramanathapuram district. Government has taken steps to restore these regions, realizing the immense benefit they provide for the entire surroundings.

### Conservation of water

Water is the basis for life. It is essential to conserve water and to protect water from being polluted. Watershed management is the comprehensive method to conserve water not only during heavy rains when rivers and tanks are over-flowing but also during dry season when they are devoid of water. Linking rivers which have surplus water with rivers in deficit areas is a wise suggestion to manage the twin problems of flood and drought.

### Common practices of conservation of water are

- 1) Wastage of water should be avoided.
- 2) Rainwater harvesting methods and construction of small check dams to arrest water from runoff and to store water for ground water recharge.

3) Recycling of water wherever possible.

4) Grow more trees. Trees act as sponge in absorbing excess water and recharge the underground water reserve.

### Activity

Look at these pictures and discuss about issues of water.

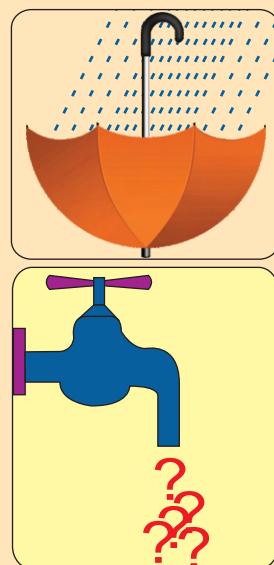
Do you pay for your potable water?

List the possibilities of saving water in your neighbourhood.

Write slogans to save water, like “**Do not watch rain, catch rain**”.

### Activity

As an individual list the possible ways by which one can reduce the amount of water used everyday.



List the ways by which wastage is avoided and yet sufficient water is supplied to plants in agriculture.

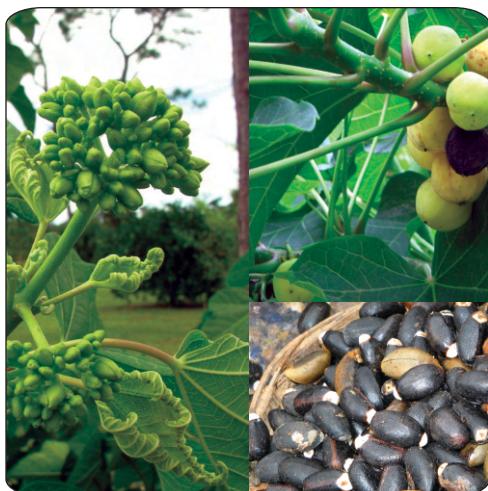
Find out by discussion how to use recycled water in industries.

### Conservation of Energy

Energy produced by conventional resources is definite to be exhausted in future. Therefore, every country is

trying to trap energy from renewable resources like energy from winds, waves, bio-gases, and bio-fuels. Under the scheme Bio-Gas Development Programme Tamil Nadu has installed 1,285 Bio-Gas plants up to March 2008. Tamil Nadu Government is a pioneer in bio-fuel production. It is one among the nine states to use 5% ethanol blended fuels for vehicles since 2003.

The state Forest Department, Government of Tamil Nadu has established Karanja based biodiesel esterification plants at three locations. These plants are based on the TNAU model developed at Hosur and Thuthukudi Forest Division.



Jatropha plant and seeds

#### Do you know?

Esterification is the general name for a chemical reaction in which two reactants form an ester as the reaction product. Ester is used in fragrance and flavour industry for their pleasant, fruity odour.

Seeds of Jatropha plant is used in the production of biofuel. Other seeds used in the production of biofuels are neem, karani and pungam.

Any developmental programme aiming at development of a place should meet the needs of the present generation without compromising the right of the future generations to do so. This is known as Sustainable Development.

Conservation and preservation are not only for natural regions and resources but also for the large built-up areas in cities. Eco-friendly building materials and techniques are emerging in the market in order to conserve and preserve our natural resources without sacrificing our comforts.



It is very important to realize that the nature's gift, in the form of resources should go to the hands of next generation with minimum damage.

## EXERCISES

**I) Choose the correct answer .**

- 1) In Tamil Nadu soil erosion by \_\_\_\_\_ is very common in Kambam valley.  
 a) wind      b) river      c) glacier      d) wave
- 2) For constant supply of forest products in a region at least \_\_\_\_\_ of the area should be under forest.  
 a) three-fourths    b) two-thirds    c) one-third    d) one-fifth
- 3) Seasonal shearing of fur of animal in captivity is \_\_\_\_\_.  
 a) conservation    b) preservation    c) protection    d) destruction
- 4) Protecting animals in their habitat is in  
 a) Preservation    b) Sanctuary    c) Park    d) zoo
- 5) Garganey, Teals and Shovallers are \_\_\_\_\_ birds.  
 a) migratory    b) native    c) captivity    d) domestic

**II) Match the following.**

- |                   |   |
|-------------------|---|
| 1) Gulf of Mannar | Tiger reserve   |
| 2) Point Calimere | Elephant reserve  |
| 3) Agastiyamalai  | Marine sanctuary  |
| 4) Mudumalai      | Bird sanctuary  |
| 5) Mundanthurai   | Biosphere reserve<br>reserve forest<br>squirrel sanctuary |

**III) Give brief answers.**

- 1) Give reason for conservation and preservation of all kinds of resources.
- 2) Distinguish between conservation and preservation.
- 3) Distinguish between MPCA and MPDA
- 4) Define Sustainable Development.

**IV) Answer in a paragraph.**

- 1) What are the common practices of conservation of water?
- 2) What are the methods of soil conservation?
- 3) Write a note on the Appiko movement.
- 4) What is a bio-sphere reserve.

**V) Mark the following on a given map of Tamil Nadu .**

- 1) Bird sanctuaries, National parks, Biosphere reserves.

### FORMATIVE ASSESSMENT

1. List out the medicinal qualities of the things which are used to cook our heritage food . Ex. Ginger.
2. Memorise the impact of Tsunami in the coastal districts. Know about the natural disaster warning centers of our state.
3. Coin slogans to explain the needs for the development of non conventional energies.

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# SHAKTHII ACADEMY

## SOCIAL STUDIES - GEOGRAPHY

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- Banking Awareness**: A red book cover with three people at a computer and the word "BANK" in large letters. It includes the text "Rs. 70".

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Between 10 AM to 7 PM

# GEOGRAPHY

## 1. India - Location and Physiography

### LOCATION

India is the large country located in South Asia with rich civilization. It has often amazed and intrigued the rest of the world for its capacity for survival and maintenance of its timeless traditions. Its cultural influences had crossed its borders and reached East Asia and South East Asia.

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**'.

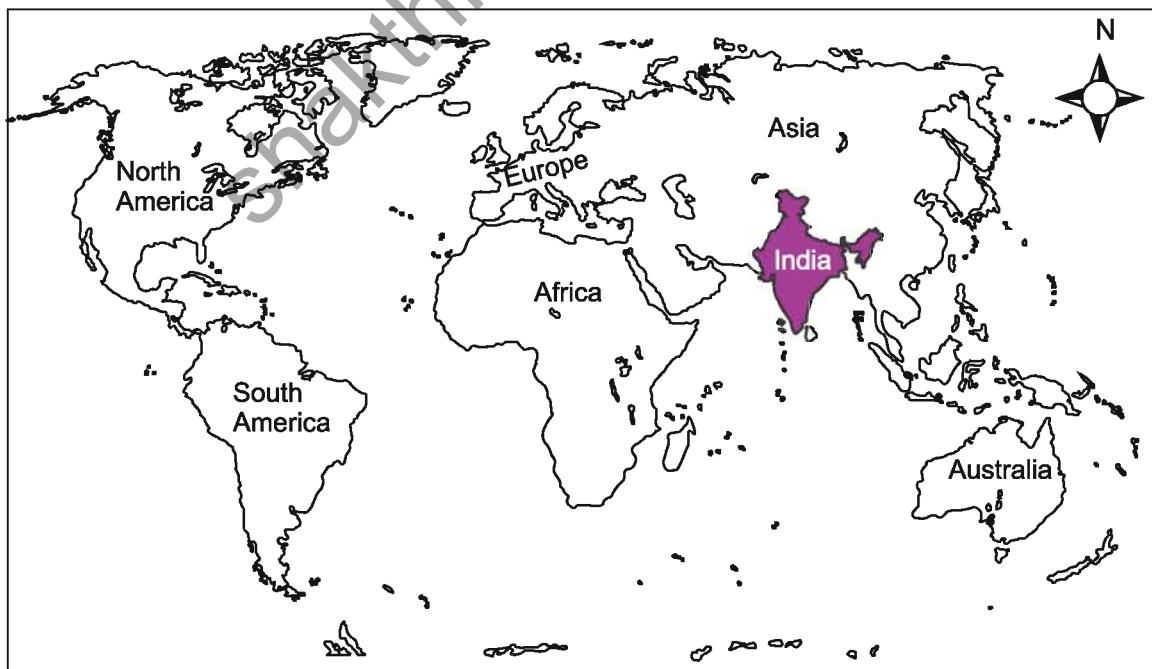
The name '**Bharat**' refers to the ancient, mighty king Bharat and the name '**Hindustan**' is given after the river Sindhu. The Europeans afterwards started referring to this country as '**India**' a derivative of the word '**Sindhu**'. Today, the officially recognized name of the country is India.

### India, a subcontinent

A continent possesses distinct characteristics of diverse,

- 1) Physical features,
- 2) Climatic conditions,
- 3) Natural vegetation,

**Location of India in the World**



- 4) Cultural norms,
- 5) Ancient ethnic and linguistic groups and
- 6) 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.

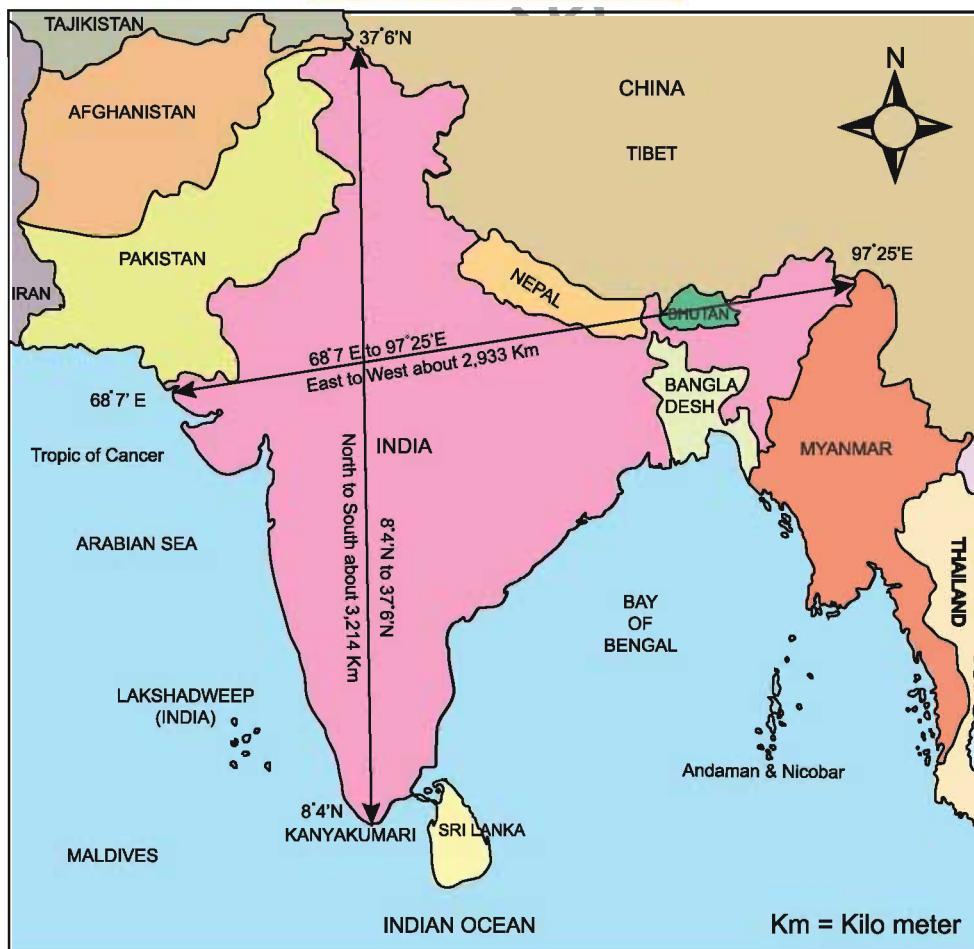
India extends from  $8^{\circ}4'N$  to  $37^{\circ}6'N$  latitudes and  $68^{\circ}7'E$  to  $97^{\circ}25'E$  longitudes. The Tropic of Cancer  $23\frac{1}{2}'N$  runs across the country and divides it into two equal halves. -

### Tropical and Temperate regions

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 2,933Km. Length of Coastline of Indian mainland is 6000 km. It has coastline of about 7,516km 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  $82^{\circ}30' E$  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** ( $0^{\circ}$  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  $82^{\circ}30'E$  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

Palk Strait separates India and Sri Lanka on the South. The Himalayas provide a natural boundary on the north. Arakan Yoma mountain range in the east separates India from **Myanmar**. India has the following neighbouring countries. They are: 1. **Pakistan** in the west, 2. **Afghanistan** in the north west, 3. **Nepal, Bhutan and China** in the north east and 4. **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.

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 Malabar coastal plain is 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 Zorastrianism 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.

## 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	Bengaluru	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 recent land forms of earth.

### 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.

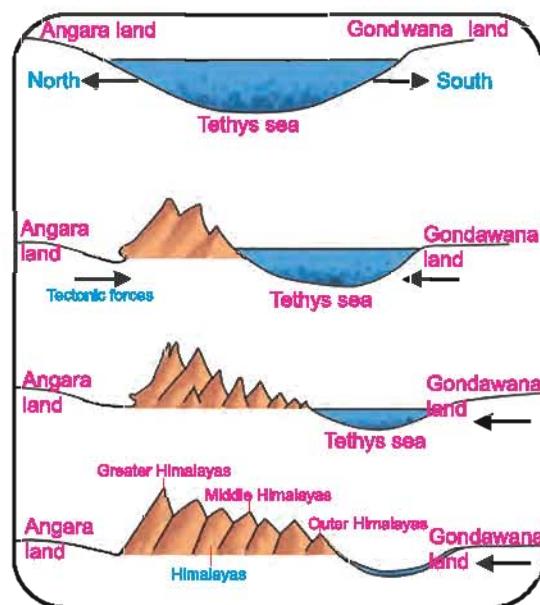
It extends, in the shape of an arc, for a distance of 2,500 km from west to east between the Indus gorge in Jammu and Kashmir in the west and Brahmaputra gorge in Arunachal Pradesh in the east. Many of the ranges rise more than upto 8,000 metres above the mean sea level.

These mountains extend through the states of Jammu and Kashmir, Himachal Pradesh, Uttar Pradesh, Uttarakhand, West Bengal, Sikkim and Arunachal Pradesh.

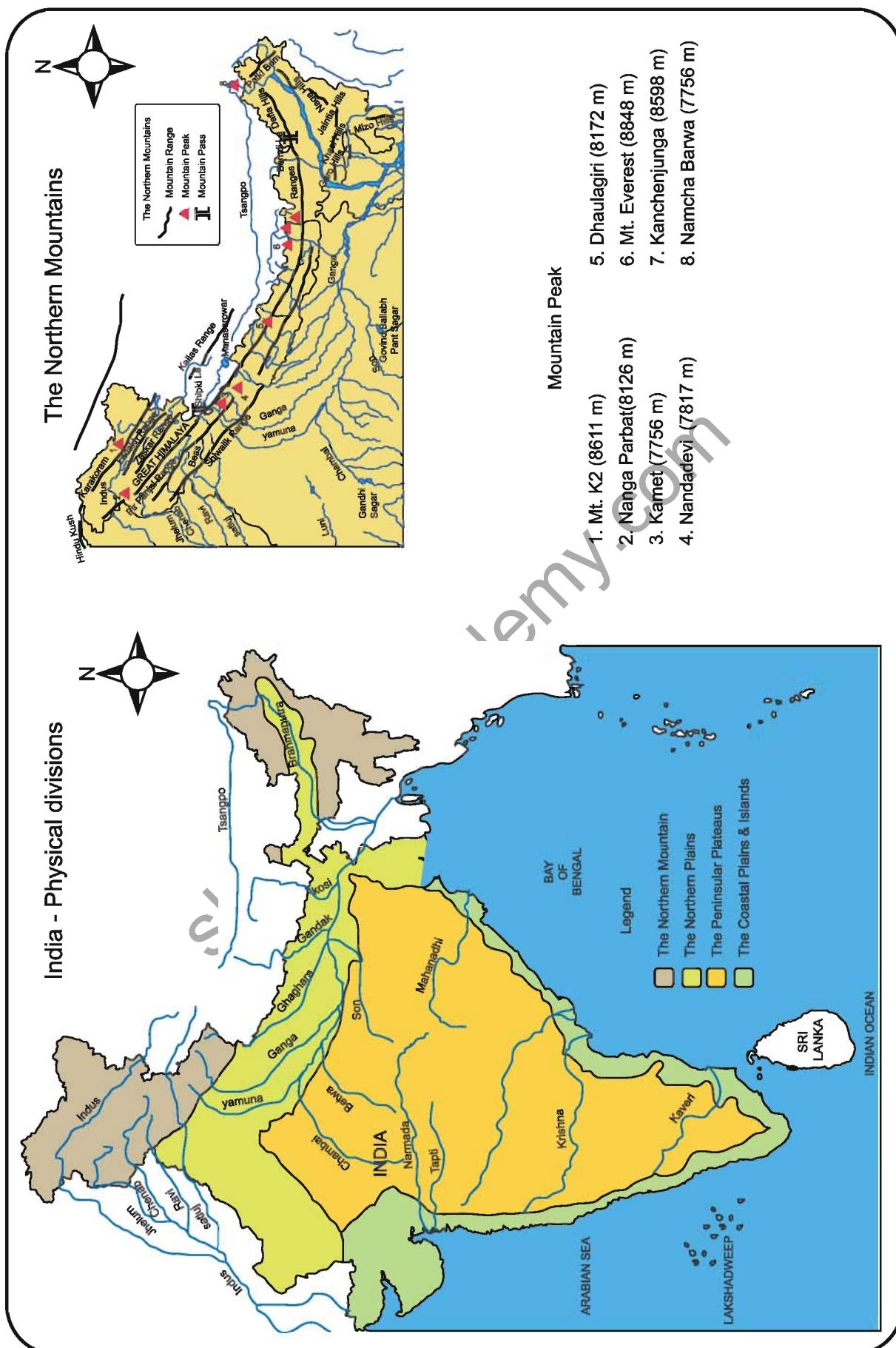
### Formation of Himalayas

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**



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 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 Afghanistan 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.

There are three parallel ranges found in the central Himalayas from north to south. They are:

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

#### **i) Himadri or Greater Himalayas**

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 **Jelepla** in Sikkim are the most important passes across Himadri.

#### **ii) Himachal or Lesser Himalayas**

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, Pahalgam, 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 or Outer Himalayas

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. Purvachal or 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 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 sinks 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**, (**Puskar 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 southwest 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 Sutlej, 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 Sutlej 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.



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. It is an example for relic mountain.

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**

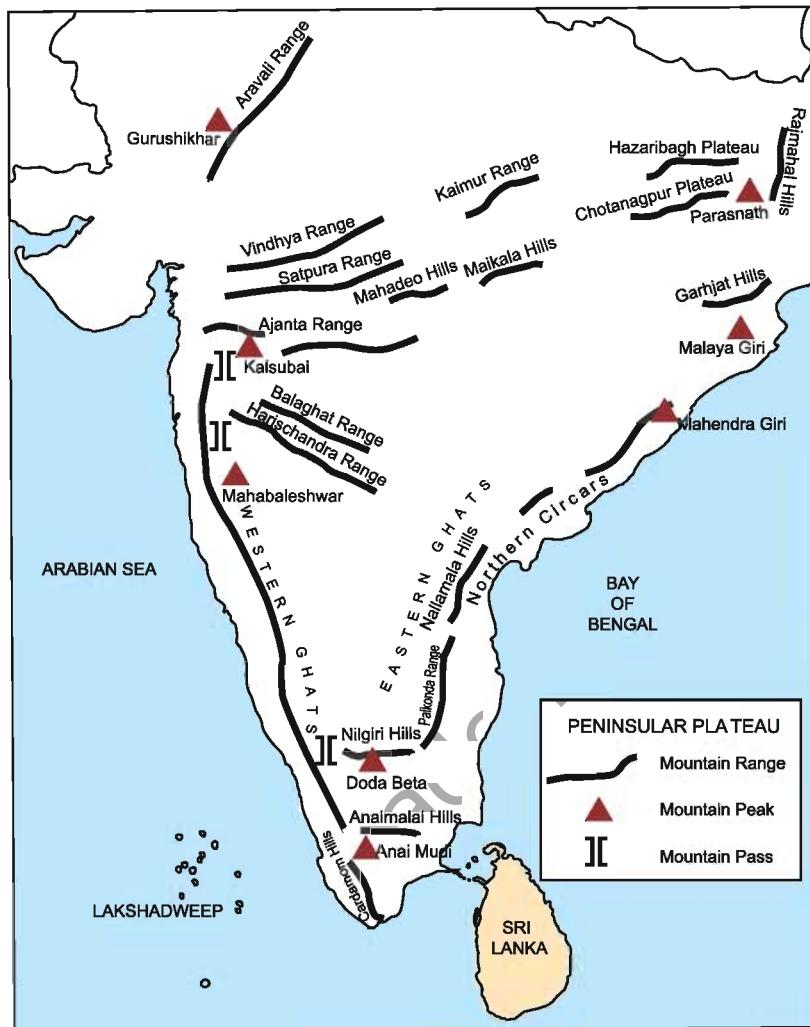
point from which hill ranges, like Anaimalai in the north, Palani in the northeast and cardamom in the south radiate. The western Ghats terminate about 20km north of cape comorin. Kodaikanal is a hill station which lies in the southern tip of the Palani hills.

### 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, Yercaud, Pachamarghi (MP), Mahabaleshwar, etc.

### 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 Andhraplain.

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 seas. 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
❖ The Himalayan rivers like Indus, Ganga and Brahmaputra originate from the snow - covered mountains.	❖ The Peninsular rivers like Mahanadi, Godavari, Krishna, Kaveri, Narmada and Tapti originate from the peninsular plateaus.
❖ These rivers have large basins and catchment areas.	❖ These rivers have small basins and catchment areas.
❖ These rivers flow through deep, nearly I - Shaped valleys.	❖ These rivers flow through broad and shallow valleys.
❖ These rivers are perennial in nature and receive water both from the monsoons and the melting of snow.	❖ These rivers are seasonal as they receive water only from the monsoon rains.
❖ Due to their perennial nature, these rivers are very useful for irrigation.	❖ Due to the seasonal nature, these rivers are not very useful for irrigation.
❖ These rivers are suitable for navigations as they flow over plain areas.	❖ These are not suitable for navigation as they flow over uneven land in the plateau region.
❖ These rivers form large deltas near their mouth like the Ganga-Brahmaputra delta.	❖ The west flowing rivers mostly form estuaries and the form smaller deltas.

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.

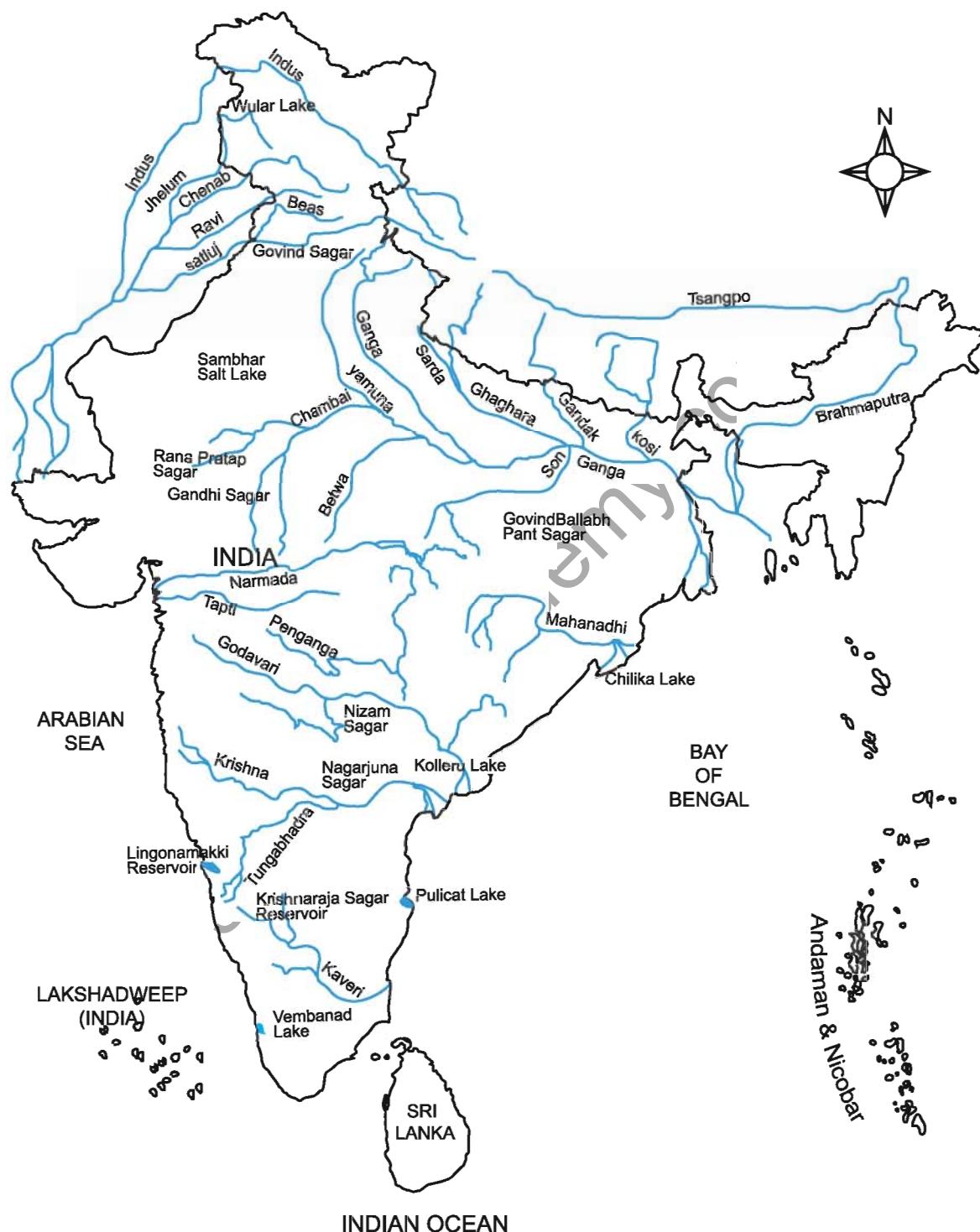
#### Inland Drainage

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 southwest 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 Kutch. 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 benifited
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	Garhwall 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 Mharashtra
Tapti	724	65,145 Sq.Km	Bettul	Arabian Sea	Madhya Pradesh and Mharashtra
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 river Yamuna is the tributary of river Ganga. The Bhavani, Amaravathy and Noyyal 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 Naramada 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) Aurangabad
- 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) Yamonotri      b) Siachen      c) Gangotri      d) Karakoram
- 6) The Himalayas are known as  
 a) Abode of snow      b) Himachal    c) Siwalik      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 Kambhat, 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  $37^{\circ}6'N$  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) Summer (March to May)
- 2) South west Monsoon.  
(June to September)
- 3) North East Monsoon  
(October to November).

#### 4) Winter (December to February)

##### 1. 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 India. At some places in northwest India the day temperature may be as high as  $45^{\circ}\text{C}$ . 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  $26^{\circ}\text{C}$  to  $30^{\circ}\text{C}$ . 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**'.

##### 2. 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**'.

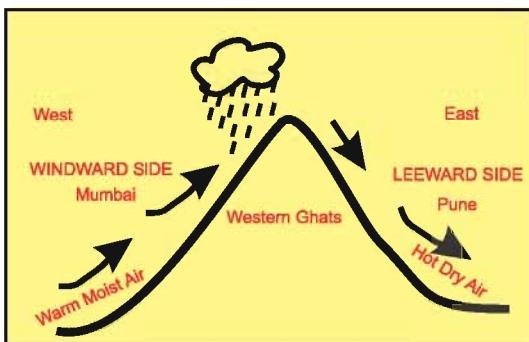
The south west Monsoon is normally divided into two branches because of the peninsular shape of the country. They are Arabian Sea branch and Bay of Bengal branch.

###### 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.

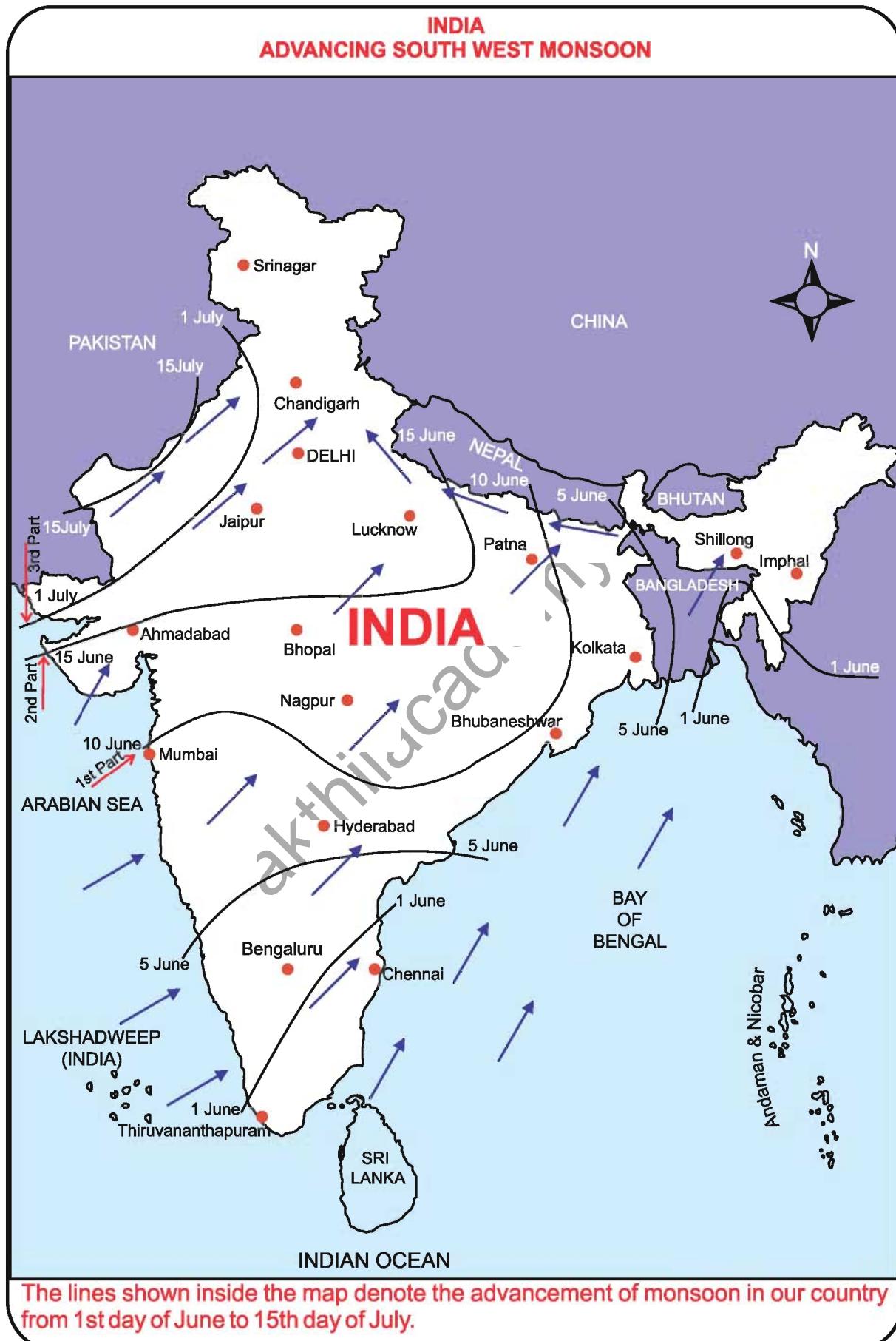
#### b. Bay of Bengal Branch

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 causes heavy rainfall in **Mawsynram**, 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.

#### 3. 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



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**



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.

#### **4. 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 Afghanistan 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, Haryana and Himachal Pradesh which is very useful for the cultivation of wheat. It also brings snow fall in the hills of Jammu and Kashmir.

#### **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. Sometimes 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

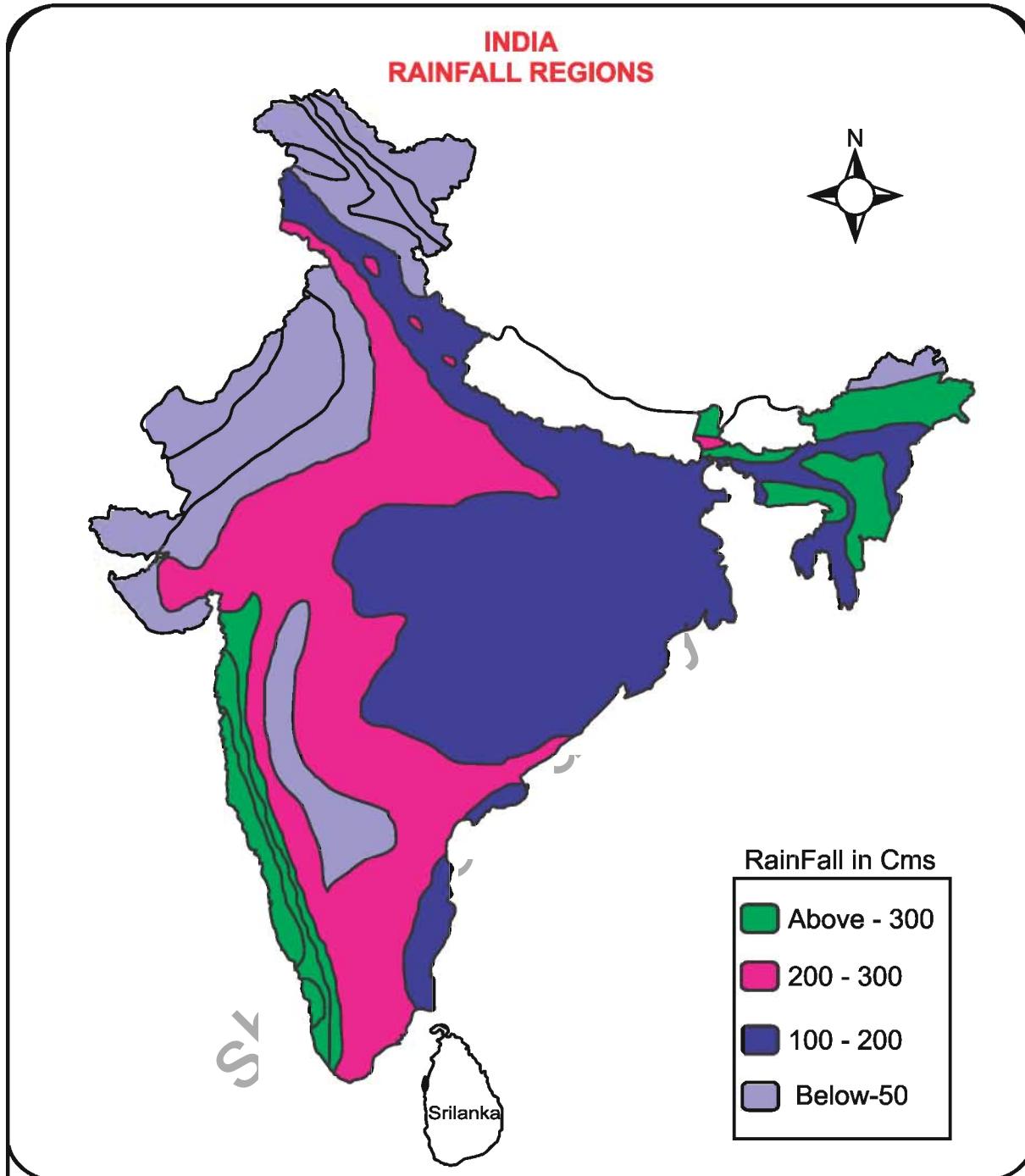
The distribution of rainfall over the country, as we have noted earlier, is determined by two main factors. These are: (1) the **direction** of the rain bearing winds and (2) the **position** of the mountain ranges.

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 **300cm** of rain are the southern slopes of the Eastern Himalayas, Assam, Bengal and the



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 undertaken at all levels.

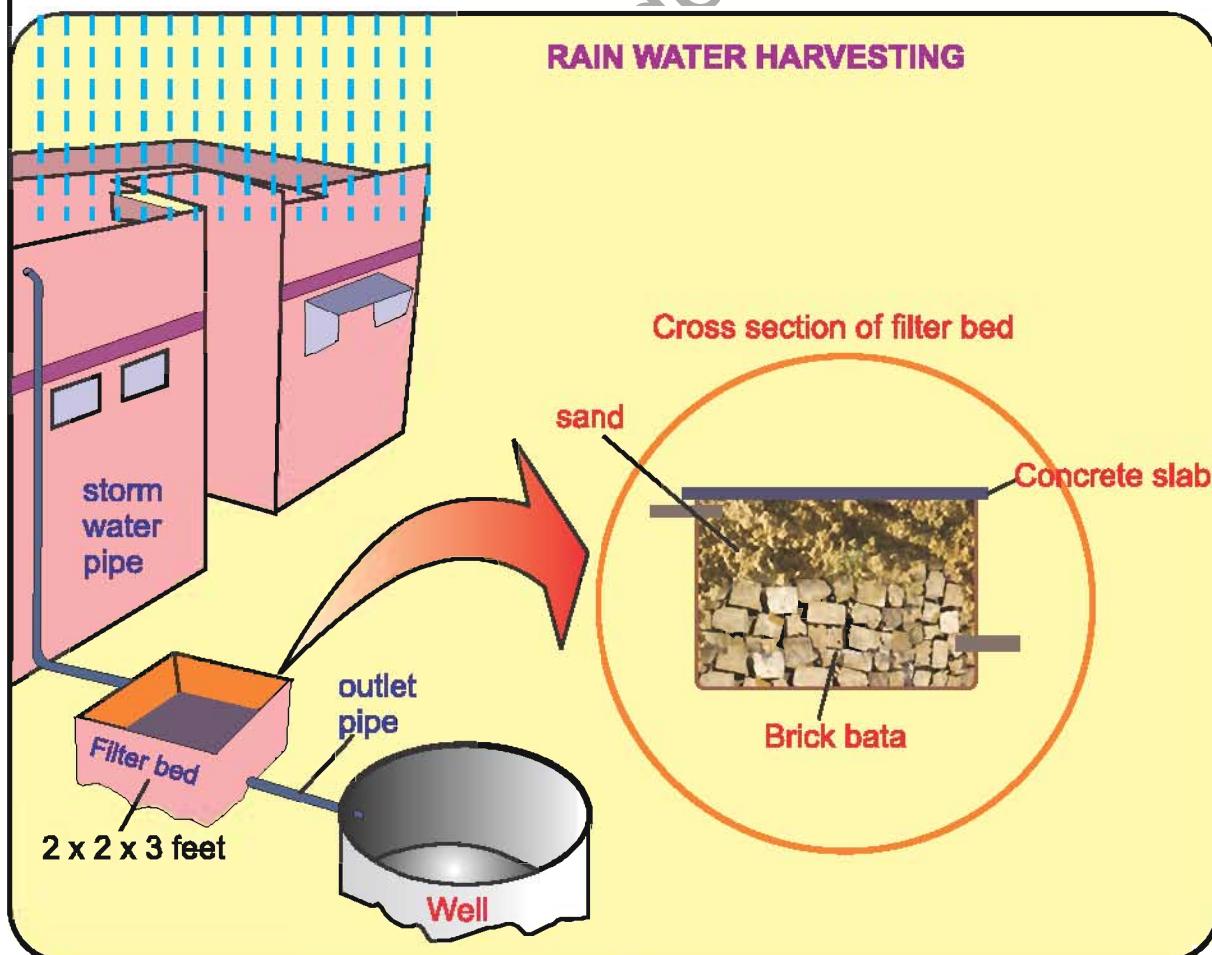
The basic requirements for water conservation activities are:

- 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.

### Classification of Soil

On the basis of genesis soils are classified as Zonal, Azonal and Intra zonal soils.

#### Zonal Soil:

Soils that exhibit the climatic condition of the formation region.  
Example 1. Laterite soil, 2.Red soil and 3.Desert soil.

1. Laterite soil is commonly found in hot and wet tropical regions. High temperature and evenly distributed rainfall throughout the year has produced highly weathered rocks. Iron particles in the rocks absorb humidity in the air. This gives the soil red colour. Laterite soil is found in western ghats, eastern ghats and foot hills of the outer Himalayas.

2. Red soil form commonly in the margins of tropical regions where rainfall and temperatures is moderate and leaching is also high. Red soil is found on the eastern and southern part of peninsular India.

3. Desert soil is found along the dry tract of the tropical region. They are yellowish in colour. It is because poor leaching of sulphur in the soil due to poor rainfall. In India it is found in Thar Desert region.

#### Azonal Soil:

Soils that do not exhibit the climatic condition of the regions where they are now found. That is soils that were formed in a climatic region and

transported to another climatic region by the agents of denudation. Example alluvial soil (transported by river). Soil of the Brahmaputra, the Ganges and many big rivers of India originated in their source and were transported by river to their deltaic areas. They do not exhibit the climatic condition of the deltaic areas.

In India alluvial soil is found along the river valleys and deltas of major rivers.

#### Intra zonal Soil:

Soils that exhibit the local condition of smaller area. Example -  
1.Regur or Black cotton soil,  
2.Mountain soil.

1. Regur or Black cotton soil: These soils were formed from the volcanic rocks formed due to volcanic eruption in the north western Deccan plateau. They are very high in iron content. So they are black in colour.

The limestone soil of Ariyalur region are also Intrazonal soil. The land was once under a large water body (lake). The animals in the water body were buried in the water body when the lake became dry. The mollusc of these animals formed the limestone soil. They are highly localised in nature. There fore they are called Intra zonal soil.

2. Mountain soils exhibit the local climate conditions of the mountain. They have high humus content because the fallen leaves get decayed in the soil.

## Distribution and characteristics of Indian soils

Soils of India are divided in to six categories.

1. Alluvial Soil
2. Black Soil
3. Red soil
4. Laterite Soil
5. Mountain Soil
6. 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 the 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.

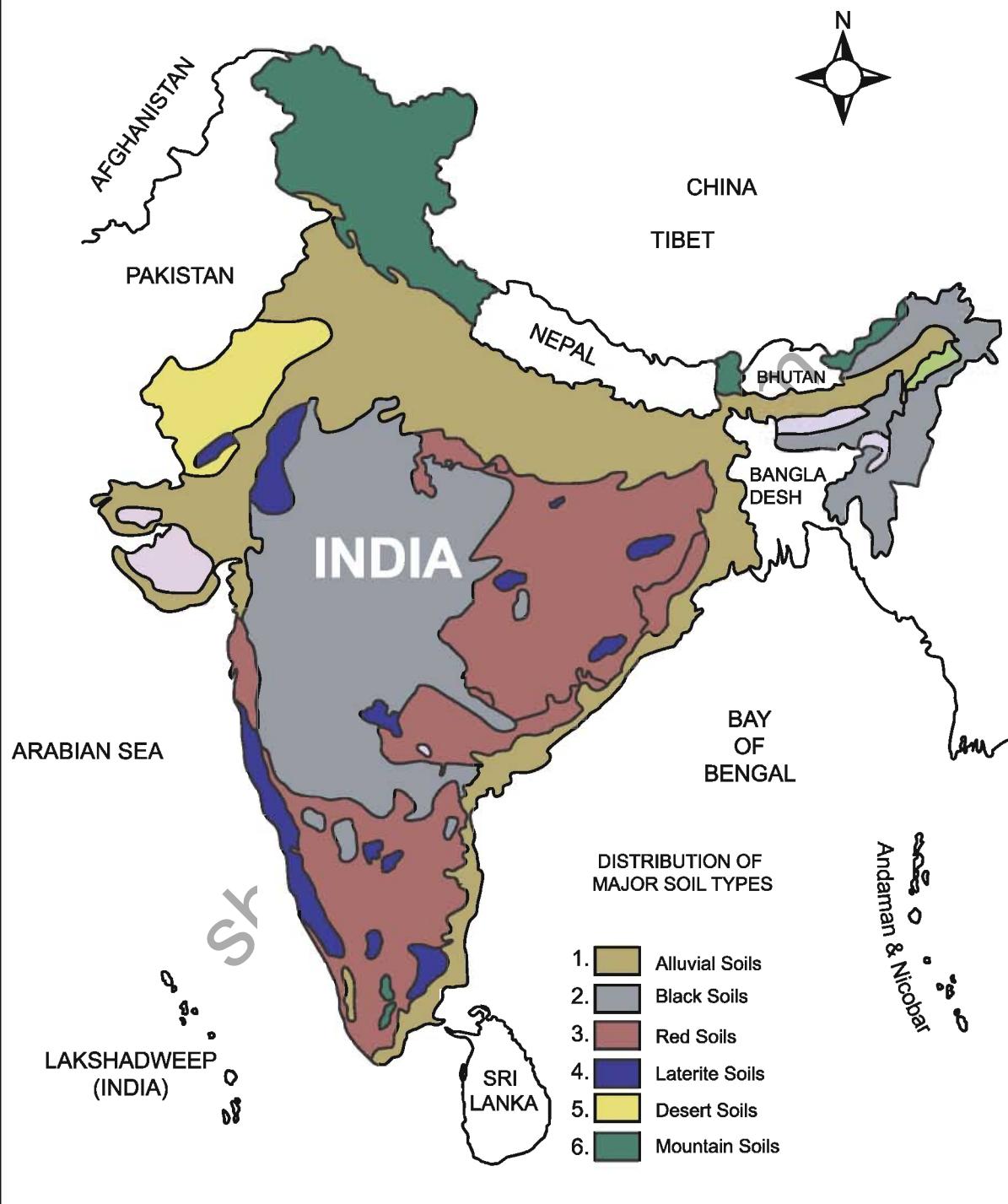
Red soil covers in most parts of Tamil Nadu, southern Karnataka, Goa, North-eastern Andhra Pradesh, Madhyapradesh and Orissa.

### 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. Assam 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.

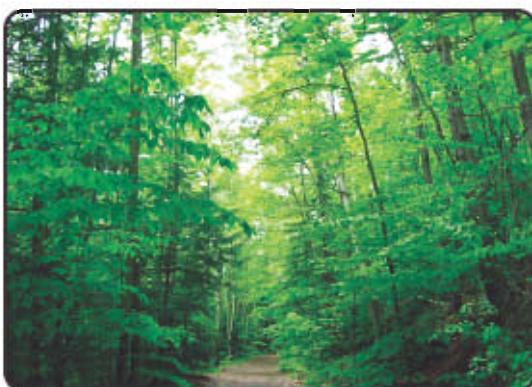
**The following are some of the preventive measures:**

- 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.

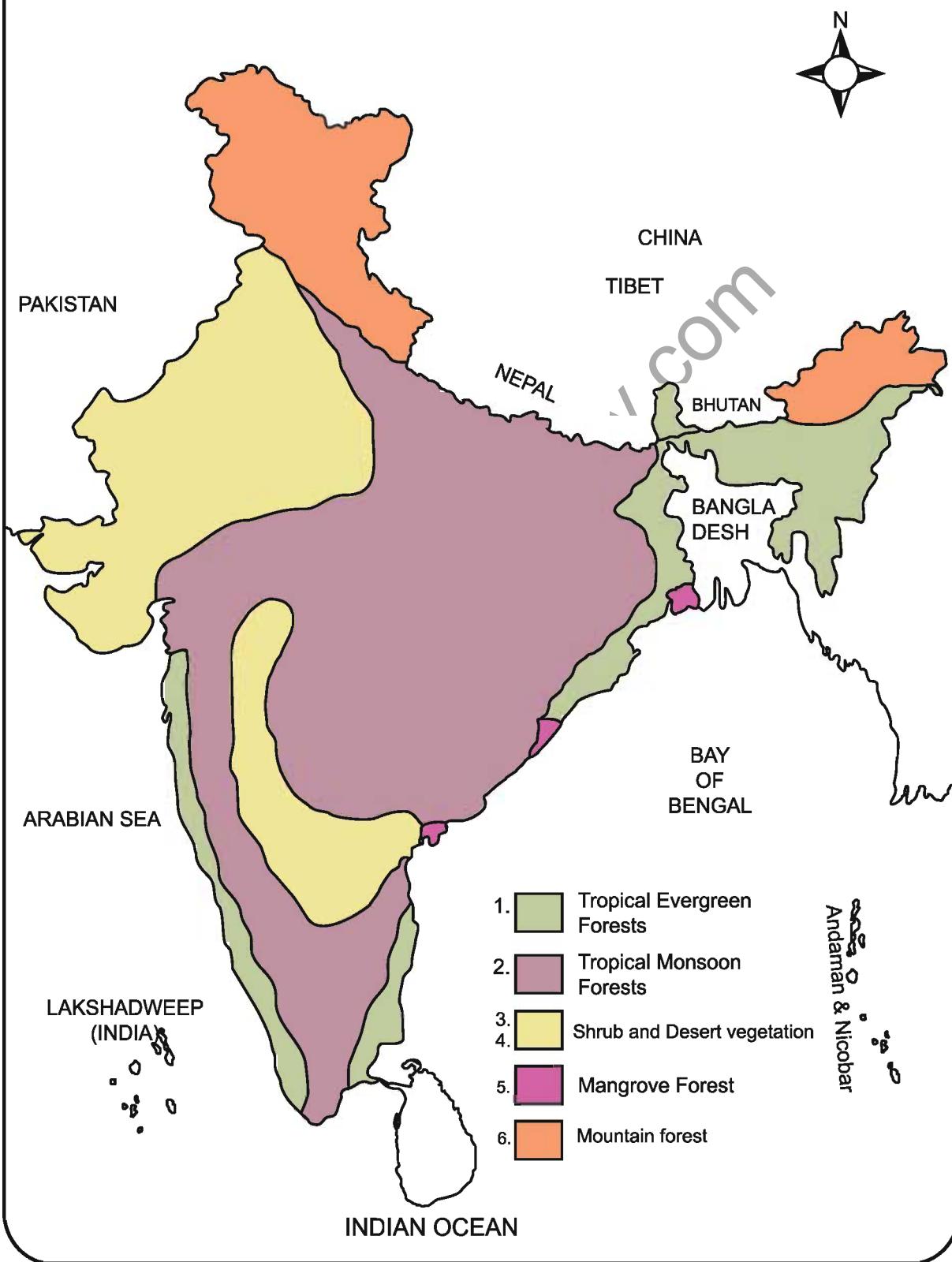
The important trees of these forests are Rose wood, Ebony, Mahogany, Rubber, Cinchona, Bamboo and Lianas. Due to dense growth of trees, the sunlight cannot reach the ground. Thus, the under growth mainly consists of, bamboos, ferns and climbers.

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 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.



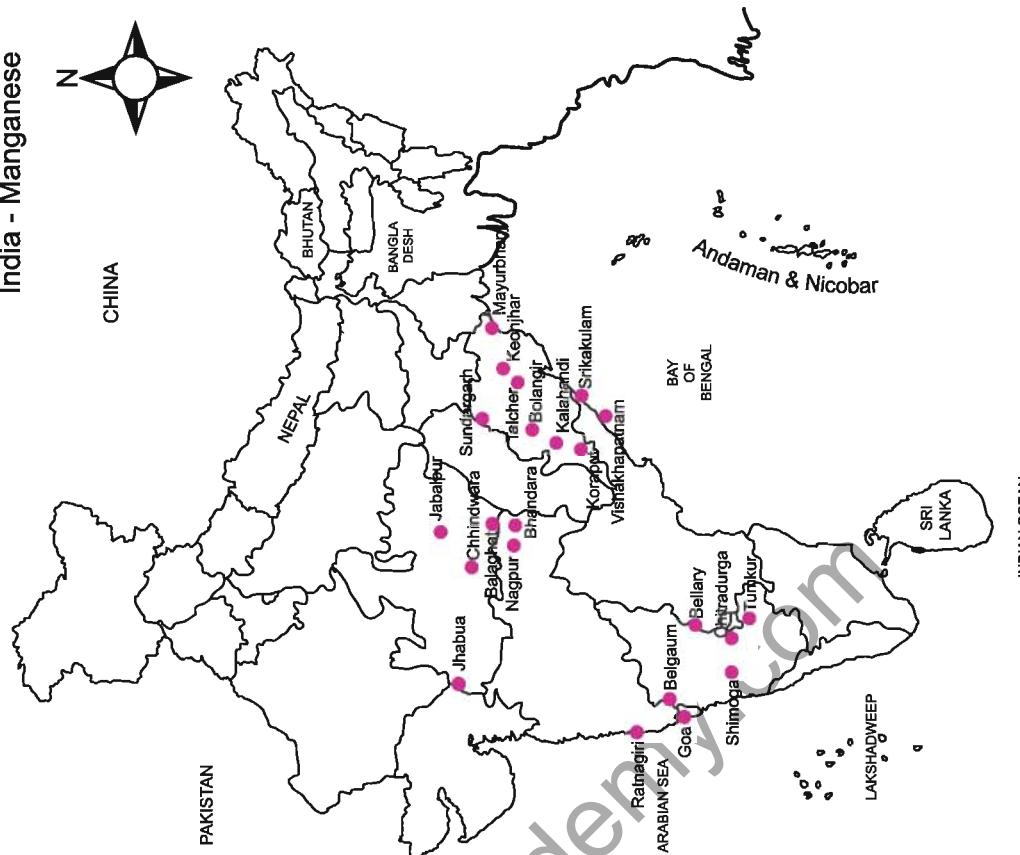
Iron Ore

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, Singh Bhum districts in Jharkhand, Mayurbhanj, Keonjhar and Sundergarh district in Orissa and other areas are Goa, Karnataka and Tamil Nadu.

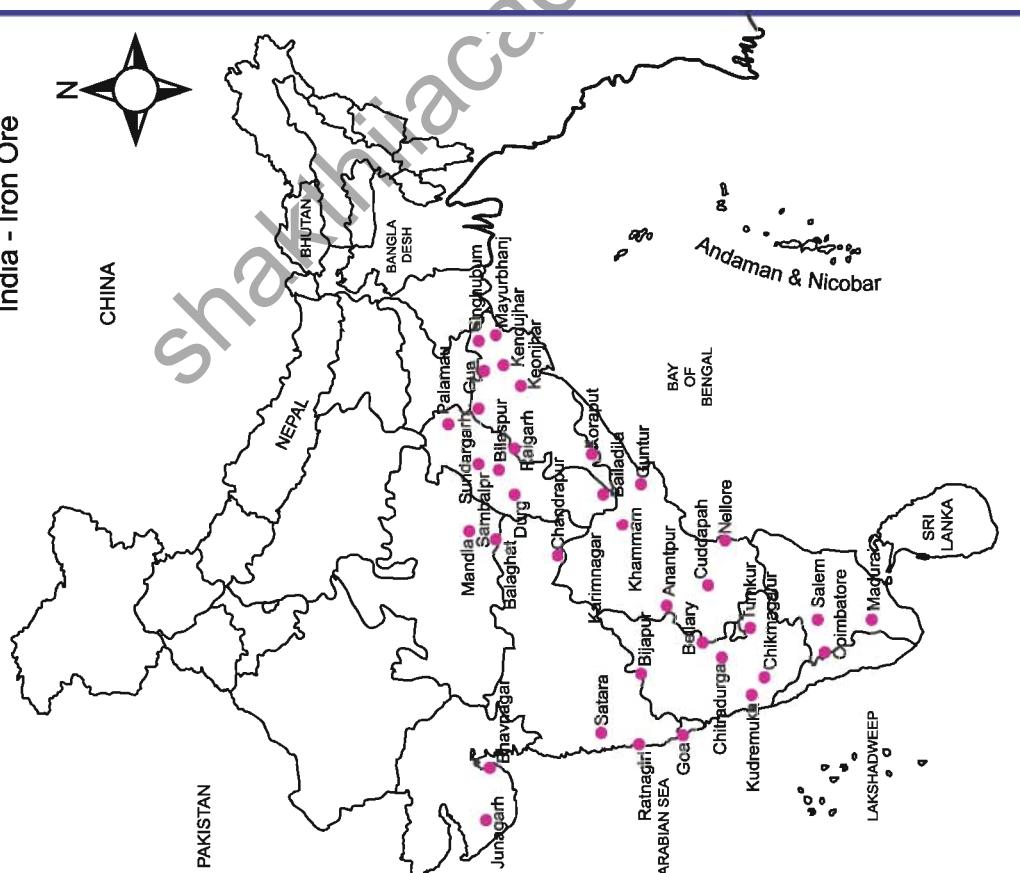
#### Manganese

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**

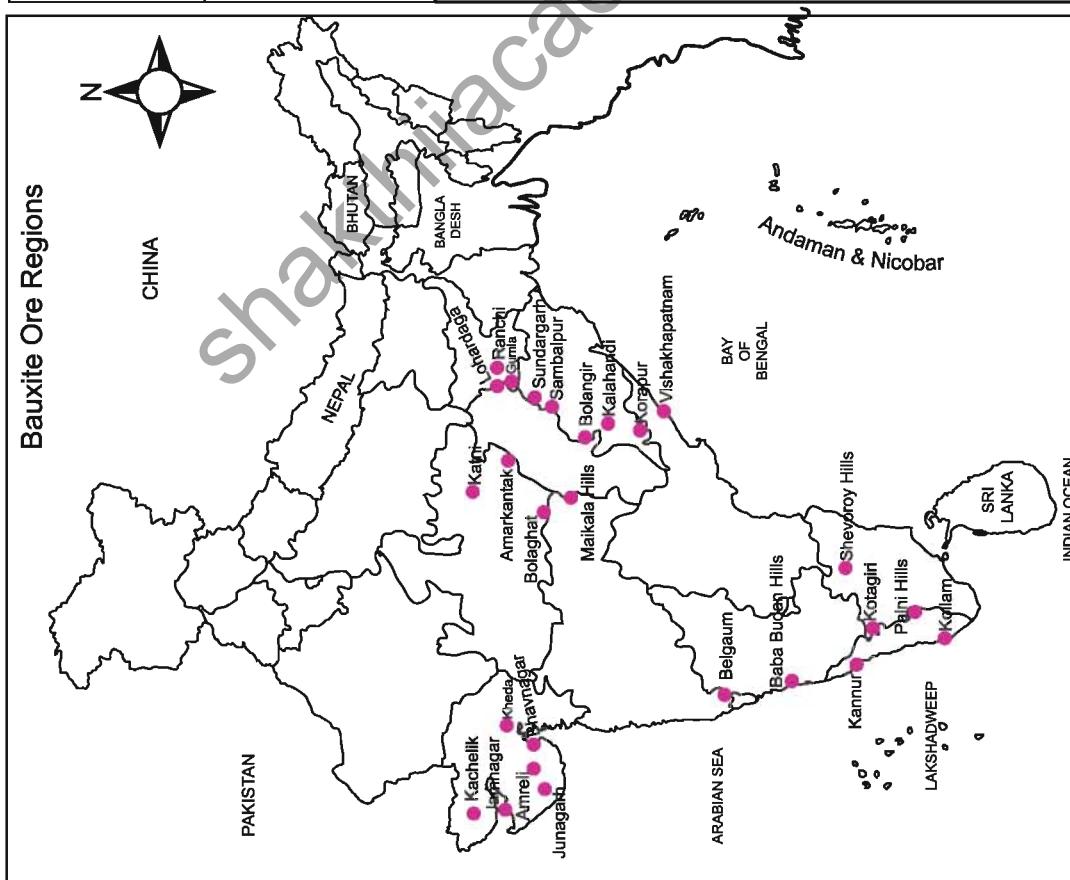
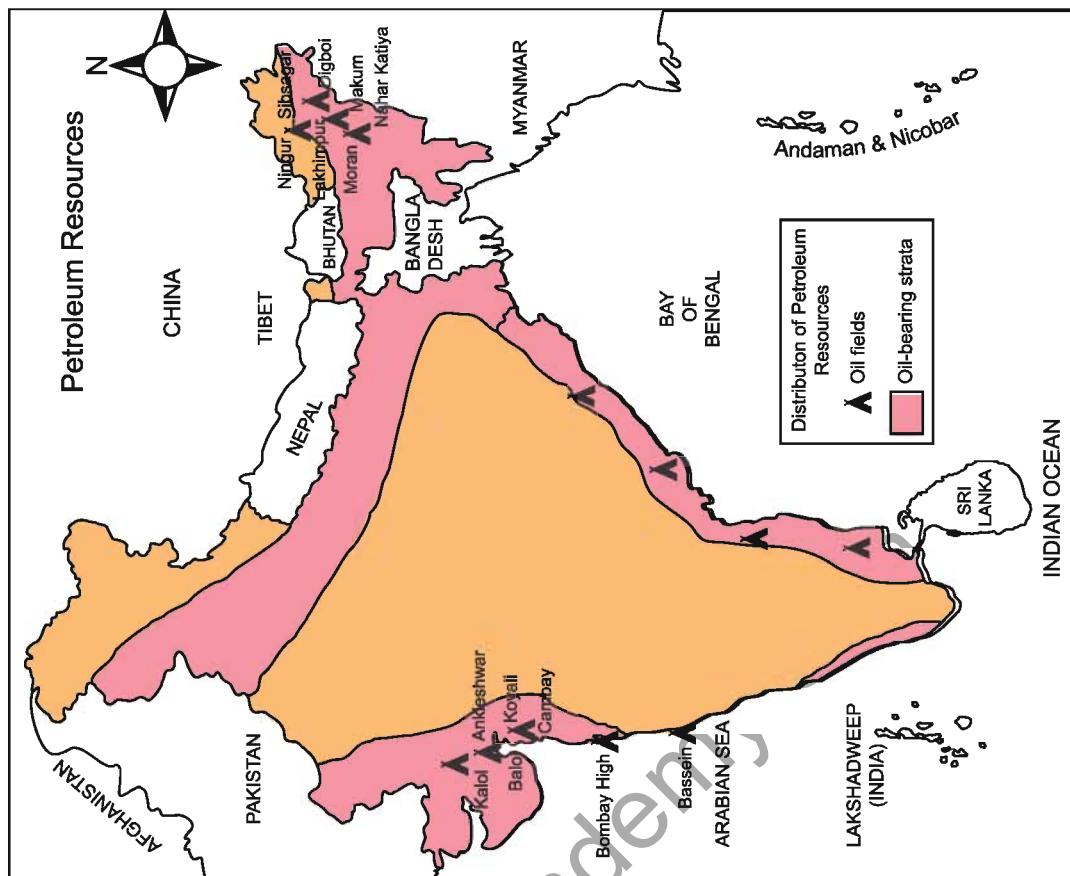
Deposits of natural gas are seen in the earth crust either independently or along with Petroleum. About 23 billion cubic meters of natural gas is used in India. India's natural gas reserve is only 700 billion cubic meters. Most of the deposits of natural gas is found in Andhra Pradesh, Maharashtra, Gujarat, 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, koodankulam (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 20megawatt of electricity through this method from 1sq.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. The wind energy can be generated if the wind velocity exceeds 30 knot. Tamil Nadu, Andhra Pradesh, Karnataka, Gujarat, Kerala, 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 MW has been installed at **Vizhinjam** near Thiruvananthapuram. 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:

- using public transport systems instead of individual vehicles
- Switching off electricity when it is not in use,
- using power saving devices
- 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

- To maintain ecological balance for supporting life.
- To preserve different kind of species (biodiversity).
- To make the resources available for present and future generation.
- 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) Landform
- 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 irrigation 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, Godavari 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 (Mono cropping)	Paddy, Sugarcane, Oilseeds, Corn
Two Crops at a time (Dual cropping)	Paddy, Blackgram, Wheat, Mustard
More than two crops (Multiple or Mixed cropping)	Paddy, Blackgram, Wheat, Mustard Barly, Jowar, Groundnut, Bajra

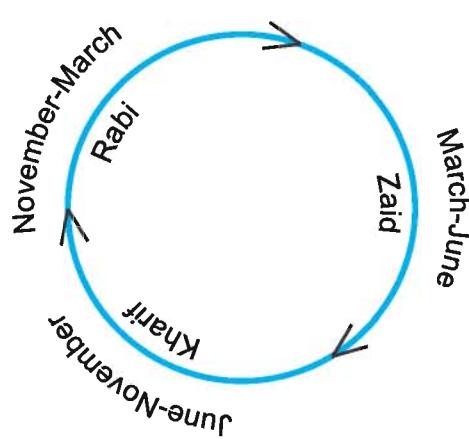
### Cropping pattern

### 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

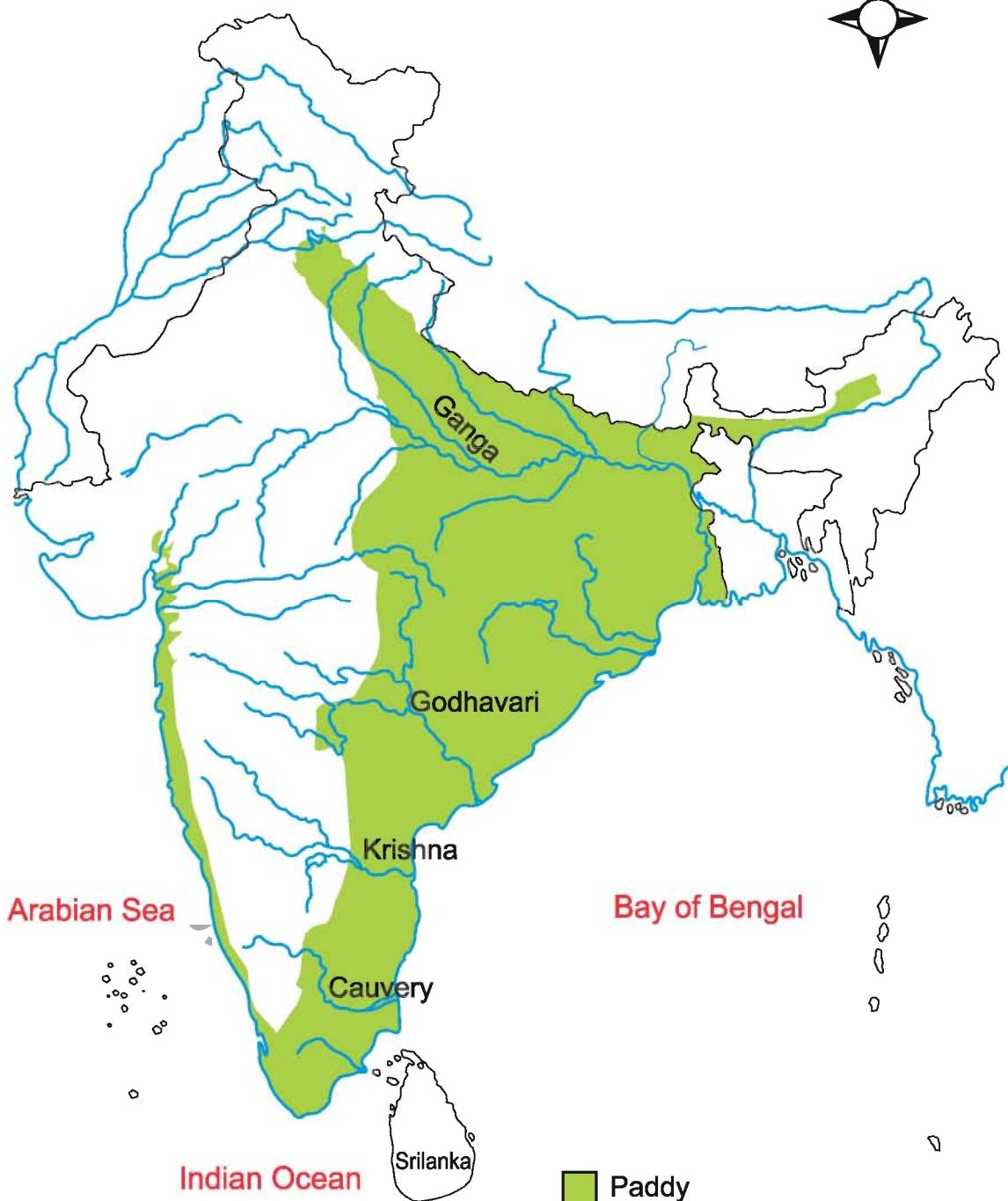
### Production of food crops

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 uphills of Himachal Pradesh and Uttarakhand.

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.

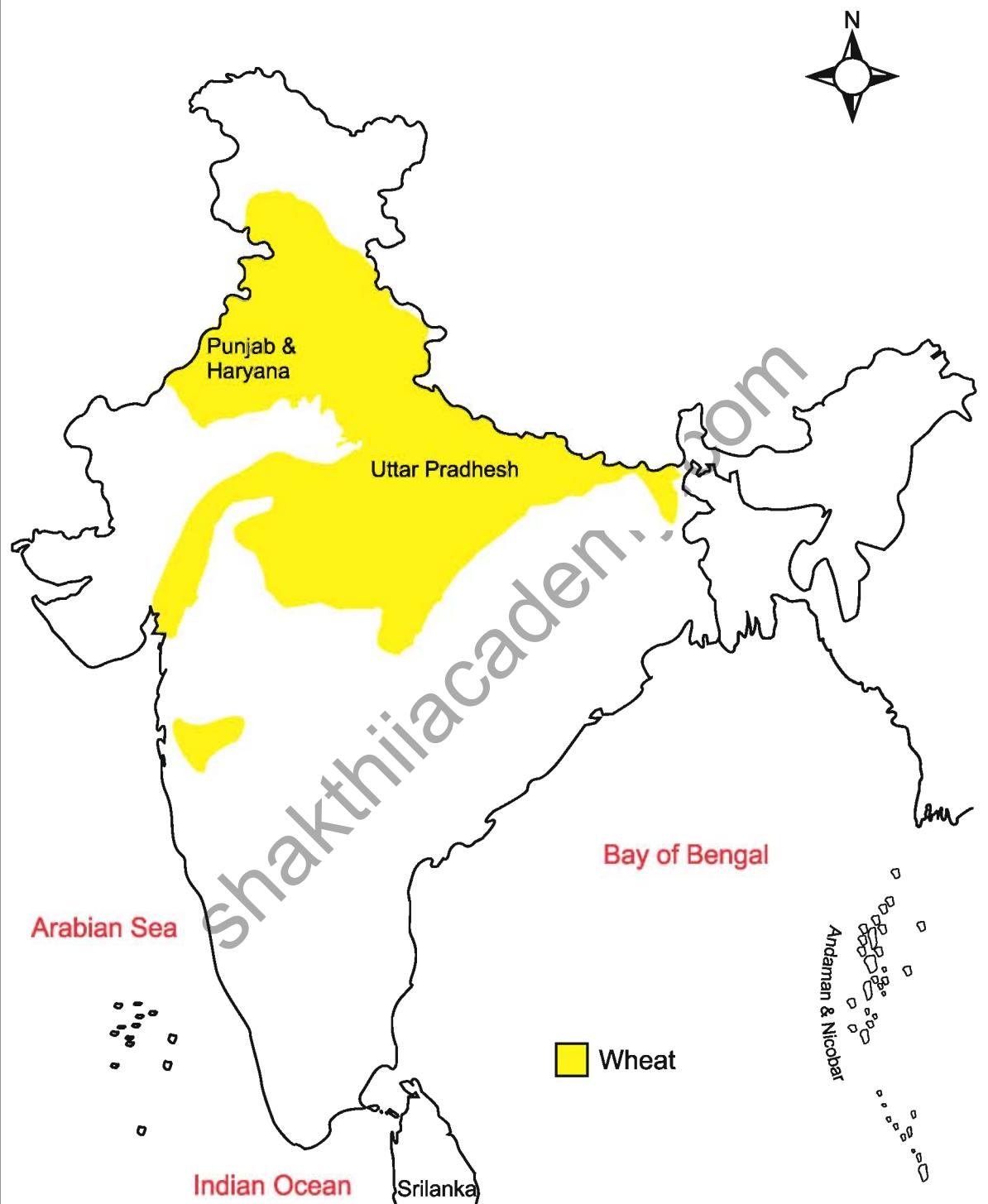


Wheat

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, lentil, 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, Andhra Pradesh 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.



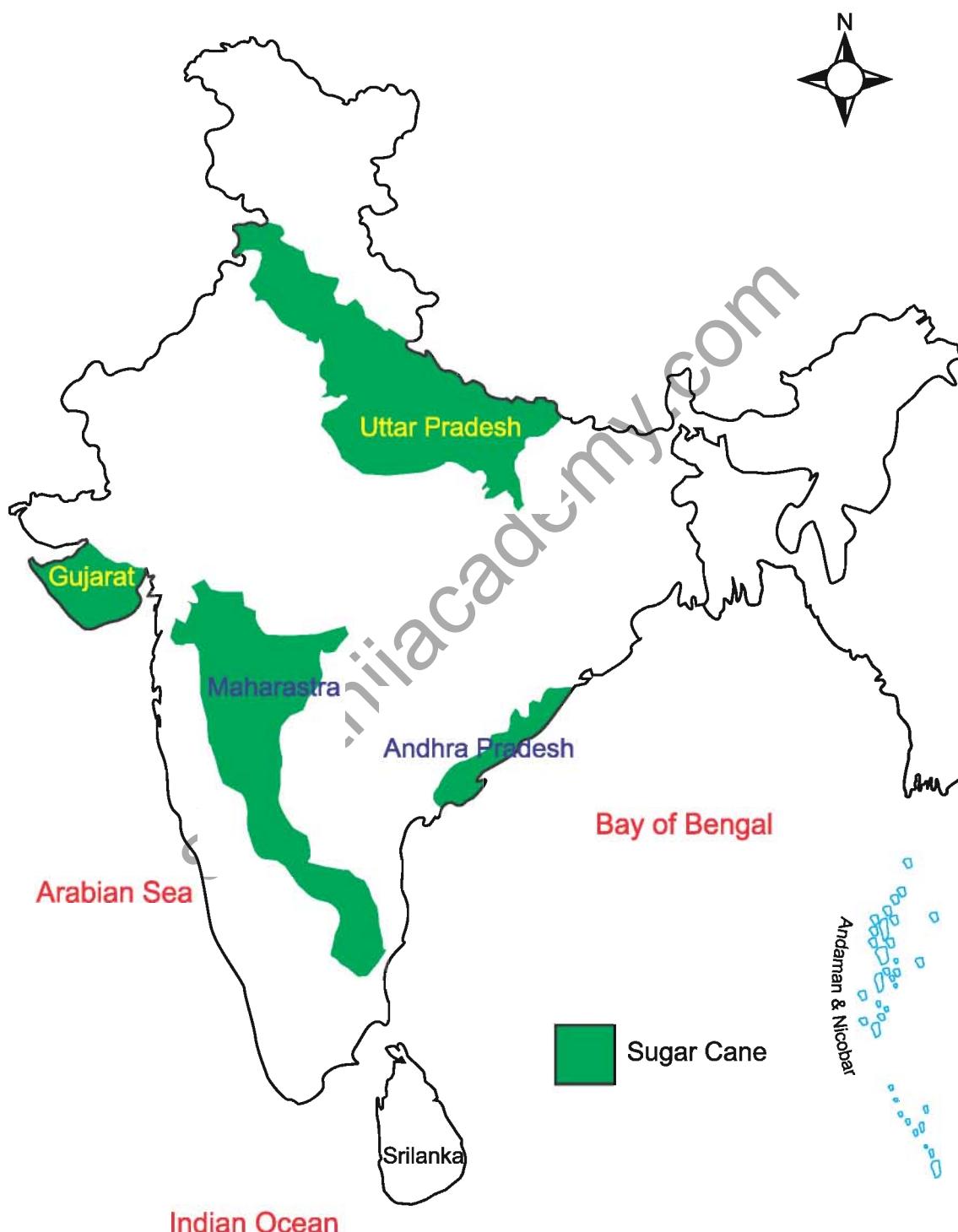
Sugarcane

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

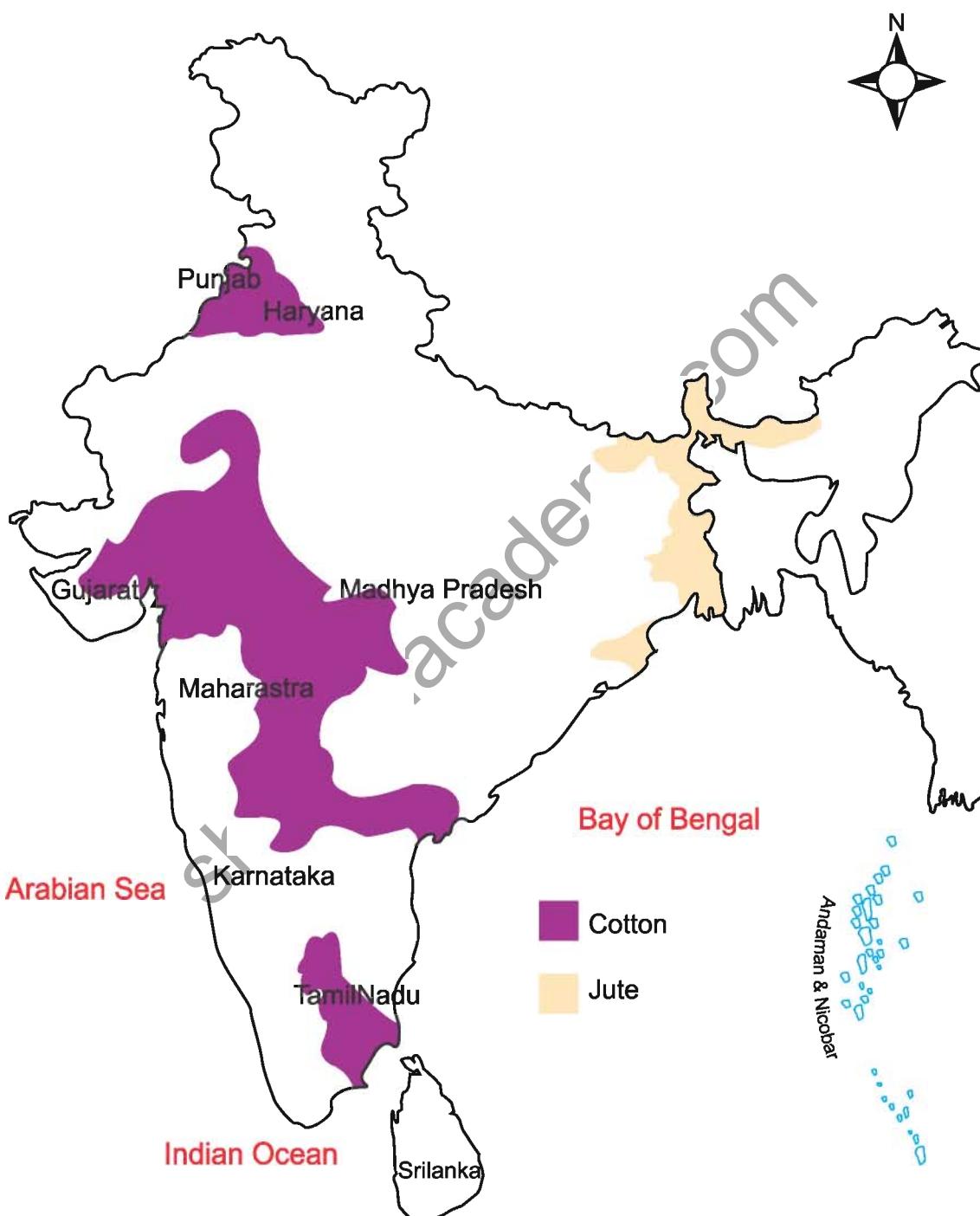
### Cotton

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. It is also called as **Golden fibre crop**. 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, upholstery 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 states 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 important 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, Jammu-Kashmir, Tamil Nadu

and Karnataka. Grape is cultivated mainly in Uttarakhand, 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.

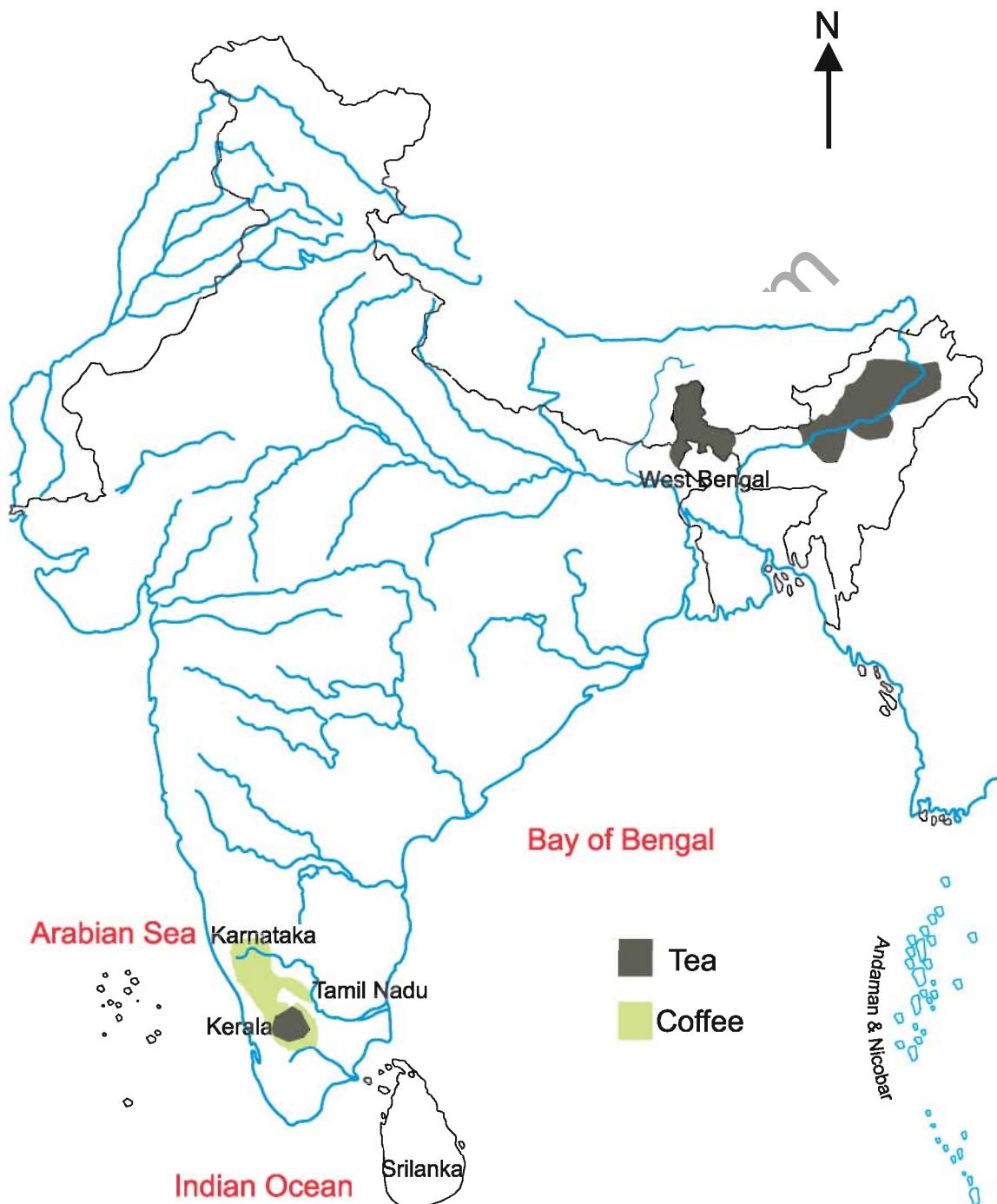
**Dairy Farming**

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



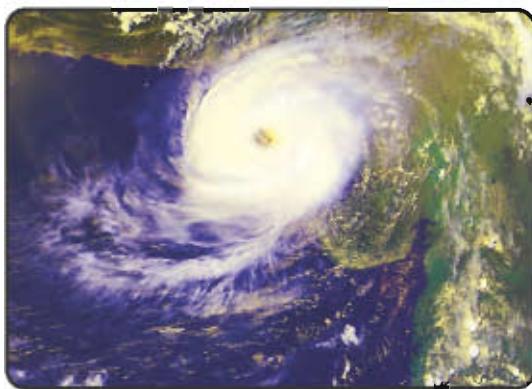
and training personnel in the modern areas of 'Molecular biology and Biotechnology'.

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.

## 5. INDIA – INDUSTRIES

A country becomes rich by converting the natural resources into usable products. So the key to prosperity of any country lies in increasing manufacturing industries. India is rich in natural resources. These resources include forest products, agricultural products and Minerals. Some of the resources can be used directly but some of them need **processing**. For example cotton has to be processed before it is brought into use in the form of finished product. So cotton is the raw material of agricultural origin. Similarly products like petrol, diesel, kerosene and gasoline are derived at different degrees of refinement of petroleum. Thus Petroleum is of mineral origin.

Though agriculture is the major occupation of the people in India, there has been a tremendous growth in Industries under five year plans and it has provided job opportunities for many people. This in turn has improved their **status of living**.

### Factors Influencing Location of Industries

The location of an industry is determined by raw material, power, transport, man power, water, market and government policies.

#### **Raw Material**

Industries are located with respect to the availability of raw materials. For example, Sugar industry is located near the raw material region (sugarcane field) because sugarcane is a weight losing material and when it is processed, the weight of sugar becomes 10 per cent of the weight of sugarcane.

#### **Power**

Most of the industries tend to be located near the source of power. The power is needed to process raw materials. For example Iron and steel industries are generally located near the coal fields because it requires about 5 tons of coking coal to melt 1 ton of iron ore.



Damodar Valley Project

#### **Transport**



Cochin Oil refinery

Transport is an important factor for carrying raw materials to manufacturing units and finished products to the market. For example Iron and steel industries and oil refineries are located near railway stations or near the port as these industries involve a high cost of transportation.

### Man Power

Availability of skilled and unskilled or technically qualified manpower is an important factor for the location of industries. Adequate supply of unskilled labour in urban locations is due to rural-urban migration. For example Mumbai and Chennai get manpower from all over the country.

### Water

Water is very essential for industries like iron and steel, textiles, rayon, paper etc. For example 1 ton of steel needs 300 tons of water for cooling and 1 ton of rayon needs 100 tons of water for bleaching. Hence the above industries are located near the rivers, canals or lakes.

### Market

High demand and purchasing power determine the market. So most of the industries are located close to the centers of consumption because it reduces the cost of transportation and enables the consumers to get things at comparatively cheaper rates.

### Government Policy

In almost every country, the government policies play an important role in determining the location of industries. In order to avoid regional disparities, the State government has marked out certain areas as **industrial zones**. These industrial zones and government concessions have helped in the growth of industries in the backward areas.

Nowadays due to scientific and technological development, geographical factors, man power and energy are considered as negligible factors. Therefore new factors have come to play major roles which include **skilled managerial services**,

availability of capital and export potential of products.

### Classification of Industries

On the basis of the source of raw materials, industries are classified into **Agro based** industries, **Forest based** industries and **Mineral based** industries.

### Agro based Industries

These industries use agricultural products as their basic raw material. For example. Cotton textile industry, jute industry, sugar industry etc.

### Cotton Textile Industry

Cotton textile industry is based on indigenous raw materials, cotton. It contributes about 14% industrial production, provides employment to 35 million persons and 4% towards GDP.

**Mumbai in Maharashtra** is the leading cotton textile centre and it is called as the "**Manchester of India**". The following factors favour the cotton textile industries in Mumbai;



**Cotton Textile Industry**

- Location of **port facilities** for the export of finished goods.
- Well connected through **rail** and **road links** with cotton growing areas.

- Humid **coastal climate** favours yarning.
- Availability of **Capital goods** and finance.
- Availability of **man power**.

The Major Cotton textile producing states of India are Maharashtra, Gujarat, West Bengal, Uttar Pradesh, and Tamil Nadu.

In Tamil Nadu, Coimbatore, Erode, Tiruppur, Karur, Chennai, Tirunelveli, Madurai, Tuticorin, Salem and Virudhunagar are the major cotton textile centres.

India's cotton textile industry holds third place among cloth producing countries in the world. India ranks second in the world in Cotton textile Trade and stands first amongst the industries in our country.

### Jute Industry

The Jute sector has been playing an important role in the economy of the country. It provides sizeable employment in the agricultural and industrial sectors. About 4 million farmers are engaged in the cultivation of jute. India tops in the production of raw jute and jute goods and second in the export of jute goods next to Bangladesh.



**Jute Industry**

Jute products include gunny bags, canvas, pack sheets, jute webs, Hessians, carpets, cordage and

twines. Now jute is also being used in plastic furniture insulation, bleached fibers to blend with wool. It is also mixed with cotton to make carpets and blankets.

Nearly 90% jute industries are located in **West Bengal** mainly along the **Hooghly River**. Recently there has been dispersal of jute industries in Uttar Pradesh, Bihar, Orissa and Andhra Pradesh.

### Sugar Industry

\* Indian Sugar Industry is the second largest agro based industry in India. Sugar factories are located near the areas of cultivation due to the following factors:

#### Sugar Industry



- \* Sugarcane is a weight losing material
- \* It cannot be stored for long time, as it loses sucrose content.
- \* It cannot be transported for long distances.

Since the sugarcane harvesting is done in a particular season and the crushing continued to a limited period and the sugar factories do not function throughout the year.

Uttar Pradesh and Bihar alone account for 70% of the sugar production. So this belt is known as '**sugar bowl of India**'. Punjab, Haryana, Maharashtra, Karnataka, Andhra Pradesh and Tamil Nadu are the other sugar producing states of India.

Nellikupam, Pugalur, Coimbatore and Pandyarajapuram are the famous centres for sugar production in Tamil Nadu.

The Government of India has developed a dual price system for internal sugar trade. Every sugar mill has to sell 40% of its production to the government at a fixed price. The government sells this sugar through public Distribution System. Rest of the 60% is sold in the open market at a higher price.

India is the fourth major sugar producing country in the world. Top three countries are Cuba, Brazil and Russia. India exports some of its surplus sugar to USA, UK, Indonesia, Malaysia, Iran and Sri Lanka.

#### Forest Based Industries

India has a rich diversity of forest resources which are capable of supporting a wide variety of industries. The most important is the paper industry.

#### Paper Industry



**Paper Industry**

Paper industry is a vital and core industry for any country. The Raw materials for paper industry include woodpulp, bamboo, salai and sabai grasses, waste paper and bagasse. Location of the industry is greatly

influenced by **bulky raw materials** and to a lesser extent by **market**.

The Indian paper industry is ranked one among the fifteen top global paper industries in the world. The leading states in paper production in our country are West Bengal, Maharashtra, Madhya Pradesh, Karnataka and Andhra Pradesh.

#### Mineral Based Industries

Mineral based industries use both metallic and non-metallic minerals as raw materials. The Major mineral based industry of our country is the **iron and steel industry**.

#### Location of Iron and Steel Industries in India

India's major iron and steel industries are located either near the **coal fields** or **iron ore** mines or midway between the coal and iron ore fields. Most of our country's major iron and steel industries are located in the **Chota Nagpur Plateau** region due to the following reasons:

- \* High grade haematite and magnetite ironore are available from the mines of Jharkhand, Bihar, Orissa, Madhya Pradesh and Chattisgarh.



**Iron Industry**

- \* Jharia and Singbhum in Jharkhand, Raniganj in west

Bengal have abundant coking coal suited for the manufacture of high grade steel.

\* West Bengal and Jharkhand states are rich in flux materials needed for purifying.

\* Limestone from Ranchi, Silica from Jabalpur and Dhanbad, Dolomite from Madhya Pradesh, Quartz from Bihar are available in close proximity.

### Distribution of Iron and Steel Industries

India has 11 integrated steel plants and 150 mini steel plants and a large number of rolling and re rolling mills.

#### 1. Tata Iron and Steel Company (TISCO)

In 1907 Tata Iron and Steel Company was setup at Jamshedpur now it is called **Tata Steel limited**. It is the oldest and the largest integrated iron and steel plant in India. It is the 10<sup>th</sup> largest producer of Iron and Steel in the World. The company produces pig iron and steel.



Iron and Steel Industry

#### 2. Indian Iron and Steel Company (IISCO)

The steel plants at Kulti, Burnpur and Hirapur were integrated and the Indian iron and steel company was setup at Burnpur in 1919.

The control and management of IISCO were taken over by SAIL(Steel Authority of India) in 1972. The company produces pig iron and crude steel.

#### 3. Visveswaraya Iron and Steel Limited (VISL)

Visveswaraya Iron and Steel Limited were set up in 1923 at Bhadravati in Shimoga district in Karnataka. Its major products are alloy and special steel.

#### 4.a. Hindustan Steel Limited (HSL)-Bhilai

The HSL- Bhilai is located in the Durg district of Chattisgarh, started its production in 1959. Bhilai's rail and structural mill are one of the most modern and largest in the world. It has also started making plates for ship building industry.

#### 4.b. Hindustan Steel Limited (HSL)-Rourkela

The Rourkela plant was started in 1965 in the Sundargarh district of Orissa. Its major products include hot and cold rolled sheets, galvanized sheets and electrical steel plates.

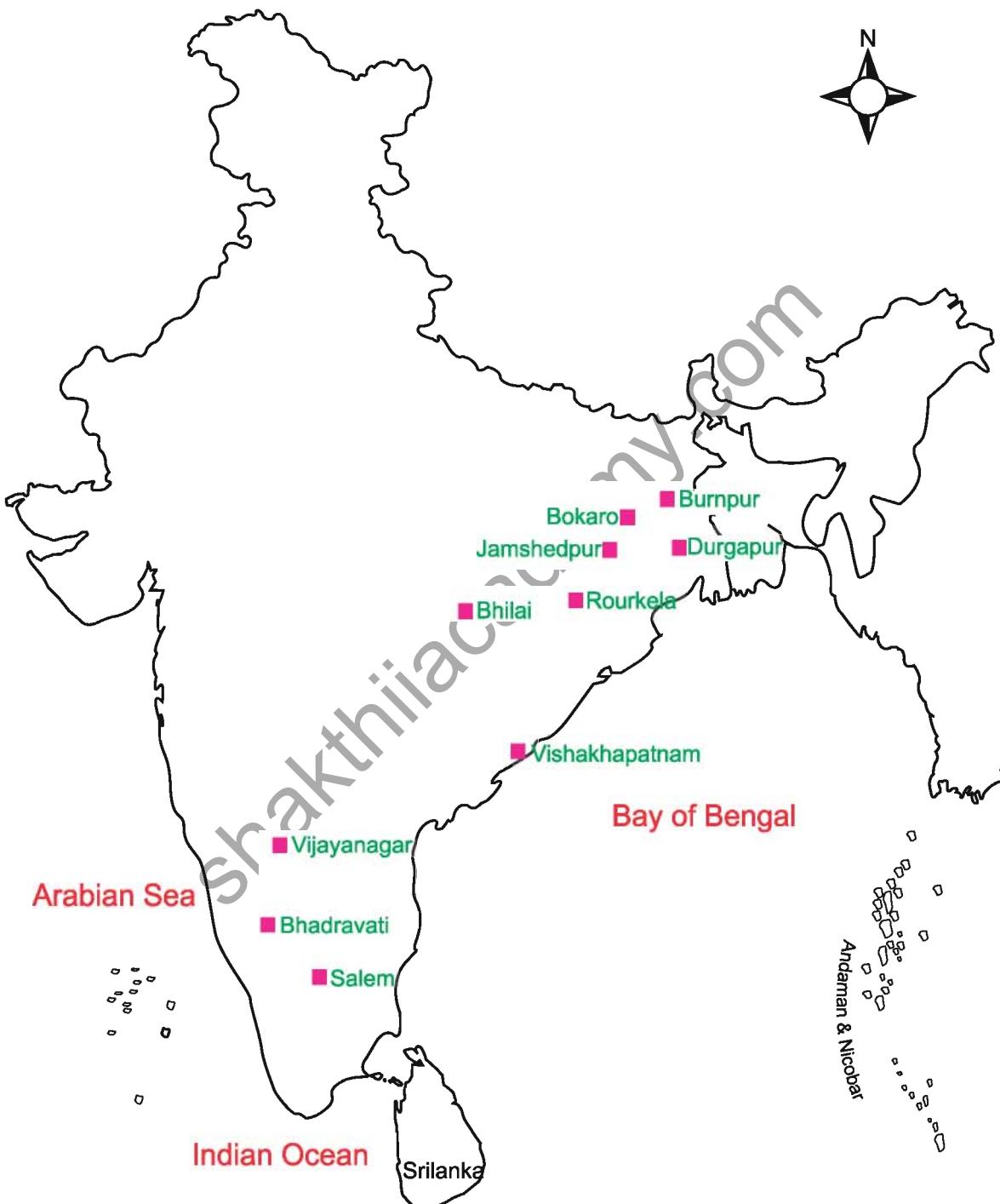
#### 4.c. Hindustan Steel Limited(HSL)-Durgapur

The Durgapur steel plant is located at Bardhaman district of West Bengal. It was setup in 1959. It started its production in 1962. This plant specializes in the manufacture of alloy steel, construction material and railway items like wheel axles and sleepers.

#### 4.d. Hindustan Steel Limited(HSL)-Bokaro

The Bokaro steel plant is situated in the Hazaribagh district of Jharkhand. It started its operation in 1972. The sludge and slag of the plant are used in making fertilizer at Sindri.

## Iron and Steel Industries



## 5. The Salem Steel plant

The Salem steel plant is located at Salem in Tamilnadu and started its production in 1982. This plant is the major producer of the world class stainless steel which is exported to many advanced countries in the world.

## 6. The Vijayanagar Steel Plant

The Vijayanagar steel plant has been setup at Tornagal in Hospet district in Karnataka.

## 7. The Vishakhapatnam Steel Plant

The Vishakhapatnam steel plant came into operation in 1992. This is the first plant in the shore region. This is the most sophisticated and modern integrated steel plant in the country. It is a major export oriented steel plant.

### Mini Steel Plants

Mini steel plants are decentralized secondary units with capacity ranging from 10,000 tonnes to 5 lakh tonnes per year. It operates through electric furnaces and generally use ferrous scrap, pig iron or sponge iron as raw materials. They help in recycling of iron and make the scrap useful and profitable. They produce mild steel, alloy steel and stainless steel.

There are more than 150 Mini Steel plants with an installed capacity of about 120 lakhs tonnes of crude steel per annum. Most of the mini steel plants are located in areas far away from the major steel plants, so that they can meet the local demands.

They suit the Indian economy because they require less investment. As these units are smaller in size they can be conveniently located in the industrial towns.

## Automobile Industry

The growth of automobile industry in India is only after the independence. The first automobile industry was started at Kurla (Mumbai) in 1947 under the name of **Premier Automobile limited**. In 1948 Hindustan motors limited setup the automobile industry at Uttarpara, (Kolkata). In the last 30 years, India has made a tremendous progress in this industry by manufacturing commercial vehicles, passenger cars, jeeps, scooters, motorcycles, mopeds and three wheelers.



**Automobile Industry**

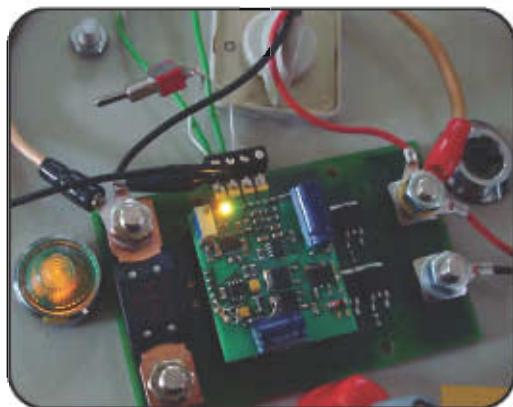
The major centres are Mumbai, Chennai, Kolkata, New Delhi, Pune, Ahmedabad, Lucknow, Satara and Mysore.

With Liberalization of the economy there are several foreign collaborations in the automobile sector and well known world leaders have entered the market – Suzuki, General motors, Ford, Mitsubishi, Honda, Daewoo, Mercedes, Nissan, Mahindra & Mahindra and Millennium Motors.

## Electronic Industries

The electronic industry in India started with radio manufacturing in the 1850s. The setting up of **Indian Telephone Industry** in 1950 at Bangalore (Bengaluru) gave a boost to this industry. The industry now meets the

needs of posts and telegraph, defence, railways, electricity boards, meteorological department etc. **Bengaluru** is the leading producer of electronic goods and it is referred as **Electronic Capital of India**. The other important centres are Hyderabad, Delhi, Mumbai, Chennai, Kolkata, Kanpur, Pune, Lucknow, Jaipur and Coimbatore.



**Electronic Equipment**

The Revolution in electronic industry has changed the lifestyle of the people to a greater extent. The

most popular products of the industry are Television, Transistor, Telephone, Cellular Phones, Computers, CD players, ipod, Pendrive etc.

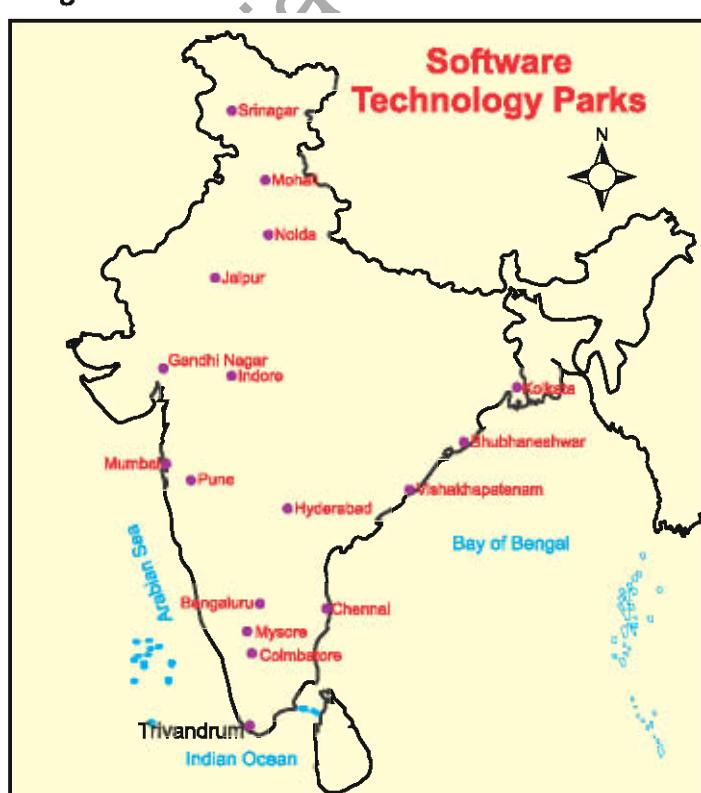
### Software Industry



**Software Industry**

The Software Industry has emerged as a major industry in the Indian economy.

The main reason for its rapid growth is due to the availability of cheap and skilled young software professionals in our country.



The Department of Electronics has established "Electronic Parks" in different parts of our country. The main centers are Chennai, Coimbatore, Thiruvananthapuram, Bengaluru, Mysore, Hyderabad, Vishakapatnam, Mumbai, Pune, Bhubaneswar, Indore, Gandhinagar, Jaipur, Kolkata, Noida, Mohali and Srinagar.

At present there are more than 500 Software firms in the country. It is expected that the Indian software industry will generate a total employment of around six million people which accounts for 9% of India's total GDP in the year 2011. Today the software industry in India exports software and services to nearly 95 countries around the world.

The Government has also played a vital role in the development of software industry.

Industrialization, Urbanization and growing population along with increasing consumption of Resources have by far crossed the carrying capacity of the earth. Industrialization has undoubtedly made life more comfortable for modern man, but it has led to extreme **stresses** and **degradation** on the environment and its resources. Indiscriminate use of substances has a detrimental effect on environment. These have made the world realize the importance of preserving our environment by changing harmful technologies into more eco-friendly technology.

## EXERCISE

### I) Choose the correct answer.

- 1) Cotton textile industry is \_\_\_\_\_  
a) mineral based                          b) agrobased  
c) forest based industry,                d) Software industry

2) Manchester of India is \_\_\_\_\_  
a) Delhi                                      b) Chennai                                      c) Mumbai                                      d) Kolkata

3) Tata iron and steel industry is located at \_\_\_\_\_  
a) Durgapur                                 b) Bhilai                                        c) Jamshedpur                                d) Burnpur.

4) Chotta Nagpur Plateau is noted for \_\_\_\_\_  
a) Natural Vegetation                      b) Mineral resource  
c) Alluvial Soil                              d) Cotton Cultivation

5) The city known as Electronic Capital is \_\_\_\_\_  
a) Kanpur                                      b) Delhi    c) Bengaluru                                    d) Madurai

**II) Match the Following.**

- |                                 |  |
|---------------------------------|--|
| 1) Jute Industry                | Jamshedpur   |
| 2) Cotton Industry              | Karnataka  |
| 3) Software Industry            | Mumbai   |
| 4) Tata Iron and Steel Industry | West Bengal  |
| 5) Sugar bowl of India          | Chotta Nagpur region<br>Bengaluru<br>Uttar Pradesh and Bihar |

**III) Distinguish Between.**

- 1) Mineral based and agrobased industries.
- 2) Iron and steel industry and software industry.

**IV) Give short answers.**

- 1) Define manufacturing.
- 2) Name the factors that determine location of an Industry.
- 3) What are agrobased industries? Give examples.
- 4) Name any five software centres.
- 5) What are the byproducts of Jute Industry?

**V) Give Paragraph answers.**

- 1) Write an account of iron and steel industries of India.
- 2) Describe the factors encouraging cotton textile industry in Mumbai.
- 3) Write a note on Sugar Industries of India.
- 4) Give an account of Automobile Industry or Software Industry in India.

**VI) Mark the following on the outline map of India.**

- 1) Major iron and steel Plants.
- 2) Software technology parks
- 3) Cotton textile
- 4) Jute textile industries
- 5) Sugarmills of India

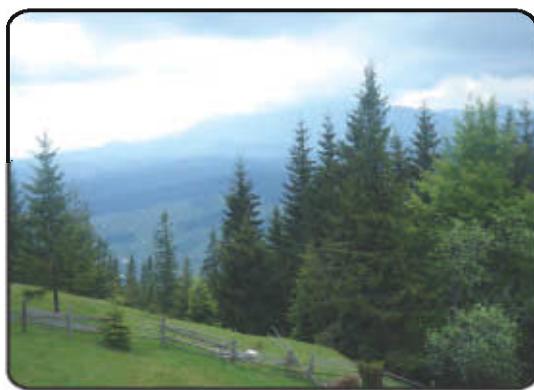
**VII) Activities.**

Select any agrobased industry and list the materials and factors required for establishing that Industry.

## 6. ENVIRONMENTAL ISSUES

The word **environment** is most commonly used to describe **Natural Environment** which means the sum of all living and non-living things that surrounded us.

### Whose Environment is it?



**Natural Environment**

It is everyone's. Nature has enough to satisfy everyone's need but has not enough to satisfy every man's greed. Our expanding greed has put us in a tough situation of various environmental problems. The problems are due to rapidly growing population from 300 million in 1947 to 1210 million at present and industrialisation. They have direct impact on environmental degradation, pollution and climatic changes. The whole world is now anxious to repair the damage. Let us discuss important environmental issues which are threatening environmental sustainability.

### Environmental Pollution

Environmental pollution is the contamination of environment which causes discomfort, instability, disorder harmful impact on physical system and on living organism.

Pollution can take the form of chemical substance, or energy, such as noise, heat or light energy. This in turn affects the ecology of the environment. There are many types of pollution degrading the environment. They are given below.

- 1) Air Pollution
- 2) Water Pollution
- 3) Land Pollution
- 4) Noise pollution
- 5) Pollution due to biomedical wastes.
- 6) Pollution due to e-wastes
- 7) Pollution due to mining

### 1. Air Pollution

It is contamination of air by the discharge of harmful substances. Air pollution has been a problem throughout the history. This can have serious effect on the health of the human beings. We breath about 2200 times a day inhaling around 16 kg of air. Every time when we breathe in we inhale dangerous substances. These dangerous substances or pollutants can be either in the form of gases or particles.

**The source of pollutants is both natural and man-made.**

Volcanic eruptions, wind erosion, pollen disposal, evaporation of organic compounds and natural radio activity are the natural causes of air pollution. Natural air pollution does not occur in abundance and also possesses little threat to the health of the people and ecosystems.

**"Gigantic Explosion of Mt. Helens**

**released only about what one coal power plant emits in a year"**

The man-made reasons for air pollution are vehicular emission, thermal power plants, industries and refineries.

Vehicular emissions are responsible for 70 % of the country's air pollution. Vehicles which are eco-friendly are certified **BHARATH II and III.**

Bharat Stage I - IV emission norms are emissions standards that focus on regulating pollutants released by automobiles (motor cars) and other powered vehicles.

Most sulphur dioxide comes from power plants that use coal as their fuel. Automobiles produce about half of the nitrogen oxide.

Listed here are the major air pollutants: sulphur oxide, nitrogen oxide, **carbon monoxide** and organic compounds that can evaporate and enter the atmosphere. **India emits the fifth most carbon of any country in the world.**

"The Bhopal gas tragedy is one of the world's worst industrial disasters that killed almost 8,000 people in December 1984."



Air pollution

Air pollution can adversely affect human health not only by direct inhalation but indirectly by other routes through water, food and skin infections. Most common air pollution directly affects the cardio-vascular systems of humans and cause diseases like asthma, bronchitis, allergies, lung and heart diseases.

### **Consequences of Air Pollution**

#### **1. Ozone layer depletion**

The atmosphere contains a thin layer of ozone about 24 to 40 km above earth's surface which protects life from the harmful **ultraviolet rays** of the sun. The release of chemicals such as CFC widely used in refrigerators has damaged the ozone layers.

Ozone monitoring stations in Antarctica have already detected average losses of 30% to 40 % of total ozone over the region. Each one percent loss of ozone is to cause an increase of about 2 % in UV Radiation. This will reduce the immunity of the body and cause eye cataracts and skin cancer.

#### **2. Global Warming (green house effect)**

Global warming is caused by the increases of green house gases such as carbon-di-oxide, methane, water vapour, CFCs which are responsible for the heat retention ability of the atmosphere. The rapid increase in average temperature of the earth will cause major changes in weather patterns all over the world.

Rise in global temperature, will also result in the melting of polar ice caps and glaciers. This in turn will raise the sea level. Land use changes will occur in coastal areas due to sea level rise. It will cause damage to coastal

structures, post facilities and water management systems.

Global temperature rises will also affect the agricultural patterns.



Global warming

### 3. Acid Rain

Acid rain was first discovered in 1852. This is one of the most important environmental problems, caused by invisible gases given out by automobiles or coal burning by power plants.

The gases that cause the acid rain is sulphur-di-oxide and nitrogen oxides. Fire and bacterial decomposition are the natural causes which increases a nitrogen oxide in the air.

These pollutants combine with water vapour in the presence of sun light and oxygen and form dilute sulphuric and nitric acids. When these mixture precipitates from the atmosphere, it is called as acid rain.

Acid rain falls down to the earth in all forms of precipitation. Acidity in the rain can harm and even destroy both natural ecosystems and man-made products.

Acid rains, when falling on oceans, reach the coral reefs. This has killed more than 70% of corals in Lakshadweep and Andaman islands.

The acid rain affects the eco systems by the following ways:

- The most basic microscopic organisms such as plankton may not be able to survive. So the sea animals, depending on planktons will die and the food chain will be affected.

If ocean temperature increases, growth of coral reefs will be affected. The corals control the proportion of carbon dioxide by turning  $\text{CO}_2$  in the water to limestone shell. Moreover, coral reefs grows in temperature just above  $10^\circ$  Celsius.

Other ecosystems such as forests and desert will also be harmed. Loss of bio-diversity and extinction of rare species will occur.

- They also change the acidity level of the soil by leaching crucial nutrients. Thus it affects forest vegetation.

**"For the protection of the ozone layer, Montreal Protocol and Vienna meet of 30 nations world wide agreed to reduce the usage of CFC's"**

### Steps to be taken to control Acid rain

Environmentalists advocate the installation of sulphur cleaning scrubbers in factories, finding new methods of burning coal and shifting to non - polluting renewable forms of energy production.

### Smog

The word smog is a combination of the words smoke and fog. Smog causes a smoky dark atmosphere, especially over cities. It decreases visibility, and creates gaze throughout the area.

### What can you do to reduce air pollution

1. Encourage your family to use neighbourhood market
2. Whenever possible take your bicycle.
3. As far as possible use public forms of transport.
4. Don't let your father drop you to school, take the school bus.
5. Encourage your family to form a carpool to office and back.
6. Reduce the use of aerosols in the household.
7. Look after the trees in your neighbourhood.
8. Switch-off all the lights and fans when not required.
9. If possible share your room with others when the air conditioner, cooler or fan is on.
10. Do not burn leaves in your garden, put them in a compost pit.
11. Make sure that the pollution check for your family car is done at regular intervals
12. Cars should, as far as possible, be fitted with catalytic converters.
13. Use only unleaded petrol.



**Smog**

Smog is caused by many factors, Major producers of smog include automobiles, fires, waste treatment, oil production, industrial solutions, paints and coatings. The articulates present in smog include carbon monoxide, dirt, dust and ozone. The smog effect is

created when sunlight, hydrocarbons and nitrogen oxide are mixed together. Smog creates harmful health hazards like lung failure and pneumonia.

Smog is not only a city problem. As smog level increases, wind carry smog away from urban areas and harm other areas too. Agriculture is also affected by smog.

### 2. Water Pollution

Water pollution is any chemical, physical or biological change in the quality of water that has a harmful effect on any living thing that drinks or uses or lives in it.

#### Major water pollutants

There are several causes of water pollution. The first are **disease-causing agents**. These are bacteria, viruses, protozoa and parasitic worms that enter sewage-systems and untreated waste.



**Waste Material**

Second pollutant is **oxygen demanding bacteria**; that is, wastes that can be decomposed by oxygen requiring bacteria. Large proportion of such bacteria in water can deplete oxygen levels in it. This causes other organisms in the water such as fish to die.

The third class of water pollutants is **water soluble inorganic pollutants**

such as acids, salts and toxic metals.

Water can also be polluted by a number of **organic compounds** such as oil, plastics and pesticides in the water which are harmful to humans and animals.

Water is able to transport pollution from one location to another easily. Every year 6,356,000 tonnes of sewage, sludge and garbage are dumped into the world oceans. "400 million people live along the Ganges river. Further, 2,000,000 persons ritually take bath daily in the river. It is filled with chemical wastes, sewage and even the remains of human and animals.

The National Ganga River Basin Authority is allocated Rs 5,000 million by National Clean Energy Fund (NCEF) for its innovative project, of cleaning of river Ganga."

Water pollution mainly affects the water based ecosystems. It also disrupts the natural food chain. Pollutants such as lead and cadmium are eaten by tiny animals. These animals are later consumed by fish and shellfish. So, the food chain continues to be disrupted at all higher levels. People can get diseases such as hepatitis by eating sea foods.

Toxic substances entering into lakes, streams, oceans, dissolve in water and get deposited on the bed. This affects aquatic ecosystems. This can also seep down and affects the ground water.

### **Eutrophication**

Eutrophication means natural nutrient enrichment of streams and lakes. The enrichment is often increased by human activities such as agriculture which will make lakes

eutrophic due to increase in nutrients. Due to this, algae will grow extensively. As a result, water will allow less light and bacteria will become more active. This will deplete oxygen levels in the water. This will destroy aquatic life and also its reproductive ability.

### **3. Land Pollution**

Land pollution is contaminating the land surface of the earth through dumping of urban waste matter and it arises from the breakage of underground storage tanks, application of pesticides and percolation of contaminated surface water, oil and fuel dumping, leaching of wastes from landfills or direct discharge of industrial wastes to the soil.



Land pollution

### **How can land pollution be prevented**

Things used for domestic purpose can be reused and recycled.

Organic waste matter should be disposed off far away from the residential places.

Inorganic wastes can be separated, reclaimed and recycled.

### **4. Noise Pollution**

Human or machine created sound that disrupts the activity or balance of

human or animal life is known as noise pollution

The unwanted sound can damage physiological and psychological health.

Noise pollution can cause hypertension, high stress levels, hearing loss, sleep disturbances and other harmful effects.

### **Control measures of noise pollution**

Development of a green belt vegetation to reduce noise.

Installation of decibel meters along highways and in places of public gatherings.

Development of plantations - A strip of wide plantation inside the compound wall effectively protects houses, school and hospitals.

### **5. Pollution due to biomedical waste**

Pollution due to biomedical waste is likely to spread diseases dangerous to life. In early April 2010, a machine from Delhi University containing cobalt- 60-a radio active metal used for radiotherapy in hospitals, sent to a scrap yard in the city. The death from radiation of a scrap yard worker revealed the reasons. as the biomedical wastes.

### **6. Pollution due to e-Waste**



E waste

India produces about 380,000

tonnes of e-waste generated out of television sets, mobile phones, computers, refrigerators and printers. This is one of major threats of environmental degradation and worst radiation incident worldwide.

### **7. Pollution due to Mining**

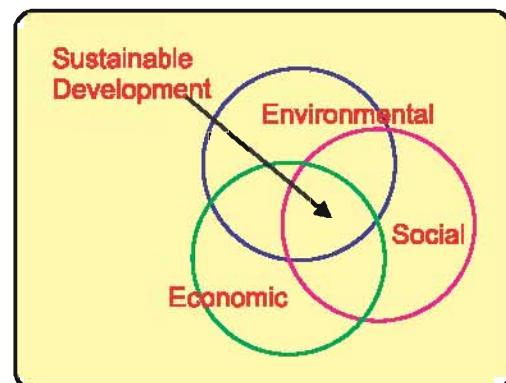
Mining is one of the important factors for the pollution of the environment.

The mines of the Mahanadi coal fields and NTPC draws about 250 million litres of water per day from river Brahmani and, in return, they release thousands of gallons of waste water which contains harmful substances like ash, oil, heavy metals, grease, fluorides, phosphorous, ammonia, urea and sulphuric acid into the river Nadir.

Due to large scale mining in the Aravalli hills in Rajasthan and Haryana, the forest cover has been depleted 90 per cent and drying up wells and affecting agriculture.

### **Biodiversity**

Acquired land for mining affects biodiversity. Biodiversity is the degree of variation of life forms within a given ecosystem. On the entire planet, rapid



environmental changes due to mining and dam constructions cause extinctions.

Many of India's environmental problems are a result of the high density of population. So, it is everyone's responsibility to preserve our environment and also keep it healthy and sustainable.

☞ It is possible by using efficient and eco-friendly technology.

☞ Adoption of Indigenous agricultural practices, soil and water conservation practices.

☞ community participation for ecological sustenance is indispensable for conservation of environment.

### EXERCISE

#### I) Choose the correct answer.

- 1) Natural nutrient enrichment of streams and lakes is
  - a) water pollution      b) eutrophication
  - c) air pollution
- 2) The main cause for natural air pollution
  - a) vehicular emission      b) Volcanic eruption
  - c) thermal power plants
- 3) Contamination of air is called
  - a) noise pollution      b) air pollution
  - c) land pollution

#### II) Distinguish between

- 1) Water pollution and Land pollution
- 2) Air pollution and Noise pollution

#### III) Answer the following questions.

- 1) What is water pollution?
- 2) List out the major Air pollutants
- 3) What is Noise pollution?
- 4) What are the major causes of water pollution?
- 5) What is bio diversity?
- 6) How pollution is caused due to bio medical waste?
- 7) What is meant by pollution due to e-waste?

#### IV) Answer the following in paragraph.

- 1) What are the effects of acid rain?
- 2) What is smog ?What are the effects of smog?
- 3) Give a brief note on Acid rain.

## 7. INDIA - TRADE, TRANSPORT AND COMMUNICATION

India is a vast land with beautiful landscape and rich abundant resources. But, the resources are not uniformly spread, and so, there are regions of surplus resources and regions of deficit. This leads to movement of goods from the surplus region to the deficit region through trade. Hence, **trade is an act or process of buying, selling or exchanging goods and services.** Growth of trade leads to economic prosperity of a nation. But, trade growth depends on well developed market, advanced transport and communication system. Thus trade, transport and communication stand complementary to each other and their overall development is essential for the country's economic growth.

Trade in general is of two types. They are **Internal trade** and **International trade.** Internal trade, also known as local trade, is carried within the domestic territory of a country. Land transport plays a major role in the movement of goods and this trade is mostly based on the nation's currency. It helps to promote a balanced regional growth in the country. For example tea from Assam, coffee from Karnataka, spices from Kerala, minerals from Jharkhand, West Bengal, Orissa belt are supplied to different parts of our country.

International trade also known as external trade, is a trade carried on between two or more countries. Ocean transport plays a major role in the movement of goods and the trade is carried on foreign currency. It leads to rapid economic progress of a country.

For example, India supplies iron ore to Japan. International trade is subdivided into two types such as **1.Bilateral trade 2.Multilateral trade.**

1) Bilateral trade is a trade carried out between two countries based on the agreement deal of not using currency for payment. In this trade a country sells its surplus goods to a needy country and in return buys an equally valuable required goods from the same country.

2) Multilateral trade is a trade carried out between many countries. In this trade a country sells its surplus goods to the needy country by getting revenue and buys the required goods from another country by using the same revenue. This trade is very complicate to negotiate, but stands very powerful when all the countries sign the agreement. All member countries are treated equally in the multilateral trade. The Trade Blocs like **APEC (Asian Pacific Economic Community), ASEAN (Association of South East Asian Nations)** and **SAPTA (South Asian Preferential Trade Aggreement)** are created to make the trade easier.

### Components of Trade

**"Export"** and **"Import"** are two components of trade. **'Export'** means goods and services sold for foreign currency. India exports nearly 7,500 goods to nearly 190 countries of the world. **Import** refers to goods and services bought from overseas producers. India imports nearly 6,000 goods from 140 countries.

The difference between the values of export and import is called **Balance of trade**.

If the value of export in a country is higher than the value of import, then the trade in that country will be called as **favourable balance of trade**. For example Japan.

If the value of import in a country is higher than the value of export then the trade in that country will be called as **unfavourable balance of trade** in that country. For example India

The value of currency of a country depends upon the balance of trade of that country.

### Major Exports from India

#### i) Agriculture Products

Cereals, pulses, tea, coffee, spices, nuts and seeds, sugar and molasses, processed food, meat and meat products .

#### ii) Ores and minerals

Iron ore, Coal, Manganese, Mica, Bauxite .

#### iii) Leather products

Wallets, purses, pouches, handbags, belts, footwear, gloves.

#### iv) Gems and jewellery

Precious stones, gold jewellery, decorations and antiques.

#### v) Chemicals and related products

Pharmaceuticals, cosmetics, rubber and glass .

#### vi) Engineering goods

Machinery, iron and steel, electronic goods, computer software.

#### vii) Textiles and handicrafts

Ready made garments, cotton, yarn and zari goods .

### Major imports of India

Machineries like transport equipment, machine tools, non-electrical machineries, electrical machineries. Wheat, medicinal and pharmaceutical products, Petroleum, fertilizers and newsprint.

India's value of exports in 1950-51 was only Rs.6,070 millions, whereas the value of export during 2008-09 was 7,66,9350 millions. India's value of imports in 1950-51 was Rs.5810 millions, whereas the value of imports during 2008-09 was Rs.13,05,5030 millions.

This clearly indicates the significant growth of both exports and imports in India.

India's International trade reflects the growing prominence of Indian economy in the global market. Since 2004, a liberal trade policy has been followed by the Government of India to promote International trade.

### Highlights of India's International Trade Policy

Merchandise trade has been doubled

Thrust is given for employment generation, especially in semi-urban and rural areas.

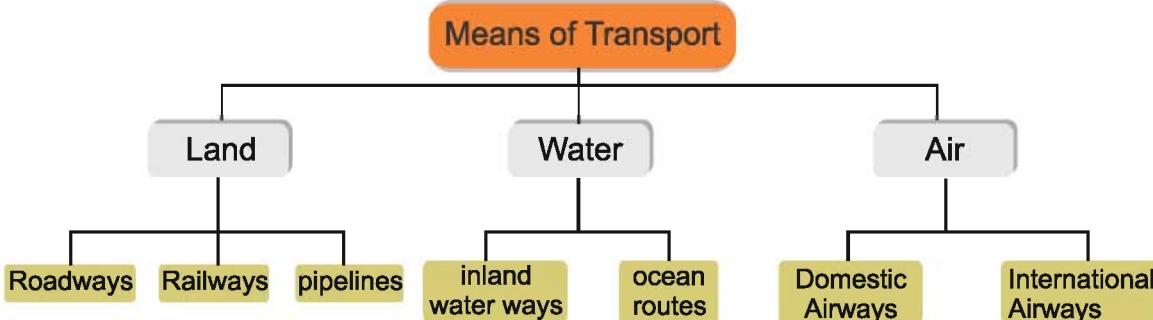
Trade procedure is simplified and transaction cost is reduced.

Special focus is given to make India a global hub.

A new scheme called Vishesh Krishi Upaj Yojna has been introduced to boost exports of fruits, vegetables, flowers and minor forest products.

### Transport System Of India

Development of a country not only depends upon the production of goods



and services but also on an efficient means of transport. It helps to move the materials to the point of production and goods to the point of consumption (market). A dense and efficient network of transport is essential to promote **social cohesion** and to **accelerate economic prosperity**. It also ensures security and territorial integrity. India is closely connected with the world countries by means of fast moving transport and an equally developed communication system.

### Roadways

The Indian Roads are cost efficient and the most popular dominant mode of transport linking different parts of our country. Roads stretch across the length and breadth of our country. It is used by all sections of people in the society. Road network in India is the **second longest** in the world accounting for 3.314 million km. The roads are classified into Village roads, District roads, State Highway, National Highway, Golden Quadrilateral Super Highways, Expressways, Border Roads and International Highways.

**Village Roads** link different villages with towns. They are maintained by village panchayats. In India villages roads run to a length of 26,50,000.Kms.

**District Roads** links the towns with the district headquarters. They are

maintained by the Corporations and Municipalities. in India run to a total length of 4,67,763 kms of district roads.

**State Highways** links the state capitals with the different district headquarters. The roads are constructed and maintained by the State Public Works Department (SPWD). The State Highways runs to a length of 1,31,899 kms. Cuddalore-Chittor Road is an example for State Highways.

**National Highways** links the state capitals with national capital. They are the primary road system of our country and are maintained by the Central Public Works Department. (CPWD) It runs to a length of 70,548 kms.

For example, NH 47 is a National Highway which connects Tamilnadu and Kerala. The total length of the road is 650 km out of which 224 km runs in the state of Tamil Nadu.

### Do you know?

The shortest National Highway is NH 47A. It runs from Ernakulam to Kochi port covering a distance of 5.9km.

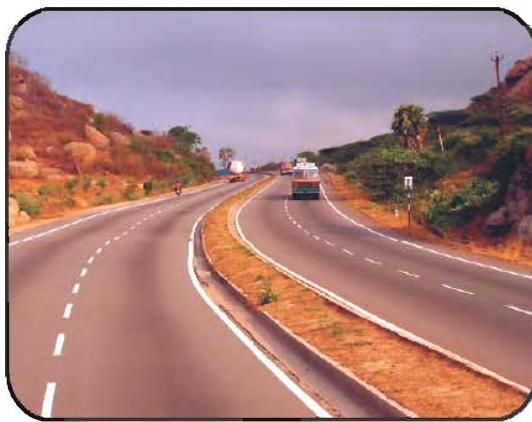
The longest National Highway NH 7, it runs from Varanasi in Uttar Pradesh to Kanyakumari in Tamil Nadu covering the distance of 2369 km. It passes through some of the important

metros like Jabalpur, Nagpur, Hyderabad and Bengaluru.



**National Highway -7**

"**Golden Quadrilateral Super Highways**" is a major road development project launched by the Government of India. It runs to a length of 14,846 km connecting the major cities of India. It includes:



**Chennai – Bengaluru Golden Quadrilateral**

- **Six lanes super highways** running to a length of 5,846 km connecting the four metropolitan cities - Chennai, Mumbai, Delhi and Kolkata.
- **North-South corridor** linking Srinagar-Kanyakumari, East-West corridor connecting Silchar-Porbander, run to a total length of 7,300 Km.
- The roads that connect the major ports with Golden Quadrilateral

and the corridors run to a length of 363km.

The main objective of the Golden Quadrilateral Super Highways is providing '**Connectivity**' '**speed**' and '**safety**'. They are meant to reduce the travel time and link the metropolitans closer. These projects are implemented by the **NHAI** (National Highway Authority of India).

As this Project involves huge investment, the government has entrusted private sector companies to invest, develop and maintain these highways. The agreement for the construction of roads is based on the concept of **Build, Operate and Transfer (BOT)**. After the private companies realize their cost and profits over an agreed period, the responsibilities will be transferred to the government.

**Expressways** are the technologically improved high class roads in the Indian Road Network. They are six lane roads. They run to a length of more than 200 kms. New Mumbai-Pune Road is an example for Expressway.

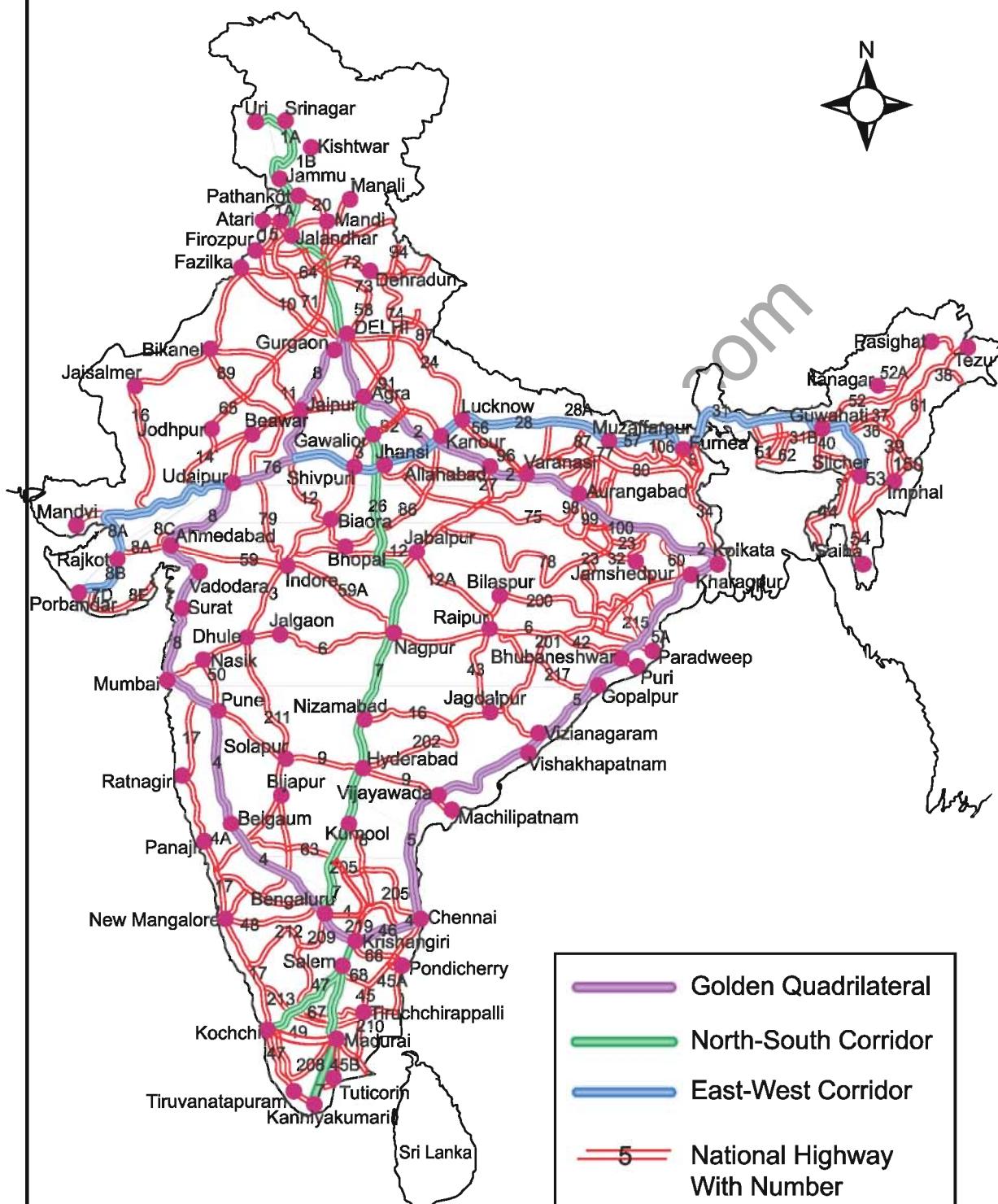


**Mumbai – Pune Expressway**

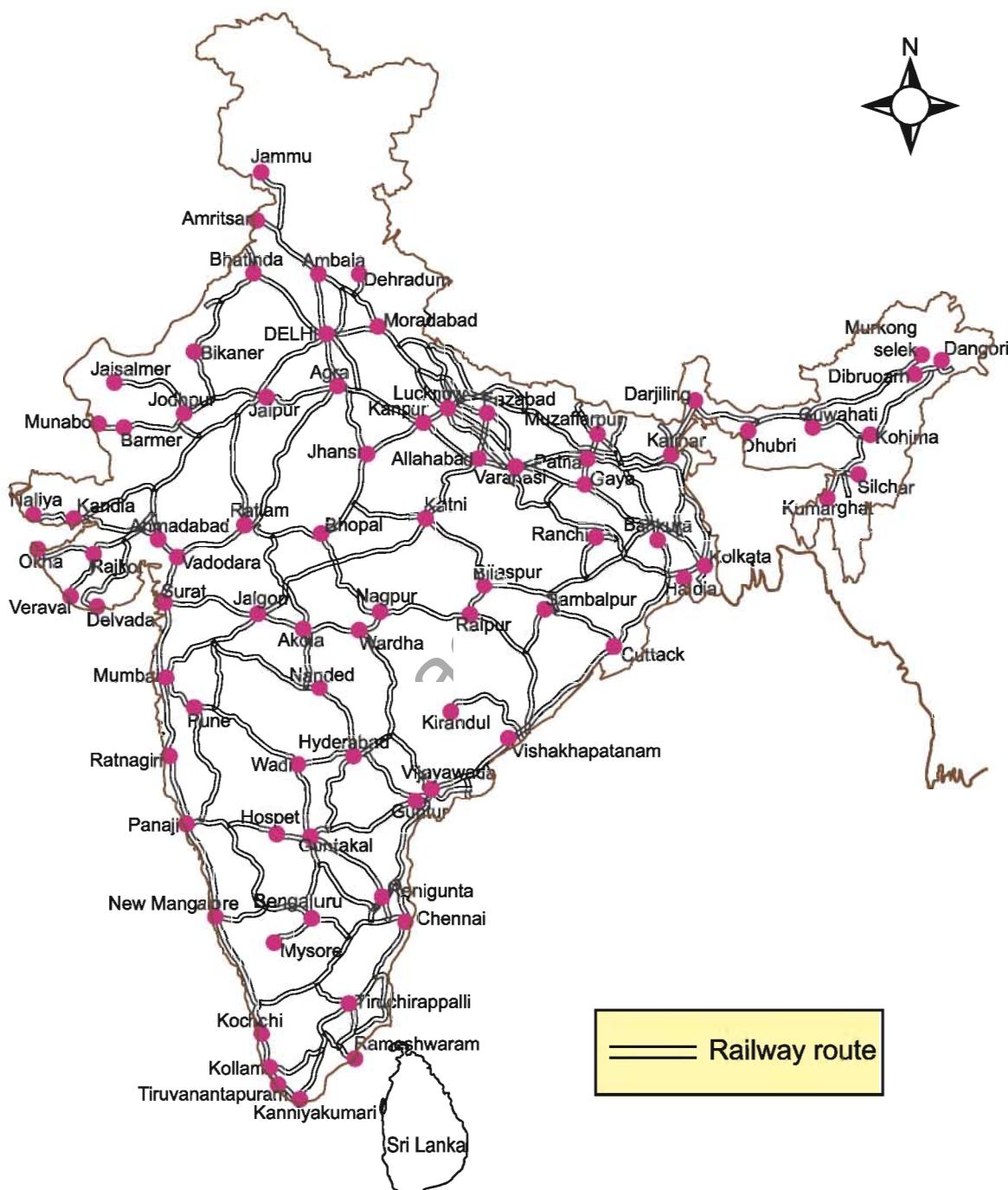
### **Border Roads**

Border Roads are the roads constructed along the northern and north eastern borders of our country.

# INDIA NATIONAL HIGHWAYS



## INDIA RAILWAYS



These roads are constructed and maintained by **Border Roads Organisation (BRO)** which was set up in 1960 by the Government of India. BRO is regarded as a symbol of nation building, national integration and an inseparable component in maintaining the security of the country. The organisation has constructed 46,780 Km of roads in difficult terrain.

### Do you know?

Border Road Organisation has constructed the world's highest road connecting Manali (H.P.) to Leh (Kashmir) at an altitude of 4270 mts.

**International Highways** are the roads that link India with neighbouring countries for promoting harmonious relationship with them.

### Railways

The Railways in India provide the principal mode of transportation for freight and passengers. It brings people together from the farthest corner of the country and promotes trade, tourism, education and national integration.



### Let us know

The First train steamed off from Mumbai to Thane in 1853, covering a distance of 34km.

Bhopal Shatabdi is the fastest train

in India. It runs at a speed of 150 km/hr. between Bhopal Junction and New Delhi.

Railway made a modest beginning in India in 1853. By 1947, they had grown to 42 rail systems managed by 37 companies. In 1951, the systems were nationalised as one unit—"The Indian Railways".

Indian Railways is the largest rail network in Asia and the second largest in the world. It traverses across the length and breadth of the country for over 63,273 km connecting 7,025 stations.

Railways help in commuting 20-million passengers and more than 2 million tonnes of freight daily. 'Delhi' is the headquarters of the Indian Railways and it is the main focal point from where the railway lines radiate in all directions connecting the seaports, airports and metropolitan cities of India. The network runs on the multigauge operation. They are:

1. Broad Guage
2. Meter Guage
3. Narrow Guage

The Indian Railways is divided into 17 zones

#### ZONES

Central Railway  
Eastern Railway  
East Central Railway  
East Coast Railway  
Konkan Railway  
Northern Railway  
North Central Railway  
Northwestern Railway  
Northeastern Railway  
Northeast Frontier Railway  
Southern Railway  
South Central Railway  
Southeastern Railway  
Southeast Central Railway  
Southwestern Railway  
Western Railway  
West Central Railway

#### HEADQUARTERS

Mumbai	
Kolkata	
Patna	
Bhubaneswar	
Navi Mumbai	
Delhi	
Allahabad	
Jaipur	
Gorakhpur	
Maligaon (Guwahati)	
Chennai	
Secunderabad	
Kolkata	
Bilaspur, CG	
Hubli	
Mumbai	
Jabalpur	

### The Role of Physiography in Railway System

The physiography of India has played a major role in the distribution of Railway network.

- The **Himalayan region** has rugged terrain and so it is very difficult to lay railway tracks along the steep slopes. Hence, this region has only three railway lines.
- Further, the condition in west **Rajasthan**, frequent flood in Brahmaputra valley thick forest and rough terrain in Northeast India has led to a few railway lines in these region.
- The **northern plains** of India is a flat land with rich alluvial soil. It has highly developed agricultural and industrial sectors with high population. Hence, it has a dense network of railways.
- **Peninsular India** is a plateau region with an undulated terrain, hence it has a moderate railway network.

### Sub Urban Railway

Cities in India such as **Mumbai**, **Chennai**, **Kolkata** and **Delhi** have separate tracks for the sub urban network, whereas Lucknow, Kanpur, Hyderabad and Pune do not have separate suburban tracks but share the track of long distance trains. The sub urban trains connect the **commuters** of sub urban areas to the urban centres. They are mostly Electric Multiple Units (EMU). These trains usually have nine coaches but to avoid overcrowd, during peak hours they attach extra coaches.

### MRTS – Chennai

The **Mass Rapid Transit system (MRTS)** is an elevated line of the suburban railway in Chennai. This railway line currently runs from

**Chennai beach to Velachery**, covering 17 stations for a distance of 25 km. The MRTS is operated by the state owned Southern Railway.



### Role of Railways in Indian Economy

- Railways help in **bulk Movement** of goods (iron and steel, mineral oil, building stone coal, metal ores etc) at large.
- Railways help in the **commercialization** of the agriculture sector by facilitating quick movement of perishable items like milk, vegetables, fruits etc.
- Railways help in developing a **unified national market**, equalisation of prices and also in the growth of internal and foreign trade.
- Railways help in **controlling famines** by quick movement of essential commodities.
- Railways play a greater role in **administration** and in national integration.

### Pipe Lines

Pipelines were used for transporting water to cities in earlier days, but now they are also used for transporting crude oil and natural gas from oil and natural gas fields to oil refineries, fertilizer factories and big thermal power plants.

### Advantages of Pipeline Transport

- Pipeline can be laid through difficult terrain as well as underwater.
- Initial cost of laying pipeline is high but subsequent cost for maintenance and operation is low.
- It ensures steady supply and minimizes transhipment losses and delays.
- Pipeline operation involves very low consumption of energy.

There are three important pipeline network in our country.

1. From oil fields in upper Assam to Kanpur in Uttarpradesh via Guwahati, Barauni and Allahabad.
2. From Salaya in Gujarat to Jalandhar in Punjab Via. Viramgam, Mathura, Delhi and Sonipat.
3. Gas pipeline from Hazira in Gujarat connects Jagdishpur in Uttarpradesh Via. Vijaipur in Madhya Pradesh.

Apart from the above, pipelines are also laid connecting, Mumbai high and Mumbai; Mumbai and Pune.

### Waterways

Waterways are the cheapest means of transport. They are most suitable for carrying heavy and bulky goods at low cost. It is a fuel efficient and environment friendly mode of transport. Waterways are classified into Inland waterways and Ocean routes.

#### Inland Waterways

India has an extensive network of inland waterways in the form of rivers, canals and backwaters. The total navigable length is 14,500km. Out of which 5,685 km of rivers and 400 km of canals are used by mechanized crafts. The "Waterways Authority" of India has

identified five National Waterways. They are:

**National waterway 1:** Allahabad-Haldia stretch of Ganga.

**National waterway 2:** Saidiya-Dhubri stretch of the the Brahmaputra.

**National waterway 3:** Kollam-Kottapuram stretch of the west coast canal, Champakara canal and Udyogmandal canal.



National waterway 3

**National water way 4:** Bhadrachalam-Rajahmundry and Wazirabad Vijayawada stretch of the Krishna Godavari river system along with Kakinad Puducherry canal network.

**National water way 5:** Mangalgadi-Paradeep and Talcher- Dhamara Stretch of the Mahanadi, Brahmani river along with the east coast canal.

#### Ocean Routes

India has a long coast line of 7516km with 13 major and 187 medium and minor ports located along the coast. These ports handle 95 percent of the country's foreign trade. The major ports are managed and controlled by 'Port Trust' under the Government of India.

The medium and minor ports are controlled by the State Governments. The major ports along the west coast are Kandla, Mumbai, Jawaharlal

Nehru, Marmagao, New Mangalore and Cochin. The major ports along the **east coast** are Tuticorin, Chennai, Ennore, Vishakapatnam, Paradip, Haldia and Kolkata.



**Chennai Port**

India is the second largest ship owning country in Asia and ranks sixteenth in the world. India has four major ship building yards. They are:

- 1) Hindustan shipyard at Vishakapatnam.
- 2) Garden reach workshop at Kolkata.
- 3) Mazagaon Dock at Mumbai.
- 4) Kochi shipyard at Kochi.

Government of India has issued guidelines for private investment in the port sectors. **Indian ports Act 1908** and **major port Trust Act 1963** have been made flexible to allow private investment in ports.

### Airways

Airways is the quickest, costliest, most modern and comfortable means of transport. They carry passengers, freight and mail. They link local, regional, national and international cities. Air transport has made accessibility easier by connecting difficult terrains like high mountains and sandy deserts.

The air transport in India made its beginning in 1911, but the real initiation

was made in 1932 by JRD Tata, when he started the **Tata Airline**. In 1946 it was renamed as **Air India** and in 1953 air transport was nationalized. **Indian Airlines** was set up to cater the needs of domestic market while **Air India** was set up to take care of the international sector. Both enjoyed monopoly over Indian skies until 1986 later, due to **liberalisation policy**, many privately owned airlines joined the air transport system.



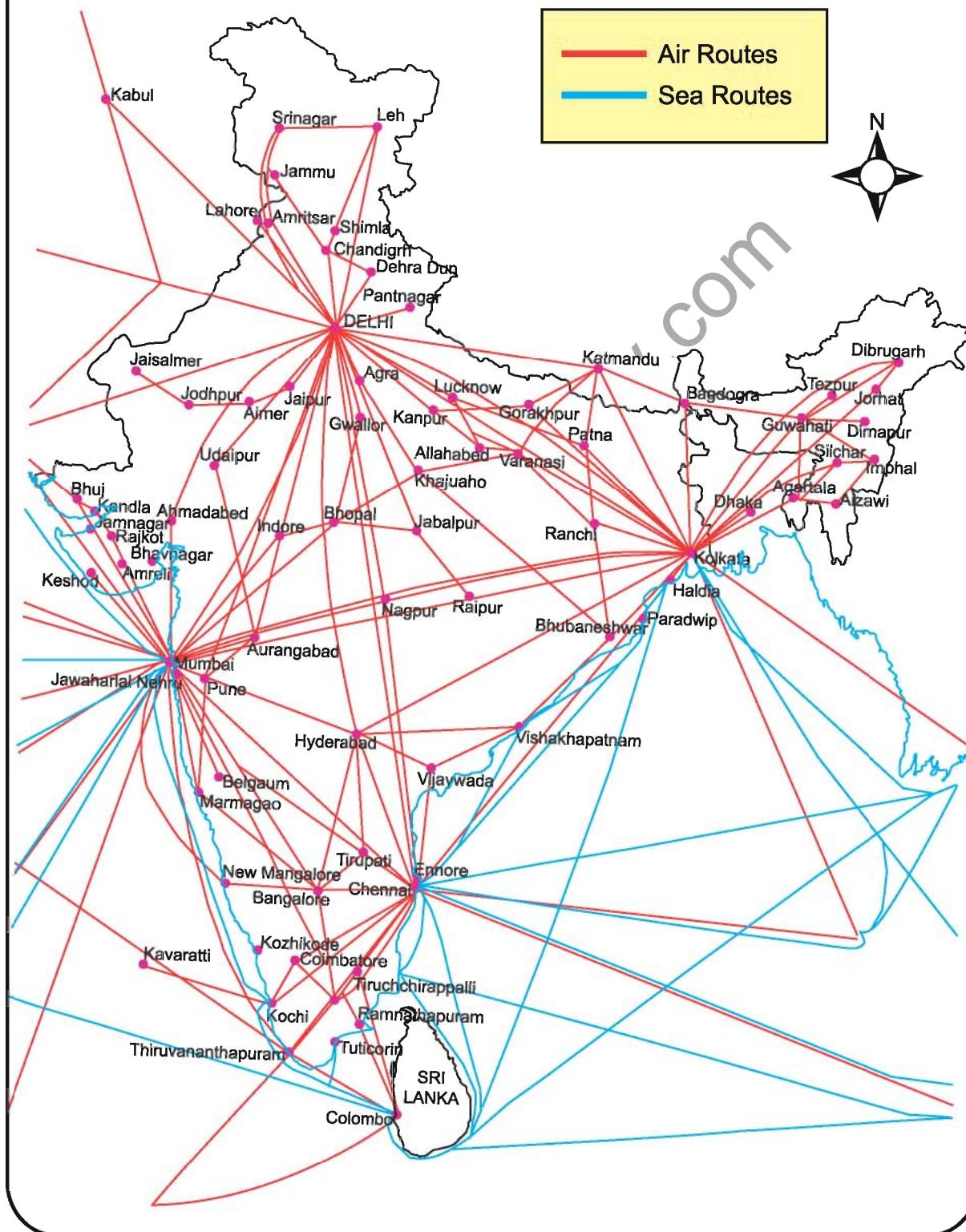
In 2007, the Government of India merged the Air India and Indian Airlines under **National Aviation Corporation of India Limited (NACIL)**. NACIL(A) provides international services, **NACIL(I)** provides domestic services and services to neighbouring countries in South East Asia and Middle East.



**Chennai Airport**

NACIL operates 159 Airbuses and Boeing aircrafts. It plays a major role in connecting Indian cities with the major cities of the world. Apart from NACIL there are **private operators** namely, Jet

## Major Sea and Air Routes



Airways, Kingfisher Airlines, Spice jet, Inter Globe Aviation (INDIGO) to provide domestic services.

**Airport Authority of India (AAI)** was constituted in 1995 and it has instituted international standards of safety to Indian Airports. At present, AAI maintains and operates 129 airports out of which 17 are International Airports.

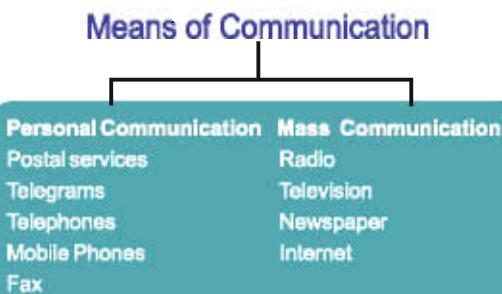
**Pawan-Hans Helicopter Ltd.** is a public sector company. It is engaged in providing helicopter services to ONGC for its offshore operations. It also provides services to various state Governments, especially in the North East to link the inaccessible areas.



### Pawan-Hans Communication

Communication system contributes to the development of economy and social relationships. It helps in promoting cultural unity.

Communication is a process that involves exchange of information,



thoughts and ideas. There are various ways of sharing information with each other and it is termed as the '**Means of Communication**'.

**I) Personal Communication** refers to exchanging of information between two persons'.

**Indian Postal Service** made its beginning in 1857 and it is the largest network in the world. It enables people to send parcels and mails to foreign lands and to the remotest villages. The mails are classified into **first class mail** and **second class mail**. First class mail includes postcards, inland letters and envelopes. They are airlifted without any surcharge between stations. The second class mail includes book packets, registered newspaper and periodicals. They are carried by land transport. They also provide **Value Payable by Post** service, Electronic Money Order service, Instant Money Order service, e-Post and e-Bill Post service, Express parcel post and Speed post services.

### Do you know?

India has the largest postal network in the world with 1,55,618 post offices.

**Telegram** is a form of **written communication** by which messages can be sent quickly to distant places.

**Telephone** is a form of **oral communication**. It is considered very essential for the growth of commerce. People at distant places within a country can communicate using STD (Subscriber's Trunk Dialing), while international communication can be made through ISD (International Subscriber Dialing). A sophisticated telephone not only enables voice messages but also written messages,

drawings, photographs and video images. Telephone is the most preferred form because it provides instant communication.

**Mobile Phones** are very popular in today's world as it provides an access to the user and receiver at anytime, at anywhere. A mobile phone allows its user to make and receive telephone calls to and from the public telephone network across the world. A key feature of the cellular phones is that it enables seamless telephone calls even when the user is moving around wide area.

**Short Message Services(SMS)** is a method by which message can be sent to a mobile phone via another mobile phone. SMS may be sent from one cell phone to another, or may be sent to all cell phones within a specific geographical region.

**Fax** is an electronic device that enables instant transmission of any matter, which may be handwritten or printed like letters, diagrams, graphs and sketches by using telephone lines. A fax machine, sends the exact copy of the document to another fax machine at the receiving end. **Internet fax** is a form for sending documents using internet with the help of a fax machine.

**II) Mass communication** enables millions of people to get the information at the same time. It helps in creating awareness among the people regarding various national policies and programme.

**Radio broadcast** in India was started in 1927. In 1936 it was named as **All India Radio (AIR)** and from 1957, it came to be called as **Akashvani**. It serves as an effective medium to educate people on health, environment protection, family planning, science and technology.

**Television** in India is known as **Doordarshan** and it is one of the largest terrestrial networks in the world. It offers three-tier program services (national, regional, local) for various categories of people. It brings its viewers all the major programmes of national and international importance through live telecast. It broadcasts a variety of programmes from entertainment, education, sports, and health hazards for people of different age groups and regions.

**Newspapers** are a most common but powerful means of communication which provides information about national and international events to the people. In a democratic country like India, they serve as a very **effective tool** for knowing public views and opinions.

**Internet** is a vast network of computers. It connects many of the world's business institutions and individuals. Internet means interconnected network of networks, which links thousands of smaller computer networks. It enables computer users throughout the world to send and receive messages and information in a variety of form. It was first started as a purely text based system to send and receive message (e-mail). But now, it is fully a **multi media based system** with capacity to deliver picture images, video and audio . The basic services of internet are e- mail, The World Wide Web (www) and Internet Phone.

### Advantages of Communication Network

- Communication network has enhanced the efficiency of communication. Because it enables quick exchange of information with people anywhere in the world.

- Leads to enormous growth of trade.
- Helps the government to tackle various socio - economic problems in the society.
- Improves the quality of human life.
- Opens the door to the information age.
- Promotes Edusat programs.

In recent decades, the world has taken giant strides into the information age. The diversity and the capabilities of various media-(print and electronics) have increased enormously and they play a significant role in the economic and social growth of our country.

### EXERCISE

#### I) Choose the correct word.

1. Trade carried on within the domestic territory of a country is known as \_\_\_\_\_ trade.  
a) External b) Foreign c) Internal d) International
2. Trade blocs are created to make the \_\_\_\_\_ trade easier.  
a) Multi Lateral b) Bilateral c) Unilateral d) Local
3. Cost efficient and most popular mode of transport in our country is \_\_\_\_\_.  
a) Airways b) Roadways c) Waterways d) Railways
4. The headquarters of Indian Railways is \_\_\_\_\_.  
a) Mumbai b) Delhi c) Nagpur d) Chennai
5. The costliest and most modern means of transport is \_\_\_\_\_.  
a) Air Transport b) Road Transport  
c) Water Transport d) Rail Transport

#### II) Match the following.

- |                      |  |
|----------------------|--|
| 1. Village Roads     | Delhi  |
| 2. District Roads    | Mumbai                                       |
| 3. Central Railways  | Chennai                                      |
| 4. Southern Railways | (Village) Panchayat                          |
| 5. Northern Railways | Municipalities and Corporations<br>Hyderabad |

#### III) Distinguish between.

1. National highways and state highways.
2. Exports and imports.

3. Internal trade and International trade.
4. Roadways and railways.
5. Airways and waterways.

**III) Short Answers.**

1. What is trade? What are the types of trade?
2. State the highlights of India's foreign trade policy since 2004.
3. Trade, Transport and communication stand complementary to each other. How?
4. What is the significance of border roads?
5. Brief how physiography play a role in the distribution of Railway networks in India?
6. Write a note on sub urban railway.
7. State the merits of pipeline transport.
8. Mention the important pipeline networks in our country
9. What are the advantages of communication network

**IV) Answer in Paragraph.**

1. Explain India's trade with reference to her major exports and imports
2. Classify the Indian roads and Explain.
3. Explain the means of Personal Communication in India.

**V) Map work.**

**Mark the following in the out line map of India.**

1. Northern Terminal of North south corridor.
2. Major Ports in Kerala and Orissa.
3. Mark the road route linking Mumbai and Delhi.
4. Mark the longest National Highways with two Inter mediates.
5. Mark the headquarters of konkan railways.
6. Mark the International Airports in the four metropolitan cities.
7. Link Chennai and Delhi by rail route.
8. Link Mumbai and Kolkata by rail route.

**VI) Activity.**

**Use Atlas and locate**

- 1) The Headquarters of the "Indian railways".
- 2) Major sea ports of India.
- 3) International airports of India.

## 8. REMOTE SENSING

Geography is the study of the Earth focusing on its surface, the atmosphere, oceans, plants, animals, and people. Most people think that geography is a study of maps. This thinking is only partially correct because Geography is also the study of man's natural environment and its influence on cultural environment. To learn and know about our environment, we use our senses of seeing, touching, smelling and hearing. These senses help us to learn about an object from close proximity. But in geography the subject matter encompasses spatial distribution and so it takes many months, to study about resources of a region by means of ground survey. Ground survey of resources is hindered by dense forests, rugged terrain, sandy deserts and unpredictable weather. In spite of this, continuous monitoring of the earth surface has become very essential due to recent increase in natural disasters, large scale climatic changes, desertification and reduction in biodiversity. Hence, the most effective technology to gather information on any part of the earth within a short span of time without footing the region is the Remote Sensing Technology.

**What is Remote Sensing?**

**Remote = far away**

**Sensing= getting information**

Remote sensing can be defined as the collection of data about an object from a distance. Humans and many other animals accomplish this task with their eyes or by their sense of smell or hearing. Geographers use the remote

sensing as a tool to monitor or measure phenomena on the Earth's lithosphere, hydrosphere, atmosphere and biosphere. Remote sensing of the environment by geographers is usually done with the help of mechanical devices known as sensors. These



sensors have a greatly improved ability to receive and record information about an Earth object without any physical contact. Often, these sensors are positioned in helicopters, planes, and satellites. The sensors record information about an object by measuring the electromagnetic energy that is reflected back and radiated from the object on the earth surface.

### History of Remote Sensing

Aerial photographs were the first results of remote sensing utilized by cartographers, or map-makers. In 1858, French map-makers used a hot air balloon and primitive cameras to take oblique (inclined) aerial photographs of the landscape. Later during World War I, air planes were used to take systematic aerial images of much of the terrain in the war zone. These photographs helped in gathering information about the

position and movement of enemy troops. After the war, systematic vertical images were taken for civilian use. By comparing photographs taken at different angles, cartographers were able to create accurate and detailed maps of different territories.



Air Balloon

The process of comparing different aerial photographs and computing accurate measurements is called photogrammetry. Maps created using aerial photographs are called orthophoto maps.



TIROS-1 satellite

In the 1960s, a revolution in remote sensing technology began with the deployment of space satellites. From their high vantage-point, satellites have a greatly extended view of the Earth's surface. The first meteorological satellite, TIROS-1 (Television and Infrared Observation Satellite) was launched by the United States.

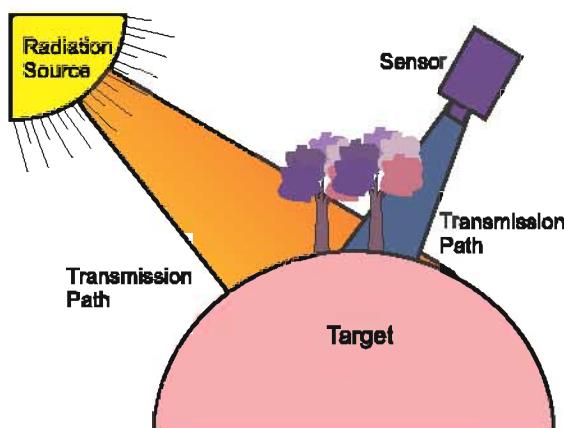
In the 1970s, the second revolution in remote sensing technology began with the launch of Earth Resource Technology Satellite (ERTS). This series was renamed **LANDSAT** in 1975. The usefulness of satellites for remote sensing has resulted in several other organizations launching their own devices. In 1986, the **SPOT** (*Satellite Pour l'Observation de la Terre*) program of France began. They launched five satellites and have produced more than 10 million images.



TIROS-1 Satellite

### Components of Remote Sensing

The four basic components of a remote sensing system are **target**,



**energy source**, **transmission path**, and a **sensor**. The **target** is an object or material that is being imaged. The components in the system work together to measure and record

information about the target without actually coming into physical contact with it. The **energy source** provides electromagnetic energy to the target. Normally, the energy source can be classified into two. 1. **Passive System** (that is sun, irradiance from earth's materials) 2. **Active System** (that is irradiance from artificially generated energy sources such as radar). Remote sensing technology makes use of a wide range electromagnetic spectrum from a very short wave Gamma ray to a very long radio wave. The electromagnetic radiation interacts with the target, depending on the properties of the target and the radiation; **transmit** information from the target to sensor. **Sensor** is a device to detect the **Electro Magnetic Radiation** (EMR). Sensors can be classified on the basis of energy received into **Passive sensors** and **Active Sensors**. **Passive sensors** detect natural radiation that is emitted or reflected by the object or surrounding area being observed. For example Cameras used for taking favourite pictures during

daylight. **Active sensors** transmit their own signal and measure the energy that is reflected (or scattered back) from the target for example Radar.

### Process Involved In Remote Sensing

**1. Sun is a Energy Source (A)** - the first requirement for remote sensing is energy source which illuminates or provides electromagnetic energy to the target of things.

#### 2. Sunrays and Atmosphere (B)

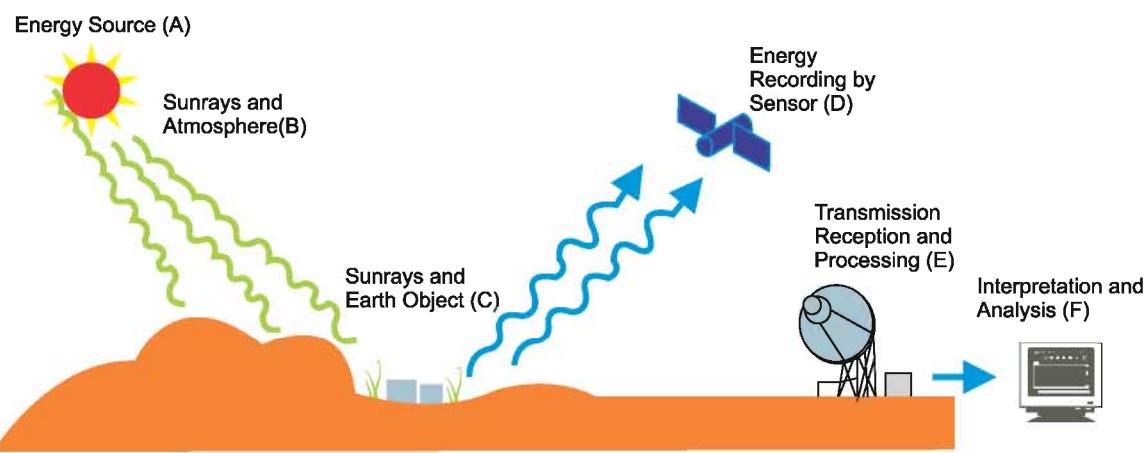
as the energy travels from its source to the target, it will come into contact with, and also interact with, the atmosphere it passes through. This interaction may take place a second time as the energy travels from the target to the sensor.

#### 3. Sunrays and Objects on Earth (C)

- once energy makes its way to the target through atmosphere, it interacts with the target, depending on the properties such as tone, texture, size, shape and patterns of both the target and the radiation.

**4. Recording of Energy by the Sensor (D)** - after energy has been scattered or emitted from the target,

### Processes involved in Remote Sensing



the sensor (remote - not in contact with the target) collects and records the electromagnetic radiation.

**5. Transmission, Reception and Processing (E)** - the energy recorded by the sensor has to be transmitted, often in electronic form, to a receiving and processing station where the data are processed into an image (hardcopy and/or digital).

**6. Interpretation and Analysis (F)**-the processed image is interpreted, visually or digitally or electronically, to extract information about the target which was illuminated.

**7. Application (G)** - the final element of the remote sensing process is achieved by applying the extracted information for better understanding and to reveal some new information, or assist in solving a particular problem.

### Advantages of Remote Sensing

1. This system has the ability to provide a synoptic view of a wide area in a single frame.

2. Remote sensing systems detect features of inaccessible areas that cannot be reached by human vision: For example Equatorial forest in



the congo basin, Africa.

3. Cheaper and rapid method of acquiring up to-date and continuous information over a geographical area For example . It helps agriculturists to

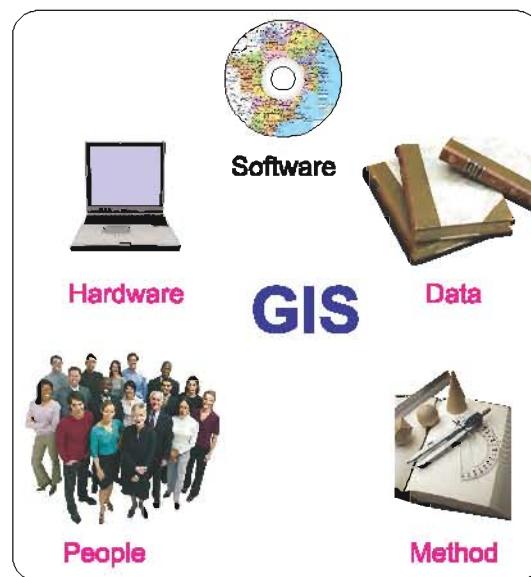
identify the areas affected by pests, crop related diseases etc.

4. Helps the planners for formulating policies and programs to achieve the holistic functioning of the environment.

For example. Spots the areas of natural disasters such as tsunami, drought prone, flood affected and cyclone hit areas and helps in providing relief and rehabilitation program in the affected areas.

5. Enable the cartographers to prepare thematic maps like geological maps, soil maps, population maps etc. with great speed and accuracy.

**Geographical Information System (GIS)** is a systematic integration of Computer Hardware, Software and Spatial Data, for capturing, storing, displaying, updating, manipulating and analysing all forms of geographically referenced data.



### Components of GIS

A Geographic Information System combines computer drawn maps with a database management system. This

diagram suggests that GIS consists of three subsystems:

(1) an input system that allows for the collected data to be used and analyzed for some purpose; (2) computer hardware and software systems that store the data, allow for data management and analysis, and can be used to display products of data manipulation on a computer monitor; and (3) an output system that generates hard copy of maps, images, and other types of output.

### **Application of GIS**

GIS is used by people of various fields.

○ Exploration and mining companies use GIS to find prospective areas for exploration and mining.

○ Power companies use GIS to monitor and analyse the electricity load on the grid network for a particular area.

○ Transport companies use GIS to locate shortest routes for delivering goods and to save time.

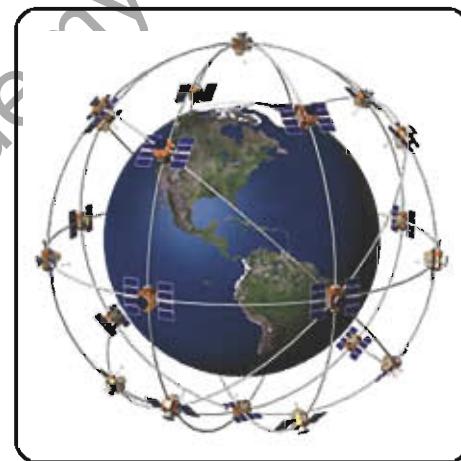
○ Law enforcement agencies use GIS to map, visualize, and analyse crime incident patterns.

○ Ecologists use GIS to understand relationships between species distribution and habitats.

### **Global Positioning Systems (GPS)**

GPS is a space-based global navigation satellite system that provides reliable location and time information in all weather and at all times. GPS was created and realized by the U.S. Department of Defence (DOD) and was originally run with 24 satellites. It was established in 1973 to overcome the limitations of previous navigation systems. GPS consists of

three parts: the space segment, the control segment, and the user segment. The space segment is composed of 24 to 32 satellites in medium Earth orbit and also includes the boosters required to launch them into orbit. The control segment is composed of a master control station, an alternate master control station, and a host of dedicated and shared ground antennas and monitor stations. The user segment is composed of hundreds of thousands of U.S. and allied military users of the secure GPS Precise Positioning Service, and tens of millions of civil, commercial, and scientific users of the Standard Positioning Service.



**GPS Satellite system**

### **Basic concept of GPS**

A GPS receiver calculates its position by precisely timing the signals sent by GPS satellites high above the Earth. Each satellite continually transmits messages that include, the time the message was transmitted and precise orbital information.

Three satellites might seem enough to solve for position, since space has three dimensions and a

position near the Earth's surface can be assumed. However, even a very small clock error multiplied by the very large **speed of light**, the speed at which satellite signals propagate, results in a large positional error. Therefore, receivers use four or more satellites to solve their location and time.

### Application of GPS

GPS is considered a *dual-use* technology, meaning it has significant military and civilian applications.

- Surveying, Map-making, Navigation, Cellular Telephony, and Geofencing are the main civilian use of GPS.

- Navigation, Target tracking, Missile and projectile guidance, Search and Rescue, and Reconnaissance are the main military use of GPS.

- GPS has become a widely used and a useful tool for **commerce**,

**scientific uses, tracking and surveillance.** GPS' accurate timing facilitates everyday activities such as banking, mobile phone operations, and even the control of power grids.



Farmers, surveyors, geologists and countless others perform their work more efficiently, safely, economically, and accurately, because GPS helps them with information.

### EXERCISE

#### I) Choose the correct word.

1. Maps created by using aerial photographs are called \_\_\_\_\_ Maps  
 a) Ortho photo      b) Aerial Photo      c) Physical      d) Political
2. The Object under study is known as \_\_\_\_\_.  
 a) target      b) source      c) sensor      d) Image
3. The device to detect the Electro Magnetic Radiation is \_\_\_\_\_.  
 a) target      b) Sensor      c) Object      d) camera

**II) Match the following.**

- |                    |                                 |
|--------------------|---------------------------------|
| 1. Ground Survey   | USA                             |
| 2. Remote Sensing  | Many Months                     |
| 3. Hot air balloon | systematic aerial images        |
| 4. Airplanes       | French map makers               |
| 5. TIROS           | short span of time              |
|                    | Geographical Information System |
|                    | Global Positioning System       |

**III) Short Answers.**

1. What is meant by remote sensing?
2. What are the disadvantages of ground survey?
3. Mention the basic components of remote sensing?
4. Define GIS.
5. Mention any two applications of GIS.
6. Write any two applications of GPS?

**IV) Answer in Paragraph.**

1. Write about Remote sensing Technology.
2. Explain the various components of remote sensing.
3. Explain the process involved in remote sensing Technology.
4. What are the advantages of remote sensing?

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