





# 3 Our Changing Earth



## Activity

Take a small coloured paper pellet and put it in a beaker half filled with water. Place the beaker on a tripod stand and heat it. As the water warms up, you will observe that the paper pellet is moving upward along with the warm layers of water and then sinks back along with the cooler layers of water. The molten magma inside the earth moves in a similar manner.



## Glossary

### Lithospheric plates:

The earth's crust consists of several large and some small, rigid, irregularly-shaped plates (slabs) which carry continents and the ocean floor.

The lithosphere is broken into a number of plates known as the **Lithospheric plates**. You will be surprised to know that these plates move around very slowly – just a few millimetres each year. This is because of the movement of the molten magma inside the earth. The molten magma inside the earth moves in a circular manner as shown in the activity.

The movement of these plates causes changes on the surface of the earth. The earth movements are divided on the basis of the forces which cause them. The forces which act in the interior of the earth are called as **Endogenic forces** and the forces that work on the surface of the earth are called as **Exogenic forces** (Fig. 3.1).

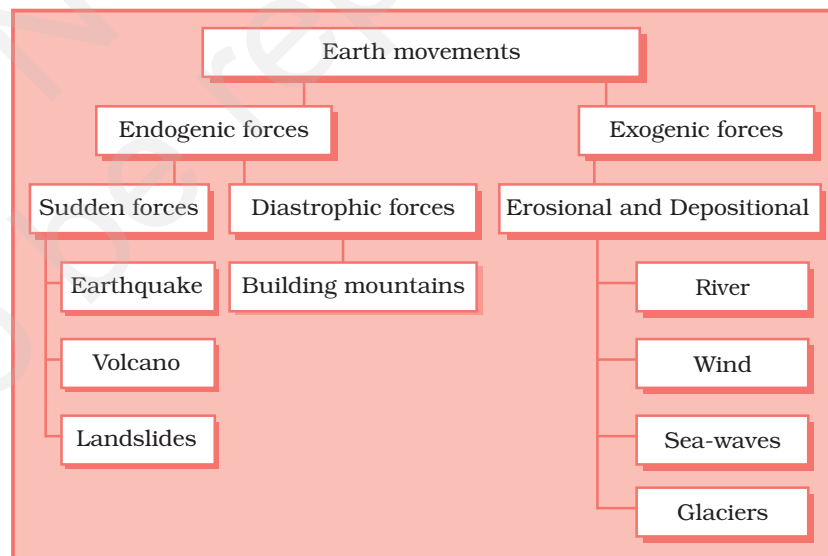
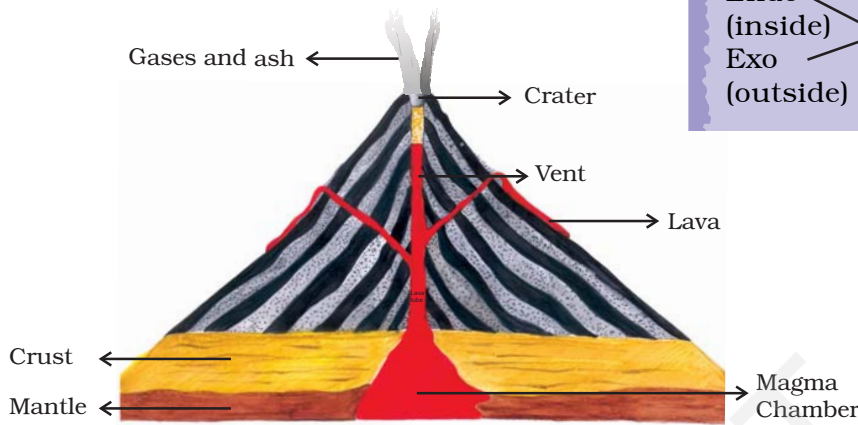


Fig. 3.1: Evolution of Landforms

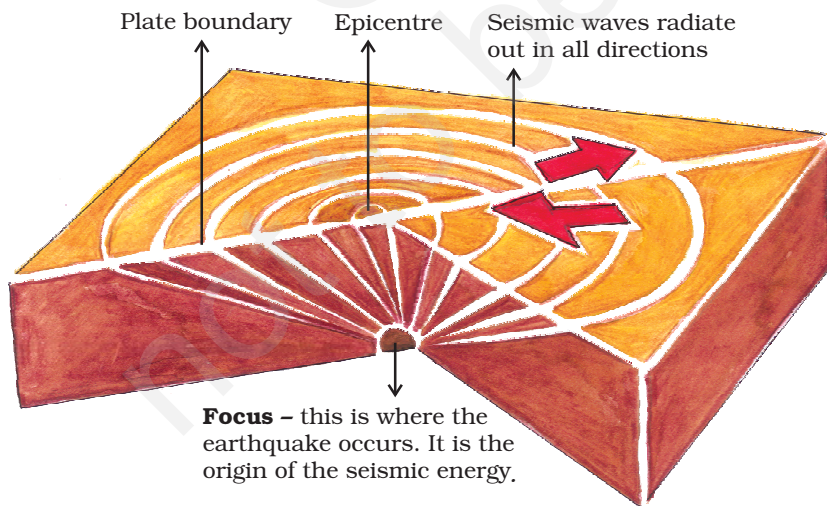
Endogenic forces sometimes produce sudden movements and at the other times produce slow movements. Sudden movements like **earthquakes** and **volcanoes** cause mass destruction over the surface of the earth.

A **volcano** is a vent (opening) in the earth's crust through which molten material erupts suddenly (Fig. 3.2).



**Fig. 3.2:** A Volcano

Similarly, when the Lithospheric plates move, the surface of the earth vibrates. The vibrations can travel all round the earth. These vibrations are called **earthquakes** (Fig. 3.3). The place in the crust where the movement starts is called the **focus**. The place on the surface above the focus is called the **epicentre**. Vibrations travel outwards from the epicentre as waves. Greatest damage is usually closest to the epicentre and the strength of the earthquake decreases away from the centre.



**Fig. 3.3:** Origin of an Earthquake



### Word Origin

Endo (inside) + genic (origin) = Endogenic  
 Exo (outside) + genic (origin) = Exogenic



### Activity

Take a container, fill it with water and close it with a lid. Put the water to boil. Now put some peas, spoon and beads on top on the lid. What do you notice? As the water boils the lid begins to shake. The things which you have put on the lid also vibrate. The beads roll down and the spoon vibrates to make a sound. In the same manner, the earth vibrates when an earthquake occurs.



### Do you know?

There are three types of earthquake waves:

1. P waves or longitudinal waves
2. S waves or transverse waves
3. L waves or surface waves

Try to find out the properties of these waves from an encyclopedia.



**Fig. 3.3a:** Destruction caused by an Earthquake in Gujarat



### Do you know?

An earthquake is measured with a machine called a seismograph. The magnitude of the earthquake is measured on the Richter scale. An earthquake of 2.0 or less can be felt only a little. An earthquake over 5.0 can cause damage from things falling. A 6.0 or higher magnitude is considered very strong and 7.0 is classified as a major earthquake.



**A Seismograph**

Although earthquakes cannot be predicted, the impact can certainly be minimised if we are prepared before-hand.

Some common earthquake prediction methods adopted locally by people include studying animal behaviour; fish in the ponds get agitated, snakes come to the surface.

## Earthquake – A Case Study

**1 EARTHQUAKE HITS BHUJ**  
A massive earthquake measuring 6.9 on Richter scale hit Bhuj Town on 26th January 2001.

**2 School worst affected**  
At least 971 students and 31 teachers are feared to have lost their lives following the collapse of school buildings.

**3 BHUJ RELIEF EFFORT BLIGHTED..**  
Three days after the quake, concern rose about food, blankets and medical supplies not reaching everyone.

**4 Destruction of Bhuj**  
Phone lines, water pipelines and power stations transmission lines were knocked out.

**5 Fire in the city**  
Hundreds of fires started as charcoal, cookers overturned.

**6 Emergency declared in quake zone**  
The President declares a state of emergency.

**7 CM'S APPEAL TO THE CENTRE**  
Gujarat appeals for financial help. The Chief Minister of Gujarat has launched an appeal for the Centre to deal with the disaster.



### Activity

1. Read the 'Earthquake – A case study' given in the form of headlines that appeared in the newspapers after the quake. Arrange the events in the right sequence of their happening.
2. Imagine if a quake suddenly shook in the middle of the school day, where would you go for safety?

## EARTHQUAKE PREPAREDNESS

Where to take shelter during an earthquake —

**Safe Spot** – Under a kitchen counter, table or desk, against an inside corner or wall.

**Stay Away from** – Fire places, areas around chimneys, windows that shatter including mirrors and picture frames.

**Be Prepared** – Spread awareness amongst your friends and family members and face any disaster confidently.

## MAJOR LAND FORMS

The landscape is being continuously worn away by two processes – weathering and erosion. **Weathering** is the breaking up of the rocks on the earth's surface. **Erosion** is the wearing away of the landscape by different agents like water, wind and ice. The eroded material is carried away or transported by water, wind, etc. and eventually deposited. This process of erosion and deposition create different landforms on the surface of the earth.

### Work of a River

The running water in the river erodes the landscape. When the river tumbles at steep angle over very hard rocks or down a steep valley side it forms a **waterfall** (Fig. 3.4).

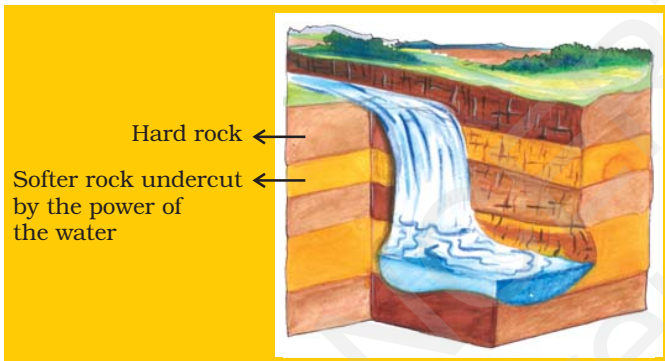


Fig. 3.4: Waterfall

As the river enters the plain it twists and turns forming large bends known as **meanders**. Due to continuous erosion and deposition along the sides of the meander, the ends of the meander loop come closer and closer. In due course of time the meander loop cuts off from the river and forms a cut-off lake, also called an **ox-bow lake**. At times the river overflows its banks. This leads to the flooding of the neighbouring areas. As it floods, it deposits layers of fine soil and other material called sediments along its banks. This leads to the formation of a flat fertile **floodplain**. The raised banks are called **levees**. As the river approaches the sea, the speed of the flowing water decreases and the

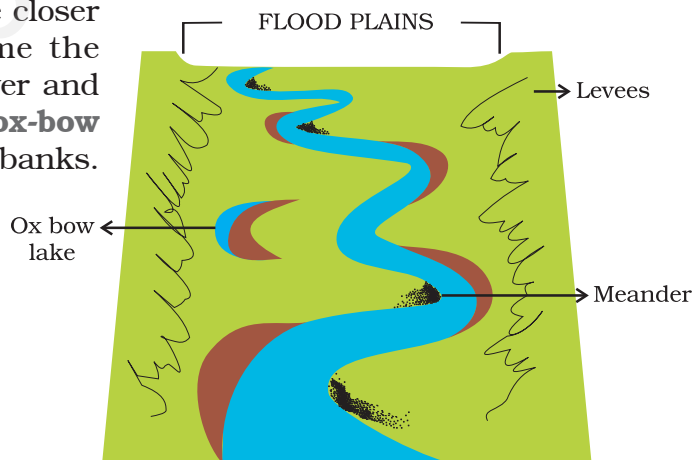
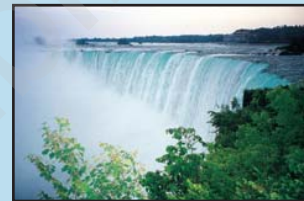


Fig. 3.5: Features made by a river in a flood plain



### Do you know?

- There are thousands of small waterfalls in the world. The highest waterfall is Angel Falls of Venezuela in South America. The other waterfalls are Niagara falls located on the border between Canada and USA in North America and Victoria Falls on the borders of Zambia and Zimbabwe in Africa.



The Niagra falls



### Let's do

Find out the names of a few rivers of the world that form a delta.

river begins to break up into a number of streams called distributaries. The river becomes so slow that it begins to deposit its load. Each distributary forms its own mouth. The collection of sediments from all the mouths forms a **delta**.

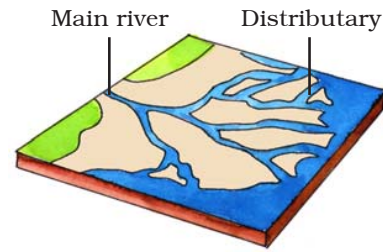


Fig. 3.6: A Delta

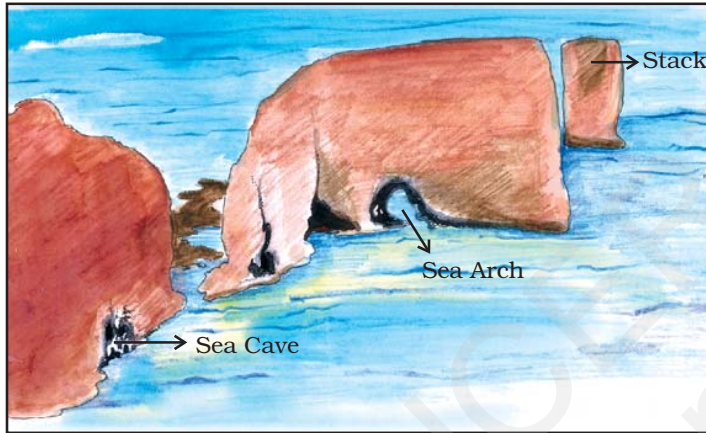


Fig. 3.7: Features made by sea waves

### Work of Sea Waves

The erosion and deposition of the sea waves gives rise to coastal landforms. Seawaves continuously strike at the rocks. Cracks develop. Over time they become larger and wider. Thus, hollow like caves are formed on the rocks. They are called **sea caves**. As these cavities become bigger and bigger only the roof of the caves remain, thus forming **sea arches**. Further, erosion breaks the roof and only walls

are left. These wall like features are called **stacks**. The steep rocky coast rising almost vertically above sea water is called **sea cliff**. The sea waves deposit sediments along the shores forming beaches.



Fig. 3.8: A Glacier

### Work of Ice

Glaciers are “rivers” of ice which too erode the landscape by bulldozing soil and stones to expose the solid rock below. Glaciers carve out deep hollows. As the ice melts they get filled up with water and become beautiful lakes in the mountains. The material carried by the glacier such as rocks big and small, sand and silt gets deposited. These deposits form **glacial moraines**.



Fig. 3.9: Sand Dunes

### Work of wind

Have you ever visited a desert? Try to collect some pictures of sand dunes.

An active agent of erosion and deposition in the deserts is wind. In deserts you can see rocks in the shape of a mushroom, commonly called **mushroom rocks**. Winds erode the lower section of the rock more than the upper part. Therefore, such rocks have narrower base and wider top. When the wind blows, it lifts and transports sand from one place to another. When it stops blowing the sand falls and gets deposited in low hill – like structures. These are called **sand dunes** (Fig. 3.9). When the grains of sand are very fine and light, the wind can carry it over very long distances. When such sand is deposited in large areas, it is called **loess**. Large deposits of loess is found in China.



#### 1. Answer the following questions.

- (i) Why do the plates move?
- (ii) What are exogenic and endogenic forces?
- (iii) What is erosion?
- (iv) How are flood plains formed?
- (v) What are sand dunes?
- (vi) How are beaches formed?
- (vii) What are ox bow lakes?

#### 2. Tick the correct answer.

- (i) Which is not an erosional feature of sea waves?  
(a) Cliff                      (b) Beach                      (c) Sea cave
- (ii) The depositional feature of a glacier is:  
(a) Flood plain              (b) Beach                      (c) Moraine
- (iii) Which is caused by the sudden movements of the earth?  
(a) Volcano                  (b) Folding                      (c) Flood plain
- (iv) Mushroom rocks are found in:  
(a) Deserts                      (b) River valleys              (c) Glaciers
- (v) Ox bow lakes are found in:  
(a) Glaciers                      (b) River valleys              (c) Deserts

**3. Match the following.**

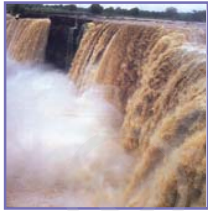


- (i) Glacier
- (ii) Meanders
- (iii) Beach
- (iv) Sand dunes
- (v) Waterfall
- (vi) Earthquake
- (a) Sea shore
- (b) Mushroom rock
- (c) River of ice
- (d) Rivers
- (e) Vibrations of earth
- (f) Sea cliff
- (g) Hard bed rock
- (h) Deserts

**4. Give reasons.**

- (i) Some rocks have a shape of a mushroom.
- (ii) Flood plains are very fertile.
- (iii) Sea caves are turned into stacks.
- (iv) Buildings collapse due to earthquakes.

**5. Activity.**

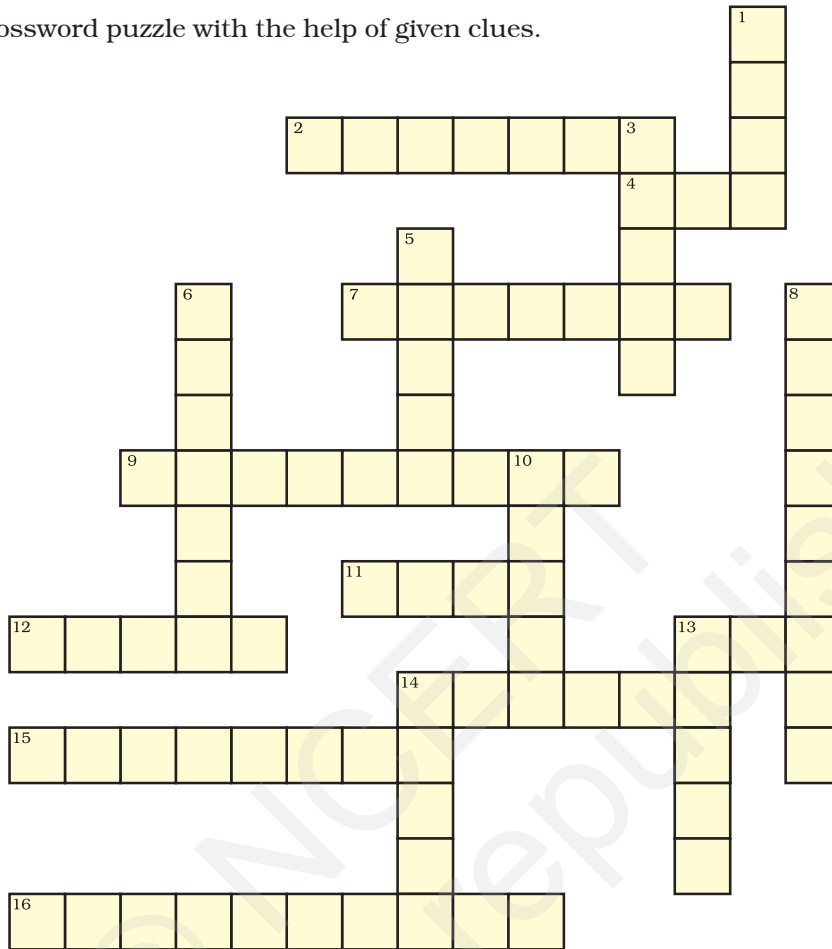
Observe the photographs given below. These are various features made by a river. Identify them and also tell whether they are erosional or depositional or landforms formed by both.

Photograph	Name of the Feature	Type (Erosional or Depositional or Both)
		
		
		



**6. For fun.**

Solve the crossword puzzle with the help of given clues.



**Across**

- 2. Loop like the bend of a river
- 4. Solid form of water
- 7. Moving mass of ice
- 9. Sudden descent of water in the bed of a river
- 11. Natural cavity on weak rocks formed by action of waves
- 12. Embankment on a river that keeps it in its channel
- 13. Large body of sea water
- 14. Dry area where sand dunes are found
- 15. Small hill of sand caused by the action of the wind
- 16. Flat plain formed by river deposits during time of flood

**Down**

- 1. Rise and fall of water caused by friction of wind on water surface
- 3. Flow of water in a channel
- 5. Steep perpendicular face of a rock along a sea coast
- 6. Debris of boulder and coarse material carried by glacier
- 8. Crescent shaped lake formed by a meandering river
- 10. Fine sand deposited by the action of the wind
- 13. Isolated mass of rising steep rock near a coastline
- 14. Alluvial tracts of land formed by the river deposits at the mouth of a river



# 4 Air



## Do you know?

Carbon dioxide released in the atmosphere creates a green house effect by trapping the heat radiated from the earth. It is therefore called a **greenhouse** gas and without it the earth would have been too cold to live in. However, when its level in the atmosphere increases due to factory smoke or car fumes, the heat retained increases the temperature of the earth. This is called **global warming**. This rise in temperature causes the snow in coldest parts of the world to melt. As a result the sea level rises, causing floods in the coastal areas. There may be drastic changes in the climate of a place leading to extinction of some plants and animals in the long run.

Our earth is surrounded by a huge blanket of air called atmosphere. All living beings on this earth depend on the atmosphere for their survival. It provides us the air we breathe and protects us from the harmful effects of the sun's rays. Without this blanket of protection, we would be baked alive by the heat of the sun during day and get frozen during night. So it is this mass of air that has made the temperature on the earth liveable.

## COMPOSITION OF THE ATMOSPHERE

Do you know that the air we take in while breathing is actually a mixture of many gases? Nitrogen and oxygen are two gases which make up the bulk of the

atmosphere. Carbon dioxide, helium, ozone, argon and hydrogen are found in lesser quantities. Apart from these gases, tiny dust particles are also present in the air. The pie chart gives you the percentage of different constituents of air (Fig. 4.1).

Nitrogen is the most plentiful gas in the air. When we inhale, we take some amount of nitrogen into our lungs and exhale it. But plants need nitrogen for their survival. They can not take

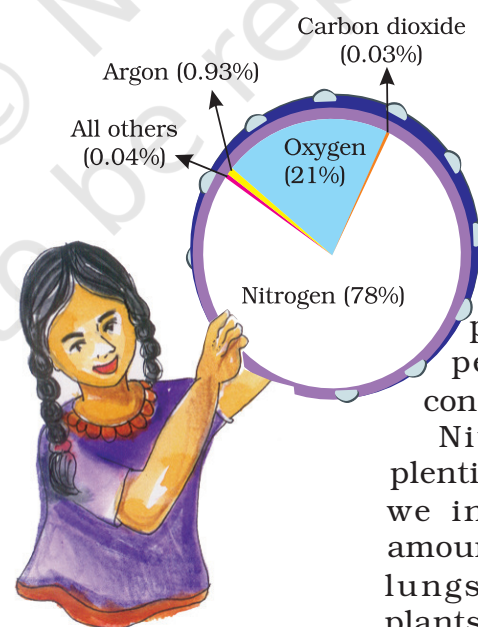


Fig. 4.1: Constituents of Air

nitrogen directly from the air. Bacteria, that live in the soil and roots of some plants, take nitrogen from the air and change its form so that plants can use it.

Oxygen is the second most plentiful gas in the air. Humans and animals take oxygen from the air as they breathe. Green plants produce oxygen during photosynthesis. In this way oxygen content in the air remains constant. If we cut trees then this balance gets disturbed.

Carbon dioxide is another important gas. Green plants use carbon dioxide to make their food and release oxygen. Humans or animals release carbon dioxide. The amount of carbon dioxide released by humans or animals seems to be equal to the amount used by the plants which make a perfect balance. However, the balance is upset by burning of fuels, such as coal and oil. They add billions of tons of carbon dioxide into the atmosphere each year. As a result, the increased volume of carbon dioxide is affecting the earth's weather and climate.



**Do you know?**

When air is heated, it expands, becomes lighter and goes up. Cold air is denser and heavy. That is why it tends to sink down. When hot air rises, cold air from surrounding area rushes there to fill in the gap. That is how air circulation takes place.

**Top scientist offers way out of global warming**  
Nobel Laureate's 'Escape Route': Alter The Chemical Makeup Of Exosphere

**Warming unstoppable**  
GLOBAL WARMING Underlying the rate of sea level rise around the world, but attempts to stop it could be as simple as...

**CO<sub>2</sub> level at 800,000-year high**  
Study Of Antarctica Ice Suggests The Increase Will Alter The Climate Dangerously

**Global 'sunscreen' likely thinned**  
New York: A new Nasa study has found that an important counter-balance to the warming by greenhouse gases—sunlight blocked by dust, pollution and other aerosol particles—appears to have lost ground. The thinning of earth's 'sunscreen' of aerosols since the early 1950s could have given an extra push to rise in global surface temperatures. The finding, published in *Journal Science*, may lead to a new understanding of related study published last month by scientists found...

**The Heat Is On**

**This winter was warmest on record: US**  
Greenhouse Gases Blamed for Rising Heat

**Global warming can bring back Jurassic era**  
Scientists predict average global temperatures will rise by between two and six degrees centigrade by 2080, similar to a world that existed 100 million years ago. At that time, temperatures were much warmer, and dinosaurs thrived. Scientists say that if global temperatures rise even a little, it could bring back some of the conditions of the Jurassic era. They are not saying that dinosaurs will be brought back, but they say that some of the conditions that allowed dinosaurs to thrive could be recreated. Some scientists say that global warming could bring back some of the conditions of the Jurassic era, but they are not saying that dinosaurs will be brought back.

**Global warming projection**  
Temperature Rise from 2006 to 2020 based on current CO<sub>2</sub> level increases

**Read and Ponder:** Is global warming a serious issue in today's world?

## STRUCTURE OF THE ATMOSPHERE

Our atmosphere is divided into five layers starting from the earth's surface. These are **Troposphere**, **Stratosphere**, **Mesosphere**, **Thermosphere** and **Exosphere** (Fig. 4.2).

**Troposphere:** This layer is the most important layer of the atmosphere. Its average height is 13 km. The air we breathe exists here.

Almost all the weather phenomena like rainfall, fog and hailstorm occur in this layer.

**Stratosphere:** Above the troposphere lies the stratosphere. It extends up to a height of 50 km. This layer is almost free from clouds and associated weather phenomenon, making conditions most ideal for flying aeroplanes. One important feature of stratosphere is that it contains a layer of ozone gas. We have just learnt how it protects us from the harmful effect of the sun rays.

**Mesosphere:** This is the third layer of the atmosphere. It lies above the stratosphere. It extends up to the height of 80 km. Meteorites burn up in this layer on entering from the space.

**Thermosphere:** In thermosphere temperature rises very rapidly with increasing height. Ionosphere is a part of this layer. It extends between

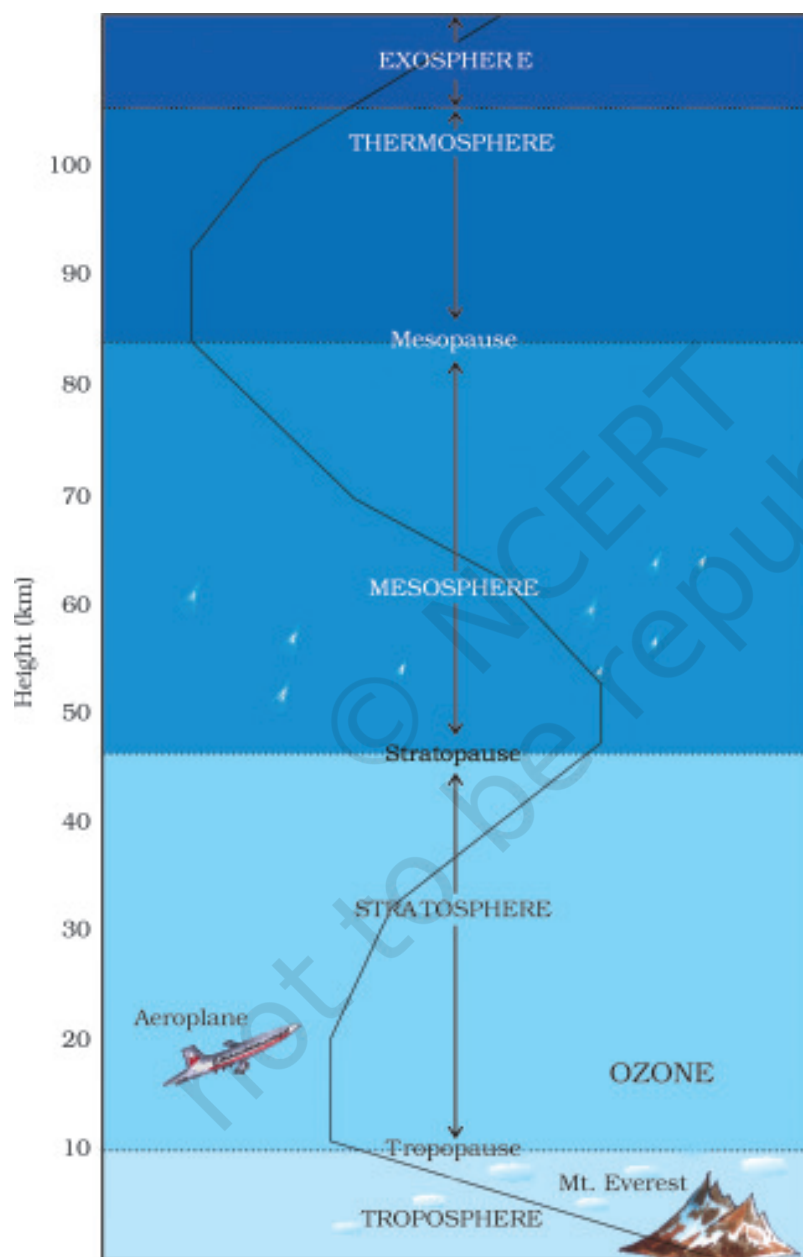


Fig. 4.2: Layers of the Atmosphere

80-400 km. This layer helps in radio transmission. In fact, radio waves transmitted from the earth are reflected back to the earth by this layer.

**Exosphere:** The upper most layer of the atmosphere is known as exosphere. This layer has very thin air. Light gases like helium and hydrogen float into the space from here.

## WEATHER AND CLIMATE

“Is it going to rain today?” “Will it be bright and sunny today?” How many times have we heard this from anxious cricket fans speculating the fate of a One Day match? If we imagine our body to be a radio and the mind its speaker, weather is something that fiddles with its control knobs. Weather is this hour-to-hour, day to day condition of the atmosphere. A hot or humid weather may make one irritable. A pleasant, breezy weather may make one cheerful and even plan for an outing. Weather can change dramatically from day to day. However, the average weather condition of a place for a longer period of time represents the **climate** of a place. Now do you understand why we have daily weather forecasts.

### Temperature

The temperature you feel everyday is the temperature of the atmosphere. The degree of hotness and coldness of the air is known as temperature.

The temperature of the atmosphere changes not only between day and night but also from season to season. Summers are hotter than winters.

An important factor that influences the distribution of temperature is **insolation**. **Insolation** is the incoming solar energy intercepted by the earth.

The amount of insolation decreases from the equator towards the poles. Therefore, the



### Let's do

For ten days note down weather report from a local newspaper and observe the changes occurring in the weather.



### Do you know?

You will be surprised to know that the earth receives only 1 in 2,000,000,000 parts of the sun's energy.

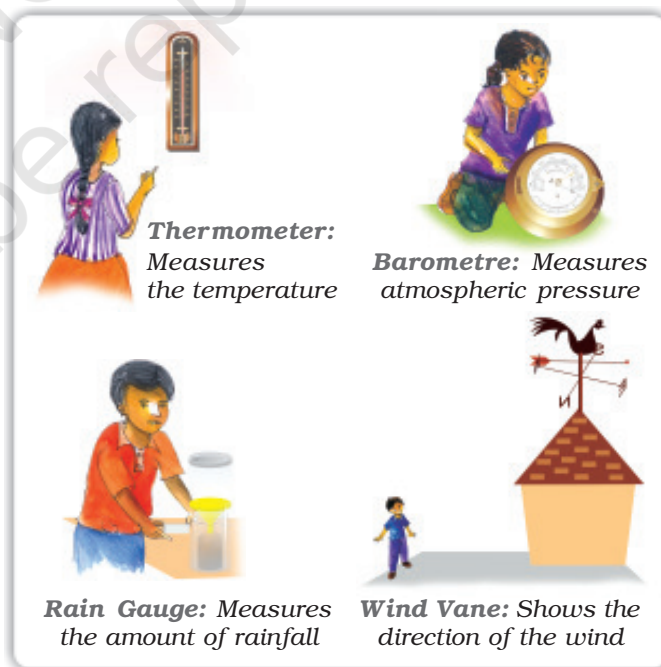


Fig. 4.3: Weather Instruments



### Do you know?

The standard unit of measuring temperature is degree Celsius. It was invented by Anders Celsius. On the Celsius scale the water freezes at 0°C and boils at 100°C.



### Do you know?

On the moon there is no air and hence no air pressure.

Astronauts have to wear special protective space suits filled with air when they go to the moon. If they did not wear these space suits, the counter pressure exerted by the body of the astronauts would make the blood vessels burst. The astronauts would bleed.



### Do you know?

A wind is named after the direction **from** which it blows, e.g. the wind blowing **from** the west is called westerly.

temperature decreases in the same manner. Now do you understand why poles are covered with snow? If the earth's temperature rises too high, it would become too warm for some crops to grow. Temperature in cities is much higher than that of villages. The concrete and metals in buildings and the asphalt of roads get heated up during the day. This heat is released during the night.

Also, the crowded high rise buildings of the cities trap the warm air and thus raise the temperature of the cities.

## Air Pressure

You will be surprised to know that air above us presses us with a great force on our bodies. However, we don't even feel it. This is because the air presses us from all directions and our body exerts a counter pressure.

Air pressure is defined as the pressure exerted by the weight of air on the earth's surface. As we go up the layers of atmosphere, the pressure falls rapidly. The air pressure is highest at sea level and decreases with height. Horizontally the distribution of air pressure is influenced by temperature of air at a given place. In areas where temperature is high the air gets heated and rises. This creates a low-pressure area. Low pressure is associated with cloudy skies and wet weather.

In areas having lower temperature, the air is cold. It is therefore heavy. Heavy air sinks and creates a high pressure area. High pressure is associated with clear and sunny skies.

The air always moves from high pressure areas to low pressure areas.

## Wind

The movement of air from high pressure area to low pressure areas is called wind. You can see wind at work as it blows dry leaves down the pavement or uproots trees during a storm. Sometimes when the wind blows gently you can even see it blowing away smoke or fine dust. At times wind can be so strong that it is difficult to walk against it. You must have experienced it is not easy to hold an umbrella on a windy day. Think of some other examples when strong winds have created

problems for you. Winds can be broadly divided into three types.

1. *Permanent winds* – The trade winds, westerlies and easterlies are the permanent winds. These blow constantly throughout the year in a particular direction.
2. *Seasonal winds* – These winds change their direction in different seasons. For example monsoons in India.
3. *Local winds* – These blow only during a particular period of the day or year in a small area. For example, land and sea breeze. Do you recall the hot and dry local wind of northern plains of India? It is called *loo*.

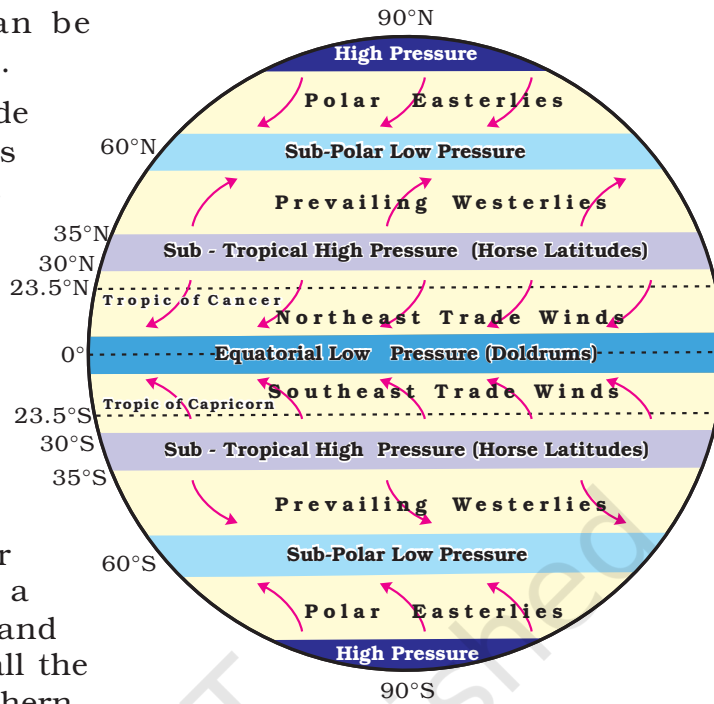


Fig. 4.4: Major Pressure Belts and Wind System

### CYCLONE – NATURE'S FURY

Odisha, located on the eastern seacoast of India is prone to cyclones that originate in the Bay of Bengal. On 17-18 October 1999, cyclone hit five districts of the state. Another supercyclone occurred on the 29 October 1999, that devastated large portions of the state. The damages caused were mainly due to three factors: wind velocity, rain and tidal surge. The winds of upto

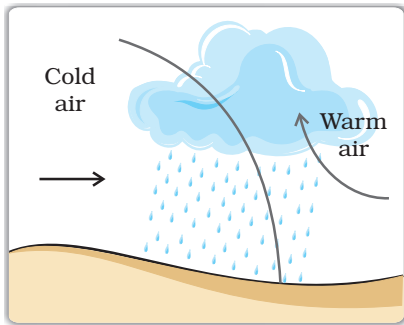


Destruction caused by a cyclone

260 km. per hour lasted for over 36 hours. These high velocity winds uprooted trees and damaged the *kutchha* houses. Roof tops of several industrial sheds and other houses were also blown away. Power supply and telecom lines snapped completely. Heavy rain occurred under the influence of the cyclone for three days continuously. These rains led to flooding in the major rivers of Odisha. The cyclonic winds caused tidal waves that swept 20 km. inland and brought massive destruction to the coastal areas. The 7 to 10 m high tidal wave intruded suddenly and caused massive damage to the standing paddy crops.

The cyclone originated as a “depression” in the Gulf of Thailand, near east of Port Blair, on 25 October 1999 and gradually moved in a northwestward direction. It intensified into a supercyclone and hit the area between Erasama and Balikuda in Odisha on 29 October at 10.30 a.m.

The supercyclone swept the entire coast of Odisha including the cities of Bhubaneswar and Cuttack and 28 coastal towns. About 13 million people were affected. A large number of livestock were killed. Standing crops of paddy, vegetables and fruits were heavily damaged. Due to salinisation caused by tidal surge, large tracts of agricultural land have turned infertile. Large tracts of sal, teak and bamboo plantations have disappeared. The mangrove forests between Paradeep and Konark vanished.



Cyclonic Rainfall



Relief (Orographic) Rainfall



Convectional Rainfall

**Fig. 4.5:** Types of Rainfall

### Moisture

When water evaporates from land and different water bodies, it becomes water vapour. Moisture in the air at any time, is known as humidity. When the air is full of water vapour we call it a humid day. As the air gets warmer, its capacity to hold the water vapour increases and so it becomes more and more humid. On a humid day, clothes take longer to dry and sweat from our body does not evaporate easily, making us feel very uncomfortable.

When the water vapour rises, it starts cooling. The water vapour condenses causing formation of droplets of water. Clouds are just masses of such water droplets. When these droplets of water become too heavy to float in air, then they come down as precipitation.

Jet planes flying in the sky leave a white trail behind them. The moisture from their engines condenses. We see trails of this condensed moisture for some time when there is no air movement to disturb it.

Precipitation that comes down to the earth in liquid form is called rain. Most of the ground water comes from rainwater. Plants help preserve water. When trees on hill sides are cut, rainwater flows down the bare mountains and can cause flooding of low lying areas. On the basis of mechanism, there are three types of rainfall: the convectional rainfall, the orographic rainfall and the cyclonic rainfall (Fig. 4.5).



Rainfall is very important for the survival of plants and animals. It brings fresh water to the earth's surface. If rainfall is less – water scarcity and drought occur. On the other hand if it is more, floods take place.



Other forms of precipitation are snow, sleet, hail.



**1. Answer the following questions.**

- (i) What is atmosphere?
- (ii) Which two gases make the bulk of the atmosphere?
- (iii) Which gas creates green house effect in the atmosphere?
- (iv) What is weather?
- (v) Name three types of rainfall?
- (vi) What is air pressure?

**2. Tick the correct answer.**

- (i) Which of the following gases protects us from harmful sun rays?  
(a) Carbon dioxide    (b) Nitrogen    (c) Ozone
- (ii) The most important layer of the atmosphere is  
(a) Troposphere    (b) Thermosphere    (c) Mesosphere
- (iii) Which of the following layers of the atmosphere is free from clouds?  
(a) Troposphere    (b) Stratosphere    (c) Mesosphere
- (iv) As we go up the layers of the atmosphere, the pressure  
(a) Increases    (b) Decreases    (c) Remains the same
- (v) When precipitation comes down to the earth in the liquid form, it is called  
(a) Cloud    (b) Rain    (c) Snow

**3. Match the following.**

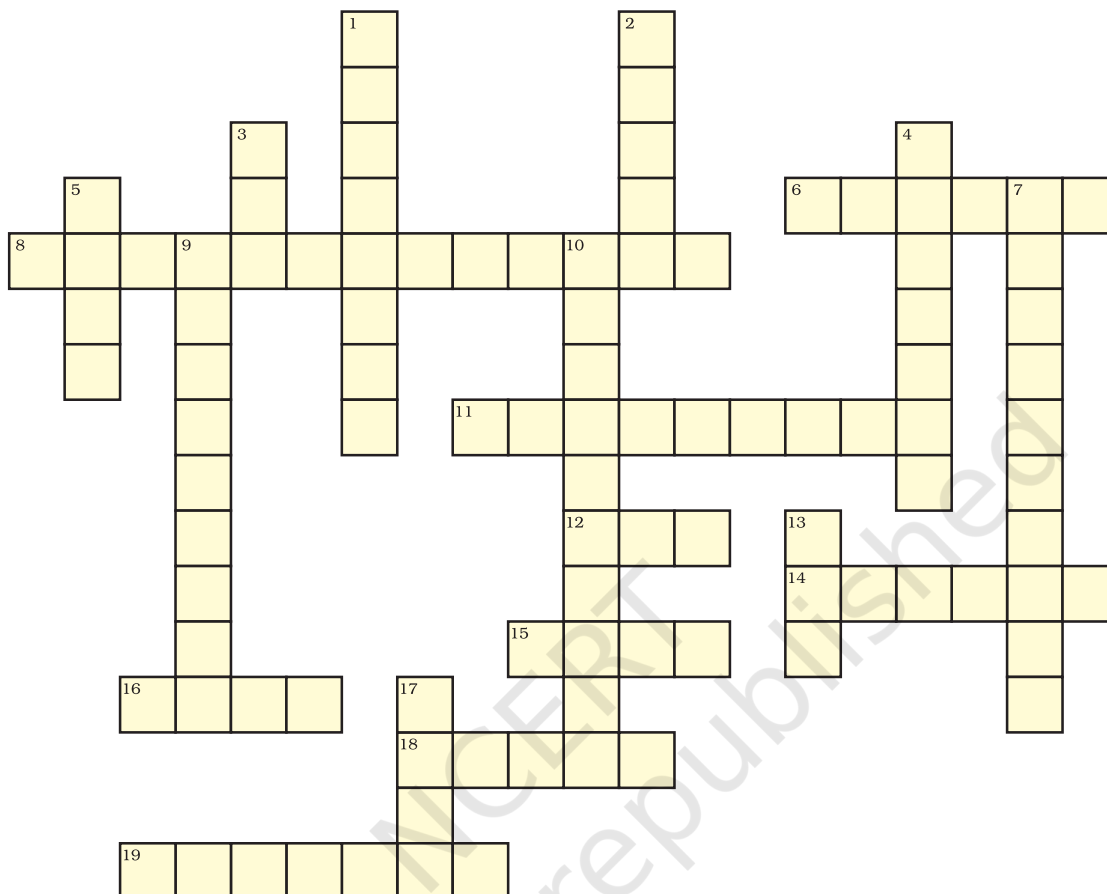
- |                 |                                |
|-----------------|--------------------------------|
| (i) Trade Winds | (a) Incoming solar energy      |
| (ii) Loo        | (b) Seasonal wind              |
| (iii) Monsoon   | (c) Horizontal movement of Air |
| (iv) Wind       | (d) Layer of ozone gas         |
|                 | (e) Permanent wind             |
|                 | (f) Local wind                 |

**4. Give reasons.**

- (i) Wet clothes take longer time to dry on a humid day?
- (ii) Amount of insolation decreases from equator towards poles?

**5. For fun.**

(i) Solve this Crossword puzzle with the help of given clues:




**Across**

- 6. An Indian tree having extraordinary quality of providing oxygen round the clock
- 8. Gas present in atmosphere occupying only 0.03% by volume
- 11. Outermost layer of atmosphere
- 12. Mixture of many gases
- 14. Life giving gas
- 15. Air in motion
- 16. An indian tree valued highly for medicinal properties
- 18. Gas protecting us from harmful sunrays
- 19. Low pressure area

**Down**

- 1. Amount of water vapour in air
- 2. Condensation of water vapours around dust particles in atmosphere
- 3. Example of local wind blowing in summer in northern india
- 4. Short term changes in atmosphere
- 5. Precipitation in liquid form
- 7. Blanket of air around the earth
- 9. Instrument to measure pressure
- 10. Incoming solar radiation
- 13. Reduces visibility in winters
- 17. It is ..... time when sun is overhead

(ii) Make a weather calendar for one week. Use pictures or symbols to show different types of weather. You can use more than one symbol in a day, if the weather changes. For example, the sun comes out when rain stops. An example is given below:

Day	Weather
1. 	Sunny day
2.	
3.	
4.	
5.	
6.	
7.	



# 5 Water



## Glossary

**Terrarium:** It is an artificial enclosure for keeping small house plants.



## Activity

### Make your own Terrarium



A Terrarium

Fill one-fourth of a big jar with soil and press it well. Put a thin layer of humus on top of it. Plant the largest plants first and then arrange the smaller ones around them. Spray the arrangement with water and close the jar. The water that evaporates from the leaves and soil condenses and falls back in the form of drops of water.

When you think of water, what images come to your mind? You think of rivers, the waterfalls, the pitter patter of raindrops, water in your taps... Children love to float paper boats in rain puddles. By noon the puddles vanish. Where does the water go?

The sun's heat causes evaporation of water vapour. When the water vapour cools down, it condenses and forms clouds. From there it may fall on the land or sea in the form of rain, snow or sleet.

The process by which water continually changes its form and circulates between oceans, atmosphere and land is known as the water cycle (Fig 5.1).

Our earth is like a terrarium. The same water that existed centuries ago still exists today. The water used to irrigate a field in Haryana may have flowed down the Amazon River a hundred years ago.

The major sources of fresh water are the rivers, ponds, springs and glaciers. The ocean bodies and the seas contain salty water. The water of the oceans is salty or saline as it contains large

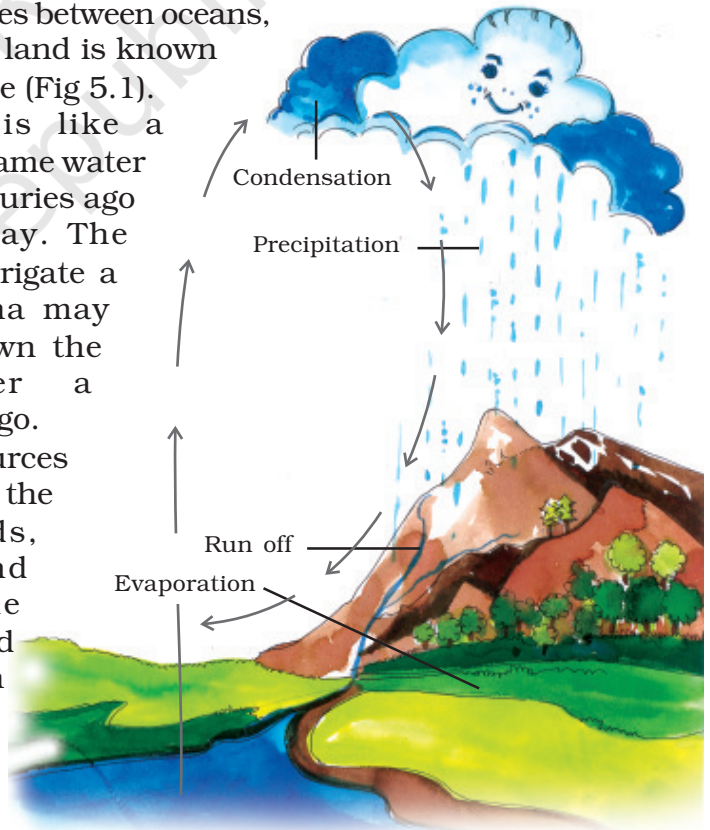


Fig. 5.1: Water Cycle



Fig. 5.2: World – Major Seas, Lakes and Rivers

amount of dissolved salts. Most of the salt is sodium chloride or the common table salt that you eat.



### Do you know?

Salinity is the amount of salt in grams present in 1000 grams of water. The average salinity of the oceans is 35 parts per thousand.



### Do you know?

Dead sea in Israel has salinity of 340 grams per litre of water. Swimmers can float in it because the increased salt content makes it dense.

## DISTRIBUTION OF WATER BODIES

We all know that three-fourth of the earth surface is covered by water. If there is more water than land on this earth, why do so many countries face water scarcity?

Is all the water on earth available to us? The following table gives the distribution of water in percentage.

Oceans	:	97.3	Saline Water
Ice-caps	:	02.0	} Fresh Water
Ground water	:	0.68	
Fresh water lakes	:	0.009	
Inland seas and salt lakes	:	0.009	
Atmosphere	:	0.0019	
Rivers	:	0.0001	
		<u>100.00</u>	

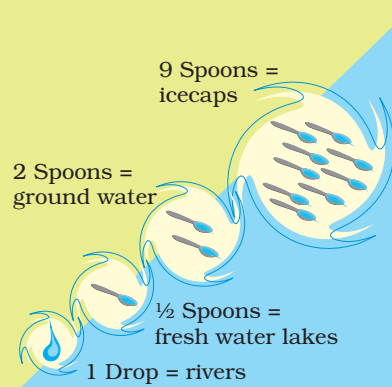
Water distribution can be demonstrated by a simple activity (see activity box).



### Activity

Take 2 litres of water. Let it represent the total water on the surface of the earth. Measure out 12 spoons of water from this vessel into another bowl. The water that is left behind in the vessel represents the salty water found in oceans and seas. This water is obviously not fit for consuming. It is saline (contains salts).

The 12 spoons of water that was taken in a bowl is the total amount of fresh water on earth. The figure shows us the distribution of this fresh water. See for yourself how much water can actually be used by you.



**Distribution of fresh water**

Water is absolutely essential for survival. Water alone can quench our thirst when we are thirsty. Now don't you think we are wasting a precious resource when we use water carelessly?

**MORE THAN JUST A PROBLEM....**

**Coping with Water Scarcity**

**Water scenario in urban India & Delhi**

The urban water supply and sanitation sector in the country is suffering from inadequate levels of service, an increasing demand for piped supply, poor sanitary conditions and deteriorating financial and technical performance.

**The water you drink**

...could be making you ill. The alarming amounts of industrial and domestic pollutants that are being dumped into our water bodies expose us to several health risks, warns Nishit Mehta

**EVERY DROP COUNTS**

Water conservation is a global issue that has become a household name. It is not just about saving water, but also about using it wisely. PALLAB CHATTERJEE

**a DROP OF LIFE**

**Dams Have Cut Rivers Off From Their Flood Plains: WWF**

**Many major rivers in danger of drying out**

Several major water rivers in the world are at risk of drying out because of climate change. WWF says that the global climate continues to heat up and the world is facing a water crisis. WWF says that the global climate continues to heat up and the world is facing a water crisis.

**Ganga among 10 dying rivers**

New Delhi: The Ganga, which is widely considered to be the holiest river in India, is among the 10 most polluted rivers in the world, according to a report by WWF. The Ganga is one of the most polluted rivers in the world, according to a report by WWF.

**Troubled Waters**

Country	Percentage of population with access to clean water
China	99%
Germany	99%
USA	99%
France	99%
UK	99%
Spain	99%
Italy	99%
Japan	99%
South Korea	99%
India	70%
China	70%
USA	70%
France	70%
UK	70%
Spain	70%
Italy	70%
Japan	70%
South Korea	70%

**The best way to tackle water scarcity is to catch rainwater where it falls...**

**Benefits of Rainwater Harvesting:**

- A concrete, tiled paved area of 100 sq. meters can save about four times the annual drinking requirements of a five member family.
- Enhances quality and quantity of ground water.
- Cheeks soil erosion by reducing surface run-off.
- Minimises water logging by retaining flow into storm drains.

- Why is water important for us?
- Suggest some ways in which water can be conserved (a) in your home (b) in your school

**OCEAN CIRCULATION**

There is something magical about walking bare feet on the seashore. The wet sand on the beach, the cool breeze, the seabirds, the smell of the salt in the air and music of the waves; everything is so fascinating. Unlike the calm waters of ponds and lakes, ocean water keeps moving continuously. It is never still. The movements that occur in oceans can be broadly categorised as: waves, tides and currents.

**Do you know?**

March 22 is celebrated as World Water Day when the need to conserve water is reinforced in different ways.



**Fig. 5.3: Pacific Ocean**



### Do you know?

Waves are formed when winds scrape across the ocean surface. The stronger the wind blows, the bigger the wave becomes.

### Waves

When you are playing throw ball on the beach and the ball falls into the water, what happens? It is fun to watch how the ball gets washed back to the shore by the waves. When the water on the surface of the ocean rises and falls alternately, they are called waves.

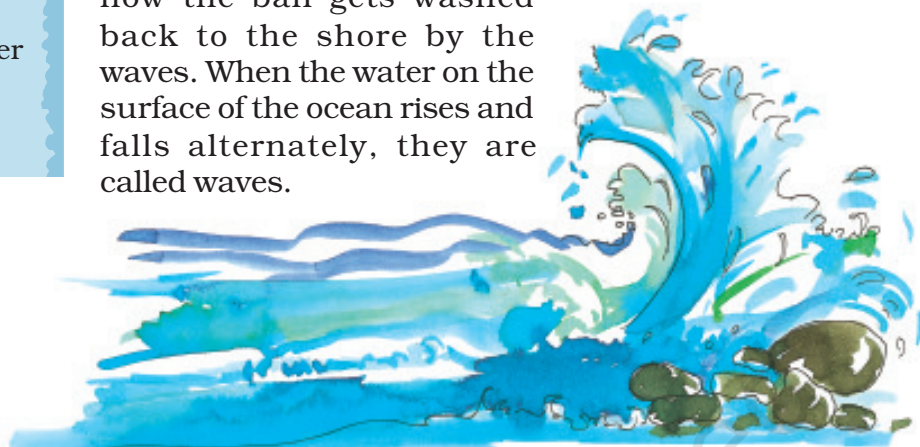


Fig. 5.4: Waves



### Do you know?

Tsunami is a Japanese word that means “Harbour waves” as the harbours get destroyed whenever there is tsunami.

During a storm, the winds blowing at very high speed form huge waves. These may cause tremendous destruction. An earthquake, a volcanic eruption or underwater landslides can shift large amounts of ocean water. As a result a huge tidal wave called **tsunami**, that may be as high as 15m., is formed. The largest tsunami ever measured was 150m. high. These waves travel at a speed of more than 700 km. per hour. The tsunami of 2004 caused wide spread damage in the coastal areas of India. The Indira point in the Andaman and Nicobar islands got submerged after the tsunami.

### TSUNAMI – THE EARTH’S PANDEMONIUM

Tsunami or the harbour wave struck havoc in the Indian Ocean on the 26 December 2004. The wave was the result of the earthquake that had its epicenter close to the western boundary of Sumatra. The magnitude of the earthquake was 9.0 on the Richter scale. As the Indian plate went under the Burma plate, there was a sudden movement of the sea floor, causing the earthquake. The ocean floor was displaced by about 10 – 20m and tilted in a downwardly direction. A huge mass of ocean water flowed to fill in the gap that was being created by the displacement. This marked the withdrawal of the water mass from the coastlines of the landmasses in the south and southeast Asia. After thrusting of the Indian plate below the Burma plate, the water mass rushed back towards the coastline. Tsunami travelled at a speed of about 800km. per hour, comparable to speed of commercial aircraft and completely washed away



some of the islands in the Indian ocean. The Indira point in the Andaman and Nicobar islands that marked the southernmost point of India got completely submerged. As the wave moved from earthquake epicenter from Sumatra towards the Andaman islands and Sri Lanka the wave length decreased with decreasing depth of water. The travel speed also declined from 700-900km. per hour to less than 70km. per hour. Tsunami waves travelled upto a depth of 3 km. from the coast killing more than 10,000 people and affected more than lakh of houses. In India, the worst affected were the coastal areas of Andhra Pradesh, Tamil Nadu, Kerala, Puducherry and the Andaman and Nicobar Islands.

While the earthquake cannot be predicted in advance, it is possible to give a three-hour notice of a potential tsunami. Such early warning systems are in place across the Pacific ocean, but not in the Indian Ocean. Tsunamis are rare in the Indian Ocean as the seismic activity is less as compared to the Pacific.



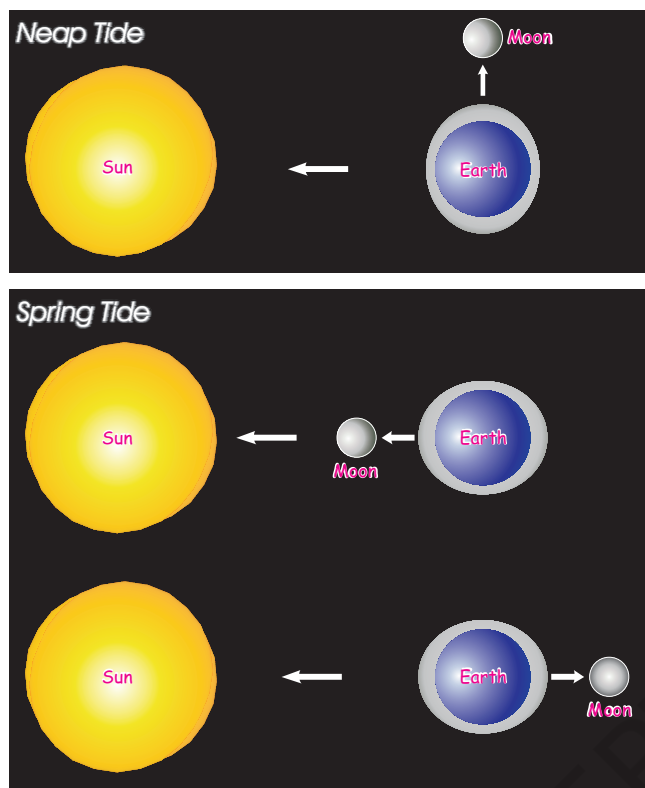
*Destruction caused by tsunami on Tamil Nadu Coast*

The tsunami that ravaged the South and South east Asian coasts in December 2004, is the most devastating tsunami in the last several hundred years. The large damage caused to life and property was primarily a result of lack of monitoring, the early warning systems and knowledge among the coast dwellers of Indian ocean.

The first indication that tsunami is approaching is the rapid withdrawal of water from the coastal region, followed by destructive wave. When this happened on the coast, instead of people going to high ground, they started assembling at the coast to view the miracle. As a consequence there was a large casualty of curious onlookers when the gigantic wave (tsunami) struck.

## **Tides**

The rhythmic rise and fall of ocean water twice in a day is called a tide. It is high tide when water covers much of the shore by rising to its highest level. It is low tide when water falls to its lowest level and recedes from the shore.



**Fig. 5.5:** Spring Tides and Neap Tide

The strong gravitational pull exerted by the sun and the moon on the earth's surface causes the tides. The water of the earth closer to the moon gets pulled under the influence of the moon's gravitational force and causes high tide. During the full moon and new moon days, the sun, the moon and the earth are in the same line and the tides are highest. These tides are called spring tides. But when the moon is in its first and last quarter, the ocean waters get drawn in diagonally opposite directions by the gravitational pull of sun and earth resulting in low tides. These tides are called neap tides (Fig. 5.5).

High tides help in navigation. They raise the water level close to the shores. This helps the ships to arrive at the harbour more easily. The high tides also help in fishing. Many more fish come closer to the shore during the high tide. This enables fishermen to get a plentiful catch. The rise and fall of water due to tides is being used to generate electricity in some places.



### Activity

Fill three-fourths of a bucket with tap water. Heat the water by putting an immersion rod on one side of the bucket. On the other side introduce an ice tray just removed from the freezer. Add a drop of red ink to observe the path of current by the process of convection.

### OCEAN CURRENTS

Ocean currents are streams of water flowing constantly on the ocean surface in definite directions. The ocean currents may be warm or cold (Fig. 5.6). Generally, the warm ocean currents originate near the equator and move towards the poles. The cold currents carry water from polar or higher latitudes to tropical or lower latitudes. The Labrador Ocean current is cold current while the Gulf Stream is a warm current. The ocean current influence the temperature conditions of the area. Warm currents bring about warm temperature over land surface. The areas where the warm and cold currents meet provide the best fishing grounds of the

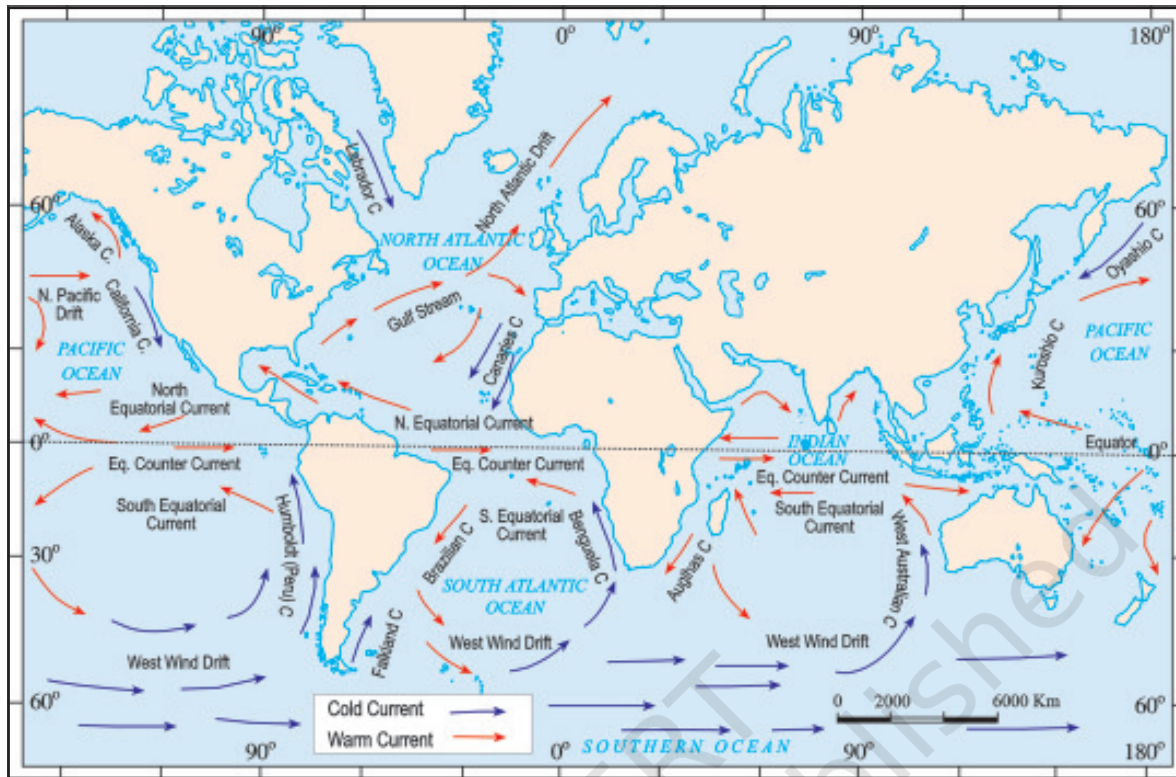


Fig. 5.6: Ocean Currents

world. Seas around Japan and the eastern coast of North America are such examples. The areas where a warm and cold current meet also experience foggy weather making it difficult for navigation.



**1. Answer the following questions.**

- (i) What is precipitation?
- (ii) What is water cycle?
- (iii) What are the factors affecting the height of the waves?
- (iv) Which factors affect the movement of ocean water?
- (v) What are tides and how are they caused?
- (vi) What are ocean currents?

**2. Give reasons.**

- (i) Ocean water is salty.
- (ii) The quality of water is deteriorating.

**3. Tick the correct answer.**

- (i) The process by which water continually changes its form and circulates between oceans, atmosphere and land  
(a) Water cycle      (b) Tides      (c) Ocean currents
- (ii) Generally the warm ocean currents originate near  
(a) Poles      (b) Equator      (c) None of these
- (iii) The rhythmic rise and fall of ocean water twice in a day is called  
(a) Tide      (b) Ocean current      (c) Wave

**4. Match the following.**

- |                     |  |
|---------------------|--|
| (i) Caspian Sea     | (a) Largest lake                                 |
| (ii) Tide           | (b) Periodic rise and fall of water              |
| (iii) Tsunami       | (c) Strong seismic waves                         |
| (iv) Ocean currents | (d) Streams of water moving along definite paths |
|                     | (e) Water cycle                                  |

**5. For fun.**

**Be a Detective**

- (i) The name of one river is hidden in each of the sentences below. Spot it.

**Example:** Mand**ira**, Vijayalakh**mi** and Surin**der** are my best friends

**Answer:** Ravi

- (a) The snake charmer's bustee, stables where horses are housed, and the piles of wood, all caught fire accidentally. (Hint: Another name for River Brahmaputra)
- (b) The conference manager put pad, material for reading and a pencil for each participant. (Hint: A distributary on the Ganga-Brahmaputra delta)
- (c) Either jealousy or anger cause a person's fall (Hint: Name of a juicy fruit!)
- (d) Bhavani germinated the seeds in a pot (Hint: Look for her in West Africa)
- (e) "I am a zonal champion now" declared the excited athlete. (Hint: The river that has the biggest basin in the world)
- (f) The tiffin box rolled down and all the food fell in dusty potholes. (Hint: Rises in India and journeys through Pakistan)
- (g) Malini leaned against the pole when she felt that she was going to faint. (Hint: Her delta in Egypt is famous)
- (h) Samantha mesmerised everybody with her magic tricks. (Hint: London is situated on her estuary)
- (i) "In this neighbourhood, please don't yell! Owners of these houses like to have peace". Warned my father when we moved into our new flat". (Hint: colour!)
- (j) 'Write the following words, Marc!' "On", "go", "in"..... said the teacher to the little boy in KG Class. (Hint: Rhymes with 'bongo')

Now make some more on your own and ask your classmates to spot the hidden name. You can do this with any name: that of a lake, mountains, trees, fruits, school items etc.

**Carry on Detective**

- (ii) With the help of an atlas, draw each river which you discovered in For fun (i), on an outline map of the world.



# 6 Natural Vegetation and Wild Life

Salima was excited about the summer camp she was attending. She had gone to visit Manali in Himachal Pradesh along with her class mates. She recalled how surprised she was to see the changes in the landform and natural vegetation as the bus climbed higher and higher. The deep jungles of the foothills comprising sal and teak slowly disappeared. She could see tall trees with thin pointed leaves and cone shaped canopies on the mountain slopes. She learnt that those were coniferous trees. She noticed blooms of bright flowers on tall trees. These were the rhododendrons. From Manali as she was travelling up to Rohtang pass she saw that the land was covered with short grass and snow in some places.



Fig. 6.1: Rhododendron

From Salima's observations, we surmise that there is a close relationship between height of land and the character of vegetations. With the change in height, the climate changes and that changes natural vegetation. The growth of vegetation depends on

temperature and moisture. It also depends on factors like slope and thickness of soil.

The type and thickness of natural vegetation varies from place to place because of the variation in these factors.

Natural vegetation is generally classified in to three broad categories as follows:

(a) *Forests*: Which grow where temperature and rainfall are plentiful to support a tree cover. Depending upon these factors, dense and open forests are grown.



### Let's do

Now can you tell why Salima saw changes in the natural vegetation as she climbed higher and higher? What types of vegetations did she see in the Himalayas starting with the foothills and going to the higher altitudes?



### Let's do

- Like Salima, when you go to visit any new place, notice the type of natural vegetation occurring there and try to think of factors responsible for the growth of such vegetation in that habitat.
- Note down if any human interference has taken place in that area in terms of deforestation, grazing, cultivation of cash crops, constructional activities etc.



Fig. 6.2: Thorny shrubs

- (b) *Grasslands*: Which grow in the region of moderate rain.  
(c) *Shrubs*: Thorny shrubs and scrubs grow in the dry region (Fig. 6.2).

Salima was sharing her experience of Himalayan trip with her father. Her father visited various places in the world. He told Salima about his observations of the variety of vegetation in different parts of different continents. He mentioned about coniferous forests in the sub polar regions, thorny bushes in the deserts, thick tropical hardwood forest in the humid regions and many more. Salima realised the Himalayas have almost all variety of vegetation which one can see while moving from the equator to the polar region.

The changes in the type of natural vegetation occur mainly because of the changes of climatic condition. Let us get to know the different types of natural vegetation of the world with their characteristic features and wildlife inhabiting there.



#### Do you know?

The tropical evergreen forest in Brazil is so enormous that it is like the lungs of the earth: Can you tell why?

## FORESTS

### Tropical Evergreen Forests

These forests are also called tropical rainforests (Fig. 6.3). These thick forests occur in the regions near the equator and close to the tropics. These regions are hot and receive heavy rainfall throughout the year. As there is no particular dry season, the trees do not shed their leaves altogether. This is the reason they are called evergreen. The thick canopies of the closely spaced trees do not allow the sunlight to penetrate inside the forest even in the day time. Hardwood trees like rosewood, ebony, mahogany are common here.



#### Do you know?

Anaconda, one of the world's largest snakes is found in the tropical rainforest. It can kill and eat a large animal such as a crocodile.



Fig. 6.3: A Tropical Evergreen Forest

## Tropical Deciduous Forests

Tropical deciduous are the monsoon forests found in the large part of India, northern Australia and in central America (Fig. 6.4). These regions experience seasonal changes. Trees shed their leaves in the dry season to conserve water. The hardwood trees found in these forests are sal, teak, neem and shisham. Hardwood trees are extremely useful for making furniture, transport and constructional materials. Tigers, lions, elephants, langoors and monkeys are the common animals of these regions (Fig. 6.5, 6.6 and 6.8).



*Fig. 6.4: A Tropical Deciduous Forest*

## Temperate Evergreen Forests

The temperate evergreen forests are located in the mid-latitude coastal region (Fig. 6.7). They are commonly found along the eastern margin of the continents, e.g., in south east USA, South China and in South East Brazil. They comprise both hard and soft wood trees like oak, pine, eucalyptus, etc.

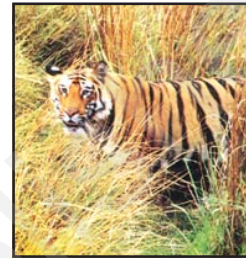


*Fig. 6.7: A Temperate Evergreen Forest*

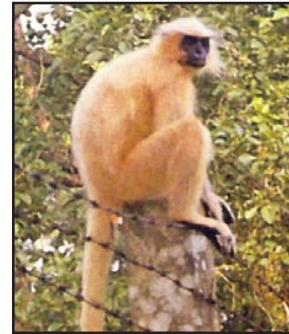


Let's do

- Where in India do tropical evergreen and tropical deciduous forests occur? Name the states.
- Which type of forest dominates most part of India?



*Fig. 6.5: A Tiger*



*Fig. 6.6: A Golden Langoor*



*Fig. 6.8: Elephants*



**Fig. 6.9:** A Pheasant



**Fig. 6.10:** A Monal

### Temperate Deciduous Forests

As we go towards higher latitudes, there are more temperate deciduous forests (Fig. 6.11). These are found in the north eastern part of USA, China, New Zealand, Chile and also found in the coastal regions of Western Europe. They shed their leaves in the dry season. The common trees are oak, ash, beech, etc. Deer, foxes, wolves are the animals commonly found. Birds like pheasants, monals are also found here (Fig. 6.9 and 6.10).



**Fig. 6.11:** A Temperate Deciduous Forest



#### Do you know?

- Mediterranean trees adapt themselves to dry summers with the help of their thick barks and wax coated leaves which help them reduce transpiration.
- Mediterranean regions are known as 'Orchards of the world' for their fruit cultivation.

### Mediterranean Vegetation

You have learnt that most of the east and north east margins of the continents are covered by temperate evergreen and deciduous trees. The west and south west margins of the continents are different. They have Mediterranean vegetation (Fig. 6.12). It is mostly found in the areas around the Mediterranean sea in Europe, Africa and Asia, hence the name. This kind of vegetation is also found outside the actual Mediterranean region in California in the USA, south west Africa, south western



**Fig. 6.12:** A vineyard in the Mediterranean Region



South America and South west Australia. These regions are marked for hot dry summers and mild rainy winters. Citrus fruits such as oranges, figs, olives and grapes are commonly cultivated here because people have removed the natural vegetation in order to cultivate what they want to. There isn't much wildlife here.

### Coniferous Forests

In the higher latitudes ( $50^{\circ}$  –  $70^{\circ}$ ) of Northern hemisphere the spectacular Coniferous forests are found (Fig. 6.13 a and b). These are also called as Taiga. These forests are also seen in the higher altitudes. These are the trees which Salima found in the Himalayas in abundance. They are tall, softwood evergreen trees. The woods of these trees are very useful for making pulp, which is used for manufacturing paper and newsprint. Match boxes and packing boxes are also made from softwood. Chir, pine, cedar are the important variety of trees in these forests. Silver fox, mink, polar bear are the common animals found here.



#### Let's do

- Look around in your surroundings and find out the articles made of hard wood and soft wood.
- Find out and learn the names of few trees of your locality.



#### Do you know?

Taiga means pure or untouched in the Russian language



Fig. 6.13 (a): A Coniferous Forest



Fig. 6.13 (b): Snow covered Coniferous Forest

### GRASSLANDS

**Tropical grasslands:** These occur on either side of the equator and extend till the tropics (Fig. 6.14). This vegetation grows in the areas of moderate to low amount of rainfall. The grass can grow very tall, about 3 to 4 metres in height. Savannah grasslands of Africa are of this type. Elephants, zebras, giraffes, deer, leopards are common in tropical grasslands (Fig. 6.15).



Fig. 6.14: Tropical Grassland



Fig. 6.15: Giraffes



**Do you know?**

Grasslands are known by different names in different regions.

**Tropical Grasslands**

- East Africa- Savanna
- Brazil- Campos
- Venezuela- Llanos

**Temperate Grasslands**

- Argentina- Pampas
- N. America- Prairie
- S. Africa- Veld
- C. Asia- Steppe
- Australia- Down

**Temperate grasslands:** These are found in the mid-latitude zones and in the interior part of the continents. Usually, grass here is short and nutritious. Wild buffaloes, bison, antelopes are common in the temperate region.

**Thorny bushes:** These are found in the dry desert like regions. Tropical deserts are located on the western margins of the continents. The vegetation cover is scarce here because of scanty rain and scorching heat. Identify the desert regions in the world map. Can you name the great desert of India? Name some of the common animals of the desert which you have learnt earlier.

If you reach the polar region you will find the place extremely cold. The growth of natural vegetation is very limited here. Only mosses, lichens and very small shrubs are found here. It grows during the very short summer. This is called **Tundra** type of vegetation. This vegetation is found in the polar areas of Europe, Asia and North America. The animals have thick fur and thick skin to protect themselves from the cold climatic conditions. Seal, walrus, musk-oxen, Arctic owl, Polar bear and snow foxes are some of the animals found here (Fig. 6.16).

*Salima's father showed her some photographs of thick forests. In some of the photographs, Salima observed that people were cutting trees and clearing the forests.*

*Her father explained that the local people wanted their land for agriculture and settlements, so they cleared up the forests. Salima started wondering if all forests are cleared, then where will the wild life go? Will the forest take its original shape again? If people go on cutting the trees like this, will there be enough oxygen, water vapour, timber, fruits, nuts available in future?*

Do you agree with Salima? Hold a discussion with your friends about the depletion of our diversified flora and fauna. Suggest some measures to conserve them.



Walrus



Polar Bear



Seal

Fig. 6.16



**1. Answer the following questions.**

- (i) Which are the two factors on which the growth of vegetation mostly depends?
- (ii) Which are the three broad categories of natural vegetation?
- (iii) Name the two hardwood trees commonly found in tropical evergreen forest.
- (iv) In which part of the world are tropical deciduous forest found?
- (v) In which climatic conditions are citrus fruits cultivated?
- (vi) Mention the uses of coniferous forest.
- (vii) In which part of the world is seasonal grassland found?

**2. Tick the correct answer.**

- (i) Mosses and Lichens are found in:
  - (a) Desertic Vegetation
  - (b) Tropical evergreen forest
  - (c) Tundra vegetation
- (ii) Thorny bushes are found in:
  - (a) Hot and humid tropical climate
  - (b) Hot and dry desertic climate
  - (c) Cold polar climate
- (iii) In tropical evergreen forest, one of the common animals is:
  - (a) Monkey
  - (b) Girraffe
  - (c) Camel
- (iv) One important variety of coniferous forest is:
  - (a) Rosewood
  - (b) Pine
  - (c) Teak
- (v) Steppe grassland is found in
  - (a) S. Africa
  - (b) Australia
  - (c) Central Asia

**3. Match the following.**

- (i) Walrus
- (ii) Cedar
- (iii) Olives
- (iv) Elephants
- (v) Campos
- (vi) Downs
- (a) Soft wood tree
- (b) An animal of tropical deciduous forest
- (c) A polar animal
- (d) Temperate grassland in Australia
- (e) Thorny shrubs
- (f) A citrus fruit
- (g) Tropical grassland of Brazil

**4. Give reasons.**

- (i) The animals in polar region have thick fur and thick skin.
- (ii) Tropical deciduous trees shed their leaves in the dry season.
- (iii) The type and thickness of vegetation changes from place to place.

**5. Activity.**

- (i) Collect pictures and photographs of forests and grasslands of different parts of world. Write one sentence below each picture.
- (ii) Make a collage of rainforest, grassland and coniferous forests.

### 6. For fun.

In the crossword table given below, some words are hidden. They are all about vegetation and wildlife and are to be found horizontally and vertically. Two have been worked out for you. Work in pairs with a friend.

M	T	N	L	P	L	M	E	H	R	T	B	A	M	B	O	O	P	N	A
<b>B</b>	<b>E</b>	<b>A</b>	<b>R</b>	A	I	X	S	E	E	R	C	M	W	H	A	L	E	D	C
T	L	P	F	L	O	R	A	N	L	E	O	P	A	R	D	C	E	E	M
A	E	I	A	M	N	L	I	C	H	E	N	S	L	F	O	A	P	E	S
N	P	G	U	D	O	G	R	T	Z	X	E	D	R	H	X	M	A	R	J
A	H	T	N	H	N	D	P	I	N	E	S	C	U	I	V	E	L	D	K
C	A	C	A	M	P	O	S	G	V	<b>N</b>	<b>N</b>	A	S	E	A	L	M	<b>Q</b>	U
O	N	A	C	F	O	W	L	E	E	<b>E</b>	A	C	D	E	O	D	A	R	M
N	T	C	H	I	R	N	G	R	V	<b>E</b>	K	T	M	O	S	S	E	S	O
D	O	T	E	A	K	S	R	S	E	<b>M</b>	E	U	S	A	P	C	G	A	N
A	X	U	R	M	A	A	N	G	R	A	S	S	W	K	A	R	<b>Q</b>	V	K
P	S	S	B	H	F	T	A	I	G	A	T	U	L	S	I	U	Y	A	E
G	H	F	I	R	P	R	A	I	R	I	E	S	A	B	E	B	O	N	Y
B	R	B	R	G	O	A	T	D	E	C	I	D	U	O	U	S	W	N	A
T	U	N	D	R	A	X	Z	E	B	R	A	H	O	R	S	E	L	A	K
C	B	E	E	A	X	L	L	A	N	O	S	A	T	P	A	M	P	A	S

