

SCIENCE

STANDARD SEVEN

Term III

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Note to the teacher...

As we present this revised edition of the Science Textbook, we would like to express our deepest gratitude to the learners and teaching community for their enthusiastic responses.

In science some concepts could be subject to change from time to time as new theories and principles are constantly being evolved.

We have tried to present facts and concepts of science (both concrete and abstract) in a visually appealing manner without detracting from the content.

Activity based learning is now accepted as the basis of science education. These activities should be regarded as a means for open-ended investigation rather than for mere verification of principles/content given in the text. Care has been taken to design low cost activities and experiments using materials available locally. With a view to streamline the activities, we have now segregated them into three groups:

- **I Do** - activities to be done by an individual learner.
- **We Do** - activities to be done by a group of learners. and
- **We Observe** - activities to be demonstrated by the teacher.

The third group of activities have a higher degree of difficulty or require careful handling as it may involve dealing with chemicals, electricity etc.,

The **“More to know”** snippets in the text represents some unusual and interesting facts or information *in which the students need not be examined.*

The evaluation section is nothing but another space for learning in a different manner. As the focus is on understanding, rote learning is to be discouraged thoroughly. Application of learnt ideas, problem solving skills and critical thinking is to be encouraged. There could be scope for more than one answer to a question, which should be acknowledged always.

To facilitate further reference, books and websites have been suggested at the end of each lesson. Suggestions and constructive criticism are most welcome. Valuable suggestions will be duly incorporated.

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Dear children, given above is a beautiful picture of a house with a garden in front. But you will be surprised to know that there are ten animals hidden in it. Shall we find them?

The picture shows a good relationship between plants and animals in a non-living environment.



1.1. ECO SYSTEM

“WILD ELEPHANTS STRAY INTO HUMAN HABITATION NEAR HOSUR”



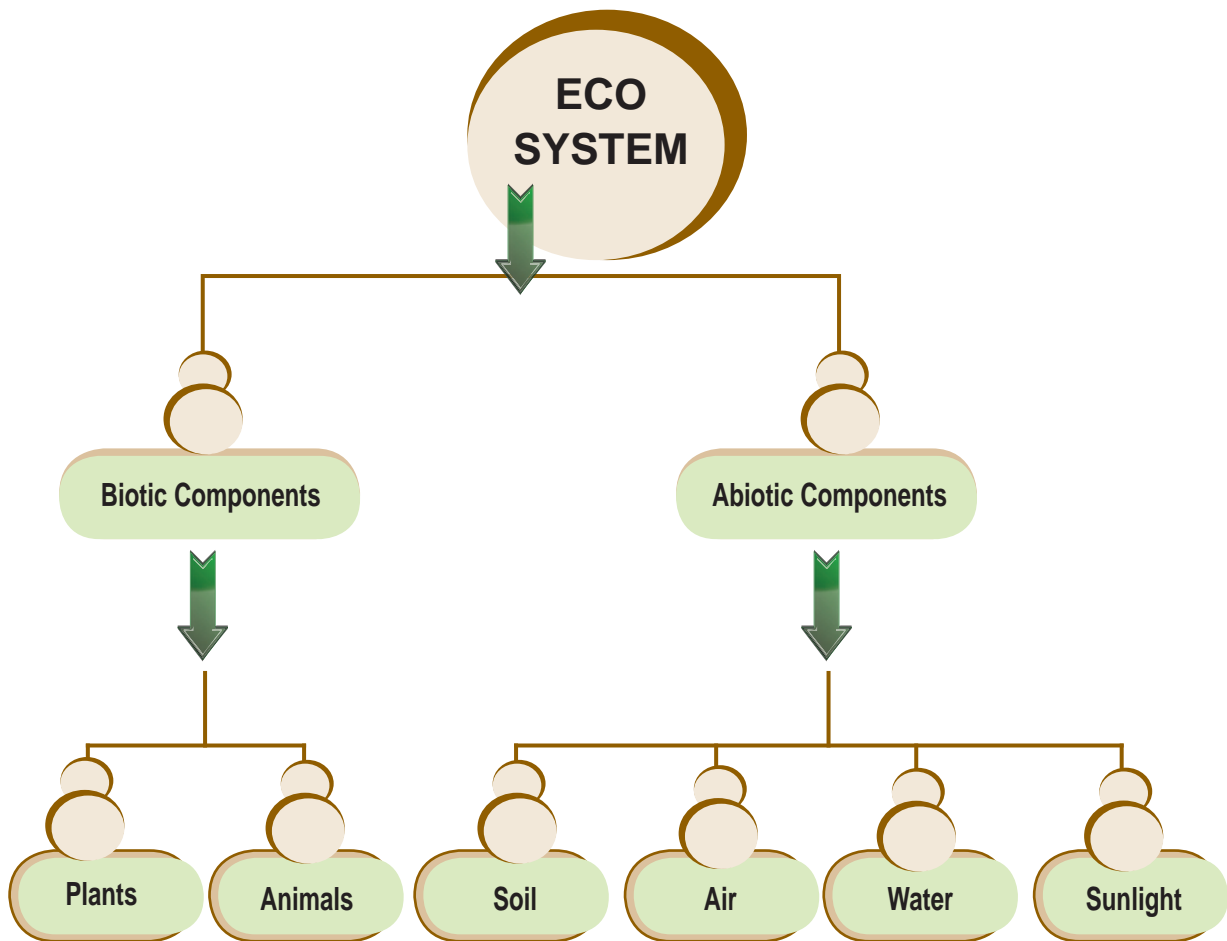
On 24th March, 2010, wild elephants entered Kumudepalli village, in Krishnagiri District. They were driven into the Sanamavu Forest near Hosur on that day. Three male wild elephants strayed into human habitation near Hosur on Tuesday.

According to the forest officials, the elephants aged between fifteen and twenty strayed into Kumudepalli village in the morning. On information, the officials led by District Forest Officer V.Ganesan, Assistant Conservator of Forest K.Rajendran and Hosur Ranger R.Madheswaran drove the pachyderms to the nearby Sanamavu Reserve Forests with the help of the villagers by bursting crackers.

Wild elephants entering into the human habitations have become an order of the day for the past three to five months. They did not harm anybody during the operation. Of the three elephants one is sub male elephant with the age of fifteen. And the other two are about twenty, an official said.

The above information is a newspaper report. Why do these elephants have come out of the forest? What has disturbed them?

Elephants live in forests. Forest is an ecosystem. Forests are the natural habitats of elephants. People have been cutting down trees and reducing forest cover for cultivation and other purposes. The elephants lose their habitations in the reduced forest area. So they are forced to come out of their forest homes (ecosystems) and move in the areas where people live.



A community of organisms living together with its non-living environment constitutes an eco-system.

Eco-systems may be natural or artificial. A pond, a grassland, a forest, a lake, a desert etc. are examples of natural eco-systems. An aquarium, a park, a paddy field, etc. are examples of artificial eco-systems.

Components of Eco-system

An eco-system consists of two main components. They are biotic (living) and abiotic (non-living) components.

Biotic Components

The living components are broadly classified into three categories.

1. **Producers:** They are green plants that prepare their own food by the process of photosynthesis.
2. **Consumers:** They are animals which depend on plants and animals for their food. eg. Goat.
3. **Decomposers:** They are organisms which feed upon dead matter to get energy and bring back the nutrients to the soil. **eg. bacteria and fungi.**

Abiotic Components

These include the soil, water, air and climatic factors such as temperature, sunlight, humidity etc.

**ACTIVITY - 1.1****I DO**

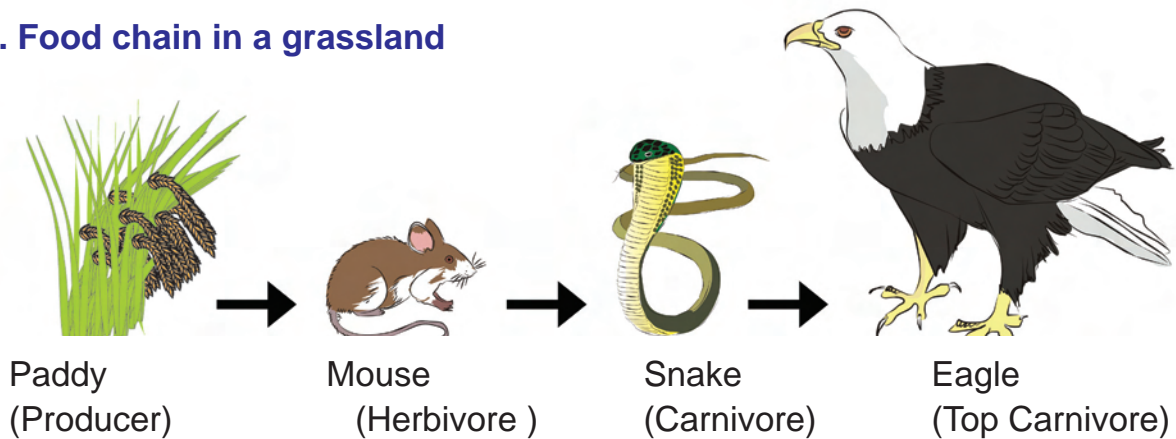
- ☛ I observe the picture.
- ☛ I suggest three biotic and two abiotic factors in it.
- ☛ I write the names of three birds.



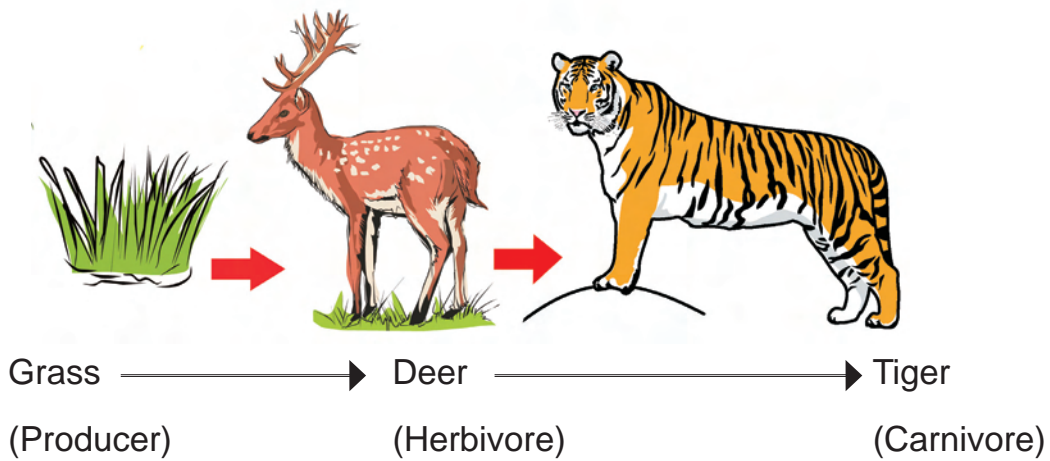
1. _____
2. _____
3. _____

1.2. FOOD CHAIN

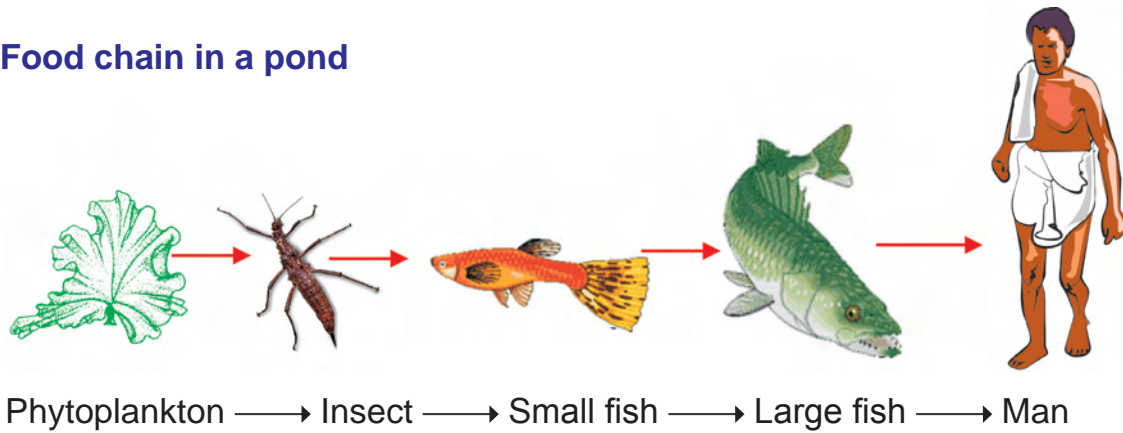
The sun is the ultimate source of energy to all living things. Green plants capture solar energy and convert carbon-dioxide and water into food by photosynthesis. This food energy is transferred to the primary consumer when they eat plants. Then the primary consumer is eaten by the secondary consumer which in turn is eaten by a tertiary consumer. So, in a given ecosystem, there is a process of organisms eating some others or being eaten by some other organisms. The path of energy transfer from one organism to another in a single direction is called a food chain.

1. Food chain in a grassland

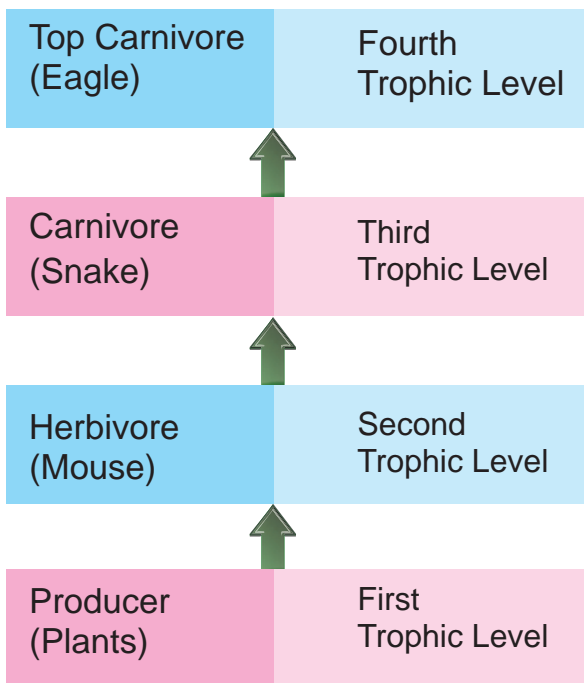
2. Food chain in a forest



3. Food chain in a pond



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In a food chain, each group of organisms occupies a particular position. The position of organisms in a food chain is called **trophic level**.

The first trophic level is of producers. The second trophic level is of herbivores. The third trophic level is of carnivores. The fourth trophic level is of top carnivores.

MORE TO KNOW

If one link in a food chain is broken it would result in the extinction of a species.

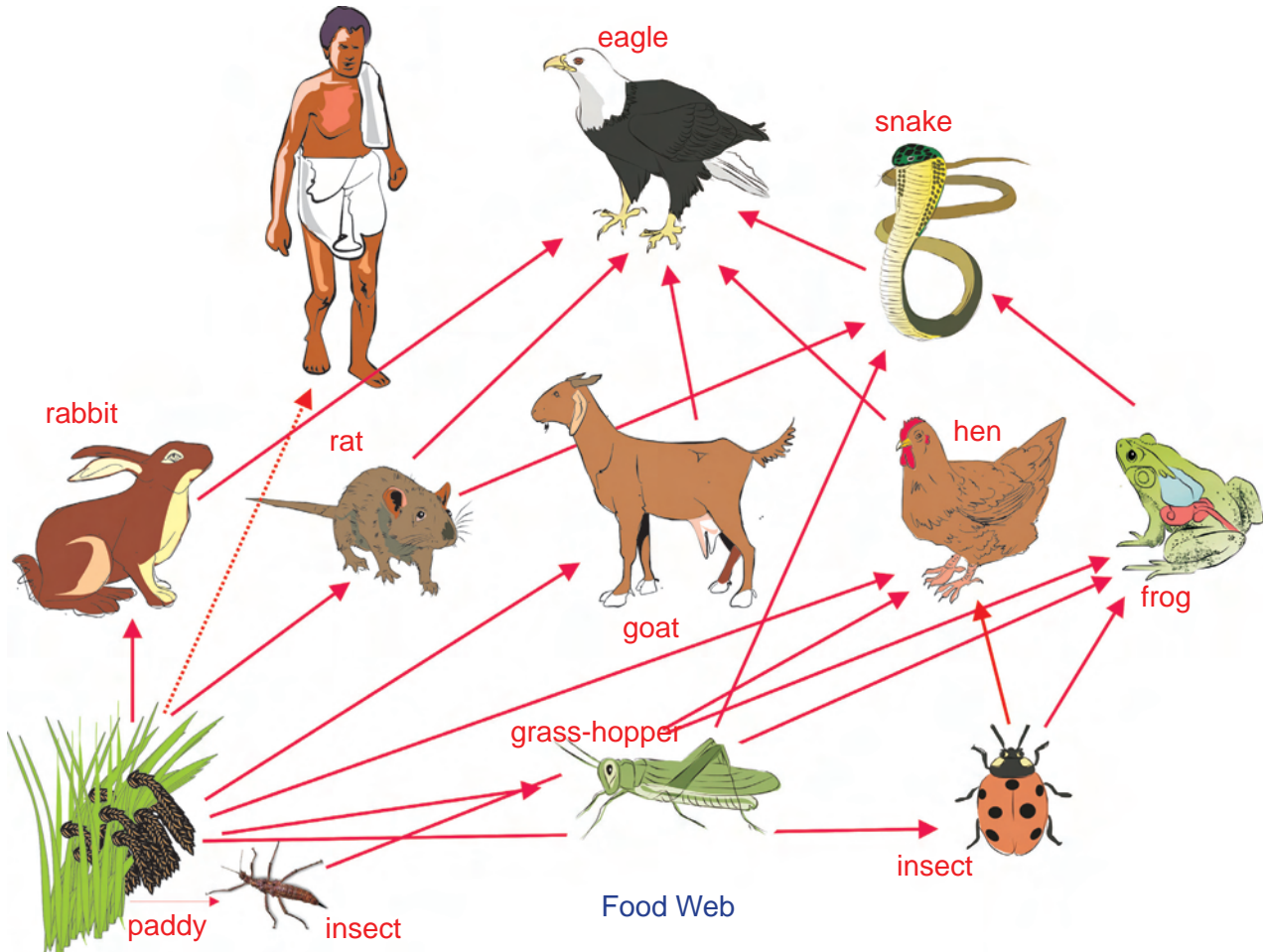


1.3. FOOD WEB

ACTIVITY 1.2

I DO

- ☛ I find which trophic level I belong to when I eat vegetables or meat.
- ☛ With dotted lines I show few more links to man.



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In a given ecosystem, a single food chain may not exist separately. An animal can eat more than one kind of food. For eg. an eagle can eat a rabbit, a mouse or a snake and a snake can feed on a mouse or a frog. So, many food chains get interlinked.

A network of interlinked food chains is called a **food web**.

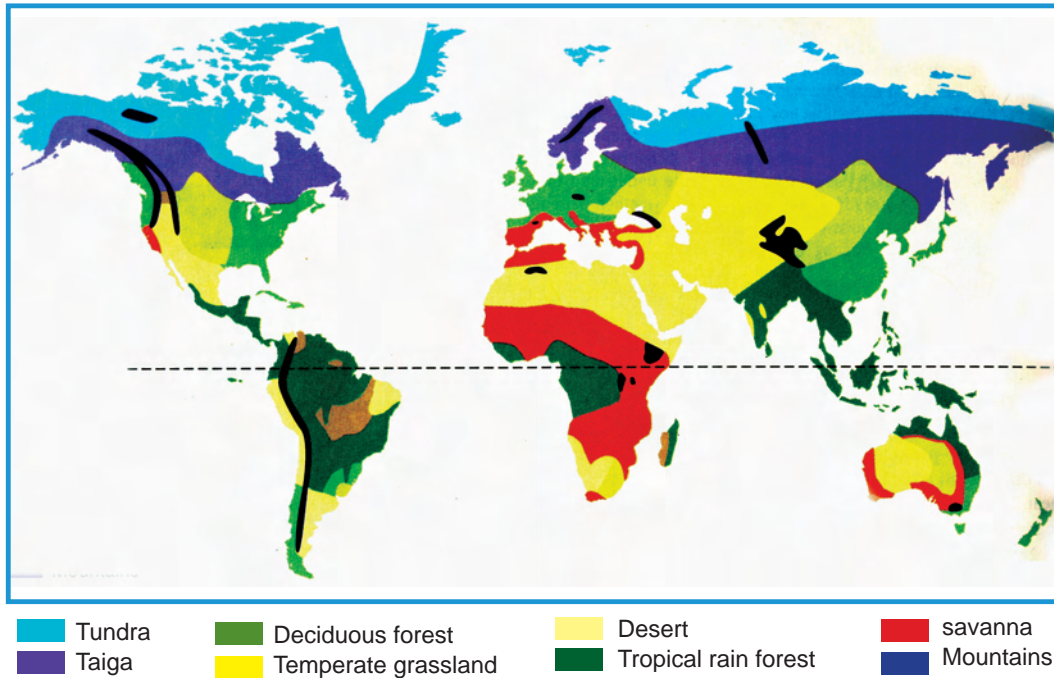
1.4. FLOW OF ENERGY

The sun is the ultimate source of energy for all living things. At first, the solar energy flows from the sun to the surface of the earth. Green plants trap the solar energy and convert it into chemical energy (food).

The amount of energy decreases from one trophic level to another. The flow of energy is always in one direction only.

1.5. BIOME

We know that all organisms acquire energy from the sun directly or indirectly. But, does the sun have any other effect on us? Yes. The rotation of the earth around the sun has an effect on the climate of a place. You have already studied about ecosystem. An ecosystem may be small or big. When small ecosystems are put together, they form a vast geographical area which supports a wide variety of flora and fauna. At the same time such a vast area has a different type of climate. Such a vast geographical area is called **biome**.



THE DIFFERENT BIOMES

We can view our earth as various biomes based on their climate and also the latitude and longitude on which they are present. Based on the types of flora and fauna, the biomes are classified into many types.

1.5.1. TYPES OF FOREST

1) Tropical Rain Forest: They are found in South America, Africa and Indo Malaysia region near the equator. The weather is warm (20°C-25°C). Rainfall is plentiful, 190 cm per year. In India, they



Fig. 1.1. Tropical Rain Forest

ACTIVITY 1.3

WE DO

Divide the class into groups of four or five students each. Each group has to select any Biome and discuss its climate, flora and fauna found there.



are found in Andaman and Nicobar Islands, Western ghats, Assam and West Bengal.

2) Savannah: They are found in South Africa, Western Australia, North West India and Eastern Pakistan. They love a dry weather alternating with wet weather. The rainfall is about 25cm per year. Frequent fires occur during the dry season. In India, grassy plains are found in the Nilgiris, Khasi hills and Naga hills.

3) Deserts: They are found in Africa, Arizona in America and Mexican desert in Mexico. The days are hot and nights are cold. The annual rainfall is less than 25 cm. In India, it is found in Rajasthan (The Thar Desert).



Fig. 1.2. Desert

4) Temperate Grassland: It is found in North and South America and parts of Europe. The annual rainfall is 25cm to 100 cm. They have two very severe dry seasons. They have windy hot summers and cold winters. In India, It is found in Uttar Pradesh.

5) Deciduous Forests: They are found in North America, Eastern Asia and Europe. They receive 75 to 100 cm of rainfall. The climate is moderate with mild winters. In India, it is found

in Punjab, Tamil Nadu, Uttar Pradesh, Bihar, Odisha and Madhya Pradesh.

6) Taiga: It is found in Canada, Europe and Russia. They are also called Boreal Forests. The climate is of a short cool summer and a long winter with abundant snowfall. The annual rainfall is 20cm to 60 cm. Most of it is covered with snow and ice. It is found in Himachal Pradesh, Punjab and Kashmir in India.

7) Tundra: It is found in south of the ice covered poles in the Northern hemisphere. Though it receives 25 cm of rainfall, it has permanently frozen soil. The climate is extremely cold and windy. The temperature is less than 10°C. In India, it is found in the Himalayas.

1.5.2. IMPORTANCE OF FORESTS

1. Forests are the sources for the formation of rivers.
2. They increase the rainfall.
3. They prevent soil erosion and floods.
4. They become habitats to animals.
5. They maintain the oxygen and carbon dioxide balance in nature.

Forests are considered as God's first temples. They play an important role in our day-to-day life.

MORE TO KNOW

Vanamahotsav is an annual Indian tree planting festival celebrated in the month of July. It is to create an enthusiasm in the minds of people to conserve forests.

1.5.3. DIFFERENT FLORA AND FAUNA

Biomes have a variety of plants and animals. The flora and fauna found in one biome is completely different from that in the other biome due to the different climatic conditions. The kind of flora and fauna found in different biomes are given below: India is one of the 12 mega biodiversity centres in the world with immense flora and fauna.

| S.NO | BIOME | FLORA | FAUNA |
|------|----------------------|--|--|
| 1. | Tropical Rain Forest | Lofty trees like teak, rubber, lianas, epiphytes, orchids, ferns | herbivores, insects rodents, monkeys, bats, birds, large cats, snakes |
| 2. | Savannah | Grasses | birds, kangaroos, lions, zebras, giraffes, cheetahs, elephants, termites |
| 3. | Desert | Succulent plants like cactus, acacia, calotropis, datepalm etc | chinkara, lizards, scorpions, camels |
| 4. | Temperate grassland | Perennial grasses | wolves. bisons, coyotes, antelopes. insects etc |
| 5. | Deciduous forest | Oak, maple, mosses, acacia, pine, fir | squirrels, black bears, beetles, birds, small mammals |
| 6. | Taiga | Spruce, fir, pine, aspen, birch, willows, mosses, lichens, fungi | porcupines, red squirrels, hares, grey wolves, insects etc |
| 7. | Tundra | Sedge, broad leafed herbs, lichens | reindeers, owls, foxes, wolves, migratory birds, polar bears, penguins |

ACTIVITY - 1.4

I DO

I match the product with its use.

| | | |
|----|----------|-------------|
| 1. | Timber | Pencil |
| 2. | Shelter | Neem |
| 3. | Music | Wood |
| 4. | Tool | Coffee |
| 5. | Medicine | Veena |
| 6. | Drink | Palm Leaves |

ACTIVITY - 1.5

I DO

Prepare a poster or logo or slogan or a notice related to deforestation.



EVALUATION

1. Pick out the correct answer:-

- a) Forest is an area with high density of _____ (trees / grass)
- b) _____ is an example of a natural ecosystem. (Paddy field / Desert)
- c) The third trophic level in a food chain is called _____
(herbivore / carnivore)
- d) A network of interlinked food chain is called a _____
(food web / food cycle)
- e) The festival of “Vanamahotsav” is celebrated in the month of _____.
(June / July)

2. Rearrange the following words to form a food chain.

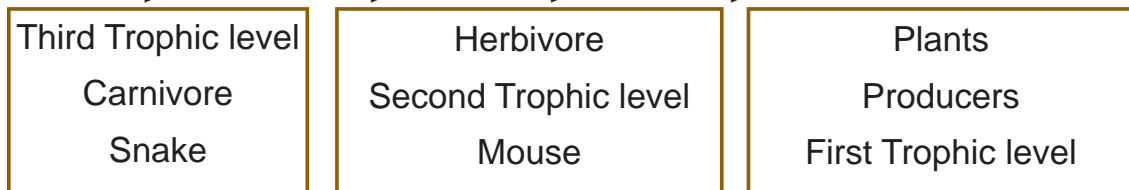
(a) snake, mouse, paddy, eagle, grasshopper.

_____ > _____ > _____ > _____ > _____

(b) man, big fish, phytoplankton, small fish, insects.

-----> -----> -----> -----> -----

3.



- a) Suggest the common idea derived from these boxes.
- b) Make two logical pairs using the data
- c) Analyse the data given above and make a food chain.

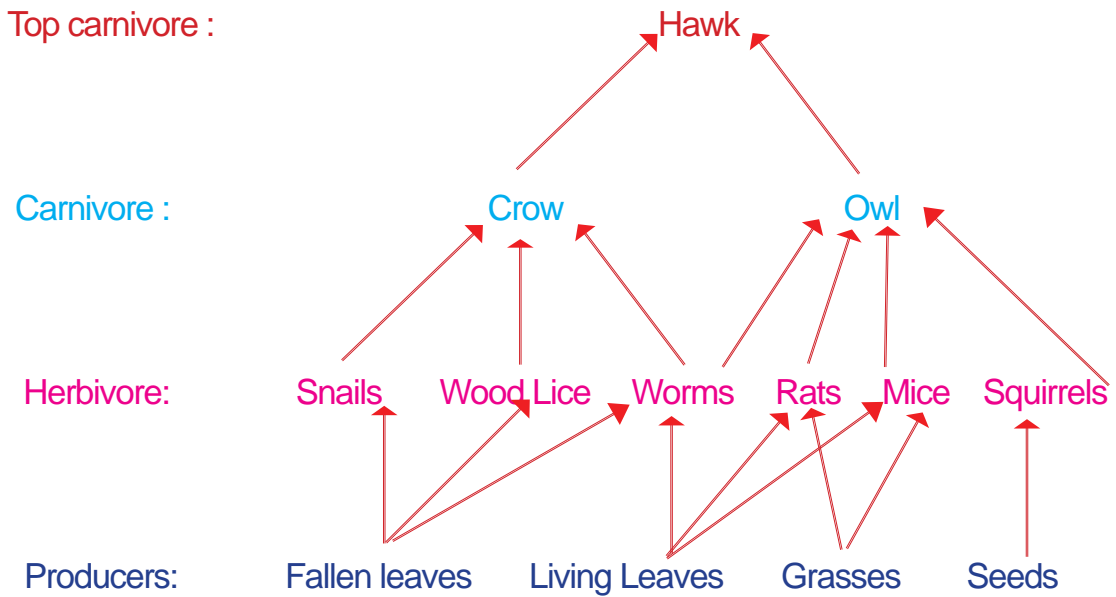
4. Differentiate between the following:-

- a) Consumers and decomposers
- b) Food chain and food web

5. Discuss the effects of deforestation on the following:

- a) Wild animals
- b) Environment

6. Food web in a forest is given below:



a) From the diagram identify an example of each of the following :

- i) a Carnivore
- ii) a Herbivore
- iii) a Producer

b) Draw as many as food chains of four organisms selected from the food web.

7. Match the following types of forests with their unique characteristic features.

Rain forest, Savannah, Desert, Grassland, Taiga, Tundra.

| S.No. | Characteristic feature | Types of Forest |
|-------|--------------------------|-----------------|
| a. | Frequent forest fire | _____ |
| b. | Windy weather | _____ |
| c. | Snow and ice | _____ |
| d. | Hot days and cold nights | _____ |
| e. | Ice covered frozen soil | _____ |
| f. | Plentiful rainfall | _____ |



8. Given below are a list of animals. Match it with the biome where they are found.

- | | | |
|---------------|---|----------------------|
| a) Snake | - | Savannah |
| b) Cheetah | - | Tundra |
| c) Camel | - | Tropical Rain Forest |
| d) Antelope | - | Taiga |
| e) Black bear | - | Desert |
| f) Grey wolf | - | Deciduous forest |
| g) Penguin | - | Grassland |

FURTHER REFERENCE

Books

Ecology - Shukla and Chandel, S.Chand & Company, New Delhi

Environmental Science (9th edition) - Enger and Smith, McGraw Hill, New York

Websites

www.national_geographic.com

www.mongabay.com

Places of scientific importance for visit

1. Coral reefs in Mandapam, Ramanathapuram District
2. Mangrove forest in Pitchavaram, Cuddalore District



Fig. 2.1. Mettur dam

Valli, Inba and Selva have gone on a picnic to Mettur dam. Valli is surprised to see so much of water available on our planet Earth. She wonders why we still experience shortage of water. Selva tells them that 70% of our Earth is made of water but only 3% of it is fresh water. Hence only a fraction of it is fit for human consumption.

Children, shall we find out why we celebrate March 22 every year as World Water Day.

It is to arouse an awareness



2.1 AVAILABILITY OF WATER

Water is a natural resource that is vital for both plants and animals. Water exists in abundance on our planet Earth. However, only a very small fraction of it is fit for human consumption.

Most of the water that exists on the earth is found in the seas and oceans. Sea water and ocean water are highly salty and hence unfit for drinking. Most of the fresh water is frozen glaciers as in the polar regions and thus not readily available.

The United Nations states that “the amount of water for drinking, washing, cooking and maintaining proper hygiene is a minimum of 50 litres per person per day”. This amount is about two and a half buckets of water for a person for a day.

MORE TO KNOW

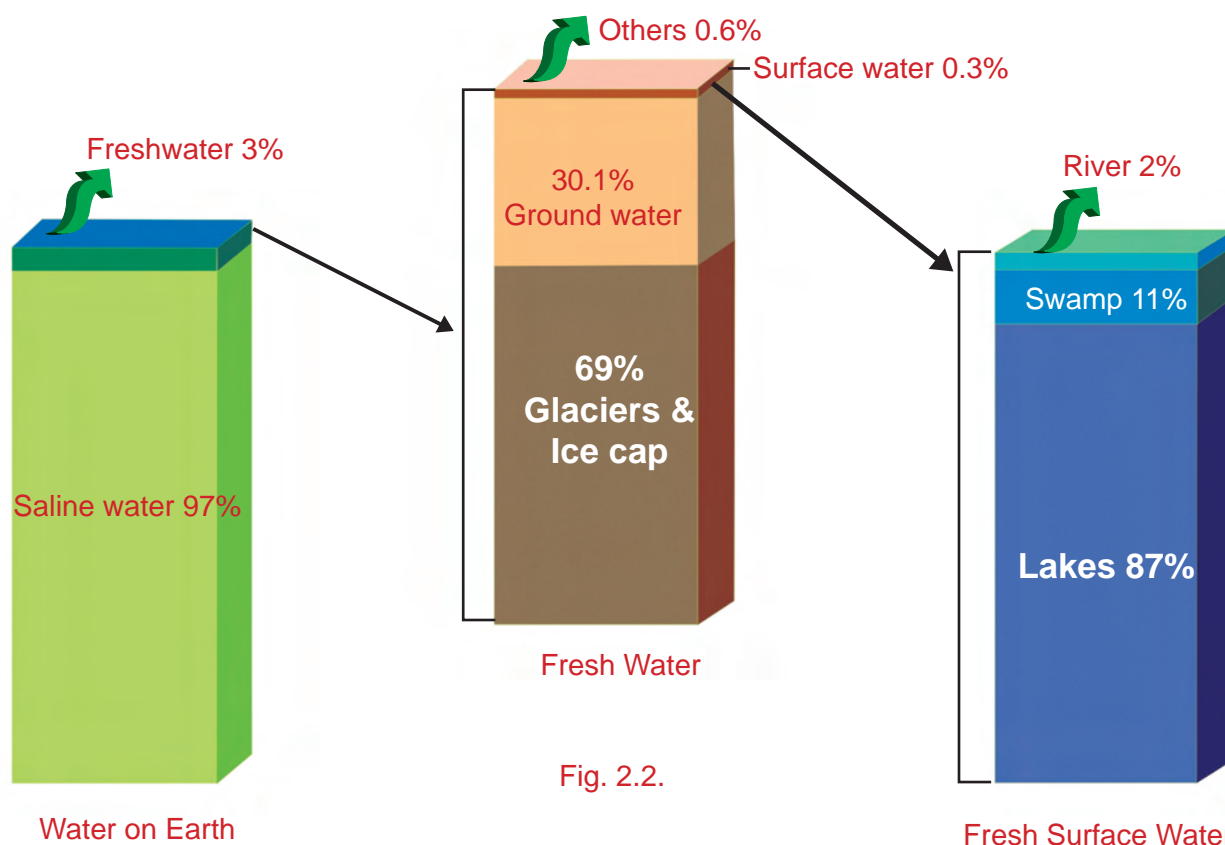
IMPORTANT DAYS

- World Wetland Day - Feb 2
- World Forest Day - March 21
- Earth Day - April 22
- World Environment Day- June 5
- Natural Resources Day - October 5
- Nature Conservation Day - Nov 25

ACTIVITY 2.1

I DO

I collect clippings from newspapers and magazines on the news items, articles and pictures related to water shortage. I paste them in my scrapbook. I show and share the information with my teachers and friends.





2.2. SOURCES OF WATER

1. Rain water

Rain water is the purest form of water. Pure water evaporates under sunlight from the seas and rivers leaving behind the impurities. It rains due to the precipitation (condensation) of tiny water droplets present in the clouds. The first showers dissolve certain gases present in air and bring down them along with the suspended impurities. Subsequent showers contain only pure water.

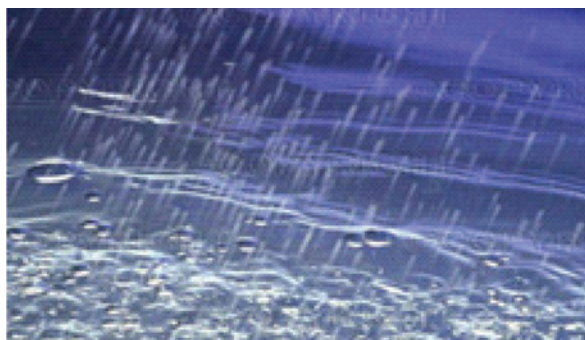


Fig. 2.3. Rain Water

2. Glaciers, ice and snow

Of the 3 percent of fresh water that is fresh, about three – fourths are tied up in glaciers, ice caps and snowfields. They occur only at high altitudes or high latitudes.

3. River water

The water in the rivers is obtained either from rainfall or melting of snow (glaciers) on the mountains.

4. Sea and Ocean water

Ocean is a large body of water. Million litres of water is present in ocean. But the water is salty and is not fit for any domestic or agricultural use.

5. Lake and Pond water

Lakes are inland depressions that hold standing fresh water almost all the year round. Ponds are small, temporary or permanent bodies of shallow water. They are still a minor component of the total world water supply.



Fig. 2.4. Glaciers

ACTIVITY 2.2

WE DO

Collect samples of rainwater, water from hailstones, river water, sea water and lake or pond water.

| S.No. | Sample | Purity | Colour | Uses |
|-------|--------|--------|--------|------|
| 1. | | | | |
| 2. | | | | |
| 3. | | | | |
| 4. | | | | |
| 5. | | | | |

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2.3. FORMS OF WATER

We already know that water exists in three states i.e., solid, liquid and gas. All the three states are reversible or interchangeable.

All the three states of water are also present in our natural environment at any given time.

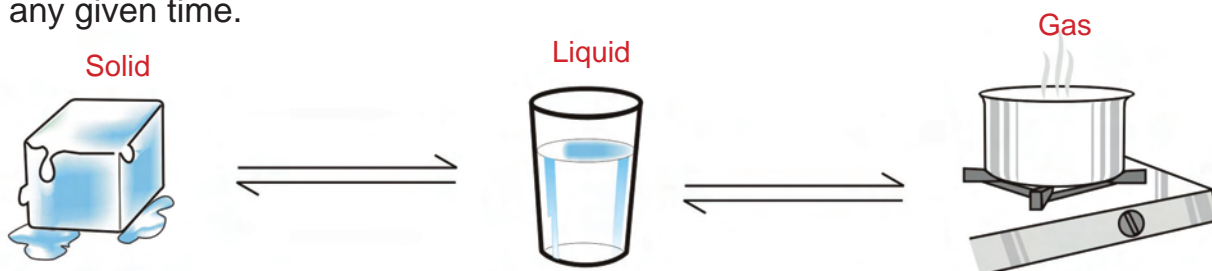


Fig. 2.5. (a) Water freezes to ice at 0°C

Fig. 2.5. (b) Water remains a liquid between 0°C and 100°C

Fig. 2.5. (c) Water changes to steam at 100°C

1. Solid: Ice is the solid form of water. It can be found in the atmosphere in the form of ice crystals, snow, ice pellets, hail and frost. It is also found in the polar regions and on high mountain peaks.

2. Liquid: Rain and dew are in the

form of water droplets. Also liquid water covers three quarters of the surface of the earth in the form of lakes, rivers and oceans.

3. Gas : Water vapour is the gaseous form of water and exists as mist, fog, steam and clouds.

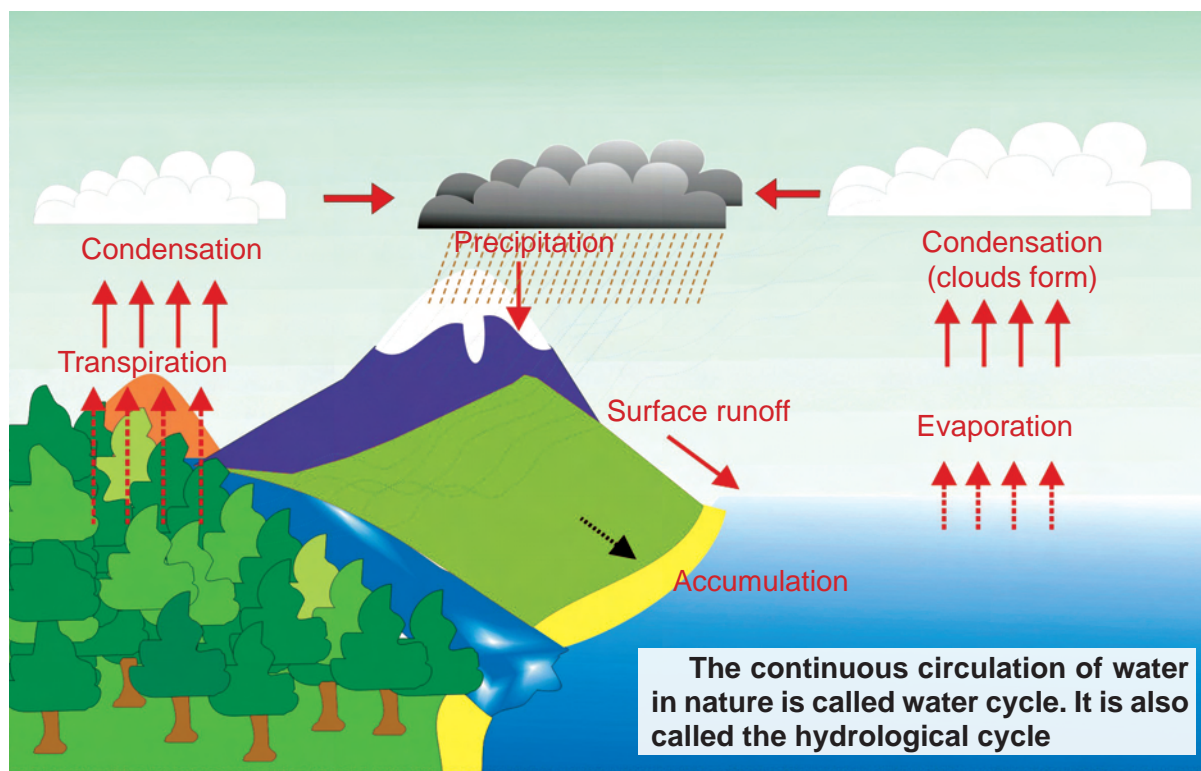


Fig. 2.6. Water cycle



2.4. GROUND WATER

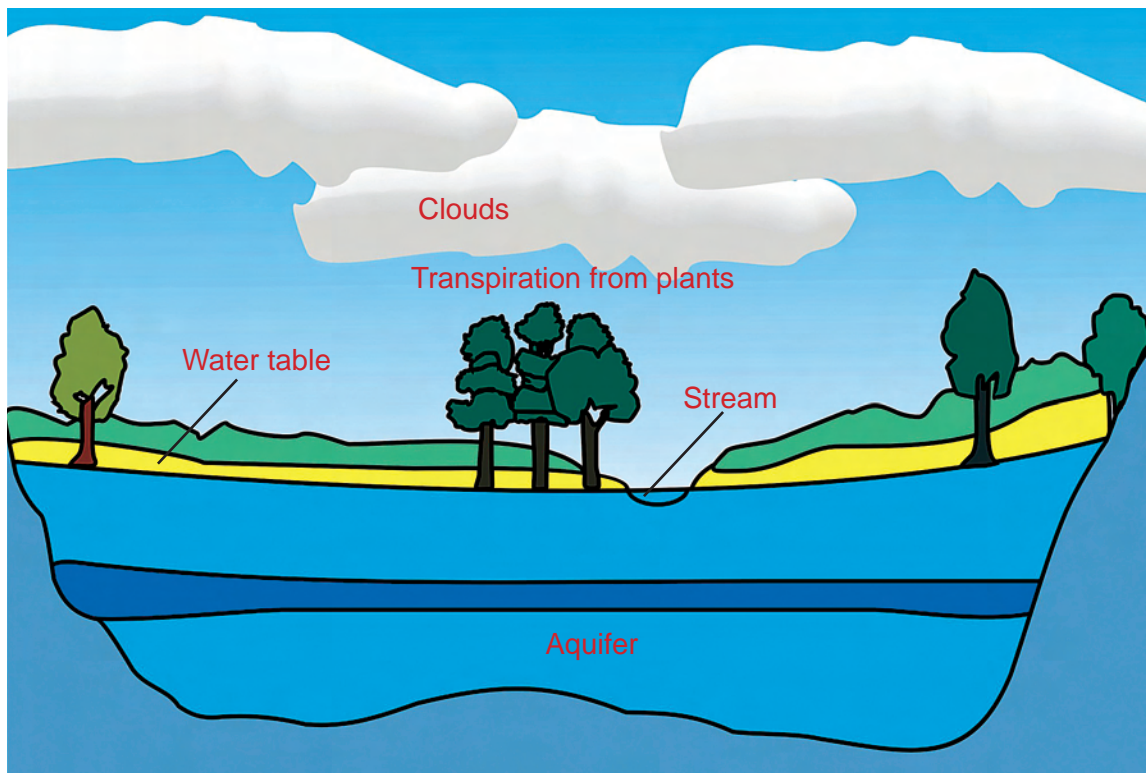


Fig. 2.7. Underground Water or Aquifer

- ☛ Precipitation in the form of rain or snow provides fresh water to our earth.
- ☛ Most of the fresh water returns to the oceans through rivers.
- ☛ A small portion of rain water seeps into the soil and is stored as underground water.
- ☛ Underground water is also called an **aquifer**.
- ☛ The top level of this underground water is called the water table. If we dig a hole in the ground near a water body we find that the soil is moist there.
- ☛ The moisture in the soil indicates the presence of underground water.
- ☛ If we dig deeper and deeper, we would reach a level where all the space between the particles of soil and the gaps between rocks are filled with water. The upper limit of this layer is called the **water table**.
- ☛ The water table varies from place to place and it may even change at a given place.
- ☛ Water in the aquifers can usually be pumped out with the help of tube wells or hand pumps.

MORE TO KNOW

A World Bank report says, "India is the largest user of groundwater in the world and its underground aquifers are being depleted at an alarming rate".

2.5. DEPLETION OF WATER

1. Natural forces

Scanty rainfall and hot winds are natural forces that may deplete the water table.

2. Human causes

Deforestation, increased population, rapid urbanization, overgrazing by cattle, excess tapping of ground water are human causes.

3. Salt water intrusion

Many parts of the world are losing freshwater sources due to saltwater intrusion. Over use of underground freshwater reservoirs often allows salt water to intrude into aquifers and affect the water table.

4. Commercialization of water resources

Some of the private companies suck a large quantity of water from rivers and underground aquifers.

5. Sand grabbing from rivers

Some rivers are deeply affected by sand grabbing. **eg. Palar river**

2.6. DISTRIBUTION OF WATER

Water availability in India depends greatly on the seasonal monsoons. The monsoons bring heavy rains over most of the country between June and September. Except Tamil Nadu, which receives over half of its rain in October and November. India has places of dry condition of deserts. (Thar desert) and places with rainforest climate (North Eastern States) too. In



Fig.2.8. Deforestation

general, the northern half of the country is subjected to extremes of rainfall. India has a large network of rivers too. The three major rivers the Indus, the Ganga and the Brahmaputra originate in the Himalayas and drain nearly two-thirds of the land area.

During the monsoon, water level in rivers increase greatly that some times it may result in floods. On the other hand, during the dry season, water level goes down quite a bit in most of the large rivers. Smaller tributaries and streams generally dry up completely.

To regulate water flow in these rivers and to distribute water more evenly throughout the year, large dams have been built across a number of rivers.

MORE TO KNOW

- ☛ India receives nearly 4 per cent of the global precipitation and ranks 133 in the world in terms of water availability per person per annum.
- ☛ The total renewable water resources of India is estimated at 1,897 sq km per annum.
- ☛ By 2025, it is predicted that large parts of India will join countries or regions having absolute water scarcity.

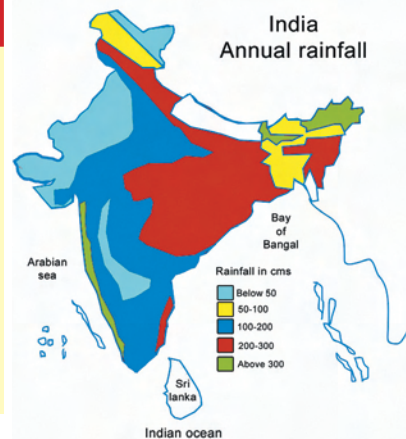


ACTIVITY 2.3

WE DO

Given here is the rainfall map of India. It gives the average annual rainfall in different regions of our country.

1. We locate on the map the place we live in.
2. Are we blessed with sufficient rainfall?
3. We discuss about the necessary steps to be taken to increase the rate of rain fall.



2.7. SCARCITY OF WATER

Scarcity of water is defined as a situation where there is insufficient water to satisfy normal requirements.

Though water is a renewable resource, we, the humans, are using it at a faster rate than it is being replenished.

There are various factors contributing to the depletion of water table.

- Growing population has resulted in a growing demand for houses, offices, shops, roads etc. As a result, open areas like parks and playgrounds are used for construction of buildings. This reduces the seepage of water into the ground.
- Growing population has also resulted in an increase in the number of industries. Water is used in almost every stage of production of things that we use.
- As we already know India is an agricultural country and farmers have to depend on rains for irrigating their fields. However, erratic monsoons result in excess use of groundwater thereby decreasing the underground water.

- Uncontrolled use of bore well technology for extracting groundwater.
- Pollution of freshwater resources. This is due to the flow of untreated sewage from homes, toxic chemicals from industries and of pesticides and insecticides used by farmers into water bodies
- No effective measures for water conservation.

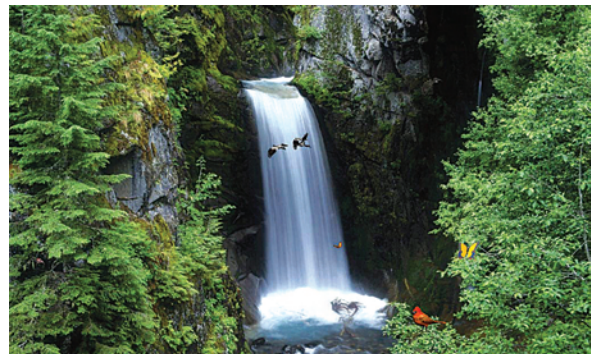


Fig. 2.9. Water is vital for the survival of all organisms on earth

MORE TO KNOW

A design of a toilet in which human excreta are treated by earthworms has been tested in India. It has been found to be a novel technique. Toilets that required little water is safe for processing of human waste. The conversion of toilet waste is very simple and hygienic. The human excreta are completely converted to vermicakes – a resource much needed for soil.

2.8 WATER MANAGEMENT - RAIN WATER HARVESTING

The activity of collecting rainwater directly or recharging it into the ground to improve ground water storage in the aquifer is called rain water harvesting. To recharge the groundwater, rainwater that falls on the terrace of the buildings and in the open space around the buildings may be harvested. Roof top rain water can be diverted to the existing open / bore well. Rainwater

available in the open spaces around the building may be recharged into the ground by simple but effective methods. The Government of Tamil nadu leads the nation in implementing rainwater harvesting programme. It has been made mandatory for all houses and buildings in the state to install rainwater harvesting facility

Rain water harvesting techniques

There are two main techniques of rain water harvesting.

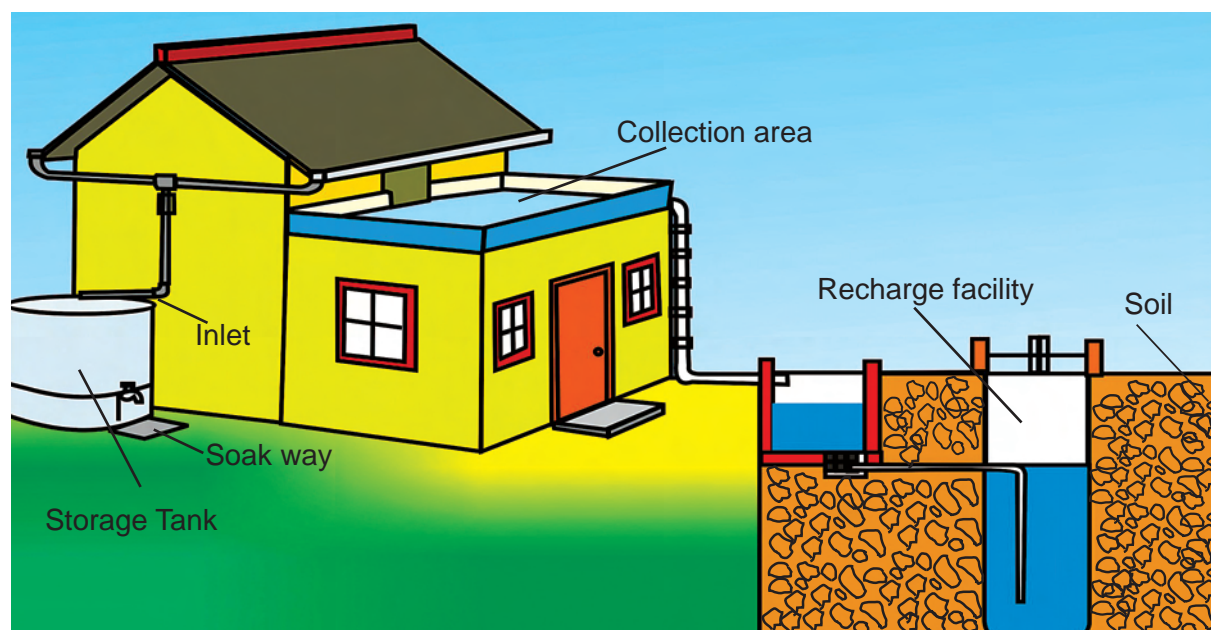


Fig. 2.10. Rainwater harvesting

1. Storage of rainwater on the surface for future use.
2. Recharging the ground water.
 - ☛ Surface water is inadequate to meet our demand and we have to depend on ground water.
 - ☛ Due to rapid urbanization, infiltration of rain water into the sub-soil has decreased drastically and recharging of ground water has diminished.

Advantages of rainwater harvesting

- ☛ Rainwater harvesting can reduce flooding in city streets.
- ☛ Sea water intrusion in coastal areas can be arrested.
- ☛ The ground water can be conserved.
- ☛ Rainwater Harvesting can reduce top soil loss.
- ☛ It can improve plant growth.

**ACTIVITY 2.4****WE DO**

Let us discuss the ways in which we can conserve water under the following headings:

1. Save a drop today. Keep drought away
2. Rain drops - life giving drops.
3. _____

2.9. SCIENCE TODAY**2.9.1. DRINKING ICE BERG WATER**

Fig. 2.11.
Melting of glacier



Icebergs are pieces of glaciers that have drifted into the ocean and would otherwise melt and become saltwater. Icebergs are mostly white because the ice is full of tiny air bubbles. The bubble surfaces reflect white light giving the iceberg an overall white appearance. Ice that is bubble free has a blue tint which is due to the same light phenomenon that tints the sky. Drinking iceberg water is one of the most environmentally conscious methods of meeting the world's increasing demand for clean fresh water. It is a noteworthy fact that all the North Indian Rivers originate in the glaciers of Himalayas.

There are two very positive environmental impacts from the use of drinking water from icebergs:

1. It decreases human dependency on traditional watersheds such as rivers and lakes, and therefore decreases human impact on these delicate and overstressed ecosystems.
2. It helps to reduce rising sea levels, which have been caused by polar icecap melting. Since most of the glaciers were formed thousands of years ago from falling snow, and snow results from condensed water vapour in the atmosphere, the water from icebergs is quite pure. Icebergs are comprised of pure fresh water.

2.9.2. DESALINATION OF SEA WATER

Desalination is an artificial process by which saline water (sea water) is converted into fresh water.

The most common desalination processes are :

1. Distillation
2. Reverse Osmosis

1. Distillation

The process in which both evaporation and condensation go side by side is called distillation

2. Reverse Osmosis

The process of forcing water under pressure through a semi permeable membrane whose tiny pores allow water to pass but exclude most salts and minerals is called reverse osmosis.

The State Government of Tamil Nadu has taken up a venture to convert sea water into potable water by the Reverse Osmosis process to solve the problem of water scarcity in Chennai.

The Minjur Desalination Plant

It is the largest desalination plant in India. It is located in Kattupalli village near Minjur, about 35km north of Chennai. The plant is established on a 60 acre site at a cost of Rs.600 crore. It consists of 8,600 Sea Water Reverse Osmosis (RO) membranes to convert sea water into potable water. The RO technology of the plant produces 100 mld (million-litres-a-day) of freshwater from 273 million litres of sea water. The Minjur Desalination Plant supplies 100 mld of fresh water to the Chennai Metro Water Corporation at the rate

of Rs.48.66 per 1,000 litres. The Desalination Plant serves potable water to an estimated population of 5 lakh in Chennai.

The Nemmeli desalination plant

The State Government has decided to alleviate the freshwater problems by the desalination of sea water. Besides the Minjur plant, the Chennai Metropolitan Water Supply and Sewage Board (CMWSSB) is also constructing a Desalination Plant at Nemmeli at a total cost of Rs.908.28 crore. The plant has a capacity to convert 100 million litres per day as



Fig. 2.12. The Desalination Plant at Minjur, Thiruvallur Dt.,

MORE TO KNOW

Water obtained through distillation is called distilled water. This water is normally pure enough for use in school science lab and medical laboratories.



potable water from sea water. Water from the Nimmeli plant would be carried over 40 km to the city, to be supplied to its residents.

2.9.3. SWEET WATER ON EARTH

1. The 2006 Mumbai “sweet” seawater incident was a phenomenon during which the residents of Mumbai claimed that the water at Mahim Creek had suddenly turned “sweet”. Mahim Creek is one of the most polluted creeks in India that receives thousands of tonnes of raw sewage and industrial waste every day.
2. Within few hours of the Mumbai “sweet” seawater incident, residents of Gujarat claimed that seawater at Teethal beach had turned sweet as well.



Fig. 2.13. Teethal Beach (Gujarat)

Geologists at the Indian Institute of Technology in Mumbai offered the explanation that water turning sweet is a natural phenomenon. Continuous rainfall over the preceding few days had caused a large pool of fresh water to accrue in an underground rock formation near to the coast. Then this water discharged into the sea as a large “plume”, as fractures in the rocks widened. Because of the differences in density, the discharged fresh water floated on top of the salt water of the sea and spread along the coast. In course of time, the two would mix to become normal sea water once more.

MORE TO KNOW



All oceans and seas have salty water. The saltiest of all is the Dead sea. It is called “dead” because the high salinity prevents any fish or other visible aquatic organisms to live in its water. Imagine 300 grams of salt in one litre of water. Interestingly, even if a person does not know how to swim, he would not drown in this sea. He would only float in it.

ACTIVITY 2.5

I DO

I calculate the amount of water I use daily.

| ACTIVITY | AMOUNT OF WATER USED IN LITRES |
|----------|--------------------------------|
| Drinking | |
| Cooking | |
| Bathing | |
| Washing | |

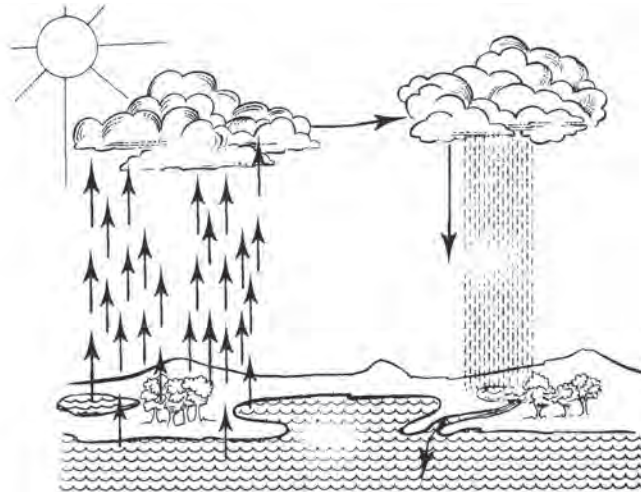
Water is a resource . Water is essential for the hygienic well being of all human beings. So water must be used optimally .

EVALUATION

- Pick out the correct answer.
 - Water exists in abundance on the planet ----- (Earth/ Mars).
 - are a huge store of water. (Oceans / Ponds)
 - is the gaseous form of water. (Rain / Water vapour)
 - Desalination is an artificial process by which ----- is converted to fresh water. (sea water / river water)
- Given below are some sources of water. Arrange the jumbled words in the right order and fill in the blanks

INAR **RAIN** OWNS RRVIE _____
 ASE . AKEL NOPD _____

- The diagram of a water cycle is given. Fix the following words in the right place; sea, cloud, evaporation, rain



- Why is supply of water essential to humans?
- a) Why has urbanisation occurred ? List the ways in which urbanisation
 - benefits human
 - harmful to wild life.
 b) Suggest one way in which the effects of urbanisation can be reduced.
- Advise class leaders on water conservation in your school. You can give them the following instructions;
 - Close the water tap after use.
 - _____
 - _____
 - _____
 - _____
 - _____
 - _____
 - _____



7. All of us use water every day. Fill in the table according to your observation:-

| S.No. | | IN SCHOOL | AT HOME |
|-------|---|-----------|---------|
| 1. | Source of water | | |
| 2. | Number of taps | | |
| 3. | Taps that leak | | |
| 4. | Water wasted by leakage every day in litres | | |

8. Visit the following places to observe rain water harvesting and state why rainwater harvesting is essential in these places.

- i) Temple
- ii) School building
- iii) Government office
- iv) House

9. The State Government of Tamil Nadu has taken up a venture to convert sea water into potable water. Name the two desalination plants setup in connection with this idea

- a) _____
- b) _____

FURTHER REFERENCE

Books

1. **Framework of Science** - Paddy Gannon, Oxford University Press, New Delhi
2. **Environmental Science** - Tata McGraw Hill, New Delhi.

Websites

www.rainwaterharvesting.org
<http://www.worldwaterday.org>

Places of scientific importance for visit:

1. The Desalination Plant, Minjur, Thiruvallur District
2. The Desalination Plant, Nemmeli, Kanchipuram District
3. Sathanur Dam, Thiruvannamalai District



In the Stone Age, people never knew the use of fire. They ate raw food. Accidently they discovered that by rubbing two stones together, they could produce fire. Later they used fire for cooking, getting light and for safeguarding their lives from animals. Fire is obtained by the rapid oxidation of a substances in the chemical process of combustion, releasing heat, light and various other products.



Fig 3.1 (a)



Fig 3.1 (b)

3.1. COMBUSTION AND ITS TYPES

Combustion is the burning of substances in air or oxygen to release heat and light. The substance that undergoes combustion is called **fuel**.

ACTIVITY 3.1

WE DO

Aim : To know about the various substances that are used as fuel.

We use various kinds of fuel for various purposes at home, in industries and for running automobiles. Let us name a few fuels.

- 1.
- 2.
- 3.

There are many substances that can burn. They can be classified depending on their state state as solid, liquid and gas. Cowung, coal and firewood are solid fuels. Kerosene and petrol are liquid fuels. LPG, coal gas, natural gas and bio-gas are gaseous fuels. You have learnt that magnesium burns to form magnesium

oxide and produces heat and light. You can perform a similar activity with a piece of charcoal. What do you observe? You will find that coal burns in air producing carbon dioxide, heat and light. This process is an example of combustion. The substances that undergoes combustion are called **combustible substances**.

ACTIVITY 3.2

WE OBSERVE

Aim: To differentiate combustible and non-combustible substances

We need: straw, wood, iron, nail, kerosene, a piece of stone, charcoal, match sticks, glass, burner, tongs

Procedure:

- ☛ Light the burner
- ☛ Using tongs, hold a piece of straw over the flame.
- ☛ What happens to the straw? Record the observation in the table given below
- ☛ Repeat the above procedure with other substances and record your observation in the table.
- ☛ If combustion takes place, mark the substance as combustible, otherwise, mark it as non-combustible.

Table 3.1

Tick the appropriate column

| Substance | Combustible | Non-Combustible |
|-------------|-------------|-----------------|
| Straw | | |
| Wood | | |
| Iron nail | | |
| Kerosene | | |
| Stone piece | | |
| Charcoal | | |
| Matchsticks | | |
| Glass | | |

From the above activity, we infer that substances like paper, straw, wood, matchsticks, etc. are combustible substances. Substances like stone, glass, iron nails, etc. do not burn on being exposed to flame. Such substances are called **non-combustible** substances.

Let us investigate the conditions under which combustion takes place.



Fig.3.2 combustible & non-combustible things



ACTIVITY 3.3

WE OBSERVE

Aim: To show air is necessary for combustion

We need: chimney, candle, match box, wooden blocks, glass plate

Procedure:

(Caution: Be careful while handling the candle)

- Fix a lighted candle on a table.

Case 1

- Place a glass chimney over the candle and rest it on a few wooden blocks in such a way that air can enter the chimney.
- Observe what happens to the flame.

Case 2

- Now, remove the wooden blocks and let the chimney rest on the table.
- Again observe the flame.

Case 3

- Finally, place a glass plate over the chimney.
- Watch the flame again.
- What happens in the three cases?
- Does the flame flicker off?
- Does it flicker and give smoke?
- Does it burn unaffected?
- Can you infer anything about the role played by air in the process of burning?

Condition necessary
for combustion

**TO THINK**

You might have heard that when the clothes of a person catch fire, the person is covered with a blanket to extinguish the fire. Can you guess why?



The candle burns freely in case 1 when air can enter the chimney from the bottom. In case 2, when air does not enter the chimney from the bottom, the flame flickers and produces smoke. In case 3 the flame finally goes off, because the air is not available. Therefore you can easily understand that air is necessary for combustion.

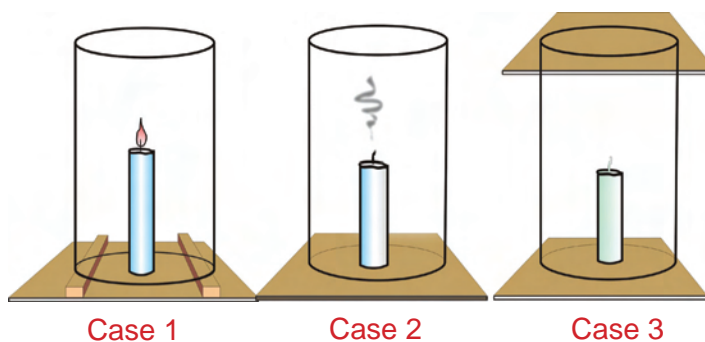


Fig 3.3
Air is essential
for burning