17 Water : A Precious Resource

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Water, as you know, is the most essential component of life. It is essential for the sustenance of life. Life is impossible without water.

Water is required for many purposes like drinking, cooking, cleaning, crop irrigation, navigation, generation of hydro-electricity and many industrial needs. Let learn more about water in this chapter.

Water is an important renewable natural resource, there is plenty of water on our planet. But the distribution of water on the earth is not uniform.

About three-fourths of the land surface on the earth is covered with water. This water is mostly stored in the five oceans—the Atlantic Ocean, the Pacific Ocean, the Indian Ocean, the Arctic Ocean and the Indian Ocean, the Arctic Ocean and the Antarctic Ocean. The water stored in the Arctic and the Antarctic oceans is frozen. 97.4% of all the water on the earth is stored in the ocean. Human beings cannot use this water because it is very salty.

Of the balance 2.6% almost 2% water is frozen in glaciers and the polar ice caps. This is pure water but again not available for human consumption. Thus, only about 0.6% is pure water in a liquid form. Of this 0.59% is present as groundwater. It is the balance 0.01% of the total water on earth that is available as freshwater. It is this tiny fraction of the total water that is repeatedly recycled in nature and used by human beings and other living beings.

All living things on the earth depend upon water. Animals as well as plants need water to survive and grow. Most of the life processes in animals and plants occur in the medium of water.

Water also provides a habitat to the large number of marine plants and animals living in oceans, rivers, lakes and ponds. Water provides them the dissolved nutrients and oxygen for their survival.

WATER, A RENEWABLE NATURAL RESOURCE

All useful things like water, sunlight, plants, animals, soil and air which are part of nature are called natural resources. Natural resources are of two kinds—renewable and non-renewable.

Natural resources like water and air, which are constantly renewed through rapid natural cycles are called renewable natural resources.

Thus, due to the continuous evaporation of water into the atmosphere and precipitation back to the earth's surface as rain and snow, the amount of water on the earth has remained unchanged for millions of years.

Forms of Water

Water occurs in all three states in natural condition. The polar regions of the earth and the heights of the mountains are covered with snow. Ice is the solid state of water. The rivers, pongs, lakes, seas and the oceans have water in the liquid state, whereas air contains water vapour which is the gaseous state of water.

Limited Availability of Freshwater

Although there is plenty of water on the earth, 98 per cent of it is saline water is of the oceans. This water being extremely salty unfit for human consumption, growing crops and industrial purposes. Only about 2 per cent of the water on the earth is freshwater, but most of it is inaccessible as it remains frozen as ice in the polar regions. A small amount of freshwater is accessible from streams, ponds, lakes, rivers, wells and underground sources. This is the only water available for human consumption, industries and growing crops.

SOURCES OF FRESHWATER

Rain is one of the main sources of freshwater, but it does not fall evenly all over the world. Some places receive excess rain causing floods while other receive very little or no rain causing drought.

Rain, the main source of water

If a well or a pond dries up in summer, it can be recharged only when it rains again. Thus, a source of freshwater although renewable can be exhausted, till rain renews its supply of water.

Groundwater

Groundwater is one of the most valuable sources of freshwater on the earth. It supplies water to the wells and lakes. It is a source of clean drinking water. You have learnt that the soil is made up of different horizons. Below horizon C, is a layer of rocks. This layer of rock is not the same everywhere. At some places, it is very hard and at some places, it is porous. At certain places, below the porous layer of rock, there are huge spaces which are filled with freshwater that has been percolating into the ground for millions of years. As the rainwater seeps into the soil, it wets the soil. The excess amount of water moves deeper into the ground and fills the spaces in the rocks. This is known as groundwater. The level of water under the ground is known as the water table.

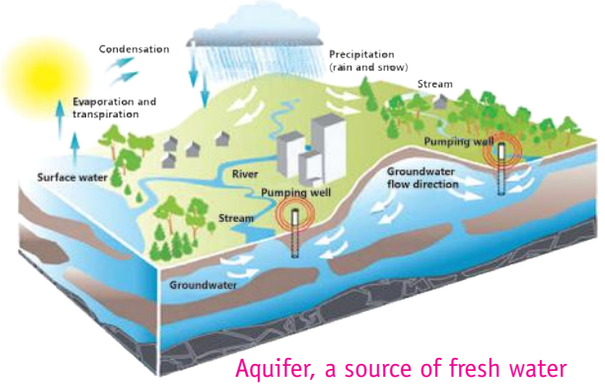
In some places, the water table is close to the surface. In such places, the groundwater can be obtained by digging a hole just a few metres deep. At some places, the groundwater level is very deep.

Do You Know ?

Underground water is usually clean and safe to drink. This is because the porous layer of the earth above acts as fine filters, removing bacteria and other insoluble impurities as the water seeps through. Nevertheless, underground water has a high concentration of dissolved salts.

Aquifer

The rainwater that has collected in the empty space below the porous layer of rock is known as aquifer. The water remains there because below it is a hard layer of rock, which prevents water from moving further downwards.



Aquifer, a source of fresh water

Factors Affecting Ground Water

In many areas, groundwater has been nearly exhausted. This is because it is being used at a faster rate than it is being renewed by the natural process. The increase in use in due to increase in human population, industries and agriculture.

INCREASE IN POPULATION

Human population is increasing all the time. To meet the needs of an ever increasing human population, more houses, offices, schools, shops and roads are being built. These construction activities need a huge supply of water. The demand for drinking water has also increased.

At present the rainwater that collects in dams, lakes and rivers is not enough to meet all the needs of human population. Hence, more and more water is being drawn from underground sources (aquifers).

Many people fulfil their water requirements by sinking tubewells. A tubewell enables us to use groundwater. Most people think that a tubewell is a permanent source of water but thisis not true. Uncontrolled increase in the number of tubewells in a region will deplete groundwater in the near future leasing to acute water shortage.

Agriculture

Earlier, most farmers of our country depended on rainwater to grow crops. Nowadays, they use large quantities of ground water by sinking deep tubewells to cultivate crops. According to the Union Ministry of Water Resources, 80 per cent of India's utilizable water is devoted to agriculture, mostly in the form of irrigation.

At a global level, per cent use of water for different purposes is as follow :

Agriculture - 70%

Industry - 25%, Domestic use- 5%

This, however, varies from country to country, In developed countries, industries use a greater percentage of water. In india, the per cent use of water for different sectors is—

Agriculture - 90%

Industry - 7%

Domestic use - 3%

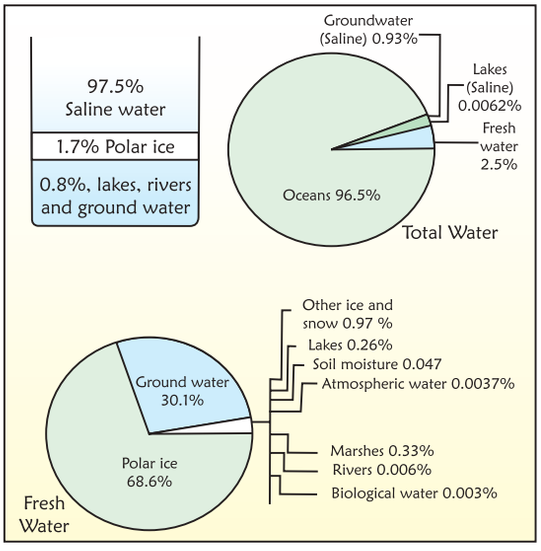
In our country, availability of water varies from place to place and from time to time. Rainfall is confined to a short period of 3-4 months. A large part of the country lacks supply of surface water for a large part of the year. Due to unequal distribution of rainfall, we face problems of floods and droughts in some parts of the country every year.

Irrigation from ground water is also becoming difficult as the water table is going down every year. It is a common experience that the farmers have to deepen their tube wells every year. This is done to obtain water from greater depths.

Increase in Industries

The number of industries is also increasing. The manufacture of almost every item that we use requires water. Most industries draw water from the ground, depleting the groundwater sources. Water consumption depends on the type of industry. Industries dealing with thermal power, textiles, paper, iron and steel use huge quantities of water.

How are we obstructing the process that renews groundwater? When land is left undisturbed, the uneven landscape collects rainwater that percolates into the



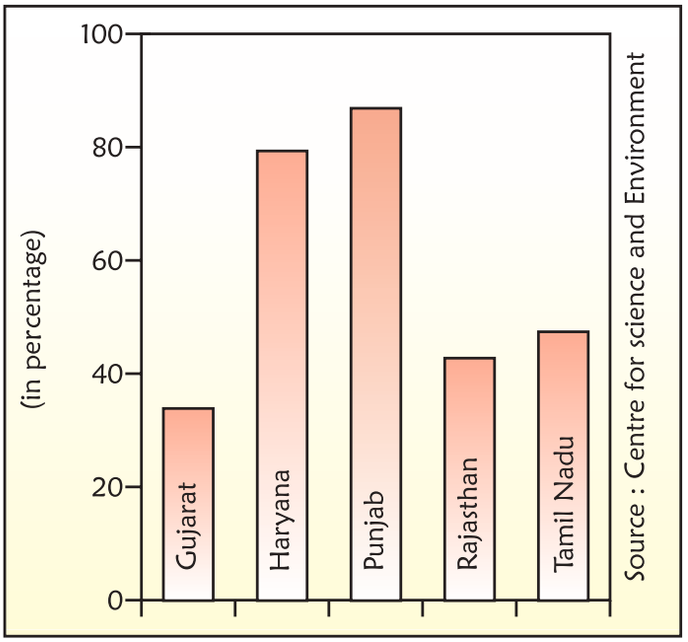
Distribution of water

ground and replenishes groundwater sources. In recent times, large stretches of land have been levelled to construct industries, houses, roads and cities, reducing the amount of water that percolates into the soil. Natural vegetation like that found in forests and grasslands helps in absorbing a good amount of water into the soil. Decrease in forests and grasslands have also affected the groundwater in certain regions.

DISTRIBUTION OF WATER

Water is not easy to obtain in many parts of our country. The amount of water in a region depends on the rain it receives. This is true for every part of the except the polar regions which are covered with ice.

Our country is very vast. Rainfall varies from place to place and the distribution of water is uneven. A region which receives very little rain has less potable water. Such regions have fewer sources of water like wells, lakes and rivers. A region with scanty rainfall also has less groundwater. Some regions like that of Rajasthan, Northern Karnataka and Gujarat are prone to drought. These regions face acute shortage of water every summer.



Bar graph showing the amount of groundwater in a few states of India

Some regions receive excess rain, causing floods. Regions which receive good rains regularly have a good amount of groundwater. They also have more water in the wells, lakes and rivers.

Water Shortage

Several parts of our country are drought-prone. These regions receive very little rain and when rains fail there is hardly any water available for domestic or agricultural purposes. Crops fail and there is shortage of food and fodder for cattle. If rains fail repeatedly for a few years, people and animals are exposed to drought, during drought, animals and poor people can die due to thirst and starvation.

Water Management

Increasing population has put tremendous pressure on the freshwater sources all over the world. Large dams are built on river to prevent rainwater from flowing away directly into the sea. Water stored in the dams is supplied to nearby cities and towns through pipelines. Water for agricultural purposes is supplied through irrigation systems. An elaborate water supply system costs a very large amount of money to the government. It is the duty of every citizen not to waste water and save every drop of water.

In many parts of our country, supply of potable water is extremely limited. Avoid water wastage.

Follow these steps.

- Do not leave the tap open while brushing your teeth.
- Do not let water overflow while having a bath, washing clothes or utensils.
- Repair dripping taps immediately. Inform your local water board authorities if you see a street tap dripping or water flowing from broken pipes.
- Water plants early in the mornings.
- Use a bucket of water to wash your vehicles. Do not use a hose.
- Flushing the toilet uses a lot of water. Adjust the ball cock to cut down the amount of water you use to flush.
- Collect rainwater in drums and use it to water your plants.

Water Pollution

Water that can be safely used for human consumption is called potable water.

Polluting rivers, lakes and wells is dangerous because they are our primary sources of drinking water. Water can get contaminated due to the following reasons.

Improper Sewage Facilities

May of the towns and cities do not have an efficient water sewage system. Most of the sewage flows into rivers.

Industrial Pollution

Chemical and industrial wastes drain into river. These wastes are harmful not only to the different life forms that live in the rivers but also to human beings who use the water for drinking.

IMPROPER AGRICULTURAL PRACTICES

Trace of fertilizers and pesticides get drained into the nearest rivers or wells. When pesticides and fertilizers are used in excess, they remain in the soil and are washed into rivers when it rains. This results in water pollution.

Religious and Social Practices

Carcasses of cattle and other animals are disposed off in river adding to the pollution load. Some industries release untreated toxic chemicals directly into rivers and oceans. Household waste is at some places released into these water bodies. Religious offerings are also thrown into river waters. It is common to see plastic bags floating on many of our rivers and lakes.

WATER CONSERVATION

Rainwater harvesting : In simple terms, rainwater harvesting is a method of direct collection of rainwater from roof tops of buildings. It can be done both on the roof tops of our houses as well as of industrial building. This water can be used for various purposes.

The rainwater collected can be stored for direct use or can be allowed to reach the groundwater. Once the water reaches the groundwater, water table is raised.

Rainwater harvesting is, therefore, a solution to the problem of depleting ground water.

Rainwater harvesting is an old method of conserving water. In certain regions of India, old houses and temples have an arrangement for storing rainwater. The famous Hutheesing temples located in Ahmedabad city, which are more than 150 years old, harvest rainwater and store it for year long use in underground tanks even today. Rainwater harvesting can raise the underground water table of the region.

Check Dams

Rainwater percolates into the soil only if it does not flow away quickly. Water can be prevented from flowing away by constructing check dams in the path of its flow. These dams slow down the flow of water and allow it to percolate into the soil.

Check dams constructed in certain villages of Rajasthan have raised the water levels in the region, party solving the drinking water problem.

Check dam

DRIP IRRIGATION

Plants need sufficient water to grow. Plants absorb water through their roots. The drip irrigation system supplies the required amount of water only around the roots. This minimizes the amount of water required to grow a crop. Since water is supplied drop by drop, water loss through evaporation and run-off is totally prevented, thus saving water. The drip irrigation system allows farmers to produce a high yield with very little water. This system ensures adequate water supply to plants while minimizing its wastage and loss.

Know the Keywords :

Natural resource : Anything that is found in nature and is useful to living things.

Surface water : The water found on the surface of the earth.

Groundwater : The water that has percolated through the soil.

Water table : The upper level of groundwater collected over non-porous rocks.

Run-off : The flowing surface water.

Point to Remember

- All useful things like water, sunlight, plants, animals, soil and air which are part of nature are called natural resources.
- The rainwater that has collected in the empty space below the porous layer of rock is known as a aquifer.
- Some regions like that of Rajasthan, Northern Karnataka and Gujarat are prone to drought.
- Rainwater harvesting is the method of direct collect of rainwater from roof tops of building.
- The drip irrigation system supplies the required amount of water only around the roots.

EXERCISE TIME

A. Answer the following questions :

1. What is a renewable resource ?
2. How is water important for agriculture ?
3. What is meant by the water table of a region ?
4. Describe rainwater harvesting.
5. Why is the groundwater depleting ?
6. How does a check dam help in raising the water table of a region ?
7. Why is distrubution of water un-even in our country ?
8. What are the main causes of water pollution ?

B. Write 'T' for true and 'F' for false statement :

1. About three- fourths of land surface on the earth is covered with water. ( )
2. Water is a non-renewable natural resource. ( )
3. Water does not provide habitat to organism. ( )
4. Check dams prevent the flow of water. ( )
5. Water is evenly distributed on the earth. ( )

C. Tick (✓) the correct option :

1. Water and air are called :
   - (i) renewable resources ( )
   - (ii) non-renewable ( )
   - (iii) none of the above ( )

2. How many states are water found ?

(i) Four ◯ (ii) Three ◯ (iii) Two ◯

3. Which water is one of the most valuable sources of freshwater ?

(i) Rainwater ◯ (ii) Groundwater ◯ (iii) Seawater ◯

4. Water that can be safely used for human consumption is called :

(i) Groundwater ◯ (ii) Rainwater ◯ (iii) Potable water ◯

5. The drip irrigation system supplies the required amount of water only around :

(i) roots ◯ (ii) stems ◯ (iii) dams ◯

6. How do the following affect groundwater ?

(i) Increase in population ◯

(ii) Increase in industries ◯

(iii) Agriculture ◯

Creative Work

- **Make a report on the ueful and adverse affects of constructing dams on rivers.**