WATER A PRECIOUS RESOURCE

INTRODUCTION

We all depend on the same vital substance water, diverse by its nature, it is solid, vapour and liquid. It is in the air, on the earth surface and within the ground ever-changing and giving shape to a dramatic range of natural ecosystem.

For the earth's inhabitants, diversity of the resource also means great disparities in well being and development. As we degrade the quality of our water and modify the natural ecosystems on which people and life depend, we also threaten our own survival.

AVAILABILITY OF WATER

Water is the most widely occurring substance on this planet. Water has shaped the earth's evolution and continues to fasion its programmes. This is the water preCipitated from the atmosphere on to land, where it may be stored in liquid or solid form, and can move laterally and vertically and between one phase and another phase by evaporation, condensation, freezing and thawing on the land surface. This water can travel at widely differing velocities usually by predictable pathway's which can slowly change with time. We are aware that about 71 % of the earth's surface is covered with water. Almost all the water on the earth is contained in the seas and oceans, rivers, lakes , ice caps, as groundwater and in the atmosphere. However, most of this water is not fit for human consumption.

COMPOSITION OF WATER

Water is a compound. Its constituent elements are hydrogen and oxygen. Water is a stable compound, but can be broken into hydrogen and oxygen when electric current is passed through it. Its chemical formula is H_2O.

PHYSICAL PROPERTIES OF WATER

The properties of water are different from those of oxygen and hydrogen. For example, water extinguishes fire, but oxygen supports combustion and hydrogen burns with pop sound.

1. Pure water is a colourless, odourless, tasteless, transparent liquid.
2. Water exists in all the three stales, solid (as ice), liquid (as water) and gas (as water vapour).
3. Pure water boils at 100°C.
4. Pure water freezes at 0°C.

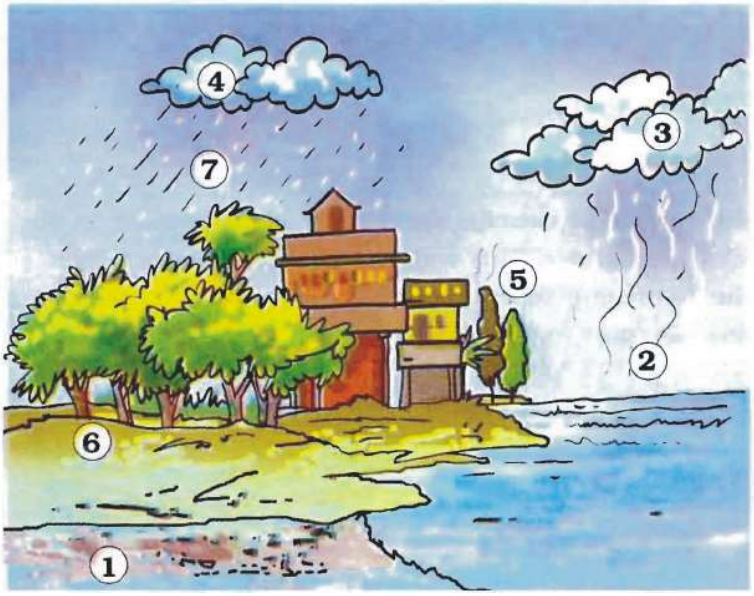
FORMS OF WATER

When water circulates through the water cycle it can be found in all the three forms i.e., solid, liquid and gas· at any given time somewhere on the earth. The solid form, snow and ice, is present as ice caps at he poles of the earth, snow covered mountains and glaciers. Liquid water is present in oceans, lakes, rivers and even underground. The gaseous form is the water vapour present in the air around us, The continuous cycling of water among its three forms keeps the total amount of water on the earth constant.

WATER CYCLE

The supply of water in nature does not run out. This is because water is continuously recycled in the water cycle.

1. Heat from the sun causes the water on the earth's surface to evaporate. The vapour rises, cools and condenses to form tiny water droplets. These droplets form clouds.
2. The clouds get carried along by air currents. They cool and the droplets join to form larger drops. These fall as mist.
3. If the temperature in the region is very low, these water droplets fall as hail, sleet or snow,
4. Some of the rain water flows along the ground as streams. Some soaks through the ground and then reappears as springs, Streams and springs join to form rivers. Rivers flow back into the sea. Thus the water cycle is complete.



Water Cycle

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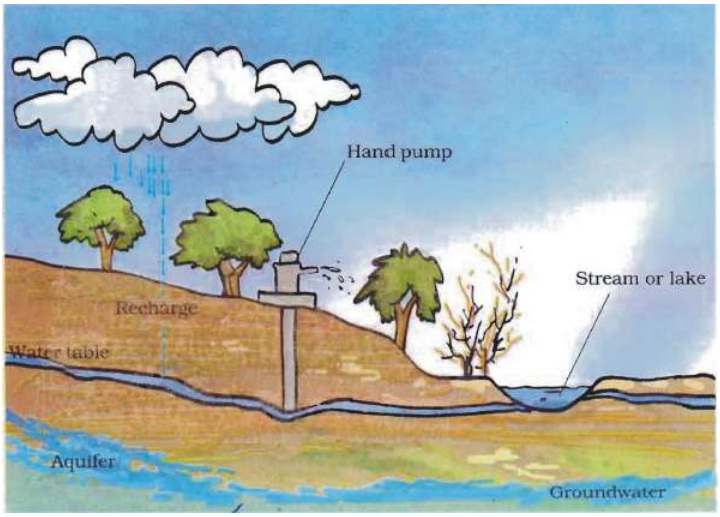
IMPORTANT SOURCE OF WATER

Ground water is an important source of water. If we dig a hole in the ground near a water body we may find that the soil is moist. The moisture in the soil indicates the presence of water underground. If we dig deeper and deeper, we would reach a level where all the space between particles of soil and 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. The water table may be at a depth of less than a metre or may be several metres below the ground. The water found below the water table is called groundwater. What is the source of this groundwater? The rainwater and water from other sources such as rivers and ponds seeps through the soil and fills the empty spaces and cracks deep below the ground. The process of seeping of water into the ground is called infiltration. The groundwater thus gets recharged by this process. At some places the groundwater is stored between layers of hard rocks below the water table. This is a known as a aquifer. Water in the aquifers can be usually pumped out with the help of tube wells or handpumps, We have at many places in India an age old practice of water storage and water recharge like the bawris. Bawris was the traditional way of collecting water.



Groundwater and water table

DEPLETION OF WATER TABLE

Increase in population, industrial and agricultural activities are some common factors affecting water table. Scanty rainfall is another factor that may deplete the water table.

(a) **Increasing population :** Increasing population creates demand for construction of houses, shops. offices, roads and pavements. This decreases the open areas like parks and playgrounds, This, in turn, decreases the seepage of rainwater into the ground. Moreover a huge amount of water is required for construction work. Often groundwater is used for this purpose. So. on one hand we are consuming more groundwater, and on the other we are allowing lesser water to seep into the ground.

(b) **Increasing Industries:** Water is used by all the industries. Almost everything that we use needs water somewhere in its production process. The number of industries is increasing continuously. Water used by most of the industries is drawn from the ground.

(c) **Agricultural Activities:** A majority of farmers in India depend upon rains for irrigating their crops. Irrigation systems such as canals are there only in a few places. Even these systems may suffer from lack of water due to erratic rainfall. Therefore, farmers have to use groundwater for irrigaiton. Population pressure on agriculture forces increasing use of groundwater day by day. This results in depletion of water table.

WATER MANAGEMENT

We have seen that most of the water that we get as rainfall just flows away. This is a waste of precious natural resource. The rainwater can be used to recharge the groundwater. This is referred to as water harvesting or rainwater harvesting. We have at many places in India an age old practice of water storage and water recharge like the bawris. Sawri was the traditional way of collecting water. With time the bawris fell into disuse and garbage started piling these reservoirs. However, because ofthe acute water shortage, people in these areas have had to rethink. The bawris are being revived. Today the situation is that inspite of scanty rains these places are managing their water needs well. A farmer using water in the field can also use water economically. May be you have heard of drip irrigation. Drip irrigation is a technique of watering plants by making use of narrow tubings which deliver water directly at the base of the plant.

EFFECT OF WATER SCARCITY ON PLANTS

Plants need water to get nutrients from the soil 10 prepare their food. Just Imagine the consequences if water is not available to plants. The green character of the planet shall be lost. This may mean the end of all life, for a world without plants shall mean no food, no oxygen. not enough rain, and innumerable other problems .

WASTEWATER

All materials that do not have immediate utili y and are usually disposed off are called waste. Wastewater is any water that has been adversely affected in quality by anthropogenic (produced by human beings) Influence. It comprises liquid waste discharged by domestic residences, commercial properties, industry andior agriculture.

CLEANING OF WASTEWATER

Cleaning of wastewater is a process of removing poflutants before it enters a water bGdy or is revised. This process is known as "sewage treatment". In a home or a public building generally one set of pipes brings clean water and another set of pipes takes away wastewater. There is an underground network of big and small pipes, called sewers, forming the sewerage. It is like a transport system that carries sewage from the point of being produced to the point of disposal. i.e. treatment plant. Manholes are located at every 50m to 60 m in the sewage, at the junction of two or more sewers and at points where there is a change in direction .

Waster water treatment plant (WWTP)

Treatment of wastewater involves physical, chemical, and biological processes, which remove physical, chemical and biological matter that contaminate the wastewater.

1. Waste water is passed through bar screens where large objects like rags, sticks, cans, plastic packets, napkins are removed.

2. Water then goes to a grit and sand removal tank. The speed of the incoming wastewater is decreased to allow sand, grit and pebbles to,settle down.

3. The water is then allowed to settle in a large tank which is sloped towards the middle. Solids like faeces settle at the bottom and are removed with a scraper. This is the sludge. A skimmer removes the floatable solids like oil and grease. Water so cleared is called clarified water.

   The sludge is transferred to a separate tank where it is decomposed by the anaerobic bacteria. The biogas produced in the process can be used as fuel or can be used to produce electricity.

4. Air is pumped into the clarified water to help aerobic bacteria to grow. Bacteria consume human waste, food waste, soaps and other unwanted matter still remaining in clarified water.

   After several hours, the suspended microbes settle at the bottom of the tank as activated sludge. The water is then removed from the top. The activated sludge is about 97% water. The water is removed by sand drying beds or machines. Dried sludge is used as manure, returning organiC matter and nutrients to the soil. The treated water has a very low level of organic material and suspended matter. It is discharged into a sea, a river or into the ground. Nature cleans it up further. Sometimes it may be necessary to disinfect water with chemicals like chlorine and ozone before releasing it into the distribution system .

BETTER HOUSE KEEPING PRACTICES

Waste generation is a natural part of human activity. But we can limit the type of waste and quantity of waste produced.

- Cooking oil and fats should not be thrown down the drain. They can harden and block the pipes. In an open drain the fats clog the soil pores reducing its effectiveness in filtering water. Throw oil and fats in the dustbin.
- Chemicals like paints, solvents, insecticides, motor oil, medicines may kill microbes that help purify water. So do not throw them down the drain. Used tealeaves, solid food remains, soft toys, cotton, sanitary towels, etc. should also be thrown in the dustbin. These wastes choke the drains. They do not allow free flow of oxygen. This hampers the degradation process.

IMPORTANT POINTS

1. The world water day is celebrated on 22 march every year.
2. The period 2005-2015 was proclaimed as the international decade for action on "water for life" by the general assembly of the united nations.
3. BOD (Biological Oxygen Demand) : It is a measure of the oxygen utilised by microorganisms during oxidation of organic materials.
4. COD (Chemical Oxygen Demand) : It is an index of the waste (organic and inorganic) of water which can be oxidised by strong oxidising agents.
5. Eutrophication: The excessive growth of algae and aquatic plants due to added nutrients is called eutrophication.