Ch-16-Water: A Precious Resource

Availability of Water

Water cycle

Groundwater as an Important Source of Water

Depletion of Water Table

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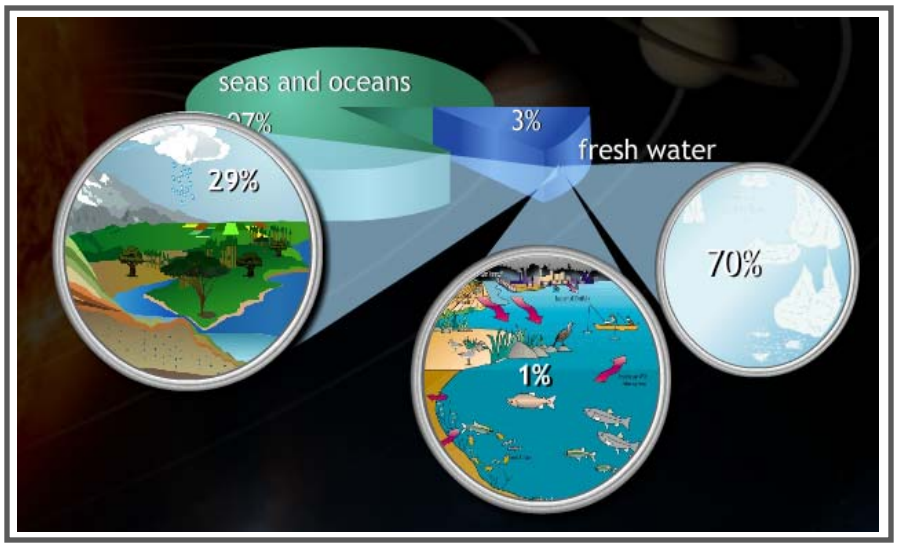
Availability of Water

Availability of Water on earth

Water is present in abundance on earth but the water which is usable is actually very little. Most of the water (about 97%) is in the seas and oceans as salt water.
But only a tiny fraction (about 3%) of the earth's abundant water is available to us as fresh water.



Distribution of water

70% of this fresh water is locked up in the ice caps or glaciers, 29% of it is buried so deep that costs too much to extract, remaining only 1% of fresh water is easily available to us as groundwater, rivers, lakes, stream, soil moisture, and water.

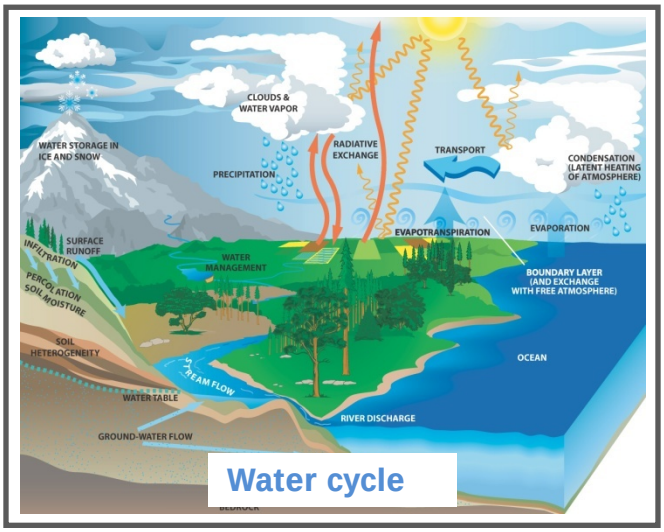
Water cycle

Water can be found in all the three forms, i.e., solid, liquid and gas on earth.

The **solid** form, snow and ice, is present as ice caps at the 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 present in the air around us.

Water cycle

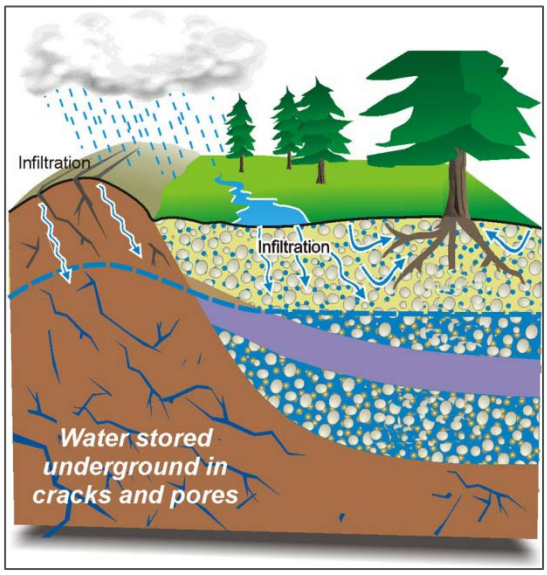
The water circulates through the water cycle and is found in all the three forms. The circulation of water between ocean and land is known as the water cycle. This cycle is made up of a few main parts:



- **Evaporation (and transpiration)**
- **Cloud formation**
- **Condensation**
- **Precipitation**
- **Water collection**

The Sun's heat provides energy to **evaporate** water from the Earth's surface (oceans, lakes, etc.). Plants also lose water to the air by **transpiration**. The water eventually **condenses**, forming tiny droplets in clouds. When the clouds meet cool air over land, **precipitation** (rain, sleet, or snow) is triggered, and water returns to the land (or sea). Some of the precipitation soaks into the ground. Some of the underground water is trapped between rock or clay layers; this is called **groundwater**. But most of the water flows downhill as runoff (above ground or underground), eventually returning to the seas as slightly salty water.

Groundwater as an Important Source of Water



Groundwater: It is the water stored beneath the ground surface in the soil pore spaces and in the fractures of the lithosphere.

When 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**. Water table level of the areas affected by scarcity of water is low due to which they face problem. This level is not same at all places.

The ground water gets recharged with rain water, lakes and ponds.

The water percolates through the soil and fills the crevices and cracks deep below the ground. The process of seeping of water into the ground is called **infiltration**.

The groundwater is stored between layers of hard rock below the water table. This is known as an **aquifer**.

Depletion of Water Table

- Increase in population
- Industrial and Agricultural activities
- Scanty Rainfall
- Deforestation
- Decrease in the effective area for seepage of water

Increasing population

With increasing population the demand for water also increases. Houses, schools, hospitals, sports complex, markets and many other essential amenities are constructed by clearing forests and agricultural land.

Increasing industries

All the products which we use day to day are manufactured in the industries. They also require water and this water is drawn from ground. Earlier farmers used to depend on rainfall for irrigating their crops but nowadays even the rainfall is uneven due to which the farmers use the ground water. Multipurpose projects are also been constructed to meet the water demands.

Water used for irrigation

Distribution of Water

The distribution of water over the globe is quite uneven due to a number of factors. Some places have good amount of rain and are water-rich. On the other hand, there are deserts which have scanty rainfall.

India is a country where there are places like Rajasthan having scanty rainfall and even places

like *Cherrapunji* blessed with good rainfall. The distribution of rainfall is uneven with some region having floods and some drought ridden.
Excessive rains cause floods, whereas the absence of rains results in droughts. Therefore, some regions in our country may have floods while others may suffer from droughts at the same time.

Scantly rainfall

Less of rainfall will leave lesser amount of water for seepage by the ground and ultimately decrease the level of the water table.

Deforestation

Due to deforestation, the balance of the nature is disturbed. This ultimately affects the water cycle. Urbanization has caused reduction in the rainfall. Forests influence the rainfall through a recycling of moisture back into the atmosphere through transpiration. Deforestation breaks this natural water cycle.

Decrease in the effective area for seepage of water

In cities the roads are concreted while in village it is just the opposite. There is no effective area left in cities for the rainwater to get absorbed. Result is water logging and flooding of drains. The concrete is unable to seep rainwater unlike the roads of village.

Water Management

The objectives of the water management efforts should include:-

Sustainability:- To ensure availability for future generations, the withdrawal of fresh water from an environment should not exceed its natural replacement rate.

Energy conservation:- Water pumping, delivery, and wastewater treatment facilities consume a significant amount of energy. In some regions of the world (for example, California) over 15% of total electricity consumption is devoted to water management.

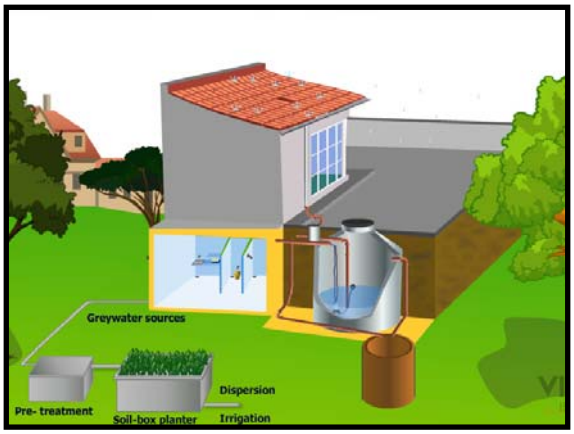
Habitat conservation:- Minimizing human water use helps to preserve fresh water habitats for local wildlife and migrating waterfowl, as well as reducing the need to build new dams and other water diversion infrastructure.

Methods of water conservation

The water can be conserved by minimizing the unwanted usage. The rainwater can be used to recharge the groundwater. This is referred to as water harvesting or rainwater harvesting.

This can be done by two ways

1. Rooftop rainwater harvesting
2. Direct collection of rainwater into drains which gets absorbed into the ground.



Rain water harvesting

In rooftop rain water harvesting the water from the rooftops is collected into tanks which after filtration becomes fit for use or goes into pits from which it seeps into the ground.

The water collected is then treated to remove the impurities and then made available for use.

Another method is to allow the rainwater to directly make it absorbed in the ground.

Many places in India store water in a traditional way like the *bawris*. It is an age old practice of recharging water.

Farmers have also become wise. They follow **drip irrigation** to water the fields. 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

Like us plants also require water for their survival. They derive water along with nutrients from the soil. If they do not get enough water they won't be able to synthesize food and gradually the oxygen level would decrease. This would ultimately affect all the living organisms.
If you don't water plants twice on a hot summer day, they wilt and ultimately dry up.

Activity

Take two sunflower plants and expose both the plants to sufficient light. Provide water to plant 'A' regularly, and no water to plant 'B'. Make observation after 5-6 days. Observation: Plant 'A' which was given water regularly remains healthy, while the plant 'B' does not show normal growth. Its leaves become yellowish and droop (wilt).