

Water

LEARNING OBJECTIVES

This lesson will help you to:

- ❖ Study about the flora and fauna in the water.
- ❖ Understand concepts such as floatation and solubility.
- ❖ Study and learn about basic concepts of liquids.
- ❖ Learn about diseases caused by breeding of insects in water.

Real-Life Examples

- ❖ When we throw a stone in the water in sinks.
- ❖ In rainy seasons, we are advised to clean our coolers more of town and avoid much watering of plants as small larvae of mosquitoes can be seen breeding in them.

Historical Preview

- ❖ 60 years ago malaria rife all over the world. It killed more people in Italy during World War II than bombs and bullets together.
- ❖ Humans have generally settled near convenient sources of water. Most of the great ancient civilizations depended on a particular source of water. For example, the Egyptians centered their civilization on the Nile.
- ❖ Understand changes in sources and availability of water over time.
- ❖ Study about different sources for irrigation.
- ❖ Learn about different quantities of water required for different crops.
- ❖ Learn about different methods of lifting water.

QUICK CONCEPT REVIEW

- ❖ In earlier times, water was not as easily available as it is available today. Our grandparents used to travel long distances to fill up the water from wells, lakes, ponds, rivers, etc.
- ❖ The major sources of water were rivers, lakes, ponds, wells, boils or step wells, etc.
- ❖ Sometimes, people travelled around 20 miles to get water that lasted them a day and then go back next day to get the water.
- ❖ There were no taps or motors then. And only one or two hand pumps or wells existed in the entire village. Some villages didn't even have a single source of water, and people there travelled to nearby villages to fetch water.

SOURCES OF IRRIGATION

The different sources of irrigation can be classified into:

1. Groundwater sources; extracted from springs or by using wells.
2. Surface water sources: withdrawn from rivers, lakes or reservoirs.
3. Non-conventional sources: like treated wastewater or drainage water.

Increasingly, agriculture is using untreated wastewater as a source of irrigation water. Because agriculture has to compete for increasingly scarce water resources with industry and municipal users, there is often no alternative for farmers but to use water polluted with urban waste, including sewage, directly to water their crops.

Water requirements of different crops differ

The amount of water taken by crops varies considerably.

Here is a list of a few crops with their water requirements in milliliter.

CROP	WATER REQUIREMENTS (in ml)
Rice	900 - 2500
Wheat	450 - 650
Maize	500 - 800
Tomato	600 - 800
Sugarcane	1500 - 2500
Cabbage	380 - 500
Cotton	700 - 1300
Banana	1200 - 2200

DIFFERENT METHODS OF LIFTING WATER

Water-lifting devices are used to lift water to a height that allows users easy access to water. Lifting devices can be used to raise groundwater, rainwater stored in an underground reservoir, and river water. Some of these techniques are:

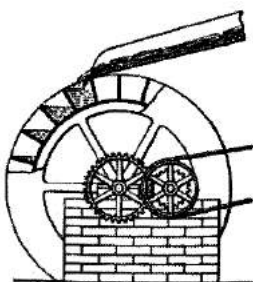
- ❖ Using rope and bucket
 - ❖ Using pumps
- There are several variations of these techniques that are available nowadays. These include using humans, animals or machines for lifting water.

Amazing Facts

- ❖ In 2010, 216 million clinical cases of malaria were recorded worldwide. 655,000 cases were fatal; 86 percent of those were children.
- ❖ The word malaria comes from the Latin words for "bad air"

- ❖ The blue whale, the largest animals to have ever existed is 96 feet long and weighs 135 tons. This is as much as 4 large dinosaurs, 23 elephants, 230 cow or 1800 men.
- ❖ Did you know fishes cannot live in the Dead Sea because the water has too much salt in it?
- ❖ The scenario nowadays is completely different. We don't have to travel distances to fetch water. Although even today, in very remote villages, people travel long distances for water.
- ❖ For long distance travelers, there were several 'piaao' arranged across the city. Few earthenware pots are filled with water and covered with clothes and kept so that the thirsty travelers can have cold water. Earthenware pots keep the water cool.

WATERWHEEL



- ❖ A waterwheel is a machine for converting the energy of free-flowing or falling water into useful forms of power, often in a watermill.
- ❖ The two main functions of waterwheels were historically water-lifting for irrigation purposes and as a power source.
- ❖ It can be made of wood or metal, and consists of blades, an outside rim, a tub and an axle.
- ❖ The invention of the waterwheel dates back to as far as 400 BC. The waterwheel was an important part of the way of life in Ancient China.

PLANTS AND ANIMALS IN WATER

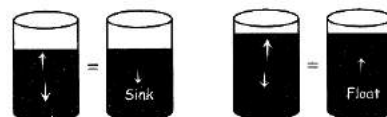


- ❖ Like land, there also exists a massive life inside the. Water. Flora and fauna are both found in the water. The life persisting in water is known as aquatic life. The animals living in water are called aquatic animals and the plants are called the aquatic plants.

- ❖ Aquatic plants are adapted to living in aquatic environment (saltwater or freshwater). They are (also referred to as hydrophytes).
- ❖ Some aquatic plants are used by humans as a food source.
Example: Wild rice, water caltrop, Indian lotus, water spinach, watercress, etc.
- ❖ One of the largest aquatic plants in the world is the Amazon water lily; one of the smallest ones is the minute duckweed.
- ❖ Animals that live on both land as well as water are called semi-aquatic or amphibious. For example, seals, sea lions, sea otters, ducks, pelicans, grebes, coots, loons, turtles, crocodiles, some lizards, garter and water snakes, sea snakes, land crabs, mudskippers and of course many amphibians are capable of living both on land and in the water.
- ❖ The aquatic animals are classified according to the water in which they live. Those animals that live in freshwater are called freshwater animals whereas the ones living in sea-water are called sea-water animals.

Floatation: The phenomenon of remaining on the surface of a liquid without sinking is called floatation.

Why do objects float?



When an object is placed in water, there are two primary forces acting on it. The force of gravity yields a downward and a buoyancy force yields an upward force. If the .Taxation force is less than the buoyancy force then the object floats (a boat), otherwise it sinks (a rock), That is; if an object weighs less than the amount of water it displaces then it floats otherwise it sinks.

Solubility: Solubility is the property of a solid, liquid or gaseous substance called solute to dissolve n a solid, liquid, or gaseous solvent to form a homogeneous solution of the solute in the solvent.

- ❖ The solubility of a substance depends on the properties of the used solute and solvent as well as on temperature and pressure.
- ❖ Not all things are soluble. There are several things that do not dissolve in water.
Example: Oil, petrol, kerosene, wax, etc. Liquids like alcohol, sugar, salt, juices ore soluble in water,

- ❖ When oil is added into water or vice-versa, two separate layers get formed.
- ❖ Water is a universal solvent. as

BASIC CONCEPTS ABOUT LIQUIDS

- ❖ The basic properties of any liquid are that it has a definite volume, it conforms to the shape of its container, it is not compressible and its elements and molecules are not in fixed positions.
- ❖ Liquids show expansion when they are heated and contract when they are cooled.

Misconcept/Concept

Misconcept: Water requirements of all the crops are more or less same.

Concept: Water requirements of different crops are rice require plenty of water whereas some others don't require much water.

Misconcept: When heated at high temperature, water and oil can be mixed together to form one solution.

Concept: Oil and water are two immiscible liquids and cannot be mixed even at high temperatures or by shaking, continuously. After some time of shaking, when the liquids start to settle, they form two separate layers of oil and water.

Misconcept: Heavy objects always sink and light objects always float.

Concept: Objects will sink or float depending on the relationship of the gravitational pull on the object and the upward force of the liquid it displaces. Density of an object in relation to the density of the liquid that it displaces it will sink or float.

- ❖ Unlike solids, two liquids can mix together and diffuse into each other to make a new type of liquid.
- ❖ A liquid will turn into a gas or a solid, depending upon the forces exerted on it. A liquid heated to a high temperature will vaporize and turn into a gas. A liquid cooled far enough, will solidify.
- ❖ Liquids exert a buoyant force on an immersed body equal to the weight of the liquid displaced by the body that makes it flow.
- ❖ Liquids are measured in terms of litres. The denomination of litre is milliliter (ml).
- ❖ Liquids are useful as solvents.

STAGNANT AND ELLOWING WATER

Water that is not in motion and is still at one place is called stagnant water. Stagnant water is the

breeding ground for various insects and mosquitoes. When these mosquitoes bite humans, it results in malaria fever.

Stagnant water is more prevalent in the rainy seasons.

MALARIA

- ❖ Malaria is caused by the bites of an infected mosquito.
- ❖ Malaria affects millions of people worldwide and kills large number of children.
- ❖ Malaria is preventable and curable.
- ❖ The various symptoms of malaria are chills, high fever, body aches, etc.
- ❖ Found mostly in warmer climates, malaria breeds where there is an abundance of humidity and rain.
- ❖ Malaria is not a contagious disease.