Water is one of the most essential natural resource for sustaining both plants and animals life. Water is needed for irrigation to fill the need of plants. We need water for drinking, cooking food, bathing, washing clothes and for industrial purposes, etc. Like air, clean drinking water is essential for the good health of all living things, especially human beings. But a large number of activities of man are polluting the water.

Water Pollution: is defined as the change in the normal properties of water by the presence of foreign material. Water has a property to dissolve a large number of substances. This property is a major causes of pollution It can also be defines as **Water pollution** may be defined as the addition of inorganic, organic or other harmful substances, which alter the quality of water so that it becomes harmful to man and other organisms.

Water Pollutants: The substances that contaminate or pollute water are called **water pollutants.** The presence of pollutants can be recognized by the following:

1. Bad taste of drinking water.
2. Offensive odour from lakes, rivers and ocean beaches.
3. Unchecked growth of aquatic weeds in water bodies.
4. Decrease in number of fish in fresh water, river water, sea water, etc.
5. Oil and grease floating on water surface.

A sudden build-up of water pollution:

When some industrial accidents take place, then there is a sudden build-up of pollution in the environment. This type of environmental pollution is more serious because it does not give sufficient time to the living organisms to escape from its effects or minimize its effects.

Causes of Water Pollution: The main source of water pollution are as follows:

1. **Domestic Waste:** Discharge of untreated domestic waste, sewage into rivers and lakes contains the chemicals present in soaps, detergents and other cleaning agents, decayed food particles. Sewage carries many kinds of disease causing germs. also contains many kinds of worms such as tape worms, hook worms etc.
2. **Industrial Waste:** The discharge of toxic industrial wastes contains toxic chemicals such as cyanide, cadmium mercury lead, arsenic chromium which are highly poisonous. They make river water unfit for the use of man and aquatic plants and animals.
3. The wastewater from hospitals could contain harmful chemicals and different types of disease-causing microorganisms.
4. **Agricultural Waste:** Fertilisers, pesticides and other chemicals are used for increasing agricultural productivity all over the world These are washed away by rainwater into water sources like river. Pesticides can poison fish as well as the animals (including human) that eat them.

To produce more food for growing human population some fungicides and insecticides are used to kill fungi and insects, etc., for example DDT. But the increasing use is dangerous because it is non-biodegradable. Along with rain water it goes into the water.

5. **Deforestation:** We are polluting water also by cutting trees and by removing vegetation. The rain water goes to small drains then to big drains, to streams and ultimately to rivers. When top soil is covered with trees and other vegetation much of the rain water is retained by the soil and the extra water which flows into

the water bodies does not contain much dirt and filth in it. But, when top soil is not covered with vegetation the rain washes away the top fertile soil which pollutes the various water bodies.

6. **Thermal Pollution:** Some factories and power generators are located near the lakes and rivers. Larger quantities of heated water is discharged in ponds, lakes and rivers. The hot water is also a kind of pollution. Many aquatic organisms cannot tolerate the rapid change in the temperature and therefore they may die. Only the organisms which can survive in warm temperature may live.

Effects of Pollution on Water bodies: The polluted water affects mankind as well as plants and animals.

1. Many diseases like cholera, dysentery, measles, typhoid etc. are caused due to consumption of polluted water.
2. The polluted water enhances the growth of algae and water hyacinth which reduces the supply of oxygen and sunlight to the aquatic fauna and flora resulting in adverse effect on their growth. This is called **Eutrophication.**
3. Industrial water contains compounds of mercury, cadmium, lead, arsenic, chromium etc. which are highly poisonous. They cause serious disorders of many kinds. They may cause death.
4. Flourides in water cause fluorosis which affect teeth and bones.

Soil Contamination: Soil becomes infertile due to the deposition of harmful chemicals discharged by industries. The high concentration of poisonous chemicals in soil can cause serious diseases in future generations.

Oil Spills from pipeline and tankers at sea are one of the most dangerous forms of pollution. The oil spreads very fast on the surface of water. It cuts off the supply of oxygen to the organisms living in sea and cause their death.

Soil Erosion caused by rains and floods takes all the sediment to the rivers and lakes. This results in the death of organisms living at the bottom of the lake or river thus upsetting the balance. The Dal lake in Srinagar, Nainital lake in Uttarakhand and Ulsoor lake in Bangalore are examples where silting is causing the choking of the lakes.

Control of Water Pollution:

1. Untreated sewage disposal pollutes water the most. The sewage should be treated to free it from harmful material before discharging into the water bodies. Sewage treatment plants are made for this purpose where sewage is stored in large tanks for some time. Air is passed through it. Harmful compounds are oxidized into harmless substances. After completing the process, tap water can be flushed into rivers and can be used for irrigation, the settled solid wastes form good manure. **Steps for the Treatment of Sewage**:

a) Sewage is churned by machines. The churned sewage is passed into a tank with a gentle slope. Heavier particles settle down and the water flowing down is relatively pure.

b) Treatment of water with alum also helps in its purification.

c) Water must be sterilized by chlorination, It kills the microbes.

2. Waste water generated from factories should be disposed off only after due treatment.
3. **Treatment of Industrial Waste:** The treatment of industrial waste depends upon the nature of the pollutants present. The chemical substances present in the

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industrial waste dissolved in water can be precipitated by suitable chemicals and removed from water.

Laws for industrial units should be strictly implemented and enforced so that polluted water is not disposed off directly into rivers and lakes, Water treatment plants should be installed in all industrial areas.

a) Industrial wastes should be recycled,
b) Proper toilet facilities should be provided to rural people.
c) Organic fertilisers and pesticides should be used.
d) Water treatment plants should be installed in every city to facilitate extraction and elimination of pollutants from water.
e) Bathing, washing of clothes and utensils should be restricted near water bodies.

General Measures to Check Pollution

1. Do not cut trees, rather plant trees.
2. Do not destroy flora (Plants) and fauna (animals), to maintain the proper ecological balance.
3. Use bio-degradable substances, as far as possible.
4. Solid waste materials should not be thrown in water or in your surroundings.
5. Waste materials should be recycled. Recycled paper is a step in this direction.
6. Use of solar cookers and biogas should be encouraged. This would reduce the pressure on the burning of fossil fuels like coal.
7. Strict check on the emissions from automobile exhausts should be enforced.
8. Industries should be made to strictly adhere to the anti-pollution steps, laid down by the government.
9. Chimneys of the industries should be very tall, so that their emissions are given out high up atmosphere.
10. Industries should not be located in residential areas.

Pure Water: Water is a compound. Its chemical formula is H_20. Pure water, therefore, has nothing but H_20 molecules. Most water that you come across in normal use is not pure. It has salts dissolved in it and is, therefore, a mixture. Completely pure water is useful only in laboratories and for certain industrial applications, for example, in the semiconductor industry. For daily use, however, when we refer to pure water, we mean water that is free from objectionable and harmful constituents.

Potable Water: Water that can be consumed in any desired amount without concern for adverse health effects is termed as potable water. Potable water is clear, colourless, pleasant to taste and is free from disease, germs and impurities. It contains dissolved gases like oxygen and carbon dioxide. Water obtained from natural sources may contain impurities such as pollutants, dirt, germs. These impurities have to be removed from water to make it potable.

The following parameters must be followed before water is supplied for drinking purposes:

1. It must be colourless and free from any odour or smell.
2. It must be free from suspended impurities.
3. It should be tasteless.
4. It must be free from microorganisms which lead to many diseases.
5. It must be free from harmful chemicals.

Different Methods are used to make water safe for drinking.

1. **By Boiling:** Water can be boiled for few minutes, to kill the germs present in it.
2. **By Filtration:** Water can be passed through candle filters made of porcelain. Most of the bacteria are trapped in this way.
3. **By exposing water to UV Rays:** An ultraviolet (UV) filter is fitted directly to the tap. Water from the tap passes through this filter. Ultraviolet light act on the water and kills the germs.
4. **By Treating with Chemicals:** Potassium permanganate are put into the water. Potassium permanganate is a germicide. It kills the germs.
5. If large amount of fluoride salt is present in water it is treated by lime. Excess fluoride in water causes defects in bones.

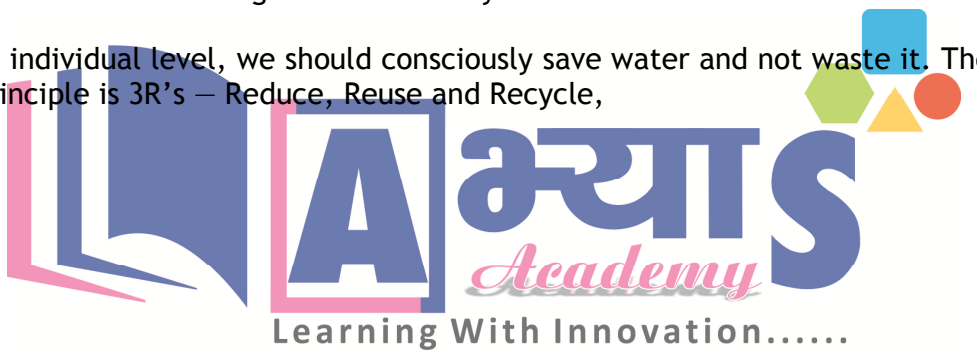
Municipal authorities remove all harmful constituents and make water safe for use before supplying to towns and cities. **Chlorination** is done by adding chlorine tablets or bleaching powder to the water. It kills disease germs.

Conservation Of Water

Think of your daily routine – how can you save water?

1. Avoid using shower. Instead use a bucket and mug for taking bath.
2. While brushing your teeth, do not leave the tap open.
3. Never pour water down the drain when there may be another use for it, such as watering a plant or cleaning.
4. When washing dishes by hand, do not leave the water running for rinsing.
5. Do not use drinking water to clean your car.

At individual level, we should consciously save water and not waste it. The guiding principle is 3R's – Reduce, Reuse and Recycle,



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