

WASTE WATER STORY

Key Points

The dirty water which is produced in kitchens, bathrooms, while washing cars or your bicycles and industrial wastes is called wastewater. Wastewater is used water.

Clean water

- ▶ Clean water is a basic need of all of us. It is needed for several purposes - for drinking, cooking food, bathing, washing clothes, growing crops and even for industries. Unfortunately, clean water is not available for use.
- ▶ As a result, people suffer from a number of water-related diseases like typhoid, cholera and dysentery. Even deaths may take place. Now only that clean water is available in short supply, there is an acute shortage of water as such.

Sewage

- ▶ Sewage is the waste water from homes domestic liquid waste as well as from industries, offices, hospitals and other places. All the wastewater that is released from various source forms the sewage which contains suspended impurities. These impurities are called contaminants.
- ▶ Sewage, thus, is a complex mixture containing suspended solids, organic and inorganic impurities, nutrients, and disease - causing organism.



The contaminant can be classified as follows:

Organic impurities	Human faeces, animal waste, urine, oil, pesticides, fruit and vegetable wastes, etc.
Inorganic impurities	Nitrates, phosphates, metals.
Nutrients	Phosphorus and nitrogen
Bacteria	Those which cause cholera and typhoid.
Other microbes	Those which cause dysentery

Sources of Waste-water

Agriculture: Waste water generated from farms contains harmful pesticides and biocides, animal waste etc.



Agriculture Waste



Agriculture Waste

Construction of buildings: Large amount of waste water is generated from construction of buildings.



Agriculture Waste

Industries: Waste water generated from paint and dye industries contains harmful chemicals such as lead, chromium etc. Such discharge is also called industrial effluents.



Agriculture Waste

Domestic activities: The wastewater generated from our houses contains detergents, food wastes, human faeces, plastics, paper, metals objects etc.



Mining: Waste water is also generated as a result of mining operations.

Hospitals, hotels, offices: Waste water from hospitals contains disease-causing germs.

Where does domestic water go?

Each time we wash something or flush our toilets, water containing paper, cloth, scrap, detergent, oil, grease, food scrap, faeces, etc., goes down the drain. This water gets accumulated and forms sewage. In large cities, this is also known as municipal wastewater.

The Sewer System

The sewer system, a channel of pipelines, carries out sewage from our houses. The

sewage leaves our houses through drain pipes and flows to the sewer mains of the city.

Waste flows easily through sewers due to a slight slope given to the drainage system.

Most sewer pipes are underground. So, to find any leak or blockage in any of these pipes we have manholes.

A manhole is a hole, usually with a cover, through which a person may enter a sewer or drain to fix the faulty pipes.

After this sewage flows through sewer mains, then larger pipes until they reach the waste water treatment plant.

In big cities or towns, however, the waste sewage water is first treated in waste water treatment plants. Then, it is released in nearby rivers or lakes. People living downstream often drink and use this water.



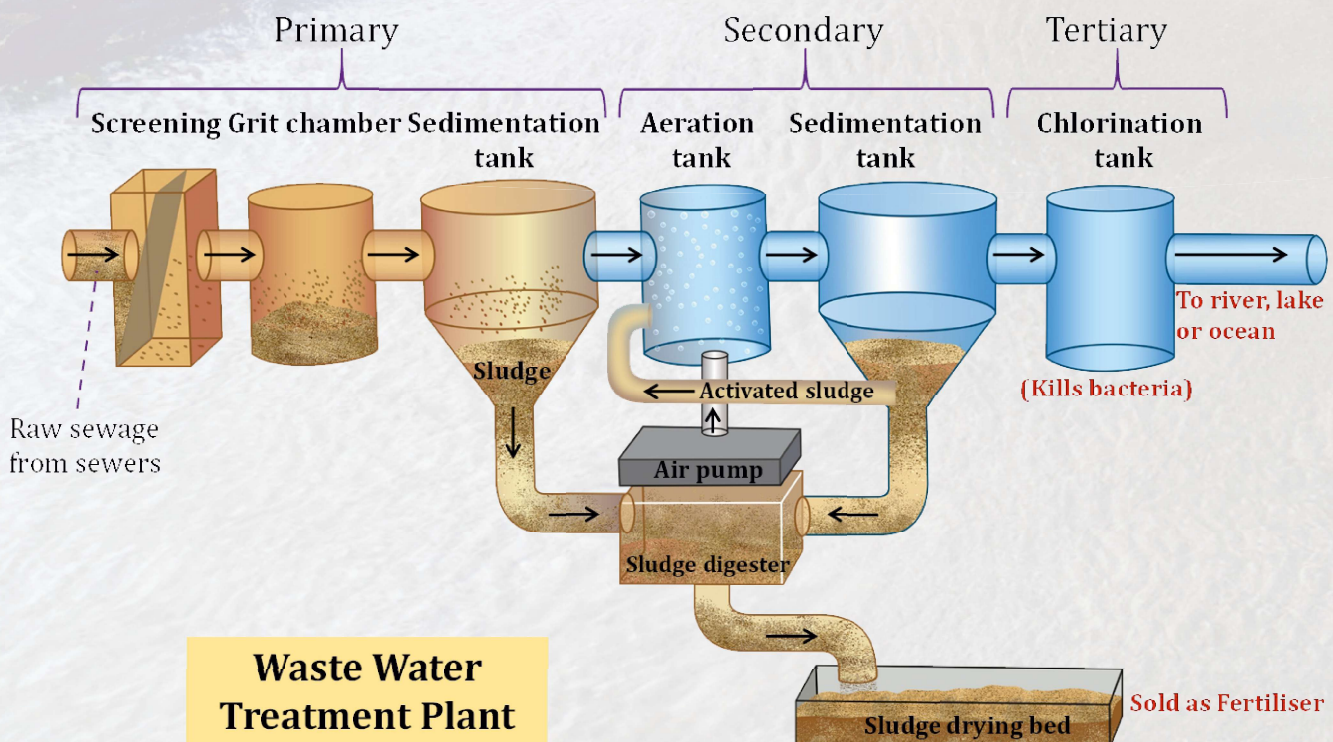
The sewer system

Important Terminology

- ▶ **Sewage:** Wastewater containing suspended impurities is called sewage.
- ▶ **Effluent:** Discharge of liquid waste from an industry is called effluents.
- ▶ **Sludge:** Solids wastes that settles at the bottom in the primary treatment of wastewater is called the sludge.
- ▶ **Scum:** Light floatable waste that rises to the top during wastewater treatment is called the scum.
- ▶ **Incineration:** A process used for treating sludge, in which the sludge is burnt into ashes is called incineration.



Wastewater treatment plant



- ▶ A wastewater treatment plant is a facility that treats wastewater from industrial source. There are basically three processes involved in treating wastewater: primary, secondary, and tertiary.

Primary process:

- ▶ This is a mechanical process which involves screening and settling of large particles.
- ▶ First the sewage is passed through screens of vertical bars to remove larger impurities such as a metal cans, plastic bags, cloth pieces, etc.
- ▶ The wastewater is then passed through a grit and sand removal tank called the grit chamber.
- ▶ The speed of the incoming wastewater is reduced so that sand, grit, pebbles, etc. settle down.



- ▶ The water is then passed through huge sedimentation tanks. Here solid waste such as faeces is allowed to settle down and the light floatable waste such as soaps, oils, plastics, and greases rise.
- ▶ The material that settles at the bottom is referred to as sludge and the material that rises to the top as scum. The water that comes out of the sedimentation tanks is called clarified water.



Vertical



Grit Chamber



Sedimentation Tank

Secondary process:

- ▶ This is a biological process in which the organic matter in the sludge is broken down with the help of bacteria. This process is called digestion.
- ▶ In this process biogas is produced. This biogas can be used either as a fuel or to produce electricity.
- ▶ The treatment at this stage can be speeded up by allowing water to flow into large aeration tanks, where air is blown onto the sewage.

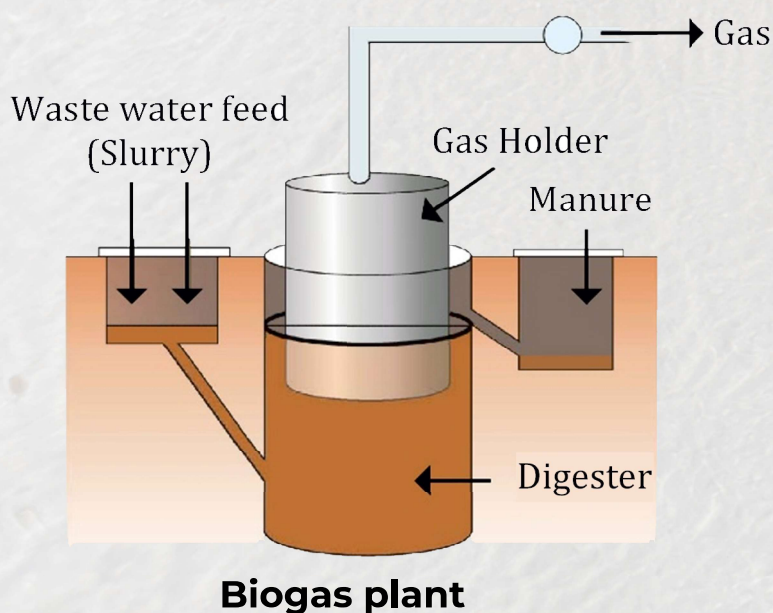
Tertiary process:

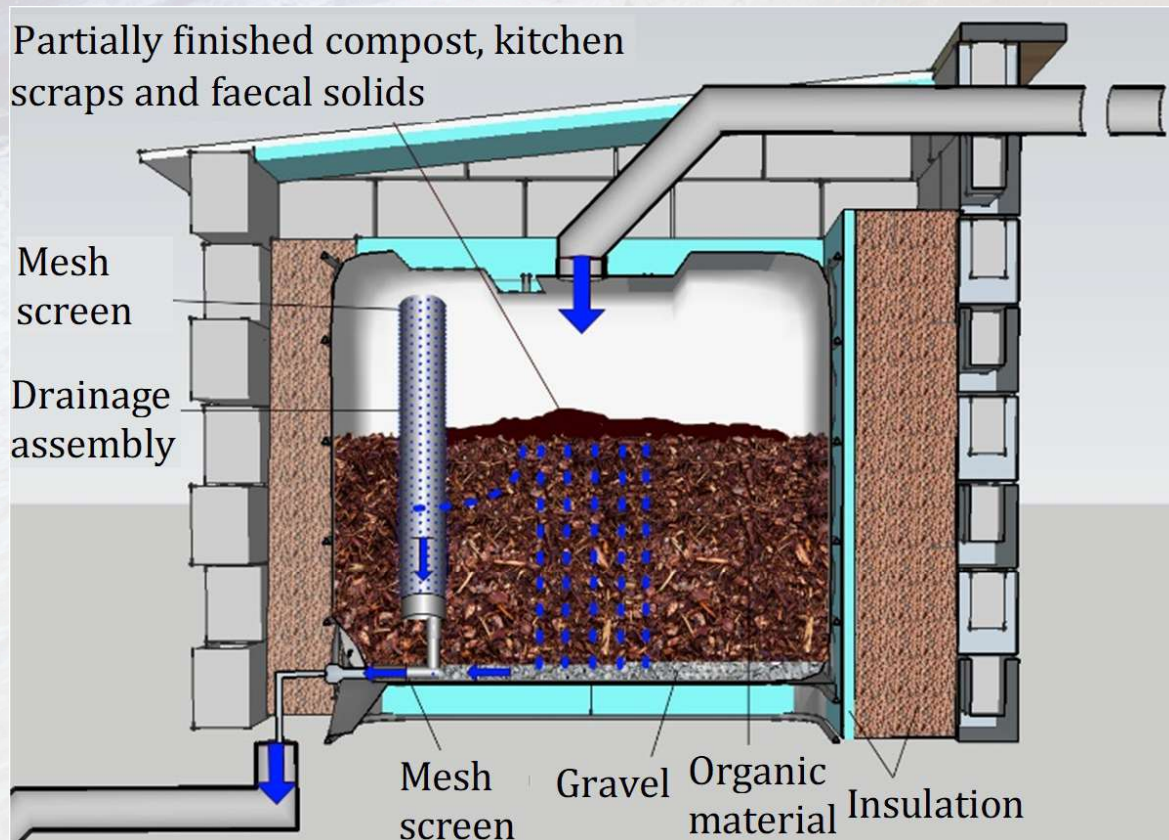
- ▶ This is basically a chemical process in which chemicals are used to remove phosphorus and nitrogen from the water.
- ▶ Addition of chlorine and exposure to ultraviolet light, KMnO_4 , O_3 can kill any remaining bacteria and disinfects the water. The water is then discharged into water bodies.



Alternatives to Sewerage system

- ▶ These systems include septic tanks and chemical toilets. A septic tank consists of a concrete or metal tank with an outlet submerged in the ground.
- ▶ Domestic sewage enters the tank through another inlet pipe. The solids settle down in the tank and the liquid flows through the outlet pipe into the soil.
- ▶ Biogas plant: Another method of waste disposal which is prevalent especially in village and small towns in India is setting up of biogas plants. In this method, human and animal excreta flow through covered drains into biogas plants. Microorganisms break down the materials present in the waste and produce biogas. This biogas is then used to produce electricity.
- ▶ Vermicomposting toilets: Recently vermi-composting toilets have been developed in India as an alternative method for proper disposal of waste. It is based on an innovative design in which earthworms are used to convert human excreta into compost. There is minimum use of water and is a safe and hygienic way of processing human waste.





Vermi-composting toilets

- ▶ What should be done to maintain sanitation and avoid water pollution
- ▶ Wastes should be disposed off properly and not thrown away anywhere.
- ▶ Proper toilet facilities should be provided to rural people.
- ▶ Chemical wastes from the factories should be properly treated before being released into water.
- ▶ Sewage from cities should not be discharged directly into rivers. It must be treated and made harmless before release.
- ▶ Ensure that there are no leaking sewage pipes.



- ▶ Ensure that there are no stagnant water in ponds and lakes.
- ▶ We should plant eucalyptus trees all along sewage ponds because these trees absorb all surplus wastewater rapidly and release pure water vapour into the atmosphere.
- ▶ Gradually, water vapour is converted into its liquid form.
- ▶ Chemicals like paints, insecticides and medicines should not be thrown in the drains.
- ▶ These things may kill microbes that help to purify water.

Used food remains, tea leaves, cotton sanitary towels should not be thrown in the drains. These waste choke the drains and do not allow free flow of oxygen. This slows down the degradation process. Such wastes should be thrown in the dustbin.

- ▶ Cooking oil and fats should not be thrown down the drain. These items on hardening block the pipes. Oil and fats should be thrown in the dustbin.
- ▶ Reduce the quantity of waste production.

Relationship between sanitation and disease

Sanitation is the equipment and system that keeps places clean, especially by removing human waste whereas disease occurs due to poor sanitation and contaminated drinking water. A vast number of people are still without sewerage system.