

7th - Wastewater Management - II



Wastewater treatment plant: A facility that treats wastewater from domestic as well as industrial sources is called a wastewater treatment plant. There are basically three stages involved in treating wastewater. Primary, Secondary, and Tertiary.

1. **Primary treatment:** This is a mechanical process which involves screening and setting of large particles. First, the sewage is passed through screens of vertical bars to remove larger impurities such as 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 wastes such as faeces is allowed to settle down and the light floatable waste such as soaps, oils, plastics, and grease rise. Solid waste that settles at the bottom in the primary treatment of wastewater is called the sludge. Light waste that rises to the top and floats, during wastewater treatment is called the scum. The water that comes out of the sedimentation is called clarified water.

2. **Secondary treatment:** 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 and as result of it, biogas is produced. The 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.

What happens to the sludge? Sludge consists of human faeces and other organic matter. It also has large amounts of water and needs to be thickened so that it can be transported easily and used as compost in farmlands.

3. **Tertiary Treatment:** The tertiary treatment involves chemical processes. The water after secondary treatment contains very less organic materials and suspended matter. It is discharged into the water bodies like rivers and sea or into the ground. The natural cleaning process takes place in water bodies. Sometimes, it is disinfected with chemicals like chlorine, ozone gas or ultraviolet rays to kill the disease-causing organisms. After disinfection, treated water is discharged into the distribution system.

Controlling sewage generation: A few measures that can be adopted to control the generation of sewage are given below.

- Use flushes with low capacity.
- Never pour household products such as cleansers, beauty products, medicine, automobile oil, and paint down the drain. These contain chemicals which the wastewater treatment plants may not be able to remove. These should be properly disposed.
- Excess cooking oil, butter, meat fats, and plastic should be disposed off in the garbage can. These materials can clog pipes, and could cause sewage to overflow in your home or in public areas.
- Fix leakages in sewer pipes. These leaks can contaminate drinking water, and seep into the water table. It can also stagnate in certain areas on the ground and become the breeding place of disease causing insects like flies, cockroaches, and mosquitoes.

Improper management of sewage

1. Domestic wastes enter sewers and are taken to rivers, often untreated.
2. Discharge, often untreated from factories enters rivers.
3. Untreated sewage waste enters rivers.

Role as active citizens: we can play an active role in waste water management and maintaining a clean and healthy surrounding in the following ways:

1. Reduce the quantity of waste water being produced in our homes.
2. Use low capacity flushes in toilets to reduce water tank is flushed down toilets.

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3. Do not throw solids like, leaves, cotton, polythene bags etc. in the drains. These choke the drains.
4. Do not throw cooking oil in the drain. It hardens and blocks the pipes of sewerage system.
5. Do not throw chemicals like paints, medicines, engine oil etc. in the drain. These chemicals kill the microorganisms present in the sewage which help to purify water.
6. If you have a septic tank, make sure it works well. Malfunctioning septic tanks can pollute groundwater.

Alternate Arrangement for Sewage Disposal: Low cost outside sewage disposal system has been developed to take care of places where there is no sewage system, e.g. rural areas, isolated buildings. These are described below:

1. **Septic tanks:** Septic tank is a low cost onsite sewage disposal system. Septic tanks are suitable where there is no sewerage made. These tanks need cleaning every four to six months. A septic tank usually consists of a big, covered underground tank made of concrete having an inlet pipe at one end and an outlet pipe at the other end. The toilet seat is connected to the inlet pipe of the septic tank. The human excreta from the toilet seat enter into the septic tank through the inlet pipe. The solid part of excreta keeps on collecting at the bottom of the septic tank in the form of sludge whereas watery waste remains above it. The anaerobic bacteria breakdown most of the solid organic matter present in human excreta due to which the volume of solid waste is reduced too much. The digested solid waste keeps on depositing at the bottom of septic tank. The watery waste is also cleaned by anaerobic bacteria. The excess water goes out of the septic tank through the outlet pipe and get absorbed in soil.

2. **Composting pits:** These are self sustained human waste disposal units which are not connected to a sewer line or a septic tank. A composting toilet breaks down and dehydrates human waste to compost. Recently vermin-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 minimal use of water, and it is a safe and hygienic way of processing human waste.

3. **Chemical toilets:** These toilets have limited storage capacity for human waste and need to be emptied periodically. These are the toilets which use chemically treated reservoir located just below the toilet seats. The chemicals reduce the foul smell coming out of human excreta and carry out partial disinfection of human waste.

4. **Biogas plants:** 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.

Sanitation at Public Places: Fairs, weekly markets, community festivals, etc., are regular features of our country. A large number of people participate in these. Crowded places like bus stations, railway stations, airports and hospitals always face the problem of poor sanitation. People generally throw litter everywhere. This becomes a breeding ground for flies, mosquitoes and other insects. Sometimes, we can see open drains in public places. This is an unpleasant sight. Rainy season worsens this problem. Often there are mud pools on the road and sewers overflow due to lack of maintenance.

As a responsible citizen of the country, you can follow some practices and contribute to the sanitation of public places. Always remember that waste generation is a natural human activity. But, we should not forget that waste management is also our responsibility.

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1. Do not throw litter anywhere. Look for the dustbin or carry the litter home and throw it in the dustbin.
2. If there is a leakage in sewer pipes at public places, immediately inform the municipality or Gram Panchayat of that area.
3. Ask the local authorities to cover the open drains.
4. Discourage people to urinate in open places.
5. Motivate others to maintain sanitation in public places.
6. Write to the local newspaper about the condition of sanitation in your area.

Ganga Action Plan (GAP): River Ganga runs its course of over 2500 kms from Gangotri in the Himalayas to Ganga Sagar in the Bay of Bengal through many cities. During the course, it becomes polluted due to sewage disposal and other human activities. The Ganga Action Plan was launched by **Mr. Rajiv Gandhi**, the then Prime Minister of India on 14th January 1986. The main aim of GAP is the diversion and treatment of sewage, prior to its disposal into the Ganga. The plan also includes active participation and awareness in public about the cleaning of the Ganga.

Effects of Poor Sanitation: Poor sanitation is the root cause of many diseases. In our country, many people still do not have sewerage facilities. These people are forced to defecate in open places, near railway tracks, agricultural fields or on the river banks. Villagers defecate in the open, on dry river beds, fields and even directly in water bodies. This untreated human excreta is the source of water and soil pollution. The polluted water seeps through the ground and contaminates underground sources of water like wells and springs. When this contaminated water is used for drinking and other purposes, it causes many diseases like cholera, typhoid, polio, meningitis, hepatitis and dysentery. These are called **waterborne diseases**.

