Bassett Adult School
Career Training Center

Water Technology

Wastewater Treatment

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Contents

1. Why Treat Wastewater?

1.1 Definition of Wastewater

Wastewater is human-polluted water from home and industries. This includes water from:

- Flushing toilets and urinals - blackwater.
- Bathing, showering, and washing clothes and dishes - greywater.
- Commercial and industrial activities.
- ...and often included is stormwater which contain pollutants washed off from inhabited areas - roads, parking lots, and rooftops.

1.2 Why Treat Wastewater

Although nature has an inherent capability to breakdown pollutants, given the large quantity generated from human activities, there is a need for centralized wastewater treatment plants to treat wastewater before releasing it back to the environment. Wastewater from homes, businesses, and industries are collected in sewers for delivery to the treatment plant and subsequently discharged to a water body like a lake, river or ocean, or land, or reused.

Wastewater treatment is designed to remove:

- organic matter
- inorganic pollutants including plant nutrients - nitrogen and phosphorous
- pathogenic (disease causing) organisms

1.3 Benefits of Treating Wastewater

Wastewater treatment protects:

- The environment

- Human health

Specifically, wastewater treatment allows for the following:

1. **Mitigates deterioration of the receiving waters' ecosystem**

   The discharge of inadequately treated wastewater will cause oxygen levels in the receiving waters to be depleted, due to:

   - Wastewater containing nitrogen and phosphorus based pollutants (plant nutrients) entering a water body such as a lake or river will promote plant and algae growth which will seriously impact its normal aquatic life including fish through a process similar to the following:
     - Nutrient promote algae bloom
     - Algae bloom prevent sunlight to the native plant spieces below the water's surface causing native plants to die
     - The organic material from the dead plants and algae promote growth of aerobic bacteria which will consume the dissolved oxygen in the water resulting in oxygen depletion.
     - The natural aquatic life including fish, frogs, and turtles will not be able to survive under oxygen depleted conditions and will die or leave that zone.
   - Other organic material present in wastewater will similarly promote growth of aerobic bacteria, intensifying the eutrophication of the receiving waters.

   Thus, proper treatment of wastewater will prevent eutrophication - which is the depletion of dissolved oxygen of the receiving water, consequently impacting/destroying its normal aquatic life.

2. **Removal of other harmful pollutants**

   Organic and inorganic pollutants, including metals such as mercury, lead, cadmium, chromium and arsenic can have acute and chronic toxic effects on aquatic species and wildlife including migratory birds, are removed during the wastewater treatment process.

3. **Removal of pathogens**

   Wastewater treatment removes parasites and disease-causing pathogens including bacteria and viruses for:

   - People to continue enjoying recreational activities in the receiving bodies of waters such as lakes and rivers
   - Preventing the contamination of fish and other consumable products obtained from the waters
   - Allow the water body to remain as the source of potable water

4. **Reclaim water for recycle or reuse**

   Besides protecting human health and the environment, wastewater treatment paves way for establishing the reuse or recycle of treated wastewater. This benefit is particularly important for densely populated areas with limited access to fresh water supplies.