

Microorganisms are found in all natural waterways. They will multiply if there is enough food available. In a polluted stream microorganisms multiply very fast to consume all of the organic matter that is available to them. Unfortunately, the microorganisms also need oxygen. The oxygen in the stream is rapidly depleted because the organisms use oxygen while consuming their food.

Dissolved oxygen is essential to the microorganisms, fish and plants in a healthy stream. When there is no oxygen in the stream, the fish, aquatic plants and microorganisms die and fall to the bottom of the stream and decay. This degradation process causes the bottom of the stream to become black and mucky. It produces odorous gases and makes the stream unacceptable for most uses. For this reason the balance of oxygen in the waterway is very important and is regulated for those who discharge water into a stream.

B. Levels of Wastewater Treatment

1. In today's modern treatment plants wastewater first receives primary treatment. During primary treatment solids found in raw wastewater are settled to the bottom of the tank. Solids removed from the bottom of the tank are called primary sludge. In this process 45-50% percent of the pollutants were removed.
2. Secondary treatment was required by the 1972 Clean Water Act which was passed when many waterways in the United States were found to be too polluted for fishing and swimming.

While the **primary treatment** is mostly a physical approach, using devices to remove various-sized waste particles, the secondary treatment uses **biological methods**.

In this stage, bacteria are intentionally used to consume or eat most of the remaining waste materials. This bacteria growth is aided by **aerating** the water - adding oxygen or air to the water. The oxygen stimulates the bacterial growth.

This is done several ways:

Activated Sludge mixes wastewater and microorganisms. During constant aeration microorganisms can absorb oxygen and begin eating the pollutants. After a few hours, the wastewater flows to a sedimentation tank, where solids settle to the bottom. Some solids are recycled and sent back to the aeration tank. The rest of the wastewater travels on to be further treated or disinfected.

Trickling Filters distribute the wastewater over a bed of rock-like material, aerating it and creating a biological growth layer of bacteria, protozoa, and fungi to eat the pollutants. In this way, organic material is removed.

