



**ECO-FRIENDLY AND NON ENERGY INTENSIVE  
TECHNOLOGIES**

## ***Eco-Friendly and Non-Energy Intensive Technologies***

Different treatment techniques can be depending on the land availability, quantity and characteristics of the wastewater. Treatment plants normally used for building sewage are based on biological processes. Today there is growing interest in artificial wetlands or reed bed systems for wastewater treatment; these methods are based on the use of deep-rooted plants.

### ***1. Anaerobic treatment systems***

These systems are based on the degradation of pollutants in the wastewater by microorganisms but reactions occur in the absence of oxygen. Conventional digesters such as anaerobic CSTR (Continuous Stirred Tank Reactors) have been used in India for many decades in sewage treatment plants for stabilizing activated sludge and sewage solids. In recent times, the emphasis has shifted to high rate biomethanation systems based on the concept of sludge immobilization techniques (UASb, fixed films, fluidized anaerobic reactor, soil bio reactor etc.). In the case of up-flow anaerobic sludge blanket (USAB) reactors, the treatment efficiencies are high even for a very short retention time. This is being used for treatment of domestic wastewater for small towns. An advantage with this type of reactor is the generation of useful by products – high calorific value fuel biogas and digested sludge that can be used as manure.

### ***2. Root Zone treatment system***

The system is suitable for the treatment of wastewater from various sources containing biodegradable compounds. The system is most suited to decentralized wastewater treatment in small colonies, hotels, etc. It is based on the principle of attached growth biological reactors similar to conventional trickling filters with combination of aerobic and anaerobic zones. The contaminants present in the wastewater are treated as they seep through the root-zone of the plants by a combination of plants, soil bacteria and hydraulic flow systems resulting in physical, chemical, and microbiological processes. Oxygen present in the zone facilitates the degradation of wastewater. A wide variety of microorganisms present in the root-zone of the plants results in efficient removal. There is efficient reduction of pathogens also by percolation through the bed material.

### ***3. Decentralized wastewater treatment system***

DEWATS system is based on a modular design. Modules of DEWAT can be designed as per the site requirement. Since 1960, BORDA (Bremen Overseas Research and Development Association) has been initiating decentralized waste water system (DEWATS) in India and China. The system has successful examples in Auroville, India and The Arvind Eye Hospital, Pondicherry.

The DEWATS system has three components:

Anaerobic Baffled Reactor

Planted Gravel Filter

Polishing Pound

In certain sites, the anaerobic baffled reactor is replaced by sedimentation or Imhoff tank. The treated water is collected in an open underground water tank from where it is emptied daily for irrigation purposes.