

# Waste Water Management

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Waste water is generated as a result of any human activity that involves the use of water for any purpose.. So waste water originated almost everywhere where fresh water is used. These activities are domestic, agricultural and industrial/commercial

**Domestic.** Waste Water that comes out of domestic side comprises two distinct categories; one that is used for bathing, washing is contaminated with food residues, oils, grease etc and is called grey water; whereas the water used for flushing toilets is contaminated with urine and faeces is called black water or 'sewage'. Black water is more difficult to treat than grey water. For the sake of convenience and because water was till recently available in sufficient quantities, both these types of waste were combined at the drainage outlet. 'Sewage' in that sense is used as a broader term that also includes domestic, municipal or industrial liquid waste disposed off via a pipe.

**Industry.** In industry or in commercial establishments, water is predominantly used for heating and cooling along with many manufacturing processes that result in very severe and heavy contamination of the water used for the process, and in some cases produce very large volumes of waste water. Paper mills, steel mills, tanneries, pharmaceutical units, distilleries, breweries, fertilizer manufacture, oil refining, synthetic fibres are just some of the many industries that produce highly contaminated and large volumes of waste water.

**Agriculture.** Modern agriculture, particularly those practices established by our "green revolution" resulted in contamination of water by fertilizer and pesticide residues due to "run offs" caused by large irrigation schemes.

Ideally this water should be treated before it is disposed off to the environment but in large cities and towns underground drainage or sewers convey this waste to treatment facilities where available. More often than not, the waste water is pumped or drains into a river or a lake. In coastal areas it is invariably drained or pumped into the sea. The logic was at that time, the receiving body was large enough to dilute the waste. Unfortunately, this situation changed long ago, and the concerned authorities just continued to ignore the problem.

Triple R strategy that is Reduce, Reuse and Recycle can be the most effective way to manage waste water.

**Reduce, Reuse and Recycle**

As any treatment of waste water comes out to be an expensive exercise; the best way to tackle waste water is perhaps minimising the consumption of water at every stage or using water efficiently. That implies there can be innovations for using water efficiently for every domestic, industrial or commercial activity that uses lesser water than we ordinarily use. Reducing water use can come from awareness and also from economic incentives for products that incorporate these efficient mechanisms such as washing machines that use lesser water, or half cycle toilets etc.

Reusing water at household and building level is also possible which can be quite effective in waste water management. Treating grey water and storing it in a separate set of tanks to be used for flushing toilets can reduce the water demand of a residential unit by 50%. Finally to reduce the fresh water demand, recycling of treated water can be very important.

There are many processes that are in place for treating industrial or municipal waste water which are biological, chemical or mechanical. In Biological process, microbes consume or degrade the waste and use oxygen to survive and multiply. It is because of this that the terms BOD and COD are relevant. Any waste water which contains organics has an oxygen demand, and, as long as this demand is continuously met, the organic matter is degraded till it is no longer present. Sewage treatment includes homogenization, primary, secondary and tertiary treatment. Homogenization evens out the flow rate and primary treatment removes physical and solid matter using grit screens followed by aeration to degrade the contamination by microbes. Secondary treatment involves clarification dead microbes settle down as sludge and clear water comes out with 10 to 15% of original BOD and COD and then it can either be discharged to open bodies of water or can be further treated called Tertiary treatment which is done by using sand beds and activated carbon beds, and chlorination and ozonation for a number of industrial uses or for gardening and floor washing. Treated wastewater can be reused as drinking water also which has been recently started in Singapore and is sold in bottles labelled as "New Water"

Industrial waste waters are treated anaerobically first to reduce high levels of BOD and COD and then conventional aerobic processes. Reverse Osmosis desalination membranes are used not only for treating brackish raw waters, but also for treating waste water. These systems require only a fraction of the space that a conventional water or waste treatment plant would require. Newer technologies such as Reverse Osmosis and Membrane Bioreactors are very popular now a days