Challenges of Sewage Treatment in India

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Water Scenario in Developing Countries

- Inadequate water supply and poor water quality
- Increasing demand for water for domestic, agriculture, as well as industrial purposes
- Available water resources continuously getting deteriorated

Causes
- Discharge of partially treated or untreated wastewater/ effluents into water reservoirs
- Agricultural and Urban runoff
- Increasing water demand
- Excessive water withdrawal prevents dilution of pollutants
Wastewater Treatment in India

Wastewater Generated (MLD) | Wastewater Treated (MLD)
--- | ---
35558 | 35000
40000 | 40000
25000 | 30000
15644 | 15553
11553 | 11553
2696 | 233.7

Metropolitan Cities | Class I Cities | Class II Towns
--- | --- | ---
15644 | 35558 | 2696
8040 | 11553 | 233.7

[CPCB, 2009]
Trends of Wastewater Treatment and Management in India

(Source: CPCB, 2009)
The Imminent Challenges in Management of Water Resources

- Pollution due to disposal of untreated (or partially treated) sewage and sullage into natural watercourses and
- Pollution caused by disposal of industrial wastewater into sewers and watercourses
One usually encountered solution is to treat the sewages and wastewaters to regulatory standards and then dispose them off into receiving bodies!
The other less favored solution is to treat the sewages and wastewaters to much HIGH standards and then reuse / recycle them!
Reclamation of Wastewaters for Recycle and Reuse: A New Horizon

- The treated effluent is used as a water resource for beneficial purposes

  - New and assured water source

- The effluent is kept out of streams, lakes, and beaches;

  - Reduces pollution of natural water reservoirs
Reuse: To extend the life of resource/product by using it again, repairing it, modifying it or creating new uses for it

Recycle: Collecting and reprocessing already manufactured materials for remanufacture either as the same thing or as part of a different product

Reduce: To bring down use of resource/material to a smaller extent, size, amount or quantity
Solution – Water Recycling

Advantages:

- Achieving 24 x 7 water supply
  - Reduced consumption of potable water
  - Elimination water pollution problems
- Reducing cost of wastewater treatment
Points for Immediate Action

- The installation and operating costs of existing technologies are rather high and hence are **ill-afforded** by the communities.

- The available technologies are often complex, require heavy machinery that are capital intensive as well as energy intensive during operation and

- The technologies usually rely upon expensive chemical inputs (such as chlorine, alum, lime, poly-electrolyte, etc.) and generate sludges that may be hazardous in nature and difficult to de-water and dispose.
What is “Appropriate”? 

- Low cost with Minimum possible Mechanization
- Simple in Operation
- Suitable for Incremental improvement and
- Recycle and Reuse oriented
Decentralized Solutions are Appropriate

- Effective and low-cost
  - NTSs Utilize plants and their associated rhizospheric microorganisms

- Natural synergistic relationship
  - plants
  - soil
  - microorganisms and water
Aquatic Natural Treatment Systems

The most common NTSs include
- Waste Stabilization Ponds (WSPs)
- Hyacinth and Duckweed Ponds (DPs)
- Fish Ponds
- Oxidation Ponds and Lagoons
- Algal-bacterial ponds
- Polishing Ponds (PPs) and
- Constructed Wetlands (CWs) etc
Zero Discharge? Near-Zero Discharge?

- Zero discharge differs from pollution prevention from the perspective of converting all the waste into useful material.

- Zero Discharge is the final destination of the journey towards preventing pollution.

- In reality, absolute zero discharge condition may not be always possible hence near zero discharge can be achieved.
In its broadest sense, "zero discharge" means no discharge/emissions to any media.

More commonly, zero discharge focuses on Zero Liquid Discharge (ZLD).
Theoretical Zero Discharge

No emissions?

Value Added Products (S/L/G)

Production Plant

S L G

Products (S/L/G)
Zero Liquid Discharge

Production Plant

ETP

Scrubbing or Detoxification

Products (S/L/G)
Technological Options for Zero Liquid Discharge (ZLD)

- Water Conservation
- Wastewater Minimization
- Wastewater Recycle / Reuse
  - Reverse Osmosis
  - Thermal/Vacuum Evaporation
  - Electrodialysis
  - Ion Exchange
Is there a “Market” for Recycled Water?

There are two schools of thought:

I. No!
   Let us not leapfrog
   Let us be practical
   Let everybody at least achieve MINAS

II. Yes!
   Yes but at certain places!
   Easier near industries, Areas of scarcity
   Yes but after few years!
   Policies, Tariff, Incentives
Can we Create the “Market” for Recycled Water?

There are two schools of thought:

I. No!
   People are not ready to use “sewage”
   Treatment is expensive
   There are no good examples
   No gray water distribution network

II. Yes!
   Make it mandatory for industries!
   Easier near industries, Areas of scarcity
   Make it mandatory for HRBs, CHSs, Malls, Commercial Bldgs, Govt. Bldgs!
   Policies, Tariff, Incentives
Thank you!