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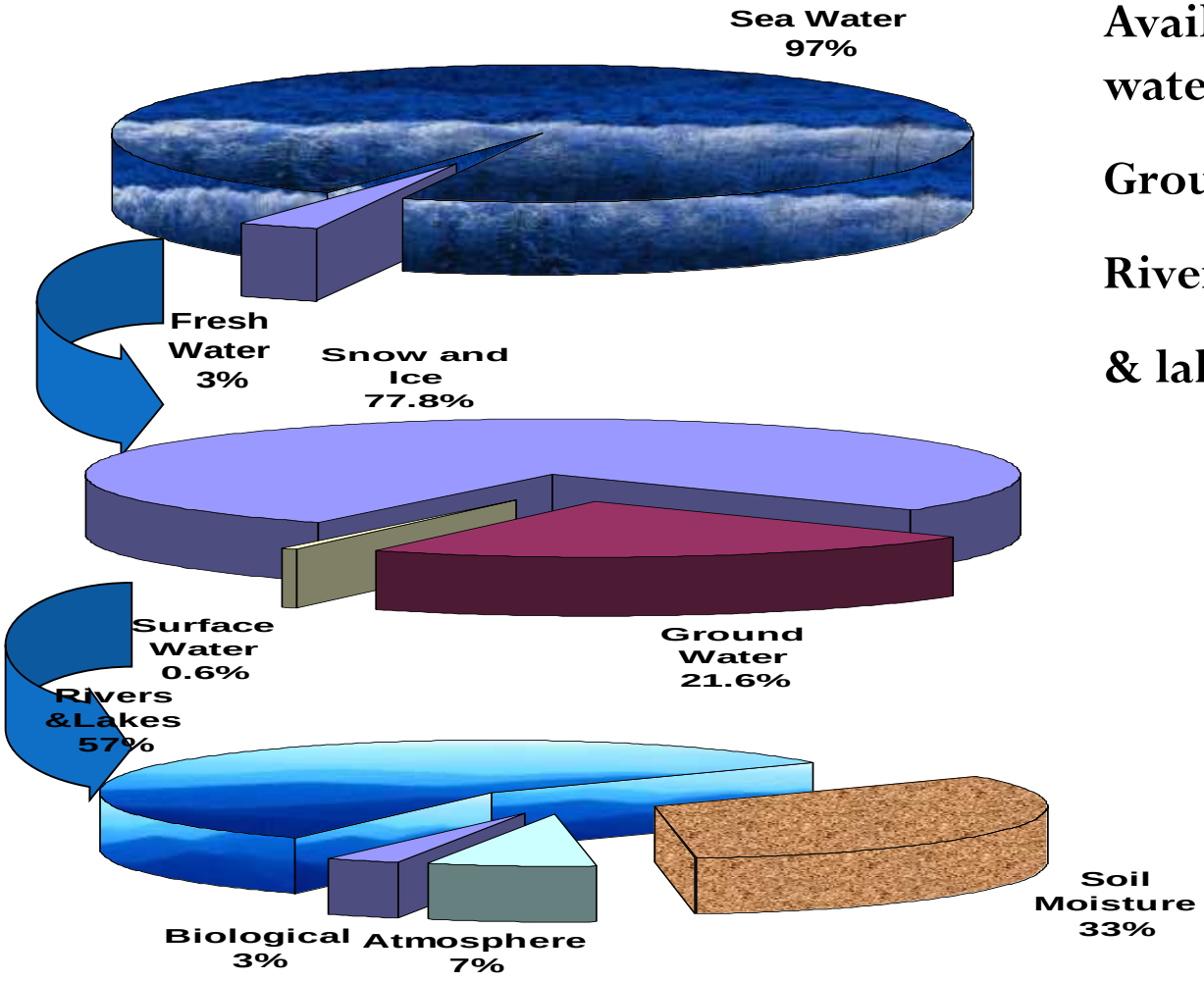
Importance of Waste Management

- Over 1 billion people are without clean water.
- Approximately 2.3 billion people (41% of the world population) facing water shortages.



Available water (% of fresh water):

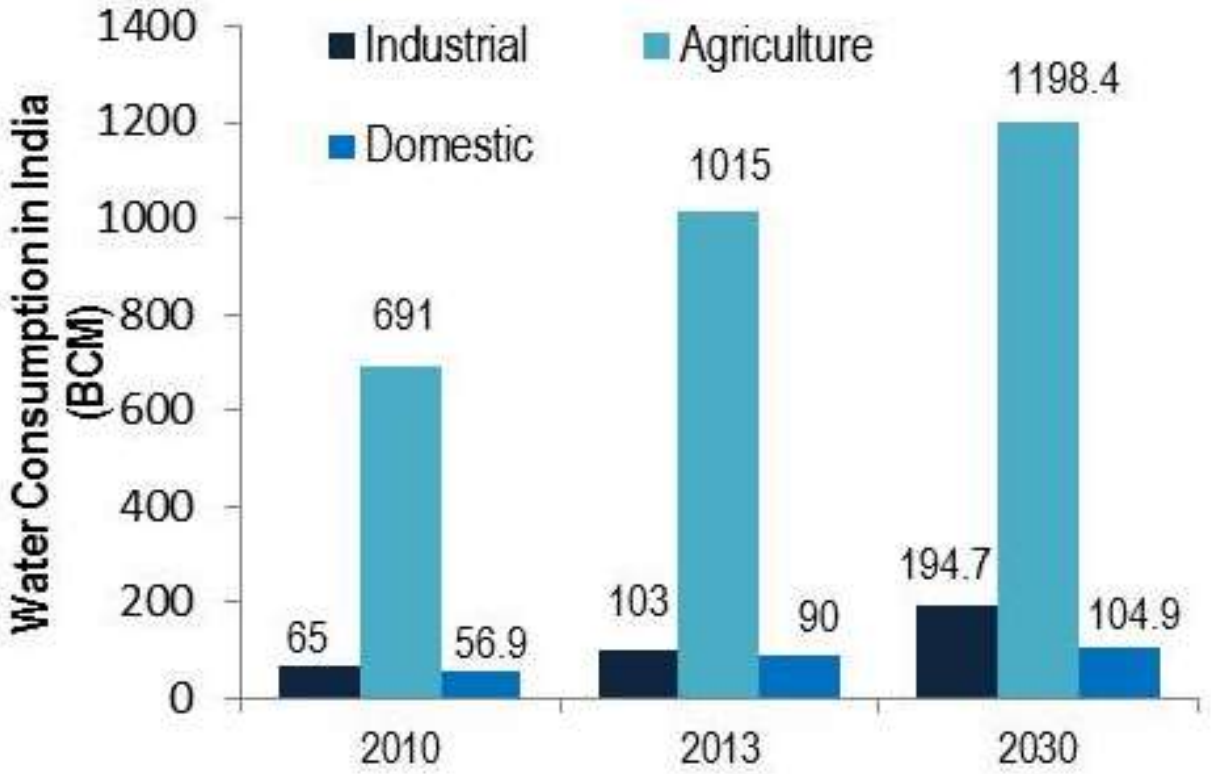
Ground water = 0.648 %

River water = 0.000124%

& lakes

India has 18% Population of the world & only 4% fresh water resources

Water use in India



Source: enincon research

1 billion = 1000 million= 1000x10 lakh = 100 Crores

REMEDIES

- Water conservation is insufficient to cope with increasing demand.
- Traditional fresh water resources such as
  - lakes,
  - rivers, and
  - groundwater

  are either diminishing or becoming saline.
- Preserve natural resources to sustain future generations.

Effects of Pollutants

- **Unsuitable for Drinking, Recreation, Agriculture, Industry.**

- **Diminishes aesthetic quality.**

Effects of Pollutants

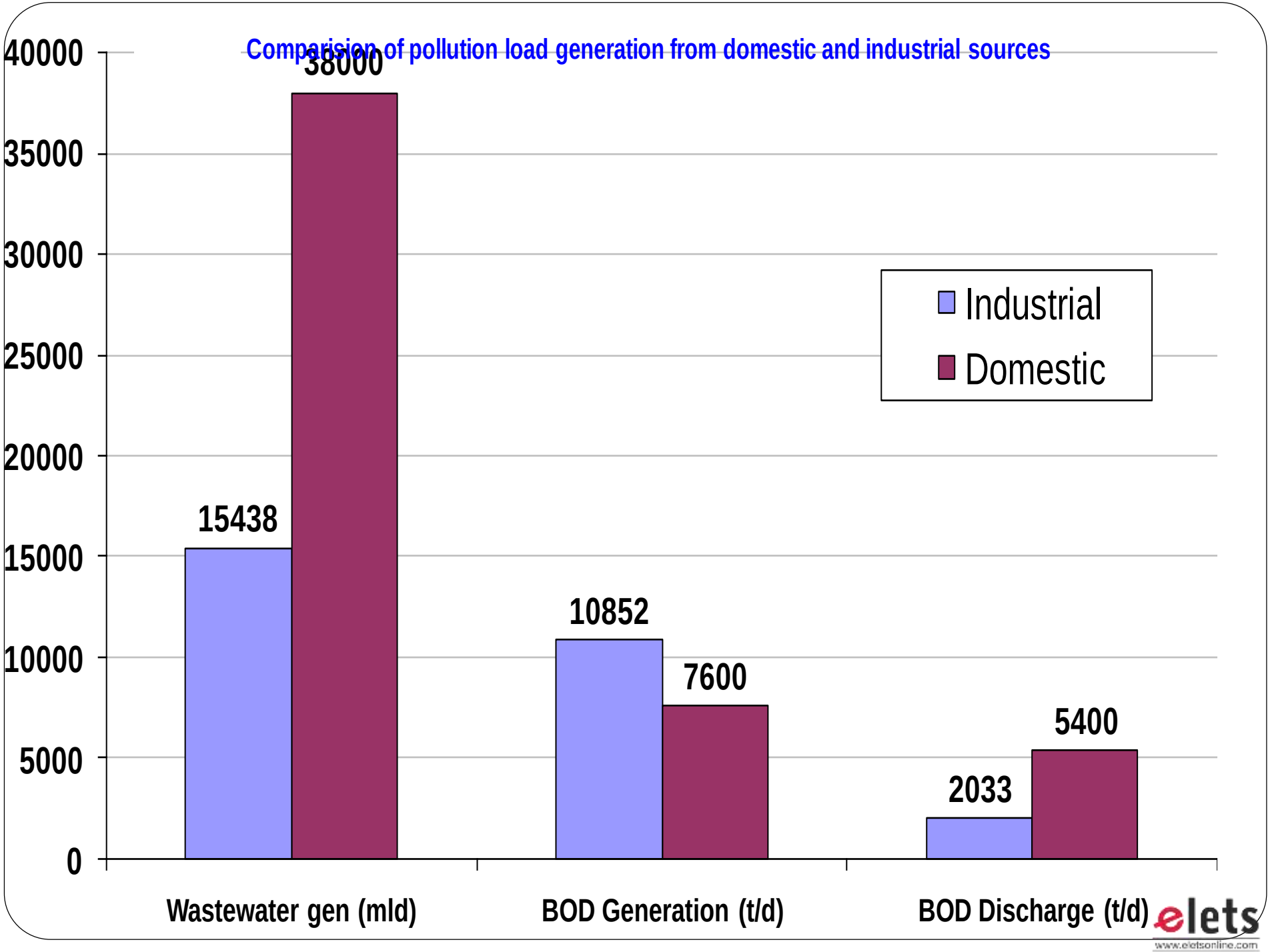
- Destroy aquatic life/ Reduce reproductive abilities.
- Eventually affect human health / All living beings.

Sources of Pollutants

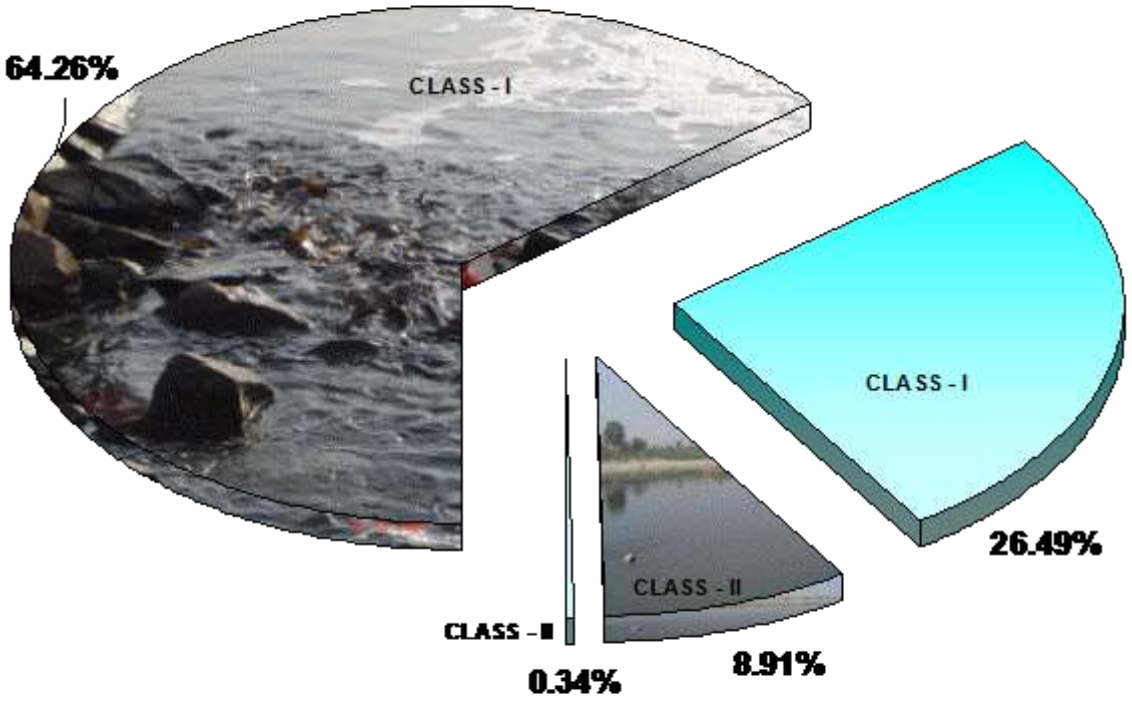
Uses	Water Pollution
• Agriculture	Pesticides, Fertilizers, Salts
• Municipal	Sewage
• Power Plant	Elevated Temperature
• Industry	Chemical, Heavy metals, Organic Pollutants.

Major Water Users are Major Pollution Contributors

Quality of Domestic Wastewater

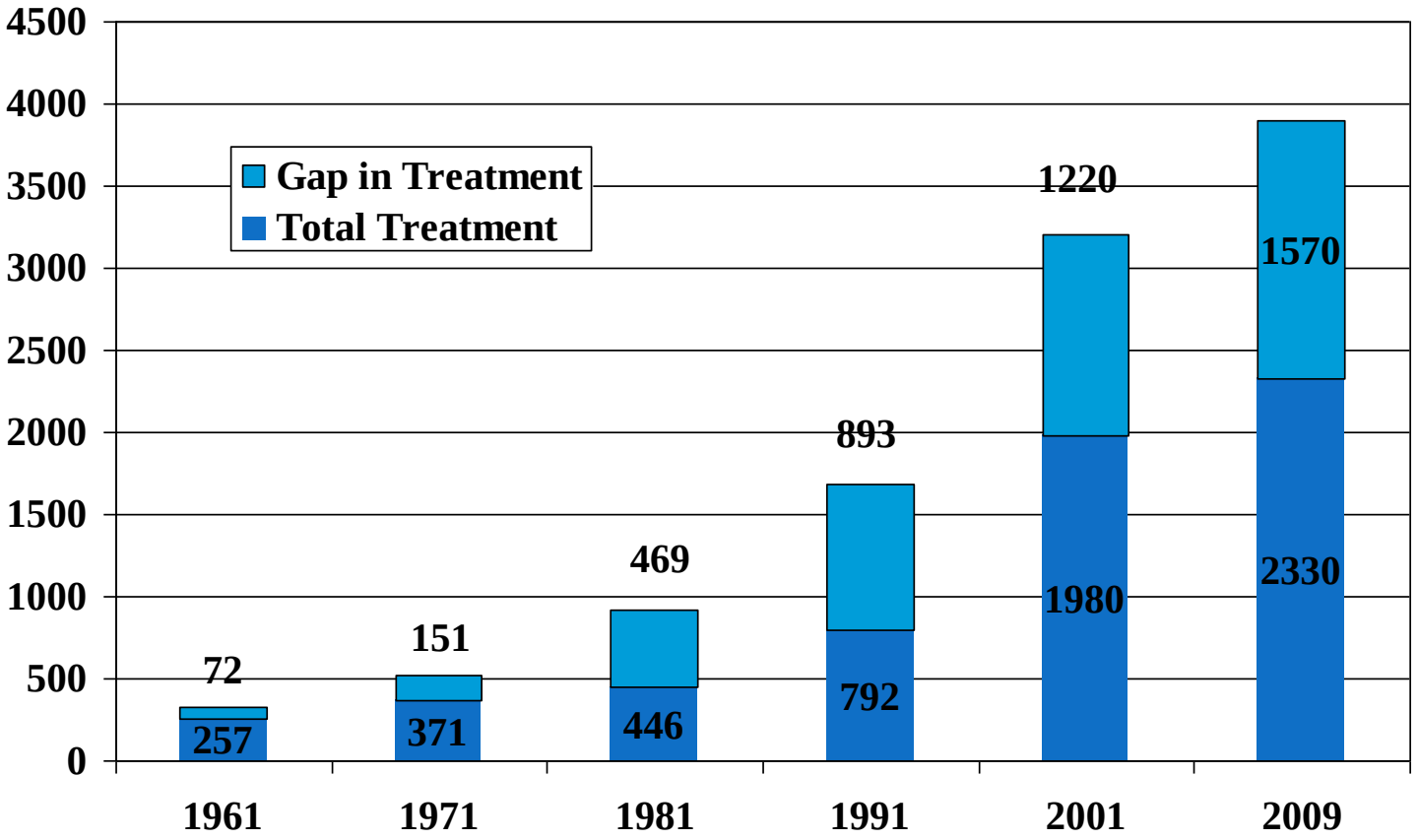

Comparision of pollution load generation from domestic and industrial sources
40000
35000
30000
25000
20000
15000
10000
5000
0
15438
38000
10852
7600
2033
5400
Industrial
Domestic
Wastewater gen (mld)
BOD Generation (t/d)
BOD Discharge (t/d)
elets
www.eletsonline.com

WASTEWATER GENERATION AND TREATMENT (mld) IN CLASS - I AND CLASS - II CITIES IN INDIA



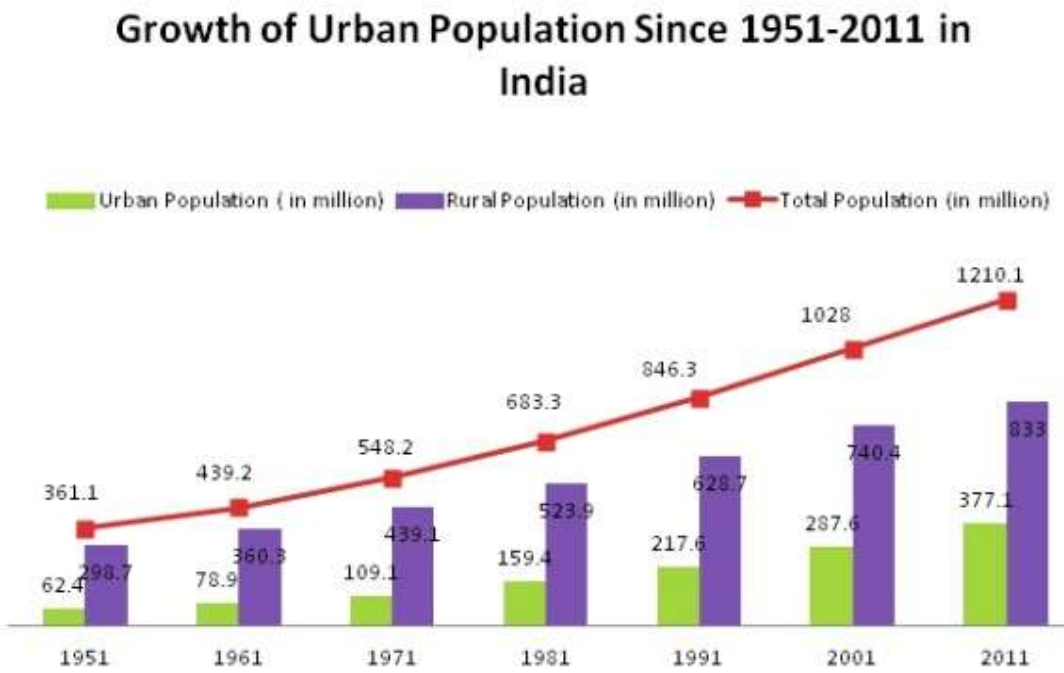
At present Total wastewater generation: 38354 MLD
Treatment capacity : 11786 MLD (30.7%)
Treatment Gap: 26568 MLD
only 60% of industrial waste water is treated.

Decadal Growth of Sewage Generation and Treatment in Delhi (MLD)



Generation in 2016 : **3800 MLD**
Treatment capacity: **2603 MLD**
Gap: **1197 MLD**

Municipal Solid Waste in India



- **Calculated current Urban population is 407 million, which generate around 16.3 million tons of MSW**
- **India produces 48.0 million tons of municipal solid waste annually at present.**
- **Per capita generation of waste varies from 200 gm to 600 gm per capita / day. Average generation rate at 0.4 kg per capita per day in 9391 plus towns.**
- **Collection efficiency ranges between 50% to 90% of the solid waste generated, and there is hardly any effort of its treatment.**

Order of Significance of Water Quality Parameters

1. Pathogens

Disease Producing

2. Organics

Putrification of Environment

3. Suspended Solids

Pathogens

Death From Water Borne Diseases Each Year

Worldwide – 250 million cases, 10 million deaths

Disease	No. of Infected Person	No. of Deaths
Diarrhea	2 billion	4 million
Amoebiasis	500million	NA
Typhoid	1 million	25,000
Cholera	21000	10,000

Microorganism Concentration in Raw Sewage & Infectious Doses

Organisms	Concentration (Number/100ml)
Total Coliforms	10^7 - 10^{10}
Clostridium perfringens	10^3 - 10^5
Enterococci	10^4 - 10^5
Fecal Coliforms	10^4 - 10^9
Fecal Streptococci	10^4 - 10^6
Shigella	1.0 - 10^3
Salmonella	10^2 - 10^4
Helminth ova	10 -10^3
Enteric virus	10^2 - 10^4
Giardia lamblia cysts	10 - 10^4
Entamoeba histolytica cysts	1.0 - 10.0
Cryptosporidium parvum oocysts	10.0 - 10^3

Organism	Infectious Dose
Escherichia coli (enteropathogenic)	10^6 - 10^{10}
Clostridium perfringens	1.0 - 10^{10}
Salmonella typhi	10^4 - 10^7
Vibrio cholerae	10^3 - 10^7
Shigella flexneri 2A	180
Entamoeba histolytica	20
Shigella dysentariae 1	10
Giardia lamblia	10
Viruses	1.0 - 10
Ascaris lumbricoides	1.0 - 10

Water Quality Parameters (Impurities in Water)

- **Physical**

Temp, Taste, Odor, Color, Turbidity, Solids

- **Chemical**

Inorganic, Organic

- **Biological**

Bacteria, Viruses, Protozoa, Helminthes

Pathogenic, Non-pathogenic

High TDS

Country	Irrigated Land Damaged by Salt (million Ha)
India	7.0 (15%)
China	6.7
Pakistan	4.2
USA	4.2
Uzbekistan	2.4
Iran	1.7
Turkmenistan	1.0
Egypt	0.9
Subtotal	28.1 (60%)
World Estimate	47.7

Major Constituents of Wastewater

Large Floating Matter

Medium – Fine Floating Matter

Oils & Grease

Grit

Suspended Solids (TSS)

Organic Matter (BOD/COD)

Pathogens

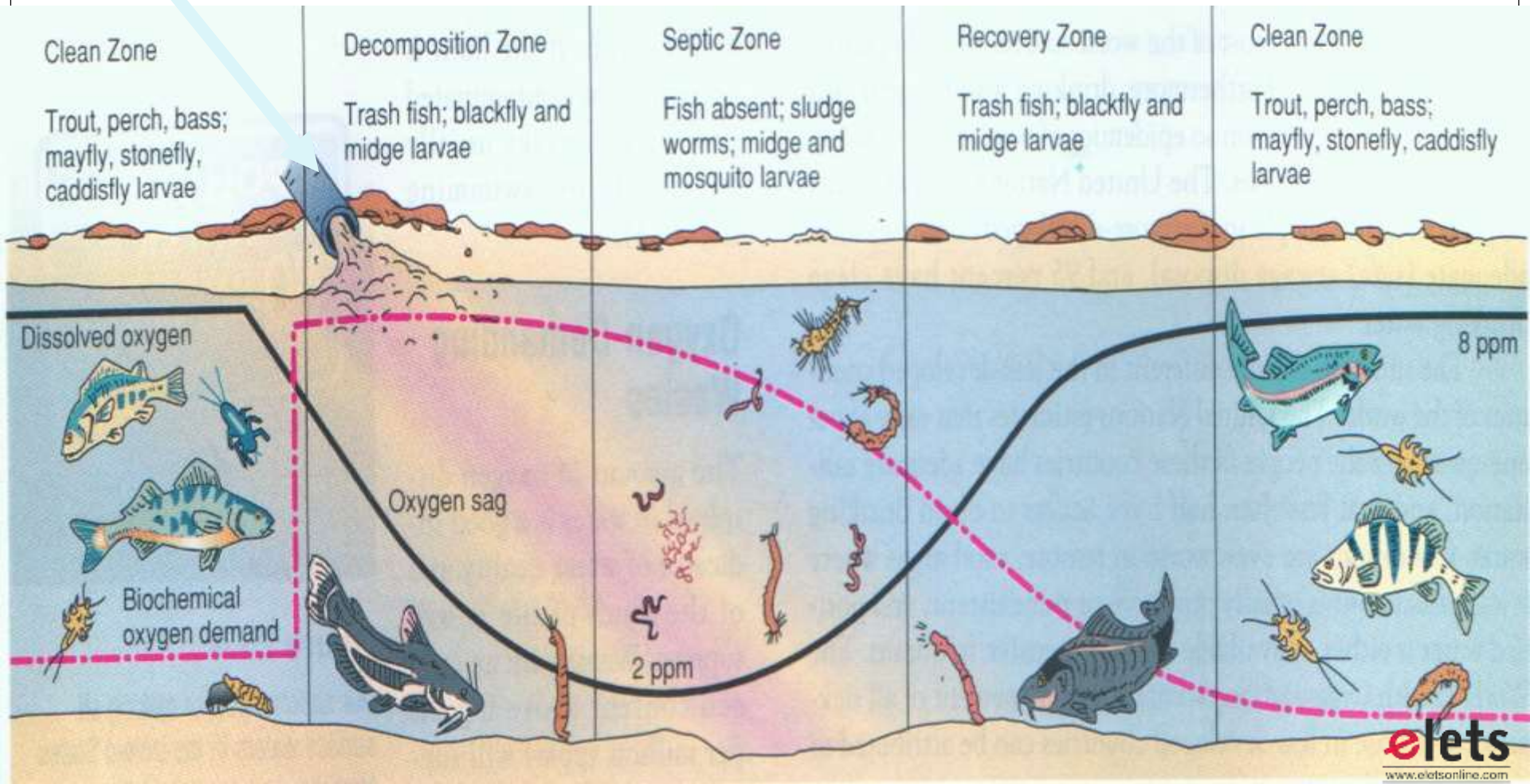
Products of Treatment – Sludges & Gases

Suspended Solids – can cause sludge deposits, flooding and anaerobic conditions in the environment

Flooding – River bed elevation

BOD Cause Dissolved Oxygen Depletion

Waste With Biodegradable Organics



The eutrophication of the Potomac River is evident from the bright green water, caused by a dense bloom of cyanobacteria

Eutrophication promotes excessive plant growth and decay,
•algae and plankton,
•causes reduction in water quality.

Nitrogen & mainly Phosphorus is a necessary nutrient for plant growth.
•When algae die they sink to the bottom.
•Decomposed algal nutrients converted into inorganic.
•The decomposition of algae uses DO and
•deprives the deeper waters of oxygen which can kill fish and other organisms.

STANDARDS FOR SEWAGE TREATMENT PLANTS ALONG WITH TIME FRAME FOR IMPLEMENTATION

Effluent discharged standards for Sewage Treatment Plant are mentioned below:

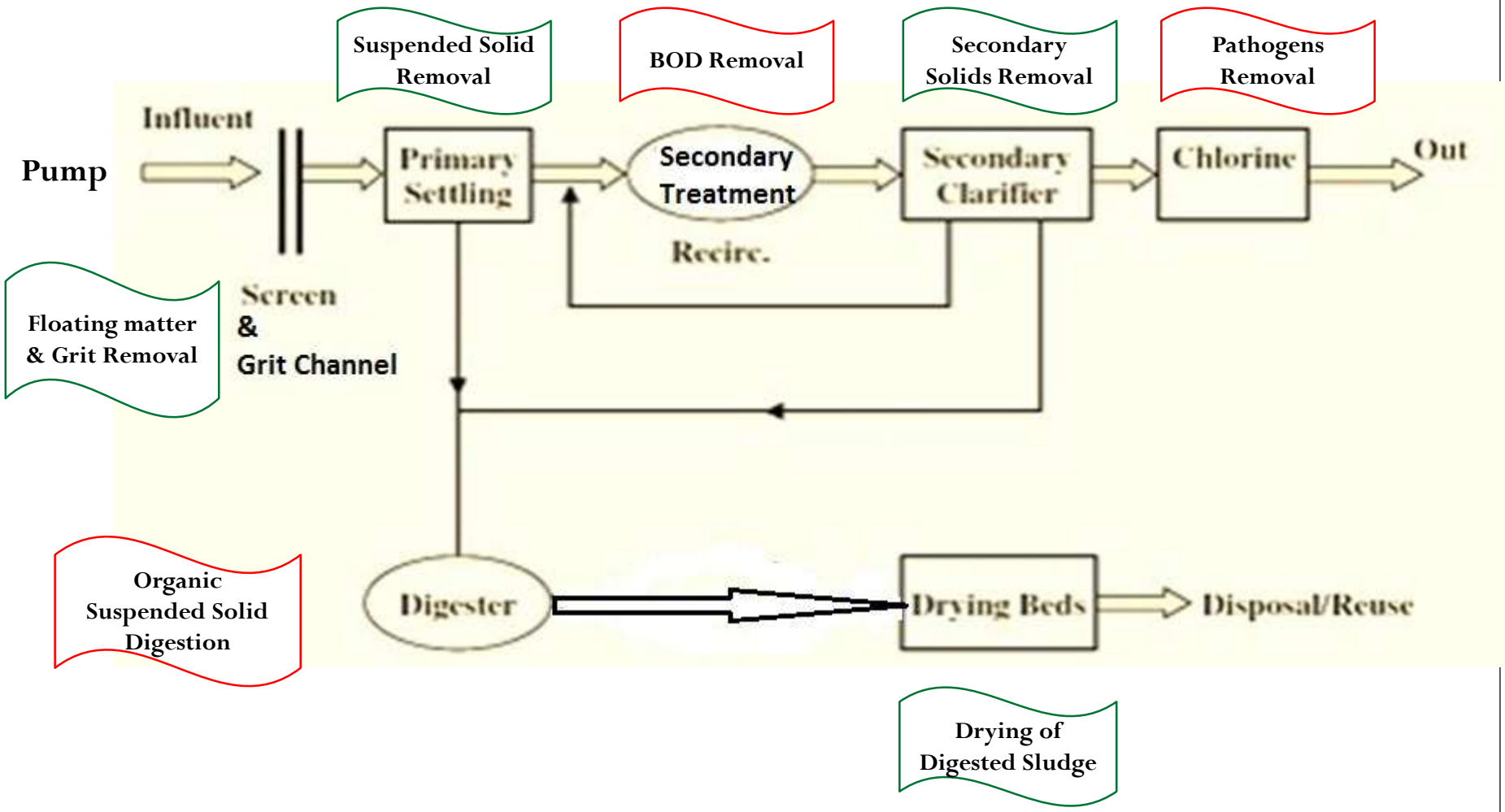
Sl. No.	Industry	Parameters	Standards for New STPs (Design after notification date)*
	Sewage Treatment Plant	pH	6.5-9.0
		BOD	10
		COD	50
		TSS	20
		NH_4-N	5
		N-total	10
		Fecal Coliform (MPN/100ml)	<100

Note:

(i) All values in mg/l except for pH and Coliform.

(ii) These standards will be applicable for discharge in water resources as well as for land disposal. The standards for Fecal Coliform may not be applied for use

Sewage Treatment Scheme

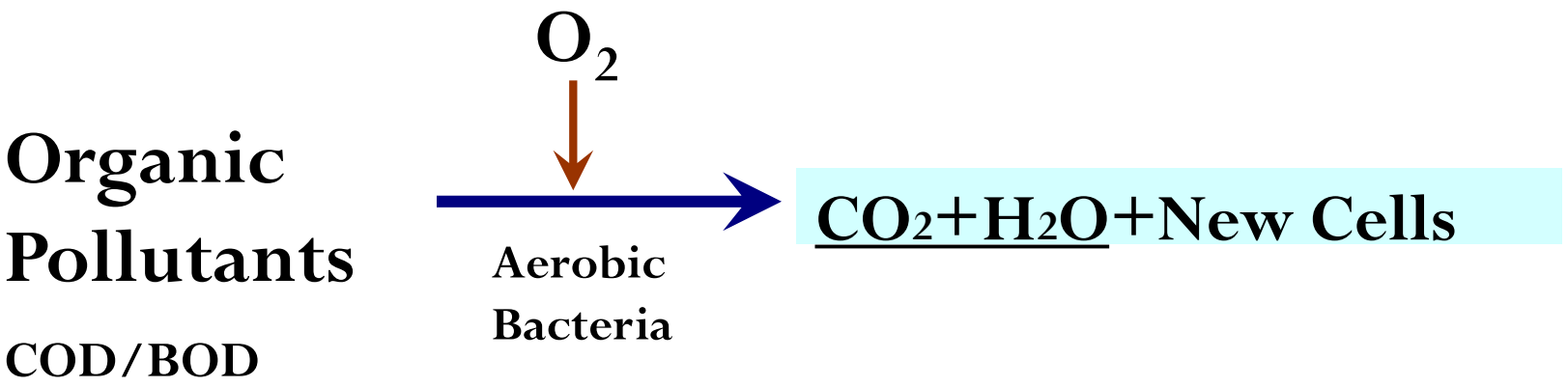


OBJECTIVES

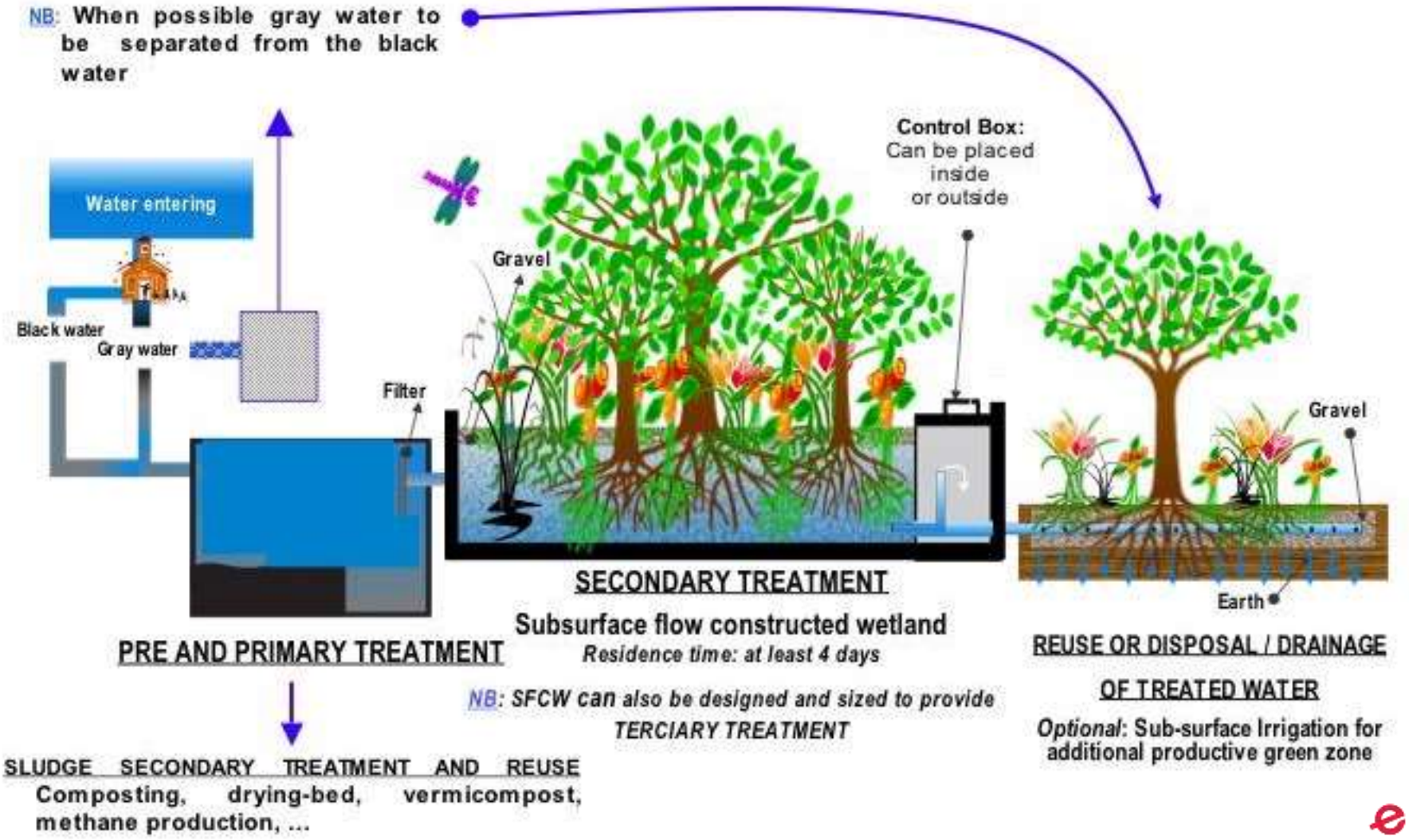
FINAL GOAL

MUNICIPAL WASTEWATER TREATMENT PLANT

AEROBIC PROCESS

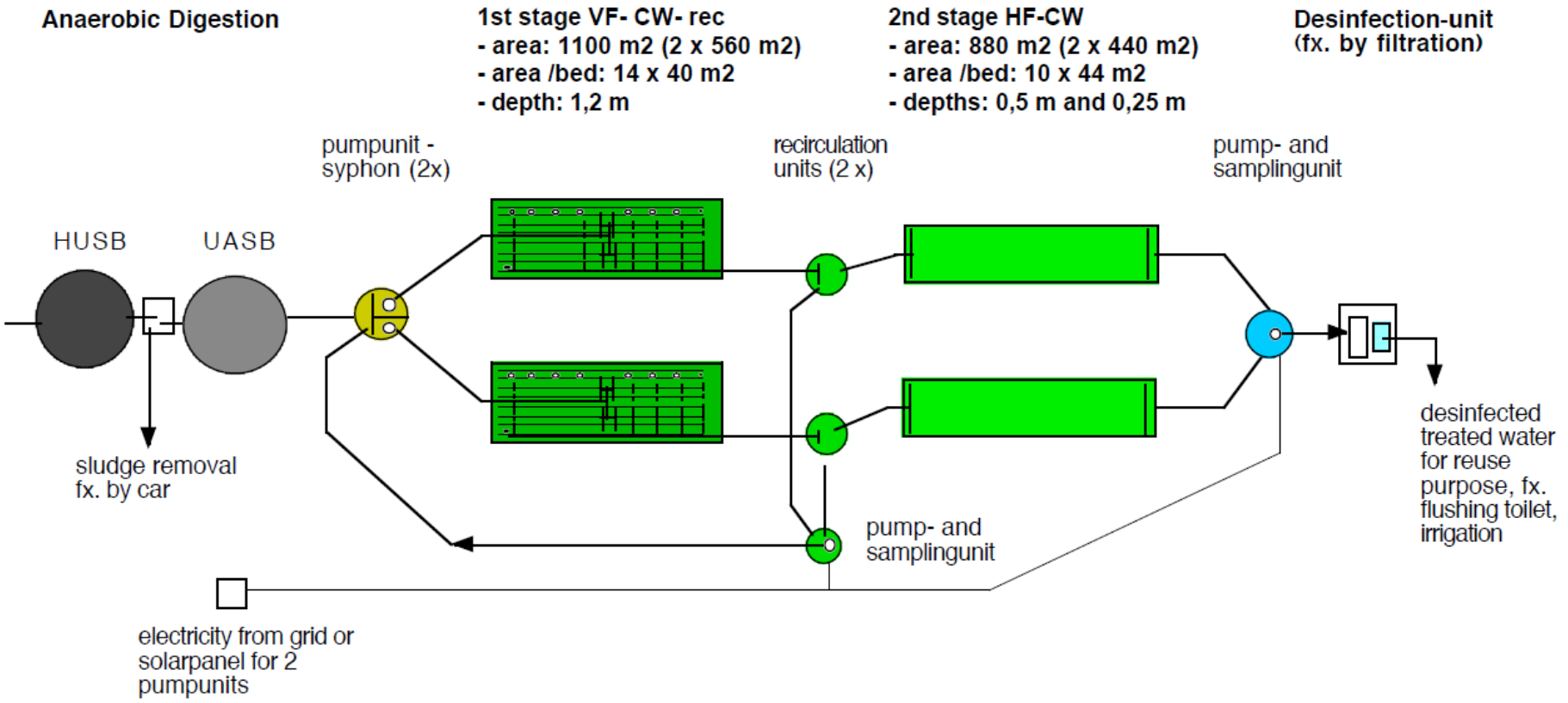


Constructed Wetlands

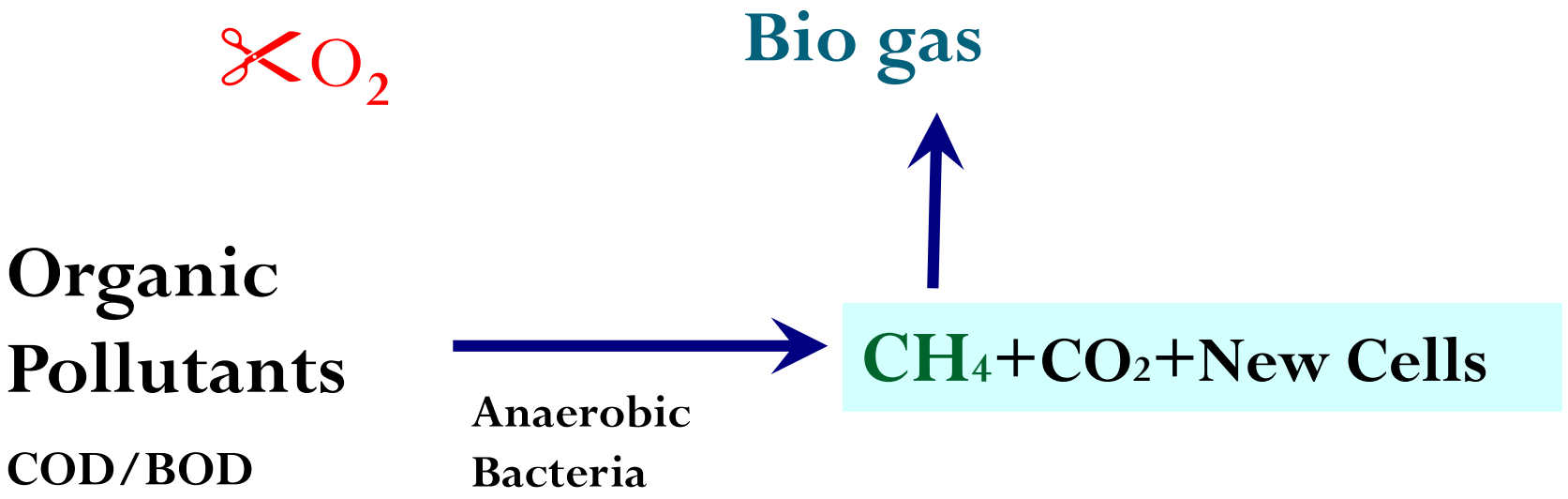


Flow chart of AMU pilot plant for SWINGS project

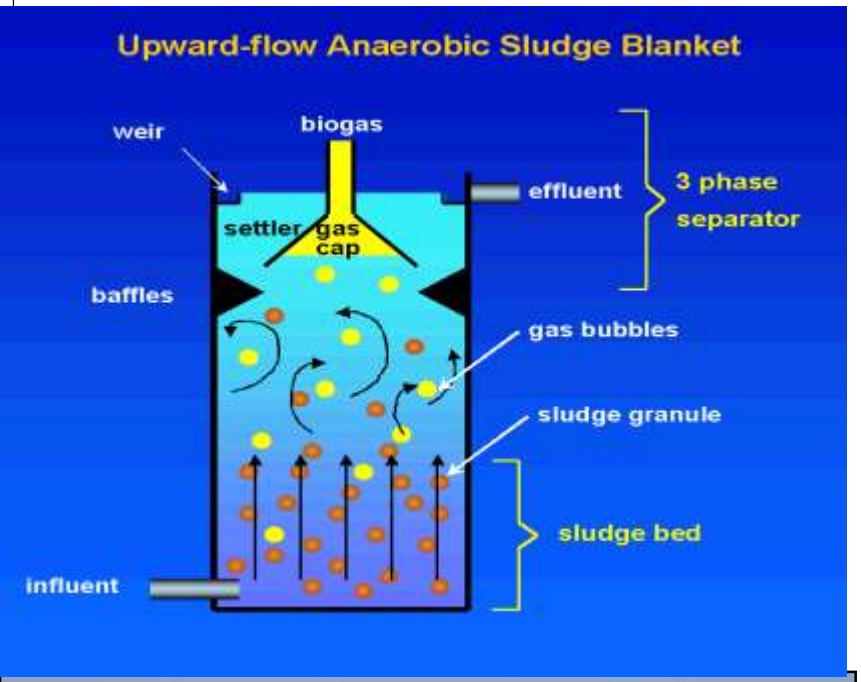
Under Prof. Nadeem Khalil

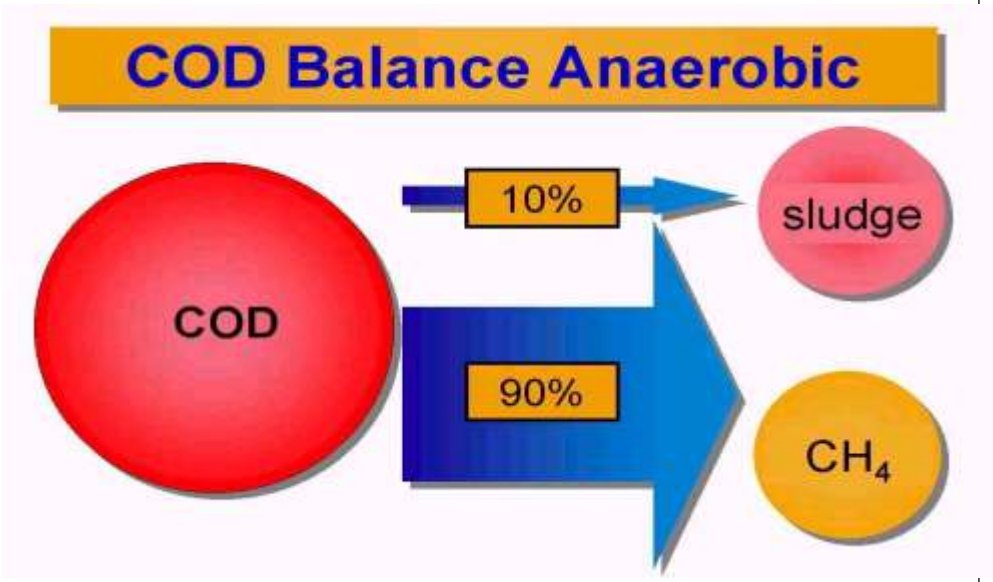


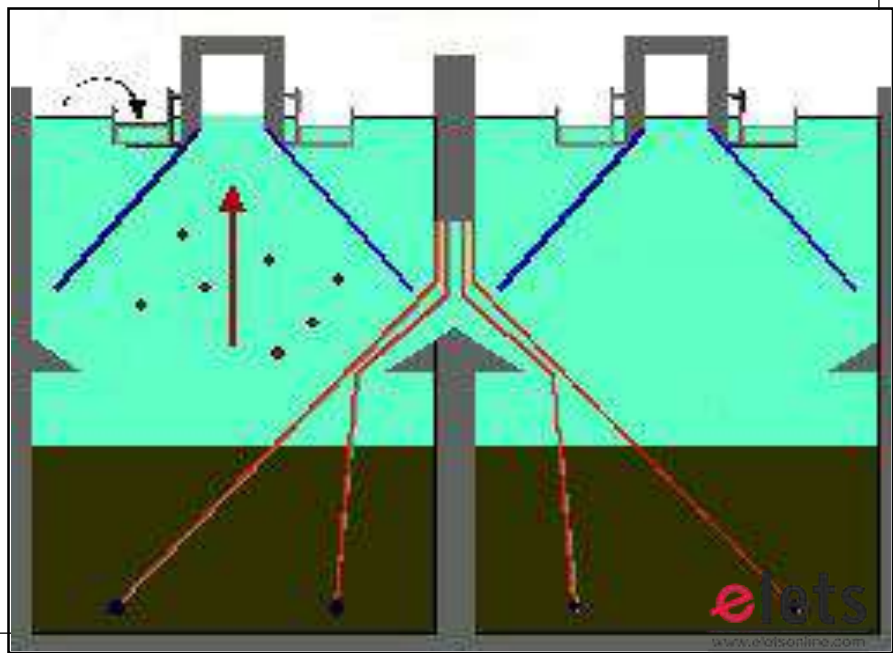
ANAEROBIC PROCESS



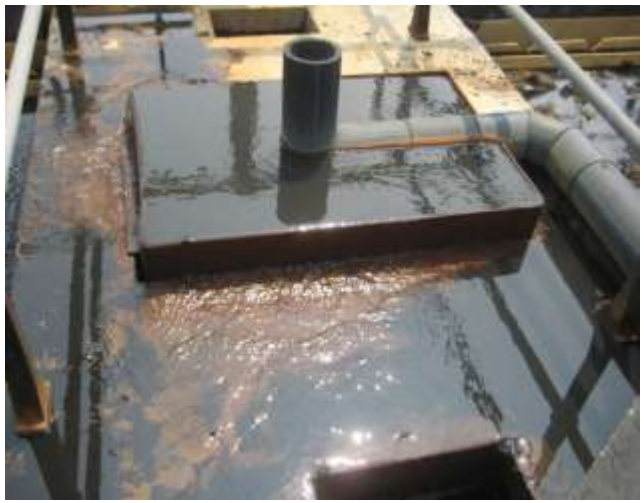
UPFLOW ANAEROBIC SLUDGE BLANKET REACTOR







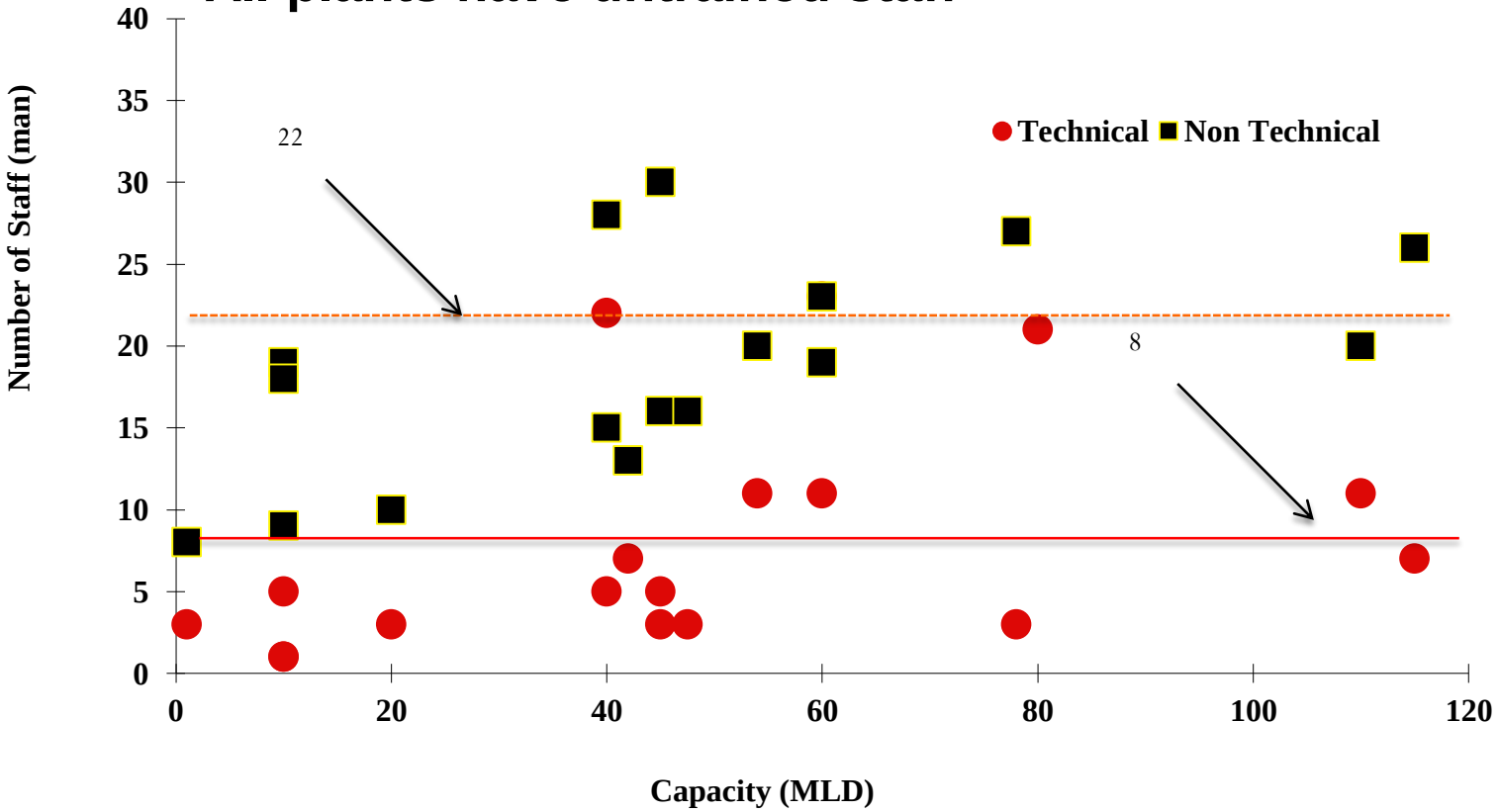
Daily Maintenance



Solid waste - Causing pipe choking and capacity reduction

Staff Deployment & Training

All plants have untrained staff



(n=18, Average Capacity=48MLD)

Average Capacity utilization was 41%

Conclusions

- ✓So first call is to make legislative initiative to make society to Pay for Water at its real price.
- ✓Shift our focus from Wastewater Treatment Industry to Water Production Industry.
- ✓It shall be mandatory for State to buy the water on quality regulation.
- ✓The Water market shall be monitored by a three layer Regulator
- ✓first – Monitoring by the state.
- ✓Second - Public Monitoring
- ✓Third is creation of Ombudsman i.e. JAL LOKPAL.

The most important is……

- ✓Real research in application which suits to Indian condition.

&

- ✓Whichever technology is used it shall be properly operated & maintained.

Contacts

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SEWERAGE NETWORK