ON-SITE TREATMENT SYSTEM ‘JOHKASOU’

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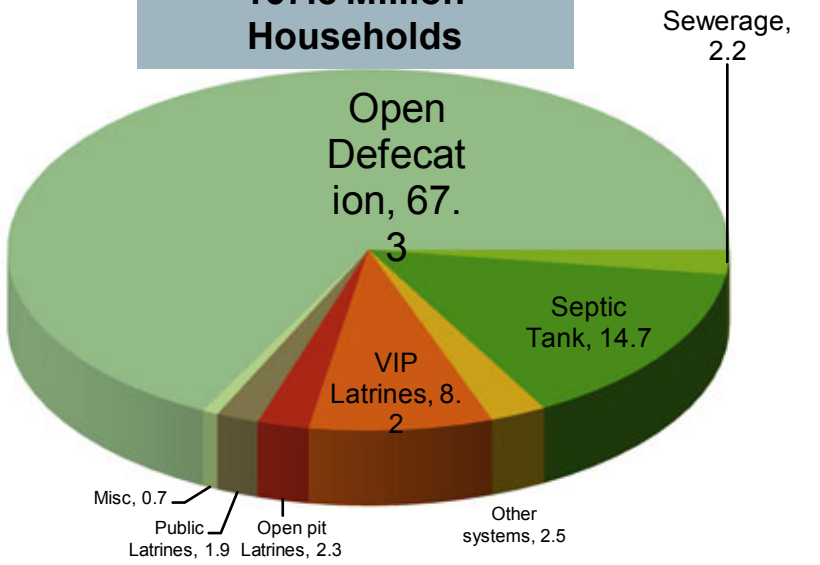
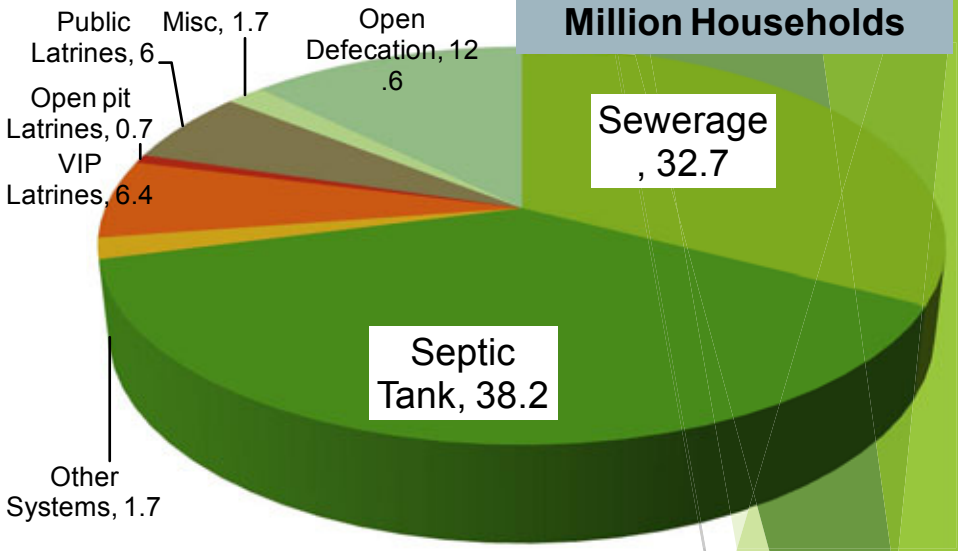
AVAILABILITY & TYPE OF TOILETS-2011 (%)

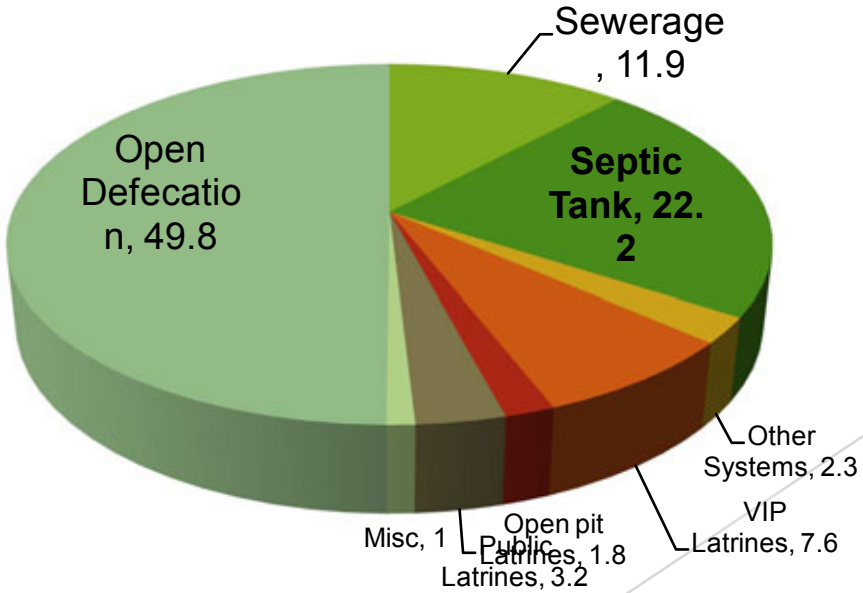
RURAL INDIA 167.8 Million Households



URBAN INDIA-78.8 Million Households



ALL INDIA 246.7 Million Households

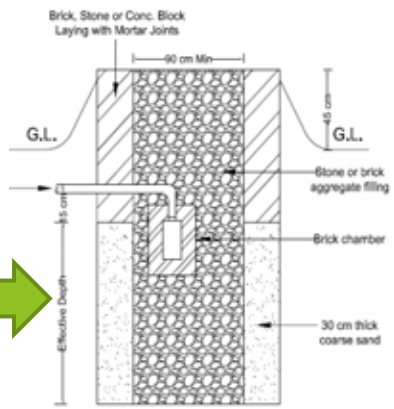


www.censusindia.gov.in/2011census/hlo/Data_sheet/India/Latrine.pdf

FLUSH TOILET + SEPTIC TANKS

Septic Tanks

Discharge to Soakage Pit



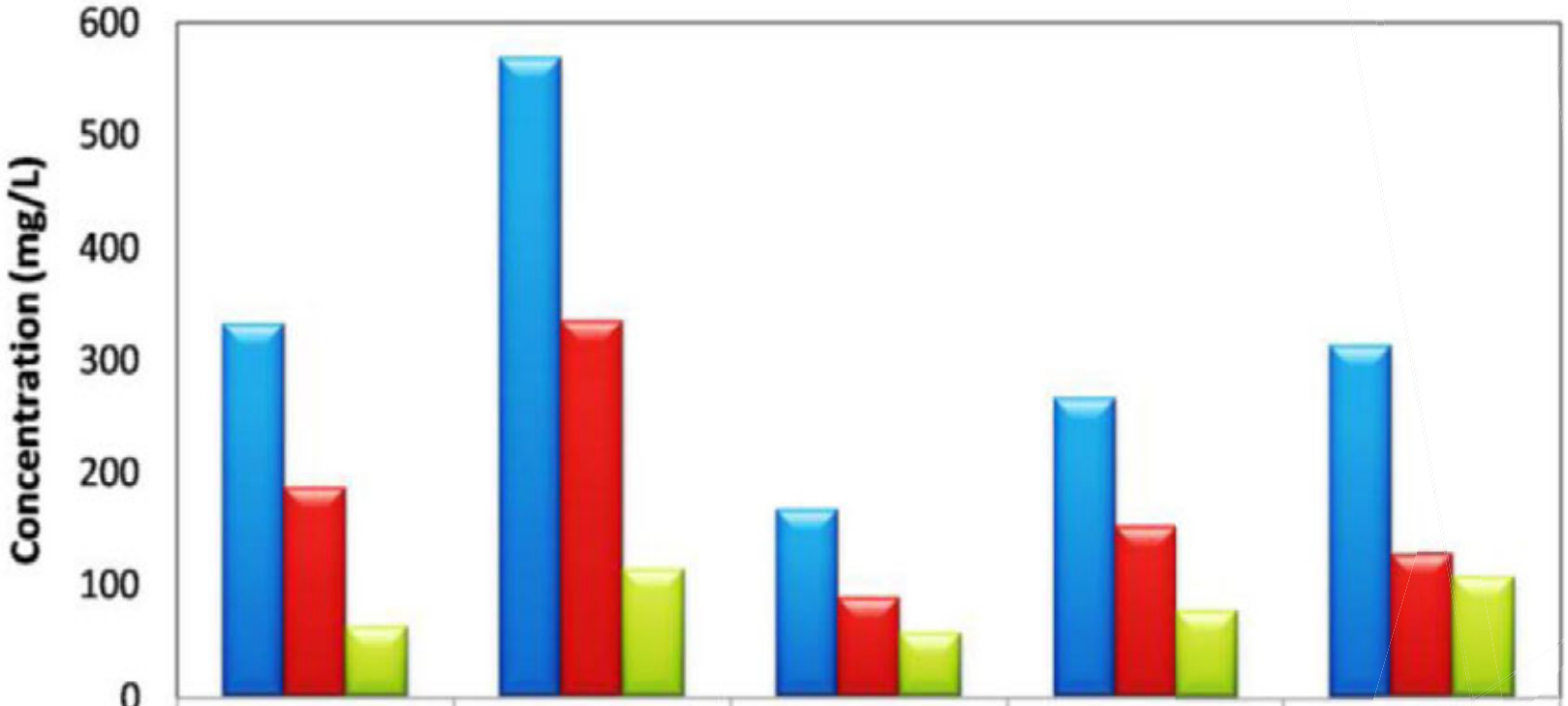
Discharge to Storm water Drain

FLUSH TOILET + TWIN PIT LATRINES

Pit-1 **Pit-2**

http://sulabhinternational.org

QUALITY OF SEPTIC TANK EFFLUENT (STE) IN ACTUAL INDIAN HOUSEHOLD CONDITION



	STE 1	STE 2	STE 3	STE 4	STE 5
COD	332	569	167	266	314
BOD	187	335	89	152	128
TSS	63	114	57	78	108

National Urban Sanitation Policy (MoUD, 2008)

The goals of the National Urban Sanitation Policy:

- Sanitary and safe disposal of 100% of human excreta and liquid wastes through network-based sewerage systems .
- Recycling and reuse of treated sewage for non-potable applications.
- Proper treatment and disposal of sludge from onsite installations (septic tank, pit latrines, etc.).
- Strengthening urban local bodies to provide sustainable sanitation services.

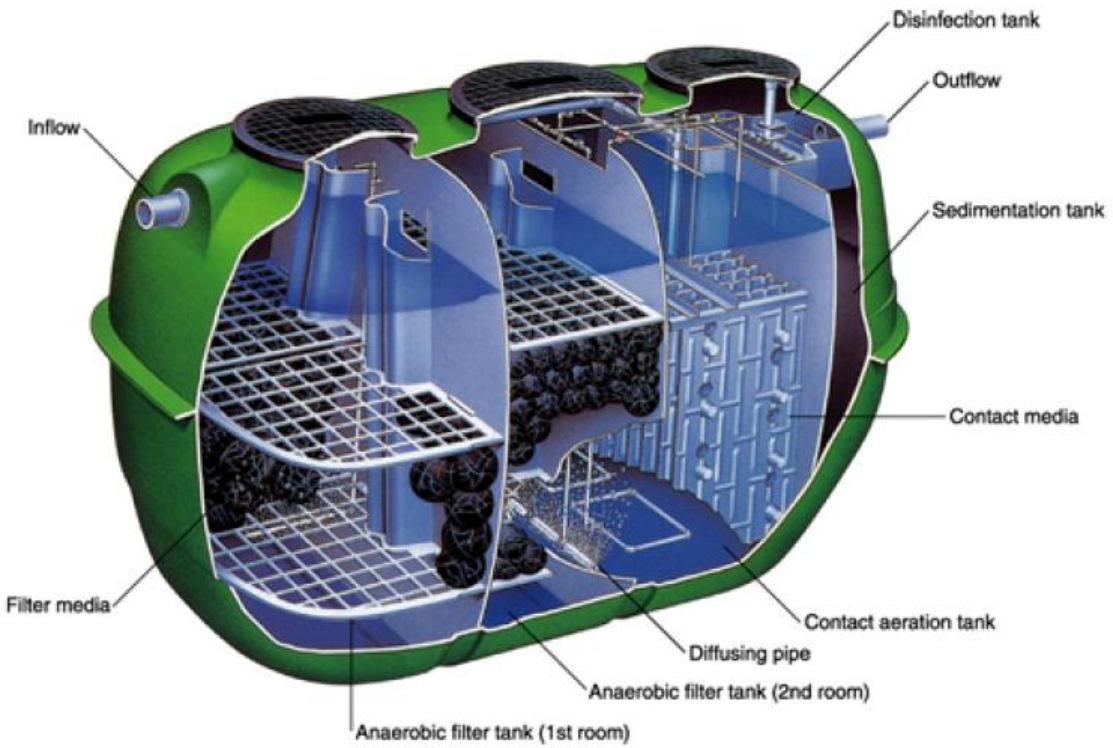
SWACHH BHARAT (CLEAN INDIA) MISSION (RURAL)

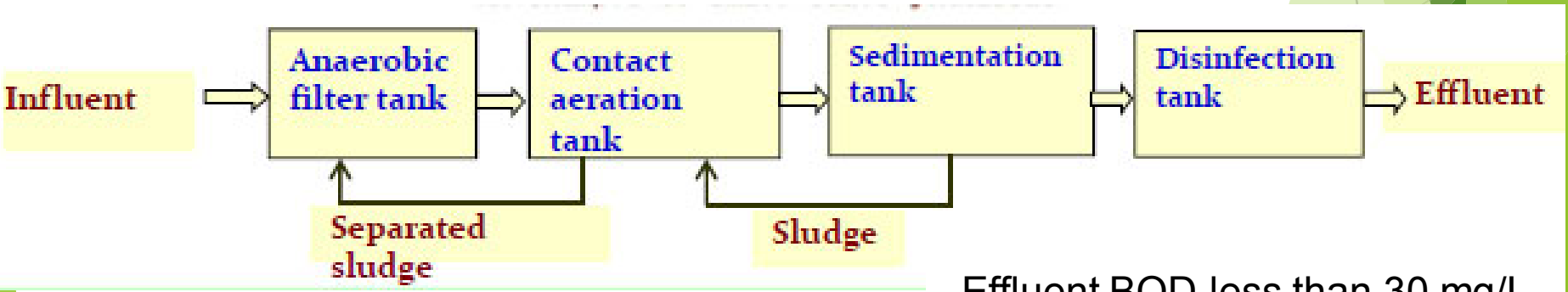
❖**Swachh Bharat Mission launched on 2nd Oct, 2014 by the Prime Minister of India;**

Objectives

- **To make India Open Defecation Free (ODF) India by 2019, by providing access to toilet facilities to all;**
- **To provide toilets, separately for Boys and Girls in all schools by 15th Aug 2015**
- **To provide toilets to all Anganwadis (**Courtyard shelters for Children)
- **To keep villages clean** Innovative: **Low cost and User friendly technologies** for toilet and Solid and Liquid Waste Management to be pursued.

Treatment Principle of Johkasou System

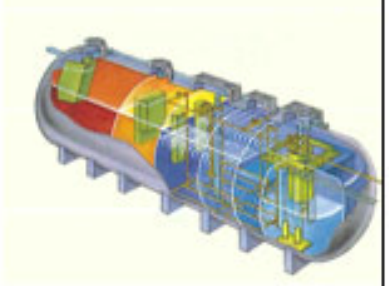




Effluent BOD less than 30 mg/L

ADVANCED ON-SITE SYSTEMS (JOHKASOU)

Table 9.9 Classification according to treatment capacity (Example of Japan)

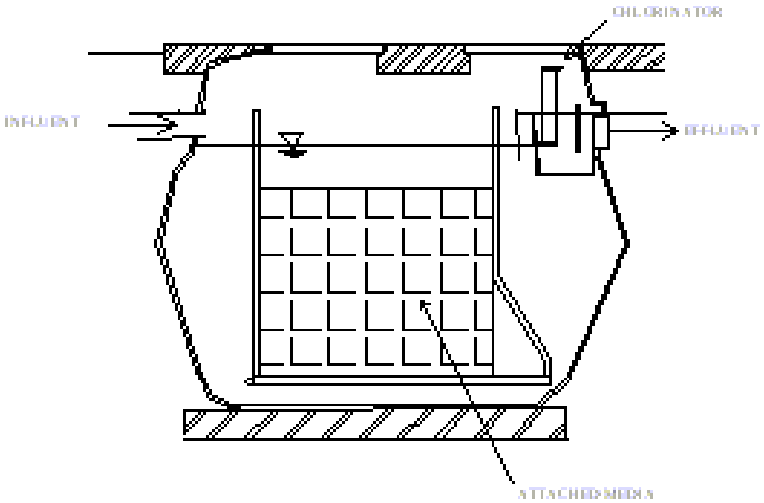
Package-type			On-site construction-type
Small-scale	Medium-scale	Large-scale	Medium/Large-scale
(About 5 to 50 people)	(About 51 to 500 people)	(Approx. 500 to 5,000 people)	(More than 500 people)
			

ii. Performance

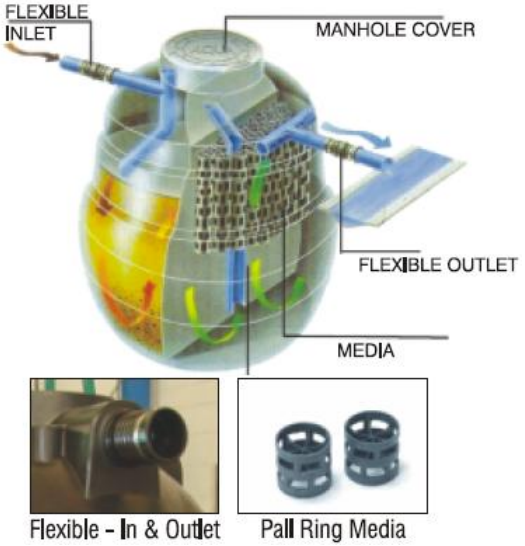
Treatment processes are classified into three kinds according to performance: a proce
that mainly removes BOD-related contaminants, a process that removes BOD-relat
contaminants and nitrogen, and a process that removes BOD-related contaminan
nitrogen, and phosphorus.

- **Small-scale Johkasou**: Average amount of wastewater **<10m³/day**
- **Medium-scale Johkasou:** Average amount of wastewater **<100m³/day**
- **Large-scale Johkasou:** Average amount of wastewater **>100m³/day**

TYPES of JOHKASOU SYSTEMS



Settler- Anaerobic filter



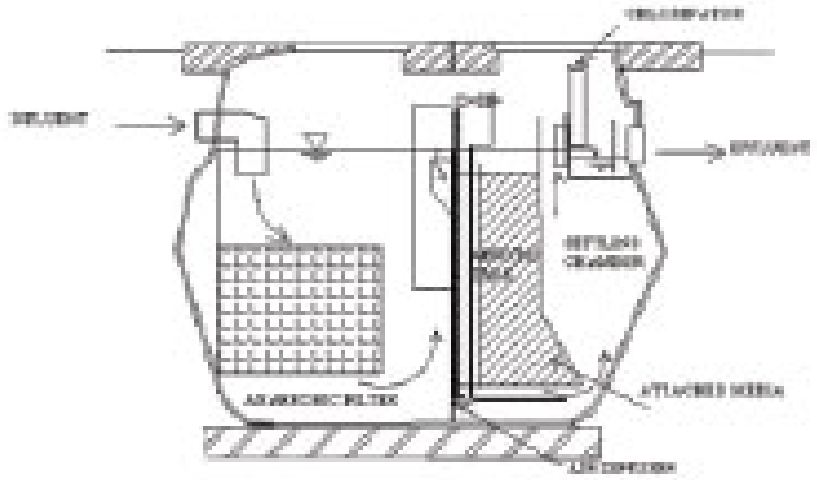
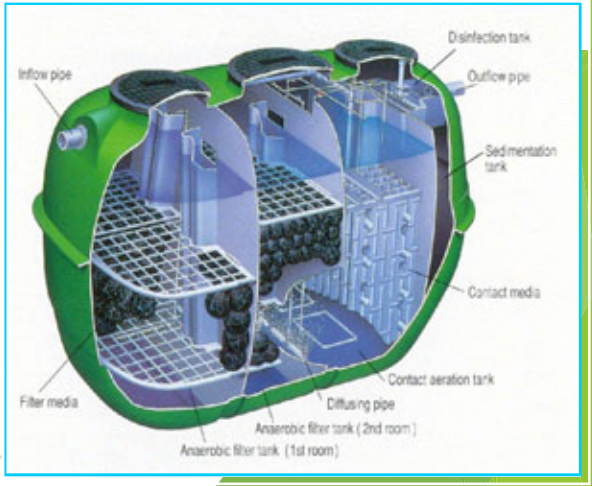


Figure 2.12. Typical cross-sectional drawings of package anaerobic filter-contact aeration system (Kazmi. 2003)



Anaerobic Filter - Contact Aeration

COMPARISON OF DIFFERENT INDIVIDUAL ON-SITE SEWAGE TREATMENT SYSTEMS

Parameters	Septic Tanks	Anaerobic Filter type	Anaerobic-Filter Contact Aeration Type
BOD Removal	30-50 %	70-75 %	More than 90 %
SS removal Efficiency	60-70 %	80-85 %	More than 90 %
Sludge generation	Low	Low	Relatively higher
Energy Requirement	No	No	36 W.h (Single house 6 persons)
Construction Cost	Lowest	Low (1.5 times of septic tank)	Relatively higher (2-3 times of septic tanks
Operation Cost	Sludge Removal	Sludge removal	Sludge removal + Electricity

Modified Settler- Anaerobic Filter based On-site Package System for Single Household Wastewater Treatment

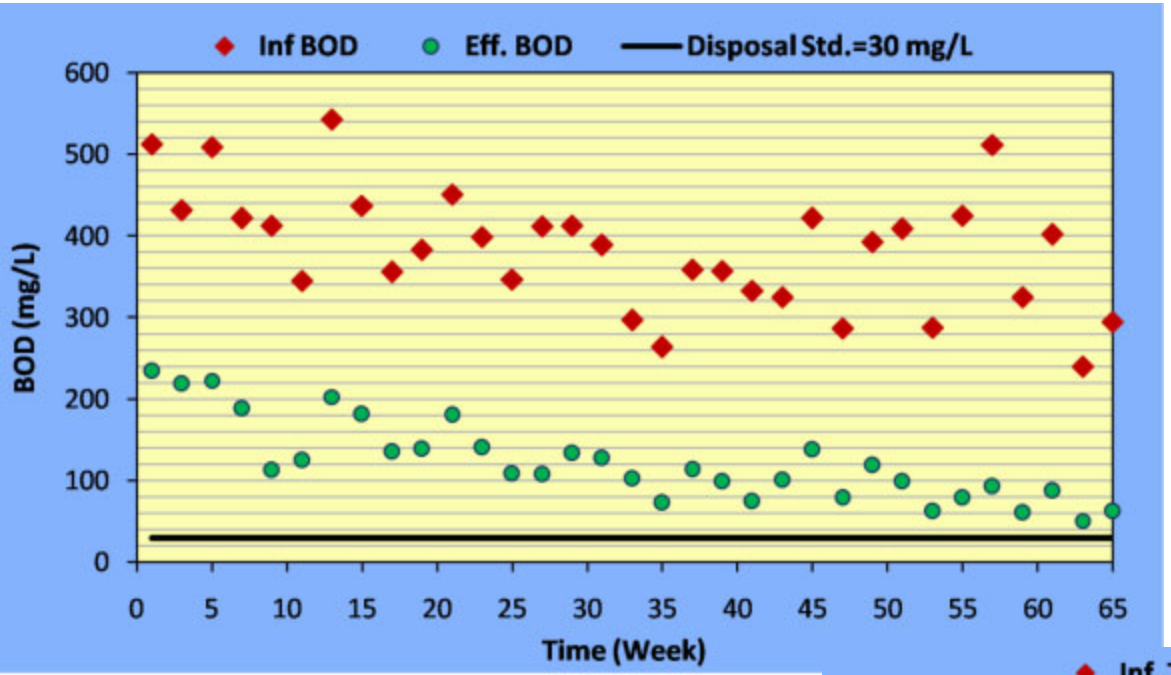
Background: Where ground conditions do not permit infiltration of treated wastewater, additional treatment in the form of a **constructed wetland or anaerobic filter** could be provided prior to discharge into a drain or watercourse.

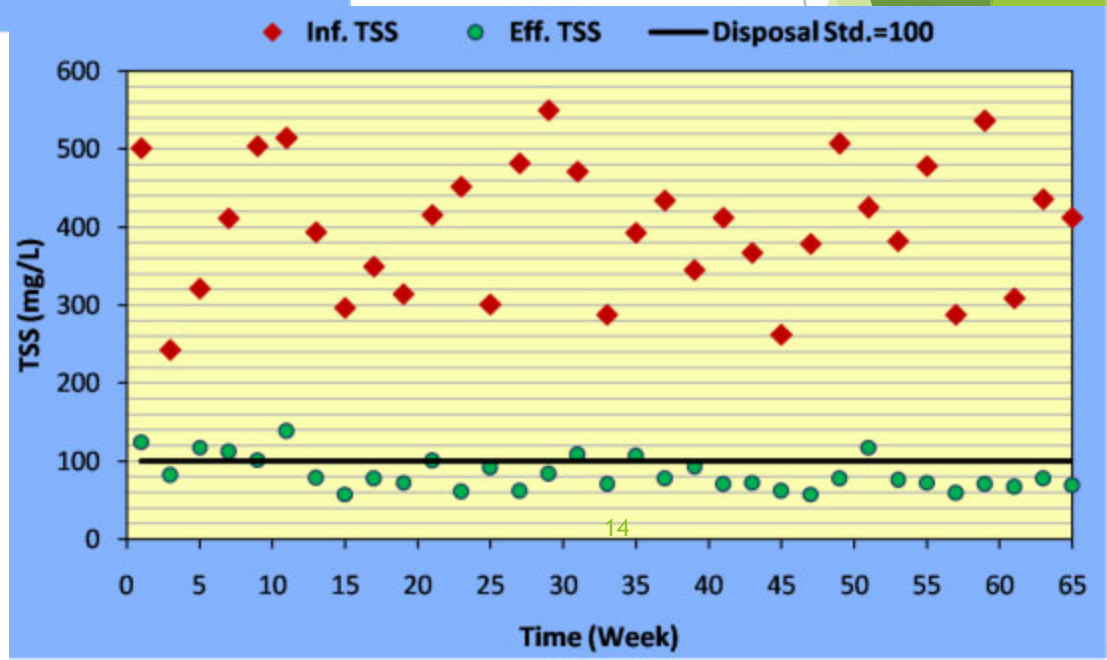
CASE STUDIES
ON
ON-SITE TREATMENT SYSTEMS

1.0 COMBINED WASTEWATER TREATMENT OF SINGLE HOUSEHOLD - SETTLER-ANAEROBIC FILTER

Single Household: Middle Class
Water Supply – 135 Litre/Cap/day
Members: 5
Size of Tank – 1200 L
Material : Polyethylene
Media of Anaerobic Filter: Polyethylene
Specific Surface Area of Media - 100 m^2/m^3

Long Term Performance Evaluation

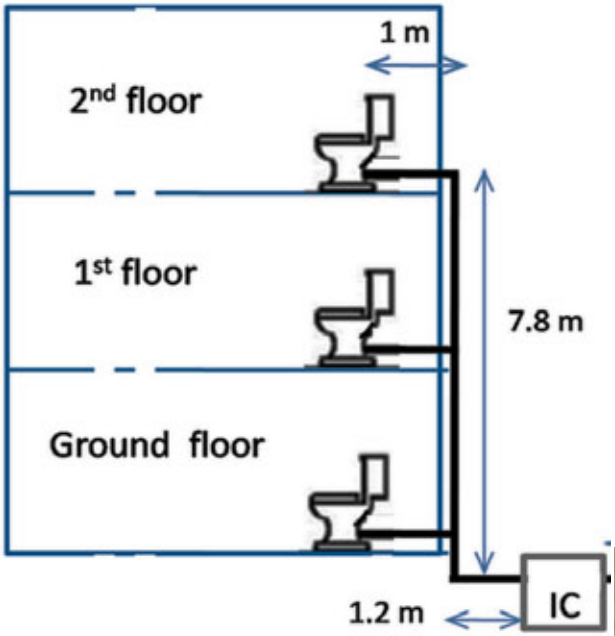




2.0 MODIFIED SETTLER-ANAEROBIC FILTER BLACKWATER TREATMENT-COMMUNITY SCHOOL

Size of Tank – 1200 L
Material : Polyethylene
Media of Anaerobic Filter: Polyethylene
Modified Inlet Arrangement
Specific Surface Area of Media - 100 m^2/m^3

SAMPLING

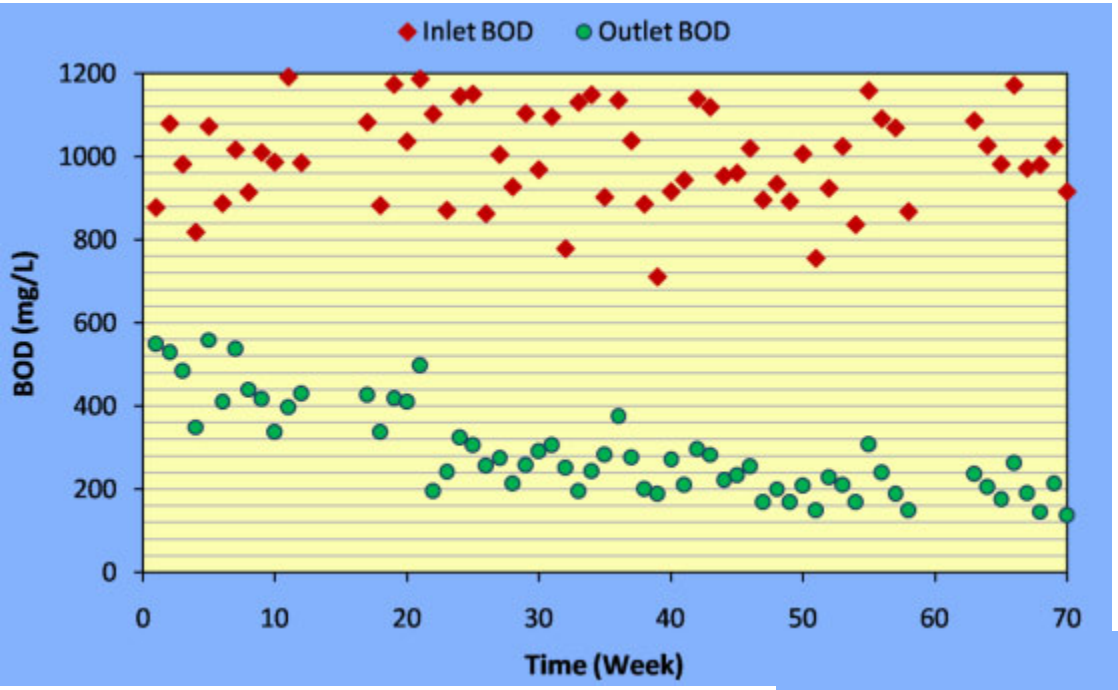


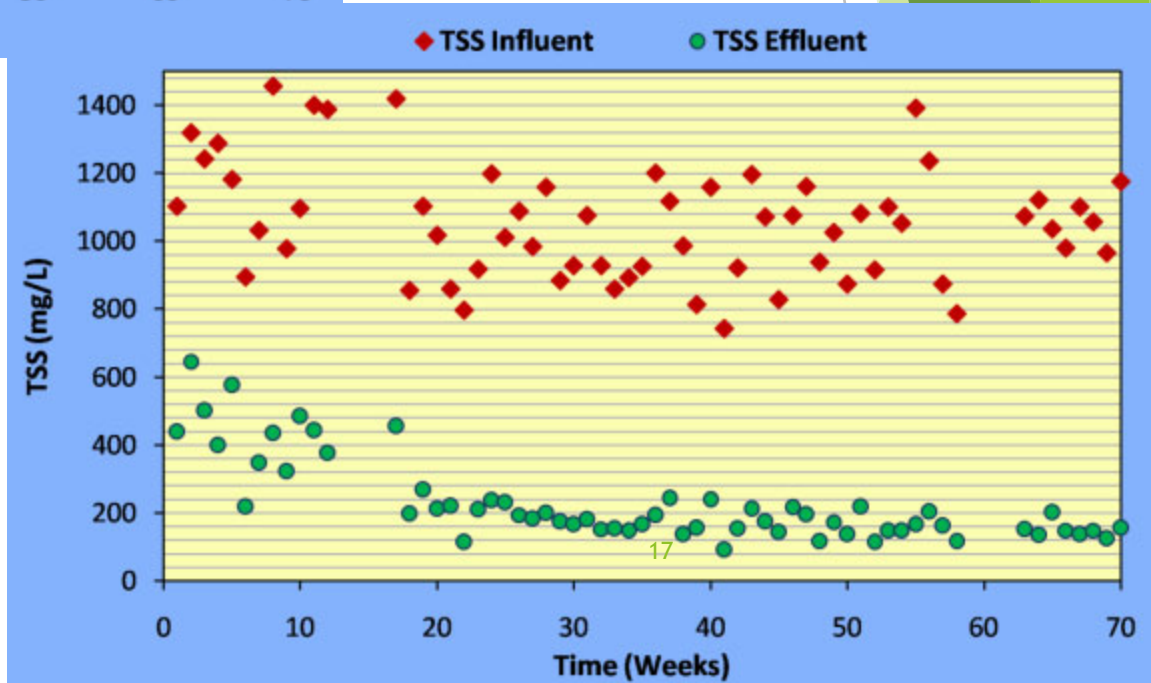
Navodaya Boys hostel

Inlet chamber

Black water collection

LONG TERM PERFORMANCE EVALUATION





Desludging – 480th Day of Operation

Sludge of septic tank

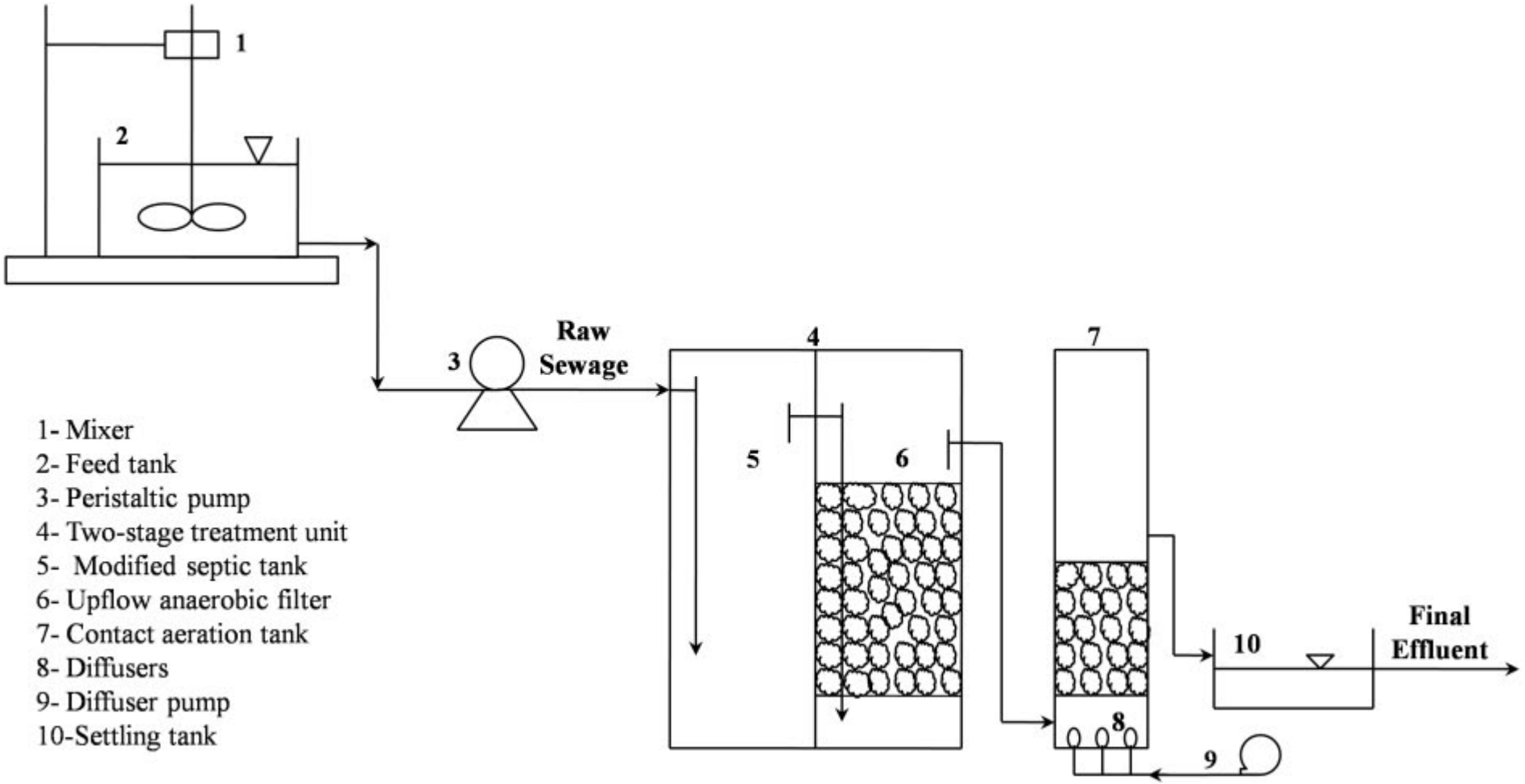
Vacuum Truck for desludging

Desludging of system

Before Desludging

After Desludging

3.0 POST TREATMENT OF ANAEROBIC FILTER EFFLUENT- CONTACT AERATION



1- Mixer
2- Feed tank
3- Peristaltic pump
4- Two-stage treatment unit
5- Modified septic tank
6- Upflow anaerobic filter
7- Contact aeration tank
8- Diffusers
9- Diffuser pump
10-Settling tank

RESULTS

Parameters	Influent	Anaerobically treated effluent	Finally treated effluent
COD	405±117	65±37	33±21
BOD	153±59	26±12	11±6
TOC	119±55	69±33	48±21
TSS	234±63	30±19	11±6
TN	33.3±21	26.1±17.1	15.2±9.1
TP	8.9 ±1.4	7.8±1.1	5.6±0.5
TC	$2.6\times10^{7}\pm1.3\times10^{7}$	$3.5\times10^{6}\pm2.9\times10^{5}$	$2.6\times10^{5}\pm2.3\times10^{3}$
FC	$3.2\times10^{6}\pm2.5\times10^{6}$	$7.2\times10^{5}\pm4.2\times10^{5}$	$7.8\times10^{3}\pm6.9\times10^{2}$

THE WAY FORWARD:

- At present, Government mainly focused on Providing Toilets for everyone.
- A new generation of highly efficient, compact, user friendly and low prices treatment systems are urgently to be developed in order to serve the needs.
- In this direction proven technology including Package (Anaerobic Filter-Contact Aeration) Johkasou has been suggested as effective liquid waste management options in Rural and Urban Areas.

THE PRESENT RESEARCH IS AN A STEP TOWARDS THE PROTECTION OF SURROUNDING ENVIRONMENT AND WATER BODIES

Thank you