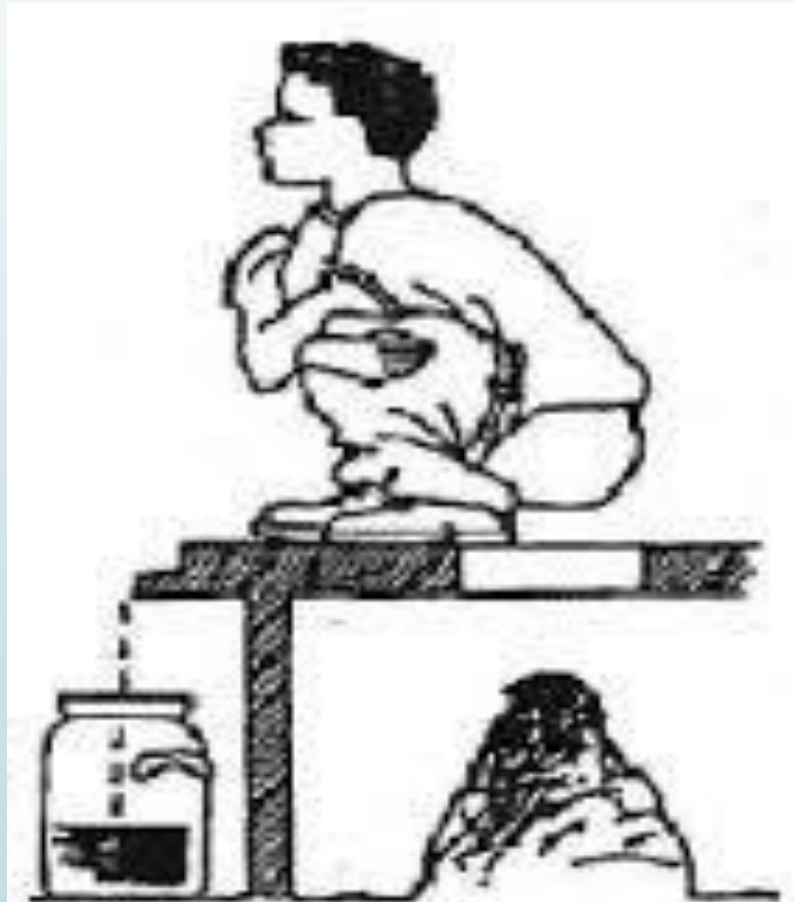


# ***Environmental Sustainable Sanitation***

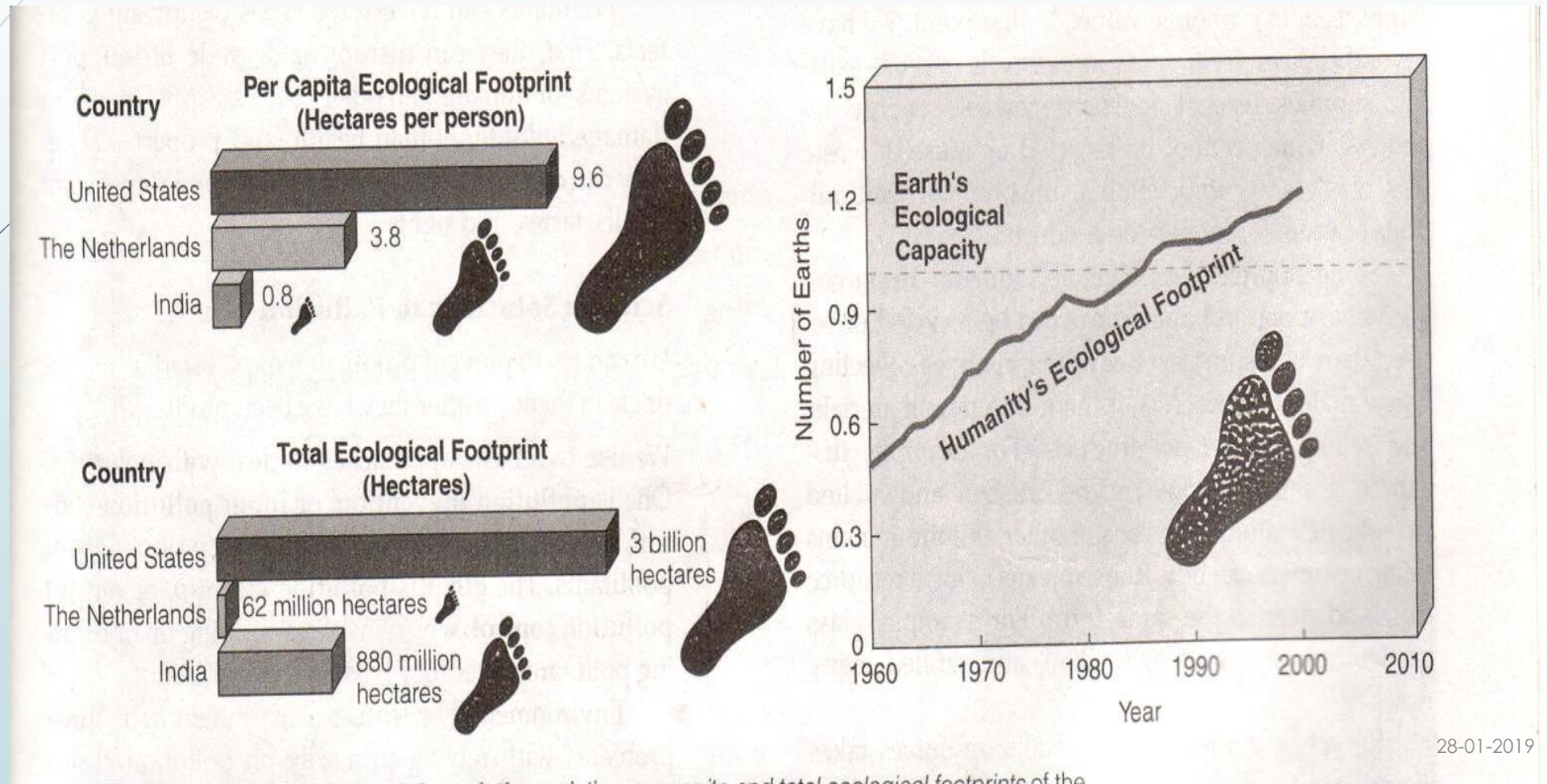


# Presentation Outline:

- ▶ Ecological & Environmental Footprints
- ▶ Problems in Conventional Sanitation Systems
- ▶ National Urban Sanitation Policy (NUSP) & City Sanitation Plan (CSP)
- ▶ Ecological Sanitation (Eco- San)
- ▶ Eco-Toilets
- ▶ Opportunities
- ▶ Resource People

# ECOLOGICAL FOOTPRINT

Source : Tyler Miller G. Jr. (2004)



# INCREASING WATER FOOT PRINT



**"THE WORLD IS RUNNING OUT OF  
SUSTAINABLY MANAGED WATER"**

# PROBLEMS IN CONVENTIONAL SANITATION SYSTEMS

- ▶ GENERAL FAILURE REASONS
- ▶ DESIGN FAILURE REASONS
- ▶ TECHNICAL FAILURE REASONS
- ▶ OPERATION AND MAINTENANCE FAILURE REASONS
- ▶ HUGE QUANTITIES OF WATER
- ▶ ENERGY INTENSIVE
- ▶ SUBSURFACE WATER & SOIL CONTAMINATION

# PROBLEM IN BLACK COTTON SOIL

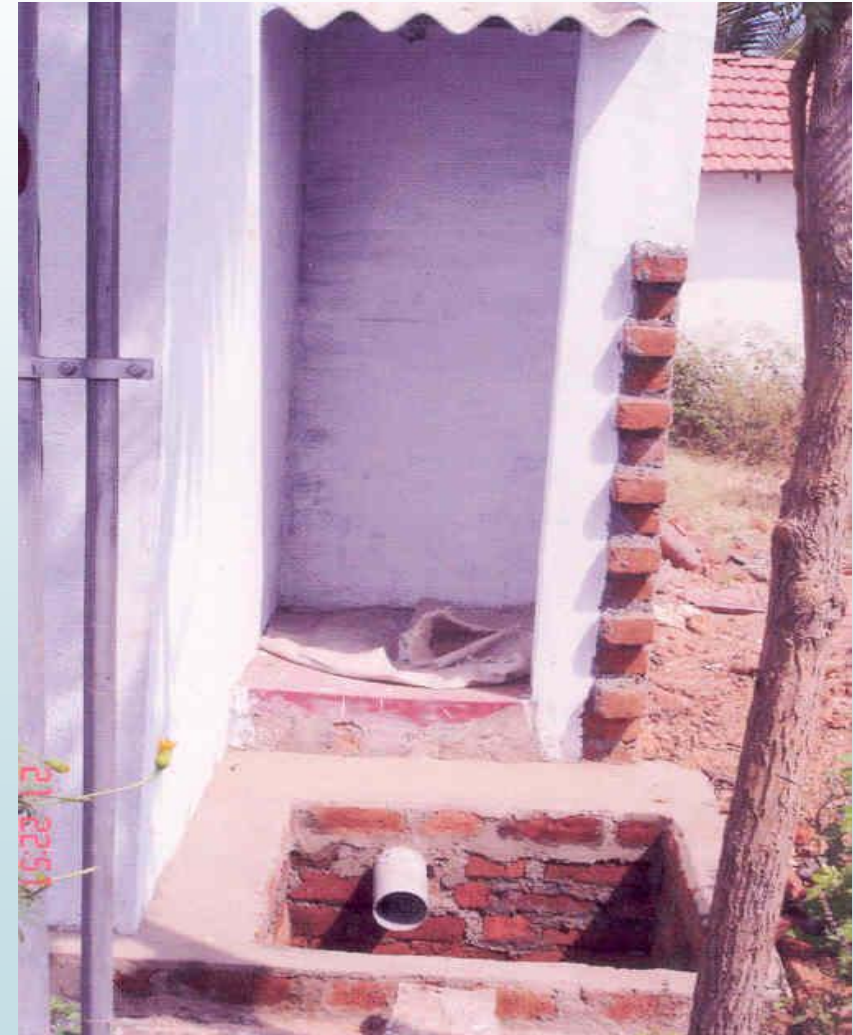
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## CONDITION OF PUBLIC TOILET



## IMPROPER DESIGN



# National Urban Sanitation Policy (NUSP) & City Sanitation Plan (CSP)



# Implementation of the NUSP

- Sanitation is a state subject and on ground implementation and sustenance of public health and environmental outcomes requires strong city level institutions and stakeholders.
- Considerable field work with technical inputs and effective consultations at local level to reflect the local needs of sanitation are required to make the plans more realistic.
- Further, to ensure quality and uniform approach it could be best managed through a single agency at the State level.

# Vision for Urban Sanitation in India

All Indian cities and towns become

- ▶ Totally Sanitized,
- ▶ Healthy,
- ▶ Liveable and
- ▶ Sustain good Public Health and Environmental outcomes

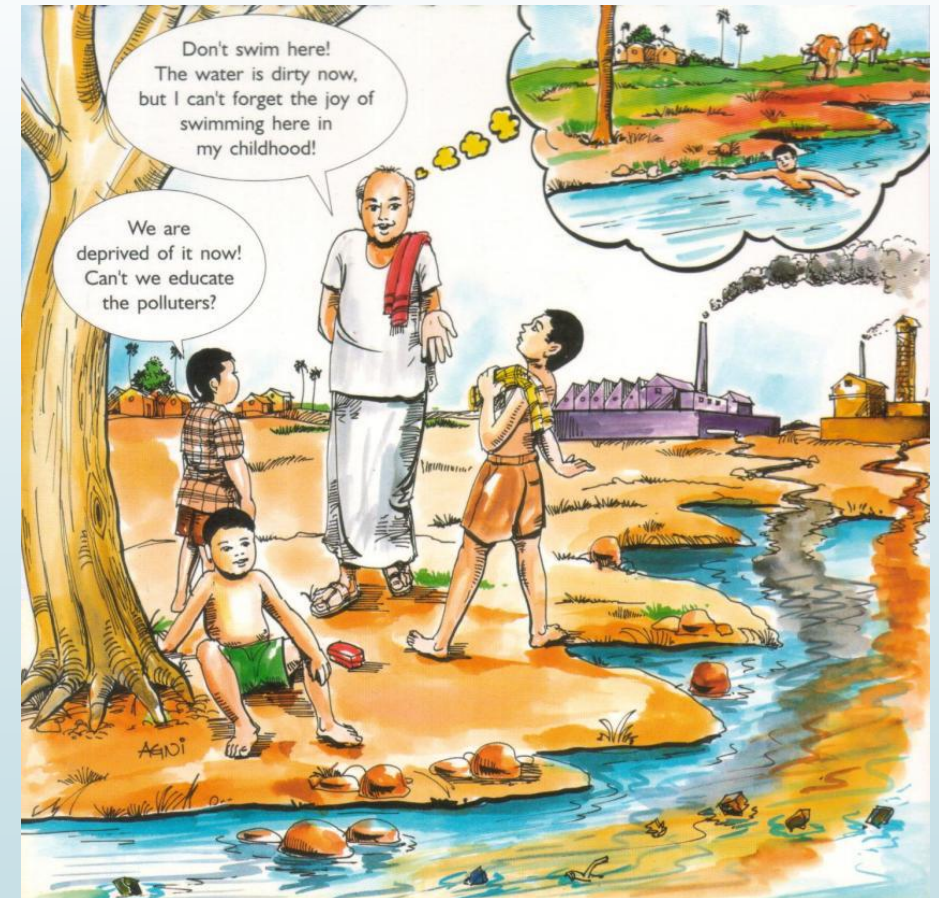
For all their citizens with a special focus on hygienic and affordable sanitation facilities for the urban poor and women.

# Policy Goals

- ▶ Awareness Generation and Behaviour Change
- ▶ Open Defecation Free Cities
- ▶ Integrated City-Wide Sanitation
- ▶ Sanitary and Safe Disposal
- ▶ Proper Operation & Maintenance of sanitary Installations

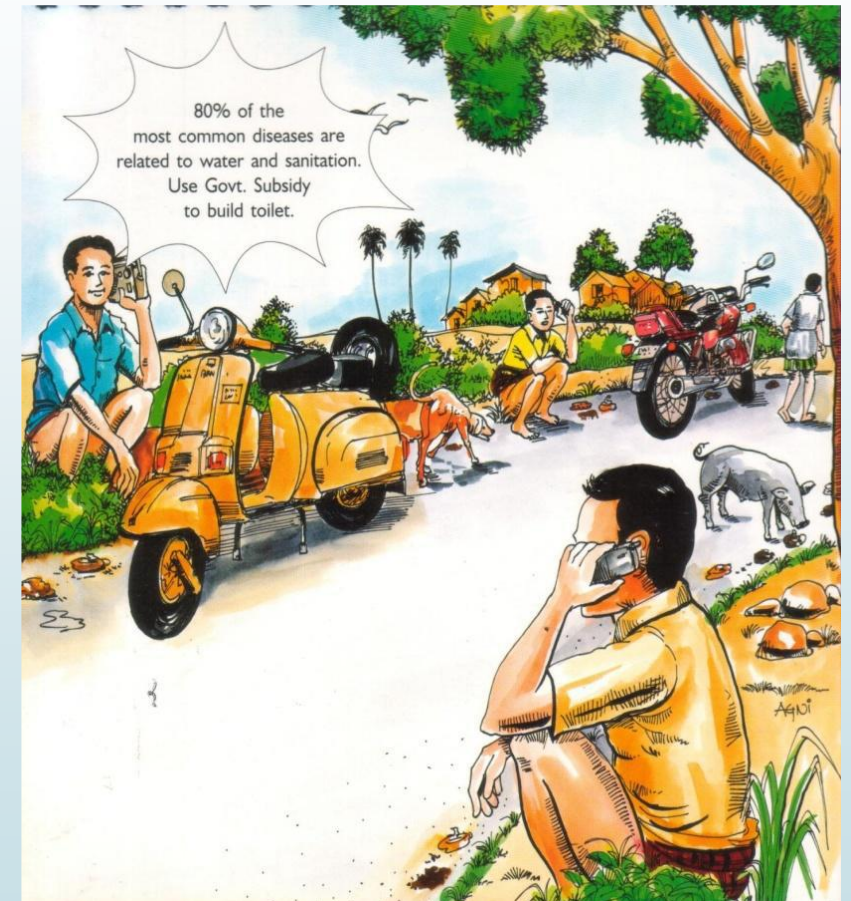
# Awareness Generation and Behavioural Change

- Generating awareness about sanitation and its linkages with **public and environmental health** amongst communities and institutions
- Promoting mechanisms to bring about and sustain behavioural changes aimed at **adoption of healthy sanitation practices**



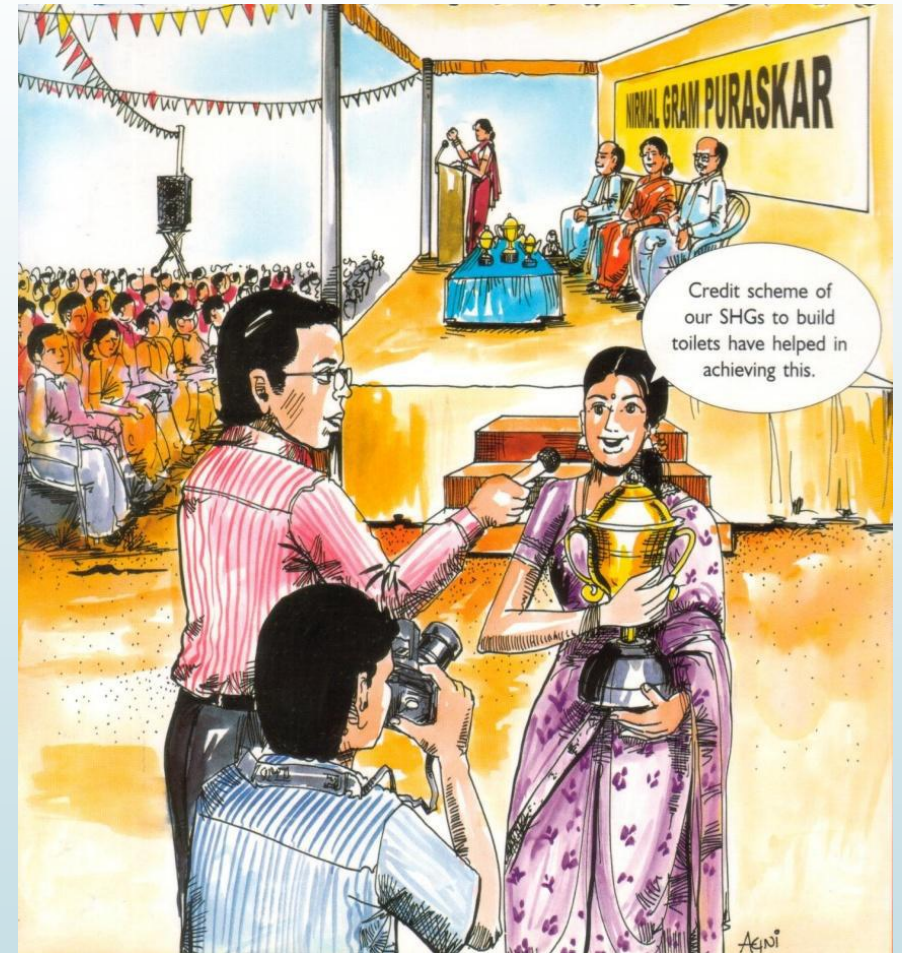
# Open Defecation Free Cities

- ▶ Promoting household access to safe sanitation facilities (including **proper disposal arrangements**)
- ▶ Promoting **community- planned and managed toilets** wherever necessary, for groups of households who have constraints of space, tenure or economic constraints in gaining access to individual facilities
- ▶ Adequate availability and 100 percent upkeep and management of public sanitation facilities in all urban areas, to **rid them of open defecation and environmental hazards**



# Integrated City-wide Sanitation

- Mainstreaming **thinking, planning and implementing** measures related to sanitation in all sectors and departmental domains as cross-cutting issue, especially in all urban management endeavours
- Strengthening national, state, city and local institutions(public, private and community) to accord priority to sanitation provision, including **planning, implementation and Operation & Maintenance (O&M) management**
- Extending access to proper sanitation facilities for **poor communities and other un-served settlements**



# Sanitary and Safe Disposal

- ▶ Promoting proper functioning of **network-based sewerage systems** and ensuring connections of households to them, wherever possible
- ▶ Promoting recycle and **reuse of treated wastewater** for non-potable applications, wherever possible, will be encouraged
- ▶ Promoting proper **disposal and treatment of sludge** from on-site installations (septic tanks, pit latrines, etc.)
- ▶ Ensuring that all the human wastes are collected safely confined and **disposed-off after treatment** so as not to cause any hazard to public health or the environment

# Proper Operation and Maintenance of All Sanitary Installations

- ▶ Promoting proper **usage, regular upkeep and maintenance** of household, community and public sanitation facilities
- ▶ Strengthening **Urban Local Bodies (ULBs)** to provide or cause to provide, sustainable sanitation services delivery



# City Sanitation Plan

- ▶ The basic step to achieve the state sanitation is **city sanitation**
- ▶ The CSP framework is to assist Urban Local Bodies, NGOs, community based organizations, citizens and private sector agencies in Govt. of India through a series of steps toward achieving the goal of **100 percent sanitation in their cities.**

# Key Area for CSP

- ▶ Safe Disposal of human excreta
- ▶ Solid Waste Management
- ▶ Liquid Waste Management
- ▶ Safe handling of drinking water
- ▶ Home sanitation & food hygiene
- ▶ Personnel hygiene
- ▶ Community environmental sanitation

# Preparations Required by Cities

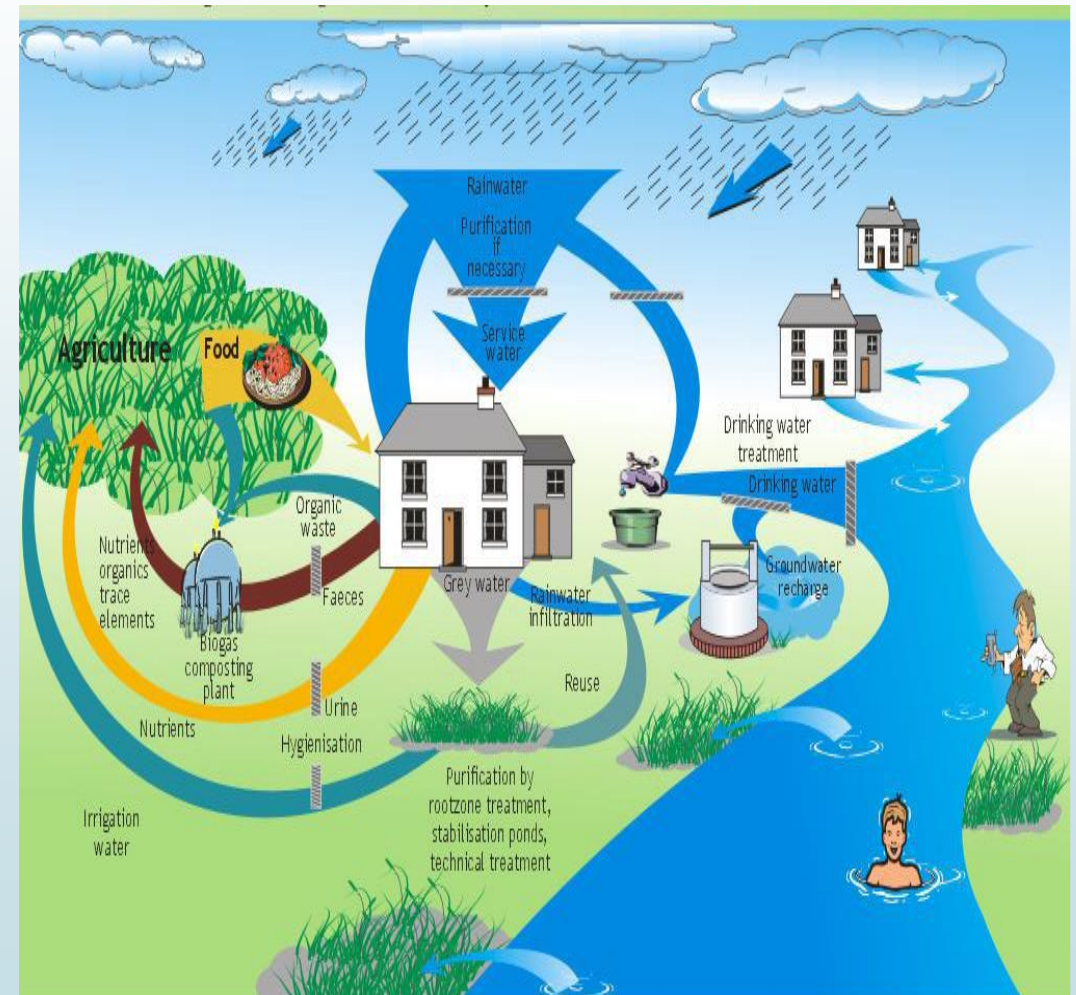
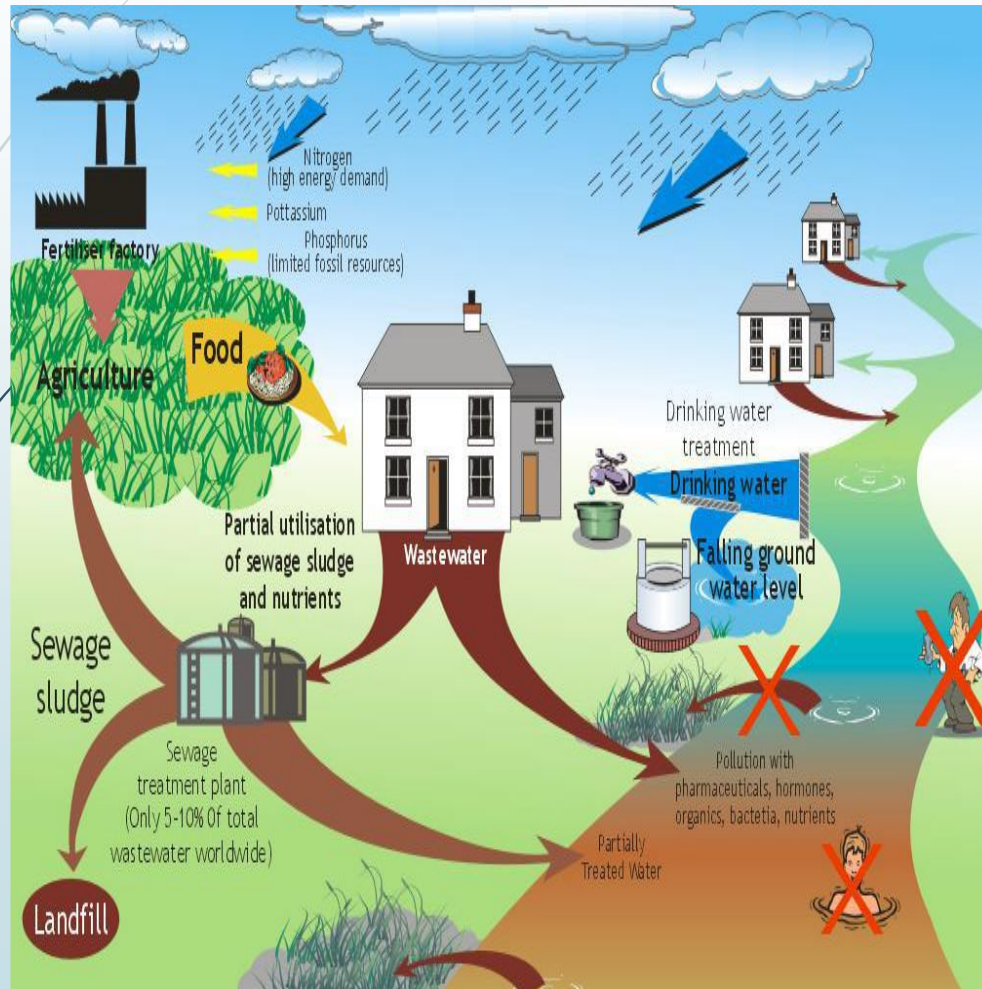
- Identify Task Force members and setup Task Force
- Appoint an Nodal Officer for CSP activity
- Update database on Sanitation
- Update maps showing existing sanitation facilities in the city
- Identify areas presently not covered under sanitation and collect relevant technical details

# ECOLOGICAL SANITATION

20

- ▶ Ecological Sanitation (**Ecosan**), is an approach which is characterized by a desire to safely “**Close The Loop**”(mainly for the nutrients and organic matter) between **Sanitation and Agriculture**
- ▶ **Ecosan** systems safely recycle excreta resources (plant nutrients and organic matter) to crop production in such a way that the use of **Non Renewable Resources** is **minimised**
- ▶ **Ecosan** systems strive to provide a hygienically safe, economical, and **closed-loop** system to convert human excreta into **Nutrients** to be returned to the soil, and **Water** to be returned to the **land**

# CONVENTIONAL & ECOLOGICAL WASTE MANAGEMENT



## SOME INTERESTING FACTS

- ▶ MANY EUROPEAN CITIES ARE BECOMING **PIPELESS** (SEWERLESS) CITIES
- ▶ AUSTRALIA IS TAXING ITS CITIZENS WITH TOILET **TAX / ECOLOGICAL TAXATION**
- ▶ CHINA IS BUILDING 5 MILLION **ECO TOILETS**
- ▶ MOST OF THE REST ROOMS OF OFFICES IN GERMANY & SWEDEN ARE **CONVERTED TO ECOTOILETS**

# ECO-SANITATION IN INDIA

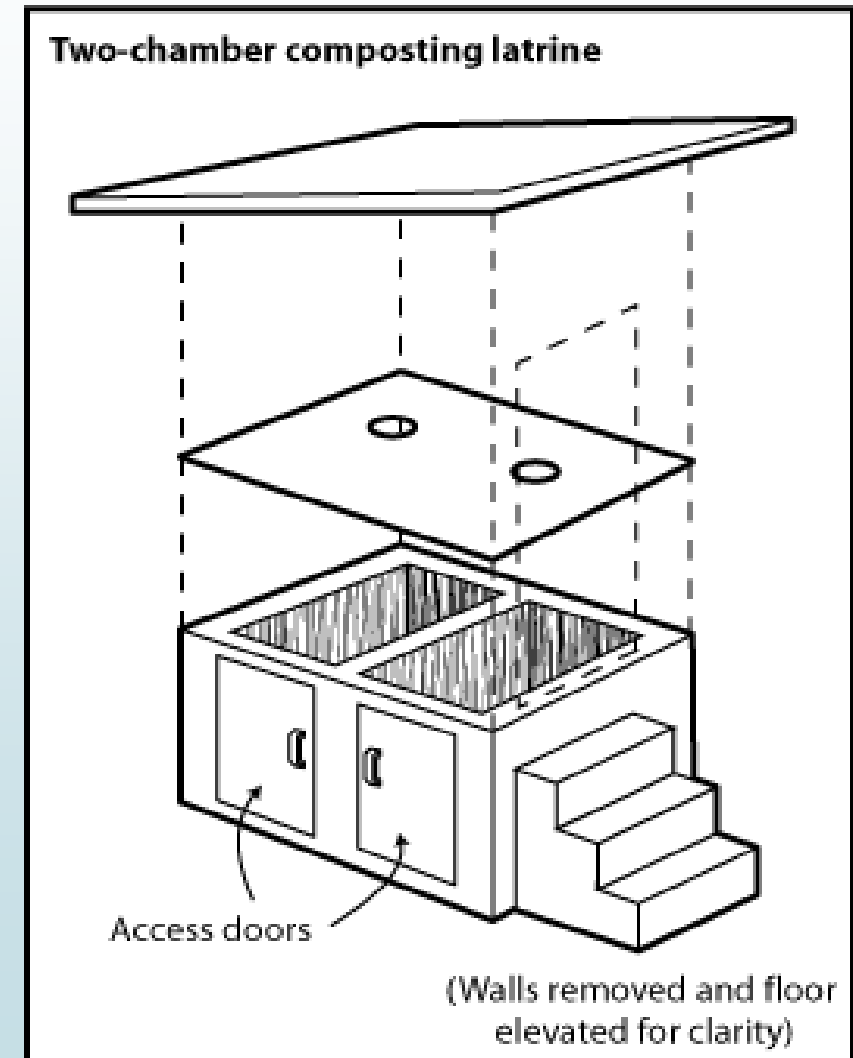
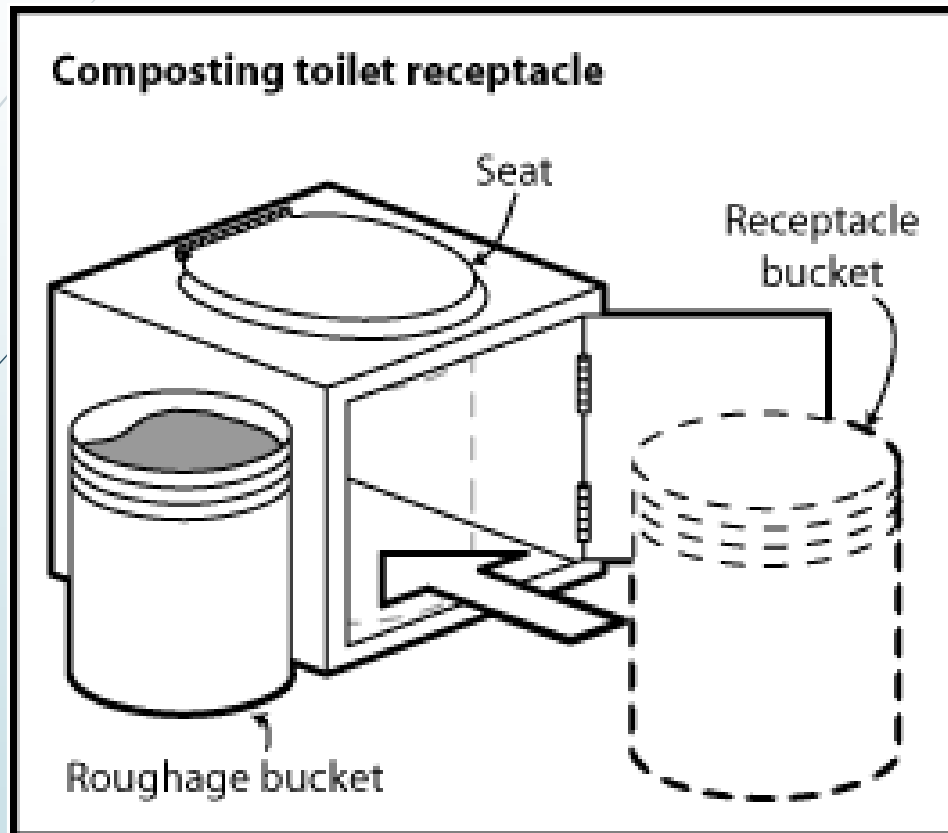
- ▶ **PREACHED AND STARTED BY MAHATMA GANDHI –THE FATHER OF NATION IN EARLY 1900s**
- ▶ **IMPORTANCE IS GIVEN IN LATE 1900s**
- ▶ **MANY OF THE STATES ARE FOLLOWING ECO-SAN APPROACH IN PERI-URBAN AND RURAL AREAS**
- ▶ **SOUTHERN INDIAN STATES ARE WELL AHEAD IN PROMOTING AND SUPPORTING ECO-SANITATION**

# ECO-TOILET

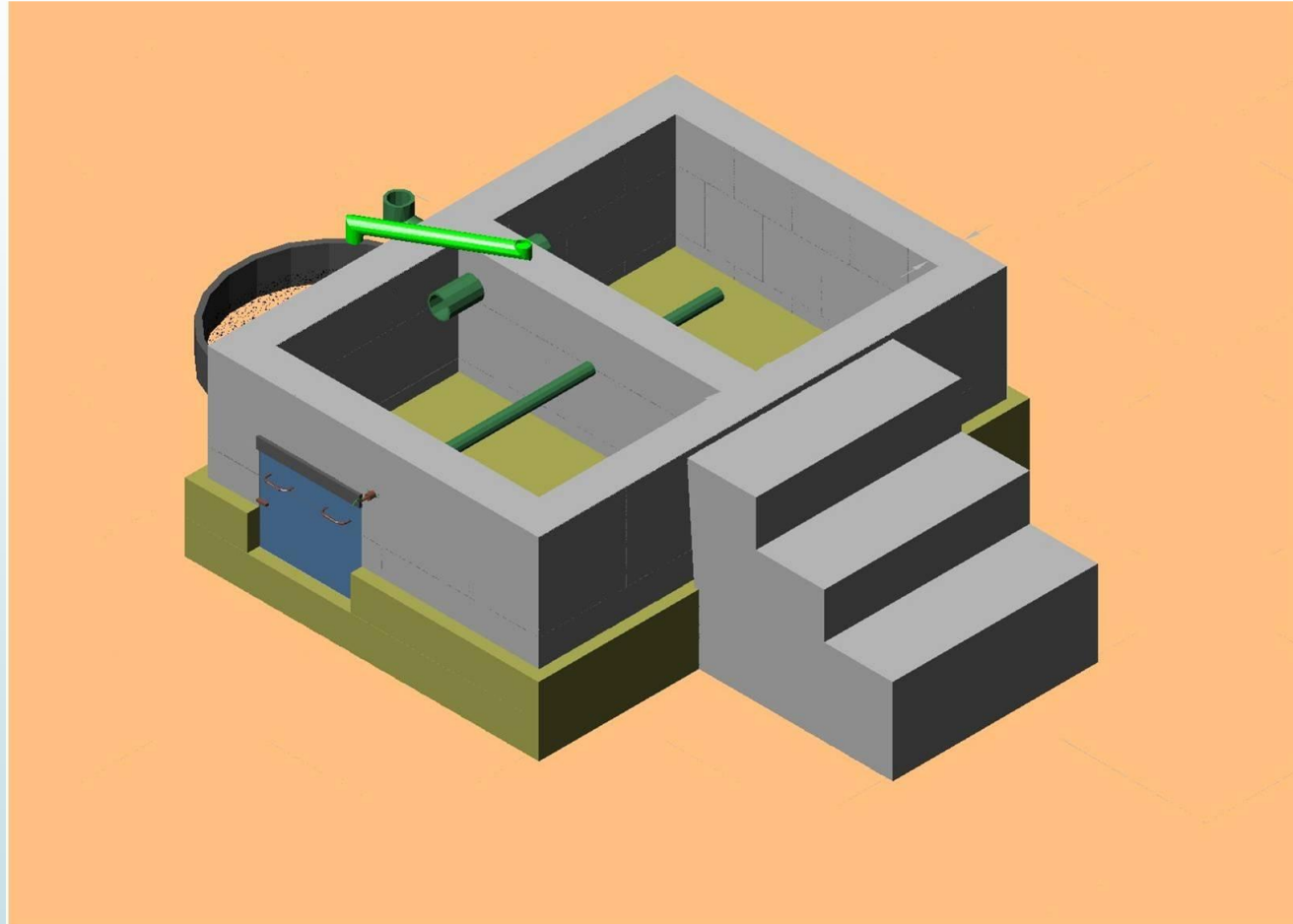
- ▶ **DRY TOILET / WATER LESS TOILET**
- ▶ **FAECAL MATTER AND URINE GET SEPARATED**
- ▶ **ABLUSION WATER GETS SEPARATED**
- ▶ **CONSERVES SIGNIFICANT QUANTITY OF WATER**
- ▶ **DOES NOT REQUIRE SEWERAGE SYSTEM**
- ▶ **SAVES HUGE LOSS OF ENERGY**



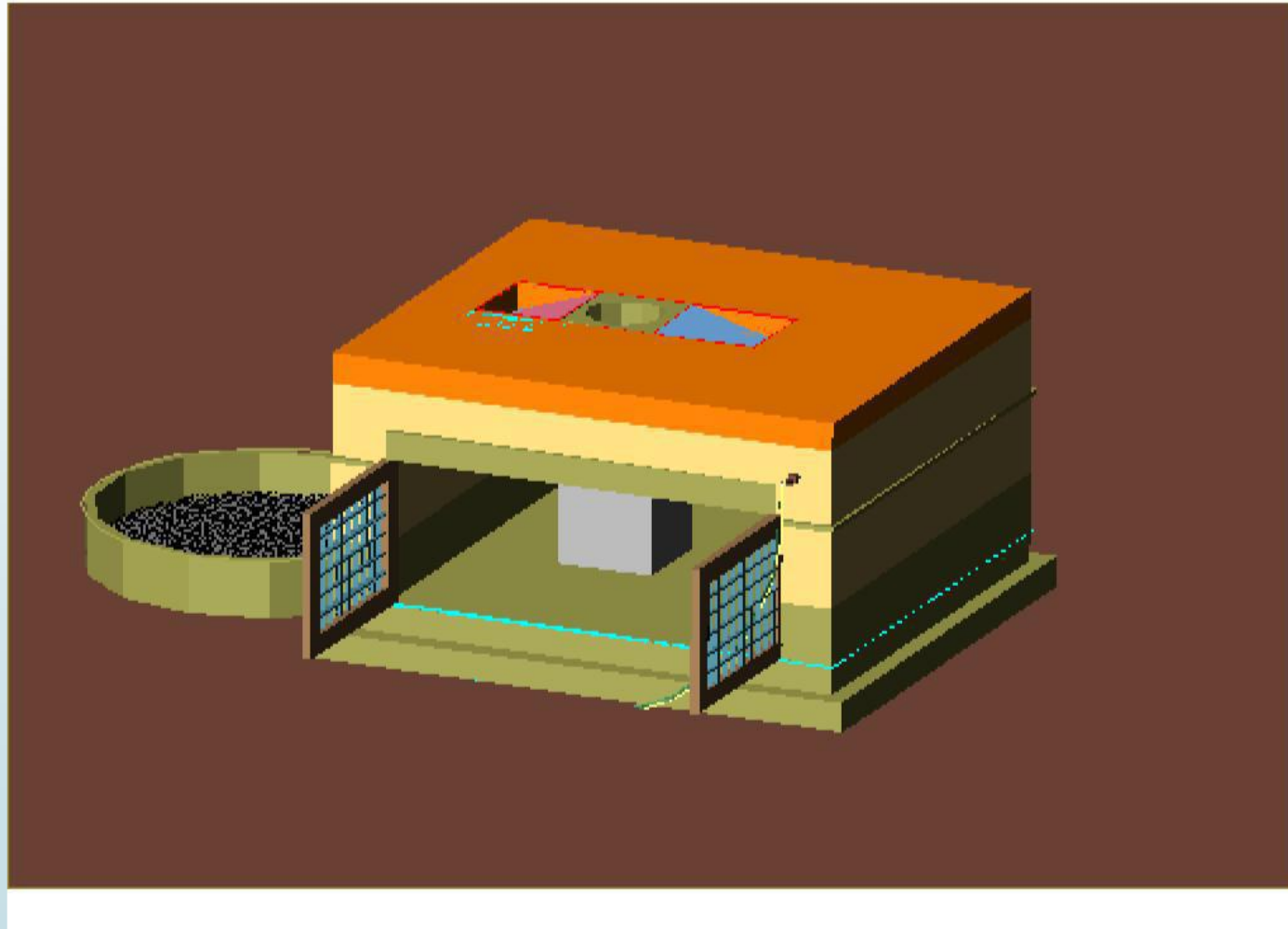
# ECO-TOILET-TYPES



# VAULT TYPE ECO -TOILET



# BIN TYPE ECO-TOILET



# TYPES OF ECO-TOILET : MEXICO, NORWAY AND NEPAL



# TYPES OF ECOTOILET : GERMANY

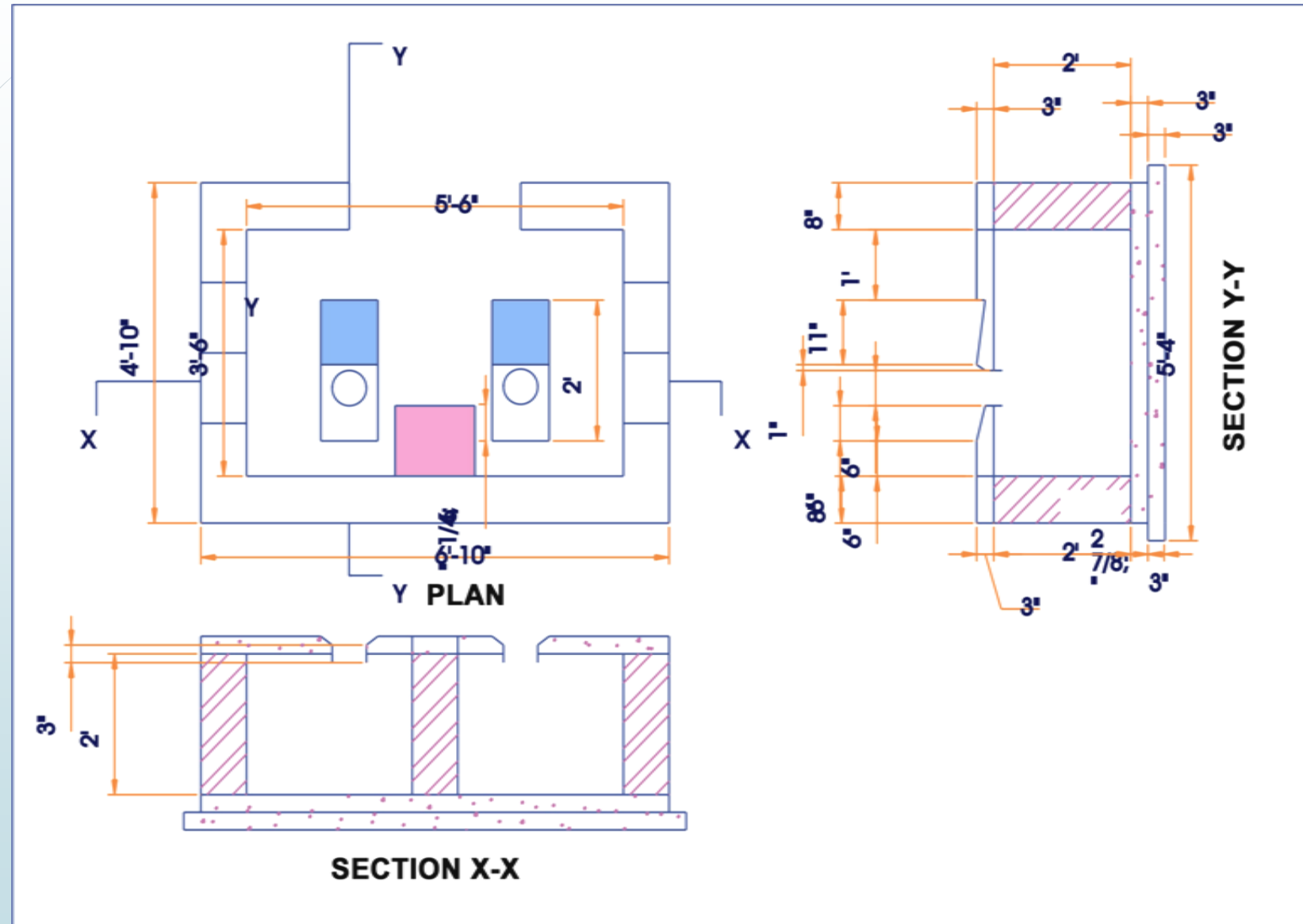


# SALIENT FEATURES OF ECO-TOILET

- ▶ LOCATED ABOVE THE GROUND
- ▶ NO UNDERGROUND SOAK PITS
- ▶ NO GROUNDWATER AND SOIL CONTAMINATION
- ▶ WATER LESS (NO FLUSHING)
- ▶ SEPARATION OF FAECES AND URINE
- ▶ SEPARATE PROVISION FOR ABLUTION AFTER DEFECATION
- ▶ PROVISION FOR TWO VAULTS FOR ALTERNATE USE
- ▶ PROVISION FOR USE OF TISSUE PAPER
- ▶ SPEEDY AND SAFE COMPOSTING OF FAECAL MATTER WITH SAW DUST / COIR DUST / SOIL WITHIN THE VAULT
- ▶ DILUTED URINE CAN BE DIRECTLY APPLIED ON PLANTS

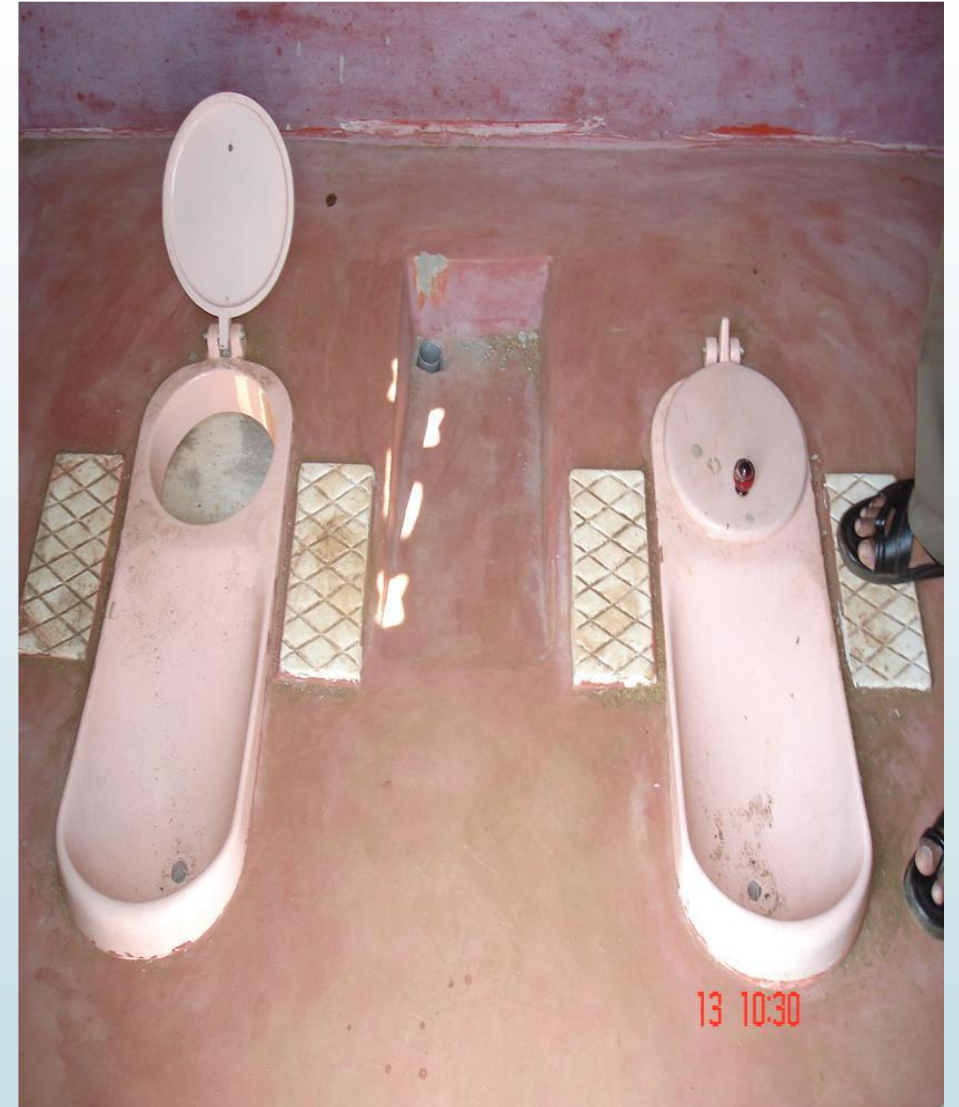
# PLAN & SECTION OF ECO-TOILET

31



# VIEWS OF ECO-TOILET

32







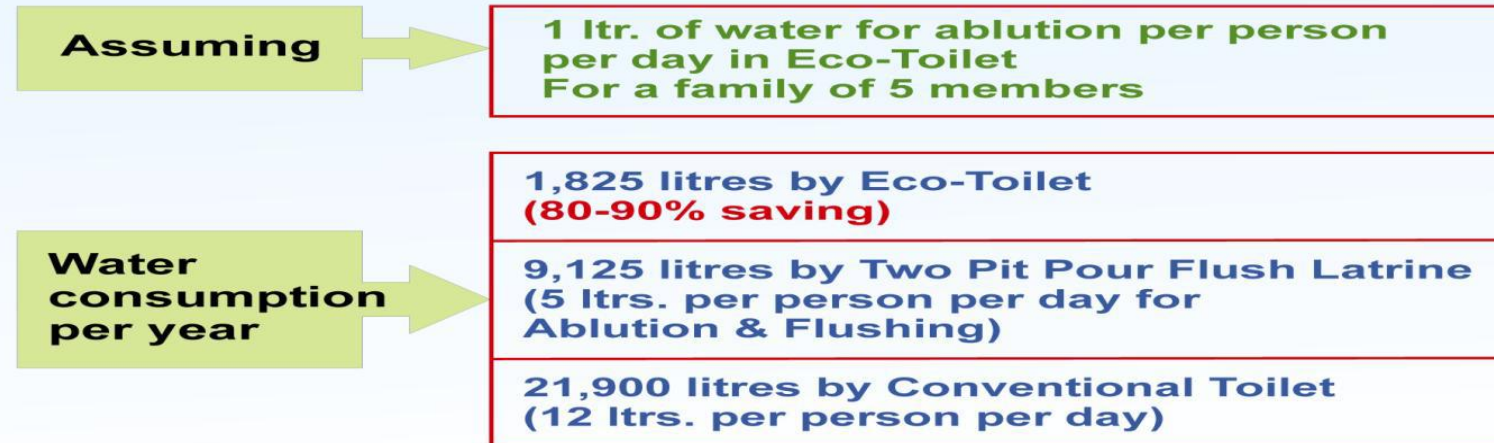
## EXCRETA COMPOSITION

Each person defecates 250-270 grams/day (wet weight)	
Moisture Content	66 - 80%
Nitrogen	5 - 7%
Phosphorous	3 - 5.4%
Potassium	1-2.5%
Carbon	40-55%
Calcium	40-55%
C/N Ratio	5-10

## URINE COMPOSITION

Each person Urinates 1.0-1.3 litres/day	
Moisture	93-96%
Nitrogen	15-19%
Carbon	11-17%
Calcium	4.5-6%
Potassium	3.0-4.5%
Phosphorous	2.5-5%

## WATER SAVING IN ECO-TOILET



## Opportunities:

- Scope for Internship for the UG & PG students of Civil and Environmental Engineering branch.
- Private consultancy
- Member of Urban local bodies, NGOs, Panchayat, Mahila Mandals.
- MPCB/ CPCB
- Companies (Environment Based).

# Resource People

Sr. No.	Name of Resource Person	Designation	Location
1.	<b>Dr. K. S. Lokesh</b>	Professor and Registrar	JSS Science and Technology University, Mysuru
2.	<b>Mr. Vijay Gawade</b>	Freelance International Consultant	Water and Environmental Sanitation, Pune
3.	<b>Mr. Sanjay Nandre</b>	Founder Member and Partner	Enprotech Solutions, Pune
4.	<b>Mr. Rohit Walvekar</b>	Project Manager	Primove Infrastructure Development Consultants Pvt.Ltd., Pune
5.	<b>Mr. Dhawal Patil</b>	General Manager - Operations	ECOSAN Services Foundation
6.	<b>Mr. Saurabh Kale</b>	Sr. Project Manager	
7.	<b>Dr. M. R. Patil</b>	Associate Professor	Department of Civil, Engineering, B.V.B. College of Engineering & Technology (Autonomous), Hubli
8.	<b>Dr. G. R. Munavalli</b>	Associate Professor	Department of Civil Engineering, Walchand College of Engineering (Autonomous), Sangli
9.	<b>Mr. Ashish Deosthali</b>	Sr. Deputy Director General,	All India Institute of Local Self Government, Mumbai
10.	<b>Mr. R. A. Nikam</b>	Associate Professor,	Department of Environmental Engineering, Kolhapur Institute of Technology's College of Engineering (Autonomous), Kolhapur
11.	<b>Mr. S. S. Shaha</b>	Associate Professor,	
12.	<b>Mr. A. A. Katkar</b>	Assistant Professor	
13.	<b>Mr. B. C. Ingavale</b>	Assistant Professor	

# Thank You.

