Emergency context - Excreta management

ECOLOGICAL SANITATION

SCOPE - TRICHY
An Emergency Situation...

• Follows from a disaster
• Puts large number of lives at risk
• Demands immediate action
• Calls for exceptional measures
• Leads to Mass Displacement
Key Environmental Health Risks

- Poor drainage, stagnant water
- People drinking contaminated water
- Unsafe Excreta disposal
- Solid waste deposition
- Inappropriate shelter
- Insecure environment
- Inability to wash hands at key times
Latrine

“A means of safe disposal or containment or recycling of human excreta”
Sanitation

The means of collecting and disposing of excreta and community liquid wastes in a hygienic way so as not to endanger the health of individuals and the community as a whole (WHO-1987)
“Sanitation is as important as Independence”
GANDHIJI

“The day every one of us gets a toilet to use, I shall know that our country has reached the pinnacle of progress”
Pandit Jawaharlal Nehru
Sanitation Options

On-site sanitation
- Pit Latrine
- Septic Tank

Off-site sanitation
- Centralized Underground Sewerage System
LIMITATIONS – LEACH PIT
LIMITATIONS – SEPTIC TANK

SCOPE - Trichy - MAY 2018 –
scopeagency1986@gmail.com
LKG student drowns in school septic tank

R. Arivanantham

KRISHNAGIRI: An LKG student in a private school at Uthangarai drowned in a septic tank of the school on Friday afternoon.

The police said V. Malathy (3), daughter of Venkatesan, fell into the partially-opened septic tank while she was playing with other students during a recess around 3.30 p.m. Her brother V. Praveen (5) was also studying in the same school.

The school authorities informed the police and the Fire and Rescue Services Department. They fished out the body from the tank. The body was sent to the Uthangarai Government Hospital for post-mortem.

On hearing about the incident, parents of the child and others rushed to the school and demanded immediate closure of the institution and the arrest of persons responsible for the incident.

Uthangarai Deputy Superintendent of Police A. Kannappan rushed to the spot and conducted an inquiry. The police arrested school correspondent S. Stephen Doss, Principal S. Mercy, Administrative Officer G. Prabhakaran and hostel warden R. Ramesh.

C. Prakasam, District Revenue Officer, told The Hindu that he pacified the agitated parents and assured them of severe action against those responsible for the incident. The school would remain closed as usual on Saturday. A decision to open it on Monday would be taken after an assessment of the situation on Sunday, the DRO said.

When contacted, Chief Education Officer S. Suganya said the school was under the control of the Inspector of Matriculation Schools, Salem.

Since he was on leave, she was rushing to the school to verify whether the school had been recognised by the government and the safety measures had been followed by the school authorities.

A report would be sent to the government.
SEPTAGE DRAINED INTO OPEN DRAINAGE AND HOLY RIVER - CAUVERY
Off-site Sanitation UGD

• Centralized Sewerage system (Under Ground Drainage system) is the chosen waste water management system in urban and peri-urban areas only.
• Excreta is transported through underground sewage drains from Individual houses to a distant place for disposal using large quantities of water for transporting human excreta.
• UGD system requires very often manual cleaning of clogged underground drains and mains (manually).
• Manual scavenging has been abolished in India in 1992 by Act of Parliament and has been amended in 2013 with severe punishment for all promoting manual scavenging.
Four die of asphyxiation

DC CORRESPONDENT
CHENNAI

Oct. 22: Four persons were killed in two incidents of asphyxiation in Pallavaram and Kanchipuram on Friday.

The first incident happened at Putheri in Periya Kanchi on Thursday night when two contract workers got into a manhole to clean municipal drainage. S. Perumal, 38, and K. Sunda-raraj, 43, who went inside the manhole without wearing necessary masks died due to asphyxiation. Fire service rescue team took their bodies out after an hour.

Kanchipuram municipal engineer on Friday claimed that workers were told not to go inside the manhole as the municipality has purchased latest equipment to clear filth from sewage pipes. Following the deaths of workers, a municipal supervisor was placed under suspension on Friday.
The different models of toilets will function well under ideal conditions but they will have to be constructed strictly as per the norms.

When the norms are not observed or geographical limitations stand in the way of efficient functioning they will become a source of potential danger to the environment.

Hence we have to look for an alternative model which will function under different field conditions and help us to close the loop on sanitation in a most environmental friendly manner.
LET US SEE AN EXAMPLE...
ECOSAN model is a solution to most of the problems we face in the field of sanitation.
The school student and his playmate the little kitten wanted to answer natural call. The young boy rushed to the cover of a tree, and when he watched his friend, was totally shocked. He saw the animal friend digging a pit, defecate and carefully close the feces with the soil. With a sheepish look he rushed to the toilet.

**We human beings have to learn a lot from our animal friends.**
What is ECOSAN?

- Ecological Sanitation is an integrated and holistic approach to the management of human excreta, utilization of the rich nutrients in both human urine and faeces.
- It promotes sustainable agriculture.
- Does not contaminate surface and groundwater sources.
- Conserves and preserves the most critical input for human life namely water.
ECOSAN

A HOLISTIC APPROACH

- Sanitation needs Integrated sustainable Ecosystem approach.
- It involves several cycles to ensure public health.
- Human excreta & wash water are not a waste.
- They are resources which could be reused for improving agricultural production and prevent contamination of the environment.
- ECOSAN approach aims at sanitizing the products and not transfer problems from one cycle to another.
ECOSAN = Triple Win

- **Water**: Protection of water resources through reduced consumption and less contamination
- **Agriculture**: Higher agricultural yields through the recovery of nutrients
- **Hygiene**: Minimisation of water-based infections

Credit: GTZ
FIT FOR DIFFERENT KINDS OF GEOGRAPHICAL CONDITIONS

The Ecosan toilets can be constructed in many different situations which would not accommodate other systems.

Rocky areas, high water table areas, water scarcity areas and sandy areas.

All these difficult site situations can be accommodated with a small amount of alteration to the basic system design.
- SCOPE initiated ECOSAN model in Thanneerpandal - Training centre of SCOPE to meet the problems faced by high water table areas.
- Two-in-one model Designed by Mr.S.Paramasivan & Mr.Kalimuthu of Water Aid.
- Size of the chamber made big since it was the first pilot model. Two vent pipes
Users numbered after using the toilet.

Urine, wash water collected in a single pot for raising kitchen garden.

First chamber was used 4320 times and when got filled up closed after 15 months.
Dr. Arno Rosmarine and Prof. Jan Olof Drangert from Sweden and a team of UNICEF officials from New Delhi, opened the first ECOSAN Compost Toilet at Thanneerpandal on Nov. 18th 2004 on the eve of "World Toilet Day"
Wash water and urine are collected together in this model.

Mangalatham is the first woman accepted for the Ecosan Construction at her residence in Kaliyapalayam.
Design change (2004) - 3 in 1 model

- Wash water, Urine and Faecal matter are collected separately

- Drop hole for faeces in the middle.
- Urine from the urine bowl in front is collected in a mud pot with holes/Jerry can.
- Wash water from the wash bowl at the rear is taken to the filter bed.
USAGE PRACTICES

1. Take out the lid
2. Sitting position should be proper so that the feecal matter is dropped right in to the drop hole without falling in the sides of the drop hole
3. After defecating move one step backward and sprinkle hand full of ash or saw dust or lime powder over the feecal matter
4. Close the drop hole with lid
5. Wash your body
6. Wash your hands using soap or ash thoroughly after using the Ecosan toilet.
rs. Shenbagavalli the pro...
No foul smell, no flies

So far 500 Toilet chambers opened and removed the compost in the presence of Government Officials, PRIs, NGOs, Foreign delegates, and the compost used in kitchen gardens.
CHAMBER OPENING ON GANDHI JEYANTHI DAY 2013
AT K.F.I SCHOOL
Arthik Samata Mandal of Regullanka Village on Krishna river banks in Andhra Pradesh visit to Musiri, ECCT
Banana Cultivation using urine at Regullanka Village
• The base of the chamber is 3 feet above the ground in the flood prone area
THE HIGH YIELD OF VEGETABLES BY USING THE COMPOST TAKEN OUT FROM ECOSAN TOILETS
First Ecosan Community Compost Toilet (ECCT) in the country at Musiri- 2005

There were two community toilets, both of them are located very close to the river Cauvery.

highly dilapidated condition and this made many people to go to the river for open defecation.

To prevent the same and provide a basic amenity to the devotees SCOPE decided to construct ECCTS.

SCOPE constructed Three ECCTs in Musiri.
Ecosan Community Compost Toilet, (ECCT)
The first chamber of ECCT is opened by Mr. V.C. Sudhakar, President, MSTP and Mr. V. Post of Netherlands
Collection of compost in ECCT
1117 Kgs from the first chamber
“Use toilet and get money”

-The brain behind this concept is Ms. Shantha Sheela Nair IAS, RD, Secretary, Tamil Nadu, and Ms. P. Amuda, I.A.S. UNICEF, New Delhi.

This is the first time in the world that toilet users are being paid as against pay and use toilets.

The urine and faeces are so rich in nutrients for farm production that they are worth buying. Those who use the toilets are paid 10 paise per use to the Ecosan toilet, on a monthly basis.
Urine from ECCT is transported to Research Field and used as a liquid fertilizer in Paddy, Banana & Short term crops to study efficacy in collaboration with TNAU, NRCB and DDWS.

Paddy field

Banana field

Horticulture field
Mrs. Shanthi, a SHG leader, who constructed the first Ecosan toilet in her house and she opened the 50th Ecosan

Individual Toilet at Kameshwaram with the support of UNICEF and so far 350 Ecosan toilets constructed and functioning well.
Mr. G. Radha, Project Officer, DRDA, Nagapattinam watering the plants near the 100th toilet in Kameshwaram in January 2007

A. Amutha, I.A.S., opened the chamber of the first ecosan toilet at Mrs. Shanthi’s house at Kameshwaram village (Tsunami hit area)
First Toilet Beauty Contest in India- Kameshwaram, July, 2007

Eligibility for participating in the contest was restricted to the first batch of the 100 Ecosan toilet families, who are using the toilets properly, and maintain the kitchen garden watered by the urine from the toilet well and keep the toilet and its environment neat, clean and hygienic.
Cash awards for the Beauty Contest

<table>
<thead>
<tr>
<th>Category</th>
<th>1st Prize</th>
<th>2nd Prize</th>
<th>3rd Prize</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Best Garden”</td>
<td>Rs. 5,000/-</td>
<td>Rs. 2,500/-</td>
<td>Rs. 1,000/-</td>
</tr>
<tr>
<td>“Best Outside Decoration”</td>
<td>Rs. 5,000/-</td>
<td>Rs. 2,500/-</td>
<td>Rs. 1,000/-</td>
</tr>
<tr>
<td>“Best Inside Decoration”</td>
<td>Rs. 5,000/-</td>
<td>Rs. 2,500/-</td>
<td>Rs. 1,000/-</td>
</tr>
</tbody>
</table>
Government of India, Unicef, Plan India has appointed SCOPE as technical Consultant for dissemination of ECOSAN concept.

Training masons for Eocosan construction in all the Sates of the country.

Training programmes have been conducted in States like, Andhrapradesh, Assam, Arunachal Pradesh, Bihar, Imachal Pradesh, Jharkhand, Karnataka, Maharashtra, Mizoram, Orissa, Rajasthan, Uttarpradesh and Uttranjal
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Filter bed Construction

2'x2'x2' SAND (5"

CHARCOAL (5"

40 MM BLUE METAL (5"

20 MM BLUE METAL(5"

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Filter bed Construction

SAND TOP LAYER (4”)

CANA INDICA

Urine – Mud pot fixing
EXPOSURE VISIT FROM TRIPURA TEAM
Opening of ECOSAN UDDT chamber - Musiri – 6\textsuperscript{th} May 2014
IEC – Mr. Saurabh from BASTI Visit to Musiri on 18th May 2014
Before Construction

SCOPE - Trichy - MAY 2018
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ECOSAN Training To Tripura Team
2nd To 5th July 2014
After completion of construction, usage practices to be explained.

Urine usage

Compost handling

Do’s and Don’ts in the Ecosan concept.
1. Before using the chamber for the first time cover the floor with dry powdered ash/saw dust or lime powder, to absorb moisture from the floor and to prevent it from sticking to the floor.

2. Always keep ash or saw dust in a bucket inside the toilet.

3. After defecate move one step backward and sprinkle ash over the faeces and cover the drop hole with the lid and cleaning your body.
4. months. Then start using the second chamber. Keep water in a small bucket and use a small mug.

5. Wash hands with soap after defecation, handling urine container and cleaning pan.

6. Keep a brush/small piece of cloth fixed with stick for cleaning the pan at regular intervals. If need be use the damp cloth for cleaning the pan.

7. When the first vault is 75% full, level the content. After that apply ash or lime at the top and seal the chamber for composting for nine
• Always wear gloves during emptying vault and wash hands with soap.
• Vent pipe should be straight as far as possible and should extend above the roof to minimum six inches, above the roof to minimum six inches.
• The cowl at the top portion should be covered with mosquito net.
• Teach new users and children the proper use of toilet.
The chamber which is not in use/sealed for composting should be well marked so that it should not be opened.

Water tap should not be provided inside the toilet.

Water should be taken with a small bucket with a mug for anal washing.
Usage practices should be explained carefully and fully, many times so that users follow them scrupulously.

The lid should be closed after defecation.

While washing the body, care should be taken to ensure that water does not get inside the drop hole.

Ash should be applied over the faeces carefully so that it will not fall inside the urine bowl or washbowl, which may lead to clogging of the flow of the liquids.
If while defecation there is a spillage on the rim of the drop hole it can be removed with a small piece of paper or wet cloth and then the same dropped inside the drop hole into the chamber.

If a few drops of or wash water goes inside the drop hole there is no serious problem, apply a little more ash.

Once a week, the flooring of the toilet outside the urine bowl, washbowl, can be cleanly wiped with a waste cloth or mop, which is available in the market.
No tap should be provided inside the toilet since it may lead to indiscriminate use of water for body washing with threat of too much water getting inside the drop hole. The water tap should be outside the toilet.

A small bucket (3 Litres capacity) with a small mug provided near the water source.

Ash can be kept in a small container inside the toilet.

The user should be told that dehydration of the faeces and the essence of the ECOSAN UDDT and lesser the water for body wash the better.

They also should be told at present they use only three Litres of water for body wash, bust 7-8 Litres to push down the faeces from out of sight from the toilet into the disposal arrangement.
After construction each family is given a user card with the details of No. of Users, starting date of using and closing the first chamber and date start using the 2\textsuperscript{nd} chamber.

The first chamber can be opened after one year from the date of closing of the first chamber for removal of compost, i.e., two years from the date of commencement of usage of the UDDT.

After removal of compost the chamber can be left open for a few days and then plastered.
Monitoring vital for success of ECOSAN UDDT

• Being a new model requiring new usage practices, continuous monitoring is vital for success of ECOSAN UDDT.
• The individual or the community to whom the toilet is constructed should be told well in advance of the usage practice before construction of the toilet and during construction of the toilet.
• The promoter (SHG) should during the first week ensure that every user is using the toilet properly. If anybody commit mistake they should be politely told of the mistake and corrected.
• For at least one week or when the user learns the usage practice their should be close monitoring.
• The lid of the drop hole should be kept closed all the time except during defecation.
• The householder should be told that water should not be enter the drop hole.
## Materials required for one Ecosan UDDT construction

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Details</th>
<th>Quantity</th>
<th>Cost</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Earthwork, Foundation using R.R rough stones</td>
<td>L.S</td>
<td>600</td>
<td>600</td>
</tr>
<tr>
<td>2</td>
<td>a) Bricks (size: 9” x 4” x 3”)(or)</td>
<td>1300 Nos. (or)</td>
<td>5 (or)</td>
<td>6500 (or)</td>
</tr>
<tr>
<td></td>
<td>b) 4” Cement Hallow Block (size:16”X4X8”)</td>
<td>200 Nos.</td>
<td>22</td>
<td>4400</td>
</tr>
<tr>
<td>3</td>
<td>a) Cement for bricks construction(53 Grade)(or)</td>
<td>6 bags</td>
<td>370</td>
<td>2220</td>
</tr>
<tr>
<td></td>
<td>b) Cement for cement hallow block construction</td>
<td>5 bags</td>
<td>370</td>
<td>1850</td>
</tr>
<tr>
<td>4</td>
<td>Sand</td>
<td>1 unit</td>
<td>750</td>
<td>750</td>
</tr>
<tr>
<td>5</td>
<td>6mm Rod</td>
<td>30kg</td>
<td>44</td>
<td>1320</td>
</tr>
<tr>
<td>6</td>
<td>Binding Wire</td>
<td>300grams</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>7</td>
<td>Steel Door Size (5’ X 2’) with4” steel clamb</td>
<td>1 No.</td>
<td>1500</td>
<td>1500</td>
</tr>
<tr>
<td></td>
<td>Description</td>
<td>Quantity</td>
<td>Unit</td>
<td>Price</td>
</tr>
<tr>
<td>---</td>
<td>------------------------------------</td>
<td>----------</td>
<td>------</td>
<td>-------</td>
</tr>
<tr>
<td>8</td>
<td>4” PVC Pipe</td>
<td>10</td>
<td></td>
<td>35</td>
</tr>
<tr>
<td>9</td>
<td>4” PVC ‘L’</td>
<td>1 no.</td>
<td></td>
<td>60</td>
</tr>
<tr>
<td>10</td>
<td>4” PVC Cowl</td>
<td>1 no.</td>
<td></td>
<td>40</td>
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<tr>
<td>11</td>
<td>4” Steel Clamb</td>
<td>2 Nos.</td>
<td></td>
<td>25</td>
</tr>
<tr>
<td>12</td>
<td>1 ¼ “ PVC Pipe</td>
<td>16 feet</td>
<td></td>
<td>225</td>
</tr>
<tr>
<td>13</td>
<td>1 ¼ PVC ‘T’</td>
<td>2 nos.</td>
<td></td>
<td>50</td>
</tr>
<tr>
<td>14</td>
<td>PVC Paste</td>
<td>100ML</td>
<td></td>
<td>30</td>
</tr>
<tr>
<td>15</td>
<td>Red Oxide</td>
<td>250 gram</td>
<td></td>
<td>50</td>
</tr>
<tr>
<td>16</td>
<td>White cem &amp; clouring</td>
<td>10kg</td>
<td></td>
<td>20</td>
</tr>
<tr>
<td>17</td>
<td>Blue Paint</td>
<td>100ml</td>
<td></td>
<td>50</td>
</tr>
<tr>
<td>18</td>
<td>Yellow Paint</td>
<td>100ml</td>
<td></td>
<td>50</td>
</tr>
<tr>
<td>19</td>
<td>Block Paint</td>
<td>100ml</td>
<td></td>
<td>50</td>
</tr>
<tr>
<td>20</td>
<td>2” Brush</td>
<td>1 no.</td>
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<td>35</td>
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<tr>
<td>21</td>
<td>4” Brush</td>
<td>1 no.</td>
<td></td>
<td>70</td>
</tr>
<tr>
<td>22</td>
<td>Cana Indica Plant</td>
<td>2 nos.</td>
<td></td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Description</td>
<td>Quantity</td>
<td>Rate</td>
<td>Total</td>
</tr>
<tr>
<td>---</td>
<td>--------------------------------------------------</td>
<td>----------</td>
<td>------</td>
<td>-------</td>
</tr>
<tr>
<td>23.</td>
<td>5 Litre capacity Plastic Bucket with lid (Red 1, Green 1)</td>
<td>2nos.</td>
<td>60</td>
<td>120</td>
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<tr>
<td>24.</td>
<td>Mug</td>
<td>1no.</td>
<td>20</td>
<td>20</td>
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<tr>
<td>25.</td>
<td>5 litre capacity mud pot &amp; Jerry can</td>
<td>1no.</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>26.</td>
<td>Brick Jally</td>
<td>2 basket</td>
<td>25</td>
<td>50</td>
</tr>
<tr>
<td>27.</td>
<td>Charcoal</td>
<td>2 basket</td>
<td>25</td>
<td>50</td>
</tr>
<tr>
<td>28.</td>
<td>Mosquitoes Net</td>
<td>1sq.f</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>29.</td>
<td>FRP Pan Three in One</td>
<td>2nos.</td>
<td>1200</td>
<td>2400</td>
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<tr>
<td>30.</td>
<td>Labour- skilled</td>
<td>7days</td>
<td>600</td>
<td>4200</td>
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<tr>
<td>31.</td>
<td>Unskilled labour (female 5, Male 1)</td>
<td>-</td>
<td>2000</td>
<td>2000</td>
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<tr>
<td></td>
<td>Female=1500 Male=500</td>
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<tr>
<td>32.</td>
<td>Labour charges for white &amp; colour washing</td>
<td>L.S</td>
<td>600</td>
<td>600</td>
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<tr>
<td>33.</td>
<td>Transportation Charges</td>
<td>L.S</td>
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<tr>
<td></td>
<td>Total</td>
<td></td>
<td>22500</td>
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</tr>
</tbody>
</table>
SCOPE constructed more than 10 School Ecocan UDTs in Trichy, Krishnagiri, Nagappattinam, Chengalput and Kancheepuram Districts.

In India more than 75 schools have ECOSAN UDDT complex.

The collection of urine used in kitchen garden and farm cultivation like tomato, brinjal, cashew nut, banana, coconut etc.
Mr. Raghuvansh Singh Prasad, Honble Minister released the school toilet FRP pan.

Mr. Devaraj, Mr. Kumar AloK were the participants in the workshop held at New Delhi In 2007

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SCHOOL TO VILLAGE

An ECOSAN UDDT complex is functioning at Thimmapuram High School, in Krishnagiri District, Tamilnadu.

After using the toilet the children and the Headmaster approached SCOPE to construct Ecosan toilet in their individual house holds.

Because the village is located nearby the irrigation tank, high-water table area, the other system of toilets are not working properly.
Thimmapuram village is a high water table area with over 120 ECOSAN toilets and ECOSAN UDDTs with sanitary napkin incinerator in 52 houses (highest in the country).

The village in Krishnagiri District is the focus District of UNICEF who have funded the project along with DRDA.

Urine collected in the UDDT is used for watering jasmine plants.

Yield and quality of flowers is enhanced by urine application.
• Application of urine has resulted in improving the quality of the flowers (jasmine) and increasing the yield.

Pilot scale struvite reactor developed by IIT Delhi at SCOPE Research Centre Musiri

Urine in the beaker and struvite powder

Struvite Packet
Toilet design

- Bowl under feces hole
- Urine hole
- Sawdust tank
- Pushed rod for turning bowl
- Sawdust button

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Composition of feces system

- Urine diversion eco-toilet
- Feces drop chute
- Feces bin and bin cover
- Ventilation system
Feces bin is changed to sealed cabinet

O&M in the past years showed that the sealing performance of the bin cover is not good enough. A trial of replacing the bin covers with sealed cabins showed good result. Up to now, 51 basements have been provided with the sealed cabins.
ECOPAN

LID OPEN
LID CLOSE

EXCRETA
WATER

ALL THREE SEPARATED

EXCRETA
WATER
URINE

ECO SOLUTIONS
The main minerals required by plants are nitrogen, potassium, and phosphorus. Urine contains roughly 80% of the nitrogen, 60% of the potassium, and 55% of the phosphorus that humans excrete.

### Pee

**Composition of Nutrients**

Kg / Person / Year

- N (4 kg)
- P (0.5 kg)
- K (1 kg)

### Poo

**Composition of Nutrients**

Kg / Person / Year

- N (0.5 kg)
- P (0.2 kg)
- K (0.3 kg)
It’s worth 49 million US$

It’s worth 1.8 Billion US$!

The global human waste (excrements), is estimated to be 8.5 million tons each day.

700 million rural Indian people excrete about 350 million tons of organic fertilizer each year.

It’s not a waste...
The NIRMAL GRAM PURASKAR awarded to SCOPE for its exemplary work on sanitation for the year 2006

The Tamil Nadu Chief Minister Best NGO Award on 15th August, 2005
Thank You!