Non Networked Sanitation Context & Priorities for Uttarakhand State

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General Manager.
Contents

• Setting the context
• Sanitation situations
• Priorities and way forward
• FSSM options- Hilly region
Natural resources

Bhagirathi River
Tehri Reservoir
Natural resources

Tehri, Uttarakhand
Non Networked Sanitation - Context and Priorities for Uttarakhand State
Land use
Population distribution

Urban District Population

Rural Population Distribution
Urban Local Bodies

- **6 Nagar Nigams**
  - 1 lakhs + population
  - Mostly served by off site sanitation system facing challenges

- **31 Nagar Palika Parishads**
  - < 50,000 population
  - Served by onsite sanitation system

- **41 Nagar Panchayats**
  - < 15,000 population
  - Served by onsite sanitation system
ULBs in focus

• AMRUT and Namami Ganga

• Focus on
  – Sewerage and centralised STPs
  – Intercepting & diversion followed by treating the wastewater at STPs

• Projects are stalled
  – Mobilisation of funds
  – Land acquisition
SANITATION SITUATION

Uttarakhand

Non Networked Sanitation - Context and Priorities for Uttarakhand State
• Mandatory to have either sewer connection or construct a septic tank
• Dependence on onsite sanitation systems much higher.
• Gaps in conveyance!
• Higher health hazard at neighbourhood.
Sanitation system

User Interface
- Almost 100% coverage through IHHT, CT
- Flush toilet
- Domestic wastewater
- 20% HHs cannot be connected to sewerage

Conveyance
- Sewer clogging
- Challenges during laying of sewers
- Sewer length: 826 km
- Sewer connections: 65322
- O&M Expense: INR 1 lakh per km or INR 1200 per connection

Treatment
- Pey Jal Nigam
  - No. of STPs: 28
  - Capacity: 225 MLD
  - Utilised: 103 MLD
- Jal Sansthan
  - No. of STPs: 10
  - Capacity: 95 MLD

Reuse/Disposal
- Disposal in surface water
Sanitation system non sewered

User Interface
- Almost 100% coverage through IHHT, CT
- Flush toilet
- Blackwater-excreta, urine, anal cleansing and flush water

Containment
- Mandatory to have septic tank
- Baffled tanks but not as per prescribed by CPHEEO manual
- Land constraints
- Unlined bottom

Conveyance
- ULBs do not have vacuum trucks
- No presence of private operators
- No demand for emptying of septic tank
- Manually emptied into ditches

Treatment
- Co treatment is practiced
- Illegally dumped in water bodies or land
- Rudrapur to have first FSTP!

Reuse/Disposal
- Trenching at household level
- Disposed into the natural drains or rivers

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New Tehri

- Relocated in 1980s
- Nagar Palika Parishad
- Population: 24,014 (census 2011)
- Sewerage network
- Up to 85% house connections
- STP Capacity 5 MLD
- Current utilization 2.5 MLD
PRIORITIES & WAY FORWARD

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Priorities

• State policy and reforms
  – FSSM Policy
  – FSSM Strategy Plan
  – FSSM operative guidelines for ULBs

• Capacity building of ULBs
  – Creating awareness among the citizens – Construction of septic tanks
  – Planning of FSSM – Coveyance & Treatment

• Capacity building of Parastatal bodies
  – Support to ULBs for planning of FSSM
  – Monitoring of the execution and operation of FSSM
Emptying and conveyance

- Septic tank volume: 4 m³
- Solid content: 3%
- Emptying time: 20 min
- Weight: approx. 4 Ton
- Conveyance time: 30 min
- Conveyance time: 15 min
- Decanting: 15 min
- Solid liquid process: 60 min
- Total Time: 140 min/household
- Travel distance: 20 km/household
Dewatering trucks

Total Time 70 min/household

Emptying time: 60 min
Weight: approx. 200 kg

Septic tank volume: 4 m$^3$
Solid content: 3%

Conveyance time: 30 min
Unloading: 15 min

Travel distance 2.5 km/household

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Land disposal

Surface application

Ridge and furrow irrigation method for applying septage to land

Subsurface incorporation

Use of special equipment for incorporating septage in the top layer of the soil safely

Burial

Deep row entrenchment
Solid liquid separation

The settleable solids can contribute to more than 90% to the TSS, BOD and COD of the septage.

Settling thickening tank allows separation of the solids and liquid. The solids need to be further treated before disposal.

Geo bags can be used for solid liquid separation. The filled bags can later be used for slope stabilization.
Co treatment at STPs

Permanent receiving stations

Components of Septage receiving station

- Dumping stations
- Screens
- Grit removal
- Equalization tank
- Odor control unit

Objective: To pretreat the septage and safely transfer it to the STP or the sewer network
Co treatment at STPs

Mechanized receiving stations

- Mechanical septage receiving stations provide screening, grit removal
- Washes and compresses the screenings for easy transfer or disposal
- Washes the grit and makes it safe for further handling or disposal
- Compact and easy to install
- Smaller foot print
Co treatment at STPs

Transfer station

Septage is transferred to bigger trucks for longer hauls

Sewer connected station

Solids are retained in the tank and the supernatant is pumped in the sewers

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## Independent FSTPs

<table>
<thead>
<tr>
<th>Process</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Solid liquid separation</strong></td>
<td>Easily settleable solids are separated.</td>
</tr>
<tr>
<td>• Settling tanks</td>
<td></td>
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<tr>
<td>• Thickening ponds</td>
<td></td>
</tr>
<tr>
<td>• Geobags</td>
<td></td>
</tr>
<tr>
<td><strong>Biological treatment</strong></td>
<td>Organic solids are digested and the sludge is stabilized.</td>
</tr>
<tr>
<td>• Lime stabilization</td>
<td></td>
</tr>
<tr>
<td>• Digester</td>
<td></td>
</tr>
<tr>
<td>• Anaerobic baffled reactor</td>
<td></td>
</tr>
<tr>
<td><strong>Stabilization</strong></td>
<td>Physical treatment</td>
</tr>
<tr>
<td><strong>Dewatering / Drying</strong></td>
<td>Reduction of moisture content in the sludge.</td>
</tr>
<tr>
<td>• Planted drying beds</td>
<td></td>
</tr>
<tr>
<td>• Mechanical drying</td>
<td></td>
</tr>
<tr>
<td>• Anaerobic drying</td>
<td></td>
</tr>
<tr>
<td><strong>Pathogen reduction</strong></td>
<td>Physical treatment</td>
</tr>
<tr>
<td><strong>Potential end products</strong></td>
<td>Disinfecting the sludge for its safe reuse or disposal.</td>
</tr>
<tr>
<td>• Storage and further drying</td>
<td></td>
</tr>
<tr>
<td>• Heat drying</td>
<td></td>
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<tr>
<td>• Incineration</td>
<td></td>
</tr>
<tr>
<td>• Pyrolysis</td>
<td></td>
</tr>
<tr>
<td>• Dry sludge</td>
<td></td>
</tr>
<tr>
<td>• Biomass</td>
<td></td>
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<tr>
<td>• Compost</td>
<td></td>
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<tr>
<td>• Energy</td>
<td></td>
</tr>
<tr>
<td>• Building material</td>
<td></td>
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</tbody>
</table>

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### FST options for Hilly Regions

<table>
<thead>
<tr>
<th>Solid Liquid Separation</th>
<th>Stabilization</th>
<th>Dewatering/Drying</th>
<th>Pathogen reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geobags</td>
<td>Lime stabilization</td>
<td>Sun drying</td>
<td>Storage</td>
</tr>
<tr>
<td>Settling thickening tank</td>
<td>Settling thickening tank</td>
<td>Planted drying beds</td>
<td>Drying</td>
</tr>
<tr>
<td>Settling thickening tank</td>
<td></td>
<td>Mechanical dewatering</td>
<td>Incineration</td>
</tr>
<tr>
<td>Settling thickening tank</td>
<td></td>
<td>Mechanical dewatering /drying</td>
<td></td>
</tr>
</tbody>
</table>

- **Solid Liquid Separation**
  - Geobags
  - Settling thickening tank
  - Settling thickening tank
  - Settling thickening tank

- **Stabilization**
  - Lime stabilization

- **Dewatering/Drying**
  - Sun drying
  - Planted drying beds
  - Mechanical dewatering
  - Mechanical dewatering /drying

- **Pathogen reduction**
  - Storage
  - Drying
  - Incineration

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Thank You!

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Log on to: www.ecosanservices.org