Managing Septage in Ganga Cities
An analysis of excreta management in 21 priority towns/cities through SFDs

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Understanding Excreta Management

**The Three Pathways** Excreta generated in a city can follow three pathways:

- **Offsite Sanitation:** Toilets connected to drainage networks like a sewerage system which conveys the excreta away from the site, preferably to a sewage treatment plant.

- **Onsite Sanitation:** Toilets connected to a tank or a pit, which stores the excreta within the site. These systems generally produce partially treated effluent and faecal sludge/ septage that needs periodic emptying.

- **Open Defecation:** Users do not have access to a toilet and hence defecate in the open.

**Sewage vs Faecal Sludge**

Sewage is untreated wastewater which contains faeces and urine—this wastewater gets conveyed through the sewerage system. Generally, grey water from the kitchen and bathroom also becomes part of sewage. The BOD of sewage ranges from 150–350 mg/l and all sewage treatment plants are designed for this load. Faecal sludge/septage is semisolid slurry, it is emptied out of septic tanks/pits and is much more concentrated than sewage. The BOD of faecal sludge ranges from 1,000–20,000 mg/l.

**What is an SFD?** An excreta flow diagram (also often described as Shit Flow Diagram) is a tool to readily understand and communicate how excreta physically flows through a city or town. SFDs show how excreta is or is not managed as it moves from defecation to disposal or end-use. The SFD report presents the service delivery context of the city or town and the data sources used for the assessment.
What is a SFD?
(एस एफ डी क्या है?)

A diagram that shows the pathways from defecation to final fate

A concise narrative report on the service delivery context

A complete record of all the data sources

मलत्याग का अंतिम मार्ग तक का रेखाचित्र

सैनिटेशन चैन सर्विस डिलिवरी की संशिष्त रिपोर्ट

ढाटा रिसर्सेज का पूर्ण रिकॉर्ड
What is an SFD

- An effective communications and advocacy tool to engage city stakeholders like political leaders, sanitation experts and civil society organizations in a coordinated dialogue about excreta management.

- A tool for engineers, planners and decision-makers to inform urban sanitation programming.

- Based on contributing populations, it gives an indication of where their excreta goes.

- A representation of public health hazard.

- An overview from which to develop sanitation priorities.
Practical applications: (एस एफ डी की उपयोगिता)

- Initiate planning at city level (शहरों की योजना बनाने में सहयोग)
- Pitch for financing sanitation infrastructure (सैनिटेशन इन्फ्रास्ट्रूक्चर के लिए वित्त व्यवस्था रूप से देता है)
- Gaining political support (राजनीतिक सहायता)
- Stakeholder involvement (हिल्कार्टाओं की सहभागीता)
- Coordination of various actors (विभिन्न हिल्कार्टाओं के बीच में समन्वय)
- Establishing baselines and monitoring progress?? (आधार रेखाओं स्थापित करना और प्रगति की निगरानी)
- Etc…
Advocacy at City, State and National level

PROPOSED 10 KLD PILOT FAECAL SLUDGE AND SEPTAGE TREATMENT PLANT – CHUNAR

OVERVIEW
- National Mission for Clean Ganga (NMCG) aims to improve effective abatement of pollution and rejuvenation of the river Ganges by exploring and promoting eco-friendly and nature-based treatment technologies to manage faecal sludge and septage in small and medium towns in Ganga basin.
- Chunar, a small town on the banks of river Ganges, has been selected as the first small town in the basin to get a dedicated Faecal Sludge and Septage Treatment Plant (FSTP) of 10 KLD capacity.
- Centre for Science and Environment (CSE), as a partner organization of NMCG, is providing technical support to the town of Chunar for improving sanitation in the city by mainstreaming Faecal Sludge and Septage Management.
- CSE has set-up a Technical Support Unit (TSU) in Chunar to support facilitate and handhold city level agencies in planning, creating operating guidelines and installing frameworks as well as designing and executing Faecal Sludge and Septage Management (FSSM) practices in cities across the town of Chunar.
- CSE is further building capacities of city officials, decision makers and other stakeholders involved in the implementation of city sanitation programmes. This would include conducting field exposure visits for officials to explore good management practices.
How to Read SFD..? (एस एफ डी कैसे पढ़ें)
Master SFD

### Containment
- **Offsite sanitation**
  - WW contained
  - WW not contained
- **Onsite sanitation**
  - SN contained
  - SN not contained
  - FS contained
  - FS not contained
- **Open defecation**

### Emptying
- WW contained delivered to treatment
- WW not contained delivered to treatment
- SN contained and delivered to treatment
- SN not contained delivered to treatment
- FS contained - not emptied
- FS contained - emptied
- FS not contained - emptied

### Transport
- FS delivered to treatment

### Treatment
- % WW treated
- % SN treated
- % FS contained - not emptied
- % FS treated

### Key
<table>
<thead>
<tr>
<th>Proportion of population</th>
<th>% Open defecation</th>
<th>% FS not contained - not emptied</th>
<th>% FS not delivered to treatment</th>
<th>% SN not delivered to treatment</th>
<th>% WW not delivered to treatment</th>
<th>% FS not treated</th>
<th>% SN not treated</th>
<th>% WW not treated</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ww: Wastewater, Fs: Faecal sludge, Sn: Supernatant</strong></td>
<td>Safely managed</td>
<td>Unsafely managed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
• Tested the methodology of data collection (डाटा कलेक्ट करने की कार्यप्रणाली का परीक्षण)
• More than 500 SFDs (different versions) developed in India, by various agents (भारत में 500 से अधिक एसएफडी विकसित किये गए विभिन एजेंट्स द्वारा)
• CSE developed more than 100 SFDs (सीएसई द्वारा 100 से अधिक एसएफडी विकसित किये गए)
• Used as an advocacy tool to sensitize the decision makers (निर्णयकर्ता के लिए पक्षपात करने वाला साधन)
• Done baseline study for developing City Sanitation Plans in Ganga basin (represents almost 40% Indian population) (गंगा बेसिन के शहरों की बेसलाइन स्थडी की गयी शहरव्यापी स्वच्छता योजना विकसित करने के लिए)
• Did analysis of sanitation in Urban Uttar Pradesh (most populous state in India) using SFDs of 66 major cities (शहरी उत्तर प्रदेश आर्मेनाट शैनेटेशन का विश्लेषण किया गया)
• Done baseline study of Hindon river basin through SFDs to decide on the relevant projects (हिंडन रिवर बेसिन की एसएफडी द्वारा बेसलाइन स्थडी की गयी)
• Used SFDs to monitor the progress of cities (एसएफडी द्वारा शहरों की प्रगति की निगरानी)
SFD of Urban Uttar Pradesh

CSE's analysis reports released by PS UD at State Workshop & by the Secretary MoHUA and DG NMCG at SFD Week April 2018

CSE Research Report submitted to NMCG Nov. 2020
Cities selected for Mapping Status of Septage Management
Status of Containment Systems in Ganga Basin Cities

These containment systems generate two types of by-products:

(i) Faecal sludge, that should be emptied periodically but is only emptied when the tank gets full and there is a backflow to the toilet. Faecal sludge from septic tanks is also known as septage.

(ii) Effluent (or supernatant), the semi-treated liquid component, which ideally should be infiltrated into the ground through a soak-pit (in case of low risk of ground water pollution) or undergo further treatment, but is discharged into open drains/open ground/water bodies.
Status of Emptying in Ganga Basin Cities

**THE PROHIBITION OF EMPLOYMENT AS MANUAL SCAVENGERS AND THEIR REHABILITATION ACT, 2013**

This act prohibits employment of manual scavengers and insanitary latrines—laying strong emphasis on rehabilitation of manual scavengers. The broad objectives of the act are to eliminate insanitary latrines, prohibit the employment of manual scavengers and the hazardous manual cleaning of sewer and septic tanks, and to maintain a survey of manual scavengers and their rehabilitation.

**Figure 8: Types of empters**

- **Manual empters**: 1523
- **Mechanical empters**: 122

Images depict the process of emptying with both manual and mechanical methods.
Status of Sewage & Septage Treatment in Ganga Basin Cities

- Sewage not treated: 34%
- FS treated: 11%
- SN treated: 30%
- Sewage treated: 66%
- FS not treated: 89%
- SN not treated: 70%

*Note: Sewage is wastewater which is flowing into sewer network*
### Summary of Sewage & Septage Management

<table>
<thead>
<tr>
<th>CITY</th>
<th>POPULATION</th>
<th>OPEN DEFECATION</th>
<th>OFFSITE</th>
<th>ONSITE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prayagraj</td>
<td>13,78,295</td>
<td>0%</td>
<td>37%</td>
<td>17%</td>
</tr>
<tr>
<td>Kanpur</td>
<td>30,11,693</td>
<td>1%</td>
<td>36%</td>
<td>22%</td>
</tr>
<tr>
<td>Varanasi</td>
<td>11,98,491</td>
<td>1%</td>
<td>21%</td>
<td>44%</td>
</tr>
<tr>
<td>Patna</td>
<td>16,80,000</td>
<td>5%</td>
<td>6%</td>
<td>19%</td>
</tr>
<tr>
<td>Mirzapur</td>
<td>2,33,691</td>
<td>9%</td>
<td>17%</td>
<td>13%</td>
</tr>
<tr>
<td>Jamalpur</td>
<td>1,30,530</td>
<td>2%</td>
<td>0%</td>
<td>5%</td>
</tr>
<tr>
<td>Farukhabad</td>
<td>2,79,012</td>
<td>1%</td>
<td>1%</td>
<td>24%</td>
</tr>
<tr>
<td>Bhagalpur</td>
<td>4,70,335</td>
<td>1%</td>
<td>0%</td>
<td>10%</td>
</tr>
<tr>
<td>Haldia</td>
<td>2,48,578</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Ramnagar</td>
<td>49,132</td>
<td>13%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Gangaghat</td>
<td>84,072</td>
<td>14%</td>
<td>0%</td>
<td>2%</td>
</tr>
<tr>
<td>Hastinapur</td>
<td>26,452</td>
<td>9%</td>
<td>0%</td>
<td>2%</td>
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<tr>
<td>Chunar</td>
<td>40,205</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
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<tr>
<td>Saidpur</td>
<td>24,438</td>
<td>14%</td>
<td>0%</td>
<td>0%</td>
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<tr>
<td>Rishikesh</td>
<td>1,18,664</td>
<td>0%</td>
<td>24%</td>
<td>27%</td>
</tr>
<tr>
<td>Bijnor</td>
<td>93,297</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Mughalsarai</td>
<td>1,09,650</td>
<td>8%</td>
<td>0%</td>
<td>14%</td>
</tr>
<tr>
<td>Ballia</td>
<td>1,04,424</td>
<td>30%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Ghazipur</td>
<td>1,10,587</td>
<td>10%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Buxar</td>
<td>1,02,861</td>
<td>30%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Bansberia</td>
<td>1,03,920</td>
<td>0%</td>
<td>0%</td>
<td>4%</td>
</tr>
</tbody>
</table>
**SFD Ganga Basin 2020**

**Excreta of 60% is still directly or indirectly polluting the river**

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**KEY OBSERVATIONS**

57% of the total population is dependent on onsite sanitation systems like septic tank, fully lined tanks, and pit latrines. Out of which, the excreta of 18% of the population is treated.

- **34%** of the population is connected to sewerage network. But excreta of only 21% of the population is treated at STPs.

- **1%** of the population still defecates in the open.

- Out of 21 Ganga cities surveyed, around **90%** of the sewerage network is found in 3 cities.

- **No city is 100% sewered**

- Sanitation provision through sewer system increases with the increase in population of cities.

- Excreta of **8%** of the population is discharged directly in open drains.

Excreta of **39%** of the total population is safely managed, 6% of which is safely stored in containment systems.
Overall FSSM Progress

- **2** Operational FSTPs
- **59** FSSM projects (Sanctioned: 38 FSTPs and 21 co-treatment)
- **37** Construction started in projects (5 co-treatment and 32 FSTPs)

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**Bijoli FSTP, Jhansi**
- FSTP Operational Since 2018
- Total Trips: 2085
- Total FS Treated: 3.2 ML

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**Hussain Nagar FSTP, Unnao**
- FSTP Operational Since 2019
- Total Trips: 412
- Total FS Treated: 1.3 ML

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**Gwari Sewage Pumping Station / Bharwara STP, Lucknow**
- Co-treatment Operational Since 2018
- Total Trips: 4350
- Total FS Treated: 21.8 ML

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**Bingawan STP, Kanpur**
- Co-treatment Operational Since 2015
- Total Trips: 14300
- Total FS Treated: 71.5 ML

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98 Million Litres of Faecal Sludge from 21000+ tanker trips Treated in Uttar Pradesh as of December 2020
Data from 4 Front Runner Faecal Sludge Treatment Facilities

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*Progress as of 24th December 2020*
Thank You