SHIT FLOW DIAGRAM (SFD)

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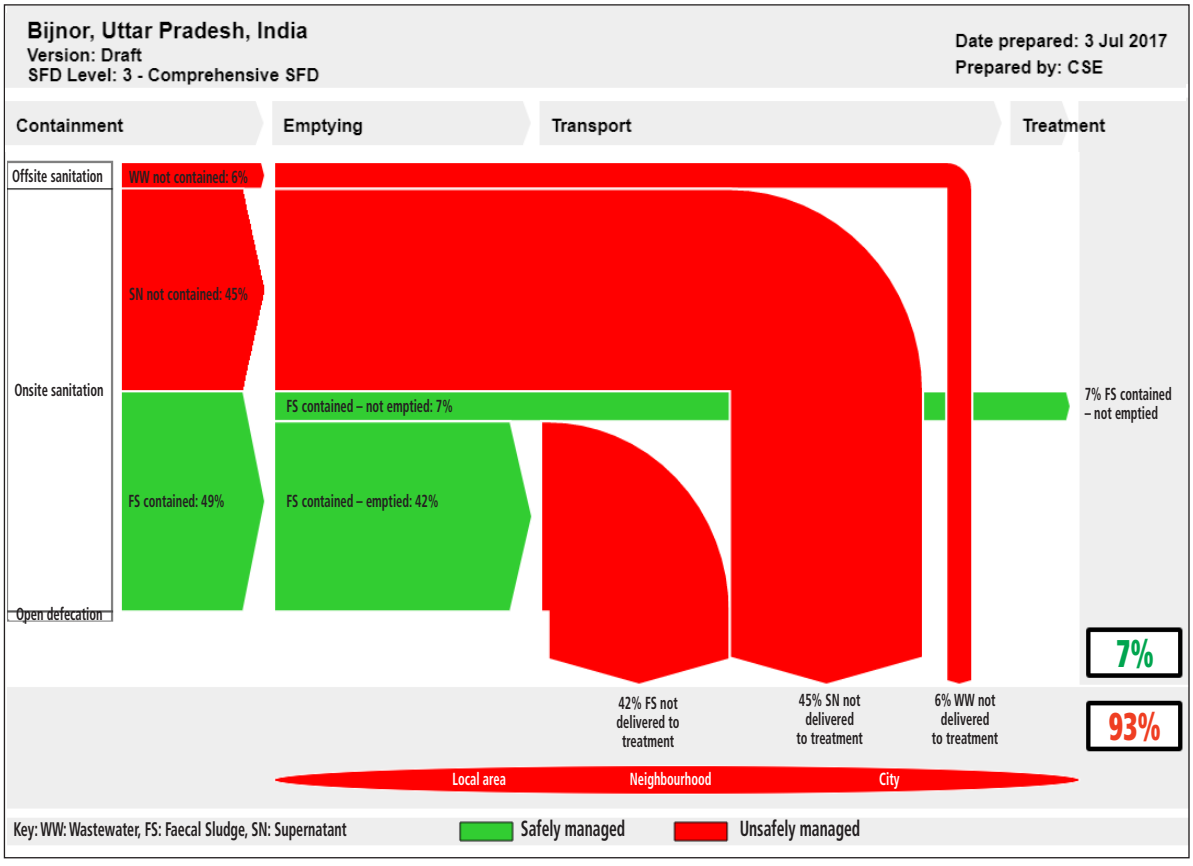

SFD Description

A Sanitation (or Shit) Flow Diagram presents a clear picture of how excreta flows are managed within the city. The diagram clearly depicts how excreta flows from user interface to the final disposal. It has the following stages:

Containment

- The city has 100% coverage of sewer network which has been completed recently but it is not functional yet, as the Sewage Treatment Plant (STP) is still in construction phase, scheduled to be completed only by 2018
- Types of containment systems observed in the city during the field-based study illustrated in the SFD diagram:
  - A fully lined tank (sealed) connected to open drain is attributed to be from 46% of the population.
  - Septic tanks connected to open drains is attributed to be from 44% of the population with 74% of the households having double chambered septic tanks while 26% having three chambered septic tanks
  - Toilets discharges directly to open drains without any containment system is attributed to be from 6% of the population
  - Lined pit with semi-permeable walls and open bottom (twin pits with honeycomb structure) is attributed to be from 4% of the population
- The average size of the containment systems varies from 1100 litres to 8500 litres based on the household size
- Supernatant (SN) generated from septic tanks and fully lined tanks connected with open drains is attributed to be from 45% of the population
- Despite the non functional sewer network, newly built houses, or households whose containment system is damaged instead of renovating have been illegally connecting toilets to sewer line
- Due to no clear differenciation between the volume of the effluent and solid FS generated from the containment, it is assumed to be 50% each to reduce maximum error

Emptying

- Since the ULB doesn't own a vacuum tanker for the emptying service, households are dependent

2017

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Figure 1: Direct disposal of effluent to open drains.

Figure 2: Septic Tank.

Figure 3: Fully lined Tank.

on private emptiers. Due to narrowness and congestion of the roads manual emptying is prevalent (Key Informant Interviews, 2016) in the few wards of the city

- The emptiers advertise their contact numbers using wall paintings and distribution of business cards
- Emptiers claim that they are able to empty 90% proportion of FS from containment systems
- Emptying frequency of septic tanks is usually 10-15 years
- Emptying process is usually carried out by 3 people (1 driver + 2 helpers)
- During emptying operation, the emptiers do not use any safety equipments and protective gears
- FS contained or not is dependent on the system polluting the groundwater. Depth of groundwater table <10m from the sanitation system is considered to pose a significant risk
- FS contained is attributed to be from 49% of the population (4% from lined pit, 22% from septic tank connected to open drain, and 23% from lined tanks)
- FS contained emptied is attributed to 42% population (includes 20% population using septic tanks, 20% population using fully lined tanks and 2% population using lined pit with semi permeable walls) with an assumption that 90% empties their systems
- FS contained – not emptied is attributed to 7% population (includes 2% FS from septic tank connected to open drain, 3% FS from fully lined

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Figure 4: Wall painting advertising septic tank cleaning services.

tank connected to open drain which remains in the system and never gets emptied and 2% infiltrate in lined pit with semi permeable walls and open bottom)

Transportation

- Supernatant (SN) is attributed to be from 45% of the population is conveyed through open drains (23 % from fully lined tank connected to open drain and 22% from septic tank connected to open drain) The open drains are connected further to bigger drains which lead to four disposal points:
  - Chandpur Road Naala
  - Hemraj Colony Pond
  - Chandpur Road Naala
  - Noorpur Naala
- Fecal sludge is collected from different parts of the city are transported by 5 privately operated vacuum tankers. These suction machines are usually truck mounted. Capacity of each vacuum tanker is 5000 litres. Trucks are pre-owned and are assembled with suction machine either at Chandigarh or karnal
- Average distance covered by private vacuum tankers is 5-6 kms
- Manually emptied FS from containment systems are loaded onto a cycle cart and disposed at the nearest big drain

Figure 5: Private vacuum tank.

Treatment and Disposal

- Currently, no treatment system available for sewage and septage in the city. A Sewage Treatment Plant of 24 MLD of UASB technology under Bijnor Sewerage Scheme is being constructed at Khedki Village
- A very small portion of the FS collected is being used for agriculture purpose as a soil conditioner
- FS of 42% of the population is not delivered to treatment plant and is disposed in the neighborhood

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Figure 6: 24 MLD UASB+Aeration Sewage Treatment Plant (under construction).

SFD Promotion Initiative

sustainable sanitation alliance

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

On behalf of Federal Ministry for Economic Cooperation and Development

UNIVERSITY OF LEEDS

WORLD BANK GROUP Water

wsp water and sanitation program

WEDC

Loughborough University

CSE

eawag aquatic research

Sandec Sanitation, Water and Solid Waste for Development

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