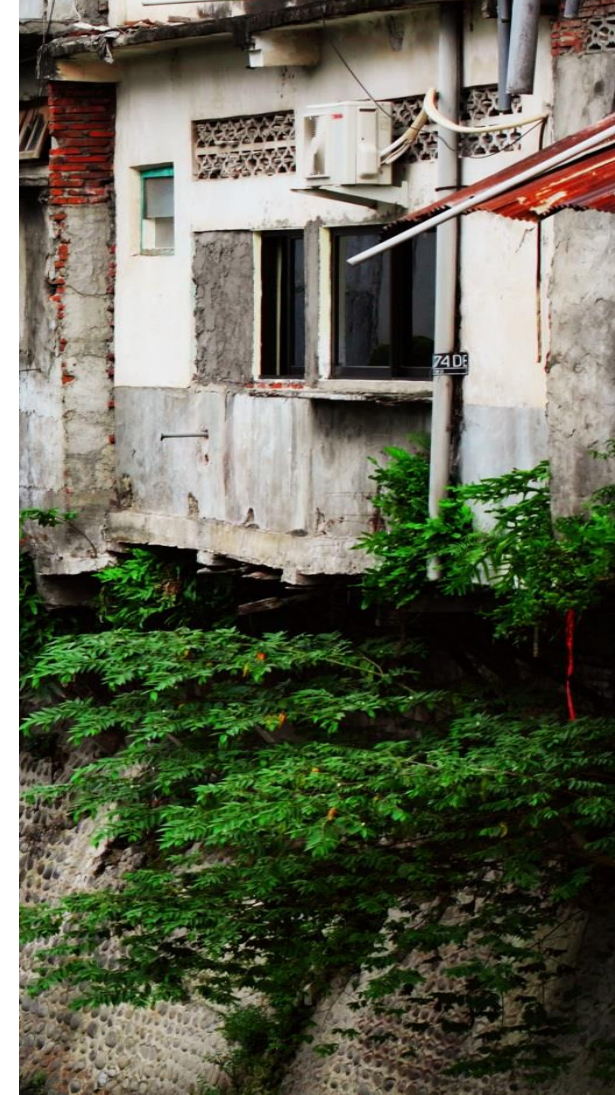




SHIT FLOW DIAGRAM (SFD): POTENTIAL AND OPPORTUNITIES FOR ACHIEVING SUSTAINABLE CITYWIDE SANITATION



Introduction and context-setting





Centre for Science and Environment



Research & advocacy

Programmes

- Air Pollution & Mobility
- Climate Change
- Industry: Pollution & Energy
- Environment Education
- Sustainable Food Systems
- Sustainable Habitats & Cooling
- Municipal Solid Waste
- Water, Wastewater, Sanitation

Communication

Media resource centre

- Strengthen reportage of mainstream and regional journalists on environment

Down To Earth (since 1992)

- English, Hindi & Digital editions

Websites, E-newsletters, media

- Campaign tools for outreach
- India Environment Portal

Pollution monitoring

- **Environment Monitoring Lab**
Pollution, toxins in food, waste, water, FSM
- Independent information in public domain

Education, Training

Anil Agarwal Environment Training Institute

- Build capacities on environment (India & across global South)
- Green campus

About CSE, Water Program



- Centre for Science & Environment (CSE) was set up in 1980's, in Delhi – as a registered non profit society.
- An institution to bridge the gap between information and knowledge; between knowledge and public awareness; to influence public policies and practices for sustainable development – *'to promote sustainable development with equity, participation and democracy'*.
- Awarded the *Stockholm Water Prize* – 2004, *Indira Gandhi Prize for Peace, Disarmament and Development* – 2018, *Edinburgh Medal* – 2022
- Centre of Excellence in the Sustainable Water management area – Ministry of Urban Development
- National Key Resource Centre of Ministry of Jal Shakti
- Anil Agarwal Environment Training Institute (AAETI) – State-of-art training institute and living lab

Action Research

Advocacy

Capacity
Development

Cross-Learning

Water

Urban Water

Rural Water

FSM Laboratory

- **Team strength:** 24 members (7 urban, 7 rural, 5 lab, 5 UP)
- **Diverse professions:** Engineers, Architects, Planners, Economics, Public Policy, Env. Science, Management
- **Offices:** Delhi, Lucknow (PSU), AAETI (Laboratory)

Purpose of the webinar



- To understand the vision behind development of SFDs.
- To highlight various applications of Shit Flow Diagrams-through some case examples.
- To showcase how SFDs can be useful in representing change in sanitation scenarios at ground level

An excreta flow diagram (also often described as shit flow diagram, SFD) is a tool to readily understand and communicate how excreta physically flows through a city or town.

It is

- 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

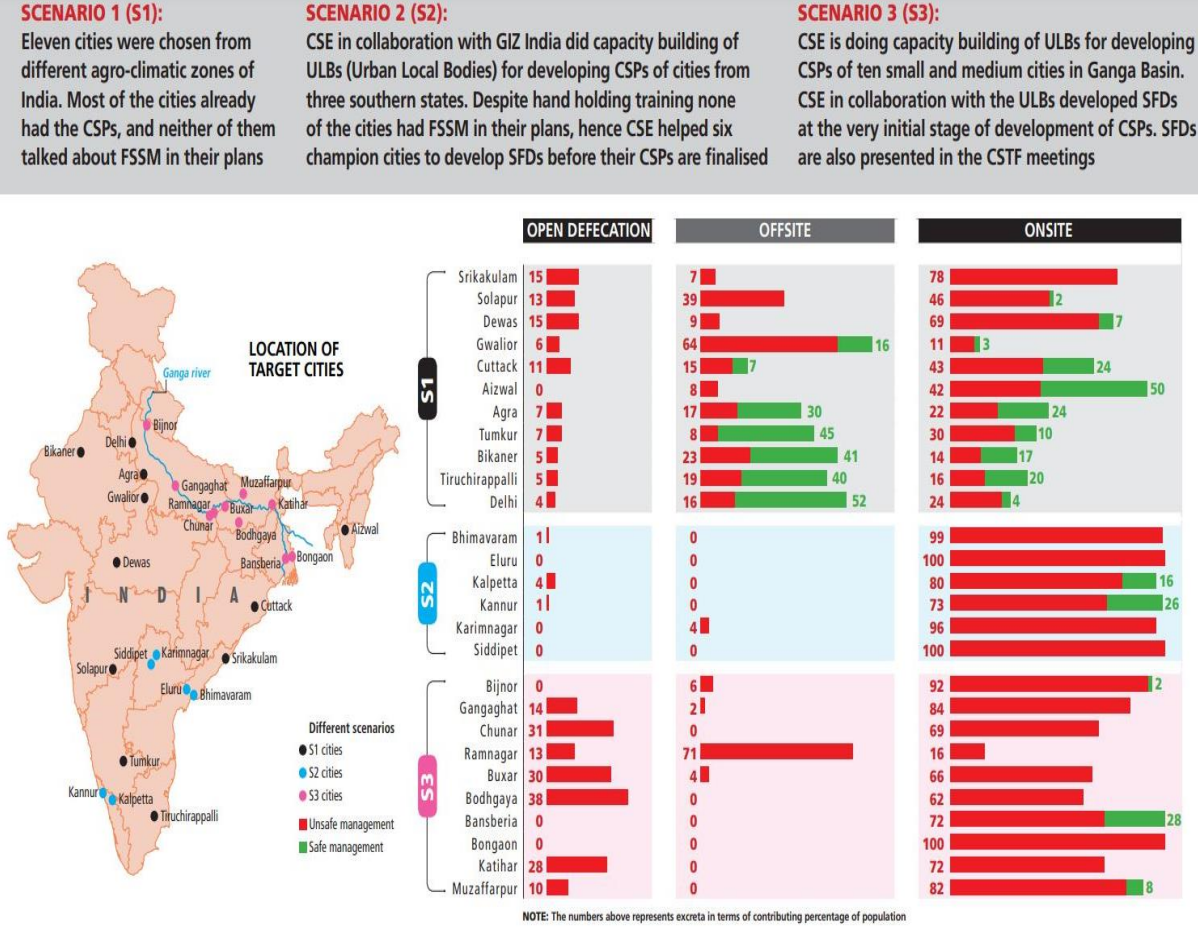
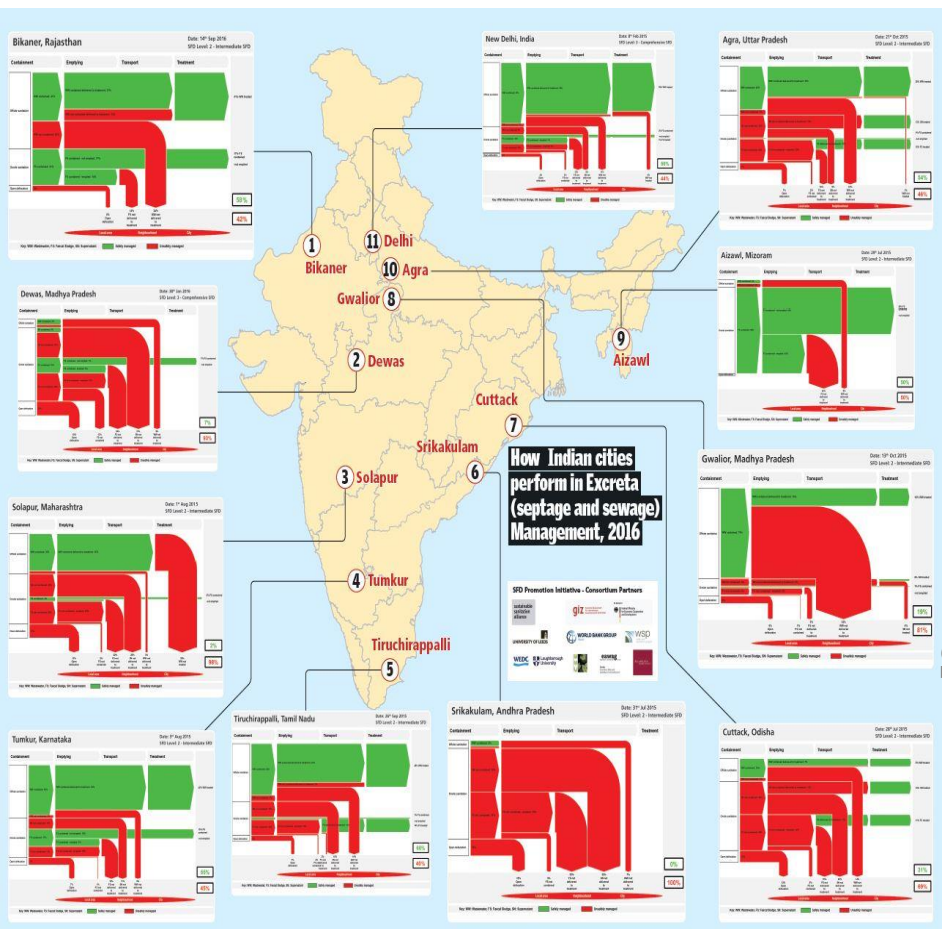
It is not

- Based on actual volumes/mass – these are determined by other related factors
- A representation of public health risk (risk = hazard x behavior)
- A precise scientific analytical tool

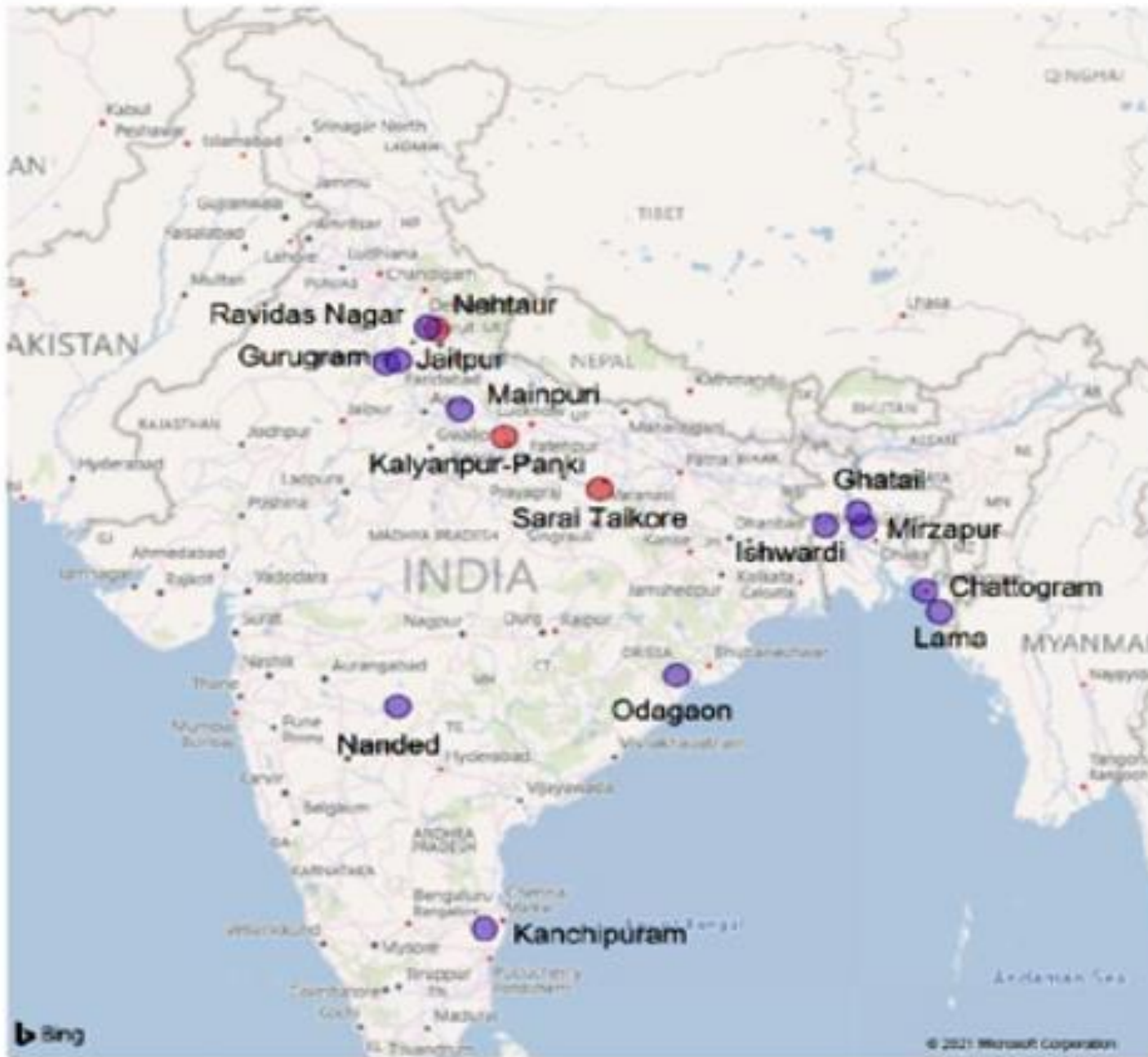
How it all began



In 2014 the centre partnered with a group of institutions active in the field of excreta management to promote excreta (septage and sewage) flow analysis to inform urban sanitation programming through the service delivery assessment tool - Shit Flow Diagrams (SFDs), developed by Water and Sanitation Programme - World Bank



- SFDs by CSE
- SFDs by Training Alumni
- SFDs supported by CSE

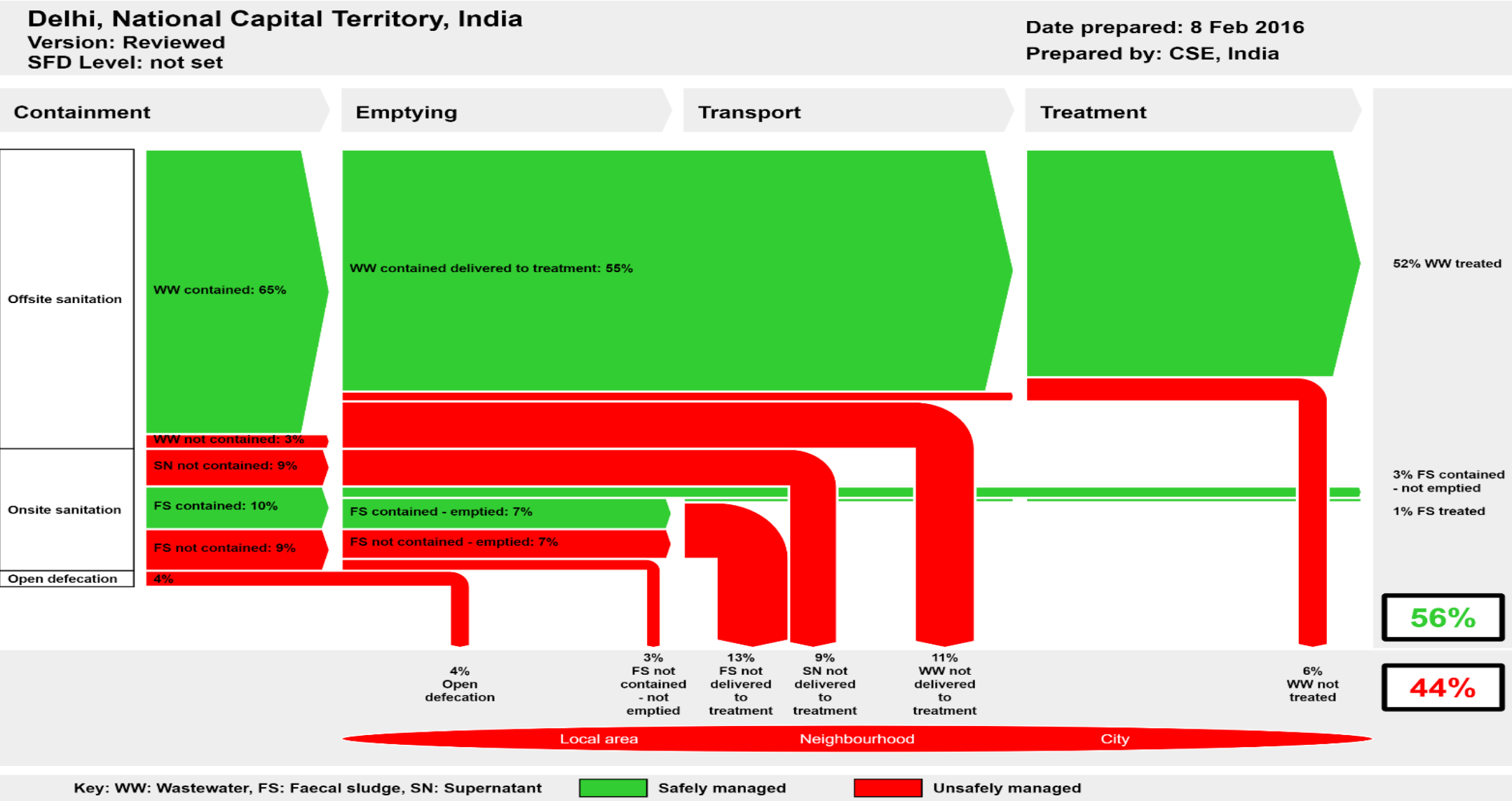


1. Data

- Data in sufficiency & non availability. No data available on how many septic tanks are followed by soak pits (for septic tank effluent treatment)
 - Accuracy. Discrepancy observed between Census data and actual ground situation
 - Currentness of the data (data available at different time lines)
 - Limited data available on reuse (formal / informal)
 - No data is available with ULBs on No. of households practicing open defecation, septic tanks and other latrines. Data is only available for no. of sewer connections
2. We have certain conditions where a city has a **sewer line without an STP** and **STP without a sewer line** (sewage conveyed to STP through open drain).
 3. Effluent in case of on-site sanitation systems not considered.
 4. Sludge generated from the wastewater treatment plant is not considered.
 5. In some cities septage is desludged and disposed in to manhole or sewage pumping station, there is no provision to accommodate such situation in SFD.
 6. In Indian context, faecal sludge and septage are interchangeably used
 7. For septic tank based systems, no distinguishing between treatment of solids (septage) and liquids (septic tank effluent)

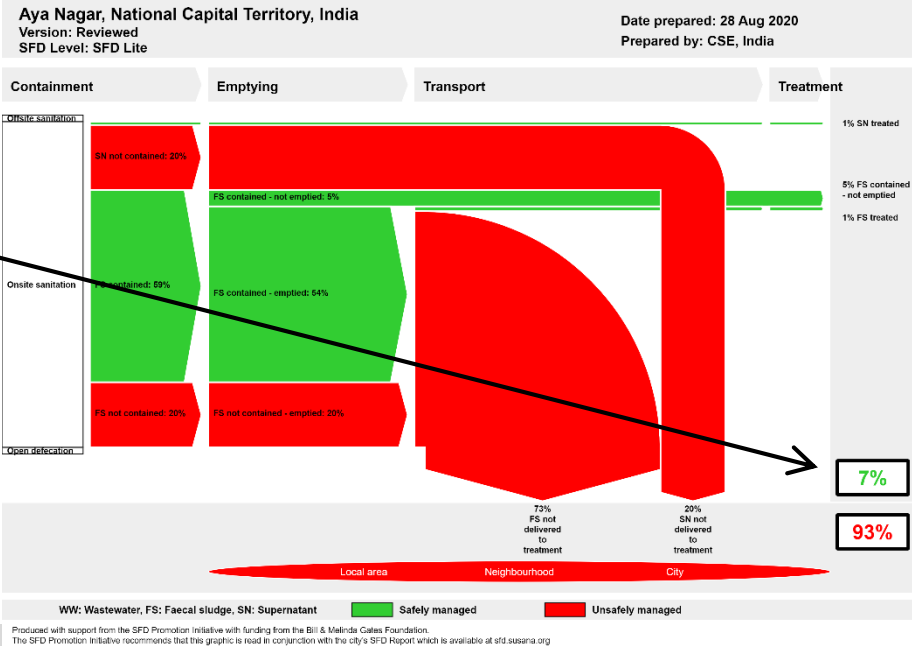
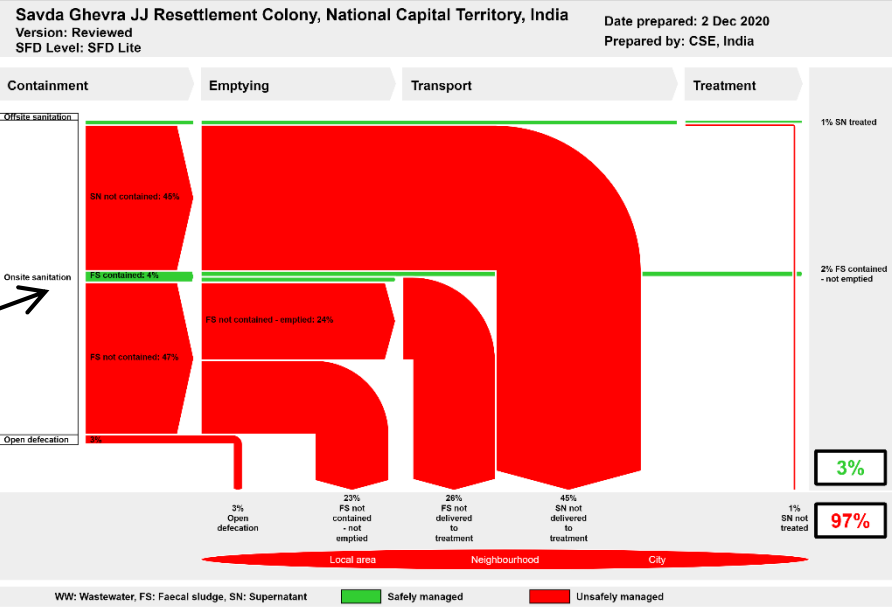
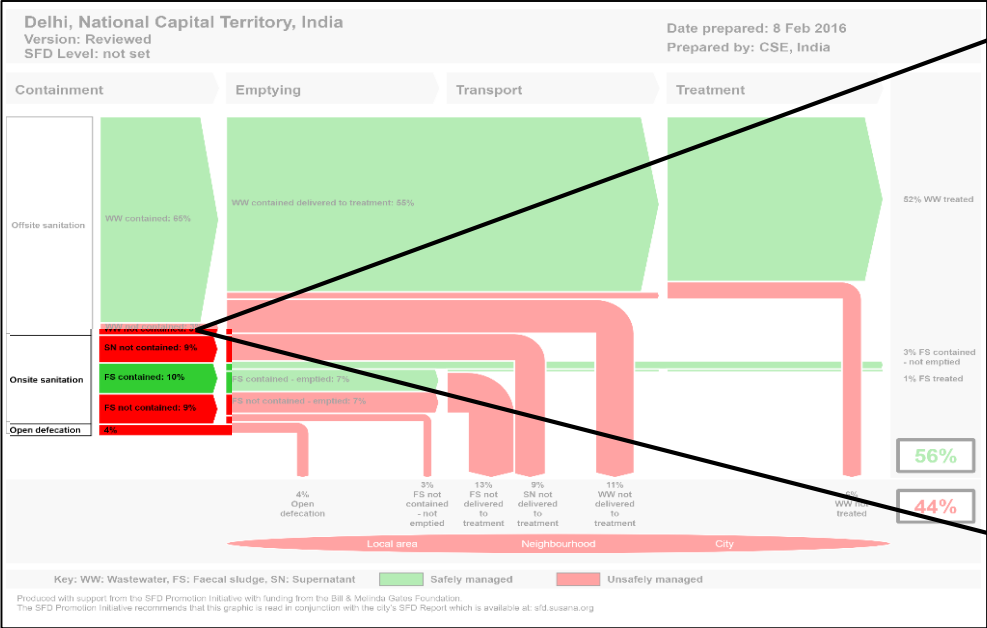
- Detailed SFD Report for Delhi prepared in 2016 by CSE
- 30% of city is dependent on Onsite Sanitation Systems (OSS)
- CSE report key in establishing (National Green Tribunal (NGT) Committee on Pollution in River Yamuna
- The findings led to various initiatives like registering of private desludgers (300 registered-as a result), co-treatment in STPs, free installation of septic tanks, etc.

Mapping sanitation inequity through SFD



Produced with support from the SFD Promotion Initiative with funding from the Bill & Melinda Gates Foundation.
The SFD Promotion Initiative recommends that this graphic is read in conjunction with the city's SFD Report which is available at: sfd.susana.org

Mapping Inequity in services-Delhi

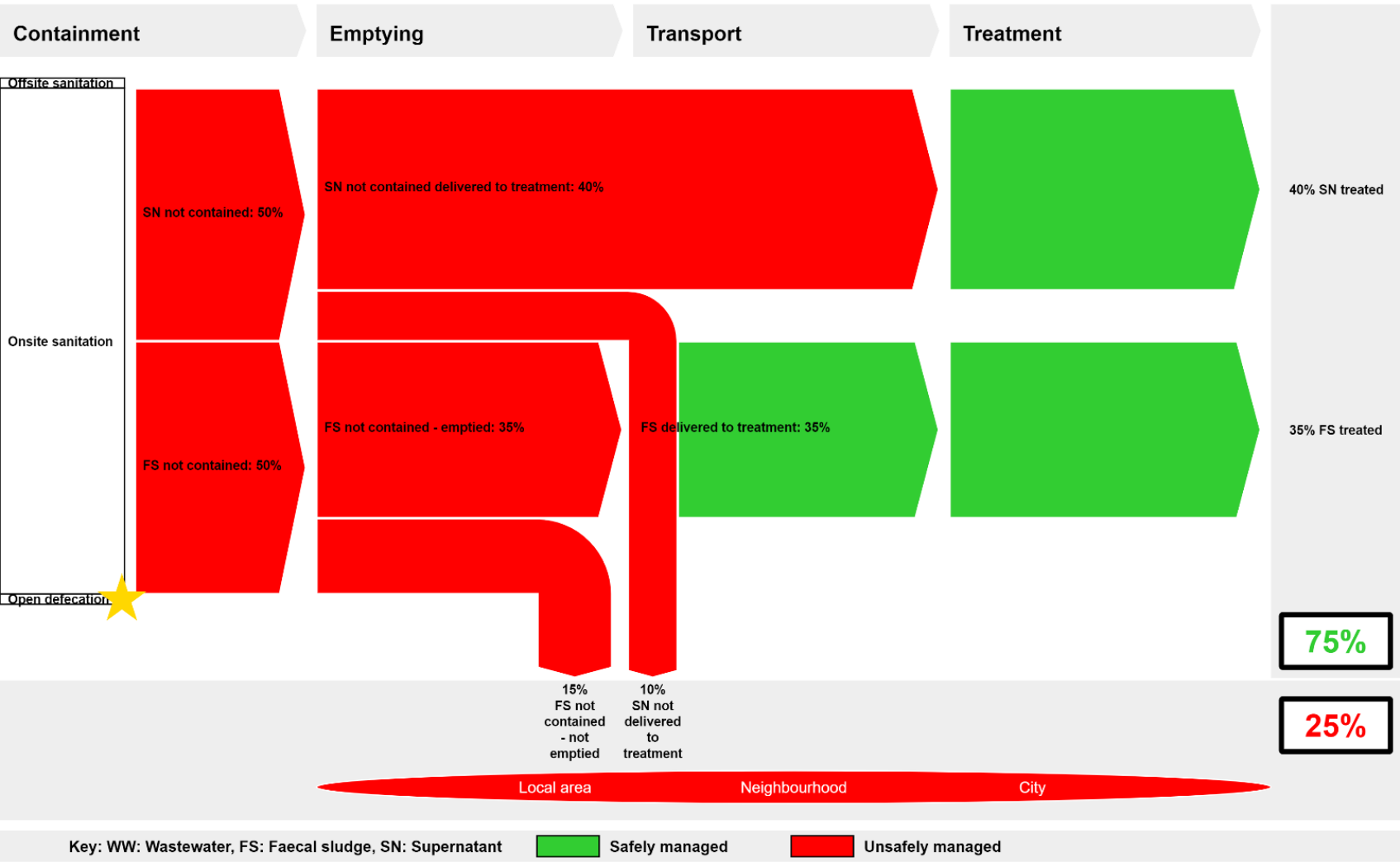


Bijnor City-CSE- Measuring progress



Bijnor (vn 2022), Uttar Pradesh, India
Version: Draft
SFD Level: SFD Lite

Date prepared: 7 Aug 2022
Prepared by: CSE, India (Desk Based)



1. No sewer lines. 2. No covered drains. 3. Septic tanks were not actually septic tanks. 4. No treatment available for wastewater and faecal sludge

1. All the major drains of the city were intercepted & diverted to 24 MLD STP by end of 2019. 2. All households had received toilets and Bijnor ODF. 3. CSE's technical support helped identifying the insanitary toilets and containments (like pits) which were upgraded to tanks

1. Co-treatment of faecal sludge being practiced. 2. All emptied sludge sent to STP. 3. All the desludgers registered and licenced. 4. Bye-laws Gazette

The SFD Promotion Initiative recommends preparation of a report on the city context, the analysis carried out and data sources used to produce this graphic. Full details on how to create an SFD Report are available at: sfd.susana.org

A City Sanitation Planning tool in the Advisory on Sewage Management

- In July 2020, the Ministry of Housing and Urban Affairs (MoHUA), Govt. of India launched the Advisory on Onsite and Offsite Sewage Management Practices drafted by Central Public Health and Environmental Engineering Organisation (CPHEEO).
- It advises all the cities to develop a city sanitation plan based on analysis of existing sanitation status.
- To analyse the current scenario of sanitation the advisory advocates to all the urban local bodies to use the SFD, which helps in mapping the flow of excreta across the city irrespective of type of sanitation system prevalent in the city, whether onsite or offsite.



Swachh Bharat Mission - Urban

Advisory on ON-SITE AND OFF-SITE SEWAGE MANAGEMENT PRACTICES

Central Public Health and Environmental Engineering Organisation (CPHEEO)

Ministry of Housing and Urban Affairs, Government of India

www.swachhbharaturban.gov.in | www.cphdeo.gov.in

July 2020

Table 3: Characteristics of various kinds of domestic wastewater

Parameter	Grey water	Black water	Septic Tank Effluent	Septic Tank Effluent	Wastewater	Sludge
BOD (mg/l)	100-400	800-1000	200-400	100-150	100-400	200-400
COD (mg/l)	200-400	1000-1500	400-1000	200-400	800-1000	1000-1500
TSS (mg/l)	100-200	800-1200	200-400	100-150	100-400	200-400
Free Chlorine (ppm)	100-150	100-150	100-150	100-150	100-150	100-150
Total Chlorine (ppm)	100-150	100-150	100-150	100-150	100-150	100-150

Figure 1.1: Typical SFD Flow Diagram of a city depicting sustainable management of excreta

The diagram shows the flow of excreta from various sources (Household, Public, Commercial, Industrial, Institutional) through different treatment stages (Collection, Treatment, Disposal) to various destinations (Landfill, Water Body, Reuse). It includes a legend for different types of excreta (Human, Animal, Industrial, Commercial, Institutional) and a scale for the flow volume (1000, 10000, 100000, 1000000).

Things to ponder !



- SFDs will not provide you technologies for treatment or costs to be incurred in sanitation initiatives but it can enlighten you on where to prioritize ;
- Just making a SFD of the city is never enough, it must be followed by actions, plans, interventions.
- For maximum utilization of SFD tool, how one can club it with other tools like CSDA, ECAM;
- What is the purpose for you to make an SFD? Is it just a baseline study you are doing or you are going to use it further to:
 - To understand change in sanitation scenarios?
 - To understand the effectiveness of sanitation service delivery?
 - To determine priorities for sanitation investments in future?
 - What else?