



# India's SFD Journey – Advocacy, Application, Opportunities and Challenges

Dhruv Pasricha





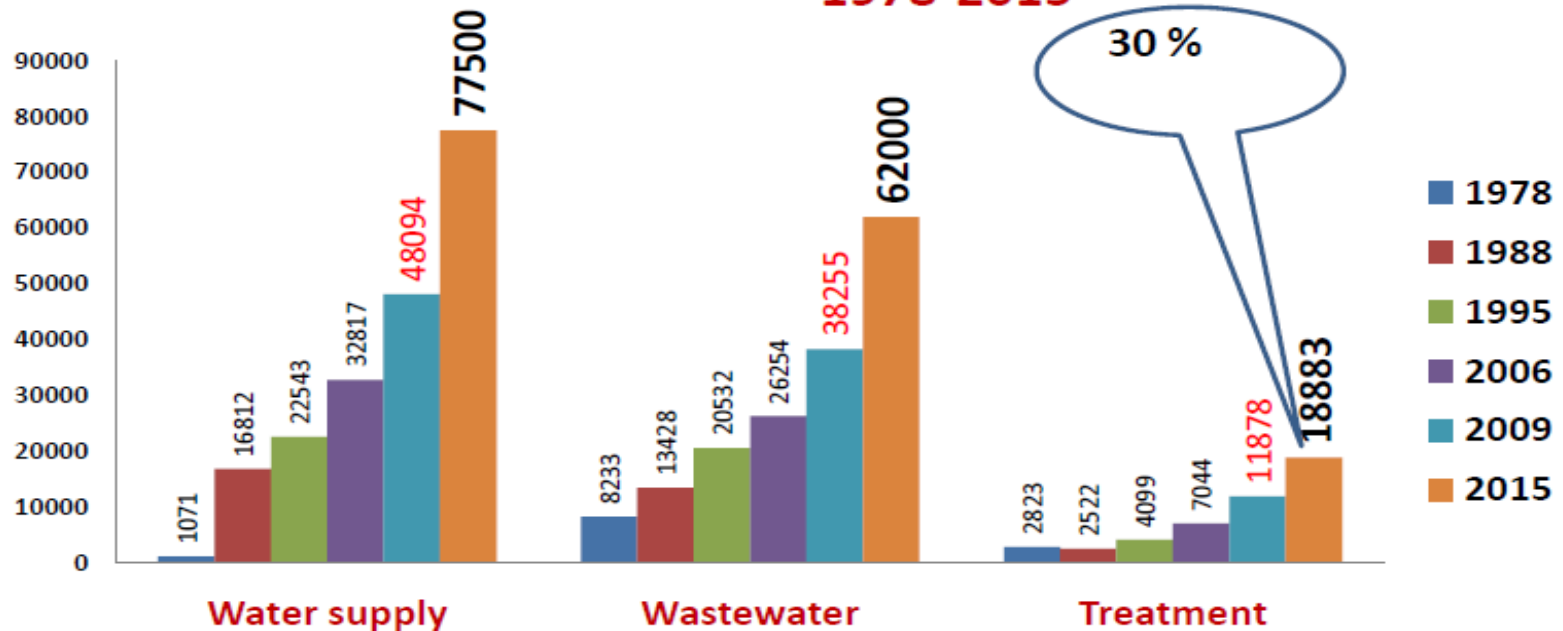
- Urban excreta management in India – Past and present
- Shit Flow Diagram (SFD) and excreta management
- SFD as tool of Advocacy
- SFD as tool for Sanitation Planning and Monitoring
- SFD as a tool to map sanitation inequity
- SFD in numbers



# Mapping SFDs: India's journey...

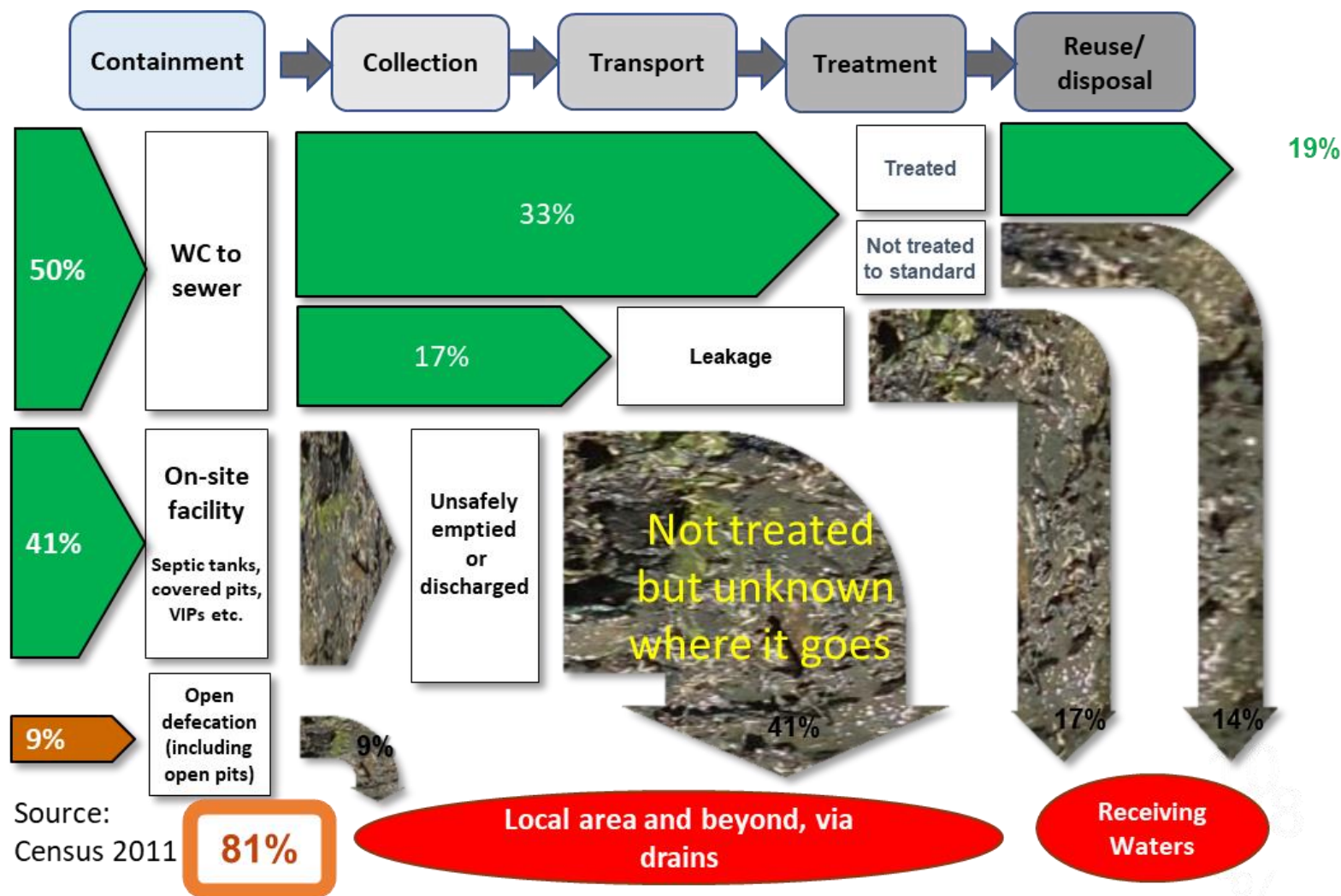


## Water supply, wastewater generation, treatment in Class I & II cities (MLD) 1978-2015



- 30% of total sewage can be treated in 2015
  - **31 % of treatment capacity in Delhi & Mumbai in 2015**
- As per a CPCB report of 2021, only 22% of sewage is treated in Urban India
- Significant population still dependent on on-site sanitation - **Septic tanks** with inadequate mechanisms across sanitation chain.
- With increasing urbanization as on date situation has not changed much, increased sewage treatment capacity is falling behind -
- **We flush and forget**

# Urban India – Excreta Management, 2011

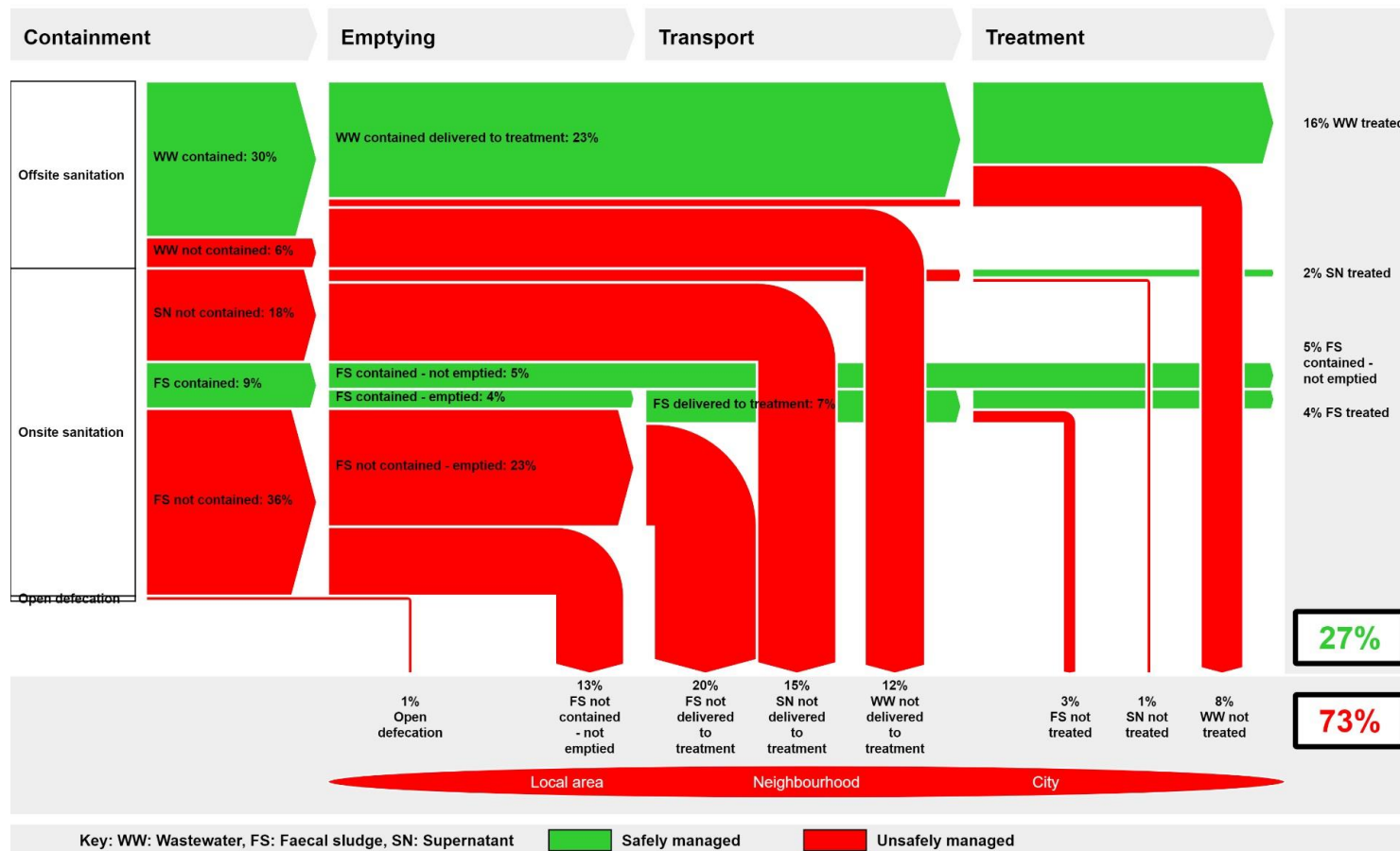


# Urban India – Excreta Management, 2021



Urban, India, India  
Version: Draft  
SFD Level: SFD Lite

Date prepared: 15 Jul 2021  
Prepared by: Athena Infonomics



Source: Luthra, B. et al. (2021) 'How swachh (clean) is urban India today?' Water Science Policy, doi: <https://dx.doi.org/10.53014/LXFY9636>



CSE prepared the India 1st Policy Paper on Septage Management in India as key reform agenda for improved urban sanitation for the Ministry of Urban Development (now called Housing & Urban Affairs), Government of India



# Gain support for more sustainable: Urban Sanitation solution...SFDs

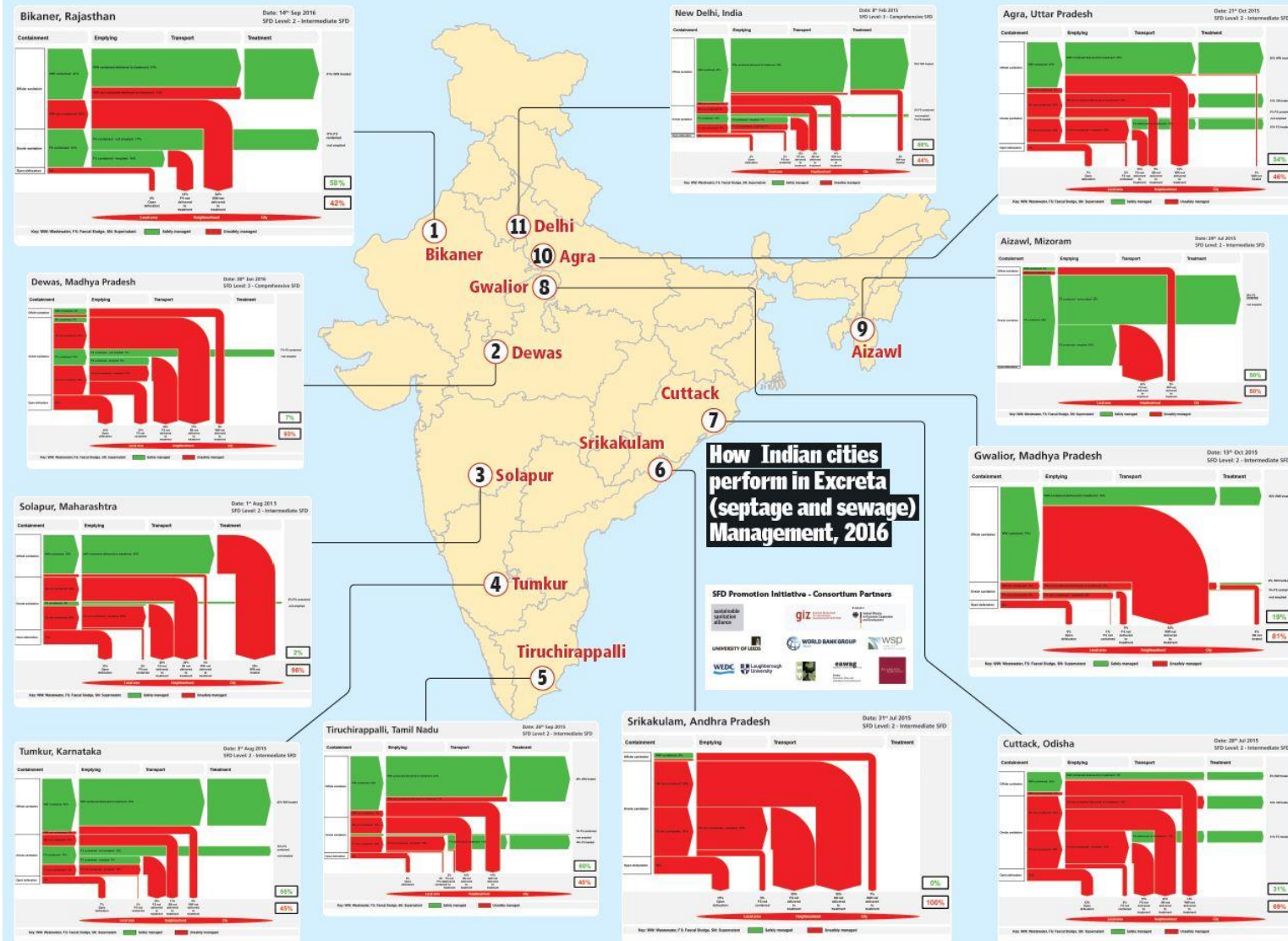


Image: Press Trust of India (PTI)

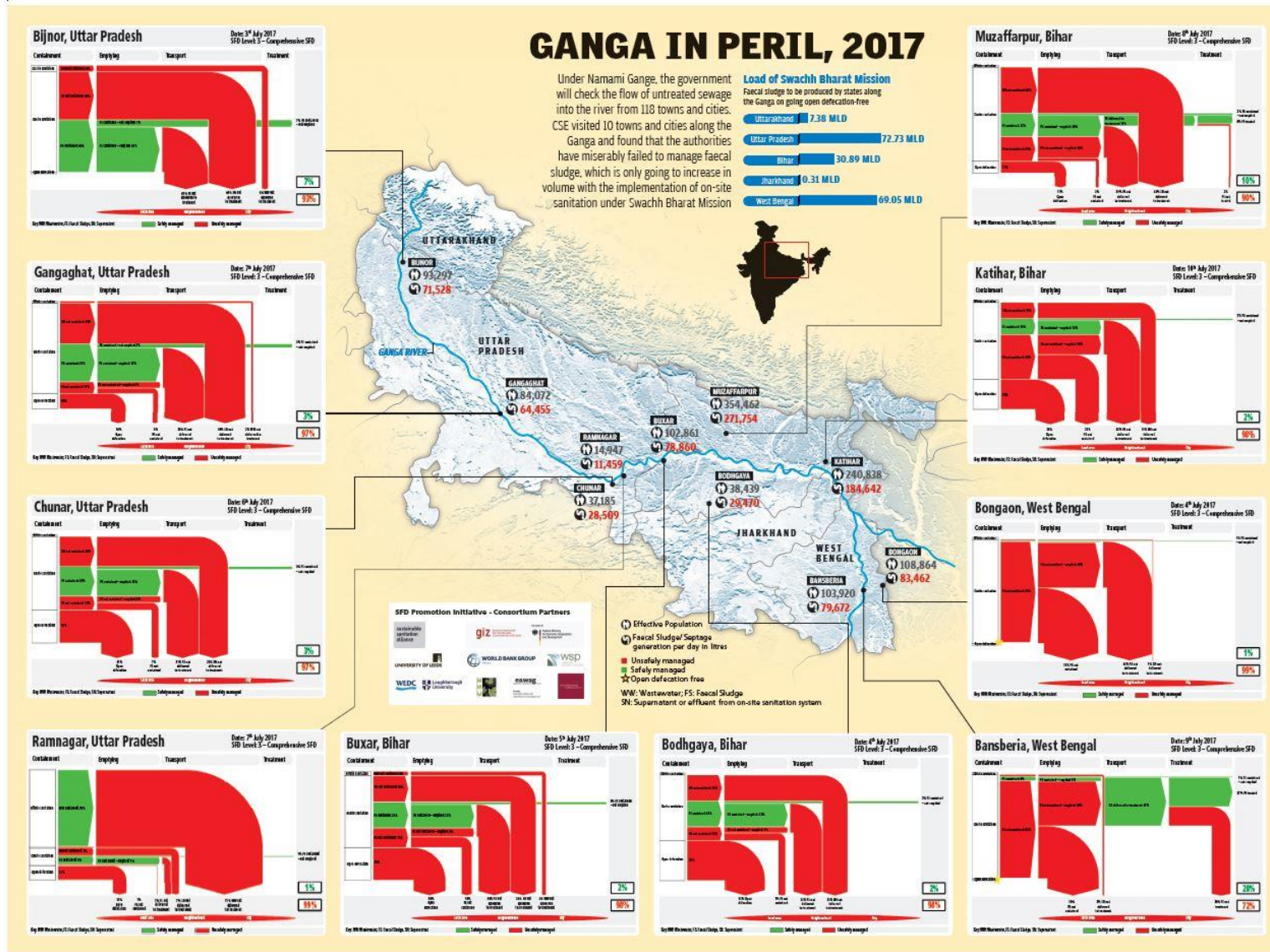
Image: Arne Panesar



# SFDs for Advocacy – Phase 1 and 2



# SFDs for Advocacy – Phase 1 and 2





# Assessment of FSSM in Uttar Pradesh



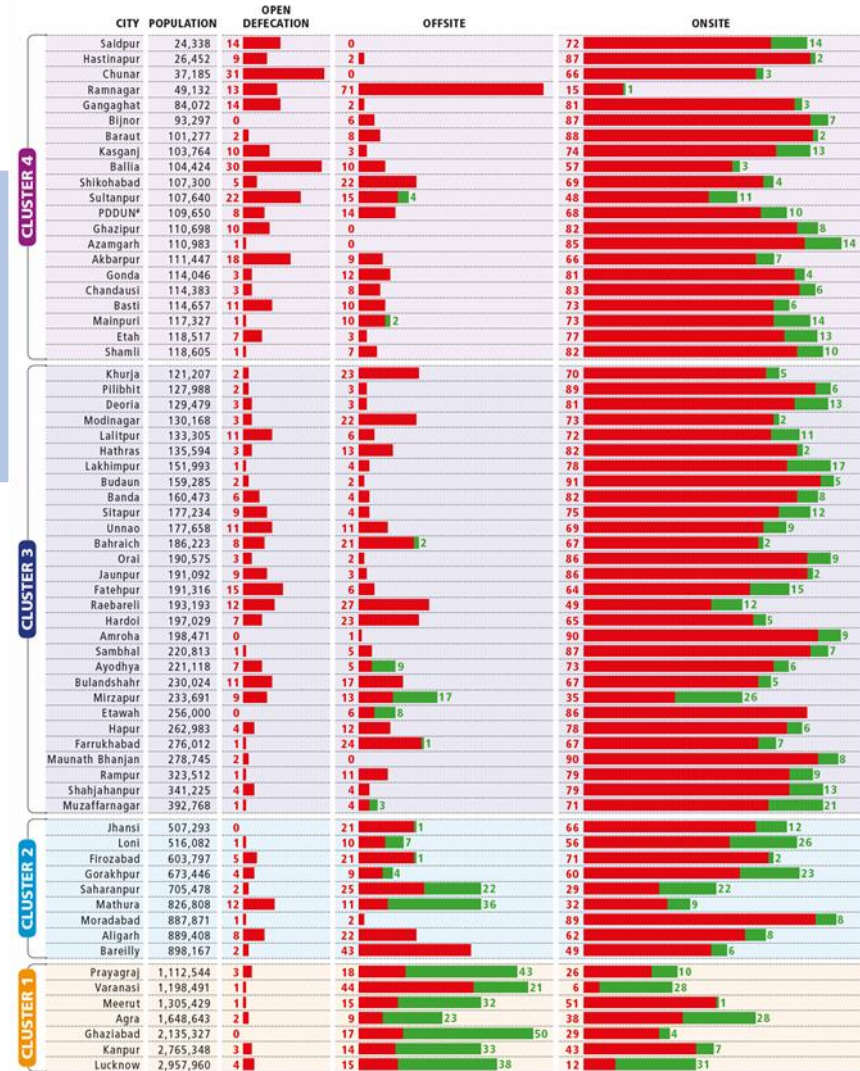
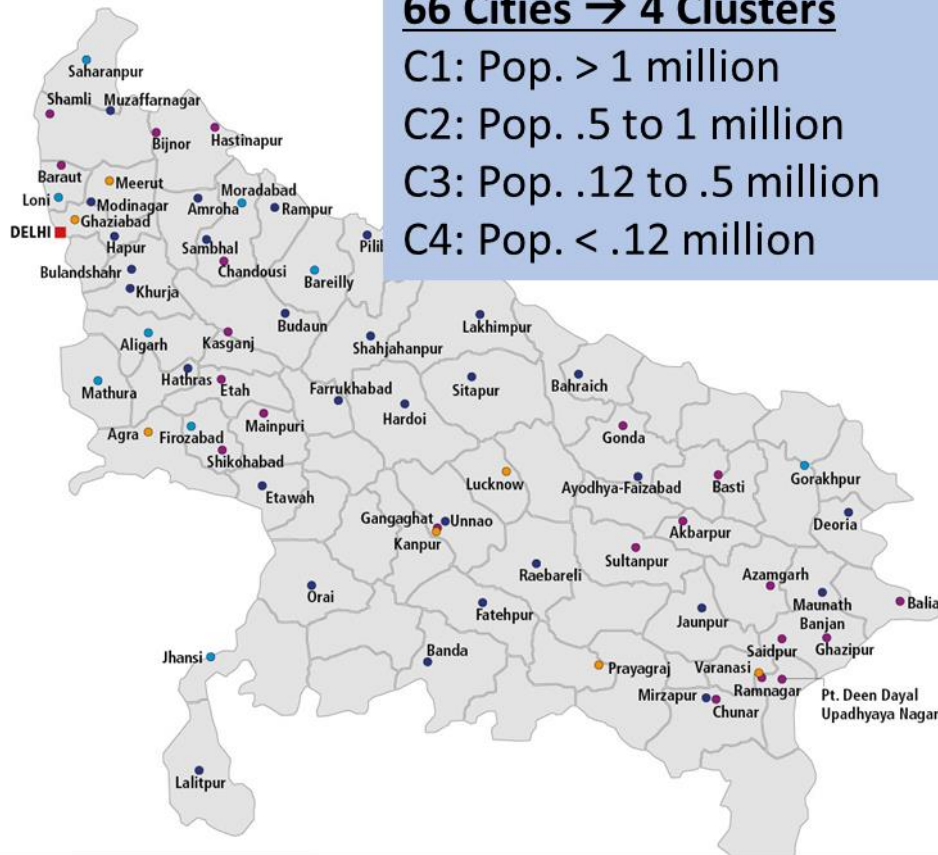
## 66 Cities → 4 Clusters

C1: Pop. > 1 million

C2: Pop. .5 to 1 million

C3: Pop. .12 to .5 million

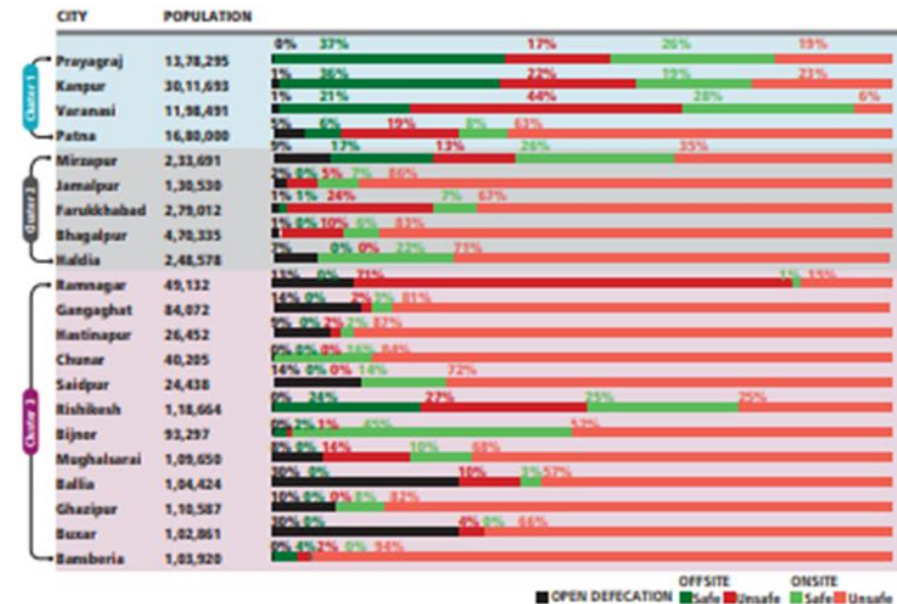
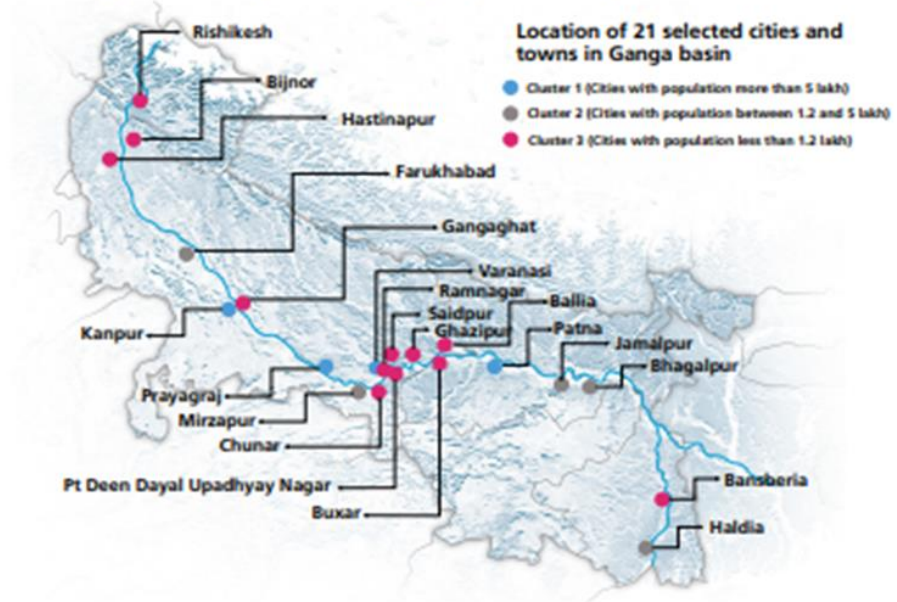
C4: Pop. < .12 million





# Assessment of Pollution in Ganga Basin

Poster 1: Analysis of excreta management of 21 selected priority towns of the Ganga Basin



# SFD for City Sanitation Planning - Bijnor



Bijnor, Uttar Pradesh, India  
Version: Draft  
SFD Level: 3 - Comprehensive SFD

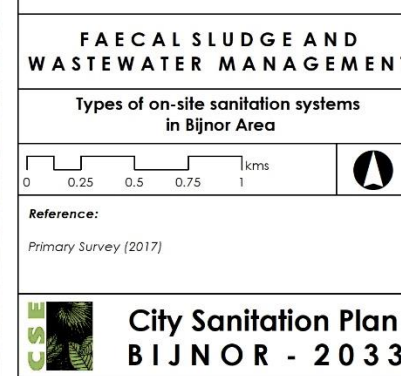
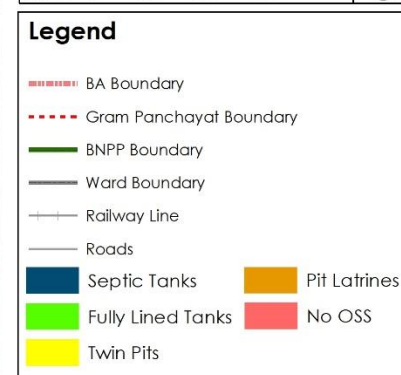
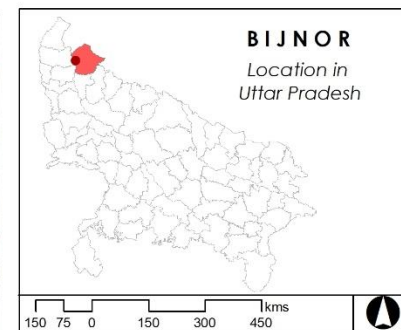
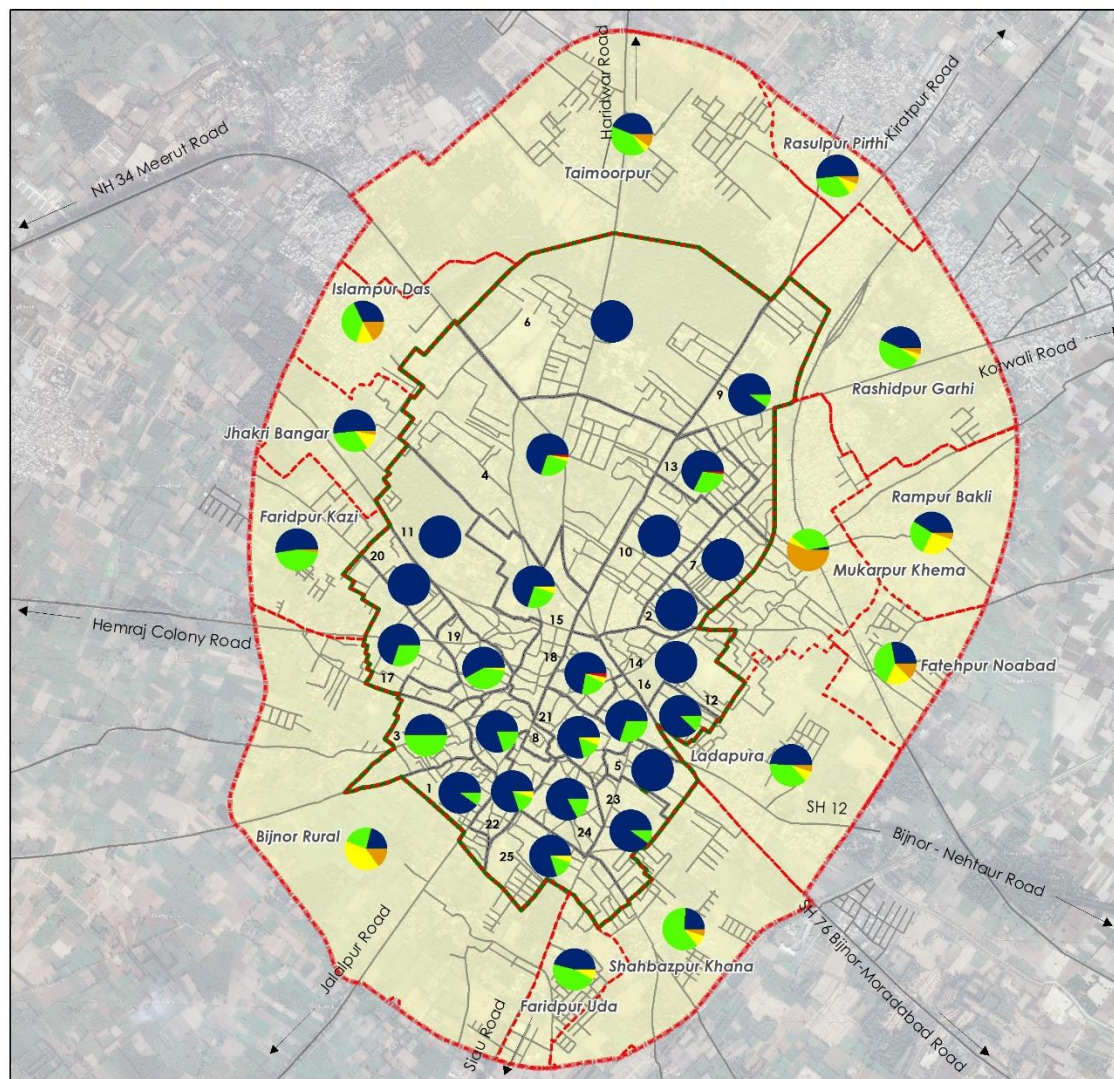
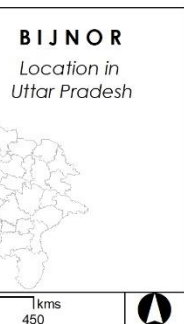
Date prepared: 30 Jan 2018  
Prepared by: CSE



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](http://sfd.susana.org)



# SFD for City Sanitation Planning - Bijnor





# SFD for City Sanitation Planning - Bijnor



**BIJNOR**  
Location in  
Uttar Pradesh



1 kms  
450



Boundary

Potential FSTP Location

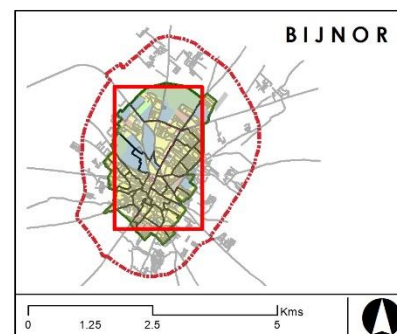
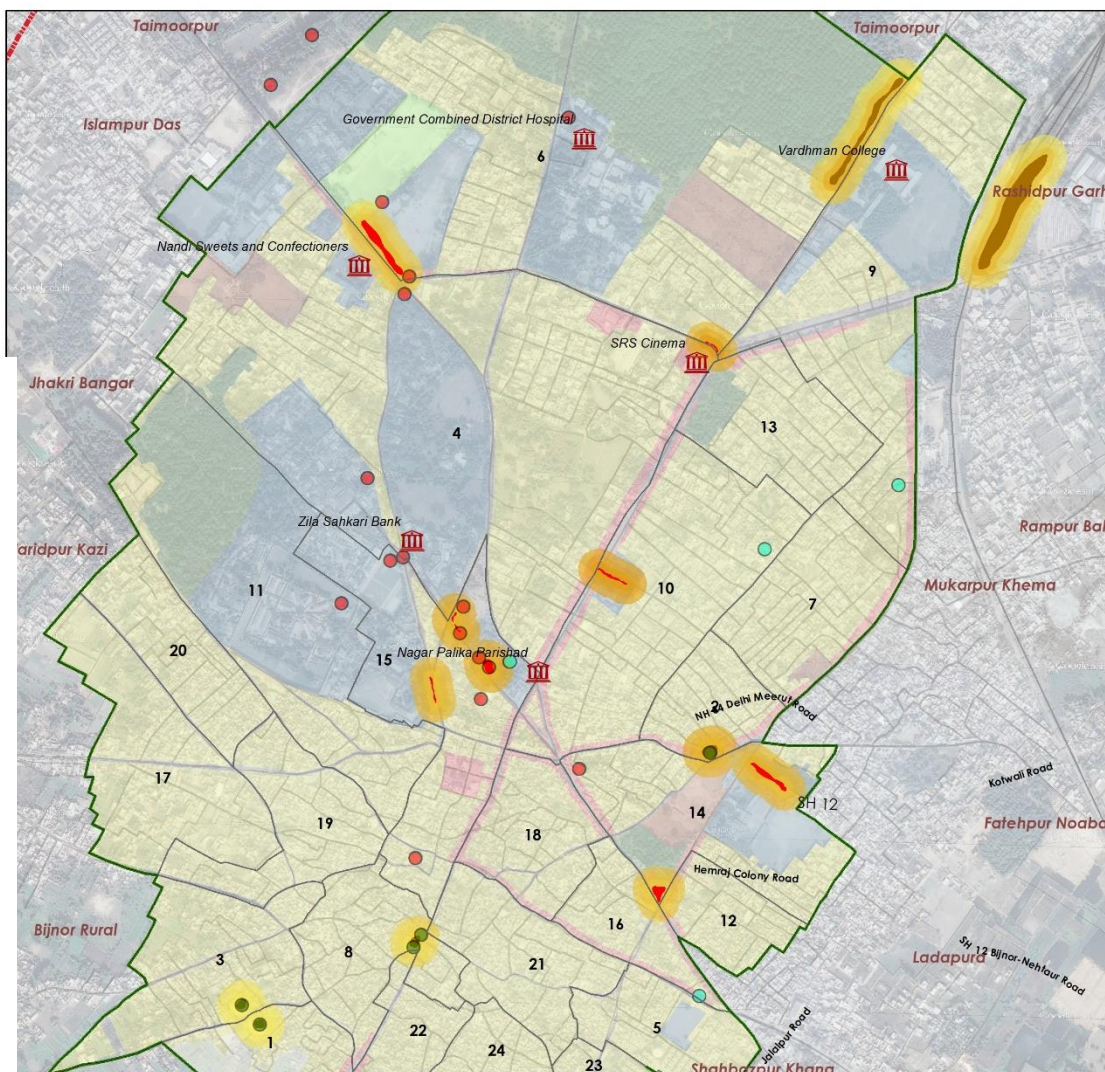
Catchment Area

FSTP

STP

Wastewater Project

DWWTS



## Legend

Bijsnor Landmarks

BA Boundary

BNPP Boundary

Ward Boundary

Railway Line

Roads

## Toilet Type

Community Toilet

Public Toilet

Urinal

## Hotspots

Open Urination

Open Urination + Open Defecation

Spread of Hotspot (15 - 45 m)

## Land Use

Agriculture

Commercial

Open Area

Orchard

Public/Semi Public

Recreational

Residential

Transportation

## ACCESS TO SANITARY TOILETS

Open urination &  
open defecation hotspots

0 0.25 0.5 1 kms



## Reference:

Primary Survey (2017)



**City Sanitation Plan  
BIJNOR - 2033**



# SFD for City Sanitation Planning - Bijnor



**BIJNOR**  
Location in  
Uttar Pradesh



1 kms  
450

boundary

Potential FSTP Location

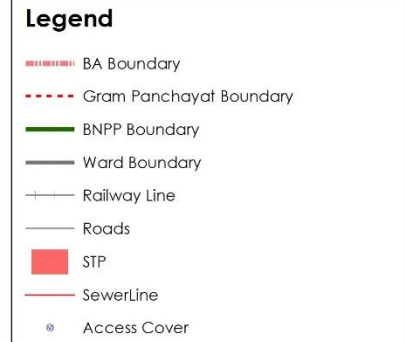
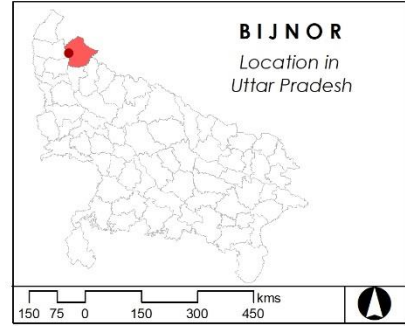
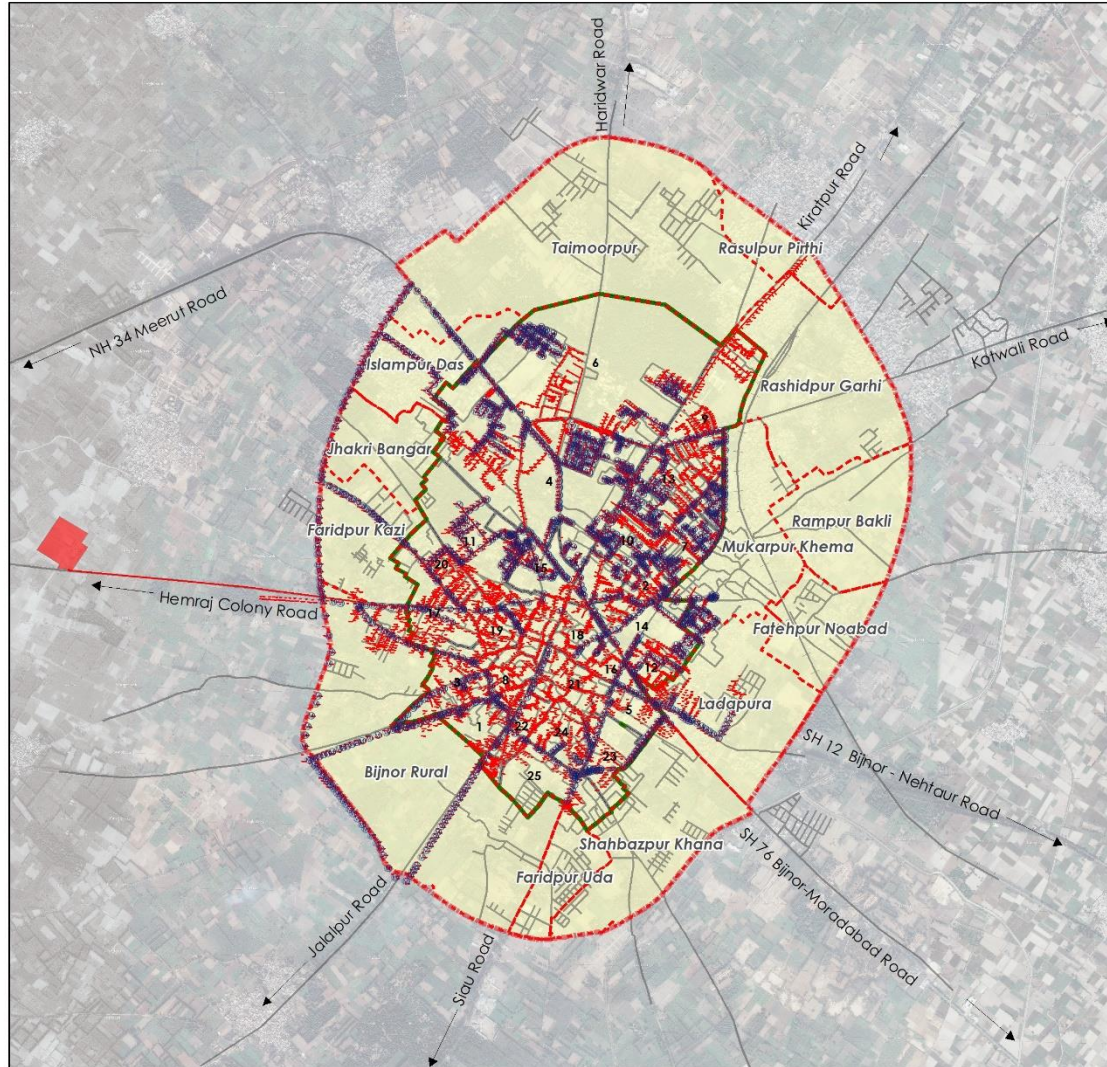
Catchment Area

FSTP

STP

Wastewater Project

DWWTS



## FAECAL SLUDGE AND WASTEWATER

### Sewerage network and STP in BA



#### Reference:

Primary Survey (2017)



**City Sanitation Plan  
BIJNOR - 2033**



# SFD for City Sanitation Planning - Bijnor



**BIJNOR**  
Location in  
Uttar Pradesh

1 kms  
450

Boundary

Potential FSTP Location

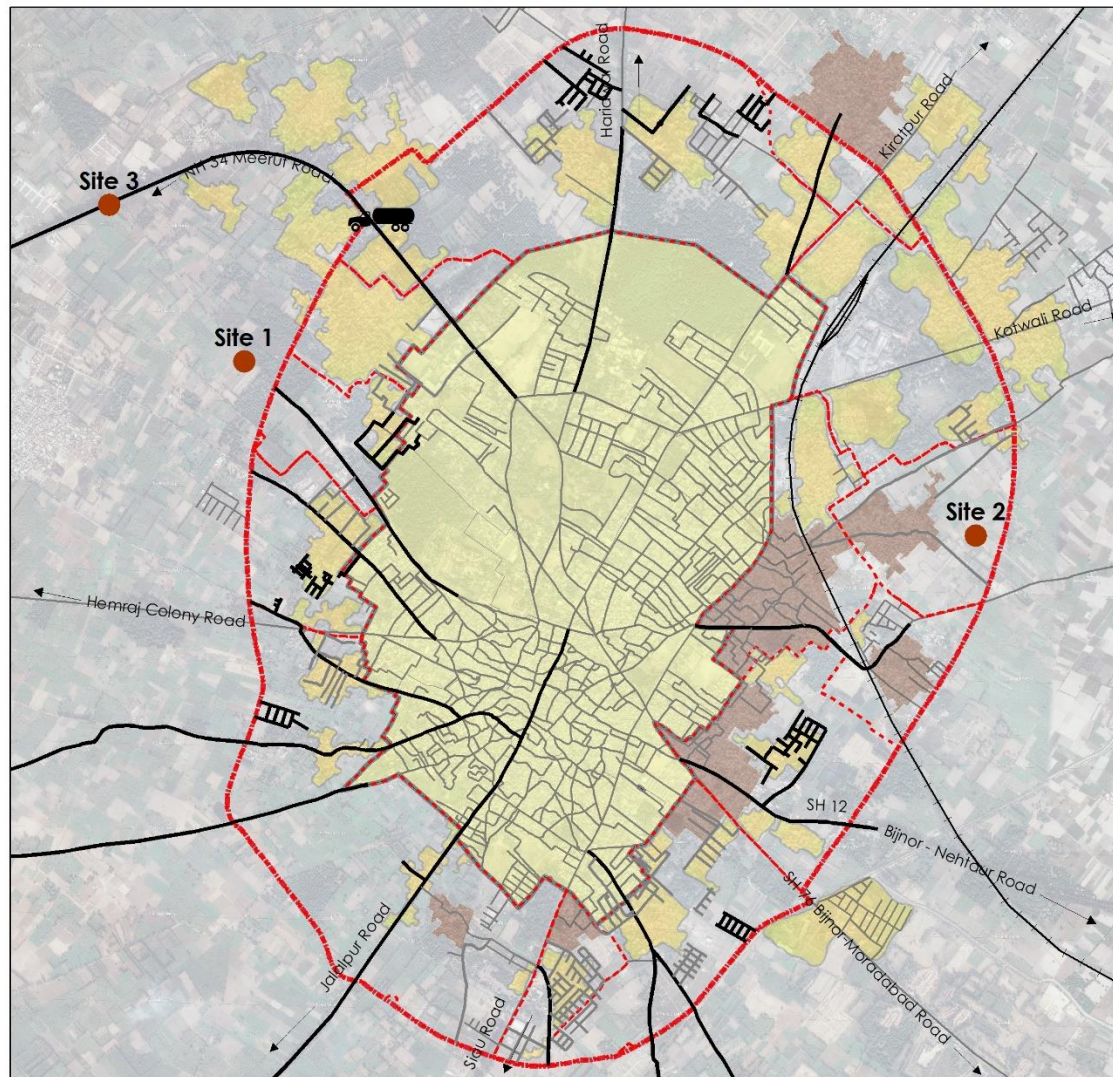
Catchment Area

FSTP

STP

Wastewater Project

DWWTS



**BIJNOR**  
Location in  
Uttar Pradesh

150 75 0 150 300 450 kms

**Legend**

- Gram Panchayat Boundary
- BA Boundary
- BNPP Boundary
- BNPP
- New Developments
- Abadi
- Railway Line
- Disposal Sites
- Desludger Parking

Road Width (m)

- Below 3
- 3 - 4.5
- Above 4.5

**FAECAL SLUDGE AND WASTEWATER MANAGEMENT**

Existing FSM in BA: Accessibility of emptying services, parking, disposal sites

0 0.25 0.5 0.75 1 kms

**Reference:**  
Primary Survey, 2017

**CSE** City Sanitation Plan  
BIJNOR - 2033



# SFD for City Sanitation Planning - Bijnor



**BIJNOR**  
Location in  
Uttar Pradesh



1 kms  
450

boundary

Potential FSTP Location

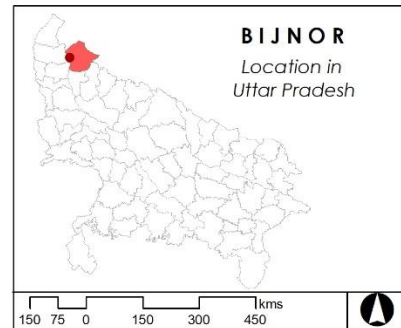
Catchment Area

FSTP

STP

Wastewater Project

DWWTS

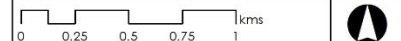


## Legend

- BA Boundary
  - BNPP Boundary
  - Ward Boundary
  - Railway Line
  - Roads
  - Agriculture
  - Commercial
  - Open Area
  - Orchard
  - Public/Semi Public
  - Recreational
  - Residential
  - Transportation
  - Abadi
- Toilet Type**
- Community Toilet
  - Public Toilet
  - Urinal

## ACCESS TO SANITARY TOILETS

### Public sanitation infrastructure



#### Reference:

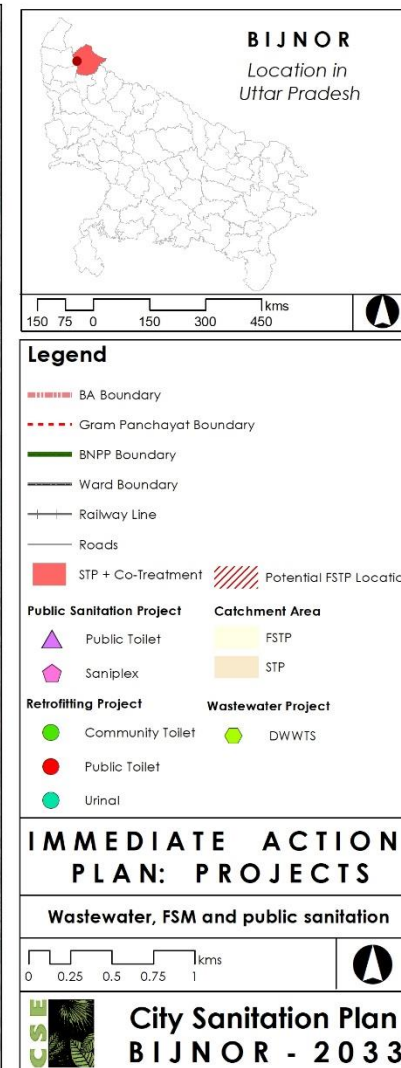
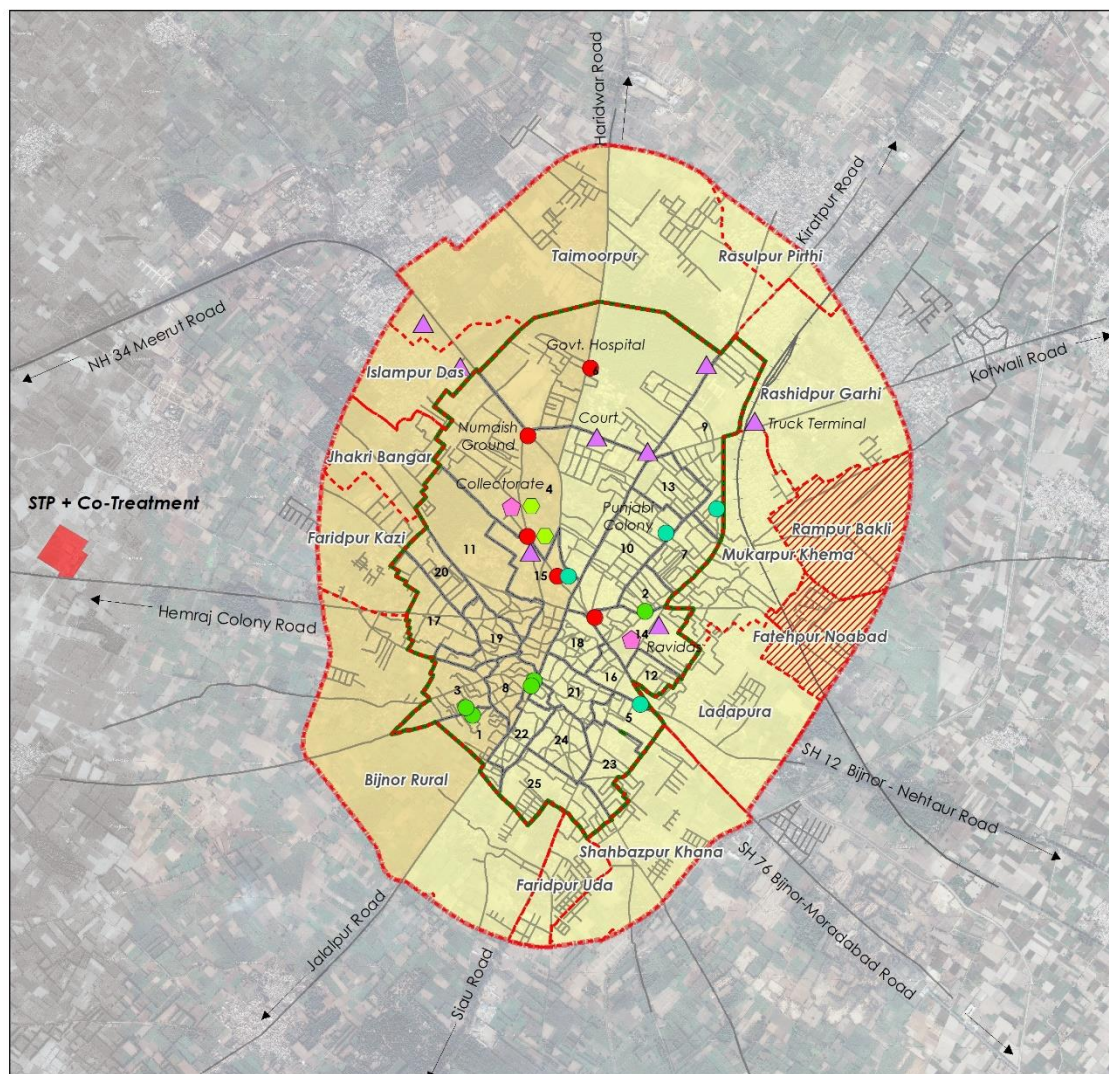
Google Earth, Primary Survey (2017)



**City Sanitation Plan  
BIJNOR - 2033**

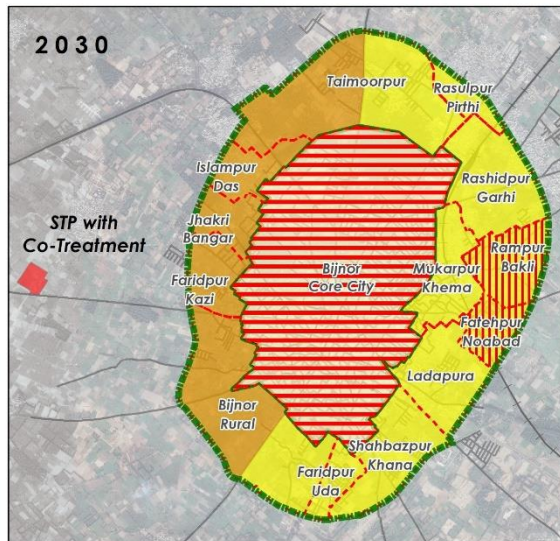
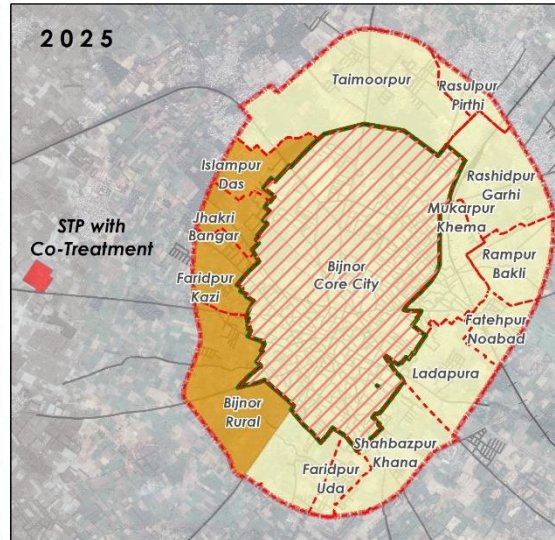
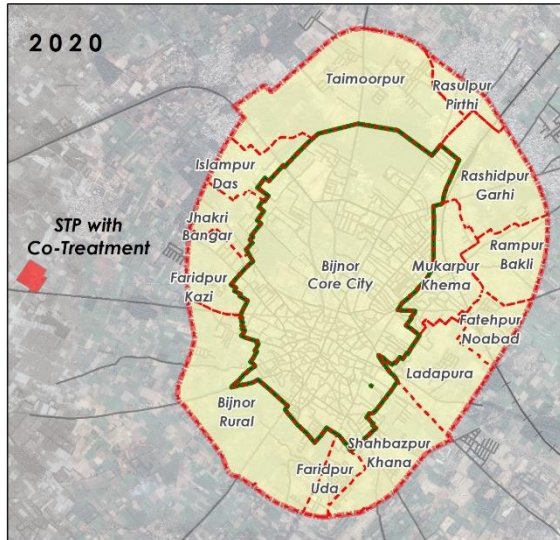


# SFD for City Sanitation Planning - Bijnor

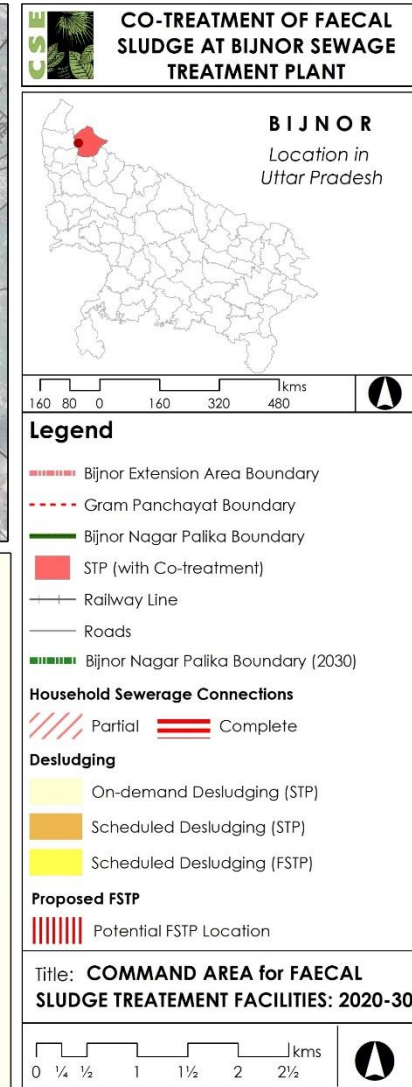




# SFD for City Sanitation Planning - Bijnor



- NOTES:**
- 2020**
1. Total faecal sludge treated through co-treatment facility at existing STP: 20 KLD.
  2. On-demand desludging from core city and Bijnor Ext. Area
- 2025**
1. Scheduled desludging on pilot basis in Bijnor Ext. Area.
  2. Expected drop in demand for desludging from core city due to partial sewerage connections.
- 2030**
1. FSTP of 24 KLD capacity is commissioned.
  2. No demand for desludging from core city due to complete sewerage connections.
  3. Municipal Boundary is extended to cover Bijnor Ext. Area
  4. Scheduled desludging from eastern parts for FSTP
  5. Scheduled desludging from western parts for co-treatment
  6. Total faecal sludge treated: 44 KLD  
- 20 KLD in co-treatment facility | 24 KLD in FSTP



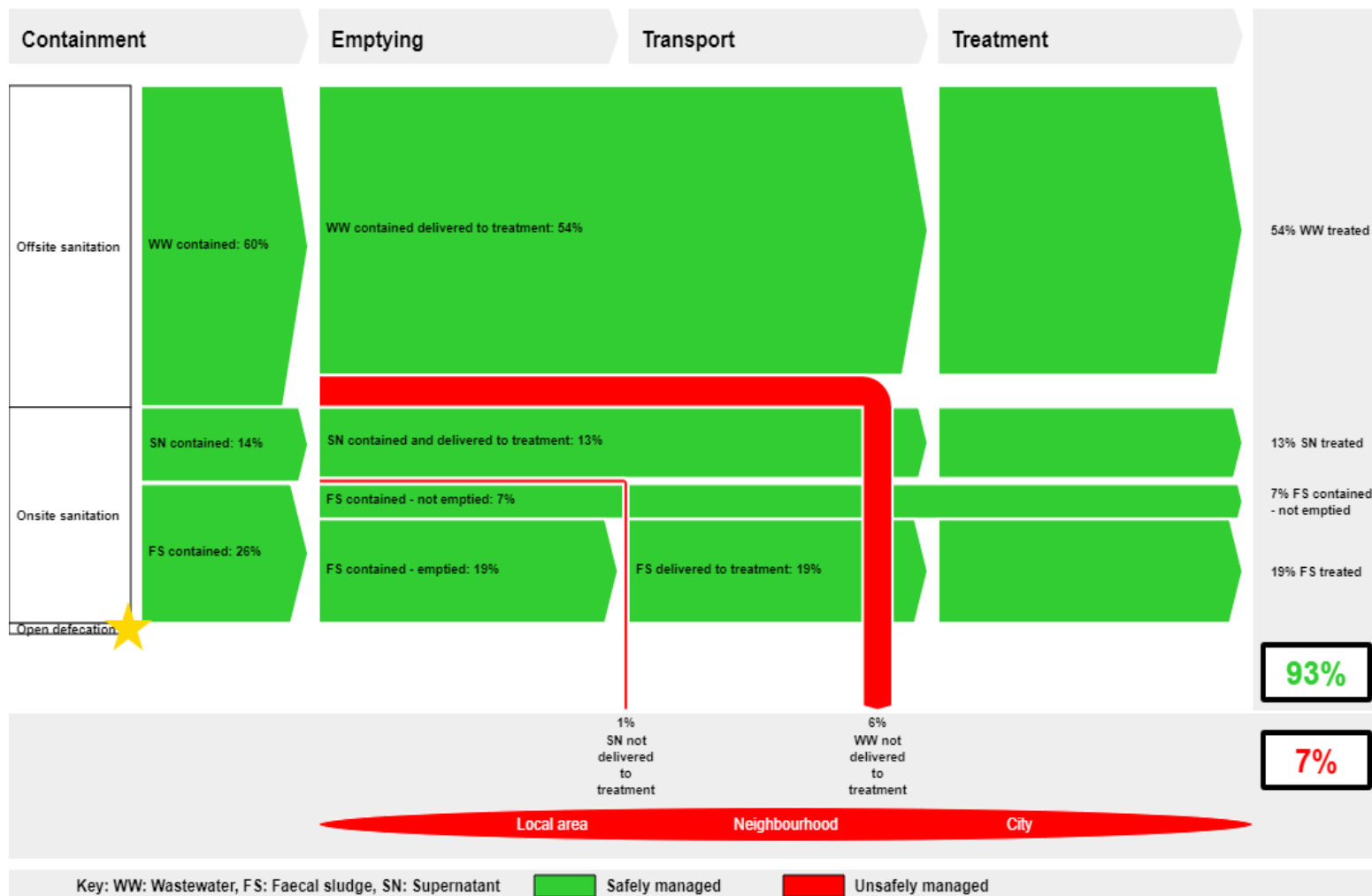


# SFD for City Sanitation Planning - Bijnor



**Bijnor, Uttar Pradesh, India**  
Version: Draft  
SFD Level: 3 - Comprehensive SFD

Date prepared: 30 Jan 2018  
Prepared by: CSE



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# Mapping sanitation inequity through SFD



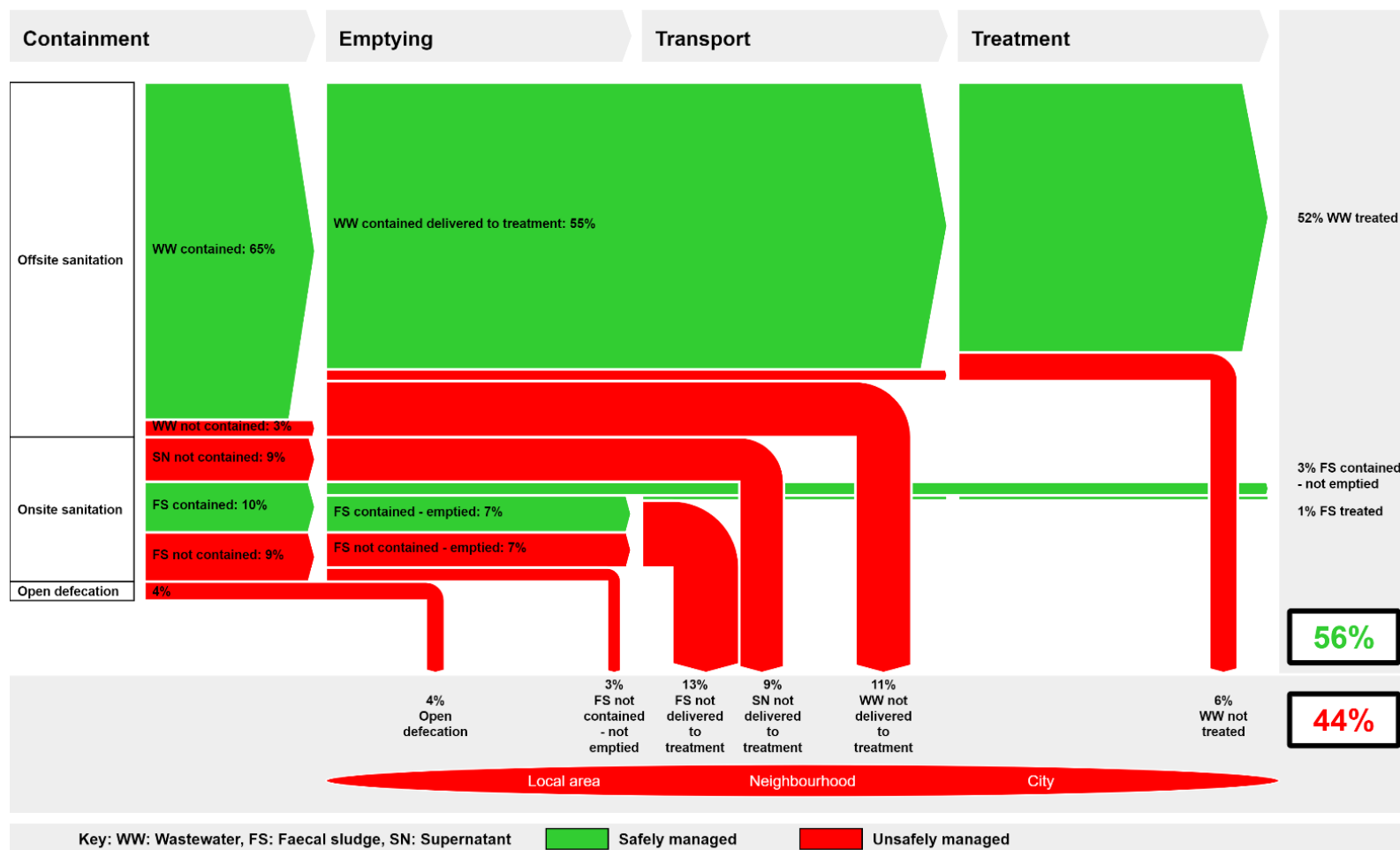
Delhi, National Capital Territory, India

Version: Reviewed

SFD Level: not set

Date prepared: 8 Feb 2016

Prepared by: CSE, India



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- Detailed SFD Report for Delhi prepared in 2016 by CSE
- 30% of city is dependent on OSS
- CSE report key in establishing NGT Committee on Pollution in River Yamuna
- The findings led to various initiatives like registering of private desludgers, co-treatment in STPs, free installation of septic tanks, etc.

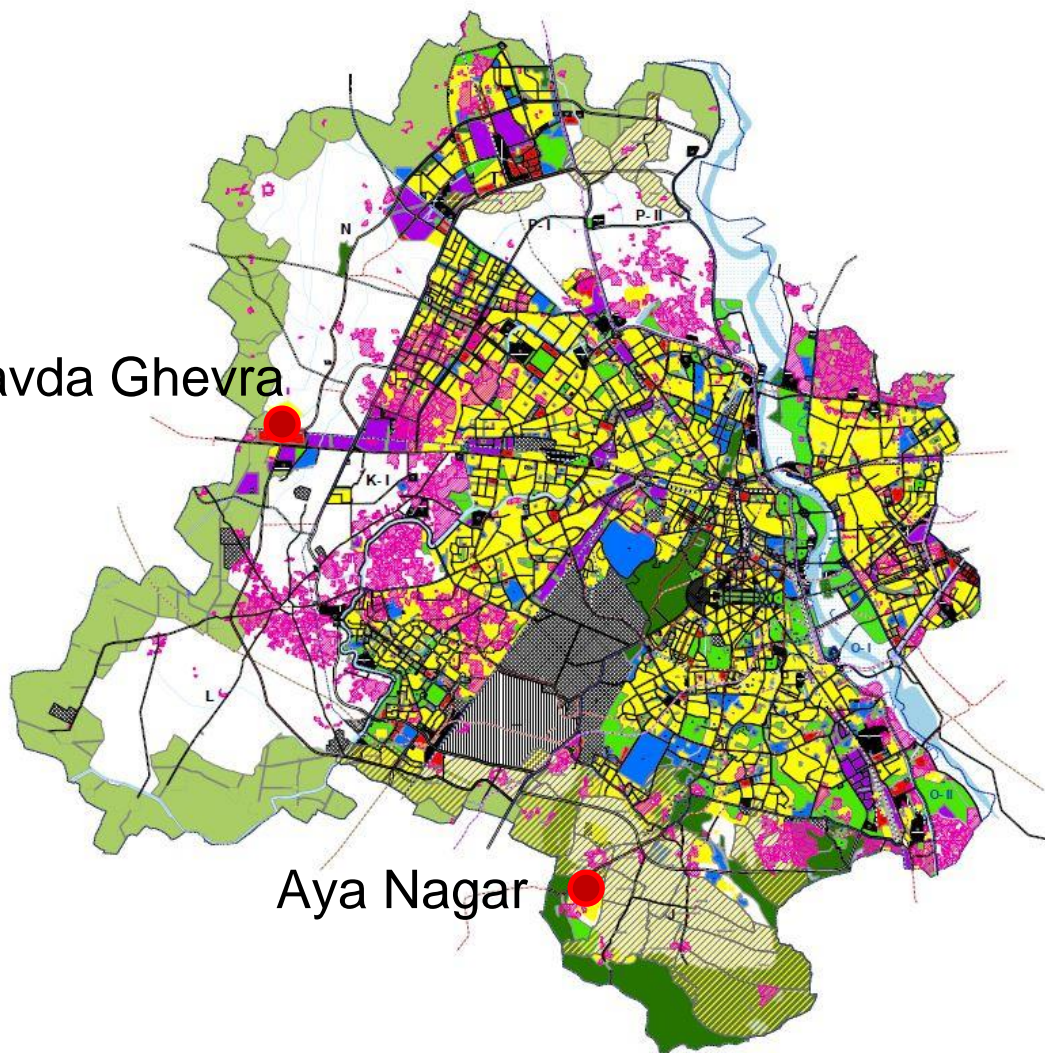


# Mapping sanitation inequity through SFD



Savda Ghevra

Aya Nagar



## LEGEND

<b>RESIDENTIAL</b>	
R0 RESIDENTIAL AREA	
R1 POORER RESIDENCE	
<b>COMMERCIAL</b>	
C1 RETAIL, SHOPPING, GENERAL BUSINESS AND COMMERCIAL	
C2 DISTRICT CENTRE	
C3 COMMUNITY CENTRE	
C4 NON-HIERARCHICAL COMMERCIAL CENTRE	
C5 WHOLESALE & MARKETING	
C6 COLD STORAGE AND OIL DEPOT	
C7 HOTEL	
<b>INDUSTRIAL</b>	
I1 MANUFACTURING, SERVICE INDUSTRY AND REPAIR BUSINESS	
<b>RECREATIONAL</b>	
P1 REGIONAL PARK	
P2 CITY PARK, DISTRICT PARK, COMMUNITY PARK, MULTI-PURPOSE GROUND	
P3 HISTORICAL MONUMENT / ARCHAEOLOGICAL PARK	
P4 GREEN BELT	
P5 SPORTS FACILITIES / COMPLEX / STADIUM / SPORTS CENTRE	
<b>TRANSPORTATION</b>	
T1 AIRPORT	
T2 TERMINAL / DEPOT / WAREHOUSE / RAIL / METRO / BUS / TRUCK	
T3 CIRCULATION - RAIL / METRO / ROAD / METRO / HIGH SPEED RAIL	
<b>UTILITY</b>	
U1 WATER (TREATMENT PLANT ETC.)	
U2 SEWERAGE (TREATMENT PLANT ETC.)	
U3 ELECTRICITY (POWER HOUSE, SUB-STATION ETC.)	
U4 SOLID WASTE (LANDFILL ETC.)	
U5 DRAIN	
U6 OTHER UTILITIES	
<b>GOVERNMENT</b>	
G1 PRESIDENT'S OFFICE AND PARLIAMENT HOUSE	
G2 GOVERNMENT OFFICE COMPLEX / COURTS / PSU	
G3 GOVERNMENT LAND (USE UNDETERMINED)	
<b>PUBLIC &amp; SEMI PUBLIC FACILITIES</b>	
P01 HOSPITAL	
P02 EDUCATION AND RESEARCH / UNIVERSITY / COLLEGE	
P03 SOCIAL, CULTURAL, RECREATIONAL COMPLEX / CENTRE	
P04 POLICE / FIRE / DISASTER MANAGEMENT CENTRE	
P05 RELIGIOUS	
P06 BURIAL GROUND / CREMATION GROUND / CEMETERY	
P07 TRANSMISSION SITE CENTRE	
<b>GREEN BELT AND WATER BODY</b>	
A1 GREEN BELT	
A2 RIVER / FLOODPLAIN AND WATER BODY	
A3 L.R.A. VILLAGES	
<b>LAND POOLING AREA</b>	
<b>OTHERS</b>	
O1 FACILITY CORRIDOR	
O2 PLANNING ZONE BOUNDARY	
O3 UNAUTHORIZED COLONIES	



DRAFT LAND USE PLAN FOR DELHI 2041

DELHI DEVELOPMENT AUTHORITY

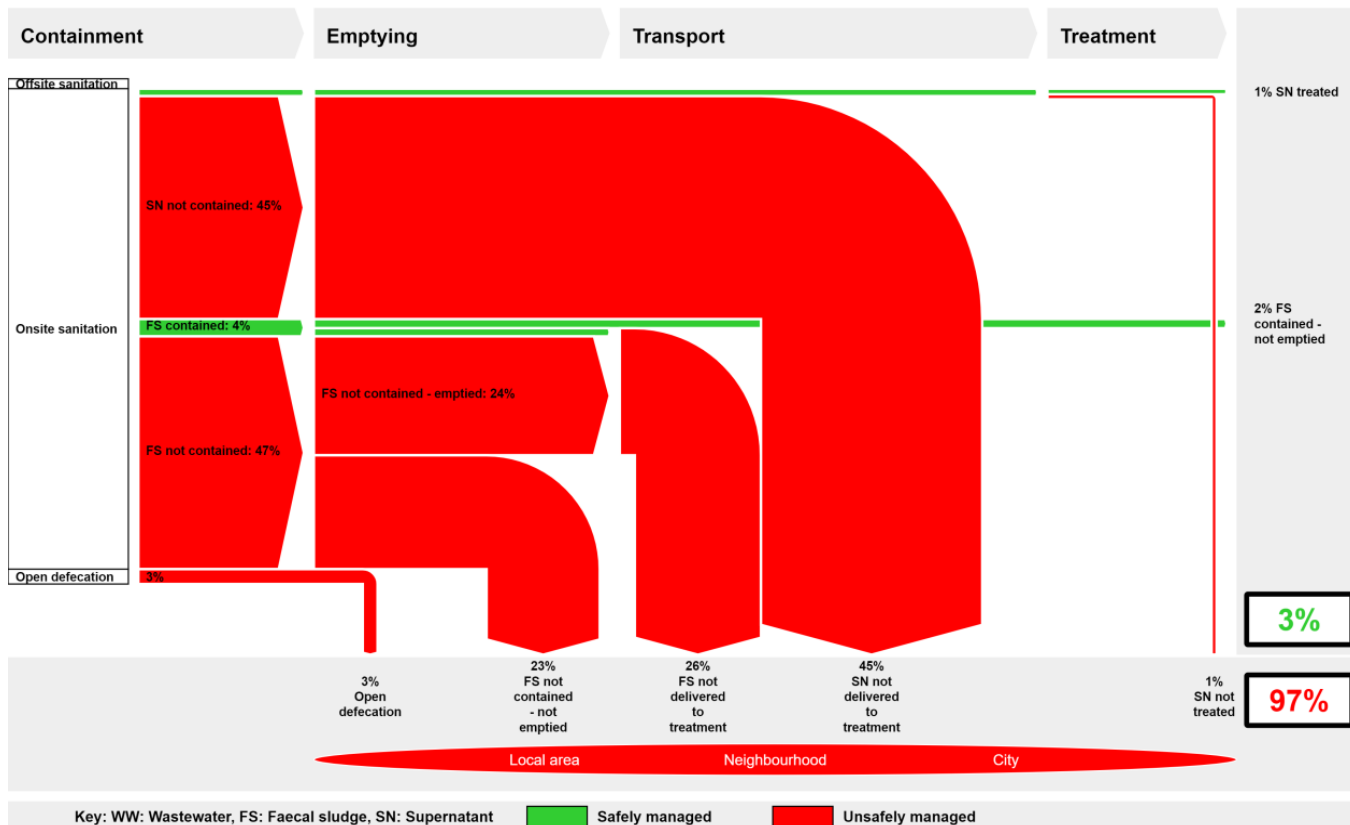
Km 0 2.5 5 10 15 Km



# SFDs: Savda Ghevra

Savda Ghevra JJ Resettlement Colony, Delhi, India  
Version: Reviewed  
SFD Level: SFD Lite

Date prepared: 2 Dec 2020  
Prepared by: CSE India



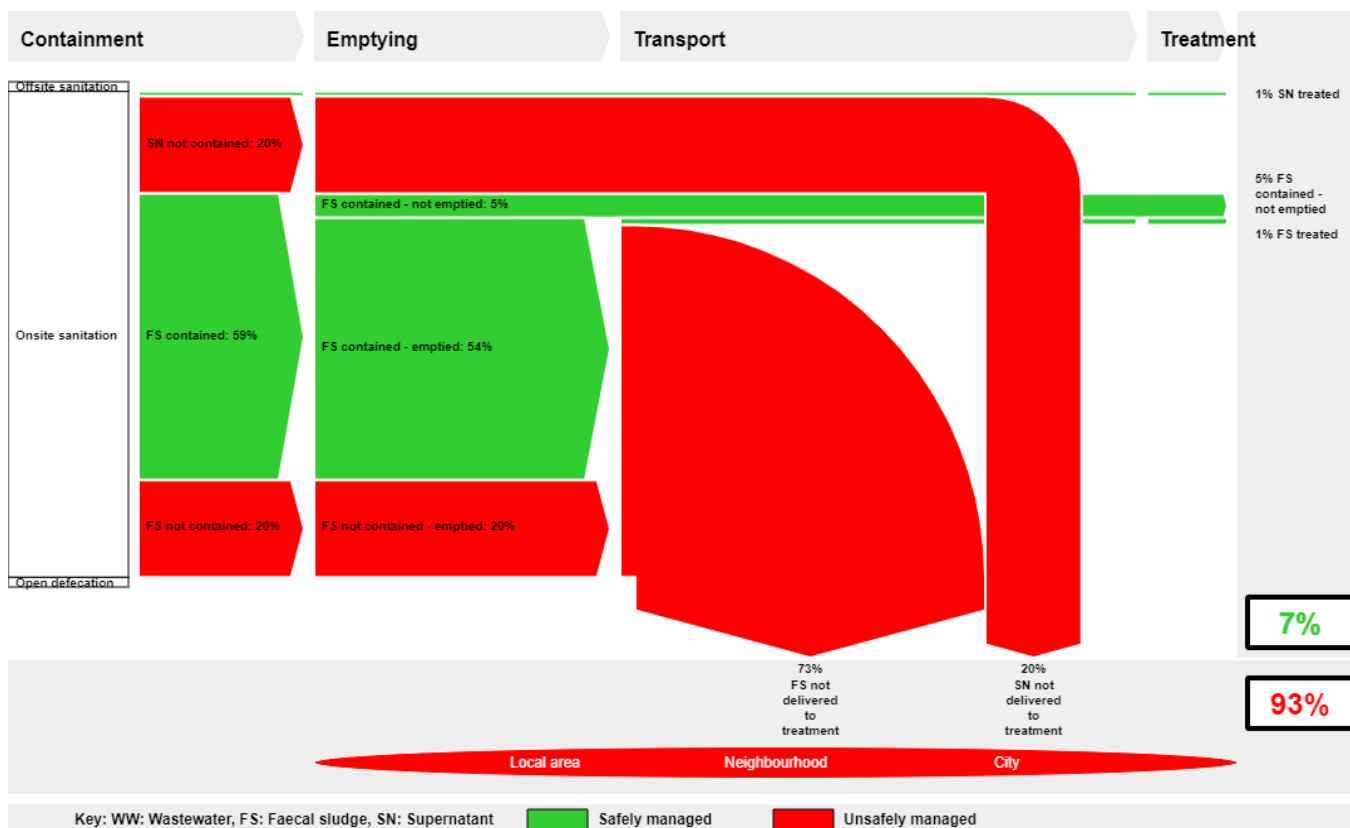
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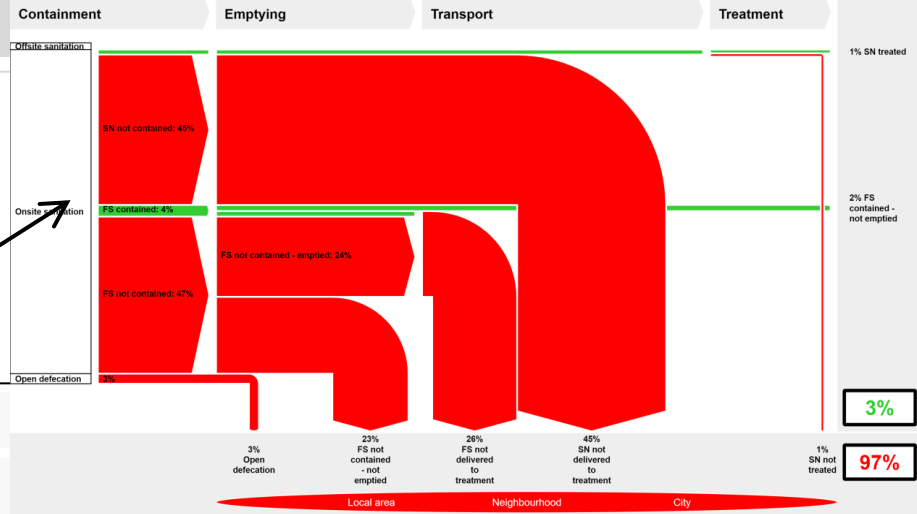
# SFDs: Aya Nagar

Aya Nagar, New Delhi, India  
Version: Reviewed  
SFD Level: SFD Lite

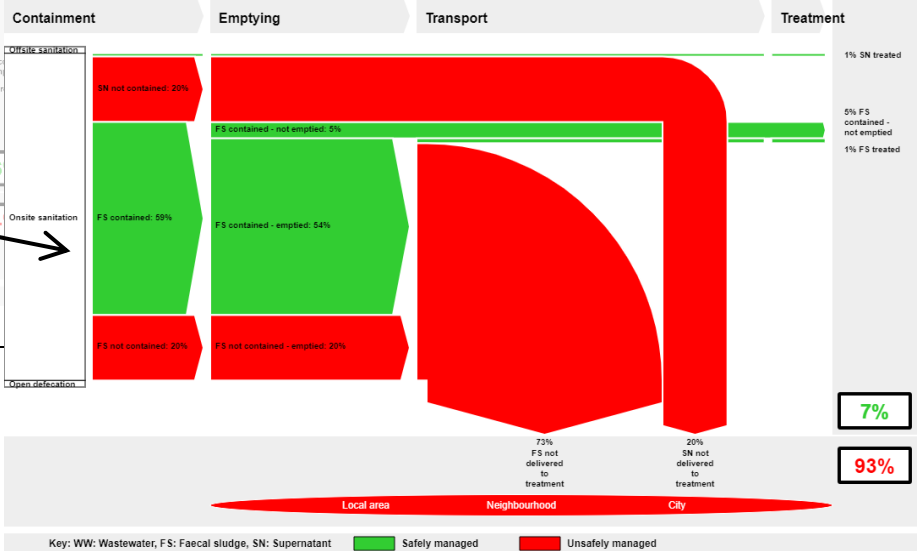
Date prepared: 28 Aug 2020  
Prepared by: CSE



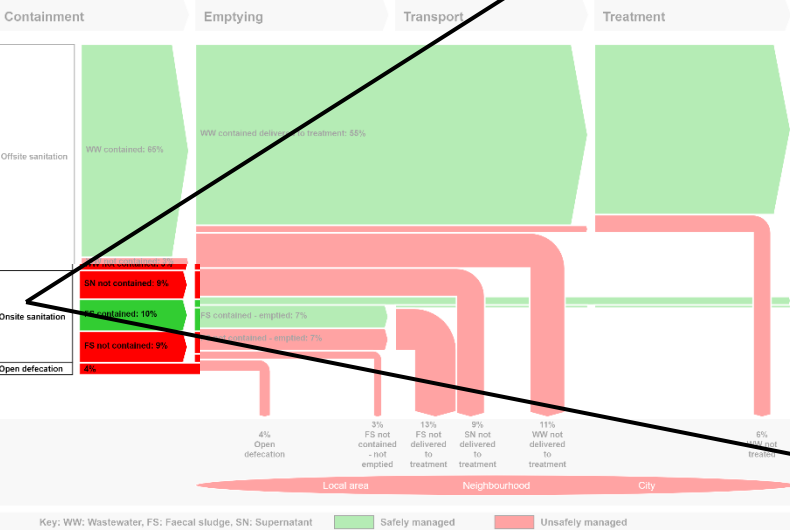
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- SFDs help in providing localised sanitation solutions
- Decentralised water and wastewater management are required to address the water woes of Delhi
- SFD as a tool are important to analyse and improve the urban water cycle of Delhi

# Indian SFD story so far:



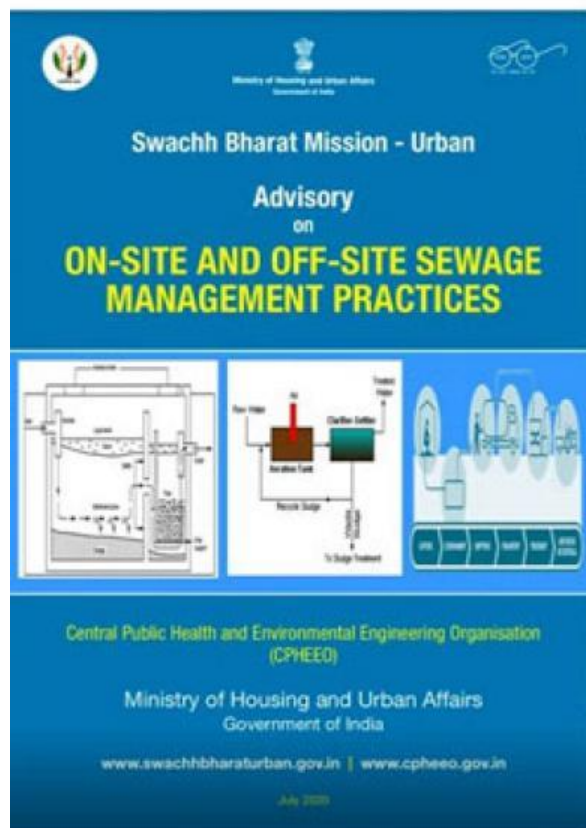
- CSE tested methodology of data collection to Indian context and trained various change agents to prepare and use SFD for advocacy and undertaken :
- Baseline study for developing City Sanitation Plans in select cities across India and in particular River Ganga basin (represents almost 40% Indian population)
- Analysis of sanitation in Urban Uttar Pradesh using SFDs of 66 major cities to produce State level SFD
- Baseline study of Hindon River basin through SFDs to decide relevant projects
- Baseline study of Ganga River Basin through SFDs of 21 cities along the main stem

- CSE has developed SFDs for 135+ towns and used as an advocacy tool to sensitize the decision makers at national , state and local level.
- More than 500 SFDs (different versions) developed in India, by various agents:
- National FSSM Policy notified,
- 19 State FSSM Policies notified and
- 450 + cities initiated effective FSM intervention



**SFDs institutionalisation & Nationwide Rollout** - Advisory issued by MoHUA (July 2020)  
on 'Onsite and Offsite Sewage Management Practices' recommends -  
*'SFDs to **monitor the progress of cities and City Sanitation Planning**'.*

# Institutionalising SFDs in India



## Chapter-3 CITY SANITATION PLANNING

This chapter, with the steps required before development begins. In particular, it contains information on the factors that will affect the selection of treatment plant site and procedures concerning the hydraulic, organic, and suspended solids loads on the plant.

### 3.1 The Planning Process

For coverage of entire urban population with safe sanitation facilities, city sanitation planning is an important step. City sanitation planning reflects sustainable priorities suited to the ULBs particularly on technological and cost options. The City Sanitation Plan preparation usually involves the following elements.

1. Identifying planning area to cover with safe sanitation facilities
2. Existing sanitation coverage
3. Characteristics of Sewage and Faecal Sludge & Septage
4. Identifying the excreta flow routes in city/town
5. Identifying existing Sewage Treatment plants/ Solid waste Plants within the city or in nearby city suitable for co-treatment
6. Identify available lands for setting up new processing facilities on stipulated shared basis.
7. Identifying the availability constraints of funds
8. Decision making tree to select one of the two feasible options at on-site & off-site
9. Factors to be considered in Technology choices
10. Plan to operationalise Sanitation Value Chain
11. Procurement of goods & services
12. Reuse of the reclaimed water from treated sewage septage and conditioned sludge that are hygienically safe

complete acceptance of physical, financial and managerial aspects

14. Collaboration with other planning agencies at local, state and national levels to ensure co-ordination in allocation of profiles and resources
- 15.
- 16.

- 3.2: The Plan
- 3.2.1: Plan
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- 3.2.87: Plan
- 3.2.88: Plan
- 3.2.89: Plan
- 3.2.90: Plan
- 3.2.91: Plan
- 3.2.92: Plan
- 3.2.93: Plan
- 3.2.94: Plan
- 3.2.95: Plan
- 3.2.96: Plan
- 3.2.97: Plan
- 3.2.98: Plan
- 3.2.99: Plan
- 3.2.100: Plan

capacity available and capacity required and also if co-treatment of sludge could be taken up in the existing STPs.

Also, details of Solid Waste Management Plants such as location, kind of processing unit, wet waste processing unit such as compost plant, bio-methanation plant, capacity of the unit etc. This data would be essential to take up co-treatment of sludge along with the wet waste organic waste for production of compost, biogas and other derivatives.

### 3.2.3 Land Availability to Set Up STPs/STTPs

Land availability Projects are often delayed because of non-availability of high price of land. ULBs should identify the land bank for treatment facility. It is important to ensure sufficient land is set aside for setting up STPs/STTPs and its infrastructure at the earliest opportunity and embedded into the local planning scheme. Failure to incorporate sufficient and requirements in the planning scheme can result in

Figure 1: A typical Silt Flow Diagram of a city depicting urban waste management of excreta

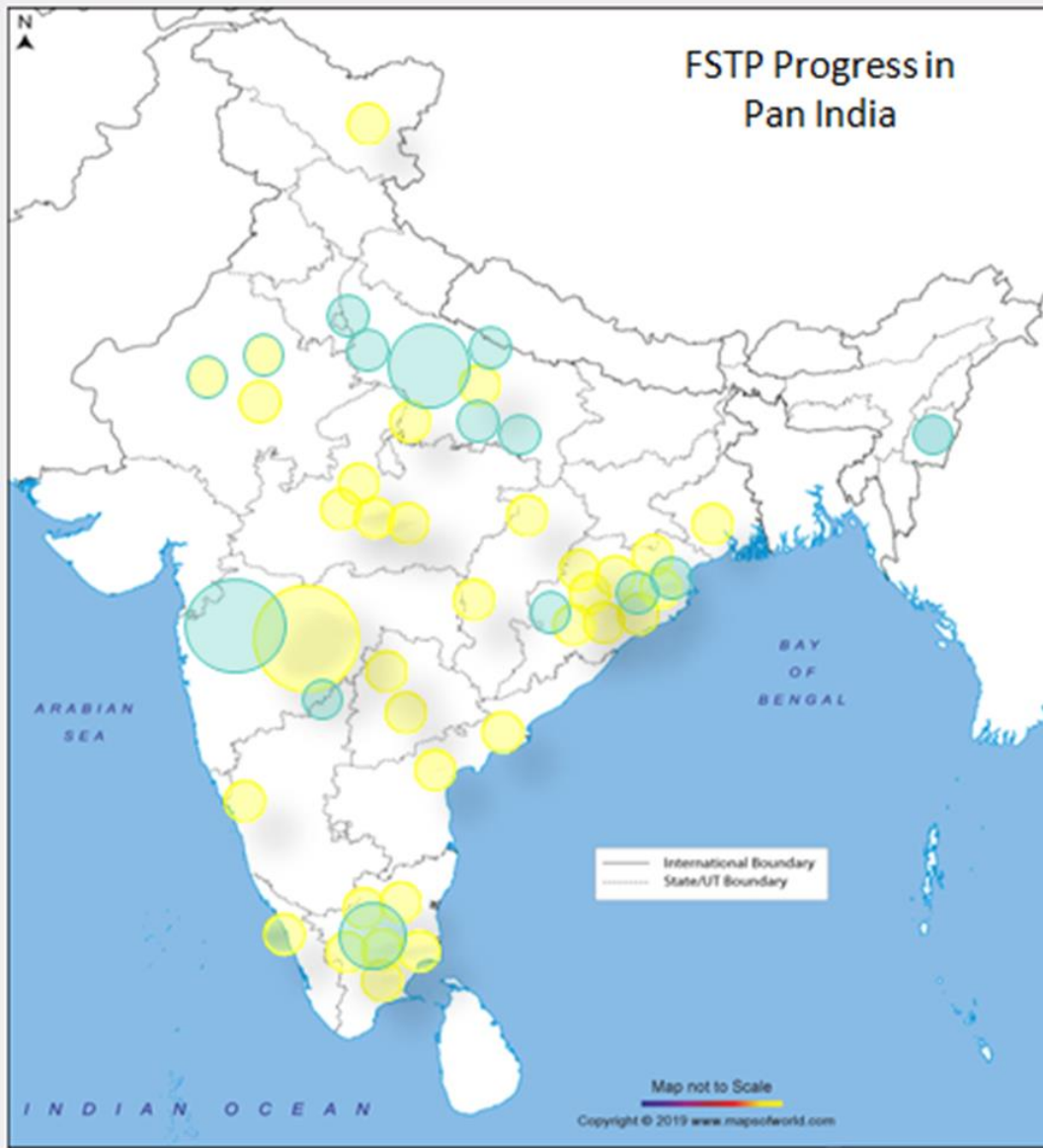


For generating SFD graphs for any city/town may be downloaded from ULB, <https://sfd.southcoast.gov.in/generator>

Revised on 06.06.2020 and 07.07.2020, Revised on 06.06.2020 and 07.07.2020

MoHUA – CPHEEO, Swachh Bharat Mission – Urban Advisory released in July 2020 included : Preparation of SFDs, DWWT & CSPs integral to achieving improved urban sanitation

# FSM progress in India



State	Operational	Under Construction
Odisha	10	33
Uttar Pradesh	2	37
Maharashtra	74	94
Tamil Nadu	6	58
Rajasthan	3	2
Madhya Pradesh	4	0
Chattisgarh	2	0

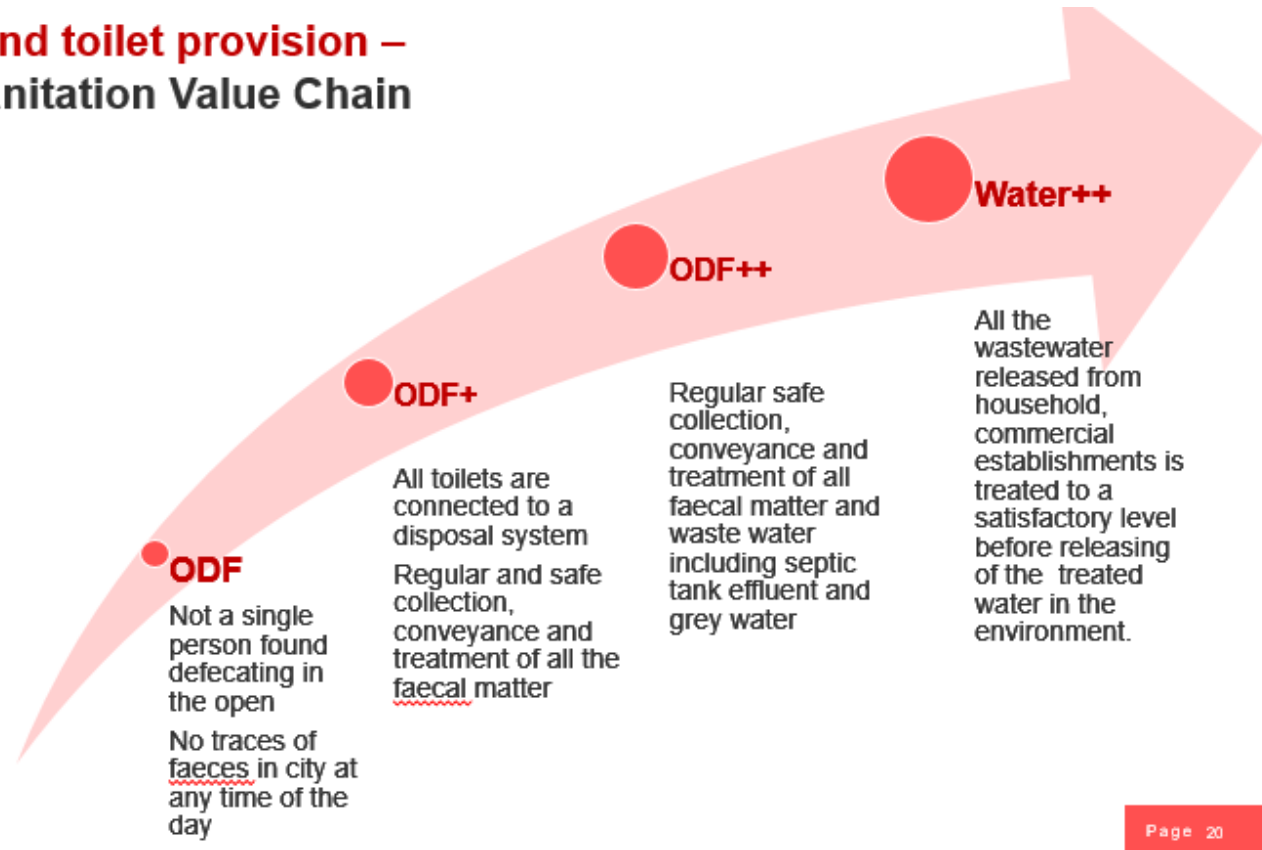
**450 + FSTP across India**



# Sanitation progress in India



## Cities journey beyond toilet provision – Progress across Sanitation Value Chain



In our journey from **Sewerage >> FSSM >> CWIS**, SFD has an important role as **advocacy, planning and monitoring tool**.

# Thank you

## Email us at: [sfdhelpdesk@cseindia.org](mailto:sfdhelpdesk@cseindia.org)

SFD Promotion Initiative

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alliance

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Zusammenarbeit (GIZ) GmbH

On behalf of



Federal Ministry  
for Economic Cooperation  
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Solid Waste for Development

**BILL & MELINDA  
GATES foundation**

- Conduct capacity building programmes for preparation of SFD, sanitation master planning – Online and Onsite
  - Regulators, Practitioners, Researchers, Academia
- Provide technical support for preparation of SFD
  - Handholding, review, publication
- Prepare SFDs for select towns, cities and Municipalities
  - Lite, Intermediate and Comprehensive, based on Sanitation / FSM planning initiatives