

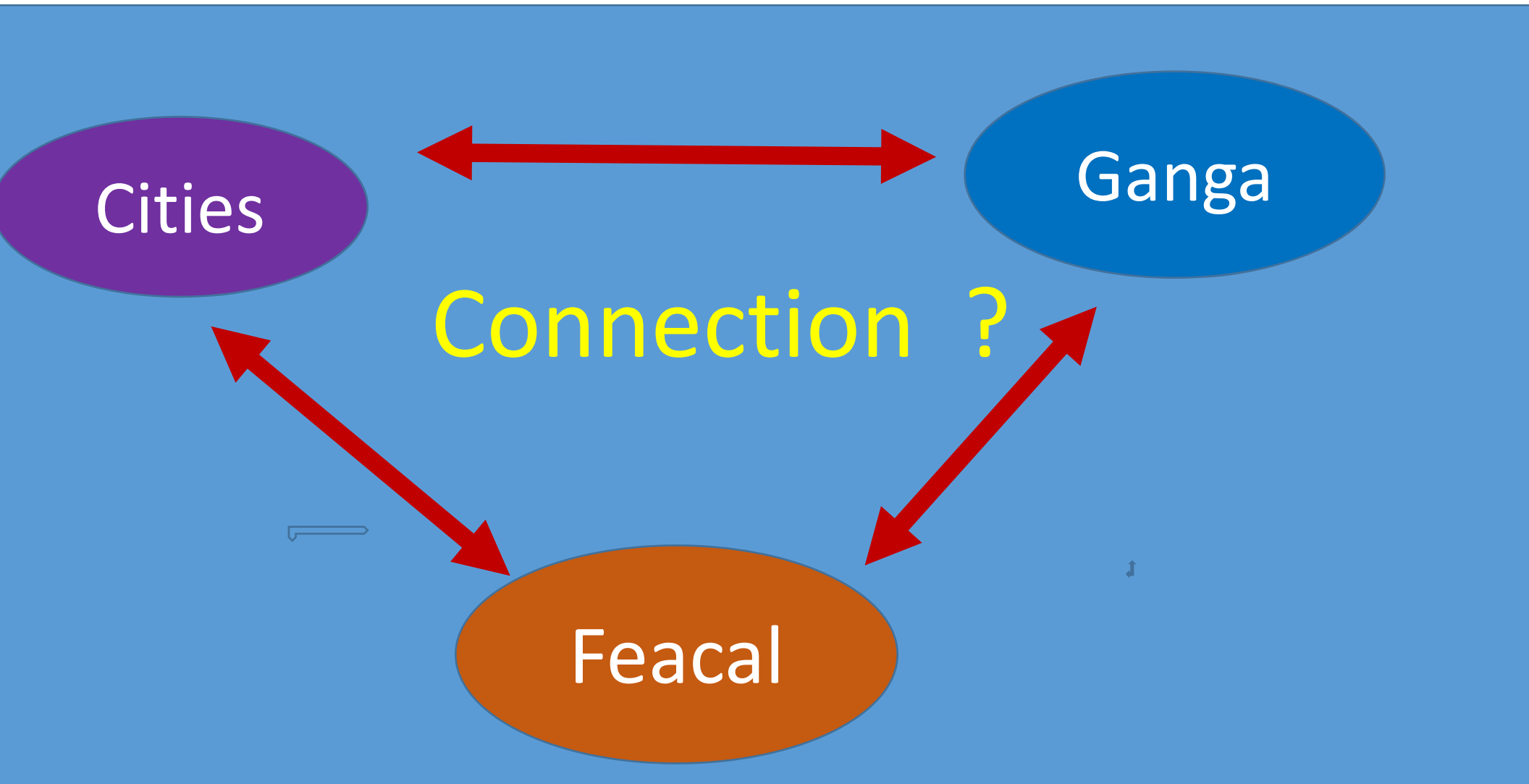
Faecal Connection - Ganga and its cities

**Suresh Kumar Rohilla, Senior Director
Water Programme**

CSE Media Briefing on ' Ganga the real saga and after :

Lucknow

Oct. 30, 2018



Defining & Monitoring River Water Quality

DO (Dissolved Oxygen): refers to free non-compound oxygen present in water or other liquids. It is crucial for survival of aquatic life.

BOD (Biological DO): It's the amount of DO used by microorganisms while metabolising organic matter (sewage or pollutants)

Total Coliform : Class of bacteria found in faeces / excreta. It's presence in drinking water may indicate a possible presence of harmful, disease causing organisms

pH : measurement of hydrogen ion concentration. pH of pure water is 7. The normal range of surface water is 6.5-8.5.

CPCB : What makes water fit for drinking ?



Class A

Fit for drinking after disinfection

Water in this category has dissolved oxygen (DO) of more than 6 mg/l and biochemical oxygen demand of less than 2 mg/L. Total coliform should be less than 50/100ml



Class C

Conventional treatment and disinfection

Fit for drinking with conventional treatment after disinfection. It should have dissolved oxygen of more than 4mg/l and biochemical oxygen demand of less than 3mg/l. The pH range should be between 6 to 9 while total coliform should be below 5,000/100 ml



Neither in Class A nor Class C

Water that does not fall in Class A or Class C is fit for drinking only after organised conventional/ advanced treatment, including disinfection

...AND FOR BATHING

For water to be fit for bathing, it should have dissolved oxygen more than 5 mg/l and biochemical oxygen demand of less than 3 mg/l. Acceptable faecal coliform range is from 500/100ml to 2,500/100 ml. The pH range should be between 6.5 and 8.5



Fit for bathing



Not fit for bathing

70 % of Ganga river pollution is attributed to
dumping of untreated municipal sewage

Sewage Vs Faecal Sludge & Septage ?

Sewage : untreated wastewater (faeces + urine) and generally grey water (kitchen & bathroom water) also become part of sewage. BOD range is 150-350 mg/l.

Faecal Sludge / Septage : Semi solid slurry emptied out of septic tanks / pits and is much more concentrated than sewage.

What is BOD of FSS ?

10000-40000/60000 mg/l



Water – Wastewater Management Scenario

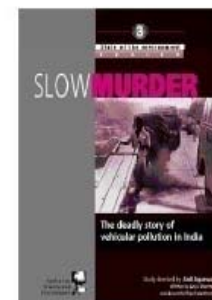
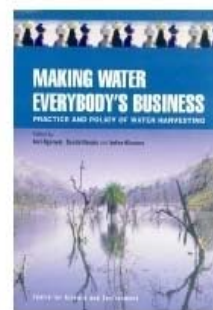
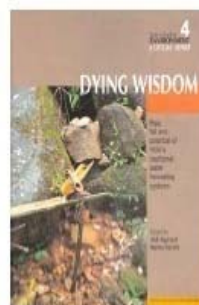


Assessment



Volume 1 - dwells on how urban India is soaking up water, polluting rivers and drowning in its own waste (296 pages).

Volume 2 - contains a very detailed survey of 71 cities, and presents an assimilation of the survey's results (496 pages) building on various Previous publications:



Excreta Matters I

- Where does water come?
- Where does waste go?
- Simple questions.
- But not asked
- Never answered

Water=waste

Cities plan for water, **forget waste**

80% water leaves homes as sewage

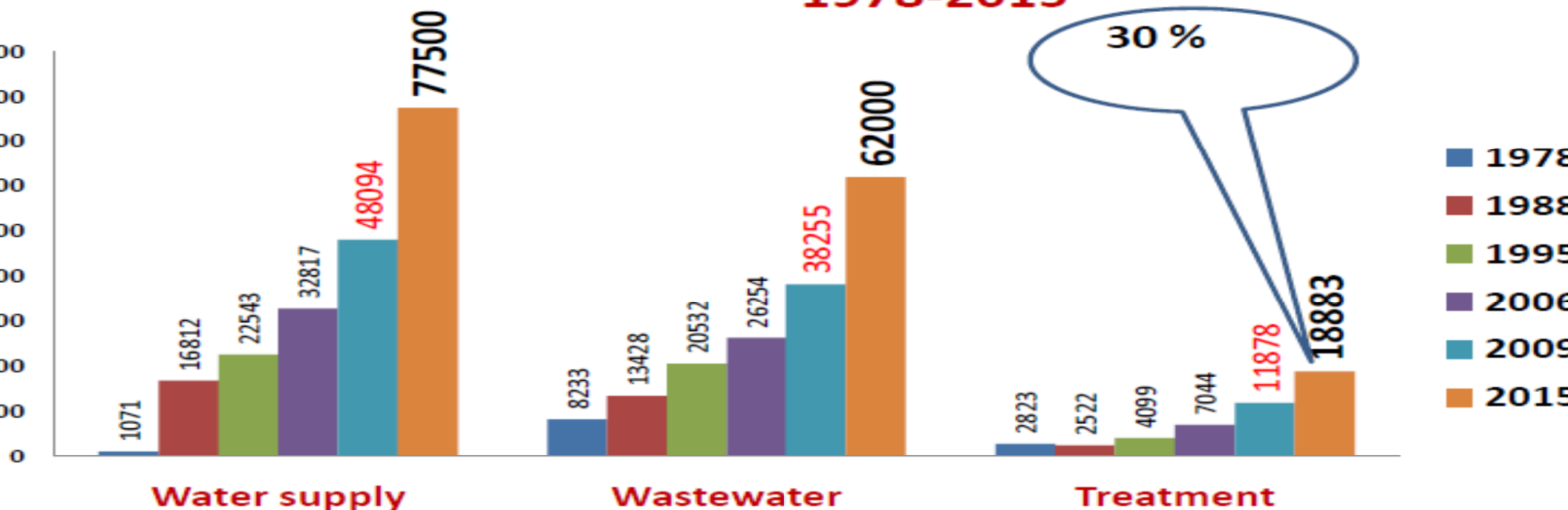
More water=more waste

Cities have **no accounts** for sewage

Cities have **no clue** how they will convey waste of all, treat it, clean
ivers

Excreta : sums

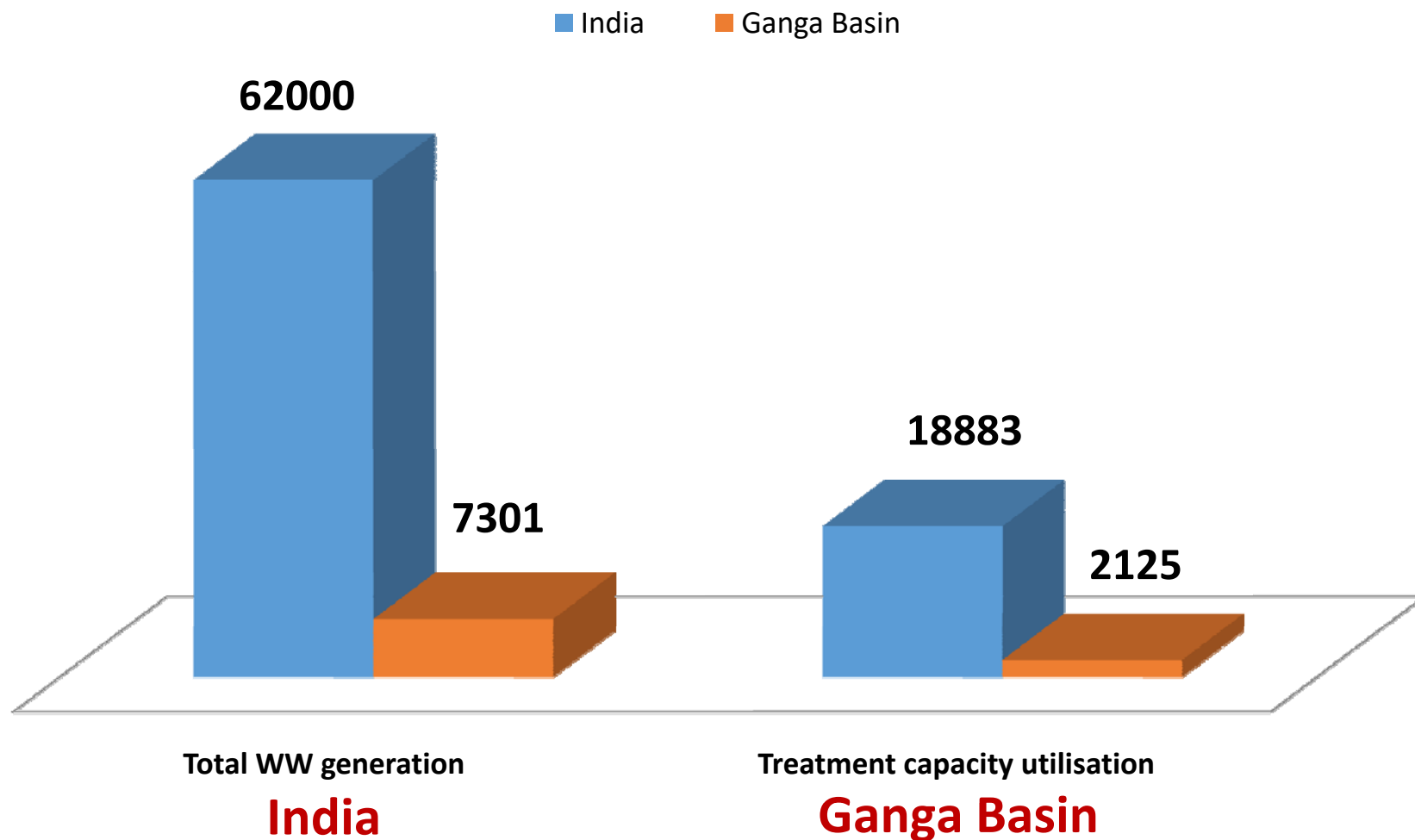
Water supply, wastewater generation, treatment
in Class I & II cities (MLD)
1978-2015



Two cities Delhi & Mumbai have 31% of total treatment capacity installed in India.

Source: CPCB Reports (1978,1988,1995,2006,2009,2015)

Sewage Generation & Treatment Gap (in MLD)



Sewage Treatment in Ganga Basin - Gap

Sewage generation in India- 62000 mld and Sewage Treatment Capacity in India- 18883 mld

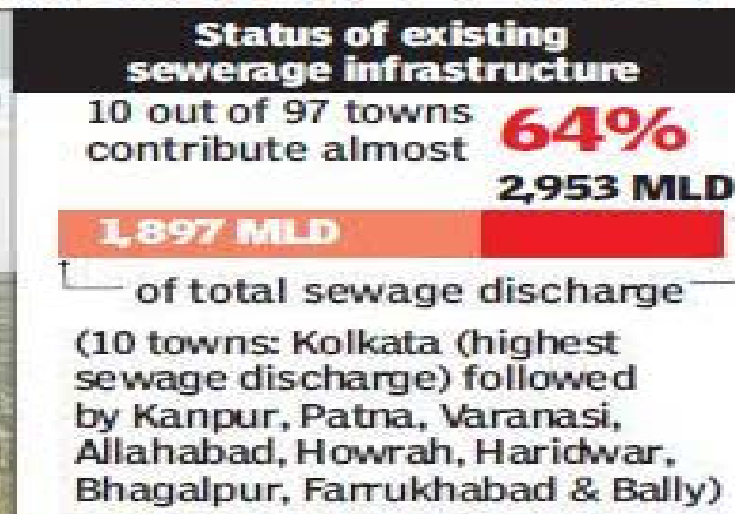
11 Ganga Basin States- 12050 mld (class I & II cities) - approx. 20 % of total.

5 Ganga basin state along main river stem (175 Class I and 102 Class II towns) generate- 7301 mld

Sewage Treatment Capacity in Ganga Basin – 2125 mld (1188 mld under approval/ construction) 3313 mld

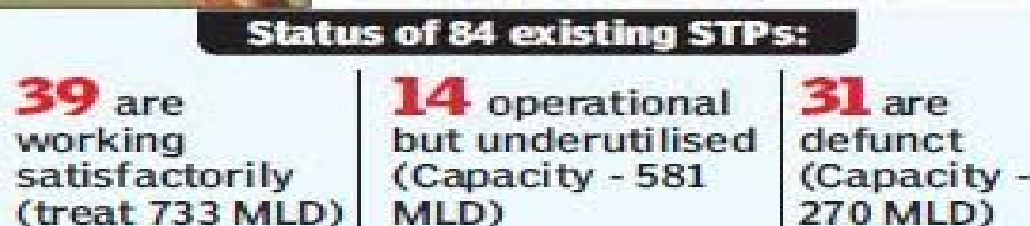
Shortfall of 8737 mld / 3988 mld along river stem

CLEANING THE RIVER: DAUNTING CHALLENGE



Projection of sewage generation in 97 towns by 2035
3,603 MLD

Treatment capacity of existing 84 sewage treatment plants (STPs) -
1,584 MLD



GANGA CLEANING BANKS ON FATE OF ONGOING PROJECT

- No. of sanctioned projects under 'Namami Gange' programme - 195
- No. of sewage infrastructure projects - 102 (out of 195)
- It'll treat 2,369 MLD of sewage
- Remaining projects (93)

out of 195) are related to crematoria development, river front development, river surface cleaning, institutional development, biodiversity conservation, afforestation, rural sanitation and public participation

STATUS OF 102 SANCTIONED SEWAGE INFRA PROJECTS:



Planning for hardware

Cities plan for treatment not sewage

Treatment plants are not simple answers

Most cities do not have underground sewage But engineers sell pipe-dreams of **catching up with infrastructure**

We lose rivers. Generations of **lost rivers**

Wastewater Scenario



The current paradigm – water supply

**More water supplied = More waste water
generated = more costs for treatment =
Unsustainable**

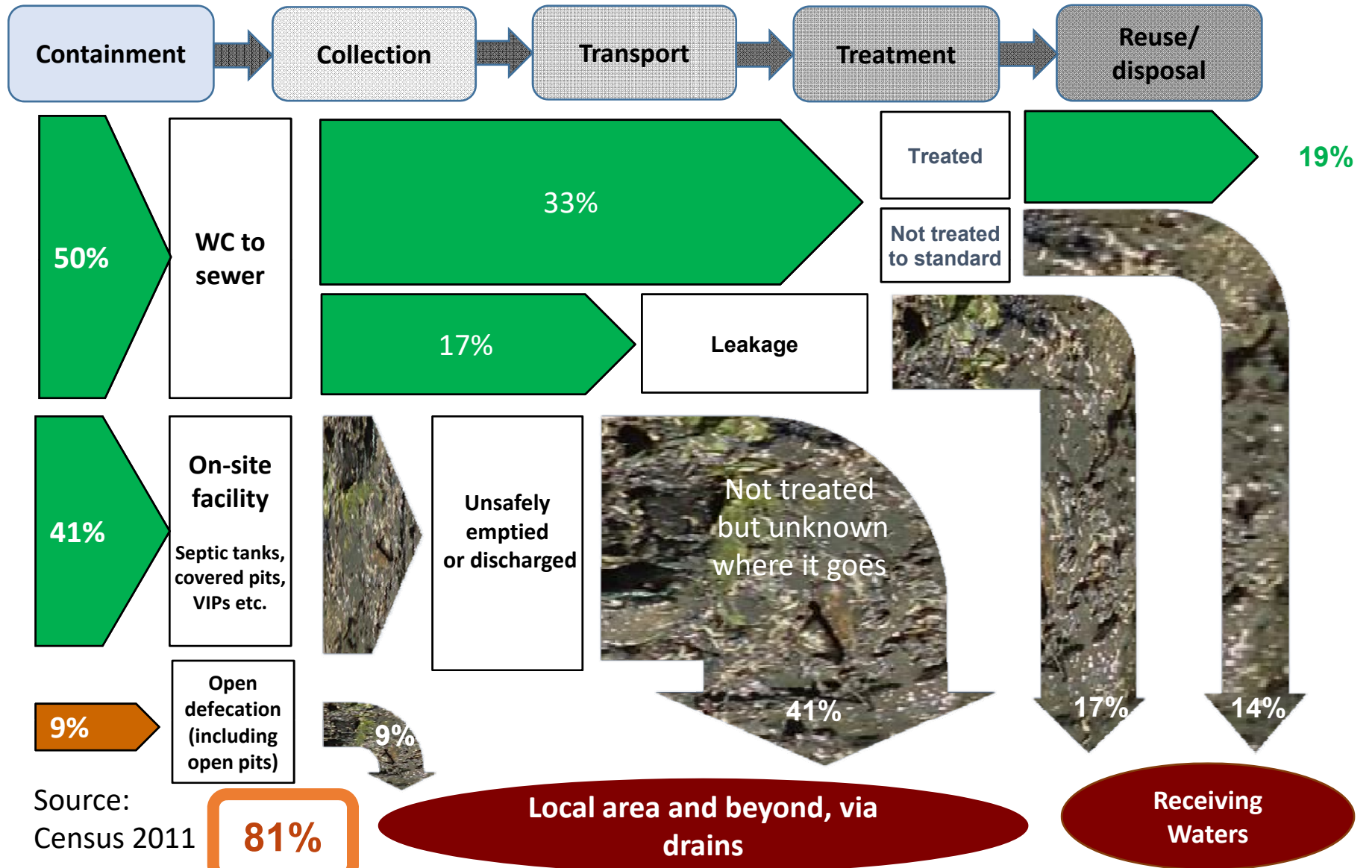
Excreta Matters II

Water-toilet-
**septage / faecal
sludge** -sewage-
treatment-reuse
in town / cities



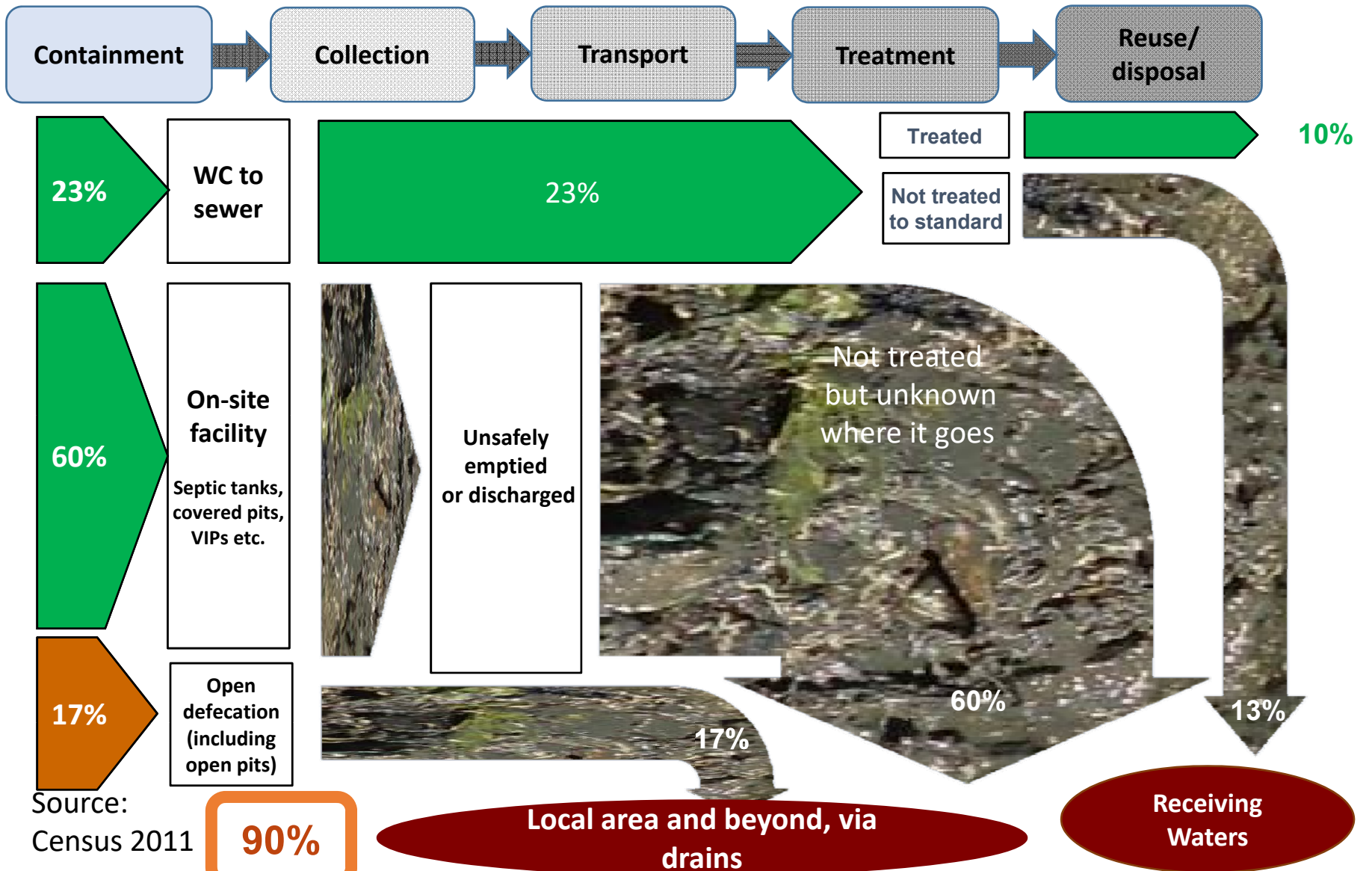
Urban India – Septage / Sewage : Shit Flow Diagram

Sewer coverage	No of Cities	% of population
<10 %	191	16.45%
10 - 30%	158	20.10%
30 - 60%	75	24.22%
>60%	78	39.23%



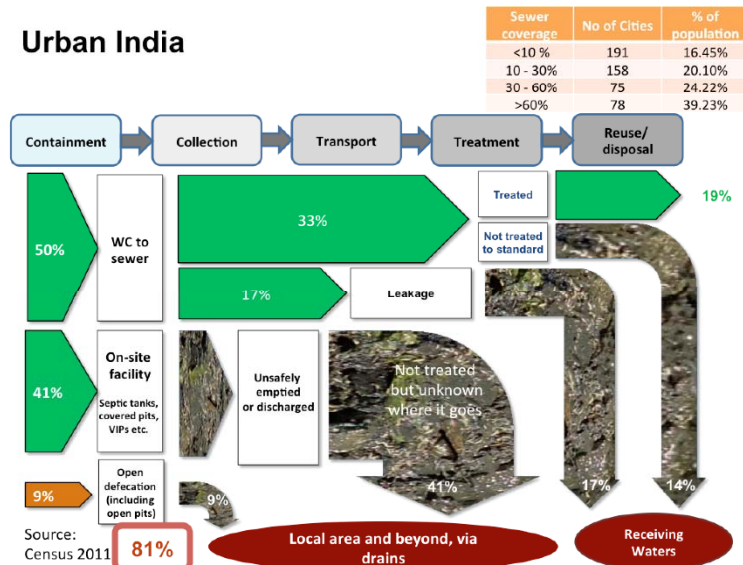
Ganga Basin – All Classes of Towns in Basin States

Sewer coverage	No of Cities	% of sewered population	% of population
<10 %	738	10%	2%
10 - 30%	348	24%	6%
30 - 60%	33	38%	9%
>60%	17	28%	6%



Excreta Flow Comparison to National Average

Urban India



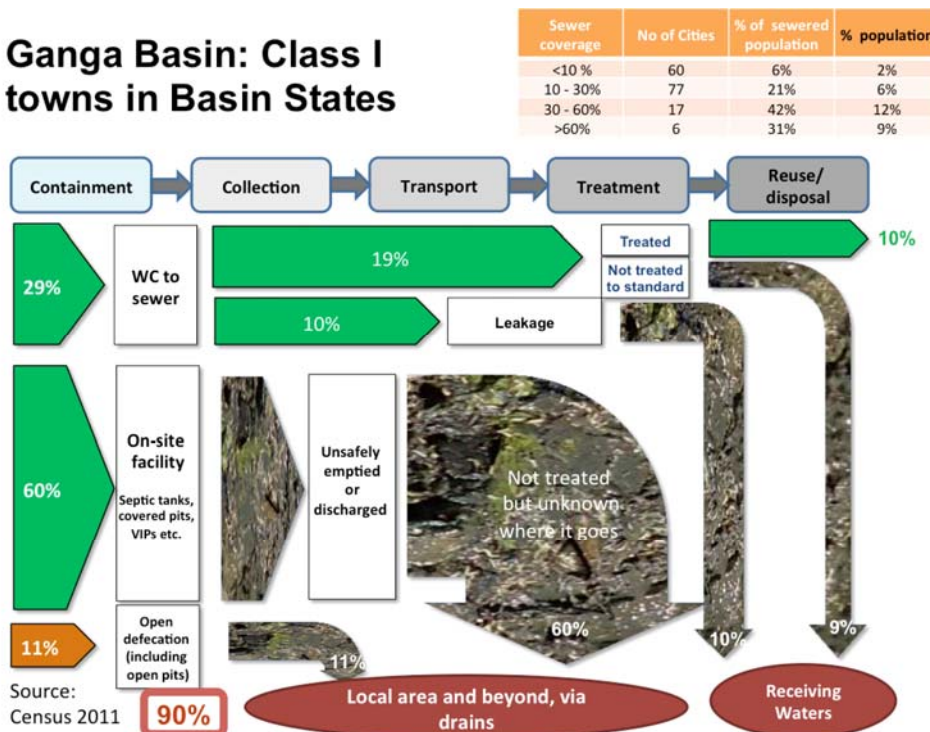
Excreta Flow - unsafe disposal in

Ganga Basin states is 90-95 %

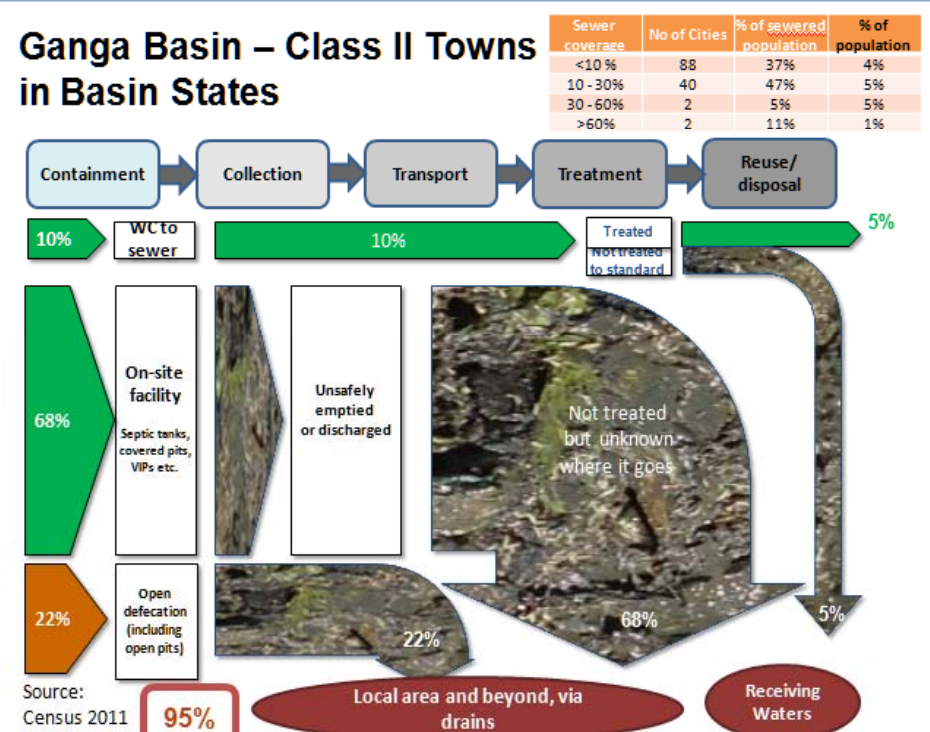
as higher compared to 81 % national average

SBM lists 400 town /cities to be declared **ODF** have **only 8 cities from Ganga basin**

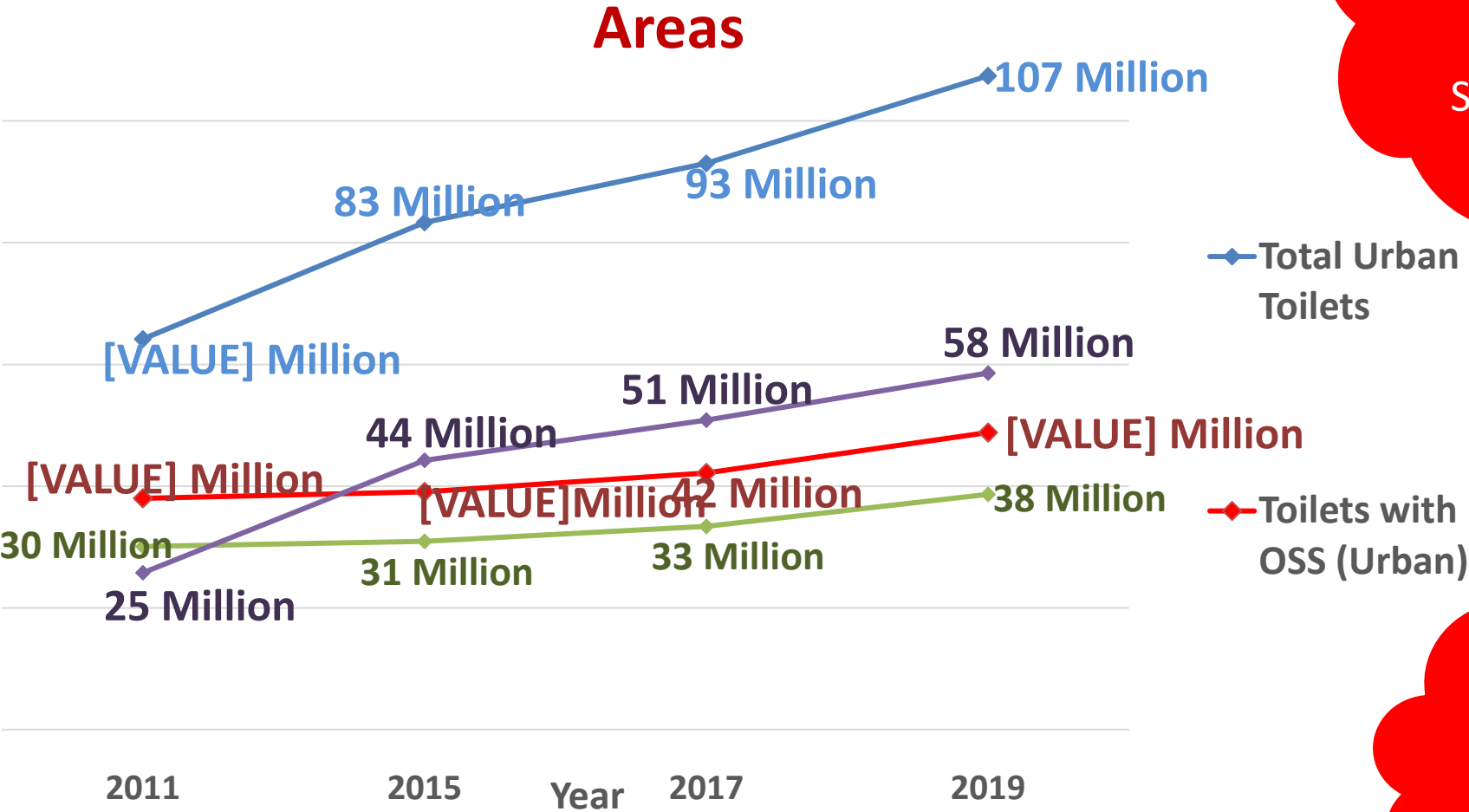
Ganga Basin: Class I towns in Basin States



Ganga Basin – Class II Towns in Basin States



Coverage of Toilets and its Dependence in Urban Areas



Septic Tanks continue to be a constant source of containment considering the current rate of Sewerage network growth

2.56 Billion litres set to seep into ground water with pit technology

On-site challenges

Toilet connected to underground 'box'

Design quality of septic tank is unknown – in many cases these are tanks, emptied regularly or simply linked to municipal drain

In most cities Informal (mafia) collects waste for a price – growing and thriving business

In all cities there is **no system for safe disposal of this waste**

In all cities, waste from septic tanks is **'dumped' in open sewers; rivers; municipal sewers; fields...**



Thriving private business:
but where does this go?

Disposal : Over land or Drains - River





Disposal : in garbage dumps

Ganga in peril

Under Namami Gange, the government will check the flow of untreated sewage into the river from 118 towns and cities. CSE visited 10 towns and cities along the Ganga and found that the authorities have miserably failed to manage faecal sludge, which is only going to increase in volume with the implementation of on-site sanitation under Swachh Bharat Mission

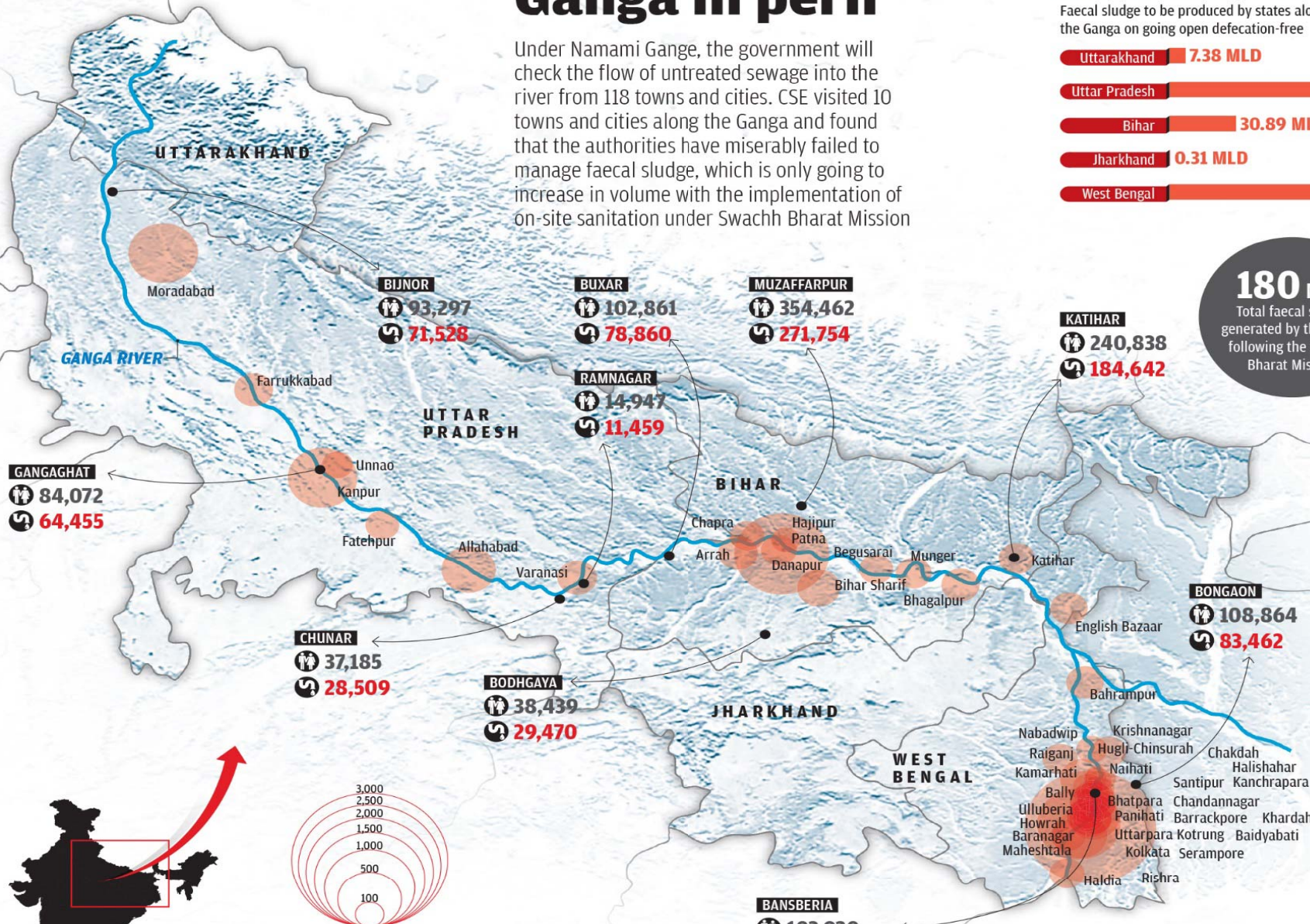
Load of Swachh Bharat Mission

Faecal sludge to be produced by states along the Ganga on going open defecation-free



180 MLD

Total faecal sludge generated by the states following the Swachh Bharat Mission



Faecal sludge from major cities under Namami Gange (in 1,000 litres/day)

● Cities surveyed by CSE

Effective Population

Faecal Sludge/Septage generation per day in litres

Prepared by DTE/CSE Data Centre

Infographics: Raj Kumar Singh; Analysis: CSE Water Team

Data source: Various sources

For more such infographics visit: www.downtoearth.org.in/infographics



Centre for Science
and Environment

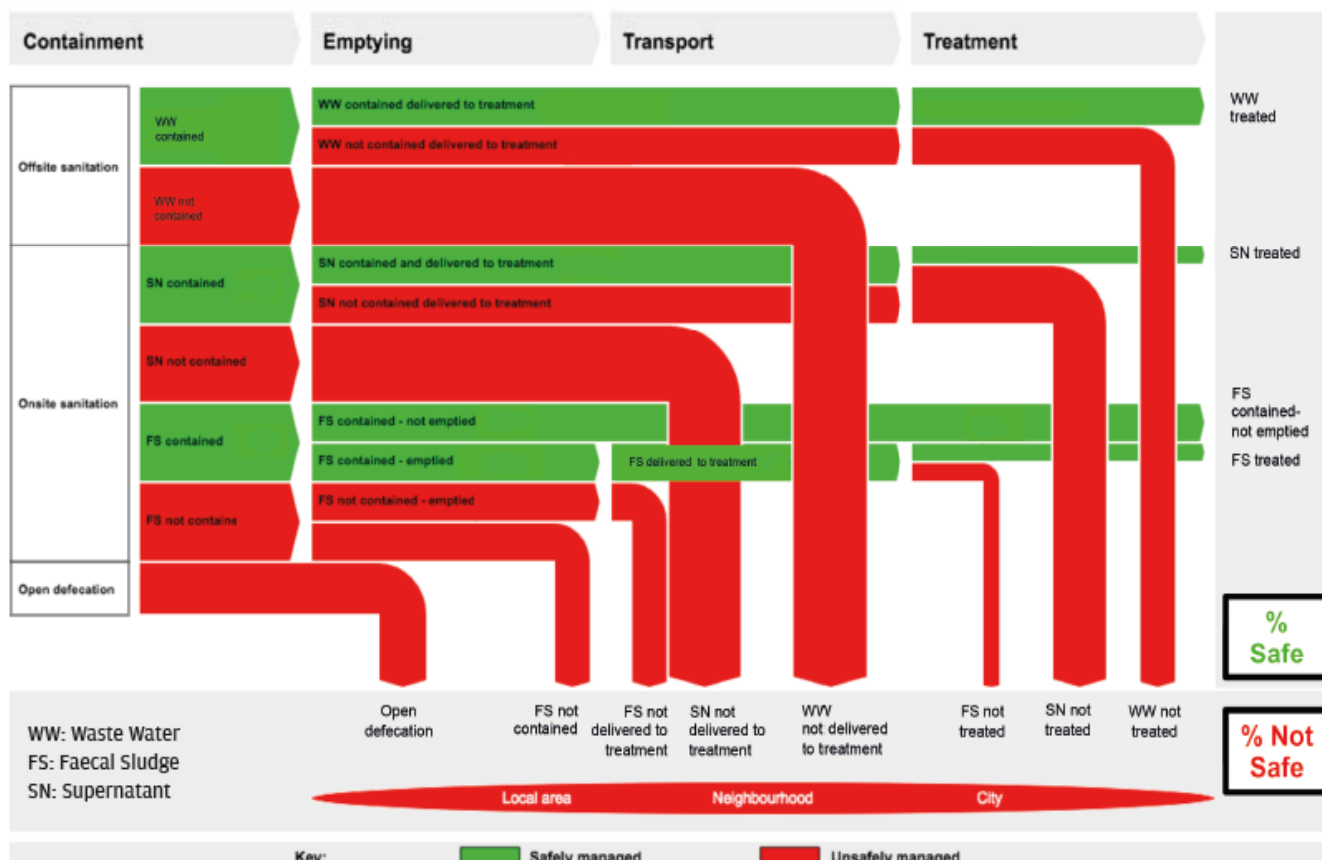
Promoting excreta (sewage and septage) flow analysis to inform urban sanitation programming at a city-wide scale



SFD- Shit Flow Diagram

City name and date of production
Desk based / Field based

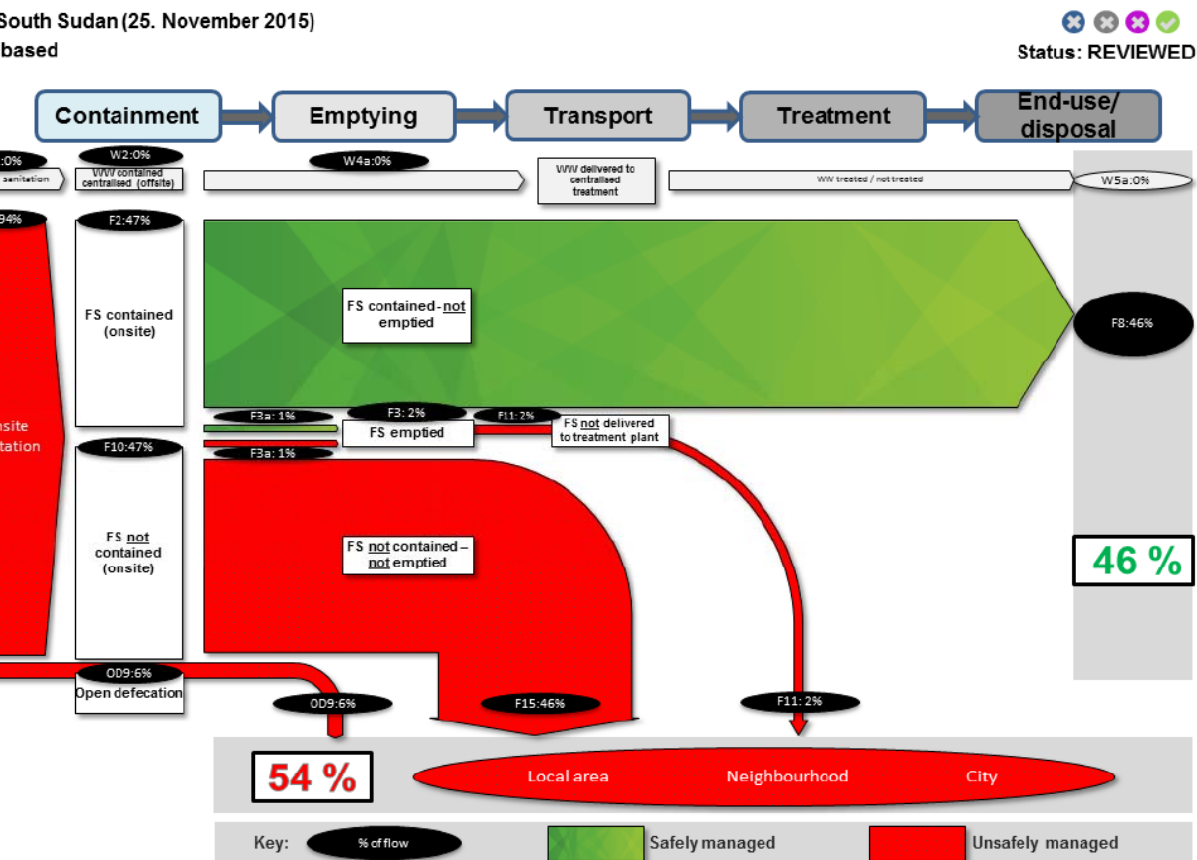
SFD- Shit Flow Diagram



Excreta Management Understanding Sanitation Chain - SFD

What is an SFD

South Sudan (25. November 2015)
based



An SFD is a graphic that shows faecal flows and its fate in conjunction with a service delivery report – IT IS NOT a stand alone diagram.

What is an SFD

• An effective communications and advocacy tool to engage city stakeholders
• Based on contributing populations, it gives an indication of where the excreta goes
• A representation of public health hazard
• An overview from which to develop sanitation priorities

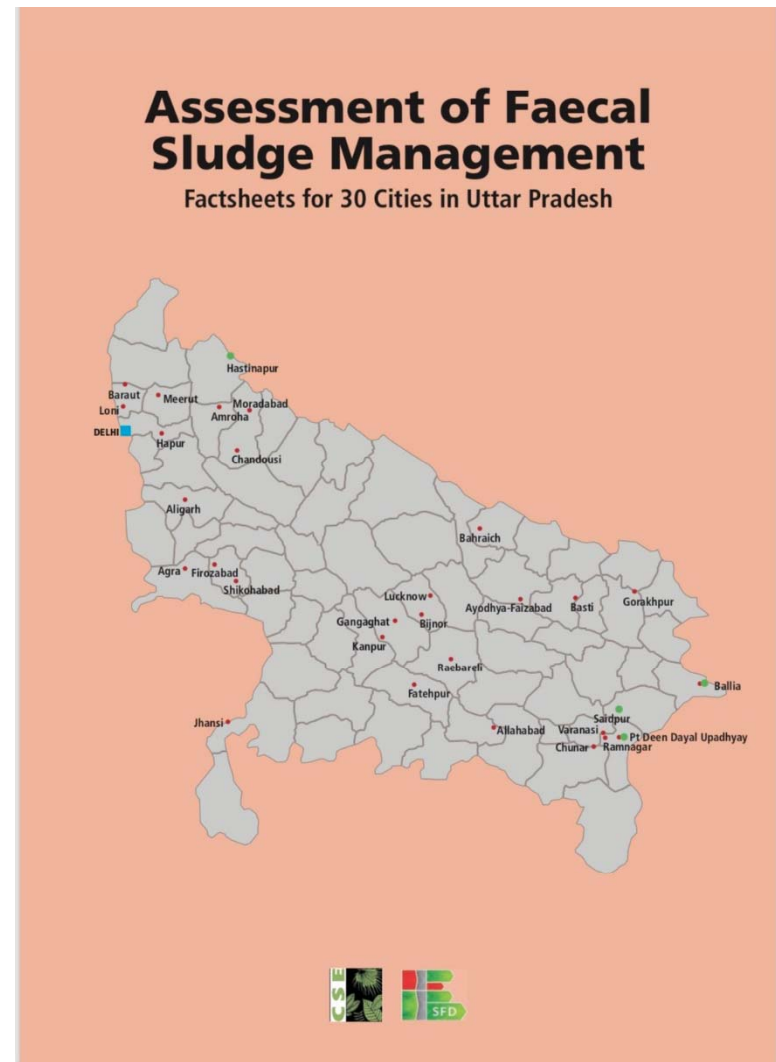
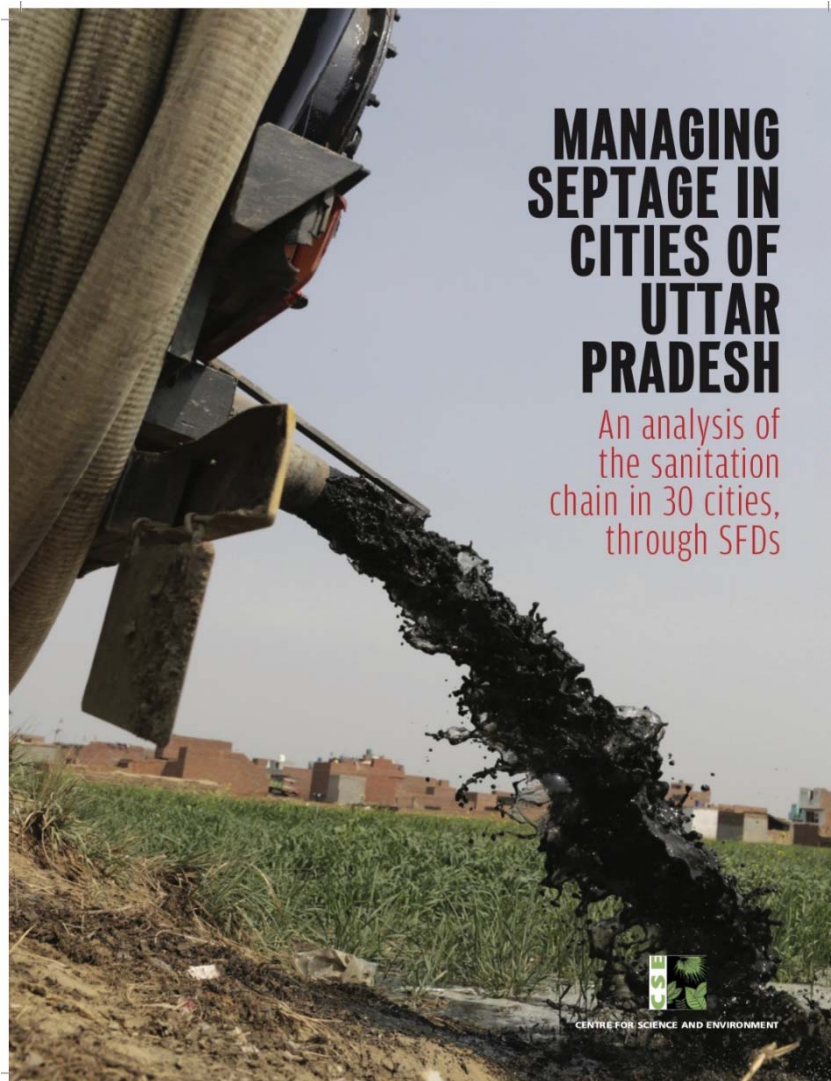
What is NOT an SFD

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

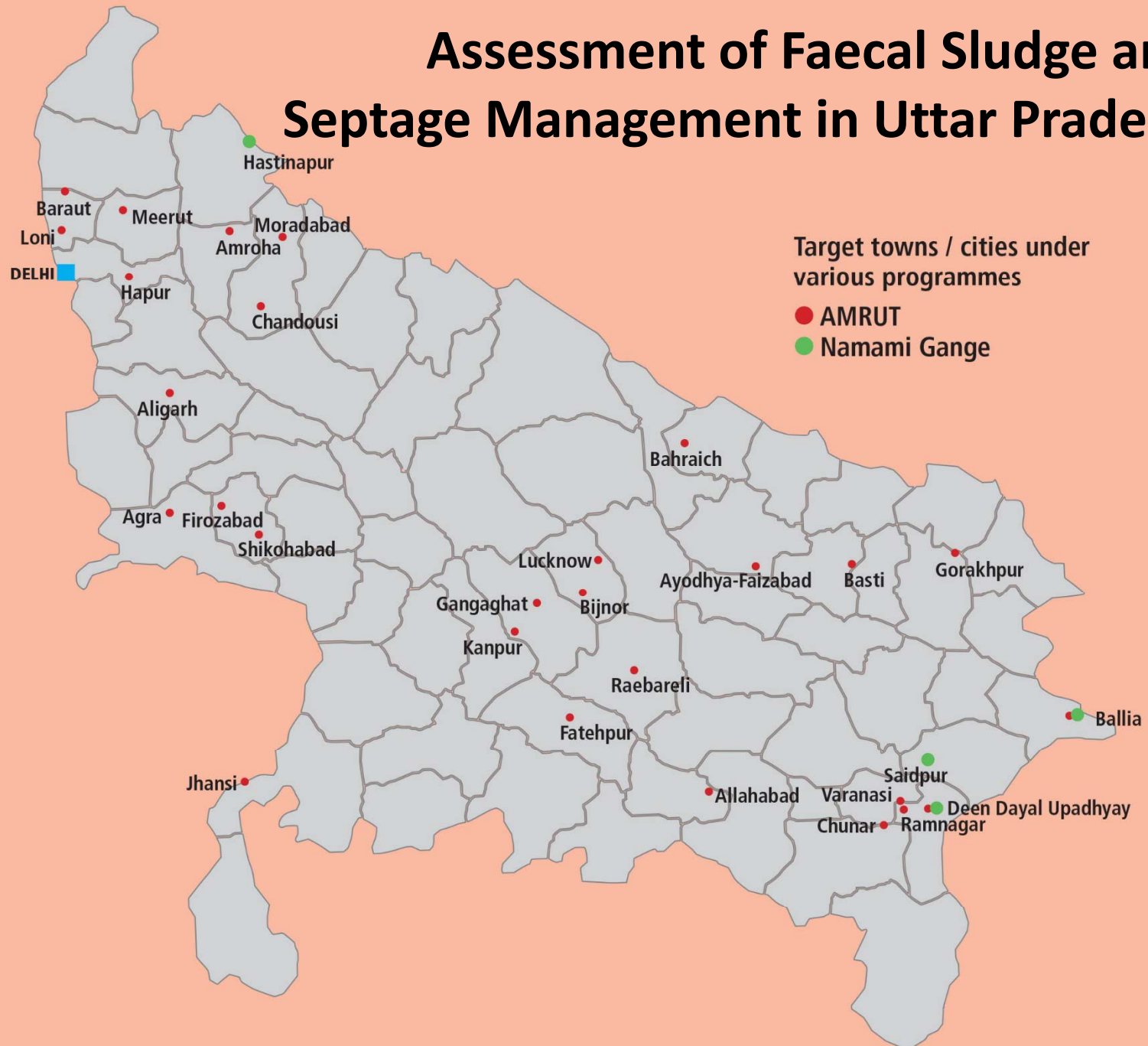


**Using excreta flow
diagrams (SFDs)
as an integral
part of city wide
sanitation planning
for Indian cities**

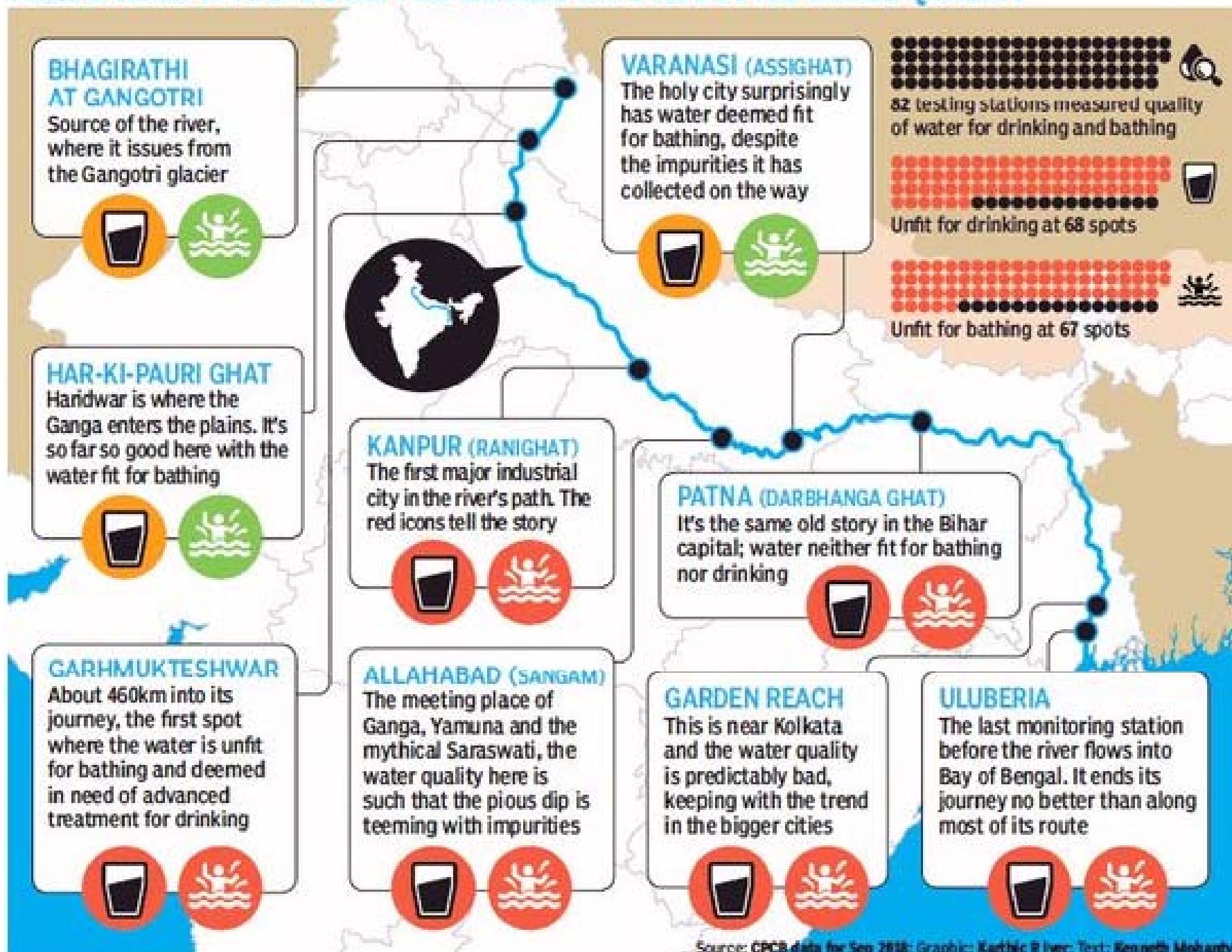
Faecal Flow Assessment: Shit Flow Diagram (SFD) of target AMRUT & Namami Gange Towns / cities in Uttar Pradesh



Assessment of Faecal Sludge and Septage Management in Uttar Pradesh



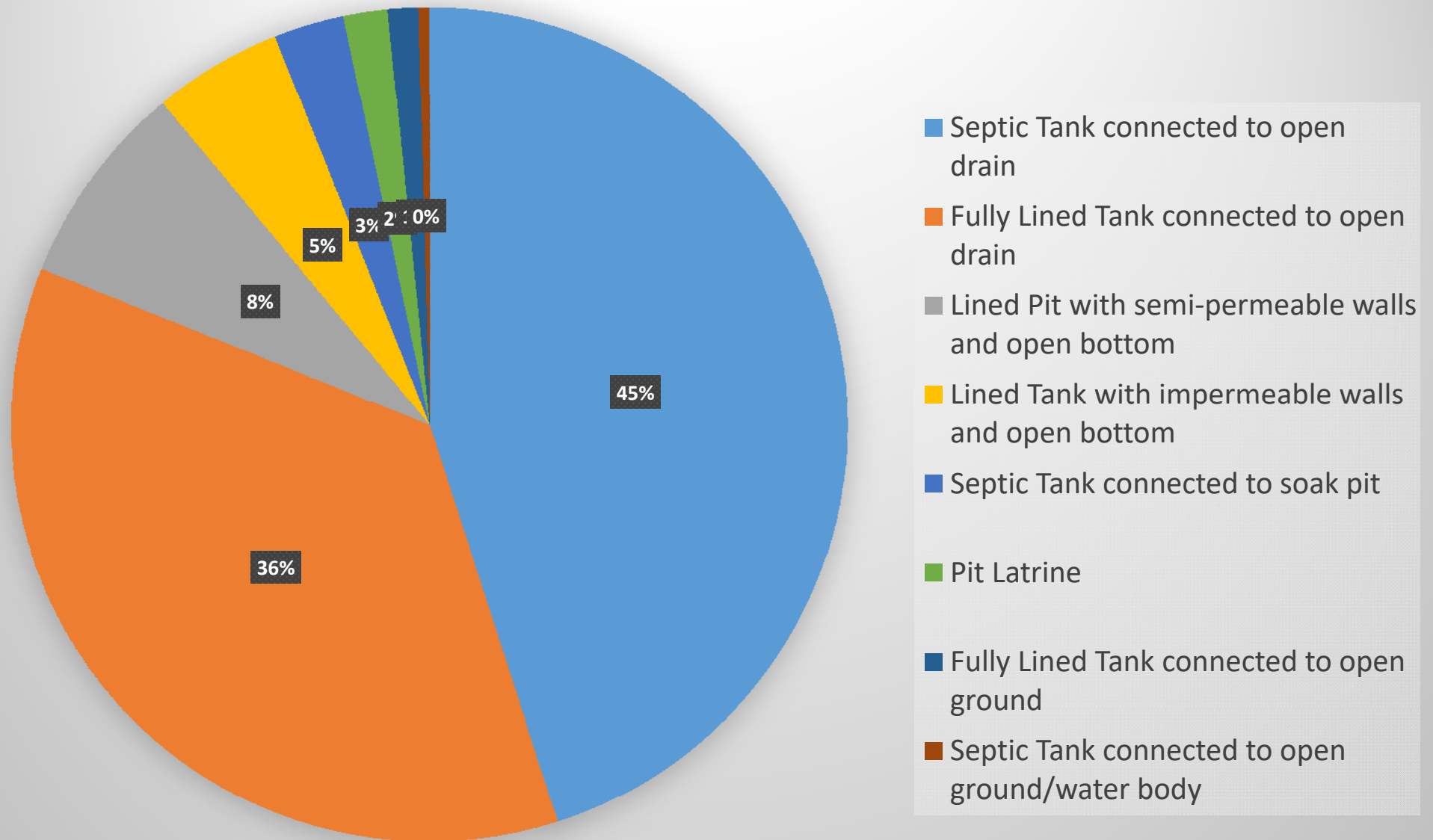
HERE'S WHAT A TRIP DOWN THE GANGES SAYS ABOUT ITS WATER QUALITY



**Analysis of Sanitation Chain in
30 cities of Uttar Pradesh through SFDs :
Assessment of Faecal Sludge & Septage Management**

Type of Containment Systems in select 30 cities

Break up of containment systems

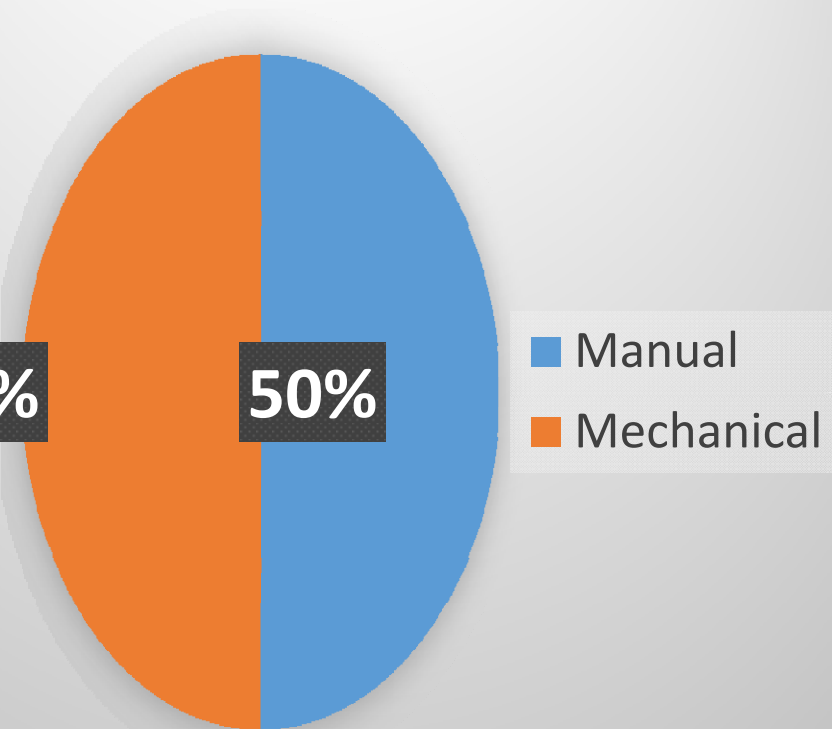


Type of Containment Systems

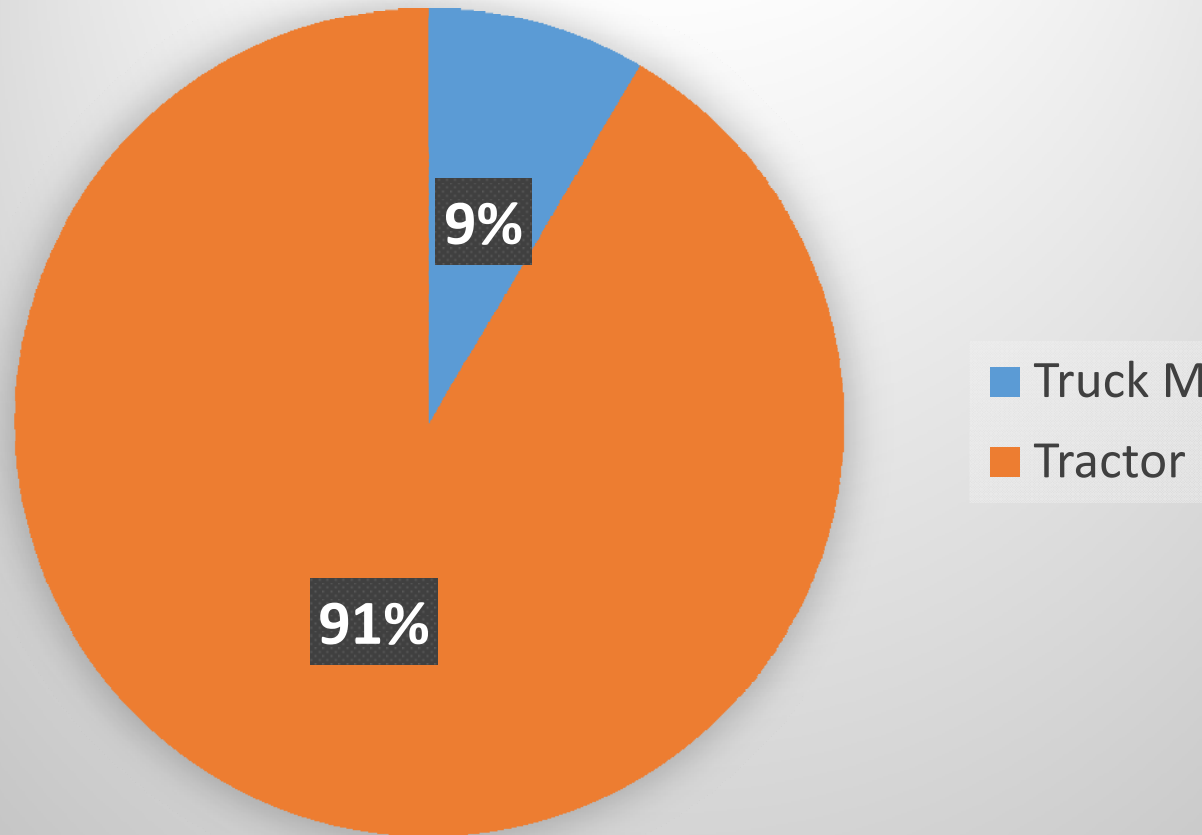


Type of Emptying in select 30 cities

Break up of emptiers



Break up of vehicles



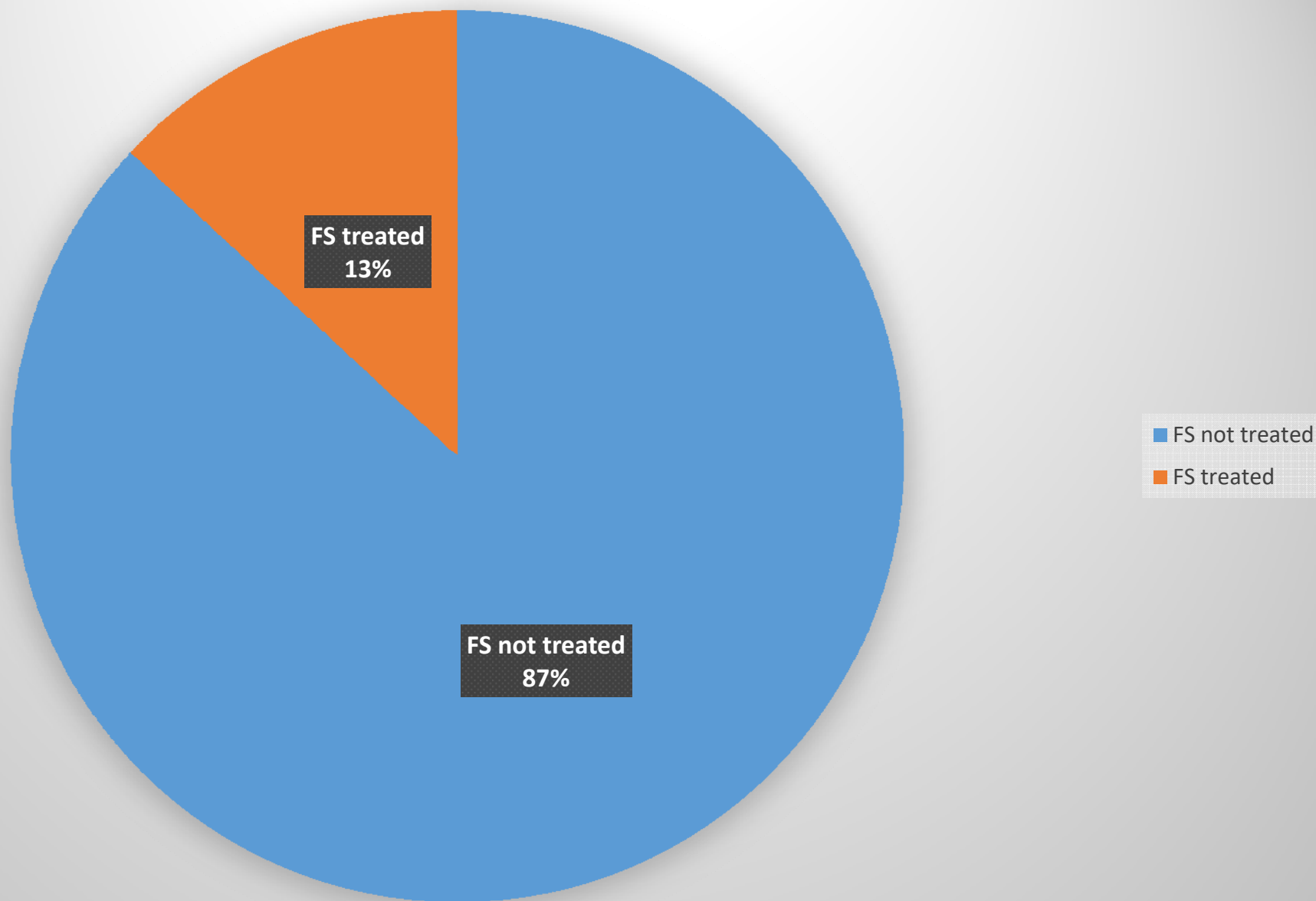
Type of Emptying



Transportation



Extent of faecal sludge treatment



reatment and Disposal



CLUSTER 1: Cities with population more than 10 lakh

Lucknow, Kanpur, Agra, Allahabad, Meerut, Banaras , Aligarh

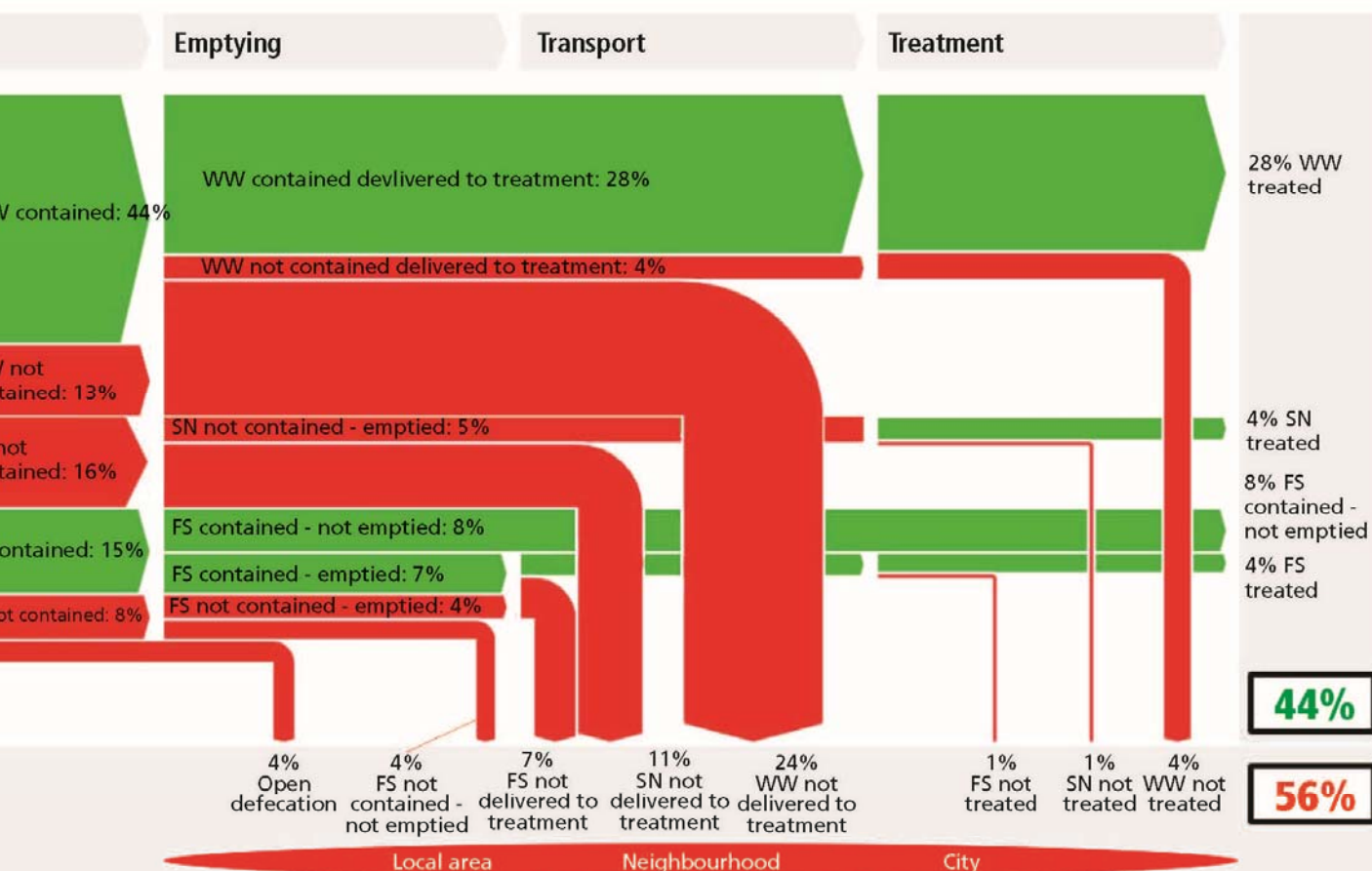
Large Cities (More than 10 lakh)

1, Uttar Pradesh, India

2 - Intermediate SFD

Date prepared: 16 October 2018

Prepared by: CSE



City	Population	FS collected based on current demand (in KLD)	FS in on year em
Allahabad	11,12,544	72	
Varanasi	1198491	22	
Aligarh	8,89,408	84	
Meerut	1305429	230	
Kanpur	2765348	320	
Lucknow	2817105	350	
Agra	1874542	260	
Total	1,19,62,867	1338	

Characteristics of cluster 1 : Large Cities

and 44% population is dependent on centralized sewerage system, but wastewater of only 28% is safely disposed

Population dependent on tanks connected to open drains

Absence of scheduled desludging, only 40-50% of FS generated gets emptied, rest remains in the tank and reduces the treatment efficiency of the septic tank

Emptyers are private operators - 90% of the vacuum tankers are tractor mounted rest are truck mounted

For inaccessible tanks (lack of small scale mechanized systems), manual emptying is still observed

There are 38 STPs with cumulative capacity of 1560 MLD which receive 1265MLD of sewage as on date

More than 30 private operators are registered with local bodies

As a preliminary measure Allahabad, Meerut and Lucknow have allowed the discharge of collected faecal sludge at pumping stations and Kanpur allows it to be directly discharged into its STP.

Faecal sludge collected by unregistered operators is disposed in drains/fields/ponds

CLUSTER 2: Cities with population between 5 and 10 lakh
Jhansi, Firozabad, Moradabad, Gorakhpur, Loni

um Cities (5- 10 lakh)

Population	FS collected based on current demand (in KLD)	FS generated in KLD (based on once in 3 years emptying)
507293	10	222
603797	55	242
887871	243	478
673446	120	314
516082	50	235
3188489	474	1491

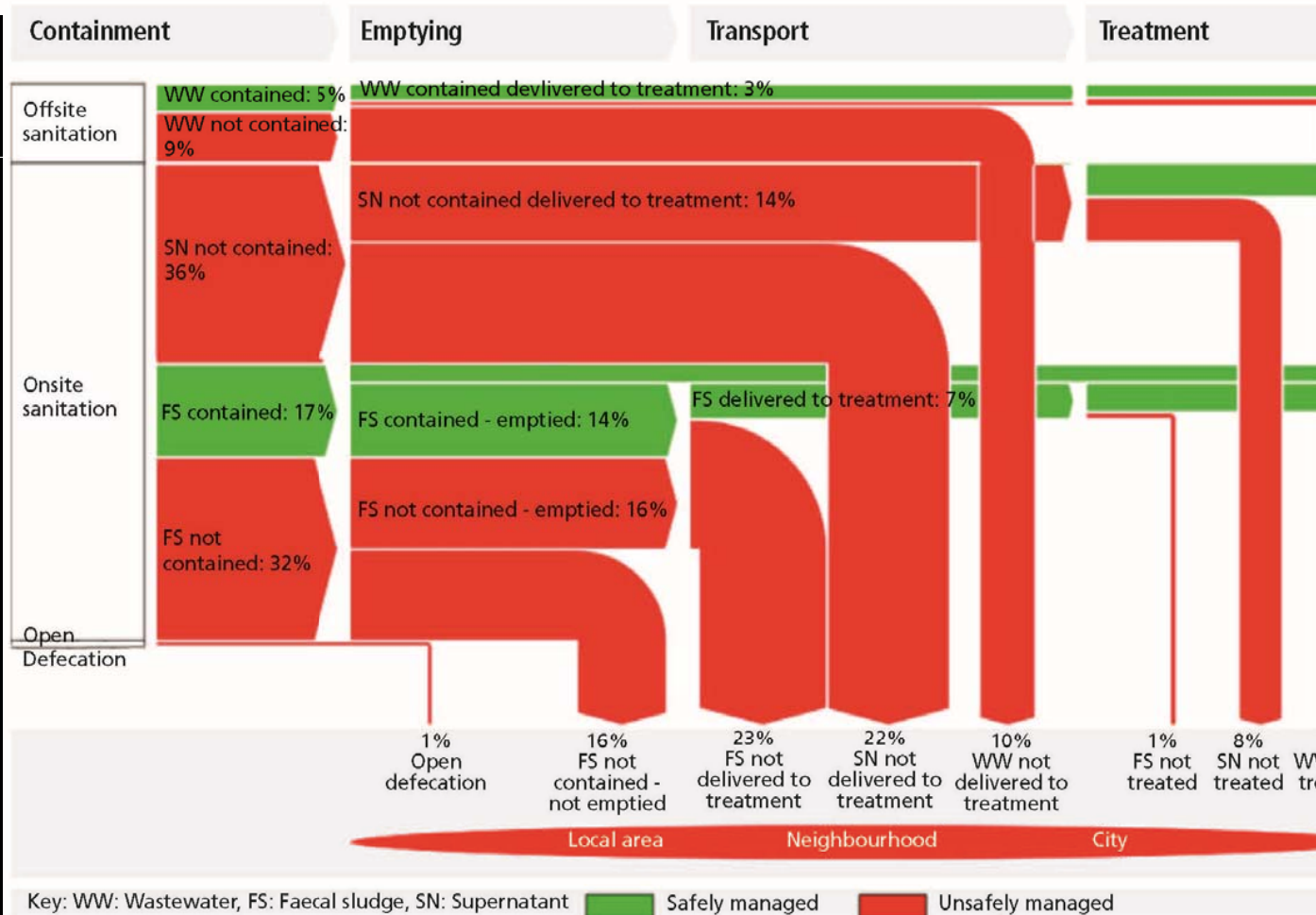
Cluster 2, Uttar Pradesh, India

Version: Draft

SFD Level: 2 - Intermediate SFD

Date prepared: 15 Oct

Prepared by: CSE



Characteristics of cluster 2

More than **70% population is dependent on tanks** connected to open drain and roughly 50% of them qualify to be called as septic tanks

In absence of scheduled desludging, **only 30% of FS generated gets emptied**, rest remains in the tank and reduces the treatment efficiency of the septic tank

Emptying is done by private operators . 40% of the vacuum tankers are truck mounted and 60% are tractor mounted

Due to inaccessible tanks, manual emptying is rampant

There are 4 STPs of cumulative capacity of 133 MLD which receives only 81 MLD sewage

Bhansi has a designated disposal site, in rest of the cities the collected faecal sludge is disposed in drains/fields/ponds - 1 FSTP of 6 KLD, which receives around 3KLD as on 01/01/2018

CLUSTER 3: Cities with population between 1.2 and 5 lakh

Bahraich, Raebareli, Fatehpur, Amroha, Ayodhya, Hapur

all and medium cities (1.2 -5 lakh)

Population	FS collected based on current demand (in KLD)	FS generated in KLD (based on once in 3 years emptying)
186223	30	74
1,91,316	40	65
193193	40	101
1,98,471	78	109
221118	40	95
262983	58	107
1253304	286	551

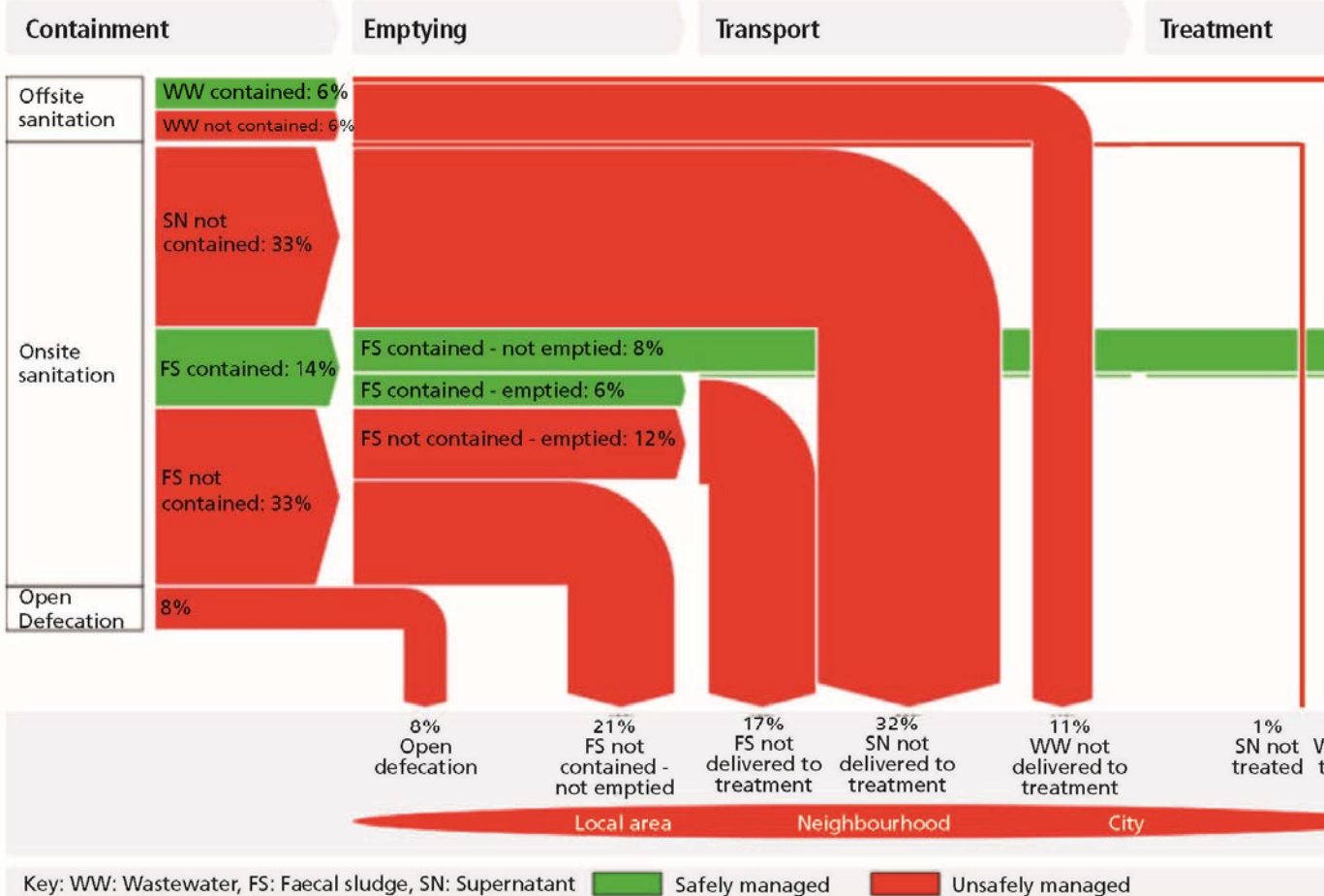
Cluster 3, Uttar Pradesh, India

Version: Draft

SFD Level: 2 - Intermediate SFD

Date prepared: 16 Oct 2018

Prepared by: CSE



Characteristics of cluster 3

More than 60% population is dependent on tanks connected to open drain and 28% of them are called as septic tanks

Most of them are dependent on pits or are defecating in open

In absence of scheduled desludging, only 40-50% of FS generated gets emptied, rest remains in the tank and reduces the treatment efficiency of the septic tank

Most of the vacuum tankers are tractor mounted rest are truck mounted

For inaccessible tanks, manual emptying is rampant

There is only 1 STP of 12 MLD in Ayodhya which receives only 6 MLD sewage as on date

There is no designated disposal site for the collected faecal sludge hence it is disposed in open spaces/fields/ponds

CLUSTER 4: Cities with population less than 1.2 lakh

**Saidpur, Hastinapur,, Chunar, Ramnagar, Gangaghat, Bijnor, Baraut, Balia, Shikohabad,
Pt Deen Dayal Upadhyay Nagar, Chandousi, Basti**

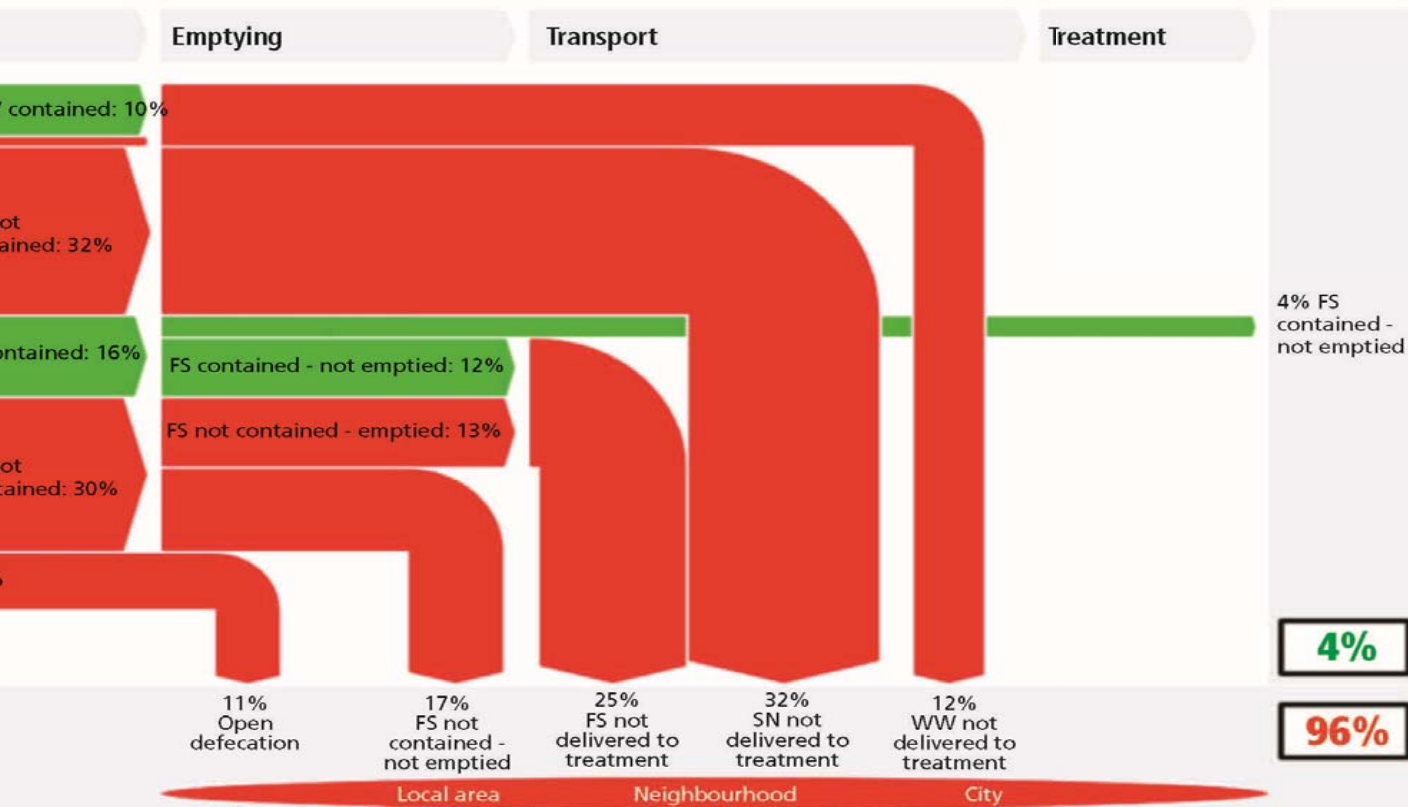
Small cities (less than 1.2 lakh)

Uttar Pradesh, India

2 - Intermediate SFD

Date prepared: 16 October 2018

Prepared by: CSE



City (Nagar Palika /Parishaed)	Population	FS collected based on current demand (in KLD)
Saidpur	24338	3
Hastinapur	26452	3
Chunar	37185	4.5
Ramnagar	49132	4.5
Gangaghat	84072	6
Bijnor	93297	12
Baraut	103764	32
Balia	104424	34
Shikohabad	107300	10
Deen Dayal Upadhyay	109650	34
Chandousi	1,14,383	50
Basti	114657	38
Total	968654	231

Characteristics of cluster 4

More than 60% population is dependent on tanks connected to open drain and roughly half of them qualified as septic tanks

Most of them are dependent on pits or are defecating in open

Agar, Chandousi and Baraut have some kind of sewerage network, but there is negligible treatment of water

A few households don't even have an open drains in their neighbourhood

Due to absence of scheduled desludging, only 50% of FS generated gets emptied, rest remains in the tank and reduces the treatment efficiency of the septic tank

Emptying is done by private operators- 95% of the vacuum tankers are tractor mounted

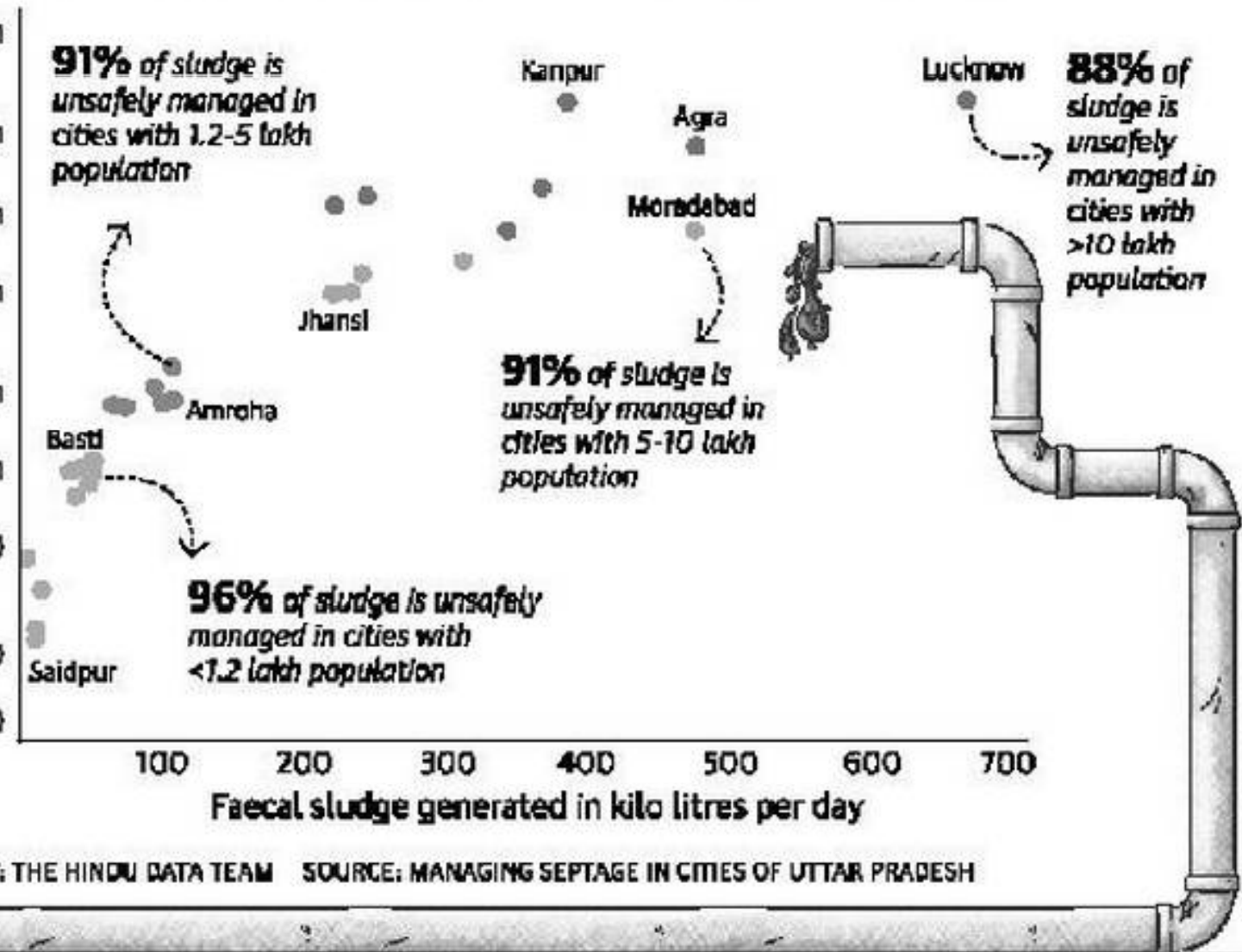
For inaccessible tanks, manual emptying is rampant

At Bijnor no other city has any sewage treatment plant, 24 MLD STP at Bijnor is yet to be commissioned

There is no dedicated faecal sludge treatment plant in any of the cities in the cluster, the collected faecal sludge is disposed in drains/fields/ponds

reated sludge

h percentage of faecal sludge is disposed off without treatment in various cities in
esh, an analysis by Centre for Science and Environment shows. Graphs plot the
f faecal sludge generated and the percentage treated in 30 U.P. cities



More toilets and septic
built without sewer or
disposal / treatment of s
will swamp the state &
increase manifold Gang
pollution attributed to
coliform

Toilet - STP+++

Current sanitation focus is on **building toilets (important and necessary)**

Current pollution-control focus is on **building sewage treatment plants (unnecessary without conveyance)**

But people are building septic tanks – there is no official conveyance;
no official treatment

End result is: pollution

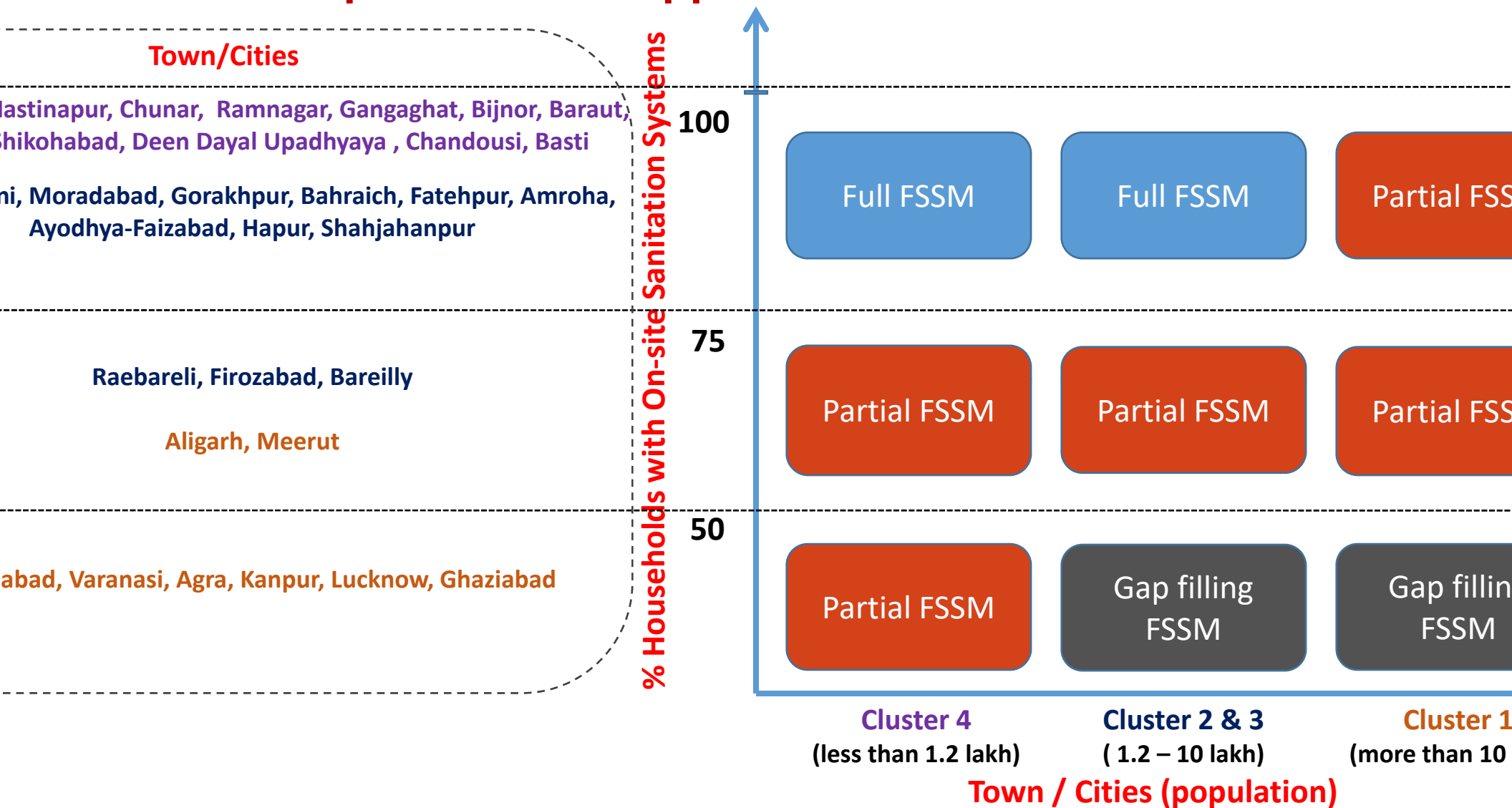
On-site needs:

Recognition: official acceptance that these are not part of the past but the future

Regulations: construction; collection; treatment

Technologies: disposal and reuse

Proposed FSSM Approach Urban Areas in U.P.



FSSM with dedicated
treatment facility



Partial FSSM – Combined FSSM & Sewerage system; co- treatment; DEWATs; On-site treatment system, FSSTP wherever necessary.



Gap Filling – Complete Sewerage; FSSM only for non - sewerage pockets with treatment at FSSTP or Co-treatment at STP



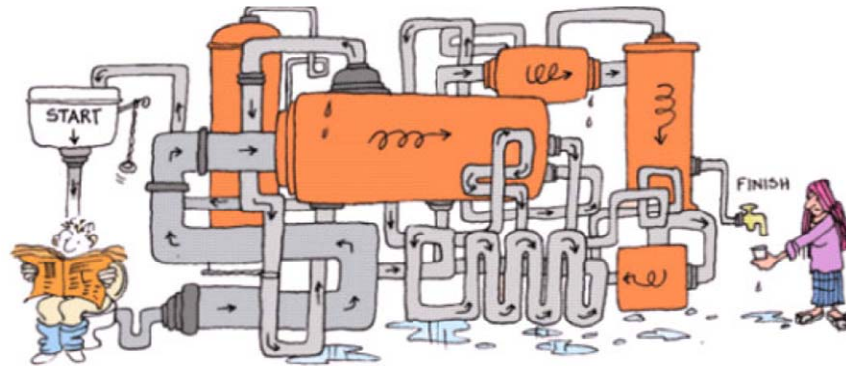
CLEANING GANGA

PIPE DREAM

Unless Swachh Bharat Mission addresses septage management, it will end up defeating Namami Gange

Sewage
are
missin
bad cond
Kanpur
of the s
is d
untreat
the

Thank You





COVER STORY

URBAN SHIT

Every four in 10 houses in Indian cities and towns use latrines connected to septic tanks. Most municipalities do not have a proper plan to dispose of the faecal sludge collected in these tanks. Where does this sludge go?

RESEARCH BY SURESH KUMAR ROHILLA, BHITUSH LUTHRA, RAHUL SANKA VARMA, SHANTANU KUMAR PADHI AND ANIL YADAV
REPORTING BY JIGYASA WATWANI

MANISH KUMAR should know the national capital's dirty little secret: where does the excreta of its residents not connected to the sewer system go? He has been working as a septic tank cleaner for 10 years. By now he owns three vacuum tankers that suck faecal sludge from septic tanks. Accompanied by his helper Raghu Pal, he arrives at a house in Surajpuri Vihar locality in south Delhi. Raghu Pal hops off the tanker and lays out a pipe to the septic tank in the house. He uses bare hands and laughs sarcastically at the idea of using a gas mask. "We have heard of illnesses where workers die when they have to go deep into the tank where toxic gases are emitted. We should at least be provided gloves," he says.

It is a two-storey building that houses seven families. Its septic tank should ideally have two chambers, with an outlet connected to a soak pit or some other treatment system for safe disposal of effluent after the faecal sludge has settled at the bottom. Instead it is a single-chambered tank without any outlet, so its entire content has to be emptied. Small wonder

www.downtoearth.org.in 29

BLIND SPOT IN NAMAMI GANGE

Two flagship programmes of Prime Minister Narendra Modi are working at cross-purposes. By 2019, when Swachh Bharat Mission comes to an end, some 30 million septic tanks and pits would have been dug along the Ganga. These tanks and pits would produce 180 million litres of faecal sludge every day, which will eventually find its way into the Ganga, defeating Namami Gange. It's time the Central, state and local sanitation programmes recognised faecal sludge management as a priority to ensure a clean Ganga

RESEARCH BHITUSH LUTHRA, SHANTANU KUMAR PADHI, ANIL YADAV, AMRITA BHATNAGAR, BHAVIK GUPTA AND AISHWARYA VARADHARAJAN
REPORTING ANUPAM CHAKRAVARTY

In Bihar's Kantiar town most people have toilets with septic tanks. The urban local body collects sewage and simply dumps it in the landfill at Udma Rekha



DEMONETISATION Small farmers are big victims P16

SOLAR POWER A good alternative to diesel gensets in high-rises P24

ANTIBIOTIC RESISTANCE India can counter this health threat P30

16-31 DECEMBER, 2016

DownToEarth

FORTNIGHTLY ON POLITICS OF DEVELOPMENT, ENVIRONMENT AND HEALTH

Subscriber copy, not for resale

25 years

CLEANING GANGA

PIPE DREAM

Unless Swachh Bharat Mission addresses septage management, it will end up defeating Namami Gange