



## Sanitation's agenda: water-toilet-waste-pollution nexus

Joining the dots for successful implementation of Swachh Bharat

CSE Delhi



## Swachh Bharat

- Important opportunity. Top-level national attention
- Important to join the **excreta-dots**
- In urban areas toilets have to be linked to disposal and treatment systems
- In rural areas toilets have to be linked to poverty, behavioural change (health connection), water, toilet design and waste disposal
- Swachh Bharat ++++



## Excreta Matters I

- [file:///localhost/Users/sunitanarain/Desktop/Excreta matter vol.1 PDF/Final chapters for book/Master Excel Checked.xls](file:///localhost/Users/sunitanarain/Desktop/Excreta%20matter%20vol.1%20PDF/Final%20chapters%20for%20book/Master%20Excel%20Checked.xls)



71 city data analyzed  
City water-waste profiles  
Where does water come?  
Where does waste go?  
Simple questions  
But not asked  
Never answered



## Water story in cities

### **Planners obsessed with water, not supply**

Water sourced from further and further away  
Leads to increasing cost of supply  
Leads to high distribution losses  
Less water to supply at end of pipeline  
Less water means more costly water  
Cities not able to recover costs of supply, have no money to invest in sewage



## First count of toilets and their connections: where waste goes

Census 2001	Census 2011	
No latrine	<b>Flush/pour toilet latrine connected to</b>	<b>72.6</b>
Service latrine	a. Piped sewer system	32.7
Pit latrine	b. Septic system	38.2
Water closet	c. Other system	1.7
	<b>Pit latrine</b>	
	With slab/ventilated improved pit	6.4
	Without slab/open pit	0.7
	Night soil disposed into open drain	1.2
	<b>Service latrine</b>	
	Night soil removed by human	0.3
	Night soil serviced by animals	0.2
	<b>No latrine within premises</b>	
	Public latrine	6.0
	Open	12.6

Source: Census of India 2011, Houses, Household Amenities and Assets: Latrine Facility.



## 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 rivers



**Cities do not have drains**  
**New growth cities are growing without drains**  
**Backlog and front-log impossible to fix**  
**As cities fix one drain, another goes under**

**71-CITY SURVEY: AREA COVERED BY CLOSED DRAINS SHOWS REAL STATE OF SEWAGE COLLECTION**

% of area covered	
0-10	Cuttack, Guwahati, Jabalpur, Jammu, Ranchi, Thane, Aizawl, Bathinda, Bhilwara, Siliguri, Srikakulam
10-30	Agra, Alwar, Aurangabad, Indore, Mathura, Meerut, Puduchery, Thiruvananthapuram, Dehradun, Dewas, Hubli-Dharwad, Jhansi, Kozhikode, Lucknow, Solapur, Tumkur, Udaipur, Ujjain, Dhanbad
30-50	Allahabad, Bengaluru, Bhopal, Delhi, Lucknow, Patna, Srinagar, Amritsar, Bhubaneswar, Jodhpur, Mumbai
50-70	Faridabad <sup>2</sup> , Hyderabad, Jaipur <sup>1</sup> , Kanpur, Kolkata, Nagpur, Gwalior, Mussoorie, Nainital, Rajkot, Vadodara, Yamunanagar
> 70	Chennai, Pune, Surat, Gurgaon <sup>2</sup>

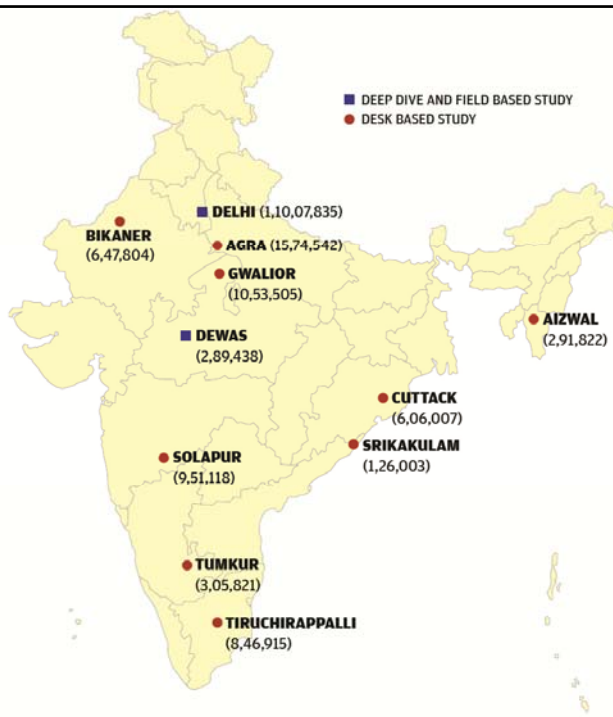
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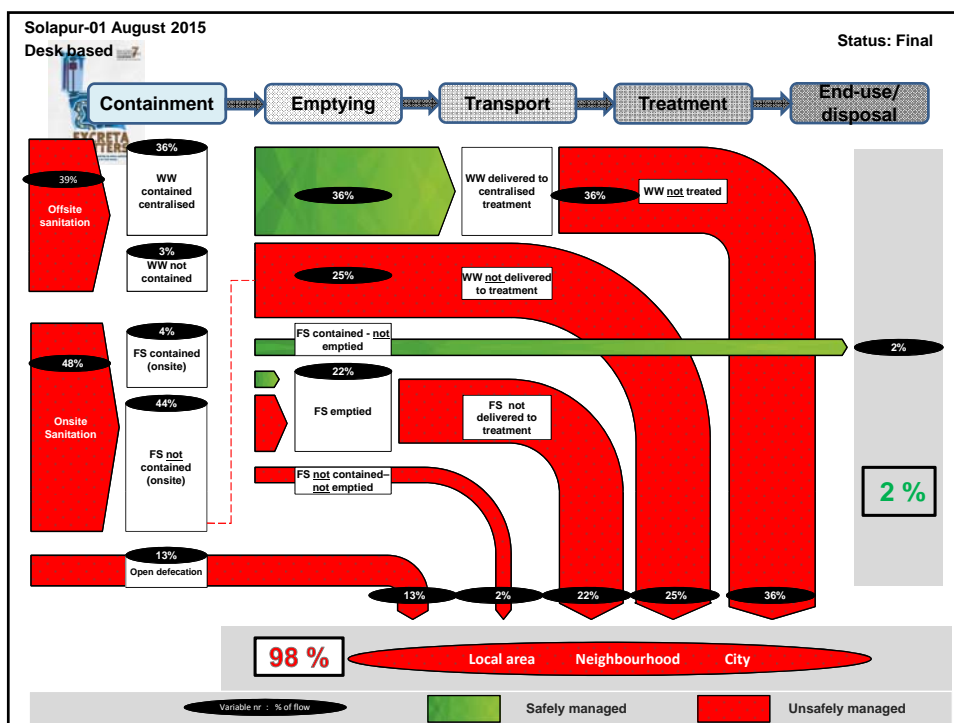
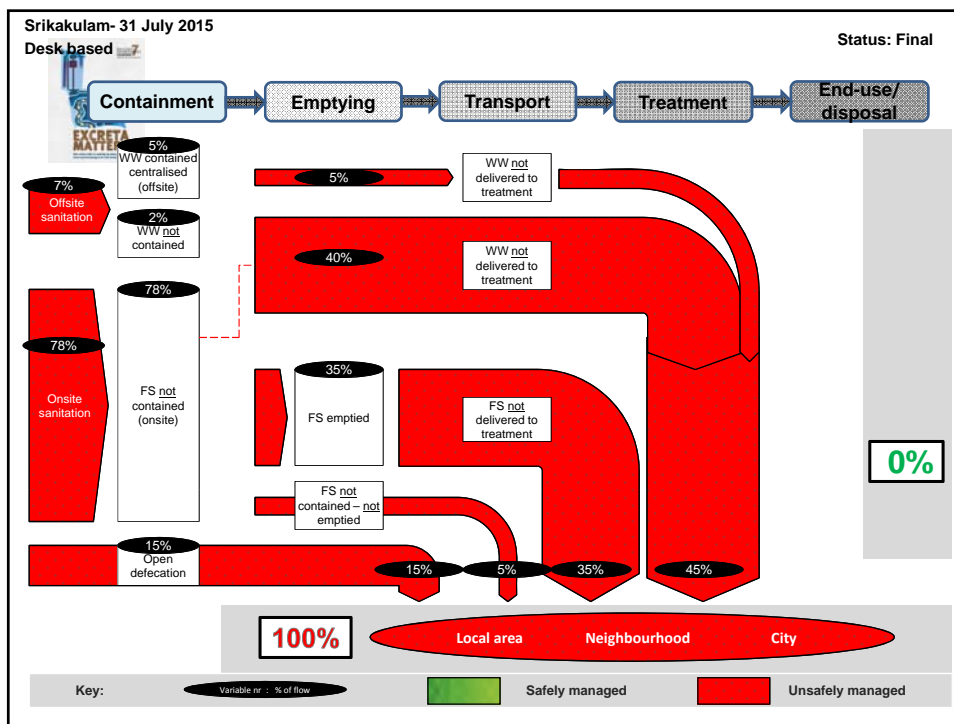
Guwahati, Jabalpur, Jammu, Ranchi, Thane, Aizawl, Bathinda, Bhilwara, Jammu, Jabalpur, Siliguri, Srikakulam

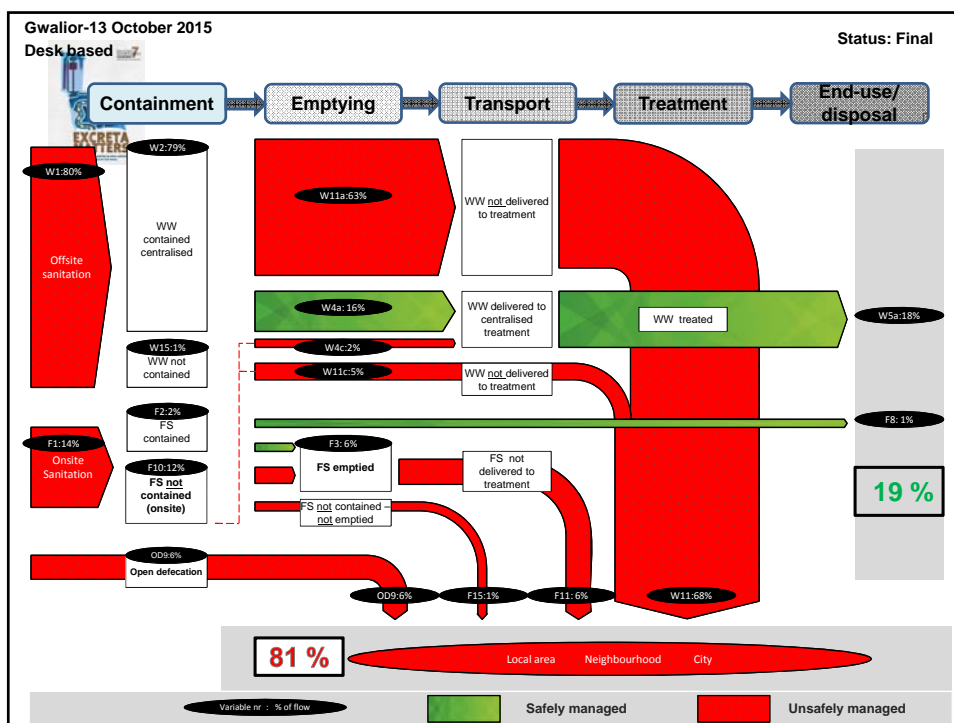
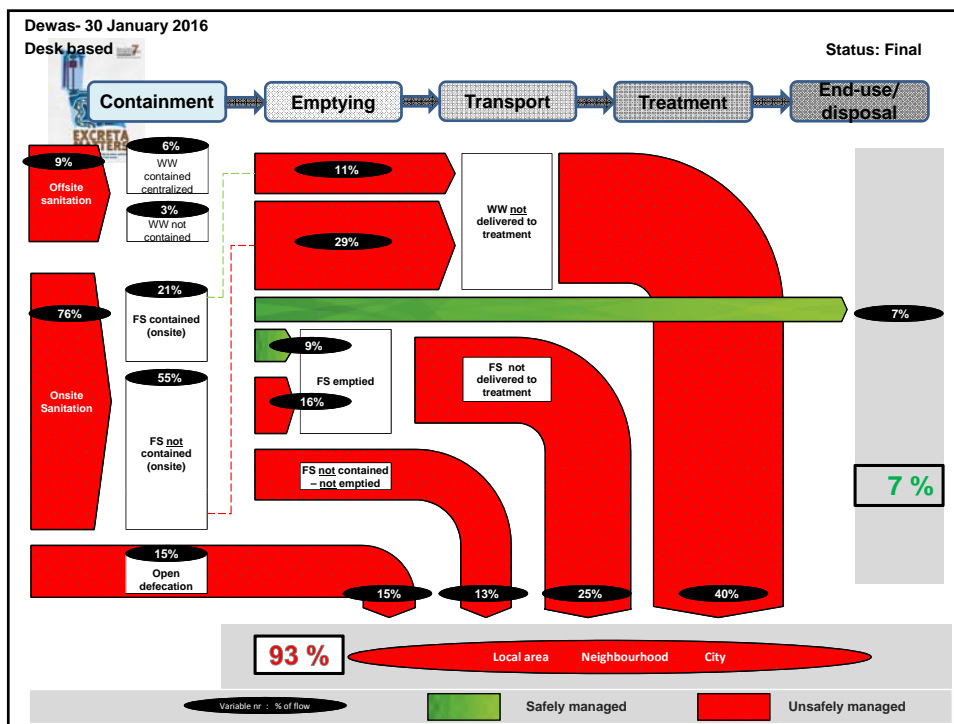
<sup>1</sup>Claims 80% coverage in CSE survey, 65% in City Development Plan for JNNURM; <sup>2</sup>Faridabad and Gurgaon: only old-city within municipal limit included  
 Source: Anon 2011, 71-City Water-Excreta Survey, 2005-06, Centre for Science and Environment, New Delhi

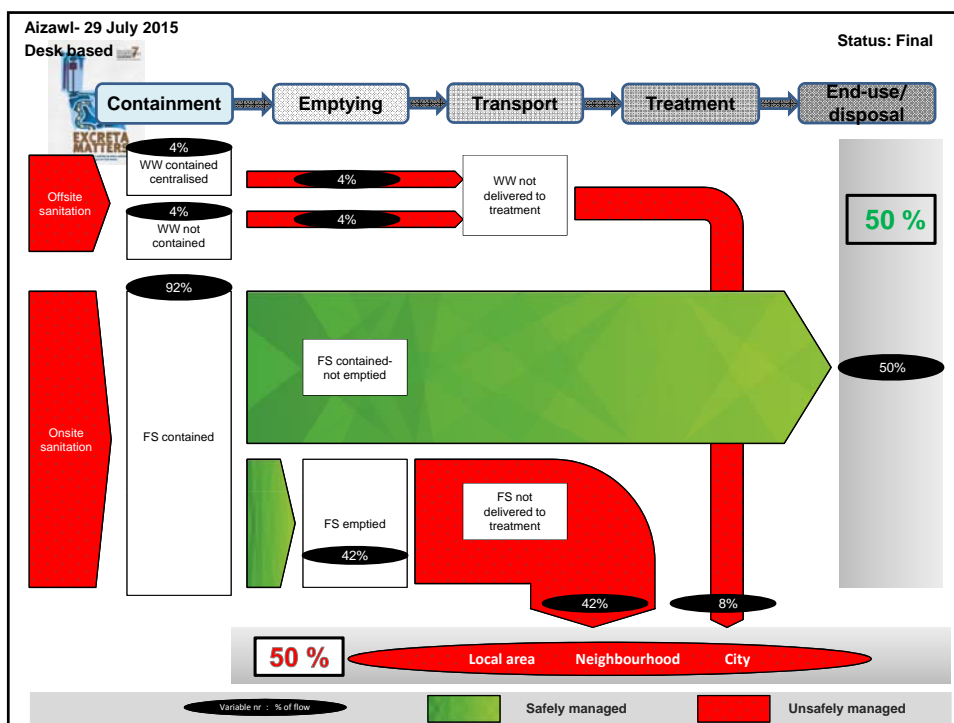
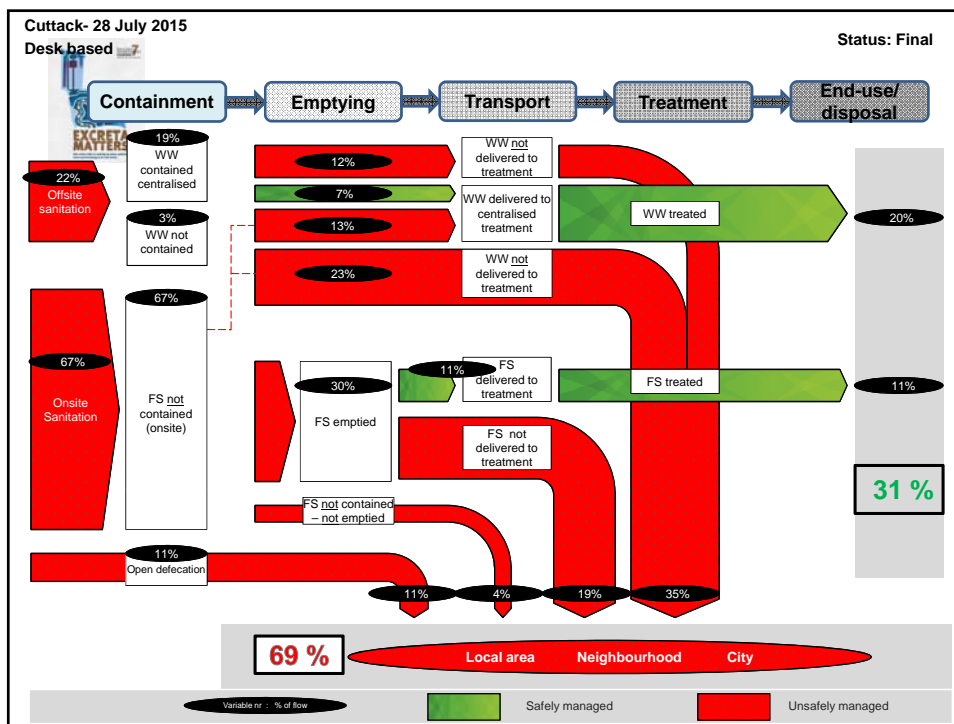


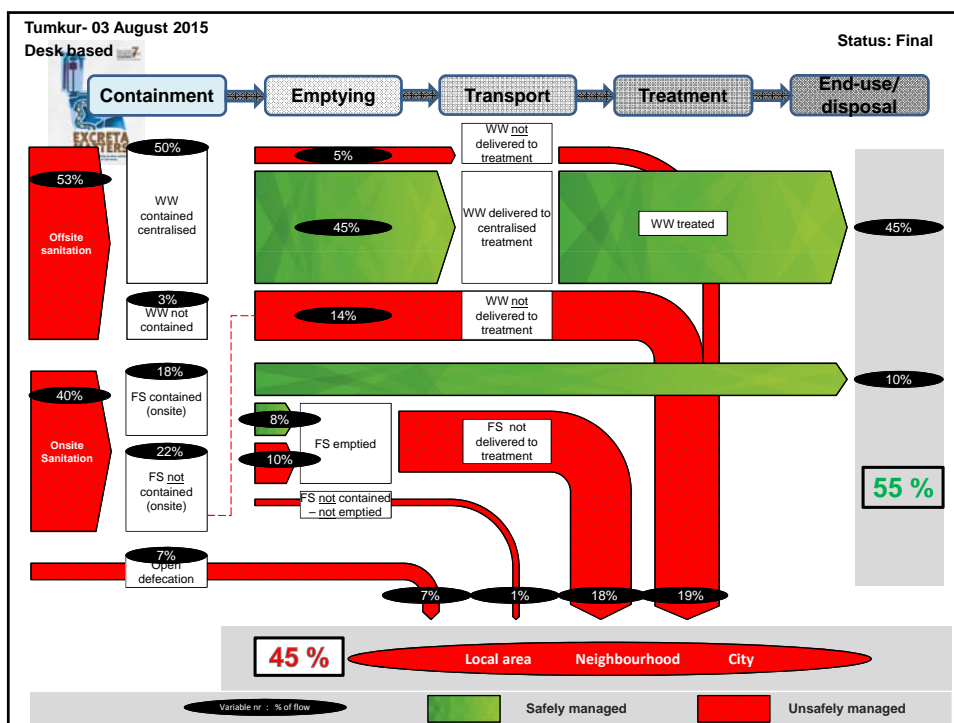
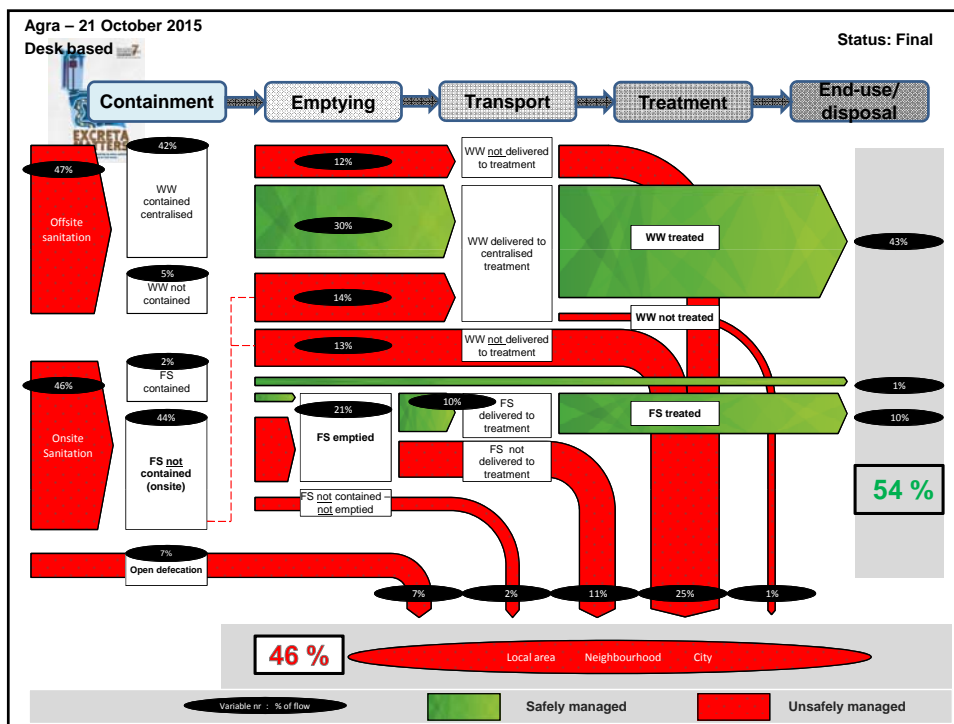
**Shit-Flow:**  
 mapping  
 the  
 sanitation  
 story of  
 cities



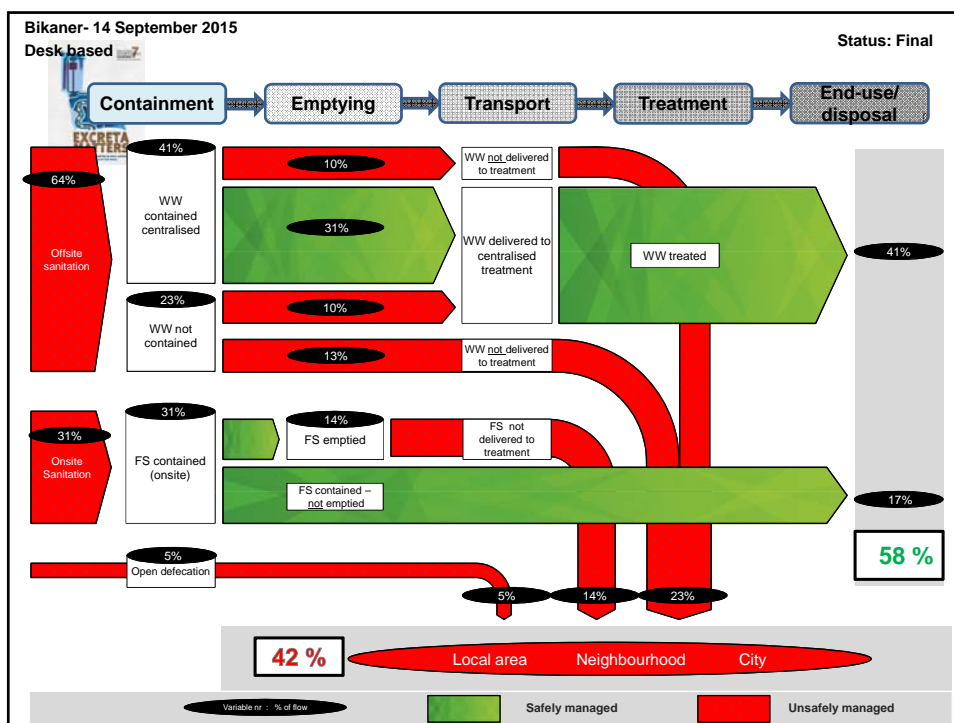
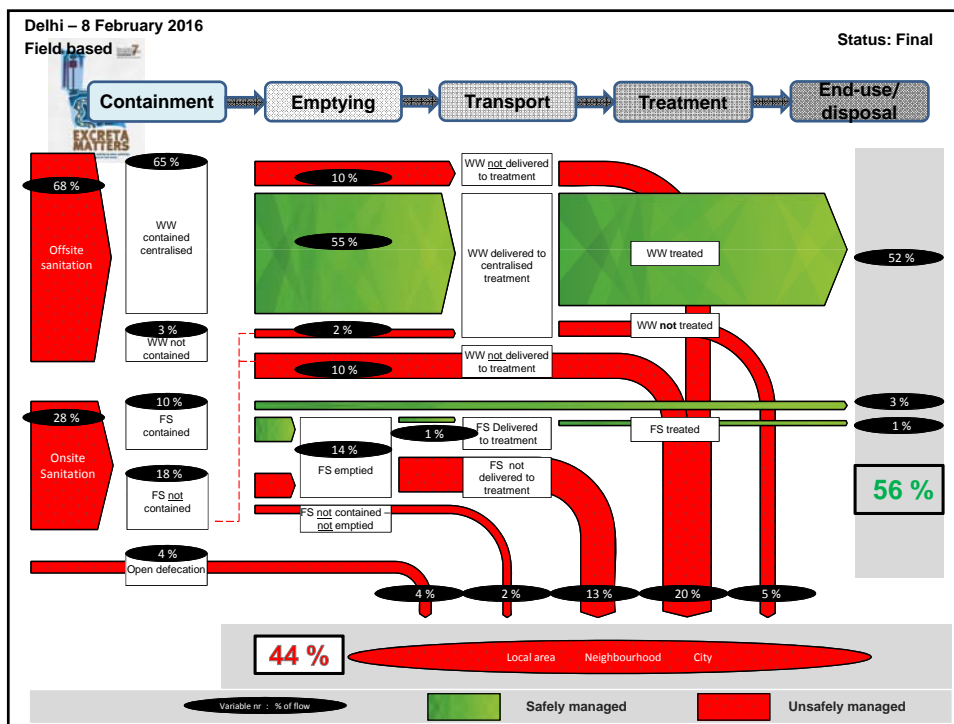


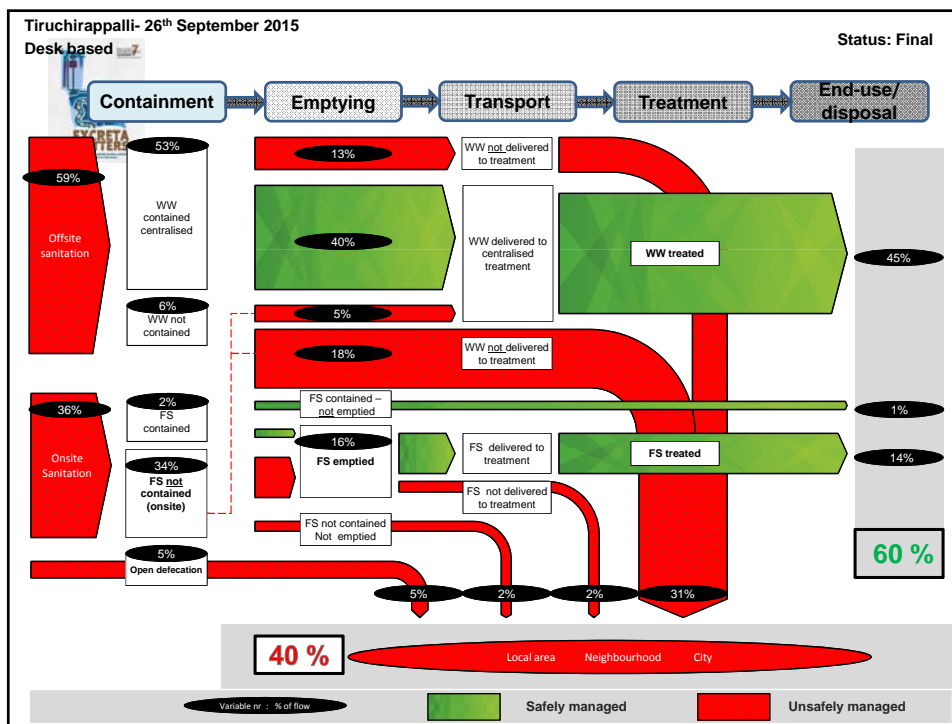












## On-site challenges

- 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 sector 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...



## 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



## Opportunity: re-invent future sanitation solutions

- If India can jump-skip-leapfrog the landline-grid route in connectivity in telephones and energy access then why not in sanitation?
- Cost-effective (do not have to plan for underground sewerage for door-to-door conveyance)
- People are managers (if septic tank is overflowing then NIMBY kicks in)
- Already exist – do not have to re-engineer entire cities for sewerage networks



## Opportunity: Re-use

- **Water-based** sewage systems destroy the nitrogen-cycle of world
- Water used to flush excreta; water as conveyance; water for disposal
- Nutrients lost
- Food security lost
- Water polluted
- **Land-based** sewage systems can repair this



## Opportunity: **Land-based**

- Nutrients-Food-Excreta-Nutrients-Food
- Excreta is segregated in septage systems (mostly and challenge is to keep it like this)
- Excreta can be used as nutrients for soil – reused in agriculture or compost
- **How? What is best practice? What is primary treatment required? Who will pay for it? How will city regulate reuse?**



## Rural sanitation **challenge**

- Complex; extensive and inhuman
- “More cell phones than toilets” about gender
- **World’s wicked problems are about gender** – cooking fuels; toilets or clean water
- Opportunity to fix much more than toilets
- This is what we want to discuss
- Not what is going wrong – but what is working **and why?**



# The nation needs to know

Where does your water come from?

Where does your excreta go?

<https://www.youtube.com/watch?v=QU098R2pKHk>