



Shit Flow Diagram (SFD)

from

Performance Assessment System (PAS)

PAS @ CEPT University

- A major action **research project** funded by a grant from Bill and Melinda Gates Foundation for developing a statewide Performance Assessment System (PAS) in Maharashtra and Gujarat, and sanitation assessment and improvement
- Now extended to state of Chhattisgarh, Telangana, Assam, Jharkhand....and may be Rajasthan
- PAS Project has three main components:
 - **Performance Measurement** using commonly agreed relevant Key indicators (SLB) and Drilled down indicators
 - **Performance Monitoring** at State and Local level, civil society
 - **Performance Improvement** through various tools and innovative financing

PAS Journey from 2009.....

2009 – 416 Cities
 68 Million population
 167 Cities of Gujarat
 249 Cities of Maharashtra
continued for 6 years

2015 – 463 Cities
 72.8 Million population
 168 Cities of Gujarat
 259 Cities of Maharashtra
 43 Cities of Chhattisgarh

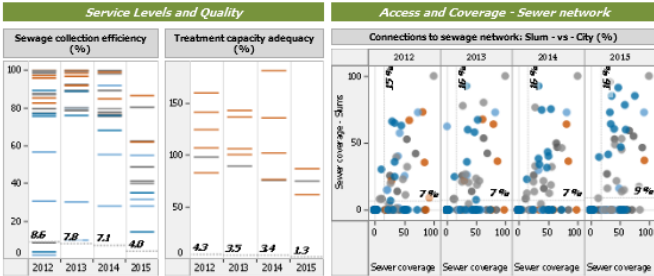
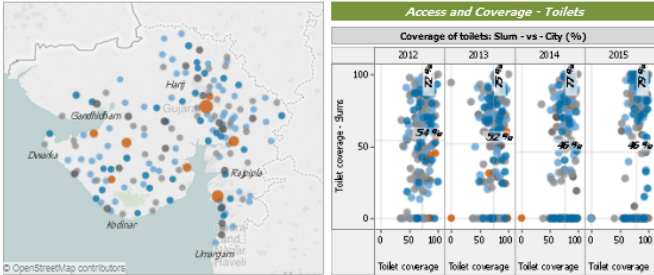
2016 – 769 Cities
 88 Million population
 168 Cities of Gujarat
 364 Cities of Maharashtra
 168 Cities of Chhattisgarh
 69 Cities of Telangana

Forth coming – 323 Cities,
 23 Million population
 96 Cities of Assam
 43 Cities of Jharkhand
 184 Cities of Rajasthan

Interactive Dashboards

State Profile 1 | State Profile 2 | City Profile | Access & Coverage | Service Level & Quality | Financial Sustainability

Key Performance Indicators for Wastewater Services



Wastewater Indicators for Ahmedabad (Class: MC)

Toilet coverage (%)		ULB Overview				
2012	2013	2012	2013	2014	2015	
0	50	Area (sqkm)	466	466	466	
0	50	Present Population (1000s)	5,895	5,981	6,249	
0	50	Households (1000s)	1,310	1,340	1,388	
0	50	Slum population (1000s)	798	729	728	
0	50	Slum HHs (1000s)	182	166	163	
0	50	Total revenue income (Million Rs)	0	0	0	
0	50	Total revenue expenditure (Million Rs)	0	0	0	
0	50	Capital receipts of ULB (Million Rs)	16,319	13,687	0	
0	50	Capital expenditure by ULB (Million Rs)	16,319	12,265	0	

Toilet coverage in slums (%)		Quality of treatment (%)	
2012	2013	2014	2015
0	50	0	50

Sewer coverage (%)		Efficiency in Service Operations	
2012	2013	2014	2015
0	50	0	50

Sewage collection efficiency (%)		Sewage reuse and recycle (%)	
2012	2013	2014	2015
0	50	0	50

Treatment capacity (%)		Complaint redressal efficiency (%)	
2012	2013	2014	2015
0	50	0	50

Financial Sustainability		Cost recovery in sewage management (%)		Sewage charges collection efficiency (%)	
2012	2013	2014	2015	2014	2015
0	50	0	50	0	50

PAS

Performance Assessment System

Annual service delivery profile for

750⁺ cities in **5** States

Time-series data for **7** years for 400 cities

National database for 1800 cities
For 18 states for 3 years

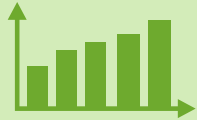
www.pas.org.in

Water supply, Waste Water, Solid waste Management & Storm Water



Sanitation Activities under PAS Project

Worked at city levels – From planning to implementation support



PIP
Performance improvement plans



CSP
City Sanitation Plans



ODF
Open Defecation Free Plans



FSM
Fecal Sludge Management Plans

Sanitation Planning tools



Integrated Fecal Sludge Management

Tools for Citywide Assessment and Planning



PSP in IFSM

Supporting Statewide Program - Maharashtra



Monitoring SBM



ODF framework



State level guidelines for ODF, IFSM



Capacity building programmes



Documentation support

Onsite sanitation



FSM guidelines



SanBenchmarks



Capacity building of cities and local contractors

Sanitation Finance



Sanitation Credit



City Sanitation Fund



Demand assessment



Crowdfunding

PAS – Indicators for WSS

WATER SUPPLY

9

Key Indicators

36

Local Action
indicators



WASTE WATER

9

Key Indicators

38

Local action
Indicators

STORM WATER

2

Key Indicators

SOLID WASTE

8

Key Indicators

12

Local action
Indicators



EQUITY

4

Key Indicators

13

Local action
Indicators



SLB – PAS Indicator Framework

Key Indicators (SLB)

Monitored by local governments as well as higher level of governments at state and national level

Drill Down Indicators

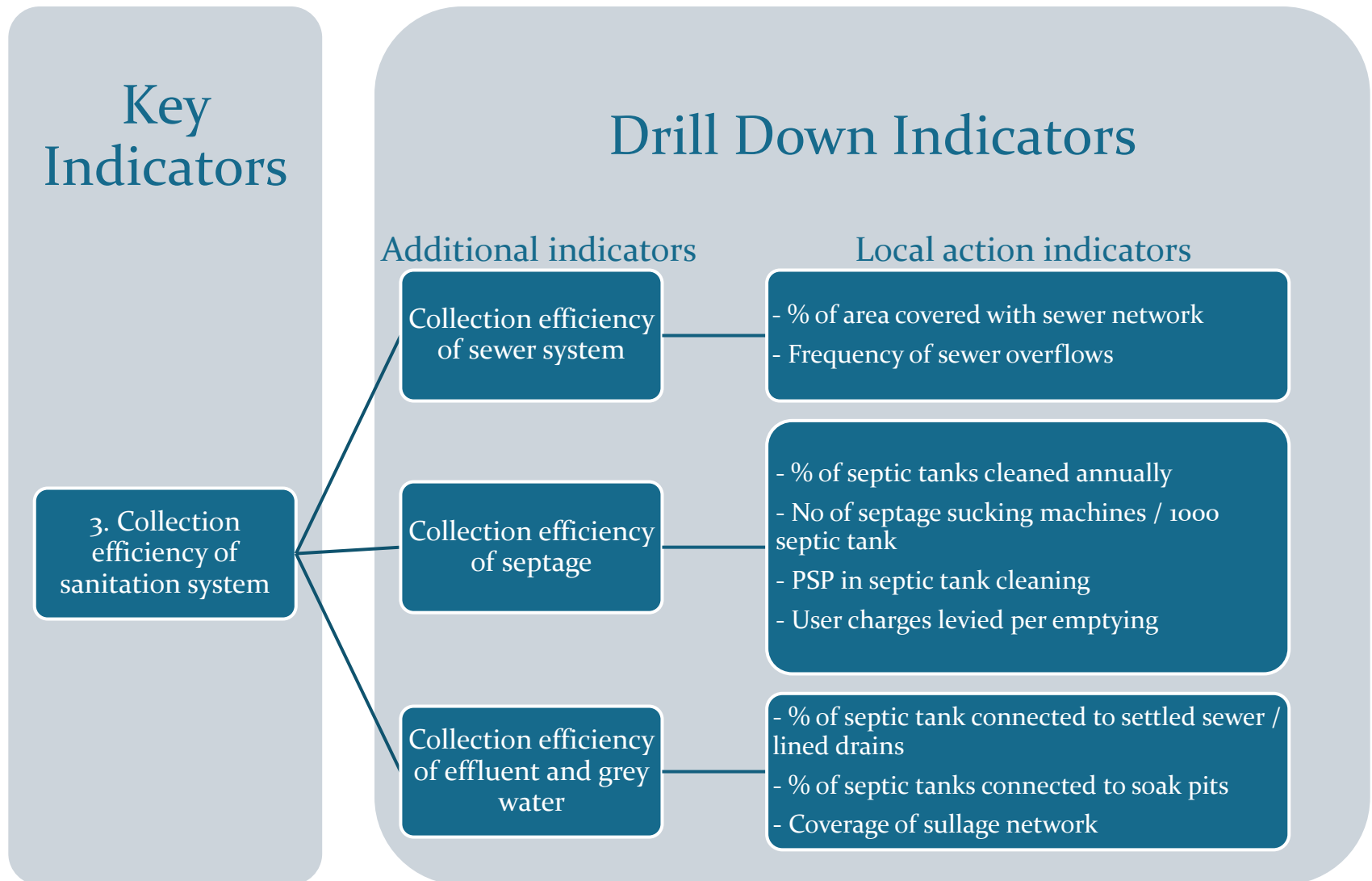
Additional indicators

- Monitored by local governments
- Provide more details on the key indicators and explain the indicator better to the city officials.

Local action indicators

- Monitored by local governments
- Facilitate in identifying local actions required and set sub-targets to achieve improved performance on service delivery.

Sanitation Indicators - CEPT



GoI indicators (SLB) - Sanitation

Conventional Underground Sewerage system

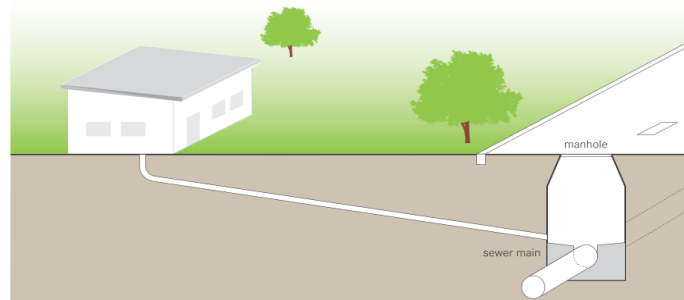
User interface



1. Coverage of toilets

2. Coverage of sewerage network

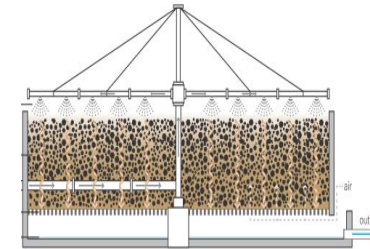
Collection



3. Collection efficiency of sewerage network

Conveyance

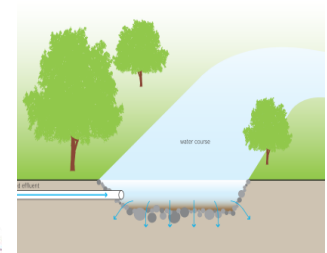
Treatment



4. Adequacy of sewage treatment capacity

5. Quality of sewage treatment

Recycle & Reuse



6. Extent of reuse and recycling of sewage

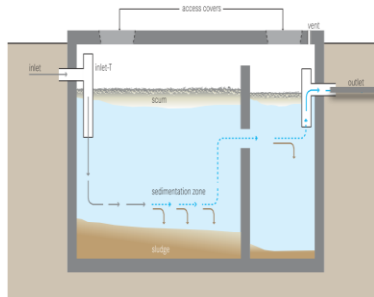
CEPT Indicators for Onsite sanitation systems

Onsite system – Septic tank with Settled Sewer/lined drain

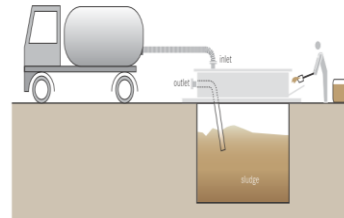
User interface



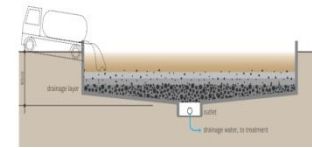
Collection



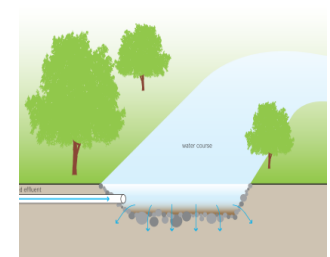
Conveyance



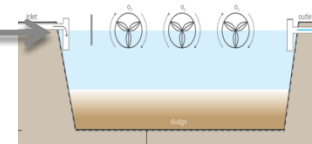
Treatment



Recycle & Reuse



Settled sewers/drains



1. Coverage of toilets

2. Coverage of onsite sanitation system

3a. Collection efficiency of septage

3b. Collection efficiency of effluents from septic tank and grey water

4a. Adequacy of septage treatment plant

4b. Adequacy of effluent and grey water treatment plant

5a. Quality of septage treatment plant

5b. Quality of effluent and grey water treatment plant

6a. Extent of reuse and recycling of treated Septage

6b. Extent of reuse and recycling of treated effluent and grey water

SAN Benchmarks: *Citywide assessment of sanitation service delivery Including on-site sanitation*

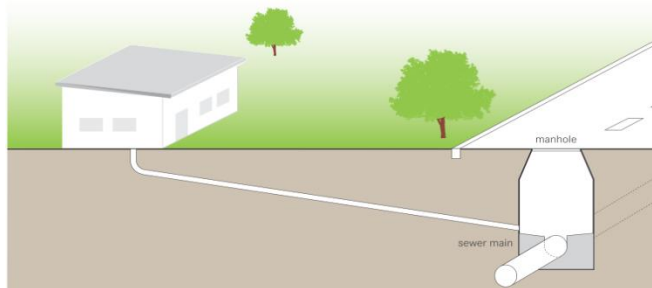
SAN Benchmarks provides a framework for performance assessment of city wide sanitation by capturing onsite sanitation systems along with the conventional sewerage systems.

Mixed Sanitation System

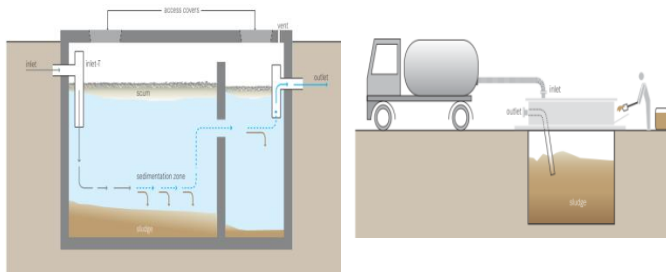
Access



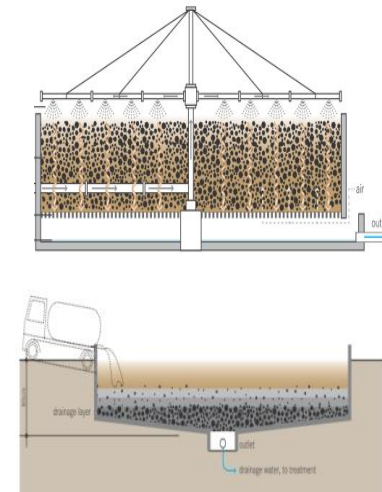
Collection



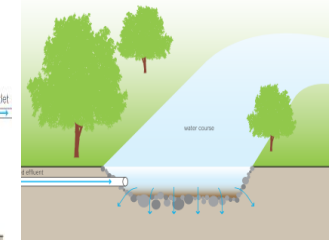
Conveyance



Treatment



Recycle & Reuse



1. Coverage of toilets

2. Coverage of adequate sanitation systems

3. Collection efficiency of sanitation system (weighted average)

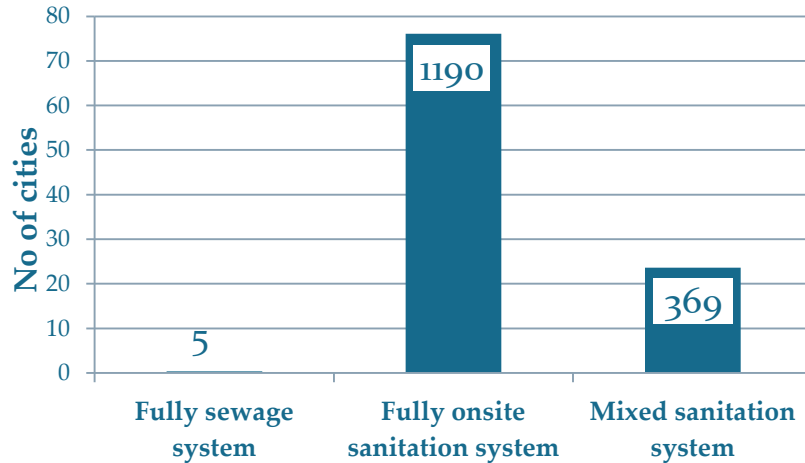
4. Adequacy of treatment capacity of sanitation system (weighted average)

5. Quality of treatment of sanitation system (weighted average)

6. Extent of reuse and recycling in sanitation system (weighted average)

performance measurement framework for Sanitation

Sanitation systems in urban India



Source: Based on the gazetted data submitted to GOI by 16 states covering 1564 cities

76 % of cities in **India** are fully dependent on **on-site sanitation systems**

24% are dependent on **mixed sanitation systems**

Yet GoI's SLB indicators only capture performance of underground sewer network

Framework Developed by PAS

SLB/GoI

SLB - PAS

SLB - PAS⁺

Basic

28 basic indicators of water supply, sewerage system, solid waste management and storm water drainage

Intermediate

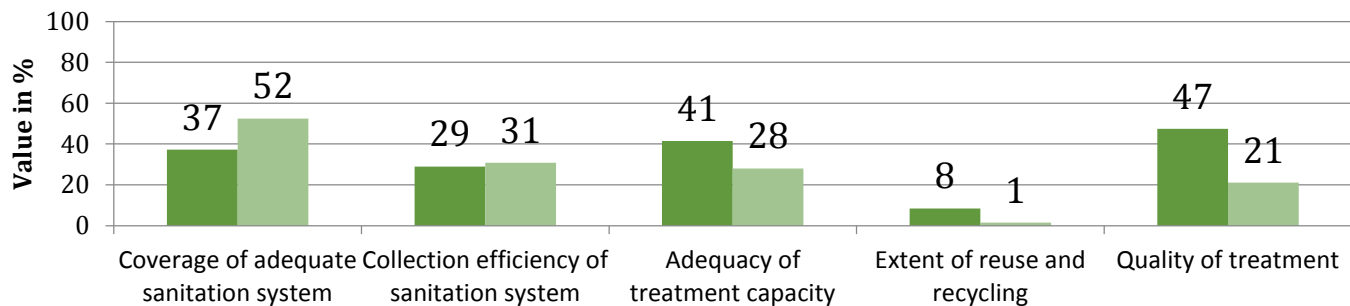
4 Equity related Indicators (for services in slum area)
100+ Drill down indicators for detailed and local action planning

Advanced

6 indicators to assess **onsite sanitation**

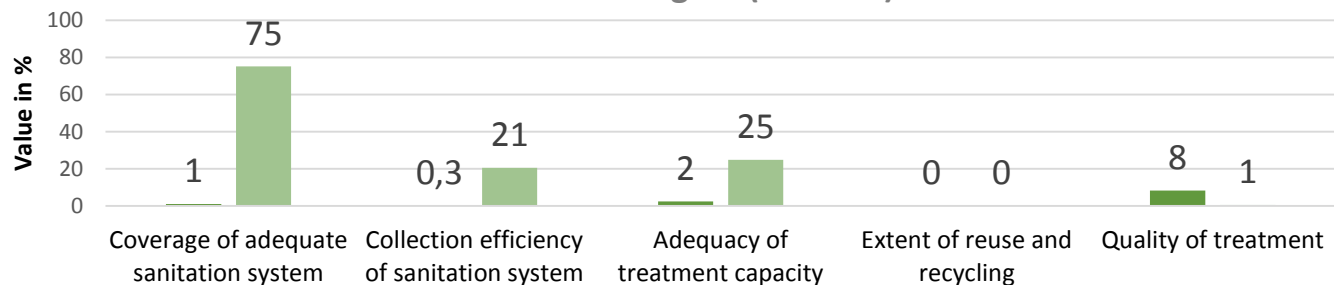
SAN Benchmarks: State Level Sanitation Assessment

Sanitation assessment using existing and revised indicators - urban Maharashtra (2014-15)



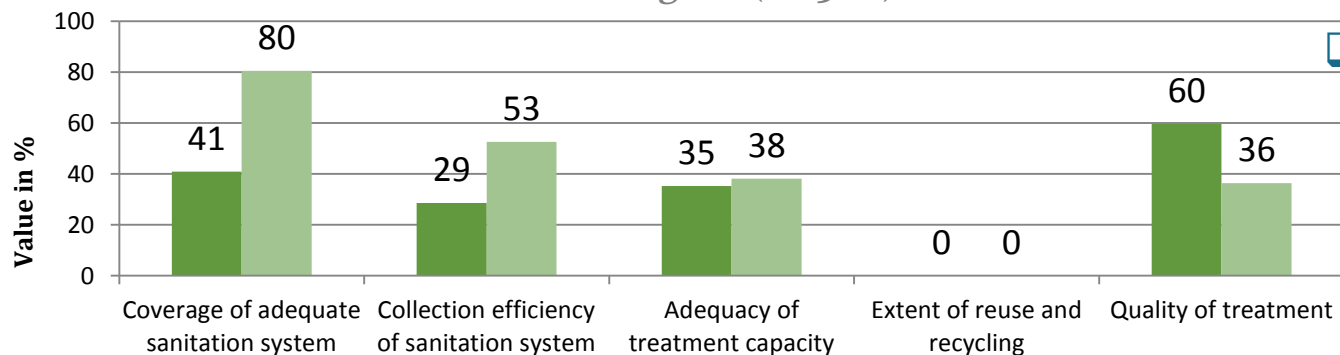
□ Maharashtra has 259 urban local bodies (ULBs) of various sizes ranging from 3000 to 3.5 million population (*excluding greater Mumbai*)

urban Chhattisgarh (2014-15)



□ Chhattisgarh has 43 urban local bodies (ULBs) of various sizes ranging from 11,000 to 1.2 million population

urban Telangana (2015-16)

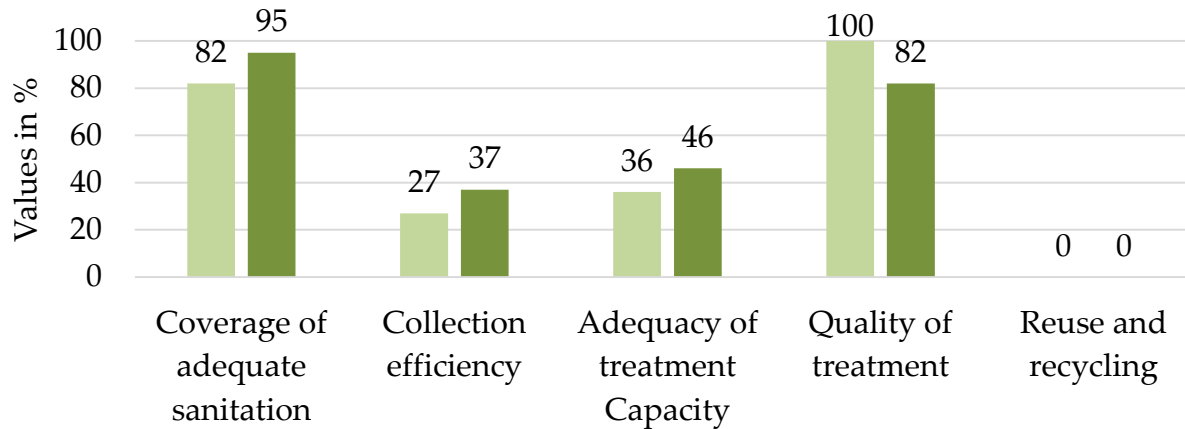


□ Telangana has 69 urban local bodies (ULBs) of various sizes ranging from 24,000 to 9.3 million population

■ SLB indicators ■ Revised indicators

SAN Benchmarks: City Level Sanitation Assessment

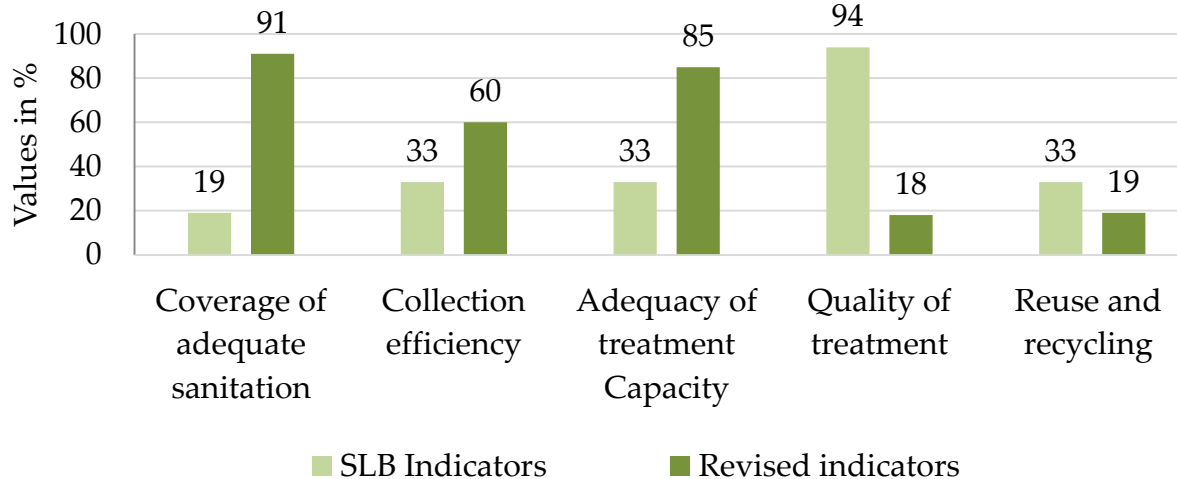
Sanitation assessment using SLB and proposed sanitation indicators framework (mixed sanitation system - Nagpur)



Nagpur :

- ❑ 82% of properties are connected to sewer network. 13% have septic tanks with soak pits.
- ❑ WW generated: 276 MLD
- ❑ STP capacity: 100 MLD
- ❑ 12% of septic tanks are cleaned annually and treated in existing STP
- ❑ Quality tests are not carried out for sludge treatment

Kalyan Dombivli



Kalyan Dombivli:

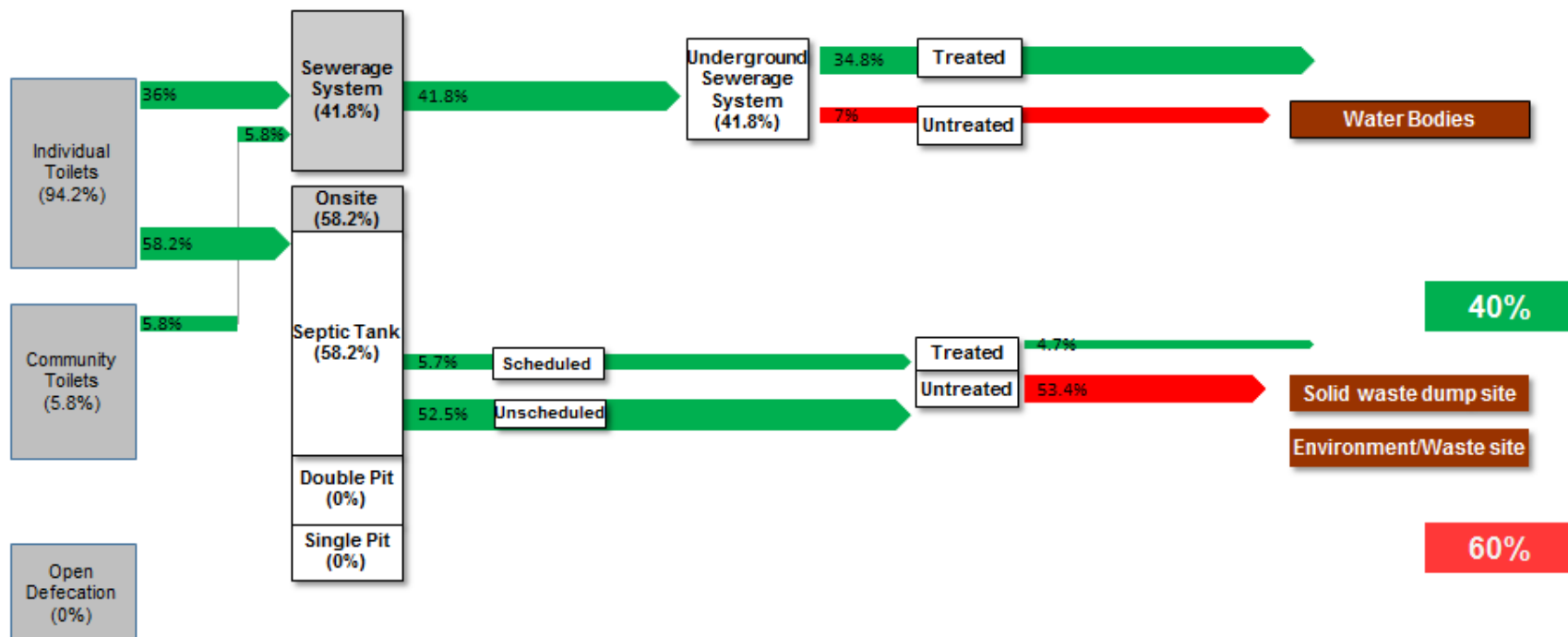
- ❑ 19% of properties are connected to sewer network. 78% have septic tanks with soak pits.
- ❑ WW generated: 370 MLD
- ❑ STP capacity: 123 MLD
- ❑ 8% of septic tanks are cleaned annually and treated in existing STP
- ❑ Quality tests are not carried out for sludge treatment
- ❑ 30 MLD treated sewage is reused

Automatic SFD & WW Flow diagram Generation tool (Excel based)

Automatic SFD generation tool will generate **SFD diagrams** and **WW Flow diagram** for around 400 cities using **PAS data** of 4 Indian states (Maharashtra, Gujarat, Chhattisgarh and Telangana states)

Select city from drop down menu and then click on Generate Shitflow Diagram Button

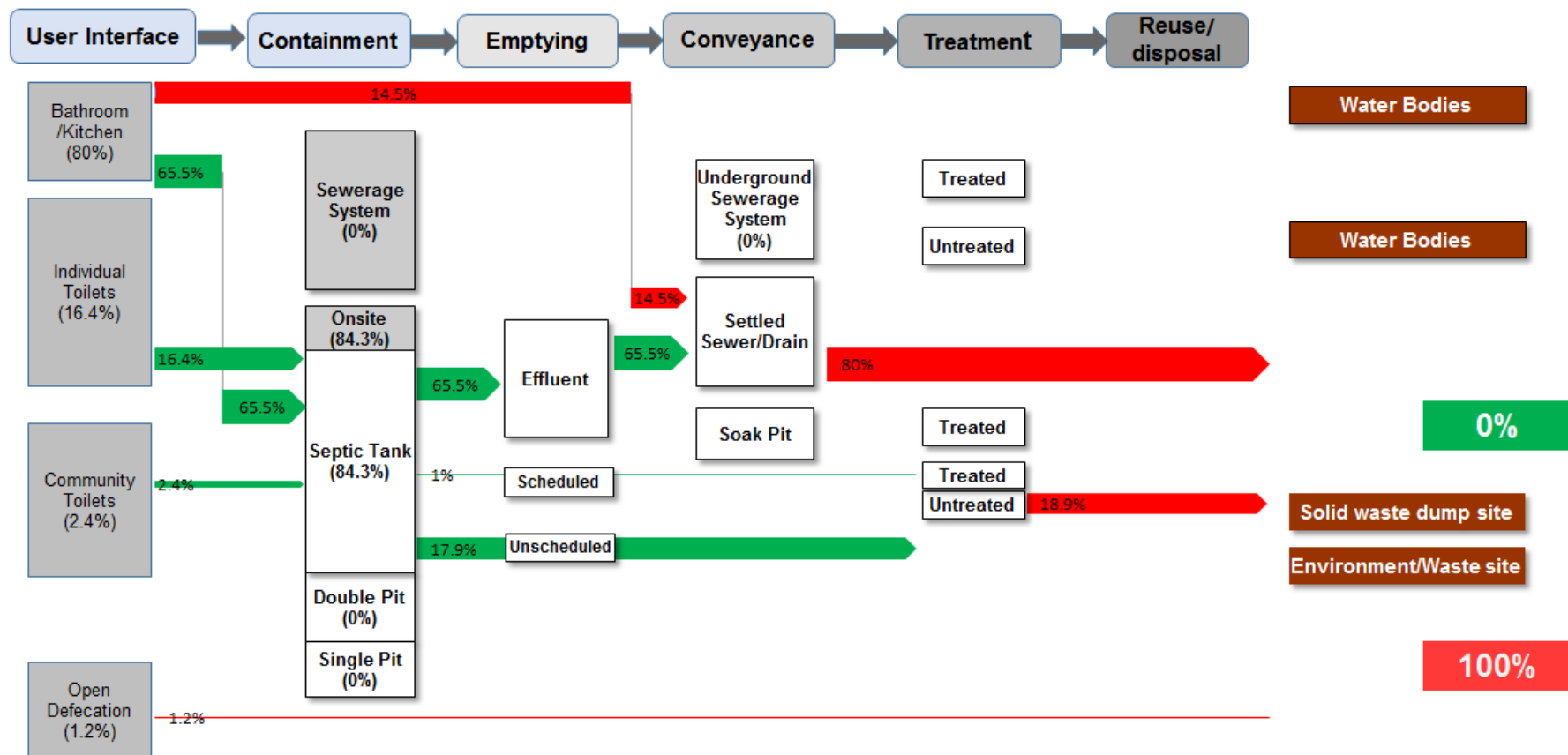
Select State:	Maharashtra	Generate ShitFlow Diagram	Generate Waste Water Flow Diagram
Select City:	Pachgani		



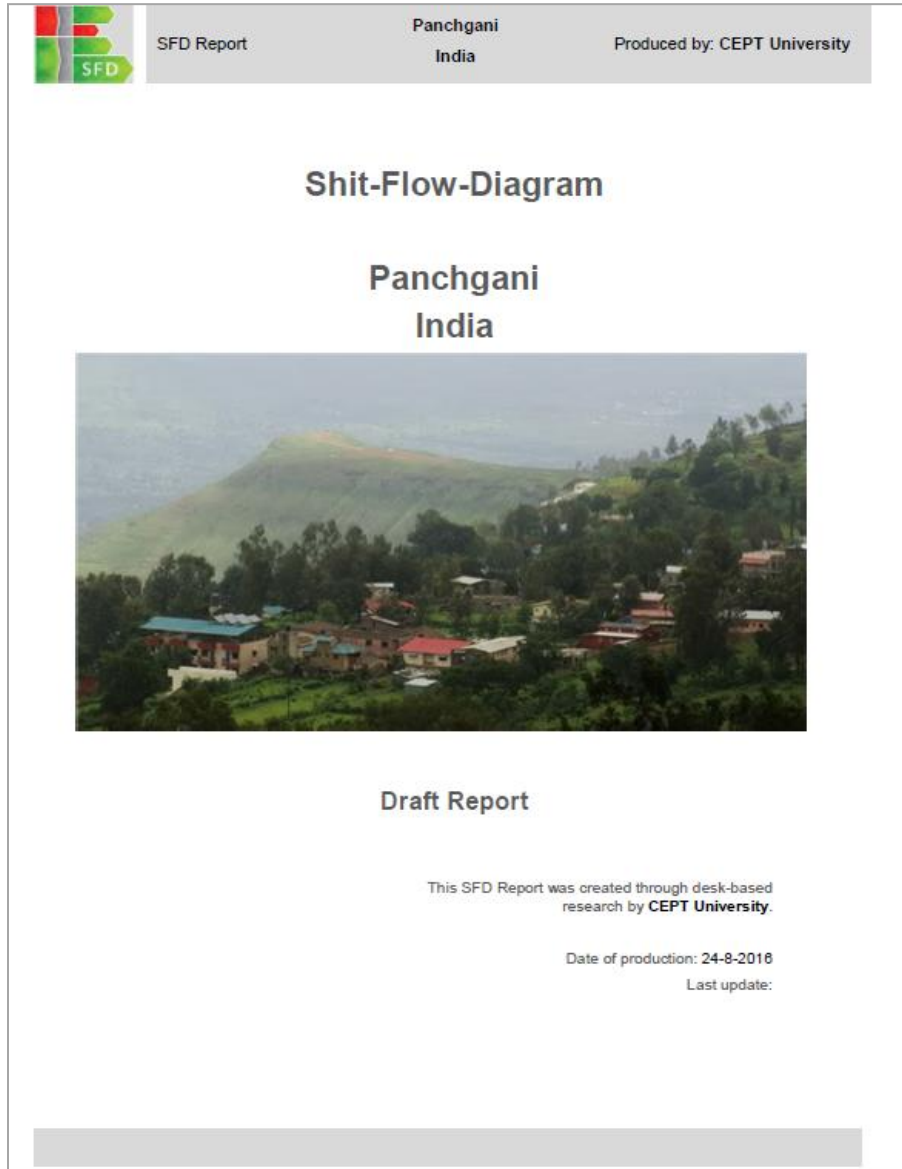
Automatic SFD & WW Flow diagram Generation tool (Excel based)

Select city from drop down menu and then click on Generate Shitflow Diagram Button

Select City:

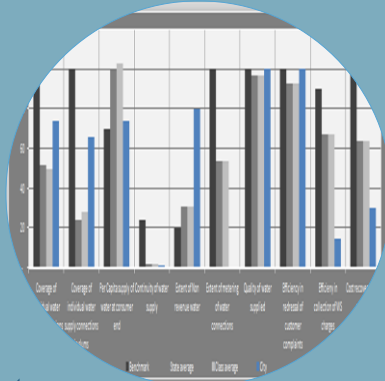


SFD Report

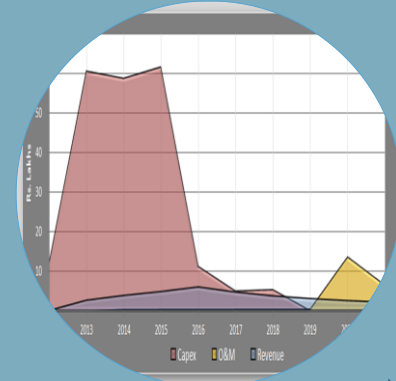


- SFD report for Panchgani city based on PAS database
- Components included in the report
 - City context
 - Policy, Regulation and Institutional roles
 - Water and sanitation service provision
 - SFD matrix and Diagram explanation
 - Stakeholder engagement

Using SFD in City Sanitation Planning



WATER SUPPLY SERVICES	2011	2012	2013	2014	2015	2016	2017	2018	2019
Percentage of individual water supply connections in city	85	85	85	85	85	85	85	85	85
Per Capita supply of water at consumer end (l/cd)	100	100	100	100	100	100	100	100	100
Continuity of water supply (hours)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Extent of Non-revenue water (%)	10	10	10	10	10	10	10	10	10
Extent of metering of water connections (%)	10	10	10	10	10	10	10	10	10
Extent of collection of customer complaints (%)	100	100	100	100	100	100	100	100	100
Extent of O&M charges (%)	10	10	10	10	10	10	10	10	10



Sanitation Assessment

Sanitation assessment using performance indicators and peer comparison to assess situation across the sanitation ladder.

Plan Options

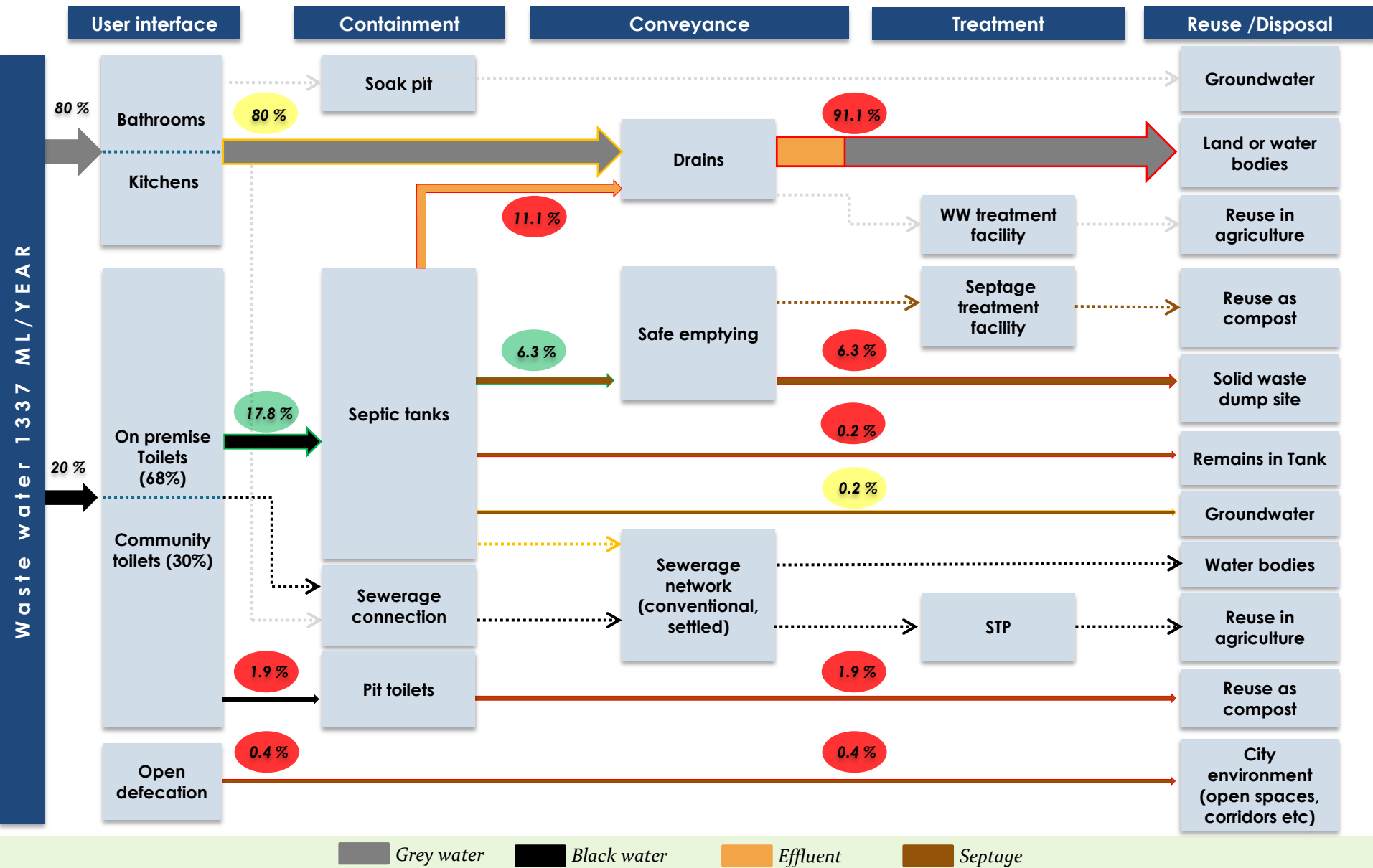
Assess technology options and process changes needed to develop citywide plan options.

Assess impact on sanitation performance and capital /O&M costs

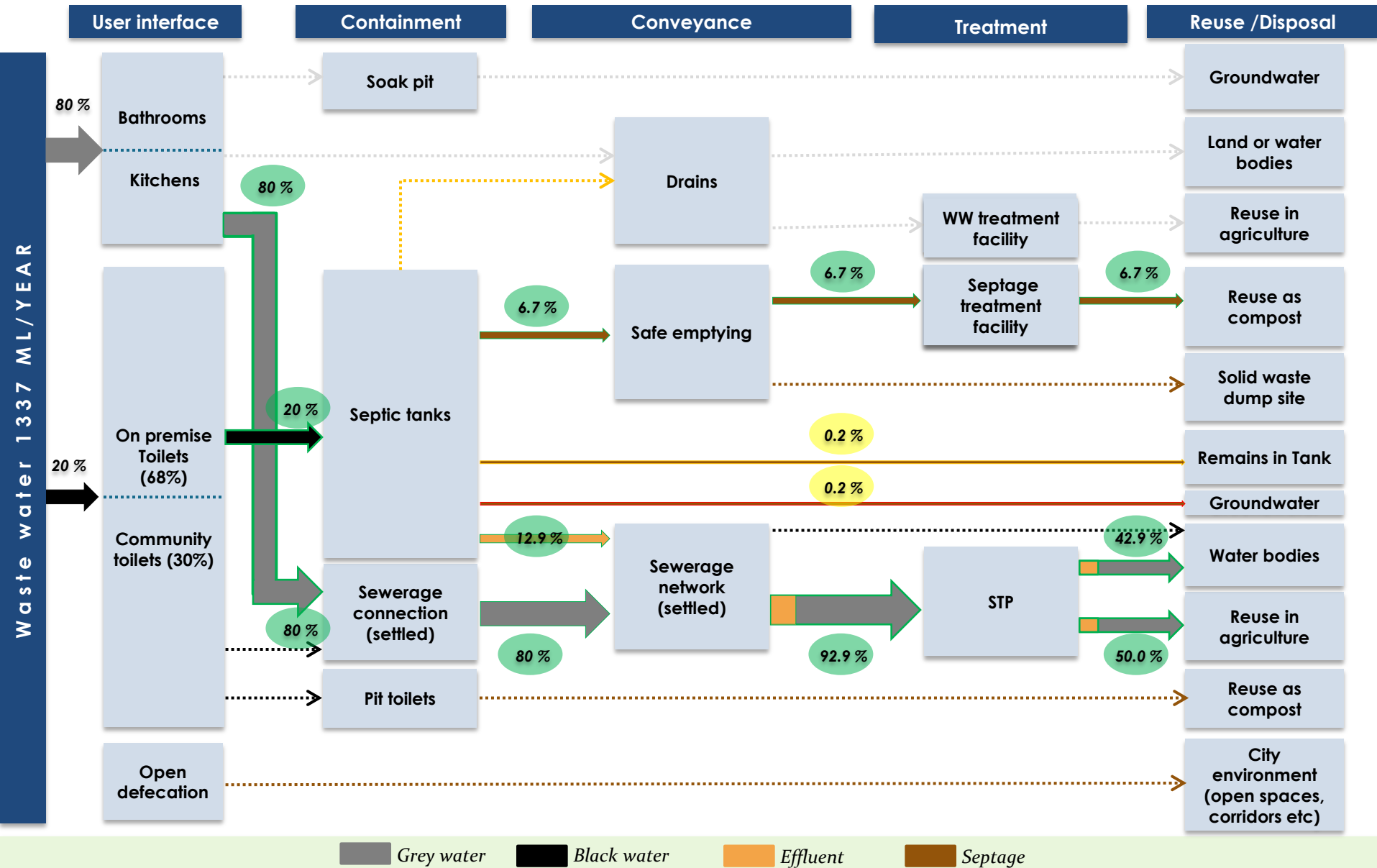
Financial Assessment

Assess municipal finances to develop a feasible financing plan. Explore creative financing through SIBs/DIBs, microcredit, debt and PPP options

Existing Wastewater flows - Wai



Wastewater flows after CSP - Wai



Wai Areas of Implementation



1

Own Toilets + Septic Tanks

Demand based incentive scheme

2

Integrated fecal sludge management

Regular (in a 3-year cycle) collection of fecal waste + treatment of septage + reuse of treated septage



Awareness



SBM Monitoring



Created Database



Citywide Plan



Treatment options



Training

Self help groups (SHGs) Micro-finance institutions (MFIs)



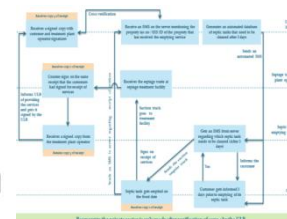
Commercial banks Housing finance companies (HFCs)



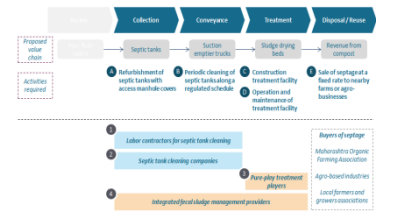
San. Financing



Awareness



Monitoring



Exploring PSP

In conclusion

- SAN Benchmark, proposed by CEPT provide quantitative information that is easily converted to SFD
- SFD is seen as an advocacy tool, but to plan adequately for FSM, decision support tools are needed
- Preparing a SFD should not be a ‘one-off’ activity, but must lead to regular monitoring of the sanitation service chain

Thank You

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