



San Benchmark

*Citywide Assessment of Sanitation Service Delivery
- Including On-Site Sanitation*

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CEPT
UNIVERSITY



PAS

Performance Assessment System

Annual service delivery

profile for **800+**

cities in **6** States

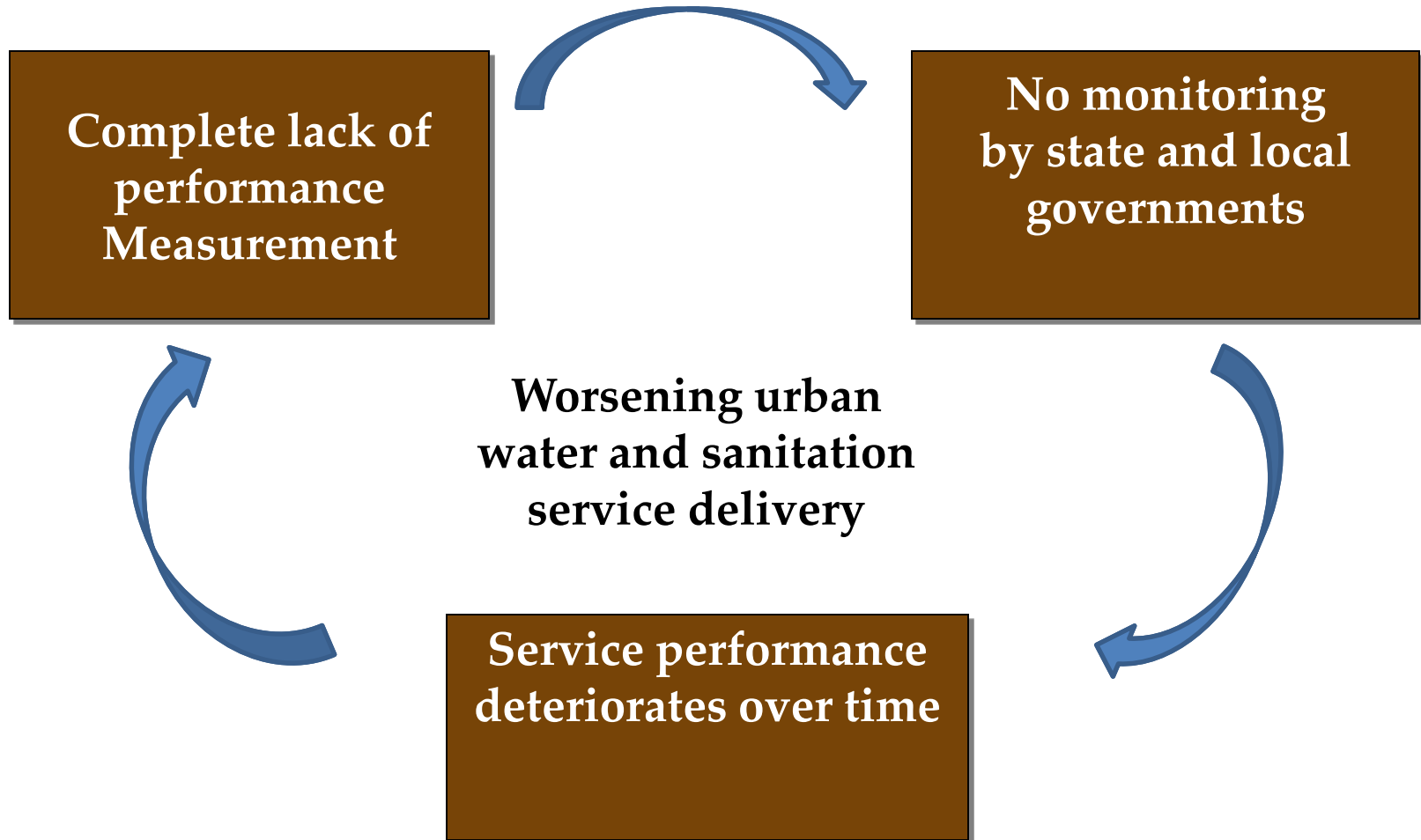
**National database for 1800 cities
For 18 states for 3 years**

www.pas.org.in

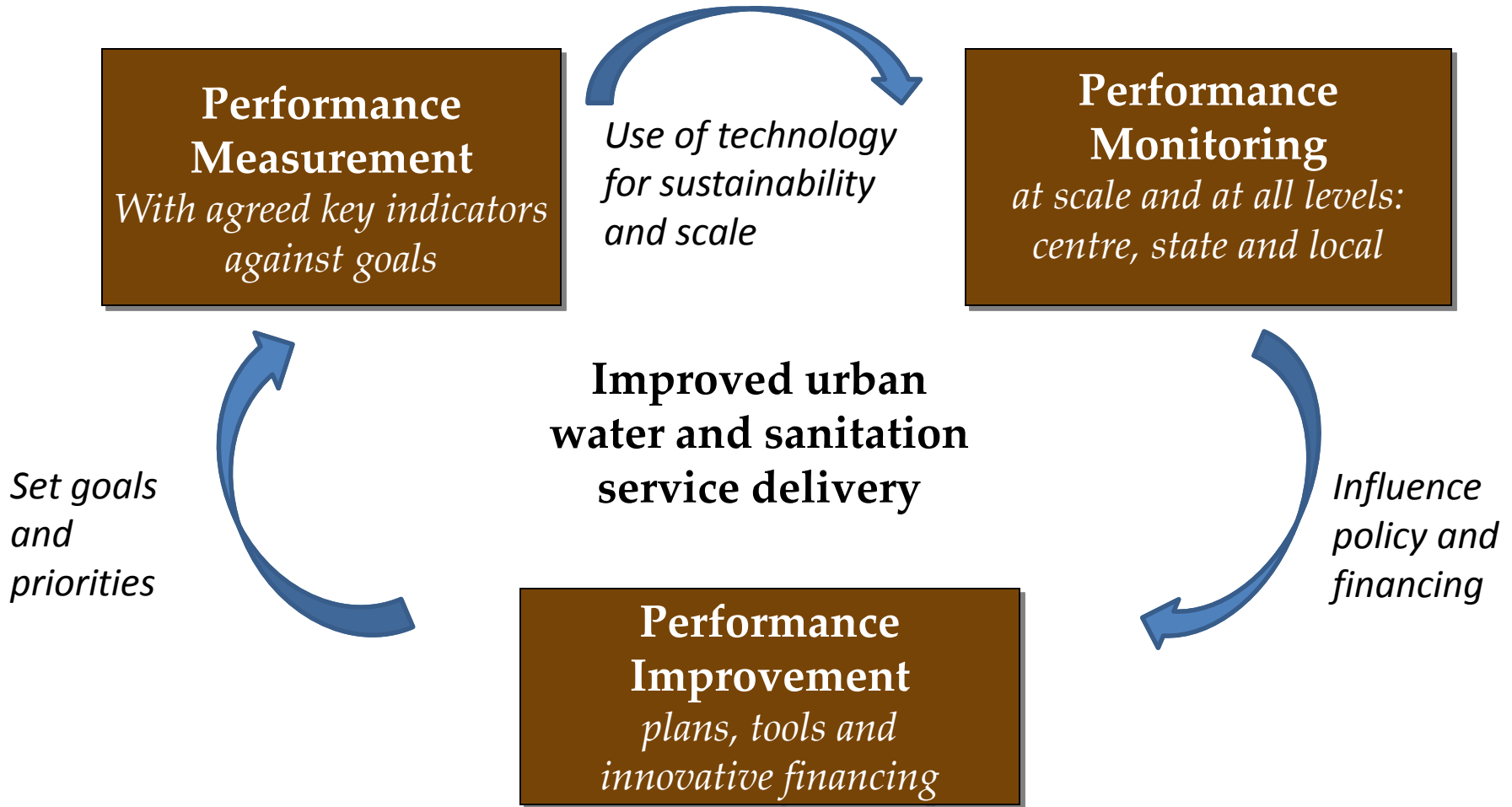
Water supply, Waste Water, Solid waste Management & Storm Water



PAS Approach – moving to a virtuous cycle



PAS Approach – moving to a virtuous cycle



Measure and monitor performance to reward and learn from success and demonstrate results



We have come a long way from this

1997-98

1996-97

1997-1998

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1995-96

1996-97

Online data entry camps in state capitals

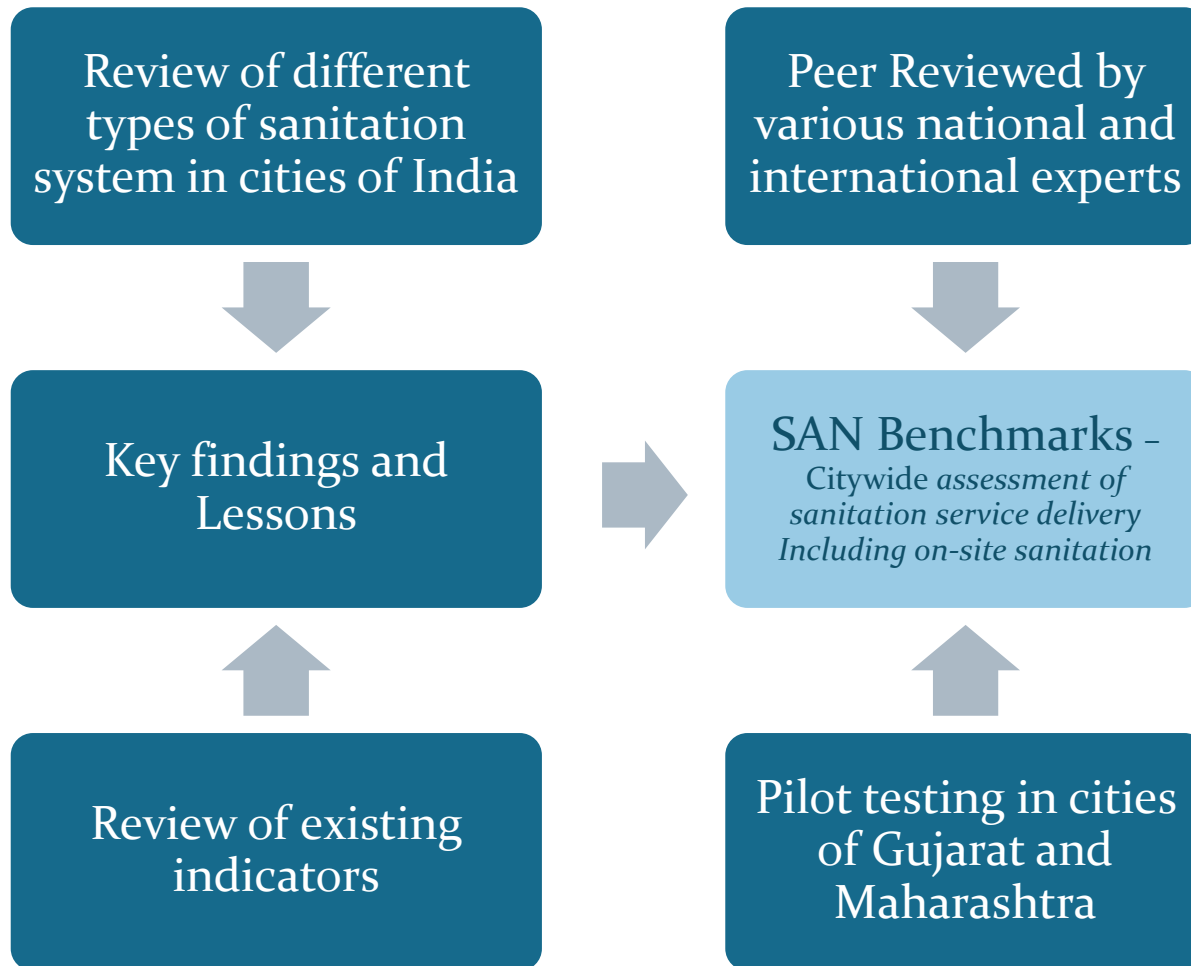


Sanitation benchmarks

- Many performance measurement, indicator and benchmarking systems for wastewater services
 - IWA Performance Indicators for Wastewater Services (Matos et al. 2003)
 - AWWA & WEF QualServe programme (United States)
 - SLB(GoI, 2008)
- All of them deal with waste water network and treatment
- No system to assess on-site sanitation



CEPT Process of developing SAN Benchmarks



GoI indicators (SLB) - Sanitation

Conventional Underground Sewerage system

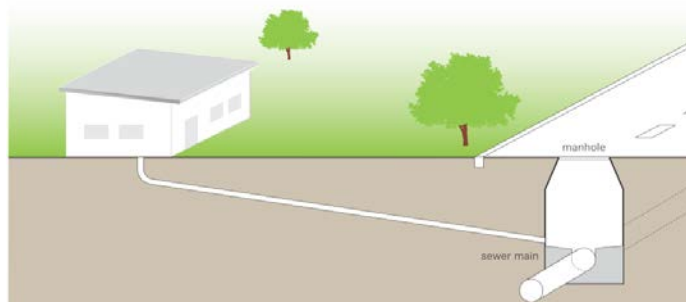
User interface



1. Coverage of toilets

2. Coverage of sewerage network

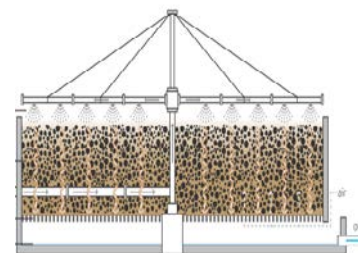
Collection



3. Collection efficiency of sewerage network

Conveyance

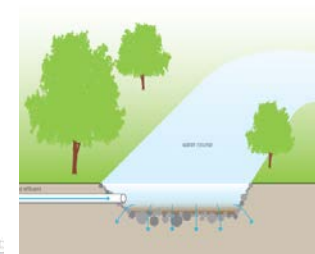
Treatment



4. Adequacy of sewage treatment capacity

5. Quality of sewage treatment

Recycle & Reuse



6. Extent of reuse and recycling of sewage

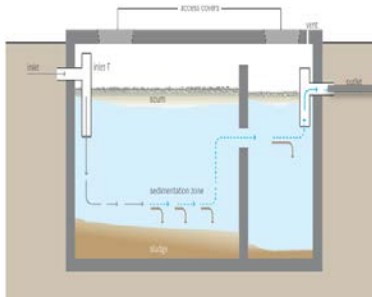
CEPT Indicators for Onsite sanitation systems

Onsite system – Septic tank with Settled Sewer/lined drain

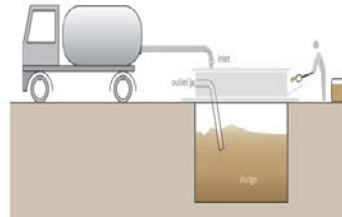
User interface



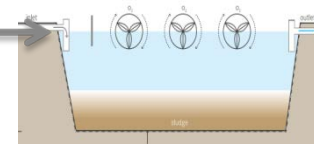
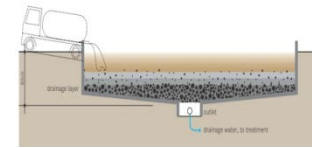
Collection



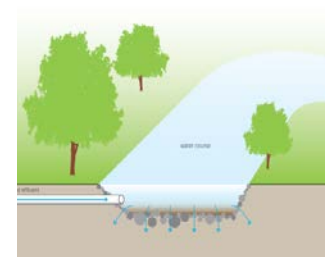
Conveyance



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

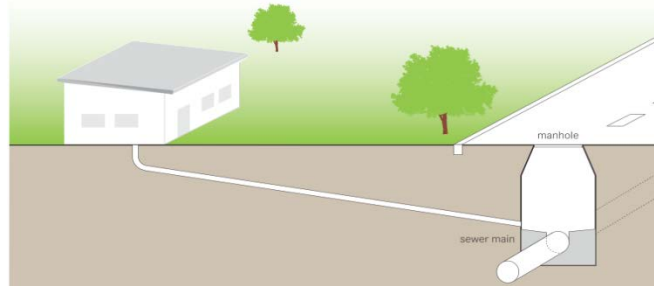
SAN Benchmarks provides a framework for performance assessment of city wide sanitation by capturing onsite sanitation systems along with the conventional sewerage systems.

Mixed Sanitation System

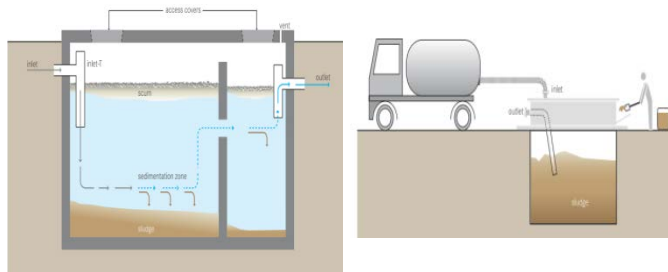
Access



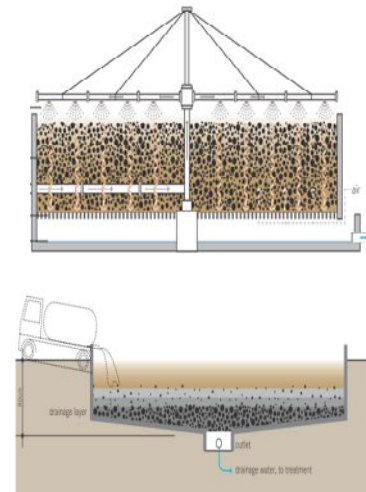
Collection



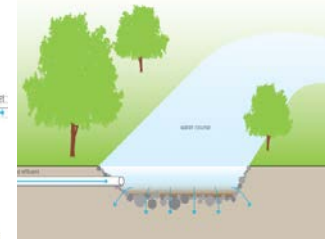
Conveyance



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)

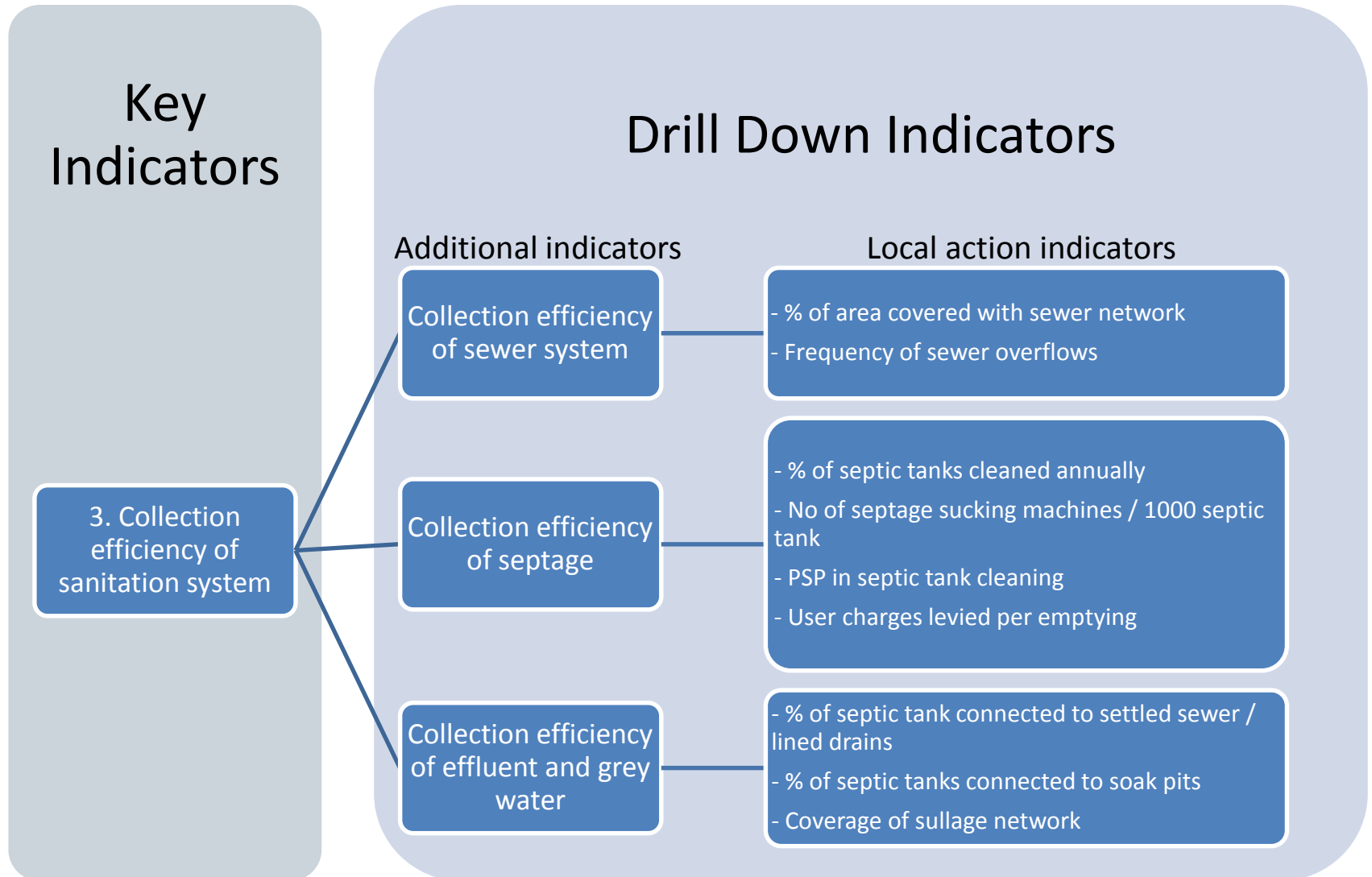
6. Extent of reuse and recycling in sanitation system (weighted average)

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

Revised Sanitation Indicators (Sewerage system + Onsite systems)	
1. Coverage of toilets	Percentage of properties with access to toilet facility in the city
2. Coverage of adequate sanitation system	Percentage of households with individual toilets connected with adequate sanitation systems (sewer network/ septic tank / double pit system) to total households in the city.
3. Collection efficiency of sanitation system	Weighted average of collection efficiency of each sanitation system, weighted by share of households dependent on each sanitation system.
4. Adequacy of treatment capacity of Sanitation System	Weighted average of adequacy of treatment plant capacity available for each sanitation system, weighted by share of households dependent on each sanitation system.
5. Quality of treatment of sanitation system	Weighted average of quality of treatment of each sanitation system, weighted by share of households dependent on each sanitation system.
6. Extent of reuse and recycling in sanitation system	Weighted average of extent of reuse of treated wastewater and sludge after adequate treatment as a percentage of wastewater and sludge received at the treatment plant, weighted by share of household dependent on each sanitation system.

SAN Benchmarks: *Citywide assessment of sanitation service delivery*

Including on-site sanitation



SAN Benchmarks: *monitoring framework suggested*

Key Indicators

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.

SAN Benchmarks: List of all Indicators

Key Indicators

Capture	Collection	Conveyance	Treatment	Recycle and Reuse
1. Coverage of toilets	2. Coverage of each sanitation system	3. Weighted average of collection efficiency of each sanitation system	4. Weighted average of adequacy of each sanitation system 5. Weighted average of quality of treatment of each sanitation system	6. Weighted average of extent of reuse and recycling of each sanitation system

<ul style="list-style-type: none"> Coverage of households with own toilets (%) Percentage of functional community toilet seats (%) 	<ul style="list-style-type: none"> Percentage of households connected to septic tank (%) Percentage of households connected to septic tank as per design standards (%) Percentage of households connected to twin pit system (%) Percentage of households connected to sewer network (%) Percentage of illegal sewer network connections (%) Percentage of identified illegal sewer network connections that are regularized (%) Percentage of area covered with sewer 	<ul style="list-style-type: none"> Collection efficiency of septage (%) % of septic tanks cleaned annually Number of septage sucking machines/1000 septic tanks (Ratio) PSP in septic tank cleaning services (Y/ N) User charges levied per emptying Percentage of septic tanks connected to settled sewer / drains for effluent disposal Percentage of septic tanks connected to soak pit for effluent disposal (%) Collection efficiency of effluent (from septic tank) and grey water (%) Coverage of sullage network (open + covered) (%) Collection efficiency of sewer network (%) 	<ul style="list-style-type: none"> Adequacy of septage treatment facility (%) Adequacy of effluent (from septic tank and grey water) treatment capacity (%) PSP in O & M operations for treatment plant (Y/N) Quality of septage treatment (%) Quality of effluent (from septic tank) treatment (%) Adequacy of sewage treatment facility (underground sewerage system) (%) Quality of treated sewage disposed (BOD & COD) (%) 	<ul style="list-style-type: none"> Extent of reuse and recycling of treated septage received at treatment plant (%) Extent of reuse and recycling of treated effluent (from septic tank and grey water) (%) Extent of reuse and recycling of treated sewage (%)
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Onsite indicators

Drill Down Indicators

Indicator definition , formula and rationale have been developed...

APPLICATION OF SAN BENCHMARK



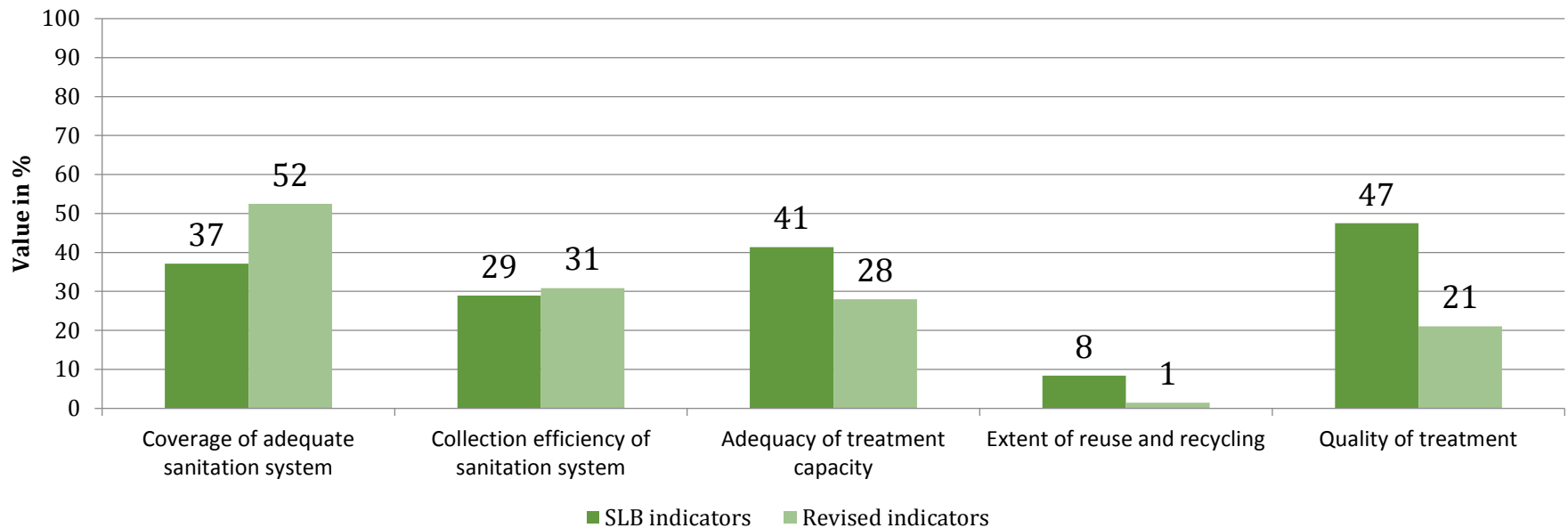
Application of San Benchmark

- ✓ SAN Benchmark indicators added in online PAS system
- ✓ Calculated for more than **600+ cities**
- ✓ Included in **IFSM toolkit and SANI PLAN tool**
- ✓ Used for preparation of **Shit Flow Diagram (SFD)**
- ✓ **Trained** more than **1200 government officials**



SAN Benchmarks: State Level Sanitation Assessment

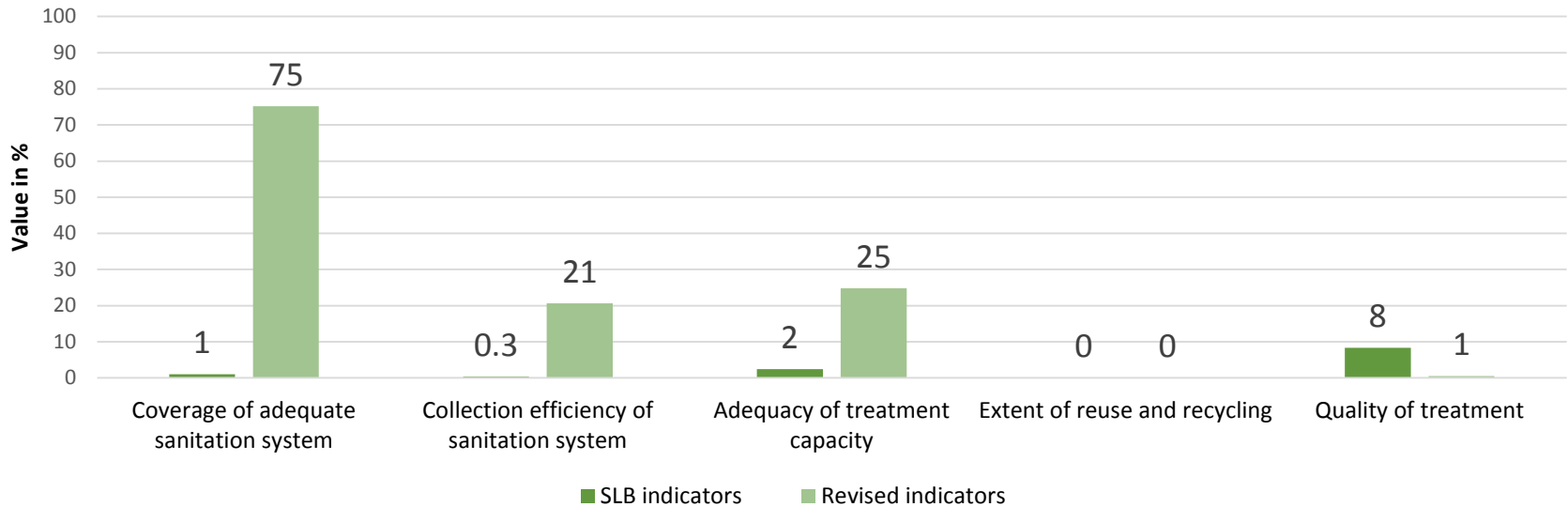
Sanitation assessment using existing and revised indicators -
urban Maharashtra (2014-15)



- Maharashtra: 259 urban local bodies (ULBs); 3000 to 3.5 million population
- Partial underground sewer network: 34 ULBs; STP: 22 ULBs
- San Benchmark shows **better performance for coverage of adequate sanitation system and collection efficiency.**
- **Adequacy of treatment decreases** as only a few cities treat septage and grey water

SAN Benchmarks: State Level Sanitation Assessment

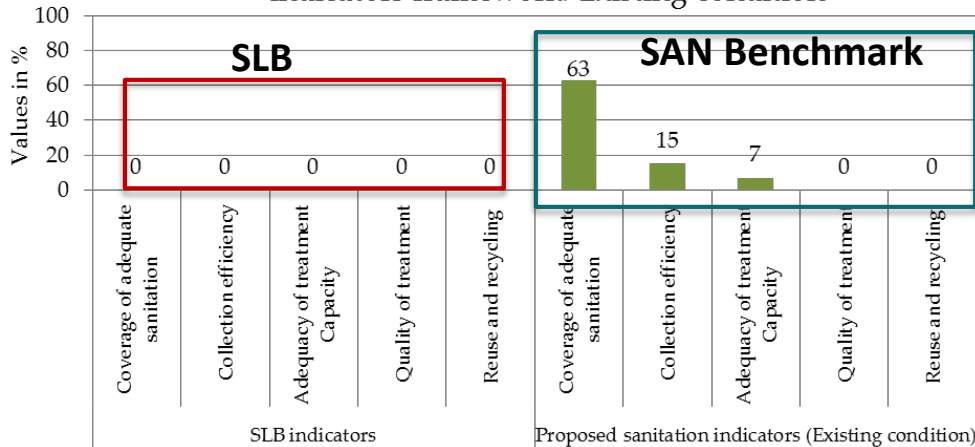
Sanitation assessment using existing and revised indicators - urban Chhattisgarh (2014-15)



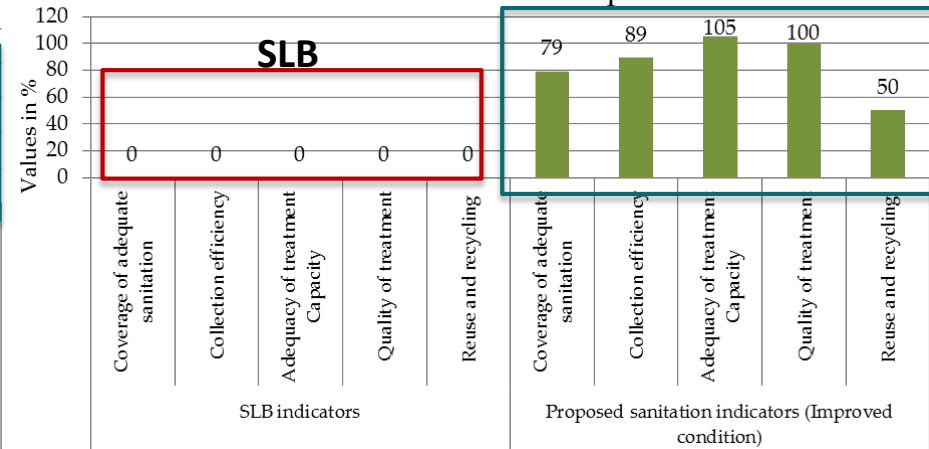
- **Chhattisgarh:** 43 urban local bodies (ULBs); 11,000 to 1.2 million population
- Partial underground sewer network: 2 ULBs; STP: 1 ULBs (Bilaspur)
- San Benchmark show **better performance** for coverage and collection efficiency
- **Adequacy of treatment** increases because it captures treatment of grey water through septic tank connected to soak pit
- **None** of the city **treat septage**

San Benchmark helps city government in monitoring FSM improvement plans

Sanitation assessment using SLB and proposed sanitation indicators framework: Existing condition



Sanitation assessment after improvement

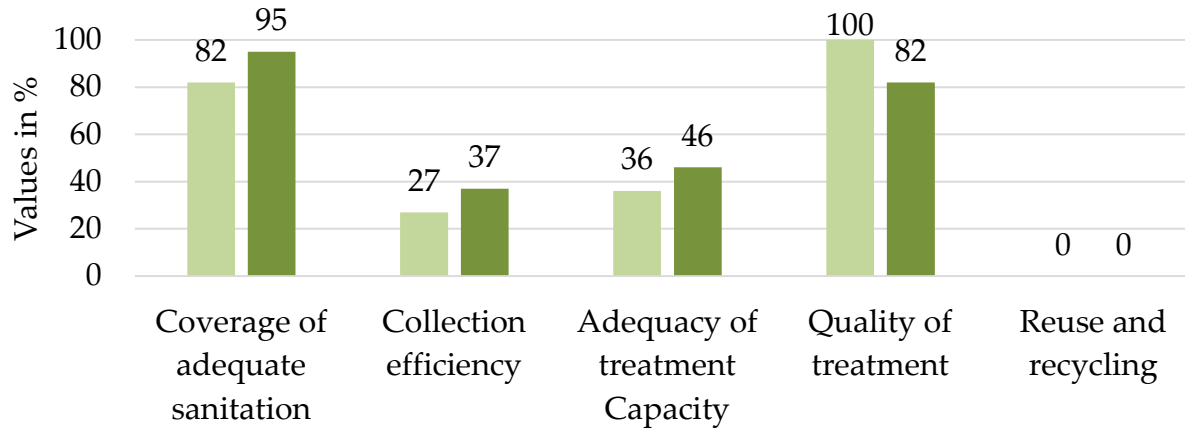


Sinnar City Example

- **SLB indicators** show **zero value** for all indicators
- Implementation of fecal sludge management plan not reflected in SLB indicators
- **San Benchmark** framework shows **improvements** in sanitation services

SAN Benchmarks: *City Level Sanitation Assessment*

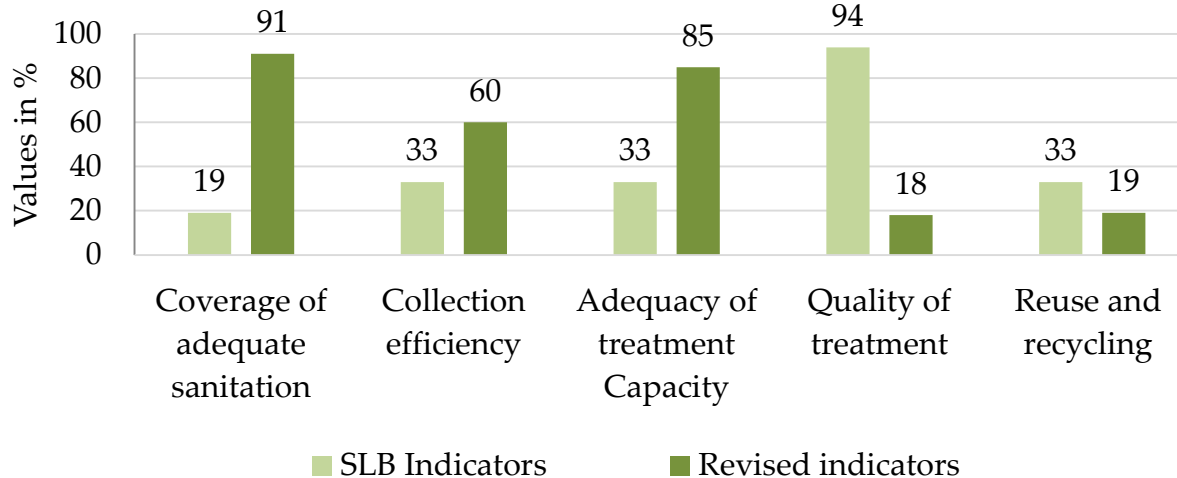
Sanitation assessment using SLB and proposed sanitation indicators framework (mixed sanitation system - Nagpur)



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:

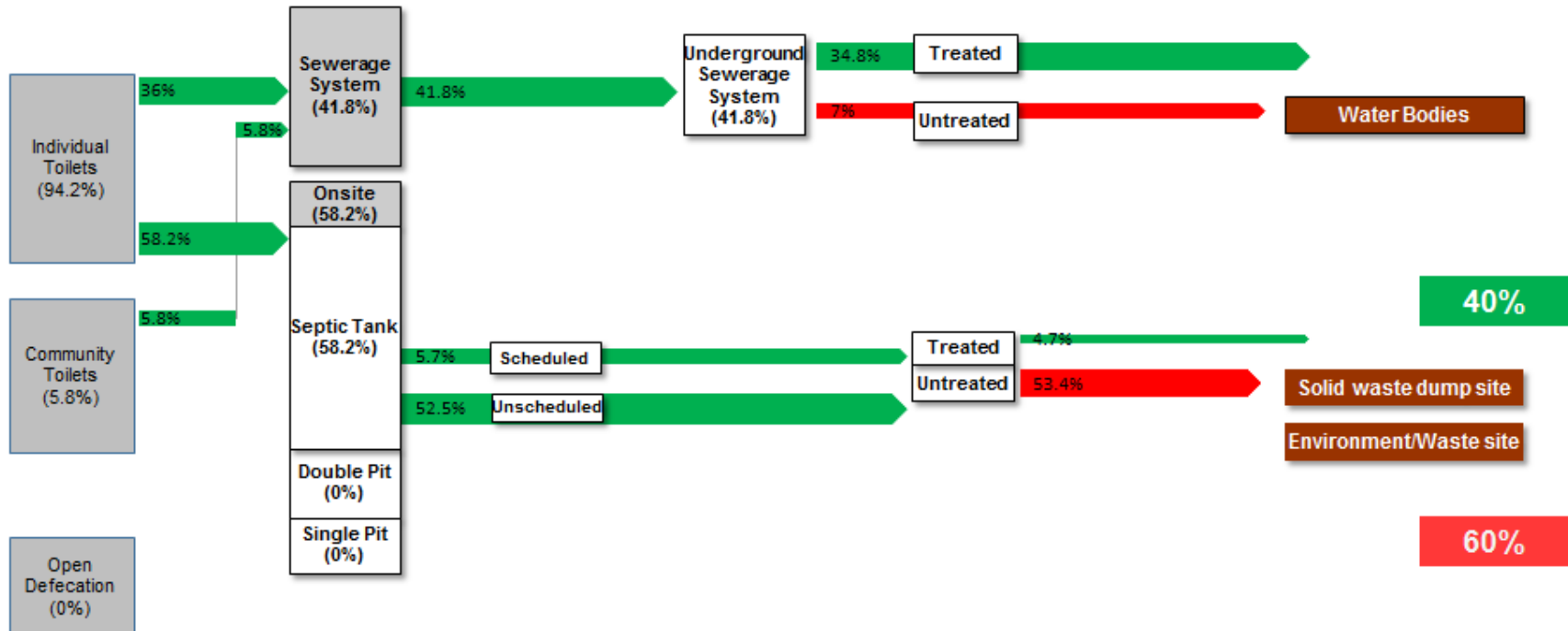
- 19% of properties are connected to sewer network. 78% have septic tanks with soak pits.
- WW generated: 370 MLD
- STP capacity: 123 MLD
- 8% of septic tanks are cleaned annually and treated in existing STP
- Quality tests are not carried out for sludge treatment
- 30 MLD treated sewage is reused

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		



Addressing Data Challenges

Major challenge: Availability of adequate information for onsite sanitation system

Challenges

- **User interface:** Lack of recorded information on household level access to onsite sanitation system, i.e. HHs with septic tank
- **Collection:** Septic tank cleaned by private operators
- **Conveyance:** Quantity of grey water and effluent collected by drains
- **Treatment:** Quantity of septage treated in treatment plant

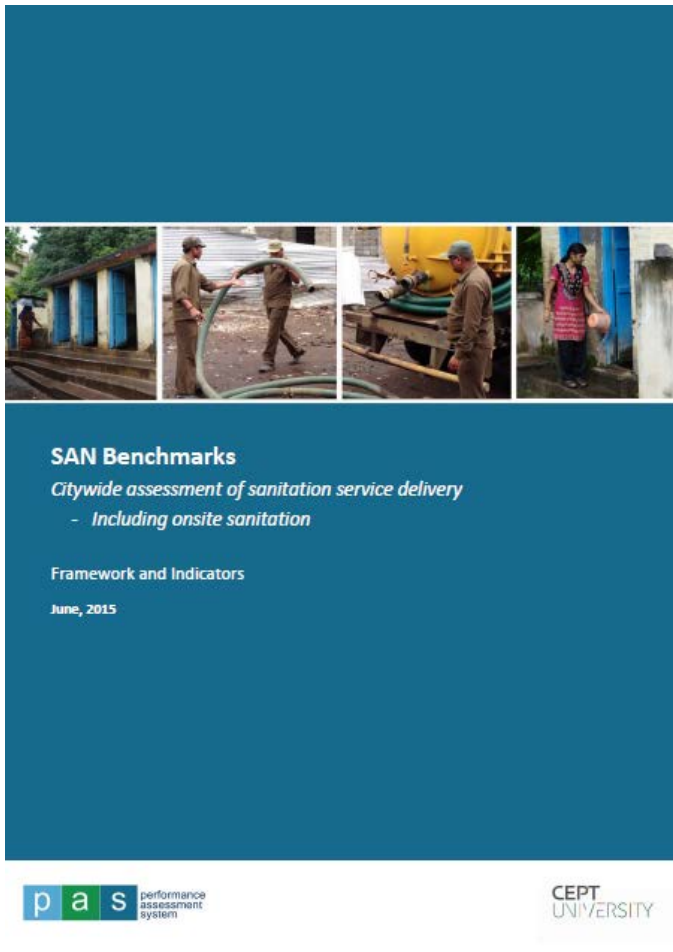
Measures

- Currently estimated based on city officials knowledge. Can be improved by **addition of question in property tax assessment form**
- **Provide license to private operators**
- **Monitor flow** in outlet drains
- **Maintain record at treatment plant** for septage received



Report and presentation

- Available at
- www.pas.org.in/urban sanitation



Thank you . . .

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