GIS analysis for city-wide FSM optimization and decision making

Narsapur, India

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About Narsapur

- River front town
- Spread over 11.2 sq.km.
- Population of 58,901 (census 2011)
  No underground drainage system
- HHs with access to on-site toilets was reported as 95%
  - Septic tanks: 56%
  - Pit latrines: 32%
  - Insanitary toilets: 12%.
- Percentage of population residing in 48 urban poor settlements: 61%
Sanitation service levels fall below the prescribed norms and there is a dire need to address the sanitation challenges in an integrated comprehensive manner.

**Key Sanitation Challenges:**
- Inadequate access to toilets
- Poor containment systems - insanitary toilets
- Unsafe management of faecal waste
- Unsafe management of waste water
- Weak institutional capacity
- Weak stakeholder engagement
- Lack of monitoring systems in place
- Lack of Gender Integrated Sanitation
Key Achievements

✓ Declared ODF in October 2016 and sustained
✓ State FSSM policy and guidelines operationalised in April 2017
✓ Licenced all desludging operators and trained them
✓ Implemented a Faecal Sludge Treatment Plant (FSTP)
✓ School sanitation improved
✓ Operations and maintenance contracts for 19 community toilets and 5 public toilets issued. SLAs developed.
✓ Sanitation vulnerability assessment completed and gender integration activities initiated

Key Pain Point: Lack of credible data to support informed decision making
Geographical Information System

- GIS is an surely an incremental system which improves upon the existing tools and imparts a spatial perspective for more informed and transparent decision making. The study aims to support decision making for bringing comprehensive decentralised sanitation solutions.
GIS based Sanitation Survey - Objectives

- To gain an in-depth understanding of the sanitation infrastructure situation of the town
- To gain insights into the sanitation awareness, attitude and behaviour among the citizens.
Methodology

1. Preparation of ToR
2. Developing Questionnaire
3. Selection of Vendor
4. APP Development
5. Training of Surveyors
6. Survey
7. Quality Check
8. Work Allocation to Surveyors
9. Data Compilation, Dashboard
10. Situation Assessment Report
11. Integration of GPS Coordinate into FSM Tracker App
Methodology

• 100% property survey (14,595)
• 6 weeks involving over 30 field and supervisory staff
• Detailed questionnaires (separate for Households, commercial, institutions)
• Data was collected using a mobile app on tablets for higher speed and quality of data collection and real time data analysis.

Survey questions to capture:
- socio-economic condition
- access to water and sanitation services
- health impact of sanitation services
- access to sanitation infrastructure
- toilet typologies
- desludging practices,
- awareness, attitude and behaviours related to sanitation.
Mobile app

Location based on emptying frequency
The municipality can look at the below dashboard for formulating an action plan for focussed desludging operations, upgradation of toilets with or within the Swach Bharat Mission (SBM) and for follow up on SBM applications.

<table>
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<tr>
<th>Ward No.</th>
<th>Application to SBM</th>
<th>Desludging on Priority</th>
<th>Prioritised (to be brought under SBM)</th>
<th>Upgradation of Toilet</th>
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Results – Access to Individual Household Toilets

Survey showed that **92%** of the HHs (11241) have access to individual household toilet while **8%** (1039) of HHs do not have access to individual household toilet.
Results – Access to Public / Community Toilets

35 HHs are located beyond 500 m distance from PT/CT

Decisions:
Number of PT/CT and specific locations for the same identified
Results – Open Defecation

Of the 1039 HHs without toilets, 409 HHs are practicing OD

ODF Wards- 5, 6, 7, 9, 10, 11, 12, 13, 17, 18

Accessibility to PT/CT by HHs practicing OD
Results – Interest in constructing toilets by HHs practicing OD

Of the 409 HHs practicing OD, 51 HHs have applied for Government subsidy for toilet construction.

Applications to be made by 358, of which 51 HHs are not interested in owning a toilet.

Decisions:
- Targeted communication regarding ill effects of OD and demand generation for applications for toilets
Results – Toilet Typology

1400 insanitary toilets

Concentration in low-income settlements
Results – Toilet Typology

1400 insanitary toilets

Concentration in low-income settlements

Decision: Communication
Notices
Application
Results – Desludging behaviors

Frequency of Desludging

- 45% Once in 3 years
- 33% Once in 3-6 years
- 13% Once in more than 6 years
- 9% Never emptied

Decision:
1. Planning for scheduled desludging – prioritization, time (basis information on access), cost (basis information on need for breakage of access cover)
2. Tarif (basis willingness to pay)
Results – Gender Lens

Decision Making with Regard to Toilet Infrastructure and Maintenance

- Responsibility of Cleaning Toilet - 98% of the HH toilets are maintained by women
- OD in HHs with toilets is by men

Though women have responsibility of cleaning toilet, decision taking authority lies with male members.
Results

• Relationship between practice of OD by households with toilet facilities and access to water
• Relationship between insanitary toilet and annual income of Household
• Relationship between ill health and monthly expenditure on soap
• ..........................
overlaying land use layer to understand proximity of OD HHs to agricultural land
overlaying type of property to understand relation between insanitary toilet with socio-economic condition
Key Benefits

GIS supported visualised decision making related to the following and more in the city of Narsapur:

• **Addressing OD** (OD spots, potential reasons for slippage)

• **Enhancing Access** (applications for HH toilets, toilets in commercial establishments, locations for PT/CTs)

• **Improved containment systems** (retrofitting of insanitary toilets)
Conclusion

• **FSTP capacity revisit** (basis size of septic tanks)
• **Targeted Communication campaigns** (handwash with soap, linkage between health and sanitation, importance of regular desludging, ill effects of OD, schemes by government, etc)
• **Vulnerability and Gender studies** (to give voice, agency and access to sanitation participation in service delivery to women)
Conclusion

• Scheduled desludging planning (CR taken,

• Desludging route planning (linkage with GPS on desludging trucks)

• User charge collection system (basis willingness to pay for sanitation services and linkage with property tax data, a differential tariff structure to benefit the poor evolved)

• FSSM budget with gender budget introduced