FSM

Urban WASH

An Assessment of **Faecal Sludge Management** Policies and Programmes at the National and Select States Level

WaterAid

A report by

WaterAid

Cover & Inside Cover: WaterAid/Jon Spaull

FOREWORD

WaterAid has been promoting Urban Sanitation in developing countries in recent years. In the process, Faecal Sludge Management has been increasingly acknowledged as a major challenge.

Faecal Sludge Management has also been identified as a central challenge in achieving the vision of an 'Open Defecation Free' India. Therefore, working on and building up solutions to challenges of Faecal Sludge Management finds a very important place in the overall WaterAid India Urban WASH strategy released in the year 2014. Following up on the increased focus on Faecal Sludge management by WaterAid India, there were a range of research and urban sanitation policy advocacy measures initiated in recent times. The internationally acclaimed collaboration with the University of Delaware and the invention and field testing of Eco Vapour Toilets using vapour permeable membranes in the slums of Kanpur, the field testing and research of the DRDO bio-digester toilets in schools of Kanpur and Puri, and using the Reed bed technology in Delhi for the treatment of wastewater are few such examples. The policy advocacy for Faecal Sludge Management and on-site sanitation options to reach the unreached in urban India by bringing together a key ministry namely, the Ministry of Urban Development, and various national and international experts on sanitation during the 'India WASH Summit – Solutions for Swachh Bharat' in early 2015 is also an example of our growing interest in dealing with this issue.

In this context, WaterAid India initiated a research study on 'Urban WASH: An Assessment of Faecal Sludge Management (FSM) Policies and Programmes at the national and select states level' in order to have a country-wide perspective on FSM and guide the policy advocacy work on FSM within WaterAid India. The study was carried out by WaterAid India with support from its partners ExNoRa International with WASHNET in Tamil Nadu and consultants Praxis Institute for Participatory Practices, Chennai.

I do hope that the assessments and recommendations of this study will be useful for policy makers workers and practitioners alike, both within WaterAid India and outside, in marching ahead to achieve the mission of Open Defecation Free India through engaging and dealing with the complex issues of Faecal Sludge Management.

Neeraj Jain
Chief Executive

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Abbreviations

AIILSG	All India Institute of Local Self-Government
BSUP	Basic Services to the Urban Poor
CEPT	Centre for Environmental Planning and Technology
CO	Chief Officer
CGWB	Central Ground Water Board
CPCB	Central Pollution Control Board
CPHEEO	Central Public Health and Environmental Engineering Organisation
CSPs	City Sanitation Plans
DC	District Committee
DPR	Detailed Project Report
FS	Faecal Sludge
FSM	Faecal Sludge Management
GDP	Gross Domestic Product
GoM	Government of Maharashtra
GR	Government Resolution
IS	Indian Standard
JnNURM	Jawaharlal Nehru National Urban Renewal Mission
MC	Municipal Corporation
MCI	Municipal Councils
MDWS	Ministry of Drinking Water and Sanitation
MGJWSSP	Maharashtra Golden Jubilee Water Supply and Sanitation Programme
MGNREGS	Mahatma Gandhi National Rural Employment Guarantee Scheme
MGSM	Mahatma Gandhi Swachhata Mission
MHADA	Maharashtra Housing and Development Authority
MHUPA	Ministry of Housing and Urban Poverty Alleviation
MLD	Million Litres per Day
MMR	Mumbai Metropolitan Region
MMRDA	Mumbai Metropolitan Region Development Authority
Mn	Million
MoUD	Ministry of Urban Development
MPCB	Maharashtra Pollution Control Board
MSNC	Maharashtra Sujal Nirmal Campaign
MSW	Municipal Solid Waste
MWRRA	Maharashtra Water Resources Regulatory Authority
NBA	Nirmal Bharat Abhiyan
NCRPB	National Capital Region Planning Board

NRCD	National River Conservation Directorate
NRW	Nonrevenue Water
NSSO	National Sample Survey Office
NUSP	National Urban Sanitation Policy
O&M	Operations and Maintenance
ODF	Open Defecation Free
PAS	Performance Assessment System (Project)
PHED	Public Health Engineering Department
SC	Scheduled Caste(s)
SPCB	State Pollution Control Board
STP	Sewage Treatment Plant
SWM	Solid Waste Management
TP	Town Panchayat
TPVD	Town Planning and Valuation Department
TSC	Total Sanitation Campaign
UDD	Urban Development Department
UGS	Underground Sewage
UIDSSMT	Urban Infrastructure Development Scheme for Small and Medium Towns
ULBs	Urban Local Bodies
UMC	Urban Management Centre
USAID	United States Agency for International Development
WASH	Water Sanitation and Hygiene
WATSAN	Water and Sanitation
WSP	Water and Sanitation Programme
WSS	Water Supply and Sanitation
WTP	Water Treatment Plant
WW	Wastewater

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Executive Summary

The Swachh Bharat Mission – Urban is the most recent effort of the Government to improve urban sanitation. Pegged at about ₹ 63,000 crore over five years, this aims at providing sanitation facilities to city dwellers. Urban sanitation was not a priority until the early 1990s. And it was not until the inception of the National Urban Sanitation Policy (NUSP) in 2008[1], that urban sanitation was allotted focused attention at the national level. The 'Swachh Bharat Mission', launched on 2 October, 2014, aims to ensure access to sanitation facilities (including toilets, solid and liquid waste disposal systems, and village cleanliness) and safe and adequate drinking water supply to every person by 2019.

1 National Urban Sanitation Policy, 2008, Ministry of Urban Development, Government of India. Available at http://indiagovernance.gov.in/files/NUSP.pdf

One the major challenges in urban sanitation is the collection, treatment and disposal or reuse of Faecal Sludge. Adequate facilities and services for collection, transportation, treatment and disposal of faecal sludge do not exist in most Indian cities and towns.

Most of the on-site sanitation systems (OSS) are emptied manually in the absence of suitable facilities. Ideally, a septic tank system should be cleaned every one and half to three years as per the Central Public Health and Environmental Engineering Organisation (CPHEEO) guidelines[2]. However, ignorance of maintenance and operational conditions often results in accumulation of organic sludge, reduction in effective volume and hydraulic overloading, which ultimately causes system failure and the release of partially treated or untreated septage from the septic tank. Private operators often do not transport and dispose of septage far away from human settlements. Instead, they dump it in drains, waterways, open land and agricultural fields.

Faecal Sludge (FS) comprises varying concentrations of settleable or settled solids as well as other non-faecal matter that is collected from on-site sanitation systems, such as latrines, non-sewered public toilets, septic tanks and aqua privies. Faecal sludge from septic tanks is specifically termed as septage.

Although there are some differences, sewage sludge is, to some extent, comparable with faecal sludge and night soil. This means that the technologies that are in use for treatment, resource recovery and reuse of sewage sludge may be appropriate for faecal sludge treatment as well.

This study on **'Urban WASH: An Assessment of Faecal Sludge Management (FSM) Policies and Programmes at the National and Select States Level'**

2 CPHEEO's latest Manual on Sewage and Sewage treatment Part A- Engineering says that minimum acceptable design interval between successive manual desludging could be one-an-a-half years, with a flexibility of provision of up to 3 years of storage volume in urban years (Chapter 9, p. 8). Report available at http://cpheeo.nic.in/Sewerage.aspx. The MoUD Advisory note on urban septage management (2013) gives the desludging frequency as once every two to three years, or when the tank becomes one third full (p. 17)

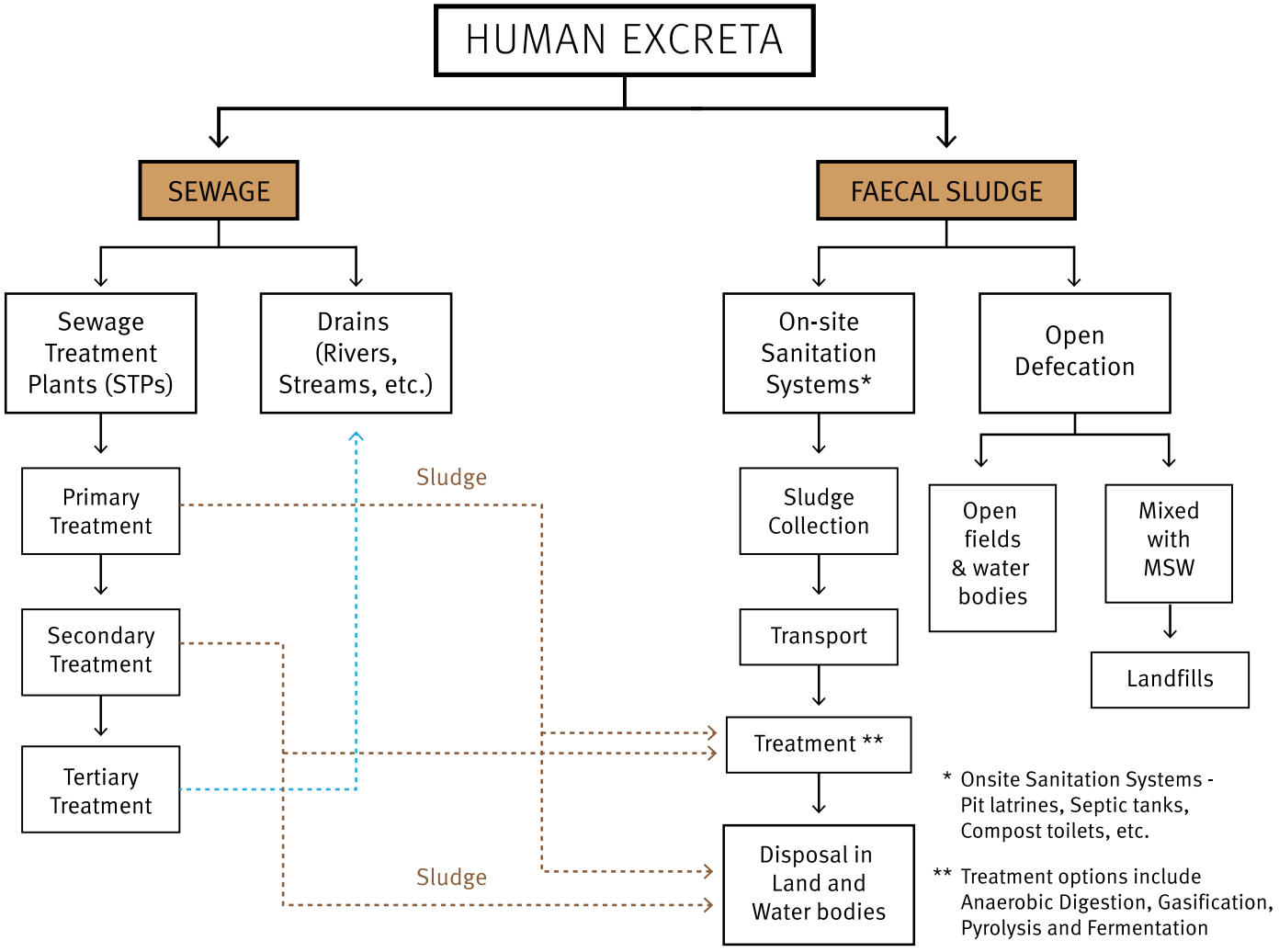


Figure 1 - Routes of Faecal Sludge Generation

Source: www.eai.in/ref/ae/wte/typ/clas/fecal_sludge.html

attempts to understand and assess the existing policies and identify key challenges and gaps while offering concrete recommendations to overcoming this acute national problem.

Provisioning of sanitation facilities in the country primarily rests with local government bodies – municipalities or corporations in urban areas (called the Urban Local Bodies or ULBs) and gram panchayats in rural areas. The NUSP instated a framework for cities to prepare City Sanitation Plans under the scheme of State Sanitation Strategy. Urban Sanitation awards and ratings were also introduced based on the benchmarking of sanitation services. Centrally sponsored schemes such as Jawaharlal Nehru National Urban Renewal Mission (JnNURM), Urban Infrastructure Development Scheme for Small and Medium Towns (UIDSSMT),

Basic Services for Urban Poor (BSUP) and Rajiv Awas Yojna etc. provide funds for creation of sanitation assets like individual toilets, community toilet blocks and wastewater disposal and treatment facilities at the city level.

The findings of the Census of India 2011 indicate that only 32.7 per cent of urban households are connected to a piped sewer system whereas 38.2 per cent dispose their wastes into septic tanks and about 7 per cent into pit latrines, underlining the predominance of on-site arrangements – and it is not clear how the waste is further disposed by the majority of these installations.

Further, about 50 lakh pit latrines are insanitary (have no slabs or are open pits); 13 lakh are service latrines – of which 9 lakh toilets dispose faeces directly into drains, 2 lakh latrines are serviced by humans (illegally) and 1.8 lakh latrines are serviced by animals. Finally, about 18.6 per cent urban households still do not have access to individual toilets – about 6 per cent use public/community toilets and 12.6 per cent suffer the indignity of open defecation. According to a USAID (United States Agency for International Development) study (2010), by 2017 the number of urban households with toilets connected to septic tanks will increase to 148 million. Therefore, on-site pit latrines and septic tanks account for a substantial proportion of toilets in urban India – 48 per cent of urban Indian households depend on on-site facilities, and this proportion is still increasing.[3]

We can witness disparity in sanitation standards and outreach of services between the urban poor and other city dwellers. A comparative analysis of access to sanitation facilities to the people living in urban areas and those in urban slums is presented in Figure 2[4].

The data in Figure 2 shows that the urban poor who live mostly in the slums (notified and non-notified) have lesser access to sanitation as compared to other urban dwellers. Inequality also exists in latrine coverage between the notified and non-

3 Advisory Note on Septage Management in India, Ministry of Urban Development, Government of India, 2013

4 Housing Stock, Amenities & Assets In Slums - CENSUS 2011

	Type of Latrine	Urban HHs (in %)	Slum HHs (in %)
1	Latrine within the premises	81.4	66.0
a	Water Closet	72.6	57.7
b	Pit Latrine	7.1	6.2
c	Other Latrine	1.7	2.2
2	No latrine within the premises	18.6	34.0
a	Public Latrine	6.0	15.1
b	Open	12.6	18.9

Figure 2 - Types of Latrine facilities - India

Source - Housing stock, amenities & assets in slums - Census 2011

notified slums in India. As per NSSO data-2012[5], at the all-India level, 31 per cent of slums had no latrine facility, the figure being 42 per cent for non-notified and 16 per cent for notified slums[6].

The different types of toilet facilities available in urban areas, according to Census 2011, are presented in Table 1.

Discharge of untreated sewage in water courses - both surface and groundwater - may be responsible for polluting about three-fourth of surface water resources[7].

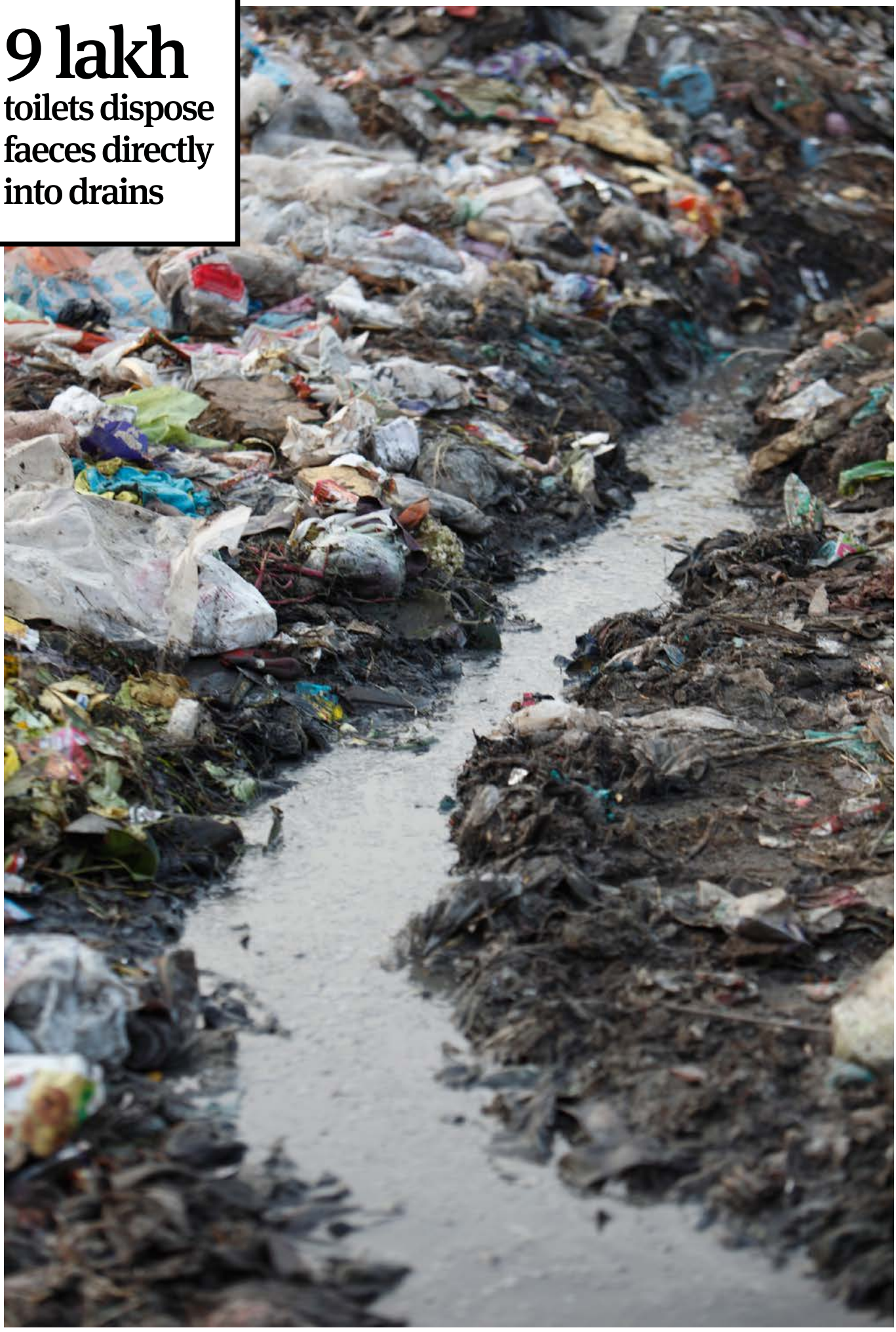
Presently, septic tanks and pit latrines along with open defecation are major contributors to groundwater and surface water pollution in many cities in the country.

5 NSSO data, 69th Round, 2012

6 While these numbers differentiate between latrines and septic tanks, many septic tanks are in reality similar to pit latrines, and have leaking sides and open bottoms. Many septic tanks, even for public toilets and commercial entities, are inaccessible for desludging and maintenance

7 Advisory Note on Septage Management in India, Ministry of Urban Development, Government of India

9 lakh
toilets dispose faeces directly into drains



WaterAid/Jon Spaull

	Household by Type of Latrine Facility	No. of Urban Households	% of Total Urban Households
Q1	Total number of urban households	7,88,65,937	100.0
Q2	Latrine facility within the premises	6,41,62,119	81.4
Q3	Water Closet	5,72,35,228	72.6
Q4	Piped sewer system	2,57,75,247	32.7
Q5	Septic tank	3,00,87,437	38.2
Q6	Other systems	13,72,544	1.7
Q7	Pit latrine	55,97,143	7.1
Q8	With slab/ ventilated improved pit	50,66,323	6.4
Q9	Without slab/ open pit	5,30,820	0.7
Q10	Other latrines	13,29,748	1.7
Q11	Night soil disposed into open drain	9,42,643	1.2
Q12	Night soil removed by humans	2,08,323	0.3
Q13	Night soil serviced by animals	1,78,782	0.2
Q14	No latrine within the premises	1,47,03,818	18.6
Q15	Public latrines	47,43,807	6.0
Q16	Open	99,60,011	12.6

Table 1 - Types of Toilet Facilities in Urban Areas

Source - Figures at a Glance, Census of India 2011

Faecal Sludge Management (FSM), which has largely been overlooked in the past, needs immediate attention in order to address the huge gap that currently exists between sewerage infrastructure and the sewage generated in the cities of India. Out of about 38000 million litres per day (MLD) of sewage generated, treatment capacity exists for only about 12000 million litres per day (32 per cent) in all metropolitan, class–I cities and class-II towns in India. There is a large gap between generation and treatment of wastewater in India. Nearly 39 per cent of the existing Sewage Treatment Plants (STPs) do not conform to the general standards prescribed under the Environmental (Protection) Rules for discharge into streams as per the Central Pollution Control Board's (CPCB) survey report.

In a number of cities, the existing treatment capacity remains underutilised while untreated sewage is discharged into water sources in the same city[8]. From the huge volume of septage that is disposed in surface water and groundwater, it can be stated that the extent of surface water pollution may be up to 80 per cent in India.

ISSUE	INDIA

Main Characteristics

FSM under WSS or solid waste?	Seems to be under solid waste
Centralised or decentralised responsibility?	Decentralised responsibility

Overarching framework

Main legislation	Municipal Waste (Handling and Management) Rules (2000)
Main responsible ministry	Ministry of Urban Development (MoUD)
Other involved ministries/ entities	Central Pollution Control Boards and State Pollution Control Boards
Main regulator	Central Public Health and Environmental Engineering Organisation (under MoUD)
Main responsibility for implementation	Urban Local Bodies (state governments provide technical and policy support)
Involved utility	Delhi Jal Board (DJB), Water Supply and Sewerage Boards
Policy development	National Urban Sanitation Policy, Draft Policy Paper on Septage Management in India
Plans for improvement	City Sanitation Plans, City Development Plans
Local regulation	Delhi Cleanliness and Sanitation by-law (mostly solid waste) Delhi Jal Board Act (1998)
Local responsible agencies	State Urban Development Departments, Public Health Engineering Departments,Urban Local Bodies

8 Section 3.2 Page 9-45 of Status of Water Supply, Wastewater Generation and Treatment In Class -I Cities & Class-II Towns of India, Control of Urban Pollution Series: CUPS/70/2009-10, Central Pollution Control Board, Ministry of Environment and Forests, Government of India.

Regulation at Household level

Building codes and designs of on-site facilities	1983 National Building Code of India - Part IX Plumbing Services, Drainage and Sanitation. 1985 Code of practice for the design of septic tanks
Enforcement of building codes	Unclear
Discharge by households	Draft guideline on septage generation, emptying and quality (developed by CSE for Ministry of Urban Development – May 2011)
Emptying frequencies	Every one and a half years to three years - CPHEEO
Enforcement of emptying frequencies	State Pollution Control Boards

Regulation of Emptying Practice

Who is allowed to operate?	Anybody
Permits and licences	No licence for desludging needed Vehicles licences not needed when using tractors
Manual scavenging	Employment of Manual Scavengers and Construction of Dry Latrines (Prohibition) Act 1993
Safe emptying practice	Non-existent
Dumping and disposal	Mechanical emptiers mention harassment by police and the environmental departments for illegal dumping, in spite of the fact that there are no designated dumping places
Enforcement dumping and disposal	Non-existent
Fair pricing/ tariff setting	None
Investigation and/or response to public complaints	None

Regulation of treatment and re-use practices

Who is allowed to operate, regulate, permits, discharge, funding of treatment	No information available

Table 2 - Overview of the main legal and institutional situation related to FSM in India

Source - Regional Synthesis Report Asia: FSM Landscape Analysis & Business Model Assessment, Bill and Melinda Gates Foundation, 2011

Total and faecal coliform, which indicate the presence of pathogens in water are also a major concern. Coliform must be below 104 MPN/100 ml and preferably absent from water for it to be considered safe for general human use, and for irrigation where coliform may cause a disease outbreak from contaminated water in agriculture[9]. Between 1994 and 2004, 33 per cent of the total 45,000 km length of rivers was found to be polluted with more than 500 MPN/100 ML of faecal coliform. About 56 per cent observations found Total Coliform and 41 per cent observations found Faecal Coliform more than MPN 500/100 ml[10].

In India, the extent of surface water pollution may be up to 80 per cent

The rivers Yamuna, Ganga, Gomati, Ghaghara, Chambal, Mahi and Vardha are amongst the most coliform-polluted water bodies in India.

It was in this context, that WaterAid India, in association with its partners ExNoRa and WASHNET-TN, and Praxis Institute for Participatory Practices, Chennai conducted this review of the policies and programmes on Faecal Sludge Management at the national and state levels, along with a research study on the practices on FSM in the state of Tamil Nadu.

The key objectives of the study were:

1. To document and assess the existing Faecal Sludge Management practices of ten town panchayats and ten municipalities from ten districts of Tamil Nadu.

2. To create a comprehensive, quantitative database on FSM for these towns and municipalities of Tamil Nadu.

9 https://en.wikipedia.org/wiki/Water_pollution_in_India#cite_ref-7

10 Bhardwaj RM (Scientist C), Water Quality Monitoring in India – and Constraints,(paper) Central Pollution Board, and Government of India. P 7

3. To study the impact of poor Faecal Sludge Management on drinking water in select small towns of Tamil Nadu.

4. To conduct a desk review of the Urban WASH policies at the national level to understand the dynamics between central and state programmes.

An extensive desk review was carried out to capture the status of Faecal Sludge Management policies, programmes and institutional frameworks of implementation at the national level and in six states namely Delhi, Gujarat, Madhya Pradesh, Maharashtra, Uttar Pradesh and Tamil Nadu.

Quantitative and qualitative tools were prepared to conduct the field study in ten municipalities and ten town panchayats in Tamil Nadu. These sample municipalities and town panchayats were selected by WaterAid and ExNoRa in consultation with Praxis to represent the diverse geographical locations of Tamil Nadu, while considering the presence of WASHNET-TN partners across the districts. However, a modification was later made in the list of town panchayats, based on a request from the Directorate of Town Panchayats, Chennai.

After consultations with WaterAid and ExNoRa-Tamil Nadu, Praxis developed a set of five schedules to elicit information from various stakeholders. These were translated into the local language, Tamil, for better communication and understanding:

1. Fact sheet
2. Schedule for management
3. Tools for sanitation workers
4. Schedule for private service providers
5. Schedule for community groups

Delhi

In Delhi, out of 3.26 million urban households, only 2.9 million were found to have toilet facilities within the premises of their house. According to data from Census 2011, about 3 per cent of households defecate in open spaces, while 21 per cent do not have toilets within the premises. However, NSSO 2012[11] estimates that 67 per cent households have exclusive toilets (not sharing with other households) in the premises, 99 per cent of which are reported as having access to improved source latrines.

The river Yamuna bears the brunt of indiscriminate discharge of untreated wastewater and is heavily polluted by domestic and industrial wastewater.

As the Yamuna flows through Delhi, the Najafgarh and 18 other major drains empty into it, making its water quality heavily degraded and unfit even for animal consumption and irrigation. As per the CPCB data of 2013[12], the sewerage generated in Delhi is 3800 MLD, while the installed STP capacity is 2330 MLD. The percentage of available capacity is 61. Delhi does not have a State Sanitation Strategy. The one currently being used is Master Plan 2021 and Master Plan 2031 has been submitted.

Gujarat

In Gujarat, As part of MGSM, the 'Nirmal Gujarat Sauchalay Yojana' has been launched, in which subsidies for toilet construction are provided. As per the Service Level Benchmarking (SLB) - Performance Assessment System (PAS) data for 2011-12, a majority of the households depend on septic tanks and soak pits[13]. Only 62 cities out of 167 have some extent of sewerage network and a similar number, 67, or around 40 per cent of Urban Local Bodies (ULBs) in Gujarat, have access to some underground sewerage network. Although each of the seven municipal corporations have sewerage networks, many smaller ULBs also have underground sewerage networks.

11 Key Indicators for Drinking Water, Sanitation, Hygiene and Housing Condition in India - NSS, 69th Round, July 2012- December 2012, NSSO, Government of India.

12 Performance Evaluation of Sewage Treatment Plants under NRCD, August 2013, Central Pollution Control Board, Ministry of Environment and Forests, Government of India

13 Standard Operating Procedure (SOP) for Faecal Sludge Management for Municipalities in Gujarat (Draft), Urban Management Centre, Under PAS programme, CEPT University, Ahmadabad, India (undated document)

The States at a glance

Delhi does not have a State Sanitation Strategy

Delhi

2.9 out of 3.26 million urban households have toilet facilities within the premises of their house

Just 7 per cent ULBs have Sewage Treatment Facilities

Gujarat

Around 40 per cent of Urban Local Bodies (ULBs) have access to some underground sewerage network

Only 2 per cent of slum households are networked to sewer systems

Maharashtra

65% wastewater is being disposed without any treatment

At present, the average quantity of sewage treated is a mere 50%

Uttar Pradesh

Only six out of 63 towns are partially covered with a sewerage system

76% urban households have the facility of being connected to either a closed or an open drain

Madhya Pradesh

Four towns have achieved open defecation free status

76% urban households have the facility of being connected to either a closed or an open drain

Tamil Nadu

45.7% of the state's population resorts to open defecation

Where sewerage systems are absent, there are open drains that carry sullage and greywater.

There is a shortage, though, of sewage treatment facilities: just 7 per cent or 12 ULBs in Gujarat have such facilities. 74 per cent of urban properties have individual toilets out of which 53 per cent properties are connected to a sewer network and 28 per cent of properties are dependent on on-site sanitary disposal systems.

Madhya Pradesh

Of the urban households in the state of **Madhya Pradesh**, 76 per cent have the facility of being connected to either a closed or an open drain for wastewater disposal. In the internal survey done by MoUD, only 14 ULBs have sewerage network and of these, only Indore has more than 70 per cent coverage. The state has 25 class-I cities with a population of 10,795,000 and sewage generation of 1248.72 MLD while treatment capacity exists for only 186.1 MLD. It has 23 class-II towns with a population of 1,745,050 and sewage generation of 130.9 MLD. There are a total of nine STPs using different technologies. The installed capacity of sewage treatment plants is 168.4 MLD and the actual utilisation is 123.7 MLD. The state has initiated the Integrated Urban Sanitation Programme (IUSP)[14] in consonance with the Government of India's National Urban Sanitation Policy (NUSP) 2008. Under the IUSP, several activities have been initiated. City Sanitation Plans (CSP) have been prepared for 37 towns, and CSP for 24 more towns is underway. The Sanitation Vision 2025 has been prepared for the state.

Four towns of Madhya Pradesh have achieved open defecation free status and ten more towns are on the verge of achieving the same.

Maharashtra

In Maharashtra, the Government developed the 'Sujal Nirmal Abhiyan' in 2008, a reform-oriented approach to managing water supply and sanitation services in urban areas. The urban sanitation coverage is 94 per cent, and 53 per cent of households in the state have latrine

14 Madhya Pradesh – Integrated Urban Sanitation Programme Guidelines, 2009, International Environmental Law Research Centre. Available at ielrc.org/content/e0925.pdf

facilities within the premises – higher than the national average of 46.3 per cent. Out of 252 ULBs in Maharashtra, only 31 ULBs have an underground sewerage network with different types of household coverage connections. Only 15 ULBs have secondary STPs and the average wastewater treatment capacity of the state is 35 per cent. This means that the remaining 65 per cent wastewater is being disposed without any treatment. Maharashtra has six sewage treatment plants. The installed capacity of the plants amounts to 284 MLD but the actual utilisation is 124.2 MLD[15]. Only 2 per cent of slum households are networked to sewer systems. **There is no formal policy for urban sanitation in Maharashtra, but the state follows the approaches advocated in the NUSP.**

Uttar Pradesh

According to Census 2011 estimates, 70.3 per cent of households in **Uttar Pradesh** have toilets. The sewage generation in NCR urban is 4,528 MLD. NCR has 64 STPs of 3,349 MLD design capacity and the sewage treated is 2,248 MLD. Therefore, the sewage treated is 50 per cent of sewage generation. The increase in sewage treatment capacity during the decade 2001-11 has been 53 per cent whereas the increase in treated sewage quantity has been much less at 33 per cent. In the Uttar Pradesh sub-region, only six out of 63 towns are partially covered with a sewerage system. There are 24 STPs. Nine of them are under construction with a capacity of 72.30 MLD. At present, the sewage treatment capacity is 779.6 MLD but the actual sewage treated is 585.8 MLD, making the average quantity of sewage treated a mere 52 per cent.

The Uttar Pradesh Urban Sanitation Policy, 2010 identified the following key sanitation issues in the state:

lack of awareness and low priority to sanitation and its linkages with public health; social and occupational hazards faced by sanitation workers; fragmented institutional roles and responsibilities; lack of an integrated citywide sanitation approach; serving the unserved and the poor; lack of facilities in slums and lack of demand responsiveness.

15 Performance evaluation of Sewage Treatment Plants in India under NRCD-2013

57 % of households in Tamil Nadu have no toilet facility

WaterAid/Jon Spaull

One of the stated goals of the policy is safe disposal of human excreta and liquid waste. Three related goals mentioned are: functioning of sewerage networks and ensuring connection of households; promoting recycling and reuse of treated water; and promoting proper disposal and treatment of sludge.

Tamil Nadu

In Tamil Nadu, 45.7 per cent of the state's population resorts to open defecation due to the absence of proper sanitation facilities.

The National Family Health Survey, 2005-06 (NFHS 3) states that 57 per cent of households in Tamil Nadu have no toilet facility. The proportion of notified and non-notified slums with no latrine facility is significantly higher for Tamil Nadu; 27 per cent and 40 per cent respectively. The state has formulated two strategies in the urban sanitation sector - coverage of all towns by Under Ground Sewerage System (UGSS) and total elimination of open defecation by 2015[16]. There are plans to implement UGSS in a phased manner in corporations and municipalities with necessary financial assistance under various schemes like TNUDP-III, Urban Infrastructure and Governance (UIG/JnNURM), Urban Infrastructure Development Scheme for Small and Medium Towns (UIDSSMT/ JnNURM), and KfW grants. Detailed project reports have been prepared for 117 municipalities at an estimated cost of Rs.7,100 crore. At present, UGSS schemes have been taken up in four town panchayats and Detailed Project Reports for the remaining 525 town panchayats have been prepared at a cost of Rs.12,904 crore under the 12th Five Year Plan.

The field study of the ten town panchayats revealed the following:

- Lack of an underground sewerage system in town panchayats.
- Septic tanks are the most used system of septage collection.
- Lack of adequate equipment for desludging.
- Lack of data on quantity of faecal sludge emptied.
- Infrequent cleaning of septic tanks at the household level.
- Non-adherence to the operative guidelines as prescribed in standards for septage management.

16 Open Defecation Free, Workshop Series 2/RD & DP/2013; State Planning Commission, July 2013

- No treatment plants at the town panchayat level.
- Lack of clarity at the town panchayat level regarding their role in FSM.
- The role of private service providers is recognized by the town panchayat management.
- Private players use modern equipment. However, they lack formal training in desludging and none of them reported treating sludge before disposal.
- There is a negative impact on health and social harmony at the community level due to poor FSM.

The field study of the ten municipalities revealed the following:

- Most of the domestic water requirement is met by municipalities.
- None of the municipalities have a full-fledged UGSS while three have partial coverage.
- The majority of individual households use septic tanks in municipalities, and one-tenth of households use public toilets.
- Most of the municipalities expressed insufficiency in emptying equipment and transport facilities.
- Frequency of faecal sludge collection from individual households varies from two to ten years.
- The most commonly reported problems with septic tank usage are: **lack of proper construction, overflow and opening during the rainy season, water pollution, a high cost of cleaning and gas formation during cleaning.**
- In the case of leach pits, poor maintenance, connection by users to drainage, lack of proper construction and water pollution were reported as issues.
- Like in other parts of Tamil Nadu, faecal sludge is disposed in agricultural land, outskirts and municipal dump yards.
- Except Mannarkudi, all municipalities have private service providers for addressing faecal sludge management. Most of them reported using modern equipment and safety measures.
- Among the challenges faced by private players is the absence of proper places for disposal, opposition from public,

harassment by government officials and police while carrying out the task during the day.

- Regarding the demand for services from private service providers in faecal sludge management, some said that the scope is narrowing due to increase in the number of service providers and expansion of UGSS coverage while others said that there is a good scope for more private players as the Urban Local Bodies are not providing such services.

- Regarding support required from the government, private service providers stated that they should be allotted specific land for disposing faecal sludge. Public awareness on emptying at regular intervals and public support for daytime collection needs to be increased. They also required help in establishing treatment units and acquiring bank loans and subsidies for their business.

- Communities stated that health problems and social disharmony exist due to poor FSM.

Of the 14 districts covered under the study, it was found that excepting two (Nagappattinam and Tiruvarur), **the groundwater of 12 districts** (Chennai, Coimbatore, Erode, Kanchipuram, Kanyakumari, Namakkal, Nilgiris, Pudukkottai, Thirunelveli, Tiruvallur, Tiruchirappalli and Tuticorin) **had a high nitrate content.**

Faecal coliform contamination was found in the water samples in a majority of the districts. However, statistics show that deaths due to waterborne diseases such as Acute Diarrhoeal Diseases (ADD) and Cholera have come down drastically.

The study identified the following as key challenges to undertaking sound FSM in India:

- **Lack of adequate/effective policy framework.**

- **Lack of explicit state sanitation strategies** and city sanitation plans on safe disposal of faecal sludge; fragmented policy frameworks without direction on septage management and weak enforcement by the state agencies.

WaterAid/Poulomi Basu

> **The village is 120 years old and is in a bad state – the roads are bad and there are open drains. The community leader's son fell in the drain when he went to the toilet. All the dirty water went into his mouth. Another child had to save him.**
>
> **Kajal Gautam,**
> Nihura Basti, Kanpur

POOR MANAGEMENT OF URBAN SANITATION

It was found that the physical infrastructure to treat faecal sludge is grossly inadequate. On-site sanitation is not accorded priority. There is a limited use of mechanised desludging practices. A distinct preference for centralised advanced engineering solutions exists rather than for appropriate decentralised septage management. There is low prioritisation and lack of awareness on the part of the public and government agencies regarding safe disposal. Inadequate attention has been paid to poor people's access to safe sanitation, sanitation solutions were found to be supply driven rather than demand-responsive. Manual scavenging was found to be widespread though prohibited by the law.

INSTITUTIONAL AND LEGISLATIVE CHALLENGES

Urban Local Bodies (ULBs) were found to have insufficient knowledge regarding FSM. There is no delineation of roles and responsibilities and the roles and responsibilities of state agencies for water, sanitation, and public health were found to

be unclear, overlapping and inadequately coordinated. There is a lack of clarity on the support of state agencies to ULBs in implementing their city sanitation plans. Exclusion of peri-urban and slum areas from the legal framework; limited awareness among stakeholders including policymakers, government officials, civil society and the common man; and lack of skilled human resources were further identified as challenges.

FUNDING CAPITAL AND OPERATIONAL COSTS

Most ULBs have very limited institutional, financial and staff capacity to improve sanitation provision and septage management. There is inadequate public funding for septage management and a dependence on external assistance, which results in a lack of commitment, ownership and poor municipal revenue generation.

RECOMMENDATIONS

In conclusion, the study offers the following recommendations in the hope that these could prove instrumental in improving the Faecal Sludge Management scenario in India:

- Comprehensive national guidelines for Faecal Sludge Management stipulating a regulatory and monitoring framework should be prepared and finalised by the Ministry of Urban Development (MoUD) with stakeholder participation and disseminated to all the states.
- Provisions should be made to integrate FSM into City Sanitation Plans and City Development Plans.
- Training and exposure to good practices in FSM should be provided to policymakers and stakeholders.
- Sewage/ Septage treatment facilities should be constructed.
- The use of Bio solid manure in agriculture should be encouraged.
- Private Sector Participation in FSM should be promoted by incentivising.
- FSM awareness campaigns and communication should be developed and delivered for enhanced participation by citizens.
- Local research institutions should be engaged to develop innovative and cost effective solutions for different aspects of FSM.

1 Introduction

Background and Scope The data gathered by the 2011 Census indicates that nearly 17 million urban households (more than 20 per cent of the total 79 million urban households) lack adequate sanitation[17] with 18.6 per cent of urban households having no latrines[18]. According to the report of the CPCB 2009, the estimated sewage generation from class-I cities and class-II towns is 38254.82 million litres per day (MLD), out of which only 11787.38 MLD (31 per cent) is being treated[19]. The remaining is disposed into water bodies without any treatment due to which three-fourths of surface water resources are polluted. The MoUD conducted a rating of class-I cities on sanitation related parameters in 2009-10[20]. Out of 423

17 Septage Management in Urban India, Advisory Note, 2013, National Urban Sanitation Programme, Ministry of Urban Development, Government of India. P 4

18 Houses and Household Amenities, Latrine Facility, Census of India - 2011, Registrar General & Commissioner, India. Available at: http://censusindia.gov.in/2011census/hlo/Data_sheet/India/Latrine.pdf

19 Status of Water Supply, Wastewater Generation and Treatment In Class -I Cities & Class-II Towns of India, Control of Urban Pollution Series: CUPS/70/2009-10, Central Pollution Control Board, Ministry of Environment and Forests, Government of India. P 46

20 Rating of Cities, 2010, Ministry of Urban Development, Government of India

cities, only four were in the 'blue' category scoring more than 66 points out of 100. No city achieved the distinction of being a 'green' city i.e. a city scoring more than 90 out of 100. Census 2011 findings show that 30 million urban households (38 per cent) have septic tanks[21]. USAID 2010 estimates that by 2017, about 148 million urban residents will have septic tanks[22]. Although the number of septic tanks will grow steeply in the next few years, there is no separate policy or regulation for septage management in India at present. The Manual on Sewerage and Sewage Treatment published in 1993 by the MoUD[23] provides guidelines on construction of septic tanks, but lacks guidelines on septage management.

Most of the states lack guidelines or regulations for septage management. Septage disposal is neither connected by a sewage system nor managed by any treatment plant. Every day blackwater from on-site sanitation is emptied into water bodies, open spaces and agricultural fields without being monitored or regulated. Septage from on-site sanitation is worse than open defecation, as the levels of pathogens and micro-organisms are higher in blackwater.

Under the NUSP, 100 per cent of human excreta and liquid waste from all sanitation facilities including septic tanks, must be disposed of in a safe manner[24]. To achieve this larger goal, it stresses on treatment of septage from on-site installations in urban locations. However the safe disposal in terms of collection, transportation, recycling and reuse is still a challenge for many municipalities and town panchayats.

Tamil Nadu, a highly urbanised state, also tops the country for open defecation in urban areas as the state's share of households practicing open defecation is 35.7 per cent of the total urban households[25]. Most of the current focus of the government is on addressing the issue of open defecation but their focus, research and investment in FSM is very limited. Within a decade, FSM will be one of the biggest challenges for rural and urban areas and this study will suggest a possible

21 Houses and Household Amenities, Latrine Facility, Census of India - 2011, Registrar General & Commissioner, India. Available at: http://censusindia.gov.in/2011census/hlo/Data_sheet/India/Latrine.pdf

22 A rapid assessment of septage management in Asia, 2010, USAID. P 34

23 Manual on Sewerage and Sewage Treatment, 2012, Central Public Health and Environmental Engineering Organisation (CPHEEO) and Ministry of Urban Development. Available at http://moud.gov.in/manual_sewage. An updated version of the manual launched in November 2013 is available at http://cpheeo.nic.in/Sewerage.aspx.

24 National Urban Sanitation Policy, 2008, Ministry of Urban Development, Government of India .Available at http://indiagovernance.gov.in/files/NUSP.pdf

25 Houses and Household Amenities, Latrine Facility, Census of India - 2011, Registrar General and Commissioner, India. From the Table: Type of latrine facility - new additions in 2011. Available at: http://censusindia.gov.in/2011census/hlo/Data_sheet/India/Latrine.pdf

way forward in FSM for small towns in Tamil Nadu.

In this context, this study on the policies and programmes on Faecal Sludge Management (FSM) at the national and state level was carried out.

The key objectives of the study were:

1. To document and assess the existing faecal sludge management practices of ten town panchayats and ten municipalities from ten districts of Tamil Nadu.

2. To create a comprehensive, quantitative database on FSM for these towns and municipalities of Tamil Nadu.

3. To study the impact of poor faecal sludge management on drinking water in selected small towns of Tamil Nadu.

4. To conduct a desk review of the urban WASH policies at the national level to understand the dynamics between central and state programmes.

An extensive desk review has been carried out to capture the status of septage management, policies, programmes and institutional frameworks of implementation at the national level and in six states namely Delhi, Gujarat, Madhya Pradesh, Maharashtra, Uttar Pradesh and Tamil Nadu.

A field study was also carried out in ten municipalities and ten town panchayats in Tamil Nadu.

After extensive review of the literature, quantitative and qualitative tools were prepared to conduct the field study in the ten municipalities and ten town panchayats. These sample municipalities and town panchayats were selected by WaterAid and ExNoRa in consultation with Praxis. They were selected to represent the various geographical locations of Tamil Nadu, while considering the presence of WASHNET-TN partners across the districts. However, a modification was made in the list of town panchayats later, based on a request from the Directorate of Town Panchayats, Chennai.

The town panchayats and municipalities covered under the study were:

	Town Panchayats	Municipalities
1	Alwarthirunagari	Gudalur
2	Kotagiri	Mannarkudi
3	Kunnathur	Nagerkoil
4	Needamangalam	Pollachi
5	Mamallapuram	Sankarankovil
6	Perundurai	Thiruchengodu
7	Keeranur	Tiruvallur
8	Manachanallur	Perambalur
9	Avinashi	Pudukottai
10	Tharangampadi	Mayavaram

After consultations with WaterAid and ExNoRa-Tamil Nadu, Praxis developed a set of five schedules to elicit information from various stakeholders:

1. Fact sheet
2. Schedule for management
3. Tools for sanitation workers
4. Schedule for private service providers
5. Schedule for community groups

All the tools were translated into the local language Tamil to enhance the understanding of the researchers.

Pre-testing of the tools was done in Tiruchirapalli and Chennai. Based on these findings, modifications were made in the final tools.

A one-day training workshop for 20 researchers from WASHNET-TN was organised by WaterAid in Erode on 17 November 2014. Dr. K. Moulasha and Stanley Joseph from the Praxis Institute for Participatory Practices, Chennai, facilitated the training workshop in Tamil.

All the municipalities and town panchayats were requested by the Directorate of Town Panchayats to provide support and cooperation for the study in January and February 2015. Data collection began in a phased manner in January and was completed in February 2015.

Quality checks were done after scrutinising the filled in tools. Based on these, clarifications were asked for.

Limitations of the study:

- There were gaps in the data collected due to the limited experience of the researchers.
- Even after repeated clarifications, the complete data could not be elicited.
- The field analysis had to be done with limited data.

ORGANISATION OF THE REPORT

The report is divided into five chapters:

Chapter 1 Briefly describes the study, its objectives and methodology.

Chapter 2 Presents the desk review of sanitation policies with special focus on faecal sludge management with reference to the national level.

Chapter 3 Presents the desk review of sanitation policies with reference to six states (Delhi, Gujarat, Madhya Pradesh, Maharashtra, Uttar Pradesh and Tamil Nadu).

Chapter 4 Divided into two sections, it describes the survey findings from town panchayats and municipalities in Tamil Nadu. The findings from the town panchayats and municipalities are presented as follows:

- Statistics and information on areas covered, domestic water supply, wastewater generation.
- Management view on the issues and challenges associated with on-site sanitation and the role of private service providers in septage collection. In relevant places, responses of sanitation workers are presented along with those of the management.
- Responses of private service providers on service delivery. The issues and challenges associated with FSM have also been presented.
- Community views on current practices of septage services and issues associated with poor FSM.

Chapter 5
Discusses water contamination and its impact on health.

Chapter 6
Summarises the findings and recommendations.

2 National Review

FAECAL SLUDGE MANAGEMENT CONTEXT IN INDIA

Septage management is a part of sanitation and has a great influence on public health and environment. It is very important to recognise that both the national government and state governments must work together to tackle this problem. The 2011 Census of India has indicated that nearly 17 million urban households lack access to adequate sanitation[26].

According to Census 2011, 31 per cent of India's population lives in urban areas[27]. The current UN 2014 estimate is that 410 million people are living in urban areas, with an expected addition of 173 million by 2030[28]. Data shows that India's cities are not only increasing in number;

26 Septage Management in Urban India, Advisory Note, 2013, National Urban Sanitation Programme, Ministry of Urban Development, Government of India. P 4

27 Provisional Population Total, India, Rural-Urban Distribution, Census of India 2011,Registrar General & Commissioner, India

28 World Urbanization Prospects: The 2014 Revision, Highlights, United Nations, Department of Economic and Social Affairs, Population Division (2014). (ST/ESA/SER.A/352).

they are also expanding, and so are the slums within them, as 7 million people[29] continue to migrate to urban India every year with most of them finding their way to slums within and on the fringes of cities. The growing urban population of India presents a vast challenge in the area of sanitation, as it needs proper maintenance in order to provide a healthy atmosphere.

ON-SITE SANITATION PREVALENCE

There is some form of sanitation facility for the 81.4 per cent urban households[30] while NSS 2012 had a higher estimate at 89.6 per cent[31]. However if we get into the depth of this data, it can be seen that the poor who live in the slums (notified and non-notified) have much lesser access to sanitation. Though the data may be contentious as there are no correct estimates on the number of slums and squatter settlements that there are in the towns, the MoUD states that in the non-notified slums, 51 per cent households do not have access to toilets[32]. Where sanitation access (Table 3) is available, only a few households (32.7 per cent) use toilets that are connected to the underground sewerage network. Of urban households with pit latrines, 5.5 lakh are insanitary (as in, they have no slabs or are simply open pits), 9.5 lakh toilets dispose of faeces directly into drains, 2.4 lakh toilets are (illegally) serviced by humans and 1.8 lakh latrines are serviced by animals. **A very high 18.6 per cent of urban households do not have access to individual toilets. Of these, 6 per cent use public or community toilets and 12.6 per cent have to resort to open defecation.** Data on open defecation indicates vulnerability, particularly for women and girls who experience a loss of dignity or are exposed to abuse and harassment while defecating in the open.

SEPTIC TANK DEPENDENCE IN INDIA

According to the World Bank (2006), the number of septic tanks has grown over the last few decades as households invest in private sanitation. It estimates that by 2017, 260 million urban residents will have sewered connections, 148 million will use septic tanks, and 78 million will use pit latrines.[33] Therefore, on-site pit latrines and septic tanks account for a substantial proportion of toilets in urban India – about 45 per cent of urban Indian households depend on on-site facilities (Refer to Table 1)[34], and this proportion is increasing. While these numbers differentiate between

29 Population Census of India, 2011, Ministry of Home Affairs
30 Houses and Household Amenities, Latrine Facility, Census of India - 2011, Registrar General & Commissioner, India
31 Key Indicators of Drinking Water, Sanitation, Hygiene and Housing Condition in India, NSS 69th Round, 2013
32 In Deep Shit, Right to Sanitation Campaign in India, 2013
33 World Bank. "India Water and Sanitation: Bridging the Gap between Infrastructure and Service." Washington, D.C.: World Bank, Jan. 2006 (hereinafter World Bank, 2006).
34 Houses and Household Amenities, Latrine Facility, Census of India - 2011, Registrar General& Commissioner, India. From the Table: Type of latrine facility - new additions in 2011.

	Piped Sewer System	Septic tank	Other systems	With slab/ ventilated improved pit	Without slab/open pit	Night soil- open drain	Night soil serviced by humans	Night soil serviced by animals	Public Latrines	Open
INDIA	32.7	38.2	1.7	6.4	0.7	1.2	0.3	0.2	6	12.6
Delhi	60.5	24.7	0.9	1.5	0.2	2.1	0	0	7.1	3
Uttar Pradesh	28.3	46.9	2	2.4	0.5	1.3	1.4	0.3	2.1	14.8
Madhya Pradesh	20.2	50.1	1.2	1.2	0.4	0.8	0.1	0.2	3.3	22.5
Gujarat	60.4	24.2	0.5	2	0.1	0.3	0	0	3.6	8.7
Maharashtra	37.8	28.6	0.9	2.2	0.2	1.2	0	0.3	21	7.7
Tamil Nadu	27.4	37.9	1.1	6.6	0.3	1.5	0.2	0.2	8.6	16.2

Table 3 - Availability and Type of Latrine Facilities (All figures in %)

Source - Census of India, 2011

latrines and septic tanks, many septic tanks are in reality similar to latrines, and have leaking sides and open bottoms. Many septic tanks, even for public toilets and commercial entities, are inaccessible for desludging and maintenance.[35]

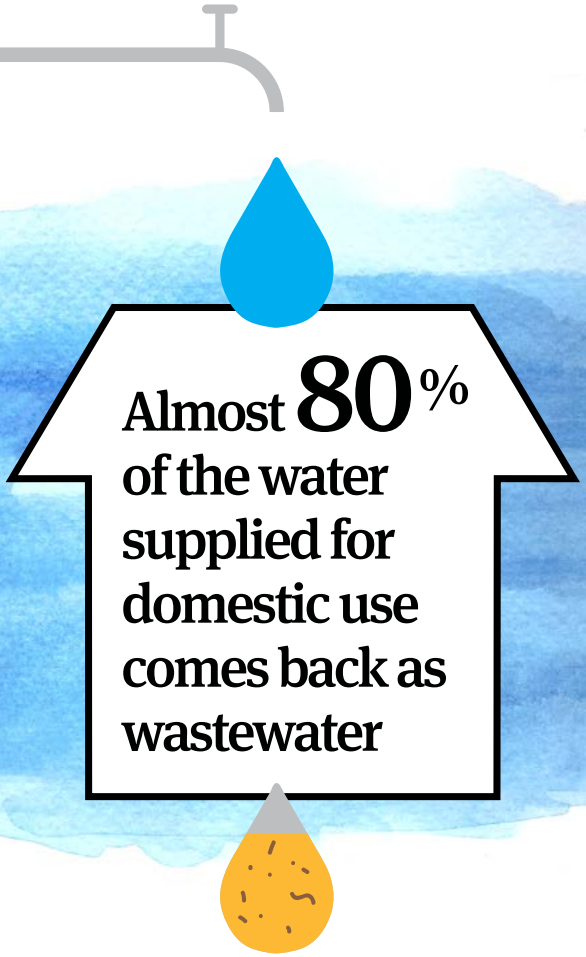
WASTEWATER GENERATION AND TREATMENT CAPACITY

The Government of India has prioritised water supply far above sanitation, therefore the national budget allocates more funds for rural water supply than for sanitation. Within the funds available for sanitation, the government has focused on toilet construction, centralised sewerage systems and wastewater treatment plants (WWTPs). While India is beginning to address septage following the NUSP, no local governments have yet provided public collection or treatment services.

Data shows that a major part of urban India is yet to be provided with sewer systems and people are mainly dependent on conventional individual septic tanks.

The findings of Census 2011 show that 30 million urban households (38 percent) have septic tanks and it is estimated that by 2017, about 148 million urban residents

35 A Rapid Assessment of Septage Management in Asia: Policies and Practices in India, Indonesia, Malaysia, the Philippines, Sri Lanka, Thailand, and Vietnam, 2010, USAID



will have septic tanks[36]. Studies have estimated that **almost 80 per cent of the water supplied for domestic use comes back as wastewater** [37 38]. There are 302 class-I cities and 467 class-II towns with no sewage treatment facilities. In most of these cases, **the untreated wastewater either sinks into the ground as a potential pollutant of groundwater or is discharged into the natural drainage system, causing pollution in downstream areas.**

Data shows that between 33,000 and 40,000 million litres of wastewater is generated every day from class-I cities (cities with population >100,000) and class-II towns (population 50,000 - 100,000)[39 40]. This is enough to irrigate 9 million hectares but only about 30 per cent is collected and treatment capacity exists for less than 20 per cent. The remainder reaches water bodies untreated, leading to highly polluted surface water resources[41] - **an alarming 70 per cent of India's surface water is now polluted and contaminated by biological, toxic, organic, and inorganic pollutants[42]. It is estimated that 75-80 per cent of water pollution by volume is from domestic sewerage.**[43]

A large number of the cities/towns either do not have any sewerage system or the sewerage system is overloaded or defunct. **Even where sewers exist, they**

36 A rapid assessment of septage management in Asia, 2010, USAID

37 Performance Evaluation of Sewage Treatment Plants under NRCD, August 2013, Central Pollution Control Board, Ministry of Environment and Forests, Government of India

38 Status of Water Supply, Sanitation and Solid Waste Management in Urban Areas, Research Studies Series No. 88, June 2005, Sponsored by CPHEEO and Ministry of Urban Development, National Institute of Urban Affairs

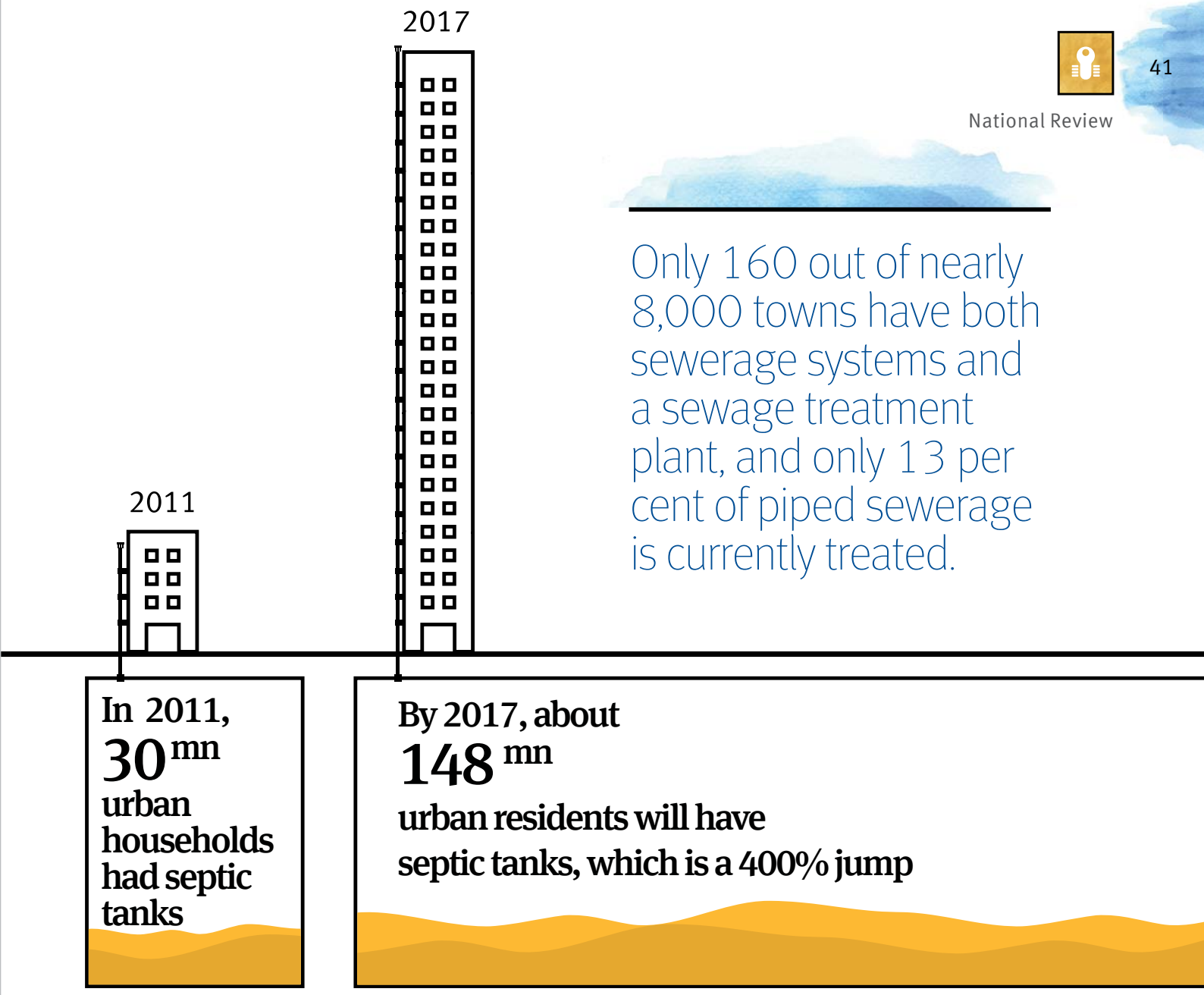
39 Evaluation of Operation and Maintenance of Sewage Treatment Plants in India, 2007, CPCB

40 http://timesofindia.indiatimes.com/home/environment/pollution/Around-80-of-sewage-in-Indian-cities-flows-into-water-systems/articleshow/18804660.cms

41 Septage Management in Urban India, Advisory Note, 2013, National Urban Sanitation Policy, Ministry of Urban Development, Government of India

42 Murthy and Kumar, 2011. Water pollution in India - an economic appraisal. In India Infrastructure Report 2011. P 285.

43 Water policy and performance for sustainable development. Infrastructure Development Finance Company. Oxford University press.Status of Water Supply, Wastewater Generation and Treatment in Class-I Cities & Class-II Towns of India, CPCB, 2009



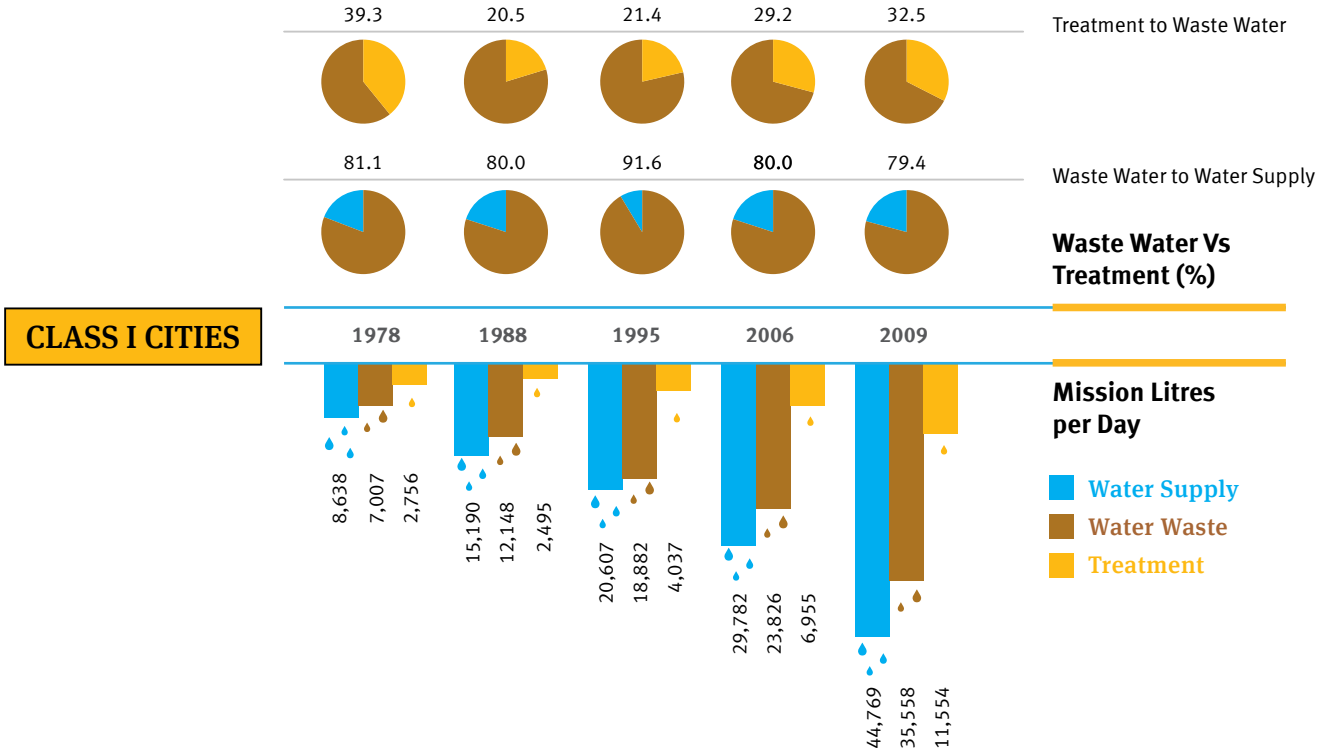
Only 160 out of nearly 8,000 towns have both sewerage systems and a sewage treatment plant, and only 13 per cent of piped sewerage is currently treated.

often leak or overflow, releasing their contents to storm water or other surface drains or percolate into the soil to reach groundwater. Thus, pollutants get retained on land to percolate, leach or get washed off into streams or groundwater. Further, treatment capacity is highly uneven, with **40 per cent of India's total treatment capacity located in just two cities — Delhi and Mumbai.**[44]

Among the cities where there are sewerage networks, much of the waste fails to reach wastewater treatment plants.[45] In this context, communities generally depend on private service providers – small companies or individuals – to clean septic tanks and latrines on an emergency basis. Municipal sanitation workers commonly double as cleaners as well. Though a few companies use gully suckers or vacuum cleaning

44 Central Pollution Control Board. Status of water supply, wastewater generation and treatment in Class-I cities and Class-II towns of India. Control of Urban Pollution Series: CUPS/70 /2009–10). Delhi, India: CPCB, Ministry of Environment and Forests, Government of India; 2009.

45 Banerjee S, Narain S, Pandey P, 2012. Excreta matters: how urban India is soaking up water, polluting rivers, and drowning in its own excreta. Centre for Science and the Environment, New Delhi.



pumps in larger cities; most informal, individual service providers empty tanks manually, without safety precautions or the necessary permits. Sanitation workers and companies dispose of the waste at remote locations, in landfills (if available), or sell it directly to farmers or fish farms as fertilizer. **The NUSP estimates that the wastewater of 48 per cent to 82 per cent of urban households in India is not disposed of safely.**[46]

STATUS OF STPs IN INDIA

According to the CBCB 2005 report on the status of sewage treatment in India, there were 269 sewage treatment plants (STPs) in Class-I cities (211), Class-II towns (31) and other smaller towns (27)[47]. Most of these were developed under various 'river action plans', which were floated from 1978-79 onwards and are located in 5 per cent of the cities/ towns along the banks of major rivers[48]. Of these, 186, 24 and 21 STPs are operational and 25, 7 and 6 were under construction in Class-I cities, Class-II towns and other smaller towns, respectively (refer Table 4). Thus, in all there were 269 STPs,

46 World Bank. "India Water and Sanitation: Bridging the Gap between Infrastructure and Service." Jan. 2006, Washington, D.C.: World Bank

47 Status of sewage treatment in India. Central Pollution Control Board, November 2005.

48 CPCB. 2005a. Parivesh Sewage Pollution – News Letter. Central Pollution Control Board, Ministry of Environment and Forests, Govt. of India, Parivesh Bhawan, East Arjun Nagar, Delhi 110 032 http://cpcbenvis.nic.in/newsletter/sewagepollution/contentsewagepoll- 0205.htm

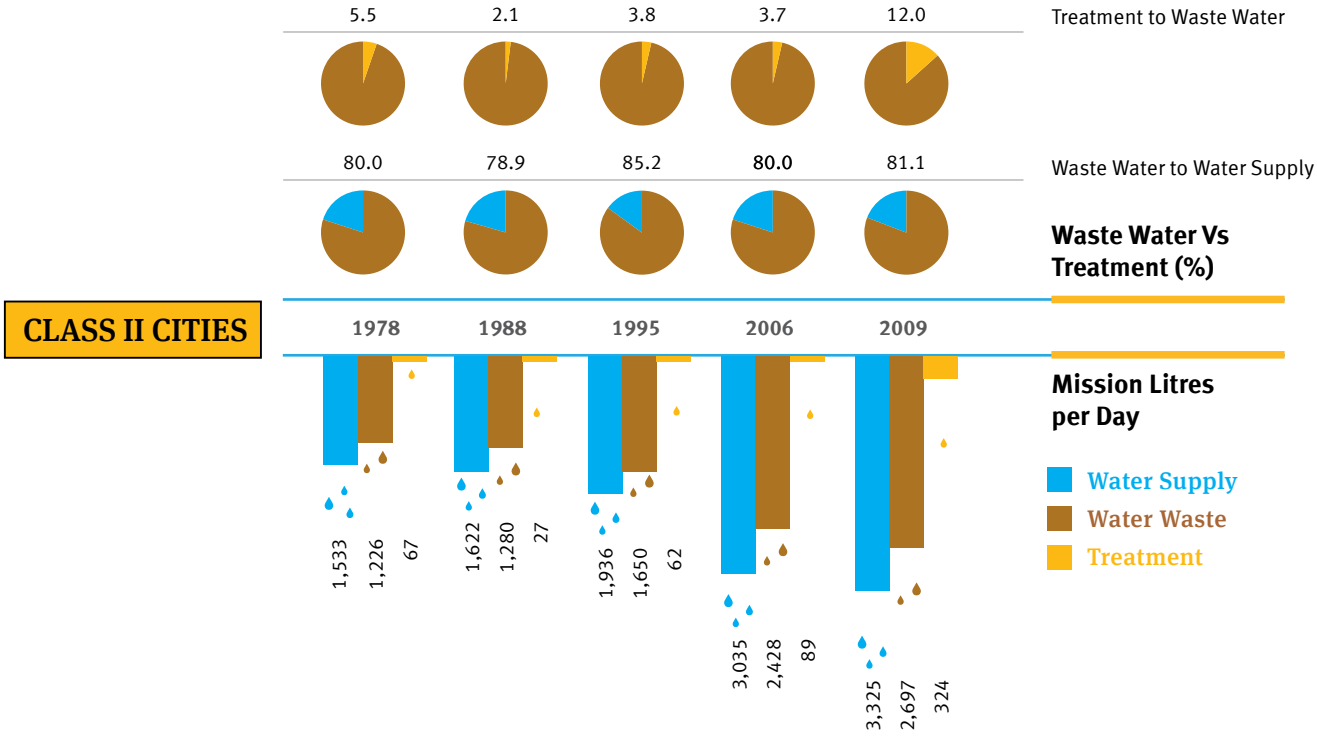


Figure 3 - Sewerage generation and treatment capacities in Class-1 and Class-II cities

Source - Calculations based on CPCB reports (1978, 1988, 2006, 2009) [49]

including 231 operational and 38 under construction[50].

A recent evaluation of STPs revealed that the actual treatment capacity utilisation is only 66 per cent of its total capacity as per Table 5[51]. Although the total utilisable capacity at the national level is pegged at 66 per cent, there is a huge difference in the percentage of utilised capacity within the states under this study. The utilisation is highest in Delhi followed by Gujarat, Uttar Pradesh, Madhya Pradesh, and Tamil Nadu and lowest in Maharashtra.

It is found that sludge removal, treatment and handling have been widely neglected due to improper design, bad maintenance and lack of technical capacity. Many remain closed most of the time[52 53]. The majority of state governments / implementing agencies are not able to provide sufficient

49 Also refer to Overview of urban sanitation, Presentation by Pavan Kumar Ankinapalli, Consultant, Ministry of Housing and Poverty Alleviation, Government of India; India Urban Conference, 17-20 November, 2011, Mysore, Karnataka

50 Ibid

51 Performance Evaluation of Sewage Treatment Plants under NRCD, August 2013, Central Pollution Control Board, Ministry of Environment and Forests, Government of India.

52 CPCB. 2007. Advance methods for treatment of textile industry effluents, Resource Recycling Series: RERES/&/2007. Central Pollution Control Board, India.

53 Kaur R, Wani SP, Singh AK and Lal K. 2012. Wastewater production, treatment and use in India. Country Report - India, UNW –AIS, 2nd Regional Workshop for South, West and Central Asia, May-2012, New Delhi.

	Class I cities	Class II cities	Smaller Towns	Total
Existing	211	31	27	269
Operational	186	24	21	231
Under-construction	38	7	6	38

Table 4 - Summary of STPs in Class-I cities and Class-II towns in India

Source - Status of Sewerage Treatment in India, 2005, Central Pollution Control Board

and regular funds for operation and maintenance (O&M) of STPs resulting in their unsatisfactory performance. **The evaluation concluded that O&M of STPs depend on uninterrupted energy supply, skilled manpower and preventive and regular maintenance.**

POLICY FRAMEWORK

There are existing policies for regulating wastewater management that are based on certain environmental laws, policies and legal provisions. These include Constitutional Provisions on sanitation and water pollution; National Environment Policy, 2006; National Sanitation Policy, 2008; Hazardous Wastes (Management and Handling) Rules, 1989; Municipalities Act; District Municipalities Act etc. For planned, strategic, safe and sustainable use of wastewater, there seems to be a need for policy decisions.

In the post-independence scenario, the government has failed to manage urban growth because of continuing reliance on inappropriate urban planning ideas. This has led to the growth of an unplanned urban population and to the growth of slums in the formally planned areas of cities and also in the peri-urban areas. The Planning Commission's Five Year Plans have also highlighted the lack of attention by planners, governments and policy makers to problems of urbanisation.

Sanitation was not prioritised until the early 1990s and became an important policy concern only around 2008

	Installed Capacity (MLD)	Actual Utilised capacity (MLD)	% Utilisation	No. of STPs
Delhi	20	20	100	2
Uttar Pradesh	168.4	123.7	73	9
Madhya Pradesh	284	124.2	44	6
Gujarat	232	226	97	2
Maharashtra	798.94	394	49	18
Tamil Nadu	779.6	585.8	75	24
	4716.33	3126.42	66	152

Table 5 - State-wise treatment capacity and capacity utilisation

Source - Performance evaluation of Sewage Treatment Plants by CPCB, 2013, p 15

An analysis of India's sanitation policies and programmes thus far, shows that their implementation has been purely government-led, infrastructure-centred, supply driven and subsidy-based. India's approach towards sanitation has been purely programmatic without a holistic overview.

INSTITUTIONAL FRAMEWORK

The 74th Constitutional Amendment Act of 1992[54] reformed the urban sector by transferring responsibility for domestic, industrial, and commercial water supply and sewerage (WSS) from state agencies, such as Departments of Public Health Engineering and State Water Boards, to ULBs. This transfer has resulted in a variety of implementation models, as well as a confusing allocation of roles and responsibilities between state and local agencies, which sometimes leave large gaps in implementation. The 2006 World Bank report on the WSS sector[55] in India notes, "In urban [water supply and sanitation] there is often an unhealthy overlap between policymaking, regulation, financing, ownership of infrastructure, and operation of service within State agencies responsible for the two sub-sectors." Another challenge facing the sanitation sector is the disconnect between WSS initiatives and the public health and education sectors. The NUSP aims to address the lack of systematic policies by calling on cities to develop integrated sanitation strategies; however,

54 The Jawaharlal Nehru National Urban Renewal Mission (JnNURM) reforms.

55 World Bank. "India Water and Sanitation: Bridging the Gap between Infrastructure and Service." Jan. 2006. Washington, D.C.: World Bank

1951	Water supply and sanitation is part of first Five Year Plan.
1980-81	Integrated Low Cost Sanitation Scheme (ILCS) for urban areas is launched to convert dry toilets to pour-flush.
1986	Central Rural Sanitation Programme (CRSP) is launched to help increase the coverage of household toilets in rural areas from 1 per cent in 1981 (Census 1981) to 22 per cent in 2001 (Census 2001) and 32.7 per cent in 2011 (Census 2011).
1987	National Water Policy is drafted recognising water as a basic right.
1993	74th Constitutional Amendment – recognises the constitutional powers and functions of Urban Local Bodies.
1999	CRSP, revamped as Total Sanitation Campaign (TSC), is launched in 559 rural districts in India.
2000	The National Health Policy recognises the link between sanitation and health.
2000-01	Valmiki - Ambedkar Awas Yojana includes sanitation as part of housing.
2002	10th Five Year Plan places significant emphasis on Urban Water Supply and Sanitation.
2005	JnNURM is launched, includes provision to develop basic services for the urban poor.
2008	National Urban Sanitation Policy is launched. Service Level Benchmark framework is launched.
2010	MoUD undertakes national rating of 423 cities on sanitation performance and introduces the 'Clean City Award'.
2012	Rajiv Awas Yojana aiming to create slum-free cities is launched.
2012	TSC is revamped as Nirmal Bharat Abhiyan (NBA) - aimed to accelerate sanitation coverage in rural areas to achieve the vision of 'Nirmal' Bharat by 2022 with all village panchayats in the country attaining 'Nirmal' status.
2013	Advisory note on Septage Management in Urban India, MOUD and NUSP, January 2013 - providing the strategies and guidelines for national level septage management.
2014	NBA is further revamped as Swachh Bharat Abhiyan (SBA). It aims to ensure access to sanitation facilities (including toilets, solid and liquid waste disposal systems and village cleanliness) and safe and adequate drinking water supply to every person by 2019, three years ahead of the deadline set by NBA.

Table 6 - Milestones in Sanitation

the existing bureaucracy surrounding the WSS sector is a key challenge to implementing new practices such as septage management.

INSTITUTIONAL STRUCTURE FOR SANITATION SECTOR[56]

The responsibility for provision of sanitation facilities in the country primarily rests with local government bodies – municipalities or corporations in urban areas and gram panchayats in rural areas. The state and central governments act as facilitators. In the central government, the Planning Commission, through the Five Year Plans, guides investment in the sector by allocating funds for strategic priorities. The Ministry of Urban Development (MoUD) and Ministry of Housing and Urban Poverty Alleviation (MoHUPA) are the nodal agencies for formulation of policies, strategies and guidelines. They assist the states by providing financial assistance for the development of urban water supply and sanitation schemes in cities and towns. The Central Public Health and Environmental Engineering Organisation (CPHEEO)[57] is the technical arm of the Ministry and assists in preparing policy guidelines, technical manuals, etc.

The Ministry of Drinking Water and Sanitation (MDWS) is the nodal agency for the overall policy, planning, funding and coordination of programmes on rural drinking water and sanitation in the country. MDWS provides financial and technical support in sanitation to all the states and union territories, while the respective state governments are vested with the responsibility of implementing the programme in their respective regions. In addition, the CPCB and the State Pollution Control Boards (SPCBs) look into the establishment and violation of norms for solid and liquid waste management, which are the main responsibility of ULBs in urban areas and the district administration in rural areas.

ROLE OF URBAN LOCAL BODIES (ULBS) UNDER NUSP

According to the NUSP, ULBs are supposed to examine laws and rules with respect to the sanitation responsibilities of households and of the ULB itself; and then to call upon the 'Task Force' to make rules explicit regarding:

1. Safe sanitary arrangements at unit level (household, establishment).
2. Designs and systems for safe collection.
3. Norms for transport/conveyance.
4. Treatment and final disposal.[58]

56 India, Country Paper on Sanitation, 2013 , SACOSAN – V 2013

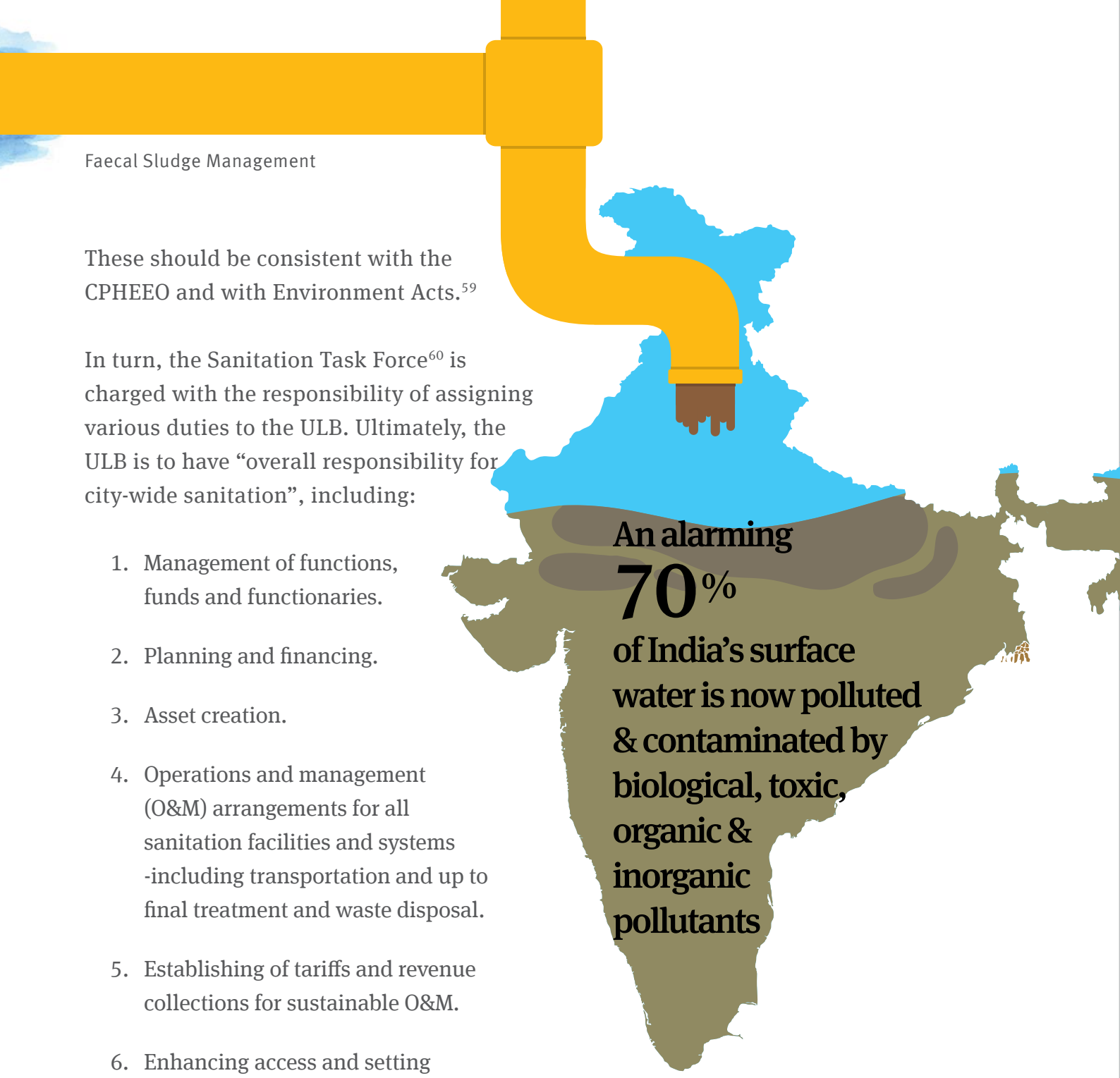
57 Please refer to the website http://cpheeo.nic.in/, for details and for access to the manuals on Sewerage and Sewage Treatment (Report available at http://cpheeo.nic.in/Sewerage.aspx.)

58 NUSP 2008. Available at http://indiagovernance.gov.in/files/NUSP.pdf

These should be consistent with the CPHEEO and with Environment Acts.[59]

In turn, the Sanitation Task Force[60] is charged with the responsibility of assigning various duties to the ULB. Ultimately, the ULB is to have "overall responsibility for city-wide sanitation", including:

1. Management of functions, funds and functionaries.
2. Planning and financing.
3. Asset creation.
4. Operations and management (O&M) arrangements for all sanitation facilities and systems -including transportation and up to final treatment and waste disposal.
5. Establishing of tariffs and revenue collections for sustainable O&M.
6. Enhancing access and setting up of designated O&M arrangements for the urban poor and unserved populations.
7. Adopting environmental, public health, processes (including safe disposal of on-site septage), and infrastructure and service delivery standards.



59 The reality is often different, with systemic and capacity weaknesses, aggravated by lack of incentivisation and resources, leading to situations of unmanaged and uncontrolled dumping of septic tank waste. Refer to the MoUD advisory note on septage management in urban India, p 11-12.

60 NUSP 2008: 19

KEY CHALLENGES IN SEPTAGE MANAGEMENT IN INDIA

When talking about sanitation, there is a need to go beyond just construction of toilets. FSM has been called the missing and ignored component of the sanitation sector. The following are the key challenges of the sector:

State Sanitation Strategies:

Currently, the State Sanitation Strategy extends to eleven states (Himachal Pradesh, Chhattisgarh, Andhra Pradesh, Kerala, Maharashtra, Karnataka, Uttar Pradesh, Madhya Pradesh, Uttarakhand, Odisha and Bihar). To date, most cities have not yet developed policies to regulate septage management, and ULBs are not very knowledgeable about this issue.[61]

Urban Sanitation: No physical infrastructure is available to treat septage. There is limited use of mechanised desludging. On-site sanitation is not accorded priority. There is a preference for centralised advanced engineering solutions rather than septage management. Most cities and states lack data and policies addressing on-site sanitation systems. There is low prioritisation and awareness at the level of public and government agencies. There is a lack of explicit policies on sanitation, particularly on safe disposal. Access of the poor to safe sanitation is not accorded attention. Sanitation solutions continue to remain supply-driven rather than demand-responsive. Manual scavenging is still widespread though prohibited by law[62] [63].

Fragmented policy framework and weak enforcement: Inadequate policies; piecemeal implementation; no comprehensive laws on urban sanitation; most cities have not yet developed policies to regulate septage management; the existence of a multitude of legal instruments like pollution control law enacted by the central government and municipal laws; laws governing parastatal bodies; public health laws and building and sanitation by-laws enacted at the state or local levels. Lack of knowledge in ULBs; no delineation of roles and responsibilities; agency roles and responsibilities for water, sanitation, and public health are often unclear, overlap and are inadequately coordinated; lack of clarity in the role of state agencies to support ULBs in implementing their city sanitation plans and absence of state policy on this; insensitive planning towards the sanitation requirements of the ever growing urban poor; exclusion of peri-urban and slum areas from the legal framework.

61 http://www.sswm.info/content/state-sanitation-strategy

62 A rapid assessment of septage management in Asia, 2010, USAID

63 Prohibition of Employment as Manual Scavengers and their Rehabilitation Act, 2013. Published in Gazette of India

WaterAid/Poulomi Basu

The development of physical infrastructure is only one component of a functioning septage management programme. It depends equally upon sustained public sector commitment and funding, effective policies, appropriate implementation, and compliance enforcement.

Inadequate human and institutional capacity: Limited awareness of stakeholders including policymakers, government officials, civil society and the common man; lack of skilled human resources; inadequate regulation and/or partnership with private service providers; insufficient wastewater planning; most ULBs have very limited institutional, financial, and staff capacity to improve sanitation provision and septage management.

Funding capital and operational costs: Inadequate public funding for septage management and dependence on external assistance translates to lack of commitment and ownership; low wastewater tariffs and inadequate O&M funding. Despite the unprecedented growth in urban population and demand for services, municipal revenue generation has not increased due to limited property tax collection and low user fees for public services. As a result, most ULBs depend on the availability of state grants and the implementation priorities of state agencies, often becoming trapped in a cycle of inadequate service provision, inadequate revenues, and inability to improve services.

Institutional issues: Shortage of government finances; inefficiency of ULB-run systems; paucity of qualified and experienced human resources and finances; administrative issues such as frequent transfer of trained staff.

RECOMMENDATIONS AND WAY FORWARD

The development of physical infrastructure is only one component of a functioning septage management programme. It depends equally upon sustained public sector commitment and funding, effective policies, appropriate implementation, and compliance enforcement. Historically, the Government of India has focused its wastewater investments on centralised sewerage and treatment. However, the 2008 National Urban Sanitation Policy (NUSP) changed the country's approach to urban sanitation. According to the NUSP, local governments are to be responsible for behavioural change, total sanitation, 100 per cent safe waste disposal, and for enforcing the end of manual scavenging, in addition to sewerage development.

The NUSP tasks state governments with drafting state urban sanitation policies, which in turn require cities to develop city sanitation strategies. Unlike other countries where the construction of facilities has preceded policy, India's focus on policy development allows cities to develop integrated strategies that maximise the efficacy of the future physical infrastructure. These are very positive steps, although the lack of existing local and state policy and management practices and the lack of physical infrastructure to treat septage, pose significant challenges for India as it begins to address the critical issue of on-site sanitation.

SPECIFIC RECOMMENDATIONS FOR IMPROVING SEPTAGE MANAGEMENT AT A NATIONAL LEVEL

Develop national guidelines on septage management:

To support the implementation of the NUSP, the Ministry of Urban Development can create an advisory board that will develop operative guidelines. These guidelines can provide a starting point for state and local agencies who can further adapt the model guidelines and manuals to their own contexts. Guidelines for septage management could include provisions on the involvement of private service providers, health and safety standards, types of septage treatment technologies, and standards for effluent and treated septage discharge or reuse.

Complete state urban sanitation strategies and streamline support for ULBs:

Already, 11 states have drafted their urban sanitation strategies; the remaining states must develop and complete theirs. MoUD can assist lagging states to develop these strategies, potentially with the assistance of international organisations. In developing the strategy for urban sanitation in each state, it is critical that these state plans not only create sanitation cells, as directed by the NUSP, but also clarify the roles and responsibilities of the WSS Board and Public Health Engineering Department (PHED), which possess most of the technical expertise in the state. In addition to providing technical assistance and implementation monitoring, state sanitation cells should draft guidelines for local by-laws on sanitation.

Integrate septage management into environmental planning:

Since NUSP charges ULBs to first survey the sanitation condition and then develop a comprehensive sanitation strategy before constructing facilities, cities in India have an opportunity to integrate septage treatment with other environmental initiatives. This could include jointly managing solid waste and septage collection and treatment, holistically addressing water and treated wastewater resources, managing septage collection and treatment to promote agricultural productivity or reduce agricultural runoff, creating centres of waste recycling to promote new jobs, or developing constructed wetland treatment systems to create new recreational spaces and wildlife habitats. Selecting strategies that resolve multiple problems and produce multiple benefits can build public support for projects and promote programme sustainability.

Provide trainings and exposure to policymakers and operators:

Having never had to address on-site sanitation before, many ULBs lack the technical knowledge or even the vision of how to develop adequate collection and treatment programmes. States should use **exposure visits, workshops, technical trainings, and twinning partnerships** for policymakers and wastewater operators in order to raise awareness and capacity. To this end, states can look to MoUD, donor agencies and research or other training institutions for funding and technical assistance. Exposure visits and trainings can involve regional peers who have successfully provided septage management through a variety of modalities.

Construct septage treatment facilities:

There are a variety of treatment technologies that will render septage safe to reuse and dispose; these can be constructed in plantations, farms, landfills, and sewage treatment plants. As part of their baseline sanitation survey process, cities should determine the quality of collected septage, and whether it can meet international standards for reuse. If the treated septage can be reused, the facilities can be designed to generate profitable fertilizers, possibly in tandem with solid waste composting.

Engage existing private service providers in public-private partnerships:

For many years, private collectors have been providing desludging services when public agencies fail to do so. There are also many examples of private septage collectors who do not dispose of septage in treatment facilities because they were not adequately consulted or engaged in the facility's siting and design process. By involving private septage collectors, community-based organisations (CBOs), and sanitation workers early in the planning process for new septage collection policies and treatment facilities, ULBs can help develop new local business opportunities, build future compliance, and ensure that new facilities will be used.

Develop public promotion campaigns:

Once treatment facilities have been constructed, cities/towns will want to educate households on the value and importance of regular desludging. To develop a public promotion programme, cities/towns can first survey household attitudes and concerns towards sanitation and septic tanks, which will in turn help to identify target audiences and tailor-make key messages. Cities/towns can then conduct the campaign, evaluate attitudes post-campaign, and further refine future promotion campaigns.

Engage local research institutions in developing septage treatment facilities:

As the nutrient and pollutant composition of septage varies by climate and culture, cities/towns in India will need to conduct research to determine the efficacy of different treatment systems, opportunities for improvement, possibilities of reuse and recycling, and new treatment technologies, such as those that combine solid and human waste composting. Engaging engineering schools in this process will also help to integrate on-site sanitation management and treatment into the curriculum and produce future professionals who are able and committed to solving this critical issue of national importance.

FSM

3

State Level Review

This chapter critically reviews the sanitation policies of six states (Delhi, Gujarat, Madhya Pradesh, Maharashtra, Uttar Pradesh and Tamil Nadu) with focus on septage management.

Urban sanitation context in Delhi

According to Census 2011, the total population of Delhi is 1.7 crore with the overall population density of Delhi increasing from 9340 persons per sq.km in 2001 to 11,320 in 2011[64]. Of the total 3.4 million households, 98 per cent are in urban areas. Of these, 3 per cent do not have toilet facilities. Of the households with any form of sanitation facilities, 60.5 per cent are connected to the piped sewer system and 24.7 per cent have septic tanks[65].

As per the Census 2011 data, out of 3.26 million urban households, only 2.9 million have toilet facilities within the premises of their house. About 3 per cent of households defecate in open spaces while 21 per cent do not have toilets within the premises[66]. NSS 2012 estimates show that 67 per cent of households have exclusive toilets (not sharing with other households) in the premises and out of these, 99 per cent are reported as having access to improved source latrines[67].

Among the slum population, about 95 per cent do not have latrines at home and they either access a public toilet or resort to open defecation[68].

Wastewater generation and treatment

The river Yamuna bears the brunt of an indiscriminate discharge of untreated wastewater, making it heavily polluted with domestic and industrial wastewater. After the convergence of the Najafgarh and 18 other major drains, its water quality becomes heavily degraded and is unfit even for animal consumption and irrigation[69].

64 Statistical Abstract of Delhi, 2014

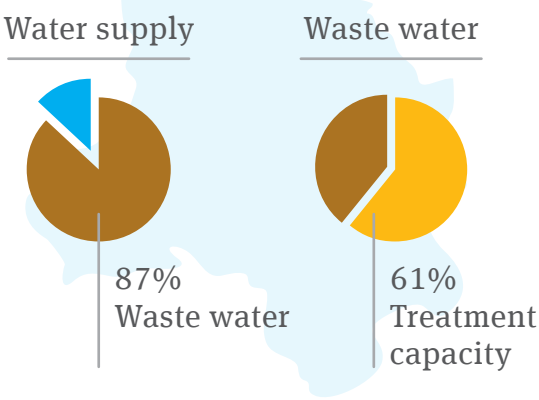
65 Houses and Household Amenities, Latrine Facility, Census of India - 2011, Registrar General and Commissioner, India. From the Table: Type of latrine facility- new additions in 2011. Available at: http://censusindia.gov.in/2011census/hlo/Data_sheet/India/Latrine.pdf

66 Ibid

67 'Exclusive use of latrine' means household's latrine facility was for its exclusive use (not sharing with other households) 'improved source' of latrine' includes sources such as 'flush/pour-flush to piped sewer system/septic tank/pit latrine', 'ventilated improved pit latrine', 'pit latrine with slab' and 'compositing toilet'.

68 NSS 69th Round, 2013 Key Indicators of Urban Slums in India, July 2012-December 2012.

69 Water Supply and Sanitation, Chapter 13, Economic Survey 2012-13, Planning Department, Govt. of NCT of Delhi



According to CPCB (2009), Delhi requires 4346 MLD for domestic use, of which 87 per cent turns out to be wastewater but Delhi has the capacity to treat only 61 per cent of the total wastewater[70].

The Delhi Jal Board (DJB) is responsible for treatment of domestic sewage in the National Capital Territory (NCT) of Delhi and is also the executing agency entrusted with the construction and maintenance of Wastewater Treatment Plants (WWTP), Wastewater Pumping Stations (WWPS), sewage networks and associated structures. **The DJB has 34 WWTPs at 21 locations in the NCT and WWPSs equipped to treat 594.92 million gallons per day (MGD) of sewage with a capacity utilisation of around 57 per cent**[71]. It currently takes wastewater from New Delhi Municipal Council (NDMC) and Delhi Cantonment Board (DCB) areas, both of which are responsible for the provision of local sewer networks. **Including peripheral and internal sewers, the sewer network in Delhi is about 7,000 km long.**

Among the metropolitan cities, Delhi has the highest capacity of sewage treatment (2330 MLD) which is 29 per cent of the total treatment capacity of metropolitan cities[72]. Some of the plants are old and therefore less efficient. Hence installed capacity is not fully utilised. As per the CPCB data of 2013, the sewerage generated is 3800 MLD. The percentage of available capacity is 61. Apart from the fact that some STPs are old and therefore inefficient, it is seen that the sewer network has gaps. This leads to a situation where there are STPs but no sewerage sent to them for treatment. This is another reason for underutilisation of STPs.

The Master Plan 2021[73] also notes that the planned reuse of treated wastewater is miniscule. The treated wastewater is largely put back into drains where it gets polluted again before

70 Status of water supply, wastewater generation and treatment in Class-I cities and Class-II towns of India. Control of Urban Pollution Series: CUPS/70 /2009–10). Delhi, India: Central Pollution Control Board, Ministry of Environment and Forests, Government of India

71 Sewerage Master Plan for Delhi - Final Report, 2014, Delhi Jal Board. P. 14. Available at http://www.delhi.gov.in/wps/wcm/connect/DOIT_DJB/djb/our+services1/suggestion+for+draft+sewage+master+plan+2031

72 CPCB Report (2013). Performance evaluation report on sewage treatment plants in India. August 2013. Also refer to Status of Sewerage and Sewage Treatment Plant in Delhi, Control of Urban Pollution Series: CUPS/2003-2004, Central Pollution Control Board, August 2004

73 Master Plan 2021. Delhi Development Authority. Chapter 9. Available at https://dda.org.in/tendernotices_docs/mar15/01.%20MPD-2021_Chapters%201-19_%20JANUARY%202015_040215.pdf

flowing into the river Yamuna, which receives 70 per cent of its waste from its 22km flow through urban Delhi.

For sewage management, Delhi is divided into six major drainage zones, namely Keshopur, Okhla, Ritala, Shahdara, Coronation Pillar and Outer Delhi. The first five zones are majorly sewered with some unsewered colonies. The sixth zone is predominantly unsewered. Only about 50 per cent of the population is covered by sewerage network and sewage generated from the remaining population goes through a number of surface drains into river Yamuna.

The sewage lines are either settled or silted up and need desilting for conveyance of raw sewage from colonies up to pumping stations and further to WWTPs. As a result, less sewage reaches the WWTPs and hence they are underutilised. Commonly, sewage that is to go through settled or collapsed sewers is diverted into storm water drains and eventually into the Yamuna. In the case of the remaining 50 per cent of the population living in non-planned sections of the city[74] (unauthorized colonies, clusters and rural villages) not having sewerage connections, the raw sewage finally reaches the Yamuna.

Institutional framework:

This includes schemes providing water supply and sewerage facilities, anti-flood works, storm water drainage, and desilting of nullahs and sewers in Delhi. The Delhi Jal Board (DJB) is entrusted with the responsibility of production and distribution of water and treatment and disposal of sewage in Delhi. It provides water in bulk to NDMC and the Cantonment Board for redistribution in their respective areas. Similarly, the sewerage is received in bulk from these two authorities for final conveyance and disposal by Delhi Jal Board. In the areas under the jurisdiction of Municipal Corporation of Delhi (MCD), the DJB is responsible for distribution of water and collection and disposal of sewage. NDMC implements water supply, sewerage, anti-flood work and covering of nullah schemes in its area.

Policies and programmes of the state:

The National Urban Sanitation Policy (NUSP) of 2008 recognises that sanitation is a state subject which is further devolved to cities under the 74th Constitutional Amendment. This is a comprehensive policy framework for urban sanitation. Although the basic concepts and principles of sanitation management remain quite similar all over the country, a number of factors influence the processes, which are physiological, climatic, socio-economic

74 Are PPPs here to stay. Centre for Science and Environment. Available at http://www.cseindia.org/node/3875

and institutional in nature at the state and city level. Therefore, NUSP directs the states to prepare their own individual sanitation plans for cities (City Sanitation Plans) to best suit their situations. State level steering committees and urban departments direct the Urban Local Bodies (ULBs) to undertake the final implementation of sanitation management at the local level.

Delhi does not have a State Sanitation Strategy. However, the Delhi Development Authority (DDA) has been coming out with a series of Master Plans since 1962. The one currently applicable is Master Plan 2021 and Master Plan 2031 has been submitted (June 2014). One of the focal points of Plan 2021 relating to the environment was the rejuvenation of river Yamuna through a number of measures including ensuring adequate flow in the river by release of water by riparian states, refurbishment of trunk sewers, treatment of drains, installing sewers in unsewered areas, treatment of industrial effluent, recycling of treated effluent and removal of coliforms at STPs.

Jawaharlal Nehru National Urban Renewal Mission (JnNURM) is a national initiative to support infrastructure development in cities. It directs the states to prepare a City Development Plan (CDP) in order to be considered for funding.[75] Under JnNURM, 11.5 per cent of the capital investment is to be made for sewerage. The CDP for Delhi prepared under JnNURM suggests the following strategies for sewerage management:

1. Extension and upgradation of the sewage network to intercept sewage (abatement of pollution).
2. Provision of sewer networks in unsewered areas; augmentation of sewage treatment capacity.

The 12th Five Year Plan specifically mentions higher standards of treatment for wastewater for all non-potable purposes. Organisational restructuring of Delhi Jal Board and promotion of the public-private partnership (PPP) approach to improve the management of water and sewerage is stressed. A project for laying of interceptor sewers along three major drains i.e. Najafgarh drain, Supplementary drain and Shahdara drain has been started. Implementation of this project is expected to ensure discharge of only treated wastewater and control pollution in the river Yamuna.[76] [77]

75 USAID 2010. A Rapid Assessment of Septage Management in Asia: Policies and Practices in India, Indonesia, Malaysia, the Philippines, Sri Lanka, Thailand, and Vietnam.

76 WaterAid India and Delhi Slum Dwellers Federation (2005). Profiling 'Informal City' of Delhi, Policies, Norms, Institutions & Scope of Intervention.

77 Planning Commission (2011). Faster, sustainbale and more inclusive growth: An Approach to 12th Five Year Plan (2012-17)

WaterAid/Poulomi Basu

A badly maintained sanitation block. Both blocks are in desperate need of repair and renovation. The toilets are not connected to a water supply, and they do not have an outlet for the waste, so drainage is a big issue here. People don't have an option or an alternative to using these awful sanitation blocks.

The funding for water and sanitation has increased under the 12th Five Year Plan. However, the funding is focused on building urban infrastructure such as expanding sewerage networks and new sewage treatment plants.

Based on the timeframe, **the Sewerage Master Plan for Delhi - 2031**[78] suggests some short term and long term plans. These include:

- Expansion of sewerage network.
- Setting up of development policies and schemes for sewerage management.
- Monitoring and supervising the construction, management and development of the sewerage system.
- Administration of technique and training to staff on sewer operation and maintenance.
- Research and developing of sewerage techniques.
- Coordinating the structure, construction and management of sewers in situations of multi-municipalities.
- Promoting measures for conservation, recycling and reuse of water.

78 Sewerage Master Plan for Delhi - Final Report, 2014, Delhi Jal Board, (AECOM-WAPCOS). Available at http://www.delhi.gov.in/wps/wcm/connect/DOIT_DJB/djb/our+services1/suggestion+for+draft+sewage+master+plan+2031

Urban sanitation context in Gujarat

Gujarat is the 10th most populous state with 5 per cent of the total population of the country. According to the 2011 Census, the state's population is 60 million. Gujarat is one of the fastest growing urbanised states, with **42.6 per cent of its population residing in urban areas.** The state has 187 ULBs comprising eight municipal corporations, 159 nagar palikas and 20 notified areas.

The 2011 Census found that 87 per cent of the total urban households have latrine facilities within the premises while other households do not. Nearly half (60.4 per cent) of them have sewer connections, 24.2 per cent had toilets connected to septic tanks, 8.7 per cent defecate in the open while 3.6 per cent had access to public latrines[79].

As per the Service Level Benchmarking (SLB) - Performance Assessment System (PAS) data for 2011-12, a majority of the households in Gujarat depend on septic tanks and soak pits for wastewater treatment[80 81]. Only 62 cities out of 167 have some extent of sewerage network and 67, or around 40 per cent of ULBs, have access to some underground sewerage network. Although each of the seven municipal corporations have sewerage networks, many smaller ULBs also have underground sewerage networks. In the absence of sewerage systems, there are open drains that carry sullage and greywater. There is a shortage, though, of sewage treatment facilities: just 7 per cent or 12 ULBs in Gujarat have such facilities[82 83].

Wastewater generation and treatment:

The state has 28 class-I cities (2008) with domestic water use of 2,101 MLD, of which, 80 per cent turned out to be sewage water. Of the total sewage water generated, nearly half of the wastewater (47 per cent) was treated[84]. In the case of class-II cities, with the requirement of 285 MLD, 80 per cent was generated as wastewater but no data is available on its treatment. This shows that a significant volume of wastewater

79 Houses and Household Amenities, Latrine Facility, Census of India-2011, Registrar General and Commissioner, India. From the Table: Type of latrine facility- new additions in 2011. Available at: http://censusindia.gov.in/2011census/hlo/Data_sheet/India/Latrine.pdf

80 Standard Operating Procedure (SOP) for Faecal Sludge Management for Municipalities in Gujarat (Draft), Urban Management Centre, Under PAS programme, CEPT University, Ahmadabad, India (undated document)

81 Performance Benchmarking of Urban Water Supply and Sanitation Gujarat (Data Book 2008-09) Part -1, April 2011, CEPT University, Ahmedabad, India

82 For additional details and reading on state and city profiles, please refer to Annual Performance Assessment Report of Urban Water Supply and Sanitation – Gujarat, Data book 1 & 2, Full Report (2009-13), 2014, CEPT University, and Ahmedabad, India.

83 TARU (2008), Impact Assessment of Nirmal Gram Puruskar Awarded Panchayat, Final Report, Volume 1, (Prepared for UNICEF).

84 Of the1680.92 MLD wastewater generated, only 782.5 MLD is treated.

is not subjected to any treatment and is ultimately discharged into surface water bodies leading to deterioration of water quality.

The Urban Management Centre (UMC) monitored and assessed the performance of all 167 cities in Gujarat over the last five years. The important findings of the study pertinent to FSM are:

1. **Like in other cities of India, faecal sludge management has been a neglected area in ULBs of Gujarat as well. The sector has not received any attention because of poor understanding of O&M requirements, lack of guidance, inadequate resources and skills, shortage of manpower and finance.** Currently, out of the 167 ULBs, 105 do not have any underground drainage system and only 62 have a partial sewer system. Most cities from the Saurashtra region do not have any underground drainage system and are dependent on on-site sanitation systems. The toilets are connected to septic tanks/pits and the sullage/effluent is often discharged into roadside storm water drains which are covered or open. Faecal sludge generated in small cities often ends up in garbage dumps, storm water drains, water bodies or is used for agriculture. In cities that have sewerage network and functional STPs, sludge is emptied in manholes or transported to STPs and treated along with the sewage conveyed through the underground network[85].

2. **In Gujarat, an average of 47 per cent of properties are connected to on-site wastewater disposal systems.** The highest dependence on on-site sanitation systems is in Class-D cities. Overall, there is a higher dependence on septic tanks and soak pits in municipalities than in municipal corporations. Three-fourth of urban properties have individual toilets, out of which 53 per cent are connected to sewer networks and 28 per cent are dependent on on-site sanitary disposal systems[86].

3. **Some 40 cities do not have sewerage systems and are not reported to have septage management services.** The septic tank/soak pit cleaning is serviced by private sector operators in these cities. As many as 77 per cent cities have reported having sucking machines for emptying septic tanks. A few cities also use private sucking machines which are licensed by the ULBs for service provision. Presence of equipment with various classes of ULBs shows that 56 per cent cities have reported having at least one sucking machine, while ten cities have reported three or more

85 Study of FSM Practices in Municipalities of Gujarat, PAS-UMC 2014. Prepared by Urban Management Centre under the PAS project, 2014
86 Ibid p 10.

In most of the cities, field visits have revealed that the sludge is either disposed in a nullah, water body, open field, dumping yard or sold to farmers

WaterAid/Jon Spaull

machines. There is a wide variation in adequacy with the equipment across cities. This leads to many of the households resorting to privatised emptying services, which may lead to dumping the sludge in open drains or open areas, posing considerable health and environmental risks. The workers are also at risk as they mostly work without adequate protective gear and equipment[87].

Another issue that the UMC team has observed is that the septic tanks/single pits are often built in huge sizes to avoid having to clean them often. Four cities in the state have septage treatment facilities. In most of the cities, field visits have revealed that the sludge is either disposed in a nullah, water body, open field, dumping yard or sold to farmers[88].

Site studies revealed that in all the cities, management of on-site sanitation systems is a neglected area. There is evidence of manual scavenging in all cities.

Most households get their systems cleaned through private players who do not have proper gear and equipment. No city has a functional septage treatment facility and septage removed from septic tanks and pits is often disposed at the dumping yard, open plots or in some cases, in agricultural farms. None of the ULBs have carried out any awareness campaign to inform and educate households regarding proper operation and maintenance of on-site sewage systems[89].

The performance audit of the Total Sanitation Campaign by CAG[90] reveals that Information, Education and Communication (IEC) activities to spread awareness among public were not carried out properly as the targets set in the annual action plan were not accomplished. The achievement of targets for individual household latrines (IHHL) have been inflated as the progress reports were generated on the basis of funds released rather than on actual construction of toilets. As per the latest baseline survey (October 2013), the sanitation coverage in the state was only 46 per cent. This was much lower than reported. Toilets constructed at the cost of Rs.2.80 crore could not be put to use due to the inferior quality of the structure or non-construction of the soak pit[91].

87 Study of FSM Practices in Municipalities of Gujarat, PAS-UMC 2014. Prepared by Urban Management Centre under the PAS project, 2014

88 Ibid, p 12

89 Study of FSM Practices in Municipalities of Gujarat, PAS-UMC 2014. Prepared by Urban Management Centre under the PAS project, 2014

90 Report of the Comptroller and Auditor General of India on local bodies. For the year ended in March 2013. Government of Gujarat. Report No.5 of 2014.

91 Ibid

Institutional framework:

The urban water and sanitation programme in Gujarat is implemented through the following institutions:

GUJARAT WATER SUPPLY AND SEWERAGE BOARD (GWSSB): Established to ensure sustainable water supply and sanitation services in the rural areas of Gujarat, GWSSB aims to accomplish the basic health and hygiene levels leading to socio-economic development, communal harmony and peace in society. Its functions include the planning and implementation of drinking water supply and sanitation policies; annual and Five Year programmes; coordinating and reviewing all water supply and sanitation programmes with the Government of India; formulating and recovering water charges; deciding and implementing the water supply and sanitation service standards; operating and maintaining these standards and implementing schemes to develop human resources for the effective implementation of programmes.

GUJARAT URBAN DEVELOPMENT MISSION (GUDM): The Government of Gujarat constituted GUDM and designated it as a nodal agency for Jawaharlal Nehru National Urban Renewal Mission (JnNURM). The objective of the GUDM is to support urban renewal and urban infrastructure development in the given timeframe for attaining better living standards, amenities and creating a congenial environment in the urban areas of Gujarat for people to live in and work.

GUJARAT URBAN DEVELOPMENT CORPORATION (GUDC): GUDC is positioned to facilitate urban development by assisting the state government and existing agencies in formulation of policy, institutional capacity building, funding and project implementation. It also assists the state government in the preparation of policy and strategy for urban development infrastructure provision; preparation of guidelines for private sector participation in urban development; maintaining an updated information database on urban development; assessing the need and form of Government Guarantee to ULBs required for raising funds from the market; assisting the state government in formulation, appraisal, implementation and monitoring of urban projects funded from multilateral sources; channelising additional grant/tax-sharing between the state and the ULBs (as recommended by the State Finance Commission) based on criteria to be decided (e.g. reforms in accounting systems, revenue collection efficiency etc., undertaken by the ULB) and in implementing urban reforms as an agent of the state government.

GUJARAT MUNICIPAL FINANCE BOARD (GMFB): The Gujarat Municipal Finance Board was established under the Gujarat Municipal Finance Board Act, 1979

to provide grants and loans for basic and infrastructure facilities through various development schemes for ULBs.

Policies and programmes of the state:

Over the past five years, Gujarat has attempted to consolidate various urban and UWSS schemes and programmes under umbrella programmes such as:
Nirmal Gujarat Programme (NGP): Launched in 2007; the Government of Gujarat celebrated that year as 'Nirmal Gujarat Year' covering all ULBs. Its mission is 'a holistic, integrated thrust to ensure clean land, clean water and air, generating an overall cultural awareness with people's participation and empowering women to ensure improved productivity in the state'. It covers low-cost sanitation, solid waste management, potable drinking water, cleansing of streets, drains, clean city initiatives, incentive grants against collection of "Safai Kar", and an energy audit scheme[92].

GARIB SAMRUDDHI YOJANA (GSY): Launched in 2007, GSY is a result-oriented action plan to integrate the urban poor in the mainstream development process. Its focus is on multiple results: permanent employment, health, education, housing, roads, power and other services to the urban poor. The main objectives include infrastructure facilities in urban poor localities, sanitised and healthy environments and affordable ownership dwellings for all, leading towards slum-free towns. 20 per cent of grants from the Urban Development Department (UDD) and 20 per cent of the income of all ULBs is used to focus on the poor. Rs.13,000 crore has been allocated to GSY over five years[93].

Swarna Jayanti Mukhya Mantri Shaheri Vikas Yojana (SJMMSVY): It was launched in 2009 to overcome pressure on urban centres, as well as to support and sustain the Urban 2005 vision and achieve administrative and fiscal reforms in all ULBs. Its salient features include: reform-linked schemes, incorporating and consolidation of various existing schemes, an overall outlay of Rs.7,000 crore over three years, focus on towns and cities other than JnNURM cities, focus on urban poor and urban green[94].

MAHATMA GANDHI SWACHHATA MISSION (MGSM)[95]: Integrated with 'Swachh Bharat Abhiyan', MGSM was launched in 2014 to achieve an open defecation free, zero waste community, a dust free and green Gujarat. Encouraging sustainable sanitation facilities through awareness creation and health education, giving inspiration to communities and panchayati raj institutions, focusing

92 Financing and Monitoring Urban Water Supply and Sanitation in Gujarat, CEPT University, 2011, p 32.
93 Financing and Monitoring Urban Water Supply and Sanitation in Gujarat, CEPT University, 2011
94 Ibid
95 Liquid Waste Management. http://www.mgsm-gujarat.in/Projects/limited-waster-management-program-3

on solid and liquid waste in urban and rural areas for complete cleanliness and developing environmental sanitation systems arranged by the community are the main objectives of the project. The following have been outlined as outcomes of municipal solid waste and liquid waste management of the programme:

- **Development of waste management infrastructure** for the implementation of solid and liquid waste management practices will provide important support for management of waste for the next 30 years.
- **Improvement in environment and health condition** of ULBs through integration of all essential parameters of waste management, condition of cities and towns.
- **Symbiotic relationship between urban and rural areas:** In the proposed waste management practices, waste has been planned to be reused as compost or organic fertilizers and for irrigation purposes.
- Ensure financial viability for ULBs through the PPP mode of waste management.
- Addressing the challenges of climate change and accruing the CDM benefits: A scientific approach to solid and liquid waste management leads to reduction in greenhouse gas (GHG) emissions, and hence helps in curbing the challenges of climate change.
- PPP for successful project implementation through exploring the scope for reuse of waste in the agricultural and industrial sectors and also identifying potential buyers and selling in the open market.

As part of MGSM, the 'Nirmal Gujarat Sauchalay Yojana' was launched. Under this scheme, all families in urban areas (BPL/APL) who do not have toilet facilities are being provided toilets with a unit cost of Rs.6000/- in the beginning. Financial assistance for individual toilets has been increased to Rs.8000/-, enabling ULBs to sanction toilet units to eligible families and reducing the number of toilet-less families.

Challenges in septage management:

Lack of state policy/guidelines and technological support to ULBs is a major constraint for the state of Gujarat. Like any other state, managing operations and maintenance of sewerage, pumping, septage emptying and treatment are major concerns. Other concerns are inability to find land for septage management, lack of awareness generation to understand the link between poor sanitation and public health, inadequate institutional capacity of ULBs, inadequate funding to ULBs and the inability of ULBs to recover operation and maintenance costs through fees and local taxes.

Urban sanitation context in Madhya Pradesh

Madhya Pradesh is the second largest state with 6 per cent of the total population of the country. According to the 2011 Census, the state's population is 72.59 million. The 377 cities and towns of Madhya Pradesh accommodate 27.5 per cent of its total population. The 377 ULBs comprise 14 municipal corporations, 100 municipal councils and 263 nagar parishads. Having a large urban sector, it faces a number of challenges coupled to a high level of planned investment in urban infrastructure and reforms under various government and donor funded initiatives[96 97].

The status with regard to sanitation in the state is poor as many households do not have access to toilet facilities and resort to open defecation. Besides, there are no safe waste disposal and management systems in place. This unhealthy environment affects mostly the women and children.
The state government and the ULBs have been implementing programmes without policy guidelines and without much progress.

According to the 2011 Census, 74.2 per cent of urban households have latrine facilities within the premises while other households do not[98]. Nearly half (50.1 per cent) of these have toilets connected to septic tanks and a fifth have sewer connections; 22.5 per cent resort to open defecation while 3.3 per cent have access to public latrines[99].

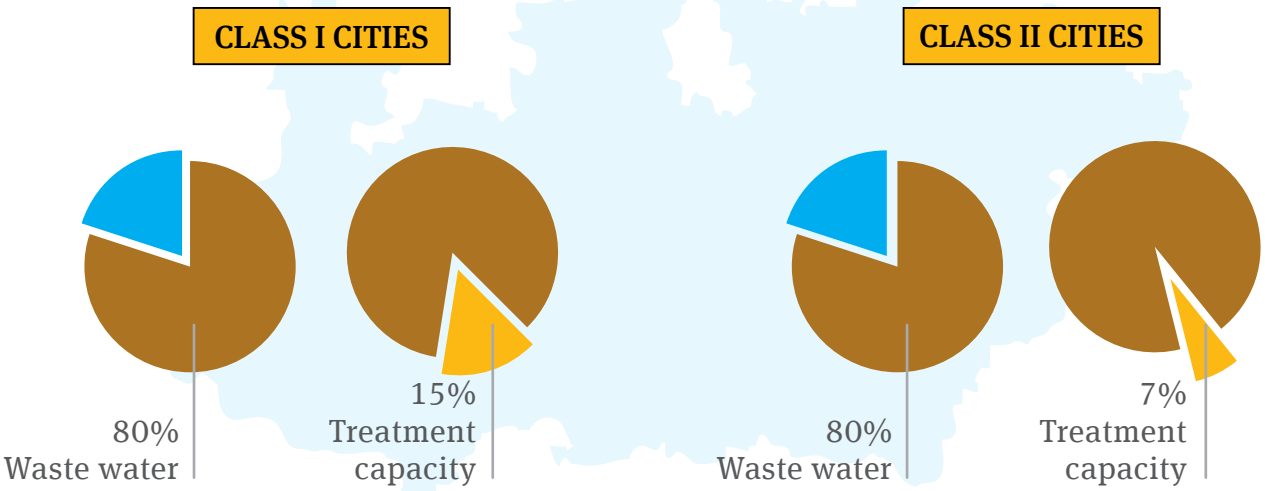
None of the cities are fully covered by the sewerage system. The larger cities are partially covered by a sewerage network but the wastewater is not treated before being released in a river. Bhopal and Indore corporations are in the process of establishing wastewater treatment plants. In the absence of a sewerage network, the liquid waste from the households is transported through open drains. Rainwater and poor maintenance often leads to choking and flooding of drains. Of the urban households in the state, 76 per

96 http://www.mpurban.gov.in/Urban_Scenario.asp

97 Water Sector Reforms and their Implications in Madhya Pradesh, Paper Presented by Rehmat and Gaurav Dwivedi, Session 16, International Conference on Water Resources Policy in South Asia, December 17-20, 2008, Colombo, Sri Lanka

98 Houses and Household Amenities, Latrine Facility, Census of India - 2011, Registrar General and Commissioner, India. From the Table: Availability and Type of latrine facility- Urban. Available at: http://censusindia.gov.in/2011census/hlo/Data_sheet/India/Latrine.pdf

99 Houses and Household Amenities, Latrine Facility, Census of India - 2011, Registrar General and Commissioner, India. From the Table: Type of latrine facility- new additions in 2011. Available at: http://censusindia.gov.in/2011census/hlo/Data_sheet/India/Latrine.pdf



cent have the facility of being connected to either a closed or an open drain for wastewater disposal. In the internal survey done by the Ministry of Urban Development, only 14 ULBs have sewerage network coverage and of these, only Indore has more than 70 per cent coverage[100].

Wastewater generation and treatment:

The state has 25 class-I cities (2008), with the domestic water use of 1,561 MLD, of which, 80 per cent turns into sewage (1,248.8 MLD). Of the total sewage water generated, only 15 per cent is treated. Corresponding figures for 23 class-II cities are 164 MLD, 80 per cent and 7 per cent. It shows that a significant volume of wastewater is not subjected to any treatment and is ultimately discharged into surface water bodies leading to deterioration of water quality. According to the report of CPCB (2013) that evaluated the performance of sewage treatment plants under National River Conservation Directorate (NRCD), for the metropolitan cities of Madhya Pradesh, there are only nine STPs using different technologies. The installed capacity of sewage treatment plants is 168.4 MLD and the actual utilisation is 123.7 MLD[101].

Policies and programmes of the state:

The state has a large number of programmes which are externally funded or centrally sponsored and state funded like JnNURM, Project Uday[102] and Project Uthan etc., which focus on urban infrastructure[103].

100 Water and Sanitation: State Series, 2012, Madhya Pradesh: Slow and Steady Wins the Race, Health of the Urban Poor Programme, Population Foundation of India

101 Performance Evaluation of Sewage Treatment Plants under NRCD, August 2013, Central Pollution Control Board, Ministry of Environment and Forests, Government of India. Refer to p 6, 7, 9 and 15. More additional reading, please also refer to Water and Sanitation in Urban Areas of Madhya Pradesh, WaterAid India, 2006

102 For details please refer to http://projectuday.nic.in/WAC.htm

103 Water and Sanitation: State Series, 2012, Madhya Pradesh: Slow and Steady Wins the Race, Health of the Urban Poor Programme, Population Foundation of India

PROJECT UDAY (URBAN WATER SUPPLY AND ENVIRONMENTAL IMPROVEMENT PROJECT)[104]:

The project aims at promoting sustainable growth and reducing poverty in the project cities of Bhopal, Gwalior, Indore and Jabalpur. One of the components of this project is sewerage and sanitation improvement and expansion. The sewerage component is proposed for high-density city centre areas where on-site or local wastewater treatment is not appropriate due to insufficient space. Sewage treatment will use low- maintenance waste stabilisation ponds. In lower density areas, on-site sanitation will continue to be used, with the Project supplying equipment for emptying septic tanks. Sewerage schemes are included for all project cities. In all cities, community sanitation blocks will be provided for urban poor settlements where on-plot latrines are not possible.[105]

Jawaharlal Nehru Urban Renewal Mission (JnNURM) and Urban Infrastructure Development Scheme for Small and Medium Towns (UIDSSMT): Launched by the Government of India in 2005, four cities (Bhopal, Indore, Jabalpur and Ujjain) are covered under JnNURM and the remaining towns are covered under UIDSSMT. These programmes aim at integrated development of infrastructure services in the cities covered, securing effective linkages between asset creation and asset management so that the infrastructure-related services created in the cities are not only maintained efficiently but also become self-sustaining over time.

MADHYA PRADESH URBAN SERVICES FOR THE POOR (MPUSP):

Operational since 2006, MPUSP aims to augment the capacity of select ULBs to deliver better services to the poor. Key project components include:

1. helping cities and the state government to bring about reform,
2. improving the ways in which ULBs and their staff work
3. developing community capacity to improve their access to services like safe drinking water and sanitation. The programme initially focused on four ULBs (Bhopal, Gwalior, Indore and Jabalpur) but ten more ULBs have been recently added for intervention.[106]

104 For the latest project details, please refer to Urban Water Supply & Environmental Improvement in Madhya Pradesh - Quarterly Progress Report (QPR17), December 2009, Project Management Unit, Project UDAY, Government of Madhya Pradesh, January 2010

105 For project Uday updates please refer to quarterly progress reports at http://projectuday.nic.in/Report.htm

106 http://www.mpurban.gov.in/Urban Services For The Poor Programme (MPUSP)

WaterAid/Poulomi Basu

Water related diseases are high in the urban areas of Madhya Pradesh due to lack of technology to treat the load of sewage flowing into the water bodies.

INTEGRATED URBAN SANITATION PROGRAMME (IUSP): This was initiated in the year 2009 with the primary objective of making at least four to five towns open defecation free (OFD). The programme is being implemented through convergence with the Government of India's Integrated Low Cost Sanitation Scheme (ILCS) and public private partnership (PPP) mode (Sulabh and community participation model) for CTs. This programme also focuses on Information, Education, Communication (IEC) and awareness generation and construction of community toilets and individual toilets based on targets.

Mukhyamantri Shahari Swachhata Mission (MSSM): This was initiated in the year 2012. A provision of prize money has also been made to encourage participation and incentivise the ULBs.

Institutional framework:

An institutional framework basically consists of two aspects: (a) facilitation and advocacy framework and (b) implementation framework. The former has the following committees:

1. The state level coordination and monitoring committee: This committee seeks to review, monitor and evaluate the programme from time to time. It

will also provide feedback and strategic direction to improve the quality of programme implementation.

2. District level urban sanitation committee: This committee is empowered to approve the City Sanitation Plans, review the progress of sanitation activities, provide guidance and issue necessary guidelines and instructions to meet the targets set under the programme. The committee includes representatives from NGOs.

3. City level sanitation committee: This committee directly supports and facilitates preparation and implementation of the City Sanitation Plan. It includes representation from NGOs, business associations, associations of sanitary workers, subject experts etc.

The state level urban sanitation cell and the city level sanitation cell comprise the implementation framework. The implementation begins with comprehensive IEC (Information, Education and Communication), awareness generation, capacity building and training activities at two levels - for ULB officials and thereafter for the stakeholders.

Challenges:

- Policies on WATSAN are not updated and do not address the urban challenges.
- Septage management remains a neglected component in urban sanitation.
- Lack of financial sustainability forces municipalities and ULBs to depend entirely on the water sanitation tariff which excludes faecal sludge management.
- WASH sector financing that reaches the urban poor is much less than required. Most of the support is meant for urban infrastructure, which excludes the poor.
- The community toilets created lack sufficient manpower. Municipalities are unable to operate and maintain these, resulting in disuse.
- Lack of community participation in urban sanitation programmes.
- Water intensive sanitation technologies put an enormous stress on water resources.
- Lack of technology to treat the load of sewage flowing into the water bodies. Water-related diseases are high in the urban areas of Madhya Pradesh.
- The Master Plan for development of the city does not focus on developing the Master Plan for sanitation of the city. It only details the norms that are applicable but does not identify possible sites for waste disposal, sites for treatment plants etc.

Urban sanitation context in Maharashtra

Maharashtra is India's second most populous state, holding 9.28 per cent of the total population: 112.37 million (Census 2011). It is a highly urbanised state, with more than 50.08 per cent living in urban areas[107]. There are around 254 urban local bodies in the state. Of these, 26 are municipal corporations, 18 are class-A municipal councils, 142 are class-B municipal councils and 63 are class-C municipal councils; 4 are nagar panchayats (notified area councils)[108].

According to the 2011 Census, 71 per cent of the total urban households have latrine facilities within the premises while other households do not. 67.3 per cent of these are water closets, 2.4 per cent pit latrines, 1.6 per cent others while 28.7 per cent do not have latrines. Regarding the type of toilets, more than one-third (37.8 per cent) of them had sewer connections, 28.6 per cent were connected to septic tanks, 7.7 per cent had to resort to open defecation and 21 per cent had access to public latrines[109].

Across the state most sanitation facilities are on-site. The larger share of districts do not have sewerage networks and most households utilise septic tanks, with some sharing (NSSO 2012). **53 per cent of households in the state have latrine facilities within the premises – higher than the national average of 46.3 per cent[110]. Out of 252 ULBs in Maharashtra, only 31 ULBs have an underground sewerage network with different types of household coverage connections. Only 2 per cent of slum households within Maharashtra are networked to sewer systems.**

Wastewater generation and treatment

The state has 50 class-I cities (2008), with the domestic water use of 12,483 MLD; of which, 80 per cent is generated as sewage water. Of the total sewage water generated, only 42 per cent is treated. Corresponding figures for 34 class-II cities are 164 MLD, 80 per cent and 14 per cent. It shows that a significant volume of wastewater is not subjected to any treatment and is ultimately discharged into surface water bodies

107 Monitoring Urban Water Supply and Sanitation in Maharashtra - A Paper. Performance Assessment System. CEPT University. April 2013

108 Performance Benchmarking of Urban Water Supply and Sanitation in Maharashtra: Data Book (2008-09) Part 1 & 2: City Profiles (Municipal Corporations), CEPT University, April 2011.

109 Houses and Household Amenities, Latrine Facility, Census of India - 2011, Registrar General and Commissioner, India. From the Table: Availability and Type of latrine facility- Urban and Table: Type of latrine facility- new additions in 2011. Available at: http://censusindia.gov.in/2011census/hlo/Data_sheet/India/Latrine.pdf

110 http://www.dnaindia.com/mumbai/report-588-households-in-maharashtra-have-tv-sets-1663098)

	% of ULBs with sewer network	% of ULBs with STP	% of WW Treated	STP Capacity
State (248)	13(31)	6(15)	39	37
MC (23)	57(13)	39 (9)	40	40
MCI (225)	6(14)	3 (6)	38	45

Table 7 - Adequacy of wastewater treatment capacity (Figures in parenthesis indicate number of ULBs)

Source - Performance evaluation of Sewage Treatment Plants by CPCB, 2013, p 15
MC- Municipal Corporation; MCI- Municipal Councils

leading to deterioration of water quality. Recent data[111] (refer to Table 7) reflects the above finding that the state does not have adequate sewage treatment capacity.

Only 15 ULBs have secondary STPs and the average state wastewater treatment capacity is only 35 per cent. This means that the remaining 65 per cent wastewater is being disposed of without any treatment[112]. Maharashtra has 6 sewage treatment plants with the capacity of treating 284 MLD but the actual utilisation is only 43.5 per cent[113].

Institutional framework

The institutional framework for managing sanitation in urban Maharashtra is analysed as per the broad functional responsibilities of: (a) policy making; (b) service provision; and (c) regulation/ oversight. The key institutions at the state level dealing with urban sanitation related aspects are the Urban Development Department (UDD), Water Supply and Sanitation Department (WSSD), Maharashtra Pollution Control Board (MPCB), Town Planning and Valuation Department (TPVD), MHADA, MMRDA and Maharashtra Water Resources Regulatory Authority (MWRRA). The ULB is the only key city level institution.

111 AIILSG (2011). Urban Water and Sanitation in Maharashtra - A Report, June 2011, All India Institute of Local Self Government, Mumbai, PAS Project, CEPT University. P 84.

112 Murty JVR (2013), Faecal Sludge and Sullage Management in Urban Maharashtra: Analysis of Institutional Arrangements and Regulations, A study prepared for PAS project, CEPT University; available at www.pas.org.in

113 Performance evaluation of Sewage Treatment Plants in India under NRCD-2013

	Policy making	Service provision	Regulation/oversight
UDD	1. Detailed guidelines of staffing 2. Hiring staff in ULBs and transfers 3. Budget allocation		1. Detailed guidelines of staffing 2. Hiring staff in ULBs and transfers 3. Budget allocation
WSSD	State urban sanitation policy and guidelines		1. Approval of CSPs prepared by cities 2. Approval of schemes taken up under Sujal Nirmal Abhiyan funds of GoM
MPCB	Advise state on pollution related standards or policies		Monitoring of surface water quality and seeking polluting cities to take appropriate actions
MTPVD		1. Development of regional development plans 2. Develop city development plans, on request of cities	1. Approve city development plans 2. Approval of town planning schemes
MHADA		1. Implement low-cost housing projects for the poor 2. Implement slum improvement projects under state grants and National Slum Development Programme (NSDP)	

Table 8 - Key institutions and functional responsibilities for urban sanitation management in Maharashtra

Institutional roles

- A host of institutions are involved in management of sanitation and sullage activities with varying roles. While most state level institutions are responsible for policy setting, oversight and monitoring, ULBs are responsible for actual implementation.
- The state Municipal Acts place most of the responsibilities of management of the full chain of sanitation and sullage with ULBs. However, provision and management of treatment facilities are not obligatory for the ULB. This needs to be corrected through appropriate amendments to the Municipal Acts.

- ULBs have the dual role of service provision for public services (construction of drains, sewerage systems, community/public latrines, maintenance of treatment systems etc.) and also regulation of activities of households (construction of household latrines, service connections, etc.). There is no institution that is clearly charged with regulation of the service provision of ULBs. One of the state level institutions, that is, the UDD, WSSD and/or MPCB, could be charged with this responsibility. It is advisable to have one institution clearly mandated with the task of oversight of all the sanitation and sullage management activities carried out by ULBs and/or other organisations. The recently initiated Service Level Benchmarking (SLB) exercise would be a good tool for this oversight function.
- Three key departments within ULBs – that is, **Town Planning, Public Works and Sanitation departments** – are vested with the powers to implement various provisions of the Municipal Acts and building by-laws. Lack of technical staff hampers effective implementation of their mandated duties.

Policies and Programmes:

There is no formal policy for urban sanitation in Maharashtra, but the state follows the approaches advocated in the NUSP. To promote the aim of achieving open defecation free (ODF) cities, the state has designed a few programmes and guidelines since 2008, as described below:

(A) MAHARASHTRA SUJAL NIRMAL CAMPAIGN (2008):

The programme outlines financial packages available to different tiers of cities (especially those that are not covered under JnNURM and UIDSSMT grants) and the reform conditions for availing the package. Sanitation components of this programme are detailed below:

Management of sewerage and sullage: Preparing action plans for connecting all the properties in the city with the sewerage/drainage/sullage system; improving or augmenting the existing sewerage system; reusing wastewater by decentralised processes of wastewater treatment; levying and collecting appropriate sullage/sewerage tax.

Toilet management: Conducting surveys to find the availability of individual and community/public toilets in the city; repairing/rehabilitating community/public toilets in the city; planning and constructing additional community/public toilets as required, with a focus on toilets for women; preparing action plans, based on surveys, to improve the facilities of individual/public toilets in the city and to make provisions for sufficient funds for the same; preparing proposals for individual/

public toilets for weaker sections and submitting them to the state government under the Central Government's programme; and encouraging participation of private organisations/non-governmental organisations for operation and maintenance and/or construction of new public toilets.

(B) GUIDELINES FOR UNIVERSALISATION OF UWSS SERVICES IN CITIES:

The government designed and issued guidelines to cities on planning and implementation of measures to achieve universalisation of UWSS services on June 19, 2010. This covered both water supply and sanitation related aspects.

(C) MAHARASHTRA GOLDEN JUBILEE WSS PROGRAMME:

The programme was announced through a government resolution on June 25, 2010 to cover the special categories (SCs and OBCs) by providing household facilities and public facilities as feasible. Under this, house connections for water supply at Rs.4,000 per family and low-cost household toilets at Rs.12,000 per family were provided. Further, cities were encouraged to undertake special surveys to gather information on the condition of these special category families and develop plans to cover them all, as appropriate, and seek funding from the state. The state plans to use the funds made available by the Government of India under the low-cost sanitation schemes, besides their own funds.

(D) STANDARDS TO BE FOLLOWED FOR PUBLIC LATRINES:

In May 2008, the WSSD issued guidelines (vide GR dated 12 May, 2008) for technical specifications for constructing public toilets by ULBs[114]. The GR clarified that cities should follow standards prescribed by the National Building Code, 2005. The GR also clarifies that the development rules for A Class Municipal Councils have been amended incorporating these specifications.

(E) RECYCLING OF WASTEWATER:

The Urban Development Department, Government of Maharashtra, issued a GR (dated October 15, 2010)[115] encouraging cities to develop plans to recycle and reuse at least 20 per cent of wastewater being generated. Such wastewater could be used for: (a) agricultural purposes; (b) non-drinking water related uses; and (c) industrial use. However, the GR does not provide any other specifications or regulations on the subject.

114 Murthy, JVR, May 2013, Faecal Sludge and Sullage Management in Urban Maharashtra - Analysis of Institutional Arrangement and Regulations, (Organized by PAS Project, CEPT University. P 9)

115 Ibid

WaterAid/Jon Spaull

In Maharashtra, policies and regulations that govern slums' sanitation issues do not encourage building of individual household latrines; slum dwellers are, instead, dependent on community facilities built by ULBs and or other development authorities through various government schemes.

Regulations

Both sullage management and night soil management involve five key stages: (a) user interface - construction of latrines, bathrooms, kitchens in premises; (b) collection/containment - construction of septic tanks for confinement of night soil and drains for sullage disposal; (c) conveyance of septage/sullage for treatment; (d) treatment; and (e) disposal and reuse.

Regulations are well laid out for activities under user interface and collection sections. Septic tanks are an important element of on-site sanitation and sullage management in non-networked cities. Detailed guidelines are available from IS codes and CPHEEO manuals. Most of these are incorporated in city level development regulations, excepting treatment options.

While regulations are strong on treatment of effluent coming out of septic tanks, there are no regulations that mandate cities to treat all the sludge and sullage coming out of septic tanks and drains. This is the weakest link in the management chain. Policies and regulations that govern slums' sanitation issues do not encourage building of individual household latrines; slum dwellers are, instead, dependent on

community facilities built by ULBs and or other development authorities through various government schemes. This is a very critical issue for Maharashtra as about 36 per cent of its urban residents dwell in slums and have limited access to good sanitation facilities. Such a situation negatively impacts the health, dignity and overall quality of living of slum residents. There is a case for special policies for addressing the sanitation issues in the slums of Maharashtra.

Challenges:

Access and equity: In order to eliminate open defecation and ensure universal access to adequate sanitation for the urban poor and slum population, appropriate policy changes are needed. Lack of space to build own toilets and lack of affordability to meet the toilet cost need to be addressed with budget allocations for partial subsidy.

Wastewater management: Strengthening the mechanisms for treatment of wastewater and faecal sludge collection, conveyance and treatment; exploring the scope for reuse of treated water and sludge will be major challenges.

Financing governance: This involves strengthening institutional capacity at the local level and regulations to implement FSM effectively; financing options and mechanisms.

Recommendations:

- Developing policies that address specific septage management.
- Bringing collection, treatment and disposal of faecal sludge under the mandatory functions of ULBs.
- Encouraging cities to include septage management activities in City Sanitation Plans.
- Need to explore ways of funding capacity, systems and equipment at ULB level.
- Faecal sludge management guidelines could be developed for ULBs and staff/consultants could be trained.
- Strengthening the systems of sludge collection and disposal and monitoring the same through appropriate mechanisms.
- Designing and implementing citizen awareness drives on the importance of having and maintaining proper septic tanks.
- Developing guidelines for providing residents of slums with decent sanitation facilities.

Urban sanitation context in Uttar Pradesh

Uttar Pradesh (UP) has a large population and a high population growth rate. According to the 2011 Census, Uttar Pradesh has a population of 199 million. The urban population of Uttar Pradesh comprises around 22.27 per cent of the state's population and has been growing rapidly (Census 2011). UP has 634 ULBs, including 14 municipalities, 193 municipal councils and 427 town panchayats. It is the responsibility of the ULBs to cater to drinking water supply and other basic civic amenities; roads, streets, drainage, sanitation; waste disposal, sewerage systems, etc.

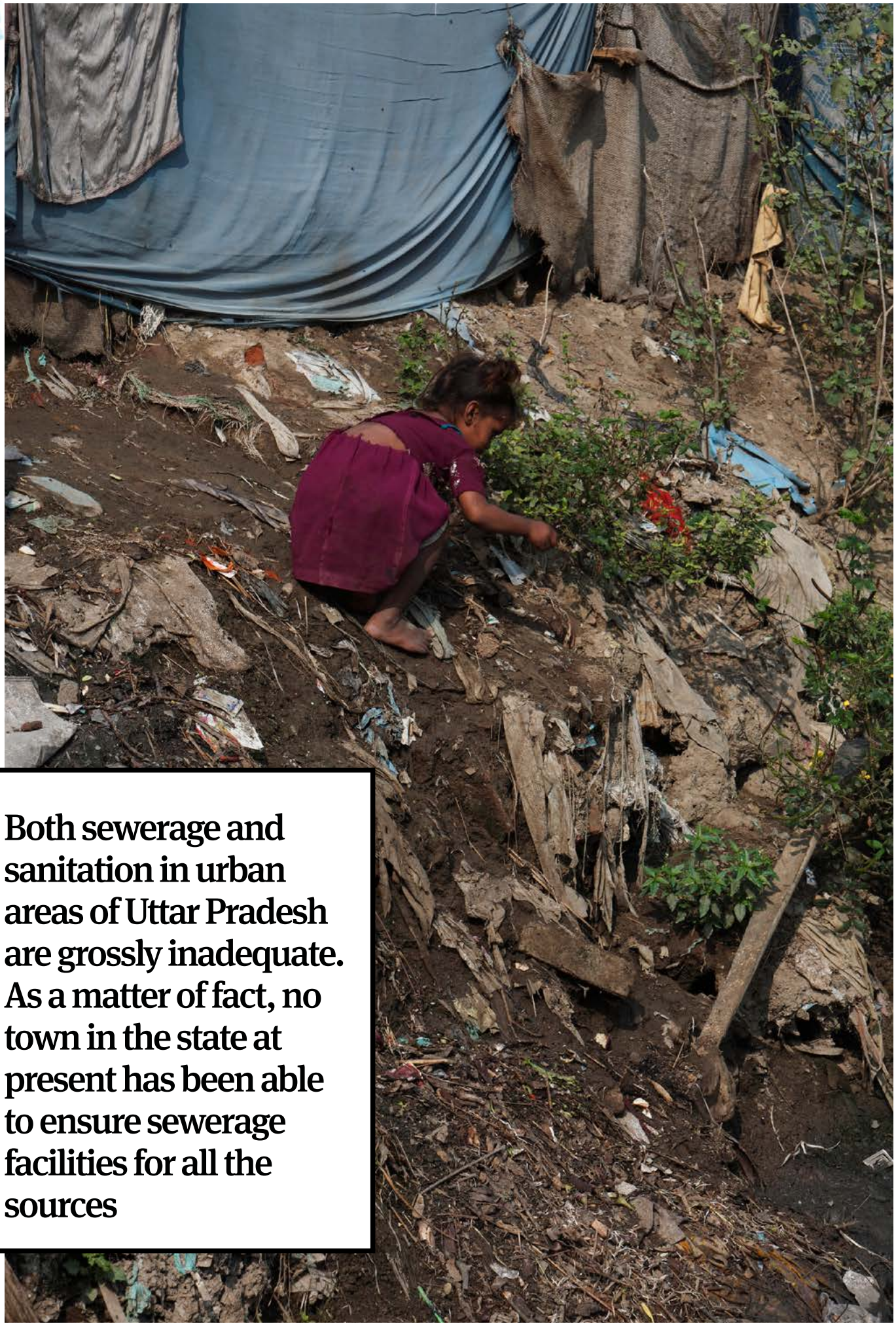
The status of urban sanitation shows that 83 per cent households in Uttar Pradesh have toilets within the premises. Regarding the type of toilets, the majority (46.9 per cent) have toilets connected to septic tanks and 28.3 per cent of households are connected to the piped sewer system[116].

With increasing urbanisation, there has been an increasing demand for basic amenities like water and sanitation. This is likely to rise further but the service providers are unable to keep pace with this increasing demand. Inadequate sanitation services leading to open defecation, on one hand, and the poor management of sanitation services, on the other, are the most critical aspects of urban living which lead to environmental and public health complications. The poor and the slum dwellers are the worst sufferers due to lack of access to sanitation. They cannot construct their own toilets because of various reasons, ranging from the unauthorised nature of their tenancy to lack of space or financial constraints.

The poor sanitation situation in Uttar Pradesh was highlighted in a policy document set within the context of the National Urban Sanitation Policy of 2008. The document observed that low priority had been given to sanitation owing to a lack of understanding about its linkages to public health. The document also identified fragmented institutional roles and lack of coordination in dealing with the issue, as well as insufficient consideration of the perspective of the user in tackling issues of sanitation[117]. Both sewerage and sanitation in urban areas of Uttar Pradesh are grossly inadequate. As a matter of fact, no town in

116 Houses and Household Amenities, Latrine Facility, Census of India - 2011, Registrar General and Commissioner, India. From the Table: Availability and Type of latrine facility- Urban and Table: Type of latrine facility- new additions in 2011. Available at: http://censusindia.gov.in/2011census/hlo/Data_sheet/India/Latrine.pdf

117 Uttar Pradesh Sanitation Policy, 2010. Available at http://www.indiawaterportal.org/sites/indiawaterportal.org/files/Uttar%20Pradesh%20Urban%20Sanitation%20Policy_%20%28JNNURM%29_2010_.pdf



Both sewerage and sanitation in urban areas of Uttar Pradesh are grossly inadequate. As a matter of fact, no town in the state at present has been able to ensure sewerage facilities for all the sources

WaterAid/Jon Spaull

	Sewer Reach (in %)		
	Partial	Without sewerage	% of houses with toilets
Municipal Corporations (11)	100		25.7
Nagar Palika Parishads (194)	18	82	35.3
Nagar Panchayats (418)	2	98	44.9
Total (623)	55 (9%)	568 (91%)	

Table 9 - Status of sanitation in urban local bodies

Source - Uttar Pradesh Urban Policy, 2010 (p 7)

the state at present has been able to ensure sewerage facilities for all the sources. Even the largest municipal corporations have a huge backlog, both in terms of percentage and absolute figures. This results in a very low proportion of population covered by sewerage in the state. In the case of nagar panchayats, more than half of the population is not covered under proper municipal sewerage systems. Of the total 623 urban local bodies, 91 per cent did not have sewerage while 9 per cent had only partial coverage. Out of 51 towns having a population of more than one lakh, 14 did not have a sewerage system at all[118].

The scale of the septage management challenge is considerable in Uttar Pradesh. Many cities remain unsewered and a sizeable population lives in slums, with little access to any sanitation and sewerage facilities. As a consequence, many areas of the city "depend on septic tanks"; but in the absence of effective septage management systems, tanks often overflow into drains and contaminate low-lying areas. To compound this, there is almost no management of the solid waste that the city generates, which means that this also causes pollution of the rivers and clogging of drains. In fact, with the current sewage treatment capacity, only 25 per cent of the generated waste can be treated, leaving 75 per cent to be discharged into waterways without treatment[119]. Meanwhile in the state capital, Lucknow, a survey found an absence of a working waste disposal system, with 95 per cent of the city's

118 Ibid p 7.

119 Narain S and Pandey P. Excreta Matters: How urban India is soaking up water, polluting rivers and drowning in its own waste. Centre for Science and Environment, 2012.

population not segregating the municipal solid waste. The study also showed that 40 per cent of the city does not have a properly functioning sewerage system[120].

Wastewater generation and treatment

Recent data (CPCB, 2013) shows that of the 4,406 MLD of domestic water requirement of 61 class-I towns, 80 per cent is generated as wastewater and only 35 per cent of the total wastewater is treated. Corresponding percentages for Class-II towns are 432 MLD, 80 per cent and 4 per cent. The sewage generation in NCR urban is 4,528 MLD. NCR has 64 STPs of 3,349 MLD design capacity and the sewage treated is 2,248 MLD. Therefore, the sewage treated is 50 per cent of sewage generation. The increase in sewage treatment capacity during the decade 2001-11 has been 53 per cent whereas the increase in treated sewage quantity has been much less at 33 per cent[121].

Policies with implications for sanitation in Uttar Pradesh

WATSAN in UP was given some priority only in the 11th Five Year Plan (2007-12), including the aim to make the state open defecation free by 2012[122]. Quite evidently this has not happened. Nonetheless, there is a cluster of state level policies that aim to improve sanitation conditions in the state, many of which have set high targets.

The following are some of the policies which have significance for sanitation in Uttar Pradesh. Although they attend to a range of different aspects of sanitation, they do not include a state-specific policy on faecal sludge management:

- Uttar Pradesh Urban Housing Policy: It was developed in 1995 under the Department of Housing & Urban Planning, Government of Uttar Pradesh. Under the ambit of environmental conservation, there are objectives around the collection of solid waste, its disposal and drainage.
- Uttar Pradesh State Water Policy: Adopted in 1999 under the irrigation department, its concerns include the protection of water against pollution and safeguards against water-related hazards.
- Uttar Pradesh Women Policy: This was instituted in 2006 by the Department of Women Welfare. It states that efforts should be made to construct community toilets in villages, and separate toilet blocks for girls in schools.
- Uttar Pradesh Urban Sanitation Policy: Adopted in 2010 by the Directorate of Local Bodies, this policy identified the following key

120 http://timesofindia.indiatimes.com/city/lucknow/40-city-areas-still-dont-have-proper-sewerage-system/articleshow/7530799.cms
121 PHED Haryana, Rajasthan Sub-Regional Plan 2021, UP Sub-Regional Plan 2021 and Delhi Jal Board, page 131.
122 Water and Sanitation for the Urban Poor, Expansion and Exclusion: A Briefing Paper on Related Policies on WASH (2012), Health of the Urban Poor Programme, Population Foundation of India

sanitation issues in the state - lack of awareness and low priority to sanitation and its linkages with public health; social and occupational hazards faced by sanitation workers; fragmented institutional roles and responsibilities; lack of an integrated citywide sanitation approach; serving the unserved and the poor; lack of facilities in slums and lack of demand responsiveness. One of the stated goals of the policy is safe disposal of human excreta and liquid waste. Three related goals are mentioned - functioning of sewerage networks and ensuring connection of households; promoting recycling and reuse of treated water; and promoting proper disposal and treatment of sludge.

Schemes on sanitation

In addition to the above policies, UP also has the responsibility to commit to certain central schemes on sanitation, such as Nirmal Bharat Abhiyan (NBA). A demand driven CLTS campaign to end open defecation in India, NBA aims to establish open defecation free areas through behaviour change in the first instance. It incentivises families by offering them Rs.10,000 to build a toilet. Funding for NBA is shared between the centre and the states, with the centre contributing 80 per cent and the states contributing 20 per cent.

Institutional framework

In Uttar Pradesh, JnNURM, which incorporates the sub-mission for urban infrastructure and development (including sanitation and waste management) is implemented by the Directorate of Urban Local Bodies (which has authority for the UIG and UIDSSMT schemes); and State Urban Infrastructure Development Agency (SUIDA) implements the Basic Services for Urban Poor and the Integrated Housing and Slum Development Programmes.

The Jal Nigam executes the water supply and sewerage projects. Both state level nodal agencies have Programme Management Units to monitor and manage the mission's work. The Uttar Pradesh Jal Nigam came into being in 1975 with the Uttar Pradesh Water Supply and Sewerage Act that was also passed in the same year. The aim of creating this corporation was to develop and regulate water supply and sewerage services. The Jal Nigam is involved in water supply and sewage disposal services including necessary preparatory work and financing; development of state plans with respect to water supply, sewerage and drainage; establishment of standards; and review of technical and economic aspects of water supply to local bodies which have entered into an agreement with it. The Jal Nigam also has the responsibility for a process of reviewing these different aspects of water

supply and sewerage in the state as a whole[123].

ULB level institutional arrangement

In Uttar Pradesh, although the responsibility for provision of water and wastewater services had been entrusted to the urban local bodies even prior to the 74th amendment, the state government has continued to play a major role in the provision of these services, mainly because ULBs lack the institutional capability. So far, Uttar Pradesh's attempts at urban reforms have been predominantly on the basis of the 74th amendment and have focused on boosting the stability of local self-government and creation of democratic institutions at the grassroot level. Direct reform attempts to improve service provision in particular sectors have been limited. The major challenges facing the water sector are: weak local body finances, poor cost recovery and excessive control by state.

Private sector service providers

NUSP emphasises the role of private players in addressing sanitation issues. However, evidence shows that private institutions and NGOs are sparingly involved in sanitation; their role is restricted to solid waste management (SWM) and running a few 'Pay and Use' toilets[124].

Challenges

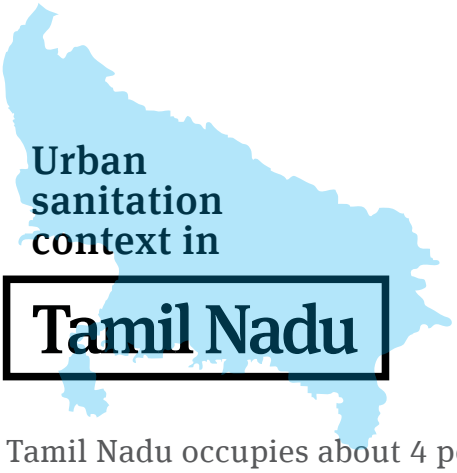
The sewage treatment plants that exist are not operated at their optimum level because of various reasons like insufficient wastewater flow, erratic power supply and high costs, etc.

- Low priority is given to sanitation because of lack of awareness regarding its linkages to public health.
- Fragmented institutional roles and responsibilities.
- Lack of an integrated approach to deal with the problem.
- Lack of consideration to the user perspective in dealing with sanitation issues[125].
- Lack of awareness amongst citizens about safe sanitation.
- Lack of appropriate planning for total sanitation outcomes.
- Inadequate capacities within ULBs to plan and manage total sanitation.
- Weak understanding of technology options.
- Weak accountability of service providers.
- Lack of proper regulation.

123 http://www.upjn.org/services.aspx

124 Urban Sanitation Policy - Uttar Pradesh, 2010

125 http://www.indiawaterportal.org/articles/uttar-pradesh-urban-sanitation-policy-jawaharlal-nehru-national-urban-renewal-mission-Uttar Pradesh Urban Sanitation Policy - Jawaharlal Nehru National Urban Renewal Mission - Government of India (2010)



Urban sanitation context in Tamil Nadu

Tamil Nadu occupies about 4 per cent of the country's geographical area and houses 6.04 per cent of the population but the available water resources are only 3 per cent of that of the country. The national decadal growth rate was 17.64 per cent and the growth rate between 2001 and 2011 for Tamil Nadu stood at 15.5 per cent. The total population of Tamil Nadu is 72,147,030 (Census 2011), 48.4 per cent of which, live in urban regions. The state has 12 corporations, 124 municipalities and 528 town panchayats. The Census presents a grim picture of sanitation in Tamil Nadu as 45.7 per cent of the state's population resorts to open defecation due to the absence of proper sanitation facilities. In 2006, the Total Sanitation Scheme was introduced but it failed to change the practice of open defecation.

The environmental sanitation index of Tamil Nadu confirmed that Chennai and Kanyakumari districts ranked first and second whereas districts like Dharmapuri, Ariyalur and Perambalur stayed at the bottom. According to the toilet index[126], Chennai ranked No. 1 in access to toilet facilities, followed by Kanyakumari, Coimbatore, Thiruvallur and Kanchipuram districts. Ariyalur district came last. On the drinking water front, the drinking water supplied to households in Ramanathapuram district, followed by Dharmapuri, Perambalur, Pudukkottai and Thiruvarur, is of very poor quality.

The Chennai Metropolitan Water Supply and Sewerage Board (CMWSSB) has been playing a crucial role in delivery of protected water supply and sewerage services to the Chennai Metropolitan Area. In the case of urban local bodies, other than Chennai Metropolitan Area, the Tamil Nadu Water Supply and Drainage Board (TWAD Board) has been responsible for water supply and sanitation. The municipal corporations and special grade municipalities are also empowered to take up water supply schemes on their own.

In the 11th Five Year Plan, an amount of Rs.7,555 crore was allocated for the water supply and sanitation sector. Out of this, 40 per cent has been allocated for rural water supply, 43 per cent for urban water supply and sanitation and 17 per cent for sewerage. Provision of drinking water supply has been ensured to all habitations, though a small proportion of them are only partially covered.

126 Environmental Sanitation Index for the State of Tamil Nadu, India. International Research Journal of Environment Sciences Vol. 3(5), 54-59, May (2014) – page 56

Policy context

The Total Sanitation Campaign (TSC) renamed as Nirmal Bharat Abhiyan (NBA) of Government of India is a major programme for rural sanitation. Underground Sewerage Systems (UGSS) under JnNURM is a major scheme for urban sanitation. The state has formulated two strategies in the urban sanitation sector for coverage of all towns by UGSS and total elimination of open defecation by 2015[127].

Tamil Nadu is one of the few states that has come out with a comprehensive programme for providing a sewerage network in Chennai city and all district headquarters with sustainable financing and user charges for sewerage connections. The successful model that involved financing of sewerage projects through a combination of user deposits, loans and government grants with user charges to manage debt servicing and O&M is being adapted to provide sewerage schemes across the state.

At present, 99 per cent of the core areas of Chennai city have been covered with sewerage facilities. CMWSSB manages over 6,10,000 sewer connections and maintains a network of 2,600km of sewer lines and 180 pumping stations. A number of new projects are being implemented in the newly added extended areas.

Municipal Solid Waste Management (MSWM) is one of the essential services of the ULBs to keep the cities/towns clean and green. Due to rapid urbanisation and change in the lifestyle, there is a considerable increase in the quantity of waste as well as variations in the characteristics of waste. The collection, transportation, treatment and disposal of waste pose a major challenge to the ULBs. The ULBs have taken efforts to make improvements in the Solid Waste Management services in accordance with the 'Municipal Solid Waste (Management & Handling) Rules, 2000'.

The state has formulated two major schemes for urban infrastructure development - the Chennai Mega City Development Mission (CMCDM) for Chennai and suburban areas and the Integrated Urban Development Mission (IUDM) for all other corporations, municipalities and town panchayats, to supplement the available funds under various schemes. Under these missions, existing schemes are dovetailed to improve the standards of basic infrastructure including sewerage and sanitation, storm water drains and solid waste management in an integrated manner. The additional resources provided under the Chennai Mega City Development Mission and the Integrated Urban Development Mission have given the much needed thrust to the development of basic amenities in urban areas and also stimulated economic growth through planned urbanisation.

127 Water and Sanitation, 12th Five Year Plan, State Planning Commission of Tamil Nadu

Due to rapid urbanisation and change in the lifestyle, there is a considerable increase in the quantity of waste as well as variations in the characteristics of waste

WaterAid/Jon Spaull

Focus on appropriate training

As per the 12th Five Year Plan, all stakeholders are to be given an orientation on various aspects of sanitation and the conditions under which different toilet models work efficiently. One of the main reasons for the poor functioning of toilets in rural areas is the lack of adequate knowledge about the technological options available for different terrain conditions. Because of this, only a particular type of model is constructed instead of the model that is suitable for the soil and area. This results in the failure of the toilet, ultimately making it defunct.

UGSS in ULBs

It has been planned to implement UGSS in a phased manner in the corporations and municipalities with necessary financial assistance under various schemes like TNUDP-III, Urban Infrastructure and Governance (UIG/JnNURM), Urban Infrastructure Development Scheme for Small and Medium Towns (UIDSSMT/ JnNURM), and KfW grants. Detailed project reports have been prepared for 117 municipalities at an estimated cost of Rs.7,100 crore and for three corporations (Tiruchirappalli, Coimbatore and Thoothukudi) at an estimated cost of Rs.1,570 crore by the Tamil Nadu Water Supply and Drainage Board.

Envisioning an open defecation free Tamil Nadu by 2015

Tamil Nadu 2023 aims at providing the best infrastructure services in India in terms of universal access to water and sanitation. The government has directed all district collectors to adopt a multi-pronged strategy to ensure the goal of an open defecation free Tamil Nadu by 2015[128] and organise all stakeholders into a mass movement to root out this practice[129].

National Project on Biogas Development: This is a 100 per cent Centrally Sponsored Scheme envisaging a subsidy of Rs.8000/- for all categories and Rs.10,000/- in the hilly areas for the installation of biogas plants. The subsidy for toilet linked biogas plants is Rs.9000/-. For the year 2012–13, the physical target for installation of biogas plants was 1000 and so far 710 biogas plants have been completed. Out of these, 24 are toilet linked biogas plants constructed in 7 districts viz. Kanchipuram (4), Kanyakumari (3), Karur (6), Theni (1), Tiruchirapalli (1), Tirunelveli (7) and Tiruppur (2).

Sewerage schemes

In Tamil Nadu, though underground sewerage (UGS) is available in 21 urban local bodies, including Chennai, the capacity of Sewage Treatment Plants (STP) remains underutilised in all other places.

128 Ibid
129 http://www.tnrd.gov.in/schemes/cen_nba_13.html (accessed on 15 March 2015)

In Chennai, the capacity utilisation is 77 per cent, and in some other areas like Namakkal, it is less than 20 percent. The government has acknowledged in its order that many of the tanks are not designed properly.

In Tamil Nadu, excluding the Chennai Corporation, there were 23 towns with a population of more than one lakh. Of these, only eight towns, namely Madurai, Tiruchirapalli, Coimbatore, Tirunelveli, Tiruvottiyur, Kanchipuram, Thoothukkudi, and Kumbakonam were provided with sewerage schemes with partial coverage. Apart from this, sewerage systems are in existence in eight other towns namely Uthagamandalam, Chidambaram, Mannargudi, Periyakulam, Palani, Thirumangalam, Sattur and Labbikudikadu where too the coverage is only partial[130].

The implementation of UGSS in the erstwhile Chennai Corporation is complete. Out of the 42 ULBs, only few towns have sewerage systems and others are in the proposal stage. With respect to other municipalities and corporations, implementation of the UGS scheme is underway in 41 ULBs with financial assistance from the Government of India, World Bank assisted TNUDP-III, German Bank assisted KfW, National River Conservation Plan (NRCP) and New Tirupur Area Development Corporation Limited (NTADCL). Out of these 41 ULBs, UGSS have so far been completed in 20 ULBs with limited coverage. Another 22 UGSS schemes have been announced in 2012-13 under which work is in progress in Ariyalur, Perambalur and Tiruchirapalli to extend UGSS to under-served areas and core areas of Nagercoil.

According to Vision 2023, underground sewerage schemes and wastewater treatment plants across urban local bodies are given priority by the Tamil Nadu state government. Funds are being allocated from loans and grants from World Bank and NRCP. In 41 cities underground sewers are being constructed. Challenges in the implementation of sewerage schemes include unprecedented delays in realisation of such schemes, leading to escalation of costs. Most projects have ended up being only partially completed. Besides, a number of commercial establishments and homes are being developed without considering the basic infrastructure like laying sewers etc. due to the rapid urban growth. Those who construct new homes and apartments, offices etc. also have septic tanks/sewers but do not always follow the standards.

130 Urban Ground Sewerage Schemes http://www.twadboard.gov.in/twad/urban_sewerage.aspx (accessed on 15 March 2015)

INSTITUTIONS AND IMPLEMENTATION CAPACITY

Municipal administration departments: Also called State Urban Development Agencies[131], these state level departments are responsible for implementing urban development, and therefore have a major role in the development of WSS services. Typically, these departments delegate WSS responsibilities to state level Public Health Engineering Departments (PHEDs), State WSS Boards, city level WSS boards and ULBs. These departments regulate revenues, provide budgets, and fund disbursements to state level agencies and provide technical support to ULBs.

Urban Local Bodies (ULBs): By constitutional mandate, ULBs are responsible for their wastewater discharge, collection and treatment. In some smaller cities, ULBs do provide these services. However, since most ULBs are critically understaffed and most staff members have inadequate training, larger cities usually depend on WSS Boards and PHEDs to provide these services on their behalf.

Private Service providers: Only private operators currently provide septage services in the state. Operators are individual truck operators or small companies with tanker trucks. They are not monitored or regulated regarding the effective implementation of septage policy. There are no known formal private treatment facilities, per se, although private collectors often bring septage to nearby farms for composting.

Funding sources

Cities depend largely on the national and state governments for sanitation and wastewater funding. Despite the unprecedented growth in urban population and demand for services, municipal revenue generation has not increased due to limited property tax collection and low user fees for public services. As a result, most ULBs depend on the availability of state grants and the implementation priorities of state agencies, often becoming trapped in a cycle of inadequate service provision, inadequate revenues, and inability to improve services. The past focus on centralised sewerage systems drained available funding sources and created an immense backlog of undeveloped and inadequate septage management infrastructure.

Key challenges

- Lack of physical infrastructure to treat septage in the state.
- Even though more than 80 per cent of households depend on on-site sanitation, it has not been given priority like solid waste management (SWM).

131 USAID 2010. A Rapid Assessment of Septage Management in Asia: Policies and Practices in India, Indonesia, Malaysia, the Philippines, Sri Lanka, Thailand, and Vietnam. Country Assessment-India, p 38.

- Coverage of centralised sewers (UGSS) is increasing in municipalities but has not extended to town panchayats.
- Tamil Nadu state government has a separate policy on septage management since September 2014.
- Various challenges exist towards implementation of policy such as data concerning on-site sanitation systems in ULBs, rectification of problematic on-site systems and regulation of private providers.
- No ULBs in Tamil Nadu have the physical capacity to safely collect, transport and treat IHHL septage.
- Funding support for ULBs to develop septage management infrastructure.
- Manual scavenging (prohibited by law) has reduced but still exists in few places.
- Most ULBs have very limited institutional, financial, and staff capacity to improve sanitation provision and septage management.
- Agency roles and responsibilities for water, sanitation, and public health are often unclear, overlap and are inadequately coordinated.
- National sanitation policy requires state and local governments to develop integrated sanitation policies, including septage management.
- The Tamil Nadu government has developed policy guidelines on septage management to strengthen and regulate faecal sludge management.
- Government initiative to include faecal sludge management as part of the state sanitation strategy and city sanitation plan.
- Involvement of various stakeholders is critical for the progress of septage management. Stakeholders include the government, private providers, NGOs, research organisations, companies, technology providers, community collectives and households.

4a

Analysis of the Field Study conducted in Tamil Nadu

4a: Findings from town panchayats

Profile of town panchayats:

Data collated through fact sheets is presented in this section. WASHNET-TN researchers collected the following information from available personnel - Executive officers/ Executive engineers/ Sanitary officers/ Sanitary Inspectors:

Table 10 provides the basic details of the town panchayats (TPs) covered under this study. The area of town panchayats ranges between 3 sq km (Needamangalam) and 30 sq km (Kotagiri). The number of wards in town panchayats vary according to the size of the area and its population. Kotagiri, which is the largest in size, has 21 wards with 10,114 households while Needamangalam is the smallest with 15 wards and 3,015 households. Data on the presence of slums reveals that there are 70 slums in ten TPs, of which 31 are notified and 39 are non-notified slums.

Town Panchayats	Area covered (in sq. km)	Number of wards	Number of households covered	Population
Alwarthirunagari	10	15	3405	9876
Kotagiri	30.93	21	10114	30643
Kunnathur	7.12	15	2724	8751
Needamangalam	2.68	15	3015	9335
Mamallapuram	12.28	15	5079	15969
Perundurai	23.39	15	7932	24930
Keeranur	16.39	15	4760	12086
Manachanallur	10.38	18	7896	26747
Avinashi	11.65	18	9591	28868
Tharangampadi	13.06	18	5474	23123

Table 10 - Profile of Town panchayats

Water requirement, wastewater generation and fecal sludge generation

Details collected from TPs on domestic water requirement and quantity of wastewater generation (Table 11) show that domestic water requirements range between 0.67 MLD (Needamangalam) and 2.02 MLD (Avinashi), with the average being 1.47 MLD.

Across all town panchayats, 94 per cent of the domestic water supply requirement is met by the panchayats themselves. In the case of three TPs (Manachanallur, Avinashi and Tharangampadi), the complete domestic water requirement is met by the town panchayat.

Data provided on wastewater generation indicates that, of the total domestic water use, 78 per cent is generated as wastewater which is closer to the CPHEEO estimation. Data on the quantity of faecal sludge generated indicates that 18 per cent faecal sludge was generated out of the wastewater.

Types of faecal sludge collection systems

Data on the types of faecal sludge collection systems (Table 12) in households across town panchayats indicates that use of septic tanks is most prevalent, followed by soak pits. Data reveals that the use of public toilets is relatively more in

Town Panchayats	Water requirement (MLD)	Total water supplied (MLD)	Quantity of wastewater generated (MLD)	Quantity of faecal sludge generated (MLD)
Alwarthirunagari	0.89	0.71	0.57	0.11
Kotagiri	2.50	2.00	1.60	0.32
Kunnathur	0.80	1.00	0.80	0.16
Needamangalam	0.67	0.70	0.56	0.12
Mamallapuram	1.12	1.24	0.99	0.20
Perundurai	1.75	1.75	1.39	0.28
Keeranur	1.08	0.94	0.75	0.15
Manachanallur	1.87	1.87	1.49	0.30
Avinashi	2.02	2.02	1.62	0.32
Tharangampadi	1.96	1.62	1.29	0.26

Table 11 - Water Requirement, Wastewater Generation and Faecal Sludge Generation – Town Panchayats

Perundurai (28 per cent), Needamangalam (21 per cent) and Mamallapuram (20 per cent). However, open defecation is still in practice in all the town panchayats except in Perundurai. One-third of the households in Mamallapuram defecate in open spaces and the corresponding percentages for Keeranur, Kotagiri, Needamangalam and Alwarthirunagari are 27 per cent, 25 per cent, 17 per cent and 16 per cent respectively.

Overall, there is no underground sewerage system in any of the TPs. Of all households, around 51 per cent use septic tanks, roughly 20 per cent use soak pits, 13 per cent use public toilets and around 15 per cent of people defecate in open spaces.

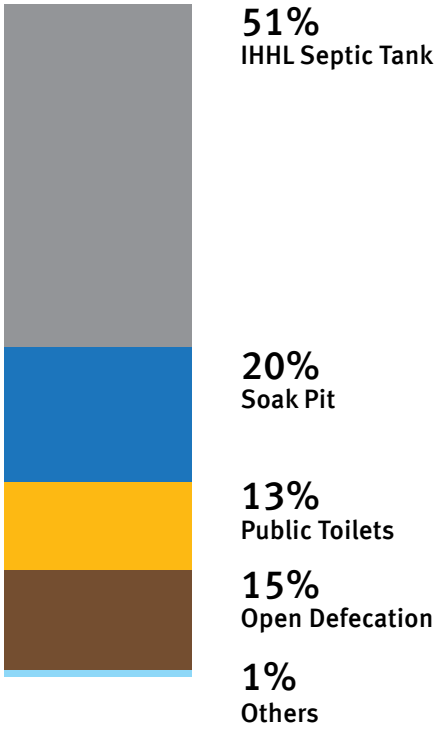


Figure 4 - Types of Latrine facilities in Town Panchayats

Town Panchayat	IHHL Septic Tank	Soak Pit	Public Toilets	Open Defecation	Others
Alwarthirunagari	72%	0%	12%	16%	0%
Kotagiri	55%	10%	10%	25%	0%
Kunnathur	20%	60%	5%	10%	5%
Needamangalam	32%	30%	21%	17%	0%
Mamallapuram	46%	0%	20%	34%	0%
Perundurai	49%	18%	28%	0%	5%
Keeranur	48%	21%	4%	27%	0%
Manachanallur	50%	26%	15%	9%	0%
Avinashi	85%	13%	0%	2%	0%

Table 12 - Types of Faecal Sludge Collection Systems – Town Panchayats

Usage of equipment in septage management

An attempt has been made to understand how well the TPs are equipped with modern equipment/machinery to handle septage. It was found that except in Tharangampadi, none of the remaining nine TPs reported having any equipment. According to the management of Tharangampadi TP, they have a suction-cum-jetting machine and vacuum emptier.

Responses from sanitary workers were found to be more detailed than those from the management of TPs. For example, sanitary workers from Tharangampadi confirmed the management's version on emptying equipment and also provided additional information on the presence of a tanker lorry with a capacity of 6000 litres and safety equipment such as hand gloves and hose pipes. Similarly, only sanitary workers from Keeranur TP mentioned that their town panchayat office has basic safety equipment and one tanker lorry with a capacity of 6000 litres, while sanitary workers from Alwarthirunagari reported having safety equipment.

Quantity of faecal sludge emptied

Data on the quantity of faecal sludge emptied everyday shows that no information is available for three TPs (Mamallapuram, Kunnathur and Avinashi); sanitary workers from Perundurai and management from Keeranur also could not provide any information on this. Complete information is available only

from Tharangampadi town panchayat. Therefore, in the absence of complete and reliable data, interpretations need to be drawn carefully. (Annexure 1, Table 1).

In the case of individual toilets, responses from the management and sanitary workers were found to be the same for three TPs (Alwarthirunagari, Kotagiri and Tharangampadi). The quantity of faecal sludge collected from individual homes (7 responses), ranges from as low as 120 litres as reported by Tharangampadi to about 10,000 litres as reported by Manachanallur.

The quantity of faecal sludge collected from group houses ranges from 200 to 2,000 litres (5 responses) and from private places ranges from 1,000 to 10,000 litres (5 responses). Fewer responses were given on the quantity of faecal sludge collected from public and community toilets with sanitary workers and management of one TP (Tharangampadi) reporting varying quantities of faecal sludge collected.

Frequency of faecal sludge collection

Irrespective of the role of ULBs in faecal sludge collection, both the management and sanitation workers from all town panchayats were asked about the frequency of FS collection from individual houses. No information was available from Avinashi and Kunnathur and among those who responded, the responses of management and sanitary workers were not similar even within the same town panchayat, which reflects the lack of clarity and the limited role played by the ULBs.

Data on frequency of emptying for different collection systems (Table 13) reported by eight town panchayats[132] indicates that most households prefer to empty their septic tanks once in 10 to 20 years as reported by sanitary workers while majority of the management (except Perundurai and Kotagiri) reported a higher frequency of once in one to five years. It is clear from the data that most households clean their septic tanks after long periods. This shows that desludging is not in accordance with the prescribed standards of operative guidelines for septage management for urban and rural local bodies in Tamil Nadu, 2013.

A similar pattern of lower frequency was reported by sanitary workers for group houses (5-20 years) while the management reported 1-10 years frequency of cleaning. Expectedly, public toilets and community toilets are reported to be cleaned more frequently (less than two years) although variations in the responses remain.

132 1. Alwarthirunagari, 2. Kotagiri, 3. Needamangalam, 4. Mamallapuram, 5. Perundurai, 6. Manachanallur, 7. Tharangampadi and 8. Keeranur

Types	Respondents	Alwarthirunagari	Kotagiri	Needamangalam	Mamallapuram	Perundurai	Keeranur	Manachanallur	Tharangampadi
Individual homes	SW	15-20 yrs	15 yrs	5-6 yrs	15-20 yrs	10 yrs	10 yrs		10 yrs
	Mgt	2-3 yrs	15 yrs	1 yrs	3 yrs	10 yrs	5 yrs	4 yrs	5 yrs
Group houses	SW	15-20 yrs	10 yrs	5 yrs	15-20 yrs	5 to 6	10 yrs		10 yrs
	Mgt		10 yrs	1 yr	4 yrs	6 yrs	1 yr		1 yr
Private (business centres/ markets)	SW			5-6 months		2-3 yrs	2 yrs		2 yrs
	Mgt		10 yrs		5-6 months	2-3 yrs	1 yr	2 yrs	1 yr
Public toilets	SW			3 yrs		1 yr	Once a year		1 yr
	Mgt	1 yr	10 yrs	6 months	3 months	1 yr	2 yrs	15 days	2 yrs
Community toilets	SW			3 yrs		1 yr	Once a year		1 yr
	Mgt					1 yr	2 yrs		2 yrs

Table 13 - Frequency of Faecal Sludge Collection – Town Panchayats

SW- Sanitary workers; Mgt- Management

Cost for emptying

To understand the cost of emptying faecal sludge, both the management and sanitation workers across town panchayats were asked about their approximate fee. Data (Table 14) shows that no uniform pattern exists and the amount specified by management and sanitation workers also varies.

To empty a septic tank, the cost per load charged by sanitation workers varies from Rs.800 (Keeranur) to Rs.2,000 (Tharangampadi). The corresponding charges by management vary between Rs.800 (Keeranur) and Rs.10,000 (Alwarthirunagari).

It is found that responses of sanitation workers varied in three town panchayats (Needamangalam, Mamallapuram and Tharangampadi) and were similar in two (Kotagiri and Keeranur). The fee quoted by management is higher than that of sanitation workers in Needamangalam and Mamallapuram. Similarly, cost of

emptying the 'soak pit', ranges from Rs.800 to Rs.2,000 per load. It is surprising to see that management from Keeranur and Tharangampadi reported the cost of manual scavenging (by private workers) to be Rs.500 per load.

According to the management and sanitation workers, fixing the cost for emptying faecal sludge is based on various factors such as distance travelled, input cost (fuel and labour charge) and tank size.

Types	Respondents	Alwarthirunagari	Kotagiri	Needamangalam	Mamallapuram	Perundurai	Keeranur	Manachanallur	Tharangampadi
Septic tank	SW		5000 - 15000	900-1,000	1,300		800		2000
	Mgt	2000-10000	5000 - 15000	2,000	1,800-2,000	Rs.2.00/ltr	800	1200	800
Soak Pit	SW		Rs.3.00/ltr	900			800		1000
	Mgt	2000-3000	5000- 15000			Rs.2.00/ltr	800		800
Manual Emptying	SW								
	Mgt						800		500

Table 14 - Cost for emptying FS per load (in Rupees) – Town Panchayats

SW- Sanitary workers; Mgt- Management

Treatment and disposal of faecal sludge

As mentioned earlier, there is no Underground Sewerage System (UGSS) and Septage Treatment Plants (STPs) in any of the town panchayats. Therefore, no question on treatment of faecal sludge arises.

Table 15 (Places of FS disposal) reveals that most often, multiple sites are reported for disposing faecal sludge – 'outskirts' and 'agricultural land' (possibly to be used as manure) – are the commonly reported disposal sites followed closely by the municipal disposal yard. Both sanitation workers and management of Mamallapuram panchayat reported disposal of faecal

sludge in the riverbed, while the management of Manachanallur and the sanitation workers of Needamangalam reported disposal in riverbeds.

Town Panchayats	Manholes	Garbage Dumps	Drains	Outskirts	Agricultural Lands	River Beds
Alwarthirunagari		Yes		Yes		
Kotagiri		Yes	Yes		Yes	
Kunnathur		Yes			Yes	
Needamangalam		Yes	Yes	Yes	Yes	Yes
Mamallapuram			Yes	Yes	Yes	Yes
Perundurai					Yes	
Keeranur	Yes		Yes	Yes	Yes	
Manachanallur		Yes	Yes			Yes
Avinashi		Yes				
Tharangampadi	Yes		Yes	Yes	Yes	

Table 15 - Places of FS Disposal – Town Panchayats

SW- Sanitary workers; Mgt- Management

Issues in FS collection systems

Information on problems associated with collection of faecal sludge was sought from management and sanitation workers on three different types of collection systems viz, septic tanks, soak/leach pits and pit latrines. Responses of management from five[133] town panchayats and sanitation workers from six[134] town panchayats are outlined in Table 16.

The most commonly reported problem with soak pit/leach pits is the 'lack of desludging at regular intervals', secondly 'poor construction', followed by 'improper desludging'. Similarly, for septic tanks, the most common problem was 'bad odour/gas formation' followed by 'overflow during monsoon', which causes problems in the neighbourhood. Higher cost for emptying the septic tank and pit latrines is also mentioned as a problem by two town panchayats.

Issues	Soak pit / leach pit	Septic tank	Pit latrines
Poor designing (no regard to soil or water table, not plastering the wall of tank, outlet to drain)	2	2	
Lack of treatment of faecal sludge	1	1	
Let out into drainage	2	1	
Lack of desludging at regular intervals	4	2	2
Bad odour/ gas formation	1	4	2
Overflow during monsoon	1	3	
Higher cost		2	2

Table 16 - Issues in FS Collection Systems – Town Panchayats

Issues in faecal sludge management

Sanitary workers from eight town panchayats did not report any issue in their town panchayats as they are not directly involved in faecal sludge management. However, sanitary workers from Alwarthirunagari and Needamangalam mentioned three issues: 1. lack of community toilets which led to open defecation; 2. lack of outreach programmes on sanitation which resulted in poor awareness among general public; and 3. direct connection of the household drainage to the river.

On the specific question of problems faced with the current collection system, management from four town panchayats (Kotagiri, Perundurai, Keeranur and Tharangampadi) stated 'lack of technology which leads to manual efforts' and 'low frequency of emptying the septic tanks' as issues. Similarly, sanitation workers from four town panchayats (Needamangalam, Mamallapuram, Keeranur and Tharangampadi) shared that 'hardening of sludge due to irregular and improper emptying of septic tanks, ground water pollution due to poorly designed septic tanks, lack of air compressor machines and poor drainage' were issues relevant to them.

On issues associated with the present emptying process, of the three responses from management, one (Perundurai) reported that faecal sludge cannot be completely removed because of 'hardening' and two others (Keeranur and

Town Panchayats	Areas affected by poor FS collection systems	Challenges in disposing FS
Alwarthirunagari	Direct discharge of septage into drains (Ward Nos. 1,4,5,6,7,9)	No vehicle and place for disposal
Kotagiri		Lack of Dual Pit system, lack of awareness in constructing well designed septic tanks, soak/ leach pit systems
Needamangalam	Mela Rajaveethi (Behind Government Hospital)	
Mamallapuram	Ward no. 10 in Meenavakuppam & Ward no. 9 in Annaikatti	During the septic tank cleaning there are no transport facilities, lack of proper disposal
Perundurai	Open defecation in Panickam palayam due to absence of public toilets	
Keeranur	Bus stand & Market	Service charges to private workers, lack of maintenance by households and non-availability of workers when needed
Tharangampadi	Bus stand	Service charges to private workers, lack of maintenance by households and non-availability of workers when needed

Table 17 - Challenges in FS Disposal –Town Panchayats

Tharangampadi) mentioned 'lack of safety materials' as issues. Sanitary workers from Keeranur and Tharangampadi mentioned 'lack of modern equipment' as issues associated with the present emptying process.

On issues with the current transportation system, only the Kotagiri management said difficulty in reaching hilly areas was an issue and of the two sanitary worker respondents, one (Perundurai) said that the entire sludge could not be collected and transported while the other pointed out that collection at night as an issue.
On issues with treatment of FS before disposal, none of the management and sanitation workers from any of the town panchayats answered as they were not directly involved in treatment of faecal sludge.

On issues with a designated place of disposal, out of the three responding managements, one (Perundurai) said there is no specific place allotted for disposal, while two others (Keeranur and Tharangampadi) reported 'air pollution, 'water contamination and mosquitoes' as issues associated with the place of disposal.

Challenges in faecal sludge disposal

TP managements were asked about the areas affected by poor FS collection and issues with current FS disposal. No information was available from Kunnathur, Manachanallur and Avinashi. Responses show that the majority (six TPs) have areas affected by poor FS collection (Table 17). Among the areas affected, areas closer to public spaces such as markets, bus stands and government hospitals are most affected. The challenges faced in disposal of FS (5 responses) ranged from lack of transport (2); lack of awareness/poor maintenance by households (3), service charges to private workers (2) and non-availability of workers. Mamallapuram responded that Buckingham canal is affected due to FS disposal.

Management view on private player functioning

According to TP management, private service providers play a crucial role in faecal sludge management across all town panchayats (Annexure 1, Table 2). The number of private service providers ranges from one to six. Cost for emptying faecal sludge is generally fixed per trip based on septic tank size, distance and quantity collected. All seven TPs (Kotagiri, Kunnatur, Mamallapuram, Perundurai, Keeranur, Manachanallur and Tharangampadi) reported sufficient human resources with private players operating in their panchayats.

With regard to FS emptying equipment available with private service providers, management of six town panchayats (Alwarthirunagari, Kotagiri, Kunnatur, Perundurai, Keeranur and Manachanallur) reported having sufficient equipment such as air compressors, hose pipes and vacuum pumps. In addition to the equipment, manual methods are also used in two town panchayats (Keeranur and Tharangampadi).

According to management from six town panchayats (Alwarthirunagari, Kotagiri, Kunnatur, Perundurai, Keeranur and Tharangampadi), private service providers own sufficient vehicles for transport.

According to management, none of the private service providers treat faecal sludge before disposal. Only in Kunnathur TP, disposal from public toilets is done in the municipal solid waste yard, while the rest dispose in ‘outskirts’ and other public spaces. A detailed list of places where FS is disposed is given in Annexure 1 Table 2.

All the management responses acknowledged that private service providers have scope in faecal sludge management as most of the urban local bodies are not equipped to do so due to various reasons. Limitations in the institutional capacities of ULBs has resulted in the creation of demand for private service providers.

WaterAid/Jon Spaull

The most commonly reported problem with soak pit/leach pits is the 'lack of desludging at regular intervals', secondly 'poor construction', followed by 'improper desludging'. Similarly, for septic tanks, the most common problem was 'bad odour/gas formation' followed by 'overflow during monsoon', which causes problems in the neighbourhood.

Analysis of responses of private service providers

Private players across the ten TPs have been in operation for two to twenty years. On reasons for starting this service, four (Alwarthirunagari, Kotagiri, Keeranur and Tharangampadi) of the ten service providers reported this to be their traditional/caste-based work. One private player (Perundurai) undertook this for commercial reasons, two (Alwarthirunagari and Manachanallur) because of poverty and two (Kunnatur and Needamangalam) stated that they started this since no one was offering this service in the municipality.

The fee charged is on average about Rs.2,000 per trip. Almost all responding private players reported between one to ten service calls a month. Two (Keeranur and Tharangampadi) private players reported having applied for licenses. The prices reported by the private players in the data and descriptive sections of the interview schedule are in the same range. Regarding training in equipment usage, only the respondent from Avinashi reported attending a training programme.

Town Panchayats	No. of PP	No. of workers	Tanker capacity (litres)	No. of clients (In a month)	Quantity of FS collected (litres)	Status of license
Alwarthirunagari	10	3	DNA	6	5,000	No
Kotagiri	1	8	6000	4	2,000	No
Kunnathur	1	3	8000	4	24,000	No
Needamangalam	5	3	1500	2	1,500	No
Mamallapuram	1	3	5000	6	50,000	No
Perundurai	1	12	6000		12,000	No
Keeranur	2	20	6000	2	4,000	Applied
Manachanallur	1	DNA	4000	1	8,000	No
Avinashi	1	DNA	5000	1 to 10	5000	DNA
Tharangampadi	2	DNA	6000	2	4,000	Applied

Table 18 - Profile of Private Service Providers – Town Panchayats

DNA - Data not available

Use of modern equipment

Nine (except Tharangampadi) private service providers reported using modern equipment for removing faecal sludge and using other supporting equipment such as shovels, ropes and rods in varying combinations. None of them have undergone any formal training for using the equipment. Two (Kunnathur and Mamallapuram) players report being trained by the vehicle company at the time of purchase.

With regard to safety equipment, workers from seven of the service providers predominantly use masks and hand gloves. Two (Keeranur and Tharangampadi) do not use any safety equipment.

Treatment and place of disposal

None of the private players provide information on treating FS before disposal, implying that the disposal is direct and without treatment. With regard to disposal, eight responded that they throw faecal sludge in multiple places – agricultural land (4); municipal dumping yard (3), own land (1) and riverbed (1). In fact, lack of proper disposal areas is acknowledged as a key problem by four of

Town Panchayats	Operating Since	Fee for emptying (Rs.) per trip	Equipment for emptying	Use of safety measures
Alwarthirunagari	6 yrs	1000 - 5000	Air compressor, Plumbing with motor	Mask for nose and gloves for hand
Kotagiri	15 yrs	10000- 15000	Motor System (Sucking & disposing out)	Gloves, masks & boots
Kunnathur	12 yrs	2000- 5000	High Air compressor vehicle	Mask and hand gloves
Needamangalam	2 yrs	2000*	Plumbing with motor	Mask and gloves
Mamallapuram	8 yrs	Max 800	Vacuum pressure	Data not available
Perundurai	12 yrs	1.50-2.00/lit	Vacuum plumbing	Mask, gloves and oxygen cylinders
Keeranur	15 yrs	700	Machines	Not using any
Manachanallur	20 yrs	1800-2500	Air Compressor	Pipe
Avinashi	15 yrs	1500 -1800	Machines	Shovel
Tharangampadi	15 yrs	200	Contract labour	Not using any

Table 19 - Profile of Services Offered by Private Service Providers – Town Panchayats

* Rs.500 will be charged for additional trip

the private players. Some, in fact, report vigilantism by the public and corruption by the state actors for personal gains. The other commonly reported problems are the lack of workers (3), lack of proper vehicles (3) and the cost of maintenance of vehicles (2). Health effects of faecal sludge collection and disposal is mentioned by one player.

Regarding the issue of water contamination, of the four (Kotagiri, Needamangalam, Mamallapuram and Perundurai) respondents, three said there is no drinking water contamination as private service providers do not discharge into water bodies while the private player from Needamangalam stated that the water was getting contaminated due to greywater discharge and not due to faecal sludge. One (Perundurai) private player who disposed faecal sludge in agricultural land, did acknowledge the chances of water contamination if faecal sludge is directly disposed in fields.

Town Panchayats	Place of disposal	Challenges faced by Private Service Providers in FSM
Alwarthirunagari	Open place of waste land. After disposal they sprinkle phenol and soap water on the sludge.	There was no proper place to dispose. Some do not have vehicles with air compressor. There is a restriction from public. When FS is taken for disposal, the septic tank vehicle has been followed by the police and other officials. They create problems and we have to give them money.
Kotagiri	Own Land (we collect the faecal sludge and dispose in Banana and other fields for use as manure)	Lack of labourers and places for disposal.
Kunnathur	Faecal sludge from public toilets is disposed in the municipal solid waste yard. The households' FS is disposed in the agricultural lands of the vehicle owner.	There is no proper place for disposal during the monsoon. When the FS is taken for disposal, the septic tank vehicle has been followed by the police and the general public.
Needamangalam	Agricultural lands and in open spaces near drainage. After disposal, phenol and soap water is sprinkled on the sludge	There is no proper place to dispose. No proper vehicle.
Mamallapuram	Town panchayat garbage dump yard	Underground construction
Perundurai	Agricultural lands	Gas formation during cleaning
Keeranur		High cost for vehicle maintenance, workers, wages
Manachanallur	Cauvery riverbed	No. of lorries, underground network has come in the cities.
Avinashi	Agricultural fields, town panchayat garbage dumps	Health, Liver affects
Tharangampadi		High cost for vehicle maintenance, workers, wages

Table 20 - Places of FS Disposal and Related Challenges - Town Panchayats

Support needed from the government

Of the ten private players, just one (Manachanallur) did not want any assistance from the state and one (Kotagiri) did not respond. The remaining eight suggested multiple avenues for assistance from the government including: land or proper dumping yard for FS (4); land and vehicles (with subsidy) (3); a vehicle per se for collection of FS (2); licensing and regulation of the same (2); and need for generating public awareness (1).

Town Panchayats	Support required from state and town panchayats
Alwarthirunagari	1. Provision of vehicle for FS. 2. The government and public should not place restrictions on daytime collection of FS. 3. Government should allocate 10 acres for the disposal of FS.
Kunnathur	Government should issue licences to private service providers to ensure quality services.
Needamangalam	Provision of vehicle for FS.
Mamallapuram	1. Proper place to be allotted. 2. Licences system to be regulated. 3. Loans arranged for buying the vehicles.
Perundurai	Proper disposal yard required.
Keeranur	Provision of loans with subsidy.
Manachanallur	Do not need support.
Avinashi	Place for disposal to be alloted.
Tharangampadi	Provision of loans with subsidy.

Table 21 - Support required from the State and Town Panchayats

Analysis of community groups' responses

Findings from the focus group discussions with ten community groups are presented here. Four group discussions were conducted with women groups and the rest were with mixed groups.

Talking about the type of septic collection used by households, respondents in nine groups reported having septic tanks in their households; members in four groups reported use of pit latrines by lesser percentage of households and one group (Needamangalam) reported resorting to open defecation.

On the type of septic collection tanks largely used by neighbourhood communities, eight groups reported neighbourhoods using septic tanks, three groups reported using leach/pit latrines, and one group (Mamallapuram) reported neighbours using public defecation facilities.

Reactions to the current faecal collection system used by the neighbours were sought from groups. Their reaction was a mixed one and the reasons are presented in Table 22.

Reasons for happiness	Reasons for unhappiness
Septic Tank	
• Septic tank is a support to us to store our sludge. • We are happy to move away from soak pits and are not required to carry out frequent desludging. • Modern technology from service providers for cleaning is useful. • We are happy with the availability of septic tank, toilet and possibility of drainage. • Septic tank is easy to operate and safe.	• Expenses are high. • The overflow is discharged into drainage directly, which leads to misunderstandings between neighbours. About 15 per cent community people are connected with drainage, rivers and ponds in Needamangalam. • Pollution, environmental problems are key concerns. • Breeding of mosquitoes and its health impact is the main issue. • Lack of toilets. • In the rainy season, overflow from septic tank is very high. About 15 per cent community people resort to open defecation (Alwarthirunagari). • As drainage is connected to a pond, ponds became unusable and cause groundwater pollution. Some community people resort to open defecation (Needamangalam).
Soak pit/ leach pit	
• Leach pit does not fill up quickly and hence easy removal.	• Discharge cannot be stored for a long time, hence we need to put soak pits or discharge into drainage, which causes environmental pollution. 15 per cent community people are connected with drainage, rivers and ponds (Alwarthirunagari). • Bad smell is a problem along with the fact that soaking is not proper during rainy season. Also, desludging is expensive.
Septic tank and Soak pit	
	• Bad smell is an acute problem along with the fact that soak pit and septic tank are not proper during rainy season. Also desludging is expensive.
Open defecation	
	• Absence of public toilets lead to open defecation in common places near rivers and drainage (Alwarthirunagari). • Absence of public toilets in bus stand cause passengers to go for public urination

Table 22 - Responses to Septic Collection Systems used by Neighbours

Town Panchayats	How often do you empty the septic tank?	Whom do you generally approach for emptying?	Reasons for service provider choice
Alwarthirunagari	Once in 15 to 20 years	Private	Such services are not available in town panchayat.
Kotagiri	Once in 5 years	Private	Such services are not available in town panchayat.
Kunnathur	Once in 15 to 20 years	Private	Such services are not available in the town panchayat.
Needamangalam	Once in 5 years	Private	No such services are available in town panchayat.
Mamallapuram	Once in 4 to 6 years		No services in town panchayat.
Perundurai	Once in 8 to 10 years	Private	Good service, punctuality, easy to approach, good technology and lack of sanitation workers available in TP.
Keeranur	no information is available	Municipal	Formal system, fair cost, easy to contact and other drainage work possible.
Manachanallur	Once in 3 years	Private and manual scavenging	Machine not available in town panchayat, cost was high and septic tank cleaning was necessary.
Avinashi	Once in 5 years	Private	Respond whenever we call, good service, empty tank with utmost care and use new technology.
Tharangampadi	Once in 5-8 years	Municipal	Formal system, fair cost, easy to contact, drainage work possible and useful for tax matters.

Table 23 - Frequency of cleaning and choice of service provider

Factors contributing to acceptance of septic tanks included: availability of cleaning service, ease of operation, its ability to store sludge and non-requirement of frequent desludging. The recurring problem with septic tanks is that overflow is discharged into drains or ponds, which creates groundwater pollution and misunderstandings with neighbours due to the bad odours it generates.

Frequency of cleaning and choice of service provider

The major reason for overflow of septic tanks and leach pits seems to be infrequent cleaning. It was reported that cleaning is

undertaken once in five years in Kotagiri, Needamangalam and Avinashi; every 8-10 years in Perundurai and between 15-20 years in Kunnathur and Alwarthirunagari. In Manchanallur, emptying of septic tanks is between 1-3 years while no information is available for Keeranur.

Choice of service providers

Six of the ten TP community groups use private services for cleaning, one community group reports using private and manual scavenging (Manchanallur) and two other groups report municipal services (Keeranur and Tharangampadi), while no data is available for Mamallapuram.

Among the reasons for seeking private players for septic tank cleaning are lack of town panchayat services (4); while one group from Perundurai said that lack of response from municipal workers made them turn towards private players who offered good service, were punctual, approachable and used modern technology. Lack of equipment with the municipality in Manachanallur turned community groups towards private services and also urgency to get septic tanks cleaned made them avail manual scavenging services.

Most of the community groups are not aware of where the faecal sludge is disposed. Two groups (Mamallapuram and Manachanallur) provided generic answers such as 'open area', 'outskirts', 'riverbeds' and 'drainage'.

Health, environmental and social impact of poor FSM

Community responses show overlapping of health, environmental and social impacts. The community perception of health impact indicates that they are aware of health problems such as cholera, malaria (due to mosquito breeding), skin allergies, and waterborne diseases arising out of poor faecal sludge management.

Similarly, regarding environmental problems, most of the community groups reported awareness of poor faecal sludge management causing groundwater contamination and water pollution (eight groups), seven groups mentioned bad odour emanating from faecal sludge polluting the air and six groups stated soil pollution (24).

Town Panchayats	Health impact	Environmental impact	Social impact
Alwarthirunagari	Fever, Skin diseases	Air, water and land pollution	
Kotagiri	Spread various diseases	Bad odour & spread diseases	Misunderstanding among neighbours
Kunnathur	Fever, Skin diseases	Air, water pollution	Quarrels among neighbours
Needamangalam	Fever, Skin diseases	Air, soil, water pollution	
Mamallapuram		Groundwater pollution	Quarrels among neighbours
Perundurai	Cholera, malaria, skin allergy, waterborne diseases	Groundwater and soil contamination	Quarrels among neighbours & diseases spread
Keeranur	Malaria, mosquitoes, fever and filariasis	Bad odour, Groundwater contamination affecting soil fertility	Health, hygiene, productivity and children's health
Manachanallur	Health problems and bad smell	Water and air pollution	Quarrels among neighbours
Avinashi	Headache, vomiting and malaria	Air pollution	Quarrels among neighbours, mental stress and expenses
Tharangampadi	Malaria, mosquitoes, fever and filariasis	Groundwater contamination affecting soil erosion, air pollution and bad smell	

Table 24 - Impact of poor FSM on Community

In the case of social impact, quarrels and misunderstandings among neighbours were commonly reported by the majority of the community groups.

4b
Findings from Municipalities

The area of a municipality ranges from 10 sq. km to 50 sq. km. Most municipalities range from 20 to 35 sq. km and are divided into wards. Each municipality has a minimum of 21 and a maximum of 52 wards. The total number of households in a municipality ranges from 11,000 to 64,000. Gudalur municipality has less households and Nagerkoil has more. The population in a municipality ranges between 49,000 to 2,24,000. Perambalur and Gudalur have a population of around 50,000 but Nagerkoil municipality has a population of around 2,24,000. There are 211 slums in nine municipalities. Out of this 211, 144 are notified and 67 are non-notified slums.

Municipalities	Area covered under (in sq. km)	Number of wards	Number of households covered	Population
Gudalur	49.1	52	64,094	2,24,329
Mannarkudi	13.87	36	26,433	90,124
Nagerkoil	21.37	30	19,475	57,315
Pollachi	25.2	33	27,165	96,431
Sankarankovil	10.75	27	14,054	54,416
Thiruchengodu	20.59	21	12,732	49,648
Tiruvallur	21.95	42	40,365	1,56,318
Perambalur	11.26	36	25,907	90,675
Pudukottai	49.1	52	64,094	2,24,329
Mayavaram	13.87	36	26,433	90,124

Table 25 - Profile of Municipalities

Water requirement, wastewater generation and faecal sludge generation

Details collected from municipalities on domestic water requirement and quantity of wastewater generation (Table 26) shows that domestic water requirement ranges between 3.90 MLD (Perambalur) and 26.90 MLD (Nagerkoil), with the average of 9.60 MLD.

Regarding domestic water supply, across all municipalities, 88 per cent of the requirement is met by the municipalities themselves. In case of Mannarkudi and Pollachi, the complete domestic water requirement is met by the municipality.

Data provided on wastewater generation indicates that, of the total domestic water use, 69 per cent is generated as wastewater which is lesser than CPHEEO estimation. Data on quantity of faecal sludge generated indicates that 19 per cent faecal sludge was generated out of the wastewater.

Municipalities	Water requirement (MLD)	Total water supplied (MLD)	Quantity of wastewater generated (MLD)	Quantity of faecal sludge generated (MLD)
Gudalur	4.70	4.50	3.60	0.72
Mannarkudi	6.03	6.03	4.82	0.97
Nagerkoil	26.90	21.00	16.80	3.36
Pollachi	9.00	9.00	7.20	1.44
Sankarankovil	5.16	5.44	4.35	0.87
Thiruchengodu	10.00	9.64	7.71	1.54
Tiruvallur	7.35	5.00	4.00	0.80
Perambalur	3.90	3.20	2.40	0.48
Pudukottai	14.00	13.50	10.80	2.16
Mayavaram	9.00	7.80	6.24	1.25

Table 26 - Water Requirement, Wastewater Generation and Faecal Sludge Generation - Municipalities

Types of faecal sludge collection systems

Data on types of faecal sludge collection systems (Table 27) in households across municipalities indicate that septic tanks are the most prevalent, followed by public toilets. Data reveals that the use of public toilets is relatively more in Mayavaram (22 per cent) and Sankarankovil (17 per cent). However, soak pits are still being used in Mannarkudi (55 per cent) and Tiruvallur (34 per cent). Only in Tiruvallur, 10 per cent of households defecate in open spaces.

Around 56 per cent of individual households use septic tanks in municipalities. Around 14 per cent of individual households use soak pits. Around 10 per cent of households are connected to the underground drainage system in municipalities. Around 12 per cent of households use public toilets (septic tank) in municipalities. Around 1 per cent of people defecate in the open. Around 7 per cent of households let the wastewater go into drainage and open places.

Municipalities	IHHL Septic Tank	Soak Pit	Public Toilets	Sewer Network	Open Defecation	Others
Gudalur	65%	11%	7%	0%	0%	17%
Mannarkudi	15%	55%	15%	10%	0%	5%
Nagerkoil	65%	15%	15%	0%	0%	5%
Pollachi	86%	0%	11%	0%	0%	3%
Sankarankovil	80%	0%	17%	0%	0%	3%
Thiruchengodu	70%	10%	15%	0%	0%	5%
Tiruvallur	42%	34%	4%	0%	10%	10%
Perambalur	16%	0%	0%	78%	0%	6%
Mayavaram	70%	0%	22%	0%	0%	8%

Table 27 - Types of Faecal Sludge Collection Systems - Municipalities

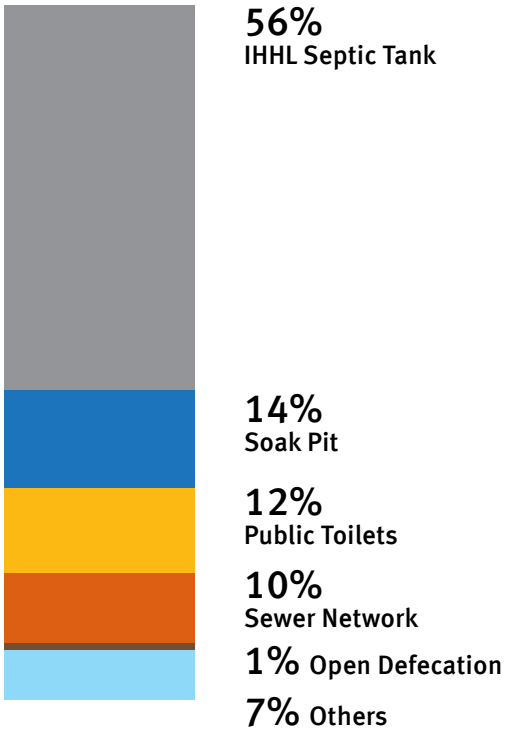


Figure 5 - Types of Latrine facilities in Municipalities

Use of equipment in septage management

According to sanitary workers from Mayavaram, cess pool machine, suction-cum- jetting machine and vacuum emptier, safety equipment and tanker lorries (8,000 litres) are available. Perambalur and Thiruchengodu have suction-cum-jetting machines and vacuum emptier and tanker lorries. Pudukottai has only a suction-cum-jetting machine. Regarding equipment, all of them felt that their municipalities had the required number of vacuum emptiers as compared to other equipment.

Safety equipment is reportedly available in Thiruchengodu, whereas data from Tiruvallur, Gudalur, Pudukottai and Mayavaram shows that the available safety equipment is insufficient.

Regarding tanker facility, three municipalities (Sankarankovil, Tiruvallur and Pudukottai) have 6,000 litres capacity and two (Mannarkudi and Thiruchengodu) have 4,000 litres capacity while Mayavaram has a tanker facility of 8000 litres. Except Thiruchengodu, all felt that the capacity of their tankers was insufficient.

Quantity of faecal sledge emptied

Available data shows that there is no clarity among sanitary workers about the quantity of faecal sludge emptied. The management also has limited information, but that is mainly about individual households (Annexure 1 Table 3).

Frequency of faecal sludge collection

Frequency of FS collection (except in the case of Perambalur) from individual homes varies from once in 2-10 years as reported by management and once in 1-10 years as reported (Refer to Table 28) by sanitary workers. In five municipalities (Mannarkudi, Sankarankovil, Thiruchengodu, Pudukottai and Mayavaram), the response varies quite widely between management and sanitation workers. Frequency of faecal sludge collection from group houses varies from once in every 6 months to once in 2-3 years. There are varied responses on faecal sludge collection from private places: management claims once in 6 months to once in 5 years and sanitary workers claim 2 to 6 years. Public toilets are reported to be cleaned between every 6 months to 4 years with three responses between management and sanitation workers (Sankarankovil, Thiruchengodu and Pudukottai) agreeing and varying in three cases (Gudalur, Mannarkudi and Mayavaram).

Cost for emptying

In none of the municipalities, manual emptying was undertaken. Fee for emptying as reported by management varies between Rs.600 to Rs.2,500 per visit, while sanitary workers (SW) report a price range between Rs.600 to Rs.5,000 per visit. One SW group in Gudalur indicated a per-litre fee of Rs.7-15. Responses of SW and management match in the six municipalities of Mannarkudi, Nagerkoil, Pollachi, Sankarankovil, Tiruvallur and Pudukottai, while they vary in Gudalur and Mayavaram (Refer to Table 29).

With regard to soak pit cleaning fee, it ranges between Rs.600 - 1,500 and responses between management and sanitary workers match in Tiruvallur, Pudukottai and Mayavaram. Leach pit cleaning fee reported by two managements ranged from Rs.600 - 700.

Types	Respondents	Gudalur	Mannarkudi	Nagerkoil	Pollachi	Sankarankovil	Thiruchengodu	Tiruvallur	Pudukottai	Mayavaram
Individual homes	Mgt	Once in 5-10 years	Once in 6 years	Once in 5 years	Once in 7-10 years	Once in 8 years	Once in 4 years	Once in 5 years	Once in 2 years	Once in 2 years
	SW	Once in 5-10 years	Once in 5 years			Once in 1-6 years	Once in 1-5 years		Once in 5 years	Once in 5 years
Group houses	Mgt		Once in 6 months					Once in 3 months	Once in 6 months	Once in 6 months
	SW							Once in 2-3 years	Once in 6 months	Once in 6 months
Private	Mgt		Once in 2-3 months			Once in 4 -5 months	Once in 3 months	Once in 3 months	Once in 6 months	Once in 6 month
	SW	Once in 3-4 months	Once in 5-6 months						Once in 2 months	Once in 2 months
Public toilets	Mgt	Once in 2 months	6 months	Every month	Every month	Every month	Once in 4 months	Once in 2 months	Every month	Once in 2 months
	SW	Once in 6 months	Every month			Every month	Once in 4 months		Every month	Every month
Community toilets	Mgt						Once in 3 months	Once in 2 months	Every month	Every month
	SW					Once in 1-2 months		Once in 2 months	Every month	Every month
Temporary toilets	Mgt									
	SW								Every month	Every month

Table 28 - Frequency of faecal sludge collection – Municipalities

SW- Sanitary workers; Mgt- Management

Managements of two municipalities (Thiruchengodu and Tiruvallur) report fixing the fee based on distance, load, and work involved. In two municipalities – Pudukottai and Mayavaram, management reports fee being fixed by workers while sanitation workers of the same municipalities say it is fixed by the private players. Tiruvallur management reports fee being fixed every year by them and SW report that it is based on load and distance.

In Mannarkudi, where the amount is fixed, management offered a detailed response: "The private service providers had been collecting a high fee (Rs.5,000 - 10,000) for emptying the septic tank. A resolution was passed in the municipality to reverse this and a vehicle was purchased. The purpose is to discourage use of private service providers and render services to the people at a lower fee of Rs.1,000 for emptying the tank".

Types	Respondents	Gudalur	Mannarkudi	Nagerkoil	Pollachi	Sankarankovil	Thiruchengodu	Tiruvallur	Pudukottai	Mayavaram
Septic tank	Mgt	2,000-5,000	1,000	5,000-7,000	1,500-2,000	2,000-2,500	1,500	700-1,200 (HH 350, CT 700)	600	1,500
	SW	Up to 15,000 (per litre 7-15)	1,000	5,000	1,500 per tank	2,500	1,500	700 (HH 350, CT 700)	600	700
Soak Pit	Mgt		1,000					700	600	1,500
	SW							700	600	1,500
Leach Pit	Mgt								600	700
	SW	2,000-5,000	1,000	5,000-7,000	1,500-2,000	2,000-2,500	1,500	700-1,200 (HH 350, CT 700)	600	1,500

Table 29 - Cost for Emptying FS per Load (in Rupees) - Municipalities

SW- Sanitary workers; Mgt- Management; CT- Community Toilet

Treatment and disposal of faecal sludge

Two managements (Mannarkudi and Perambalur) and three sanitation worker groups (Mannarkudi, Perambalur and Mayavaram) report treating FS before disposal but offer no description. Responses by the Mannarkudi municipality suggest that they do not treat but have a compost yard. As regards the quantity of FS collected, Tiruvallur reports that 360,000 litre of sludge is collected, while Perambalur reports 1.82 MLD (grey and black water).

The municipal solid waste site is the most frequently used dumping yard for faecal sludge disposal followed by agricultural land and outskirts. The other options reported include the lake bed in Perambalur as reported by the management and the river belt in Gudalur as reported by

Town Panchayats	Manholes	STPs	Garbage Dump	Drains	Outskirts	Agricultural Lands	River Beds
Gudalur			Yes	Yes	Yes	Yes	Yes
Mannarkudi						Yes	Yes
Nagerkoil			Yes				
Pollachi			Yes		Yes		
Sankarankovil			Yes	Yes	Yes		
Thiruchengodu			Yes			Yes	
Tiruvallur			Yes				
Perambalur		Yes					Yes
Pudukottai	Yes			Yes	Yes	Yes	
Mayavaram	Yes			Yes	Yes	Yes	

Table 30 - Places of FS Disposal - Municipalities

sanitation workers. Mannarkudi sanitation workers reported disposing in a compost yard. In Tiruvallur, both management and sanitation workers reported using the dedicated STP site constructed since January 2015 for municipal lorries only.

Issues in FS collection systems

Information on problems associated with collection of faecal sludge was sought on three different types of technology – septic tanks, soak / leach pit, ECOSAN/ twin pit latrine and centralised sewer systems. Only few municipal managements and sanitary workers responded to this question (31).

The most commonly reported problems are with septic tank usage, stated by the six managements (Gudalur, Sankarankovil, Thiruchengodu, Tiruvallur, Pudukottai and Mayavaram) and sanitary workers from Nagerkoil and Thiruchengodu as follows - lack of proper construction (4), overflow and opening during rainy season (4), water pollution (2), cost of cleaning (2), and gas formation during cleaning (2).

The answers by five managements (Sankarankovil, Thiruchengodu, Tiruvallur, Pudukottai and Mayavaram) to questions on issues with soak/leach

	Soak pit / leach pit	Septic tank	Sewer System
Connecting to drainage	2	1	
Lack of proper construction method	1	4	2
Poor maintenance	4		
Water pollution	1	2	
Lack of sewerage connection		1	
Overflow / opening during rainy season		4	
Cost		2	2
Gas formation		2	2
Machinery		1	

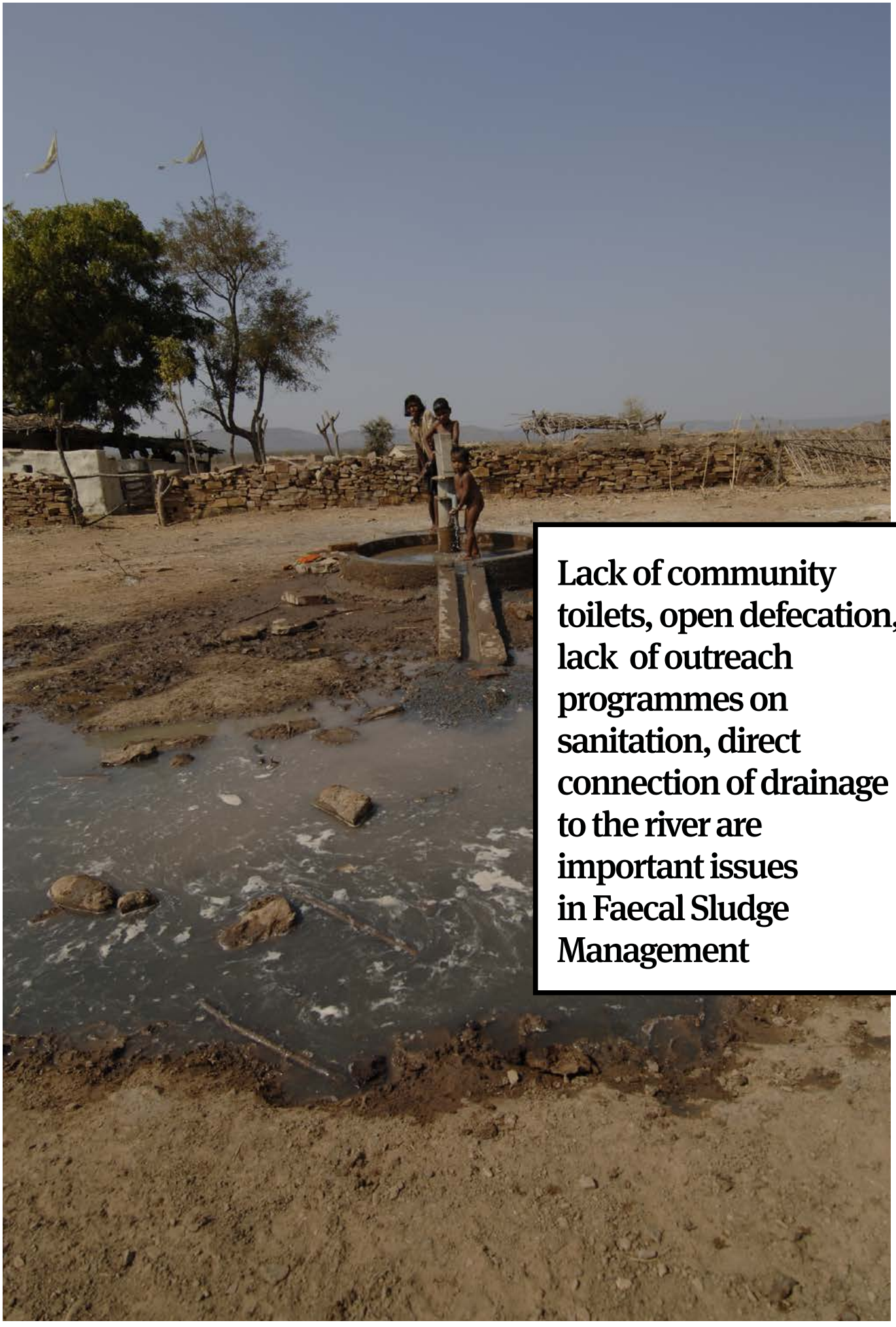
Table 31 - Issues in FS Collection Systems - Municipalities

pits include – poor maintenance of the system, connection by users to drainage, lack of proper construction methods and water pollution. Pudukottai and Mayavaram sanitary workers reported that soak pits need to be regularly cleaned. Cost and gas formation were reported mostly in centralised sewer systems by the managements of Pudukottai and Mayavaram.

Issues in faecal sludge management

In general, lack of community toilets, open defecation, lack of outreach programmes on sanitation, direct connection of drainage to the river are important issues. Another group stressed the lack of connection to drainage and connection to water bodies as an important issue. One sanitary worker group mentioned throwing of faecal matter in plastic bags as a problem.

On the specific question of problems faced with current faecal sludge collection technology, the managements of Mannarkudi, Thiruchengodu, Tiruvallur, Pudukottai, Mayavaram and the sanitation workers from Tiruvallur, Pudukottai and Mayavaram responded. Neighbourhood issues due to overflow (1); poor machinery (1), low levels of mechanisation (2), manual cleaning by Pudukottai and Mayavaram, narrow access to reach collection points (3), low frequency of



Lack of community toilets, open defecation, lack of outreach programmes on sanitation, direct connection of drainage to the river are important issues in Faecal Sludge Management

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service (4), water contamination (5), mosquitoes (6), health issues (7) and drainage were the commonly reported problems.

On issues associated with the emptying process, both management and sanitation workers from Thiruchengodu, Tiruvallur, Pudukottai and Mayavaram and sanitation workers from Gudalur responded. Problems mentioned were – lack of public support (1), non-availability of vacuum emptier / proper machines (3), lack of safety equipment (2), absence of healthcare after emptying (2) and non-availability of workers and clubbing orders (1).

On issues with treatment of FS before disposal, four managements (Thiruchengodu, Tiruvallur, Pudukottai, Mayavaram) and SW from Gudalur, Thiruchengodu, Pudukottai and Mayavaram responded. The problems mentioned include lack of awareness among the public, lack of public support (2), absence of low cost technology (1), gas formation (2), no proper place of disposal (1), bad odour/smell (2), delay (2) and mosquitoes (2).

With regard to issues with the place of disposal, three municipal managements (Tiruvallur, Pudukkottai and Mayavaram) and three sanitary worker groups (Gudalur, Thiruchengodu and Tiruvallur) reported - lack of treatment units (2), air pollution (2), water contamination (2), growth of mosquitoes (2), drain connecting to drinking water connection (1), disposal during rainy season (1), inconvenient time of disposal (1) and objection by neighbours. Other issues mentioned by sanitary workers from Nagerkoil include extensive health issues. They also reported that open defecation is taking place on the drainage.

Issues with faecal sludge collection facilities

Seven municipal managements (Gudalur, Mannarkudi, Nagerkoil, Thiruchengodu, Tiruvallur, Pudukottai and Mayavaram), reported on the places affected by poor FS collection. Main issues include: lack of awareness (3), water directed to storm water drainage (2), lack of vehicles (1), lack of place for disposal (1), design issues of the septic tanks (1) and lack of public toilets (1).

Social problems arising out of poor collection and maintenance were: frequent complaints (1), problems among neighbours (2), less use of sanitary facilities (2) as reported by five municipalities – Gudalur, Mannarkudi, Tiruvallur, Pudukottai and Mayavaram. Environmental issues reported by four municipality managements – Gudalur, Tiruvallur, Pudukottai and Mayavaram - include water pollution (2), breeding of mosquitoes (2), various infections (2) and bad smell/odour (2). Health issues reported

Town Panchayats	Areas affected by poor FS collection systems	Challenges in disposing FS
Gudalur	No data	Lack of place for disposal, cost of desludging, improper design of tanks, no underground facility, water pollution and social issues.
Mannarkudi	Arisikadai santhu, Azad Street, Masthan Street and the Market area	No data
Thiruchengodu	Naripallam & Sanarpalayam	No data
Tiruvallur	Perumbakkam, area near the Kakkalur lake	No low cost technology for safe disposal.
Pudukottai	Soil pollution & salinity of water, major parts of municipality	Poor maintenance by households, worker non-availability when needed and high service charges to private providers.
Mayavaram	Soil pollution & salinity of water, major parts of municipality	Poor maintenance by households, worker non-availability when needed and high service charges to private providers.

Table 32 - Challenges in FS Disposal – Municipalities

No information available from Nagerkoil, Pollachi, Sankarankovil and Perambalur

by the four municipalities of Mannarkudi, Sankarankovil, Pudukottai and Mayavaram include waterborne diseases, fever, filariasis and malaria, each reported twice.

Challenges in faecal sludge disposal

Municipality managements were asked about the areas affected by poor FSM and issues with faecal sludge disposal. Details of areas affected by poor FSM and challenges faced in disposal are given in Table 32 above.

Management view on private player functioning

It is clear from the Annexure 1 Table 4 that Mannarkudi municipality does not engage private players, Pollachi offers no information and Perambalur has underground sewerage connection. Gudalur, Nagerkoil, Pudukottai have five private players each, Tiruvallur has four, and Thiruchengodu and Mayavaram have two and one respectively.

In Sankarankovil, vehicles are hired from neighbouring municipalities. All five players in Pudukottai and one in Mayavaram have licenses.

In Nagerkoil, Sankarankovil, Thiruchengodu and Tiruvallur, the fee for emptying FS is based on factors such as tank size, labour cost, distance travelled and quantity of sludge. In Pudukottai and Mayavaram, it is decided by households and workers.

The rate charged in Gudalur for public toilets is Rs.2,000 and between Rs.5,000 – Rs.10,000 for households. Six municipalities of Gudalur, Sankarankovil, Thiruchengodu, Tiruvallur, Pudukottai and Mayavaram reported having sufficient human resources.

Six municipalities of Gudalur, Nagerkoil, Sankarankovil, Thiruchengodu, Tiruvallur and Mayavaram reported having sufficient equipment while seven municipalities reported having enough vehicles. With regard to equipment used for emptying faecal sludge, six municipalities use air compressors, Thiruchengodu uses a suction machine with diesel engine. Importantly, in the two municipalities of Pudukottai and Mayavaram, manual emptying is also reported.

Regarding treatment of faecal sludge, none of the municipalities reported treating the faecal sludge before disposal.

Analysis of responses of private service providers

Private players across the ten municipalities have been in operation for 3 to 21 years as reported by six players. Mannarkudi municipality has no private operators. On reasons for starting this service, five of the nine service providers are basically continuing with the traditional profession of the family, three players took advantage of the demand-supply mismatch and one started with a service motive. Tanker capacity reported by the nine players varies between 500 litres to 10,000 litres with Pollachi private operators reporting more than one vehicle. The number of service calls varies from two per day to about 15 - 20 per month. One player from Pollachi has applied for a license (they also pay union membership fees) and another from Tiruvallur mentions having Regional Transport Officer (RTO) permission.

Municipalities	No.of Private service providers	No. of workers	Tanker capacity (litres)	No. of clients	Quantity of FS collected (litres) Per month	Status of license
Gudalur	1	5	5,000	3 - 4 calls per month	15,000 -20,000	
Mannarkudi	0					
Nagerkoil	9	4	5,000	2 calls per day	5,000-10,000	
Pollachi	3	7	3,000 - 6,000	2-4 calls per day	49,000	
Sankarankovil	1	3	4,000	2 - 3 clients per month	48,000	
Thiruchengodu	2	3	2,500	3 - 4 calls per month	7,500	
Tiruvallur	1	2	10,000	2 calls per day	30,000	RTO permission
Perambalur	2	5	4,000	15 - 20 calls per month	12,000	
Pudukottai	3	No data	6,000	2-3 calls per day	4,000	
Mayavaram	1	3	500	4 calls per per month	500	

Table 33 - Profile of Private Service Providers – Municipalities

Use of modern equipment and safety measures

Regarding the use of equipment in emptying and the use of safety measures by the service providers, responses show that eight of the nine private service providers used suction machines / air compressors for removing FS and some used other supporting equipment such as shovels, ropes and rods in varying combinations.

Thiruchengodu also reports manual procedures. Importantly, in Gudalur and Sankarankovil, private players report being trained by service providers (besides learning from parents) while the Pollachi private player reports receiving training, although details are not available. However, only in Tiruvallur, private players report receiving training from the municipality.

With regard to safety equipment, mask/ handkerchief and gloves and other safety equipment are reported to be used by seven of the nine service providers, while two players from Pudukottai and Mayavaram do not provide any information.

Municipalities	Fee for emptying (Rs.) per trip	Equipment for emptying	Use of safety measures
Gudalur	Public toilets 2,000 per trip, HH toilets 2,000-3,000 per trip	High Air Compressor, Iron rod, 200ft hose, return compressor, clamp and washer tube	Hand gloves, mask, crow bar, spade
Mannarkudi	No data	No data	No data
Nagerkoil	**Septic tank** 3,000-5,000; **Soak pit** 6,000-7,000	Air compressor, Plumbing with motor, Iron rod, hose, clamp and washer tube	Handkerchief for nose and gloves for legs & hands
Pollachi	Septic Tank 1,300 to 1,800	Motor, Crowbar, shovel, shoe, jumper hammer, PVC hand pipe for sucking, washer and clamp, shovel, hoe	Gloves, hard cloth, soap, shoes, mask, helmet
Sankarankovil	Septic Tank 2,000 to 2,500	Air compressor, Iron rod, hose, gloves, clamp and washer tube	Masks and gloves
Thiruchengodu	Septic Tank 2,000 - 2,200	Machinery & Manual	Mask, Boots, Gloves
Tiruvallur		Diesel engine with foot valve, if necessary vacuum emptier hired (Rs.3,000); Crow bar, spade, knife, rope, tool box (spanners)	Mask, gloves, First Aid box (mostly they are not used)
Perambalur	Septic Tank 2,000/ 2,500 to 5,000	Air compressor, motor, tube	Masks and gloves
Pudukottai	Septic Tank 300/load	Suction cum jetting machine	No data
Mayavaram	770 to 1,500	Motor and hose pipe; Tank (500 lts), Plastic pipe, Motor, Three-wheeled vehicle	No data

Table 34 - Profile of Services Offered by Private Service Providers – Municipalities

Treatment and place of disposal

Three private players from Mannarkudi, Perambalur and Mayavaram report existence of partial facilities for treating FS before disposal. In Mannarkudi, a concrete based settler is used while Perambalur and Mayavaram report a partially commissioned underground network.

With regard to place of FS disposal, nine players commonly indicated the following sites -– agricultural land (6); garbage dump and drainage (4); municipal dumping yard (2), outskirts (4), coconut grove (1), wasteland (1), forest land (1) and riverbed (1).

Municipalities	Place of disposal	Challenges faced
Gudalur	Public toilet FS is disposed in the municipal solid waste yard. The household FS is disposed in agricultural lands.	There is no proper place to dispose and we are followed by auto drivers and officials to prevent us from disposing in public spaces. Also, there is restriction from the Forest department.
Mannarkudi		
Nagerkoil	Municipal solid waste garbage dump (1/2 km from the municipality).	There is no proper place to dispose and there are restrictions from public. When FS is taken to dispose, the septic tank vehicle is followed by the police.
Pollachi	Agricultural lands, Coconut groves.	
Sankarankovil	Outskirts, but if collection is in dry season, then FS is disposed in agricultural lands.	There is no proper place to dispose, no proper vehicle.
Thiruchengodu	Garbage dumps and drains.	Lack of support from government, disposal is at night time.
Tiruvallur	Agricultural land, open land in the outskirts and major drainage.	1. Most of the households are constructing soak pits. Hence, the frequency of desludging of the tank is not high and water drains in the land, as a result, sludge becomes hard. 2. Due to low rate, they could not use vacuum emptier. 3. No specified place for disposal. 4. Competition in local area. 5. We cannot dispose in other service provider areas.
Perambalur	Wasteland, forest land and riverbed.	
Pudukottai	Garbage dumps, drains, outskirts and agricultural land.	High cost of vehicle maintenance, workers, wages.
Mayavaram	Garbage dumps, drains, outskirts, agricultural land.	High cost of vehicle maintenance, workers, wages etc.

Table 35 - Places of FS Disposal and Related Challenges – Municipalities

Among the challenges faced by private players is the lack of proper place of disposal which is reported by four players, along with harassment by public, officials and police, forcing some to dump in the night. Other issues related to disposal included higher cost of workers, vehicles and wages (2), business competition (1), hardening of sludge due to soak pit which prevents use of vacuum emptier (1), lack of proper vehicle (1) and lack of support from the government (1).

On the scope of private providers in FS management, Perambalur reported less service requirement for private players (as underground sewerage networks are in place). Players from Pudukottai and

Mayavaram report good scope for more private players, while Gudalur players reported limited scope by stating the following: “Private commercial buildings are connected to drains. The municipality has given permission to dispose the faecal sludge in the STP. Due to improper design of septic tanks and soak pits, the overflow of septic tanks is discharged into drains, the desludging period is high, and hence the scope is limited”.

Drinking water contamination

On the issue of water contamination, three players say there is no contamination (Gudalur, Pollachi and Tiruvallur). Sankarankovil private players describe the problem in detail – “Few household toilets and public toilets make use of the drainage canal as septic tank. Further, during the rainy season, household septic tanks are connected to the sewer with the support of motor pumps which is an issue”.

Support needed from the government

Of the nine private players, just one did not want any assistance from the state. From the remaining eight, multiple suggestions were offered - land or proper dumping yard for FS (3); support from municipality (2), public awareness and support for day time collection (2), provision of vehicle for FS collection (1), treatment unit (1), bank loan and subsidy for their business (1), and need for workers (1).

Municipalities	Support required from State & municipalities
Gudalur	Allotment of proper place to dispose FS and municipality’s permission to dispose the sludge in STP at Ooty. Need license from the government to carry out our activities.
Mannarkudi	No data
Nagerkoil	Provision of vehicle for FS collection. Government and public should support the collection of FS during the day time. Need license from Government.
Pollachi	Need place of disposal.
Sankarankovil	Allotment of proper place to dispose the sludge. Need license from the government.
Thiruchengodu	No data
Tiruvallur	Area allocation or treatment unit of FS.
Perambalur	Municipality support and bank loan.
Pudukottai	Loan with subsidy.
Mayavaram	Permanent workers.

Table 36 - Support required from State and Municipalities

Analysis of community group responses

This section deals with the community views on various aspects of faecal sludge management practices in their localities, such as frequency of cleaning, choice of service providers and their perception of health, environmental and social impacts of poor FSM.

In total, ten group discussions were conducted across the municipalities chosen for study. In Pudukottai and Mayavaram, discussions were held with women groups and the rest were mixed groups.

On the issue of type of septic collection used by the respondents' households, the majority of members from all ten groups reported having septic tanks; some members from five groups (Gudalur, Mannarkudi, Nagerkoil, Pollachi, and Sankarankovil) reported having pit latrines while one group in Perambalur reported sewer connection and a few members from Gudalur reported open defecation.

On the type of septic collection mostly used by the neighbourhood, eight groups reported neighbours using septic tanks, seven reported using leach/pit latrines, five groups reported neighbours using public defecation facilities (Gudalur, Mannarkudi, Nagerkoil, Sankarankovil, Perambalur) and four groups from Gudalur, Mannarkudi, Nagerkoil and Sankarankovil reported their neighbours using 'sewer connection'.

Frequency of cleaning and choice of service provider

In five municipalities, desludging is done between two and five years, in three municipalities it takes 'more than five years' and between seven to 20 years in two others. In six municipalities, services of private players are sought – in two municipalities because of lack of municipal services and in two others due to quality of service.

In Mannarkudi, Tiruvallur, Pudukottai and Mayavaram, municipal services are sought, which are found to be low cost and fair, besides other reasons. On the frequency of cleaning, Tiruvallur community groups responded in detail – **"There are three different categories of development - old town, rural and new development area. Overflow of septic tanks is discharged into drainage and so the desludging period is around ten years. Rural areas completely depend on soak pits, which are cleaned of sludge in seven to ten years. The newly developed area is in the lake area, where no drainage facility exists and in this place due to the high water table, desludging takes place almost every rainy season".**

Municipalities	Frequency	Choice of Service Provider	Reasons	Problems due to leakage/ overflow/non-emptying of septic tank
Gudalur	5+ years	Pvt	No such service available from municipality.	Jaundice, skin disease, fever and breeding of mosquitoes.
Mannarkudi	2 - 4 years	Muni	Low cost, private players not allowed.	No data
Nagerkoil	5+ years	Pvt	No such service available from municipality.	Bad smell, mosquitoes, storage of sludge in drainage.
Pollachi	7 - 10 years	Pvt	No data	No data
Sankarankovil	8 - 20 years	Pvt	No data	No data
Thiruchengodu	5+ years	Pvt	Quick service using machines; manual - low cost, dry and clean.	During monsoon, sewage water flows into the house.
Tiruvallur	5 years	Muni	Less fees.	Overflow of septic tanks is an issue in the newly developed area.
Perambalur	1 - 3 years	Pvt	Good service, low cost and need for cleaning.	Poor sanitation.
Pudukottai	5 years	Muni	Formal system, fair cost, other drainage work possible and contacts with government.	No data
Mayavaram	Once in 5 years	Muni	Good service, fair cost.	No data

Table 37 - Frequency of cleaning and choice of service provider - Municipalities

Pvt- Private; Muni- Municipality

Health, environmental and social impacts of poor FSM

Septic tanks/latrine pits need to be emptied periodically and data shows that this is not happening due to various reasons such as lack of awareness among the public, poor design of septic tanks preventing emptying and non-availability of affordable emptying services. The lack of state resources available to municipalities indicates that the faecal waste management is often the responsibility of residents themselves. In this context, in Tamil Nadu, delay in emptying, irresponsible disposal of faecal sludge by private service providers resulted in various issues. Many others are likely to opt for the easiest means of disposal by dumping the sludge into nearby open drains and rivers. This has significant

Municipalities	Health impact	Environmental impact	Social impact
Gudalur	Contamination causes waterborne diseases, sleeplessness because of bad odour, illness of children.	River and well water contamination, lack of access to safe water.	Right to fresh water is violated, social disharmony, right to health at stake.
Mannarkudi	Children falling sick (Malaria, Dengue and Jaundice)	Drinking water is contaminated, pond water becomes polluted, FS disposed on the roadside without any drainage.	Social disharmony.
Nagerkoil	Fever, skin diseases	Air pollution, land pollution.	No data
Pollachi	No data	No data	No data
Sankarankovil	No data	No data	No data
Thiruchengodu	Skin problems, Asphyxia	Bad smell, mosquitoes.	No data
Tiruvallur	Fever, Jaundice, Dysentery, Cholera and Typhoid	Water pollution, bad smell.	Social disharmony.
Perambalur	No data	Environmental pollution.	No data
Pudukottai	No data	Groundwater contamination, air pollution, foul odour and contamination of water supply.	Poor standard of living, health of self and children, personal hygiene and productivity affected.
Mayavaram	Filariasis, mosquitoes cause fever and malaria	Groundwater contamination, air pollution, smell and contamination of water supply.	Poor standard of living, health of self and children, personal hygiene and productivity affected.

Table 38 - Impact of poor FSM on Community - Municipalities

public health and environmental consequences with the whole community potentially being exposed to untreated human waste.

Therefore, an attempt has been made to understand the community view on the health, environmental and social impacts of poor faecal sludge management (38).

Environmental pollution, which is reported by eight of the ten municipalities in Tamil Nadu, include air, land and water pollution, especially pollution of water bodies and groundwater, which denies them access to safe water

WaterAid/Dieter Telemans

All community groups reported being aware of the health and environmental impacts of poor faecal sludge management. Multiple health issues were reported by six community groups. These included skin problems, malaria, cholera, typhoid and sickness among children. Environmental pollution, which is reported by eight of the ten municipalities, include air, land and water pollution, especially pollution of water bodies and groundwater, which denies them access to safe water. Social impacts mentioned by five municipalities include social disharmony, violations of right to health, polluted water and lack of hygiene which affects the overall quality of life.

SWOT analysis of faecal sludge management in Tamil Nadu

An attempt has been made to analyse and understand the ongoing faecal sludge management in Tamil Nadu. The SWOT analysis gave the opportunity to evolve a strategy to tackle the weaknesses and threats at ULB level.

S

Strengths

1. Municipal Solid Waste Collection Services provided by ULBs mobilised public trust and support in favour of ULBs, which can be capitalised for beginning FSM services.
2. Affordable septic tank emptying fees by municipalities.
3. Nominal FS disposal fee charged by septage treatment plants.
4. Presence of equipment, facilities and human resources.
5. Scope for integrating Septage Treatment Plants into Resource Recovery Park.
6. Experience in implementation of sanitation programmes.
7. Municipal service providers have designated land for disposal.

W

Weaknesses

1. Lack of political commitment and lack of budget allocation.
2. Lack of coordination between local bodies and private service providers.
3. Public enterprises have low operational and financial capacity in Urban Local Bodies.
4. Government officials from ULBs are not aware of health risks from poor FSM.

5. FS treatment plants are too distant from the collection areas, which prevent private service providers from using them.
6. Unsafe handling and dumping of FS by public and private service providers.
7. Only few private service providers have designated land for disposal.
8. No treatment of faecal sludge before disposal by private providers.
9. Inadequate internal financial resources.
10. Lack of awareness on FSM among the officials of local bodies/ government.
11. Inadequate localised disposal and treatment facilities.
12. Inefficiency of existing treatment facilities.
13. Lack of affordable and environmentally viable modern technology.
14. Inefficiency and lack of trained personnel for FSM.
15. Lack of emptying equipment and facilities.
16. Lack of government will and/or capacity to control and enforce regulations against illegal dumping.
17. Lack of political will to promote use of treated sewage.
18. Lack of suitable incentives and sanctioning procedures for private service providers.
19. Large number of insanitary toilets/ poorly constructed septic tanks.
20. Lack of skilled personnel for the construction of properly designed septic tanks.
21. Lack of awareness among government officials and private service providers on the scope for 'increased cost recovery' and potential 'nutrient and energy reuse from FS'.

O

Opportunities

1. Scope for collaboration between municipal and private operators in FSM.
2. Scope for evolving as a business model.
3. Increasing demand for paid emptying services by the public.
4. Public acceptance for legal services more than illegal services.
5. Scope for demand for bio-solids.

T

Threats

1. Many private service providers dispose faecal sludge without treatment.
2. Lack of knowledge and support from central government agencies for FSM.
3. Illegal dumping in service areas.
4. FS treatment capacity is not enough for service areas.
5. Stigma attached to faecal sludge management among the public.
6. Unwillingness of public to allow the construction of STPs in their neighbourhood.
7. Unsafe handling and dumping of FS by public and private service providers.
8. Septic tanks/pits difficult to access.
9. Inappropriate emptying equipment (size and performance for complete sludge removal)
10. Lack of public and farmers' involvement in promotion and marketing of bio-solids.
11. Non-existent or insufficient involvement of stakeholders (owners and users of sanitation facilities, farmers, private entrepreneurs).
12. Non-availability of land for the construction of STPs.
13. Non-cooperation from public to construct STPs.
14. Septic tanks are not connected to soak pits or drains and are oversized or under sized.
15. Suffer from irregular cleaning due to lack of awareness.

5

Water Contamination and its Health Impact in Tamil Nadu

This chapter deals with water contamination and its impact on the health of people, based on the information available from various secondary sources.

Water quality and health in Tamil Nadu

It is generally assumed that groundwater is safe (free from pathogenic bacteria), it does not contain harmful constituents, it is free from suspended matter because the rainwater, which is the primary source of groundwater, has moved through the soil and vadose (unsaturated) zone before meeting the groundwater. It gets cleaned and purified due to a number of physical, chemical and biological activities and processes such as oxidation and reduction, adsorption, precipitation etc. The belief that groundwater is safe is not true under all circumstances. The unscientific disposal of human and animal waste is found to be the main anthropogenic activity that has led to the contamination of groundwater

with microorganisms, nitrates, potassium etc.[135].

Contamination of drinking water sources by sewage can occur from raw sewage overflow, septic tanks, leaking sewer lines, land application of sludge and partially treated wastewater. Sewage itself is a complex mixture and can contain various types of contaminants. The greatest threats posed to water resources arise from contamination by bacteria, nitrates, metals, trace quantities of toxic materials, and salts. Seepage overflow into drinking water sources can cause disease from the ingestion of microorganisms such as E coli, Giardia, Cryptosporidium, Hepatitis A, and helminths[136].

Composition and sources of sewage

Human and animal excreta (faeces, dung, urine, etc.) contain a variety of pollutants; inorganic, organic and microbiological, which can affect groundwater quality adversely. Human and animal waste loaded with microbiological pollutants may contain four types of pathogens (disease causing bacteria) like eggs of helminths (worms), protozoa, bacteria and viruses. Human faecal matter on an average contains 109 bacteria/gram (not all of them pathogenic) and in the case of an infected person, faecal matter may contain as many as 106 viruses/gram.

The soil regularly receives refuse and organic matter in the form of human and animal waste, sewage, manure, compost, sewage from pans, septic tanks, pit latrines, barnyard wastes, and irrigation by sewage etc. All these release pathogens into the environment. Graveyards may abound in clostridium tetani, which causes tetanus in man and animal. Cattle graves may abound in bacillus anthrax, which cause anthrax, an acutely infectious disease in man and animal. Clostridium botulinum, a strictly anaerobic bacillus, has been found to be present in cultivated soils and offal dumps (waste of carcasses, slaughter house waste), which are potent reservoirs of botulism germs.

The main sewage sources contaminating the groundwater are: raw sewage overflows, septic tanks, poor placement of septic leach fields and leakage from sewer lines. High nitrate contaminations found in groundwater in several urbanised localities in Tamil Nadu are likely to be attributed to these sources[137].

As per the BIS Standard for drinking water, the maximum desirable limit of nitrate concentration in ground water is 45 mg/l with no relaxation. Though nitrate is considered relatively non-toxic, a high nitrate concentration in drinking water is an environmental health concern arising

135 Contamination of Ground Water by Sewage, CGWB, 2011
136 Ibid
137 Ibid

from increased risks of Methemoglobinemia particularly to infants. Adults can tolerate higher concentrations. The specified limits are not to be exceeded in public water supply. If the limit is exceeded, water is considered to be unfit for human consumption.

Water testing conducted in Tamil Nadu found localised occurrence of nitrate (>45mg/l) in groundwater in many districts. Of the 14 districts covered under the study, with the exception of two districts (Nagappattinam and Tiruvarur), the groundwater of the remaining 12 districts (Chennai, Coimbatore, Erode, Kanchipuram, Kanyakumari, Namakkal, Nilgiris, Pudukkottai, Thirunelveli, Tiruvallur, Tiruchirappalli and Tuticorin) was found to have a high nitrate content[138].

Level of faecal coliforms in Tamil Nadu river water sources

The occurrence of coliforms in surface water has been used as an indicator of faecal contamination, signalling the possible presence of faecal pathogens such as Salmonella and Shigella. This is due, in part, to the observed correlation between elevated bacterial counts in water and the rate of occurrence of gastrointestinal symptoms or diseases.

Rivers provide the main water resources for domestic, industrial and agricultural purposes. Studies (Sivaraja and Nagarajan 2014; Environmental Information System, Government of Tamil Nadu) found that the

	% of Faecal Coliform Contamination
Nilgiris	0.19%
Pudukottai	0.12%
Thiruvarur	4.96%
Nagapattinam	1.06%
Tirupur	0.04%
Erode	1.77%
Tiruchirappalli	1.11%
Kanchipuram	0.02%
Tiruvallur	6.70%

Table 39 - Faecal Coliform Contamination in Tamil Nadu

Source: Pollution Database for Tamil Nadu; Environmental Information System, April 2014, ENVIS Centre, Department of Environment, Government of Tamil Nadu, Page 51

major factors affecting the microbiological quality of surface waters in India are discharges from sewage, open defecation and runoff from informal settlements. Water contaminated with faecal matter has the capability to pose serious health risks for fish consumers and swimmers. Indicator organisms are commonly used to assess the microbiological quality of surface waters and faecal coliforms (FC) are the most commonly used bacterial indicator of faecal pollution in India.

Total coliforms (TC) comprise bacterial species of faecal origin as well as other bacterial groups. The coliforms are indicative

138 Pollution Data Base: Tamil Nadu 2014; Central Ground Water Board, Ministry of Water Resources, GOI

Year	Acute Diarrhoeal Diseases			Cholera		
	Cases	Deaths	Fatality Rate	Cases	Deaths	Fatality Rate
1997	78025	520	0.67	2261	2	0.09
1998	77677	368	0.47	1807	0	0
1999	74583	266	0.36	1807	1	0.06
2000	64130	195	0.3	1328	1	0.05
2001	59511	159	0.27	1110	1	0.09
2002	69889	199	0.28	1591	3	0.19
2003	58784	66	0.11	390	1	0.26
2004	77333	119	0.15	1500	2	0.13
2005	70465	65	0.09	777	1	0.13
2006	52555	22	0.04	152	1	0.66
2007	37556	19	0.05	212	0	0
2008	57463	62	0.11	994	0	0
2009	87207	21	0.02	826	0	0
2010	60314	45	0.07	932	1	0.1
2011	206669	24	0.01	580	0	0
2012	198317	17	0.01	516	0	0
2013	179560	24	0.17	145	0	0
2014	176795	6	0.05	18	0	0

Table 40 - Details of cases and deaths due to ADD/Cholera in Tamil Nadu

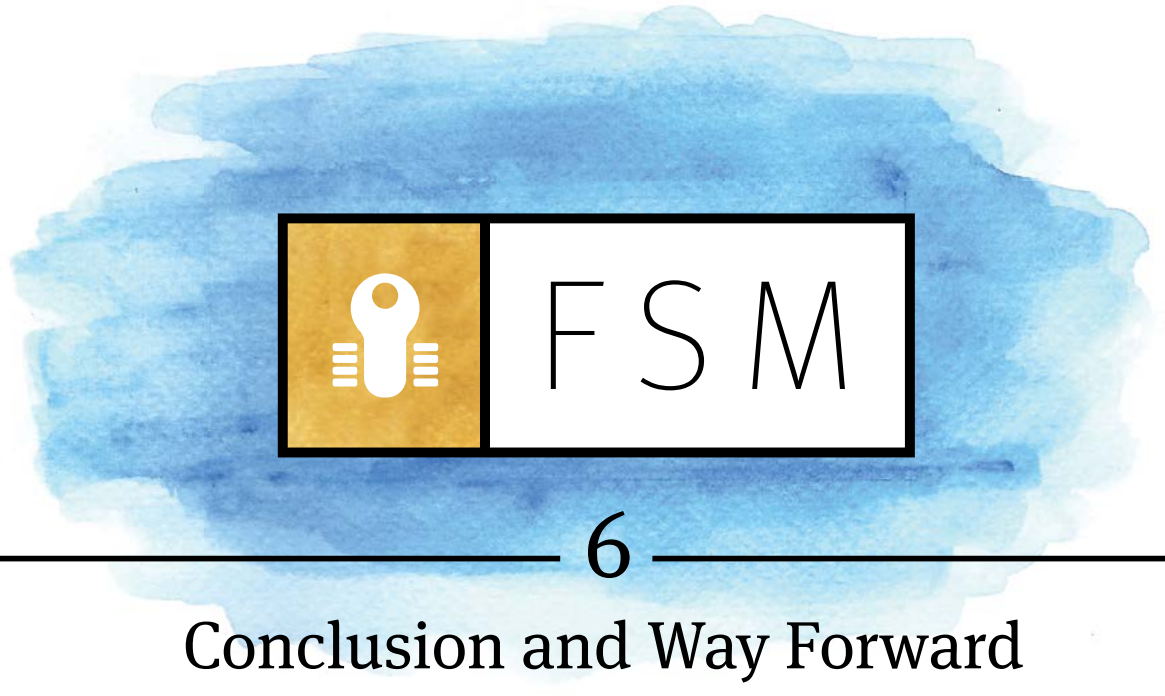
Source: http://www.tnhealth.org/dph/dphdb.php

of the general hygiene quality of the water and potential risk of infectious diseases from water. High FC and TC counts in water are usually manifested in the form of diarrhoea and sometimes by fever and other secondary complications[139]. In the districts covered under this study, no faecal coliform contamination was found in the water sample from five districts (Coimbatore, Thoothukudi, Tirunelveli, Kanyakumari and Namakkal).

Waterborne diseases

Several hundred people have been affected in the state, by diseases caused by consumption of unsafe and contaminated water. Contaminated water can cause Acute Diarrhoeal Diseases (ADD) and Cholera. The above Table 40 provides details of cases and deaths due to ADD/Cholera in Tamil Nadu which clearly shows that the fatality rate due to ADD and Cholera has been coming down drastically.

139 Sivaraja R and Nagarajan K. (2014), Levels of Indicator Microorganisms (Total and Faecal Coliforms) in surface waters of rivers Cauvery and Bhavani for circuitously predicting the pollution load and pathogenic risks, International Journal of PharmTech Research, Vol.6, No.2, pp 455-461, April-June 2014



6
Conclusion and Way Forward

While looking at the national picture of FSM, the following is evident:

There is some form of toilet facility for the 81.4 per cent urban households[140] while the NSS[141] estimation was found to be higher at 89.6 per cent. However if we get into the depth of this data, it can be seen that the poor who live in the slums (notified and non-notified) have lesser access to sanitation. As per NSSO data-2012, at the all-India level, 31 per cent of slums had no latrine facility, the figure being 42 per cent for non-notified and 16 per cent for notified slums[142].

Where sanitation access is available, only a few households (32.7 per cent) use toilets that are connected with the underground sewerage

140 Houses and Household Amenities, Latrine Facility, Census of India - 2011, Registrar General and Commissioner, India. From the Table: Availability and Type of latrine facility- Urban and Table: Type of latrine facility- new additions in 2011. Available at: http://censusindia.gov.in/2011census/hlo/Data_sheet/India/Latrine.pdf

141 Key Indicators for Drinking Water, Sanitation, Hygiene and Housing Condition in India - NSS, 69th Round, July 2012- December 2012, NSSO, Government of India.

142 NSSO data , 69th Round, 2012

network. A very high 18.6 per cent of urban households do not have access to individual toilets, of which 6 per cent use public or community toilets and 12.6 per cent have to resort to open defecation. On-site pit latrines and septic tanks account for a substantial proportion of toilets in urban India – 48 per cent of urban Indian households depend on on-site facilities [143], and this proportion is increasing. While these numbers differentiate between latrines and septic tanks, many septic tanks are in reality similar to pit latrines, and have leaking sides and open bottoms. Many septic tanks, even for public toilets and commercial entities, are inaccessible for desludging and maintenance.

The adequate facilities and services for collection, transportation, treatment and disposal of urban domestic septage do not exist in Indian cities.

Most on-site sanitation systems (OSS) are emptied manually in the absence of suitable facilities. Ideally, a septic tank system should be desludged every two to five years. But ignorance of maintenance and operational conditions often results in accumulation of organic sludge, reduction in effective volume and hydraulic overloading, which ultimately causes system failure and the release of partially treated or untreated septage from the septic tank. Private operators often do not transport and dispose of septage far away from human settlements. Instead, they dump it in drains, waterways, open land, and agricultural fields. Data shows that 33,000 and 40,000[144] million litres of wastewater is generated every day from class-I cities (cities with population >100,000) and class-II towns (population 50,000 - 100,000) respectively. This is enough to irrigate nine million hectares, but only about 30 per cent is collected and treatment capacity exists for less than 20 per cent. The remainder reaches water bodies untreated, leading to highly polluted surface water resources. According to the Ministry of Urban Development (2013), an alarming 70 per cent of India's surface water is now polluted[145]. It is estimated that 75–80 per cent of water pollution by volume is from domestic sewerage[146]. Untreated sewage flowing into water bodies has almost doubled from around 12,000 million litres per day to 24,000 million litres per day in Class-I and II towns

143 Houses and Household Amenities, Latrine Facility, Census of India - 2011, Registrar General and Commissioner, India. From the Table: Availability and Type of latrine facility- Urban and Table: Type of latrine facility- new additions in 2011. Available at: http://censusindia.gov.in/2011census/hlo/Data_sheet/India/Latrine.pdf

144 Evaluation of Operation and Maintenance of Sewage Treatment Plants in India, 2007, CPCB. And http://timesofindia.indiatimes.com/home/environment/pollution/Around-80-of-sewage-in-Indian-cities-flows-into-water-systems/articleshow/18804660.cms

145 Murthy and Kumar 2011. Water pollution in India - an economic appraisal. p 285. In IDFC (2011). India Infrastructure Report 2011. Water-Policy and performance for sustainable development. Infrastructure Development Finance Company. Oxford University press.

146 Status of Water Supply, Wastewater Generation and Treatment in Class-I Cities & Class-II Towns of India, CPCB, 2009

between 1991 and 2008[147]. According to the CPCB 2005 report[148], there were 269 sewage treatment plants (STPs) with 211 in Class-I cities, 31 in Class-II towns and 27 in other smaller towns.

At the policy level, sanitation was not prioritised until the early 1990s and became an important policy concern only around 2008. It was not until the inception of the National Urban Sanitation Policy (NUSP) in 2008, that urban sanitation was allotted focused attention at the national level. The NUSP instated a framework for cities to prepare City Sanitation Plans under the scheme of a State Sanitation Strategy. **Urban Sanitation awards and ratings were also introduced based on the benchmarking of sanitation services.** Centrally sponsored schemes such as JnNURM, Urban Infrastructure Development Scheme for Small and Medium Towns (UIDSSMT), Rajiv Awas Yojna, etc. provide funds for creation of sanitation assets like individual toilets, community toilet blocks, wastewater disposal and treatment facilities at the city level. The 'Swachh Bharat Mission', launched on 2 October 2014, marks the beginning of the largest programme on sanitation by the Government in India. The programme aims to ensure access to sanitation facilities (including toilets, solid and liquid waste disposal systems, and village cleanliness) and safe and adequate drinking water supply to every person by 2019. The responsibility for provision of sanitation facilities in the country primarily rests with local government bodies – municipalities or corporations in urban areas and gram panchayats in rural areas.

In **Delhi**, out of 3.26 million urban households, only 2.9 million have toilet facilities within the premises of their house. As per Census 2011 data, about 3 per cent of households defecate in open spaces, while 21 per cent do not have toilets within the premises. However, NSS 2012 estimates that 67 per cent households have exclusive toilets (not sharing with other households) in their premises, 99 per cent of which are reported as having access to improved source latrines. The river Yamuna bears the brunt of indiscriminate discharge of untreated wastewater and is heavily polluted by domestic and industrial wastewater. As the Yamuna flows through Delhi, the Najafgarh and 18 other major drains empty into it, making its water quality heavily degraded and unfit even for animal consumption and irrigation. As per the CPCB data of 2013, the sewerage generated in Delhi is 3800MLD, while the installed STP capacity is 2330MLD. The percentage of available capacity is 61 per cent. Delhi does not have a State Sanitation Strategy. The one currently being used is Master Plan 2021 and Master Plan 2031 has been submitted.

147 Kantawala Deepak, 2013, Management of Sewage, Centre for Science and Environment, New Delhi, March 2013
148 Status of sewage treatment in India. Central Pollution Control Board, November 2005

SBM launched on 2 October 2014, marks the beginning of the largest programme on sanitation by the GoI. The programme aims to ensure access to sanitation facilities and safe and adequate drinking water supply to every person by 2019

WaterAid/Jon Spaull

In **Gujarat**, as per the Service Level Benchmarking (SLB) - Performance Assessment System (PAS) data for 2011-12, a majority of the households depend on septic tanks and soak pits. Only 62 cities out of 167 have some extent of sewerage network and a similar number, 67, or around 40 per cent of ULBs in Gujarat, have access to some underground sewerage network. Although each of the seven municipal corporations have sewerage networks, many smaller ULBs also have underground sewerage networks. In the absence of sewerage systems, there are open drains that carry sullage and greywater. There is a shortage, though, of sewage treatment facilities: just 7 per cent or 12 ULBs in Gujarat have such facilities. Even though 74 per cent of urban properties have individual toilets, only 53 per cent properties are connected to a sewer network and 28 per cent of properties are dependent on on-site sanitary disposal systems. The Mahatma Gandhi Swachhata Mission (MGSM) which is integrated with 'Swachh Bharat Mission' was launched in 2014 to achieve an open defecation free, zero waste community, a dust free and green Gujarat. As part of MGSM, 'Nirmal Gujarat Sauchalay Yojana' has been launched in which subsidies for toilet construction are provided.

Of the urban households in **Madhya Pradesh**, 76 per cent have the facility of being connected to either a closed or an open drain for wastewater disposal. In the internal survey done by the Ministry of Urban Development (MoUD), only 14 ULBs have sewerage network and of these, only Indore has more than 70 per cent coverage. The state has 25 class-I cities with a population of 10,795,000 (2008) and sewage generation of 1248.72 MLD while treatment capacity is only 186.1 MLD. It has 23 class-II towns with a population of 1,745,050 and sewage generation of 130.9 MLD. There are a total of nine STPs using different technologies. The installed capacity of sewage treatment plants is 168.4 MLD and the actual utilisation is 123.7 MLD. The state has initiated the Integrated Urban Sanitation Programme (IUSP) in consonance with the Government of India's National Urban Sanitation Policy, 2008. Under the IUSP, the following have been initiated:

a) City Sanitation Plans (CSP) have been prepared for 37 towns. CSP for 24 more towns is underway.

b) Sanitation Vision 2025 was prepared for the state.

c) A District Head Scheme is in place and demand-driven sanitation requirements are mandated from ULBs [149].

d) Four towns of Madhya Pradesh have achieved an open defecation free status and ten more towns are on the verge of achieving the same.

149 Sanitation - Integrated Urban Sanitation Programme (IUSP), HUDCO Best Practices Award, 2013-14, Urban Administration and Development Department & City Managers Association, Government of Madhya Pradesh

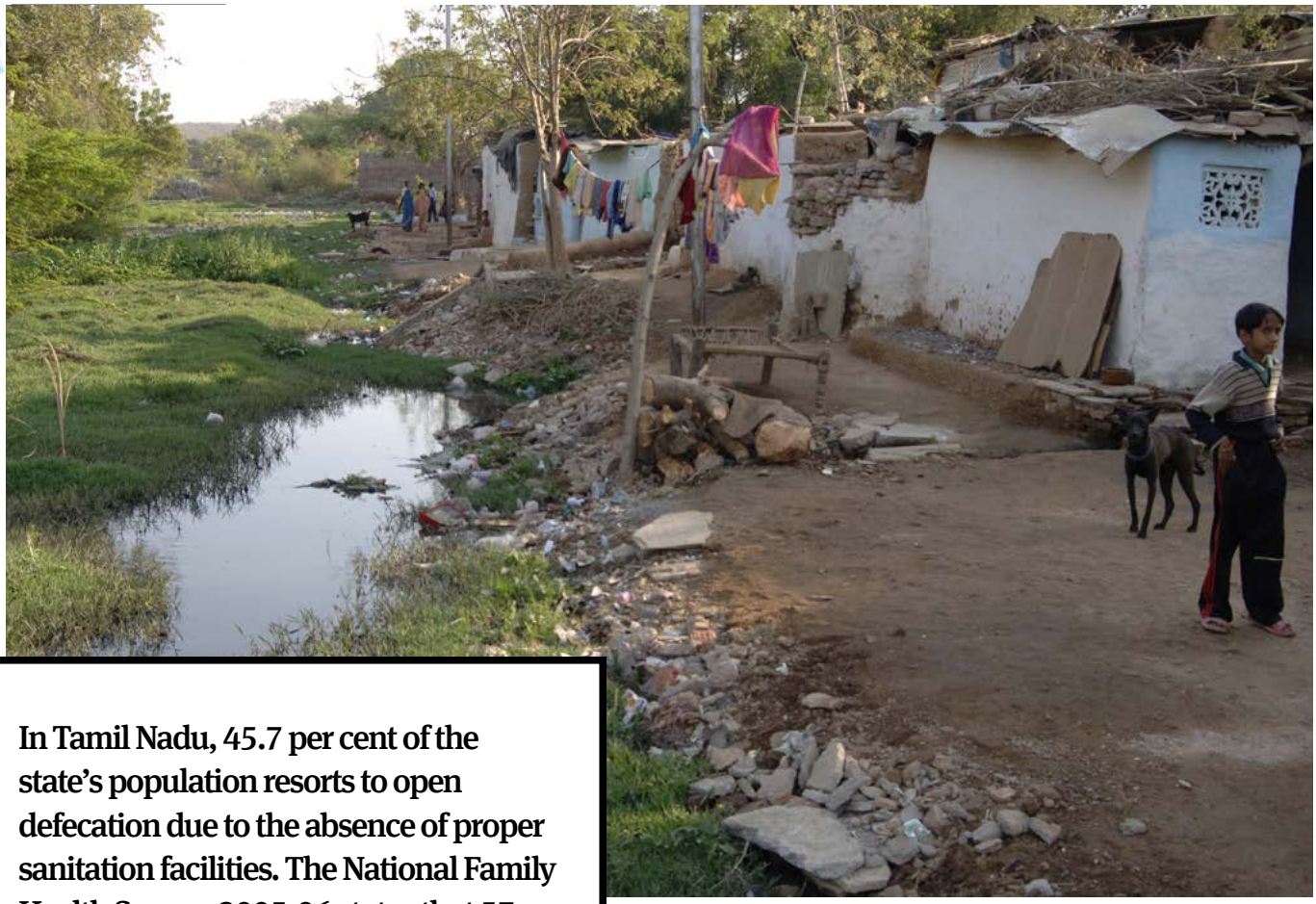
In **Maharashtra**, the urban sanitation coverage is 94 per cent and 53 per cent of households in the state have latrine facilities within the premises – higher than the national average of 46.3 per cent. Out of 252 ULBs in Maharashtra, only 31 ULBs have an underground sewerage network with different types of household coverage connections. Only 15 ULBs have secondary STPs and the average wastewater treatment capacity of the state is 35 per cent. This means that the remaining 65 per cent wastewater is being disposed of without any treatment. Maharashtra has six septage treatment plants. The installed capacity of the plants amounts to 168.4 MLD and the actual utilisation is 123.7MLD. Only 2 per cent of slum households within Maharashtra are networked to sewer systems. There is no formal policy for urban sanitation in Maharashtra, but the state follows the approaches advocated in the NUSP. The Government of Maharashtra developed the 'Sujal Nirmal Abhiyan' in 2008, a reform-oriented approach to managing water supply and sanitation services in urban areas.

According to Census 2011 estimates, 70.3 per cent of households in **Uttar Pradesh** have toilets. The sewage generation in NCR urban is 4,528 MLD. NCR has 64 STPs of 3,349 MLD design capacity and the sewage treated is 2,248 MLD. Therefore, the sewage treated is 50 per cent of sewage generation. The increase in sewage treatment capacity during the decade 2001-11 has been 53 per cent whereas the increase in treated sewage quantity has been much less at 33 per cent. In the Uttar Pradesh sub-region, only six out of 63 towns are partially covered with a sewerage system. There 24 STPs. Nine of them are under construction with a capacity of 72.30. At present, the sewage treatment capacity is 779.6 MLD but the actual sewage treated is 585.8 MLD and the average quantity of sewage treated is 52 per cent.

The Uttar Pradesh Urban Sanitation Policy, 2010 identified the following key sanitation issues in the state:

- Low priority to sanitation and lack of awareness about its linkages with public health.
- Social and occupational hazards faced by sanitation workers.
- Fragmented institutional roles and responsibilities.
- Lack of an integrated city-wide sanitation approach.
- Serving the unserved and the poor.
- Lack of facilities in slums.
- Lack of demand responsiveness.

One of the stated goals of the policy is safe disposal of human excreta and liquid waste. Three related goals mentioned



WaterAid/Poulomi Basu

In Tamil Nadu, 45.7 per cent of the state's population resorts to open defecation due to the absence of proper sanitation facilities. The National Family Health Survey, 2005-06 states that 57 per cent of households in Tamil Nadu have no toilet facility.

are: functioning of sewerage networks and ensuring connection of households; promoting recycling and reuse of treated water; and promoting proper disposal and treatment of sludge.

In **Tamil Nadu**, 45.7 per cent of the state's population resorts to open defecation due to the absence of proper sanitation facilities. The National Family Health Survey, 2005-06 (NFHS 3) states that 57 per cent of households in Tamil Nadu have no toilet facility. The proportion of notified and non-notified slums with no latrine facility is significantly higher for Tamil Nadu; 27 per cent and 40 per cent respectively. These slums towns are neither connected with a sewage system nor do they have any septage treatment plants. The state has formulated two strategies in the urban sanitation sector – coverage of all towns by Under Ground Sewerage Systems (UGSS) and total elimination of open defecation by 2015. There are plans to implement UGSS in a phased manner in corporations and municipalities with necessary financial assistance under various schemes like TNUDP-III, Urban Infrastructure and Governance (UIG/JnNURM), Urban Infrastructure

Development Scheme for Small and Medium Towns (UIDSSMT/JnNURM), and KfW grants. Detailed project reports have been prepared for 117 municipalities at an estimated cost of Rs.7,100 crore. At present, UGSS schemes have been taken up in four town panchayats and detailed project reports for the remaining 525 town panchayats have been prepared at a cost of Rs.12,904 crore under the 12th Five Year Plan.

The field study of the ten town panchayats revealed the following:

- Lack of an underground sewerage system in town panchayats.
- Septic tanks as the most used system of septage collection.
- Lack of adequate equipment for desludging.
- Lack of data on quantity of faecal sludge emptied.
- Infrequent cleaning of septic tanks at the household level.
- Non-adherence to the operative guidelines as prescribed in standards for septage management.
- No treatment plant at town panchayat level.
- Lack of clarity at the town panchayat level regarding their role in FSM.
- Role of private service providers recognised by the town panchayat management.
- Use of modern equipment by private players. However, they lack formal training in desludging and none of them reported treating sludge before disposal.

The field study among the ten municipalities revealed the following:

- Most of the domestic water requirement is met by municipalities.
- None of the municipalities have a full-fledged UGSS while three have partial coverage.
- The majority of individual households use septic tanks in municipalities, and one-tenth of households use public toilets.
- Most of the municipalities expressed insufficiency in emptying equipment and transport facilities.
- Frequency of faecal sludge collection from individual households varies from two to ten years.
- The most commonly reported problems with septic tank usage are: lack of proper construction, overflow and opening during rainy season, water pollution, and cost of cleaning and gas formation during cleaning.
- In the case of leach pits; poor

maintenance, connection by users to drainage, lack of proper construction and water pollution are reported issues.

Like in other parts of Tamil Nadu, faecal sludge is disposed in agricultural land, outskirts, municipal dump yards. Except Mannarkudi, all municipalities have private service providers for addressing faecal sludge management. Most of them reported using modern equipment and safety measures.

Among the challenges faced by private players is the **absence of proper places for disposal, opposition from public, harassment by government officials and police while carrying out the task during the day.**

Regarding the demand for services from private service providers in faecal sludge management, some said that the scope is narrowing due to increase in the number of service providers and expansion of UGSS coverage while others said that there is a good scope for more private players as the urban local bodies are not providing such services.

Asked about support required from the government, private service providers stated that they should be allotted specific land for disposing faecal sludge. Further, public awareness on emptying at regular intervals and public support for day time collection needs to be increased. They also required help in establishing treatment units and acquiring bank loans and subsidies for their business.

Communities stated that health problems and social disharmony exist due to poor FSM.

Regarding the water quality, of the 14 districts covered under the study, with the exception of two districts (Nagappattinam and Tiruvarur), **the groundwater of 12 districts was found to have a high nitrate content.** These are Chennai, Coimbatore, Erode, Kanchipuram, Kanyakumari, Namakkal, Nilgiris, Pudukkottai, Thirunelveli, Thiruvallur, Tiruchirappalli and Tuticorin.

Presence of faecal coliform in river water sources shows that, of the districts covered under the study, faecal coliform contamination was found in the water sample in a majority of the districts. However, statistics show that deaths due to waterborne diseases such as Acute Diarrhoeal Diseases (ADD) and Cholera have come down drastically.

THE FOLLOWING ARE THE KEY CHALLENGES TO FSM IN INDIA:

Lack of adequate/effective policy framework:

Lack of explicit state sanitation strategies on safe disposal of faecal sludge; fragmented policy frameworks without direction on septage management; weak enforcement by the state agencies.

Poor management of urban sanitation:

No physical infrastructure to treat septage; limited use of mechanised desludging practices; on-site sanitation not accorded priority; preference for centralised advanced engineering solutions rather than decentralised septage management; low prioritisation and lack of awareness of the public and government agencies regarding safe disposal; inadequate attention paid to poor people's access to safe sanitation; supply driven rather than demand-responsive sanitation solutions; and manual scavenging found to be widespread though prohibited by law.

Institutional and legislative challenges:

Lack of knowledge in ULBs; no delineation of roles and responsibilities; the roles and responsibilities of state agencies for water, sanitation, and public health are often unclear, overlap and are inadequately coordinated; lack of clarity on the support of state agencies to ULBs in implementing their city sanitation plans; Exclusion of peri-urban and slum areas from the legal framework; limited awareness among stakeholders including policymakers, government officials, civil society and the common man; lack of skilled human resources.

Funding capital and operational costs:

Most ULBs have very limited institutional, financial and staff capacity to improve sanitation provision and septage management; inadequate public funding for septage management and dependence on external assistance, which reflects lack of commitment and ownership and poor municipal revenue generation.

The development of physical infrastructure is only one component of a functioning septage management programme. It depends equally upon sustained public sector commitment and funding, effective policies, appropriate implementation, and compliance enforcement. Historically, the Government of India has focused its wastewater investments on centralised sewerage and treatment. However, the 2008 National Urban Sanitation Policy (NUSP) changed the country's approach to urban sanitation. According to the NUSP, local governments are to be responsible for behavioural change, total sanitation, 100

per cent safe waste disposal, and enforcing the end of manual scavenging, in addition to sewerage development.

The NUSP tasks state governments with drafting state urban sanitation policies, which in turn require cities to develop city sanitation strategies. **Unlike other countries where the construction of facilities has preceded policy, India's focus on policy development allows cities to develop integrated strategies that maximise the efficacy of the future physical infrastructure. These are very positive steps, although the lack of existing local and state policy and management practices and the lack of physical infrastructure to treat septage, pose significant challenges for India as it begins to address the critical issue of on-site sanitation.**

RECOMMENDATIONS FOR IMPROVING SEPTAGE MANAGEMENT AT A NATIONAL LEVEL

Develop national guidelines on septage management:

To support the implementation of the NUSP, the Ministry of Urban Development can create an advisory board that will develop operative guidelines. These guidelines can provide a starting point for state and local agencies who can further adapt the model guidelines and manuals to their own contexts. Guidelines for septage management could include provisions on the involvement of private service providers, health and safety standards, types of septage treatment technologies, and standards for effluent and treated septage discharge or reuse.

Guidelines on technological options:

Policy guidelines should address different technological options, which can address different types of residences e.g., individual households, small clusters, large clusters etc. Further, guidelines should specify the type of machinery recommended in order to do away with manual handling of faecal sludge.

WaterAid/Poulomi Basu

A spot where people practice open defecation as there are no toilets.

Gopalpur Mushari, Bihar, India

Complete state urban sanitation strategies and streamline support for ULBs:

Already ten states have drafted their urban sanitation strategies; the remaining 18 states must develop and complete theirs. The Ministry of Urban Development can assist lagging states in developing these strategies, potentially with the assistance of international organisations. In developing the strategy for urban sanitation in each state, it is critical that these state plans not only create sanitation cells, as directed by the NUSP, but also clarify the roles and responsibilities of the WSS Board and Public Health Engineering Department (PHED), which possess most of the technical expertise in the state. In addition to providing technical assistance and implementation monitoring, state sanitation cells should draft guidelines for local by-laws on sanitation.

Integrate septage management into environmental planning:

Since NUSP charges ULBs to first survey the sanitation condition and then develop a comprehensive sanitation strategy before constructing facilities, cities in India have an opportunity to integrate septage

treatment with other environmental initiatives. This could include jointly managing solid waste and septage collection and treatment, holistically addressing water and treated wastewater resources, managing septage collection and treatment to promote agricultural productivity or reduce agricultural runoff, creating centres of waste recycling to promote new jobs, or developing constructed wetland treatment systems to create new recreational spaces and wildlife habitats. Selecting strategies that resolve multiple problems and produce multiple benefits could build public support for projects and promote programme sustainability.

Construct septage treatment facilities:

There are a variety of treatment technologies that will render septage safe to reuse and dispose. These can be constructed in plantations, farms, landfills, and sewage treatment plants. As part of their baseline sanitation survey process, cities should determine the quality of collected septage, and whether it can meet international standards for reuse. If the treated septage can be reused, the facilities can be designed to generate profitable fertilizers, possibly in tandem with solid waste composting.

Develop public promotion campaigns:

Once treatment facilities have been constructed, cities/towns will want to educate households on the value and importance of regular desludging. To develop a public promotion programme, cities/towns could first survey household attitudes and concerns towards sanitation and septic tanks, which will in turn help identify target audiences and tailor-make key messages. Cities/towns could then conduct the campaign, evaluate attitudes post-campaign, and further refine future promotion campaigns.

Engage local research institutions in developing septage treatment facilities:

As the nutrient and pollutant composition of septage varies by climate and culture, cities/towns in India will need to conduct research to determine the efficacy of different treatment systems, opportunities for improvement, possibilities of reuse and recycling, and new treatment technologies, such as those that combine solid and human waste composting. Engaging engineering schools in this process will also help to integrate on-site sanitation management and treatment into the curriculum and produce future professionals who are able and committed to solving this critical issue of national importance.

RECOMMENDATIONS FOR IMPROVING SEPTAGE MANAGEMENT AT THE STATE LEVEL

Provide trainings and exposure to policymakers and operators:

Having never had to address on-site sanitation before, many ULBs lack the technical knowledge or even the vision of how to develop adequate collection and treatment programmes. States should use exposure visits, workshops, technical trainings, and twinning partnerships for policymakers and wastewater operators in order to raise awareness and capacity. To this end, states can look to the MoUD, donor agencies and research or other training institutions for funding and technical assistance. Exposure visits and trainings could involve regional peers who have successfully provided septage management through a variety of modalities.

Promotion of Ecosan Toilets:

Ecosan toilets are a sustainable sanitation solution for all geographical areas. At this time of deteriorating ecosystems and increasing demand for water, these toilets might provide a viable option. However, appropriate guidelines need to be developed to promote these toilets.

Promotion of Biosolid Manure:

Appropriate IEC materials need to be developed to increase awareness among farmers regarding biosolids and its uses in farming. Further, capacity building needs to be organised for farmers on the opportunities and constraints in using biosolids produced in FS treatment.

States can facilitate exemplary marketing models for biosolids and also facilitate networking between farmers and stakeholders in FSM. The stigma associated with biosolid manure among the general public needs to be addressed to create a demand for agricultural produce using biosolid manure. Central and state governments need to evolve the financial mechanism in order to support biosolid manufacturers.

RECOMMENDATIONS FOR IMPROVING SEPTAGE MANAGEMENT AT A ULB LEVEL

Engage existing private service providers in public-private partnerships:

For many years, private collectors have been providing desludging services when public agencies failed to do so. There are also many examples of private septage collectors who do not dispose of septage in treatment facilities because they were not adequately consulted or engaged in the facility's siting and design process. By involving private septage collectors, community-based organisations (CBOs), and sanitation workers early in the planning process for new septage collection policies and treatment facilities, ULBs can help develop new local business opportunities, build future compliance, and ensure that the new facilities will be used.

Enforcement of the National Building Code:

State governments are required to ensure that ULBs enforce strict adherence to the National Building Code of India (NBC, 2005). The NBC guidelines for septic tank design, construction, installation, operation and maintenance must be followed if newly submitted individual and group housing plans are to be approved.

Public promotion campaigns:

Urban local bodies need to take steps to increase community awareness on the importance of septic tank design. The existing poorly designed septic tanks also need to be improved. State governments need to provide subsidies to BPL (below poverty line) households for reconstruction or replacement of poorly designed septic tanks. Awareness needs to be created among the public regarding the frequency of desludging septic tanks, FS treatment and disposal. ULBs need to fix the rate for desludging/emptying septic tank services by public and private service providers to motivate the public to utilise their services.

Service providers' promotion campaign:

Awareness needs to be created among private service providers and septage transport vehicle drivers regarding unsafe handling of faecal sludge, the negative environmental impact of improper disposal and the importance of treatment before disposal.

Decentralisation of STPs:

Decentralisation of septage treatment by constructing STPs at the town panchayat level will encourage private service providers to treat and dispose effluents from septage tanks at nearby locations. ULBs need to identify and allocate land for septage management.

Annexures and Appendices

Annexure 1

Tables for Town Panchayats and Municipalities

Types	Respondents	Alwarthirunagari	Kotagiri	Needamangalam	Perundurai	Keeranur	Manachanallur	Tharangampadi
Individual homes	SW	2,000	1,000	3,600	-	120		120
	Mgt	2,000	1,000	-	5,000	-	10,000	120
Group houses	SW	2,000	1,500	-	-	200	-	200
	Mgt		1,500	-	2,500	-	-	200
Private (business centres/ markets)	SW		2,000	-	-	1,000	-	1,000
	Mgt		2,500	-	1,000	-	10,000	1,000
Public toilets	SW	500	-	-		200	-	200
	Mgt	-	-	-	1,000		10,000	200
Community toilets	SW	-	-	-		150	-	150
	Mgt	-	-	-	2,500	-	-	250

Table 1 - Quantity of faecal sludge emptied by TP by source (per day in litres)

SW Sanitary workers ; **Mgt** Management

Town Panchayats	Sufficiency			Emptying Equipment	Treatment before disposal	Place of disposal
	Human resources	Emptying equipment	Vehicles			
Alwarthirunagari (6)	DNA	Yes	Yes	Air compressor	No	Outskirts (on the way to Thiruchendure15km away; Amman puram 20km away; Kayampuli 25km away from Alwarthirunagari
Kotagiri (4)	Yes	Yes	Yes	Motor, Hose Pipes, Bleaching Powder and Soap water	No	In the land of private service providers and others (Banana plantation and other fields for use as manure)
Kunnathur (1)	Yes	Yes	Yes	Air Compressor, Hose Pipe	No	In the agricultural lands of the vehicle owner and other farmers, located 3kms from the town area.
Needamangalam (5)	DNA	DNA	DNA	DNA	No	In a barren land between Kovilvenni and Ammapettai
Mamallapuram (2)	Yes	No	No	Air Compressor	No	Riverbeds, Outskirts & on the way to outskirts
Perundurai (3)	Yes	Yes	Yes	Vacuum Pump	No	Agricultural land
Keeranur (2)	Yes	No	Yes	Air Compressor, Hose Pipe	No	In the municipal garbage yard & private lands of private service providers
Manachanallur	Yes	Yes	DNA	Hose Pipes	No	Outskirts
Avinashi	DNA	DNA	DNA	DNA	DNA	DNA
Tharangampadi (2)	Yes	No	Yes	Air Compressor, Hose Pipe	No	Marshland by municipal sources. Private lands by private service providers

Table 2 - Management view on the role of private service providers (Town Panchayats)

DNA Data Not Available

Per Day	Respondents	Gudalur	Mannarkudi	Nagerkoil	Pollachi	Sankarankovil	Thiruchengodu	Perambalur	Mayavaram
Individual homes	Mgt	6,00,000	7,000		35,000	6,000	8,000	2,00,000*	
	SW		9,000	5,000					155
Group houses	Mgt								
	SW								250
Private (business centres/ markets)	Mgt		1,000				9,500		
	SW								500
Public toilets	Mgt	19,350	1,000				1,000		
	SW								5,000
Community toilets	Mgt						1,500		
	SW								300
Temporary Toilets	Mgt								

Table 3 - Quantity of faecal sludge emptied by Municipalities by source (per day in litres)

(Pudukottai and Tiruvallur not included as there is no information collected)
*(grey and black water data)

	Sufficiency					
	Human resources	Emptying equipment	Vehicles	Emptying Equipment	Treatment before disposal	Place of disposal
Gudalur	Yes	Yes	Yes	High Air Compressor	No	Public toilet - municipal solid waste (garbage dumps) at Thettukkal (Uthagamandalam municipality) garbage dumps, Kanthal STP site & agricultural lands
Mannarkudi	DNA	DNA	DNA		No	
Nagerkoil	Yes	Yes	Yes	Air Compressor	No	Municipal garbage dump - 1/2 km from the Nagerkoil municipality
Pollachi	Yes	Yes	Yes		No	
Sankarankovil	Yes	Yes	Yes	Air Compressor	No	
Thiruchengodu	Yes	Yes	Yes	Machine & Air Compressor	No	Kottapalli & Sanarpalayam
Tiruvallur	Yes	Yes	Yes	Suction with diesel engine	No	Open places, agricultural land, huge drainage
Perambalur	DNA	DNA	DNA	UDG Connection	NA	
Pudukottai	Yes	Yes	Yes	Compressor, Hose Pipes, Manual	No	Municipal garbage dumps by municipal sources, Private lands by private service providers
Mayavaram	Yes	Yes	Yes	Compressor Hose Pipes, Manual	Soap and Kerosene	Forest and Wasteland

Table 4 - Management view on the role of private service providers (Municipalities)

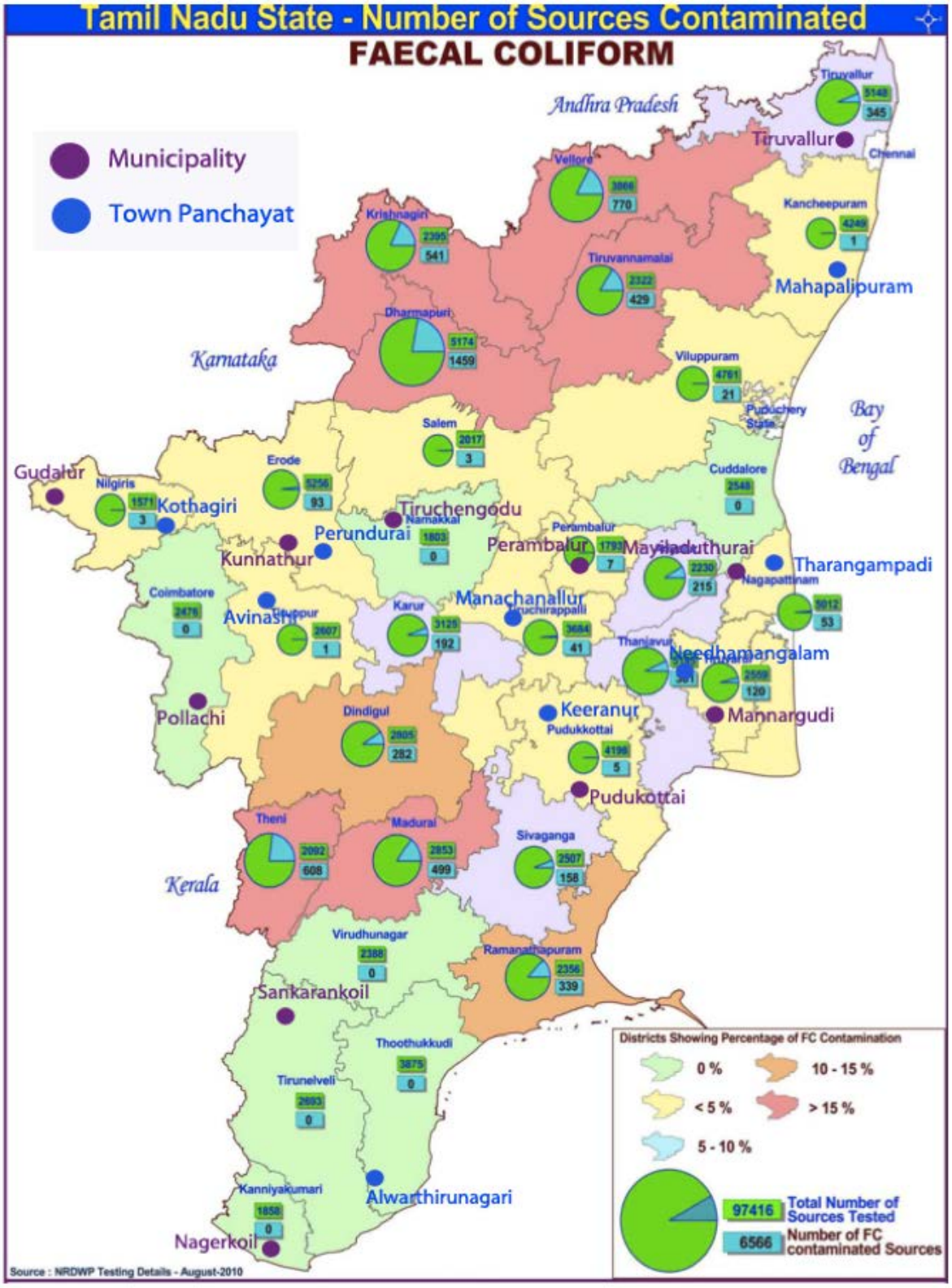
DNA Data Not Available; **NA** Not Applicable

Annexure 2

Map of study areas

Annexure 3

Number of Water Sources Contaminated (Faecal Coliform)



Source: Pollution database for Tamil Nadu (Water Pollution), April 2014

Important findings on FSM in ten town panchayats and municipalities:

Issues in FSM management:

- Data on domestic water requirement and quantity of wastewater generation shows that domestic water requirement ranges between 0.67 MLD (Needamangalam) and 2.02 MLD (Avinashi), with the average of 1.47 MLD. Data provided on wastewater generation indicates that, of the total domestic water use, 78 per cent is generated as wastewater which is closer to CPHEEO estimation. Data on quantity of faecal sludge generated, indicates 18 per cent faecal sludge is generated out of the wastewater.
- Overall, there is no underground sewerage system in any of the TPs. Of all households, around 51 per cent use septic tanks, around 20 per cent use soak pits, 13 per cent use public toilets and around 15 per cent of people defecate in open spaces.
- It was found that except in Tharangampadi and Keeranur, the other eight TPs do not have any equipment for septage emptying.
- Lack of clarity on the data regarding quantity of faecal sludge emptied. Complete data is available only for Tharangampadi TP.
- Regarding frequency of faecal sludge collection, no information is available from two town panchayats (Avinashi and Kunnathur) and among those who responded, responses of management and sanitary workers are not similar even within the same town panchayat, which reflects the lack of clarity and limited roles played by the ULBs.
- Frequency of emptying for different collection systems reported by eight town panchayats indicates that most households prefer to empty their septic tanks, once in 10 years to 20 years as reported by sanitary workers while majority of the management (except Perundurai and Kotagiri) reported higher frequency from 1 year to 5 years. It is clear from the data that most of the households clean their septic tanks after long periods for various reasons which shows that desludging is not in accordance with the prescribed standards of operative guidelines for septage management for urban and rural local bodies in Tamil Nadu, 2013.
- Data shows that no uniform pattern exists in case of cost for emptying septage and the amount specified by management and sanitation workers also varies. In case emptying septic tank, cost per load mentioned by sanitation workers, varies from Rs.800 (Keeranur) to Rs.2,000 (Tharangampadi). Corresponding

information from management varies between Rs.800 (Keeranur) and Rs.10,000 (Alwarthirunagari). The cost of emptying the 'soak pit', ranges from Rs.800 to Rs.2,000 per load. Managements from Keeranur and Tharangampadi report cost of manual scavenging by private workers at Rs.500 per load. According to the management and sanitation workers, fixing the cost for emptying faecal sludge is based on various factors such as distance travelled, input cost (fuel and labour charge) and tank size.

- As mentioned earlier, there is no Underground Sewerage System (UGSS) and Septage Treatment Plants (STPs) in any of the town panchayats. Therefore no question on treatment of faecal sludge arises.
- Multiple sites are reported for disposing faecal sludge – 'outskirts' and 'agricultural land' is the commonly reported disposal site followed closely by municipal disposal yard.
- Most commonly reported problems with soak pit/ leach pit is 'lack of desludging at regular intervals', 'poor construction', followed by 'improper desludging'. Similarly, for septic tanks, the most common problem was 'bad odour/gas formation' followed by 'overflow during monsoon', which causes problems in the neighbourhood. Higher cost for emptying the septic tank and pit latrines is also mentioned as a problem by two town panchayats.
- Regarding issues faced with the current collection system: Management from four town panchayats (Kotagiri, Perundurai, Keeranur and Tharangampadi) stated 'lack of technology which leads to manual efforts', 'low frequency of emptying the septic tanks' as issues. Similarly, sanitation workers from four town panchayats (Needamangalam, Mamallapuram, Keeranur and Tharangampadi) shared that 'hardening of sludge due to irregular and improper emptying of septic tanks, ground water pollution due to poor design of septic tank, lack of air compressor machine and poor drainage' were issues relevant to their places.
- On issues associated with the present emptying process, of three responses from management, the following were mentioned: faecal sludge cannot be completely removed because of hardening and lack of safety materials. Sanitary workers mentioned lack of modern equipment as issues associated with the present emptying process.
- TP managements were asked about the issues with current FS disposal. Common challenges for disposal ranged from lack of transport; lack of awareness / poor maintenance by households; service charges to private

workers and non-availability of workers.

- It has to be mentioned that the role of town panchayats in FSM is not well defined. So there were poor responses from the town panchayats.

Roles and issues of private service providers

- According to the managements, private service providers play a crucial role in faecal sludge management across all town panchayats. The number of private service providers ranges from one to six and most of them did not have a licence to operate.
- Cost for emptying faecal sludge is generally fixed per trip, based on septic tank size, distance and quantity collected. All seven TPs (Kotagiri, Kunnatur, Mamallapuram, Perundurai, Keeranur, Manachanallur and Tharangampadi) reported sufficient human resources with private players operating in their panchayats. The fee charged ranges from Rs.2,000 to Rs.12,000 per trip. Almost all responding private players reported between one to ten service calls in a month
- Nine (except Tharangampadi) private service providers reported using modern equipment for removing faecal sludge and using other supporting equipment such as shovels, ropes and rods in varying combinations. None of them have undergone any formal training for using equipment. Two players (Kunnathur and Mamallapuram) reported being trained by the vehicle company at the time of purchase. None of the private players provide information on treating FS before disposal, implying that the sludge is disposed without treatment. With regard to the place of disposal, eight responded that they throw faecal sludge in multiple places – agricultural land (4); municipal dumping yard (3), own land (1) and riverbed (1). Multiple suggestions were offered regarding the support they require from the state: land or proper dumping yard for FS; land and vehicles (with subsidy) or vehicle for collection of FS; licensing and regulation of the same and need for generating public awareness.

Community responses on FSM

- The communities responded regarding the type of septic collection used by the households. Respondents in nine groups reported having septic tanks in their households; members in four groups reported use of pit/ latrine by lesser percentage of households and one group reported open defecation.
- According to the communities, the major reason for overflow of septic tanks and leach pits seems to be infrequent cleaning. It was reported that these are cleaned once in five

years in Kotagiri, Needamangalam and Avinashi; once in 8-10 years in Perundurai and between 15-20 years in Kunnathur and Alwarthirunagari. In Manachanallur, emptying of septic tanks is between 1-3 years while no information is available for Keeranur.

- Six of the ten TP community groups used private services for cleaning, one community group reported using private and manual scavenging (Manachanallur) and two other groups reported municipal services (Keeranur and Tharangampadi), while no data is available for Mamallapuram.
- Chief among the reasons for seeking private players for septic tank cleaning is the lack of services offered by the town panchayat (4). One group from Perundurai said that lack of response from municipal workers made them turn towards private players who offered good service, were punctual, approachable and used modern technology. Lack of equipment with municipality in Manachanallur led community groups towards private services and also the urgency to get septic tanks cleaned made them avail manual scavenging services.
- Fever (5), skin diseases (3), malaria (4) are the commonly reported health issues arising out of poor faecal sludge management. Among the environmental impacts, air pollution (7) especially odour is a common issue among community groups. Eight of the ten community groups reported water pollution, and six groups reported degradation of soil fertility. Quarrels and misunderstanding among neighbours is the most commonly reported social impact of poor FSM.

Important findings on FSM in ten municipalities:

Responses from Management and Sanitary Workers

- Details from municipalities on domestic water requirement and quantity of wastewater generation shows that domestic water requirement ranges between 3.90 MLD (Perambalur) and 26.90 MLD (Nagerkoil), with the average of 9.60 MLD. 88 per cent of water requirement is met by municipalities and 19 per cent of faecal sludge is generated out of wastewater.
- None of the municipalities has full-fledged UGSS. Of the three municipalities with partial coverage, Perambalur municipality has relatively higher coverage as compared to Mayavaram and Mannarkudi.
- It was found that 56 per cent of individual households use septic tanks in municipalities, 14 per cent of individual households use soak pits, and 10 per cent of households

are connected to the underground drainage system in municipalities.

- It was found the 12 per cent of the households use public toilets, 7 per cent of the households resort to open defecation.
- In case of desludging equipment, Mayavaram reported to be better equipped and other municipalities expressed insufficiency in equipment and tanker lorries.
- Complete information on sewerage collection is not reported across municipalities. Household waste collection is the most frequently collected data. However, the frequency is not available.
- Frequency of FS collection from individual households varies from 2-10 years as reported by management and 1-10 years as reported by sanitary workers; whereas public toilets are reported to be cleaned between 6 months to 4 years.
- In none of the municipalities, manual emptying was undertaken.
- According to management, fee for emptying varies between Rs.600 to Rs.2,500 per load, while sanitary workers reported a price range between Rs.600 – Rs.5,000 per visit. Soak pit cleaning fee ranges between Rs.600 - 1,500.
- Municipal dumping yard is most frequently used for disposing faecal sludge, followed by agricultural land and outskirts. At Mannarkudi, faecal sludge is disposed in the compost yard while in Thiruvallur, faecal sludge is disposed in the STP.
- Most commonly reported problems with septic tank usage are: lack of proper construction, overflow and opening during rainy season, water pollution, cost of cleaning and gas formation during cleaning. In case of leach pits; poor maintenance, connection by users to drainage, lack of proper construction, water pollution were reported as issues.
- In case of faecal sludge collection; overflow, poor machinery, low levels of mechanisation, manual cleaning by private service providers, less frequency of emptying and water contamination were reported as problems.
- On issues associated with emptying process – lack of public awareness about emptying, lack of equipment, lack of safety equipment and lack of health care after emptying are stated as problems.
- None of the municipalities, except Thiruvallur, has facilities for treatment of faecal sludge. Absence of low cost technology and proper place for disposal were also stated as the major issues associated with non-treatment.

- On issues with place of disposal – like in other parts of Tamil Nadu, faecal sludge is disposed in agricultural land, outskirts, municipal dump yards.
- Infrequent collection and poor maintenance of toilets resulted in social problems among the neighbours and also resulted in environmental issues such as groundwater pollution and breeding of mosquitoes.

Responses of private service providers

- Except Mannarkudi, all municipalities have private service providers for addressing faecal sludge management. Most of them do not have a license to operate. The number of service calls varies from two per day to about 15-20 per month.
- Most of the private providers reported using modern equipment such as suction machines / air compressors for removing sludge.
- With regard to safety equipment, seven of the nine service providers reported using safety equipment such as mask/handkerchief and gloves.
- Regarding treatment, only three private players (Mannarkudi, Perambalur and Mayavaram) reported existence of partial facilities for treating faecal sludge before disposal. With regard to place of disposal of faecal sludge, the commonly indicated sites are - agricultural land, garbage dump and drainage, municipal dumping yard, outskirts, coconut grove, wasteland, forest land and riverbed.
- Among the challenges faced by private players is the absence of proper place for disposal, opposition from public, harassment by government officials and police while carrying out the task during daytime. Other issues mentioned included higher cost of labour, high investment for vehicles and increasing business competition. Another major issue reported is hardening of sludge due to infrequent emptying of soak pit/septic tank, which force them to involve manual effort many times.
- On the scope of private service providers in faecal sludge management, there is a mixed reaction from the respondents. Some said that there is a mismatch in demand and supply of services, as there is a steady increase in the number of service providers and also the increasing coverage of urban areas under UGSS, while a few said that there is good scope for more private players as the urban local bodies are not providing such services.
- Regarding the support required from the government, private service providers stated that they should be allotted specific land for disposing faecal sludge. Further, public awareness on emptying at regular intervals and

public support for day time collection needs to be increased. Support was also required for establishing treatment units, and acquiring bank loans and subsidies for their business.

Community group responses

- On the type of septic collection used by the households, all of them reported having septic tanks; followed by pit/ latrine (5 groups). People from Perambalur reported using sewer connections while Gudalur group stated defecating in open spaces.
- In five municipalities, desludging is done between two to five years, three municipalities mentioned 'more than five years'.
- Six of the ten community groups preferred private providers due to easy availability, accessibility and quality of services as compared to that of government services. The major reason for opting for services from four municipalities was 'low cost' as compared to private service providers.
- All ten community groups reported awareness of health and environmental impacts of poor faecal sludge management.

Appendix 1

Tables for State Level Review

		Percentage of households having			
	% of Urban HH	Water closet	Pit latrine	Other latrines	No toilets
Delhi	97.5	87	2	2	10
Uttar Pradesh	22.3	77	3	3	17
Madhya Pradesh	27.6	72	2	1	26
Gujarat	42.6	85	2	0	12
Maharashtra	45.2	67	2	2	29
Tamil Nadu	48.4	67	7	2	25

Table 1 - Availability and Type of Toilet Facilities in Urban Households

Source- Houses and Household Amenities, Latrine Facility, Census of India - 2011, Registrar General & Commissioner, India. Available at: http://censusindia.gov.in/2011census/hlo/Data_sheet/India/Latrine.pdf

	India	Delhi	Uttar Pradesh	Madhya Pradesh	Gujarat	Maharashtra	Tamil Nadu
Piped sewer system	32.7	60.5	28.3	20.2	60.4	37.8	27.4
Septic tank	38.2	24.7	46.9	50.1	24.2	28.6	37.9
Other systems	1,7	0.9	2	1.2	0.5	0.9	1.1
With slab/ ventilated improved pit	6.4	1.5	2.4	1.2	2	2.2	6.6
Without slab	0.7	0.2	0.5	0.4	0.1	0.2	0.3
Night soil - open drain	1.2	2.1	1.3	0.8	0.3	1.2	1.5
Night soil - serviced by humans	0.3	0	1.4	0.1	0	0	0.2
Night soil - serviced by animals	0.2	0	0.3	0.2	0	0.3	0.2
Public latrines	6	7.1	2.1	3.3	3.6	21	8.6
Open	12.6	3	14.8	22.5	8.7	7.7	16.2

Table 2 - Type of Toilet Facilities - New Additions in Urban Households

Source- Houses and Household Amenities, Latrine Facility, Census of India - 2011, Registrar General & Commissioner, India. Available at: http://censusindia.gov.in/2011census/hlo/Data_sheet/India/Latrine.pdf

	Class-1 Cities	Class-1 Total Water Supply (MLD)	% Sewage generation to total water	% Sewage treated to total sewage generated
Delhi	1	4346	87%	61%
Gujarat	28	2101.18	80%	47%
Madhya Pradesh	25	1560.91	80%	15%
Maharashtra	50	12482.87	80%	42%
Tamil Nadu	42	1346.54	80%	31%
Uttar Pradesh	61	4406.25	80%	35%

Table 3 - Water supply, wastewater generation and sewage treated: Class-1 Cities

Source- Status of Water Supply, Wastewater Generation and Treatment In Class -I Cities & Class-II Towns of India, Control of Urban Pollution Series: CUPS/70/2009-10, Central Pollution Control Board, Ministry of Environment and Forests, Government of India. p: 4-5

	Class-2 Towns	Class-2 Total Water Supply (MLD)	% Sewage generation to total water	% Sewage treated to total sewage generated
Delhi	0	NA	NA	NA
Gujarat	31	284.46	80%	0%
Madhya Pradesh	23	163.64	80%	7%
Maharashtra	34	267.18	80%	14%
Tamil Nadu	42	230.86	80%	16%
Uttar Pradesh	46	432.19	80%	4%

Table 4 - Water supply, wastewater generation and sewage treated: Class-2 Towns

Source- Status of Water Supply, Wastewater Generation and Treatment In Class -I Cities & Class-II Towns of India, Control of Urban Pollution Series: CUPS/70/2009-10, Central Pollution Control Board, Ministry of Environment and Forests, Government of India. p. 7

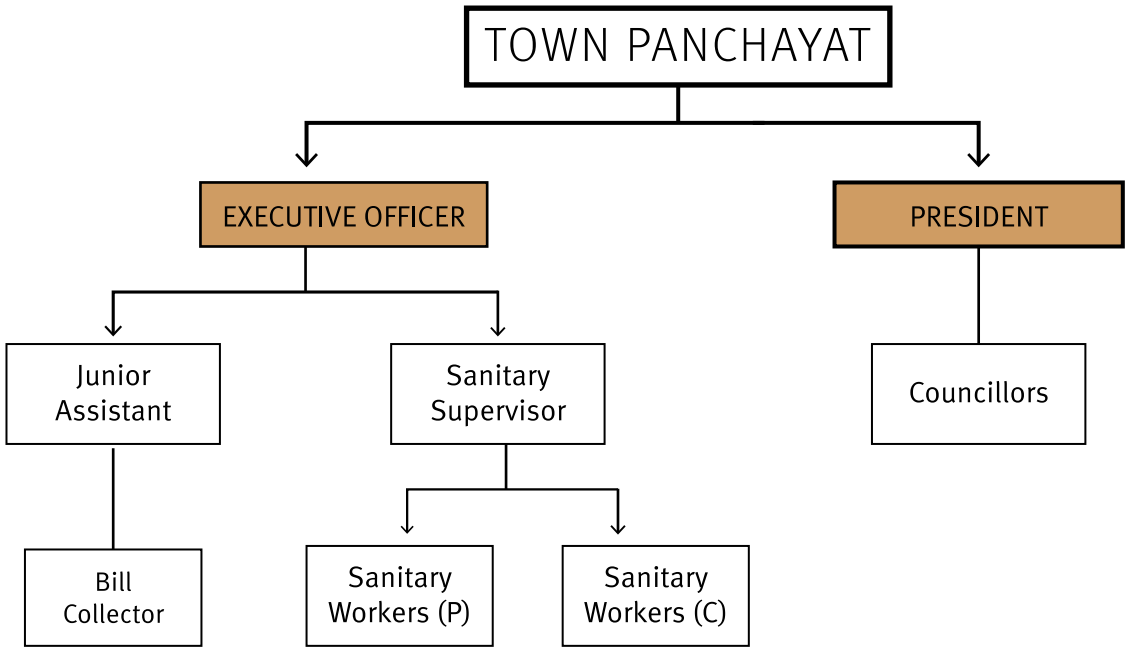
	Installed capacity (MLD)	Actual utilised capacity (MLD)	% Utilised	No. of STPs
Delhi	20	20	100	2
Gujarat	232	226	97	2
Madhya Pradesh	168.4	123.7	73	9
Maharashtra	284	124.2	44	6
Tamil Nadu	798.94	394	49	18
Uttar Pradesh	779.6	585.8	75	24

Table 5 - Performance evaluation of sewage treatment plants under NRCD

Source- Performance Evaluation of Sewage Treatment Plants under NRCD, August 2013, Central Pollution Control Board, Ministry of Environment and Forests, Government of India. p. 15

Administrative profile and Administrative structure of Town Panchayats

	Executive Officer	Executive Engineer / Municipal Engineer/ Asst. Engineer	Sanitary Officer / Sanitary Inspector	Sanitary Supervisor	Sanitation workers (permanent)	Sanitation workers (contractual)
Alwarthirunagari	Yes	No	No	Yes	12	3
Kotagiri	Yes	Yes	Yes	Yes	30	40
Kunnathur	Yes	No	No	Yes	10	10
Needamangalam	Yes	No	No	Yes	11	16
Mamallapuram	Yes	Yes	Yes	No	17	45
Perundurai	Yes	No	No	DNA	21	52
Keeranur	Yes	No	No	Yes	2	0
Manachanallur	Yes	Yes	Yes	DNA	30	40
Avinashi	Yes	Yes	No	Yes	28	30
Tharangampadi	Yes	Yes	Yes	No	19	16



Role in Faecal Sludge Management

Chairman

The Chairman does not have any specific role in FSM. However, he is involved in:

- Assessments done and discussions with the committee members to take decisions.
- Approval of government schemes although the budget allocation is done by the state.
- Policy making at ULB level, deciding and approval through Council.
- Approval authority based on council recommendation for any activity from general fund.
- To collect the requirement of basic amenities (Garbage cleaning, public toilet maintenance, water source, electricity, footpaths etc.) from councillors/ward members and forward this to the Executive officer and monitoring the activities.
- Organising meetings, reviewing progress, planning, passing resolutions and schemes.

Executive officer

- Supervising the sanitary activities, identifying the household needs of public health and making decisions on purchases of sanitary material below Rs.10,000/-.
- Creating awareness on FSM among community and workers, planning and implementation of schemes.

Engineer / Assistant Engineer

- Providing technical support, preparing estimates for the required need.
- Developing project designs, and authority to prepare detailed project reports for various schemes and their execution.
- Planning, implementing and monitoring engineering works and maintenance of infrastructure.

Sanitary Officer

- Checking the sanitation conditions in the villages.
- In charge of maintaining the procured material, vehicles etc., for sanitation work.
- Looking after FSM works of manpower and equipment.

Sanitary Inspector

- Supervising the day-to-day work of sanitary workers (cleaning and desludging the public toilets) and stock taking of equipment.
- Identifying the needs and problems of the sanitary workers and bringing them to the notice of the Executive Officer.
- Checking the sanitation conditions in the villages and ensuring all public toilets and open defecation areas are kept clean.

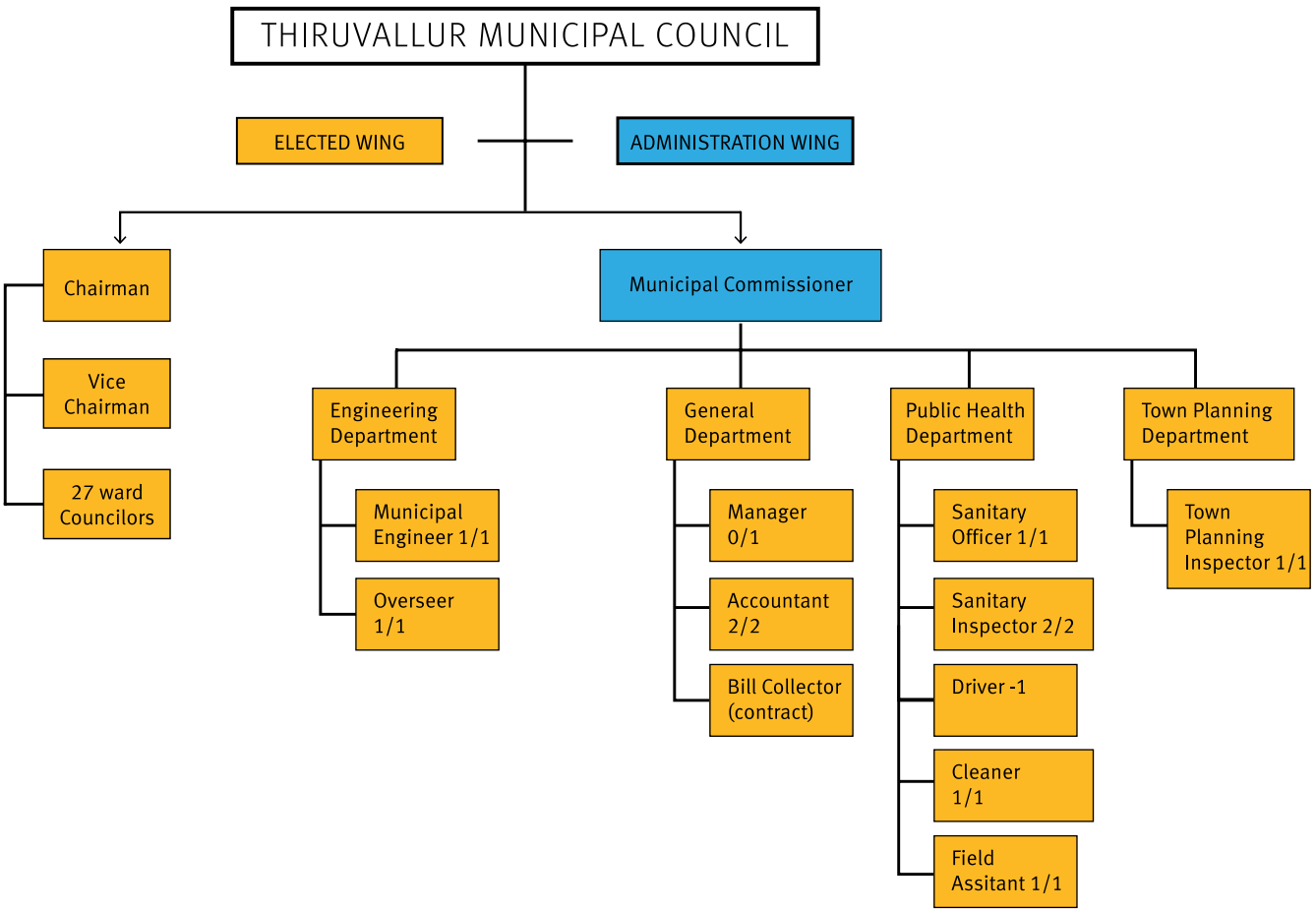
Sanitation workers

- Cleaning the drainage, road, garbage, public toilets, collection of household waste.
- Clearing blockages in the public or community toilets.
- Referring private service providers to the public who demand septic tank emptying services.

Appendix 3

Administrative profile and structure of municipalities

	Executive Officer	Municipal Engineer	Sanitary Officer / Sanitary Inspector	Sanitary Supervisor	Sanitation Workers (permanent)	Sanitation Workers (contractual)
Gudalur	Y	Y	N	Y	27	17
Mannarkudi	Y	Y	Y	Y	95	40
Nagerkoil	N	Y	Y	Y	312	0
Pollachi	Y	Y	Y	Y	136	9
Sankarankovil	N	Y	Y	Y	90	74
Thiruchengodu	N	Y	Y	Y	166	60
Tiruvallur	Y	Y	Y	Y	69	43
Perambalur	Y	Y	Y	Y	44	121
Pudukottai	Y	Y	Y	Y	256	102
Mayavaram	Y	Y	Y	Y	174	60



Role of Municipality in FSM

There is no specific role for Municipal authorities in the case of FSM. However, they have defined roles in the case of underground drainage, and construction and maintenance of public and community toilets

Municipal Chairman

Municipal Chairman does not have any specific role in FSM. Generally he/she performs administrative roles such as chairing the planning, budget and review meetings on schemes allotted by the state government.

Municipal Commissioner

Municipal Commissioner does not have any specific role in FSM. He/she performs routine administrative duties such as:

- Execution activities based on approved budget.
- Implementation of mechanisms.
- Management of finance, human resource and infrastructure.

Municipal Engineer

- Planning, implementing and monitoring engineering works and maintenance of infrastructure.
- Planning and budget preparation for construction of public toilets and buildings under government schemes.
- Preparing detailed project reports and execution of work.
- Procurements and implementation.

Sanitary Officer

- To check the sanitation conditions in the villages.
- Authority of maintaining the procured material, vehicle etc., for all sanitation work.
- Looking after FSM works for manpower and equipment.
- In the absence of sanitary officer, senior sanitary inspector is authorised to maintain the procured material, vehicle etc. related to sanitation work.
- Authority of field execution of desludging and maintenance of the infrastructure.

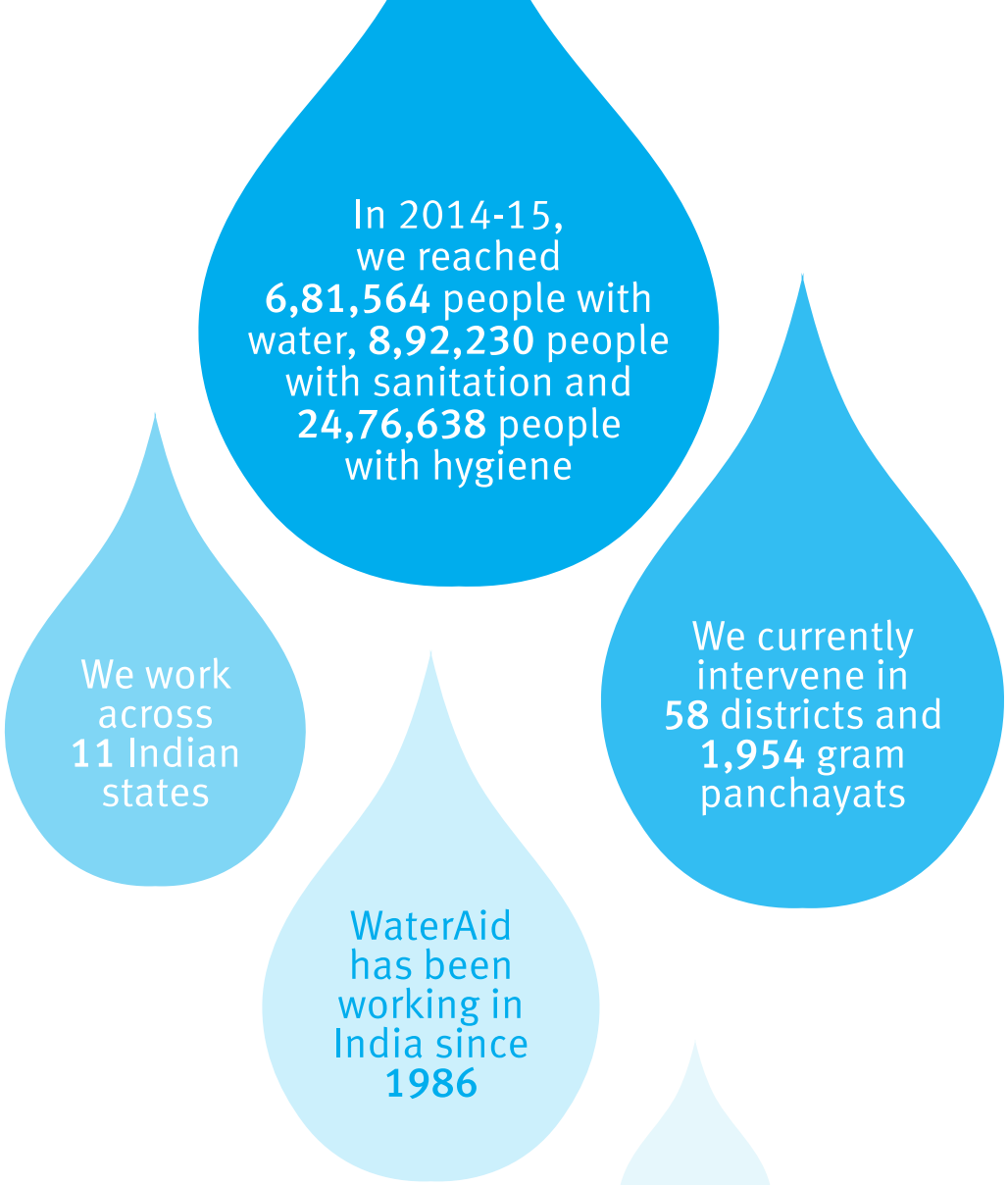
- Material and human resource management.

Sanitary Inspector

- Supervises the sanitary workers and makes field visits to see the progress of sanitation work.
- Takes stock of equipment, and brings the needs and problems of sanitary workers to the notice of the Executive Officer.
- Supervises cleaning and desludging the public toilet.
- Checks the sanitation conditions in the villages.
- Execution of day-to-day cleaning work.
- To ensure all public toilet and open defecation areas are kept clean.
- Inspection and supervisory role of field execution.
- Planning and monitoring of implementation.

Sanitation Workers

- Cleaning the drainage, road, garbage, public toilet, collection of household waste.
- Clearing any blockages in the public or community toilets.
- Referring private service providers to the public who enquire and ask for desludging.
- Desludging of the septic tanks in municipality area.
- Collection and disposal of faecal sludge.



WaterAid's mission is to transform the lives of the poorest and most marginalised people by improving access to safe water, sanitation and hygiene

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