iihs™

INDIAN INSTITUTE FOR
HUMAN SETTLEMENTS

Scoping Exercise to Support Sustainable Urban Sanitation in Tamil Nadu

EXPOSURE VISIT REPORT

March 2016

Scoping Exercise to Support Sustainable Urban Sanitation in Tamil Nadu

EXPOSURE VISIT REPORT

March 2016

For Citation: TNUSSP, 2016. Scoping Exercise to Support Sustainable Urban Sanitation in Tamil Nadu, Exposure Visit Report

DOI: https://doi.org/10.24943/tnusspevr.03.2016

This document is produced as part of Tamil Nadu Urban Sanitation Support Programme (TNUSSP). TNUSSP supports the Government of Tamil Nadu (GoTN) and cities in making improvements along the entire urban sanitation chain. The TNUSSP is being implemented by a consortium of organisations led by the Indian Institute for Human Settlements (IIHS), in association with CDD Society, Gramalaya, and Keystone Foundation.

Document Team: Chaya Ravishankar, Devi Kalyani, Geetika Anand, Rajiv Raman, Shivaram K.N.V., Vishnu M.J.

Editing: Word Lab, IIHS, Bengaluru

Production: Shaheena Manoj, Krishnapriyaa P., Govardhan Seshachalam

Team Leader: Kavita Wankhade

Project Director: Somnath Sen

2. BMGF funding acknowledgement: This Research / Work was supported by Bill & Melinda Gates Foundation.

Table of Contents

List of Tables

Abbreviations

BMGF	Bill and Melinda Gates Foundation
CPCB	Central Pollution Control Board
FSM	Fecal Sludge Management
GoTN	Government of Tamil Nadu
IIHS	Indian Institute for Human Settlements
IWK	Indah Water Konsortium
MIS	Management Information System
M&E	Monitoring & Evaluation
MLD	Million Litres per Day
MoUD	Ministry of Urban Development
ONAS	Office National de l' Assainissement du Senegal
SPAN	Suruhanjaya Perkhidmatan Air Negara
TNUSSP	Tamil Nadu Urban Sanitation Support Programme
UGD	Underground Drainage
ULB	Urban Local Body

1 Introduction

1. Introduction

The current report presents the preparatory work undertaken for the organizing of exposure visits for Govt. of TN officers to locations where there are examples of successful demonstration and implementation of fecal sludge management practices.

This report forms a part of Tamil Nadu Urban Sanitation Scoping Study undertaken by the Indian Institute of Human Settlements (IIHS) for the Government of Tamil Nadu (GoTN), with support of the Bill and Melinda Gates Foundation (BMGF).

1.1. Background and Urban Sanitation Context in Tamil Nadu

Tamil Nadu is the most urbanised state (amongst the large states[1]) in the country, with an urban population share of 49 percent (Census of India, 20111), about 3.49 Crore people. The state has 33 districts for administrative purposes. Of this the district of Chennai is wholly urban. Apart from Chennai, there are six districts that have urbanisation share of more than 60 percent. There are 14 districts that display urbanisation levels less than 30 percent. The urban areas of Tamil Nadu are organized into 10 Corporations, 148 Municipalities, 561 Town Panchayats, two Cantonment Boards, and 376 Census Towns.

In Urban Tamil Nadu, about 75 percent of households have toilets within their premises, 9 percent use public toilets, and 16 percent resort to open defecation. About 66 percent of the household toilets are reported to have water closets (Census of India, 2011a). About 27 percent of all households (or 40 percent of those with water closets) have their toilets connected to the sewer system, and 38 percent of the household toilets (40 percent of those with water closets) are connected to septic tanks (Census of India, 2011a). In Class 1 Cites, the coverage of household toilets connected to sewers is as high as 50 percent; smaller cities, hence, have a higher prevalence of septic tanks. About 35 percent of the households without latrines use public conveniences. While on-site systems are the majority, most investments historically have targetted creation or upgradation of sewerage (under-ground drainage or UGD). In urban Tamil Nadu, 1,129 MLD of sewage treatment capacity exists with another 151 MLD under construction; however current utilisation is reported to be lower at 394 MLD (CPCB, 2013).

The Govt. of Tamil Nadu (GoTN) is committed to improving urban sanitation, and taking cognisance of the predominance of on-site sanitation systems, the GoTN issued Operative Guidelines for Septage Management across the State in September, 2014. These guidelines underlined the importance of standardizing septic tank designs, instituting standard operating procedures for collection and transportation of septage, and implementing possible co-treatment options at the existing under-utilized sewage treatment plants, apart from creating new infrastructure and systems for comprehensive septage management.

The Bill & Melinda Gates Foundation (BMGF, hereafter “The Foundation”) have come forward to assist the GoTN in developing and implementing sustainable sanitation solutions for urban Tamil Nadu. The objectives of the support include elimination of open defecation; safe containment, treatment, and disposal of human excreta, so that the outcomes of improved public health, hygiene and dignity can be achieved for urban Tamil Nadu.

With a view to scoping the tasks that may need to be carried out over the future years, including identification of the institutional arrangements and capacities required, the Foundation commissioned IIHS to carry out a Scoping Study. The study comprised:

- A Secondary Review

[1] Delhi, Goa and Mizoram have a higher proportion of urban population in their state.

- A Primary Study
- Exposure Visit Report

In addition to analysis based on the above secondary and primary studies, consultation workshop was organized to present findings to and elicit inputs and responses from stakeholders (including State officers, municipalities, and Town Panchayat representatives, NGOs, research institutions, etc. Exposure visits to selected developing country sites where septage management solutions are being implemented, have also been proposed if feasible, and a short report outlining the possible locations was also prepared.

This Report presents the contours of the proposed exposure visits to selected developing country sites where septage management solutions are being implemented. A secondary scan of best practices in selected locations was carried out and on this basis; suitable sites were identified for exposure/ field visits aligned with the objectives of the proposed Urban Sanitation Support Program for Tamil Nadu. The exposure visits are expected to enable key officers to obtain an appreciation of lessons for implementation of sustainable sanitation in Tamil Nadu.

1.2. Objectives of the Exposure Visits

As outlined in the previous section, while on-site systems are the most predominant household arrangements across the State, there has hitherto been limited attention paid to proper construction and maintenance of septic tanks. One, many of these structures may be in the nature of holding tanks and do not serve their purpose of safely collecting and confining human excreta. Most of these are not emptied or de-sludged regularly. Then, Septage/fecal sludge from these on-site structures is generally emptied using vehicle mounted vacuum tanks (cess-pool vehicle). However, limited data is available on the number and coverage of these vehicles, as these are mostly operated by the informal sector. This is also a largely unregulated activity that has started receiving attention only lately.

The sludge collected from septic tanks is commonly disposed into either natural storm water drainage system or a nearby surface water body in the absence of any treatment systems. Urban Local Bodies (ULBs) on the other hand, have not recognized the full cycle of sanitation, especially on-site installations, as something that needs their attention.

The most popular understanding of sanitation in urban areas is stopping open defecation, and using toilets, and more importantly, the sewerage or UGD is seen to be the panacea of all human excreta management. Therefore, even in smaller Town Panchayats, stakeholders prefer to “wait” for the UGD solution, howsoever, expensive these may be in terms of capital costs, and complex that these may be to operate and maintain. With the issuance of GoTN’s Operative Guidelines (and supportive documents from MoUD too), the imperative and cost advantages for strengthening on-site systems, and the whole septage management have received recognition in policy. However, the proof of concept for these approaches remains to be established in the perception of decision-makers and implementers.

There is a lack of demonstrated successful models in India, in the area of septage management / fecal sludge management (FSM). Stakeholders gaining exposure to robust FSM/septage management models in another developing country context, is therefore envisaged as one of the key preparatory steps for the development and operationalization of effective FSM systems.

The objectives of the Exposure Visit are for participants:

i. To obtain an overview of concepts and practices in the full cycle chain of improved urban sanitation management including safe containment, conveyance, treatment, disposal/re-use etc.

ii. Through facilitated site visits and interactions with stakeholders in the selected sites, for participants to get an appreciation and practical understanding of all elements of septage management/FSM system including the following:
   a. Legal, policy, institutional, and regulatory framework
   b. FSM/Septage Management infrastructure and technology, procedures and operations, along the entire sanitation service chain i.e. collection, de-sludging, transport, treatment and disposal/ re-use, in various stages in the urban sanitation chain
   c. Stakeholder roles and responsibilities
   d. Financing and business models at different parts of the full urban sanitation cycle value chain
   e. Data management, Management Information Systems, and M&E for organization management and service standards
   f. Capacity development strategies including improved skills and operating systems and procedures
   g. Changes in attitudes and mindsets of customers and public and private agency personnel
   h. Innovations including those in products and services
   i. Other salient aspects of the selected sites

iii. To synthesise exposure learning into concrete plans of action for follow-up interventions for implementing septage management/FSM solutions and innovations in urban areas of Tamil Nadu

Based on a review of secondary material, selected locations in Malaysia; and Dakar in Senegal, are proposed for site / exposure visits.

2 Learning from the FSM Model in Kuala Lumpur, Malaysia

2. Learning from the FSM Model in Kuala Lumpur, Malaysia

2.1. Overview

Kuala Lumpur, the capital of Malaysia has a well -developed and advanced model for fecal sludge management whose key features include: (i) Institutional framework and regulation and monitoring; (ii) Delineation of Roles and Responsibilities of Stakeholders; and explication of (iii) Sanitation value chain for on-site systems.

The following sub- sections present a snapshot of key facts and figures relating to the urban water and sanitation context at the country and city level for Malaysia and its capital Kuala Lumpur respectively.

2.1.1. Country Snapshot-Malaysia

Table 2.1: **Malaysia Basic Statistics**

Sl. No.		
1	Area sq. km	328,550
2	Urban Population- 2014	22 million
3	Urban Population as Percentage of Total Population-2014	74.01
4	Percentage of Population with access to improved sources of water-2014	98.2
5	Percentage of urban population with access to improved sources of water-2014	100
6	Percentage of population with access to improved sanitation facilities-2014	96
7	Percentage of urban population with access to improved sanitation facilities-2014	96.1
8	Human Development Index Ranking 2013	62

2.1.2. City Profile- Kuala Lumpur

Kuala Lumpur has a population of 1.6 million spread over an area of 243 sq. km. Access to direct piped water supply connections is available to 100% of the population .98 % of the population has access to improved sanitation facilities comprising connection to a sewerage system (98%) or on site sanitation facilities namely individual or community septic tanks and a small percentage of pour flush systems. There is no incidence of open defecation reported. Collection and emptying of septic tanks, is highly regulated with monitoring of enforcement and compliance. Treatment infrastructure consists of both mechanized and non-mechanized facilities. At present, Kuala Lumpur is able to treat between 80 and 90% of the generated fecal waste in a safe manner; and re-use sludge and bio solids to a limited extent.

2.2. Learning Opportunities

Sanitation infrastructure in Kuala Lumpur Malaysia with a population of 1.63 million is largely served by sewered/ networked systems with the exception of far-flung sub-urban areas that are on-site systems. The on- site systems are well regulated and planned for emptying conveyance and treatment.

At the policy level, legislative reforms and institutional provisions with clear allocation of roles and responsibilities, subsidy provision with well laid-out procedures and systems for the technical and financial operations, and management of fecal sludge are noteworthy.

Further, emphasis has been given to citizen outreach, information and awareness programs. A sound management information system is also in place and aids effective demand management.

2.2.1. Institutional Framework and Regulation

Sanitation infrastructure in Malaysia is governed under the provisions of the Water Services Industry Act 2006 under the Department of Environment. A National Water Services Commission (Suruhanjaya Perkhidmatan Air Negara- SPAN) constituted within its provision, undertakes regulatory control for sewerage and fecal sludge management. Since the 1990s, sanitation including on site sanitation infrastructure vests not with the local authorities or municipalities, but is a federal government subject and it owns all sanitation related assets. The Indah Water Konsortium (IWK) company was given a long term concession contract from 1993 to 2008 to develop and maintain sanitation infrastructure including de-sludging and treatment facilities and services. Since 2008, the IWK has been reconstituted as a government-owned company under the Department of Finance. Services for FSM are provided by IWK, which provides nationwide sewerage services and other private contractors (permit holders) who are licensed by SPAN. Other operators are also now allowed to apply for permits from the IWK

2.2.2. Roles and Responsibilities of Stakeholders

The National Water Services Commission (SPAN)at the national level is responsible for development, maintenance and regulation of the sanitation infrastructure/assets and its governance including tariff setting. The operations of the sanitation infrastructure are heavily subsidized by the federal government.

The IWK, a wholly government-owned company under the Department of Finance which undertakes construction and operations of the infrastructure including licensing of operators, desludging, transportation, treatment and customer outreach, billing and collection. In Malaysia, private developers are required to deploy capital expenditure for the development of sanitation infrastructure and its safe containment, treatment, disposal/reuse. It is estimated that between 70% and 80% of the sanitation infrastructure in Malaysia, has been developed privately.

Customers/end users are required to comply with enforcement standards in relation to construction and maintenance of septic tanks, and to make them accessible for regular desludging. While punitive measures are in place to address violations and non-compliance, these have been rarely enforced and customer outreach and education is relied upon.

2.2.3.Sanitation Value Chain for On Site Systems in Malayasia

The elements across the full sanitation value chain for on- site systems, is presented in **Error! R eference source not found.**.

Table 2.2: **Sanitation Chain in Malaysia**

Sl. No.	Component of OSS	Infrastructure	Investment
1	Collection	Of the 20 percent population connected to on-site sanitation facilities, 98 percent are connected to septic tanks and the remaining to pour flush latrines. Private developers are expected to provide communal septic tanks or sewerage connection whichever is feasible.	Households are expected to adhere to standardized design for septic tanks enabling access to them while de-sludging.
2	Emptying	Licensed permit holders under IWK, undertake the de-sludging services on a pre-scheduled and demand basis. Repeat de-sludging and responsive de-sludging for areas outside IWK jurisdiction, is also undertaken. On an average, de-sludging is carried out every two years. A customer database is maintained with tracked rescheduling. A standardized operating procedure is followed for emptying, transportation , treatment , disposal and reuse of sludge.	Per household cost is estimated to be $3.6 per month. Tariff for emptying services is levied based on tank capacity and on the basis of treatment technology. Investment on de-sludging equipment is made by the license holder.
3	Transportation	De-sludging trucks are specifically designed in three sizes in accordance with septic tank size and road width. They are tracked with GPS technology.	Investment on specially designed trucks are made by the license holders.
4	Treatment	Non mechanical and mechanical treatment are used. Mechanical treatment includes activated sludge treatment – belt press, filter press and centrifuge. Non mechanized methods like trenching/ mobile dewatering and redirecting to effluent to treatment systems, lagoons and oxidation ponds. Private developers are advised on treatment technology to be adopted for use in developed areas.	Treatment technology is adapted based on a graduated approach and the phased replacement on septic tanks is carried out on an ongoing basis with federal government support.
5	Disposal	100 per cent scientific disposal is prevalent	Only 20% of operating expenditure is recovered and the remaining is subsidized by the federal government
6	Reuse	Reuse is carried out in a limited manner for soil conditioning, land reclamation and composting. Use of bio solids for generation of electricity has also been piloted.	

2.2.4.Key learning elements

Malaysia showcases one of the most advanced models of FSM globally as well as in the region with an effective and efficient regulatory framework, clear role allocation and monitoring system across the sanitation value chain and a graduated approach towards environmentally sound outcomes.

Unlike other models, the Malaysian model has developed an effective collection and safe containment system before putting in place systems of treatment and disposal/reuse. Joint provisioning of water and waste water services are also noteworthy. Enforcement of regulation has been achieved with effective collaboration of the private sector, citizen outreach programs and heavy subsidies and financial support from the federal government. Capacity development and training of all stakeholders involved and training for other countries is a hallmark.

1. The Malaysian model showcases one of the most advanced models of FSM globally as well as in the region with an effective and efficient regulatory framework, clear role allocation and monitoring system across the sanitation value chain and a graduated approach towards environmentally sound outcomes.
2. Unlike other models, the Malaysian model has developed an effective collection and safe containment system before putting in place systems of treatment and disposal/reuse. The sequencing and phasing of such strategies may be relevant for Tamil Nadu to learn about.
3. Enforcement of regulation has been achieved with effective collaboration of the private sector, citizen outreach programs and heavy subsidies and financial support from the federal government. In the TN context, given national flagship schemes' resources, the basic programme frame is in place, but sustained engagement with private sector and households will be required to achieve substantial improvements.
4. Capacity development and training of all stakeholders involved and training for other countries is a hallmark, apart from the integration of water and wastewater management.

3

Learning from the FSM Model in Dakar, Senegal

3. Learning from the FSM Model in Dakar, Senegal

3.1. Overview of Senegal

Dakar, the capital of Senegal has an established model for fecal sludge management and has an enabling environment for the sustainable provision on sanitation at scale. It's key features include: (i) clear Institutional framework and regulation; (ii) Roles and Responsibilities of Stakeholders; and explication of the (iii) Sanitation value chain for on-site systems.

The following sub- sections present a snapshot of key facts and figures relating to the urban water and sanitation context at the country and city level for Senegal and its capital Dakar respectively.

3.1.1. Senegal – Country Snapshot

Table 3.1: **Senegal Basic Statistics**

Sl. No.		
1	Area sq. km	196,722
2	Urban Population- 2014	6.36 million
3	Urban Population as % of Total Population-2014	43.39
4	Per cent of Population with access to improved sources of water-2014	78.5
5	Per cent of urban population with access to improved sources of water-2014	92.9
6	Per cent of population with access to improved sanitation facilities-2014	47.6
7	Per cent of urban population with access to improved sanitation facilities-2014	65.4
8	Human Development Index Ranking 2013	163

3.1.2. City Profile- Dakar

Dakar has a population of 2.6 million spread over an area of 82.38 sq. km. Access to direct piped water supply connections is available to 82 percent of the population with the remaining depended on private sources. About 98 percent of the households, has access to improved sanitation facilities comprising pour flush toilets connected to sewers / small bore sewers (35 percent), septic tanks (58 percent), Ventilated Improved Pit latrines (4 percent), with negligible / no incidence of open defecation. Of a total estimated generation of 6,000 cum per day, approximately 1,500 cum of human excreta, is collected daily.

Collection and transportation of sludge is carried out by both formal and informal / private service providers with de-sludging carried out mechanically and manually. Treatment infrastructure consists of three waste water treatment plants and four transfer stations. At present, Dakar is able to treat between 25 percent and 39 percent of its fecal waste in a safe manner.

Office National de l'Assainissement du Senegal) (ONAS), the national office for sanitation is mandated with the management of sanitation including sewerage and fecal sludge management since 1996, while

the responsibility for water supply is with SONES. The sanitation code provides the legal and regulatory framework with the environment code, health code, local authorities code and the urban development code administered by other departments constituting related provisions.

3.2. Learning Opportunities

The innovations described across the sanitation chain, include the formalized institutional framework and regulation; stakeholder roles and responsibilities; sanitation value chain for On Site Systems; and (iv) Structuring of the FSM Market for the benefit of poor households

3.2.1. Institutional Framework and Regulation

The National Office for Sanitation ONAS (Office National de l'Assainissement du Senegal) is mandated with the management of sanitation including sewerage and fecal sludge management including the establishment of regulatory provisions, treatment standards, licensing of providers, levying of user fee for sewerage services, tax for the use of disposal and treatment facilities as well as the expansion of sanitation infrastructure. The enforcement of various regulatory provisions and formalization of the National Sanitation Code is the responsibility of ONAS.

3.2.2. Roles and Responsibilities of Stakeholders

The ONAS is mandated with the responsibility of sanitation provision and management including the management of various stakeholders. The ONAS builds and maintains infrastructure related to treatment and disposal in partnership with local authorities/municipalities. The private providers are licensed by the ONAS, and are free to set and collect user fee from customers. The responsibility for procurement of infrastructure, vehicle and equipment and provision of services, determining and levying of user fee for emptying, collection and transportation of fecal sludge is the responsibility of licensed private operators. They are required to pay dumping tax for use of the disposal site. NGOs and users' associations play an active role in raising awareness on sound practices in sanitation. The Association of Senegalese Sanitation Workers is an important stakeholder in effective management of on-site systems. Informal providers known as 'Baay Pelles' are also contracted by households for manual emptying.

3.2.3. Sanitation Chain for On Site Systems

The elements across the full sanitation value chain for on- site systems, is presented in **Error! R eference source not found.**.

Table 3.2: **Sanitation Chain in Dakar**

Sl. No	Component of OSS	Infrastructure	Investment
1	Collection	Effectively 90 percent of the sanitation infrastructure is served by on site systems with 84 percent connected to septic tanks.	Privately constructed. Social connections for small bore systems/ toilet construction were undertaken as part of various government/externally supported projects. In order to enhance connections to the low income settlements, a microfinance initiative is functional.
2	Emptying	Carried out at least twice a year by majority of households. Both manual and mechanical facilities are available for de-sludging. Emptying is not prescheduled but based on demand. A call-in center	Private investment. Manual de-sludging is informal and costs around 18 USD. Mechanical de-sludging is carried out by licensed operators and costs approx. 37 USD.

Table 3.2: **Sanitation Chain in Dakar**			
Sl. No	**Component of OSS**	**Infrastructure**	**Investment**
		has been operationalized with tracking technology and showing good results.	
3	Transportation	A fleet of 150 trucks are available currently including vacuum trucks, hydro-excavators and slurry tankers.	Private investment consisting of vehicle assemblers and equipment suppliers.
4	Treatment	Three Fecal Sludge Treatment Plants (WWTPs) and four Transport Stations. An additional facility is proposed to be constructed.	Public investment by ONAS. Expansion of infrastructure and its maintenance is the responsibility of ONAS and Municipalities. Possibility of concessions being examined.
5	Disposal	It is estimated that 1,500 cum is treated while another 4,500 cum of septage is disposed in an unsafe manner.	Public Investment. Possibility of concessions being examined.
6	Reuse	Sludge / bio solids treatment standards defined and enforced, and utilized as soil conditioner in a limited manner. Options for re-use being piloted e.g. the Omni Processor Technology	Public Investment. Project supported by the BMGF.

3.2.4.Key Learning Elements

1. The Dakar experience of the formalization and accreditation of private and informal service providers is relevant in the context of Tamil Nadu. The collaboration between the government agency and the service providers is noteworthy.
2. The use of ICT for streamlining of service delivery is another point of learning. As Tamil Nadu grapples with the challenge of eliminating manual scavenging the Dakar experience of transition to mechanical emptying through structuring the FSM market can offer useful and practical insights.
3. Follow up plans to consolidate the progress so far include a project supported by the BMGF 'Structuring of the FSM Market for the benefit of poor households 'is being implemented by the ONAS and partner agencies. The strategy is to improve the market for private operators involved in de-sludging by scaling up sanitation provision to reduce costs and include populations in the low income category.
4. Multi-pronged interventions to streamline demand management, deployment of ICT, database and MIS infrastructure, development of awareness and capacities of various stakeholder groups, market assessment by organized group of accredited private operators are operational.
5. Sanitation infrastructure for flood prone areas and an additional treatment facility is also being developed.

iihs™
INDIAN INSTITUTE FOR
HUMAN SETTLEMENTS

Indian Institute for Human Settlements
Bangalore City Campus No.
197/36, 2nd Main Road
Sadashiva Nagar
Bangalore 560 080. India
T +91 80 6760 6666
www.iihs.co.in