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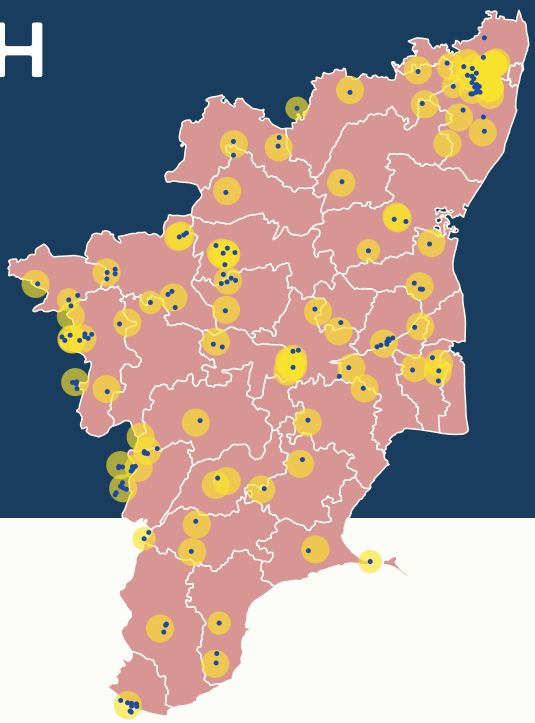
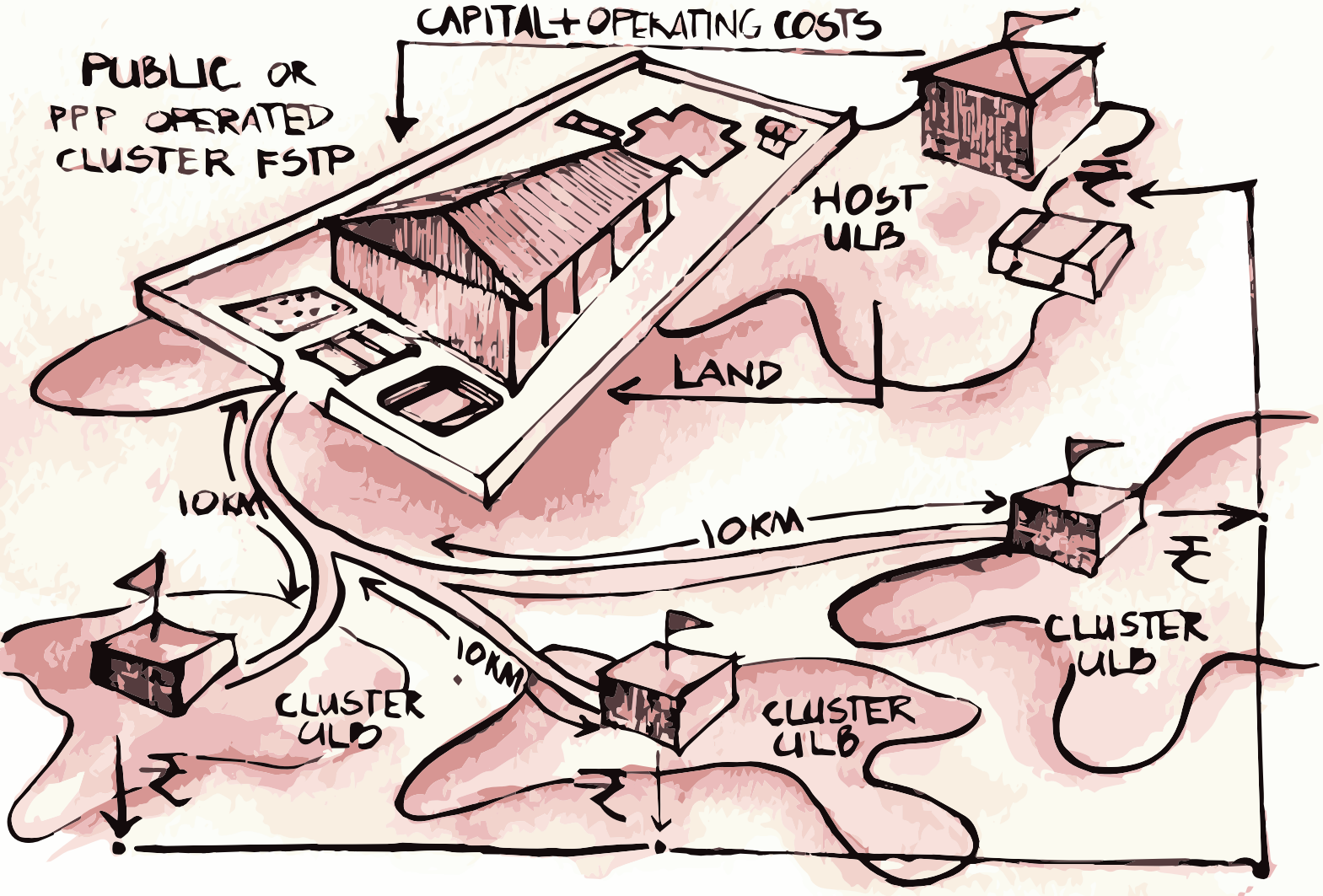
TAMIL NADU URBAN SANITATION SUPPORT PROGRAMME

REPORT

CLUSTER APPROACH FOR USED WATER TREATMENT: A CASE STUDY

August 2022





Cluster Approach for Used Water Treatment: A Case Study

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Abbreviations

AC	Appeals Committee
CPHEEO	Central Public Health and Environmental Engineering Organisation
FS	Fecal Sludge
FSM	Fecal Sludge Management
FSTP	Fecal Sludge Treatment Plant
GoTN	Government of Tamil Nadu
JC	Joint Committee
MoU	Memorandum of Understanding
MAWS	Municipal Administration and Water Supply
O&M	Operation and Maintenance
OG	Operative Guidelines
OSS	On-site Sanitation System
RD&PRD	Rural Development and Panchayat Raj Department
RLB	Rural Local Body
SIP	State Investment Plan
SLA	Standard License Agreement
STP	Sewage Treatment Plant
TNUSSP	Tamil Nadu Urban Sanitation Support Programme
ULB	Urban Local Body

1. Introduction

India has seen concerted efforts in increasing access to toilets and sanitation systems in recent years through schemes such as the Swachh Bharat Mission. However, treatment still poses a huge challenge due to the limited operational treatment capacity. India also has a large proportion of population dependent on Onsite Sanitation Systems (OSS) such as Septic Tanks and soak pits. Faecal Sludge and Septage (FSS) from OSS is disposed into water bodies and agricultural fields, leading to environmental pollution and public health hazards.

Taking cognisance of the above facts, Government of India has introduced the National Faecal Sludge and Septage Management (NFSSM) policy in 2017 to emphasise the importance of treating the faecal sludge from OSS.

Access to treatment facilities is critical, either by setting up new Faecal Sludge Treatment Plants (FSTPs) or through saturation of capacities of underutilised or non-functional Sewage Treatment Plants (STPs). Given the costs of treatment systems and limited capacity of smaller local bodies, scaling access to treatment facilities is a challenge.

Clustering of local bodies around those with treatment facilities optimises the use of resources and capacity, and investment requirements, allowing scaling of access to treatment. It can help assign the Operations and Maintenance (O&M) of facilities to the larger and better equipped local bodies. The approach can be applied to both the use of FSTPs as well as for co-treatment of FSS at unutilised capacity at STPs.

Clustering local bodies (rural and urban) around existing and proposed treatment plants within an optimal distance also enables de-sludging vehicles to easily access the designated disposal facilities from customer sites.

To enable above, the following are suggested:

1. Conduct mapping exercise to cluster towns and villages around a treatment facility.
2. Direct the host local body (where treatment facility is located) to accept waste from other local bodies.
3. Enable governance mechanisms to ensure operationalisation of the cluster approach including provisions for cost sharing between local bodies for O&M.
4. Ensure licensing of de-sludging operators is done at the cluster level.

The following sections present the case study of Tamil Nadu, which has adopted the cluster approach as part of efforts to scale Fecal Sludge Management (FSM) across the state. The case study covers the rationale and key principles underpinning the approach along with methods adopted for its implementation and operationalising in both urban and rural areas of the state.

2. Cluster Approach for Tamil Nadu

2.1 Urban Sanitation Context in Tamil Nadu

As per Census 2011, 48.4 per cent of Tamil Nadu's population live in urban areas, making it one of the most urbanised states in India. Urban areas in the state are categorised into a three-tier hierarchy with Municipal Corporations, Municipalities and Town Panchayats.

Table 2. 1 Urbanisation Structure in Tamil Nadu

S. No	Urban Local Body	No.	Population	% of Population
1	Corporations	21	1,34,28,002	43%
2	Municipalities	138	96,84,799	32%
3	Town Panchayats	490	80,90,847	25%
	Total	**649**	**3,12,03,648**	**100%**

Source: Census 2011

Within these urban areas, on-site sanitation systems (OSS) remain the dominant household sanitation arrangement across the state, with nearly 70 per cent of households connected to OSS and 30 per cent to piped sewer system (Ministry of Statistics and Programme Implementation, 2018). The sewage generated in piped sewer systems is treated in Sewage Treatment Plants (STPs). In 2017, the sewage generated from urban areas of Tamil Nadu was three times higher than the installed capacity for treatment in the state (Ministry of Environment, Forest and Climate Change, 2017). In addition to the lack of adequate treatment capacity, the absence of treatment facilities like Fecal Sludge Treatment Plants (FSTP) leads to unsafe disposal of Fecal Sludge (FS) accumulated from OSS into waterbodies around cities, causing contamination of potential drinking water sources.

The Government of Tamil Nadu (GoTN) has been a pioneer in not only recognising such challenges as core to improved standards of public health, but also prioritising the full sanitation chain, including the strengthening of FSM as an economical and sustainable complement to network-based systems.

To achieve the Tamil Nadu Sanitation Mission, GoTN aims to scale up access to safe and sustainable sanitation in all urban areas. As one of the first states to recognise the need for FSM to ensure access to sanitation for all, the government issued the Operative Guidelines (OG) for Septage Management in 2014. To support the GoTN in its sanitation mission and implementation of the OG, the Tamil Nadu Urban Sanitation Support Programme (TNUSSP) was launched in 2015.

2.2 The Need for Cluster Approach

Baseline studies conducted as part of TNUSSP involved discussions with de-sludging operators across the state. The studies revealed that operators resort to unsafe disposal practices and disposed the fecal sludge in nearby waterbodies, stormwater drains, fields, and other such open spaces.

While there are multiple reasons underpinning the prevalence of open dumping of fecal sludge, the lack of adequate disposal facilities is most significant, with de-sludging operators reporting difficulties in traveling long distances to dispose fecal sludge at designated facilities. This has also led to operators transferring the high transportation costs on to the customers.

To address this need for appropriately located disposal facilities, the GoTN in its OG adopted an approach of clustering Urban Local Bodies (ULBs) around treatment plants that optimised distance travelled by operators as well as increased the utilisation of the treatment facilities.

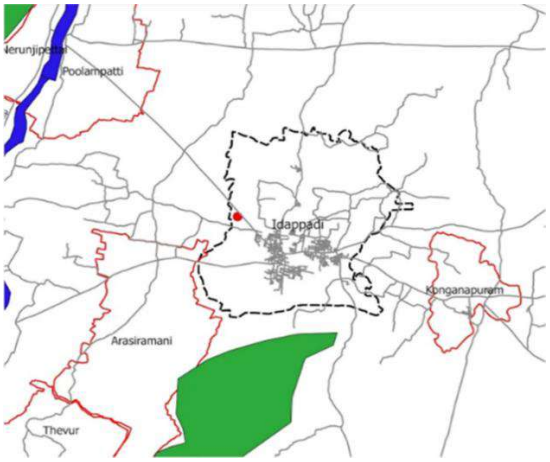
2.3 Introducing the Cluster Approach

The 2014 OG identified 35 clusters of local bodies based on the existing locations of STPs. The local bodies were grouped such that all collection points were situated within a radius of approximately 18-20 km of the designated STP. The OG also stipulated that decanting facilities should be designed based on expected volumes of septage generated in local body clusters with adequate capacity for the next five years based on the projected urbanisation in the cluster.

Further discussions with operators to operationalise the cluster approach revealed that the optimal travel distance to disposal facilities was within 10-12 km from customer sites. In addition to the distance factor, the studies also showed municipalities to be in a better position to manage treatment facilities with more resources and capacity, than the smaller town panchayats.

In essence, the baseline studies and discussions reiterated the benefits of a cluster approach to ensure total sanitation across the state. Hence, considering these findings, the government developed a State Investment Plan (SIP) that focused on scaling up treatment across the state on the basis of the cluster approach.

Figure 2. 1: Map Representing a Simple ULB Cluster



Source: TNUSSP, 2018

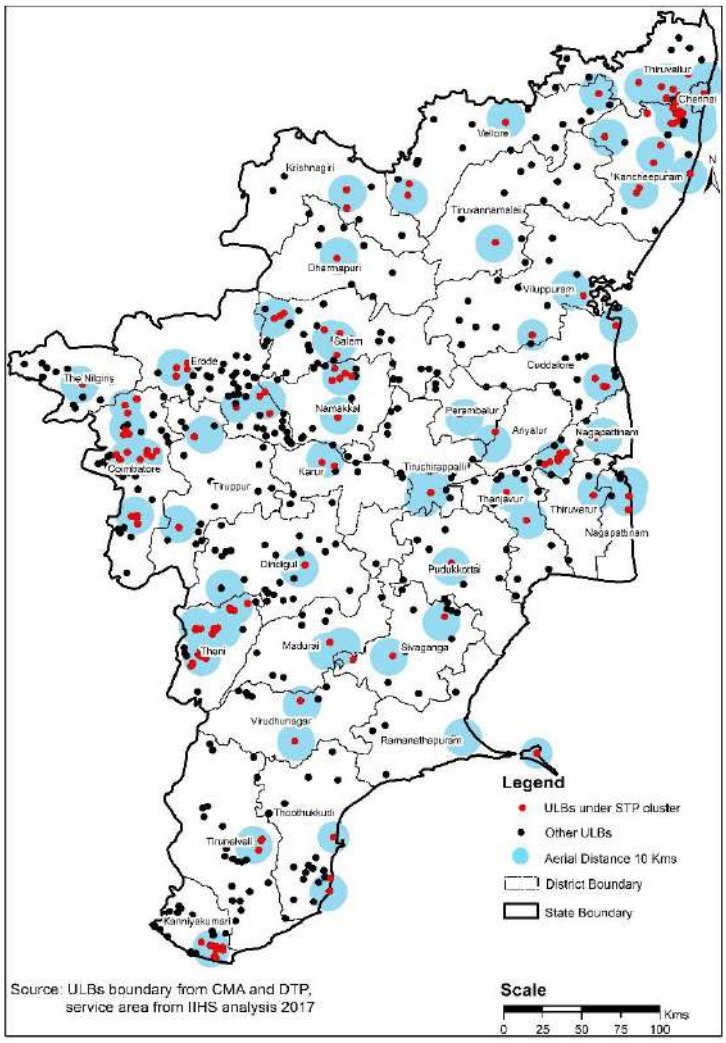
2.4 Scaling the Cluster Approach to all Urban Local Bodies

The cluster approach through SIP was planned to be scaled up across the state in a phased manner as follows:

1. Phases I and II covers a population of 11.9 million through co-treatment at STPs in 68 ULBs.
2. Phase III secures municipal solid waste management (SWM) sites to locate FSTPs in 56 ULBs and covers a population of 3.7 million through clusters of municipalities and town panchayats.
3. Phases IV and V are clusters in small town panchayats or standalone FSTPs in 353 ULBs and cover a population of 6.3 million.

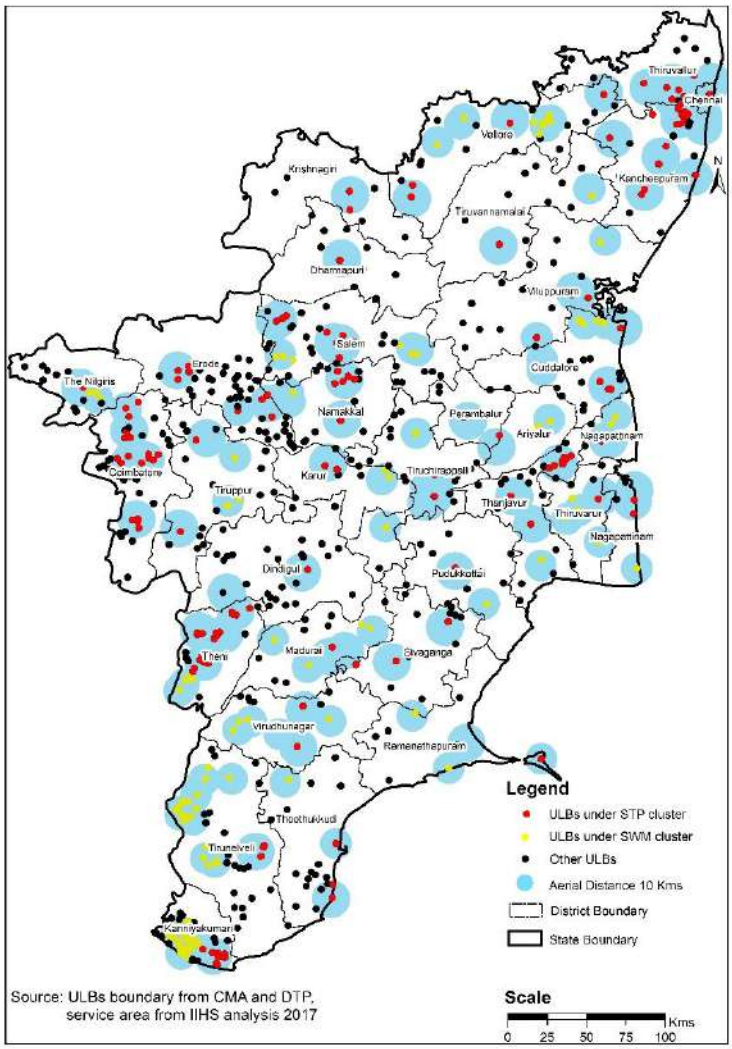
The GoTN is working on two phases – I, II, III – simultaneously. In 2018, the government sanctioned Rs. 200 crores for 49 FSTPs and in 2019, Rs. 31 crores for an additional 11 FSTPs under Phase III.

Figure 2. 2: Phase I & II- SIP



Source: TNUSSP, 2018

Figure 2. 3: Phase III- SIP



Source: TNUSSP, 2018

2.5 Scaling the Cluster Approach to Rural Local Bodies in Tamil Nadu

The GoTN is looking to expand the cluster approach to rural areas of the state. As a first step, the GoTN is including Village Panchayats (VPs) in the urban clusters with the aim to maximise access to treatment facilities across the state.

Initial clustering is to be initiated in the first three operational phases of SIP. Clustering with STPs practicing co-treatment (Phase I and II of SIP) will take priority, allowing VP's to start decanting FS loads as STP at no additional cost. Clustering with FSTP clusters (Phase III of SIP) could be initiated in parallel once the O&M cost sharing mechanism between ULBs and RLBs is finalised. Clustering with Phase IV and V treatment facilities is to be initiated after treatment facility work commences.

A tentative urban-rural clustering exercise has been undertaken and the road map for coverage of local bodies is presented in the table below. Access to treatment facilities for VPs falling outside the ULB clusters shall be implemented by either rural-rural clustering or standalone facilities, as decided by the Rural Development & Panchayat Raj Department.

Table 2. 2 Urban-Rural Clustering Road Map for TN							
#	**Facilities / Local Bodies**	**Phase 1**	**Phase2**	**Phase 3**	**Phase 4**	**Phase 5**	**Total**
1	No. of Treatment Facilities	46	22	56	103	250	477
2	M Corp. (exc. Chennai)	16	3	1			20
3	M	35	15	50	38		138
4	TP	48	24	70	98	250	490
5	ULBs Covered	**99**	**42**	**121**	**136**	**250**	**648**
6	(M Corp + M + TP)						
7	VP Covered	**1,014**	**452**	**1,164**	**1,720**	**3,482**	**7,832**

*Note: Clustering done for 10,630 VPs (Of 12,525) with geo-codes available**,** of which 7,832 VPs can be clustered with ULBs with treatment facilities**.** Exercise to be revised and completed once complete geo-code list received.*

As these treatment facilities come into operation, they will be shared by the clusters of urban and rural local bodies for the scientific treatment and disposal of fecal sludge generated within their respective jurisdiction.

3. Implementation of the Cluster Approach in Tamil Nadu

At present, with 25 FSTPs completed and 31 FSTPs under various stages of construction, and co-treatment being enabled at 48 STPs, the government recognised the need to develop governance mechanisms that formalised the cluster model and ensured the sustained usage of treatment facilities.

In May 2020, the GoTN issued a Government Order (G.O (2D) 35) to operationalise the cluster approach and institute two governance mechanisms – i) a Memorandum of Understanding (MoU) to formalise the working arrangements between ULBs for the joint usage of shared treatment facilities, including cost sharing of Operation and Maintenance (O&M); and ii) the Standard License Agreement (SLA) that streamlines the collection and conveyance process and aligns de-sludging operations with the cluster approach.

Following the GoTN's decision to implement urban-rural clustering, the MoU and SLA is to be revised to include provisions for rural local bodies and their representative authority. In the MoU for FSTPs, revisions will also include the O&M cost-sharing mechanism. The revisions will seek to facilitate urban-rural clustering.

3.1 Memorandum of Understanding (MoU)

The MoU establishes the cluster approach and provides ULB clusters with a facilitative framework for the O&M of the upcoming, shared FSTPs as well as the co-treatment process at existing STPs.

While there exist few examples of such formal arrangements between local authorities that either share or provide services in the areas of water supply and solid waste management, none appear to be implemented at scale across India. This MoU is the first of its kind in the area of sanitation to be institutionalised at the state level.

Key Considerations and Decisions - During the process of developing the MoU, alternate options were considered for certain critical aspects of the MoU and key decisions were taken by the Advisory Committee[1]. These include the following:

1. Framing the MoU as a Tripartite Agreement: This would entail the concessionaire (or FSTP O&M contractor) being party to the MoU along with the concerned ULBs. This, however, was ruled out to reduce complexity and avoid confusion with respect to ownership and purview over the FSTP (which lies solely with the Host ULB).
2. Sharing of FSTP O&M costs: This would be done based on (i) loads received or (ii) a base fee plus additional cost. The AC decided that the sharing formula would be tied to population, and costs shared in proportion to the ULB population.

By stipulating the terms and conditions for the shared usage of treatment facilities, the MoU aims to enable the smooth and sustained functioning of the FSTPs/STPs. The MoU details a set of obligations for the Host ULB i.e., the ULB where the treatment facility is located, as well as Participating ULBs i.e., ULBs that cluster around the said treatment facility. The key attributes of the MoU are:

[1]As a part of TNUSSP, GoTN constituted the Advisory Committee and State Working Groups to help establish credibility of FSM as a sustainable and standalone sanitation solution and enable its quick scaling. Key members of the AC include Additional Chief Secretary, Municipal Administration and Water Supply Department (Chair), Heads of Departments (CMA, DTP), representatives from key departments and state agencies, and special invitees.

- To define the stakeholders involved in the O&M and use of FSTPs, and in the co-treatment process.
- To set out the responsibilities of ULBs along with the terms and conditions for the use of the shared facility.
- To encourage the usage of treatment facilities, whilst affording Host ULBs the right to recover costs of operating and maintaining these facilities.
- To establish the principles by which O&M costs are shared between the ULBs served by an FSTP.
- To safeguard funds collected for the O&M of the FSTP, and thereby ensure financial sustainability.

The table below describes the various components of the MoU.

Table 3. 1: Salient Features of Memorandum of Understanding

#	Salient Features	Details
1	Obligations of the Host and Participating ULBs	Prior to and from the starting date of operations
2	Payment Terms (only applicable for FSTP clusters)	As per agreed distribution of O&M fees, and paid on receipt of demand notice
3	Dispute Resolution	Joint Committee (JC) comprising representatives of regional authorities. Disputes referred to Appeals Committee (AC) constituted of senior officers of Commissionerate of Municipal Administration and Directorate of Town Panchayats.
4	Review and Amendment	On AC approval.
5	Term and Renewal	Three-year term and renewal to be agreed upon by all parties.
6	Temporary Shutdown/ Downtime of the Facility	Prior intimation to participating ULBs and de-sludging operators to avoid de-sludging or arrangements in the next nearest available treatment facility.
7	Force Majeure Event	Host ULB to notify Participating ULBs about the nature, extent and estimated duration of the event. Parties to discuss resumption of obligations.
8	Termination	On AC approval.

In summary, the MoU brings together ULBs in a cluster to oversee the use and maintenance of shared treatment facilities whilst accessing the services of treatment facilities. The MoU is a significant step towards ensuring sustainability of treatment facilities by:

- Safeguarding funds collected for the O&M of the FSTP.
- Mandating ULBs to follow proper disposal and treatment processes.

To sustain operations of the treatment facilities, adequate volume of fecal sludge is a key requirement. With this aim of promoting the usage of the treatment facilities and preventing open dumping, the MoU assigns Host and Participating ULBs the responsibility of ensuring that all de-sludging operators operating within their jurisdiction are regulated or streamlined through a formal licensing agreement.

3.2 Standard License Agreement

The SLA was developed to achieve the above-mentioned objectives as well as comply with the provisions of the OG, Ministry of Housing and Urban Affairs' guidelines and Swachh Survekshan 2020 that emphasise treatment of septage, licensing of operators and regulation of open dumping. While it was primarily aimed at preventing open disposal of FS, the SLA reinforces the cluster approach.

Through the SLA, the GoTN has mandated 'Host ULBs' (i.e. ULBs where treatment facilities are located) to license private de-sludging operators serving within the cluster. De-sludging operators can operate across ULBs in a cluster once the vehicle is registered/licensed with the Host ULB. When the de-sludging operators apply for license, they are required to provide a set of documents as listed in the table below:

Table 4. 1: Documents required for Licensing

#	Documents / Requirement	Phase
1	Vehicle documents - RC book, Insurance, FC, Goods vehicle permit and photograph of vehicle	At the time of new license / renewal
2	Worker / Driver - Name, Photo ID proof, Medical certificate, Personal accident insurance cover of Rs. 10 lakhs	At the time of new license / renewal
3	Signed undertaking preventing manual scavenging as per G.O. (Ms) No. 293 MAWS Department dated 26.11.2010	At the time of new license / renewal
4	Equip vehicle with approved GPS device and provide access to ULB	Ongoing
5	Ensure periodic training, maintenance of logbook and usage of safety gears	Ongoing

As per the SLA, operators are mandated to equip their vehicles with approved GPS devices that can be accessed by ULBs to ensure disposal only at the designated treatment facilities. The SLA is to be renewed annually, and it is not valid for collection and transportation of industrial waste or mixed industrial waste. In terms of occupational safety, licensed operators are to undertake periodic health and safety training for employees and improve access to safety gears, and ensure their usage during collection, transportation, and disposal of FS.

The SLA also mandates ULBs to periodically publish a list of licensed operators to ensure households and establishments engage only such licensed operators. Further, ULBs are required to share information on grievance redressal mechanisms for households to address violations.

Additionally, the SLA is to be revised to include rural local bodies, to facilitate the urban-rural clustering.

4. Operationalising the Cluster Approach in Tamil Nadu

To ensure institutionalisation of the provisions of the MoU and SLA, a byelaw for Septage Management framed as part of the OG has been updated and circulated across ULBs. These byelaws, once enacted by all host and participating ULBs, will be key to enforcing the cost-sharing mechanisms as part of the MoU and licensing of de-sludging operators at the cluster level. At present, nearly 43 ULBs have received general approval for issuing public notification of the byelaws which would be followed by the final gazette notification process.

At the state level, the implementation of the MoU and SLA as part of the cluster approach has been undertaken through various methods. A series of webinars have been conducted for ULBs officers from nearly 200 ULBs. Digital learning modules have also been developed around the governance mechanisms in Tamil. These digital modules were created as self-learning videos to ensure accessibility to resources for ULB officers such as Municipal Commissioners, Executive Officers, Engineers inter alios. Additionally, field level support and coordination for signing of MoUs is ongoing and nearly 24 ULBs (13 FSTP and 11 STP ULBs) have signed the MoUs across Tamil Nadu. Additionally, apart from the signing, operationalisation of the MoU is well under way. With some FSTPs having run for a year or more, Host ULBs have begun raising demand notices for O&M fees to cluster ULBs.

As FSM is a relatively new area for GoTN, the operationalisation of the two governance mechanisms has faced challenges such as knowledge gaps, lack of officers' capacity to pick up additional responsibilities, and apprehensions in terms of availability of funds for financing and cost-sharing of FSTP O&M. In terms of licensing, with disparate systems already in existence in certain ULBs, there is certain resistance to shift to nominal fees prescribed as part of the standard licensing agreement. Additionally, the COVID-19 pandemic has put a strain on the finances and realigned the priorities of officers, and hence, needs a push from the state level to re-start and sustain the cluster operations.

As with most governance mechanisms, enforcement is key to sustainability, which involves unique implementation models, monitoring support as well as a concerted effort to build awareness, capacity, and address concerns through a consultative process.

Bibliography

Commissionerate of Municipal Administration (2014). *Operative Guidelines for Septage Management for Local Bodies in Tamil Nadu*. Municipal Administration and Water Supply Department, Government of Tamil Nadu.

Ministry of Statistics and Programme Implementation. (2018). *National Sample Survey (76th Round) Drinking water, sanitation and hygiene in India.*

Ministry of Environment, Forest and Climate Change. (2017). *Lok Sabha Unstarred Question No. 2541.* Government of India.

Municipal Administration and Water Supply Department (2014). *Septage Management – Operative Guidelines for Septage Management for Urban and Rural Local Bodies in Tamil Nadu – Approved – Orders Issued (G.O. (Ms) No. 106.)*. Government of Tamil Nadu.

Municipal Administration and Water Supply Department (2018). *In principle approval for creation of 49 numbers of Faecal Sludge and Septage Management (FSSM) treatment facility to cover 51 Municipalities and 59 Town Panchayats – Orders – Issued (G.O. (Ms) No. 88.)*. Government of Tamil Nadu.

Municipal Administration and Water Supply Department (2020). *Faecal Sludge and Septage Treatment Plants – Approval of Faecal Sludge and Septage Management Licensing Agreement and Memorandum of Understanding of the Faecal Sludge and Septage Treatment Plants prepared by TSU of TNUSSP, IIHS for the use of the constructed Faecal Sludge and Septage Treatment Plants – Orders – Issued (G.O. (2D) No. 35.)*. Government of Tamil Nadu.

TNUSSP. (2016). *Baseline Studies for Urban Sanitation: Tiruchirappalli, Periyanaicken-Palayam, Narasimhanaicken-Palayam*.

TNUSSP. (2017). *Tamil Nadu State Baseline Study: Technical Assessment of Sanitation Chain*.

TNUSSP. (2018). *Draft State Investment Plan for FSM*.

TNUSSP. (2019). *Kilakarai Baseline Study for Urban Sanitation*.

TNUSSP. (2019). *Kodaikanal Baseline Study for Urban Sanitation*.

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