



NFSSM Alliance

**Innovative
& Sustainable
Financing
Compendium**

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Dasra has had the privilege of compiling and curating these experiences into this compendium. We hope it serves as a resource for practitioners, policymakers, and stakeholders committed to building safe, inclusive, and financially sustainable sanitation systems.

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01

Introduction

Urban sanitation in India has made significant progress through initiatives like the Swachh Bharat Mission–Urban (SBM-U), yet critical implementation gaps persist that require substantial funding interventions. Many cities lack comprehensive sewer networks, and existing infrastructure is often outdated or poorly maintained, forcing a significant portion of urban households to rely on unsafe on-site sanitation systems such as septic tanks and pit latrines that suffer from poor design, inadequate regulation, and insufficient desludging services. With only 28% of generated sewage receiving proper treatment, the sector faces severe environmental pollution and public health risks that demand immediate attention¹.

Key funding gaps exist in expanding sewerage and Faecal Sludge Management (FSM) infrastructure and service delivery, particularly in smaller cities and informal settlements, where Urban Local Bodies (ULBs) often lack the technical capacity and financial resources to effectively plan, implement, and monitor sanitation services. Critical investments are needed to upgrade treatment facilities, improve integration of solid and liquid waste management systems, scale up inclusive and gender-sensitive sanitation solutions, and sustain behavior change campaigns and capacity-building efforts essential for achieving equitable and sustainable urban sanitation coverage across India.

¹ <https://www.indiawaterportal.org/water-quality-and-pollution/waste-water-/urban-wastewater-scenario-india#:~:text=Of%20the%20total%20urban%20sewage%20generated%2C%20only%2028,leading%20to%20contamination%20and%20deterioration%20of%20water%20quality>.

02

Innovative & Sustainable Financing Models



Innovative financing models have emerged as critical enablers for achieving sustainable sanitation coverage in India, addressing persistent funding gaps that hinder infrastructure development and service delivery.

The financing models outlined in this compendium, including sanitation credit, progressive sanitation taxes, Performance Linked Annuity Models (PLAM), Hybrid Annuity Models (HAM), State Investment Plans, and the strategic use of intergovernmental transfers, demonstrate how structured financial innovations can bridge the gap between available resources and the needs across the sanitation value chain. These models enhance accessibility by making services affordable for low-income households, ensure sustainability through predictable revenue streams for operators, and promote accountability through performance-based payment structures. Their successful implementation across states such as Maharashtra, Telangana and Tamil Nadu showcases the potential for scaling sustainable sanitation solutions while optimizing resource utilization and improving service quality.

2.1 Sanitation Credit ^{2,3}

2.1.1 Introducing the Challenges

Despite government sanitation initiatives (SBM, SMMUA), 0.8 million households in Maharashtra still lack sanitation access and defecate in the open. To achieve full coverage, an additional 2.6 million households need financial resources to construct their toilets.

*One of the key challenges is that the current SBM subsidy of **Rs. 12,000 only covers about 30% of the total cost** of constructing a toilet in urban areas.*

As a result, as noted through a statewide survey in Maharashtra, many households are unable to proceed with the construction or complete their toilets without additional financial support. Additionally, as only 50% of this subsidy is available upfront, many households face a financial gap, making it difficult for them to initiate or complete toilet construction without external support. This gap requires bridge financing to make up for the difference, which is not easily accessible for most households.

2.1.2 Mahila Arthik Vikas Mahamandal (MAVIM) Sanitation Project

Despite government sanitation initiatives (SBM, SMMUA), 0.8 million households in Maharashtra still lack sanitation access and defecate in the open. To achieve full coverage, an additional 2.6 million households need financial resources to construct their toilets.

Sanitation credit refers to a financial product or mechanism that provides loans or credit to households to help them cover the costs of constructing individual household toilets. Sanitation credit is seen as a solution to bridge the gap between the available subsidy and the total cost of toilet construction, allowing households to secure the necessary funds to complete the construction of durable toilets and bathrooms. This credit can help address the latent market demand and enable more households to achieve universal access to sanitation facilities.

Initiated in 2018, The MAVIM Sanitation Credit Project aims to increase access to quality individual household toilets in urban Maharashtra by providing sanitation credit to Self-Help Groups (SHGs). The project seeks to demonstrate how sanitation credit can bridge the finance gap for toilet construction, enabling women SHGs to build their own toilets. Designed as an output-based aid initiative, the project disburses 50% of its funding to MAVIM after loans are provided to women for toilet construction. It also helps banks, microfinance institutions, policymakers, and women's empowerment organizations better understand the demand for sanitation credit and address challenges in scaling up such initiatives.

Project Stakeholders

- 01 **MAVIM (Mahila Arthik Vikas Mahamandal):** A state women development corporation of Maharashtra working towards women empowerment. MAVIM facilitates the SHG-Bank linkage program to help construct individual toilets for low-income households, especially women.
- 02 **Self-Help Groups:** Women-led groups that benefit from MAVIM's microfinance services, training, and empowerment initiatives, particularly in the area of sanitation and credit for constructing toilets.
- 03 **Community Management Resource Centres (CMRCs):** Institutions created by MAVIM to support SHGs. These centres are self-sufficient and help mobilize funds, facilitate government schemes, and provide services that contribute to livelihood improvement and social protection.
- 04 **Banks and Financial Institutions:** Part of the SHG-Bank linkage program, which helps provide credit for constructing individual toilets, enhancing sanitation access for low-income households.
- 05 **Women and Child Development Department of Maharashtra:** The government department that administers MAVIM and works on enhancing women's access to education, decision-making, and governance.
- 06 **Government of Maharashtra:** The state government is responsible for overseeing and implementing the SBM and urban sanitation initiatives.
- 07 **Centre for Water and Sanitation (CWAS), CEPT University:** Supports the Government of Maharashtra in implementing urban sanitation programs, specifically under SBM. CWAS engages with MAVIM to explore financing options for increasing sanitation access for low-income households.

² <https://www.pas.org.in/Portal/document/ResourcesFiles/pdfs/Assessing%20Credit%20Options%20for%20Household%20Sanitation%20in%20Urban%20areas.pdf>

³ https://sbmurban.org/storage/app/media/pdf/sbm_knowledge_center/Access-to-Individual-Household-Toilets-Case-Study-Compendium.pdf

2.1.3 Implementation

STEP 1

Identification of borrowers through primary research



The MAVIM-CMRC team identified target localities with a strong presence of SHGs, focusing on areas like Chandanzira, where demand for individual toilets was high. A survey identified slums with poor community toilet conditions, particularly in areas under the National Urban Livelihoods Mission (NULM).

STEP 2

Demand generation through capacity building workshops and training programs



Programs were conducted to raise awareness about sanitation and the importance of individual toilets, using focus group discussions, street plays, and door-to-door visits to engage SHG women. The sessions, led by an IEC expert, were attended by SHG members without individual toilets, as well as DCO-MAVIM, CMRC Managers, Sahyoginis (health coordinators), and Community Resource Persons (CRPs).

STEP 3

Responding to the demand for toilets through loans



After conducting awareness and training programs, demand for toilets was met by facilitating access to sanitation credit to SHGs, with ICICI Bank providing loans that included interest subvention benefits under NULM. Loan camps organized by the MAVIM-CMRC team enabled efficient loan disbursement, and effective monitoring ensured high repayment rates due to SHGs' training in book-keeping and financial management.

STEP 4

Provision of technical support for toilet construction



The team provided training to SHG women, Sahyoginis, and CRPs on toilet design, construction quality, and user needs before disbursing loans for individual toilets. A specialized program was run by CWAS' technical experts to guide members on toilet types, septic tank dimensions, and construction costs, along with site visits for practical demonstrations and query resolution.

STEP 5

Timely and rigorous monitoring for toilet construction and loan repayment



The Sahyoginis and CRPs monitored the progress of toilet construction and loan repayment through weekly meetings and field visits, tracking SHG details, loan amounts, and repayment profiles, with the information documented in signed monitoring forms. These forms were collected, entered into Excel by the CMRC accounts officer, and submitted to MAVIM, while ICICI Bank ensured timely installment payments.

Phase 1

Needs Assessment and Demand Generation

This phase seeks to verify the scope before the project begins. This will be done keeping in mind the need to gain a clear understanding of community needs, and to build a strategy to foster interest and awareness.



01 Target Locality Identification

Have project areas been identified through primary research?



Verification Process

Review survey data, slum identification reports, or NULM program documentation.



02 Demand Generation Activities

Have awareness and training programs been conducted to generate demand for individual toilets?



Verification Process

Conduct demand generation activities such as focus group discussions, street plays, door-to-door discussions, community visits and workshops, which generate a demand for building toilets from within the community. If they have already been conducted by other stakeholders, thoroughly check the records.

03 Participant Engagement

Were relevant stakeholders and community members without toilets involved in these programs?

Verification Process

Examine attendance sheets from workshops and meetings, noting participation of SHG members, Sahyoginis, and other community members.

Phase 2

Loan Facilitation and Financial Management

This phase will ensure that financial mechanisms are in place to support the project and that participants are equipped to manage their loans.

01 Access to Credit

Is there a process to facilitate access to sanitation credit for beneficiaries?

Verification Process

Review agreements with partner financial institutions (e.g., ICICI Bank), and check for records of loan camps or application processes.

02 Financial Training

Are borrowers, particularly SHG members, trained in bookkeeping and financial management?

Verification Process

Ensure that trainings are conducted for all loan-seekers, and especially for members of the SHGs in financial literacy. If these have already been conducted, request training materials and attendance records for financial literacy sessions.

03 Loan Disbursement and Monitoring

Is there a clear process for the disbursement and tracking of loans?

Verification Process

Examine loan disbursement records, repayment schedules, and monitoring reports to confirm timely payments, and share all of this information with the SHG members, to ensure transparency.

Phase 3

Technical Support and Construction

This phase will confirm that beneficiaries receive adequate technical guidance for constructing quality toilets.

01 Technical Training

Have participants received training on toilet design, construction quality, and user needs?

Verification Process

Review technical training modules, workshop materials, or curricula provided by technical experts (e.g., CWAS).

02 On-Site Guidance

Is technical support provided through practical demonstrations or site visits?

Verification Process

Request a sample of site visit reports or photographic evidence of on-site guidance.

03 Construction Progress Tracking

Is there a mechanism for monitoring toilet construction progress?

Verification Process

Verification: Examine construction progress reports, monthly updates, or field visit logs submitted by field staff (e.g., Sahyoginis, CRPs).

Phase 4

Monitoring and Reporting

This phase will evaluate the rigour and consistency of the project's monitoring and reporting practices.

01 Regular Monitoring

Is there a system for rigorous and timely monitoring of both construction and loan repayment?

Verification Process

Review monitoring forms, tracking sheets, and field reports.

02 Data Collection

Is data on SHG details, loan amounts, and repayment profiles collected and documented systematically?

Verification Process

Request access to monitoring forms or the database (e.g., Excel files) used to track this information.

03 Reporting and Accountability

Is there a clear reporting structure to ensure information is shared with relevant stakeholders?

Verification Process

Check for a chain of command for reporting (e.g., field staff to DCO-MAVIM) and review submission records.

The project achieved remarkable success in demonstrating the viability of sanitation microfinance. Key performance indicators show that women borrowers accessed affordable credit at a 4% interest rate (after NULM subsidies) to construct quality toilets costing an average of Rs. 45,000, with loans averaging Rs. 10,040 per beneficiary.

Most women constructed durable, good-quality toilets with bathrooms using in-situ construction methods. The average construction time of 3.6 months was facilitated by technical support from trained CRPs and Sahyoginis who provided guidance on toilet design, septic tank dimensions, and quality construction practices.

2.1.5 Key Takeaways & Learnings

The growing demand for durable, individual toilets, driven by the Swachh Bharat Abhiyan and the increasing aspirations of urban households, highlight the need for sanitation credit. Despite this demand, the potential market for sanitation credit remains largely untapped. Without access to this credit, many households struggle to overcome the financial challenges, hindering progress toward universal sanitation coverage and sustainability of ODF status. Addressing these financial gaps is essential to ensuring that all urban households have access to sanitation facilities.

2.1.4 Outcomes

The MAVIM Sanitation Credit Project successfully demonstrated how microfinance through SHGs can bridge the financing gap for toilet construction. **By October 2018, the project achieved 83% of its target by disbursing 207 loans to women in Jalna city, with an exceptional repayment rate exceeding 98%.** This pilot project proved that sanitation credit can effectively address the financing barriers that prevent households from constructing toilets, complementing government subsidies under SBM.



2.2 Scheduled Desludging - Sanitation Tax and Performance Linked Annuity Model (PLAM)^{4,5,6,7,8}

2.2.1 Introducing the Challenges

The SBM has made significant strides in promoting sanitation and eliminating open defecation across India. One of the key priorities of SBM is the push for cities to achieve ODF++ status, which goes beyond providing basic sanitation infrastructure to ensuring sustainable maintenance and resource recovery. However, managing sanitation facilities, particularly the collection, treatment, and safe disposal of faecal sludge and wastewater, presents ongoing challenges.

*Census 2011 indicates that the piped sewer system that transfers waste from households to treatment facilities is available to only **32.7%, comprising 26 million** of the 79 million households in urban India.*

The remaining households rely on onsite sanitation systems (OSS) like septic tanks, use public toilets, or defecate in the open. The most commonly used OSS in India, is the septic tank (38%). Over time, many individual household septic tanks harden or overflow due to a lack of regular emptying and upkeep given the cost of desludging services. This lack of proper O&M leads to the deterioration of sanitation systems and poses significant public health risks.

2.2.2 Fostering an Ecosystem for FSSM Service Delivery

Through the financial support of sanitation tax levied at the consumer side, and the enabling environment created through PLAM at the service provider side, the cities of Wai and Sinnar implemented the Scheduled Desludging model. Under this system, septic tanks are cleaned regularly according to a predetermined schedule, in line with the recommended desludging cycle of every three years.

2.2.3 Sanitation Tax

The sanitation tax is a charge imposed by ULBs to support sanitation services. It is collected alongside property or water bills, and is allocated to services such as septic tank desludging, sludge treatment, and drain cleaning. It is a progressive financing structure, making sanitation services more affordable for low income groups. The tax transformed user perception by eliminating point-of-service charges, ensuring that households perceived it as a free service, akin to garbage collection. **This was a crucial factor, given that previous desludging fees of INR 1,500-2,000 per trip were a significant deterrent for low-income households.**

In the cities of Wai and Sinnar, this tax has made it possible for local governments to offer desludging as a public service, eliminating the need for residents to pay for these services separately. Moreover, the sanitation tax ensures that local governments have adequate funding to manage and maintain sanitation services. The city of Wai collects INR 60 per annum through the sanitation tax, with plans to incrementally increase the tax to INR 120, and eventually to INR 180 per annum. In the city of Sinnar, the sanitation tax is INR 300 per annum for residential properties, and INR 100 per annum for commercial properties. This led to a total sanitation tax collection of INR 5.7 million in the fiscal year 2018-19.

2.2.4 PLAM

A performance-based payment contract for desludging was developed for Wai and Sinnar to ensure high-quality, reliable septic tank cleaning services. Under this contract, payments to private service providers are tied to the number of septic tanks emptied and the safe disposal of waste at designated treatment sites. These contracts included provisions such as prohibition of manual scavenging and mandatory use of protective equipment for workers, proper cleaning procedures, responsibility for spillage management, and damage liability for septic tanks. This agreement, acting as a service level contract, safeguards the interests of all parties involved, private service providers, city governments, and citizens, ensuring that local governments receive consistent, high-quality desludging services while the private providers are assured of regular payments.

This Public-Private Partnership (PPP) model was strategically adopted to ensure standard and efficient operators in the scheduled desludging system. Traditional demand-based desludging relied heavily on unorganized private operators who lacked proper equipment, safety standards, and regulatory oversight. These informal operators often operated without licences, adequate safety gear, or proper disposal mechanisms, leading to environmental and health hazards.

⁴ https://www.cseindia.org/static/mount/recommended_readings_mount/Advisory-On-Site-and-ffsite-Sewage-Management-Practices-MoHUA.pdf

⁵ https://pas.org.in/Portal/document/UrbanSanitation/uploads/Sanitation_tax_note.pdf

⁶ <https://cdn.cseindia.org/userfiles/sceptical-about-septage.pdf>

⁷ https://www.pas.org.in/Portal/document/UrbanSanitation/uploads/Enhancing_Own_Revenue_Income_for_WMC.pdf

⁸ <https://www.frontiersin.org/journals/environmental-science/articles/10.3389/fenvs.2019.00188/full>

Selection Process



Private service providers in each city were selected through a competitive e-tender process run by the government. The contract stipulates that the bid price for desludging a septic tank is one-third of the cost of demand-based desludging, making it a cost-effective solution. Coupled with the sanitation tax, this mechanism ensures that the service is financed locally without overburdening government budgets, while also promoting a cleaner, healthier environment for citizens.

Ensuring Transparency through ESCROW



To address concerns about late payments, which private service providers raised during pre-bid meetings, an escrow account mechanism was implemented. This tripartite agreement involves the local government, private service providers, and a local bank, ensuring that the local government sets aside three months' worth of payments as a reserve fund. This reserve fund safeguards against payment delays, offering financial security to service providers and fostering trust in the payment process. Through this approach, the performance-based model ensures both the effective delivery of desludging services and financial stability for all parties involved.

2.2.5 Implementation

Sanitation Tax

Phase 1

Financial Model & Sustainability

This phase will evaluate the foundational policies and financial mechanisms that enable the sanitation tax model.

01 Policy and Levy

Has a sanitation tax been officially introduced?

Verification Process

Reviewing municipal resolutions or government orders that establish the tax. Researchers can also check property or water bills to confirm whether a tax is levied.

02 Fund Allocation

Are the funds generated from the tax specifically allocated to sanitation services?

Verification Process

Examining the municipal budget documents to see if there is a separate line item or account for sanitation tax funds, earmarked for desludging, treatment, and drain cleaning.

03 Tax Structure

Is the tax structure designed to be progressive, with wealthier property owners paying more?

Verification Process

Analyzing the tax rate structure to see if it's proportional to property value or another metric that reflects ability to pay.

Phase 2

Service Delivery and Operations

This phase will verify the operational implementation of the services financed by the sanitation tax.

01 Shift to Scheduled Desludging

Has the system transitioned from on-demand to a scheduled desludging model?

Verification Process

Requesting the predetermined desludging schedule for different city zones, and comparing the frequency of service calls (e.g., number of tanks emptied per day/month) before and after implementation.

02 Service Coverage
Does the service cover all households, including low-income households?

Verification Process
Cross-reference the desludging service list with property records in different income brackets to ensure broad coverage.

03 Operational Efficiency
Are there mechanisms to improve operational efficiency, such as a large volume of operations that reduces costs?

Verification Process
Review data on the number of desludged tanks per trip or the total volume of septage collected per day.

Phase 3

Monitoring and Outcomes

This final phase will check for verifiable results and social impacts of the sanitation tax model.

01 Service Acceptance
Is there a high rate of household acceptance for the scheduled service?

Verification Process
Conducting surveys or reviewing project reports that document household satisfaction and acceptance rates.

02 Worker Safety
Are sanitation workers consistently using safety gear?

Verification Process
Conducting on-site inspections or reviewing photographic evidence and training records that show the use of personal protective equipment (PPE).

03 Waste Management
Is the collected septage being delivered to a treatment facility?

Verification Process
Check records from the Faecal Sludge Treatment Plant (FSTP) that document the volume of septage received. You can also trace the route of desludging trucks to confirm they are delivering waste to the designated plant.

PLAM

Phase 1

Procurement and Contractual Framework

This phase will verify that the PLAM was established through a competitive and transparent process, with a robust legal and financial contract.

01 Competitive Bidding
Was a competitive e-tender process used to select the private service provider?

Verification Process
Requesting and reviewing the official e-tender documents and bid submissions. Confirming that the selection was based on the lowest bid price for desludging services.

02 Contractual Terms
Does the contract include specific clauses on performance, safety, and liability?

Verification Process
Examining the service level agreement or contract to confirm clauses that mandate the use of protective gear for workers, proper cleaning procedures, and spillage management protocols. Look for liability provisions for any damage to septic tanks.

03 Payment Security

Was an escrow account mechanism established to ensure payment security?

Verification Process

Requesting a tripartite agreement between the local government, the private provider, and the bank. Verify that the account is funded with a reserve equivalent to at least three months' worth of payments.

Phase 2

Operational Implementation and Service Delivery

This section will assess the on-the-ground performance and effectiveness of the scheduled desludging services.

01 Service Frequency

Has the service frequency increased from a demand-based to a scheduled system?

Verification Process

Comparing the daily or monthly records of desludged tanks before and after PLAM's implementation. Look for documentation of an increase in operational frequency.

02 Desludged Properties

Is there a record of the number of properties served?

Verification Process

Reviewing project reports or a database that tracks the number of properties that have received desludging services since the launch of PLAM.

03 Waste Treatment

Is the collected septage being safely delivered and treated at a designated facility?

Verification Process

Requesting reports from the FSTP that detail the volume of septage received from the private operator's trucks. This confirms safe disposal.

Phase 3

Social and Financial Outcomes

This phase will evaluate the model's impact on the community and its financial viability.

01 Community Acceptance

Has the scheduled service been well-received by the community?

Verification Process

Checking for survey results or anecdotal reports on household acceptance rates.

02 Financial Sustainability

Is the PLAM financially sustainable for the local government and the private provider?

Verification Process

Reviewing financial reports to see if the cost of the PLAM is being financed locally, for example, through a sanitation tax. Check if the government is making timely annuity payments to the private provider, which the escrow account should help ensure.

2.2.5 Outcomes

The implementation of the sanitation tax has led to several positive outcomes. Households now pay a more affordable and predictable sanitation tax, replacing the previously high user charges for desludging. This shift has contributed to a significant increase in the frequency of septic tank desludging, with 7-8 tanks being emptied per day, compared to just 7-8 per month previously. As a result, **approximately 5 million liters of septage are being delivered to the Wai FSTP and 2 million liters to the Sinnar FSTP as of 2019-20**. Additionally, over 90% of households have shown acceptance of the scheduled service, with sanitation workers consistently using safety gear, ensuring improved safety and hygiene practices.

PLAM was designed keeping in mind numerous considerations, including plans to ensure scheduled desludging instead of demand-based services, creating predictable revenue streams for private operators, eliminating point-of-service charges for households, and ensuring equitable access across income groups for desludging services.

The success of scheduled desludging in Wai and Sinnar has influenced broader policy adoption. The Government of India has recognized the importance of regular cleaning and recommended desludging of septic tanks at 2-year intervals. The model is now being considered by other cities and states in India, with several municipalities beginning implementation of similar scheduled desludging programs.



2.2.6 Learnings & Key Takeaways

The notable success achieved in both Wai and Sinnar has had a significant ripple effect, directly influencing national guidelines. Following these successes, the Government of India has now begun recommending two-year desludging cycles. This systematic approach significantly increased both the coverage and reliability of the desludging services across the cities, proving it to be a viable and scalable model for achieving citywide inclusive sanitation.

Sanitation Tax

The sanitation tax is designed to be progressive, with wealthier property owners paying higher amounts. This ensures that low-income households can access the service more affordably. In Sinnar, the sanitation tax has been sufficient to cover the full cost of O&M of FSSM services. In Wai, however, the local government provides transfers to supplement sanitation tax to meet the total cost. Even with the current 51% property tax collection efficiency, the system achieves 65% cost recovery, with potential for full cost recovery through improved collection efficiency. The taxation system helps secure funding for annuity payments to private service providers, facilitating the provision of a regular desludging service while ensuring financial sustainability. The introduction of the sanitation tax was well-received, as it made desludging services more inclusive and equitable.

The transition from on-demand to scheduled services has revolutionized FSSM delivery in both cities. In Wai, annual properties served increased from 200 to 1,500 - a 650% improvement. Sinnar achieved a 533% increase with projected annual service coverage rising from 260 to 1,645 properties. Scheduled desludging services achieved acceptance rates of 95% in Wai and 80% in Sinnar, compared to typical acceptance rates below 50% for on-demand services. The few households that declined service were those whose tanks had been recently desludged. **Over Wai's completed three-year cycle, 6,800+ households were covered with consistent high acceptance.**

Sanitation tax has successfully addressed financing gaps in FSSM services while ensuring equitable access, high service acceptance, and financial sustainability for municipal operations in Maharashtra.

PLAM

Linking payments directly to clear service outcomes, such as the total number of tanks emptied and ensuring safe disposal, created powerful incentives for private operators to maintain quality and strictly adhere to safety standards. Further, the rigorous service-level clauses and continuous monitoring effectively led to the consistent provision of high-quality desludging services.

The implementation of a tripartite escrow account was crucial in securing the financial stability of the system by guaranteeing three months of payments upfront. This mechanism effectively eliminated private providers' common concerns over payment delays. As a robust financial safeguard, the escrow increased operator confidence, thereby encouraging better performance and promoting long-term engagement within the service sector.

The mandatory use of safety gear and the strict prohibition of manual scavenging fundamentally transformed working conditions for staff. These measures were instrumental in raising the status and significantly improving the safety of desludging staff. Furthermore, the establishment of standard operating procedures and performance monitoring cultivated a more professional and responsible service sector.

2.3 Hybrid Annuity Model (HAM)^{9,10}

2.3.1 Introducing the Challenges

There have been several challenges in managing urban sanitation infrastructure, particularly with respect to sewage and wastewater. One of the key issues was the lack of funding for sewage treatment plants (STPs) and other sanitation projects, as ULBs often struggled with limited resources. Traditional models like BOT (Build-Operate-Transfer) placed excessive financial risks on private players, leading to low private sector participation. Further, there were often delays in implementation caused by inefficient funding structures, approvals, and a lack of incentives for timely delivery. Traditional approaches also suffered from poor O&M, as there was no long-term accountability after project completion.

2.3.2 Developing Sanitation Infrastructure through HAM

The HAM model combines elements of both EPC (Engineering, Procurement, and Construction) and BOT-Annuity models, creating a balanced risk-sharing framework, under this structure:

- + **40% of capital cost is paid by the government during the construction phase in equal instalments**
- + **60% of the remaining cost is disbursed as annuities over the 15-year O&M period, bi-annually to the developer**
- + **100% central sector funding ensures no resource constraints for project implementation**
- + **Performance-linked payments tied to Key Performance Indicators (KPIs) ensure accountability and efficiency**

This financial architecture significantly reduces the equity requirement to only 12-15% of total project cost, making it more attractive for private investors compared to traditional BOT projects. The model also provides immunity against traffic, inflation, and interest rate risks while ensuring regular annuity payments to concessionaires. This model reduces the financial risks faced by the concessionaire during the construction phase. Unlike the EPC model, where the government bears the full upfront cost, HAM eases the government's initial cash flow pressures by spreading the payments over a longer period. It provides a balanced approach by sharing the financial burden between the government and the private developer, ensuring a more stable and sustainable implementation of infrastructure projects. In essence, HAM helps manage the financial risks for both the government and the private sector, promoting smoother cash flows and long-term project sustainability.

Under HAM, private players retain full responsibility for Operations and Maintenance (O&M) over a fixed period, which directly ensures improved service quality. By promoting cost-effective project delivery and long-term accountability, the model successfully addresses historical issues such as cost inefficiencies, poor management, and prevalent cost overruns in project execution, leading to the smoother implementation of critical sanitation infrastructure projects.



⁹ <https://www.pas.org.in/Portal/document/UrbanSanitation/uploads/Hybrid%20Annuity%20Model%20for%20Sanitation%20April%2023%202018.pdf>

¹⁰ <https://www.adb.org/sites/default/files/publication/820206/sawp-094-ham-ppps-india-road-sector.pdf>

2.3.3 Implementation

Phase 1

Project Initiation and Risk Allocation

This phase will verify the project's foundational structure, particularly its financial and risk-sharing mechanisms, aligned with the HAM principles.

01 Financial Structure
Is the project financed using the **40/60 split** between the government and the private developer?

Verification Process
Review the project's financial documents and the concession agreement. Confirm that the **government is responsible for 40%** of the capital cost during construction and the **private developer arranges the remaining 60%**.

02 Payment Plan
Are the payments structured as equal installments during construction and bi-annual annuities over the operational period?

Verification Process
Examine the payment schedule in the contract to ensure it specifies bi-annual annuity payments and O&M payments over a typical 15-year period.

03 Risk Mitigation
Does the model mitigate risks for the private developer by assigning specific responsibilities to the government?

Verification Process
Check the contract to see if the government is responsible for securing land and environmental clearances before the project begins.

Phase 2

Financial Security and Outcomes

This final phase will assess the financial stability of the model and its overall benefits.

01 Financial Security
Is there a mechanism to ensure timely payments to the private contractor during the O&M phase?

Verification Process
Look for evidence of an escrow account or a similar financial instrument that holds funds to cover O&M costs and annuity payments. This confirms the government's commitment to timely payments.

02 Private Sector Confidence
Has the HAM model successfully attracted private sector investment and financing?

Verification Process
Review the project's financing documents to see if the developer secured funding from lenders or financial institutions, which is a key benefit of the model's assured payments.

03 Long-Term Accountability
Is there evidence of the private developer's commitment to long-term accountability?

Verification Process
Check for reports on the project's O&M standards and performance over time. The performance-linked payments should create an incentive for the developer to maintain the infrastructure well beyond the construction phase.

2.3.4 Outcomes

HAM is a highly effective approach for infrastructure projects, offering a range of benefits and clear outcomes. Fundamentally, it encourages private sector investment by lessening the upfront financial burden on the government and motivating private developers through performance-based payments to ensure efficient O&M. Crucially, the government assumes the financial risk during O&M, covering any shortfalls and providing timely payments to contractors, often facilitated through mechanisms like escrow accounts, thereby ensuring financial security.

As of 2025, the National Mission for Clean Ganga (NMCG) has successfully implemented multiple HAM projects with a combined operational capacity of 246 MLD across five major cities, representing an investment of ₹1,114 crores. The projects are designed to intercept and treat raw sewage before it reaches the Ganga, directly addressing the river's pollution load. The operational projects collectively prevent approximately 246 million liters of untreated sewage daily from entering the river system. As per the government records on the Namami Gange project, the operational projects include:

- + **Haridwar, Uttarakhand: 82 MLD capacity (₹171 crores) - operated by HNB Engineers Pvt Ltd**
- + **Varanasi, Uttar Pradesh: 50 MLD capacity (₹153 crores) - operated by Essel Infra Projects Ltd**
- + **Bareilly, Uttar Pradesh: 63 MLD capacity (₹271 crores)**
- + **Ghazipur, Uttar Pradesh: 21 MLD capacity (₹153 crores) - operated by Mirzapur Ghazipur STPs Pvt Ltd**
- + **Munger, Bihar: 30 MLD capacity (₹366 crores)**

HAM has proven to be a transformative approach for sanitation infrastructure development under the Namami Gange Programme, successfully balancing public funding with private sector efficiency to achieve sustainable river rejuvenation objectives. With over ₹2,000 crores already invested across operational and ongoing projects, the model continues to expand, promising significant improvements in India's largest river basin's ecological health.

2.3.5 Key Takeaways & Learnings

The 40:60 cost-sharing arrangement stands as HAM's most significant innovation, fundamentally restructuring financial risk. This model drastically reduces the private sector's equity requirements from the typical 25-30% seen in older models to just 12-15% of the total project cost. This restructuring effectively addresses the persistent problem of undercapitalization that hampered earlier BOT models, consequently making projects more appealing to a wider range of developers.

The HAM framework incorporates mechanisms for inflation indexation to protect private partners against the risks of cost escalation over time. Additionally, provisions for compensation for change-in-laws introduce a crucial element of regulatory certainty that was often missing in previous PPP models. These features work together to significantly reduce the risk premium demanded by both private developers and financial lenders.

Further, project commencement is streamlined as the government takes responsibility for obtaining environmental and land clearances, minimizing delays and risks for private developers and accelerating the construction phase. The provision of assured annuity payments builds confidence, making it easier for developers to secure financing from lenders. Furthermore, the model includes inflation adjustment for project costs and O&M expenditures, which helps mitigate the risks associated with rising costs in long-term projects.

Finally, the performance-linked annuity payments create strong incentives for private developers to maintain high standards of service and project quality throughout the life cycle. In a nutshell, HAM effectively balances the financial risks between the government and the private sector, successfully fostering increased private sector investment, reducing financial pressure on the government, and promoting long-term project sustainability through performance-based incentives and inflation protection.

HAM demonstrates considerable potential for replication and scaling across various infrastructure needs. It is well-suited for setting up and expanding waste treatment plants and also serves as an effective mechanism for attracting investment in the development and adoption of upcoming and new technology within the infrastructure domain.

2.4 State Investment Plan (SIP)^{11,12}

2.4.1 Introducing the Challenges

In 2017, Tamil Nadu’s sewage generation was three times greater than the existing sewage treatment capacity, creating a critical gap in managing wastewater effectively. Additionally, the absence of FSTPs led to the unsafe disposal of faecal sludge into water bodies, contaminating potential drinking water sources and raising significant public health and environmental concerns. These challenges were compounded by the insufficient treatment infrastructure in place for both sewage and faecal sludge.

2.4.2 State Investment Plan

In 2014, the Government of Tamil Nadu (GoTN) introduced the Operative Guidelines (OG) for Septage Management in Local Bodies, which aimed not only to construct toilets but also to regulate collection and ensure safe disposal of septage through proper treatment facilities. The creation of adequate treatment infrastructure was recognized as a crucial step for the successful implementation of these guidelines. To assist in scaling up treatment facilities across the state, the Tamil Nadu Urban Sanitation Support Programme (TNUSSP) developed the State Investment Plan (SIP) in 2018. This initiative aimed to improve sanitation, reduce contamination risks, and mitigate the adverse health and environmental impacts caused by inadequate wastewater management systems.

The SIP was developed around two main principles:

- + **Utilization of Existing Treatment Facilities:** The OG emphasized the potential for co-treating faecal sludge using the spare capacity of existing STPs. This co-treatment model, which allows septage to be processed alongside sewage, was identified as a cost-effective and time-efficient approach. The SIP proposed expanding this model by upgrading decanting and pumping stations at both current and potential STPs.
- + **Cluster Approach:** The OG recommended grouping ULBs into clusters based on their proximity to existing or potential treatment facilities within a 10 km radius. This approach allowed the SIP to maximize the use of existing resources and treatment capacity, thereby optimizing investment needs and facilitating efficient scaling of treatment services.

2.4.3 Implementation

Phase 1

Planning and Assessment

This phase will focus on the foundational work of a project, including mapping, data collection, and setting up the policy framework.

01 Policy and Guidelines

Verify the existence of an official government order (GO), which will be the driving force behind the initiative.

Verification Process

Obtain copies of the official documents from the Directorate of Municipal Administration (DMA) or the Tamil Nadu government website. Look for specific language regarding the state’s intent to invest in sanitation treatment facilities.

02 Initial Site Assessment and Mapping

Confirm that mapping exercises were conducted to identify existing treatment facilities (STPs and FSTPs) and determine if there is enough residual capacity for co-treatment.

Verification Process

Request access to the GIS maps or digital records used for the mapping. Cross-reference the locations and capacities of identified facilities with publicly available data or on-site visits.

03 Operator Engagement and Needs Analysis

Verify that the project team engaged with private desludging operators to understand their challenges, such as the long distance to treatment facilities.

Verification Process

Review minutes of meetings or baseline study reports that document discussions with desludging operators. Look for data on ideal travel distances (e.g., 10-12 km) that informed the clustering approach.

¹¹ <https://www.niti.gov.in/sites/default/files/2021-08/NITI-NFSSM-Alliance-Report-for-digital.pdf>

¹² <https://www.cnbctv18.com/environment/nfssm-sanitation-services-cluster-approach-tamil-nadu-mahima-vijendra-19279061.htm>

04 Stakeholder Collaborations

Confirm the involvement of key stakeholders, including government departments and partners.

Verification Process

Review project proposals, memorandums of understanding (MOUs), or partnership agreements that outline the roles and responsibilities of each stakeholder.

Phase 2

Infrastructure Development

This phase will focus on the construction and commissioning of new and upgraded treatment plants.

01 Funding Allocation

Verify the allocation of funds from sources like the Integrated Urban Development Mission (IUDF) and the central government's SBM 2.0.

Verification Process

Obtain financial records or government budget documents that show specific budgetary allocations.

02 Construction Monitoring

Confirm that a digital monitoring system was used to track the progress of FSTP construction.

Verification Process

Request to view the app's data or reports. Verify that construction milestones and payments were linked to the progress shown in the app.

03 FSTP Technology

Verify the type of technology being used for the FSTPs, such as the screen stabilization reactor and integrated settler and anaerobic filter systems.

Verification Process

Conduct site visits to the FSTPs and review technical specifications and design documents. Ensure the constructed plant matches the approved design.

04 Project Targets

Check progress against the target number of FSTPs, the number of ULBs being served, and the population coverage.

Verification Process

Request project reports and dashboards. Cross-verify the numbers of completed FSTPs and the population served.

Phase 3

Operations and Sustainability

This phase assesses the day-to-day management of the FSSM system and its long-term viability.

01 Desludging Regulation and Licensing

Confirm the existence of a GO for the licensing of desludging operators and the mandatory registration of their vehicles with the ULB.

Verification Process

Request copies of the licensing GO and the list of registered vehicles. Interview a sample of desludging operators to confirm they are aware of and following the licensing requirements.

02 Operational Monitoring

Verify the use of the FSM app for tracking key operational metrics, such as number of vehicles entering facilities, volume of septage received, and collection of tipping fees.

Verification Process

Request a demonstration of the FSM app or access to its data. Review reports to confirm that data is being regularly entered and monitored.

03 Cluster-Based Approach

Confirm the implementation of the cluster approach, where host STPs or FSTPs serve multiple ULBs within a specific radius.

Verification Process

Review MOUs between ULBs that outline the co-treatment arrangements. Confirm the operational status of the host facilities and their designated clustered ULBs.

04 Financial Sustainability (O&M)

Assess the funding model for O&M of the FSTPs.

Verification Process

Review ULB financial records to see if a portion of the tipping fees is being used for O&M. Additionally, check for evidence of the new state-level O&M fund being allocated to ULBs.

Crucially, the SIP acted as a catalyst for wider sanitation improvements, driving holistic interventions across the entire sanitation cycle and enhancing the awareness and adoption of sanitation practices, particularly in urban areas. This approach highlighted cost-effectiveness and resource optimization, which has allowed for the rapid scaling up of treatment infrastructure, demonstrating significant promise for broader FSSM adoption. The entire framework offers strong Potential for Replication, providing a viable, resource-optimized model for scaling up FSSM and improving sanitation infrastructure in diverse contexts across other states.

2.4.4 Outcomes

As of March 2024, the Tamil Nadu SIP has achieved significant results in establishing decentralized treatment facilities, which will collectively serve 192 ULBs. **Key progress includes the operationalization of 32 FSTPs, with 51 more planned, alongside the enabling of 50 STPs for co-treatment of faecal sludge.**

The cluster approach has been vital in optimizing resource use and capital efficiency, allowing smaller ULBs to access shared treatment facilities, a practice now seen as a potential best practice for replication elsewhere.

Furthermore, the SIP has prioritized capacity building and support through extensive efforts at the ULB level, including online orientation sessions for over 200 officers and the drafting of bylaws for legal backing. Efforts towards institutional strengthening continue through state-level mandates and knowledge-sharing, ensuring the effective implementation of MoUs and SLAs, all contributing to the overarching vision for dignified sanitation and the prevention of unsafe faecal sludge disposal.

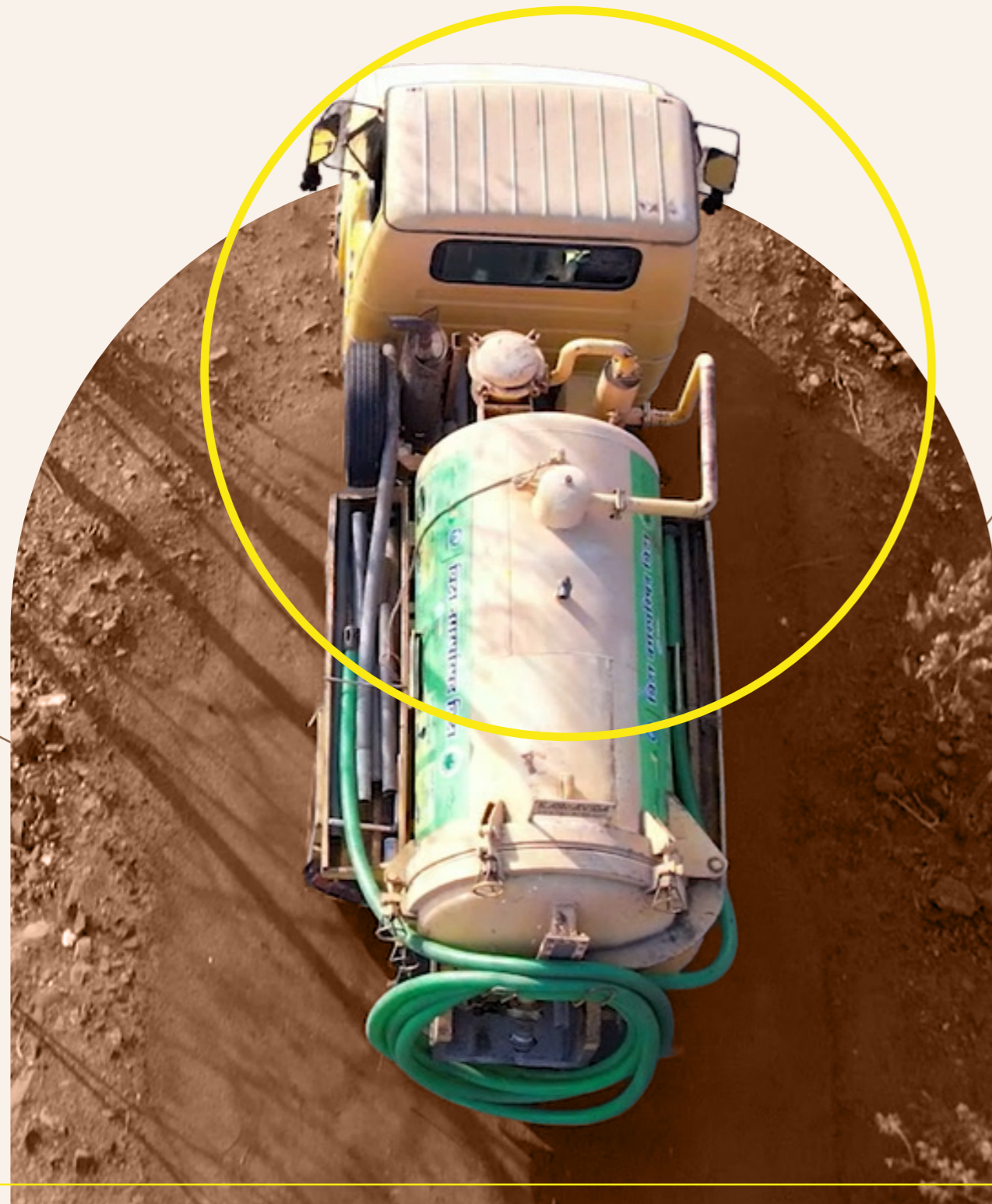
2.4.5 Key Takeaways & Learnings

The success of the SIP stems from the early recognition of FSSM's importance, positioning Tamil Nadu as a pioneering state in adopting FSSM as both a standalone and complementary solution to networked systems. Despite being a frontrunner, the state had to make considerable efforts to build credibility and support for FSSM, tackling acceptance challenges through substantial awareness-building initiatives.



03

Leveraging Government Funds



3.1 Intergovernmental Transfers (IGTs)

IGTs are financial allocations made by one level of government to another, typically from a central or federal government to regional, state, or local governments. These transfers play a crucial role in ensuring fiscal balance across regions, enabling less economically developed areas to provide public services comparable to wealthier ones. They can be unconditional, giving local governments flexibility in spending, or conditional, earmarked for specific purposes such as education, healthcare, or infrastructure. IGTs also help implement national policies at the local level and promote equity and efficiency in public service delivery.

Leveraging IGTs for sanitation involves strategically allocating finances from central or state governments to local authorities to improve public infrastructure and services. These transfers can be a powerful tool for scaling up sanitation programs, particularly in under-resourced or rural areas, by providing the necessary funds for building toilets, waste treatment facilities, and awareness campaigns. When aligned with national priorities and performance-based incentives, these transfers can drive accountability, encourage innovation, and ensure that sanitation initiatives are both sustainable and inclusive. Effective coordination between tiers of government is essential to maximize the impact of these funds and to ensure that investments lead to long-term improvements in hygiene and quality of life.

3.2 14th Finance Commission (FC)

By increasing the devolution of funds to local bodies, the 14th FC empowered ULBs to allocate resources towards critical infrastructure projects, including sanitation and wastewater treatment. This financial empowerment enabled ULBs to utilize the grants for setting up and maintaining FSTPs, addressing the pressing need for safe and sustainable sanitation solutions in urban areas.

In Maharashtra, the state government issued a resolution in November 2019, authorizing ULBs to use the 14th FC grants for implementing FSTPs. This directive was part of a broader strategy to achieve ODF++ status, which emphasizes safe management and treatment of faecal sludge and septage. The resolution provided a standardized framework for the design and implementation of FSTPs, including pre-approved technical designs and a single-window approval process to expedite construction. This approach aimed to streamline the establishment of FSTPs across the state, ensuring uniformity and efficiency in addressing sanitation challenges.

04

A Guide for Implementing Innovative Financing Mechanisms

By following the ten steps below, which are grounded in the models detailed above, municipalities can structure innovative, bankable sanitation financing solutions that align public and private incentives, ensure sustained operations, and pave the way for scalable, replicable models across diverse contexts.



Sustainable funding for sanitation infrastructure and operations requires a structured, multi-stakeholder approach, which involves combining mapping, PPP models, ring-fenced budgets, and rigorous monitoring, to unlock diverse funding sources and guarantee long-term service delivery.

4.1 Implementing Innovative Financing Mechanisms

01

Conduct a Comprehensive Mapping Exercise

Begin by identifying all existing and planned sanitation treatment facilities (STPs, FSTPs) within the target jurisdiction. Collect geocoordinates, treatment capacity, current utilization, and available decanting or co-treatment sites. This mapping informs cluster formation and reveals capacity gaps. In Maharashtra, this was done by mapping Wai and Sinnar as pilot cities.

02

Define Clusters Based on Proximity and Capacity

Group ULBs into clusters around host facilities within a 10–12 km radius, ensuring desludging operators and ULB vehicles can transport waste economically. Exclude clusters where host facilities exceed >80% utilization, and prioritize sites with residual capacity. State Resolution (Nov 2019) in Maharashtra authorized 14th FC grants for cluster-based FSTPs.

03

Define Clusters Based on Proximity and Capacity

Adopt HAM for capital-intensive sanitation projects. The Government pays 40–60% of construction costs upfront, with the balance disbursed as annuity during the O&M period. This structure ensures bankability for private concessionaires and spreads government expenditure across multiple fiscal years. HAM adopted via National Mission for Clean Ganga (₹1,114 crore, 246 MLD).

In Maharashtra, FSTPs: ₹1.40-2.8 lakh/KLD (40-60% cheaper vs. conventional). Standardized pre-approved designs and single-window approvals enabled rapid scaling.

04

Secure Funding Commitments and Ring-Fence Budgets

Obtain formal GOs or GEOPs to allocate capital for infrastructure (e.g., Tamil Nadu's ₹200 crore IUDF allocation) and commit O&M funds through state Finance Corporation deficit grants earmarked for FSTP O&M. The SBM 2.0 and central-state funding shares (50% central, 33% state, 17% ULB) for STP projects.

Establish a dedicated fund line ("ring-fence") at state and ULB levels to guarantee uninterrupted annual disbursements over the concession period.

05

Engage an Independent Engineer for Quality and Contract Compliance

Appoint an Independent Engineer to monitor construction milestones, certify work completion, and enforce contractual obligations throughout the 10-year concession. Tie milestone payments to third-party verification to safeguard quality and timely progress. Maharashtra deployed IEs to monitor FSTP construction under standardized designs. IE certification was tied to milestone payments. Performance-based contracts enforced safety (PPE mandatory, manual scavenging prohibited), reduced delays, and ensured quality compliance.

06

Mobilize Private Sector and Financial Institutions

Issue work orders or guarantees to private concessionaires, enabling them to secure construction loans. Structure milestone payments during construction and annuity payments during O&M as assured revenue streams to attract private investment in projects such as FSTPs. Private concessionaires in Wai & Sinnar secured construction loans via HAM. The PLAM model tied payments to desludged tank counts & safe disposal verification.

07

Implement Digital Monitoring Platforms

Deploy a unified FSM application to log desludging trips, record load volumes, track licensed vehicles, and capture tipping-fee collections in real time. Integrate this with SBM tracking sheets and state dashboards to inform decision-makers and trigger automated fund releases. Maharashtra implemented FSM app integrated with SBM tracking sheets, capturing vehicle movements, septage volumes, and tipping-fee collections real-time.

08

Build Capacity and Institutionalize Processes

Conduct regular trainings and coordination meetings at state, regional, and ULB levels. Institutionalize KPIs for FSM into existing government reporting systems. Use apps for both construction monitoring and operational tracking to embed transparency and accountability.

09

Introduce Incentives for Smaller Operators

Loosen eligibility criteria to allow smaller contractors to participate under HAM, promoting competition and capacity building. Offer subsidized desludging rates via government vehicles for community toilets and urban poor settlements to ensure equitable access. Through the MAVIM project, SHGs accessed sanitation credit at 4% interest (post-NULM subsidy). Women borrowers: avg ₹10,040 loan for ₹45k toilets. Small desludging operators participated under the scheduled desludging model.

10

Plan for Resource Recovery and Revenue Generation

In parallel, evaluate technologies (e.g., pyrolysis omniprocessors, gravel filters, MVBR) based on O&M costs, land requirements, and sludge characteristics. Where feasible, monetize treated effluent or biosolids through landscaping, industrial reuse, or sale to create supplementary revenue streams that reduce net O&M burden.

References

Administrative Staff College of India. (2018, April 23). Hybrid Annuity Model for Sanitation. Policy and Administration Support. <https://www.pas.org.in/Portal/document/UrbanSanitation/uploads/Hybrid%20Annuity%20Model%20for%20Sanitation%20April%202023%202018.pdf>

Asian Development Bank. (2023). Hybrid annuity model for PPPs in India's road sector (SAWP-094). <https://www.adb.org/sites/default/files/publication/820206/sawp-094-ham-ppps-india-road-sector.pdf>

Centre for Science and Environment. (2020, July). Advisory on site and off-site sewage management practices. Ministry of Housing and Urban Affairs. https://www.cseindia.org/static/mount/recommended_readings_mount/Advisory-On-Site-and-ffsite-Sewage-Management-Practices-MoHUA.pdf

Centre for Science and Environment. (2015). Sceptical about septage. <https://cdn.cseindia.org/userfiles/sceptical-about-septage.pdf>

CNBC-TV18. (2023, March 1). Mahima Vijendra discusses NFSSM sanitation services cluster approach in Tamil Nadu. CNBC-TV18 Environment. <https://www.cnbctv18.com/environment/nfssm-sanitation-services-cluster-approach-tamil-nadu-mahima-vijendra-19279061.htm>

NITI Aayog. (2021, August). National Faecal Sludge and Septage Management Alliance report. <https://www.niti.gov.in/sites/default/files/2021-08/NITI-NFSSM-Alliance-Report-for-digital.pdf>

Policy and Administration Support. (2016, June). Assessing credit options for household sanitation in urban areas. <https://www.pas.org.in/Portal/document/ResourcesFiles/pdfs/Assessing%20Credit%20Options%20for%20Household%20Sanitation%20in%20Urban%20areas.pdf>

Policy and Administration Support. (2020, December). Enhancing own revenue income for WMC. https://www.pas.org.in/Portal/document/UrbanSanitation/uploads/Enhancing_Own_Revenue_Income_for_WMC.pdf

Policy and Administration Support. (2020, September). Sanitation tax note. https://pas.org.in/Portal/document/UrbanSanitation/uploads/Sanitation_tax_note.pdf

Saran, S., Ranganathan, S., Kabir, M., Kumar, V., & Kapur, D. (2019). Scheduled desludging for effective faecal sludge management: A planning tool for appropriate spacing and timing. *Frontiers in Environmental Science*, 7, Article 188. <https://www.frontiersin.org/journals/environmental-science/articles/10.3389/fenvs.2019.00188/full>

Swachh Bharat Mission - Urban. (2020, November). Access to individual household toilets: Case study compendium. Ministry of Housing and Urban Affairs. https://sbmurban.org/storage/app/media/pdf/sbm_knowledge_center/Access-to-Individual-Household-Toilets-Case-Study-Compendium.pdf

