

CONCEPT NOTE

Parallel Session: **Water, Waste and Resource Efficiency**

National Urban Conclave
24-25 October 2026

1. Background

India's cities are growing rapidly, and with that growth comes a simple but pressing question: how do we use our water and resources better while managing what we consume and discard? The focus is shifting from building infrastructure alone to making urban systems work better—ensuring water is conserved and reused, waste is recovered as a resource, and investments deliver sustained value. This workshop brings these issues together to look at practical approaches that can help cities become more resource-efficient, resilient and better equipped for the future.

Solid Waste Management

Solid Waste Management in urban areas has achieved significant progress in collection and transportation under the Swachh Bharat Mission Urban (SBM-U). With the enactment of the new Solid Waste Management (SWM) Rules, 2026, the policy philosophy has moved the focus from building infrastructure to ensuring compliance, segregation, and accountability across the entire waste chain. The new SWM Rules, 2026 reorient waste governance around strict compliance, an explicit processing hierarchy, and a mandatory four-stream segregation at source. In response to recent rules, municipalities must pivot from traditional waste disposal methods toward advanced processing, legacy dumpsite remediation, and circular economy initiatives.

To bridge the gap between compliance and execution under SBM 2.0, city administrators must accelerate the completion of critical processing facilities and infrastructure currently under construction. This requires scaling up Material Recovery Facilities (MRFs) for automated dry-waste sorting, establishing specialised Construction and Demolition (C&D) waste-handling plants to recycle urban debris, and safely commissioning efficient Waste-to-Electricity (WtE) plants for non-recyclable fractions. Simultaneously, the focus must expand to environmental restoration through the systemic bio-mining and bioremediation of legacy waste sites, effectively reclaiming valuable urban land.

Sustaining this capital-intensive transformation requires moving away from traditional municipal budgets towards self-funding circular economy models that monetise waste outputs (like organic compost, recycled aggregates, and green energy). To lower the risk of large-scale investments, urban local bodies (ULBs) must deploy bankable public-private partnership (PPP) business models that offer predictable revenue-sharing terms to private developers. By effectively leveraging innovative climate financing tools such as green bonds, carbon credits, and international sustainability funds, cities can successfully offset heavy infrastructure costs, meet the SWM Rules 2026 mandates, and build resilient, zero-waste cities.

Used Water Management

Clean water and sanitation are fundamental to human health, economic development, and sustainable growth. To realise the vision of a Viksit Bharat by 2047, ensuring availability and sustainable management of water and sanitation for all is central.

Over the past decade, India's landscape has witnessed a transformative shift, moving from a long-standing challenge of inadequate access to toilets to a more holistic focus on safe, inclusive, and sustainable sanitation systems. Used water management has emerged as a pivotal component in achieving sustainable and resilient urban infrastructure, particularly in the context of India's growing cities. With the Atal Mission for Rejuvenation and Urban Transformation – AMRUT 2.0 and Swachh Bharat Mission – SBM-U 2.0 being launched in 2021, there is an increasing focus on environmental, social, and financial sustainability in urban sanitation and used water management, including reuse of treated water in cities and towns. Bassi, Gupta, and Chaturvedi (2023) estimate that sewage treatment capacity will be 80 per cent of sewage generation by 2050, making over 96,000 million litres per day of treated used water available for reuse in India. Used water management, therefore, needs to be prioritised as an essential urban service. ULBs, which are the implementing authorities responsible for developing and maintaining used water infrastructure and service delivery in Indian cities, need to align with SDG 6.

Urban India's used water challenge has shifted from one of creating treatment capacity to one of ensuring that the capacity created actually receives, treats and returns used water safely. The CPCB's National Inventory of Sewage Treatment Plants (March 2021) estimates sewage generation at 72,368 MLD against an installed treatment capacity of 31,841 MLD (43.9 per cent), of which 26,869 MLD was operational, and actual utilisation stood at only 20,235 MLD, leaving roughly 52,133 MLD discharged untreated. With urban growth, generation is projected to rise to about 1,20,000 MLD by 2050. A substantial share of urban households still rely on on-site systems, making faecal sludge and septage management an integral, not residual, part of the city's sanitation chain.

The policy architecture has evolved steadily, from the National Urban Sanitation Policy (2008) and the National Policy on Faecal Sludge and Septage Management (2017) to the second phase of the national missions. SBM-U 2.0 extends wastewater management to cities with populations below one lakh (Census 2011) that are not covered under AMRUT, with an outlay of ₹1,41,600 crore for 2021-22 to 2025-26. AMRUT 2.0 targets sewerage and septage coverage in the 500 AMRUT cities. Its reform agenda envisages treated used water meeting 20 per cent of total city water demand and 40 per cent of industrial demand, in aggregate at state level. City Water Balance Plans, focused on recycling, water body rejuvenation and conservation, are the principal instrument for achieving this. The National Framework on Safe Reuse of Treated Water (NMCG, 2022)

guides states in formulating reuse policies and establishing economic models for reuse, and states have begun responding. Uttar Pradesh and Uttarakhand have recently notified reuse policies adapted to local geography and sectoral needs.

Three interlinked areas now determine whether this architecture delivers outcomes.

- Conveyance: Safe, reliable movement of used water through sewer networks and of faecal sludge through scheduled, regulated desludging, so that treatment assets are fully utilised.
- Integrated sludge management: Treating sludge from sewage and faecal sludge treatment plants as a resource, governed by clear quality standards and viable end uses.
- Reuse linked to pollution abatement: Converting treated water into a planned, priced and accepted resource while restoring rivers and water bodies.

The financing landscape has also shifted, where the Urban Challenge Fund, with ₹1,00,000 crore of central assistance for FY 2025-26 to FY 2030-31, supports bankable projects through a competitive challenge mode, with water and sanitation as one of its three verticals. This creates an opportunity to structure used water projects as investable, outcome-linked propositions.

With the SBM-U 2.0, the Government of India has intensified efforts to promote effective solid waste and wastewater management, emphasising treatment, reuse, and resource recovery as central objectives. However, cities' experiences shared at national platforms such as the Urban Development Ministers' Meeting and the recent Preparatory Workshop on Clean Himalayan Hill Cities Initiative held on 16 December 2025 highlight uneven progress. Variations in city size, geography, tourism intensity, institutional capacity, and financial resources mean that while a single operational blueprint is not feasible, the absence of standardised models for garbage removal, used water treatment, circular planning, and PPP structuring often results in fragmented contracts, inconsistent service levels, and sub-optimal outcomes.

Water Management

India's demographic growth and its aspiration to become a Viksit Bharat by 2047 make water security, particularly in urban areas, an urgent national priority. Cities, as the engines of economic growth, will play a central role in realising this vision. However, ensuring reliable, equitable, and sustainable water access remains a significant challenge.

According to NITI Aayog, most Indian states already face conditions ranging from water scarcity (500–1,000 cubic meters per capita) to water stress (1,000–1,700 cubic meters per capita), and similar trends are projected to persist through 2050. An annual per capita water availability of less than 1,700 cubic meters is categorised as water-stressed,

while levels below 1,000 cubic meters indicate water scarcity.

For Indian cities and their peri-urban regions to become water-secure, it is essential to conserve and protect natural ecosystems within their jurisdictions. Safeguarding rivers, wetlands, lakes, floodplains, and groundwater recharge zones ensures that urban populations have access to sufficient, safe, and affordable water. At the same time, local industries and urban agriculture must be able to meet their water needs without exacerbating stress on water resources. Water security also requires resilience to extreme climatic events such as prolonged droughts and intense rainfall that result in water shortages and urban flooding, disrupting economic activity and daily life.

In recent years, national schemes supported by central and state governments have enabled cities to implement a wide range of water-sector projects. Despite these investments, there is a growing recognition of the need to strengthen learning and institutional capacity to address water security comprehensively. Cities continue to grapple with complex and interconnected challenges, including:

- Building the capacity of ULB officials to optimise the water available within the city by adopting Integrated Urban Water Management principles;
- Developing sponge cities for urban flood mitigation;
- Promoting aquifer management for water security and controlling urban floods;
- Adopting nature-based solutions and blue-green infrastructure concepts;
- Encouraging urban river management and coming up with bankable projects that cities can implement; and
- Finding innovative solutions for operation and management (O&M) of infrastructure.

Cross-cutting Themes: Driving Resource Efficiency

Water, used water and solid waste are often planned and managed as separate sectors, but they are closely interconnected through the resources they consume, recover and generate. As cities face growing pressures on water availability, waste generation, infrastructure capacity, climate resilience and municipal finances, there is a need to move beyond sector-specific solutions towards an integrated resource-efficiency approach. This means using resources more efficiently, reducing losses and waste, recovering value from used resources, and creating systems that are environmentally sustainable, financially viable and socially inclusive. The workshop will therefore focus on the following actions to help cities move from linear service delivery towards integrated, circular and resilient urban systems:

- Maximise reuse and resource recovery: Reduce consumption, minimise waste and systematically recycle and reuse treated water, organic matter, materials, nutrients and energy. Develop viable end-use markets and standards that enable recovered resources to substitute for freshwater and virgin materials.
- Scale cluster-based solutions: Develop shared treatment, processing and

resource-recovery facilities for small and medium-sized cities and towns where individual city-level solutions may not be technically or financially viable. Use inter-city and regional clusters to achieve economies of scale and improve O&M performance.

- Deploy AI and digital technologies: Use AI, machine learning, sensors and data platforms to improve demand forecasting, network and asset management, leakage detection, waste collection and routing, treatment-plant performance, predictive maintenance and compliance monitoring.
- Strengthen user fees and cost recovery: Move towards appropriate, predictable and socially responsive user charges that support O&M and service sustainability. Develop transparent tariff and cost-recovery frameworks while protecting access for vulnerable households.
- Build stronger institutions and accountability: Clarify responsibilities among ULBs, parastatals and regulators, strengthen regulatory oversight and establish dedicated municipal engineering and sanitation cadres with the technical capacity to plan, procure, operate and monitor urban services.
- Strengthen municipal finance and creditworthiness: Improve own-source revenues, leverage Finance Commission grants for water and sanitation, strengthen financial management, and build municipal creditworthiness to access market-linked finance, PPPs, and other sources of capital.
- Embed resource efficiency in spatial planning: Reserve land for water, wastewater treatment, sludge management, material recovery and waste-processing facilities within master plans and development plans. Identify and protect appropriate buffer zones and integrate infrastructure requirements into urban expansion plans.
- Plan beyond municipal boundaries: Extend service planning to peri-urban areas and census towns that are increasingly integrated with urban economies but may fall outside statutory ULB boundaries or existing mission coverage. Develop appropriate institutional and financing arrangements for these rapidly growing settlements.
- Put inclusion and worker dignity at the centre: Apply a gender, equity, disability and social inclusion lens to service planning and access, ensuring that improvements reach underserved communities. Strengthen occupational health and safety, social protection, skills and dignity for sanitation and waste workers, including those engaged across informal and formal value chains.

Taken together, these actions can help cities use less, recover more, pay for services sustainably and govern resources more effectively. They provide a common agenda across water, used water and solid waste management, while allowing solutions to be adapted to the scale, geography, institutional capacity and resource conditions of individual cities.

2. Objective

To develop a comprehensive outcome document and guiding questions to shape the key thematic agenda, panel sessions, and policy targets for the Water, Wastewater, Waste,

and Resource Efficiency track at the National Urban Conclave.

Solid Waste Management

- Discuss pathways towards integrated, circular and financially sustainable waste management systems.
- Identify governance, institutional, technological and financing mechanisms that can accelerate creation and maintenance of infrastructure related to processing of waste
- Develop actionable priorities for the next phase of urban waste management, with a focus on measurable outcomes and scalable solutions.
- Accelerate processing infrastructure and dumpsite remediation: Define actionable pathways to speed up the completion and operationalisation of MRFs, C&D facilities, and WtE units, alongside clear targets for legacy waste remediation.
- Enable resource recovery and circular economy: Establish frameworks to promote material recovery, reuse, and circular economy practices within municipal waste streams.
- Strengthen rule enforcement: Institutionalise strategies and monitoring mechanisms to ensure full compliance with and enforcement of the SWM 2026 guidelines across ULBs.

Used Water Management

- To review progress under AMRUT 2.0 and SBM-U 2.0 and identify the gaps between treatment capacity created, used water conveyed, and used water actually treated.
- To examine models for safe, efficient and dignified conveyance of used water and faecal sludge across networked, non-networked and hybrid systems, including scheduled desludging and sanitation worker safety.
- To deliberate on integrated sludge management, including co-treatment, quality standards for treated sludge and biosolids, and viable end-use markets.
- To identify pathways for operationalising city and state reuse plans, linking them to the abatement of pollution in rivers and water bodies.
- To surface the institutional, regulatory and financing reforms required for sustained operation and maintenance, including bankable project structures.
- To distill actionable recommendations for the National Urban Conclave session and the outcome document.

Water Management

- Protecting natural ecosystems in and around cities through robust planning norms
- Shifting from supply-side to demand-side water management
- Optimising all available water within the city (rainwater, groundwater, stormwater, used water)
- Integrating blue-green infrastructure with conventional (grey) infrastructure
- Ensuring sustainable O&M of water systems
- Rationalising water supply norms and tariff structures
- Ensuring universal and equitable access to water for all

3. Challenges

Solid Waste Management

Indian cities face a critical bottleneck in transitioning from successful waste collection to efficient waste processing. The country's urban waste management investments have largely focused on infrastructure, while inadequate and irregular O&M funding often leads to delayed payments, poorly functioning facilities, and declining service quality. This highlights the need to move from capex-led schemes to lifecycle financing models, with predictable O&M funding and financial support increasingly linked to measurable outcomes such as waste processed, diverted from landfills, and resources recovered.

- Transition gap from collection to processing: While substantial progress has been made in solid waste collection and transportation, significant gaps remain in processing efficiency and the remediation of legacy dumpsites.
- Incomplete infrastructure: Critical processing facilities and infrastructure—including MRFs, WtE plants, and C&D waste management units remain under construction, delaying operational targets.
- Rule enforcement and operational compliance: Implementing and enforcing the SWM 2026 rules across ULBs faces operational, institutional, and compliance hurdles.
- Financial and business model viability: A lack of robust PPP business models and accessible climate financing continues to hinder sustainable resource recovery and circularity initiatives.

Used Water Management

Despite significant investment, used water management in Indian cities remains characterised by a gap between infrastructure and outcomes. Treatment plants frequently operate below capacity because house service connections, interception and diversion works, and trunk conveyance lag behind plant construction. In non-sewered areas, desludging remains largely demand-driven and informally delivered, with limited regulation of private operators, weak tracking of where sludge is disposed of, and persistent risks to the safety and dignity of sanitation workers.

Sludge is still largely treated as a disposal burden rather than a resource. India still lacks a dedicated, notified standard for biosolids derived from sewage and faecal sludge. Existing guidance in the CPHEEO Manual (2013) advises that dewatered septage or sludge for agricultural use should meet US EPA Class A biosolids criteria, while related provisions draw on the Fertiliser Control Order. The absence of clear national standards constrains market confidence, end-user acceptance and private investment in sludge valorisation.

Reuse and pollution abatement remain weakly connected. CPCB's November 2022

assessment identified 311 polluted river stretches on 279 rivers across 30 states and Union Territories, with untreated urban used water a principal contributor. Reuse targets exist, but on-the-ground progress is slow. Few cities have firm agreements with bulk users, and treated-water pricing remains unclear. Weak quality assurance and limited public acceptance further complicate implementation. The regulatory framework is also in transition, with the Draft Liquid Waste Management Rules, 2024, notified by the Ministry of Environment, Forest and Climate Change on 07 October 2024, covering wastewater, treatment plant sludge and faecal sludge across urban and rural local bodies and other authorities. Institutional fragmentation among ULBs, parastatals, and pollution control boards, combined with low cost recovery, continues to undermine long-term asset operation and maintenance.

Water

Global and national experiences show that water security cannot be achieved solely by developing infrastructure. It requires aligning national and state policies with regional and local realities, applying science and technology in long-term planning, and empowering communities, all of which are critical to water security.

4. Guiding Questions

Solid Waste Management

- Why, despite significant investments, has source segregation and resource recovery not become the norm across cities?
- How can we shift from financing waste infrastructure to financing sustained waste management outcomes?
- How do we create viable markets for waste-derived resources and make circularity economically attractive?
- What needs to change in policy, governance and implementation to move from successful pilots to systemic transformation across Indian cities?
- What kind of capacity building is required for municipal staff to transition from manual, unmeasured waste collection to automated, data-driven tracking systems?
- How can collection mechanisms for waste user charges be streamlined or digitally integrated with existing utility billing (like water or property tax) to improve financial collection rates and reduce municipal deficits?
- What specific PPP business models and climate financing avenues can make resource recovery and circularity initiatives commercially attractive to private investors?
- What steps must be prioritised to fast-track incomplete infrastructure—such as half-built MRFs and WtE plants—to meet operational targets and accelerate legacy dumpsite remediation?
- What are the most effective technical and regulatory approaches for speeding up legacy dumpsite remediation and land reclamation?

- How can cities build viable, bankable PPP models to increase the market value of recycled and recovered materials? What mechanisms are needed to leverage climate financing and carbon offsets for municipal solid waste processing projects?
- What institutional and monitoring frameworks are required to ensure strict local enforcement of the SWM Rules, 2026? How can user fees and cost-recovery mechanisms be structured to ensure long-term service sustainability without lowering citizen compliance?

Used Water Management

A. Conveyance of used water and faecal sludge

- What measures would close the gap between installed treatment capacity and actual utilisation, particularly in last-mile connections and interception and diversion works?
- How can cities plan for citywide coverage through an appropriate mix of sewerage, non-sewered and decentralised systems, rather than defaulting to networked sewerage?
- What regulatory and contractual models (licensing, scheduled desludging, performance-based contracts) best professionalise desludging services while safeguarding sanitation workers?

B. Integrated waste management: sludge management and standards

- What would an enabling national standard for treated sludge and biosolids comprise, and which agency should own it?
- How can co-treatment of faecal sludge at sewage treatment plants, and co-processing of sludge with municipal organic waste, be scaled to improve resource efficiency?
- What market linkages (agriculture, horticulture, land restoration, energy recovery) are needed to make sludge valorisation financially viable?
- Measures to enhance the operational and service delivery functions of Urban Local Bodies to achieve the targeted service outcomes specified in national programs and initiatives.
- How can emerging technological advancements, particularly AI, be leveraged to enhance policy formulation and strengthen institutional governance systems?

Water Management

- How do cities prepare water budgets to optimise management, fill existing gaps, and meet future demand?
- What strategies should cities adopt to meet the 135 LPCD water supply norm, especially water quality requirements (drinking and low-end usage)?
- How can cities leverage ICCD for GIS-based water management planning?
- What reforms are required for large, medium and small cities for O&M efficiency and tariff planning?
- What are sustainable financial models for capital and O&M of water assets?
- How can cities ensure equitable water supply across cities as well as socio-economic

classes?

- What roles can citizens and communities play in ensuring cities' water security?