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Innovation and best practices in household waste management: A case study of Maharashtra

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Abstract
Appropriate waste management for residential regions serves as a fundamental pillar of sustainable urban development. In Maharashtra, India's most populous and industrialized state solid waste management, particularly at the household level, remains a significant operational and environmental challenge. This paper examines innovative and community-driven strategies implemented across key cities in Maharashtra, including Pune, Navi Mumbai, Kolhapur, and Nashik. Key strategies such as Smart Waste Monitoring Systems, Extended Producer Responsibility (EPR) programs, Community-Based Segregation and Composting, Decentralized Biogas Systems, and Circular Economy initiatives have shown tangible, positive outcomes. These localized models highlight how technological advancements, active civic engagement, integrated policy support, and decentralized systems can collectively build a replicable and sustainable framework for waste governance. The study concludes by advocating for the wider adoption of these best practices and underscores the necessity for enhanced collaboration among municipal authorities, private sector stakeholders, and local communities. Among all surveyed cities, Pune emerges as the most effective in managing household-level waste, offering a replicable blueprint for other urban areas within the state.

Keywords: Maharashtra, waste management, innovation, sustainable, household-level waste

Introduction
Maharashtra is currently grappling with a pressing challenge in municipal solid waste management, driven by rapid urbanization, population growth, and increased consumerism particularly at the household level. According to the Maharashtra Pollution Control Board (MPCB, 2023), the state generate over 26,000 metric tonnes of solid waste daily, with plastic accounting for 8-10% and a substantial portion comprising unmanaged biodegradable material. Deficiencies in waste segregation, limited infrastructure, and general public indifference often lead to overflowing landfills, environmental pollution, and public health hazards.

In recent years, however, Maharashtra has positioned itself as a frontrunner in the adoption of innovative and community-driven waste management strategies. Urban centers such as Mumbai, Pune, Nagpur, Nashik, and Kolhapur are leveraging technology, policy frameworks, and citizen participation to address the root causes of household waste inefficiencies.

This paper presents a review of successful innovations and best practices in Maharashtra focused on household waste management. These include smart waste monitoring systems, Extended Producer Responsibility (EPR) programs, community-driven composting projects, and circular economy experiments implemented largely through collaborations among municipal authorities, academic institutions, civil society organizations, and public-private partnerships.

Innovations and best practices in Maharashtra: A case-based review
Smart Waste Monitoring System, Navi Mumbai Municipal Corporation (NMMC)
The Navi Mumbai Municipal Corporation (NMMC) has introduced a technologically advanced Smart Waste Monitoring System to enhance efficiency, transparency, and accountability in municipal solid waste management.

This integrated system combines GPS-based tracking for waste collection vehicles with RFID-tagged bins to enable real-time monitoring of collection activities. Each collection vehicle is monitored via a centralized control room, ensuring that routes are followed and no areas are left unattended. Smart bins are equipped with sensors that notify the system when they reach capacity, enabling prompt collection and minimizing overflow incidents. To further streamline operations, NMMC has launched a mobile application and a digital dashboard that offer real-time data, daily operational reports, and a grievance redressal platform accessible to both citizens and municipal staff. This data-driven initiative has led to a more than 30% improvement in operational efficiency, enhanced public satisfaction, reduced instances of missed collections, and provided valuable insights for strategic planning. The success of this model firmly establishes Navi Mumbai as a national leader in smart urban waste management practices.

Extended Producer Responsibility (EPR), Pune Municipal Corporation & SWaCH

The Pune Municipal Corporation (PMC), in collaboration with SWaCH Seva Sahakari Sanstha, has successfully implemented an innovative Extended Producer Responsibility (EPR) model for plastic waste management. Under this system, Fast-Moving Consumer Goods (FMCG) companies such as Hindustan Unilever, Bisleri, and Nestlé are held accountable for collecting and recycling their post-consumer plastic packaging. SWaCH, a cooperative of waste pickers, plays a pivotal role in this initiative by conducting door-to-door collection of branded plastic waste directly from households. The collected plastic is sorted, documented, and then sent for recycling in coordination with the respective companies, fulfilling their EPR compliance obligations. This model not only promotes environmental responsibility among producers but also ensures livelihood security for over 3,000 waste pickers by integrating them into the formal waste value chain. Through this decentralized and socially inclusive approach, Pune has emerged as a national leader in implementing EPR at the municipal level, setting a precedent for other Indian cities.

Community-Led Composting, Shivaji University, Kolhapur (Harit Ghar Yojana)

As part of the Harit Ghar Yojana, Shivaji University in Kolhapur, in collaboration with the Kolhapur Municipal Corporation, launched a community-driven composting initiative aimed at promoting sustainable household waste management. The program emphasized the importance of source-level waste segregation and encouraged households to compost their wet (organic) waste at domestic level. To raise awareness and build capacity, university students and volunteers conducted door-to-door campaigns, organized training workshops, and delivered live demonstrations on the use of compost bins. Households were provided with color-coded feedback cards to encourage correct segregation practices. The initiative was successfully implemented in several residential areas, including Rajarampuri, Tarabai Park, Kasaba Bawda, and Shivaji Peth, covering both individual homes and housing societies. As a result, over 1,200 households adopted home composting practices, leading to a 50% in daily organic waste in targeted zones. The initiative has not only reduced landfill dependency but also fostered a culture of environmental responsibility and civic participation. The Harit Ghar Yojana is now regarded as a scalable model for university-supported, community-based waste management in semi-urban contexts.

Decentralized Biogas System, Nashik Municipal Corporation

The Nashik Municipal Corporation (NMC) has pioneered a decentralized biogas system as part of its strategic approach to managing organic waste at the ward level. Instead of relying solely on centralized waste processing facilities, NMC established small-scale biogas plants throughout the city to treat biodegradable waste generated by households, vegetable markets, and local vendors. These plants use anaerobic digestion technology to convert organic waste into methane-rich biogas, which is then utilized for street lighting, powering municipal offices, and cooking in community kitchens. Each unit is capable of processing up to 1 tonne of food waste per day, significantly reducing both transportation costs and pressure on landfill sites. Local self-help groups (SHGs) and youth organizations are actively involved in the daily operations and maintenance of the plants, providing employment opportunities and strengthening community ownership. This decentralized model has proven effective in waste-to-energy transformation, environmental protection, and public education, and it stands as a replicable solution for other mid-sized cities aiming to integrate clean energy into urban waste management.

Integrated Household Waste Management, Nagpur Municipal Corporation

The Nagpur Municipal Corporation (NMC) has implemented several innovative and inclusive practices to improve household-level waste management in the city A key initiative is the city-wide adoption of 100% door-to-door segregated waste collection, facilitated by a GPS-based tracking system that ensures route compliance and timely collection. To support source segregation, NMC introduced a standardized three-bin system for wet, dry, and domestic hazardous waste, now widely adopted across residential colonies. The city has also led efforts in promoting home composting by distributing compost kits to households through awareness campaigns and municipal outreach. Additionally, NMC has partnered with private firms and local NGOs to streamline the collection and recycling of e-waste and plastic waste, effectively integrating informal waste workers into the formal waste economy. Material Recovery Facilities (MRFs) have been established for sorting and processing recyclable materials, further enhancing the city's recycling efficiency. Public engagement has been a key factor in the initiative’s success, supported by ongoing IEC (Information, Education, and Communication) campaigns, school-based programs, and sanitation rating drives. These efforts have contributed to Nagpur’s improved ranking in the Swachh Survekshan survey and solidified its reputation as a data-driven, citizen-centric model for urban waste governance.

Conclusion

Maharashtra, as one of India's most urbanized and industrially advanced states, is emerging as a leader in innovative and community-driven household waste management. The case studies reviewed from Pune, Navi Mumbai, Kolhapur, and Nashik demonstrate practical, replicable models. Among these, Pune stands out for its exemplary blend of innovation, inclusivity, and operational efficiency. Its success is drawing national attention and being adopted as a benchmark in other urban regions. Technological advancements such as smart

bins and IoT-enabled tracking systems in Navi Mumbai have significantly enhanced transparency and operational efficiency in waste collection. Simultaneously, decentralized community composting programs and Extended Producer Responsibility (EPR) frameworks have improved source segregation and material recovery rates.

These localized, scalable initiatives have not only helped divert large volumes of waste from landfills but have also empowered citizens and informal sector workers. Moving forward, such practices must be institutionalized across other urban local bodies in Maharashtra through stronger policy frameworks, multi-sectoral collaborations, and sustained public education.

With continued innovation and inclusive governance, Maharashtra has the potential to set a national precedent in effective and sustainable household waste management.

References

1. Government of Maharashtra. Annual report on solid waste management 2022-2023. Maharashtra Pollution Control Board, 2023 [Internet]. Available from: https://mpcb.gov.in
2. Pune Municipal Corporation. Solid Waste Management Department report, 2022 [Internet]. Available from: https://pmc.gov.in
3. SWaCH Cooperative. Impact report: Door-to-door collection and EPR implementation in Pune, 2023 [Internet]. Available from: https://swachcoop.com
4. Navi Mumbai Municipal Corporation. Smart Waste Management Implementation Report, 2022 [Internet]. Available from: https://nmmc.gov.in
5. Nashik Municipal Corporation. Waste-to-energy initiative and biogas plant report. Nashik Smart City Division, 2023 [Internet]. Available from: https://smartnashik.in
6. Shivaji University. Harit Ghar Yojana: Community composting model and results. Environmental Studies Department, Shivaji University, Kolhapur, 2022.
7. Nagpur Municipal Corporation. Solid Waste Management Strategy for Nagpur: Urban household interventions. 2022 [Internet]. Available from: https://nmcnagpur.gov.in
8. Ministry of Housing and Urban Affairs. Swachh Survekshan 2023: Survey report and rankings. Government of India, 2023 [Internet]. Available from: https://swachhsurvekshan2023.org
9. Earth5R. Sustainable waste management in Indian cities: Case studies of Pune and Indore, 2023 [Internet]. Available from: https://earth5r.org
10. The Guardian. How Indian cities are cleaning up: Lessons from Pune and Indore. The Guardian [Internet], 2024 Apr 4 [cited 2025 Jul 21]. Available from: https://www.theguardian.com
11. World Bank. What a Waste 2.0: A global snapshot of solid waste management to 2050. Washington, DC: World Bank Group, 2018 [Internet]. Available from: https://openknowledge.worldbank.org/handle/10986/30317