



Walchand College of Engineering, Sangli

(Government aided Autonomous Institute)

Department of Civil Engineering

TY CSE Solid Waste

Management

Report on

Case Study: Ratnagiri SWM

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2024 - 2025

SOLID WASTE MANAGEMENT ISE 2

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Solid Waste Management (SWM) Report - Ratnagiri District

1. Waste Generation

Solid waste generation in Ratnagiri District, according to the District Environment Plan, totals 61.9 Metric Tons per Day (MTD). This waste includes 27.855 MTD (45%) of dry waste and 34.045 MTD (55%) of wet waste. Dry waste generally comprises plastics, paper, glass, metals, and textiles, while wet waste primarily includes food waste and other organic material.

The substantial percentage of wet waste reflects a high potential for composting, anaerobic digestion, and other organic waste management strategies. This data suggests that a large part of the district's efforts should focus on efficient biodegradable waste processing. The district also generates 1.63 MTD of plastic waste and 219 kg/day of biomedical waste.

2. Waste Storage

Waste storage plays a critical role in the overall management chain. In Ratnagiri, although data on containerization at the household level is not explicitly mentioned, the successful segregation of waste at source in many ULBs indicates some level of systematic storage. Waste segregation into dry and wet categories must begin at the point of storage to improve collection efficiency.

To optimize waste storage, municipalities should promote the use of color-coded bins for different waste streams, install communal storage systems in public spaces, and train citizens through awareness campaigns. Enhancing temporary storage facilities with covered and leak-proof bins can significantly reduce nuisance and secondary pollution.

3. Collection

All ULBs in Ratnagiri district have implemented door-to-door collection of solid waste. Collection coverage is between 80% and 100%. While manual road sweeping is fully functional across the district, mechanical road sweeping is yet to be adopted in several areas.

The segregation of waste at source is observed to be effective, with transport vehicles designed to keep segregated streams separate. However, there is a need to enhance the monitoring of collection schedules and streamline route planning for increased efficiency. Community participation remains a key factor in ensuring consistent segregation and timely collection.

4. Transfer and Transport

Transport of solid waste is primarily carried out by local ULBs using vehicles adapted for segregated transport. The system is effective in most ULBs, although the use of intermediate transfer stations is limited.

To ensure uninterrupted and hygienic transport, municipalities should establish well-equipped transfer stations with weighing bridges and material recovery facilities (MRFs). Use of GPS-enabled tracking and mobile monitoring systems can enhance accountability and route optimization. Moreover, improving vehicle maintenance and increasing the fleet size can address delays and overflows.

5. Processing

The district processes about 42.2 MTD out of 61.9 MTD of generated solid waste through composting techniques such as vermicomposting and pit composting. This reflects a treatment efficiency of nearly 68%. However, the remaining 19.7 MTD is unprocessed and dumped daily, indicating significant gaps in processing infrastructure.

Only one ULB in the district operates a biomethanation facility. There is a need to expand such decentralized technologies for better organic waste management. For dry waste, material recovery facilities should be strengthened to sort recyclables like plastics, paper, and metals. Integration of waste pickers into the formal system could boost efficiency and provide livelihood opportunities.

6. Disposal

Disposal of untreated waste remains a critical issue in Ratnagiri. Currently, 19.7 MTD of waste is directly dumped, raising serious environmental and public health concerns. The district lacks engineered sanitary landfills, and illegal dumping of construction and demolition (C&D) waste persists.

Out of 277.7 MTA of C&D waste generated annually, only 200.75 MTA is landfilled, while 74.8 MTA is dumped illegally. To address this, ULBs must establish dedicated C&D waste facilities and encourage recycling and reuse of construction materials. There is also a pressing need to set up controlled landfilling sites with leachate management and methane recovery systems.

Performance Analysis

Ratnagiri's solid waste management system shows significant progress in terms of collection and initial segregation. However, treatment and disposal systems are underdeveloped. The absence of modern processing technologies, adequate infrastructure for plastic and e-waste, and limited transfer stations contribute to inefficiencies.

Biomedical waste treatment is functional, but hazardous and e-waste management remains poor due to lack of inventory and infrastructure. Plastic waste management needs attention, especially in implementing Extended Producer Responsibility (EPR) and establishing recycling units. While dry and wet waste segregation is fairly implemented, consistent follow-up and citizen engagement are necessary to maintain momentum.

Improvements Required

- Setup of additional processing units such as MRFs, composting stations, and biomethanation plants.
- Develop engineered sanitary landfill sites for safe final disposal.
- Establish and enforce policies on C&D waste management and EPR compliance for plastic producers.
- Build decentralized e-waste collection centers and initiate inventorization of hazardous waste.
- Introduce mechanical street sweeping and modernize the transport fleet.
- Promote awareness and capacity-building programs for municipal workers and citizens alike.

Conclusion

Solid Waste Management in Ratnagiri district is progressing but still faces critical challenges in infrastructure, enforcement, and community participation. With strategic investments, policy enforcement, and public cooperation, the district can transition toward a more sustainable, zero-waste future.

Implementing best practices in waste segregation, expanding processing capacity, and creating formal disposal sites are essential steps. This report aims to guide authorities in aligning with national and state-level solid waste management goals.