

Solid Waste Management

TY CSE (24-25) ISE-2

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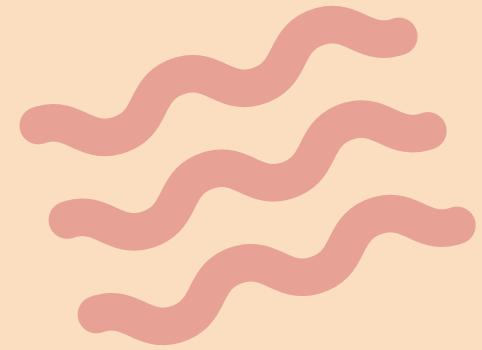
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Ratnagiri & Solid Waste Management

About Ratnagiri District

- Located on the Konkan coast of Maharashtra
- Known for Alphonso mangoes, beaches, forts, and fisheries
- Area: 8,208 sq. km
- Population: 1.6 million (2011 Census)
- Administrative Units: 9 Municipalities, 9 Tahsils
- Mix of urban towns, coastal villages, and forest zones



Solid Waste Management (SWM) Overview

- SWM includes the collection, storage, transport, processing, and disposal of waste.
- Rapid urban growth, tourism, and fisheries are causing a spike in waste generation.
- Ratnagiri generates around 61.9 MT of solid waste daily, but:
 - Only 68% of waste is processed.
 - No scientific landfill exists.
 - Segregation and storage systems are underdeveloped.
- The district has potential for improvement using decentralized systems, bio-processing, and community engagement.

1. Waste Generation

Total Solid Waste Generation: 61.9 Metric Tons/Day

Composition Breakdown:

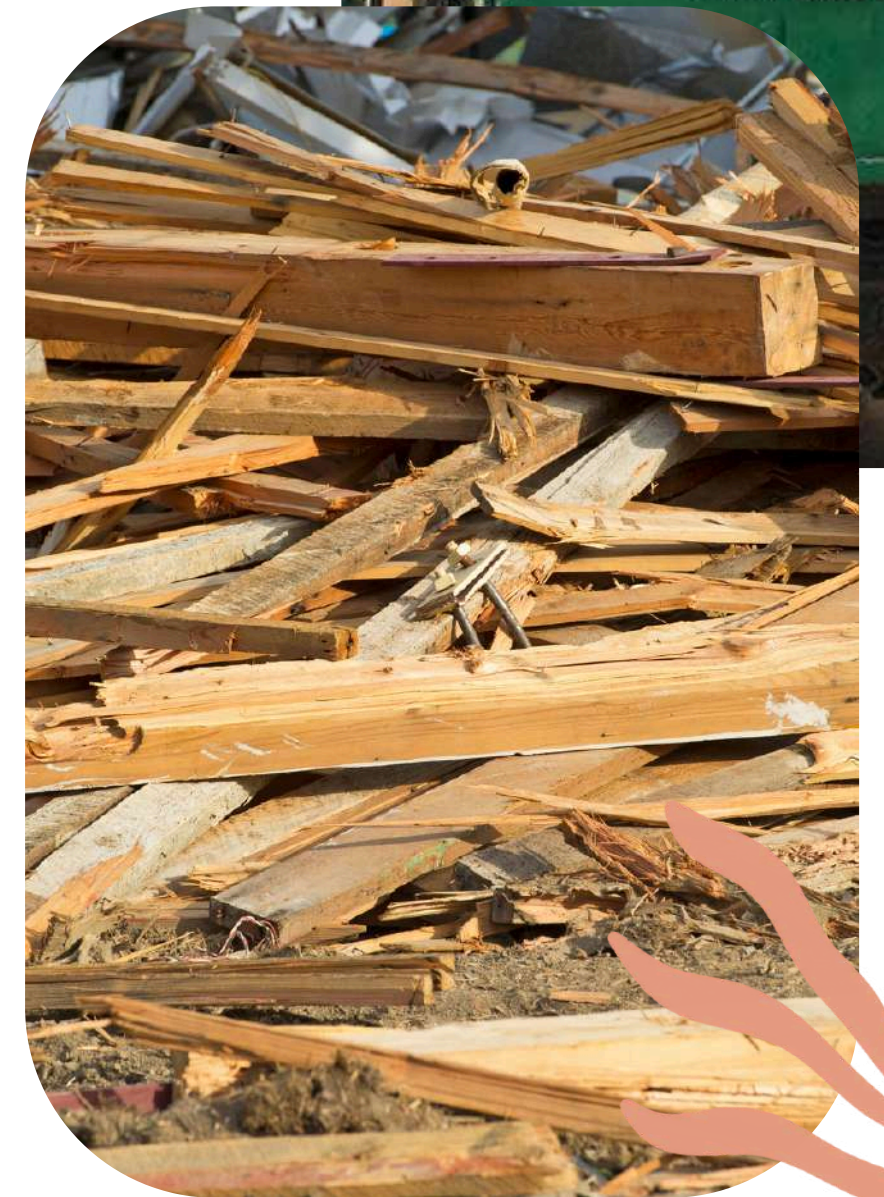
- Wet Waste (55%): ~34.05 MT/Day — mainly kitchen and market waste
- Dry Waste (45%): ~27.85 MT/Day — paper, plastic, metals, etc.
- C&D Waste: 277.7 MT/Year — mostly from renovation & coastal construction
- Plastic Waste: 1.63 MT/Day — rapidly increasing with packaged goods
- Biomedical Waste: 219 kg/Day — mainly from hospitals in Ratnagiri city

Key Insight:

- Increasing urbanization is directly leading to growing volumes of solid waste.
- There is no formal quantification methodology, impacting planning and budgeting.

Local Insights:

- Fish markets and weekly haats contribute significantly to wet waste.
- Tourism (Ganpatipule, Pawas) increases dry waste during peak seasons
- Coastal erosion and unplanned construction contribute to rising C&D waste.



2. Waste Storage

Current Situation:

- Limited segregated storage systems
- Insufficient bins in public places
- Inadequate household-level storage
- Dedicatedly 6 C&D waste storage facilities available

Challenges:

- No standardized bin system
- Very low segregation at source
- No separate storage for domestic hazardous waste
- No e-waste storage infrastructure
- Tourists leave behind plastic waste with no bins on beaches or forts

Suggested Actions:

- Introduce color-coded bins for wet/dry/hazardous waste
- Ensure two-bin system at household level
- Build e-waste and hazardous waste storage hubs in each municipality



3. Waste Collection

Current Status:

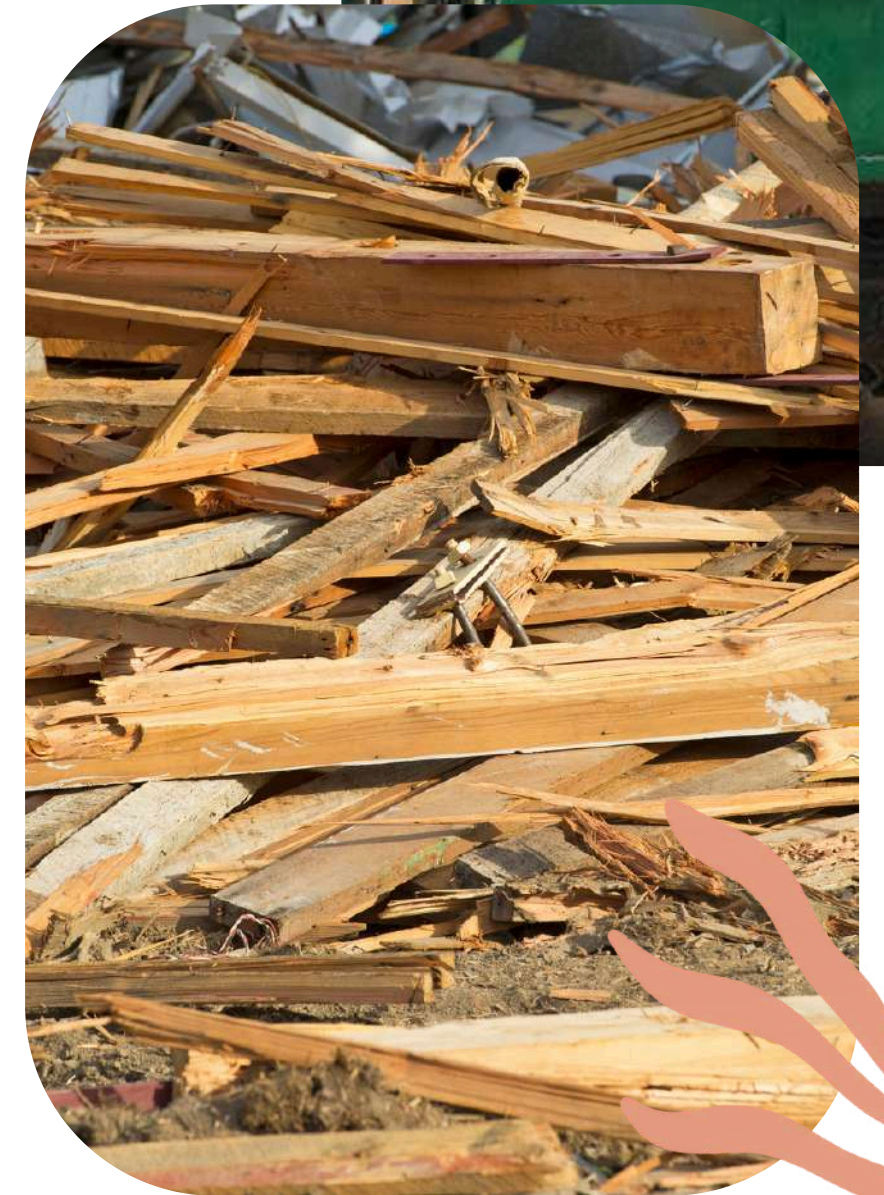
- 60–100% collection efficiency across the district.
- Door-to-door collection implemented in all ULBs (Urban Local Bodies).
- 100% manual road sweeping coverage.
- Limited mechanical road sweeping facilities.
- 100% segregated waste collection in most ULBs.
- No authorization for waste pickers in the district.

Identified Gaps:

- Collection efficiency needs to improve in some areas.
- Lack of mechanical road sweeping facilities.
- No formal integration of waste pickers.
- Limited specialized collection for hazardous and e-waste.

Ideal 3-Tier Collection System:

- a. Door-to-Door Collection:** Primary collection from households and establishments.
- b. Community Collection Points:** Strategically located for community drop-off.
- c. Transfer Stations:** Intermediate facilities for waste consolidation before transport to processing sites.



4. Transfer and Transport

Current Status:

- 65–100% segregated waste transport across ULBs.
- Dedicated vehicles for waste transportation.
- Limited transfer stations in the district.
- C&D (Construction and Demolition) waste transport often unregulated.
- Biomedical waste transported to treatment facility in Kolhapur.

Identified Gaps:

- Lack of intermediate transfer stations.
- Unregulated transport of C&D waste.
- Limited GPS tracking of waste transport vehicles.
- Inefficient routing of collection vehicles.

Efficient Transfer & Transport System:

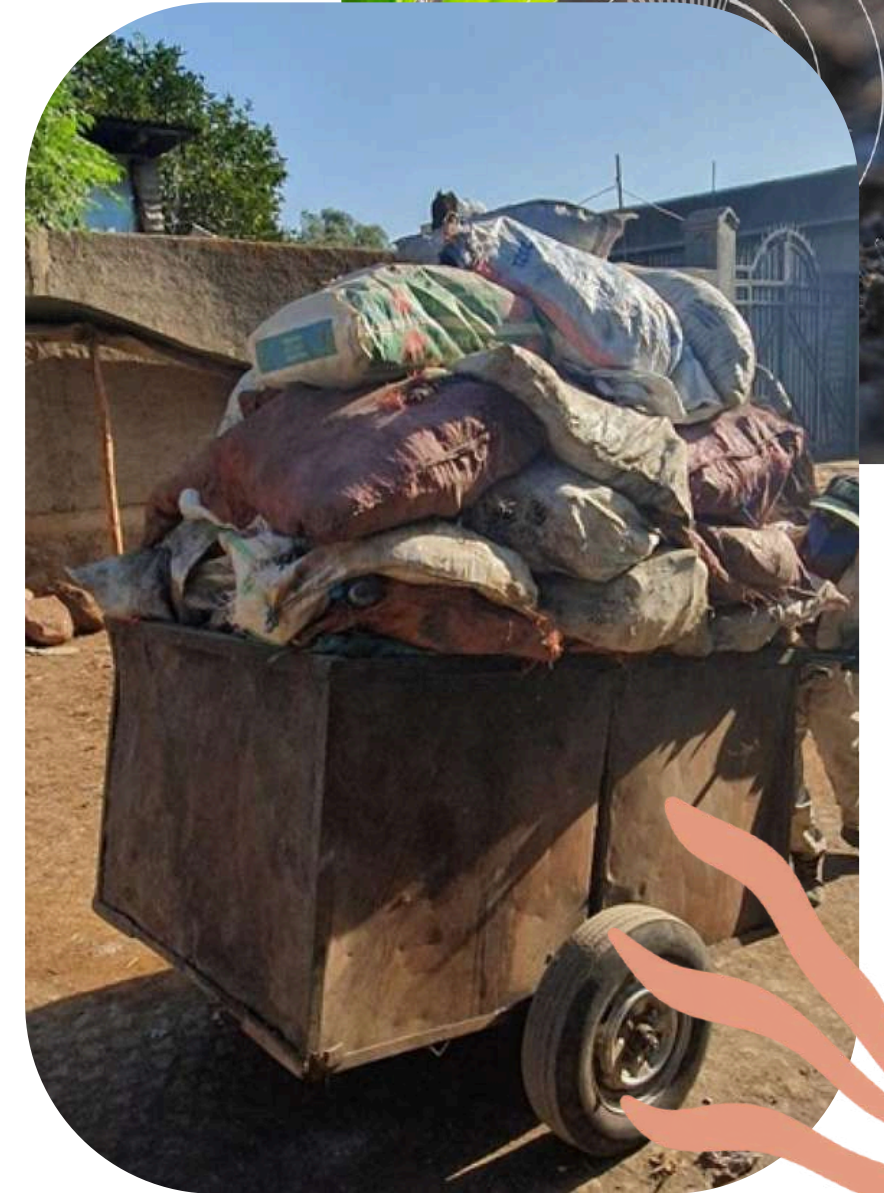
- Covered vehicles to prevent waste spillage.
- GPS tracking for route optimization.
- Separate vehicles for different waste streams.
- Strategic transfer stations to reduce transport costs.
- Regular maintenance of transport vehicles.





Innovative Add-ons in Waste Collection & Transport

- Smart Bins with sensors to reduce overflow and optimize collection routes
- Pre-sorting hubs at ward level to ease transport load and improve efficiency
- QR-coded bins & geo-tagged complaints to track problem zones and enhance accountability
- PPP models involving SHGs for micro-collection and secondary transport
- Climate-resilient routing planned for monsoon-prone areas
- Live dashboards for ULBs to monitor collection, vehicle routes & citizen feedback



5. Processing Systems

Current Status:

- 42.2 MT/Day (68%) waste processed
- Primary methods: Vermicomposting, Pit composting
- One ULB has biomethanation facility
- 200.75 MT/Annum of C&D waste recycled/disposed
- Plastic waste processing: 45 MT/Month in cement kiln (1 ULB)

Challenges:

- No E-waste processing facilities
- Limited plastic waste recycling options
- Need for more advanced treatment technologies



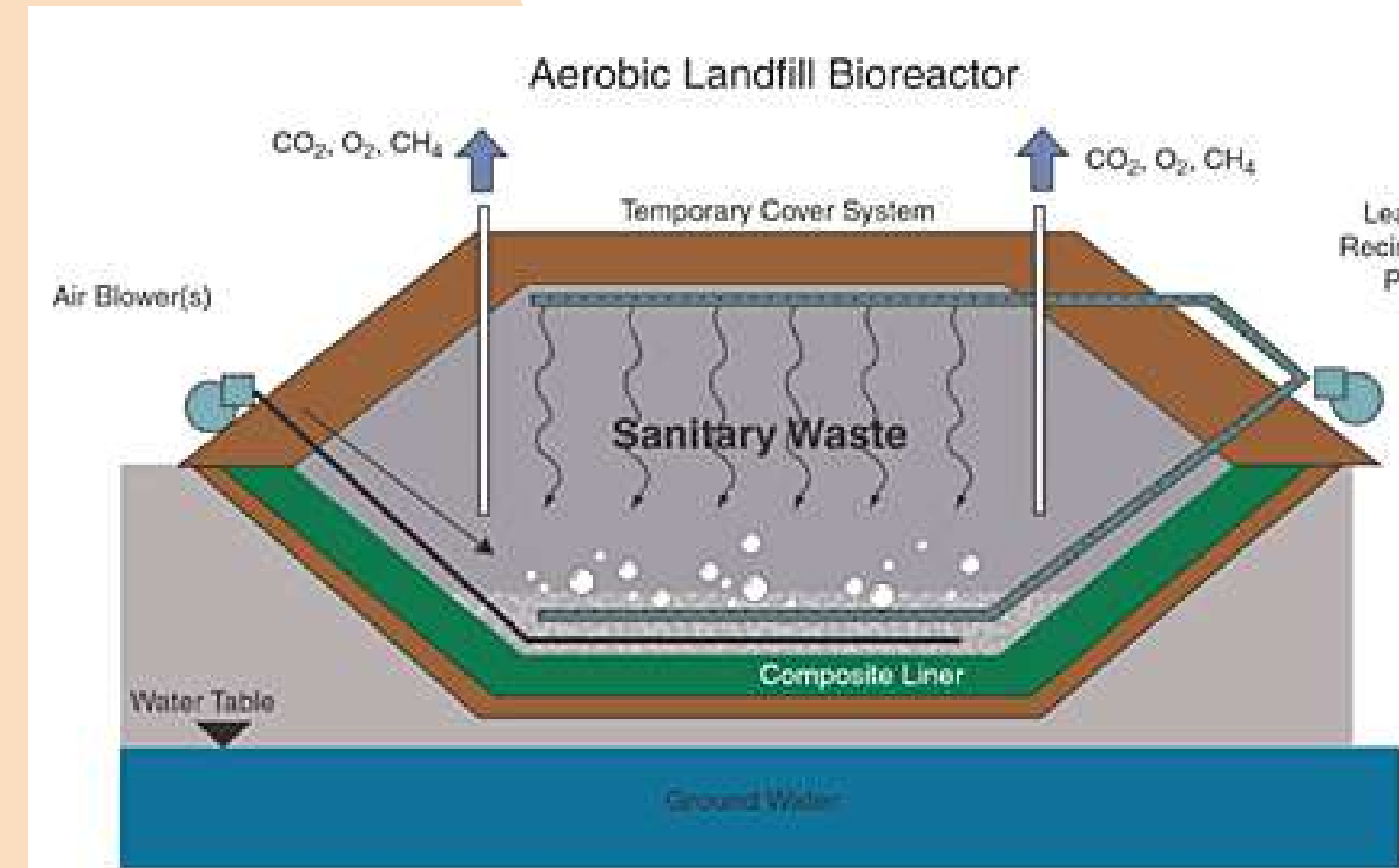
6. Waste Disposal

Current Status:

- 19.7 MT/Day (32%) waste dumped untreated
- C&D waste: 74.8 MT/Annum illegally dumped
- No scientific landfill facilities
- Biomedical waste: 100% treated (facility in Kolhapur)

Challenges:

- Lack of engineered landfills
- Unscientific dumping practices
- Limited land availability
- Environmental impact of dumping sites



7. Performance Analysis

SWM Performance Indicators

FUNCTIONAL ELEMENT	PERFORMANCE	STATUS	KEY ISSUES
Waste Generation	<div><div></div></div> Average	Moderate	Lack of proper quantification methodology
Storage	<div><div></div></div> Average	Moderate	Inadequate specialized storage facilities
Collection	<div><div></div></div> Above Average	Good	80-100% collection efficiency
Transfer & Transport	<div><div></div></div> Above Average	Good	85-100% segregated transport
Processing	<div><div></div></div> Average	Moderate	68% waste treated, limited processing options
Disposal	<div><div></div></div> Below Average	Poor	32% waste dumped, no scientific landfill

7. Performance Analysis

Above Average Performance

- ✓ **Collection System**
80-100% door-to-door collection efficiency across ULBs
- ✓ **Transfer & Transport**
85-100% segregated waste transport system
- ✓ **Biomedical Waste Management**
100% treatment of generated biomedical waste

Below Average Performance

- ⚠ **Waste Disposal**
32% of waste dumped without treatment, no scientific landfill
- ⚠ **C&D Waste Management**
74.8 MTA illegally dumped, no processing facilities
- ⚠ **Hazardous & E-Waste Management**
No dedicated facilities or systems for collection and treatment

7. Performance Analysis

✓ Strengths vs ✗ Weaknesses in Ratnagiri's SWM

Strengths:

- ✓ Door-to-door collection in all ULBs
- ✓ Manual road sweeping with 100% coverage
- ✓ Segregated waste transport operational in all ULBs
- ✓ Composting practices (vermicomposting, pit composting) in use

Weaknesses:

- ✗ Limited waste quantification methods
- ✗ Inadequate segregated storage systems
- ✗ No engineered landfills for scientific waste disposal
- ✗ No dedicated infrastructure for E-waste or hazardous waste
- ✗ Insufficient adoption of advanced processing technologies

Recommendations For Improvement

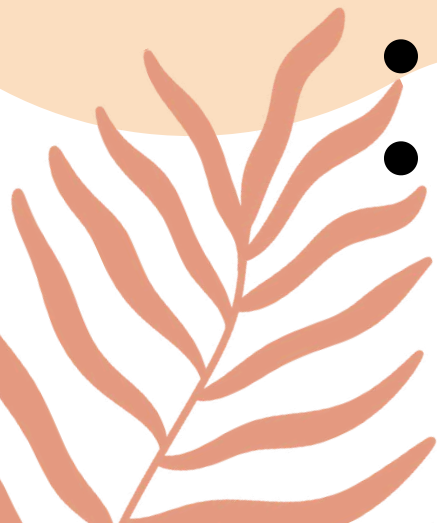


1. Waste Generation & Storage:

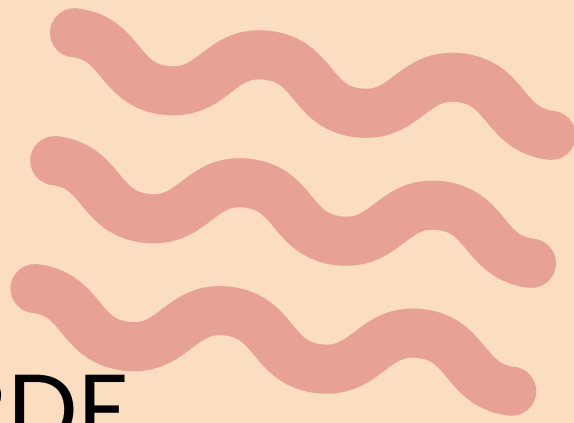
- Install graded weighing systems at transfer stations to ensure accurate measurement.
- Use quadrature sampling to better assess waste quantity and quality.
- Create specialized storage facilities for hazardous, plastic, and e-waste.

2. Collection & Transport

- Roll out a 3-tier collection system—door-to-door, community bins, and transfer stations.
- Use mechanical road sweepers for cleaner streets.
- Build transfer stations to optimize logistics.
- Formalize waste pickers as part of the system for inclusive employment.



Recommendations For Improvement

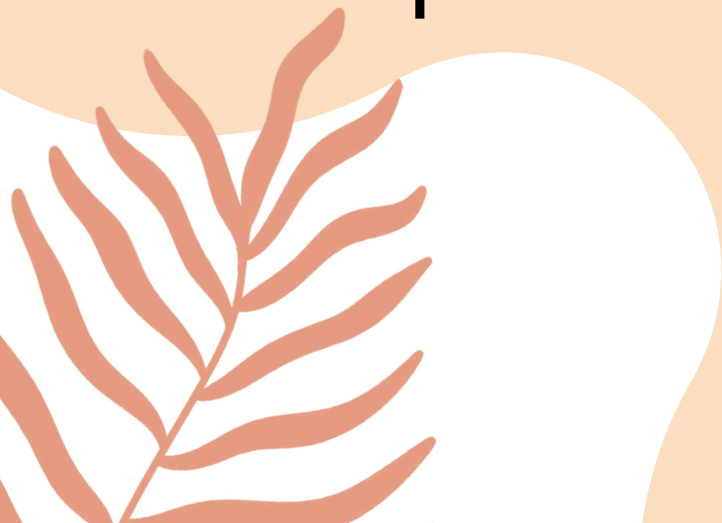


3. Processing & Disposal

- > Diversify treatment methods like biomethanation and RDF.
- > Set up Construction & Demolition (C&D) waste facilities per urban local body.
- > Develop scientific landfills with proper liners and gas management.
- > Enforce EPR for plastics, holding producers accountable.

4. Special Waste Streams

- > Implement domestic hazardous waste segregation protocols.
- > Build an e-waste management system with collection and processing units.





Conclusion



Key Findings

- Waste collection system works well in Ratnagiri (80–100% efficiency)
- Many ULBs transport waste in a segregated way
- 32% of waste is not treated and just dumped
- Big gaps in managing C&D waste, hazardous waste, and e-waste
- No scientific landfill in the whole district

Benefits of Better Solid Waste Management

- *Environmental*: Less pollution and emissions
 - *Economic*: New jobs and value from recycling
 - *Social*: Better health and quality of life
 - *Operational*: Smoother and more efficient systems
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**Thank
You**

