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Waste Management in India – Need of the Hour

Ayan Khan

Student

Abstract

Due to rapid urban development, industrial growth, and changing lifestyles, waste management in India has emerged as an urgent challenge for the environment, public health, and the economy. The country generates around 160,000 tonnes of municipal solid waste (MSW) per day, and only 70 to 80 percent of this is collected, with less than 25 percent processed in a scientific manner. The challenges we face in managing waste include insufficient waste segregation at the source, inadequate infrastructure, and low recycling rates, particularly for plastics (3.4 million tonnes a year), which exacerbate pollution, groundwater contamination, and health impacts. This paper will scrutinise current practices and identify primary challenges to effective waste management; we will review successes in India (such as in Indore, Pune, and Kerala), examine government initiatives (such as the Swachh Bharat Abhiyan, Solid Waste Management Rules 2016, and Plastic Waste Management Rules 2021), and propose sustainable waste management solutions that involve public engagement and community participation, supporting technological innovation, using a circular economy model, and formalizing the role of the informal sector.

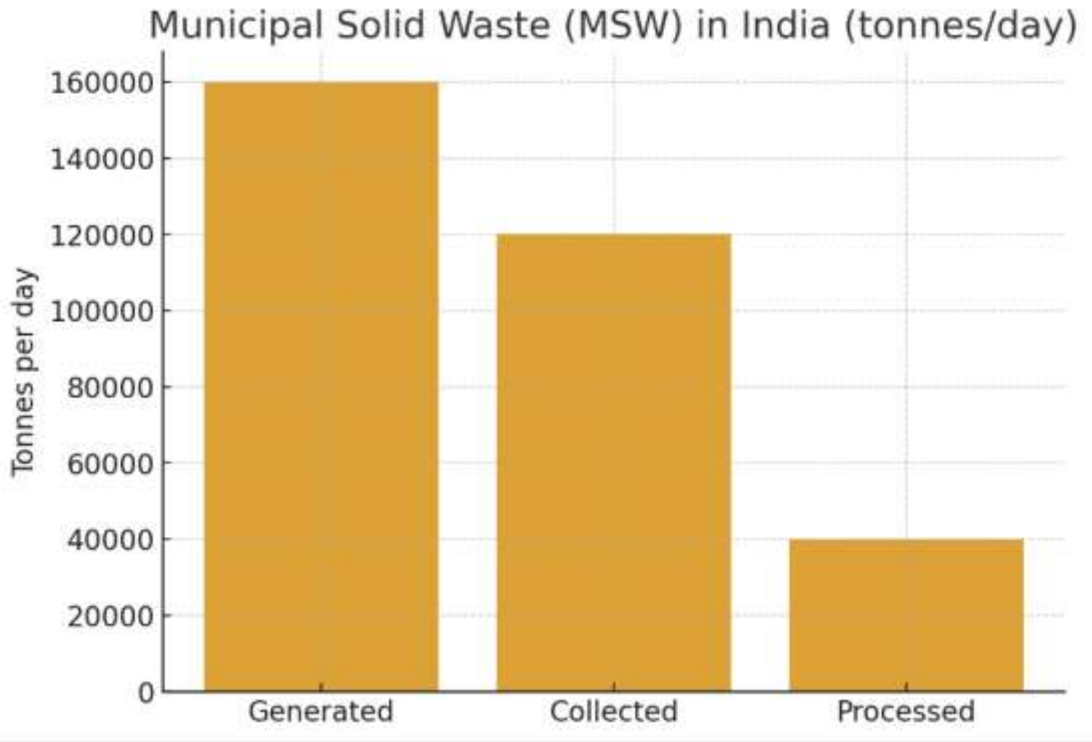
Keywords: Municipal Solid Waste; Segregation; Recycling; Circular Economy; Community Participation

Introduction

In the last two decades, waste generation in India has increased five times due to a growing population and changing trends in consumption. Almost 85 percent of municipal solid waste (MSW) is generated in urban areas, but rural waste, driven by the use of plastic and agricultural waste, is not receiving adequate attention. Waste is not being processed properly, which has led to more than 350 officially operated landfills in India. Most of these are overflowing and leeching toxins into the soil and groundwater. The improper disposal of biomedical, e-waste, and hazardous industrial waste has added to environmental degradation and public health risks. Hence, effective waste management is necessary for sustainable development and economic resilience.

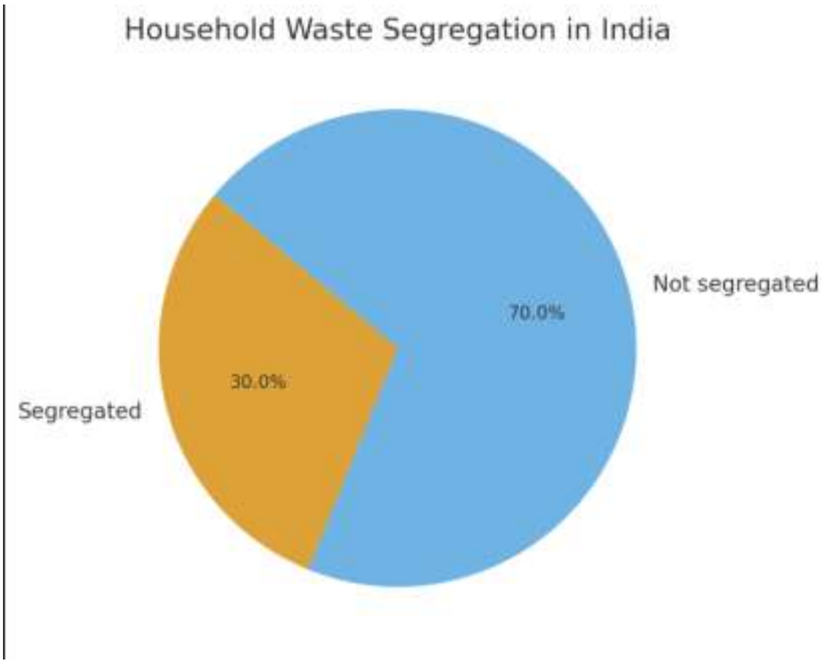
Types of Waste

There are many different waste types created by human activities, each requiring its own unique management technique. Municipal Solid Waste (MSW) incorporates the regular refuse from the household, including food waste, plastics, paper, and yard waste. "Disposal" of MSW usually occurs via collection, recycling, and composting protocols. Biomedical waste is waste generated from hospitals and clinics that can be infectious or potentially infectious, and this type of waste disposal uses specific disposal processes to eliminate the risk of disease transmission. E-waste consists of used electronics, batteries, and appliances, and is an escalating global concern. India generates the fifth-largest amount of e-waste globally, in addition to the related concerns surrounding oceans, rivers, and public health. Industrial waste is characterized by hazardous chemicals, heavy metals, or residues from manufacturing goods that require tighter controls from regulators and processes to limit disposal and/or following advanced disposal protocols in existing landfills. Agricultural waste is generally composed of crop residues or pesticide-treated materials and organic by-products found on farms, and being able to suitably manage this waste is key to maintaining the quality of soil, agronomy and minimizing environmental degradation.



Challenges in Waste Management

Source segregation remains poor, with only 30 percent of households maintaining the three wet, dry, and hazardous fractions. 85 percent of the cities have no infrastructure and rely on landfilling waste, with only 15 percent having the means to use composting, recycling, or waste-to-energy (WtE). Even though 3.4 million tonnes of plastic waste is generated each year, less than 50 percent is recycled, leading to pollution. Public understanding of the three R's (Reduce, Reuse, Recycle) is low and the informal sector, consisting of over 1.5 million waste pickers, has no safety nets or official recognition or protection, and is largely unregulated and receives very low wages and pay not in a timely manner.



Government Initiatives

- **Swachh Bharat Abhiyan (2014):** Nationwide cleanliness drive emphasizing behavior change, door-to-door collection, and public outreach.
- **Solid Waste Management Rules (2016):** Mandated source segregation, decentralized processing, and Extended Producer Responsibility (EPR).
- **Plastic Waste Management Rules (2021):** Phased ban on single-use plastics, EPR for producers, and guidelines for waste generators.
- **Waste-to-Energy Plants:** Pilot projects in Delhi, Hyderabad, and Pune aiming to convert non-recyclable waste into electricity, though facing technological and financial hurdles.

Case Studies

Kerala's Haritha Karma Sena

Haritha Karma Sena (HKS) is a decentralized waste management system organized under the Suchitwa Mission and local self-governments, and it is led by women, spanning the state of Kerala.
Model: The waste (solid) management is done at the ward level by women self-help groups (Kudumbashree units).
Segregation: Households are trained and encouraged to segregate waste at the household level into biodegradable waste and non-biodegradable (recyclables) waste.
Collection & Processing: HKS members collect the segregated waste from homes, institutions, and businesses. Biodegradable waste is processed through composting at the household, institution, or HKS Kudumbashree unit level, while the recyclable waste is taken to the authorized recyclers at the local level.
Employment: This initiative provides dignified livelihood for thousands of women across the state.
Community Engagement: The decentralized model fosters a system of engagement with the community contributing to ownership, accountability, and implementation and oversight of the initiative.
Impact: Reduced reliance on landfills for waste disposal, decreased plastic pollution within the communities, and ultimately created pathways to community sustainability.

Sustainable Strategies

Enhancing waste management necessitates a holistic approach that involves multiple stakeholders and approaches. Community engagement is critical and encompasses efforts to strengthen local governance structures such as wards and panchayats and set up resident welfare associations that can monitor compliance and run awareness campaigns to educate the community about waste management. Formalizing the informal sector, which includes the employment of waste pickers as members of your municipal waste team, provides opportunities for training, distributing personal protective equipment, and social security–which positively contributes to social welfare and efficiency. Technology uptake also includes scaling buy decentralized composting and biomethanation, as well as improved recycling strategies such as chemical recycling and pyrolysis for plastics and initiatives to improve waste-to-energy (WtE) plant efficiency. Circular economy initiatives encourage stakeholders to reduce and reuse materials, such as deposit-refund options for bottles, buy-back centers, and incentives for manufacturers to improve longevity and recyclability. Multi-stakeholder partnerships build collaboration among government, NGOs, private businesses, and academia and also help facilitate funding for research, pilot innovative initiatives, and promote best-practice models for sustainable waste management at multiple levels.

Conclusion

Proper waste management is a critical modern requirement for India’s environmental integrity, public health security, and economic sustainability. While the country has note worthy policy frameworks, effective mechanisms for properly implementing them lie contingent upon building institutional capacity or strengthening established institutional capacity combined with encouraging various stakeholders to engage in the waste management sector. Establishing formal ties to the informal sector, the role of community ownership, and adopting circular economy models are potential pathways to re-engineering waste as a resource in alignment with goals for India's sustainable development. Achieving a clean, healthy, and resource efficient India will require collective action at all levels of society.

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