Indian Journal of Modern Research and Reviews

This Journal is a member of the *'Committee on Publication Ethics'*

Online ISSN:2584-184X

Research Paper

Municipal Solid Waste Management in Tamil Nadu: A Descriptive Analysis

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DOI: https://doi.org/10.5281/zenodo.17094144

ABSTRACT

In the contemporary era, the rapid rise of solid waste is a serious problem within rural and urban areas, and the main factors, such as rapid urbanization, increased per capita income, and rapid population growth, have contributed to the increase in solid waste that poses a serious threat to the environment and public health. The impact of the generated waste on the economy cannot be ignored, and efficient management of this waste has become a major problem. Municipal solid waste management has been a major challenge to the respective local governments at the regional and international levels. Financial constraints have been considered as one of the key issues. In Tamil Nadu, there are about 21 corporations, 138 Municipalities, and 490 Town Panchayats. The total quantity of solid waste generated is about 16066.392 Tons/day, of which about 15683.92 Tons/day of solid waste was collected, and 9708.82 Tons/day of the collected solid waste is treated, and 5975.1 Tons/day of municipal solid waste is dumped in the dumpsites allocated within the local bodies of Tamil Nadu. So far, the Tamil Nadu Pollution Control Board has issued the authorization to around 226 local bodies, and it is also informed that the local bodies that did not apply for authorization or did not have a valid authorization are instructed to apply for authorization. The current board is promoting the concept of waste segregation from the source, waste reduction, recycling, and prolonged usage of materials to avoid further degradation of the environment

Manuscript Info.

- ✓ **ISSN No:** 2584- 184X
- ✓ **Received:** 19-07-2025
- ✓ **Accepted:** 27-08-2025
- ✓ **Published:** 10-09-2025
- ✓ **MRR:3(9):**2025;13-17

- ✓ **Peer Review Process:** Yes
- ✓ **Plagiarism Checked:** Yes

How To Cite this Article

Sasikala M, Mahalakshmi M. Municipal Solid Waste Management in Tamil Nadu: A Descriptive Analysis. Ind J Mod Res Rev. 2025;3(9):13-17.

KEYWORDS: Municipal Solid Waste Management (MSWM), Collection, Transportation Segregation, Urban Local Bodies (ULB).

1. INTRODUCTION

Municipal Solid Waste Management (MSWM) in the urban areas has evolved as one of the major challenges that affect the country. Over the past few years, India's waste management sector has introduced various campaigns to promote efficient solid waste management among the public. The "Swachh Bharat Mission" has been one of the largest campaigns and has proven to be effective among the citizens. These campaigns tend to promote the adverse effects of unscientific, uncontrolled dumping of waste and illegal dumping of waste in public places. The mismanagement of waste will also lead to the spread of diseases like cholera, dysentery, typhoid, jaundice, and diarrhoea. Improper solid waste disposal often results in the spread of diseases and also contamination of water bodies and soil. Therefore, it is a major concern that MSWM is one of the

major problems in India. Urban solid waste management has become one of the major concerns of the respective authorities, and the current waste management system involves the process of door-to-door collection, which has created littering habits, and in most cities, the solid waste remains unattended. The collected waste is segregated by the authorities, and if not properly disposed of, the consequences are dangerous. The per capita generation of municipal solid waste has increased due to the increased population and improved lifestyle. Municipal solid waste has become one of the biggest environmental problems of the developing and developed countries since about 50% of the globe's population lives in urban cities, and efficient solid waste management should be implemented to take care of the thousands of tons of municipal solid waste on a daily basis.

2. REVIEW OF LITERATURE

Bhide and Sundaresan (2001), in their book *Solid Waste Management in Developing Countries*, highlight that urban local bodies in India face severe difficulties in handling municipal waste due to inadequate infrastructure, financial constraints, and lack of community participation. They stress that collection efficiency is often higher in metropolitan cities, but treatment and safe disposal remain a challenge. The study emphasizes decentralized approaches such as composting and community-level segregation, which are more sustainable for Indian towns and cities. Their work provides a strong theoretical base for understanding waste management in the Indian context and remains relevant for Tamil Nadu, where urbanization and population growth have led to mounting solid waste challenges.

Agarwal (2005), in *Solid Waste Management*, presents a comprehensive overview of the sources, types, and impacts of solid waste in India. The author points out that improper disposal of waste contributes to land degradation, water contamination, and public health risks. The book emphasizes the importance of source segregation, recycling, and reduction techniques to minimize the burden on landfills. It also advocates for the integration of informal waste pickers into the waste management system, given their contribution to recycling. This work is especially significant for Tamil Nadu, where waste segregation and the role of informal recyclers remain critical areas for policy intervention.

Reddy (2011), in *Municipal Solid Waste Management Processing–Energy Recovery–Global Examples*, focuses on modern waste processing technologies such as waste-to-energy, anaerobic digestion, and biogasification. The book examines global best practices and their applicability to Indian cities. The author argues that energy recovery from biodegradable waste not only reduces landfill burden but also contributes to renewable energy generation. In Tamil Nadu, where nearly 9,700 tons of waste are treated daily, the adoption of such technologies could strengthen sustainable urban development. The work thus offers valuable insights into technological pathways for improving MSWM efficiency in the state.

Goel (2017), in *Municipal Solid Waste Management in India: Status and Emerging Practices*, provides a status report on waste management practices across different Indian states. The study identifies critical challenges such as a lack of enforcement of solid waste management rules, low public awareness, and inadequate financial support for local governments. Goel emphasizes that Tamil Nadu has been relatively progressive in adopting segregation at source, but gaps remain in treatment and scientific landfill practices. The book also underscores the importance of public-private partnerships and community participation in enhancing the efficiency of MSWM systems.

Mohanty (2015), in *Solid Waste Management in Urban India*, critically examines the role of urbanization and policy in shaping waste management practices. He notes that rapid urban growth has outpaced the capacity of municipal bodies to manage solid waste effectively. The study highlights the Tamil Nadu experience, where initiatives like decentralized composting and segregation drives have been piloted but face challenges in scaling up. Mohanty argues for an integrated framework combining policy, technology, and public participation to address the crisis. This work contributes to understanding the governance and policy dimensions of MSWM in Indian states.

3. OBJECTIVES OF THE STUDY

1. To analyze the present status of municipal solid waste generation, collection, treatment, and disposal in Tamil Nadu.
2. To examine the role of local bodies, including Corporations, Municipalities, and Town Panchayats, in managing municipal solid waste.
3. To study the effectiveness of waste management practices such as segregation at source, recycling, and waste reduction.
4. To assess the challenges faced by local governments, particularly financial and infrastructural constraints, in effective waste management.
5. To evaluate the role of the Tamil Nadu Pollution Control Board (TNPCB) in granting authorizations and monitoring compliance with waste management rules.

4. RESEARCH METHODOLOGY

This paper is a review paper based on the information gathered from secondary sources. The data have been collected from the Internet, Journals, Websites, Books, Articles, Newspapers, Media Reports, Magazines, and Official Government Sites. This paper provides descriptive research to understand the government campaigns and their effectiveness in achieving a sustainable Solid Waste Management system.

Municipal Solid Waste Management

Municipal solid waste includes sources from commercial and domestic waste within the notified areas. Solid waste is generated as a result of human activities; thus, the growing urbanization and rapid industrialization have developed the economy of the nation at the same time have also increasing the solid waste generation. Millions of tons of solid waste, comprising waste from Industries, plastic waste, E-waste, biomedical waste, and construction and demolition waste, are generated in India. There have been major problems with a lack of infrastructure for the process of collection, treatment, and

disposal of waste. The identified problem can be transformed into an opportunity by imposing the proper segregation of waste, waste minimization, and maximizing resource recovery. The primary key to developing a regulated policy framework is the emphasis required to reduce waste and maximize resource recovery. These will aid in the process of implementing proper solid waste management that is efficient and sustainable.

Process of Municipal Solid Waste Management of Tamil Nadu

(i) Collection, Transportation, and Segregation of MSW in Tamil Nadu

The generated waste should be collected, and this process involves the usage of collection bins, community bins, compactor bins, and Lorries using dust bins. Recently, most of the urban bodies have started the practices of waste segregation at the source collection level and have segregated the collected waste into biodegradable and non-biodegradable waste. Transport facilities such as tipper tractor, trucks, and dumper lacer and tipper lorry are used for the primary collection of solid waste in urban areas, and similarly, town panchayats utilize tractor-trailer, tipper, tricycle, dumper place, and push carts as transport facilities for the collection of solid waste.

(ii) Solid Waste Processing Facilities in Tamil Nadu

The collected solid waste should be processed in such a manner that the accumulation of waste will not affect the environment and public health. Tamil Nadu has various waste processing facilities like Vermicomposting, Onsite Composting (OCC), BioMethanation, Material Recovery Facilities, Micro Compost Centres (MCC), windrow composting, and Incineration plants are listed below.

- About 1008 MCCs are currently installed and are under operation to process 3618 TPD of generated wet waste, and it is also proposed to install a new 69 MCC with a handling capacity of 328 TPD of wet waste.
- 907 OCCs are installed with a handling capacity of 350 TPD and are under operation to process the collected wet waste into compost materials.
- To process around 259 TPD of wet waste, about 107 biogas methanation plants are established.
- To process 200 TPD of solid waste, two biogas/bio CNG plants are installed, and it is also proposed to set up 7 new plants for the purpose of processing 1500 TPD of solid waste.
- 544 windrow composting facilities are currently installed with a handling capacity of 1522 TPD and are operational. It is also proposed to set up new facilities with a handling capacity of 321 TPD and 590 TPD.

5. RESULT AND DISCUSSION

Table 1: Solid Waste Management in Tamil Nadu

Total Waste Generation in TPD	Wet waste in TPD	Dry waste in TPD	Inert and silt in TPD
14,995	8,084	5,471	1,440

Source: Implementation of SWM Rules, 21st July 2022, Government of Tamil Nadu

Table 1 indicates that out of the total solid waste generated, 14,995 TPD, it comprises 8,084 TPD of wet waste, 5,471 TPD of dry waste, and 1440 TPD of Inert and slit waste.

Table 2: Solid Waste Management status in Tamil Nadu

Status	As of July 2019,	As of July 2020,	As of June 2021,	As of June 2022,
Quantity of Waste Generated in TPD	13,744	11,437	13,006	14,995
Quantity of Door-to-Door Collection (TPD)	12,781	10,751	12,335	14,396
Quantity of waste Segregated at Source (TPD)	11,270	8,120	10,404	12,147
Quantity of waste collected & transported (TPD)	13,744	11,437	13,006	14,995
Quantity of waste processed (TPD)	7,422(54%)	5,947 (52%)	7,543 (58%)	9,310 (62%)

Source: Implementation of SWM Rules, 21st July 2022, Government of Tamil Nadu

Table 2 indicates the quantity of waste related to the process of solid waste management according to the timelines from 2019 to 2022. The Quantity of waste generated in the years 2019, 2020, 2021, and 2022 is around 13,744 TPD, 11,437 TPD, 13,006 TPD, and 14,995 TPD. Quantities of Door-to-Door Collected waste in the years 2019,2020, 2021, and 2022 are around 12,781 TPD, 10,751 TPD, 12,335 TPD, and 14,396 TPD. Quantities of waste segregated at source in the years 2019, 2020, 2021, and 2022 are around11 270 TPD, 8,120 TPD, 10,404 TPD, and 12,147 TPD. Quantities of waste collected and transported in the years 2019, 2020, 2021, and 2022 are around 13,744 TPD, 11,437 T PD, 13,006 TPD, and 14,995 TPD. The total quantity of waste processed in the following years 2019,2020, 2021, and 2022, is 7,422 (54%), 5,947 (52%), 7,543 (58%), and 9,310 (62%).

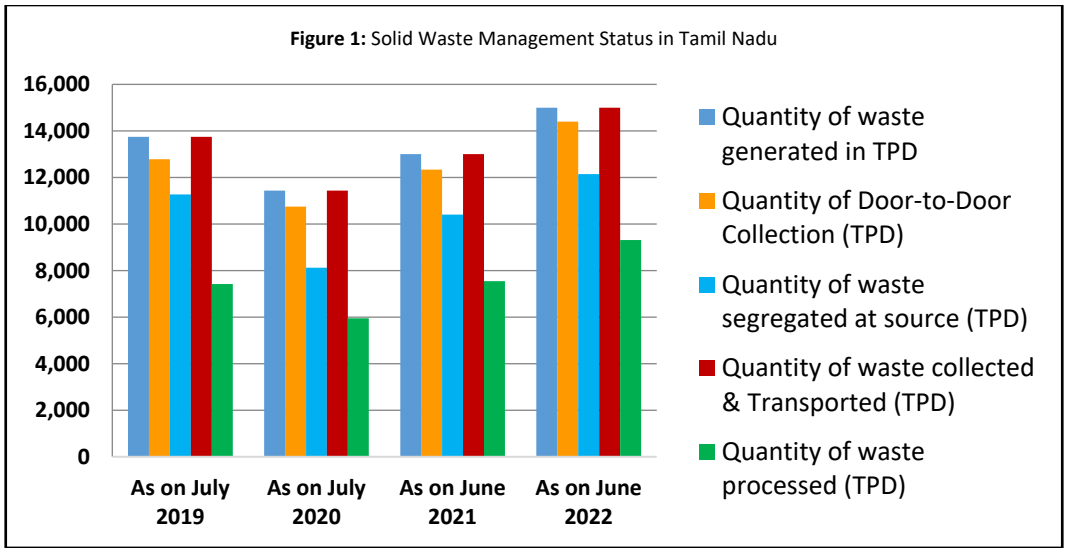
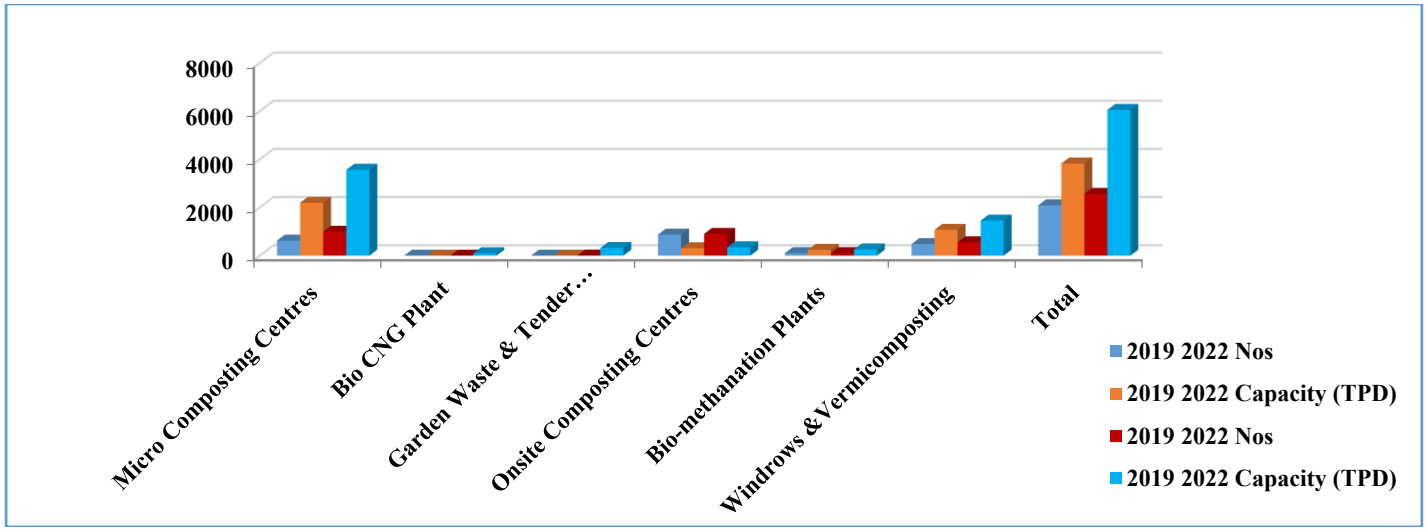


Table 3: Processing Facilities of Tamil Nadu

Processing Facilities	2019		2022	
	Nos	Capacity (TPD)	Nos	Capacity (TPD)
Micro Composting Centers	628	2198	995	3569
Bio CNG Plant	-	-	1	100
Garden Waste &Tender Coconut Shells Plant	-	-	4	320
Onsite Composting Centers	876	310	907	350
Bio-methanation Plants	104	244	107	259
Windrows &Vermicomposting	485	1075	556	1,455
Total	2,093	3,827	2,570	6,053

Source: Implementation of SWM Rules, 21st July 2022, Government of Tamil Nadu

Table 3 highlights the processing facilities of Tamil Nadu, and there are around 628 Micro Composting Centers with a capacity of 2198 TPD and around 995 centers with a capacity of 3569 TPD. Currently, there is only one Bio CNG plant with a capacity of 100 TPD. There are about 4 Garden Waste & Tender Coconut Shells Plants with a capacity of 320 TPD. There are about 876 Onsite Composting Centers with a capacity of 310 TD and about 907 centers with a capacity of 350 TPD. There are about 104 Bio-methanation Plants with a capacity of 244 TPD and about 107 plants with a capacity of 259 TPD. About 485 plants are used for Windrows &Vermicomposting with a handling capacity of 1075 TPD, and about 556 plants with a capacity of 1455. In total, the processing facilities in Tamil Nadu are about 2093 with a capacity of 3827 TPD, and about 2570 plants with a capacity of 6,053 TPD.



Policy Measures

The government of Tamil Nadu has undertaken many steps to address the issue of waste management, including:

- Implementing a waste segregation policy
- Establishing new waste treatment plants with high handling capacity
- Promoting recycling, waste minimization, and composting.
- Raising awareness of waste management issues via campaigns and awareness programs.

(i) Waste Segregation: Waste segregation serves as an important step in waste management, and this process involves the segregation of different types of waste, such as wet waste, dry waste, and hazardous waste. The processes of waste segregation make the other processes, such as composting and recycling, much easier and also allow the usage of separate waste treatment practices according to the types of waste. For example, Hazardous waste is incinerated, and dry waste is recycled.

(ii) Waste Treatment Plants: The state of Tamil Nadu has a large number of waste treatment plants that are used to treat waste based on waste characteristics. For example, the plants are categorized on the basis of the waste, plants which are used for composting wet waste, incinerating hazardous waste, and recycling dry waste.

(iii) Recycling and Composting: Recycling and composting are two key methods for the process of waste reduction. Recycling involves turning the generated waste materials into new products, thus making the waste material useful once again, while the process of composting involves the turning of organic waste into nutrient-rich soil fertilizers that can be used as a replacement for artificial fertilizers.

(iv) Awareness Rising: The Government of Tamil Nadu has launched several campaigns and awareness programs to raise awareness regarding solid waste management issues. This program includes educating the public and also creating awareness regarding the importance of waste minimization, Segregation, Recycling, and composting.

6. CONCLUSION

Implementation of an efficient and sustainable solid waste management system in India is important for the long-term growth and also for the protection of the environment and public health. The contemporary solid waste management system requires comprehensive programs and policies that address waste segregation, treatment infrastructure, regularity enforcement, scientific disposal methods, and public awareness. By the process of implementation of the policies and thus by encouraging stakeholder engagement, the pollution of land, soil, and water bodies can be reduced. The implementation of a scientific and efficient solid waste management system allows for safeguarding natural resources, reducing waste generation, reducing the spread of diseases, and building a sustainable environment for the current and future generations.

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