

Origin, Nature and Growth of Urban Solid Wastes in Tamil Nadu – A Study

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Introduction

In India Urban Solid Waste Management (USWM) is one of the important environmental threats to be addressed very seriously. The present solid waste management system is affected by adverse economic, social, cultural, institutional, technical, operational, environmental and legislative constraints. A reliable waste collection service is required. Waste collection vehicles are need to be enlarged to the regional expectations. Wastes required to be sorted at source as much as possible and to reduce the amount needed for disposal. Co-operation among Communities, Industrial sector, Service sector and the private authorities are necessary to maintain the quality environment in the country.

Solid Waste Management issue is the biggest threat to the local bodies such as metropolitan, corporation, smart cities, town panchayats, municipalities and village panchayats. Madurai is one of the identified smart cities in Tamilnadu facing the problem of solid wastes. Solid Waste generation is influenced by factors like production, trade, consumption, income of the households, population, level of industrialization, GDP, climate and other factors like environmental awareness, legislation or waste management measures.

- (i) Domestic wastes
- (ii) Market and commercial wastes
- (iii) Street sweeping water
- (iv) Industrial wastes
- (v) Hospital wastes
- (vi) Demolition and Building Wastes and
- (vii) Sewage Sludge.
- (viii) Other Waste Generated from Industry / Service Sector

India is considered as the world's fifth-largest economy in terms of GDP and the third-largest by purchasing power parity (PPP). High income groups consume more than low income groups, which

results in a higher waste generation rate. Developed countries generate more than twice the weight of waste when compared with developing countries.

Concepts

Litter

The synonyms for litter are waste, debris, scraps, leaving. If everyone decided to litter or drop trash the ground, the world would be covered with garbage.

Garbage

Garbage is any waste that is left over or anything that is thought to be worthless.

Solid Waste

Solid waste is defined as the useless and unwanted products in the solid state derived from the activities of human beings. It is produced either by product of production processes or arise from the domestic or commercial sector when objects or materials are discarded after use.

Waste from Health Sector

Health care waste includes all the waste generated by health-care establishments, research facilities, laboratories and multi specialty hospitals. .

Methodology

This study is based on secondary data, the data collected from various sources such as Economic Survey, Corporation Office, Ministry of Environment and Health, International Journal of Environmental Science, Tamil Nadu Pollution Control Board Report, IRANIN – Iranian Journal of Environmental Health Science and Engineering. This paper aims to study about the sources of solid waste, solid waste generation in India and the select cities in Tamil nadu.

Origin of Municipal Solid Waste Generation, Composition, and Management

India has drawn the world's attention through the high-paced expansion of population, urbanization and mechanization using ICT and science and technology. This has resulted in increased waste generation and consumption of natural resources led to ecological degradation and pollution. As awareness increases of the ill effects of currently used waste disposal methods on the environment, accountability is absolutely essential for an effective waste management system. The volume of waste generation has been increasing rapidly for all these years in India.

Solid wastes collected from the city is disposed of by open dumping at the Vellakkal site, located south of Madurai in Avaniyapuram over an extent of more than 110 acres including a sewage farm that receives sewage/partially treated effluent from the predominantly deficient sewage treatment plant. The existing dumping ground has been reportedly used by Madurai Corporation for over 30 years. A weigh bridge is available at the entry to the dump site which essentially records the details of vehicle and weight of the incoming waste and source. The Madurai

Corporation has reviewed its agreement with the Indian Medical Association to ensure that Bio-Medical Waste generated from Govt. and Corporation Hospitals will be properly segregated from MSW for treatment and disposal through common facility. Pursuant to implementation of the disposal system through common facility for biomedical (contaminated) wastes, such wastes would not reach the Vellakkal site.



Sources of Urban Solid Wastes

The table furnishes the important sources and their types of urban solid wastes in developing, developed and less developed countries.

Major Sources	Typical waste generators	Nature of solid wastes
Households	Single and multifamily dwellings	Paper, cardboard, plastics, textiles, leather, yard wastes, wood, glass, metals, ashes, bulky items, consumer electronics, batteries, oil, tires and household hazardous wastes including food wastes.
Agriculture and Allied Activities	Crops, orchards, vineyards, dairies, feedlots, farms	Spoiled food wastes, packing materials of pesticides and fertilizers, agricultural wastes, hazardous wastes
Industries	Light and heavy manufacturing, fabrication, construction sites, power and chemical plants	Housekeeping wastes, packaging, food wastes, construction and demolition materials, hazardous wastes, ashes and electronic wastes
Municipal Corporation Service	Street cleaning, landscaping, parks, beaches, other recreational areas, water and wastewater treatment plants	Street sweepings, landscape and tree trimmings, general wastes from parks, beaches, and other recreational areas sludge
Commercial Activities	Shops, Lodges, Markets, Office etc,	Electrical wastes, paper, cardboard, plastics, wood, food wastes, glass, metals and hazardous wastes
Institutions	Schools, hospitals, prisons, government centers	Paper, electrical wastes, cardboard, plastics, wood, food wastes, metals and hazardous wastes
Construction sector	New construction sites, road repair, renovation sites, demolition of buildings	Wood, steel, concrete, dirt, electrical wastes and building materials
Manufacturing, Industries	Heavy and light manufacturing, refineries, chemical plants, power plants, mineral extraction and processing	Industrial process wastes, scrap materials, off-specification products, tailings from the mines

It is observed from the table that the important sources are generated from agricultural sector, industrial sector and service sector. Besides, the solid wastes are harmful and lead to physical, chemical and biological changes on land, water and air. It directly and indirectly affects man, animals and plants. Therefore the local bodies should take the meticulous efforts to prevent the ill effects of the solid waste generated in the cities. The problem of management of solid waste in developing country is challenging than the developed countries. It is because of technological backwardness in the management system of solid waste.

Municipal Solid Waste

The status of solid wastes generated in select countries in the world is presented in table 1.

Table 1: Top 5 Municipal Solid Waste Generators In The Select Countries (in Million tones/per annum)

Sl. No.	Country	2030 (Projected)	2050 (Projected)
1.	India	387.8	543.3
2.	USA	311	359.9
3.	China	295	335.8
4.	Brazil	96.7	114.3
5.	Indonesia	87.9	118.6

Source: Times of India.

It is inferred from the table that the top five select countries solid waste is projected for the year 2030 and 2050. Among the five countries, India will stand first both in the year 2030 and 2050. The projected solid waste in India will be an obstacle for the growth of the country socially, economically and environmentally. Though the china is highly populated country in the world but it only will generate 295 million tones and 335.8 million tones solid wastes in the year 2030 and 2050 respectively. It is to be noted and projected that USA is one of the super power countries in the world will generate 311 and 359.9 million tones solid waste in 2030 and 2050 respectively which is moderate compared to India and China.

Municipal Solid Waste Generation in India

Municipal solid waste generation in India has been very high in the recent past due to industrialization, urbanization, the advancement in science and technology.

Table 2: Quantity Of Municipal Solid Waste Generation In India 2019 (per day)

Sl. No.	State	Metric Tons
1.	Maharashtra	23844.6
2.	Uttar Pradesh	17377.3
3.	West Bengal	14613.3
4.	Tamil nadu	13968
5.	Karnataka	11958
6.	Delhi	10817
7.	Telangana	8497
8.	Madhya Pradesh	8000
9.	Rajasthan	6629.6
10.	Andhra Pradesh	6440
11.	Haryana	4635.8
12.	Punjab	4634.5
13.	Kerala	3903
14.	Odisha	2564.4

Source: Municipal solid waste generated in India for the financial year 2019-20, Published by Madhumitha Jaganmohan, Statista Inc. USA.

It is inferred table 2, that the municipal solid waste generation in India for the financial year among the various states Maharashtra generated 23844.6 metric tons per day whereas Odisha generated 2564.4 metric tons per day. The difference between these two states was 21280.2 metric tons. It is too high for Maharashtra in terms of solid waste due to high population compared to Odisha. It is observed that Kerala state generated 3903 metric tons per day but in the case of Uttar Pradesh 17377.3 metric tons per day. The reasons for the difference in solid waste between these two states were population, education and natural climatic condition etc.

Nature of Solid Wastes in Tamil Nadu

The sources of hazardous waste and their causes of an adverse impact on the environment in Tamil Nadu are presented below:

- 1) Tanneries located Vaniyambadi and Erode.
- 2) Bleaching and dyeing industries at Tirupur and Karur.
- 3) Chemical industries located at Tuticorin, Cuddalore, Chennai and Kancheepuram districts.

Table 3: Tamilnadu Pollution Control Board Status and Nature of Hazardous Waste Generating Units in Tamilnadu

Sl. No.	Name of the District	No. of Units	Total Quantity of HW generation in MTA	Quantity of HW in MTA		
				Landfills	Recyclable	Incinerable
1.	Chennai	94	1644.412	187.817	1014.273	443.022
2.	Coimbatore	368	23182.115	22261.478	822.481	98.156
3.	Cuddalore	41	6541.246	4856.792	886.454	798.000
4.	Dharmapuri	10	26.950	-	26.950	-
5.	Dindugul	46	6055.585	5370.300	659.685	22.000
6.	Erode	341	6191.714	5923.200	268.514	-
7.	Kancheepuram	162	8913.883	6095.389	1750.418	1068.076
8.	Kanyakumari	19	133.687	0.108	123.219	10.360
9.	Karur	60	6482.429	6324.520	157.909	-
10.	Krishnagiri	63	3324.168	1276.127	1481.016	567.025
11.	Madurai	116	2007.506	964.064	564.230	479.212
12.	Nagapattinam	17	652.337	296.280	290.587	65.470
13.	Nammakkal	116	1664.310	1519.830	144.480	-
14.	Nilgiri	11	685.820	618.000	51.820	16.000
15.	Perambalur	13	286.361	1.675	137.686	147.000
16.	Pudukkottai	29	478.527	443.067	35.400	0.060
17.	Ramnad	10	9.194	0.096	9.090	0.008
18.	Salem	118	13190.126	9474.828	794.816	2920.483
19.	Sivaganga	20	223.508	162.020	60.788	0.700
20.	Thanjavur	26	101.136	1.938	99.198	-
21.	Theni	11	1029.052	1000.000	29.052	-
22.	Thiruvallur	154	25011.549	5306.754	17960.480	1864.315
23.	Thiruvannamalai	13	52.164	-	52.164	-
24.	Thiruvarur	11	450.184	440.000	10.144	0.040
25.	Thoothukudi	39	50026.929	39995.294	9958.434	73.210
26.	Tirunelveli	38	1363.475	1171.582	126.501	65.392
27.	Trichy	54	2906.545	990.104	972.721	943.720
28.	Vellore	153	18308.324	13696.382	4264.254	347.688
29.	Villupuram	17	483.631	445.180	28.436	10.015
30.	Virudhunagar	40	429.831	161.389	135.782	132.660
	Grand Total	2210	181,856,698	128,984,214	42,916,982	10,072,612

Source: <https://www.environment.tn.gov.in/Document/archives/WasteManagement, 2018-19>.

It is understood from the Table 3 Tamil Nadu Pollution Control has been monitoring the 17 categories of 190 large and medium units' identified as highly polluting industries by the Government of India. To create an updated inventory for hazardous waste in the different districts of Tamil Nadu an exercise was initiated. As per the data, around 181,856.698 Metric tons of hazardous wastes are generated in Tamil Nadu the State. Out of which nearly

42,916.982 Metric tons are recyclable, 128,984.214 Metric tons are disposable and 10,072.612 Metric tons are destroyable waste.

Solid Wastes Generated in Major Cities in Tamil Nadu

The solid waste generated in the select cities of Tamil Nadu is presented in Table 4.

Table 4: Solid Wastes Generated in Major Cities in Tamil Nadu

Cities	Quantity of solid wastes generated in Tonnes Per Day
Chennai	5247
Madurai	900
Coimbatore	990
Tiruchirapalli	460
Salem	350
Tirunelveli	170

Source: Tamil Nadu Pollution Control Board Report, Annual Report 2018-19.

Solid Wastes Generated In Major Cities In Tamil Nadu

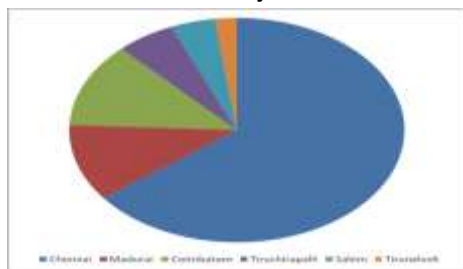


Table 4 reflects the solid waste accumulated in major cities. Chennai corporation has generated 5247 tons per day because of land size and population. Other corporation namely Madurai, Coimbatore, Triuchirappali, Salem and Tirunelveli generated solid waste much lesser than Chennai corporation comparing the other five corporations Coimbatore 990 metric tons generated much higher and least generated district was Tirunelveli 170 metric tons.

Developed cities have systems that are planned to collect and handle Solid Waste separately, or to prevent their generation and reduce their ill effects. There are few cities which are not endowed with latest technology to prevent and reduce their toxicity.

Suggestions for Waste Management

- To develop digitalization of waste collection and disposal operations.
- Smart Waste Management strategies may be adopted for improved data quality and better insights into waste streams.
- Integrated waste management technique may be followed to monitor waste collection and transportation.

Conclusion

This study summarizes the various sources of solid wastes generated in the major cities of Tamil Nadu with special reference to Madurai. The types of litter generated and the approximate time taken for degeneration have been analysed. The current solid waste management system in Tamilnadu mixes different types of wastes in all sectors. The quality, quantity and efficiency of waste management have a direct consequence on the environment and the health of the man, animals and plants. The discussion on solid waste management in cities by the NGOs implies that community participation can perform better in providing a sustainable solution to waste management.

The policy aim must shift from waste disposal to waste management and towards the integration of all sectors. Government and society need to be more attentive to the livelihood, occupational health and safety of the general public. This would help to avoid spreading disease. Solid Waste Management has social, economical and environmental dimensions as mentioned in the sustainable development goals. Looking at the environmental dimensions, it includes preventing disposal of waste in the streets, public places, drainage, ponds, lakes, rivers to preserve the environmental quality and control and alleviate vector born diseases. The inner value of Solid Waste Management is to ensure the quality water, land and air for man, animals and plants for sustainable development with inclusive growth.

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