

# A SOLID WASTE MANAGEMENT-WAY TO HEALTHY LIFE

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## **ABSTRACT**

*Environmental conditions in India are continuously changing due to increasing population pressures in cities. Cities are crowded which generate waste material at faster rate and it is difficult to dispose/ manage. The city like Pune is important city in Maharashtra and peoples from all parts of India are attracted towards it in search of an opportunities. The present paper deals with solid waste management system in region of Dhayari (Ward No.54). It also focus suggestions regarding the solid waste management.*

**Keywords:** MSW, Population, Pyrolysis, Solid Waste, TPD

## **I. INTRODUCTION**

The rapid industrialization ,modernization ,desire of better living in major cities of India results into migration of peoples from villages to major cities. Increases in population of major cities in India. This reflects into increase in municipal solid waste(MSW) in India.

The Urban areas in India generates more than 1,00,000 MT waste per day(CPHEEO,2000).[1]A large metropolis such as Mumbai generates about 7000 MT of waste per day(MCGM,2014).[2]Bangalore generates about 5000 MT(BBMP,2014)[3] and other large cities such as Pune and Ahmedabad generate waste in the range of 1600-3500 MT per day(PMC,2014).[4]Collection, processing, transportation and disposal of MSW is the responsibility of urban local bodies(ULBs) in India. Most local bodies are struggling to provide efficient waste management services to citizens. The coverage and efficiency of waste collection is still not appropriately manage. Waste is collected in open trucks and it is unsafe and insanitary manner. There is limited waste recovery and processing and waste is often dumped indiscriminately at open dump sites without any treatment(HPEC,2011).[5]Improper waste management has led to worsening sanitation conditions in urban areas.

## **II. STATUS OF SOLID WASTE MANAGEMENT IN INDIA**

Solid waste is defined as discarded solid fractions generated from domestic units, trade centres, commercial establishments, industries and agriculture, institutions, public services and mining activities. Characteristics of solid waste is vary from place to place of generation and season in which it is generated. The central Public Health and Environmental Engineering Organisation,the technical wing of Ministry of Urban Development has classified solid waste in fourteen categories based on source, origin and type of waste. These include domestic waste, municipal waste, commercial waste, institutional waste, garbage, rubbish, ashes, bulky waste, street sweepings, dead animals, construction and demolition waste, hazardous waste and sewage waste(CPHEEO,2000).

2.1 Table No.1-Municipal Solid Waste Generation in Metro Cities / State Capitals

Sr.No.	Name of the City	Municipal Solid Waste(Tonnes per day)		
		1999-2000(a)	2004-2005(b)	2010-2011(c)
1	Agartala	-	77	102
2	Agra	-	654	520
3	Ahmedabad	1683	1302	2300
4	Aizwal	-	57	107
5	Allahabad	-	509	350
6	Amritsar	-	438	550
7	Asansol	-	207	210
8	Bangalore	2000	1669	3700
9	Bhopal	546	574	350
Sr.No.	Name of the City	Municipal Solid Waste(Tonnes per day)		
		1999-2000(a)	2004-2005(b)	2010-2011(c)
10	Bhubaneswar	-	234	400
11	Chandigar	-	326	264
12	Cheennai	3124	3036	4500
13	Coimbatore	350	530	700
14	Daman	-	15	25
15	Dehradun	-	131	220
16	Delhi	4000	5922	6800
17	Dhanbad	-	77	150
18	Faridabad	-	448	700
19	Gandhinagar	-	44	97
20	Gangtok	-	13	26
21	Guwahati	-	166	204
22	Hyderabad	1566	2187	4200
23	Imphal	-	43	120
24	Indore	350	557	720
25	Itanagar	-	12	102
26	Jabalpur	-	216	400
27	Jaipur	580	904	310
28	Jammu	-	215	300
29	Jamshedpur	-	338	28
30	Kanpur	1200	1100	1600
31	Kavaratti	-	3	2
32	Kochi	347	400	150
33	Kohima	-	13	45

34	Kolkata	3692	2653	3670
35	Lucknow	1010	475	1200
36	Ludhiana	400	735	850
37	Madurai	370	275	450
38	Meerut	-	490	52
39	Mumbai	5355	5320	6500
40	Nagpur	443	504	650
41	Nashik	-	200	350
42	Panjim	-	32	25
43	Patna	330	511	220
44	Pondicherry	-	130	250
45	Port Blair	-	76	45
46	Pune	700	1175	1300
47	Raipur	-	184	224
48	Rajkot	-	207	230
49	Ranchi	-	208	140
50	Shillong	-	45	97
51	Shimla	-	39	50
52	Silvassa	-	16	35
53	Srinagar	-	428	550
54	Surat	900	1000	1200
55	Thiruvananthapuram	-	171	250
56	Vadodara	400	357	600
57	Varanasi	412	425	450
58	Vijayawada	-	374	600
59	Vishakhapatnam	300	584	334
	Total MSW	30058	39031	50592

\* Municipal Solid Waste Study conducted by CPCB through; a) EPTRI (1999-2000), b) NEERI-Nagpur (2004-2005), c) CIPET during 2010-11.

## 2.2 Role of Legal and Regulatory bodies for SWM in India

Various acts, rules and regulations have been design to ensure qualitative municipal solid waste management services in the cities.

The most significant legislation is the Municipal Solid Waste(Management and Handling)Rules,2000.The rules are applicable to every urban local body responsible for collection, segregation, storage, transportation, processing and disposal of municipal waste.

As per the MSWM rules, waste should be collected in a segregated manner with categories including organic/food waste., domestic hazardous waste, recyclable waste , silt ,construction and demolition waste.

Further suggestion were made regarding transportation , processing and disposal in accordance with the national plan.

Compliance with MSW Rules,2000 requires that appropriate systems and infrastructure facilities should be put in place to undertake scientific collection, management, processing and disposal of municipal waste.

### 2.3 Solid Waste Management System in Dhayari(Ward no.54) in Pune

Pune city has a population 31 lakhs. It is the second largest city in Maharashtra and ninth largest in the country(Census,2011)[6].The city is located near the western boundaries of the Deccan plateau at the confluence of Mula and Mutha rivers. Pune emerged as a prime administrative and educational centre during the British period and since then has remained the prominent educational hub in western region. Presently, the city is also regarded as one of the most preferred corporate destination for software, technology and business processing companies.

As the employment scope has widened, the city witnessed migration of qualified professionals ,labors and workers from all parts of rural and urban India. As the central part of the city is densely populated and result into growth in suburb to accommodates the newly arrived population.

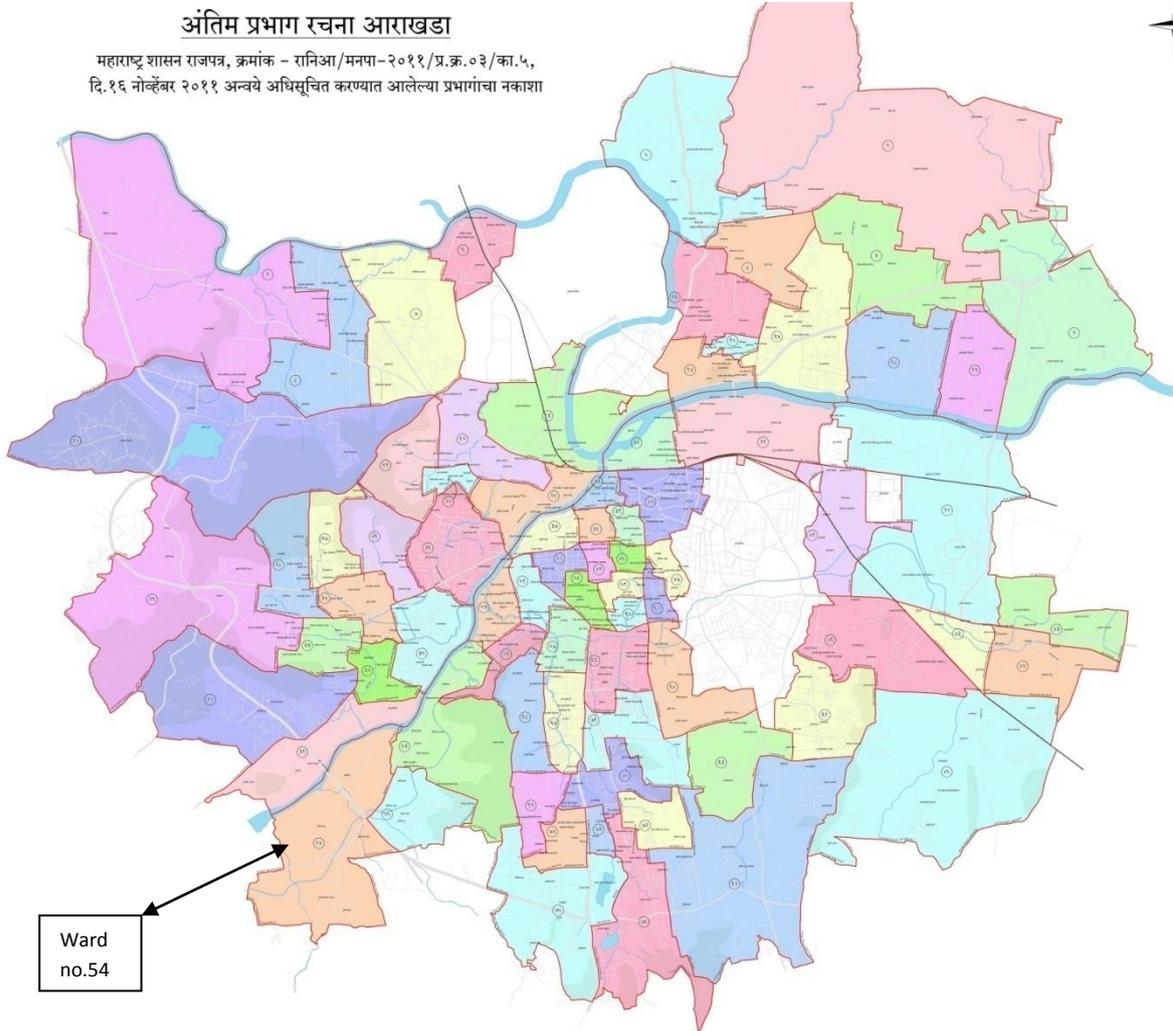
**Table No.2-Population in Pune**

Year	Population	Decadal growth rate	Area(Sq.km)	Density/Sq.km
1961	606777		138.94	5204
1971	856105	41.09	139.79	7154
1981	1203363	40.56	147.66	9346
1991	1691430	40.56	166.11	10445
2001	2538473	50.08	243.84	10410
2011	3115431	22.73	243.84	12777

**Table No.3-Waste Processing Plants in Pune**

Name of Operator/Treatment	Processing Capacity	Output
Hanjer Biotech projects - Urali Devachi	1000 TPD	Composting, RDF, Pallets and Bio-fuel
Disha Waste Management- Ramtekdi Industrial Estate	100 TPD	Vermi-composting
Ajinkya Biofert	200 TPD	Vermi-composting
Rochem	700 TPD	Electricity(10 MW)

Dhayari is one such suburban situated on the west side of Pune city. The study area of Dhayari is a part of ward no 54. The study with the help of the ward maps provided by the Pune Municipal Corporation (PMC) is as below



Persons involved in waste management at Dhayari-

During the waste collection 4 supervisors and 43 workers involved.

**Table No.4 The working scheduled as follows:**

No of shifts	Timing	No. of workers involved
Shift 1	6.00am – 1.00pm	4 supervisor 34 workers
Shift 2	1.00pm – 10.00pm	6 workers
Shift 3	10.00pm – 6.00am	3 workers

Estimation of amount of solid waste generated for each person:-

According to the Pune Municipal Corporation (PMC) data, the amount of solid waste generated per person per day may range in the values of 0.2 to 0.5 kilograms (Source: Pune Municipal Corporation). Hence, an average value of 0.30 kg is consider.

**Table No.5 Waste collection area in Dhayari**

Details	Values
No. of single houses	2500
No. of flats	12000
Hotels	2500

**Table No.6 Dry waste and wet waste collected daily in Dhayari**

Component	Values in ton
Dry waste	5 ton
Wet waste	12 ton

**Table No.7 Disposal of waste generated from Dhayari**

Method of disposal	Quantity of waste disposal
Katraj biomethanation	10 ton
Rochem – electricity generation plant	5 ton
Prayeja city biogas plant*	2 ton
Composting within the society level	2.5 to 3 ton

\*- waste food generated by hotels

**Table No.8 Present plants of biomethanation in Pune city are as below:**

Sr. no	Location	Capacity of plant
1	Aundh Ramp	5 TPD
2	Maharashtra Board Yerwada	5 TPD
3	Tingre Nagar	5 TPD
4	Peshwe Park-2	10 TPD
5	Hadpsar Ramp-2	10 TPD
6	Katraj Ramp-2	10 TPD
7	Bavdhan	5 TPD
8	Katraj Gaothan	5 TPD
9	Model Colony	5 TPD
10	KK Market	5 TPD
11	Ghole Road Ramp	3 TPD

12	Wanowari	5 TPD
Sr. no	Location	Capacity of plant
13	Taljai-2	10 TPD
14	Baner	5 TPD
15	Yerwada Mental Hospital	5 TPD
16	Dhayari Smashan Bhoomi	5 TPD

Municipal solid waste to energy – ROCHEM PLANT

1. MSW Processing plant of capacity 700 TPD
2. Technology: Gasification/Pyrolysis
3. Output: Electricity generation@10 MW per day.
4. DBOOT basis
5. Space Requirement: 10000 sqmts
6. Waste disposal in 48 hours
7. Less inert material after treatment
8. Carbon credit system under CDM.

### III. CONCLUSION

Waste collected from Dhayari (ward no.54) has been utilized for energy generation is about 29.41% (dry waste) and 70.59% (wet waste) in current condition.

The other ways may used for energy source generation such as advanced biofuels can be made from non-edible plants (e.g. switch grass, *Miscanthus*), agricultural waste, or even waste water, in the case of algae. Advanced biofuels generally include longer chain and more energy-dense compounds like isoprenoid and terpene-based hydrocarbons (e.g. farnesol, geraniol, isopentenol) as well as energy dense fatty-acid derived also hydrocarbons (e.g. fatty alcohols, alkanes, alkenes). Which result into better performance in engine. Although relatively less important for applications that have potential substitutes such as electrification (e.g. personal transportation powered by “green” electrons), high energy density fuels are critical to applications sensitive to weight (e.g. aviation).

The production method for the conversion of plastics to liquid fuel is based on the pyrolysis of the plastics and the condensation of the resulting hydrocarbons. Pyrolysis refers to the thermal decomposition of the matter under an inert gas like nitrogen. The production process of liquid fuel, plastics that are suitable for the conversion are introduced into a reactor where they will decompose at 450°C to 550°C. The major product of the pyrolysis being the oil (mixture of liquid hydrocarbons) is obtained continuously through the condenser, once the waste plastics inside the reactor are decomposed enough to evaporate upon reaching the reaction temperature. The evaporated oil may also be further cracked with a catalyst. The boiling point of the produced oil is controlled by the operation conditions of the reactor, the type of reactor, and presence of catalyst. [7]

Production of liquid fuel would be a better alternative as the calorific value of the plastics is comparable to that of fuels, around 40 MJ/kg and is carried out by pyrolysis process, occur in absence of oxygen at high temperatures. As a complementary recycling technology to combustion this technique is really attractive for ecological point of point view. [7]

Converting waste into energy is a powerful solution to the issue of climate change, because it substitutes fossil fuel and restrains methane emissions. In Pune city, there is construction of 700 TPD capacity waste to energy plant is in progress, the plant will work based on the technology of gasification/pyrolysis. It is expected that the plant will generate a total of 10 MW per day of electricity.

The modernization of land fill site at Urali Devachi near Pune city can be possible by using model of Achan landfill site at Srinagar to minimize bad odour.

The student awareness program can be taken through schools regarding waste management. The Clean ward championship will be helpful to initiate cleanliness among the wards in Pune.

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Unpublished work