

Smart Waste Management in Pune City

Mr. Manish U. Parate¹, Prof. Rahul Shinde²

^{1,2} Department of Civil Engineering

^{1,2} RMD Sinhgad School of Engineering, Warje, Mumbai-Pune Bypass Highway, Pune-411058, India

Abstract- *This report shows that Pune city waste collection by door-to-door, smart bins, zero garbage model and manage the waste of Pune City because now-a-days there are heavy population in Pune city. Because of population and IT industries that's why lots of professional workers are shifted in this city. That's why the common way of waste generated. Waste of foods, product with water, etc. Pune is the 8th largest city in India and the 2nd largest in the state of Maharashtra. Lots of waste is generated from Pune City that's why Waste Management is very important in this city. Smart Waste Management is applied for Pune City because in future Pune is the first implemented Smart City in India and approval is already done. And inauguration was held in Balewadi Stadium on 25th June, 2016 by Shri Prime Minister Narendra Modi. In this paper we have studied from different literature and journals of some countries and try to solve out the problems are facing in this city for best use for future environment. The PMC (Pune Municipal Corporation) approach waste management si in a comprehensive manner with careful selection and sustained application of appropriate technology by using various techniques which we are showing by this paper.*

Keywords- Sustainability, municipal solid waste management , swachh bharat, Zero garbage model

I. INTRODUCTION

1.1. General Information

Solid Waste Management comprises and unwanted and discarded materials from buildings, houses, street sweeping, hotels, etc. Because of increase in urban population and changing life styles lead to the generation of solid waste. Solid waste is a mixture of foods, vegetables, paper, plastics, rags, glass, etc. If solid waste is disposed off on land in open areas, then is a cause of negative impact on environment, ground water and on health.

The main problems of solid waste associated with improper management of solid waste include diseases, odor nuisance, fire hazards, atmospheric and water pollution, aesthetic nuisance and economic losses. (Jilani, 2002). There has been a significant increase in solid waste generation in India over years from 100 gm per person per day in small towns to 500 gm per persons per day in large towns. Currently

most of the municipal waste in India is being disposed unscientifically (Akolkar, 2005). Generally municipal solid waste is collected and deposited in landfill such unscientific disposal attract birds, rodents and fleas to the waste site and create unhygienic conditions (Suchitra, et al. 2007).

The 600-square meter compound that shares its boundary with the Pune Municipal Corporation (PMC) ward office in Aundh, an affluent suburb, gives no sign of what happens inside. Strollers cheerfully walk past it. Behind its green steel gates is the city's cleanest weapon to fight garbage. The five-tonne per day (TPD) biogas plant silently operates all day decomposing organic waste—vegetables, fruit rejects and stale food—and converting them into methane. The gas is injected into a generator to produce electricity. The leftover is excellent organic manure. Yet, passers-by have nothing to complain. There is no stench around; no flies or eagles hovering above food. Life goes on, the way it would with any other commercial compound there.

The plant is Pune's experiment to ensure that no waste goes to the city's landfills. "The aim is to make the 244-sq km municipal area zero-landfill by 2015," says Sanjay Gawade, additional commissioner, municipal solid waste, PMC. Pune generates about 400 grams of solid waste per person per day. The 2011 Census puts the city's population at about 3.5 million. Another 0.5 million come into the city every day. This translates into 1,400 to 1,600 tonnes of municipal solid waste (MSW) every day, say PMC officials. Of this, 65 per per cent per cent comes from residences, hotels and restaurants (see 'Waste contributors'). Wet waste accounts for about 70 per cent.

1.2. Waste Contributors

Most of the waste Pune generates is organic, and comes from households PMC's projections show that by 2031, daily waste generation would reach a whopping 3,600 tonnes. To solve the MSW conundrum, Pune has used a mixed of technologies. "We are looking at all options to recycle, reuse and recover, so that no waste goes to the landfill," says Gawade.

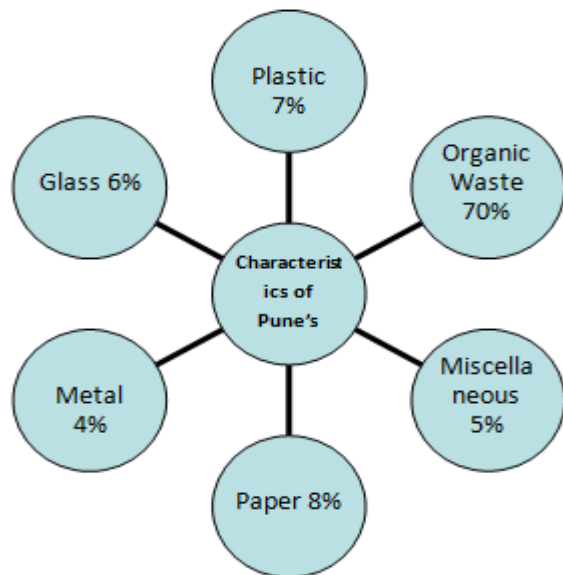


Fig 1.1: Characteristics of Pune's Waste

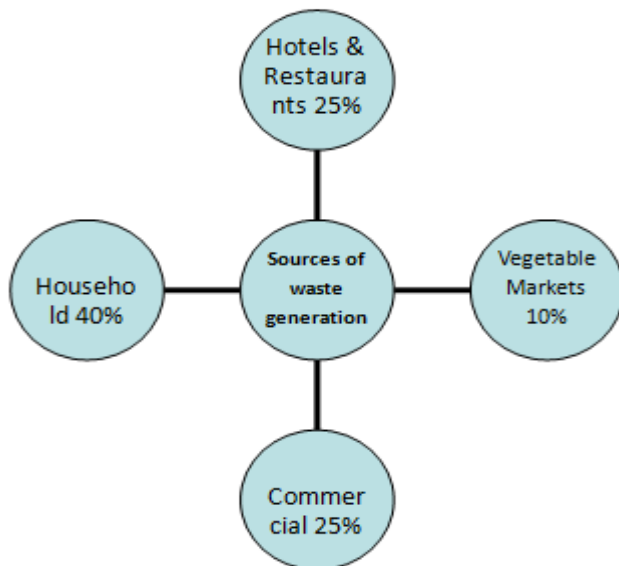


Fig 1.2: Sources of waste generation

1.3. Solid Waste Management programs in the city

- Significant progress under Swachh Bharat – featured as model city in the GOI newsletter, <https://swachhbharaturban.gov.in/writereaddata/SBM-newsletter.pdf> (3)
- Increase in segregation from 28.3 percent in 2012 to 57.2 percent by 2015 and in collection efficiency from 70.9 percent in 2012 to 90 percent in 2015. Door-to-door collection is underway in 15 packages and 15 packages have zero waste.
- PMC is in process to sign contracts with Swachh and Janwani to improve collection efficiency in slums from 35% to 100%.

- 100% scientific disposal since 2010 and no open dumping-scientific land filling and capping.

1.4. Scope

- Solid Waste Management
- Achieve service delivery benchmarks on Sanitation and Sewage in the next 3-4 years
- 100 % Open Defecation Free (ODF) by 2nd October 2017.
- 100% Door-to-door Collection of waste and segregation of waste.
- Decentralized Model of Waste Processing
- Development of Scientific Landfill Sites
- Strengthening Partnership with Swacch and other NGO's

II. OBSERVATIONS FROM LITERATURE

Arun Firodia(2), he said that, the Pune Municipal Corporation has taken a charge of reducing the population and finding difficult cope with problems on it and finding the problems of disposal of solid waste has assumed huge proportions. Understanding the situations of gravity, PMC got the various stakeholders to find the innovative solutions to the problem of solid waste management. A pilot solid waste management project at Katraj was undertaken in association with Janwani.

Jose M. Gutierrez*, Michael Jensenb, Morten Heniusa and Tahir Riazc (6), states on paper that practically demonstrate Geological Information System (GIS), we present a waste collection solution based on providing intelligence to trashcans by using IoT prototype sensors. A realistic scenario is set up by using Open Data from the city of Copenhagen, highlighting the opportunities created by this type of initiatives for third parties to contribute and develop Smart city solutions.

Dinesh Bhalchandra Joshi1, Ashok B More2, (9), in this paper they proposed that waste management can handled by them as sole responsibility, the scenario of civilization became smart in individual and institutional levels, but social cleanliness a=culture of citizen in respect of social places are still as it or rotten up. New sustainable approach is required to change our habits in daily routine.

III. RESEARCH METHODOLOGY

I have collected the waste management data of Pune City from Pune Municipal Corporation from various department, I have studied about what they are doing for the

smart city management and planning, they are developing three major areas of pune city as Smart City i.e. Aundh, Baner and Balewadi. After successfully completion of these three areas they will analyze and launch the smart city project for the whole city.

This section deals with the methodology of the study are-

- Collection of data and information from Pune Municipal Corporation.
- Study of Research Papers and Journals.
- Analyze the situations by visiting sites.
- Through study of execution of smart city in other countries.
- Comparative study of Metro City Management against Smart City Management.

IV. DATA COLLECTION & ANALYSIS

4.1. Aim & Objectives of Study

1. A planned disposal of these elements is essential for attaining sustainability.
2. To make good healthy environment.

Objectives of study:-

1. To control different types of pollution, i.e air, water, soil pollution.
2. To recycle hazardous wastes for further production.
3. To stop the spread of infectious diseases.
4. Reduce the amount of time and energy required to provide waste management services.

Table No: 01 – City initiatives will improve the key indicators of Waste

Sector	Metric	From	To	Benchmark
Sanitation and Waste	Door-to-door or garbage collection coverage (%)	20%	30%	50%
	Waste segregated at source (%)	20%	50%	30%
	Public Toilets (number per lakh of population)	20%	40%	40%

V. RESULT AND DISCUSSION

The Pune has been developing day by day, Development of Urban Ministry already given approval for Pune Smart city, PMC doing ABB project means the areas which are Aundh-Baner-Balewadi developed till 2019 when the BJP Government session will end, then they do further procedure to all over Pune City and then they analyse whether the ABB Project is successful or not. But some certain obstacles are arising in this project during research and questioning to PMC and other departments, that are-

- Lack of funds
- Areas for waste collection
- Pune Municipal Corporation Services
- Dynamic Scheduling and Monitoring
- Public Toilets has been providing in every areas
- Improving waste collection process and Door to door garbage collection

VI. CONCLUSION

In this paper it is found that with increase in the global population and the rising demand for food and other essentials things, that's way there has been a rise of waste being generated daily by each household. Cities are not properly managed the waste from households and the community, are a serious health hazards and lead to the spread of infectious disease, that's the solution of being smart waste collection by GIS are used to improve the waste collection and free from diseases.

ACKNOWLEDGEMENT

This Technical Report was researched and principally authored by Professor Rahul Shinde from the Savitribai Phule. The author also acknowledges the guidance and support from all the members of the RMD Sinhgad Institute.

REFERENCES

- [1] Pune Smart City Proposal PMC www.punecorporation.org
- [2] Arun Firodia : Smart city 2016: Zero garbage model key to a clean, smart city <http://indianexpress.com/article/cities/pune/smart-city-2016-zero-garbage-model-key-to-a-clean-smart-city/#sthash.jNfc3HwH.dpuf>
- [3] <https://swachhbharaturban.gov.in/writereaddata/SBM-newsletter.pdf>
- [4] Complex Adaptive Systems, Publication 5, Cihan H. Dagli, Editor in Chief Conference Organized by

Missouri University of Science and Technology 2015-
San Jose, CA, “Smart Waste Collection System Based
on Location Intelligence”

- [5] Theodoros Anagnostopoulos a,b, Kostas Kolomvatsos c, Christos Anagnostopoulos d, Arkady Zaslavsky b, e, Stathes Hadjiefthymiades c, “Assessing dynamic models for high priority waste collection in smart cities”.
- [6] www.punesmartcity.in
- [7] Dinesh Bhalchandra Joshi¹, Ashok B More²,
¹Department of Technology, Savitribai Phule Pune University, ²Department of Technology JSPM’s, PVP Institute of Technology, Pune, “Environmental and Social-Economic Impact of Existing Domestic Solid Waste Management and Sustainable Smart Actions- A Case Study for Pune City”
- [8] Solid Waste Management Manual (2000), Central Public Health and Environmental Engineering Organization (CPHEEO), Government of India.
- [9] Solid Waste Management in Greater Bombay, (September 2004), www.atsdr.cdc.gov.in
- [10] Gupta, Sanjay K (April 2004).”Waste management”, India Together, <http://www.epa.gov/epawaste/nonhaz/i>
- [11] Gupta, Sanjay K (April 2004), “Waste Management”, India Together,
<http://www.epa.gov/epawaste/nonhaz/index.htm>,
www.epa.gov/epawaste/conservation/index.htm
- [12] <http://www.ibm.com/smarterplanet/in/en/sustainablecities/ideas/>
- [13] http://www.ibm.com/smarterplanet/in/en/sustainable_cities/ideas/