

# Solid Waste Management on Dumping Ground in Mumbai Region – A Study

M.P.Joshi

P.G. Student  
Datta Meghe College of  
Engineering,  
Airoli, Navi Mumbai-400708.

S.B.Patil

Research Scholar  
Datta Meghe College of  
Engineering,  
Airoli, Navi Mumbai-400708.

K. Mourya

U.G. Student  
Datta Meghe College of  
Engineering,  
Airoli, Navi Mumbai-400708.

## ABSTRACT

Now a day, we are facing a problem regarding the management of waste generated daily. This waste includes solid waste from industrial zone, commercial zone and residential zone. Among all these waste management from residential zone requires first priority because if this waste is not properly disposed off daily, then it will create problems to public health, affects the aesthetics. This paper gives the present status of solid waste management on dumping ground in Mumbai region and also suggests some methods to control the same. Urgent steps in this direction will reduce the water, air, soil pollutions and health hazards.

**Keywords:** *Waste, Solid waste management, Dumping ground, Pollutions*

## 1. INTRODUCTION

The solid waste from Mumbai city and suburbs municipal is rising in Mumbai Metropolitan Region. Such rise in solid waste generation is observed by Municipal Corporation of Greater Mumbai (MCGM). An increase in solid waste is observed because of increase in urbanization, population density and income, changing food habits, taste and pattern. The growth of industry, commercial units such as hotels, theaters, restaurants, malls are rising fast. Such units are positively contributing to the solid waste generation. Solid waste collection, segregation and disposal capacity of Municipal Corporations is low and inadequate with rising solid waste. Therefore Municipal Corporation must adopt scientific methods for collection, segregation and disposal of solid waste. Municipal corporations must accommodate private sector for investment and management of solid waste. Urgent steps in this direction will reduce the water, air, soil pollutions and health hazards. It will improve the quality life of people in Mumbai Metropolitan Region.

## 2. LITERATURE REVIEW

A review of literature gives the various informations of the topic solid waste management, future scope and studies. Sahu Amiya Kumar (2007) experienced one such case of dumping ground on which a business hub center at Mind space, Malad (W), Mumbai situated and has become the largest center of BPO's irrelevant of understanding the health and technicality of problem arising from this dumping ground and provided solutions for it. Zaveri Chetan (2004) had challenge in the context of Mumbai lied in developing a scientifically and environmentally compatible MSW processing and landfill facilities while keeping the site specific constraints in mind.

Rode Sanjay (2000) studied the solid waste in all municipal corporations is rising in Mumbai Metropolitan region. Such rise in solid waste generation was observed in Brihan Mumbai, Thane, Mira-Bhayander, Kalyan-Dombivali, Ulhasnagar, Navi Mumbai and Bhiwandi-Nizampur Municipal Corporation. An increase in solid waste is observed because of increase in urbanization, population density and income, changing food habits, taste and pattern and it was concluded that the city needs improvement in solid waste management system of MMRDA region.

The journal Environmental and Resource Economics (2001) showed main interest in the application of economic theory and methods to environmental issues and problems that require detailed analysis in order to improve management strategies. Areas of particular concern include evaluation and development of instruments of environmental policy; cost-benefit and cost effectiveness analysis; sectoral environmental policy impact analysis; modeling and simulation; institutional arrangements; resource pricing and the valuation of environmental goods; and environmental quality indicators. Special issues are occasionally dedicated to particular topics.

The journal Environmental Monitoring and Assessment (2001) focused the results of analyzed data pertaining to assessment and monitoring of risks that may affect the environment and human beings. The analysis was also synthesized with various categories of health data. The data gathered from the studies of diseases in human populations (risk factors and remedies), and toxicological ramifications obtained from the data analysis was published as well. Coverage included the steps and process of assessing risks from exposure to pollution.

The Journal of Environmental Assessment Policy and Management (JEAPM) (2000) covered laws, policies and procedures for environmental assessment, including areas such as environmental impact assessment, eco-labeling, stakeholder communication and environmental tools for the financial community. Gautam *et.al* (2011) presented study done at Sewapura MSW dump site near Jaipur to assess the ground water quality in and around the study area. The ground water in the study area was being polluted by percolation of toxic substances into it and also concluded that MSW dumping in the open area should be prohibited by the authorities to control the further pollution of water.

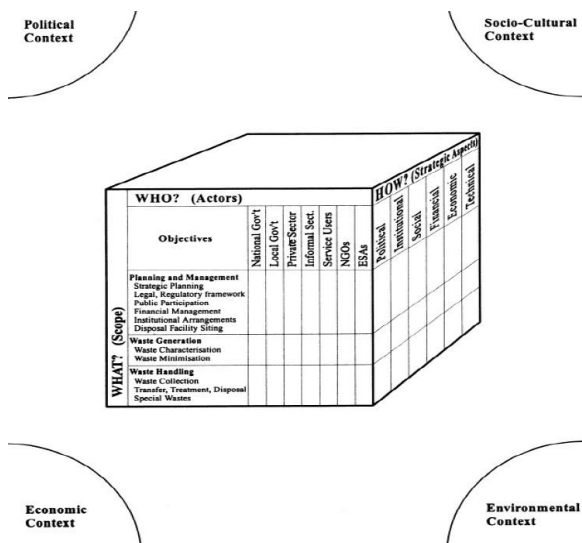
Lober (1996) reported various findings such as no national legislated or voluntary definition of recycling exists, despite this being crucial for developing waste management policy.

Muttamara *et.al* (1996) concluded that open dumping should be converted to a sanitary landfill with proper environmental protection measures in order to minimize environmental pollution. If possible government should adopt the waste-to-energy treatment system.

### 3. METHODOLOGY

#### 3.1 Conceptual Framework and Qualitative Research

The conceptual framework for this study has been adopted from taking into account three important dimensions scope of waste management activities i.e. what needs to be covered? Actors and development partners i.e. who can contribute for taking the system towards higher sustainability? How to address strategic objectives and issues i.e. what is the best course of action to take?



**Fig1: Conceptual framework**

Qualitative research generally involves interactive and participatory methods of data collection; strong emphasis is given to the need for the researcher to build rapport with the participants and involvement of the participant in the discussions. Qualitative research is emergent and process oriented; several aspects emerge during the study, which allows the researcher to “view social phenomenon holistically”. The objective of this study is to recommend measures that will ensure long term sustainability of the solid waste management system in Mumbai. Hence, a need of an approach, which was both flexible yet organized. Keeping in view the above requirement, a qualitative study was the most appropriate approach to follow.

The study was undertaken from August 2012 to March 2013. The study was developed to understand the solid waste management system in an urban settlement in a developing country framework in order to suggest ways the system might achieve higher level of sustainability. It has examined in depth the nature and features of the system and problems associated with it. In order to gain knowledge of the system being studied, interviews were conducted in conjunction with other methods for obtaining qualitative data. This research is based on the paradigm of critical social science. The main approach employed for this study is a qualitative case-study, Brihanmumbai Municipal Corporation, Mumbai, India. The case study approach allows use of inductive methods, such as

interviews, focus group discussions, which allows for general conclusions to be drawn from particular facts.

The research has been based on the paradigm of critical social science, as the research seeks to critique and transform social relations in terms of solid waste management. This research helps in unraveling the problems related to solid waste management in Mumbai, which in turn provides direction for people to change the system towards greater sustainability. The main reason for following the paradigm of critical social science is that, we believe social realities change over time, and with our understanding of the problem and possible solutions, the prevalent system of solid waste management in Mumbai can be definitely made sustainable in the long run.

#### 3.2 Data collection and analysis

It was undertaken as a single-case exploratory case study, as the strategy of inquiry for conducting the qualitative research. The case study strategy allowed exploration of the solid waste management system in Mumbai in detail. The collection of detailed information using a variety of data collection procedures which allows studying solid waste management system in an urban environmental setting. The research involved “how” and “why” questions and the researcher had no control over the behavioral events, characteristics that make a case study strategy suitable. As the data have been collected from various sources & transcribed the data was classified according to the contents. The organized data was then overviewed to get a general sense of emerging trends, patterns and concepts.

From the Kanjurmarg Dumping Ground visit it was observed that:

- No segregation of solid waste is carried out. Government yet to decide should the segregation be at source or at dumping ground
- Segregation MSW rule 2000 flouted
- Leachate treatment plant capacity need to be increased
- Treated Leachate is disposed OPENLY not sent in the sewer
- Proposed RDF plant Construction Delayed
- Need of energy recovery system from the gases evolved from dumping ground. Calorific value of gas evolved was observed to be 380-390 °C
- Air Pollution Monitoring frequency to be increased per month as dumping site is in vicinity to City population
- Improvement in Monitoring well required to check groundwater table and surface water pollution.

From the visit to Mulund Dumping Ground it was observed that:

- No proper conveying road inside the site
- No segregation of solid waste is carried out. Government yet to decide should the segregation be at source or at dumping ground.
- Site lacks waste measuring system.
- Segregation MSW rule 2000 flouted.
- Burning of MSW in open was observed, polluting the air
- Illegal cutting of mangroves observed

- Maharashtra Non-Biodegradable Garbage (Control) Act 2006 breached.
- Leachate collection and treatment system is absent. Leachate is disposed off without treatment polluting the Thane Creek.
- Proposed Bio-Methanization plant construction delayed by 3 years
- Need of energy recovery system from the gases evolved from dumping ground.
- Air Pollution Monitoring system absent.



**Fig 2: Burning of solid waste**



**Fig 3: Mulund Dumping Ground**



**Fig 4: Mulund Dumping Ground**



**Fig 5: Mulund Dumping Ground**

The study found that about 2% of the total MSW generated in Mumbai is openly burnt on the streets and 10% of the total MSW generated is burnt in landfills by humans or due to landfill fires.

In Mumbai, open burning of MSW is

- the largest emitter of carbon monoxide (CO), particulate matter (PM), carcinogenic hydrocarbons (HC) and nitrous oxides (NO<sub>x</sub>), among activities that do not add to the economy of the city;
- the second largest emitter of hydrocarbons (HC);
- the second largest emitter of particulate matter (PM);
- the fourth largest emitter of carbon monoxide compared to all emissions sources in Mumbai; and
- the third largest emitter of CO, PM and HC combined together in comparison to all emission sources in the city.

Open burning contributes to 19% of air pollution due to CO, PM and HC in Mumbai. More than twice as much particulate matter is emitted by open burning of MSW as compared to emissions from road transportation in Mumbai. Also, a quarter

of volatile hydrocarbons entering the atmosphere in Mumbai are a result of such activity

### **3.3 Present Disposal of Municipal Solid Wastes Disposal through Dumping**

The Corporation disposes waste through landfill or land dumping method. At present there are 4 dumping sites in operation. Waste is brought here from various locations throughout the city as well as from the Transfer Stations at Mahalaxmi and Kurla. Refuse and debris are leveled at these sites by means of bulldozers and landfill compactors. The land filling carried out here is open dump tipping. At present there are 3 landfill sites in Mumbai. These are Deonar, Mulund and Gorai.

**Table 1: Classification of Dumping Sites**

Location	Area (hectares)	Quantity of MSW received (Maximum) (TPD)
Deonar	111.00	6826
Mulund	25.30	598
Gorai	14.50	2200
Total	150.80	9624

Two more landfill sites have been proposed: at Kanjurmarg of 82 ha and at Mulund of 40 ha. Of all the four waste disposal sites, Deonar receives 70 per cent of the total waste generated, as this is the largest of all the three dumping sites with an area of 111 ha. All the dumping grounds are nearly 30-40 km north of South Mumbai, which is generating 48 per cent of the total waste of the city. As a result, transportation costs of waste are quite high and approximate to about Rs. 16 lakhs per day. Costs for maintenance of dumping ground, waste transportation and hire charges come to Rs. 126 crores per annum and constitute nearly 28 per cent of the total budget allocated for SWM. These sites need to be upgraded and the waste appropriately treated as it has been estimated that they will last for only another 5 years. Increasing population of the city has forced people to settle near the dumping grounds. Densely inhabited areas now surround the landfill sites. This has led to a situation where the residents have starting making complaints of environmental pollution caused due to burning of garbage and foul odor.

## **4. ISSUES IN SOLID WASTE MANAGEMENT IN MUMBAI**

### **4.1 Primary Collection**

Because of non-segregation, part of the waste that gets dumped on the disposal sites is recyclable in nature. This has led to increase in quantity of waste required to be disposed. The problem in Mumbai is further aggravated due to a high density and large proportion of slum population.

### **4.2 Lack of Dumping Ground**

With increasing urbanization, land available for dumping and creation of landfill sites for disposal of waste is becoming unavailable. There are only 4 landfill sites in the MCGM area, whose expected lifespan remains only 5 years. MCGM is going to find it difficult to find new waste disposal sites in the near future to take care of present level of waste generations and that generated by the new population.

### **4.3 Incompetency in Enforcement of MSW Rules**

The MCGM has not yet been able to enforce MSW Rules 2000. Although it is mandatory to segregate waste at the household level, notices to this effect have not been given for the implementation of the rules. Rules require that community waste storage bins are put up.

### **4.4 Lack of Participation/ Communication**

It has been proven through research that in the case of Mumbai, there has been an absence of communication between local government and the communities.

### **4.5 Law provisions**

Municipal Solid Waste (Management & Handling) Rule, 2000:

The Ministry of Environment and Forest has notified the Municipal Solid Waste (Management & Handling) Rule, 2000 under the Environment (Protection) Act, 1986 to manage the Municipal Solid Waste (MSW) generated in the country. According to this rule there is specific provision for Collection, Segregation, Storage, Transportation processing and Disposal of MSW & it apply to all Municipal authorities. Under the Management of Municipal Solid

## **5. Enforcement of New Efforts in Waste Management by Municipal Corporation of Greater Mumbai (MCGM)**

Looking into the drawbacks, relating to the solid waste management that the city is facing at present and also anticipating the future problems, local NGOs along with the MCGM have taken up certain new initiatives in order to control the waste management problem.

Three new initiatives,

- Advance Locality Management,
- Slum Adoption Programme and
- Refuse Paper Plastic and Wood Fuel-RPPWF

### **5.1 Advanced Locality Management (ALM) programme**

The scheme has been initiated by MCGM with the main objective of mobilizing citizens in a participative approach in setting up a system for dealing with the problem of solid waste management in an environmental friendly manner. The focus of the initiative was decided as 'waste minimization' and 'segregation of waste at source'.

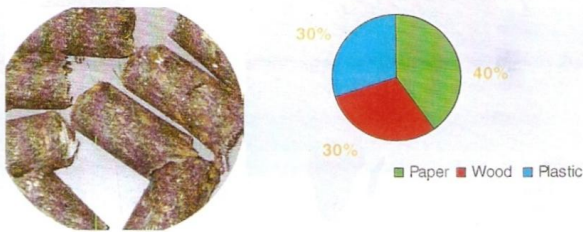
### **5.2 Slum Adoption Scheme**

A study done by the Youth for Unity and Voluntary Action (YUVA) in 1998, which covered 100 communities in the slum pocket of Jogeshwari (E), found that while the residents were aware of the problems related to inadequate practices of household disposal of waste and systems of collection and transportation of garbage in the community, there was very little community involvement in solving the problem. It was also experienced by the MCGM that because of the heterogeneous population in the slums there was no sense of belongingness in the slums, which led to piling up of garbage and deteriorating health conditions of the dwellers.

As a result of the survey, it was realized that an attempt to motivate and involve the slum population in keeping the slums clean had to be made through offering some incentives for the purpose. It is in this background that the Slum Adoption Scheme (SAS) through community-based organizations and public participation was started by the MCGM. Called the Dattak VastiYojana, which means Slum Adoption Scheme, this programme is meant to financially support slum communities to form garbage committees that would then hire workers to clean their areas.

### 5.3 Refuse Paper Plastic and Wood Fuel-RPPWF

RPPWF stands for Refuse Paper Plastic and Wood Fuel. RPPWF is a result of in depth result of ecologically sustainable waste management strategies and technologies that culminate in clean, carbon neutral sources of energy. It is a mixture of plastic, paper and wood. The proportion of plastic can be in the range of 10% to 20% and remaining is paper and wood. As RPPWF is produced in a controlled manner regulating moisture, chlorine and sulphur and its solid rod shape size offers benefits as ease to transport, storage and operation, clean and allergy free, high and Consistent calorific value, high biomass, clean processes, environmentally sound fuel, cost effective.



**Fig 6: Typical Composition of Refuse Paper Plastic and Wood Fuel**

## 6. SUMMARY AND DISCUSSION

The Government of Maharashtra and BMC should work with their partners to promote source separation, achieve higher percentages of recycling and produce high quality compost from organics. Also, provisions should be made to handle the non-recyclable wastes that are being generated and will continue to be generated in the future. State Government should take a proactive role in leveraging their power to optimize resources.

Mumbai should choose following options or a combination of them, which are

- Best address the issue of overall solid waste management,
- Have the least impact on public health and environment,

And the Government should propose

- RPPWF Plant at Kanjurmarg dumping ground site as abundance of land is on site
- ABT technology for faster treatment of waste
- Incineration technology upgradation to produce energy from waste

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