

Assessment of Solid Waste Management of Malegaon City

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Abstract- In this article, 29 published studies on solid waste management were reviewed for their methodological and technological assumptions. Overall, research study has been providing a flexible framework to quantify environmental impacts of improper solid waste management. Solid waste management (SWM) has become an issue of increasing global concern as urban populations continue to rise and consumption patterns change. The health and environmental implications associated with SWM are mounting in urgency, particularly in the context of developing countries. While systems analyses largely targeting well-defined, engineered systems have been used to help SWM agencies in industrialized countries since the 1960s, collection and removal dominate the SWM sector in developing countries. However, urbanization, inequality, and economic growth; cultural and socio-economic aspects; policy, governance, and institutional issues; and international influences have complicated SWM in developing countries. This has limited the applicability of approaches that were successful along the SWM development trajectories of industrialized countries. The approach of corporation of Malegaon towards waste is only collection & disposed off it, no further treatment is given to non-decomposable waste as decomposed waste is composted with the method of vermincomposting. Also there is no approach towards revenue generation from waste. Waste collected from municipal region is not segregated. Waste collected from industry, hospitals, commercial complexes, institutes is disposed off on the same place.

Keywords- SWM, socio-economic aspects, policy, urbanization, vermicomposting, revenue.

I. INTRODUCTION

The time waste was just some kind of leftover that had to be disposed of is long gone. With the realization that our resources are not inexhaustible came the awareness that our waste offers economic opportunities that have to be taken advantage of. While the recycling goal for some products containing glass, metal, etc. is clear, it is important to point out that even the garbage we put outside can be used to make electricity or can be used in other useful products.

1.1 Necessity:

Solid waste management is a global issue. It requires a typical solution for proper collection, transportation and disposing. Malegaon is 4, 71,312 population city from which produce 168 tonnes of waste is generated per day. So it is very complicated issue for handling agency. Scope of this study is to analysis the overall information about waste generation from Malegaon city, its characterisation, physical and chemical composition, amount of waste, waste collection system, transporting system and disposing methods. Study is carried out to analysis problem due to improper management of private agency which having work order of handling solid waste generated from Malegaon city. And also any suggestions for effective management of solid waste. Now days Malegaon city facing serious problem of garbage. Also it needs more space for dumping the waste .now waste is dumped on 28 acre land which is proved as insufficient now days. So it is very necessary to find out suitable solution for dumping as well as new methods of disposal which results in zero deposition of waste on dumping yard. The second approach is to finding out possibilities for revenue generation for Malegaon Municipal Corporation. Which has two basic sub approaches of revenue generation from decomposable and from non-decomposable matters.

1.2 Objectives:

Solid waste management is one among the basic essential services provided by municipal authorities in the country to keep urban centres clean. However, it is among the most poorly rendered services in the basket—the systems applied are unscientific, out dated and inefficient; population coverage is low; and the poor are marginalized. Waste is littered all over leading to insanitary living conditions. Municipal laws governing the urban local bodies do not have adequate provisions to deal effectively with the ever growing problem of solid waste management. With rapid urbanization, the situation is becoming critical. The objective of this seminar is to study about waste generation from Malegaon city, its characterisation, physical and chemical composition, amount of waste, waste collection system, transporting system and disposing methods. Study is carried out to analysis problem due to improper management of private agency which having work order of handling solid waste generated from Malegaon city. The basic objectives are as follows:

- 1) To study the waste generation rate of Malegaon city.
- 2) To study the characteristics of waste generated from Malegaon city.
- 3) To study the system of collection of waste.
- 4) To study the transporting equipment's and their capacity of agency which is appointed by MMC.
- 5) To study the recent disposing methods of solid waste.
- 6) To study the environmental impact due to improper management of municipal solid waste.

II. LITERATURE REVIEW

Cecilia Sundberg et al. [1] presented a research on, 'Effects of pH and microbial composition on odour in food waste composting. In that he studied that, A major problem for composting plants is odour emission. Slow decomposition during prolonged low-pH conditions is a frequent process problem in food waste composting. The aim was to investigate correlations between low pH, odour and microbial composition during food waste composting. Samples from laboratory composting experiments and two large scale composting plants were analysed for odour by olfactometry, as well as physic-chemical and microbial composition.

Peter Grathwohl et al. [2] Carried out a research on, 'On equilibration of pore water in column leaching tests. In that he studied that, Column leaching tests are closer to natural conditions than batch shaking tests and in the last years have become more popular for assessing the release potential of pollutants from a variety of solids such as contaminated soils, waste, and recycling and construction materials. Uncertainties still exist regarding equilibration of the percolating water with the solids that might potentially lead to underestimation of contaminant concentrations in the effluent.

III. METHODOLOGY

The municipalities collect waste factors and household collection, transfer and transport of waste. Time for collection of waste fitting the service users' needs has a significant relationship to the availability of waste transportation facilities and the quality of the road. When local leaders are interested in solid waste management issues, they allocate adequate funding for equipment and infrastructure. As a result the stakeholder is willing to pay and also to participate in the solutions for an improved service.

3.1 Generation and separation:

The quantity of solid waste generation is mostly associated with the economic status of a society. Suggests that the quantity of solid waste generation is lower in countries

with lower GDP. A possible explanation is that waste generation rates have been collected from information provided in the cities by several sources: municipalities, NGOs, universities, research centres.

3.2 Collection, transfer and transport:

The study showed that municipalities collect waste factors and household collection, transfer and transport of waste. Time for collection of waste fitting the service users' needs has a significant relationship to the availability of waste transportation facilities and the quality of the road. When local leaders are interested in solid waste management issues, they allocate adequate funding for equipment and infrastructure. As a result the stakeholder is willing to pay and also to participate in the solutions for an improved service. The providers of waste collection often tend to forget the needs of the service users; therefore the cooperation and coordination between service user and service providers are of great importance.

3.3 Treatment:

Vermicomposting: Vermicomposting is the natural organic manure produced from the excreta of earthworms fed on scientifically semi-decomposed Organic waste. A few vermin composting plants generally of small size have been set up in some cities and towns in Maharashtra.

Composting: Composting is a technology known in India since times immemorial. Composting is the decomposition of organic matter by microorganism in warm, moist, aerobic and anaerobic environment. Farmers have been using compost made out of cow dung and other agro-waste. The compost made out of urban heterogeneous waste is found to be of higher nutrient value as compared to the compost made out of cow dung and agro-waste.

Recycling: The success of recycling not only depends on participation levels but on the efficiency of the equipment and infrastructure, irregular collection services, inadequate equipment used for waste collection. Even though the technology of waste to energy (WTE) projects has been proven worldwide, its viability and sustainability is yet to be demonstrated and established in the country.

Disposal: In case of disposal of waste, there are no examples of private sector participation in India as no such plants existed thus far. However, the concept of paying tipping fees is gaining acceptance with a beginning made by the Municipal Corporation of Bangalore. The usingan integrated treatment and disposal facility Based upon technology and investment requirements, various profiles of contracting with private firms is emerging.

IV. RESULTS

4.1 Collection system:

A private agency is appointed to collect the waste from various regions of the city and disposed it safely .The name of this agency is water grate having administrative office in Ahmadabad Also municipal corporation appointed their system to collect the waste. Description of types of vehicles appointed by private agency and Municipal

Corporation is as follows. The distribution of vehicles for collecting the waste is based on population, more dense populated area covered with the more waste carrying capacity vehicles. But this again depends on size of road on which vehicles are collected the waste. so due to narrow roads it is very important to select vehicle for the collection of waste. Generally some of the vehicles are not reached their last point of collection. So it is necessary to developed some waste collection equipment which can easily collect the waste to avoiding littering and nuisance.

SR. NO.	NAME OF VEHICLE	NO OF VEHICLES	CAPACITY OF VEHICLE (IN TONNES)	Total tonnage per day
1	TRACTOR	40	2.5 to 3	100
2	APPE (three wheeler)	40	1 to 1.5	40
3	TIPPERS	2	10	20
4	HYDROULIC CONTAINERS	4	2 to 2.5	8
TOTAL	168			

4.2 Details of dumping yard:

Now collected waste from Malegaon city is disposed on dumping yard in Maldeshivar , which is located near Malegaon city. The distance of dumping yard from the centre of the Malegaon city is near about 4.5 km. The vehicles Initially collect the waste & ideally transported to dumping yard ,no centrally located system available for waste collection. The area of recently used dumping yard is 28 acre which have been lost their capacity from last few year. So another 22 acre land proposed by the Malegaon Corporation for disposing the solid waste. now days stacked material or waste reach 3 meters of height. Which having overall volume are as follows:-

Area of dumping yard in meters- $28 \times 4046 = 1,13,288$ sq. m.

Volume of total stacked waste – $1, 13,288 \times 3 = 3,39,864$ m³.

4.3 Details of survey for physical characteristics:-

A survey is to be carried out in Malegaon city to derive physical characteristics of waste generated in four various wards. The average municipal waste generation rate in India is ranges between 200-879grams/day/person. Waste generation rate is depends on locality, living standard of people, habits of people. A sample survey is carried out to know waste generation rate, its physical characteristic, collection system and many other issues regarding this city. A private agency is appointed to collect the waste from various regions of the city and disposed it safely .The name of this agency is watergrate having administrative office in Ahmadabad .private vehicles are appointed by this agency to

collect the waste. Also Municipal Corporation has appointed their system to collect the waste. The average daily disposed quantity of waste on dumping yard is near about 168 tonnes per day .A survey for physical characteristics of waste is carried out for some wards of Malegaon city. These wards are Aayeshanagar, Jafarnagar, Camp road, Islampura.

Proposed methodology for final solid waste disposal for Malegaon city – Mechanised composting.

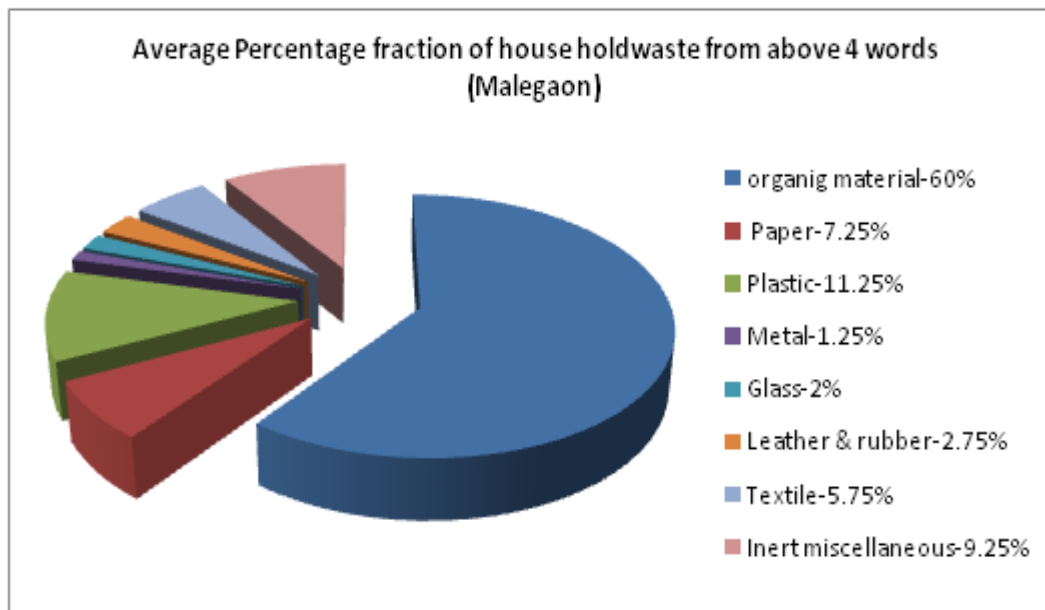
I visited to Nasik mechanised composting plant in February 2016, at the time of visit I had information regarding funds arability from central government to Nasik Municipal Corporation. Technical assistant of municipal corporation gives me information that there are only 7 mechanised composting plant are installed in our country in 2006, among Nasik composting plant was one of them. Total cost of installation of this plant is 12.6 cores .In this total amount central government gives 70% subsidy, rest 30% amount was invested by Nasik Municipal Corporation. Mechanised composting plant reduces about 5, 80,000 m³ of waste till date which is clear out near about 11.6 hectares of land. The total cost invested for treating the waste is 6.4 million. Hence we can conclude that only 11.06 rupees cost charge for each meter cube.

In the case of individual households, small establishments and colonies, vermin-composting which involves the stabilisation of organic solid waste through earthworm consumption for conversion of the organic material to larva casting is being increasingly preferred.

Details of physical characteristic are of solid waste from Malegaon city:

Percentage fraction of household wastes (by weight)	Aayeshanagar	Jafarnagar	Camp road	Islampura	Average Percentage fraction of household wastes (by weight)
Organic	63%	59%	57%	61%	60%
Paper	5%	8%	7%	9%	7.25%
Plastic	13%	11%	14%	9%	11.75%
Metal	1%	1%	2%	1%	1.25%
Glass	1%	2%	2%	3%	2%
Leather & Rubber	3%	3%	3%	2%	2.75%
Textile	6%	7%	3%	7%	5.75%
Inert Miscellaneous (soil, wood, demolition material, road sweep)	8%	9%	12%	8%	9.25%

Graphical representation of percentage fraction of house hold waste for various words of Malegaon city-



Percentile details of individual waste generation:

	Aayeshanagar		jafarnagar		Camp		islampura		Average Percentage fraction of household wastes (by weight)	
	Word Number	05	20	12	22					
Population (as per census 2011)	11554 Persons	12563 Persons	12200 Persons	12444 Persons	12190 Persons					
Waste generated	4044 kg	4397kg	3909kg	4480kg	4207kg					
per capita waste generation	0.350 kg	0.349 kg	0.320kg	0.360kg	0.345kg					
Amount of Waste Generation % & Wt by Grams	By %	By wt	By %	By wt	By %	By wt	By %	By wt	By %	By wt
Organic	63%	0.220	59%	0.205	57%	0.182	61%	0.219	60%	0.207
Paper	5%	0.017	8%	0.027	7%	0.022	9%	0.032	7.25%	0.025
Plastic	13%	0.045	11%	0.038	14%	0.044	9%	0.032	11.75%	0.040
Metal	1%	0.003	1%	0.003	2%	0.006	1%	0.003	1.25%	0.004
Glass	1%	0.003	2%	0.006	2%	0.006	3%	0.010	2%	0.006
Leather & Rubber	3%	0.010	3%	0.010	3%	0.009	2%	0.007	2.75%	0.009
Textile	6%	0.021	7%	0.024	3%	0.009	7%	0.025	5.75%	0.019
Inert Miscellaneous (soil, wood, demolition material, road sweep)	8%	0.028	9%	0.031	12%	0.038	8%	0.028	9.25%	0.031

4.4 Chemical characteristics of leachate :

The characteristics of leachate generated from municipal solid waste landfilling sites of Malegaon City. Leachate samples were collected and analyzed for various physico-chemical parameters to estimate its pollution potential. This study aims to serve as a reference for the implementation of the most suitable technique for reducing the negative environmental effects of discharge leachate. All the

three landfilling sites of Malegaon city are non-engineered low lying open dumps. They have neither any bottom liner nor any leachate collection and treatment system. Therefore, all the leachate generated finds its paths into the surrounding environment. It has been found that leachate contains high concentrations of organic and inorganic constituents beyond the permissible limits. While, heavy metals concentration was in trace amount as the waste is domestic in nature.

Parameter	Concentration
Colour and Odour	orange brown or dark brown
pH	9.8 mg/l
TS, SS and TDS	5963 mg/l, 615 mg/l, 5348 mg/l
Turbidity	79 NTU
Hardness	585 mg/l
BOD₅	329 mg/l
COD	1335 mg/l
Chlorides	1448 mg/l
Nitrate	12.5 mg/l
Total Phosphorus	52.8 mg/l
Sulphate	48.7 mg/l

V. CONCLUSION

- Waste generation rate in Malegaon city for per capita is 349grams. Rate is affecting due to family income& lifestyle of the people. Per capita waste generation in Islampura is maximum as compared to other words. Waste generation rate in camp is 320 grams which is minimum.
- Generally centrally located waste collection system is adopted for many cities in India, but such system is not adopted in Malegaon for waste collection.
- Percentage of plastic generation rate is more in Malegaon city as compared to other cities in India. Organic waste is more as it contains waste from slaughterhouses.
- Corporation fulfilled the requirement of waste collection system which having maximum daily collection capacity 175 tonnes & waste generated in Malegaon city is near about it.
- Disposal of waste is serious problem as dumping yard crosses their capacity, so corporation required new dumping yard for disposal of waste.
- The approach of corporation towards waste is only collection & disposed off it, no further treatment is given to non-decomposable waste as decomposed waste is composted with the method of vermicomposting. Also there is no approach towards revenue generation from waste.
- Waste collected from municipal region is not segregated. Waste collected from industry, hospitals, commercial complexes, institutes is disposed off on the same place.

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REFERENCES

- [1] Akolkar, A.B. (2005). Status of Solid Waste Management in India, Implementation Status of Municipal Solid Wastes, Management and Handling Rules 2000, Central Pollution Control Board, New Delhi.
- [2] Asnani, P.U. (2004). United States Asia Environmental Partnership Report, United States Agency for International Development, Centre for Environmental Planning and Technology, Ahmedabad.(2005).
- [3] CPCB (2000). Status of Municipal Solid Waste Generation, Collection Treatment, and Disposal in Class I Cities, Central Pollution Control Board, Ministry of Environment and Forests, Government of India, New Delhi.
- [4] GOI (2003). Report of the Technology Advisory Group on Solid Waste Management, Government of India Publications, New Delhi.
- [5] NEERI (1995). 'Strategy Paper on SWM in India', National Environmental Engineering Research Institute, Nagpur.
- [6] What a Waste: Solid Waste Management in Asia, WorldBank, Washington, DC 1999.
- [7] Report of the Supreme Court Appointed Committee on Solid Waste Management in Class I Cities in India, Supreme Court of India, New Delhi.
- [8] Report of the Supreme Court Appointed Committee on Solid Waste Management in Class I Cities in India, Supreme Court of India, New Delhi.
- [9] Management of Solid Waste in Indian Cities, Ministry of Urban Development, Government of India, New Delhi.1995.
- [10] Draft Report of Core Group on Appropriate Technology, Research and Development (SWM), Technology Advisory Group.1993.
- [11] United States Asia Environmental Partnership Report, United States Agency for International Development, Centre for Environmental Planning and Technology, Ahmedabad.2005.
- [12] Manual on Solid Waste Management, Ministry of Urban Development and Poverty Alleviation, Government of India Publications, New Delhi.2000.
- [13] Technical Committee Report, West Bengal SWM Mission, Government of West Bengal, Kolkata.2005.
- [14] Report of the Technology Advisory Group on Solid Waste Management, Government of India Publications, 1998.

- [15] Worku, D. 2012. Recycling Practices and Potentials in Bahir Dar and the Influence of Landfill Leachate on Groundwater Quality. Cornell University, Ethiopia and Swiss Federal Research Institute for Aquatic Science and Technology (Eawag).