

Status for Urban Solid Waste Management in Aurangabad Town of Marathwada Region

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Abstract

In the present investigation the status of solid waste management and treatment practices in Aurangabad region throughs light about solid waste generation sources, handling, treatment and disposal. The results show that the composition of the waste in the city area is heterogenous because it contains both bio-degradable and non-biodegradable material such as e-waste, plastic, polyethnic material, hospital waste and domestic waste, among others. Aurangabad is one of the fastest developing cities, it generates total quantity of waste is about 1300 to 1400 metric tons per day. So, there is need of the proper waste collection, transportation route for prevention of environment form the hazardous waste disposal.

The study strongly recommends that the authorities be made to sit up on their functions while government should consider introducing waste to energy as a way of curbing the menace of waste management and simultaneously solving the energy needs of the city based on Municipal Solid Waste (Management and Handling) Rules, 2000. We also suggest that there should be appropriate planning for proper waste management by means of analysing the waste situation within Aurangabad Municipal Corporation (AMC) area. We conclude by offering suggestions to tackle the problems of solid waste which is one of the major areas of concern all over the Marathwada Region in Maharashtra, India.

Key Words: Municipal Solid Waste, Waste Management, Collection of Waste; Disposal and Environment.

Introduction

Aurangabad Municipal Corporation (AMC) area is found on the bank of river Kham, the whole city is situated at the latitude 19° 53' 50" N and longitude 75° 22' 46" E in Marathwada region which recognize as fastest growing industrial city in Asia with industries spread over different parts and known as one of the measure industrial centre in central Maharashtra. These industrial centres are in various part of the town as a five-star MIDC i.e. Chikalthana, Shendra, Pandharpur, Waluj, Paithan under AMC area. Aurangabad municipal council was established in 1936 and has become municipal corporation in 1982. As per the census of 2011 the total population of district was 11,77,330. The current population of Aurangabad is approx. 15.5 lakhs. The Ajanta Ellora caves surrounding city are UNESCO world heritage

sites. By the population it is the fifth largest city in Maharashtra after Mumbai, Pune, Nagpur and Nashik but in Aurangabad Municipal Corporation (AMC) area, the problem of municipal solid waste disposal has been a persistent battle over the years with successive government applying different approaches in a bid to eradicate the scourge. Urban development in Aurangabad Municipal Cooperation in Marathwada Region of Maharashtra, India have brought significant benefits to the people such as employment and economic development but caused increased environmental problems. An improvement in the quality of life is accompanied by an increase in resource consumption and large amount of waste generated from various urban centres every day. The high volumes of waste and management cost involved transcended the capacities of governments, local councils and other agencies to handle. The deposition and burning of domestic waste cause a

profound strain on the environment; potential contamination of ground water resources, organic and inorganic pollution of nearby surface water and carbon dioxide release from landfill and incineration plants contributing to global heating. The rapid increase in volume and kinds of solid waste seen in recent times may be a result of continuous economic process, urbanization and industrialization which has become a serious problem for national and native governments to make sure effective and sustainable management of waste. Aurangabad city generates large amount of solid waste and these large amounts of waste poorly disposed without treatment. The city does not have an engineered or scientific landfill site and the capacity of existing dump site cannot cater the future demand of the waste generated. So, there is an immediate need for designed scientific integrated solid waste management. According to Kapoor (2009), an attitude can be defined as inclination towards some object. It is relatively permanent characteristic of human personality and is set by the essential value system, core beliefs, biological and psychological background, socialization process and environmental experiences. Attitude is a major determinant of decision-making behaviour. Recently many researchers have given their contribution towards solid waste management i.e. JoardarSouro, 2000; Chakrabarti and Sarkhel, 2003; Zerbock Olar, 2003; Creswell John. 2003; Yin, 2003; Kumar and Gaikwad, 2004; Kumar Sunil, 2005; Sonawane and Thorat, 2010; Gauri Kallawar, et. al. 2018, and so on.

Materials And Methods

The pivotal idea of this research methodology was to develop the deepest approach which ranges from the identification of waste generators, capacity building/participation, choice of technology and policy options that enhance sustainability of waste management.

Qualitative information was gathered by in-depth interviews with institutions and stakeholders having different roles within the Solid Waste Management Sources. Quantitative data was gathered by means of a questionnaire survey to be conducted on the household and individual level within the selected study area. While secondary data relevant to solid waste management in Aurangabad

region have assembled from national and international statistics, reports and studies.

Site description: In this study, oral interviews from selected residents of some major streets in Aurangabad Municipal Corporation (AMC) area where these solid wastes dump sites are commonly seen unattended for very long periods were used as primary source of knowledge.



Figure 1: Showing Satellite view of Aurangabad Municipal Corporation (AMC) area

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 Sampling preparation: In particular, three hundred and fifty people were randomly selected and interviewed on the critical aspects of municipal solid waste management and disposal such as evacuation of the waste from the dump sites, composition, disposal methods, environmental impacts and management of the municipal solid waste in Aurangabad Municipal Corporation (AMC) area. Other relevant primary source of data used in the study were extracted from the field observations of the municipal solid waste in the waste dumping sites at Naregaon where, the composition, dump sites and typical environmental issues in Aurangabad Municipal Corporation (AMC) area where shown in photographs. Some heads of departments in Aurangabad Municipal Corporation (AMC) were also interviewed especially on issues of waste evacuation from the dump waste sites, legislation and enforcement of existing laws, data analysis and Government support. Due to limited research work in the literature on municipal solid waste management and disposal in the study area, very few secondary data were used in the analysis. Some relevant data on solid waste disposal was also obtained from the monthly reports of the Aurangabad Municipal

Corporation (AMC). Analytic methods used in the form of Microsoft excel was used to analyse the data, thus the sources of the municipal solid waste in Aurangabad Municipal Corporation (AMC) area are shown in Table 1 the composition of municipal solid wastes in Aurangabad Municipal Corporation area and Table 2 shows the response of residents on the disposal method.

Results And Discussions

Present scenario Solid Waste Management in AMC area: Aurangabad is a city one of the historical cities, in the Indian state of Maharashtra It is a municipal corporation and the headquarters of Marathwada region and divisional office It is also a part ancient Capital of Aurangzeb. The city is one of the major trading and business centres of the state and hence, it is also known for industrial corridor. It is one of the commercial hubs of Maharashtra with a GDP of \$3 billion in 2010 and is expected to increase to \$17 billion by 2025. The political, agricultural, industrial sectors are a boon for its recognition and a hub of transportation. The total waste generated in the city is about 455 MT in year 2019. The proposed new capital city in the vicinity of Aurangabad may result in exponential population growth in another 5 - 10 years. This growth of population would be more than 20% over and above the natural growth of the city. The SWM in the city is governed by Aurangabad Municipal Corporation (AMC).

Sources of Municipal Solid Wastes in AMC area: The sources of municipal solid waste in the metropolis were obtained from the analysis of the physical observation of the composition of the wastes in each waste dump site. The analysis revealed that a greater percentage of the wastes emanate from the residential sector 62%, followed by the commercial sector 20%, industrial 10%, institutional (6%) while other miscellaneous sectors account for 2%. The Aurangabad Municipal Corporation (AMC) has very few industries and within the AMC area, only food processing industries such as sachets water, abattoirs, cassava, beans and fast-food processing plants are some of the major industries. Waste from the commercial sector is also significant because the AMC area currently has many motor parks as only automobile constitutes

the transport sector in an around Aurangabad urban area.

Composition of Municipal Solid Wastes in AMC area: Physical observation of the municipal solid waste in the waste dump sites indicates that the wastes are mostly composed of biodegradable and non-biodegradable materials. Fig. 2: Solid Waste Collection from Housing Colonies in AMC area, Aurangabad and Fig. 3: Solid Waste in Aurangabad City. The biodegradable and non-biodegradable material that constitutes the wastes are shown in Table 1. The biodegradable contents can be harnessed to more useful avenues by introducing appropriate technologies for processing them into bio-fertilizers or as a source of green energy through landfill technology or other waste to energy routes. This will also serve as a potential source of job creation and revenue generation for the Aurangabad Municipal Corporation (AMC). The need for conversion of waste to more useful forms to ensure sustainability have been widely discussed by the researcher i. e. Patrick Akata Nwofe, 2015; Taiwo, 2011; Ogundiran and aflolabi, 2008; Nwofe, 2013; Anikwe et. al., 2002; Amoo and Fangbare, 2013; Salve et.al., 2019. The non-biodegradables could be recycled after being assembled by the waste pickers. However, it is unfortunate to note that the waste pickers are not currently recognised by Government and there is no on-going recycling programme in Aurangabad Municipal Corporation (AMC) area. The observations in this study agree with the reports of other authors in the literature. Vawhare, et. al., 2017 reported that analysis of municipal solid waste in Aurangabad Municipal Corporation (AMC) indicates that they are made up of organic and other biodegradable matter 56% and the 44% non-biodegradable made up of substantially dirt, ash and another household trash as presented in Table 2. The negative effect of unsustainable waste management in Aurangabad Municipal Corporation (AMC) is manifested in, environmental pollution, road encroachment, air pollution, health and in residential land encroachment.

Environmental pollution in AMC area: Public display and dumping of any type of waste in an open space is a big threat to the environment. This is because the wastes create a sore sight within the vicinity, pollute the air and the environment in that

the solid waste may decompose to emit greenhouse gases which contributes to climate change. Moreover, most of the non-decomposable solid wastes may contain harmful chemical elements which have severe health implications for humans. These heaps of solid wastes also serve as good breeding grounds and hideouts for reptiles, rodents, and other dangerous insects such as mosquitoes and flies.

Road encroachment in AMC area: Roads are designated routes that are created or designed for the purpose of travel of humans either with foot, bicycle, motorcycle, motor vehicle or other mechanical devices. Roads should be clear of any obstructing materials for increased access and visibility to reduce the risks of accidents or other physical harm to the road users. However, in most developing countries, the scenario is different. In Aurangabad Municipal Corporation (AMC) area, municipal solid waste does encroach the roads even in the major streets with the consequence that a very narrow part is left for pedestrians and motorists to use. A typical picture of such case is Fig. 6: shows waste encroached road in AMC area. And Fig. 7: Dumping Site in Naregaon area in Aurangabad area.

Air pollution in AMC area: Air pollution simply refers to when air is made unfit for human consumption. This could flow from to emission of toxic substances, decay of waste materials, burning or by other factors. Waste disposal in Aurangabad Municipal Corporation (AMC) area is mostly done by primitive methods with little technological approach by few institutions and hospitals. Open burning of waste is commonly seen within the city and these generate serious greenhouse gases and other hazardous gases that pollute the air within the vicinity. Some research groups have reported on this ugly trend in the literature are Soumare et. al., 2003; Olorutande et. al., 2013; Pamnani and Shinivasarao, 2014.

Waste dump sites aren't alleged to be located very almost residential areas and waste dump bins should be covered. In Aurangabad Municipal Corporation (AMC) area, waste dump sites are randomly scattered very close to residential homes and public buildings. Fig. 4: Transportation of Solid waste in AMC area and Fig. 5: Solid waste dump sites in AMC area.

Separate collection and management of waste from bulk generators in AMC area: Separate collection and management of Bulk Waste is most critical and cost-effective way for waste management in city. The waste processing is also easier if such bulk waste is not allowed to get mixed with rest of waste. Such waste is more homogenous concentrated i. e. containing mostly wet garbage and thus can easily be treated and disposed without additional cost incurred on segregation Independent collection and transportation of waste from bulk producers helps in establishing a system of collection and transporting segregated waste.

Waste generated from construction materials / debris Waste generated from restaurants, canteens, marriage halls, temples Waste from vegetable and fruit markets, meat and fish market Waste generated from parks and gardens, household garden waste etc. **Road Sweeping and Nuisance Detection in AMC area:** Once the waste is collected directly from the generators, the road cleaning load would come down sharply. Road in commercial areas could also be swept twice each day. The arterial and main roads where there is heavy traffic and are crowded during the daytime could be cleaned up at night. Good painted litter bins should be kept along the roadside and walkways for picking up garbage generated along the roadside. Litterbins should be providing at a distance ranging from 25m to 250m depending on the site condition. Removal of waste from these litterbins should be done by beat sweepers and directly transferred into the handcart.



Fig. 2: Solid Waste Collection from Housing Colonies in AMC area, Aurangabad. Fig. 3: Solid Waste in Aurangabad City. Fig. 4: Transportation of Solid waste in AMC area. Fig. 5: Solid waste dump sites in AMC area. Fig. 6: Waste encroached road in AMC area. Fig. 7: Dumping Site in Naregaon area. Fig. 8 and Fig. 9: Housing Colony Waste Dumping Sites in AMC area. Fig. 10: Segregation of Waste and recycled items in AMC area, Aurangabad

Waste Processing and Land Filling in AMC area: The processing of waste becomes simpler in case segregated waste is obtained. This can be achieved through following steps: Separate collection and transportation of bulk waste Debris not getting mixed up in municipal waste House to house collection of segregated biodegradable waste

various treatment technology options are currently available for handling waste. Bio-methanation is the simple technology, which can be used to treat source segregated biodegradable waste.

Population projection in AMC area: The waste generation is function of population and lifestyle of people. Therefore, it is essential to project

the population for 20-25 years for setting out the infrastructure for Solid Waste Management. The population projection is Aurangabad city is carried out based on following methods i. e. Incremental increase method, Arithmetic increase, Geometric increase and Exponential method.

Segregation of waste at source in AMC area: Segregation of solid waste is the first criterion for effective management of solid waste of city. Depending upon the nature of the solid waste, they should be segregated as far as possible at the source of generation. The segregation of waste should be facilitated with the assistance of colour code bins. Separate bins would be provided for dry and wet wastes to the residents. Such bins should be distributed free of cost in LIG and Slums, whereas HIG, MIG, Institutional areas should maintain their own bins in premises.

Residential land encroachment in AMC area: Lands are used for different purposes with the objective of deriving maximum benefit from it. In the urban areas, land is always more expensive to acquire compared to the rural areas hence the need to maximise the space available for residential or other purposes. However, in Aurangabad Municipal Corporation area, large area of land has been lost to solid waste dump sites. A typical example is the waste dump sites near New Layout Chikalthana MIDC near Naregaon Fig. 8 and Fig. 9: Housing Colony Waste Dumping Sites in AMC area. Recent work by Sonawane and Thorat, 2010 indicate that municipal solid waste has deeply encroached on residential land in Jalgaon City Municipal Corporation area of Jalgaon. Other research groups have also reported similar observations i.e., Joardarsouro, 2000; Soumare, 2003; Post et. al., 2003; Zerbock Olar, 2003; Kumar and Gaikwad, 2004; Kumar Sunil, 2005; and Kapoor, 2009.

Recycling in AMC area: Recycling simply means reusing already used or discarded materials. Waste management can be improved in developing countries if recycling is practiced effectively. Enforcing a recycling culture in Aurangabad Municipal Corporation (AMC) area will be reduce the volume of solid wastes and reduce the cost of raw materials used in producing such items. Recycled materials from this waste are only possible on a low scale because of the waste pickers who pick these

items and then display them in any open space within the AMC area so that people that need them could come and buy. Fig. 10: Segregation of Waste and recycled items in AMC area, Aurangabad is put in place.

Waste disposal practice in AMC area: As indicated earlier, the agency responsible for waste and refuse management, and sanitation in Aurangabad Municipal Corporation (AMC) area. The agency amongst other contributions, established that solid waste in AMC area is to be dumped by the public at designated waste dump sites for collection by AMC staff. It was observed in this study that wastes were dumped in the open space, on the street and at proximity to the residential houses and even public places within the AMC. In the suburban informal settlements of Aurangabad Municipal Corporation area. Table 2 gives the perception of the residents interviewed on the extent of coverage in the provision of waste collection services in AMC. Table 3, 4 and 5 shows generation, composition and vehicles present in AMC, Aurangabad. Physical observation from the field work indicates that despite the availability of AMC collection containers in some of the designated waste dump sites, the waste is thrown in a random manner and these heaps of waste then blocks free access to the actual waste points near city at Naregaon in AMC area. In the undesignated waste dump sites, the waste is just piled up and open burning is used to reduce its volume periodically. According to the respondents, the landfills are mostly done using scraps from demolished buildings and other associated solid wastes. They also noted that the wastes are not evacuated from the waste dump sites by AMC staff on a regular basis and that Aurangabad Municipal Corporation collection containers are too high thereby making it difficult to put those wastes inside the containers. The current waste disposal method could deteriorate as more illegal waste dumping sites is expected to emerge due to unchecked urbanisation, population explosion and illiteracy among other factors.

Table 1: Composition of Municipal Solid Wastes in Aurangabad Municipal Corporation Area

Biodegradables	Non-biodegradables
Food scraps	Polythene bags
Worn-out clothes	Sachet water bags
Ash	Rubber items
Vegetables	Plastics
Sawdust	Bottles
Charcoal	Can
Leaves	e-wastes
Wood	Worn-out footwears
Used cartons/cardboard boxes	Worn-out tyres
Metallic materials	Tile debris

Table 2: Response of Residents on Disposal Method in Aurangabad Municipal Corporation Area

Site	Percentage %
Authorised waste dump site	36.50%
Unauthorised waste dump site	46.75%
Open burning	13.25%
Land fill	03.50%

Source: Field work carried out in AMC area

Table 3: Generation and quantities from various places in Aurangabad Municipal Corporation, Aurangabad

Sr. No.	Description	Quantity
1	Total MSW generation (MT/day)	400
2	MSW generation (gm/capita/day)	350
3	Total MSW generation	750
4	Quantity of domestic MSW (MT/day)	160
5	Quantity of commercial MSW (MT/day)	100
6	Quantity of industrial waste (MT/day)	40
7	Quantity of waste from markets (MT/day)	40
8	Quantity of waste from hotels (MT/day)	50

Table 4: Composition of Municipal Solid Waste in Aurangabad Municipal Corporation, Aurangabad

Sr. No.	Description	Quantity
1	Biodegradable	56%
2	Paper	05%
3	Plastic	04%
4	Glass	03%
5	Metal	18%
6	Building material	08%

Table 5: Type of Equipment and Vehicles Numbers in Aurangabad Municipal Corporation, Aurangabad

Sr. No.	Equipment	Numbers
1	Community bins	612
2	Auto-tipper	126
3	Skip-loader	08
4	Hook loader	09
5	Tractor	11
6	Trucks	26

Source: Field work carried out in AMC area

Conclusions

In developing country like India, there's rapid increase in municipal solid waste thanks to urbanization and increase. tremendous amount of lose in terms of environmental degradation, health hazards and economics descend thanks to direct disposal of waste. So, it is better to segregate waste at the initial generation stages rather than going for later option which is inconvenient and expensive as well. Management and disposal of solid waste in Aurangabad Municipal Corporation (AMC) area has been investigated and the findings show that the municipal solid wastes are mostly composed of the biodegradables and non-biodegradable materials. The study further revealed that the agency responsible for the evacuation of these waste do not do that on a regular basis. It was also observed that the present waste disposal situation is expected to worsen due to rapid urbanisation in the AMC area of Marathwada region, increase in unplanned settlements and housing, and lack of sustainable waste management technologies in

AMC area. The major proportion of the wastes emanates from the residential sectors and recycling are not currently practiced formally in the AMC area. The consequences of the poor waste management are manifested in environmental degradation, road encroachment, air pollution, residential land encroachment and loss of aesthetic view of the city. The findings and suggestion presented in this work will serve as useful guide for improved waste management services within the Aurangabad Municipal Corporation and regions with similar waste challenges in Marathwada region and other developing cities in Maharashtra.

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