



SOLID WASTE IN MYSORE CITY- A FUTURISTIC SCENARIO

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ABSTRACT

In this article a detailed work about solid waste condition existing in Mysore city has been discussed. So this is an important issue which is considered in this decade throughout the world. The present paper has been substantiated with a set of measures taken by the corporation for the frequent disposal of solid waste in their boundary and clearing in order to help citizens in the city. The problem have highlighted on extremely bothering the solid waste existing in Mysore city for easy disposable for segregation. This is based on the data provided by the Mysore city corporation (MCC) and projected for future by using the regression equation. To safeguard the environment, efforts are being made for recycling different wastes from collection. In this present study, it shows the status of generation and disposal of both non-hazardous and hazardous solid wastes in Mysore has been discussed.

KEYWORDS: Garbage, epidemic, discarded, disposal, degradation, categorized

INTRODUCTION

The municipal solid waste management is an important aspect for planning, engineering, organization, administration and environmental aspects. The activities associated with generation, storage, collection transport, processing and disposal of municipal solid wastes which includes such as household garbage, rubbish, street sweepings, construction debris, sanitation residues, industrial, bio-medical, butcher waste etc. The increase in the urban population is changing the nature of solid wastes generated in developing countries from mainly a low priority, local issue to an international social problem that exists in the society.

The Mysore City is one of the important urban centers having a population of about 8.81 lakhs of population and 19, 3761 households in the corporation limits. By adding the new layouts to the city limits the population will be around 9.3 lacks and expected to generate 385 tones of solid waste per day, excluding the collection of wastes from industries, restaurants, hospitals, construction activity and Bio-Medical wastes. Out of 300 tones of solid waste, 300 tones are being transported excel plant, which is 10 kms away from the city for categorizing, recycling, composting, With the result about 100 tones are added every day which is causing severe environment and ecological problems due to lack of transport facilities.

Objectives

- To know the types of wastes generated in Mysore city.
- To study the works carried out for clearing the solid waste.
- To forecast the wastes generated and amount spent on clearing in 2019-2020.

MATERIALS AND METHODS

The research work is carried out by different techniques adopted to choose the ways and means for the collection of data in Mysore city pertaining to of solid waste. The study consists of collection of data from primary and secondary sources related to the generation, administration, collection, transportation, disposal of solid wastes generated and its impact on human life if not properly disposed it will lead to epidemic diseases for the human health.

The primary data regarding the generation and disposal of solid wastes have been collected from the different localities of the sample households in the study area

by using personal investigation, questionnaire and interview regarding the segregation and disposal and transportation from their houses per day. The secondary data regarding the topic have been collected from the available studies that have been taken from the internet, e-journals and related to the transportation of solid wastes. In a similar way consulted the Environmental engineers of the Mysore city corporation, who are having the data on different themes pertaining to the paper.

Study Area

Mysore city occupies an important location in the larger context of southern part of the Karnataka State at 12°18' N latitude and 76°12' E longitude. Mysore city lies in a saucer shaped basin flanked by Chamundi Hills on the south east. It is in the interfluent between two rivers Cauvery and Kabini.

The city of Mysore is next only to Bangalore in importance as a growing urban centre in Karnataka. It is described as a "Garden city" and "City of Palaces". The city is spread over an area of 87 sq km and it is situated in an undulating surface. The present study has been carried out in the urban environment of Mysore in the year 2009 to understand the problems and perspective associated with solid waste management in the city.

Generation of Solid Waste

The estimated that solid waste generated in small, medium and large cities and towns in India is about 0.1 kg, 0.3 - 0.4 kg and 0.5 kg per capita per day respectively. The studies carried out by National Environmental Engineering Research Institute (NEERI) indicated that the per capita generation rate increases with the size of the city and varies between 0.3 to 0.6 kg/d based on the population and income of the members of the urban people. In the metropolitan areas, values up to 0.5 kg / capita / day have been recorded. The estimated annual increase in per capita waste quantity is about 1.33% per year.

One of the major problems of an urban center is the collection and segregation, transportation and disposal of solid wastes. The amount of solid waste is increasing day to day due to increase in population, urbanization, standard of living etc.

The Solid waste refers to materials disposed and discarded by the user and no longer considered as a resource to retain. The disposed materials are degradable and non-

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degradable which includes vegetative, polythene, paper, leather, cloth, shells, bones, cardboard etc. The solid waste is associated with the storage, collection transfer and disposal of solid waste.

Table 1. Generation of Solid Wastes from sample House Holds in Mysore city

Types of waste	Solid waste generated per day /in grams	Solid waste generated in an week	Percentage of Solid waste generated in one day
Resin/ Leather	6	42	2.44
Plastic	8.5	59.5	3.46
Plastic covers	09	63	3.66
Glass bottle	10	77	4.07
Metals	13	91	5.29
Paper	17	119	6.92
Old cloths	20	140	8.15
Wood	20	140	8.15
Dust	30	210	12.22
Vegetable waste	112	784	45.65
Total	245.5	1718.5	100

Primary data collected through Questionnaire –2009

The solid waste generated is categorized in to ten types based on the sample survey conducted by questionnaire. They are resin/ leather, plastic, plastic covers, glass, metals, paper, old cloths, wood, dust, and vegetable waste.

The above table-1 indicates that the solid wastes generated in households that the vegetable waste is the maximum is of about 45.65 percent, that it includes the green waste from the houses. This is because cooking will be carried out daily. The second most is dust consists of 12.22 percent, that is sweeping and other mud related items disposed from the households. While third important wastes are wood is old cloths consists of 8.15 percent thrown out from households in a locality. The papers, thrown from the households accounts for 6.92 and ranks in fourth place in percent such as card boards, papers, boxes, packing items etc. The fifth place is of metals consists of 5.29 percent from household waste, such as shaving blades, metal boxes etc. The sixth place is of glass bottle about 4.07 percent these include the medicine bottles, broken glasses, bulbs etc. While

seventh place is of plastic, a one of the important and maximum usages now a day's even though it is a small in percentage of 3.66 it cannot be recycled and re used. The covers are disposed from houses are more because of cheaper in cost. The plastic rank in eighth place is also disposed off from residences amounts for 3.46 percent. The items disposed are old buckets, plastic bottles etc. The last leather and related rexin items disposed are of 2.44 percent in the households. These include shoe, sandals, belts etc.

These collected wastes will be categorized into different types; the vegetative matters and the rest are converted into composts. The different wastes like plastics, metals, papers and cardboard will be transported for the recycling units .These recycling materials will be transported by private vehicles for Gujries.

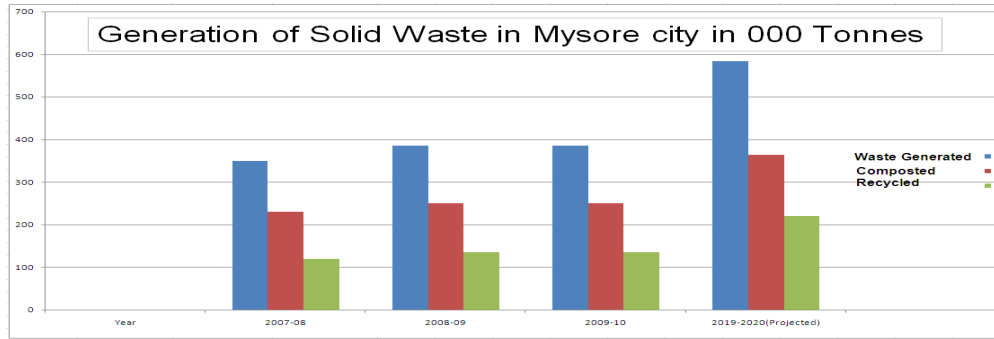
In this regard a study has been made to understand the problems associated with the solid waste management in Mysore City. For this proper solid waste management facility has been worked out on the basis of generation of solid waste the study area by previous years. This is represented by a graph shown below by.

Table 2: Generation of Solid Wastes in Years

Year	Waste Generated in 000 tones	Composted in 000 tones	Recycled in 000 tones
2007-08	350	230	120
2008-09	385	250	135
2009-10	385	250	135
2019-2020 (Projected population)	583	363	220

Source: Mysore City Corporation

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The above table-2 (Generation of solid wastes in Years) shows that there is an increase in the use of solid wastes in the year 2007-08, the waste generated is of 350 tones out of which the composts is of 230 tone and recycled is 120 ton. In the year 2008-09 there is an increase in the use of solid waste is of due to increase in population and the commercial activities carried out. But in the year 2009-10, the available data from the corporation shows that the waste generated is 385 tones, out of this 250 is composted and remaining 135 'tones is recycled due to awareness among the people regarding the usage of solid wastes. By this we come to know that urban centre creates 36 grams of wastes per person per day. Based on this data tried to project by using the regression equation $Y=17.5x-3.4767$ and $R^2=0.75$. The projected data for 2019-2020 shows that there is an increase of 200 tones (583) in thousand tons from 385 in 2009-10.

Collection

In order to protect and maintain the environment and health of residents of Mysore City the corporation has to take the responsibility of collection, transporting and disposal of solid wastes. The corporation and Non-Government organizations has appointed workers to collect the solid wastes from the household numbering 193761 etc by tricycle, shops and will be dumped them in nearby dustbins of the locality in a closed or open dustbins.

The generated waste amounts for about 385 tons per day in the urban area of Mysore. In these wastes the composted is of 250 and recycled of about 135 tons per day. These collected wastes will be taken over by the municipality authorities by their vehicle once in a day through trucks to the dumping yard outside the city area on Nanjangud road.

The collection of waste have been classified into daily collection, weekly twice collection and weekly once

collection by Mysore city corporation. The Mysore city corporation has received a prize as a second cleanliest city in India for speedy disposal of solid waste. For the transportation of these wastes dumper placer containers are being used for collection in commercial centers as a bulk generator. Nearly 25 wards are managed by private or NGO on contract authorized by MCC. The contract involves collection, sweeping, transport of waste to the dust bins and door to door collection point.

Transport

The transportation of solid waste is carried out by the municipality and partially by private contractors on contract to the corporation and NGO firms. The non-governmental organizations will collect the wastes from the residences to the disposable sites in an area through the tri-cycles and goods autos and dump them in dustbins. The private vehicles of the contractor on contract to the municipal authorities collect the wastes from the disposable sites in residence area to the main site which is situated on Mysore-Nanjangud road. The corporation will take the responsibility of taking out the waste from the corporation limits consisting of 65 wards. The corporation will clear the wastes daily of about 60 percent from the waste generated, while private contractor has the responsibility for the rest 40 percent of the waste generated in the Mysore city. While the remaining 10 of the wastes is not collected by them due to lack of transport and some restricted wastes. These wastes consist of animal waste, bio-medical waste, industrial waste, butcher waste etc.

The solid waste generated is from residence stored in the dust bins will be transported through the vehicles to the disposal site on Mysore-Nanjangud road. So, for the transporting the wastes different vehicles are used is given by the following table.

Table 3: Vehicles used for transportation of solid wastes in Mysore city

Name of Vehicle	Numbers Vehicles
Trucks	5
Tractor with trailer	17
Dumper	2

Source: Mysore City Corporation

For transporting the solid waste totally 24 vehicles are used. Out of this the trucks are 5 in number, tractors are 17 and 2 are dumpers. But we have not taken the tri-cycle and autos into account due to non availability of data from the private contractor and the non-governmental

organizations. Majority of garbage is lifted manually but in some localities iron containers are kept, these containers will be replaced by empty after it has been filled. The waste collected from the roads and bins is directly transported to the final dumping site which is situated in the outskirts of the

Mysore city. The trucks will transport 12-15 tones per trip and will collect 3 trips a day in different parts of the residential areas. The tractor capacity is about 3-4 tones per trip and will collect solid wastes in the center of the city twice a day. This shows that there is a lack of transport vehicles to collect the solid wastes in the city area by 80 to 100 tons a day. The city corporation has a shortage of staff as well as the trucks for the collection and transportation of solid vehicles. The above table-2 shows that the number of vehicles owned by corporation for this purpose. By this due to non availability of transportation the solid wastes will be collected in the dustbins for many days.

The trucks which carry the solid wastes have the leakage of nearly 10 percent. The leakage of chemicals and other rotten things will lead to viral infection among the residents of urban area. The corporation employees will not collect the solid wastes regularly in the heart of the city, where there is a segregation of butcher waste, vegetable waste, bio-medical wastes from hospitals etc. The corporation has a less number of vehicles and employees for the transportation of solid waste from the city to the disposal sites.

The majority of them will be transported through the trucks, dumpers and tractors in residential areas. But in the centre of the city the wastes will be collected from tractors.

Expenditure incurred on solid waste

The expenditure on solid waste generated in the Mysore city is increasing every year. The expenditure on this waste is shown by the following data given by the corporation.

Table-4: Expenditure incurred on solid Waste in Mysore city

Sl. No.	Years	Expenditure incurred on solid waste in crores
1	2007-08	14.21
2	2008-09	17.96
3	2009-10	19.28
4	2019-20	47.7

Source: Mysore City Corporation 2010

According to the data available from the table-3 shows that the expenditure on solid waste is of Rs. 14.21 crores, but in the year 2008-09 the expenditure has increased to Rs.17.79 crores due to increase in the collection and transportation of solid waste in all the corners of the city area. But in the year 2009-10 the expenditure has raised to Rs.19.28 crores due to increase in the vehicles and labor cost incurred for the transportation of solid waste. By this the city of Mysore has ranked second place in India for clearing the solid waste on a regular basis. The projected expenditure on the solid waste for the year 2019-2020 has shown that will be an increase in 2.5 times of the amount to Rs. 47.7 crores. This is based on the regression equation $Y=2.535x-5073$, $R^2=0.928$. Where x = year, y = projected amount.

RESULTS AND DISCUSSION

The solid waste generation of in Mysore city is considered on the basis of the questionnaire survey and the data based on the city corporation. It is based on the day to day wastes generated from the households. But for this paper not considered the waste generated on medical waste, e-waste, butcher waste, industrial waste, and debris of buildings, extra

waste collected from the choultryaries, tourism places etc. By taking into consideration of these into account the solid waste generated is of 385 tons per day while 250 tons are composted and 135 tons are recycled. The waste of 250 tons compost is a major problem in the urban area, for disposal due to accumulation of these leads to environmental degradation. The daily segregation of waste, collection, transportation will leads to different environmental and health problems. The waste disposed from the households should be transported in a closed container regularly in all the areas, with the help of non government organizations in the city due to inadequate staff in corporation.

The solid waste is not only a problem but also the other waste such as building, e-waste etc are to be considered into account. The city is known for tourism, in order to maintain cleanliness the collection and management should be privatized for regular and speedy disposal. The waste generated is to be minimized by the public, for this a proper media is to be made for communication in order to avoid the environmental problems faced by them in near future. The waste is to be bifurcated at the collection point or the disposer by dividing as reusable, vegetable waste and other waste in order to avoid labor, amount and speedy disposal. Some of the measures taken by the corporation to clear the waste have exceeded its limit, which needs immediate attention from policy makers, planners, administrators and public for unless mitigation measures are adopted for the management of solid waste.

CONCLUSION

The methods used in this present paper may be useful for measuring and predicting potential scenic activities of solid waste management in Mysore. The paper has investigated the spatial measures for estimating a combination of factors such as collection, segregation, transportation and disposal of solid waste in Mysore city. The corporation must follow the intergraded approach to have effective implementation of management of solid waste. Therefore, more effective management of solid waste should be provided in Mysore. The commercial and residential areas shall be "barred from disposal of solid waste in the city and main roads with the immediate effect". The solid waste should be "monitored and checked effectively". Alternative mode of collecting, transportation and disposal of solid waste shall be "strengthened covering all the areas of the city". While the segregation and transportation of recyclable material would also leads to reduction in quantity of solid waste for final disposal and healthy environment. The city of Mysore might need to look for better solution of managing waste disposal considering unavailability of landfill at disposal site in a frequent interval. These measures do not cost much and are very effective in reducing degradation of solid waste. Effective and strict implementation by Mysore City Corporation and master plan should be enforced. In future for 2019-20 shows there will be increase in the amount and the solid waste in the city. So in order to reduce the solid waste the corporation limits, it should think of banning the plastic in the business areas and should think of '**Zero waste/ Green City**'.

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