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RESEARCH ARTICLE

SOLID WASTE MANAGEMENT FOR GADHINGLAJ MUNICIPAL COUNCIL

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ABSTRACT

Waste management is been a crucial environmental issue since the second half of 19th century. It has been seen that the generation increases with increasing population, industrialization and urbanization etc. Cities like Mumbai, Delhi, Bangalore, and Kolkata are facing problems in managing their waste, these examples tell us the need of solid waste management in growing cities, therefore by keeping approach of prevention from future threats this work is executed. This study is a review of solid waste management in Gadhinglaj which is situated in the Kolhapur district, the population of the city is 27,185 in 2011, which generates waste 5MT/day. The growth ratio of city is very high, present work evaluates all aspects of waste management and elaborates the situation and also highlights the deficiencies in the system. The overall study of generation, collection, transportation, treatment of waste in the city has been made with physical observations and review from the people, also some information is collected from municipal council office and some web references are utilize for the same. After a genuine review of the system few interesting outcomes are come forward those are discussed in the paper. As scope of work is very wide and available resources are less, there are some limitations of work. The depth of investigation can be increased in upcoming studies; there is good scope for some betterment of waste management system in the city.

INTRODUCTION

Since the second half of 19th century due to rapid growth in population and urbanization the generation of solid waste has significantly increased which triggered off the management problems of waste. The cities like Mumbai, Kolkata, Chennai, and Bangalore from India are already generating more than 1000 tons per day. It has seen that solid waste can cause health and environmental problems, the study of WHO has revels that the waste has dangerous consequences over health and environment, through water, land and air pollution. Also the insects like rats, Rodents; flies etc. are responsible to spreads diseases. Gadhinglaj is well known sub district place from Kolhapur district. The city generates about 5MT of waste per day which is taken care by municipal council. Due to development of city the population has rapidly increasing since last decade which consequently adds extra load of waste management over municipal council. The waste generates in city is moreover organic and it has potential for energy recovery options. Proper SWM provides facility of collection, segregation, transportation and treatment of waste, that will reduces odour pollution and risk of diseases, also good management improves the aesthetics of the city. Though SWM is complex to execute but with modern eco-friendly techniques and disciplinary work it is possible to achieve needful.

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Study area

Gadhinglaj is city from Kolhapur district which lies at (16° 10' N, 74° 20' E; p. 8,546) southwest corner of Maharashtra. This city is well known taluka headquarter from Kolhapur district which is governed by municipal council over there. With population of 27,185 it stands 3rd among Kolhapur district. The total area is about 17.97 km^2. Due to availability of good education & medical facilities, the population of the city is continuously increasing; also due to market and educational facilities the floating population is also considerable which causing load on existing SWM system. (Source: http://en.wikipedia.org/)

MATERIALS AND METHODS

As Part of data collection physical survey is carried out in the city and the observations are recorded. The sampling is done at three different locations viz. at domestic source, commercial source and at dumping site. These samples are analyzed in laboratory to understand the composition of waste at these locations.

Sampling Details

Sampling No 01: at the storage station-(Location-compost yard neharunagar Gadhinglaj)

Sampling No 02: at domestic source - (Random sampling through the litter bins from apartments or colonies). Sampling No 03: at the commercial source. (At commercial complexes)

From above mentioned sites we have collected 10 samples each weighing 1kg from every location. These samples are collected in polythene bags and for further analysis these are transported to the laboratory. In laboratory sorting of material is done and waste was classified in 10 categories and then it was separate and weight is measured and recorded. Also the moisture content of same samples is been find out in laboratory and Temperatures at the similar sites are also recorded. The secondary data needed was collected from Municipal council Gadhinglaj.

RESULTS AND DISCUSSION

Present S.W.M. Scenario in the city

As Gadhinglaj is growing city from Kolhapur district, the waste generated from the city has specific character; the waste from the city is moreover organic one but it has contained some amount of recyclable inorganic part. The city generates about 5 MT of waste per day which is significant amount. All the waste management work carry out in city is done as per solid waste management and handling rules 2000. For the purpose of waste management the city has been divided in five zones and work is also divided accordingly.

Fig. 1. Map Of Maharashtra, India **Fig. 2. Map Kolhapur District showing location of Gadhinglaj**

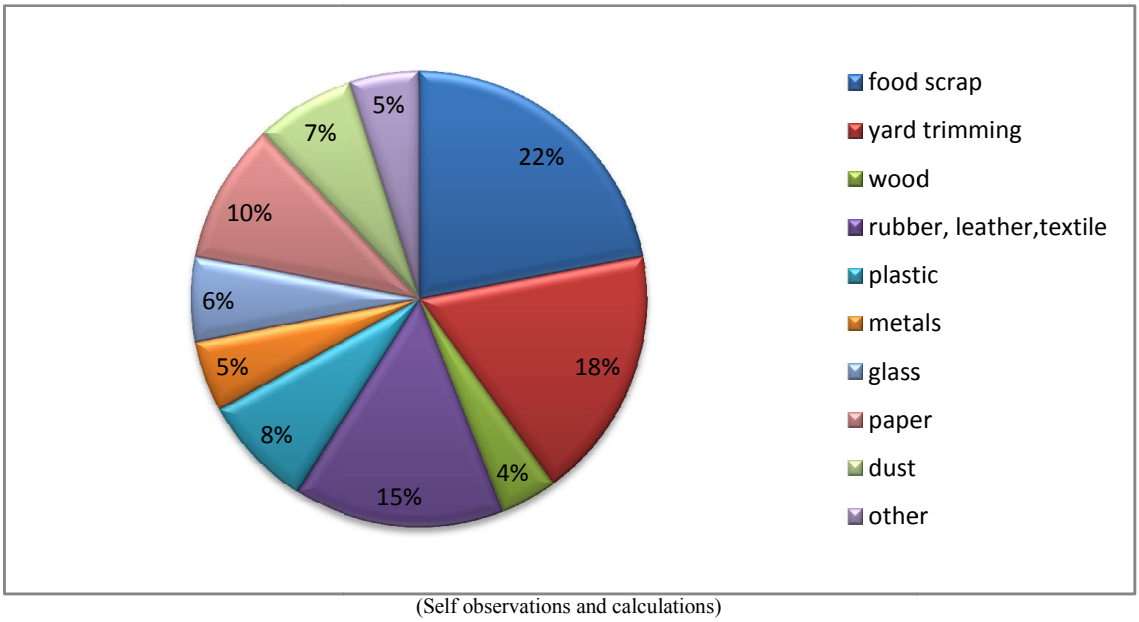
Fig. 3. Satellite Map showing study area of Gadhinglaj. (Source: www.google.co.in)

Workers can do daily 3000sq, m cleaning of roads and 300m of gutters. But as considering growth of the city this manpower is not enough. Therefore private contractors invited by bidding and nearly 268000 sq. m of area are cleaned by private contractors. House to house collection system is adopted for collection of waste. Presently there are 2 refuse vehicles (tractor) (with 5workers), 4 push carts (with 2workers) is utilize for collection. The Cost of collection is 3700Rs /day. Presently all the waste is stored at Gadhinglaj compost yard, Neharu nagar, the total area for storage is 2 acres and storage capacity of the plant is 300 to 400 Tones, For Pedestrians 72 No of cement Dustbins are provided at certain places and 40 small dustbins are also placed at some places. The waste from these bins is collected frequently. For disposal of solid waste, the facility of land filling is provided at 1km distance from the city. Also the composting plant is situated at the same place, there is need to inspect working and efficiency of the plant.

domestic area generates more than 50% biodegradable waste which highlights its potential for composting. When these waste reaches at dump site the percentage of food scrap decreases to 22% and that of yard trimming comes around 18%. The percentage of food scrap at the commercial source is very negligible (i.e. 3%). These numbers are very interesting about recyclable waste (i.e. plastic, rubber, leather, and paper, metal. Glass Etc.). The total recyclable waste at dumpsite is found to be 44% but it is at domestic source is about 15 % and that of 76% at the commercial source which shows the possible recyclable opportunities at these sources. Among recyclable waste plastic seems to be major part. It is consumes29% of waste at commercial end. These observations show that the composition changes significantly according to locations of sources of waste. If the collection of these wastes is done separately then there are opportunities of composting as well as recycling of waste.

Table 1. Observations of sampling No. 1 –AT STORAGE STATION

Sampleing Station.	1	2	3	4	5	6	7	8	9	10	Avg	%
CATEGORY	(wt in gm)	(wt in gm)	(wt in gm)	(wt in gm)	(wt in gm)	(wt in gm)	(wt in gm)	(wt in gm)	(wt in gm)	(wt in gm)	(wt in gm)	percentage
Food scrap	225.66	268.23	156.39	190.23	333.34	220.21	270.11	226.43	135.88	192.26	222.4	22.24
Yard trimming	193.08	150.09	200.69	180.26	120.36	223.39	200.89	190.11	180.26	170.30	180.9	18.09
Wood	37.96	25.27	29.36	15.36	36.59	50.51	35.35	20.15	35.34	60.26	34.31	3.43
Rub,leath, text	156.93	188.47	137.26	160.37	133.37	190.11	100.25	190.26	150.29	137.25	154.4	15.44
Plastics	49.92	92.76	75.69	56.69	37.35	35.26	115.77	137.29	93.36	122.34	80.64	8.06
Metals	43.85	22.89	57.79	60.69	26.20	37.25	93.92	40.12	74.35	50.29	51.03	5.10
Glass	59.60	80.32	60.60	59.33	66.32	56.56	65.82	70.29	50.26	45.54	61.46	6.14
Paper	73.27	116.62	125.37	60.37	150.15	109.26	60.37	55.54	130.26	77.82	95.96	9.59
Dust	103.4	30.05	92.66	120.3	63.46	43.50	35.39	11.25	70.05	100.12	66.97	6.69
Other	56.33	25.30	64.19	116.4	32.68	33.95	22.13	58.56	76.95	53.82	54.03	5.40



(Self observations and calculations)

Graph 1. Composition of Waste from Sampling No 1 –At Storage Station (i.e. At dumpsite)

Characteristics of waste

Waste samples have been collected from different places as mention in methodology and their composition was determined. The primary finding is that the waste from the city is moreover organic, the food scrap in domestic source is found to be 38%, and that of yard trimming is 14% it means the

The detail readings of waste percentages at dump site are shown in Table 1. Likewise other readings are taken and graphs are ploted, which are shown in Graphs 1, 2, and 3.

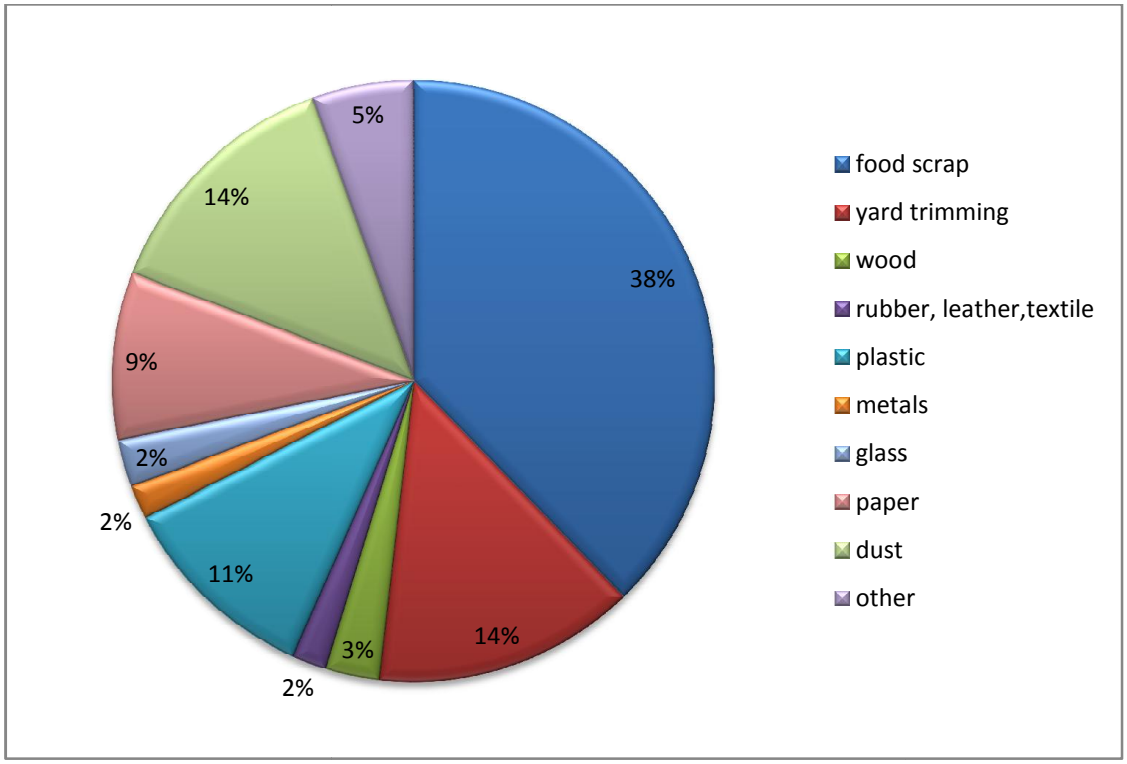
Moisture content

The moisture in a sample is expressed as percentage of wet weight of Solid waste material. First of all categories of wastes

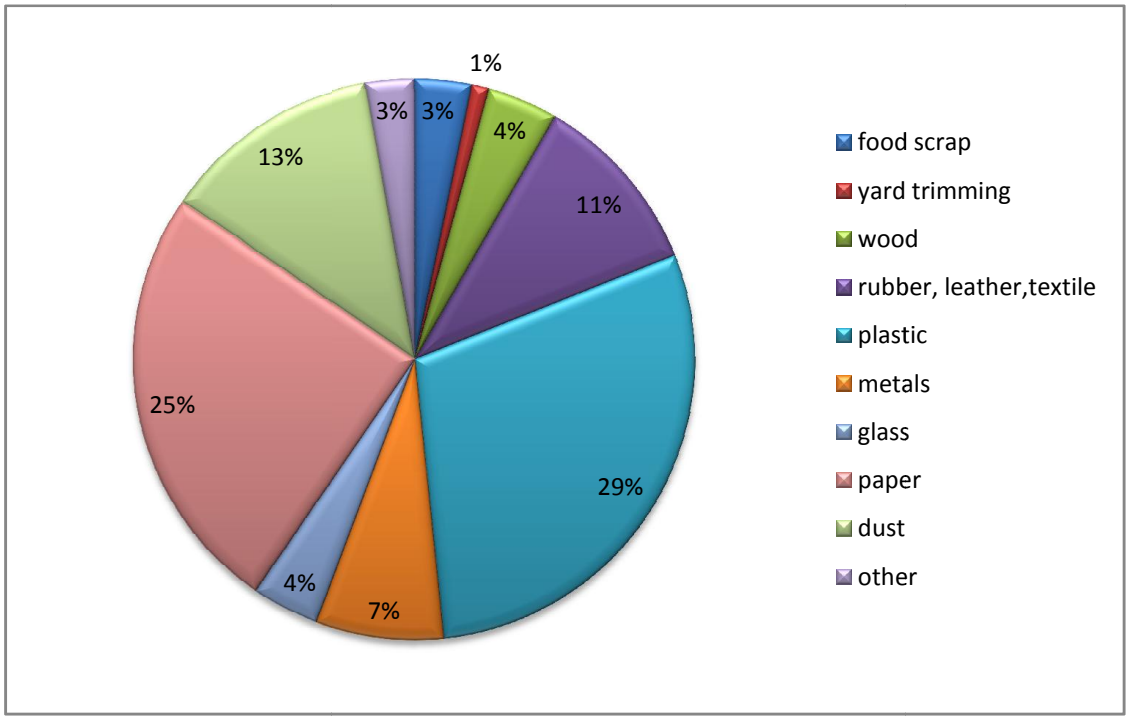
are separated and 100gm of each category is taken for calculation of moisture content. From observations we can say that among all categories of waste, food waste containing maximum of moisture content, the graph 4 is showing the percentage of moisture content in the waste, the food waste has more than 50% of moisture content. And other categories like paper, plastic, textile, rubber, leather, glass has less moisture content. The overall waste was found to be moist which shows that there is need to segregate waste in wet and dry waste at domestic sources.

Temperature

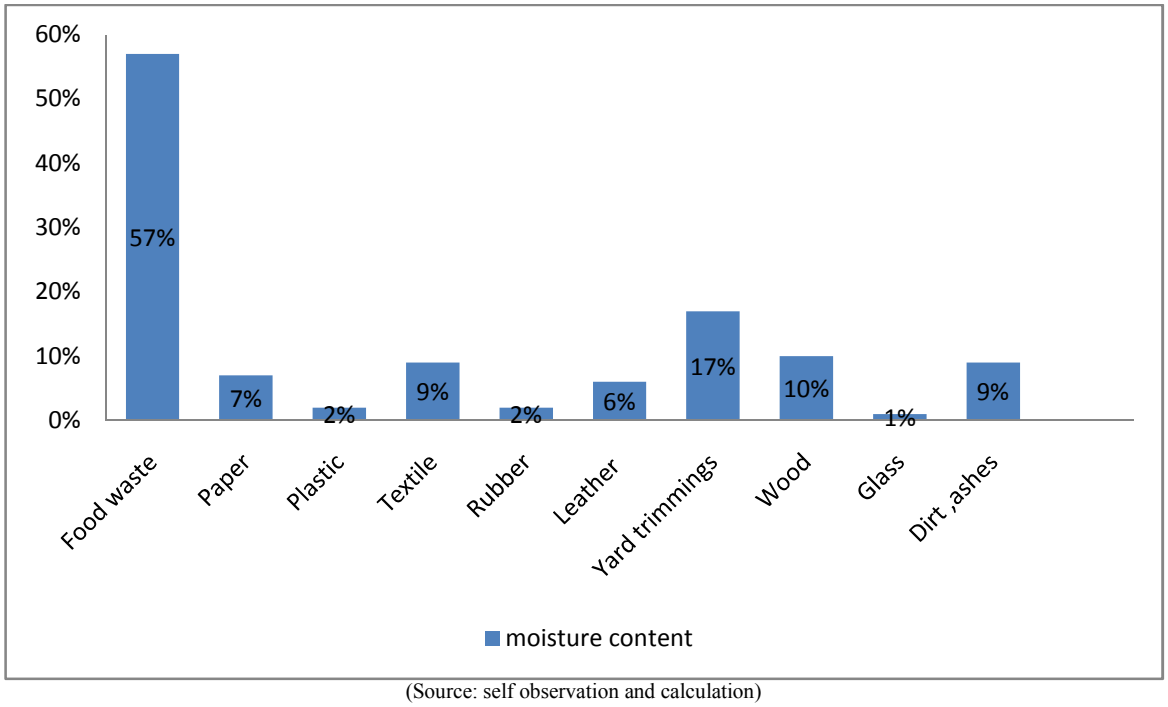
The temperature of waste is important characteristic of waste because the disposal facilities vary according to temperature; the high temperature waste can cause fire and smoke problems in landfills.



Graph 2. Composition of waste from sampling No 2- At Domestic Source



Graph 3. Composition of waste from sampling No 3 - At Commercial Source



(Source: self observation and calculation)

Graph 4. Moisture content chart

Table 2. The table showing observed values of temperature of waste

Source	(Temp) T1	T2	T3	T3	T5	Avg. Temp (°C)
At storage station(dumpsite)	26	27	25	24	26	25.6°C
At domestic source	25	23	26	22	23	23.8°C
At commercial source	23	22	24	23	23	23.0°C

(Source: self observation at field)

The average temperature at the storage station is found to be $25.6^{0,}$ average temperature at the domestic source is 23.8^{0} and It is at commercial source is 23^{0} (Shown in Table 2). Beyond that some fire incidences and smoke problems are found at the land filling site which is result of increased temperature of waste.

Conclusion

Solid waste management is one of the difficult threats in front of world, the change in habitats of people, rapid development are responsible for large generation of waste, This waste is creating problems to public health, drainage, aesthetics, of the cities, Proper collection, storage, processing, transport and disposal of waste will lead to minimisation of waste impacts, Gadhinglaj city is generating 5MT of waste per day, and the quantity of waste is considerable as compare to extent and development of city.

Presently there is landfill (not engineered) facility for disposal of waste which is not efficiently working. Analysis of waste samples determines that the 38% food waste generated at the domestic source end which can be easily composted and dumpsite contains 44% of recyclable waste and It is 76% at commercial sources which can be possible to recycle.

The moisture content: food waste: 57%, Paper: 07, Plastic 02%, Textile 09%, yard trimming 17%, wood 10% and Temperature of waste: the temperature of waste ranges from 23°C to 25.6°C. With proper collection facilities and provision of efficient disposal facilities the waste from the city can be managed well. So this study of waste composition at various sources will be useful to municipal council to understand the collection points of waste which are more beneficial.

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