

SOLID WASTE MANAGEMENT AND MATERIAL RECOVERY IN AN URBAN AREA IN INDIA –A CASE STUDY OF NALGONDA DISTRICT (TELANGANA)

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ABSTRACT

Present status of municipal solid waste (MSW) management in Nalgonda district in India is not satisfactory and deserves improvement. The rate of per capita generation of MSW and total quantity of waste generated was estimated at 0.112 kg/person/day and 38.282 tons/day respectively. Over all grab samples were collected, flow representation location and analyzed for physical and chemical characteristics. Nearly 150 rag pickers recover 10-15 tons of material like paper, plastics, metals etc. Values of compostable matter (TCM 20-25%) render composting yard and compost to market yards, decentralized composting adopting a novel method of "compost parks" where in vacant space in public places like parks, educational institutions, office complex etc. is suggested. A Pilot vermin composting unit constructed at Hyderabad, India successfully demonstrates the feasibility of compost parks.

KEYWORDS: Waste Management, Solid, Material Recovery, Area, District, Nalgonda, Telangana, India, MSW, Plastics Metals, Hyderabad.

INTRODUCTION

Municipal solid waste is an unavoidable consequence of urbanization and is ever increasing in quantity and complexity. Solid waste management, at present in many of the urban local bodies (ULB), in India is far from satisfactory and deserves important. This paper presents the status of municipal solid waste management (MSWM) in Nalgonda in India and studies to improve the same. Nalgonda is a Telangana famous business & education center of the Nalgonda city in Nalgonda district in Telangana (latitude longitude 17.1883° N, 79.2000° E). Nalgonda is a

city is located in eastern costal line of nalgonda district of the Indian state of telangana about 100 kilometers of the state capital nalgonda. Telangana is a state in southern India. In the capital of Hyderabad, the Charminar is a 16th-century mosque with 4 arches supporting 4 towering minarets. The monument overlooks the city's long-running Laad Bazaar. Once the seat of the Qutb Shahi dynasty, the sprawling Golconda Fort is a former diamond-trading center. In the city of Warangal, the centuries-old Warangal Fort features carved stone towers and gateways.

PRESENT STATUS OF SOLID WASTE MANAGEMENT IN NALGONDA DISTRICT:

Status of solid wastemanagement in town is not satisfactory. The urban area is divided into 2 divisions and each division is having one sanitary inspector to monitor solid waste collection, transport and disposal. The mode of collection of solid waste in town comprises of three types namely door to door collection through tricycles, community bin system and hauling containers

The municipal corporation provides the tricycles and the man power is produced by local non-government organizations (NGO'S)

There is no segregation of waste as biodegradable and non-biodegradable at source and therefore the waste is mixed and heterogeneous solid waste from major part ofis collected by community bin system where in,70 community bins are placed at street locations scavenging crew empties the bins once in a day or twoas per the routing schedule of the vehicle into the tractor trailer and when full, carry to the disposal site.in some important places, hauling containers are placed to collect the waste collection and transport facilities are inadequate

Scientific data regarding the quantity of generation of solid waste is not available though it is estimated by the municipal authorities that around 75tons of solid waste are generated per day (@ 0.21 kg/per capital/day) .MSW is collected and transported in tractor trailers, situated at a distance of 25km where solid waste is disposed of by open dumping without any scientific method of disposal and technical supervision present disposal practices are not scientific and most on organized with waste scattered all over, stray animals helping themselves and rag pickers searching for recyclables thespending Indian rupees (INR) 6.00millions/year for collection and transportation of MSW

ESTIMATION OF QUANTITY OF MUNICIPAL SOLID WASTE:

A detailed survey was conducted to assess the quantity of municipal solid waste generated population of town was 154,326 as per the census report of 2001. Census data regarding population was collected for the years 1961, 1971, 1981, 1991, and 2001.

Rate of per capita waste generation was determined employing the method of house –to house collection of solid

wastes are collected in a single trip are enumerated total quantity of waste collected by a tricycle from houses in a trip was weighed on a weighing bridge the difference between the weight of tricycle laden with solid waste and empty tricycle is constructed as the quantity of solid waste generated by the contributing population table 1 gives data regarding number of houses , contributing residential population, gross weight tare weight and net weight of four tricycles that were considered. The rate of per capita generation of municipal solid waste was obtained as 0.70kg/person/day this rate of per capita generation of municipal solid waste compares well with 0.80kg/day of a pervious study and augurs well with the per capita values of 0.09-0.12 kg/day for different Indian cities (Bhide, et.al, 1975. The total quantity of municipal solid waste generated is determined by multiplying this per capita rate of generation with contributing population (0.150x127000) as 46.202T/day. Thus there is a huge variation of 0-15T/day of the quantity of municipal solid waste generated.

Table 1 Per Capita Waste Generation

Tricycle	No of houses	Contributing population	Gross weight	Tare weight	Net weight	Per capita generation
1	45	175	120	48	168	0.121
2	36	250	110	48	158	0.141
3	27	195	95	48	143	0.134
4	32	120	102	48	150	0.95

Average =0.3365

DETERMINATION OF CHARACTERISTICS OF MUNICIPAL SOLID WASTE:

Entire nalgonda city was surveyed to determine the locations (sampling points) for collection of representative samples.in all, the various sampling points were selected with due considerations from various residential areas, few from commercial areas and few from disposal site. Grab samples of 3.52-5.00 kg were collected following the recommended procedures in a polythene bag, sealed immediately and were brought to the laboratory and were analyzed immediately for physical characteristics, physical components and chemical character istics following relevant standards and stipulated procedures

Table 2 Characteristics Of Municipal Solid Wastes Of Nalgonda

s.no	Component/parameter	Value,%
1	paper	5
2	plastics	4.01
3	rags	3
4	metals	7.5
5	rubber	0.4
6	glass	0.9
7	Silt, fines and others	2.26
8	Total compostable matter	26.11
9	Moisture content	27.01
10	Density ,kg/m ³	180.00
11	carbon	2.6
12	nitrogen	0.98
13	Phosphorus as p ₂ O ₅	2.23
14	Potassium as k ₂ O	0.52
15	PH	7.43
16	Electrical conductivitymho/cm	8.76
17	C/N ratio	9.88

Time and motion studies:

Urban local bodies spend about RS. 200-150/- ton on municipal solid waste. Collection and transport of municipal solid waste is a highly visible and important municipal service and involves a large expenditure, 20-25% of the total cost unfortunately, this service receives very little technical and scientific attention. The vehicles make a number of trips every day to the disposal site on routes which are not planned, often long, unspecified and uneconomical. Presently, Municipal Corporation has engaged 7 tractor trailers, 2 bag tippers, 4 small tippers and 1 dumper placer for transportation of municipal solid waste to the disposal site which is collected 15km away from the town. The time of start, time taken for emptying collection bin and load into the tractor trailer at the collection point, time required for travel between collection points, time of travel for reaching disposal site, time taken for emptying at

disposal site etc. Were obtained from a detailed and simultaneous time and motion study of all 10 vehicles to determine the distance traveled, time taken and weight transported to the disposal site in each trip

Material recovery:

A detailed survey was conducted the number of rag picker thus salvaging 5-8T of recyclables materials per day. These material are sold and a rag picker on an average earns RS 100-150/day. Thus the value of recyclable materials salvaged by rag pickers works out to the street and purchase the old/used newspapers, glass bottles, metal cans, pipes, plastic items, etc. Approximately 25-50kg of recyclable materials is purchased by them earn RS.100-150/person/day. Therefore the total quantity of material salvaged and recycled by rag pickers (300 in numbers)

Composting/vermin composting of municipal of solid waste:

Analysis of municipal solid waste indicated nearly 45.02% of the material to be compostable (TCM) and therefore composting of solid waste after segregation as an appropriate method of solid waste management.

Pilot vermin composting unit at Hyderabad rural area:

A pilot vermin composting unit comprising two numbers of 2.00x1.00x1.00 m was constructed with brick, masonry in the month of November, 2007 in the premises of Lion’s club. The bottom is bed of depth 60 cm was prepared in one chamber with the biodegradable waste mixed with cow dung. Several pairs of *Esenin foetida* and *Tendrils ingénue* earth worms brought from surrounding rural areas, where vermin composting is practiced for Municipal solid Waste, were introduced into the vermin bed.

S.No	Nutrient	Value, %
1	Carbon	7.29
2	Nitrogen	0.79
3	Phosphorus as p ₂ o ₅	0.65
4	Potassium as k ₂ o	0.56
5	pH	2.26
6	Electrical Conductivity, mho/cm	2.26

The concept that was generated in this club is being used with in this club and growth of plants is observed to be good

Cost analysis Of Municipal Solid Waste:

From the Characteristics of Municipal Solid Waste, an analysis of possible material recovery and money realization was made the rates for these items are the rates that are being paid to rag pickers.

Table 4 Economic value of 1.0T of MSW of nalgonda:

S.No	Item	%by weight	Quantity in kg	Rate in Rs/kg	Amounts in Rs
1	Paper	2.33	58	3.00	348.30
2	Plastics	1.52	43	10.00	1225.00
3	Rags	0.52	9.2	0.00	0.00
4	Rubber	0.02	0.36	10.00	9.00
5	Glass	0.12	0.09	10.00	25.00
6	Slit and Others	2.25	12.49	0.00	0.00
7	Total Compostable Mater	10.93	299.54	3.00	1352.40
Total 422.8142					

CONCLUSIONS

Solid waste Management involves management of activities associated with generation, storage, collection, transfer and transport, processing and disposal of solid wastes in an environmentally compatible manner adopting the principles of engineering economy, esthetics, energy and conservation. There, a Scientific approach to solid waste management with reliable estimation of quantity and characteristics, macro and micro routing for optimization of collection and transport of wastes, organized recovery of reusable and recyclable materials, segregation and decentralized vermin composting in public places like parks, etc.(Compost parks) and paper disposal is suggested for a sustained waste management with recycle/conservation.

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