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MANAGEMENT OF MUNICIPAL SOLID WASTE: A STUDY OF SMALL SCALE MUNICIPALITY

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ABSTRACT

Municipal solid waste is nowadays becoming more area of concern due to increase in population and decrease in area for disposal of the same. Study and work has been done in metro and large cities while medium scale and small scale towns and villages are neglected for municipal solid waste management. Paper indicates identification of town according to population. India comprises of 70% population in medium and small scale town and villages thus any problem related to environment can be solved only when this area is focus. Study has been done in small scale municipality of sojitra, Gujarat state Suggestion has been done for better solid waste management. Analysis of waste is also done for study purpose and it is found that waste comprises of major portion of organic waste which can be handled properly for making natural manure or for utilizing as alternative fuel.

KEYWORDS: municipal solid waste management, sojitra, small scale town, natural manure, population and alternative fuel

INTRODUCTION

In all developing countries municipal solid waste management is becoming major issues as change in social and economic lifestyle has increased in amount of municipal solid waste world wide. Proper management of solid waste is critical to the health and well-being of urban residents (World Bank 2003). There is constant increase in municipal solid waste which increases the problem of management of the same. There are uncontrolled sector for disposal of solid waste in developing country like India. India has 641,000 inhabited villages and 72.2 percent of the total population resides in these rural areas. There are 3,961 villages that have a population of 10,000 persons or more. India's 27.8 percent urban population lives in more than 5,100 towns and over 380 urban agglomerations. In this regard small town centers are considered as the first urban centers and a part of rural regions and also considered as a link between rural regions and larger cities. Any activity in these centers will first directly influence rural areas (Fanni, 2003). Hinderdink et al.(1998) state that the role of small towns is very important in urban-rural relations but these relations are mainly ignored. Especially Randinly (1983) emphasizes the developmental role of these towns in providing a range of services for the area under their control (Hinderdink and Titus, 1998). In general, small towns can be considered as centers, which play an important

role in reinforcing developmental stimulants and in developing rural regions under their control. In addition, solid waste management is hampered by a lack of data at all levels from the ward, district and municipality, and where available, is generally unreliable, scattered and unorganized (World Bank 2003). Better lifestyle will also reduce the rate of rural urban inflation which can give a better growth rate for a developing country and improvise environment of urban towns also. As there is increase in populating and modernization in rural and small towns which has increased generation of solid waste from the population. The MSW amount is expected to increase significantly in the near future as the country strives to attain an industrialized nation status by the year 2020 (Sharma and Shah, 2005; CPCB, 2004; Shekdar et al., 1992). Studies have been mostly carried out in large or medium and large scale town and municipalities. It is found that in large or medium scale cities sufficient number of trained personnel for solid waste management, sufficient financial support from government and public for cleanness, public awareness for solid waste is more as compare to small scale town. Small scale town are neglected for infrastructure development and other amenities due less awareness amongst public.

A study is done to study waste management and character of a small scale municipality in Gujarat

state. This can give a rightful direction to municipality and population for proper management of municipal solid waste. Municipality is selected according to classification given by the urban development and urban housing department of government of Gujarat. According to census 2001 data there are 18 class A municipalities, 33 class B municipalities, 45 class C municipalities and 63 class D municipalities. Class D municipalities comprise of small villages around and have very few facilities for municipal solid waste and infrastructural development reaches these areas little slow and less due to low population and non political influence. But these municipalities can act as interface between medium municipalities which can be a scientific and economical solid waste management for both the municipalities.

For study purpose sojitra municipality is selected in Anand district of Gujarat state. Study of existing facilities and method is done and further detail study of character of waste is done for better waste management system The Ministry of Environment and Forest (MoEF) of the government of India has issued MSW management and handling) rules in the year 2000 for scientific MSWM Local authorities often see MSWM as a poor service compared to other basic services because MSWM can barely recover operating costs.Due to a number of problems, they have not been very effective as far as SWM services are concerned (Siddiqui et al., 2006; Kansal, 2002; MoEF, 2000; Gupta et al., 1998) during proper collection, segregation, transportation, processing and disposal of MSW and upgrade of the existing facilities to arrest contamination of soil and ground water.

RESEARCH METHODOLOGY

Sojitra is a village in the Indian state of Gujarat . It is in the Anand district, situated at 22°33′N 72°43′E. The total distance between Sojitra to Anand is 23 KM (kilometers) and 651.49 meters. According to census 2011 population of sojitra is 19720 persons. Total area of sojitra is 14.3 Sq KM (urban development mission).Data of municipality indicates that 20 percentage of population comes under high income group, 30 percentage of population are middle income group people and 50 percentage of population is low income group. There are two major commercial areas in the town market area and bahgol other areas have small cluster of commercial activities. New development of residential area is found in navagahra area which has high to middle income population. Nearly 80% of population are working in agriculture rest are either in job or small business. There are two big hospital and high school

for both girls and boys. Sojitra has hot and humid climate in summer, an average rainfall is 1015 mm during monsoon and climate is dry and cold in winters Climatic factors play a crucial role in the municipal waste management of the study area. For example, during the wet season, heat and humidity cause the municipal solid waste to be of higher moisture content thus increasing the weight of the refuse. In addition, high humidity with heat causes the organic portion of the waste to decompose quickly leading to problems in handling and disposal, which directly affects the environmental health of the waste workers and the inhabitants. In this detail study is carried out for existing solid waste management system by the municipality authorities. Municipality is supported by government of Gujarat by providing 30 large bins of 4 to 5 tonne carrying capacity and small container of 250 to 300 Kg of carrying capacity for door to door collection. To drive large bin to disposal site tractor is provided and for transporting small containers hand/cycle cart is provided. One sanitary inspector and 41 persons are provided for over all sanitation of the town which includes municipal solid waste management. Solid waste is collected from large bins once in two days and thrown in low line area which is consider as dumping site no scientific care is take of the site nuisance of insects, flies and leached is found at the dumping site. Earlier an area near railway station was consider for dumping but now chara area is consider for dumping no segregation is done before dumping. Area near dumping site has bad odor and unwanted site. Unscientific disposal causes an adverse impact on all components of the environment and human health (Rathi, 2006; Sharholy et al., 2005; Ray et al., 2005; Jha et al., 2003; Kansal, 2002; Kansal et al., 1998; Singh and Singh, 1998; Gupta et al., 1998). Street weeping for major road is done every day and for internal road is done once in two days. Waste collected from street sweeping is also dumped with other waste. No segregation is found agricultural and cattle waste is dumped in side of the farms where it gets compost with due course of time. A sweeper who sweeps the roads manually is allotted a specific area (around 250 m^2). During study door to door collection of solid waste was started first on two major lanes and now is followed in entire town waste is collected door to door daily and collected in big bin which is taken to landfill site once in two days. There are twenty large bins placed in entire town at different location looking to population and commercial activity of the area. The quantity of MSW generated depends on a number of factors such as food habits, standard of living, degree of commercial activities and seasons (Mufeed Sharholy

et al,2007). Primary segregation is done at residential level as recyclable and resale things are segregated at primary level on personal basis. For study purpose 10 large bins were selected so as representative sample is obtain for the study. Weight of the bin was done to get total volume of waste coming out of the area. Weights of the bins were taken in computerized commercial weighing machine near sojitra chokdi. It is found that at many places where commercial or construction activities are going on quantity and weight of the waste is more. Weight of waste collected in large bins alternate day.

Table 1.Quantity of solid waste according to social economical status

AREA	SOCIO ECONOMIC STATUS	WEIGHT OF WASTE (KG)
Market area	Semi commercial area	972.5
Vankar vas	Social backward	760
Madar	Socially/economically backward	720
Falanagar	Mixed area	682.5
Shasan	Mixed area	650
Sat kaival mandir	Mixed area	510
Vaghrivas	Socially/economically backward	470
Bhagol	High income	392.5
Chokdi	Semi commercial area	380
Nava ghara	High income	307.5

Figure:1

Graph of weight of waste (kg/two day)
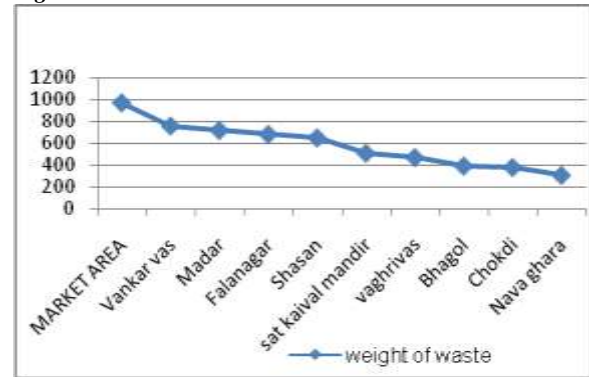
From the above data it can be seen that waste is found maximum at market area as it is commercial area. Due to new developing area less waste is found in navaghara area as developing is still going on in the area .Total waste generated is found to be having close values for areas having same socio-economic status. Market and chokdi having same statue show different graph as market have more other waste as small construction work going on during collection of sample. Physical Analysis of waste was done taking sample from each bin. Segregation and weighing of waste was done on site so as no changes are found in sample. Analysis was done for organic waste, inorganic waste and debris as separate component. Dry weight of the waste is considered for study work.

Satkaival mandir and shasandevi mandir both are area of religious importance for Hindus and jains respectively thus analysis of waste is almost same it has almost equal amount of three type of waste. It is seen that socially/ economically backward areas like madar and vagri vas shows different type of waste at one area organic waste is found more while other area shows low organic waste and high inorganic waste which is generally found in socially backward areas in other countries also. Composition of municipal solid waste provides a description of the constituents of the waste and it differs widely from place to place (Kuruparan et al. 2003). The most striking difference is the difference in organic content which is much higher in the low income areas than the high income, while the paper and plastic content is much higher in high income areas than low income areas. This reflects the difference in consumption pattern, cultural and educational differences. In higher income areas disposable material and packaged food are used in higher quantities; this results in the waste having higher calorific value, lower specific density and lower moisture content. In the case of lower income areas, the usage of fresh

vegetables to packaged food is much higher. This results in a waste composition that has high moisture content, high specific weight and low calorific value (Dhussa et al. 2000; Klundert and Scheinberg 2001). This is found that new developing area Navghara has low organic waste as number of resident is less in the area. While have high inorganic waste may be due to construction works going on for new houses.It is found from the studies that high organic waste is generated from a small municipalities due to occupation of people mostly is agriculture and less urbanization. The two leading innovative mechanisms of waste disposal being adopted in India include composting (aerobic composting and vermi-composting) and waste-to-energy (WTE) (incineration, pelletisation, Biomethanating). WTE projects for disposal of MSW are a relatively new concept in India. Although these have been tried and tested in developed countries with positive results, these are yet to get off the ground in India largely because of the fact that financial viability and sustainability is still being tested (Lal, 1996; Khan, 1994). At interface and small municipalities municipal solid waste can be treated considering quantity and quality of waste along with availability of man power and financial matter.

CONCLUSION

Form research it if found that most difficulty faced by small town/municipalities is proper analysis of waste which was done in research methodology which will give proper method of disposal and treatment. Person involved in solid waste management need to be given training for proper handling and disposal of waste generated. Waste to energy method of treatment requires constant supply of organic waste which can be obtained if integrated waste for small villages and medium municipality is consider in general but there will be increase in cost of transportation of waste from one center to another. Moreover this method very skilled personal for continuous monitoring and proper working of the system which is not very feasible in small and medium scale town in developing country. Integrated solid waste gives a better solution for management of organic and in organic waste for organic waste coming out of medium scale town Vermicomposting can be a better treatment as it gives manure from the waste which can be utilized for improvement of solid for agriculture. It is found that nearly 80% of population has farming as main occupation which can improve living standard due to it. One of the solutions for collection can be given as alternate day collection of waste for organic waste and inorganic waste. As calorific value of organic municipal solid waste is found to be high it can be utilize as alternate fuel for industrial purpose.

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