Available online at www.joac.info

ISSN: 2278-1862

Journal of Applicable Chemistry

2014, 3 (1): 245-253

(International Peer Reviewed Journal)

Solid Waste Management in Hyderabad, Andhra Pradesh –A Review

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Accepted on 27th December 2013

ABSTRACT

The development of a city can be achieved in many ways. With respect to its impact on solid waste management, development is categorized on the basis of availability of economic resources and on degree of industrialization. Status of economic development is more a measure of the permanent economic framework than of the existing condition of the economy (recession vs. prosperity). In the present context solid waste management is primarily non-industrial and attaining a great concern. Such management is adapted to the nature and quantities of waste generated and to the availability of technology for handling and processing characteristic of non-industrial settings. Degree of industrialisation is measured in terms of extent of mechanisation and availability of technological resources. In the developing countries especially in the Indian cities industrial settings should be established to manage the various wastes that are generated for an effective management. In view of the solid waste management some possible strategies are suggested to improve the present management systems in the present paper.

Keywords: Municipal solid waste, solid waste management, sustainable development.

INTRODUCTION

Hyderabad (or Hyderabad-Secunderabad twin city) is the sixth largest metropolis in India, with a population of 7.75 million in 2011 in the urban agglomeration. It is the capital city of the southern Indian state of Andhra Pradesh, occupying 650 sq. km (250 sq mi) on the banks of the Musi River and also the largest city in the state. The city is known for heritage buildings, Pearls and now for Information Technology (IT) [1]. The twin city has an area of 170.0 sq. km and is part of larger Hyderabad Urban Development Authority (HUDA) that spreads over 1864.0 sq km. The other towns in HUDA are Cyberabad (Cyberabad Development Authority-CDA), Secunderabad Cantonment (Secunderabad Cantonment Board - SCB) and Buddha Purnima Project Area (Buddha Purnima Project Authority - BPPA). HUDA is the planning authority for the entire HUDA area (except the three special authorities mentioned above; CDA, SCB and BPPA). MCH area forms just 9 per cent of the total HUDA area. MCH has jurisdiction over the twin cities except the SCB area. Besides the twin city and three special authorities mentioned, there are 10 Municipalities and 105 Gram Panchayats in HUDA. area. HUDA consists of MCH, SCB, Osmania University, 10 Municipalities and outgrowths. The twin city has 3000 km length of road network maintained by the MCH. Hyderabad Metropolitan Water Supply and Sewerage Board (HMWSSB) is a separate agency, which looks after the water supply and sewerage in the MCH area. The

water supply is metered and the sewerage system covers about 70 per cent of the MCH area. Storm water drainage and Solid Waste are managed by the MCH itself. Hyderabad is one of the first urban centres, which has effectively experimented with a wide range of contracting system, starting from leasing to management contracting. MCH has been awarded with Cleanest City Certification for two consecutive years by rating agency Crisil. The Hyderabad city in Andhra Pradesh is shown in figure1.MCH is working under a programme titled, 'Litter- free Hyderabad' in the twin cities to bring about a major change in the city sanitation involving the citizens. The programme aims in segregating of garbage at source by the residents into organic waste and recyclable waste and converting the organic waste into nutrient rich manure by vermin composting locally. The Resident Welfare Associations (RWAs) in the housing colonies and Neighbourhood Committees (NCs) in the slums are participating in this programme. RWAs and NCs are permitted to establish Vermi composting centres in the localities. One time cost for setting up of vermi composting centre is provided by the MCH and the recurring cost for maintenance is generated by the agencies through collection of service charges, sale of vermi compost and recyclable materials. About 1.2 lakh households have been motivated through RWAs and NCs for the collection and transportation of garbage. However, presently, the segregation of waste has not been fully achieved as yet by the MCH. The twin city is divided into 52 wards under 7 circles.

Figure 1. Hyderabad in Andhra Pradesh

The city today generates 2200 Metric Ton (MT) of garbage daily. Of this 60 per cent (1300 MT) is from the residential sector and the remaining 900 MTs from non residential areas. MCH is able to manage this in spite of no new recruitments or retirements in the workforce for the last two decades. 22 per cent of the waste is collected at household level under Volunteer Garbage Disposal Scheme (VGDS), implemented through Neighbourhood Committees (NCs). 75 per cent of the road cleaning work is privatized using the unit rate system innovated by MCH. Private contractors sweep daily around 2000 km length of roads. Those who sweep the roads also manage the solid waste management. This programme of 'Litter-free Hyderabad' has enabled the MCH to reduce transportation of 500 MT of garbage per day, save transportation cost of Rs. 4 crore (Rs. 40 million) per annum (of Rs. 12 crores annual cost) and reduce the need and the cost for development of landfill sites for disposal [2].

MATERIALS AND METHODS

Solid waste Management: Of all the total solid waste generated from different sources such as households (slums and non-slum areas), markets, other commercial spaces, and so on, 52 per cent is organic waste (table 1). This consists of 5.99 per cent of leaves, 12.42 per cent of the fruits waste, another 18.08 per cent of vegetable waste, 8.88 per cent of coconut waste and 3.09 per cent of food waste. The solid waste generation within MCH has increased at a rapid rate especially from the household sector. Among all the sources, households generate the largest amount of waste and largest increase from this source is therefore a point to be noted. The main reason for the increase of house hold waste is increase in the population drastically with in the city. The Municipal Solid waste Management System is depicted in figure 2.

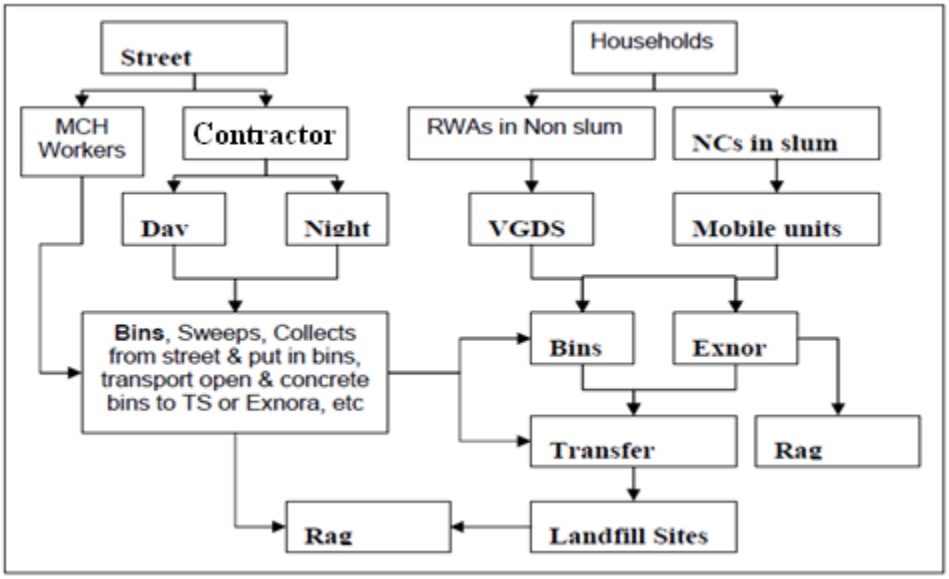

Figure 2. Solid waste management system MCH

Sweeping the roads: According to the Supreme Court guidelines 2000, an efficient sweeping can support a better SWM, because one of the main problems is garbage on the roads. MCH has tried to achieve a better SWM via an efficient sweeping. The 8,000 strong conservancy workers consisting of the corporation staff and the private contractors sweep the city based on the formations called units (day and night) innovated by the MCH.

There are some units that sweep in the day and the others that sweep in the night. Of the total sweeping staff, 3,592 are the corporation employees, and the rest are the employees of the private contractors, including the workers of the 14 DWCUA groups. Under Development of Women and Children in Urban Areas (DWCUA) scheme, women have made Shelf Help Groups (SHGs). 14 such SHGs have also been given the contract to sweep the streets. This is what is the innovation in Hyderabad and also many other cities in Andhra Pradesh. After the sweepers sweep the street, they collect the waste lying on the road and deposit the same in the dustbins. The placing of dustbins on the roads and streets is based on the people's choice. Wherever they have been throwing the waste, that place is given a dustbin and it becomes a collection point. The collection system is spread across the city. This private contracting system of MCH has evolved with time. Initially, private contractors were entrusted with the sanitation contracts for cleaning the streets and collection of garbage. These contracts were not uniform in size and works were of various magnitudes. This was creating an unhealthy competition among the contractors and monitoring the works was turning out to be difficult [3].

Table 1. Solid waste composition, MCH

Solid waste item	Proportion in total (%)
Leaves	5.99
Fruits	12.42
Hay & Straw	3.67
Vegetables	18.08
Food Waste	3.09
Coconut	8.88
Paper	8.04
Plastics	8.36
Metals & Minerals	1.40
Glass	2.71
Ash & Fine earth	6.63
Fine organic Waste	15.57
Stones & Bricks	1.00
Others	0.42
Rubber/Leather	1.59
Racks	2.35
Coal	0.10
Wood & Metal	Nil
Crockery	Nil
Bones	Nil
Earthenware	Nil
Total	100.0

Source: MCH Handout

Municipal Solid waste Collection: The MCH introduced a voluntary garbage collection scheme in 1994 and it has been functioning since then. The scheme provides a full subsidy to voluntary agencies and resident associations to undertake house-to-house collection of garbage. The association submits a signed list of households it will serve. The subsidy covers a tricycle for every 100-150 households. The association is responsible for appointing and supervising the staff The tricycle puller must be paid at least Rs. 750 per month with every household contributing at least Rs 10. Under this scheme, about 600 localities, representing about 20 per cent of the population, have been covered. While the scheme is also operational for slum area by creating neighborhood committees, the participating associations are mainly from middle-income areas. In other areas, residents themselves bring garbage to the MCH collection point.

The other system is mobile units, run by the MCH itself, in which a mobile unit, such as a tricycle or a tractor (in case of large slum) comes and collects the garbage from the households and streets. The mobile unit come generally once in four days and also on all special occasions such as festivals, holidays and visit by some important people. In some circles, the mobile units have been given to the private contractors. However, optimal standard of cleanliness is not being maintained in several slums. The infrastructure deficiencies and extreme overcrowding in the slums are the main reasons for the same. Expansion of the above system depends on participation of the RWAs and formation of NCs. Waste collection system in MCH is shown in Figure 3.

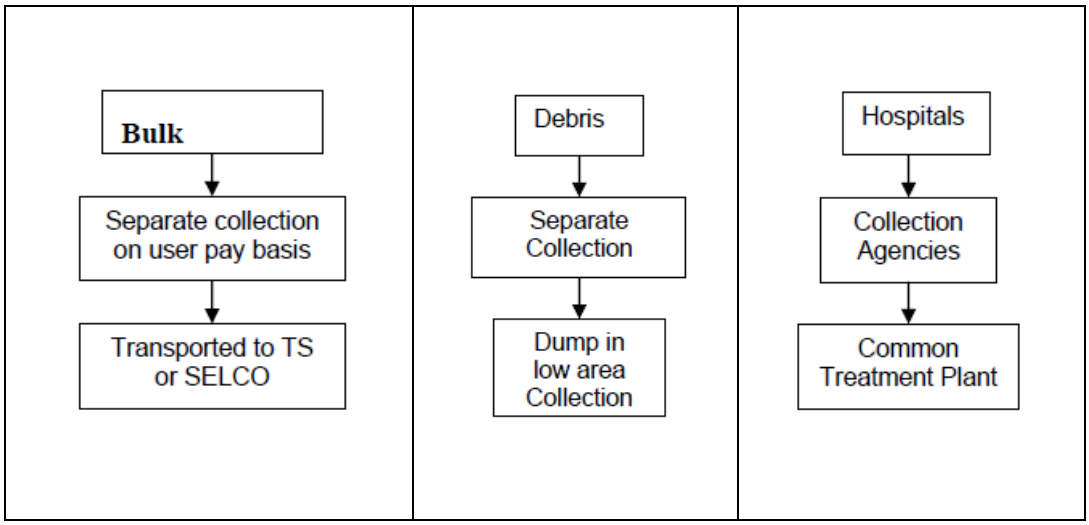

Figure 3. Waste Collection System by MCH

The non-recyclable waste is put in the bins at the collection points. There are three types of bins put by the MCH, steel, concrete and open bins. The steel dumper bins are periodically lifted by the MCH fleet and the waste is carted to the transfer station from where it is filled in the trucks taking the waste to the dumping sites. The concrete and open bin garbage is transferred manually by the private contractors into the trucks, and then the waste is transported to the transfer station. Modern Dumper Placer bins (which are of steel) are provided at 1900 locations and in the balance 1950 locations RCC bins are provided. The Bio-medical waste generated in hospitals and nursing homes is covered under a special arrangement where the private agencies approved by the APSPCB, collect and transport the Bio-medical waste to their Hydroclaving / Autoclaving plants. The Biomedical waste is treated and finally disposed off at the plant sites. The firms collect the charges directly from the hospitals and nursing homes, according to the rate per number of beds prescribed by the pollution control board. The collected waste is segregated at the source as per the norms by the hospitals in different bins. So far, not all hospitals are covered under the bio medical waste treatment norms. APSPCB sends notices to other hospitals and nursing homes to get the facility of waste treatment before a set deadline. Presently, there are two common treatment units in Hyderabad for the disposal of Bio-medical waste. Under the principle of users pay, beneficiaries' pay, andpolluters' pay, MCH has introduced the scheme of collecting user charges from bulk garbage [5] generators in the city. 1700 establishments like hotels, restaurants, function halls, markets, commercial complexes etc., which are generating bulk garbage are identified and classified into 12 categories for levying user charges. A separate truck collects the bulk garbage from these establishments and transports it to the landfill site or power generation plant. The charges are about Rs 1200 – Rs. 1800 per month for the bulk collection. Mostly, this bulk collection goes to power generation plant as the calorific value of these wastes is high. Although, slaughterhouses are mostly outside the MCH limits, the concerned local authority on the user pays basis separately does their waste collection. MCH has a separate collection system for debris from construction sites. On the user pay basis, debris are collected and dumped into the low-lying sites. Also, contractors themselves collect the debris from their site and dump it on the sites demanded by the owners of the vacant sites.

Recycling of MSW: The collected recyclable waste by the tricycle puller from the households sells it in the market, which gives him an extra income. However, he does not collect all the recyclable wastes, and quit some recyclable material is still remaining in the garbage that is dumped on the collection point in the bins. Here, the rag pickers sort the garbage and collect whatever is saleable. These rag pickers come with a rickshaw and a large plastic bag, which they fill with the recyclable materials and take it to the buyer on

the rickshaws. Mostly, they are in the age group of 10 – 16 years. They earn around Rs. 1,000 per month from the waste. On the land fill site, two types of rag pickers are deployed, one picking paper, plastics, etc. and other pick only the metals such as iron. 35 families are rag pickers and 35 families are metal pickers. Metal pickers come during the night and burn the waste. In the daytime they pick metals using magnet from the waste inhaling all the smoke and toxic gases. These people live near the landfill site in huts. They earn about Rs. 2,000-Rs. 2,500 per month. The rag pickers work in hazardous conditions. There was a proposal by a private company to the MCH for the buying of recyclable waste. They would provide strong bags to the tricycle pullers for collecting recyclable waste, which would be bought by the company. The bags would be washable so that they would be comfortable to be used by the collector. But the company wanted a guarantee from the MCH that the complete recyclable waste is made available to them, which the MCH denied stating that it did not have any control over the waste collectors or the rag pickers or their recyclable waste and that the waste collectors sell the recyclable waste to whomsoever they wanted to. The company did not want to give extra incentives to the waste collectors to ensure that the waste pickers sold waste to the company only. The company was interested in this business because it had calculated an income of Rs 31.41 lakh per day from the daily MSW. In other words, the private company wanted to streamline and monopolise the waste trade in the city, which is difficult because of large number of informal sector workers engaged in this trade that is highly decentralised.

Transportation of MSW: The handling of garbage at the local collection point for transportation to the nearest transfer station is manual where the collection bins are concrete or open. The private contractors' workers manually transfer the collected garbage on to the tipper trucks or mini compactor trucks of the corporation, which come at a designated time. If the garbage collection bin is of steel, then the dumper placer vehicles mechanically lift the full steel bin and cart them to the nearest transfer station or landfill site. First an empty steel bin is placed at the collection centre and only then, the full steel bin is lifted for emptying at the transfer station. At present, 55 per cent of the garbage is handled manually and 45 per cent mechanically at the collection centre. There are 102 Dumper placer trucks with a carrying capacity of 2.5 MT each, 45 big Tippers (10 MT), 79 small Tipper trucks (3.5 MT), with the MCH. The MCH has taken the responsibility of transporting the waste to appropriate locations. The Transfer Station (TS) is a transit point in the movement of garbage to the landfill site or Solid Waste processing plant. It may be mentioned here that in Hyderabad, some waste is carted to a power plant for energy generation. Hence, the destination of the waste collected depends on the type of waste; the areas where composting is being carried out, the waste from the local collection point reaches the composting site where the rag pickers sort the waste and take whatever is recyclable for selling. The non-recyclable waste reaches the local collection centre to be picked up for transport to the nearest TS or a dumping site. If the waste is collected from those areas where there are no composting units then the waste reaches the TS through the collection point. Before the waste reaches the collection point, the waste pickers take out certain recyclable materials which they can sell and dump the rest at the collection point from where the waste is carted to the TS or the dumping site, whichever is the nearest. For biomedical waste, there is an altogether different system. In all these, Transfer Station is of immense importance, from where the garbage is taken to the dumping or landfill sites. At the TS, the garbage is brought in small Dumper placer bins and Tippers. The contents are transferred directly into large 10 tonner Tipper vehicles through a specially designed Hopper. The big Tipper Trucks take the garbage to the landfill site or MSW processing plant for final disposal. The small Dumper Placer vehicles need not have to travel long distances up to the landfill site, which on an average are located at 20 to 25 km away from the centre of the city. This saves travel time and the fleet can be better utilized for making extra trips resulting in effective cleaning and sweeping a neat and hygienic look to the city. There is a saving on the consumption of the diesel; thus the cost of the garbage transport is minimized. The wear and tear of the tyres and other components of vehicles are minimized by avoiding long trips and adverse conditions at landfill sites. Further, there is less traffic at landfill site thereby facilitating proper spreading of garbage and giving a better look at these sites. Presently, there are three transfer stations: Tank Bund transfer station, Imliban transfer station, Yousufguda transfer station. One more transfer station is under construction at Jiaguda, which will be commissioned shortly. The MCH has

a very good concept of transfer station. Presently they have three TS and they want to increase them to 7 i.e. one in each circle. There are around 70 trips of the 10-ton truck daily from the Tank Bund TS. It has a staff of around 45 (drivers and labours)

Power Generation from MSW: Since the modern practice is of processing of solid waste rather than distancing and disposal, the MCH is encouraging enterprises to setup processing plants. One such plant setup by M/s. SELCO International was commissioned in December 1999. This plant is designed to utilize 700 MT of garbage every day to generate 6.6 MW of electric power. It was set up to produce 105 tpd fuel pellets from MSW. The pellets produced from this project are being used as industrial fuel and for generation of power. Presently, SELCO uses only 400 MT of the waste that is supplied to it separately as it is getting the required power from 400 MT. A memorandum of understanding is signed with another firm M/s RDF Power Projects to process 700 MT of MSW to generate 11 MW of power. This plant is likely to complete construction soon. The power generation company is only allowed to sell power to the AP Transco. Third party selling of power is not allowed.

Dumping of MSW: There are at present 2 landfill sites in operation at Autonagar (45 acres) and Gandhamguda (20 acres). Both these sites are equipped with the computerized weighbridges and other infrastructure like roads, high mast lighting etc. To ensure scientific disposal of Municipal Solid Waste, sanitary landfill sites are being developed with proper liners, network of roads, lighting, pumps, computerised weigh bridges, leachate drains, treatment facilities, proper fencing, environmental monitoring equipment etc. Mechanical equipment like front end loaders and bulldozers are being purchased for spreading the solid waste and capping with debris/ gravel layers. Since MSW is dumped at open ground it gives rise to ground water contamination by leachate. With the overloading of the existing dumpsites MSW may have to be transported even further, escalating the cost of transportation. However, identification of land for new sanitary landfill sites has become a difficult task as numerous statutory exclusionary factors are to be complied. About 60 per cent of the municipal budget on solid waste management is spent on collection 30 per cent on transportation and 10 per cent on disposal. Environment Protection Training and Research Institute (EPTRI), Hyderabad has been appointed to identify vacant government lands around Hyderabad city, which are suitable for locating sanitary landfill sites and for carrying out environmental impact assessment study on these sites.12 MCH is actively pursuing with the HUDA to ear mark some sites suitable for sanitary landfill and also to notify 500 meter radius around these sites as no development zones/green belt areas in order to minimize any adverse environment impact[6-16].

RESULTS AND DISCUSSION

The MCH has given a commitment to itself to make Hyderabad a 'Litter-free' city. For this, about 10.9 per cent of the city's budget is being spent on this head. But, at the same time, it is also true that the MCH does not take on the responsibility of providing water supply and taking care of sewerage systems, which is the responsibility of the HMWSSB, a special para-statal board that is directly funded by the state government. Hence, the SWM appears as an important activity of the city government, which infact it is. In order to improve the management system by MCH stringent fines regime should put in place to deal with shortage of workers attendance, quality of sweeping, shortfall in weighing of garbage and for terminating and black listing non-performing contract agencies. All these factors have given MCH a positive image nationally and goodwill among the citizens of Hyderabad. For example, 'Cleanliness is next to Godliness'; the main caption of MCH which is more appreciable.

However the MCH is more active in the entire system of SWM. The system evolved by the MCH is working well. But, the households too need to take the responsibility of segregating the waste at the source and assisting the MCH by ensuring recycling of organic waste through vermi-composting that would reduce the costs of transportation of the wastes and would also reduce the land required for dumping of the

solid wastes, which would be in the benefit of the whole city. Lack of necessary level of participation by the households in this whole system of SWM in Hyderabad is one of the biggest concerns today. At the same time there is no source segregation of waste in MCH area. This increases the numbers of rag pickers and also the quantity of waste to be transported. If the waste is segregated at source and Vermi composting units were set up than lot of burden and cost can be reduced as per the SWM rules 2000. According to the officials, it is very difficult to segregate the waste at source that is why they are trying to make other parts of the system more efficient. Finally it is suggested to apply Solid waste management hierarchy which includes the following aspects to achieve sustainable development.

- Prevent the production of waste, or plan the strategies to reduce the amount generated.
- Reduce the toxicity or negative impacts of the waste that is generated.
- Reuse in their current forms the materials recovered from the waste stream.
- Recycle, compost, or recover materials for use as direct or indirect inputs to new products.
- Recover energy by incineration, anaerobic digestion, or similar processes.
- Reduce the volume of waste prior to disposal.
- Dispose of residual solid waste in an environmentally sound manner, generally in landfills [4]

APPLICATIONS

By implementing the suggested strategies, the above said problems can be solved and can opt for a good solid waste management system in concern with the sustainable development.

CONCLUSIONS

It is recommended to implement all the municipal solid wastes (Management and handling) rules 2000 stringently by MCH without fail so as to achieve the overall benefits to wards sustainable development. Studies have shown that a high percentage of workers who handle refuse, and of individuals who live near or on disposal sites, are infected with gastrointestinal parasites, worms, and related organisms. By the implementation of modern solid waste management practices, both the public health and the quality of the environment are benefited directly and substantially. A comprehensive municipal solid waste system followed by MCH should focus on the waste characterisation studies to adjust systems to the types of waste generated, establishing training programs for MSWM workers, planning and evaluating municipal MSWM activities by system designers, users, and other stakeholders, developing and enforcing regulations. However integrated waste management can also act as an effective approach in which the management is based on the concept that all aspects of a waste management system (technical and non-technical) should be analysed together, since they are in fact interrelated and developments in one area frequently affect practices or activities in another area.

ACKNOWLEDGEMENTS

Authors are thankful to the management and principal of Institute of Aeronautical Engineering, Hyderabad, for their kind cooperation and providing necessary facilities for the data generation.

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