

Review for MSWM in Indian Cities and Town

Raj Parmar*, Dr Arti Pamnani[#]

*M. E Student of B. V. M. Engineering College, Vallabh Vidyanagar, Gujarat, India

[#]Sr. Lecturer at B & B Institute of Technology, Vallabh Vidyanagar, Gujarat, India

Abstract- Solid waste is defined as thing that cannot be further use for the purpose and discarded things from community. Generally MSWM include collection, transportation and disposal of solid waste. Urbanization and industrialization has created a great challenge for managing the solid waste because of change in quality and increasing in quantity of waste generation. This challenge make it more complex to manage municipal solid waste around the world. The developing country like India, MSWM is major issues. In last many years waste generation rate of India is increased. This generally happens due to rapid growth and change in life style. Themajor issues related to MSWM in India is that there is not 100% segregation at household level and 90% of solid waste is directly disposed to land. Some suggested remedies for MSWM are increasing the source separation, implementing some tax on MSW collection so that funds for recourses can be adjust and protection of groundwater from leachate.

Keywords- Urbanization, Municipal solid waste, Landfilling, Population, Generation rate, Recycling, Incineration, Composting plant.

I. INTRODUCTION

The term solid waste is defined as useless and discarded things from community. In recent time solid waste management is becoming major environment concern all around the globe. MSWM includes collection, transportation and disposal of solid waste. Due rapid population growth and industrialization there is a quantum change in waste generation rate has generated challenges for MWSM. Collection and transportation of MSW varies for different country as per their policy and facilities available. Studies indicates that there are sever pollution of air and ground water due to improper method disposal of MSW. In many Asian and African countries and many places around world open dumping is general practice for disposal of MSW. In developed nation MSWM data for generation and management are updated and available in literature. The data is collected on daily basis and also use for planning and executing of strategies while in developing nation MSWM data are insufficient and has short history.

II. SOLID WASTE MANAGEMENT IN DEVELOPED COUNTRIES

Solid waste management is also area of concerns for many developed countries as quality and quantity of waste varies as per urbanization and population increase. In year 2007 United States generate about 254 million tons of municipal solid waste [1]. US manage their waste by landfilling, combustion

facilities, recycling and composting plant. Landfill manage 61% of MSW generated, combustion facility manage 15% while recycling and composting manage 24% of waste in 1994 [2]. In year 2000 Canada generation rate was 365 kilogram per person per year (kpc). About 80.66% of MSW was landfill, 5% of waste is incineration and remaining MSW was compost in 2000 [3]. Australia generate approximate 32.4 billion tons of solid waste in 2002-03. According to researcher Australia is more dependable on landfilling for disposal of solid waste about 70% of waste is landfill and 30% of waste is recycled in 2002-03 [4]. In United Kingdom about 34% of generated waste was manage by composting and recycling plant in year 2007-2008 [5]. Denmark generation rate in 2008 was 802 kilogram per person per year (kpc). In Denmark about 5% of waste in landfilled, 53% of waste was incineration, 24% waste is recycled and remaining waste was compost in 2007 [6].

III. SOLID WASTE MANAGEMENT IN ASIAN COUNTRIES

Asia is vast and heterogeneous region. Over last few years Asian countries has experienced rapid economic development and change in social life. The population of Asia in 1950 was 1.4 billion which was increased to 3.7 billion in 2002. Urban area of Asia generated about 760,000 tonnes per day in 1998 which was estimated to increase to about 1.8 million in 2025 due to rapid growth and change in life style. Asia has many highly developed country like Japan and South Korea as well as many developing country like India, china, Pakistan, Indonesia. In most cities of Asia municipal solid waste management (MSWM) is done by respective municipalities [7]. Generally urban areas of Asian cities spend about US\$25 billion per year in 1998 on solid waste management and this figure will estimated to increase to about US\$ 47 billion in 2025[8].

Asia is well known for its mixed culture. A mix that is truly showing in MSWM system. In Bangladesh the city of Dhaka Corporation have started their own waste collection system and door to door collection is gaining momentum [9]. In Vietnam in Ho Chi Minh City major portion in municipal waste is of food waste. Food waste contribute about 61% to MSW. Common practise of waste management is landfilling. About 86% of waste is dispose openly and rest is recycled [10]. In China the city of Macao generate about 249255 tons of waste in 2003. Researcher said more 80% of waste was incinerated and remaining waste was landfilled and recycled [11]. In Rasht city Iran, waste generation rate in 2007 was 800

g/capita/day [12]. Main practice for disposal of waste in Rasht city is composting and open dumping. About 60% of waste was transfer to composting plant and 40% of waste was landfilled [13]. In Pakistan the area of Lahore city district generate about 500,000 tons per year in 2005. About 60% of waste is collected and disposed in open dumping and reaming 40% was not collected and lies along roadside, streets, open sewers [14].

IV. CURRENT SCENARIO OF SOLID WASTE MANAGEMENT IN INDIA

In developing country like India waste management has created great challenges for local bodies and municipalities. In spite India being 2nd largest country in population with 1.21 billion people does not have sufficient resources to treat its solid wastes[15]. The urban population of India generated 114,576 tons/day of MSW in 1996and it was estimated to increase about 440,460 tons/day by the year 2026 [16]. The per capita waste generation has been increase from 0.44 kg/day in 2001 to 0.500 kg/day in 2011 ofurban area of India. It is generally happens due to changing in life-style and urbanization [15].

TABLE I

Classification	Population
Class I	>100000
Class II	50000-99999
Class III	20000-49999
Class IV	10000-19999
Class V	5000-9999
Class VI	<5000

Source:-[17]

In class I city generally waste is collected, stored, transfer to transfer station and then to disposal site. Research indicate that there arevery less sanitary landfill sites available in class one cities in India.NEERI has conducted survey of 59 cities (35 metro cities and 24 state capitals) in year 2004-05 and estimated 39031 ton per day of MSW generated in these 59 cities.In metropolitan cities like Bangalore, Hyderabad, Ahmadabad, and Kolkata compost plants have been established and commissioned by private agencies with capacity of 40-700 ton/day but for various reasons and condition this plants is not operating properly.Most of class II/III cities does not have any specific mode of collection, transportation and disposal. Class IV cities generally associated with agriculture field. General practices for waste management is to decompose this waste along with farm waste and reuse the same as fertilizer. Collection is the main problem in classIV cities [17].

Generally, in India waste collection is done by local authorities and municipalities. The municipalities are finding difficulty in coping large quantity of waste generated in urban areas. The increase in MSW is due to rapid increase in

population and urbanization. The community bin collection system is mainly practice used for waste collection. In this community bin system household deposit their waste to nearest bin located along street at particular time interval. Researcher have found that Segregation of MSW into dry and wet wastes is carried out only in limited areas of a few cities. Door to door collection is becoming common in India, except for in a few cities where in community bin collection is done, collection is done in handcarts or specially design vehicles are used [18].

V. ISSUES WITH CURRENT SOLID WASTE MANAGEMENT SYSTEM IN INDIA

Due to rapid urbanisation, industrialization and change in life style waste generation has been increase in India. Many Indian cities facing problem of management of municipal waste. This generally happed due to lack of public participation, increase in per capita waste generation and in capabilities of urban local bodies [19]. Majority of Indian cities does not have 100% segregation at household. On an average only 70% of waste is collected and remaining 30% of waste is lost in environment. According to report of CPCB 2013 only 12.45% of waste is recycled out of collected waste [20].

India is lacking in segregation of waste.There is not any organization and systematic way of separation of waste at household level or at community bin. Segregation is done in very low amount as unorganized sector collect only valuable recyclable material [21]. In India for collection and transportation vehicle are used. For the maintenance purpose ULBs has workshop but this workshop can do only small repairs because of that when there is break down of this vehicles collection, transportation and disposal efficiency is affected [22]. Biggest problem associated with waste management in Indian cities is that more than 90% of MSW generated in India is directly disposed on land in unsatisfied way because of that it has created great effect to public health [23]. Open dumping generate leachate which will percolate through ground, mixed with water and contaminate ground water [24, 25].

VI. SUGGESTED REMEDIES FOR CURRENT SOLID WASTE MANAGEMENT IN INDIA

- Pubic support has to be increase by educating them which will increase the source separation at generation point as biodegradable, inert and recyclable material.
- Viable composting plant has to be install so that dependency on landfill is reduced and also cost of solid waste management is decreased
- Various tax has to be implement on solid waste management so that funds for inadequate resource of municipal bodies can be manage

- For primary collection of waste private agencies and NGOs has to be involved
- Vehicles which are used for waste collection, transportation and disposal are of specific design and suiting waste characteristics
- Manufacturing of non-recyclable materials like plastics bags should be banned or any alternative method should be research for manufacturing of biodegradable plastic bags
- Sanitary landfilling sites needs to developed instead of open dumping
- Proper protection of ground water has to provide from leachate because leachate generally percolate from soil and mixed with groundwater

VII. CONCLUSION

Solid waste management is vast and complex area. It needs proper training and guidelines to deal with SWM. Due rapid population growth and industrialization waste generation rate has increase which has generated challenges for MWSM. In developed nation data on solid waste is proper and updated while in developing nation data is insufficient and need proper attention. In developed countries waste manage is done by landfill, incineration, recycling and composting. In Asian countries two common practice for disposal is landfilled and composting. In developing country like India waste management is done by local bodies and municipalities and it has created great challenges for them. Rapid urbanisation and industrialization has created more waste generation in India and many Indian cities facing problem of MSWM. This generally happed due to lack of public participation, increase in per capita waste generation and in capabilities of urban local bodies. MSWM can be improved by increasing the source separation, installing decentralize composting plant and involvement of NGOs in primary collection.

ACKNOWLEDGMENT

I am particularly grateful for the assistance given by Dr Arti Pamnani for her valuable and priceless suggestions during the planning and development of this work. His willingness to give her time so generously has been very much appreciated.

REFERENCES

- [1]. U.S. Environmental Protection Agency. (2008). Municipal solid waste generation, recycling, and disposal in the United States: Facts and figures for 2007. EPA-530-F-08-018, Washington, DC: U.S. Environmental Protection Agency
- [2]. Marjorie J. Clarke a, Adam D. Read b,*, Paul S. Phillips c. (1998). Integrated waste management planning and decision-making in New York City. *Resources, Conservation and Recycling*, 6 (2), 125-141
- [3]. Statistics Canada. (2000). Waste Management Industry Survey: Business and Government Sectors
- [4]. Australian Bureau of Statistics. (2010). Feature article: Solid waste in Australia. Retrieved from <http://www.abs.gov.au/AUSSTATS/abs.nsf/Lookup/4613>.
- [5]. Department for Environment, Food and Rural Affairs. (2008). Environment statistics service. Retrieved from <http://www.defra.gov.uk/environment/waste>
- [6]. Eurostat. (2009a). Municipal waste generation and treatment, by type of treatment method - kg per capita. Retrieved from http://epp.eurostat.ec.europa.eu/portal/page/portal/waste/data/sectors/municipal_waste
- [7]. Ashok V. Shekdar. (2008). Sustainable solid waste management: An integrated approach for Asian countries. *Waste Management*, 29 (4), 1438-1448
- [8]. Angela Griffin, Tim Campbell (1999). What a Waste: Solid Waste Management in Asia. The World Bank
- [9]. Fatema Tania (2014). Solid Waste Management of Dhaka City: A Socio-economic analysis Vol. 13 • No. 1
- [10]. R. L. Vermaa., G. Borongana, M. Memonb (2016). Municipal Solid Waste Management in Ho Chi Minh City, Viet Nam, Current Practices and Future Recommendation. *Procedia Environmental Sciences*, 35, 127-139
- [11]. Jianjun Jin, Zhishi Wang, Shenghong Ran (2005). Solid waste management in Macao: Practices and challenges *Waste Management*, 26, 1045-1051
- [12]. Technical report (2007). OWRCMR (Organization for waste recovery and composting of the municipality of Rasht)
- [13]. M.R. Alavi Moghadam, N. Mokhtarani, B. Mokhtarani (2008). Municipal solid waste management in Rasht City, Iran. *Waste Management*, 29 (1), 485-489
- [14]. Syeda Adila Batool, Muhammad Nawaz Ch (2009). Municipal solid waste management in Lahore City District, Pakistan. *Waste Management*, 29(6), 1971-1981
- [15]. Ranjith Kharvel Annepu (2012). Sustainable Solid Waste Management in India
- [16]. Talyan V., Dahiya, R.P., Anand, S., Sreeprishman, T.R. (2008): State of municipal Solid Waste Management in Delhi, the capital of India, *Waste Management*, 28, 1276-87.
- [17]. Javaid Ahmad Bhat M.Phil Sees, Davv Indore. Challenges of urbanization in India: A Review of Solid Waste Management
- [18]. Sunil Kumar, J.K. Bhattacharyya, A.N. Vaidya, Tapan Chakrabarti, Sukumar Devotta ,A.B. Akolkar (2009). Assessment of the status of municipal solid waste management in metro cities, state capitals, class I cities, and class II towns in India: An insight. *Waste Management*, 29(2), 883-895
- [19]. Ali M. Olley J, Cotton A (1999). Public sector delivery of waste management services: case from the Indian sub-continent. *Habitat Int* 23(4):495-510
- [20]. Rajkumar Joshi and Sirajuddin Ahmed (2015). Status and challenges of municipal solid waste management in India: A review. *Cogent Environmental Science*, 2(1)
- [21]. Kaushal, R. K., Varghese, G. K., & Chabukdhara, M. (2012). Municipal solid waste management in India-current state and future challenges: A review. *International Journal of Engineering Science and Technology*, 4, 1473-1489
- [22]. Joseph, K. (2002). Perspectives of solid waste management in India. In *International Symposium on the Technology and Management of the treatment and Reuse of the Municipal Solid Waste*, Shanghai.
- [23]. R. Chatterjee (2009). Municipal Solid Waste Management in Kohima city-India *Journal of Environmental Health Science & Engineering*, 7(2), 173-180.
- [24]. Lo, I. M. C. (1996). Characteristics and treatment of leachates from domestic landfills. *Environment International*, 22, 433-442
- [25]. Mor, S., Ravindra, K., Dahiya, R. P., & Chandra, A. (2006). Leachate characterization and assessment of groundwater pollution near municipal solid waste landfill site. *Environmental Monitoring and Assessment*, 118, 435-456