SCIENCE PARK
Research Journal
ISSN: 2321-8045
IMPACT FACTOR : 3.4218(UIF)

MUNICIPAL SOLID WASTE MANAGEMENT AND CLIMATE CHANGE

Amul M. Late[1] , V. K. Mukke[2] and M. B. Mule[2]
[1]Dept. of Env. Sci. Shivneri Mahavidyalaya, Shirur Anantpal, Dist.-Latur.
[2]Dept. Env. Sci. Dr. B.A.M. University, Aurangabad.

ABSTRACT

The municipal solid waste management is an obligatory function of Municipal Corporations, Municipalities and other local village administrative bodies in India. It involves activities associated with generation, storage, collection, transfer and transport, processing and disposal of solid waste. In the 21st century of modern development with the progress of civilization and rapid industrialization the problem of generation of large quantity of solid waste is become a concern in urban centers for Urban Local Bodies (ULB).

The issue of climate change becomes a serious environmental concern at global level. The recent changes in global climate are believed to be the result of growing anthropogenic greenhouse gas (GHG) emissions; mainly carbon dioxide and methane, resulting from the increased industrial activities over the years. One of the main emission sources that add to the anthropogenic greenhouse gases concentrations in the atmosphere are derived from the processes of solid waste disposal. It is estimated that about 3.4 % of Green House Gases (GHGs) emitted from waste disposal sites due to obsolete waste processing techniques. The unscientific way of solid waste disposal continuously emits GHGs, which may ultimately contributing to the global climate change.

The present paper deals with the relevance of solid waste disposal in context with emission of GHG's. It covers the waste management process and highlights the urge of proper and effective municipal solid waste management to cope with the issue of climate change.

KEY WORDS: *Solid waste, ULBs, GHG's, management, disposal.*

INTRODUCTION

Solid waste is the term used to describe non-liquid waste materials arising from domestic, trade, commercial, agricultural, industrial activities and from public services (Palnitkar, 2002). The 'Municipal Solid Waste' includes commercial and residential waste generated in municipal or notified areas in either solid or semi-solid form, excluding industrial hazardous waste but including treated bio-medical waste (MoEF, 2000).

Rapid industrial growth in urban developments may responsible for increase in living standards of residential population which is ultimately responsible for generation of huge quantity of solid waste.

The quantity of MSW generated depends on a number of factors, such as food habits, standard of living, degree of commercial activities and seasons. Data on quantity variation and generation are useful in planning for collection and disposal systems for waste management. With increasing urbanization and changing life styles, Indian cities now generate eight times more municipal solid waste than they generated in

1947. Presently, about 90 million tons of solid waste are generated annually as byproducts of industrial, mining, municipal, agricultural and other processes. As per the 2001 census the population of urban India was 285 million which produces approximately 1,20,000 tons of solid waste every day. The most exhibited consequence of the population explosion is seen in the form of increase in solid waste quantity and the problems associated with disposal (Singhal and Pandey, 2001).

In India, the per capita waste generation in urban areas ranges from 0.2 to 0.6 kg, leading to a generation of 38 million ton of municipal solid waste (MSW) per year The Ministry of Urban Development (MoUD) in India estimates that, the rate of collection is about 75 % (ton of MSW collected by municipal corporation/ton of MSW generated by city) for urban areas. While, The Energy and Research Institute (TERI) estimates the rate of collection is about 72.5% (CPCB, 2000a).

Per capita MSW generation in various towns of the state ranges between 100 and 600 gm per day. In total, over 16000 tons per day (TPD) of MSW is generated of which around 50 % is generated in three cities, namely Mumbai, Thane and Pune only (as in 2001-02). Compared to other metropolitan cities in India as well as in Maharashtra, amount of MSW generation is the highest in Mumbai and the city alone generates about 7500 TPD followed by Pune at 1000 TPD and Thane at 724 TPD (TMC, 2001; TOI, 2003).

Management of solid waste is become a major challenge for the administrators, engineers and planners. Huge volume of generated solid wastes is need to be collected, transported and finally disposed off scientifically. Unfortunately in many developing countries, the system for managing wastes is primitive and cannot cope with huge volumes of waste being generated. In developing countries, it is common to find large heaps of garbage festering all over the city. The problem gets further complicated due to the obsolete techniques employed for waste management (Tyagi, 2008).

Municipal solid waste management is an obligatory function of Municipal Corporations, Municipalities and other local village administrative bodies in India. It involves activities associated with generation, storage, collection, transfer and transport, processing and disposal of solid waste. But, in most cities, the MSWM system comprises only four activities, i.e., waste generation, collection, transportation, and disposal.

Generation: The baseline data regarding the quantity of waste generation is very essential to meet the challenges of waste disposal. Customarily it was recorded that, the quantity of generated waste is being calculated with considering the waste carrying capacity of vehicle employed for the transportation of waste and their number of trips in one day (Lokmat, 2009).

SYSTEM OF PRIMARY COLLECTION FROM THE DOORSTEP

The system of primary collection from the source of waste generation was meagerly employed in India. The waste discharged near the source and later collected by municipal sanitation workers through street sweeping, drain cleaning, etc. Street sweeping has, thus become the principal method of primary collection. Even street sweeping is not carried out on a day-to-day basis in most cities and towns in India. The tools used for street sweeping are generally inefficient and outdated. For instance, the broom with a short handle is still in use forcing sweepers to bend for hours resulting in fatigue and loss of productivity. Traditionally carts or tricycles are used for collection, which do not synchronize with the secondary storage systems. The work distribution ranges between 200 meters to 1000 meters of street sweeping each day. Some sanitation workers are found under worked while some overburdened.

Waste storage depots

As waste is collected through traditional handcarts and tricycles, that can carry only a small quantity of waste in single time effort. There is a practice to set up depots for temporary storage of waste to facilitate transportation through motorized vehicles. Generally, open sites or round cement concrete bins, masonry bins or concrete structures are used for temporary bulk storage, which necessitates multiple handling of waste. Waste often spills over which are both unsightly as well as unhygienic.

Transportation of waste

Transportation of waste from the waste storage depots to the disposal site is done through a variety of vehicles such as three-wheelers, tractors, and trucks. A few cities use modern hydraulic vehicles as well. Most of the transport vehicles are old and open. They are usually loaded manually. Inefficient workshop facilities do not support this old and rumbling squad of squalid vehicles. The traditional transportation system does not synchronize with the system of primary collection and secondary waste storage facilities and multiple manual handling of waste results.

Processing of waste

Few cities from India are practicing decentralized or centralized composting process on solid waste in limited scale, using aerobic or anaerobic systems of composting. In some towns un-segregated waste is put into the pits and allowed to decay for more than six months and the semi-decomposed material is sold out as compost. In some large cities aerobic compost plants of 100 MT to 700 MT capacities are set up but they are functioning much below installed capacity. A few towns are practicing vermi-composting processes at a limited scale.

Disposal of waste

Scientific disposal of waste is the most neglected area of SWM services. Almost all municipal authorities deposit solid waste at a dump-yard situated within or outside the city haphazardly and do not bother to spread and cover the waste with inert material. These sites emanate foul smell and become breeding grounds for flies, rodent, and pests. Liquid seeping through the rotting organic waste called leachate, which may pollutes underground water and poses a serious threat to health and environment. Landfill sites also release landfill gas with 50 to 60 % methane by volume. Methane is 21 times more potent than carbon dioxide aggravating problems related to global warming. It is estimated by TERI that in 1997 India released about 7 million tons of methane into the atmosphere. This could increase to 39 million tons by 2047, if no efforts are made to reduce the emission through composting or recycling of solid waste.

Solid waste management and mitigation to climate change

The phenomenon of climate change is an outcome of certain environmental changes due to human activities which may leads to alterations in weather conditions and further an emergence of global warming. Adoption of obsolete and unscientific waste disposal methods are responsible for emission of GHG's. Landfilling, composting and incineration are considered as the most common treatment technologies or municipal solid waste worldwide.

The waste sector is accountable for approximately 5% of the global green house budget with total emissions of of approximately 1300 $MTCO_2$ –eq in 2005 is reported by IPCC. This 5 % consist of methane (CH_4) emission from anaerobic decomposition of solid waste.

The mitigation of GHG's emission from waste must be addressed in the context of Integrated Solid Waste Management. The major ISWM activities are waste prevention recycling and composting and combustion and disposal in properly designed, constructed and managed landfills.

REFERENCES

CPCB (Central Pollution Control Board) (2000a): *Manual on Municipal Solid Waste Management*, 1st ed.; Prepared by The Expert Committee constituted by the Ministry of Urban Development, The Government of India.

Jha, M.K; O.A. K. Sondhi & M. Pansare, (2003): "Solid waste management – a case study", *Indian Journal of Environmental Protection*; 23 (10): pp 1153–1160.

Kansal, A. (2002): "Solid waste management strategies for India", *Indian Journal of Environmental Protection;* 22 (4): pp 444 – 448.

Kansal, A; R.K. Prasad & S. Gupta (1998): "Delhi municipal solid waste and environment – an appraisal", *Indian Journal of Environmental Protection;* 18 (2): pp 123–128.

MoEF (2000): Ministry of Environment & Forest: Notification on Municipal Solid Waste (Management and Handling) Rules, India. pp. 3.

Palnitkar S. (2002): Manual of Solid Waste Management, AIILSG, Mumbai. pp 9.

Rathi, S. (2006): "Alternative approaches for better municipal solid waste management in Mumbai, India", *Journal of Waste Management*; 26 (10): pp 1192–1200.

Singhal, S. & S. Pandey (2001): "Solid waste management in India Status and future directions". *TERI Inf. Monit. Environ. Sci.*: *6* (1): pp 1-4.

TERI, (1996): "State of India's Environment (A Quantitative Analysis)", New Delhi: TERI [Report no 95EE52]. pp. 16.

TMC, (2001): "Environment Status of Thane Municipal Corporation", Thane Municipal Corporation, Thane.

TOI, (2003): "Civic Bodies not equipped to handle waste", Times of India, February 18th, 2003, Mumbai.

Tyagi Anil (2008): Environmental Sciences, UGC – SET/NET IInd Paper, Truman's publication, New Delhi; pp. 335 – 340.