

Study of Solid Waste Management: Case Study for Khamgaon City

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Abstract— Solid Waste Management (SWM) is a Polite term for Garbage management. As human being is living in groups in communities lot of waste is generated and hence Solid Waste Management has become a global issue. Solid waste can be defined as non-liquid waste material that is of no use to human beings. It is generated by domestic Households, Commercial, Industrial, Medical and Institutional activities. Solid waste is one of the major reasons of environmental degradation in India. Improper management of solid waste causes hazards to people.

There are many techniques for Solid Waste Management. The traditional techniques are used in India from a long time, but these techniques are now not so efficient and also cause environmental degradation. This is because of increase in population and change in type of solid waste generation. Many new techniques are introduced for SWM; these techniques are comparatively more effective and have less harmful effects on environment. The Khamgaon city also suffers a problem of solid waste, thus total waste generated in Khamgaon city is going on increasing day by day so it is essential to dispose of municipal waste in planned, economical and safe manner. Present work on SWM for Khamgaon city has been reviewed and efforts have been made to provide comprehensive review on SWM. After analysing the entire functional element related to SWM various conclusion has been drawn along with recommendations to improve the existing SWM.

Keywords— Municipal Solid Waste Management; Techniques; Suggestions ; Solid Waste ; Management.

I. INTRODUCTION

Humans have always produced trash and have always disposed of it in some way, so Solid Waste Management (SWM) is not a new issue. What have changed are the types and amounts of waste produced, the methods of disposal, and the human values and perceptions of what should be done with it. Improper disposal of solid wastes pollutes all the vital components of the living environment (i.e. air, water and land) at local and global levels. A country such as India, with its high economic growth and rapid urbanization, requires immediate solutions to the problems related to improper management of urban waste. Human activities create waste, and the ways that waste is handled, stored, collected and disposed of can pose risks to the environment and to public health. SWM includes all activities that seek to minimize health, environment and aesthetic impact of solid waste. SWM reduces or eliminates adverse impacts on the environment and human health, also supports economic development and improved quality of life. Bad waste collection practices and improper solid waste disposal contribute to local episodes of disease, regional water resource pollution, and global greenhouse gases.

In many cities, Municipal Solid Waste (MSW) contains human and animal excrement as well as hazardous chemical pollutants. All facilitate disease and injury, Study of Solid Waste Management for Khamgaon City especially among children, rag pickers and employees in the waste management sector. Studies have shown that a high percentage of workers who handled refuse and of individual who live near or on disposal sites are infected with gastrointestinal parasites, worms and related organisms. Contamination of this kind is likely at all points where waste is handled. Although it is certain that vector insects and rodents can transmit various pathogenic agents (amoebic and bacillary dysenteries, salmonellosis, various parasitises, cholera, yellow fever, plague, others) it is often difficult to tress the effect of such transmission to a specific population. The implementation of Municipal Solid Waste Management (MSWM) practices benefits both public health and environmental quality directly and substantially.

II. OBJECTIVE OF STUDY

There are following different objectives of my study on Solid Waste Management in Khamgaon City.

1. To study the current situation & major problem in generation, collection, transportation, handling & disposal of solid waste.
2. To gain information on existing techniques and practices of SWM.
3. To Study new techniques of SWM.
4. To reduce harmful impacts of improper SWM on health and environment.
5. To promote Biological recovery of waste and recycling of material.
6. To study the comparison between old and new techniques of SWM for Khamgaon

III. METHODS OF DISPOSAL

A. Landfill

A landfill is a site for disposal of waste material by burial and is the oldest form of waste treatment. Historically, landfills have been the most common method of organized waste disposal and remain so in many places around the world. Some landfills are also used for waste management purposes, such as the temporary purposes, consolidation and transfer or processing of waste material (sorting, treatment or recycling). Landfills are engineered waste disposal systems that have large rubbish tips or dumps. Gases are produced in landfills due to anaerobic digestion by microbes, and these gases are called as 'landfill gases'. These landfill gas containing about 45-55% methane, which can be recovered through a network of gas collection pipes and utilized as a source of energy. Typically, production of landfill gas starts within few months after disposal of the waste and generally lasts for about ten years or more the modern landfills are made to prevent the loss of leachate and gases to the surrounding environment. The main advantage is that burying can produce energy and can be obtained by the conversion of landfill gas.



Fig 1: Landfilling

B. Composting

Due to shortage of space for landfill in bigger cities, the biodegradable yard waste (kept separated from the municipal waste) is allowed to degrade in a medium. A good quality nutrient rich and environmental friendly manure is formed which improves the soil condition and fertility. Organic matter constitutes 35% -40% of the municipal solid waste generated in India. This waste can be recycled by the method of composting, one of the oldest form of disposal. It is the natural process of decomposition of waste that yield manure or compost, which is very rich in nutrients.

Composting is a biological process in which micro-organism, mainly fungi and bacteria, convert degradable organic waste into human life substance. This finished product, which looks like soil, is high in carbon and nitrogen and is excellent medium for growing plants. Vermi-composting has become very popular in the last few years. In this method worms are added to the compost. This help to break the waste and the added excreta of worms makes the compost very rich in nutrients.



Fig 2: Composting

C. Recycling

Recycling is the process of converting waste materials into reusable objects to prevent waste of potentially useful materials, reduce the consumption of fresh raw materials, energy usage, air pollution (from incineration) and water pollution (from landfilling) by decreasing the need for "conventional" waste disposal and lowering greenhouse gas emission compared to plastic production. Recycling is a key component of modern waste reduction and is the third component of the "Reduce, Reuse and Recycle" waste hierarchy. Recyclable material includes many kinds of glass, paper, metal, plastic, tires, textiles and electronics.



Fig 3: Recycling

Also there are some more methods available like Incineration, Bio Drying, Pyrolysis, Plasma Arc Process etc. which are also used for disposal of Solid Waste Management.

IV. DESCRIPTION OF KHAMGAON CITY

Khamgaon is a city and a municipal council in Buldhana district in the state of Maharashtra, India. Latitude is 20°41'0" N, Longitude is 76°03'40" E and Altitude is 295m.

- 1) Area in Square Kilometre: Area of city is 13.36 Sq. Km
- 2) Roads in Kilometre: Total road length is 142 km.
- 3) Population as per 2011 census: As of 2001 India census, Khamgaon had a population of 95836. In 2011, Khamgaon had a population of approximately 1.2 lakh. Males constitute 52% of population and females 48%. In Khamgaon 12% of population is less than 6 years of age.
- 4) Present MSW in T/Day: Present (2015-16) MSW in T/Day is approximate 26 MT/Day.
- 5) MSW in GPC: Present (2015-16) MSW is 271 GPC. MSW assessed (2001) by MSW cell is 210 GPC.
- 6) No. of zones/ wards / prabhags: The city is divided into 32 wards.
- 7) Present Disposal site: Area in sq.km is 23 acres.
- 8) The average distance of dumping site from city is 5 km.

The aim of the work is to analyse the present SWM situation in the area of Khamgaon city, India and evaluate the problems that arise due to shortcomings of the waste management system. The methodology includes the collection of information about the waste management situations in Khamgaon city and preparing the data base about the waste situations of the case study area. It also includes analysis of the present waste situation and recognizes the problems in the system. The study analysis will help to learn about the different waste management problems and the way to deal with waste management in different system. On the basis of the present situation analysis, the data availability of the case study area and the study analysis, the framing guidelines for the work to be proposed in dealing with waste management planning for the case study area will be carried out.

V. MUNICIPAL SOLID WASTE

A. Generation of Waste

According to the survey, the types of waste generated in Khamgaon city are shown below in tabular form.

TABLE NO I
TYPES OF WASTE

Type of waste (in T/Day)- Year 2015-16					
Total Waste	Biodegradable Waste	Recyclable Waste	Construction, Debris, Road Sweeping and Drain line Cleaning Waste	Green Waste	Final residue and Rejects
31.650	13.091	8.727	6.237	1.617	1.978
100%	41%	28%	20%	5%	6%

B. Collection of Waste from Various Places

In addition to the above scheme of waste collection, there is provision of door to door collection of waste from houses. The provision of additional handcarts is envisaged for collection of waste from house to house. Waste is collected from various places such as hotels, bars, slotted house, community halls, vegetable market, residential colonies, and various institutes.

C. Transportation of Waste

The collected waste is transported to open dumping ground which is approximately 5 Kms away from the main city. The waste material is collected from different areas of the city and transported to open dumping ground by means of vehicles like open trucks. Open trucks collect the waste and take it to Rawan Tekadi depot at Chikhali Bypass. The transportation of MSW is carried out purely on contract basis. Contracts are given for daily sweeping and collection of garbage in Khamgaon. The collection of MSW is carried out both by contractual labour and K.M.C. employs.

- 1) The total manpower bifurcated into the contractual labour and K.M.C. manpower is as follows:

- Mukadam: 4
- Driver: 3
- Sweepers: 258
- Other Workers: 20 (on permanent basis)

- 2) Types and number of bins: MSW Rule complaint type 0 Community Bins are placed in Khamgaon City.
- 3) Equipment deployed: 3 tractors with trolley and one 4 wheeled mini tipper of K.M.C. are deployed.
- 4) Manpower deployed on C & T, Mukadam, Driver, Labours: 1 Sanitation Supervisor, 4 Mukadam, 3 Driver, 21 Sweepers & 10 other workers are on permanent basis in K.M.C.

D. Disposal of Waste

Different waste collected from houses, roads, industries and all other areas from the city is transported to open ground for the open dumping purpose. Open dumping is the only method use to dispose the waste in Khamgaon city. This is one of the poorest types of method of disposal of waste. This leads to the air, water and soil pollution. Also it causes harm to human lives and animals. This reduces the soil fertility and makes the land barren.

VI. LIMITATIONS AND SUGGESTIONS TO OVERCOME

Limitations of SWM

1. Khamgaon Municipal Corporation provides an annual budget of Rs. 85, 00,000/-, but it is not enough to manage the solid waste properly.
2. Presently 23 acres land is available for open dumping in Khamgaon city, and the availability of land is not enough also it reduces soil fertility and causes soil pollution.
3. The practice of segregation of sewage from the source is not currently being adopted by K.M.C.
4. K.M.C is lacking in transportation vehicles for proper disposal of solid waste.
5. At present only open dumping method of solid waste disposal is adopted by K.M.C, hence it exerts tremendous load on disposal and makes it more critical.
6. As the population of Khamgaon increases 25% in every 10 years, the waste generation will also increases. In consideration with this, the land required for open dumping will be insufficient in future. So there is need of finding proper disposal techniques of solid wastes.

Suggestions

1. Provision of dustbin in all public places such as bus stand, station, squares etc.
2. Separation of wet and dry waste should be done at the source.
3. As biodegradable and recyclable waste constitute maximum amount of solid waste generated from K.M.C. open dumping is not appropriate method of disposal for it.
4. Land filling with composting should be adapted for biodegradable waste of K.M.C.
5. For disposal of recyclable waste method of recycling should be adapted.
6. Recycling plant should be established in place of open dumping method and remaining land should be used for land filling technique of disposal.
7. Application of used of new methods in place of open dumping will reduce the problem of pollution and soil fertility. It also reduces the fear of diseases cause due to improper solid waste management.
8. Separate provisions should be done for waste generated from hotel and restaurants.
9. Presently biomedical waste is not considered by KMC. As biomedical waste is one of the most hazardous waste generated, special provision should be given for its collection and disposal.

VII. CONCLUSION

The emphasis should be given on segregation of waste at the source itself. This approach will certainly reduce the problem of quantity and quality of waste generated in the city. The current SWM of Khamgaon city is lacking in identifying the importance of segregation. Proper segregation of waste will certainly open many options for proper method of disposal to treat particular type of waste. Currently Khamgaon city is on the verge of development. The population of Khamgaon city is increasing, thereby increasing the quantity of solid waste generated. The amount of biodegradable waste is more than in organic waste hence method of composting should be certainly used. Big composting plants should be established for proper treatment of organic waste. As recyclable wastes constitute the second biggest part of solid waste from Khamgaon city recycling plant should be established. So that the recyclable waste is properly treated and it reduces pollution. As the area around Khamgaon city is large the process of sanitary land filling can be easily adopted and it can be proven one of the best methods of disposal.

Rag pickers and private pickers over previously working in same sector and spend their life at foul smelling and most unhygienic places collecting the waste with bare hands and getting irregular low payment for this dirty work should be brought into an organized sector by K.M.C. and now called as swachhata doot. As the open dumping method proves to be very harmful for the environment as well as human being it should be replaced by new methods such as land filling and recycling which prove to be less harmful and eco-friendly. If the methods such as recycling is adopted the burden of waste management on K.M.C. will not increase in future.

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