SOLID WASTE MANAGEMENT- A REVIEW

Amit Kumar*

*Assistant Professor,
Department of Civil Engineering, Faculty of Engineering,
Teerthanker Mahaveer University, Moradabad, Uttar Pradesh, INDIA
Email id: amit.engineering@tmu.ac.in

DOI: 10.5958/2249-877X.2021.00135.1

ABSTRACT

It is well recognized that waste that is discarded can be reused in a variety of ways. The methods and practices of solid waste management in India are the subject of this paper. Solid waste management encompasses a wide range of waste kinds, including industrial, agricultural, transportation, municipal, and so on. Although all wastes are destructive, municipal solid trash (now referred to as Solid Waste) is the form of waste that may be effectively managed without polluting the environment or harming other species. The focus of this study is on municipal solid waste. Various strategies for managing solid waste have been described, ranging from organic composting to energy generation. As a result, reducing pollution to decrease the risk of ill health, preserve the environment, and improve our quality of life is an important part of sustainable development.

KEYWORDS: *Municipal, Organic, Pollution, Solid, Waste.*

1. INTRODUCTION

India is the world's second most populous nation and has the world's second fastest expanding economy. Rural regions have a population of 852 million people, whereas urban areas have a population of 325 million people. In the last 50-60 years, the country's urbanization rate has risen from 26.5 percent to 38 percent, with 44 percent predicted by 2026.In India, rapid industrialization and population growth have resulted in migration from rural to cities, resulting in the generation of hundreds of tons of MSW per day.

As the country aspires to achieve the status of an industrialized nation by 2020, the MSW quantity is anticipated to rise substantially in the near future. The disparity between India's growing urban population and its accessible services and resources is stark. India has a huge gap to close in terms of solid waste management (SWM). To deal with the growing quantity of trash, proper municipal solid waste (MSW) disposal facilities are lacking. Current SWM services are inefficient, costly, and of such poor quality that they pose a risk to human health and the environment.

Citizens of India today are experiencing unprecedented economic development, increasing ambitions, and quickly changing lifestyles, all of which will increase public health and quality of life demands. When these expectations aren't fulfilled, people may experience a decline in their quality of life. Pollution, whether in the air, water, or on land, reduces productivity over time, causing a country's economic situation to deteriorate.

Large cities gather about 70-90 percent of MSW produced, while smaller cities and villages collect less than half of that. More than 91 percent of MSW collected officially is dumped on open land or in landfills. MSW open burning and landfill fires emit a total of 22,000 tons of pollutants into the sky. Carbon Monoxide (CO), Carcinogenic Hydrocarbons (HC) (including dioxins and furans), Particulate Matter (PM), Nitrogen Oxides (NO), and Sulphur Dioxide are among the contaminants (SO).

1.1 Waste Management Hierarchy:

The most environmentally friendly waste management strategy is to reduce the usage of resources and reuse them. The first step in source reduction is to reduce the quantity of trash produced and reuse resources to keep them out of the waste stream. As a result, trash is not produced until the conclusion of the "reuse" phase. Waste must be collected after it has been produced. Material recovery from trash, such as recycling and composting, is widely acknowledged as the most efficient method of waste management. The majority of MSW produced in India ends up in landfills due to technological and economic constraints in recycling; product design; insufficient source separation; and a lack of sufficient markets that can utilize all sorted materials. Local governments should begin collaborating with their partners to encourage source separation. While this is being accomplished and recycling rates are rising, plans should be developed to deal with the non-recyclable wastes that are now being produced and will be generated in the future[1]–[3].

The most effective methods to minimize trash production are also to reduce and reuse. It is estimated that up to 95% of a product's environmental effect occurs prior to its disposal, mostly during its manufacture and the extraction of virgin raw materials.

Recycling, on the other hand, requires a distinct waste stream, whether it is separated at the source or subsequently after collection. Due to limits in source segregation, trash is collected in a mixed form known as municipal solid waste (MSW). It's tough to separate mixed trash. Paper, plastic, glass, and metal that have been physically separated may then be recycled. Separating these elements from SW requires a lot of energy and effort, therefore it is seldom done. As a consequence, waste mixing will always produce a percentage of residues that can't be recycled or composted and must be combusted in RDF or WTE facilities to prevent landfilling and create energy. Source separated organic wastes may be composted, and the compost produced can be utilized as an organic fertilizer, similar to the recycling of inorganic materials.Fertilizer is used on farmland. Plant macronutrients such as nitrogen, phosphorus, and potassium, as well as other important micronutrients, are abundant in organic compost[4]–[6].

When mixed garbage is composted aerobically, it becomes polluted with organic and inorganic elements, mostly heavy metals. Heavy metal contamination of MSW compost may damage human health and the environment, which is one of the main reasons for its limited agricultural usage. As a result, mixed waste composting is not a viable solution for long-term waste management, although this fact is not well known. In countries like India, where more than 91 percent of MSW island filled and there are no other options, mixed waste composting is extensively used and regarded superior. Fertilizer is used on farmland. Plant macronutrients such as nitrogen, phosphorus, and potassium, as well as other important micronutrients, are abundant in organic compost.

When mixed garbage is composted aerobically, it becomes polluted with organic and inorganic elements, mostly heavy metals. Heavy metal contamination of MSW compost may damage

human health and the environment, which is one of the main reasons for its limited agricultural usage. As a result, mixed waste composting is not a viable solution for long-term waste management, although this fact is not well known. In countries like India, where more than 91 percent of MSW is land filled and there are no other options, mixed waste composting is extensively used and regarded superior.

(SLFs) are designed to keep wastes out of the environment and make them harmless via natural biological, chemical, and physical processes. UNEP also identifies three fundamental criteria that must be met in order for an SLF to be designed: Compaction of wastes, daily covering of wastes (with soil or other material), and control and prevention of harmful effects on public health and the environment are all things that must be done.

1. Sanitary land filling is divided into three categories according to the waste management hierarchy.
2. SLFs that recover and use methane (CH4) SLFs that recover and flaring CH4 SLFs that do not recover CH4.
3. Observance of the Sustainable Waste Management Hierarchy

When comparing SWM in India to the hierarchy of sustainable waste management, the picture isn't quite rosy. It denotes a developing nation with a large population and a rising economy, as well as dispersed but continuing SWM activities. Local governments and policymakers are also aware of the importance of SWM. The SWM industry in India has moved in the correct direction in recent years, particularly with the establishment of the Government of India's Jawaharlal Nehru National Urban Renewal Mission (JnNURM) (GOI).

However, it continues to be hampered by a lack of administrative and financial resources, as well as public awareness of the problem. There is still a long way to go in this industry. More widespread integration of the informal waste sector into the formal systems, increased building of composting facilities, new RDF, WTE, and Sanitary Landfill facilities, and capping of certain landfills for landfill gas (LFG) recovery are all anticipated changes in MSW disposal in the near future.

The current state of SWM in metropolitan settings poses a risk to human health and the environment. Inhaling bioaerosols, as well as smoke and odors generated by open trash burning, may cause health issues. In addition, germs inhaled via the air is contagious. Toxic chemicals found in solid waste are linked to respiratory and dermatological issues, as well as eye infections and a shorter life expectancy. The fine particle range is dominated by carbonaceous fractions and hazardous metals such as Pb, Cr, and Zn. The introduction of heavy metals into the food chain is a less well-known secondary consequence of poor SWM in India[7]–[10].

Heavy metal contamination is prevalent in compost from mixed waste composting facilities. The use of this compost on agricultural areas will lead to heavy metal pollution of the soil. Zinc (Zn), Copper (Cu), Cadmium (Cd), Lead (Pb), and Chromium (Cr) are heavy metals present in mixed garbage composts (Cr).

2. DISCUSSION

Diseases spread by stray animals, vermin, and insects drawn to wastes are also a danger to public health. Solid trash clogs sewers and drains, providing mosquito breeding grounds. In 1994, improper SWM in the city of Surat resulted in a city-wide bubonic plague outbreak, which

subsequently turned Surat into one of India's cleanest towns. Other illnesses like cholera and dengue fever are spread by stray animals and insects.

When SWM in India is compared to the hierarchy of sustainable waste management, the picture isn't very rosy. It denotes a developing nation with a large population and rising economy, as well as dispersed but continuing SWM initiatives. Local governments and policymakers are also fully aware of the importance of SWM. The SWM industry in India has made significant development in recent years, particularly with the establishment of the Government of India's Jawaharlal Nehru National Urban Renewal Mission (JnNURM) (GOI). However, owing to a lack of management and financial resources, as well as public knowledge about the problem, it continues to suffer. There is still a lot of work to be done in this field. More extensive integration of the informal waste sector into formal systems, increased construction of composting facilities, new RDF, WTE, and Sanitary Landfill facilities, and capping of some landfills for landfill gas (LFG) recovery are some of the changes expected in MSW disposal in the near future.(SLFs) are designed to keep wastes out of the environment and make them harmless via natural biological, chemical, and physical processes. UNEP also identifies three fundamental criteria that must be met in order for an SLF to be designed: Compaction of wastes, daily covering of wastes (with soil or other material), and control and prevention of harmful effects on public health and the environment are all things that must be done. Sanitary land filling is divided into three categories according to the waste management hierarchy. SLFs that recover and use methane (CH4) SLFs that recover and flaring CH4 SLFs that do not recover CH4.

Problems are getting more sensitive as urbanization, development, and industry increase, necessitating quick and stringent response. The correct disposal of municipal trash is not only essential for the maintenance and growth of public health, but it also offers enormous resource recovery potential. It is projected that the country produces about 1,00,000 MT of municipal solid waste. Waste production per capita in large cities varies from 0.20 kg to 0.6 kg. In most major areas, collection efficiency varies from 70 to 90 percent, whereas in some smaller communities, it is less than 50 percent. The ULBs are expected to spend about a ton on solid management operations such as storage disposal and so on. About 60-70 percent of this amount is used for waste street sweeping, 20-30 percent for waste transportation, and less than 5% for final disposal, indicating that organized and safe disposal sites are not yet recognized by municipalities, and landfill sites have been particularly local bodies don't have resources. The collection efficiency suffers as a result of the reduced availability of disposal locations.

Despite the lack of national statistics, CPCB has looked into a number of metropolitan regions. Consider some of the main cities that produce, such as Mumbai, Chennai, Bangalore, and Kolkata. Since the past several decades, waste management has been a critical environmental problem. Population, industrialization, and urbanization, among other factors, have all been seen. This article examines the waste management system, its components, and waste disposal systems. The article discusses the need of a waste management system, the negative consequences of poor management, and different problems that arise in dies. It has been determined that the waste management system should include proper waste collection, storage, processing, transportation, and disposal in order to reduce the negative effects of is an open access article distributed under the Creative Commons Attribution License, which allows for use, distribution, and reproduction in any medium as long as the original work is properly cited.

Problems are more problematic as a result of urbanization as a result of planned economic development and industrialization, and urgent and stringent response is required. The correct

disposal of urban trash is not only essential for public health, but it also offers enormous resource recovery potential. A total of 1,00,000 MT of municipal solid waste is produced every day in the country, according to estimates. The average amount of trash produced per person in large cities is 6 kg. In most major areas, collection efficiency varies from 70 to 90 percent, whereas in some smaller communities, it is less than 50 percent. It spends around Rs.500 to Rs.1500 per ton on solid waste management activities such as storage and collection, with 70% of this amount going to waste street, 20% to 30% going to waste transportation, and less than 5% going to waste final disposal, indicating that waste disposal safety is given very little thought. Many towns have yet to identify landfill sites, and in some municipalities, landfill sites have been depleted, and local governments lack the means to purchase additional property for filling. The collection efficiency suffers as a result of the reduced availability of disposal locations.

3. CONCLUSION

Solid waste management is one of the most challenging challenges facing the globe; changes in people's habitats and fast growth are responsible for huge amounts of garbage production; in India, cities like Delhi and Mumbai generate more than 5000 MT of rubbish each day. This trash is causing issues with public health, drainage, and aesthetics in cities, necessitating the implementation of effective waste management systems in both cities and villages. The system should use proper trash collection, storage, processing, transportation, and disposal to reduce waste's negative effects and enhance people's quality of life.

REFERENCES

1. I. Adebayo Bello and M. N. bin Ismail, "Solid Waste Management in Africa: A Review," *Int. J. Waste Resour.*, 2016, doi: 10.4172/2252-5211.1000216.

2. A. Vitorino de Souza Melaré, S. Montenegro González, K. Faceli, and V. Casadei, "Technologies and decision support systems to aid solid-waste management: a systematic review," *Waste Management*. 2017, doi: 10.1016/j.wasman.2016.10.045.

3. R. Joshi and S. Ahmed, "Status and challenges of municipal solid waste management in India: A review," *Cogent Environmental Science*. 2016, doi: 10.1080/23311843.2016.1139434.

4. A. Pires, G. Martinho, and N. Bin Chang, "Solid waste management in European countries: A review of systems analysis techniques," *Journal of Environmental Management*. 2011, doi: 10.1016/j.jenvman.2010.11.024.

5. I. I. Innovative Research Publications, "Vermicomposting in Solid Waste Management: A Review," *Int. J. Sci. Eng. Technol.*, 2013.

6. M. Sharholy, K. Ahmad, G. Mahmood, and R. C. Trivedi, "Municipal solid waste management in Indian cities - A review," *Waste Manag.*, 2008, doi: 10.1016/j.wasman.2007.02.008.

7. A. Soltani, K. Hewage, B. Reza, and R. Sadiq, "Multiple stakeholders in multi-criteria decision-making in the context of municipal solid waste management: A review," *Waste Management*. 2015, doi: 10.1016/j.wasman.2014.09.010.

8. R. Joshi, G. R. Kale, and A. N. Vaidya, "Applications of pyrolysis for carbonaceous wastes in solid waste management – A mini-review," *Eur. J. Sci.*, 2018, doi: 10.29198/ejs1802.

9. A. C. Karmperis, K. Aravossis, I. P. Tatsiopoulos, and A. Sotirchos, "Decision support models for solid waste management: Review and game-theoretic approaches," *Waste Manag.*, 2013, doi: 10.1016/j.wasman.2013.01.017.

10. S. I. Pirani and H. A. Arafat, "Solid waste management in the hospitality industry: A review," *Journal of Environmental Management*. 2014, doi: 10.1016/j.jenvman.2014.07.038.