

Challenges and Opportunities Related to Waste Management

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ABSTRACT: *India faces significant environmental issues as a result of waste generation as well as insufficient waste collection, transportation, treatment, including disposal. India's current waste management systems are unable to cope with increased capacities of waste created by growing urban populace, posing a threat to environment including public well-being. The obstacles besides difficulties are substantial, and so are prospects. This paper intelligences on a worldwide seminar organized by Council of Scientific besides Industrial Research-National Environmental the Royal Society and Engineering Research Institute Moving away from relying on waste dumps that have very little environmental protection and toward waste management programmers that keep convenient capital within economy is a top priority. A crucial role is played by waste exclusion at the source and the use of dedicated waste management facilities to isolate recyclable materials. Engineered biodegradable wastes and/or development in waste-to-energy facilities are needed for the processing of residual waste after the extraction of physical wealth. The opportunities for energy production from landfills through methane recovery or thermal action is significant, but a major stumbling block is India's lack of trained engineers including environment professionals with the expertise needed to implement enhanced waste organization systems.*

KEYWORDS: *Population Development, Resource Retrieval, Sustainable Growth, Waste to Energy, Waste Management.*

1. INTRODUCTION

All the residential colonies have been divided into the urban and rural area, these areas have categorized based upon their development and employment of the people. The density of the peoples is also too much in the urban localities, therefore, a proper Solid Waste Management (SWM) mechanism is needed to dump the waste product. The fact is that with increasing Population in country, waste administration is developed a serious problematic to urban frames [1]. The foremost reasons of solid waste in urban places are industrialization, economic growth as well as urbanization. As the technological innovation has reached its peak, therefore an individual has become depended over the comfort of everything like packaged fast food and other eateries, the consumption of this type of the food also contribute in the heap of the solid waste.

The growing population of the India is also a problem for the SWM as living standard of the people are also changing and diverted towards the new means to live. Achieving environmental sustainability within a world witnessing population growth besides higher existing standards is completed even difficult in India since it is multicultural place with numerous separate religious communities, customs and religions. Notwithstanding of technological advancement, the way of managing the solid waste has not been changed a lot. This sectors still unorganized sectors and workers are using methods which are decade old. With approximately 90% of outstanding waste essentially discarded somewhat than correctly landfilled, relaxed sector plays a dangerous role in removing value beginning waste. There is need of transition to more sustainable SWM, which demands the formation of new management organizations and waste management amenities. Waste has a disadvantageous consequence on public health, the climate, in addition to reduced, and current SWM systems are inefficient. The administration implemented waste administration in addition to treatment rules in India, but enforcement is inconsistent besides limited[2].

The present paper has been written to investigate the SWM related barriers, challenges as well as opportunities and also look into the ways that can be implement to improve the existing system. Such management is not an easy task as the waste is generated on the daily basis, therefore. there is a requirement to process the waste daily to keep the cities neat and clean and also free from bad odor. The condition of the Asian countries is not good in comparison of the European countries; the fact is that management system in western country are much better than the Asian countries. The reason behind the improve condition can be related with the development and the low Population, on the other hand, the condition in the developed countries is more pathetic as the blame should be goes to the large Population and their density of Population that will become a hinder in the management services for the waste management. Particularly for India, India has been going through a phase that is witness of the great urbanization, and technological advancement. The people 's way of living has been changing in addition

to their food habit and packaging the things.

Table 1: Population Growing in India Between 1911 to 2011

Census Year	Population*10 ⁶	Decadal growth *10 ⁶
1911	252.0	13.7
1921	251.3	-0.8
1931	278.9	27.6
1941	318.6	39.7
1951	361.1	42.4
1961	439.2	78.1
1971	548.1	108.9
1981	683.3	135.1
1991	846.4	163.1
2001	1028.7	182.3
2011	1220.2	181.4

Indian population is suffering rapid development although remaining a nation through climatic, physical topographical, environmental, cultural, social, besides linguistic assortment, as exposed in table 1. The populace has been 1242 million in 2014, in comparison of 1025 million as in 2002. Populace development is a main giver to cumulative MSW in India. Developments in civil organization are compulsory for India to secure a place among the main economies of the world. Emerging good substructure that encounters needs of persons besides defends atmosphere is significant to completing effective financial evolution. Waste management group has a noteworthy character in conveying sustainable development. Rapid inhabitant's development in India controlled to tiredness of ordinary capitals. Wastes has been considered as resources in addition actual waste organization with standby withdrawal is significant to actual SWM. Value extraction from leftover could be resources, liveliness or nutrients, besides this can deliver a maintenance for numerous persons[3].

yields and processed meats. Weighty metal contamination of groundwater produced by leachate percolation under unhygienic landfills can principal to heavy metal biomagnification in persons who drink water. Long term experience of inhabitants surrounding dumpsites to exposed waste removal can lead to wellbeing problems. Health of community workers in addition to waste picker's earnings a threat to communal health. Also, contagious ailments can blowout rapidly in efficiently populated Indian metropolises posing a superior threat to communal health [5].

Lal Chand et al investigated that SWM is actual concentrated and exclusive and cannot be have enough money by all emerging countries. Climate modification is a problematic that would touch republic on the ground besides it necessitates concentrated labors. The earth has touched a location anywhere it is more inexpensive to attain GHG emanation discounts in developing countries as associated to industrialized countries. This condition has formation of Clean Development Mechanism (CDM) underneath Kyoto Protocol. Number of countries which have employed Kyoto Protocol agree to reduce their GHG productions below confident values. CDM delivers street to industrialized countries to accomplish these ideals, through construction it easy to buy carbon acclaims after unindustrialized nations. This apparatus has dual assistances of plummeting complete GHG productions of earth in addition to also helps recover amenities in emergent nations.

2.1. Waste Management in India

2.1.1. Waste Characterization:

The indigenous economy influences on generated leftover, as high-income collections consume more parceled goods, subsequent in sophisticated amounts of glass, plastics, paper, minerals and fabrics. Variations in solid wastes may consume a substantial effect on waste management performs. Hazardous wildernesses, such as chemicals, decorates, unused medicine, in addition to batteries, can be found in MSW. Fruits, vegetables, and other organics are compostable. The average MSW composition generated by Indian metropolises is almost 41 weight percent organic, 40 weight percent inert, and 19 weight percent potentially recycled waste. The majority of organic waste comes from homes, while inert waste comes from building, demolition, and road sweeping. MSW characteristics vary between cities, according to waste examples collected in Ahmadabad, Delhi, and Bangalore.

2.1.2. Prediction On Future Growth:

By 2050, global waste manufacture is projected to reach about 28 billion tons per year, with Asia accounting for one-third of the total, with China and India leading the way. In 2025, waste generation in India's urban areas would be 0.8 kg per day, roughly four to six periods higher than in 2000. As scale of communities grows, issues related with leftover become additional acute, opening up chances for dispersed waste management finished self-help organizations besides NGOs. The leftover generated in India's urban zones amounts to around 170,000 tons per day, or 61 million tons per year, besides this figure is predictable to rise by 6% per year due to populace growth and altering lifestyles. It demonstrations that in 2001, town India produced 32.7 million tons of leftover, which has increased to 47.3 million tons today. Waste production is projected to hit 160 million tons by 2036, a fivefold rise in four periods.

2.2. Existing Waste Management in India

2.2.1. Main waste Organization in India:

To ensure proper waste organization in India, government released MSW (Management and Handling) Rules in 2000, and new revised draught rules were recently written. Municipal governments are in charge of enforcing these regulations and building facilities for MSW gathering, storage, separation, conveyance, processing, besides disposal. In comparison to other Indian cities, Chandigarh was the first to build SWM in an intentional manner and strengthened waste management.

2.2.2. Character of Informal Segment in waste Materials reuse in addition to recycling:

In India, informal segment plays significant role, which must be incorporated into formal SWM structures. Small-scale, largely tolerant moreover unregistered low-technology production or delivery of

materials in addition to services describe casual sector. Waste pickers amass domestic or profitable/industrial waste, and despite related health besides social problems, hundreds of thousands of waste depend on waste for a living. Waste containers, trucks, highways, rivers, and dumpsites are all locations where pickers can extract potential value. Some operate in cooperatives or waste picker groups that own recycling plants.

Waste collection is often a family's only foundation of income, as long as a source of income for a large number of urban poor people as well as useful materials for other businesses. Organic waste is collected by waste handler in Pune for composting besides biogas production. Waste pickers also play an important role in keeping cities safe. According to study of six Indian cities, garbage collectors recovered roughly 25% of waste, through 85000 people complicated in reprocessing roughly three millions. Every ton of recycled materials collected is expected to save ULB approximately INR 25 500 per year in addition to prevent emission of 735 kg CO₂.

2.2.3. *Waste Collection as well as transportation:*

Waste collection, storing, and transportation are vital components of SWM system, but they could be difficult in metropolises. In India, municipal corporations remain responsible for waste collection, and bins are usually issued for environmentally friendly and inert waste. Dumping of mixed decomposable and unmotivated leftover is popular, as is open boiling. Landfill collection besides transportation infrastructure investment in India would build jobs, enhance public health, and boost service sector. Local governments devote about Rs. 500–1000 per ton on SWM, through 75% of that going to collection and 20% to transportation.

2.2.4. *Waste Removal:*

In India, SWM removal is critical phase of growth. It is necessary to build amenities to handle and position of growing volumes. In India, it is estimated that additional of 90% waste is disposed of in an unacceptable manner. In 1997, about 1400 km² of land was engaged by waste dumps, with number predictable to growth in future. Waste treatment that is properly constructed protects public health while also preserving significant environmental resources including surface water, groundwater, and air quality. Mumbai, Chennai, Kolkata, Nashik, Vadodara, Amritsar, Jamshedpur, Allahabad, Shimla, Rajkot, Thiruvananthapuram, in addition to Dehradun are among the Indian metropolises with suppression landfill sites. It displays treatment facilities in various Indian states as well as information on landfills affiliated with various metropolises.

2.2.5. *Environmental besides well-being influences of waste dumping:*

Leftover landfills have negative environmental and public health implications. Under anaerobic conditions, methane is released from open dumps as biodegradable waste decomposes. Methane is a significant donor to global heating which causes fires and explosions. There are issues of odour and leachate movement into receiving waters as well. Odor is a major issue, predominantly during summer, temperatures can reach 47°C. At dumps, rejected tyres gather water, allowing mosquitos to breed and spread diseases like malaria, and West Nile fever.

Fine particles released by unregulated waste burning at dump sites are a foremost cause of breathing disease besides smog. Every year, 21 000 tons of contaminants are released into atmosphere everywhere in Mumbai due to open boiling of MSW and tyros. Increased reported cases of nose in addition to throat pollutions, respiratory problems, tenderness, infectious agents, allergies, decreased immunity, influenza, and additional infections have all been related to inadequate waste management.

2.2.6. *Planned Landfills in India:*

According to United Nations Conservational Program, landfilling is the supervised discarding of MSW on land that waste-to-environment interaction is greatly condensed, with leftover disposal concerted in a defined region. Concocted landfills allow for safe discarding of outstanding MSW on land while also shielding ground besides surface water from contamination, preventing air pollutants, fire hazards, odor, animal, bird, and other pests/rodent problems, and lowering greenhouse (GHG) discharges besides slope unpredictability concerns. In India, correctly maintained constructed landfills must take the place of

dumps. This will have a huge effect on waste's environmental impact.

2.2.7. *Waste to energy in India:*

By requiring material recovery, the issues related with excessive leftover disposal can be greatly summarized. The possibilities for current retrieval besides treatment selections would be maximized if inert besides high dampness content fractions were separated at source. Thermal retrieval waste is leftover waste afterward all commercially obtainable recyclable resources have been uninvolved. Waste machineries harvest energy, reprocess ingredients, in addition to free up land that would be enthusiastic to landfills. The gratified of residual leftover is critical for energy salvage, in addition to in India, majority of supplementary calorific waste is rising.

In most extensively recycled waste-to-energy engineering for waste substantial, combustion produces heat in addition to electricity. In India, combining full recycling with landfill as part of a comprehensive waste administration will suggestively diminish dumping. Waste-to-energy technology capable of processing gender-segregated low-calorie waste is available, and production in Malaysia is eager to put it to use. Several waste-to-energy schemes are currently in production, focusing on disposal of non-segregated low-calorific waste. Gasification, the production of forget trying fuel, in addition to gas-plasma processing are only a few examples of possible combustion treatment options.

The create, run, and move model is used in waste energy production. Increased waste energy will minimize waste disposal to the environment while also generating safe, dependable energy from a renewable fuel source, decreasing reliance on fossil fuels and lowering GHG emanations. Furthermore, producing electricity from waste will provide India with major social and economic benefits. However, India's experience with waste energy tourist attractions some of the challenges. The vast mainstream of amenities have failed to function properly due to a variety of organizational and design issues.

2.2.8. *Barriers to enhanced waste management:*

SWM in India is presently in a bad state since best suitable waste gathering besides disposal methods are not existence used. There is a shortage of qualified waste organization practitioners besides there is a scarcity of training in SWM. In India's existing SWM constructions, there is a lack of photograph. Municipal managements are in responsibility of management MSW, but their resources are derisory to cover costs of executing adequate waste collection, storage, treatment, in addition to disposal systems. In India, achieving successful SWM is hampered by a lack of considered MSW strategies, waste assemblage/segregation, and management economics supervisory arrangement. Low motivation in addition to a lack of conservational consciousness have muffled creativity besides implementation of new knowledge that could modification water conduct in India. In India, community arrogances against waste are also a big impediment to calming SWM.

2.2.9. *Changes compulsory to recover waste management:*

The usage of wastes as tools, through improved revenue withdrawal, recovery, recycling, and recycle, is central to India's waste organization vision. Waste management must be the responsibility of ULBs, with ULB Commissioner in addition to Chairman being responsible for waste management arrangement results. Waste management must be viewed as a critical service that requires long-term funding in Indian society. The benefits of sound waste management expenditure must be demonstrated in case posed to a ULB for an appropriately funded scheme.

If SWM in India is to change, it will need a strong in addition to sovereign authority to control waste. Developments would not occur deprived of clear regulation and compliance. Strong waste regulations have the potential to spur innovation. The wastewater treatment sector must include appealing and sustainable companies with specific performance criteria levied by the ULB, as well as financial penalties for waste management services that do not operate properly. A waste tax must be imposed on waste producers to collect funds for waste management companies and facilities.

A regular charge of one rupee will generate nearly 50000 crores once a year, and this amount of subsidy will most likely be satisfactory to provide successful leftover management crosswise India. Knowledge on potential waste amounts and classification is important because it defines the suitability of various waste

management and treatment solutions. Primary in addition to secondary collection, as well as operative systems for tracking collection, conveyance.

To permit for more effectual value withdrawal in addition to recycling, waste organization must include waste isolation at the source. Unraveling dry besides wet waste would be helpful in addition to should be waste producer's accountability. Long-term management preparation necessitates innovative scheme employment by local directions, private division, and non-governmental officialdoms. The functions and responsibilities for delivering sustainable systems must be identified, and progress must be tracked and evaluated. Experiences from various parts of India and from various social classes should be exchanged.

An amount of investigation institutes, establishments, non-governmental organizations (NGOs), besides private firms are occupied on a comprehensive view to waste disposal in India, besides future waste system would necessitate significant participation from the shadow economy. All school going kids should appreciate position of wastewater treatment, properties of poor management on atmosphere including public well-being, and role in addition to responsibilities in the solid waste organization. As a result, more diligent citizens will emerge who see pollution as a renewable adsorbent.

3. DISCUSSION

Waste management is need to be address as the population and manmade waste is increasing day by day. The problem of the waste management is increased because of the packaging material in all most everything whether it is gift items or even vegetable containers. The plastic is considering as biggest factors of this pollution, apart from the plastic, there are many other elements that are counted in the solid waste. The metropolitan cities are biggest contributor in the solid waste. The government has been implementing a many policies for mitigate this problem. The Indian government had launched a pan India program for control the pollution in the form of Swachh Baharat abhiyaan. A public place is also developed in Delhi named as the waste to wonder and it is constructed with use of the waste material.

4. CONCLUSION

Management of the solid waste is important in not only metro cities but also in non-metro cities as well. The importance of the SWM is to keep the environment clean by proper disposing the debris. The government has taken many step to keep the cities clean and start many scheme regarding this. The most prominent scheme is the Swachha Bharat Abhiyaan, and this is pan India scheme and implemented by every state with enthusiasm. The benefit of this scheme is to make every person knowledgeable and aware about the cleanliness and also make them responsible for keeping the nearby area clean voluntarily. In fact, community awareness is not an easy task but proper management of the waste is only possible through a proper channel. There are serious issues with public participation in wastewater treatment, as well as a complete absence of collective waste obligation. Unless these basic conditions are met, and implications for human health and environment.

REFERENCES:

- [1] R. Yadav, "Solid waste management," *Pollut. Res.*, vol. 34, no. 1, pp. 93–102, 2015, doi: 10.5958/2395-3381.2016.00015.0.
- [2] R. Yadav, "Solid waste management," *Pollut. Res.*, 2015, doi: 10.5958/2395-3381.2016.00015.0.
- [3] A. G. S. Cuthbertson *et al.*, "Population development of *Tuta absoluta* (Meyrick) (Lepidoptera: Gelechiidae) under simulated UK glasshouse conditions," *Insects*, 2013, doi: 10.3390/insects4020185.
- [4] H. D. Sharma, A. D. Gupta, and Sushil, "The objectives of waste management in India: A futures inquiry," *Technol. Forecast. Soc. Change*, vol. 48, no. 3, pp. 285–309, 1995, doi: 10.1016/0040-1625(94)00066-6.
- [5] R. K. Annepu, "Sustainable Solid Waste Management in India," 2012.