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Editorial

Waste management scenario in India

Pooja Adwani, Jiwan Singh*, Shikha*

Department of Environmental Science, Babasaheb Bhimrao Ambedkar University, Lucknow-226025, Uttar Pradesh, India



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ABSTRACT

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In India, waste is collected, moved and disposed of in an unorganized and non-scientific manner. Due to irresponsible waste disposal, landfills on fringes of towns and cities are overflowing and challenging to reclaim because the trash is carelessly thrown and have serious adverse impact on health and environment by contaminating groundwater and climate change. Due to rapid urbanization growth of population and economy have been increased which in turn produces waste. Poor practices of waste management causes health risk and deterioration of land subsequently revolutionary waste management studies must be implemented for sustainable waste management.

Waste is produced by most human activity and producing waste has been a major source of concern, since prehistoric times. Rapid urbanization in recent decades have increased waste generation both in quantity and rate. However, most of the developed nations are trying to handle issues related with waste generation in their own ways which adversely affect the environment and health. Similarly, the rapid urbanization and growth in developing nations is also causing the same issues that developed nations have previously faced to recur. The process of collection, movement, and disposal of wastes in a way that minimises or completely eliminates their detrimental effects is known as waste management. Numerous methods of research have been direct to address the need of identifying the factors that influence the sustainable development of waste recycling and solid waste management systems. In developing nations, managing municipal solid waste remains a challenge. Only a small fraction of waste generated could be recycled while the majority ends up in landfills or other disposal locations. Fostering recycling is essential to solving disposal issues since it permits the recovery of raw materials, which is

likely to cut down the greenhouse gas emissions. Recent urbanization in emerging nations has increased population density, resulting in an accumulation of trash that needs an appropriate handling and disposal. Many challenges to waste usage implementation exist such as a lack of public acceptance, risks related to technology, economy, and hygiene, and also additional uncertainties brought on by a lack of knowledge, consistent norms, and legislation. An unplanned and rapid growth of metropolitan areas leads to municipalities that are primarily overloaded with the collection and disposal of huge amount of waste. Number of efforts have been appliance in production and consumption systems, including industrial symbiosis, extended producer responsibility (EPR), cleaner production, and design for environment. In order to achieve the adequate resource efficiency, such technological and operational advancements have expanded the discussion on waste issues; yet, they still emphasize the specific product or systems in isolation rather than a more cohesive system approach. Substantial contribution of garbage-related emissions to environmental problems such as climate change, waste

*Corresponding Editors:

Email address: jiwansingh95@gmail.com (J. Singh); dr_shikha2003@yahoo.co.in (Shikha)



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concerns are now being considered as a global problem rather than local. Prioritising preventing and or minimising waste generation at the source; enhancing the quality of the waste created, such as by lowering hazards; and promoting re-use, recycling, and recovery have emerged as the three main components of waste minimization. Based on a brief review of the global waste management situation, it seems that developing nations like India have more severe waste management issues. This is mostly because of their comparatively underdeveloped infrastructure and rising rates of garbage output. Waste management in developing nations face both non-technical and technological obstacles, and are extremely complex because of rapid urbanization, rising inequality, and struggle for economic growth; diverse economic, cultural, socio-economic, and political landscapes; governance, institutional, and responsibility issues; and international influences. Growing garbage levels across global countries demonstrate the close relationship between waste production and economic expansion. In low and middle income countries per capita garbage generation rates are low as compared to those in high-income countries. The volume of fresh trash entering the waste streams is enormous. Therefore, managing garbage responsibly presents issues even for nations with a reasonably developed infrastructure for waste management.

The amount of solid garbage generated in Indian cities surged from 6 million to 48 million, and by 2047, it is predicted to reach 300 million tons annually (CPCB, 2000). In India, almost 70% cities lack the necessary transportation capacity. Approximately 25% of municipal solid trash is not collected at all and also there are no proper and hygienic landfills where the waste can be disposed of. Even the landfills which are currently in place are poorly maintained and are not well equipped which in turn pollute soil and groundwater. Solid waste can be classified on the basis of their generation as:

- **Municipal solid waste**

It is also called as Domestic waste or household waste. According to Municipal solid waste (Management and Handling) Rules 2000 “residential and commercial waste generated in a municipal in any form that is solid or semi-solid including treated medical waste and excluding industrial hazardous waste.” Household consumptions like meat, vegetable and fruit peel, waste from hotels, restaurants, offices are collectively classified under municipal solid waste. The properties of such wastes are greatly depends on factors like local population, climate, food habits, lifestyle and dietary habits.

- **Biomedical or Hospital waste**

During diagnosis and treatment of human and veterinary hospitals toxic wastes like pathological (bandages, syringes, glucose bottles etc), anatomical (body fluids, human excreta and so on), chemical wastes (medicines, cultures and so on) are generated by hospitals are contagious and poses major risk to both human and environment.

- **Industrial waste**

The waste generated by various industries like pesticide-based industry, mining operation, industrial processes are hazardous being combustible, corrosive, inflammable and explosive in

nature. Some hazardous wastes are also produced from hospitals (mercury used in thermometers and blood pressure measuring devices, chemicals like formaldehyde and phenol), household utilities (old batteries, paint tins, shoe polish, expired medicines). An exposure of such waste with general population can be fatal. According to MoEF report out of 323 hazardous waste recycling unit 303 use locally produced materials and 20 depend on recyclable waste.

- **Agricultural waste**

These wastes include pesticide, waste oil, machinery scrap, veterinary medicines, and animal excreta in form of slurry, farmyard manures, polluted water and silage effluent. If these wastes are not handled properly it may adversely impact the environment. Nutrient run off into surface water can lead to over-enrichment of water body which pose seriously threat to the ecosystem. Furthermore methane and ammonia emission from farming operation have potential to cause greenhouse emission which in turn cause global warming and impact the climate.

- **Radioactive Waste**

Commercial production of nuclear power has resulted in accumulation of irradiated fuel and thousand tons of radioactive waste. The radioactive waste produced by nuclear power plant remains in the environment for extended period of time as they do not degrade and produce strong radiations. There is no adequate disposal and treatment method for radioactive waste. In India approximately 3% energy is generated by nuclear power plant. Uranium is used as a fuel which happens to be carcinogenic and if not treated properly may cause long lasting effect on environment.

Most of the waste generated are disposed of in an unscientific manner. Site for the treatment and disposal may pose severe risks to surrounding community. Inadequately operated incineration can emit harmful pollutants in air; poorly maintained landfills draw variety of pests and rodents which in turn serve as carrier of different diseases like diarrhea, dysentery etc. When untreated waste is dumped directly into waterbodies (river, seas and lakes) and landfills, it accumulates in food chain and affect the ecosystem. In addition foul odour can degrade the aesthetics of the surrounding. The most efficient methods for treating and recycling organic wastes are biological ones that make use of microorganisms like bacteria, fungus, algae, and other higher living forms. These biological processes produce biomass from proteins, biofuels, and compost fertilizer as by-products. Hot climates ought to be ideal for the execution of waste recycling programs because the proliferation of microorganisms (or the effectiveness of organic waste treatment and or recycling) depends on temperature. Therefore, it is obvious that waste management systems that are easy to use, practical, and affordable must be created to protect public health and lessen environmental pollution. Solid wastes from residential, commercial, street sweeping, institutional, and industrial sectors are among those produced by human activity. Across the globe, solid waste management is a significant economic and environmental concern. There are several ways to design a recycling system that best serves a community's needs. Wastes can be reclaimed, recreated, and

given life as a part of a new creative process at any point in the dumping process, including cleaning, collection, sorting, and disposal. Due to rapid population growth and urbanization, the percentages of people served by adequate water supplies and sanitation have increased over the past ten years, and much improvement is still needed in rural areas. Consequently, the phrase "waste minimization" has gained width and encompasses both treatment and preventative strategies. As an "end-of-pipe" response to waste problems, separate landfill sites were developed in response to growing garbage volumes and associated environmental concerns around open dumping and open burning of waste. This necessitates an environmentally responsible strategy to waste management that goes beyond the simple safe disposal or recovery of wastes produced and instead aims to address the fundamental causes of the issue by trying to alter unsustainable patterns of production and consumption. Environmental awareness in society plays a very crucial role in sustainable consumption and disposal of resources. Participation of people in waste management plays a potential role in the overall operational efficiencies of any waste management system. The search for adequate solutions for the collection, treatment, disposal, or reuse of household trash presents a substantial challenge to scientists and engineers working in developing nations. Methods like incineration and pyrolysis for recovering energy from agricultural and municipal waste, are not currently commercially feasible due to their high operating and capital costs. While a number of industrialized nations have effectively implemented garbage recycling programs, many developing countries still lack sustainable waste management plans. It appears that recycling waste has been successfully included into the main stream waste management system in a number of developed nations. With each passing day of invention, it is anticipated that technologies will become more affordable, opening up the opportunity of their broad use. The lack of waste management infrastructure and the quickly increasing amounts of garbage generate a very problematic scenario for waste management in middle- and low-income countries. However, due to a high level of consumption, high-income countries have more serious waste management challenges overall, even with their comparatively sophisticated waste management systems.

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Prof. Shikha
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Editors in Chief

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