

SOLID WASTE MANAGEMENT IN BENGALURU CITY

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ABSTRACT

Waste is an unavoidable byproduct of human activities since ages. The Economic development, urbanization and improving of the living standards in cities, have led to an increase in the quantity and complexity of the generated waste. Rapid growth of population and industrialization degrades the urban environment and places serious threat on natural resources, which undermines the sustainable development of the nation. Inefficient management and disposal of solid waste is an obvious cause of degradation of the environment in most of the cities of the developing nations in the world. Municipal corporations of the developing countries are not able to handle the increasing quantities of waste, which results in uncollected waste on roads and in other public places. There is a urge need to work towards a sustainable waste management system, which requires environmental, institutional, financial, economic and social sustainability in the system. The purpose of this paper "Solid Waste Management" system is to improve the present practices of solid waste in that prevail in BENGALURU city where it has received sufficient attention. This paper reviews the treatment and disposal methodology of the waste so as to handle the disposal of the waste and result in a good environment to the citizens.

Keywords: Pyrolysis, Incineration, Biological Reprocessing, Resource Recovery

I. INTRODUCTION

Bengaluru is one of the fastest-growing cities in the world. With a population approaching 9 million, it produces around 4000 tonnes of solid waste each day and now the BBMP is looking at a ban on plastic and plastic products to reduce the burden. At present, there are seven waste processing units in the city but not all the garbage being sent there. Since the garbage is being sent to landfill sites instead, which results in the city's garbage woes are unending. Most of these are dumped in land fill sites near villages or the city's outskirts. But the question which arises among us, is this the best way of dealing with the waste problems?

A crippling garbage crisis is staring at Bengaluru. And although garbage has been a problem which the city is familiar with, this time it could be very serious threat with the alternative plants refusing to take unsegregated garbage for the processing units.

Two landfills that were taking garbage from Bengaluru South are now closed as they have reached the saturation point, and the entire garbage are being rerouted to the city's northern landfill, Terrafirma near Doddaballapur, and to the besides plants in Seegehalli and Kannahalli, close to Rajarajeshwarinagar, Doddabidrakallu, MSGP, and Mavalipura.

II. CITY STATISTICS

Area: 800 sq km

Population: 84 lakhs as per 2011 census

Households: Approximately 25 lakhs

Commercial properties: 3.5 lakhs

No of zones: 08

No of wards: 198

III. WASTE GENERATION

Table 1

Per capita waste generation per day	Average waste 0.425-0.618 kg
Waste generation per household	1.30kgs, slums 1.7kgs
Estimated waste generation of solid waste	Garbage 3750 tons per day

Waste composition (approximate) [for guidance only]

Table 2

Vegetable	0.33
Paper	0.095
Plastic	0.2
Cardboard	0.035
Textiles	0.045
Grass/Leaves/Woos	0.07
Leather	0.001
Electronic Item	0.028
Metal	0.013
Organic	0.238
Glass	0.036
Debris	0.1
Biomedical	0.024

IV. PLANTS CLOSED BY BBMP AND CAPACITY OF GARBAGE LYING

Mandur: Around 2 lakh tons unprocessed garbage is dumped

Bingipura: 50,250 tons

Laxmipura: 50,100 tons

V. WHERE IS GARBAGE SENT?

Terrafirma, Doddabidrakallu, Kannahalli, Seegehalli, MSGP, Mayalipura.

VI. WHAT IS THE PROBLEM?

These sites are not taking the unsegregated garbage, which are being dumped by the roadside by the contractors.



A substantial quantity of garbage can be reduced if we segregate bio-degradable waste from the rest before being sent to the processing plants. Compost pits should be encouraged especially in large apartment complexes so that they act like mini-processing plants in their own houses, despite being only bio-degradable waste. In case of the non-biodegradable waste, a substantial percentage can be reduced if we reduce the usage of plastic. Plastic, along with metal is also recyclable. Henceforth, they can be separated at the processing plants for recycling. But it does not mean change should not happen at our own houses, i.e., carry a reusable plastic bag or jute/cloth bag when you go out for buying the groceries or for shopping. Refrain from buying a polythene cover. Of course, there is an acute need for the betterment of the garbage collection and processing system. But it is the other half of the problem. The main objective is the waste segregation and it should start from the low level i.e. from the households.

VII. SPREAD AWARENESS AMONG PUBLIC

In order to create awareness among people about waste segregation, the high court has ordered the BBMP to take up public awareness programmes about waste segregation, processing of good waste, separate storage of wet and dry waste, encouraging waste pickers to take segregated waste, wrapping the sanitary waste etc. The court instructed the BBMP to give due publicity for implementing the rules.

The court has stressed on the same in the last given order, by suggesting that BBMP provide short films on waste segregation and related issues to state-owned media which can be aired by the latter. The BBMP in recent days has been organizing jathas in each ward on waste segregation, and has deployed the mobile vans and street plays to work on spreading awareness.

VIII. VIOLATORS TO BE PUNISHED

The order has also emphasized on punishing the rule violators who don't segregate, in accordance with Karnataka Municipal Corporation Act, 1976.

“The above orders and directions are in conformity with the solid waste management rule-2000. Therefore, if there is any omission and commission in the following the directions, it will amount to violation of SWM rules 2000. Hence, the violation will be an offence punishable under section 431(A) of the Karnataka Municipal Corporations Act”, the court said.

It can be noted that under KMC act, those who violate the rule can be penalized with an amount ranging from Rs 100 to Rs 5,000.

Following the traditional method of solid waste disposal i.e. sanitary landfilling and its treatment is not sufficient with the growing scarcity of land. The different method of dealing with the garbage being produced in day-to-day life has to be adopted for a clean and healthy environment. The method of treating the garbage has to be revolutionized and practiced. The few methods are enlisted below:

IX. PYROLYSIS

The thermo-chemical decomposition of the organic materials by heat in the absence of oxygen which produces various hydrocarbon gases is known as pyrolysis. During the process, the molecules of the object subjected to very high temperatures leads to very high vibrations. Therefore, every molecule in the object will be stretched and



shaken to an extent that molecules starts being to broken down. The rate of pyrolysis increases with temperature.

In the industrial applications, temperatures range above 430 °C (800 °F). Pyrolysis is a very good promise for the conversion of waste biomass into useful liquid fuel. Pyrolysis of the waste plastics can produce millions of litres of fuel. Solid products in this process contains metals, glass, sand and pyrolysis coke which cannot be converted to gas in the process.

X. INCINERATION

Incineration is n another disposal method in which solid organic wastes are being subjected to combustion,so as they get converted into residue and gaseous products.This method is useful for disposal of residue of both solid waste management and solid residue from waste water management. This process helps in reducing the volumes of solid waste to 20%-30% of the original volume. Incineration and other high temperature waste treatment systems are sometimes described as “thermal treatment”. Incinerators convert waste materials into heat, gas, steam and ash. But the only disadvantage of this process is the disposal of ash which is being produced by this method.

XI. RECYCLING

Recycling is a resource recovery practice that refers to the collection and reuse of waste materials such as empty beverage containers,papers and plastics. The materials from which the items are made can be reprocessed into new products. Materials for recycling may be collected separately from general waste using dedicated bins and collection vehicles, a procedure called kerbside collection. In some communities, the owner of the waste is required to separate the materials into different bins(e.g. for papers, plastics, metals) prior to its collection. In other communities, all recyclable materials are placed in a single bin for collection, and the sorting is handled later at a central facility. The latter method is known as “single-stream recycling”.

The most common consumer products recycled include aluminum such as beverages cans, copper such as wire, steel from food and aerosol cans, old steel furnishings or equipment, rubber tyres, polyethylene bottles, glass bottles and jars, paperboard cartons, newspapers, magazines and light paper, and corrugated fiberboard boxes.

XII. BIOLOGICAL REPROCESSING

Recoverable materials that are organic in nature, such as plant material, food scraps, and paper products, can be recovered through composting and digestion processes to decompose the organic matter. The resulting organic material is then recycled as mulch or compost for agricultural or landscaping purposes. In addition, waste gas from the process (such as methane) can be captured and used for generating electricity and heat(cogeneration) maximizing efficiencies. The intention and advantage of biological processing in waste management is to control and accelerate the natural process of decomposing the organic matter.

XIII. RESOURCE RECOVERY

Resource recovery is the systematic diversion of waste, which was intended for disposal, for a specific next use. It is the processing of recyclables to extract or recover materials and resources, or convert to energy. These activities are performed at a resource recovery facility. Resource recoveryis not only important from the view

point of environment, but it is also cost effective. It decreases the amount of waste for disposal, saves space in landfills, and conserves natural resources.

As an example of how resource recycling can be beneficial, many of the items thrown away contain precious metals which can be recycled to create a profit, such as the components in circuit boards. Other industries can also benefit from resource recycling with the wood chippings in pallets and other packaging materials being passed onto sectors such as the horticulture profession. In this instance, workers can use the recycled chips to create paths, walkways, or arena surfaces.

XIV. SUSTAINABILITY

Companies are encouraged to improve their environmental efficiencies each year by eliminating waste through resource recovery practices, which are sustainability-related activities. One way to do this is by shifting away from waste management to resource recovery practices like recycling materials such as glass, food scraps, paper and cardboard, plastic bottles and metal. The international Conference on Green Urbanism which was held in Italy from 12-14 October 2016 throws light on the sustainability of the wastes which can be recovered and recycled thus eliminating the increased piling up of the waste.

XV. AVOIDANCE AND REDUCTION METHODS

As the saying goes by “PREVENTION IS BETTER THAN CURE” , in the concert with the waste management ,an important method of waste management is the prevention of waste being created which can be termed as waste reduction. Methods of avoidance includes the reuse of second hand products, repairing of the broken items instead of buying a brand new one, designing products to be refillable or reusable (such as cotton instead of plastic shopping bags), encouraging consumers to avoid using disposal products (such as disposal cutlery), removing any food/liquid remains from cans and packaging, and designing products that use less material to achieve the same purpose.

XVI. INTERNATIONAL WASTE MOVEMENT

While waste transport within a given country falls under national regulations, trans-boundary movement of waste is often subject to international treaties. A major concern to many countries in the world is the hazardous waste. The provisions of the Basel Convention have been integrated into the ES waste shipment regulation. Nuclear waste, although is considered as hazardous, does not fall under the jurisdiction of the Basel Convention.

XVII. CHALLENGES IN DEVELOPING COUNTRIES

Waste management in cities with developing economies and economies in transition experience depleted waste collection services, inadequately managed and uncontrolled dumpsites and the problems keep up on worsening day by day. Problems with governance also complicate the situation. Waste management, in these countries and cities, is an ongoing challenge and many struggle as a result of weak institutions, chronic under-resourcing and rapid urbanization in this modern world. All of these challenges along with the lack of understanding of different factors and little knowledge of regarding the waste management contribute to the hierarchy of waste management which affects the treatment of waste.

XVIII. BENEFITS

Waste is not something that should be discarded or disposed of with no regard for future use. It can be of a valuable resource if addressed correctly, through policy and practiced in the right direction. With rational and consistent waste management practices there is an opportunity to reap a range of benefits. Those benefits include are summarized as below

- 18.1 Economic**-Improving economic efficiency through the means of resource use, treatment and disposal and creating markets for recycled products can lead to efficient practices in the production and consumption of products and materials resulting in valuable materials being recovered for reuse and the potential in valuable materials being recovered for reuse and creating a strong potential for new jobs and new business opportunities.
- 18.2 Social**-reduction in the adverse impacts on health by proper waste management practices, the resulting consequences are more appealing settlements to the environment. Better social advantages leads to new sources of employment and potentially lifting communities out of poverty especially in some of the developing countries which are poor.
- 18.3 Environmental** - Reducing or eliminating adverse impacts on the environment through reducing, reusing and recycling, and minimizing resource extraction can provide improved air quality and water quality and help in the reduction of greenhouse emissions. Provides subsequent generations a more robust economy, a fairer and more inclusive society and a cleaner environment.

XIX. CONCLUSION

The problem of waste disposal has been the major problem in Bengaluru city ,henceforth the management process for the disposal of waste is a very major issue that has to be given due consideration. Following the traditional method of land filling in an uncontrolled manner for the disposal leads to scarcity of land for the disposal of waste. Therefore Selection of appropriate technology/combination of suitable technologies is the most important step for the management of the waste in a metro city like Bengaluru. It must be viable from the point of view of local conditions, investment capabilities, infrastructure available, etc. simple rugged technologies have a higher chance of sustainability. Public awareness should be created among masses to inculcate the health hazards of the wastes littering of municipal solid waste should be prohibited strictly and the violaters should be penalized.

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