Urban Solid Waste Management In India

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A R T I C L E I N F O

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A B S T R A C T

At present time management of solid waste is a big and serious problem of country. Urban solid waste+8 P87s are discarded from various sources due to anthropogenic activities. These wastes are produces from various activities. Solid waste consist various kinds of wastes generated from urban areas .In waste management system is not related to defuse the urban waste but it is also related to reduce the generation of solid waste. The waste discards as a unusable materials. It consists of the different verity of waste released from the urban community, agricultural, industrial, mining, biomedical waste etc. Many types of disposal methods can be used like open dumping, ocean dumping, sanitary land filling, composting and incineration. In our country these methods are very common. After waste generation Proper waste collection and conveyance and disposal are essential parts of the overall solid waste management system. In collection methods the refuse is delivered to fixed storage bins and refuse is stored in the bins till it is collected for disposal by a larger vehicle for shifting it to transfer station. Community storage point, kerbside collection and block collection methods are some popular method for waste collection. For the disposal of solid waste so many methods are using in India but due to various merits and demerits all method are not feasible for solid waste management. These methods are Open dumping, Ocean Dumping, Sanitary land filling, Composting, Vermicomposting and Incineration. Some potential disposal methods are also beneficial for waste management like Reduction, Reuse and Recycle (3R's).

1. Sources of Solid Waste

In a huge quantity of solid waste generation is regular practice from various sources like domestic, commercial. industrial and various other agricultural related activities. At dumping sites it can pollute the surrounding environment due to foul smell and can seriously affect the health of humans, wildlife and our environment. In urban areas these waste generation is a regular practices so the management of these waste is essential .Some major sources of solid waste generation are:

1.1. Domestic sources

Domestic sources including homes where people live are some of the major sources of solid waste. Garbage produces from food wastes, plastics, paper, glass, leather, cardboard, metals, yard wastes, ashes and special wastes like bulky household items like electronics, tires, batteries, old mattresses and used oil. Maximum houses have dust bins where they can throw away their solid wastes in and after the collection of wastes in the bins they emptied by a sweeper for dumping at the sites for treatment and disposal.

1.2. Industrial wastes

Industries are highly responsible for generating solid wastes so they known to be one of the biggest contributors of solid waste. In this category included light and heavy manufacturing industries, construction sites, fabrication plants, canning plants, power and chemical plants and distilleries. These industries produce solid waste in form of housekeeping wastes, food wastes, packaging wastes, ashes, construction and demolition materials, special wastes, medical wastes as well as other hazardous wastes.

1.3. Commercial places

Commercial sectors and buildings are another source of solid waste like hotels, markets, restaurants, go downs, stores and office buildings. Some of the solid wastes generated from these places include plastics, food wastes, metals, paper, glass, wood, cardboard materials, special and hazardous wastes.

1.4. Waste from Institutions

Various institutes like schools, colleges, prisons, military barracks and other government centers also produce solid waste. Common solid wastes obtained from these places are glass, rubber waste, plastics, food wastes, wood, paper, metals, cardboard materials, electronics as well as various hazardous and toxic wastes.

1.5. Construction and Destruction waste

Construction sites and destruction sites are also responsible for production of solid waste. Construction sites for buildings and roads, road repair sites, building renovation sites and building demolition sites. Some of the solid wastes produced in these places include steel materials, concrete, wood, plastics, rubber, copper wires, dirt and glass.

1.6. Municipal services

The urban areas also contribute immensely to the solid waste crisis in most countries today. Some of the solid waste brought about by the municipal services include, street cleaning, wastes from parks and beaches, wastewater treatment plants, landscaping wastes and wastes from recreational areas including sludge and dead bodies of animals.

1.7. Treatment Plants and Sites

Heavy and light manufacturing plants also produce solid waste. They include refineries, power plants, processing plants, mineral extraction plants and chemicals plants. Among the wastes produced by these plants include, industrial process wastes, unwanted specification products, plastics, metal parts etc.

1.8. Agriculture

Agricultural and farm lands are also a major source of solid waste generation. Crop farms, orchards, dairies, vineyards and feedlots are produces solid wastes. Among the wastes they produce include agricultural wastes, organic waste, contaminated food, pesticide containers and other hazardous materials.

1.9. Biomedical wastes

Waste comes from hospitals, medical centers, infectious wastes, biomedical equipment and chemical manufacturing firms called biomedical waste. All hospitals produces various kind of infectious and non infectious waste. Some of these solid wastes include syringes, bandages, used gloves, drugs, paper, plastics, food wastes and chemicals. All biomedical wastes require proper disposal otherwise they will cause a huge problem to the environment and health.

1.10. E-waste

Ewaste are called electronic waste which can be generate from electronic sources like discarded computers,laptops,mobile phones, circuits boards etc.At present time e waste management are a very difficult because its volume is too much high.

2. Methods for collection of discarded materials

Solid waste collection by various conveyance systems are the important part of waste management. In collection method the refuse is delivered to fixed storage bins and refuse is stored in these bins till it is collected for disposal by a vehicle. The organic matter in the refuse tends to decompose rapidly in the hot climate so the collection of waste should be daily. Collection methods include activities with the gathering of solid wastes from different sites with the help of collection vehicle and ultimately it to the site of disposal. Community storage point, kerbside collection and block collection methods are some popular method for waste collection system.

Community Storage point: The municipal Solid waste is taken to fixed large storage bins. The waste collection agency collects it daily disposal in a vehicle.

Kerb side Collection: In this collection system the refuse is collects in metal containers and placed on the foot path, from where it is collected by the waste collection agency. Materials are collected in large bins, colored bag or small open plastic bags, specially designed for the purpose.

Block Collection: Individuals bring the waste in containers and hands it over to the collection staff empties it into the waiting vehicle and returns the containers to individuals.

The collection trucks and crew is the most important member of the collection system.

Transfer Station: A transfer Station may be described as a place receiving refuse from a number of small collection vehicles and transferring it to larger vehicles.

In order that the transfer station may be economically viable the total cost of collection transfer and disposal must be less than the total cost of collection, direct transport by collection trucks and disposal.

3. Disposal Methods:

Many methods for waste disposal are using in India but the still most common methods of disposal are open dumping, sanitary land filling, incineration composting and Vermicomposting.

Sanitary land filling is the main practices used in the developed countries and open dumping is very cheap and common method of India.

3.1. Open Dumping:

Open dumping of solid waste is practiced extensively in India because it is cheap and requires no planning, generally the low lying areas and pot skirts of the towns and cities are used for the purpose.

Advantages:

1. Inexpensive

Disadvantages:

3.2. Health hazards

1. Generates air pollution
2. Ground Water and Runoff pollution
3. Breeding ground for insects, Rodents etc.

Ocean dumping: The dumping or placing of material in designated places in the ocean called ocean dumping. Varieties of materials involved including garbage construction and destruction waste like debris, sewage sludge etc.

Advantages:

1. Inexpensive

Disadvantages:
1. Occupational accidents injuries and exposures to persons.
2. Exposures of the public to hazardous or toxic material washed up on beaches.
3. Human consumption of marine organisms that have been contaminated by ocean disposal.

3.3. Sanitary landfill:

Sanitary land filling means filling all refuse in the ground and compacted in layers form without any harm to our air and water resources. In this method the volume of waste can be reduces by making of waste bundles. These bundles are called "Cell". The cell fills up in low lying area. In every cell having intermediate soil cover of 20 cm. After fill up of all cell final soil cover is spread around 1 mi. of thickness.. The proper compaction of the cell depth should not exceed about 2 mt. The cell is covered with a layer of soil which is spread uniformly and then compacted. To provide an adequate seal the cover should normally be at least 20 cm thick. If the refuse includes large irregular objects it may be necessary to increase the thickness of the cover.
This final cover of land filling is necessary to spray pesticides to prevent rodents and mosquitoes.

The landfill operation is an important part of waste treatment. The refuse stabilization may be divided into five distinct phases-
Aerobic bacteria which are actively reduce the available oxygen and as a result of aerobic respiration the temperature increases.
Anaerobic environment become established and hydrogen and carbon dioxide which are the part of acidogenic activity.
The methanogenic activity becomes stabilized.
The methanogenic bacteria's decreases the organic matter and ultimately the process reached to aerobic conditions.
End products of decomposition during phases three and four are mostly CO_2 and CH_4.Accompanied by small amount of H_2S, NH_3 and water vapors.

Advantages:
1. Very is simple and economical method for waste decomposition.
2. Skilled person is not required
3. Low lying areas can be reused and put to better use after filling.
4. No residue or byproduct is formed; hence no further disposal is required.

Disadvantages:
1. Foul smell continuously emanates from the landfill site.
2. Need of insecticides and pesticides.
3. Large land area is required for filling.
4. Landfills requires maintenance.
5. Gases produced may become health hazard.
6. Not economical than open dumping.

3.4. Incineration:

Incineration means the burning of solid wastes at higher temp. Leftover materials like ash, glass, metals, and unburned combustibles amount to about 25% refuse of the original waste. This residue must still be disposed of in some other methods. Air Pollution can be controlled by installation is to become an economical method for solid waste disposal, useful material and energy must be recovered by the process.
Multiple hearths, rotary and fluidized bed are some incinerators with wide applications for industrial waste treatment and disposal.
Advantage:
1. Requires minimum land area.
2. Incinerator can be work in any season.
3. It produces ash as a reusable material.
4. After incineration waste volume in fewer amounts as comparison to total waste.

Disadvantages:

1. Expensive to install, build and operate.
2. Requires high amount of energy.
3. Requires skilled person for maintenance.
4. Produces foul smell, waste, vermin.

3.5. Composting:

Composting is a process to convert organic waste or decomposable waste into manure. Various microorganisms already present in the waste to stabilize the organic matter in the waste to produce a soil conditioner.

3.5.1. Vermicompost-

Vermicomposting is the method of breakdown of organic matter into compost by the help of some species of earthworm. Vermicompost is a nutrient rich, organic manure and soil conditioner. The process of producing Vermicompost is called Vermicomposting.

Vermicomposting is a bio-oxidation process of Organic material and involves a step by step activity of micro-organisms and earthworms in two months or less.

Several species or varieties of earthworms like Eisenia fetida, Eudrilus eugeniae etc. used to increase the process for waste reduction. The amount of Vermicomposting produce by the worm activity depends primary on environmental factors and secondary on the nature of organic waste. The process of Vermicomposting is cover following steps:

Raw material-----Spread 1-2days-----Mixed with water----Partially decompose waste-----Inoculation of earthworms-----Vermicomposting----Separation of Vermicompost and earthworms.

Advantages:

1. Minimizes the need of chemical fertilizers and make the soil healthy with high NPK content.
2. Provide organic manure free from pollution.
3. Eliminate odour and fly problem.
4. Increases Soil fertility and retain the soil.
5. No health hazards
6. Less soil erosion and salinization.
7. Better ground water recharge.
8. Waste creates no soil, water, ground water and air pollution.
9. Boost to rural economy.

Disadvantage:

1. It is suitable only for decomposing organic waste.
2. It is slow process.
3. It requires more handling before the waste is stored to decompose.

4. Conclusion:

From the study of various methods of solid waste management it is conclude that in India due to huge population and lack of awareness in public about waste management and related technologies as well as the disposal methods of solid waste is still a big problem. Still we are using those methods of Solid waste disposal having many types of advantages and disadvantage. So according to the wastes composition we have to select perfect method for waste disposal with removal of their disadvantages.

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