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SUSTAINABLE ENVIRONMENTAL SANITATION AND WATER SERVICES

Management of Solid Waste

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Introduction

Solid waste is a very common term used now a days in the context of Environmental problem. The use of conventional and non-renewable energy reserves causes huge amount of solid waste. In addition to this, rapid urbanization and population explosion cause the problem more acute than ever before. Huge tonnes of solid waste are generated in urban areas specially in the industrial and Metro-Politan city. In rural areas also it is increasing day by day. A grim situation is ahead in near future due to disposal of solid waste and Environmental pollution. This is going to affect the quality of life in several ways if proper measures are not taken.

The composition of solid waste depends on the population of cities, standard of living which changes with time. They usually contain the ingredients like biodegradable, paper, plastics, glass and crockery, metals, coals, inerts and others.

Source

Any substance in solid state which are produced as waste by different human activities are called solid waste. The important sources of solid waste are as follows.

1) Commercial places like market, hotel, Bank, Restaurant.
2) Industrial places like small scale industries, medium and big industries.
3) Residential places like slums, housing colony, private holding.
4) Institutional places like School, Colleges.
5) Common gathering places like Railway station, Bus terminous, parks, hospitals.
6) Other sources like Trees, leaves, barks, dead bodies of animals.

Disposal Techniques

Waste disposal is one of the major problems being faced by all nations across the globe. There are several techniques for the disposal of this solid waste. Depending on the available technology and conditions like space, topography etc, one or more of the following methods may be adopted.

1) Open dumping
2) Composting
3) Sanitary land filling
4) Incineration
5) Pyrolysis

1) Open Dumping

This is the cheapest and oldest method of solid waste disposal, where the refuse is dumped in low lying areas on the out skirts of city and leveled by bulldozers from time to time. The financial involvement for this method of waste management is quite high particularly for the big cities.

This method has a few drawbacks viz.

a) exposure to flies and rodents
b) a source of nuisance from smell and repulsive appearance
c) partial disposition of loose refuse by the action of wind
d) serious pollution of surface and ground water

With horizontal growth of cities, particularly Metropolis, new housing colonies are coming up close to the former dumping areas and for this reason open dumping should be discontinued in a phased manner.

2) Composing

Decomposition of solid organic waste materials has been taking place in nature ever since life appeared on this planet. The process that have evolved as a result are referred to as "Composting" and the final product called "Compost". Normally this composting is prepared either by (1) heaping the garbage in rows and meachanically turned over, it takes about 3 weeks or (2) by spreading the refuse over a large area with air blown through the mass. As a result bio-degradation process is accelerated and completed within a week. This process is more efficient when the moisture content of solid waste is within 50-55% because bio-chemical reaction (i.e. composting process) slows down when the moisture exceeds 55% and finally stopped at 60%.

(3) Sanitary Land Filling

Sanitary land filling is the most satisfactory method of city solid waste disposal where suitable land is available. In this method, the solid waste is leveled in layers, compacted and covered with earth. The decomposition

takes 4 to 6 weeks. A few advantages claimed of the techniques are

i) The equipment required to operate is relatively inexpencive and can be used for other municipal operations.
ii) Serious threat to community health by open dumping or burning is avoided.
iii) Rodent breeding is reduced.
iv) They can be put to operation quickly.
v) They can be used to reclaim swamps, marshes etc.,

(4) Incineration

Incineration is a hygienic method for the disposal of solid waste. The method can be utilized to generate electricity as well as steam. The incineration of solid waste can primarily be conducted in three different modes, i.e.

a) Direct combustion of unprocessed solid waste.
b) Preparation of fuel from the solid waste and its direct combustion
c) Co-generation.

In the 1st method unprocessed solid waste is incinerated directly, in case of 2nd method a few troublesome components are separated to prepare fuel which burns with a higher thermal efficiency and in 3rd case the solid waste is burnt along with other fuels like coal, fuel oil, natural gas e.t.c. to generate steam & electricity.

However it has some drawbacks

i) The ash produced from incineration is quite reactive and demands careful disposal.
ii) Fines and gaseous effluent produced contribute towards air pollution.
iii) Cost of incinerator and additional investment on pollution control devices make the process more expensive.

6. Pyrolysis

It can be done by the action of heat in an atmosphere in absence of oxygen. The process is carried out at a temperature between 500-1000 degree centigrade to produce three components viz. gas, liquid (tar) and solid (char). Various advantages of this process are

i) Substantial volume reduction (50-90%)
ii) Production of solid, liquid & gaseous fuels.
iii) Storable/ transportable fuel or chemical feed stock is obtained.
i) Minimal environmental problem.
v) Less capital investment compared to the incineration process.
vi) Once started, the process is self sustaining.

Thus the process of Pyrolysis is most promising method of solid waste management both from the the point of view of economic and social acceptability. Yet not much headway have been made as regards to setting up of full scale commercial plants.

Solid waste management strategies : Indian Scenerio

The daily per capita solid waste generated in India ranges from about 100 g in small towns to 500 g in large town. According to TIFAC (Technology Information Forecasting and Assessment Council) Delhi, Mumbai, and Kolkata would be generating 5000 tonnes of garbages every day and estimated quantity of Municipal Solid Waste generated in India is about 27.4 million tones/ year. Table (1) shows the estimated quantity of waste generated in India.

Table - 1 Estimated quantity of waste generated in India

Waste	Quantity
Municipal solid waste	27.4 million tonnes/year
Municipal liquid waste	12145 million litres/day
Distrillery (243 nos)	8057 kilo litres/day
Pressmud	9 million tonnes/year
Food and fruit processing waste	4.5 million tonnes/year
Willow dust	30000 tonnes/year
Dairy industry waste	50-60 million litres/day
Paper and pulp industry waste (300 mills)	1600 m^3 waste water/day
Tannery (2000 nos)	52500 m^3 waste water/day

Source: Bakthavatsalam (1999)

In a developing country like India, accelerated industrialization in and around specific centers has led to rapid urbanization which is associated with its inherent problems of unplanned development of human settlements with inadequate sanitary facilities. Unscientific and Indiscriminate disposal of solid waste has posed serious threat to community, health, which was marked by the out break of epidemics in various cities and towns. Adoption of economically viable and environmentally acceptable waste disposal technique is very much necessary.

Non availability of nearby dumping sites and failure of mechanical composting due to economic considerations have made municipal authorities in India turn to other alternative like incineration and pyrolisis of solid waste.

Conclusion

The waste disposal and its management is a serious problem in developing country like India. The normal practice of waste disposal like dumping on the ground or burning in the open air is not sufficient in the field of waste management. It needs to develop new idea for the utilization of renewable resources through the efficient recycling. More over the solid waste are the major

source of water, air and land pollution. Mass awareness programme, stringent, regulation and sincere motivation of authority can solve this problem.

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