

CONTEMPORARY APPROACH FOR THE DISPOSAL OF SOLID WASTE MANAGEMENT AND ITS TREATMENTS

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Abstract:

Because of rapid industrialization and urbanization India faces a variety of challenges like pollution of the environment, increasing demand for water, depletion water resources as a result of over-exploitation, and decreasing per capita availability of water in regards to quality and quantity. The majority of wastewater that is not treated reaches the rivers every day and is a source of pollution. In addition to these problems, the management of solid waste is an urgent issue. Solid waste is material that comes by industrial, residential as well as commercial operations. Solid waste from municipal sources is usually an everyday waste like food, paper, kitchen and plastic waste, among others. It is most biodegradable (kitchen waste etc.) in addition to recycling (newspaper as well as plastic, etc.) waste. Solid waste can

also include hazardous waste produced by the pharmaceutical and chemical industries. Everyday massive amounts of solid waste is produced from residential and other industries that need an appropriate removal and collection. In the present disposal is mostly by filling the land on dumping sites. The modern disposal methods are more safe to the environment as well as human health. However, because of a deficiency of appropriate treatment facilities, the limited funds and the lack of disposal facilities, proper management of waste materials is an issue for environmentalists and scientists. Solid waste poses a threat to the environment and is responsible for air pollution as well as ground and surface water pollution. Leachate that is produced through open dump sites (traditional method of waste disposal) encounters groundwater, the leachate contaminates

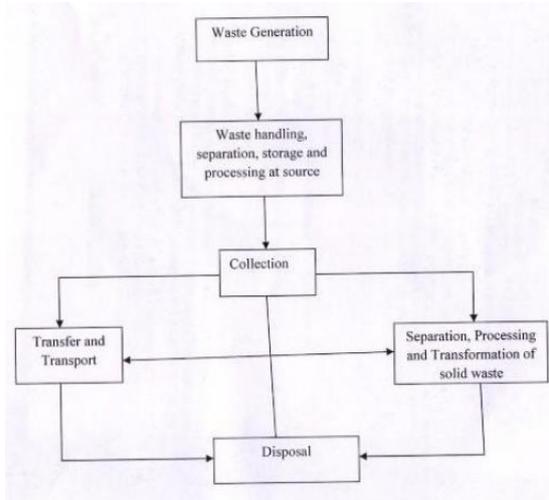
it. The aquatic system also gets disturbed by pollution of the surface waters. The proper disposal of solid waste removes or minimizes harmful effects on the environment as well as the health of humans up to a certain amount and aids in Green Gross Development Product (sustainable development) and enhances the quality of living. This paper is focused on municipal solid waste to support sustainable management and development.

Keywords: Solid waste, Water, management, Recycle, Disposal.

1 INTRODUCTION:

Solid wastes are discarded products of our increasingly consumer-oriented society. This increasing amount of garbage and waste is not just an attitude of lack of concern for precious natural resources as well as a major public health and economic problem -Jimmy Carter. It is defined as a material or objects that have been being disposed of or are intended to be removed from the environment or must be removed from the environment (K.Sasikumar 2009). Solid Waste is an item that costs less to dispose of than store or make use of. Solid Waste is a significant issue that needs to be dealt with efficiently and

promptly. In many cities, waste is burnt in pits, disposed of at random places or dumped in uncontrolled landfills with no treatment, resulting in harmful effects on humans and the environment. A proper waste management system does more than to safeguard the health of people as well as the environment, but it also helps conserve the natural resources. When products are manufactured, distributed and throughout the duration of the life cycle of goods the emission of green house gases take place which impact the climate change. Decomposition of organic wastes in landfills releases methane that contributes to the climate change. Solid Waste Management is a collection, transport and disposal of sewage, garbage and other waste materials. It is the method of dealing with solid wastes . It also offers a variety of options for recycling things that aren't garbage. It's about how waste can be utilized as a resource. The management of waste is something every business and household across the globe needs. The process of removing waste disposes of items and materials you've employed in a safe and efficient way. Figure 1 below illustrates process of managing waste.



II. COMPOSITION OF MSW

The distribution of each part of the waste as a percent of the total weight is known as the composition of MSW.

Fig 1 : The management process

Treatment and disposal methods depend on composition of the MSW. The high proportion of food and yard waste are appropriate for composting. MSW is mostly food waste yard waste paper and plastics, cardboard, and more.

III. PROCESSING OF MSW

The processing of MSW is crucial prior to disposal to safeguard the environment and health of the human. MSW must be sorted out and moved to a suitable location frequently as per the MSW (management and handling guidelines). Separation from MSW at the point of origin plays an essential role in the

proper management. Disposal and treatment facilities are closely associated with segregation.

IV. TYPES OF WASTE

- Residential and Commercial Waste
- Institutional Waste
- Industrial Waste
- Construction and Demolition Waste
- Municipal Services Waste
- Agricultural Waste
- Treatment Plant Waste
- Special Category Waste

V. MUNICIPAL SOLID WASTE

Municipal Solid Wastes are comprised of garbage from commercial, residential and institutional spaces Construction as well as demolition materials, as well as waste generated by municipal services. MSW is usually believed to encompass all municipal waste that is

generated apart from industrial waste. It can be considered hazardous or non-hazardous. Hazardous waste has at minimum one of the four properties: ignitability, the ability to react, virtuosity and toxic. Hazardous household wastes (HHW) like batteries, paints, and more. are considered to be hazardous waste. They require special attention when they are the disposal process. MSW that is biodegradable, non biodegradable however is not toxic, corrosive and ignition or reactive is considered to be a non-hazardous solid waste.

VI. WASTE MANAGEMENT HIERARCHY

According to Wikipedia Waste management refers to an approach to the "generation, prevention, characterization, monitoring, treatment, handling, reuse and residual disposition of solid wastes". There are many kinds of solid waste, including municipal (residential commercial, institutional, residential) agricultural, municipal, specific (health care) household hazardous wastes, sewage sludge).)||Waste Management Hierarchy a system of arrangement or classification of solid waste

management actions. It can be seen in diagram below.

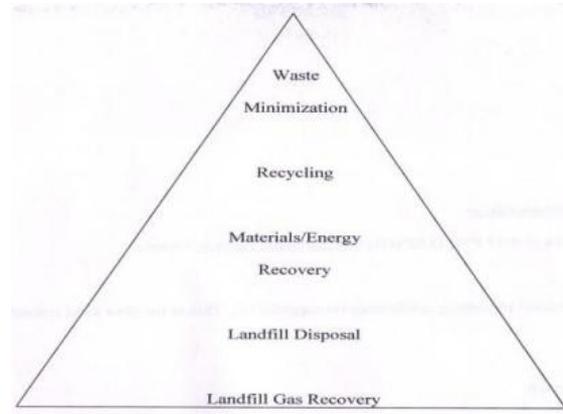


Fig 2 : Waste management hierarchy

There are different strategies similar to. For instance, the EPA in the USA includes an order of choices: (Encyclopedia of Environment and Ecology)

Source reduction

Recycling (reuse and recycling waste)

Treatment-destroying, detoxifying or neutralizing wastes

Disposal-discharging waste

Another possible hierarchy could be the 6 R's : Rethink Refuse, recycle, reuse, replace and remove. Others schemes use the 3R's - Reduce Reuse, Reuse and Recycle.

VII. WASTE DISPOSAL

The most efficient way to address the issue of solid waste is cutting down on quantity of waste first, i.e. stopping the waste from happening. The first priority should be elimination of sources. Another option is recycling and composting. The disposal of waste in landfills should not be the final alternative. The most common waste management strategies include reuse and reduction of sources as well as composting, recycling vermiculture, engineered waste landfills as well as incineration and land use.

VIII. METHODS OF WASTE DISPOSAL

a) WASTE MINIMIZATION (SOURCE REDUCTION)

The most efficient method for managing waste is to minimize the production of waste materials, thereby cutting down on amounts of garbage. Reduction, prevention or minimization refers to the reduction of waste by not producing the waste in the first place. Source reduction, commonly referred to as described as the process of reducing the amount of materials in packaging and in products prior to when that material is incorporated into the municipal solid

waste management system. It can be achieved by recycling the products instead of purchasing new ones and avoiding the using disposable items like plastic bags, recycling products that are used in the past and by purchasing environmentally friendly products. The process of preventing waste actually reduces production. In short, reducing waste helps protect the environment and preserve the resources of nature. It stops the production of GHGs which are extremely damaging to the environment.

b) RECYCLING

In this way, solid waste products are further processed to be used or transformed into energy. Recycle is the act of changing the waste into useful products that reduce the use of energy and the consumption of natural raw materials. The purpose of recycling is to cut down on the use of energy, manufacturing costs as well as the volume of landfills pollution from water and air carbon dioxide emissions, and conserve natural resources for the future as well as sustainable growth. Paper, plastic, aluminum, glass etc. are all recyclable materials. Other products

include computers, batteries, tires, electronic devices and mobile phones.

The argument for recycling is solid. The conclusion is simple. Recycling takes a small portion of our daily time. Recycling helps save money and reduces pollution. Recycling is more productive than incineration or land filling. It is a neglected but crucial aspect Recycling reduces the requirement to dispose of our waste in someone else's yard" David Morris". A lot of these items contain harmful chemicals. These products should be cleared of safely. In certain countries the waste is recycled prior to it reaches landfills.

c) COMPOSTING

Composting can also be a recycling process. It is a simple and natural bio degradation process. This process transforms organic waste is transformed into food that is rich in nutrients i.e. humus that acts like an organic fertilizer to soil and plants, thus less needing pesticides and fertilizers. The conversion of waste into humus is called composting. Composting is mainly used for organic farming. Composting is among the most effective methods for

disposing of waste since it transforms organic materials into compost that is safe. It's an extremely slow process that takes plenty of space. The process is affected by the this parameter.

Particle size

Moisture Content

C/N ratio

pH

Temperature

Blending and Seeding

Air requirement

Mixing and Turning

Pathogen

Odor

Note-- Recycling and composting are a two of the most effective methods for managing waste. Recycling is used extensively across the globe. Many recycled items are reused to fulfill their original purpose. These methods are environmentally friendly as they create employment and earn money and improve the quality of their lives health, safety, and health and health. This reduces waste significantly, and reduces GHGs emissions.

d) VERMICULTURE

Organic waste is decomposed by the aid of earthworms (burrowing kind). They produce the substance referred to as vermicasting, which is composed of excreta from earthworms. It's cheap, simple and suitable biotechnology for the bio degradation of organic waste. The excreta can be used as an organic manure.

e) WASTE TO ENERGY (RECOVER ENERGY)

The process of converting waste into energy involves the transformation of non-recyclable waste products into energy-efficient heat energy, electricity, or fuel by a variety methods. This kind for energy can be considered a sustainable energy source since recyclable waste can be utilized in a continuous manner to generate energy. It also helps in reducing carbon emissions reducing the demand to use fossil fuels for energy. Waste-to Energy, which is often referred to with its abbreviation WtE is the production of energy through energy or heat by utilizing waste.

f) LANDFILL

Open dumps of solid waste can pollute groundwater and cause degradation to

the soil. It attracts disease-carrying rats as well as insects, leading to fires as well. An appropriately constructed built, constructed and maintained engineered landfills are the best alternative to open dump. The landfill that is engineered (shown in Fig. 3) includes an artificial or earthen layer that shields the groundwater from contamination by leachate. Landfill should be equipped with a method to release, burn, or store methane. Landfills Landfill can be the largest and most commonly employed method of disposal of waste. The process of disposing of waste concentrates on the process of burying the garbage in the soil. Landfills can be found throughout the world. There is a procedure that removes the odors and hazards of waste before it is buried in the soil. This is the most common method of disposal, it is becoming less popular these days because of the deficiency of space available, the right location and community opposition (not at my home) and the adolescent presence of GHG such as methane and other gases from landfills that can cause a myriad of pollution issues. Methane can be used to produce electricity.

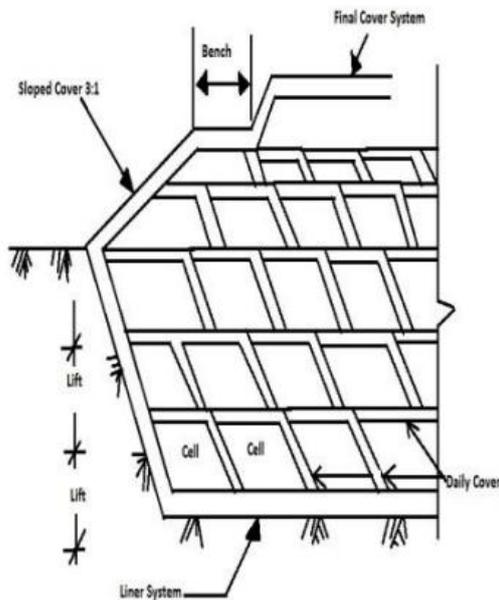


Fig-3 Engineered landfill (Khan Iqbal H, Ahsan Naved)

g) ADVANTAGE OF ENGINEERED LANDFILL

When the waste is decomposed at open dump sites there is leachate (a mixture of non-toxic and toxic liquids as well as rain water) that could enter local water supplies and then contaminate your drinking water. These dumps release gasses that are explosive and can be flammable. In some cases, waste is burned on these locations, which is an immediate safety risk due to the possibility of an explosion. Because improper disposal of waste produces GHGs that contribute to climate changes. If properly constructed and constructed

landfills are designed to reduce or reduce health and environmental negative impacts. The landfills that are constructed with engineering have a lines and leachate collection systems which prevent groundwater contamination. They also have a gas collection systems that capture or burn methane emitted in landfills in a safe manner.

h) THERMAL TREATMENT

- Incineration
- Pyrolysis
- Gasification

INCINERATION/COMBUSTION

If waste cannot be recycled the waste is dealt with through this method. It is an exothermic chemical process that creates carbon dioxide, heat and water. This method is used to dispose of municipal solid wastes are combusted at high temperatures under controlled conditions that is converted into ash as well as other gaseous substances. The main benefit of incineration is that it could reduce the amount of solid waste by 20-30 percent of its original volume and lessen the strain on landfills. It is also referred to for its thermal processing of

waste management. Incineration is extremely popular across Japan and Switzerland in countries where space for landfills isn't readily available. Different kinds of incinerators include Mass Fired, RDF Fired and fluidized Bed incinerators. About 60 percent of MSW is burned within these countries. The process of combustion produces the steam as well as water is created as a byproduct which can be used to create energy. As a result, toxic chemicals are released into the air. Toxic chemicals are than 90% contained in the in the ash. It's very costly contrasted to landfills. It also causes the destruction of compostable and recyclable substances by making them toxic Ash.

PYROLYSIS

Pyrolysis is a process that prevents the oxidation of organic part is not allowed to take place. The organic created from the waste by heat and leaves an ash composed mostly of carbon-free and non-organic material (metal and glass that is not removed prior to the process of pyrolysis). The process is carried out without oxygen. It is an endothermic process that requires the external heat source. Through the process we obtain

gas (methane CO₂, CO₂ etc.) as well as liquid (Tar that contains acetic acids, the methanol and acetone) and finally, solid (Char with carbon and inert substances.) The proportions of these items are dependent on the temperature. Higher the temperature, more gaseous substances and less of solid and liquid substances are released.)

GASIFICATION

The process occurs in the absence of a lesser amount of oxygen than is required to achieve stoichiometric combustion. CO₂ and Hydrogen gases produced can be used as fuel.

IX. INTEGRATED SOLID WASTE MANAGEMENT

Integrated Solid Waste Management (ISWM) employs a holistic strategy to create sustainable solutions that are feasible, socially acceptable, and sustainable. A solid waste management strategy involves the use of a variety of different treatment methods and the primary element of a system like this is collecting and separation of waste. It is essential to realize that no single method of treatment is able to handle all substances in an environmentally

efficient manner. Therefore, all available methods of disposal and treatment must be considered equally, and the most effective combination of solutions that are suited to the specific community is selected. Effective management strategies therefore have be designed in ways that meet current economic, social and environmental needs of the community.

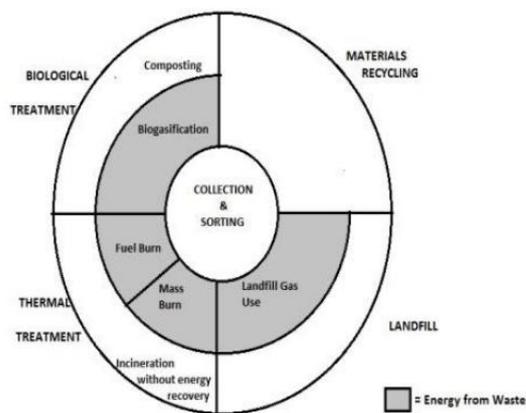


Fig 4: Elements of Integrated Solid Waste Management

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