



A CONCISE REVIEW ON ENVIRONMENTAL MANAGEMENT AND SUSTAINABLE DEVELOPMENT

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Abstract

Careful management of the available resources is necessary for sustainable development so that even future generations can use and benefit from them. Environmental, economic, and socio-political aspects are three key influences on sustainable development. The effective management of natural resources, the eradication of poverty, consumption patterns that lead to sustainable production, and investment policies that are appropriate are only a few of the elements required for sustainable development. Waste management is an important aspect of the urban infrastructure since it ensures environmental and human health protection. Learning environmental planning techniques is the aim of the curriculum.

Keywords: Sustainable development, Waste management, Resources.

Introduction

Human activity is necessary for environmental management and sustainable growth. The ecosystem is maintained and sustainable development results from man's effort to meet his requirements while appropriately managing the environment. On the other hand, irresponsible use of natural resources by humans will harm the environment. The eventual outcome will be a general decline in population welfare, as well as poverty and famine, deforestation, pollution, and resource depletion. Waste management is one of the world's most pressing environmental issues. Solid waste generation rates have increased as a result of human activities and changes in lifestyles and consumption patterns.

Waste management is also practised in order to recover resources. Solid, liquid, gaseous, or radioactive wastes can all be managed, with distinct procedures and fields of knowledge required for each. Collection, transportation, pre-treatment, processing, and ultimate residue abatement are all part of a typical waste management system. Different sorts of garbage can be handled independently. Waste

management, according to early researchers, is one of the public infrastructures that is based on a certain form of physical infrastructure to supply products or services, and it is similar to the electricity, natural gas, and water sectors in this regard.

Content

The waste management practises of developed and developing countries, urban and rural locations, and residential and industrial producers are all different. In urban regions, local government bodies are typically responsible for non-hazardous residential and institutional garbage, whereas the generator is typically responsible for non-hazardous commercial and industrial waste[1,2]. Recycling rates for household garbage in most developed nations were in the low single digits by percent in the 1980s, when recycling became recognised as important for both environmental and resource management reasons. Over the last 20 years, modern western waste management systems have restored recycling rates. Many developing nation towns seek to have modern waste management systems with high recycling rates of clean, source separated materials [3].

The following aspects of waste management have to be considered properly: (As shown in Figure 1)

1. Source reduction

2. Onsite storage
3. Collection and Transfer
4. Processing Technique
5. Disposal



Figure.1. Steps in Waste Management

Waste management methods

Conventional parameters cannot easily classify and assign different waste products to distinct classifications. Researchers have proposed and developed some novel strategies. Nowadays, not all trash are classified in the same traditional

category, necessitating the same elimination technique. It is extremely difficult and impracticable to set up and operate separate waste management systems for different types of wastes, especially in businesses where the types of wastes are so diverse [4,5].

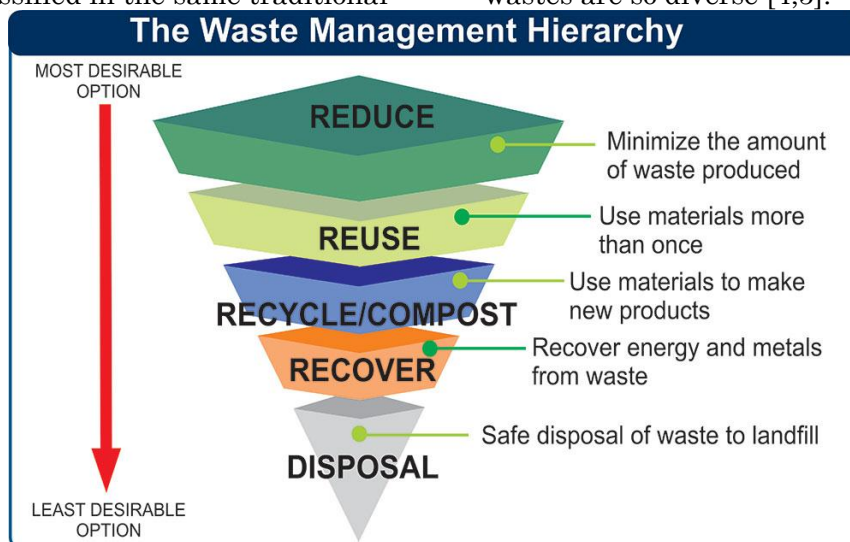


Figure.2. Hierarchy in Waste Management

Different waste management procedures are utilised depending on the deposition and kind of trash. They can differ from person to person, location to location, period to time, and country to country. They are as follows:

Recycling

Recycling is not only good for the environment, but it also has a significant financial advantage for both individuals and the economy as a whole. Recycling is ideal since it decreases the amount of effort required to create a product

appropriate for consumption. Not everything, of course, can be recycled. Plastics, paper, and glass are the most commonly recycled materials. Recycling necessitates work on the part of all parties involved, including you! Professionals in charge of garbage disposal will constantly strive to promote recycling as much as feasible. Quality bin rental businesses will always sort rubbish into recyclable and non-recyclable categories.

Landfill

A landfill, on the other hand, is more like a securely sealed storage container. To safeguard the environment from dangerous contamination, a landfill is designed to prevent degradation. Even

organic wastes like paper and grass clippings decay slowly at a landfill when they are deprived of oxygen and water. Municipal Solid Waste Landfills (MSWLs) are landfills that accept a diverse range of municipal and industrial trash. Mechanical qualities of MSW, such as strength and compressibility, are affected by waste composition, mechanical properties of deposited components, water concentration, and decomposition. In most nations, burying rubbish to dispose of it in a landfill is still a prevalent practise. Disused quarries, mining voids, and borrow pits were frequently used as landfills [6].

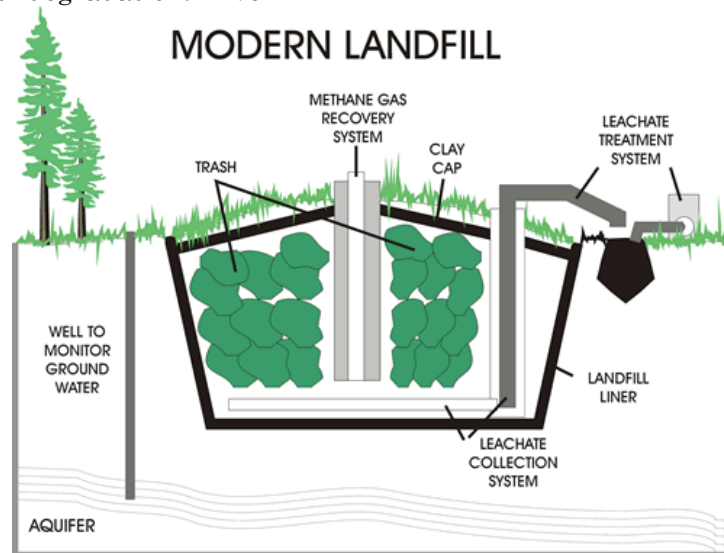


Figure.3. Modern Landfill Plant

A landfill that is well-designed and managed can be a sanitary and relatively economical way to dispose of garbage. To keep odour, methane, and liquid penetration levels under control, landfill techniques require constant maintenance. Even in a country with such vast expanses, there are dangers. Methane and other gases can be created and rise to the surface, posing serious difficulties if not adequately managed. To avoid such problems, strict safety precautions must be followed.

Thermal Treatment: Incineration

Incineration is a disposal method that involves combustion of waste material. Incineration and other high temperature waste treatment systems are sometimes described as “thermal Treatment”. Incinerators convert waste

materials into heat, gas, steam, and ash. When garbage is handled through incineration plants, the mass of the waste is reduced by 95 to 96%. It can be a viable option in areas where there is a scarcity of land. It may be used in all types of weather. Furthermore, the energy generated can be put to other uses. Because there is no decay, there is no unpleasant odour or methane, and the heat kills the hazardous germs and chemicals. Modern incinerators include a computerised monitoring system that allows them to troubleshoot most problems using a computer [7,8].

Plasma Gasification

To transform carbon-based materials into fuel, this waste management technique uses highly ionised or electrically charged gases termed plasma within a tank. It is a

new technology that converts incinerator ash or chemicals into non-hazardous slag to handle hazardous waste. Toxin chemicals such as dioxins, NOX, furans, and sulphur dioxide cannot form due to the high temperature and absence of oxygen. The entire waste processing is environmentally friendly, transforming solid or liquid wastes into syngas.

Waste to Energy (WtE)

To protect ourselves and the environment against non-recyclable objects, we need a reliable disposal mechanism. Waste materials are used to generate heat or power in this method of disposal. It can be useful for disposing of non-recyclable waste by turning them to heat, fuel, or power. Carbon emissions can be reduced by reducing the demand for fossil fuels.

Composting

Composting is a natural process that breaks down organic waste and turns it into rich manure that can be used to improve the quality of the soil in your garden. It is inexpensive, simple, and virtually risk-free. Rather than dumping organic garbage in the trash and having it dealt with by waste removal companies,

set it aside and mix it all together over time. That's all there is to composting!

Biogas Technology

Anaerobic digestion (AD) is the process of converting organic matter directly to biogas, which is a mixture of mostly methane and carbon dioxide with tiny amounts of other gases like hydrogen sulphide. Methane is the primary component of biogas, which is utilised for cooking and heating in many households. The biodigester, also known as a biogas plant, is a physical structure that is used to create an anaerobic environment that promotes different chemical and microbiological processes that result in the decomposition of input slurries and the creation of biogas, primarily methane. The first methane digester plant was built at a leper colony in Bombay, India, in 1859. Most of the biogas plants utilize animal dung or sewage [9-11]. After proper gas purification, biogas can be utilised as a fuel for engines, gas turbines, fuel cells, boilers, industrial heaters, and other activities, as well as for chemical manufacture.

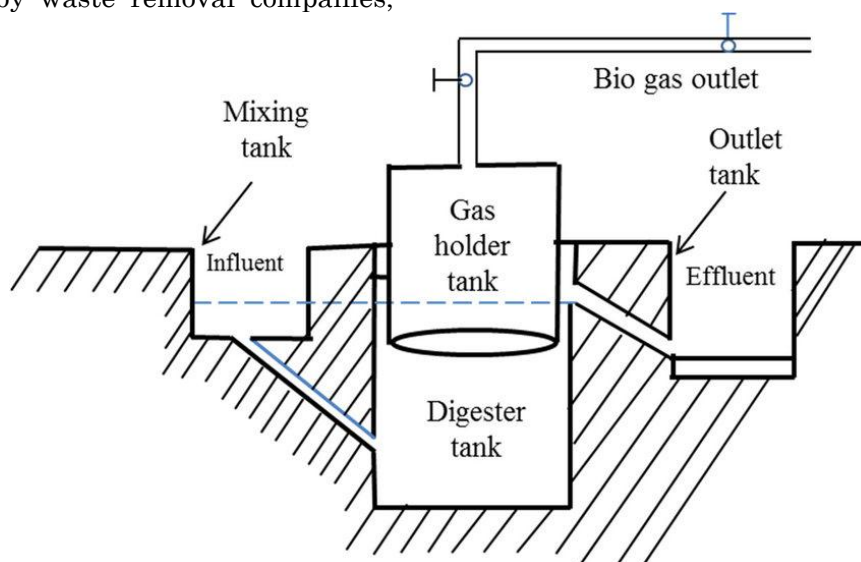


Figure.4. Schematic of a Biogas Plant

Treatment or stabilisation of biodegradable materials prior to landfilling can be achieved using a combination of anaerobic digestion and aerobic composting.

Conclusions

Promoting a high-quality waste management system not only improves

social, economic, and environmental efficiency and supports sustainable development, but it may also assist in resolving the dual problem of resource scarcity and environmental degradation. Poor waste management can generate major environmental issues like an unpleasant odour and the risk of explosion

in landfills, as well as groundwater contamination via leachate percolation. Unsuitable waste management procedures also waste resources and energy that could be recycled or created from a considerable portion of solid trash. Three major issues confront the world today: (1) rising fuel prices, (2) climatic changes, and (3) air pollution. Renewable energy is a viable alternative because it is clean and safe for the environment. To maintain environmental, economic, and social development principles, waste and recycling management strategies should be prepared prior to the start of any building project.

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