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MANAGEMENT OF WASTE FOR SAFE ENVIRONMENT (Case study in NALGONDA)

R. Venkat Reddy[1], Dr. T. Vijayalakshmi[2], Dr. R. Venkat Reddy[3]

1Research Scholar (External) JNTUH, 1503PH1116,
E-mail:venkatreddyramasahayam@yahoo.co.in, Tel: +91-9703559035

[2] Assistant Professor &Head, Centre for environment, Institute of science &technology JNTUH, Kukatpally, HYD.

[3]Professor &Head, Department of Mechanical Engineering,Anurag Engineering College, Ghattkesar, Medchel, District.

Abstract:

Solid waste management, modification of solid waste to useful material without producing any hazardous effect to environment. In environmental engineering management of solid waste plays main roll to keep the environment safe, sources of solid waste from various disciplines, collection, segregation as bio-degradable solid waste, non bio-degradable solid waste, hazardous waste ,managing of solid waste by technological methods including composting, incineration, sanitary land fill, and chemical neutralization.

I estimated that the overall average weekly household waste generated is around 6.5kg per household in the studied enumeration areas; this results into 7.5kg per household per week in nalgonda town. The level of waste generated weekly is more dependent on the number of people living within the household. Rapid urbanization, industrialization and globalization are exerting a severe pressure on the environment through many ways including production of huge quantities of organic solid waste. Hence the environmental problems have emphasized for better utilization of waste for various purposes involving suitable cost-effective technologies the present bibliography has been abstracted and is arranged in categories corresponding to the various administration, engineering, and operational phases of solid-waste management

Key Words: *composting, hazardeous waste, incineration, organic solid waste, sanitary land fill.*

Corresponding author:

R. Venkatreddy,
Research scholar (External) JNTUH,
1503PH1116,
E-mail: venkatreddyramasahayam@yahoo.co.in
Tel: +91-9703559035

QR code

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INTRODUCTION:

India is the second largest nation in the world, but it does not have enough resources or adequate systems in place to treat its solid wastes. India is facing a sharp contrast between its increasing urban population and available services and resources. Solid waste management (SWM) is one such service where India has an enormous gap to fill. Proper municipal solid waste (MSW) disposal systems to address the burgeoning amount of wastes are absent. Improper solid waste management deteriorates public health, causes environmental pollution, accelerates natural resources degradation, causes climate change and greatly impacts the quality of life of citizens. The present citizens of India are living during times of unprecedented economic growth, rising aspirations, and rapidly changing lifestyles, which will raise the expectations on public health and quality of life. Remediation and recovery of misused resources will also be expected, Pollution of whether air, water or land results in long-term reduction of productivity leading to a deterioration of economic condition of a country. Therefore, controlling pollution to reduce risk of poor health, to protect the natural environment and to contribute to our quality of life is a key component of sustainable development, During 2009Andhra Pradesh State residents, institutions, commercial businesses and industries generated approximately 37.2 million tons of solid waste excluding bio solids. In addition, approximately 1.2 million tons of solid waste was imported from other states. The solid waste was managed using an integrated waste management approach of waste reduction, reuse, recycling, waste combustion, land filling and waste exportation.

OBJECTIVES:

■ Identify the roles and responsibilities of each level of government.

■ Establish a national policy and pass laws on solid waste management standards and practices.

■ Ensure the local government has the authority and resources to implement an ISWM plan.

■ Encourage citizen participation in all phases of waste management planning to help gain community awareness, input, and acceptance.

■ Calculate the initial capital investment requirements and long-term operating and maintenance costs associated with the various waste management activities.

■ Identify sources that can provide funding for solid waste management, including general revenues or user fees, the private sector, and government or international agency grants and loans.

■ Evaluate the public's ability and willingness to pay.

■ Evaluate activities based on effectiveness in handling waste and potential for job creation.

■ Include geological factors, transport distances, and projected waste generation in sitting and design considerations.

■ Establish procedures to verify the protection of groundwater and drinking water.

■Monitor compliance with the national standards to ensure human health risks are minimized.

■ How To Establish Recycling and Composting Programs

■ What Are the Options for Waste Disposal?

■ What Are the Components of Waste Collection and Transport?

Process of solid waste management:

Integrated Solid Waste Management: Integrated Solid Waste Management (ISWM) is a comprehensive waste prevention, recycling, composting, and disposal program. An effective ISWM system considers how to prevent, recycle, and manage solid waste that most effectively protects human health and the environment. ISWM involves evaluating local needs and conditions, and then selecting and combining the most appropriate waste management activities for those conditions. The major ISWM activities are waste prevention, recycling and composting, and combustion and disposal in properly designed, constructed, and managed landfills Each of these activities requires careful planning, financing, collection, and transport, all of which are presented in this paper . Waste generation increases with population expansion and economic development. Improperly managed solid waste poses a risk to human health and the environment. Uncontrolled dumping and improper waste handling causes a variety of problems, including contaminating water, attracting insects and rodents, and increasing flooding due to blocked drainage canals or gullies. In addition, it may result in safety hazards from fires or explosions. Improper waste management also increases greenhouse gas (GHG) emissions, which contribute to climate change. Planning for and implementing a comprehensive program for waste collection, transport, and disposal (along with activities to prevent or recycle waste) can eliminate these problems.

WASTE PREVENTION: Waste prevention (often called source reduction) means reducing waste by not producing it. Examples of waste prevention would include purchasing durable, long-lasting goods and seeking products and packaging that are as free of toxic substances as possible. It can be as simple as switching from disposable to reusable products, or as complex as redesigning a product to use fewer raw materials or to last longer. Because waste prevention actually avoids waste generation, it is the preferred waste management activity. Overall, waste

prevention conserves resources, protects the environment, and prevents the formation of greenhouse gases. To prevent waste from being generated. Waste prevention strategies include using less packaging, designing products to last longer, and reusing products and materials. Waste prevention helps reduce handling, treatment, and disposal costs and ultimately reduces the generation of methane.

MATERIALS EXCHANGE: - Materials exchanges facilitate the exchange of materials or wastes from one party, which has no use for that material, to another party that views the materials as a valuable commodity. These facilities foster waste reduction efforts through the reuse of materials, thus eliminating the need to process the materials for recovery or disposal.

RECYCLING: Recycling makes use of materials that otherwise would become waste by turning them into valuable resources. Recycling helps reduce greenhouse gas emissions, in part, by diverting waste from landfills. In some countries, a great deal of recycling occurs before the waste reaches the landfill. Scrap dealers buy directly from households and businesses, waste pickers or scavengers collect materials from waste bins, and waste collectors separate materials that can be sold as they load their trucks. Governments can build on these practices by providing support to organize and improve recycling efforts. Recycling is a process that involves collecting, reprocessing, and/or recovering certain waste materials (e.g., glass, metal, plastics, paper) to make new materials or products. Some recycled organic materials are rich in nutrients and can be used to improve soils. The conversion of waste materials into soil additives is called composting. Recycling and composting generate many environmental and economic benefits. For example, they create jobs and income, supply valuable raw materials and reduce greenhouse gas emissions and the number of landfills and combustion facilities.

COMPOSTING: Another form of recycling is composting—the controlled aerobic biological decomposition of organic matter, such as food scraps and plant matter, into humus, a soil-like material. Compost acts as a natural fertilizer by providing nutrients to the soil, increasing beneficial soil organisms, and suppressing certain plant diseases, thereby reducing the need for chemical fertilizers and pesticides in landscaping and agricultural activities. Organic materials often comprise a large portion of the solid waste stream, particularly in communities that rely heavily on tourism. Composting can be particularly helpful to communities managing their waste and thus reducing greenhouse gas emissions.

INCINERATION: Incineration is the most common thermal treatment process. This is the combustion of waste in the presence of oxygen. After incineration, the wastes are converted to carbon dioxide, water vapour and ash. This method may be used as a means of recovering energy to be used in heating or the supply of electricity. In addition to supplying energy incineration technologies have the advantage of reducing the volume of the waste, rendering it harmless, reducing transportation costs and reducing the production of the green house gas methane

Figures-1 Solid waste management hierarchy

COMBUSTION: Combustion is the controlled burning of waste in a designated facility to reduce its volume and, in some cases, to generate electricity. Combustion is an ISWM option for wastes that cannot be recycled or composted, and is sometimes selected by communities where landfill space is limited. While the combustion process can generate toxic air emissions, these can be controlled by installing control equipment such as acid gas scrubbers and fabric filters in combustors. Combustion of solid waste can help reduce amount of waste going to landfills. It also can reduce reliance on coal, one of the fossil fuels that produces greenhouse gases when burned.

Disposal: These activities are used to manage waste that cannot be prevented or recycled. One way to dispose of waste is to place it in properly designed, constructed, and managed landfills, where it is safely contained. Another way to handle this waste is

through combustion. Combustion is the controlled burning of waste, which helps reduce its volume. If the technology is available, properly designed, constructed, and managed landfills can be used to generate energy by recovering methane. Similarly, combustion facilities produce steam and water as a byproduct that can be used to generate energy. Developing a Plan for Integrated Solid Waste Management Planning is the first step in designing or improving waste management system. Waste management planners should, take into consideration institutional, social, financial, economic, technical, and environmental factors). These factors vary from place to place. Based on these factors, each community has the challenge of selecting the combination of waste management activities that best suits its needs. Because integrated solid waste management involves both short- and long-term choices, it is critical to set achievable goals. While developing ISWM plan, should identify goals or objectives (e.g., protect human health, protect water supplies, eliminate open dumping, increase recycling or composting). The ISWM plan will help guide through the implementation process. Government plays an important role in developing and enforcing waste management standards, providing funding, and managing day-to-day

LANDFILLING: Uncontrolled dumping of waste can contaminate groundwater and soil, attract disease carrying rats and insects, and even cause fires. Properly designed, constructed, and managed landfills provide a safe alternative to uncontrolled dumping. For example, to protect groundwater from the liquid that collects in landfills (leachate), a properly designed landfill has an earthen or synthetic liner. As waste decamp emits methane, a greenhouse gas that can also cause fires. To prevent fires, a properly designed landfill should have a way to vent, burn, or collect methane. Landfill operators can also recover this methane—thereby reducing emissions—and generate electricity from the captured gas. United States Environmental Protection Agency Solid Waste and Emergency Response May 2011 His fact sheet provides an overview of options for managing solid waste, identifies the important issues should consider when planning for solid waste management, and describes the link between solid waste management and climate change.

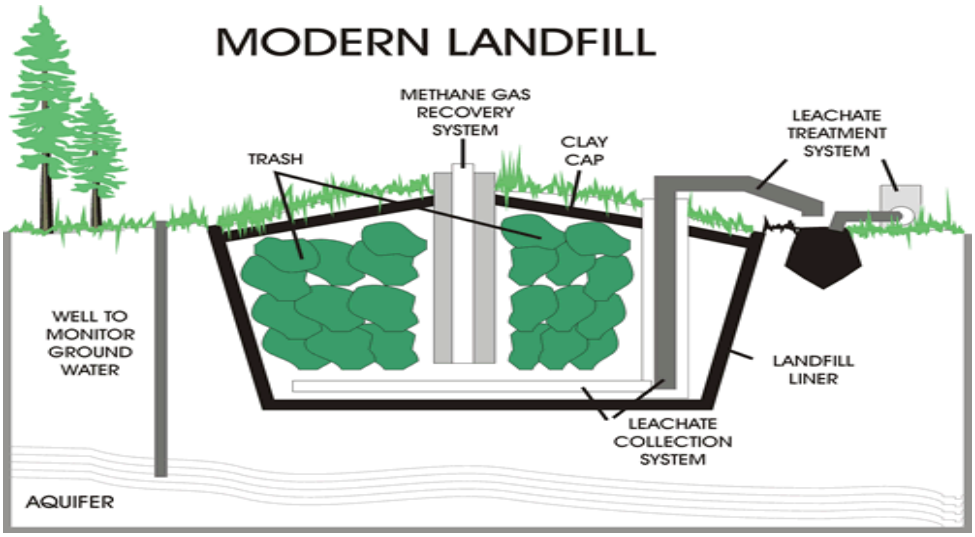
Sanitary Landfills are designed to greatly reduce or eliminate the risks that waste disposal may pose to the public health and environmental quality. They are usually placed in areas where land features act as natural buffers between the landfill and the environment. For example the area may be comprised of clay soil which is fairly impermeable due to its tightly packed particles, or the area may be characterized by a low water table and an absence of surface water bodies thus preventing the threat of water contamination.

In addition to the strategic placement of the landfill other protective measures are incorporated into its design. The bottom and sides of landfills are lined with layers of clay or plastic to keep the liquid waste, known as leachate, from escaping into the soil. The leachate is collected and pumped to the surface for treatment. Boreholes or monitoring wells are dug in the vicinity of the landfill to monitor groundwater quality.

A landfill is divided into a series of individual cells and only a few cells of the site are filled with trash at any one time. This minimizes exposure to wind and rain. The daily waste is spread and compacted to reduce the volume, a cover is then applied to reduce odours and keep out pests. When the landfill has reached its capacity it is capped with an impermeable seal which is typically composed of clay soil.

Some sanitary landfills are used to recover energy. The natural anaerobic decomposition of the waste in the landfill produces landfill gases which include Carbon Dioxide, methane and traces of other gases. Methane can be used as an energy source to produce heat or electricity. Thus some landfills are fitted with landfill gas collection (LFG) systems to capitalize on the methane being produced. The process of generating gas is very slow, for the energy recovery system to be successful there needs to be large volumes of wastes.

These landfills present the least environmental and health risk and the records kept can be a good source of information for future use in waste management, however, the cost establishing these sanitary landfills are high when compared to the other land disposal methods.



Figures- 2. Main features of a modern landfill

Effects of solid waste management on environment and human life:

By APPLIYING INTIGRATED SOLIDWASTEMANAGEMENT CAN CONTROLLSTHE GREENHOUSE GAS EMISSIONS, The Earth's atmosphere contains many types of gases, including those known as "greenhouse gases," which hold in the sun's warmth. Scientists call this naturally occurring phenomenon the "greenhouse effect." Greenhouse gases help regulate global temperatures. Certain human activities such as burning fossil fuels and dumping solid waste, however, produce additional greenhouse gases and upset the natural balance by raising global temperatures.

WHY SHOULD BE CONCERNED ABOUTGREENHOUSE GAS EMISSIONS? Greenhouse gas emissions are slowly changing the Earth's climate. The Earth has already become slightly warmer in the past 100 years and will continue to become warmer. This could cause serious human health and environmental consequences because a warmer climate may cause more frequent and severe heat waves, damage agriculture, and cause droughts in some places and floods in others.

HOW DOES SOLID WASTE IMPACT CLIMATECHANGE? Even before a material or product becomes solid waste, it goes through a long cycle that involves removing and processing raw materials, manufacturing the product, transporting the materials and products to markets, and using energy to operate the product. Each of these activities has the potential to generate greenhouse gas emissions through one or more of the following means:

■ Energy consumption. Extracting and processing raw materials, manufacturing products, and transporting materials and products to markets all generate greenhouse gas emissions by consuming energy from fossil fuels.

■ Methane emissions. When organic waste decomposes in landfills, it generates methane, a greenhouse gas.

■ Carbon storage. Trees absorb carbon dioxide, a greenhouse gas, from the air and store it in wood through carbon sequestration. Waste prevention and recycling of wood and paper products allow more trees to remain standing in the forest, where they can continue to remove carbon dioxide from the air, which helps minimize climate change impacts. Different wastes and waste management activities have varying impacts on energy consumption, methane emissions, and carbon storage. For example, recycling reduces greenhouse gas emissions by preventing methane emissions from landfills or open dumps and by preventing the consumption of energy for extracting and processing raw materials. Communities that are looking for ways to help prevent climate change can start by implementing an integrated solid waste management program.

Some greenhouse gases—such as water vapor, carbon dioxide, methane, nitrous oxide, and ozone—occur naturally in the atmosphere, while others result from human activities. Carbon dioxide is released to the atmosphere when solid waste, fossil fuels (oil, natural gas, and coal), and wood and wood products are burned. Methane is emitted during the production and transport of coal, natural gas, and oil; the decomposition of organic wastes in municipal solid waste landfills; and by livestock. Nitrous oxide is emitted during agricultural and industrial activities, as well as during the combustion of solid waste and fossil fuels. Each greenhouse gas differs in its ability to trap heat in the atmosphere. Methane traps over21times more heat than carbon dioxide, and

nitrous oxide absorbs 310 times more than carbon dioxide. The higher the heat trapping potential of the gas, the greater the impact on climate change. Efforts to decrease emissions of these gases help reduce climate change impacts. By proper solid waste management improves the quality of environment

CASE STUDY: In one of gated community in Nalgonda, (i.e. chendra giri villas)

MATERIALS AND METHODS:

what the process applied to manage the solid waste in this case study.

Step 1: collected the solid waste from community dustbins and transported to treatment site, during the transportation solid waste coved with protective cover to prevent leakage

Step2: All the solid waste segregated as degradable waste , non-degradable waste and hazardeous waste the degradable waste processed to compost.

Non-degradable waste again segregated as metallic solid waste, glass, and plastic waste, all metallic and non-metallic, glass solid waste was sold to concern industries for recycling purpose,

Step3: Hazardeous waste generated from that community chemical related material are neutralized by using acidic and basic nature chemicals

Step4: biomedical solid waste collected from nursing home and clinical laboratory treated by using autoclaving, microwaving process then it was converted as compost, waste treatment site just four kilometers from the community, average 1.230grams of solid waste was generated per person per week

I estimated that the overall average weekly household waste generated is around 6.5kg per household in the studied enumeration areas; this results into 7.5kg per household per week in Hyderabad City. The level of waste generated weekly is more dependent on the number of people living within the household. Rapid urbanization, industrialization and globalization are exerting a severe pressure on the environment

FACTORS SHOWS THE EFFECTS ON SOLIDWASTEMANAGEMENT:

Institutional factors: Review existing laws or regulations on waste collection, transport, and disposal. When designing a waste system, whether existing national, state, provincial, regional, or local regulations provide adequate legal authority to establish a waste collection, transport, and disposal system. For example, the regulations may specify vehicle types and sizes that can be used for collection, road use limitations (what vehicles may travel on what roads and during what hours), and waste transport safety requirements to reduce the potential harm and exposure to the public. If no such requirements exist in current regulations, the national government may want to rewrite the regulation or address these issues in a national policy.

Social: local customs and religious practices, public education

Financial: funding

Economic: costs and job creation

Technical: location and equipment

Environmental: natural resources and human health

In many countries, recycling occurs informally at landfills, uncontrolled dumps, and on streets. Scavengers or waste pickers often collect materials for reuse or sale without any organization, supervision, or regulation. While scavenging or waste picking can be very effective at reducing the amount of plastic, glass, metal, and paper ultimately requiring disposal, pursuing these activities can be harmful to worker health. Incorporating scavengers or waste pickers into organized or formal recycling programs can improve the quality of their working conditions and the local environment. Composting can also improve local economies and the environment—by turning organic waste, which is a large portion of many city waste streams, into a marketable product for urban and agricultural uses. Together, recycling and composting can provide income, significantly reduce waste, and decrease greenhouse gas emissions. This paper describes the benefits of formal recycling and composting activities and provides steps on how you can incorporate scavenging or waste picking into formal recycling and composting programs. Benefits of Formal Recycling and Composting Programs. Recycling and composting activities, if organized properly by the local government, can generate many environmental and economic benefits. For example, it can create jobs and income, supply valuable raw materials to industry, produce soil-enhancing compost for agriculture, reduce the need to site or build more landfills and combustors, and prevent green house gas emissions. An organized approach to recycling and composting can also have many benefits for your community. Involving scavengers or waste pickers in formal recycling activities can empower them, increase their income and reputation, and improve their quality of life, health, and safety. How To Establish Recycling and Composting Program Recycling or Composting Program. Establishing and managing formal recycling and composting programs requires significant local government time and resource investments. However, these investments can save money in the long term by allowing governments to maximize existing recycling and composting activities before making significant investments in collecting and transporting waste. To successfully implement formal recycling or

composting programs, governments will need to consider social, financial, institutional, and regulatory issues

■ Designate one agency to oversee waste collection, transport, and disposal. The local government should make one agency responsible for waste collection, transport, and disposal. Having a single agency for this task will help eliminate potential overlap and confusion among various government agencies.

■ Determine geographic scope of collection and transport services. Several local governments may consider combining resources to create a regional collection and transport authority. This alternative is usually more cost-effective and may also reduce the need to site several disposal facilities. If a regional authority approach is selected, communities need to agree on an overall budget and source of funding, then determine how much funding each community will contribute to the program. Many communities also have found they can decrease the cost and improve the quality of service by using private waste collection and transport companies and even cooperatives or microenterprises, rather than providing this service themselves.

■ Determine funding, equipment, and labor needs. After the agency has been selected, you should determine how much labor, equipment, and money to dedicate toward managing waste collection and transport. This decision should be based on at least a basic knowledge of the types and amounts of waste, as well as distances traveled to the waste disposal site. The most economical method may be manual collection from communal bins. In city areas with established roads, trucks may be used. Enclosed trash containers should be used whenever possible to reduce infestation by insects and rodents. Other factors to consider include vehicle maintenance, frequency of collection, cost of labor, and potential revenues.

■ Determine the type and amount of waste to be processed. Should identify the types of customers that will be served. Then need to determine how much waste these customers currently generate, and estimate how much they expect to generate in the future. Future generation rates can be determined by multiplying the following factors: amount of waste generated per person per year, population size, anticipated population growth, and the Types of Solid Waste Customers Potential customers may include public housing, private residences, factories or other industrial facilities, construction and demolition sites, office buildings and commercial establishments, and large public institutions such as universities, hospitals, and prisons. Inmost countries, solid waste generated by a private business is paid for by the company.

CONCLUSIONS:

what is the use of a beautiful house if you don't have a decent planet to put on? Proper solid waste management needed to maintain the safe environment. By managing the solid waste we should get the energy or new products by recycling but the environment problems.

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