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Waste Material Management

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ABSTRACT

Our Environment is constituted of living things and what is around them. It includes physical, chemical and other natural forces. Living things do not simply exist in their environment but they constantly interact with it. In the environment, there are interactions between plants, animals, soil, water, temperature, light, and other living and non-living things which give rise to the production of waste materials.

Environment & Waste material management is all about "generation, prevention, characterization, monitoring, treatment, handling, reuse and residual disposition of solid wastes". Managing the waste material is ultimately lead to the management of the environment.

Keywords-*environment; environment management; waste management*

I. INTRODUCTION

Solid waste means any garbage, refuse, sludge from a waste water treatment plant, water supply treatment plant, or air pollution control facility and other discarded materials including solid, liquid, semi-solid, or contained gaseous material, resulting from industrial, commercial, mining and agricultural operations, and from community activities, but does not include solid or dissolved materials in domestic sewage, or solid or dissolved materials in irrigation return flows or industrial discharges. In simple words, solid wastes are any discarded or abandoned materials. Solid wastes can be solid, semi-solid or containerized gaseous material.

Environment and waste management system both are simultaneously based on the concept of reduce, reuse, recycle, recovery and landfill strategy.

II. CHARACTERISTICS OF SOLID WASTE IN DEVELOPING COUNTRIES

Fermentable, and non-fermentable. Putrescible wastes tend to decompose rapidly and unless carefully controlled, decompose with the production of objectionable odors and visual unpleasantness. Fermentable wastes tend to decompose rapidly, but without the unpleasant accompaniments of putrefaction. Non-fermentable wastes tend to resist decomposition and, therefore, break down very slowly. A major source of putrescible waste is food preparation and consumption. As such, its nature varies with lifestyle, standard of living, and seasonality of foods. Fermentable wastes are typified by crop and market debris.

Wastes generated in countries located in humid, tropical, and semitropical areas usually are characterized by a high concentration of plant debris; whereas those generated in areas subject to seasonal changes in temperature or those in which coal or wood are used for cooking and heating may contain an abundance of ash. The concentration of ash may be substantially higher during winter. Regardless of climatic differences, the wastes usually are more or less contaminated with night soil. These differences prevail even in wastes generated in large metropolitan areas of a developing country. Ideally, solid waste should not contain faecal matter or urine, and the mixing of these materials with household waste should be prohibited by law. However, enforcement difficulties, combined with variations in way of life, necessitate some tolerance in this matter. Solid waste collection in a manner satisfactory with respect to environmental health is made difficult when human excretory wastes are mixed with household wastes. Handling of pathological wastes, abattoir wastes, industrial wastes, and similar materials, in association with household wastes, also should not be permitted. Nevertheless, it is important to keep in mind that despite all precautions, some pathogens and chemical residues inevitably will be present in the waste.

The characteristics and quantity of the solid waste generated in a region is not only a function of the living standard and lifestyle of the region's inhabitants, but also of the abundance and type of the region's natural resources. Urban wastes can be subdivided into two major components - organic and inorganic.

In general, the organic components of urban solid waste can be classified into three broad categories: putrescible,

Sources and Types of Solid Wastes

Source	Typical waste generators	Types of solid wastes
Residential	Single and multifamily dwellings	Food wastes, paper, cardboard, plastics, textiles, leather, yard wastes, wood, glass, metals, ashes, special wastes (e.g., bulky items, consumer electronics, white goods, batteries, oil, tires), and household hazardous wastes
Industrial	Light and heavy manufacturing, fabrication, construction sites, power and chemical plants	Housekeeping wastes, packaging, food wastes, construction and demolition materials, hazardous wastes, ashes, special wastes
Commercial	Stores, hotels, restaurants, markets, office buildings, etc.	Paper, cardboard, plastics, wood, food wastes, glass, metals, special wastes, hazardous wastes
Institutional	Schools, hospitals, prisons, government centers	Same as commercial
Construction and demolition	New construction sites, road repair, renovation sites, demolition of buildings	Wood, steel, concrete, dirt, etc.
Municipal services	Street cleaning, landscaping, parks, beaches, other recreational areas, water and wastewater treatment plants	Street sweepings; landscape and tree trimmings; general wastes from parks, beaches, and other recreational areas; sludge
Process	Heavy and light manufacturing, refineries, chemical plants, power plants, mineral extraction and processing	Industrial process wastes, scrap materials, off-specification products, slag, tailings
All of the above should be included as "municipal solid waste."		
Agriculture	Crops, orchards, vineyards, dairies, feedlots, farms	Spoiled food wastes, agricultural wastes, hazardous wastes (e.g., pesticides)

III. INTEGRATED WASTE MANAGEMENT SYSTEM

Integrated waste management system is a frame of reference for designing and implementing new waste management systems and for analyzing and optimizing existing systems. Integrated waste management is based on the concept that all aspects of a waste management system (technical and non-technical) should be analyzed together, since they are in fact interrelated and developments in one area frequently affect practices or activities in another area. Integrated waste management system is a key element in successfully achieving integrated waste management -- a single, overall approach to managing waste in a city, town, or a region.

A. Elements of waste management system

A comprehensive municipal solid waste management (MSWM) system includes some or all of the following activities:
Setting policies;
Developing and enforcing regulations;
Planning and evaluating municipal mswm activities by system designers, users, and other stakeholders;
Using waste characterization studies to adjust systems to the types of waste generated;
Physically handling waste and recoverable materials, including separation, collection, composting, incineration, and landfilling;
Marketing recovered materials to brokers or to end-users for industrial, commercial, or small scale manufacturing purposes;
Establishing training programs for mswm workers; Carrying out public information and education programs;
Identifying financial mechanisms and cost recovery systems;
Establishing prices for services, and creating incentives;
Managing public sector administrative and operations units; and Incorporating private sector businesses, including informal sector collectors, processors, and entrepreneurs.

B. Importance of Integrated system approach

Certain problems can be more easily resolved in combination with other aspects of the waste system than on their own. Also, development of new or improved waste handling in one area can disrupt existing activities in another area unless changes are handled in a coordinated manner.

Integration allows for capacity or resources to be optimized and, thus, fully utilized; there are frequently economies of scale for equipment or management infrastructure that can be reached only when all of the waste in a region is managed as part of a single system. An integrated approach allows for participation of public, private, and informal sector participants, in roles appropriate for each. Some waste management practices are more costly than others, and integrated approaches facilitate the identification and selection of low-cost solutions.

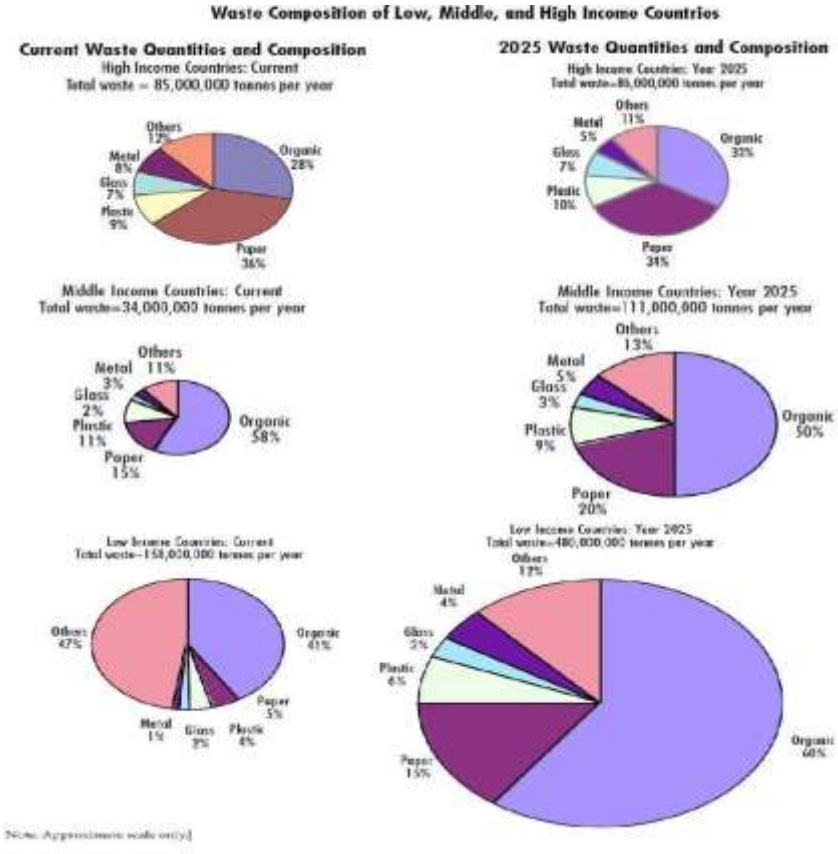
Some waste management activities cannot bear any charges; some will always be net expenses, while others may produce an income. An integrated system can result in a range of practices that complement each other in this regard. Failure to have an integrated system may mean that the revenue-producing activities are “skimmed off” and treated as profitable, while activities related to maintaining public health and safety fail to secure adequate funding and are operated at low or insufficient levels.

C. Methods for integrated waste management system

Planners can work toward integrated systems in a number of ways. The first task is to consider all aspects of the formal part of the waste system within one framework and to produce a plan based on the objectives of the entire system. One of the foundations of the framework for modern, integrated solid waste management systems is the solid waste management hierarchy, which specifies the precedence that should be given to key waste management activities that affect waste generation, treatment, and disposal. The hierarchy is discussed in more detail in the following section.

Second, in terms of jurisdictional and staffing issues, is putting all waste-related functions under the same division or agency, which is an important means of achieving integration. A third way of facilitating coordination and assessing trade-offs among all aspects of a waste management system is to create integrated financial structures that, for example, use disposal fees to finance materials recovery or public education. More broadly, it is important to assess all MSWM system costs, as well as identify opportunities for generating revenues."

D. Waste composition of low, middle and high income countries



Low income countries have the lowest percentage of urban populations and the lowest waste generation rates, ranging between 0.4 to 0.9 kg per capita per day. All of the countries that have a GNP per capita less than US $400 produce under 0.7 kg per capita per day. As GNP increases toward the middle income range, the per capita waste generation rates also increase, ranging from 0.5 to 1.1 kg per day. As predicted, the high income countries show the greatest generation rates, which vary from 1.1 to 5.07 kg per capita per day.

IV. SCOPE OF WORK FOR PREPARATION OF SOLID WASTE MANAGEMENT PLAN UNDER COMPREHENSIVE MELA PLAN OF SIMHASTHA 2016 AT UJJAIN

A. Project Area

Area for preparation of Solid Waste Management plan is a total area of Simhastha 2016 Mela.

B. Objective

1. Comprehensive Mela Plan of Simhastha -2016, Ujjain is being prepared by EPCO. Solid Waste Management is one of the important components of Mela Plan.
2. To effectively manage huge quantity of municipal solid waste generated by the masses specially pilgrims during Simhastha 2016.
3. Holistic approach to all waste streams thus maximizing synergetic benefits in collection, recycling, treatment & disposal
4. To suggest suitable technology, method and equipment for managing municipal solid waste during Simhastha 2016.
5. To ensure safe disposal of waste and treat the waste as per Municipal Waste Management and Handling Rules 2000.
6. To provide quality urban environment by the way of efficient solid waste management
7. Reduce Air pollution due to bad odor of the waste.
8. To promote public and private partnership and involvement of local stakeholders to successfully implement the management plan.

C. Scope Of Work

1. Preparing for Solid Waste Management Plan for Simhastha 2016
2. Data Collection and Analysis for accurate quantification and characterization of waste
3. Waste quantification assessment and prediction. Analyze the existing waste management situation. Assessing the institutional framework and resources available
4. Stake holders' consultation comments and input. Understanding the role of different stakeholders at different levels of solid waste management chain.
5. Formulate action plan and SWM plan for the Simhastha 2016
6. Selection of system, equipments, vehicles, technology keeping focus to Simhastha 2016
7. Design waste management hierarchy, planning and design of systems, technology selection.
8. Preparation of plan for transportation of solid waste.
9. Preparation of plan for disposal on land i.e. environmentally safe and sustainable disposal in landfills.
10. Implement the action plan and monitor the results.
11. All necessary works related to the job of preparation of SWM plan for Simhastha 2016.

D. Methodology

A comprehensive solid waste management plan involves storage, collection, transportation, segregation, waste characterization, processing and disposal. The detailed methodology proposed for the solid waste management plan for Simhastha 2016.

1. Baseline Information Collection
2. Preparation of Design & Drawing
3. Waste Minimization
4. Estimation of Quantity of Waste Generated and Future Projections
5. Assessment of Physico-Chemical Characteristics of Municipal Solid Waste
6. Establish Current Status/Baseline of Solid Waste Management
7. Assessment of Solid Waste Generation Trends

8. Assessment of Primary and Secondary Collection Mechanisms
9. Assessment of Infrastructure – Collection and Transportation Equipment and Vehicles
10. Assessment Resource Recovery Through Material Recycling
11. Resource Recovery Through Waste Processing
12. Assessment of Man Power and Other Infrastructure
13. Preparation of Report

CONCLUSION

In summary, there are four main ways that most city governments in developing countries can enhance waste reduction: Inform citizens about source separation and recycling, and the needs of waste workers. Promote recycling industries and enterprises. Reducing the organics. Reduction of plastic packaging; coding of plastics to improve recycling.

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