
Environmental Audit of Municipal Solid Waste Management

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Introduction

Waste is a continually growing problem at global and regional as well as at local levels. Solid wastes arise from human and animal activities that are normally discarded as useless or unwanted. In other words, solid wastes may be defined as the organic and inorganic waste materials produced by various activities of the society and which have lost their value to the first user. As the result of rapid increase in production and consumption, urban society rejects and generates solid material regularly which leads to considerable increase in the volume of waste generated from several sources such as, domestic wastes, commercial wastes, institutional wastes and industrial wastes of most diverse categories. Management of solid waste may be defined as that discipline associated with the control of generation, storage, collection, transfer and transport, processing, and disposal of solid wastes in a manner that is in accord with the best principles of public health, economics, engineering, conservation, aesthetics, and other environmental considerations. In its scope, solid waste management includes all administrative, financial, legal, planning, and engineering functions involved in the whole spectrum of solutions to problems of solid wastes thrust upon the community by its inhabitants. Solid wastes have the potential to pollute all the vital components of living environment (i.e., air, land and water) at local and at global levels. The problem is compounded by trends in consumption and production patterns and by continuing urbanization of the world.

The problem is more acute in developing nations than in developed nations as the economic growth as well as urbanization is more rapid. The government of India started encouraging proper management of solid waste as early as 1960's by giving loans for setting composting plants for MSW. The government of India over

the years has taken many initiatives and implemented new technologies and methods. With the rapid urbanization, the problem of the MSWM problem has compounded and Maharashtra is awakening to the magnitude of the problem. Due to increased public awareness of MSWM, a public litigation was filed and resulted in the Municipal Solid Waste (Management and Handling) Rules, 2000. Government for the first time now has included private organizations in providing this public service. New methods of storage, collection, transportation, processing and disposal are being implemented. It is necessary to evaluate the current process at this stage to understand if the methods being implemented are suitable for the Indian scenario and to identify the lacuna in the methods being adopted. This can be achieved by carrying out an audit. An audit not only brings out the shortcomings in a system, but also raises awareness on the problems addressed.

Audit of a waste management system is a way to reduce problems caused by waste by revealing the shortcomings of the management system, the responsible actors and identifying the actors and the areas that need improvement. This endeavor aims at evaluating the Marathwada MSWM scenario through literatures review and a case study of Beed district.

Objectives of the Study

1. To review the existing municipal solid waste management practices
2. To audit the municipal solid waste management practices of Beed district.

Research Methodology

The research approach for the case study was mainly qualitative. Data collection methods included document and observation. Information was gathered using a variety of methods to gain a better understanding of the situation, issues, perspectives and priorities.

Types of environmental Audits

An overview of different audit types and their use are given below. It should be noted that the divisions are not very sharp between the various types. Objectives and scope are often a combination of several audit types and are usually defined on a case-by-case basis. Many organizations have

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developed audit programs to fit in their particular need. Based on Objectives environmental audit can be categorized as shown in Table 1

Table 1: Environmental Audit Categories

Liabilities audit	Management audit	Activities audit
Compliance audit	Corporate audit	Site audit
Operational risk audit	System audit	Waste audit

(Sources: Documentary)

liabilities audit is often conducted as a prelude to gaining insurance cover and as a means of Demonstrating the regulator Compliance Audit is the most common form of environmental audit that is carried out; it is a verification process whereby the facility establishes the extent to which it is complying with the environmental legislation, regulations, emission limits, etc.

□ Operational risk liability audit concentrate on the potential frequency and consequence of environmentally damaging activities in the various functions of the process. Compliance with regulation does not necessarily reduce liability due to operational risks.

Management Audit

pays considerable attention to management systems as they are a guide to how effectively and efficiently the operations runs A corporate audit is initiated by the main Board of a parent company and is concerned with the organization structure, roles and responsibilities, policy implementation, awareness and communication. It is carried out as a reassurance to the main Board that their aims and objectives are being implemented throughout the corporate structure.

Management systems audit are carried out to check the systems against the policy and standards such as British standard 7750 or ISO 14001.

Activities

cover auditing of select technical and management issues.

Environmental site audit examines all aspects of the facilities performance with respect to the environment. It combines most of the elements of other types of environmental assessment and when undertaken in depth involve considerable time and cost. The waste audits are of two types. The first identifies and quantifies waste streams and is a precursor to both waste minimization programmes. The second type assesses waste management practice and procedures.

Solid Waste Management

solid waste is associated with the control of generation, storage, collection, transfer and transport, processing, and disposal of solid wastes in a manner that is in accord with the best principles of public health, economics, engineering, conservation, aesthetics, and other environmental considerations. In its scope, it includes all administrative, financial, legal, planning and engineering functions involved in the whole spectrum of solutions to problems of solid wastes thrust upon the community by its inhabitants

Municipal Solid Waste

The term municipal solid waste (MSW) is normally assumed to include all of the waste generated in a community, with the exception of waste generated by municipal services, treatment plants, and industrial and agricultural processes . In the urban context the term municipal solid wastes is of special importance. The term refers to all wastes collected and controlled by the municipality and comprises of most diverse.

5. Types of Municipal Solid Waste

Table 1: The sources of municipal solid waste

Sources	Examples
Residential	Single family homes, duplexes, town houses, apartments
Commercial	Office buildings, shopping malls, warehouses, hotels, airports
Institutional	Schools, medical facilities, prisons
Industrial	Packaging of components, office wastes, lunchroom and restroom waste

Source: Observation and Document

Municipal Solid Waste Management

Municipal Solid waste management involves the application of principle of Integrated Solid Waste Management (ISWM) to municipal waste. ISWM is the application of suitable techniques,

technologies and management programs covering all types of solid wastes from all sources to achieve the twin objectives of (a) waste reduction and (b) effective management of waste still produced after waste reduction. In the Municipal Solid Waste Management the major issues to be considered are:

- Increasing waste quantities
- Wastes not reported in the state MSW totals
- Lack of clear definition for solid waste management terms and functions
- Lack of quality data
- Need for clear roles in state and local government
- Need for even and predictable enforcement regulations and standards.

Environmental and Health Risk Scenarios

Potential hazards of solid wastes are numerous to the living community when it is improperly managed. Solid wastes have the potential to pollute all the vital components of living environment (i.e., air, land and water). Some of the hazards caused by solid wastes are listed below:

1. Uncollected wastes often end up in drains, causing blockages that result in flooding and unsanitary conditions.
2. Open and overflowing bins attract stray dogs, which has been a major cause of the spread of rabies.
3. Open waste bins also attract stray and domestic cattle. Cattle in the city causes nuisance by blocking the traffic on the roads. Cattle that graze on the waste from bins end up eating the plastic along with the vegetable matter, which proves to be fatal for them. The milk obtained from the cattle that feed on waste can be contaminated and can prove to be unsafe for human health.
4. Flies breed in some constituents of solid wastes, and flies are very effective vectors that spread disease.

5. Mosquitoes breed in blocked drains and in rainwater that is retained in discarded cans, tire and other objects. Mosquitoes spread disease, including malaria and dengue. Numerous technologies / options are available in SWM, among developed countries. Replicating the same in low-income countries is inappropriate / incompatible. The success of waste disposal practices depends largely on overcoming the following constraints

Municipal Capacity

The scale of task is enormous and regulatory authorities are able to collect only 60-70% of total waste generated, so treatment and disposal inevitably receives less attention. Attempts are being made in a few instances to overcome this lack of capacity by privatizing this operation

Finance, Cost Recovery and Resource Constance

Deployment of a proper management system represents a major investment and it may be difficult to give it priority over other resource demands. Most of the waste management authorities are severely constrained by the lack of resource to finance their services. Since the collection and transport itself usually dominate SWM costs in developing countries, safe disposal invariably receives less attention where as in all other developed countries concentrate on all aspects of management.

Technical Guidelines

Standards of planning and implementation in high income countries may not be appropriate in low-income countries due to difference in climate, resource, institutions, attitude priorities, etc. However, relatively little appropriate guidance is available for low-income countries. Arising from this uncertainty, officials find themselves ill equipped to plan management strategies, which are both achievable and avoid unacceptable environmental hazards.

The Environmental (Protection) Act, 1986 and its subsequent notifications. The aspect in regard to MSWM would be the EIA notification, 1944, which states that for any project to be authorized an EIA report should be submitted first

Institutional Responsibilities

Though managing wastes effectively is the responsibility of the municipality, there is no clearly stated vision of management

Legislation concerning waste is usually differentiated according to the type of waste. International conventions often cover nuclear and hazardous waste, whereas non hazardous waste, often called solid waste is usually more regulated at the national level. From an environmental angle the following environmental rules, regulations and acts would be the most relevant for MSWM:

Municipal Solid Waste (Management & Handling) Rules 2000, notified by the ministry of Environment and Forests, Government of India vide notification no. S.O.908 (E) dated 25th

September 2000. The guidelines given in this law covers all the functional elements of municipal solid waste management.

Political Committees and Social Responsibility

Solid waste management is much more than a technical issues; it has implications for local taxation, employment, and regulation of public and managing authorities. Any change needs political support to be effective. However, it is rarely a priority for political concerns unless there is strong and active public interest. This is viewed as a cost to the "public" without apparent returns.

Legal Framework applicable to Municipal Solid Waste Management

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The Water (Prevention and Control of Pollution) Act, 1974. Two aspects have to be kept in mind of this law in regard to MSWM. Firstly, consent from the state pollution control board for establishment of a sanitary landfill site and compost plant is essential. And secondly, no water pollution should be caused by the leach ate that is emitted by the sanitary landfill site or a compost plant.

Functional Elements of Municipal Solid Waste Management

To implement proper waste management, various aspects have to be considered such as Waste generation (source reduction), Waste handling and sorting, storage and processing at the source (onsite storage), Collection, Sorting, processing and transformation, transfer and transport, and Disposal (The Expert Committee, 2000).

Waste Generation

Waste generation encompasses activities in which materials are identified as no longer being of value (in their present form) and are either thrown away or gathered together for disposal. Waste generation at present is not very controllable. However, reduction of waste at source is included in system evaluations as a method of limiting the quantity of waste generated. The compositional terms that are used can vary a lot, from relatively simple descriptions in terms of organic to more complicated schemes, using many or all of the constituents, such as paper,

Plastic, glass, metal etc. The composition of the waste is a description of the contents of the waste. In addition to providing important information about the way to handle the waste, the composition tells us about the people who generated the waste. The composition of waste varies widely from place to place, especially country to country.

Municipal Solid Waste Management System in India

Legislative Body The Parliament –creates legislation, policies and acts to mange MSW Ministry of Environment and Forests- Overseas the implementation of the

Federal legislation regarding waste Central Pollution Control Board- Coordinate the activities of the State Pollution Control Boards and provide technical assistance and training to the personnel. Disseminate information and sponsor research relating to waste management. To perform functions, prescribed by the Government. State Pollution Control Board - Plans a comprehensive program for the prevention, control or abatement of air pollution and water pollution. To inspect, at all reasonable times, any control equipment or process. Prior to installation of a landfill or incinerator, permission from SPCB must be obtained.

Sanitation System

The Department of Health as a separate department was felt in 1887 when the Senior Surgeon was appointed as ex-officio Sanitary Commissioner. And the first health officer was appointed on Second October 1898. The health department was reorganized in 1907 with the appointment of whole-time Deputy Sanitary Commissioner in 1907. A central sanitary board and District sanitary board was organized for the improvement of Sanitation. In 1917 a full time Sanitary Commissioner was appointed. In 1929 the sanitary department was separated for the medical department and the department was named as the Health Department and the Sanitary Commissioner as the Director of Health. A central health committee was created. The Department of Health was divided into seven

bureaus, the Bureau of Administration, the Bureau of Epidemiology and Communicable diseases, Bureau of Laboratories, Bureau of Vital Statistics, Bureau of Health Education, and Bureau of San the Sanitary conditions of the city prior to 1877 were irregular. The open drainage caused bad smell and there was only one sewage cart to dispose of the filth. Public health measures assumed much importance with the outbreak of plague in 1898. In March 1898, a loan was granted to the Bangalore Municipality by the Government for sanitary improvements, such as cleaning and repairing of drains, repairing of buildings, demolishing of dirty and unoccupied buildings itary Engineering and the bureau of Rural Health In June 1960, the curative and preventive services, which were separate till then, were amalgamated at the taluka level and below under the control of the District Health Officer and the Health and Medical department were combined into Directorate of Health services, each district being headed by a District Health Officer. The duties of the Health Officer consist of supervision and control of epidemics supervision of sanitary arrangements, examination of drinking water supply, health propaganda work, etc. He is responsible for all the health programmes, both National and State at the district level. The Beed district Corporation has its own health department headed by the Health Officer to look after the sanitation and to carry out health programs in the District.

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