

## **Chapter 5**

### **Urban Solid Waste Management Approaches**

Studies conducted in Third World Cities have outlined various features of MSWM as: Centralized and undiversified solutions without distinguishing the different needs and heterogeneity of neighborhoods within each city, and between cities; bureaucratic approaches top-down solutions, without or with little community participation; capital intensive approaches involving advanced technology and equipment; formal and conventional solutions considering only the formal sector and neglecting the existence and possible contributions of the informal sector that has developed around waste collection and recycling in many Third World cities (Medina Martin, 1997).

#### **5.1 Solid waste management: developed and developing countries**

Industrialized countries have a relative abundance of capital and high labor costs, while developing countries have a relative scarcity of capital and an abundance of unskilled and cheap labor. It is easy for the industrialized countries to devise waste management systems intensive in capital and that save in labor costs, but it is difficult for the developing countries to follow the same approach. Developing countries need socially desirable low-cost, labor-intensive municipal solid waste management solutions that create income opportunities that reduce poverty, especially among the weaker sections of the society. The physical characteristics of cities in developing and industrialized countries differ significantly. Third World cities have large areas with substandard conditions like slums, narrow and unpaved streets. Many immigrants who cannot afford to purchase land occupy vacant land and become squatters. Most of the areas that lack refuse collection service are slum and squatter settlements as local authorities decline to provide refuse collection to squatters as they do not pay taxes and also due to poor road conditions. It is common for Indian cities to have, at any given time, half of their collection

vehicles requiring some kind of repair and spare parts. Faulty or nonexistent maintenance also contribute to the high percentage of idleness. This refusal to provide waste collection has a serious effect on the urban environment. Many Third World cities have an active informal sector that has evolved around solid wastes, which provides income opportunities for migrants, unemployed, children, women, elderly and handicapped individuals. The most common occupations are informal refuse collection and scavenging.

Differences between developed and developing countries in terms of income, standard of living, consumption patterns, institutional capacity, and capital available for urban investments are glaring. Different methods, technologies and systems are used in SWM given the problems linked with solid wastes especially in the disposal stage. It is important that the suitability, affordability and public acceptability has to be considered before selecting the various methods and technologies. Municipal authorities levy taxes, charges, fees, for raising revenues to meet their statutory obligations as per the state laws. Municipalities need adequate and consistent revenue flows to provide a service and in its absence service provision must rely on transfers from another level of government or grants, making the service difficult to sustain. Municipal authorities levy taxes, charges, and fees to gain revenues and to improve their financial situation. However, municipal authorities generally have a major deficit of funds to meet their obligations. Many municipalities do not generate sufficient funds even to pay their staff members' salaries. The principal sources of municipal authorities' income include: property and house taxes, octroi duty water tax, sewerage, drainage, and conservancy tax, city cleaning tax, fees for passing building plans, levies on advertisement through hoardings, signboards etc., rents from municipal properties, fees from licenses for various trades and parking fees.

Despite powers given to impose taxes, most municipal authorities do not levy sufficient taxes. First, many taxable properties are not registered. Second,

the mechanism of tax recovery is poor. The rates of tax recovery generally range between 30 and 50 percent. The financial health of municipalities in India is poor, and they are unable to fulfill their obligations. They therefore depend on the state government for grants. The states give the municipalities grants for paying staff salaries as well as for carrying out development work. This dependence on state government grants is not sustainable in the long term, and municipalities need to find ways to fund services from their own resources. The main sources of grants that municipalities can obtain are State Finance Commission grants, 12th Finance Commission grants, Jawaharlal Nehru National Urban Renewal Mission (JNNURM) grants, Urban Infrastructure Development for Small and Medium Towns (UIDS &MT) scheme grants.etc. (Da Zhu et al 2008).

Financing for Municipal Solid Waste Services generally comes from Share from stamp duty on transfers of property, Share from entertainment tax, Share from education tax in the form of a grant from the provincial or national government. Municipal decision makers do not give adequate priority to SWM. Most of the municipal authorities allocate general municipal funds to cover the costs of SWM services. They most often do not levy any sanitation or city cleaning tax, nor do they impose user fees for waste collection service or for any other SWM service. Very few cities levy user fees for door-to-door collection. Financial allocations go for staff salaries as the first priority, and what is left is spent on visible infrastructure projects. Very little is allotted to improving SWM services, varying between 1 percent and 30 percent of the total municipal budget depending on the size of the municipality. Most of the budget for SWM is consumed in salaries of sanitation workers and transport of waste. Very little or none is set apart for actual treatment and disposal of waste. The percentage of expenditures for various solid waste services is as follows 70 to 75 percent on street sweeping, 25 to 30 percent on collection, and 0 to 5 percent on disposal (Supreme Court 1999)

## 5.2 Conventional systems of SWM

The important conventional systems of SWM are

D) land filling: This is probably the oldest method of waste disposal and is the most popular and commonly used method. Land fills are generally classified into three types

- i) open dump sites: a disposal area where the solid wastes are indiscriminately thrown or disposed of without due planning and consideration for environmental and health considerations.
- ii) controlled dump sites: a disposal site at which solid waste is deposited in accordance with the minimum prescribed standards of site operation.
- iii) sanitary land fills: a disposal site designed, conducted, operated and maintained in a manner that exerts engineering control over significant potential environment impacts arising from the development and operation of the facility.

The features that must be present in order for a landfill to be considered sanitary are: Full or partial hydrogeological isolation through the use of liners to prevent leachate infiltration into the soil and groundwater; collection and treatment infrastructure should be used where leachate is expected to be generated; Formal engineering preparations with an examination of geological and hydrological features and related environmental impact analysis, waste tipping plan and final site restoration plan; Permanent control, with trained and equipped staff to supervise construction and use; Planned waste emplacement and covering, with waste and soil placed in compacted layers as well as daily and final soil cover to reduce water infiltration and reduce odors and pests (Cointreau, 1982).

- II) incineration: This method has long been in use in many countries. This involves using thermal decomposition to convert solid waste to less bulky less toxic material. It is an easy way to reduce the weight and volume of wastes. Incineration eliminates harmful and pathogenic bacteria, viral constituents and toxic organic compounds. The use of incineration has been found useful particularly that produce pathological wastes. The main concern about incineration is mainly on air pollution and its effects.
- III) composting: This is the biological decomposition of the organic portions of solid waste under controlled conditions. It produces compost, which is high in organic matter. Compost is useful as organic fertilizer. Care must be taken to prevent bad effects on ground water.
- IV) pyrolysis: This method is described as a process of destructive distillation where complex polymers are broken down to produce solids, liquids and gaseous fractions. Although similar to incineration, Pyrolysis produces a valuable product or recovers energy.
- V) vermi composting: In this method certain organic wastes like animal wastes, agricultural crop waste and other solid waste are converted to a useful product. Earth worms are used to speed up the y process of decomposition. The product is useful as fertilizers.

### **5.3 Recent developments in USWM**

The earlier definitions gave importance to the operational aspects of solid waste management. The new ideas that have emerged in the literature of solid waste management are Integrated Solid Waste Management, zero waste model and Ecological Solid Waste Management.

#### **i) Integrated solid waste management (ISWM)**

One of the earlier definitions for ISWM was given by Tchobanoglous et al (1993) and Dr. Peter White (1996). Tchobanoglous et al (1993) defined

ISWM as the selection and application of appropriate techniques, technologies and management programs to achieve specific waste management objectives and goals while Dr. Peter White (1996) defined ISWM as something dealing with more about how many treatment options are used to manage the waste handled by the system in an environmentally, socially and economically sustainable way. ISWM consists of a range of treatment options including reuse, recycling, composting, biogasification, energy recovery and land filling. Economic, environmental and social benefits are thus achieved through the creation of system synergies. It involves sorting of wastes at source, composting the biodegradable wastes, processing the recyclables into waste derived materials and using the incinerators for the other wastes to produce energy and construction materials from the ash left over(Pujalte.E.A.1993).

**ii) Zero waste approach**

Zero waste approach is a unique waste management approach in which waste becomes a source of innovation rather than a source of economic drain. It promotes reuse, recycling and prevention of waste generation. The important aspects of zero waste management approach includes enhancing a community's self sufficiency for resources and resource management, developing a system that will ensure that the natural resources are not converted to forms that will degrade nature, going by the nature's cyclical flow of resources ie from natural resources to useful products to resources reincarnation and also simplicity, utility and aesthetics.

**iii) Ecological solid waste management**

Ecological solid waste management refers to the systematic administration of activities which provide for segregation at source, segregated transportation, storage, transfer, processing, treatment and disposal of solid

waste and all other waste management activities which do not harm the environment (Ecological Solid Waste Management Act 2000).

#### **5.4 Satellite accounts for waste management**

Waste management is one of the important aspects of environmental management which needs to be incorporated in the system for Environmental and Economic Accounts (SEEA) as a satellite account. An I-O framework used in the conventional system of National Accounts (SNA) can be used to first include waste management sector, formal and informal. A waste account can be defined as the organisation of data on the production and disposal of waste into a framework that allows their integration with the economic data in the system of National Accounts. The developed countries may exclude the informal sector in the SEEA. But for developing countries the integration of the informal sector into the SEEA becomes imperative. The SWM sector in the Mumbai city consists of both formal and informal sector. A leading industrialist in Mumbai calls 'rag pickers' as "over environmental entrepreneurs". The informal SWM sector is primarily responsible for undertaking the critical job of retrieving valuable materials from waste. They generate important positive benefits for the environment (UN 1997).

Concerns over environmental degradation and depletion of natural resources resulting from increased urbanisation and industrialization, as well as improper disposal and non-use of wastes, has necessitated the development of new solid waste management systems. It is a complex task which requires appropriate organizational capacity and cooperation between numerous stakeholders in the private and public sectors. The salient features of the study area will help us to have an insight into the gravity of solid waste management issue which is given in the following chapter.

## References

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