

PERFORMANCE AUDIT ON “MANAGEMENT OF WASTE IN INDIA”

CHAPTER 1

Introduction

1.1 Definition of waste

Wastes are substances or objects, which are intended to be disposed of, or are required to be disposed by the provisions of national laws¹. Additionally, wastes are such items which people are required to discard, for example by law because of their hazardous properties. Many items can be considered as waste like household rubbish, sewage sludge, wastes from manufacturing activities, packaging items, discarded cars, old televisions, garden waste, old paint containers etc.,. Thus, all our daily activities give rise to a large variety of different wastes arising from different sources. The rising quality of life and high rates of resource consumption patterns have had an unintended and negative impact on the environment- the generation of wastes far beyond the handling capacities of governments and agencies.

1.2 Kinds of waste

Municipal waste is waste generated by households and consists of paper, organic waste, metals etc.,. The production processes, households and commercial activities generating waste are hazardous waste. Bio-medical waste is waste generated by hospitals and other health providers and consists of discarded drugs, waste sharps, microbiology & biotechnology waste, human anatomical waste, animal waste etc.,. Construction and demolition waste arises from activities such as the construction and demolition of buildings, creation of infrastructure such as road planning and maintenance etc.,. Mining waste arises from prospecting, extraction, treatment and storage of minerals. Waste electrical and electronic equipment² consists of end of life products and comprises of a range of electrical and electronic items such as refrigerators, washing machines, information technology and telecommunication equipment like computers and printers, televisions etc.,. Radioactive waste is any material that contains a concentration of radionuclides greater than those deemed safe by national authorities, and for which, no use is foreseen. Other sources of waste include end-of-life vehicles, packaging waste, tyres, agricultural waste etc.,.

1.3 Impact of waste on health and environment

Waste represents a threat to the environment and human health if not handled or disposed of properly. Surface and ground water contamination takes place when waste reach water bodies. Residues from waste can change the water chemistry, which can affect all levels of an ecosystem. The health of animals and humans are affected when they drink the contaminated water. A specific environmental hazard caused by waste is leachate, which is the liquid that forms, as water trickles through contaminated areas leaching out the

¹ According to the Basel Convention

² Commonly referred to as WEEE

chemicals. Movement of leachate from landfills, effluent treating plants and waste disposal sites may result in hazardous substances entering surface water, ground water or soil. Waste contaminates soil and can harm plants when they take up contaminants from their roots. Eating plants or animals that have accumulated soil contaminants can adversely affect the health of humans and animals. Emissions from incinerators or other waste burning devices and landfills can cause air contamination. Incinerators routinely emit dioxins³, furans⁴ and polychlorinated by-phenyls⁵, which are deadly toxins, causing cancer and endocrine system damage. Landfills are a big source of release of green house gases, which are generated when organic waste decomposes in landfills. E-waste contains a mix of toxic substances such as lead and cadmium in circuit boards; lead oxide and cadmium in monitor cathode ray tubes; mercury in switches and flat screen monitors; cadmium in computer batteries; polyvinyl chloride in cable insulation that release highly toxic dioxins and furans when burned to retrieve copper from the wires. Thus, improper handling of waste has consequences both on the environment as well as on the health of the people.

1.4 Management of Waste

According to United Nations Environment Programme (UNEP), waste management includes both the components of prevention and disposal of waste. The waste management hierarchy can be traced back to the 1970s, when the environment movement started to critique the practice of disposal-based waste management. Rather than regarding 'waste' as a homogenous mass that should be buried, they argued that it was made up of different materials that should be treated differently i.e. some should not be produced, some should be reused, some recycled or composted, some should be burnt and others buried. According to this hierarchy, the priority of any country should be to extract the maximum practical benefits from products and prevent and minimize the waste that is generated. Thus, strategies for waste disposal should focus on waste prevention and minimization through the '3 Rs' - Reduce, Reuse and Recycle. According to this hierarchy, waste disposal strategies are 'end of the pipe' solutions and should be the least favored option. Emphasis on waste prevention and waste minimisation would ensure that less waste is being produced which needs to be disposed.

Waste prevention means measures aiming at the reduction of the quantity and harmfulness for the environment of diverse waste streams. Prevention is the most desirable waste management option as it eliminates the need for handling, transporting, recycling or disposal of waste. It provides the highest level of environmental protection by optimising the use of resources and by removing a potential source of pollution.

³ Dioxins are known to increase the likelihood of cancer and are considered a serious threat to public health. Environmental campaigners describe dioxins as among the most dangerous poisons known.

⁴ Furan is a colorless, flammable, highly volatile liquid with a boiling point close to room temperature. It is toxic and may be carcinogenic.

⁵ Also called PCBs, these were used as coolants and insulating fluids for transformers and capacitors, stabilizing additives in flexible PVC coatings of electrical wiring and electronic components etc.. PCB production was banned in the 1970s due to the high toxicity of most products containing PCBs. PCBs are classified as persistent organic pollutants which bioaccumulate in animals.

- Reducing waste includes any process or activity that avoids, reduces or eliminates waste at its source or results in reuse or recycling.
- Reusing is using an article more than once. This includes conventional reuse where the item is used again for the same function and new-life reuse where it is used for a new function.
- Recycling involves the treatment or reprocessing of a discarded waste material to make it suitable for subsequent re-use either for its original form or for other purposes.

Waste disposal typically involves the collection, transportation and finally, disposal of waste. Disposing waste in a landfill is the most traditional method of waste disposal and a properly designed and well-managed landfill can be a hygienic and relatively inexpensive method of disposing waste materials in a way that minimises their impact on the local environment. Another byproduct of landfills is landfill gas (mostly composed of methane and carbon dioxide), which is produced as organic waste breaks down anaerobically. This gas can create odor problems, kill surface vegetation, and is a greenhouse gas. Incineration is a waste disposal method that involves combustion of waste at high temperatures. Waste materials that are organic in nature, such as plant material, food scraps, and paper products, are increasingly put through a composting and/or anaerobic digestion system to control the biological process to decompose the organic matter and kill pathogens. Gasification/Pyrolysis are two related forms of thermal treatment where waste materials are heated to high temperatures with limited oxygen availability.

1.5 Amount of waste being generated in India

As per the Tenth Plan document, India produces 48 million tones (MT) of urban solid waste annually, with solid waste generation being approximately 0.4 kg per capita per day. The Director General of Health Services estimates that 5.4 MT of bio-medical waste is being generated in the country every year; based on the generation figure of 250 grams/capita/day. The Tenth Plan document also estimates that around 7.2 MT of hazardous waste is being generated in the country. However, no estimates exist for the other kinds of wastes being generated in the country. Of mounting importance is the quantity of Waste Electrical and Electronic Equipment (WEEE), especially waste computers, TVs, printers etc. The e-waste inventory for the year 2005 has been estimated to be 0.15 MT and is expected to exceed 0.8 MT by 2012, according to CPCB estimates. No estimates or even guesstimates exist for construction and demolition waste, packaging waste, mining waste, waste from end-of-life vehicles and tyres, and agricultural waste.

1.6 Organisational Set up

1.6.1 Policy making

The Ministry of Environment and Forests (MoEF) is the nodal agency of the Government of India for planning, promotion, co-ordination and overseeing the implementation of environmental and forestry programmes. The principal activities undertaken by MoEF consist of conservation and survey of flora, fauna, forests and wildlife, prevention and

control of pollution, afforestation and regeneration of degraded areas and protection of environment, in the framework of legislations. MoEF is headed by the Secretary, Environment and Forests and is assisted by one Special Secretary, three Additional Secretaries and an Additional Director General, Forests who are responsible for the various divisions of MoEF like control of pollution, forest conservation, wildlife, ozone cell etc.,. In the states, the Department of Environment and Forests undertake control of pollution.

Central Pollution Control Board (CPCB) was constituted in September 1974 as an autonomous body of MoEF under the Water (Prevention and Control of Pollution) Act, 1974 and was entrusted with the powers and functions under the Air (Prevention and Control of Pollution) Act, 1981. It serves as a field formation and provides technical services to MoEF for the provisions of the Environment (Protection) Act, 1986. Principal functions of CPCB are to promote cleanliness of streams and wells in different areas of the states by prevention, control and abatement of water pollution, to improve the quality of air and to prevent, control or abate air pollution in the country. A Chairman, a member Secretary and 13 members comprise CPCB. Member Secretary, CPCB reporting to the Chairman is responsible for the day to day functioning of CPCB. All states have a Pollution Control Board (PCB) whose functions are similar to CPCB.

1.6.2 Regulatory Framework for management of waste in India

To regulate the management and handling of waste, the government notified the following:

- In 2000, under the powers conferred by the Environment (Protection) Act, 1986, the ***Municipal Solid Wastes (Management and Handling) Rules*** were notified which made every municipality, within its territorial jurisdiction, responsible for management and handling of solid waste. In the report, for the sake of simplicity, the Municipal Solid Wastes (Management and Handling) Rules are referred to as municipal solid waste rules.
- To ensure proper management of bio-medical waste, ***Bio-Medical Waste (Management and Handling) Rules***, were notified in 1998 with amendments in 2000 and 2003. Under the rules, the institutions generating bio-medical waste were responsible for management and handling of bio-medical waste. In the report, for the sake of simplicity, the Bio-Medical Waste (Management and Handling) Rules are referred to as bio-medical waste rules.
- Plastics were also regarded as a major source of pollution to the environment and ***Recycled Plastics Manufacture and Usage Rules*** were notified in 1999 with an amendment in 2003 entrusting the District Commissioner/ District Magistrate of each district and PCB with the responsibility of managing plastic waste. In the report, for the sake of simplicity, the Recycled Plastics Manufacture and Usage Rules are referred to as plastic waste rules.
- The Government of India promulgated the ***Hazardous Waste (Management and Handling) Rules*** in 1989 through MoEF under the aegis of Environment

(Protection) Act, 1986. Subsequent amendments to the Rules followed in 2000 and 2003 defining the roles and responsibilities of the waste generator and waste monitoring agencies. In the report, for the sake of simplicity, the Hazardous Waste (Management and Handling) Rules are referred to as hazardous waste rules.

1.6.3 Implementing Agencies

The rules relating to management of municipal, bio-medical and plastic waste are implemented at the state level. It is the responsibility of the municipal authorities to implement the laws relating to collection, segregation, storage, transportation, processing and disposal of municipal solid waste. The rules regarding bio-medical waste management are to be implemented by the hospital authorities and the rules pertaining to the implementation of Recycled Plastics Manufacture and Usage Rules are to be implemented by the concerned District Magistrate/ District Commissioner. The central government has allowed private participation in the field of municipal solid waste and bio-medical waste management, but the ultimate authority to implement these rules efficiently and effectively rests with the agencies of the government.

1.7 Scope of Audit

Performance Audit (PA) of “Management of Waste in India” sought to examine whether the government had identified waste as a risk to environment and health, accurately assessed the amount of different kinds of waste being generated in the country and drafted a policy on waste management which focused on waste minimisation and waste reduction, as compared to waste disposal, as the more effective ways to manage waste. In addition, the PA sought to examine whether all kinds of waste had been covered under legislation for safe disposal and whether agencies had been allocated responsibility and accountability for the management of waste. The PA also sought to check the compliance to rules relating to the implementation, monitoring and evaluation and adequacy of funding relating to municipal solid waste, bio-medical waste and plastic waste.

The scope of the PA excluded:

- the implementation, monitoring and evaluation of hazardous waste management rules due to its complexity and the multiplicity of agencies involved in its implementation and monitoring; and
- the implementation, monitoring and evaluation of radioactive waste due to the confidential nature of such wastes as well as their restricted use.

At the central level, audit scope covered policy, planning and legislation at MoEF and the implementation, monitoring and evaluation activities relating to management of waste at CPCB. At the state level, audit checked the records of 24 state government departments like Department of Environment/Forests, Urban Development etc., 24 PCBs, 56 municipalities in 20 states, 60 districts in 20 states and 180 hospitals in 15 states to verify implementation and monitoring of municipal solid waste, bio-medical waste and plastic waste rules.

1.8 Audit objectives

Performance audit of “Management of Waste in India” covering the period from 2002-2003 to 2006-2007, was taken up with the objectives of assessing whether:

- I. the quantum of waste being generated in the country had been assessed and the risks to environment and health posed by waste had been identified;**
- II. a specific policy for management of waste existed and whether policies and strategies for the management of waste gave priority to waste reduction and waste minimisation as against waste disposal;**
- III. legislations specifically dealing with disposal of each kind of waste existed and whether penalty for violation had been incorporated in the legislations already enacted;**
- IV. various agencies involved in the process had been allocated clear responsibility and accountability for waste management and whether or not a mismatch/gap/overlap existed among the responsibility centers;**
- V. effective compliance to laws regulating municipal solid waste, bio-medical waste and plastic waste was taking place in the states;**
- VI. monitoring was effective in checking non-compliance; and**
- VII. funding and manpower were adequate for the implementation of rules on waste management and whether the funds/infrastructure were used economically, efficiently and effectively.**

The observations of audit with reference to each of the seven objectives of the PA have been presented in separate chapters i.e. Chapter 2 to Chapter 8.

1.9 Audit criteria

The main audit criteria used in the PA were:

- Agenda 21 document of the World Commission on Sustainable Development of the United Nations Conference on Environment and Development, held in Rio in June 1992;
- United Nations Environment Programme (UNEP) guidelines;
- Adherence to rules relating to the bio-medical waste, plastic waste and municipal solid waste;
- Implementation of the ECOMARK scheme;
- Adherence to system of periodic monitoring in MoEF, CPCB and PCBs relating to management of waste; and
- Policies, directives, legislations and good practices for management of waste in different countries.

1.10 Audit methodology

The initiation of the PA was with guidelines for audit, prepared in consultation with NGOs like Center for Science and Environment, Toxic Links, apart from stakeholders

like MoEF and CPCB. Guidelines of INTOSAI (International Organisation of Supreme Audit Institutions) on waste titled “Towards Auditing Waste Management” were also referred to while framing these guidelines. These guidelines facilitated audit effort in the sampled states.

The Performance Audit of “**Management of Waste in India**” commenced with an entry conference with MoEF in July 2007, in which the audit methodology, scope, objectives and criteria were explained. The audit methodology mainly consisted of document analysis, responses to questionnaires, physical collection and testing of samples. Records and returns relating to the issue were examined:

- at the central level at MoEF and CPCB between July 2007 to December 2007.
- at state level (in 24 states) in PCBs, state Forest Departments, state urban development department, municipalities, districts and hospitals between June 2007 to December 2007.

1.10.1 Sample selection

During pilot studies conducted before undertaking the Performance Audit, we had encountered a situation where the states opted not to give answers to certain issues raised during audit. Thus, we anticipated large number of ‘non verifiable’ responses as compared to a clear ‘Yes’ or ‘No’. To ensure that we had a sufficient number of clear ‘Yes’ or ‘No’ responses, we considered a larger sample in terms of state coverage; hence the PA covered 24 out of 28 states (86 *per cent*) for responses on policy for management of wastes, municipalities in 20 out of 28 states (71 *per cent*) for compliance to municipal solid waste/plastic waste rules and hospitals in 15 out of 28 states (54 *per cent*) for compliance to bio medical waste rules.

- Random sampling was used to select 24 states/PCBs from whom responses were sought on policy issues.
- Municipal solid waste: Stratified random sampling was used to select the municipalities for inclusion in the sample for audit. Three municipalities each in 20 states (1 municipality in Delhi, 1 municipality in Meghalaya, 5 municipalities from Chhattisgarh and no municipality in Sikkim (so the whole state was taken as one municipality) were selected by means of a stratified random sample where the sample was stratified according to population and municipalities were selected randomly from within the strata. 56 municipalities were sampled in total.
- Plastic waste rules: The districts in which the municipalities fell were taken as sample and 56 districts were sampled in total.
- Bio-medical waste: simple random sampling was used to select hospitals for inclusion in the audit sample. 180 hospitals were selected (12 hospitals each in 15 states) by means of random selection of four districts in each state and random selection of three hospitals from within the sampled district.

List of all sampled states, municipalities, hospitals and PCBs is attached as **Annexure 1**.

1.10.2 Reporting methodology

The results of audit, both at the central level and the state level, were taken into account for arriving at audit conclusions. While framing the conclusions and recommendations, good practices regarding waste management in India and in other countries have also been quoted to illustrate the fact that these practices are possible in the field of waste management. While it is recognised that not all these international practices can be easily implemented in India, however, they can serve as examples or best practices to policy makers while framing policies.

The affirmative responses to audit queries which were accompanied by supporting evidence have been reflected in the report as a 'Yes' response. Where the states have responded negatively to the queries, the same has been reflected as a 'No' response in the report. Cases where responses were not received or where no supporting evidence was furnished for affirmative responses, have been reflected as 'non verifiable' in the report. **The audit findings, conclusions and recommendations against each of the stated objective of the PA have been discussed in the following chapters.**

1.10.3 Acknowledgement

Entry Conference was held with MoEF/CPCB on 3 July 2007 which was not attended by the Secretary, MoEF. The cooperation of MoEF during the entry conference and course of audit was satisfactory. The draft PA report was issued to MoEF on 5 May 2008 and their reply was received on 1 August 2008. The replies given by MoEF have been suitably incorporated in the PA. The exit conference with MoEF/CPCB was held on 23 September 2008 in which the Secretary, MoEF informed that keeping in view the audit recommendations, a committee to draw up a road map for the management of waste in India has been formed. The Committee consists of senior officials of MoEF, CPCB, representatives from NGOs, representative of the C&AG and eminent persons in the field of waste management. The committee has been mandated to submit its report within three months. The initiative taken by the Secretary, MoEF in promptly addressing the issue of management of waste in India by constituting this committee is appreciated.