ANNEX 3
AUDIT REPORTS ON WASTE

All India Audit Report on 'Management of Waste in India'

EXECUTIVE SUMMARY

The Ministry of Environment and Forests (MoEF), along with the Central Pollution Control Board (CPCB) is the nodal agency of the Government of India for planning, promotion, co-ordination and overseeing the implementation of environmental and forestry programmes and one of their principal activities is the control of pollution. Environment (Protection) Act, 1986 also empowers the Ministry to enact laws for the protection of the environment in India, which are also adopted by the states.

The Performance Audit revealed that MoEF/CPCB/states do not have complete and comprehensive data about all the various kinds of waste being generated in India. Further, the risks to health and environment had not been adequately assessed by MoEF/states, which could lead to insufficient recognition, both by policy makers as well as public, to the problems caused by ineffective management of waste. Despite being a signatory to Agenda 21 of the World Commission on Sustainable Development of the United Nations Conference on Environment and Development, waste management efforts in India were not directed by a clear-cut policy. The '3 Rs' model indicating the waste hierarchy of reducing, recycling and reusing waste has not been replicated. Instead, the focus has been on disposal of waste being generated. MoEF had also not adequately promoted the use of recycled and environmentally friendly products through its environment education, consumer information and environment labeling programmes.

Rules framed for safe disposal of waste did not cover many kinds of waste like construction & demolition waste, electronic waste, agricultural waste etc,. Despite being empowered by the Environmental (Protection) Act, 1986, instances of the polluter being held responsible for unsafe disposal of waste were very few, and thus, there was no effective deterrence for non-compliance, even with the framed rules.

The Performance Audit also revealed that there appeared to be an absence of a single body taking ownership of waste issues in India. Further, there was no clear identification of bodies for monitoring of waste rules at the Central Government level, which caused a mismatch/gap in responsibility and accountability and led to the rules for management of waste being rendered ineffective.

Study of compliance to municipal solid waste rules revealed that collection of waste by the municipalities was not taking place regularly and effectively and there was negligible segregation of waste after collection. Waste processing facilities and scientific landfills were almost non-existent, as a result, open dumping was the most common option for the disposal of waste. Municipalities did not adequately plan for closing of dumpsites and had not

identified areas for landfills for scientific disposal of waste. In the absence of landfills, open dumping of waste was likely to continue leading to harmful effect on health and environment.

Study of compliance to bio-medical waste rules revealed that hospitals/ private operators were running waste disposal facilities without authorisation and segregation of bio-medical waste according to categories was not being done. The waste treatment/disposal infrastructure created in the states was also inadequate. Study of compliance to plastic waste rules revealed ineffective enforcement of the rules by District Commissioners/District Magistrates and Pollution Control Boards in the states.

The problem of non compliance to rules for the management and handling of municipal solid waste, bio-medical waste and plastic waste was further compounded by lax and ineffective monitoring. In the absence of effective monitoring, violation of these rules escaped detection. Shortages of staff in municipalities/PCBs hampered the monitoring and implementation of the waste rules.

MoEF needs to take leadership in advancing the cause of environmentally responsible management of waste in India, which should necessarily incorporate the use of the '3 Rs' strategy in reducing the waste meant for final disposal. Keeping in view the gravity of the various findings in this report, it is recommended that MoEF set up a Committee to study the need for a separate waste management policy and suggest ways and means for its effective implementation and monitoring. This could go a long way in effective management of waste and reduce the threats posed to the environment and public health.

Keeping in view the audit recommendations, a committee to draw up a road map for the management of waste in India has been formed by MoEF in September 2008. The Committee consists of senior officials of MoEF, CPCB, representatives from NGOs and eminent persons in the field of waste management. The committee has been mandated to submit its report within three months.

HIGHLIGHTS AND SUMMARY OF RECOMMENDATIONS

1. Assessment of quantum of waste being generated in the country and identification of the risks to environment and health posed by waste.

- Neither MoEF nor the states had completely assessed the quantity of various kinds of waste like municipal solid waste, bio-medical waste, hazardous waste, e-waste etc., being generated in the country.

- MoEF was unable to make any projections about the amounts of waste that might be produced in future. Only 25 per cent of the sampled states had made projections about the growth in waste. Adequacy of capacity to handle waste currently and in the future was assessed only by 29 per cent of the states.

- MoEF/CPCB had not completely assessed the risks to environment and public health posed by waste. Only 25 per cent of the sampled states had assessed the risks to public health.

Recommendations

- CPCB, as the nodal agency for pollution related issues should carry out, periodically, a comprehensive assessment of the amounts of waste being generated, according to the major waste types. All the states in India should be involved in this exercise so that a comprehensive database on waste is generated for aiding policy-making and intervention.
- MoEF, with involvement of all the states, may collect data about growth of the various kinds of waste, analyse the factors contributing to its growth and the increase in waste quantities to arrive at strategies for waste management.
- MoEF/CPCB, in conjunction with the states, may estimate the current capacity to handle all kinds of waste all over the country and ensure that additional capacity of waste infrastructure, if required, is created for safe disposal.
- MoEF may carry out waste related pollution impact monitoring, on a regular basis, to study the effects of improper disposal of waste on the environment. MoEF along with the states may also carry out regular surveillance including epidemiological surveillance of waste related impacts on public health.

2. Existence of policies and strategies for management of wastes and reflection of priority to waste reduction and waste minimization as against waste disposal.

- Waste management efforts were not directed by a separate policy. MoEF has not adopted a hierarchical approach to waste management, in the order of environmental priority. No effective strategies have been introduced to implement the '3 Rs' (reduce, reuse and recycle), the current focus being only on disposal of waste. Only eight per cent of the sampled states had implemented the '3 Rs'.
- MoEF/CPCB as well as 79 per cent of the sampled states did not set any targets/timelines for reduction of municipal solid waste, bio-medical waste, plastic waste, hazardous waste etc,. In the absence of clear targets/timelines, efforts made by the government to reduce waste were not measurable.
- MoEF had not appropriately addressed the role of informal sector in handling waste. Only 17 per cent of the sampled states had recognised the role of ragpickers.
- MoEF and the states have not taken effective action to promote the use of recycled and environmentally friendly products. The implementation of MoEF's environment labeling programme called "ECOMARK" was tardy as "ECOMARK" was granted to only three product categories ever since the programme was introduced in 1991.

Recommendations

- MoEF may consider framing a specific policy for the management of wastes in India, incorporating the internationally accepted hierarchy for management of wastes.

- MoEF and the states may consider introducing effective strategies for the reduction and recycling of household waste like deposit refund schemes, promoting the use of jute bags rather than plastic bags, waste exchanges, etc., for reduction of waste at source.

- MoEF, in consultation with the states, should prepare an action plan for the reduction, reuse and recycling of waste with clearly defined numerical targets as well as timelines for the achievement of targets.

- MoEF should consider the introduction of Environmentally Preferred Purchases and lay down guidelines for the purchase of recycled products to promote the purchase of eco- friendly goods by the government and the agencies controlled by it.

- MoEF should include more products under the "ECOMARK" scheme and monitor adherence to environmental standards of these products. It should also prescribe standards for classifying products as environmentally friendly and carry out environmental impact studies of such products.

3. Existence of legislations specifically dealing with disposal of each kind of waste, incorporating penalty for violation.

- Laws have not been framed for all kinds of waste, leaving the safe disposal of many kinds of waste like construction and demolition waste, agricultural waste, e-waste etc., unmonitored.

- The polluters were not being effectively held responsible for unsafe disposal, thereby creating no deterrence for non-implementation of the rules. In only 25 per cent of the sampled states, some token action had been taken by PCBs/state governments against defaulters for illegal dumping of waste.

Recommendations

- MoEF should consider framing laws/rules for the management of all major kinds of waste like construction & demolition waste, end of life vehicles, packaging waste, mining waste, agriculture waste and e- waste being generated in the country.

- Considering the fact that the provisions of Environment Protection Act are seldom used, both at the central and the state level for punishing the polluter, there is a need to incorporate the Polluter Pays Principle (PPP) in the waste rules/legislations itself. This would act as a deterrent against open dumping of waste.

4. Allocation of clear responsibility and accountability to various agencies involved in the process of waste management.

- There was no single body taking ownership of waste issues both at the central level and at the state level, leading to diffusion of responsibility and weak accountability.

- Only 15 per cent of states constituted the Solid Waste Missions for implementation of municipal solid waste rules, despite directives of CPCB in 2004-05 that all states should set up such missions.

- There was no clear identification of bodies for monitoring of waste rules at the centre as none of the four central ministries, i.e., MoEF, Ministry of Urban Development, Ministry of Health and Family Welfare and Department of Petrochemicals took responsibility for monitoring of municipal solid waste, bio-medical waste rules and plastic waste rules.

- In the states, only 33 per cent of the sampled states had allocated responsibility to PCBs for monitoring of municipal solid waste rules; 46 per cent of the states had allocated responsibility for monitoring of bio-medical waste rules and only 37 per cent of the sampled states were monitoring the implementation of the plastic waste rules.

Recommendations

- Since waste causes pollution and pollution issues are necessarily the responsibility of MoEF, the Central Government should consider appointing MoEF as the nodal body for managing all kinds of waste.

- MoEF should clearly identify, at the central level, bodies which would be responsible for the implementation of the waste management rules relating to municipal solid waste, biomedical waste and plastic waste. The states should also clearly identify the agency responsible for implementation of the waste rules.

- Solid Waste Missions for dealing with overall issues relating to implementation of municipal solid waste rules should be set up in all the states.

- The government should assign clear responsibility to MoEF or any central body/agency for monitoring the implementation of all waste management rules throughout the country.

5. Compliance to rules regulating municipal solid waste, bio-medical waste and plastic waste.

5.1 Compliance to Municipal Solid Waste rules

- Collection: Waste was regularly collected only in 22 per cent of the sampled municipalities.

- Segregation: Segregation of waste took place only in 10 per cent of the sampled municipalities.

- Storage: Only 17 per cent municipalities were able to ensure proper storage of waste.

- Transportation: Covered trucks for transportation of municipal solid waste were being used only in 18 per cent of sampled municipalities.

- Processing: Only 11 per cent municipalities had waste processing capabilities.

- Disposal: Only six municipalities out of the sampled 56 municipalities had established a landfill, leading to dumping of waste in open dumpsites in the states. The activity outlined in the Implementation Schedule for the development of landfills was carried out only in 14 per cent of the sampled municipalities.

5.2 Compliance to bio-medical waste rules

- Authorisation: Waste disposal facilities were set up after getting authorisation from prescribed authority only in 29 per cent of the sampled hospitals.

- Segregation: Segregation as envisaged in the bio-medical waste rules was taking place in only 29 per cent of the sampled hospitals. Bio-medical waste, like effluents, needle sharps etc., were mixed with other wastes in 34 per cent of the sampled hospitals.

- Labeling and storage: Labeling took place only in 19 per cent of sampled hospitals and 17 per cent of sampled hospitals kept untreated waste beyond 48 hours.

- Treatment /disposal: Only 17 per cent of sampled hospitals were treating/disposing bio-medical waste as per the compliance criteria in the rules. More than 50 per cent of the hospitals sampled had inadequate waste processing/disposal infrastructure.

5.3 Compliance to plastic waste rules

- Actions were not being taken by District Collectors/District Magistrates for the enforcement of the rules and it was difficult to verify whether vendors were using carry bags or containers made of recycled plastic for storing, carrying, dispensing or packaging of foodstuffs.

- It was difficult to verify in audit whether recycling was being done according to specifications of Bureau of Indian Standards.

- None of the sampled states had complete database on the number of manufacturers of plastic carry bags/containers; thus, it was difficult to verify whether all manufactures had sought authorisation from PCBs for the manufacture of plastic carry bags/containers.

Recommendations

- Segregation should be given greater emphasis by means of publicity and awareness campaigns and holding regular meetings with housing associations and NGOs. State governments could make waste segregation mandatory and the municipalities could be authorised to levy fines if segregated waste is not made available to the municipalities for collection.

- Waste processing should be made mandatory in each municipality. CPCB could help each municipality in identifying the waste processing technology best suited to the needs of the municipality. Sufficient funding should be provided by MoEF/MoUD to set up waste processing infrastructure in each municipality.

- All municipalities should take steps to improve the existing dumpsites to make them more sanitary and aesthetic. Dumpsites in residential areas and near water sources/water bodies should be closed down and periodic monitoring of dumpsites for contamination of environment should take place.

- Identification of land for setting up landfills should be done on a priority basis and each municipality, according to a time bound programme, should develop landfills. Landfilling should be restricted to non-biodegradable/inorganic waste.

- Registrations of those hospitals that do not set up treatment/disposal facility or join a common facility could be cancelled. New hospitals should not be allowed to commence treatment without making sure that it has a facility for treatment/disposal of bio-medical waste.
- Segregation of bio-medical waste according to its type should be ensured in each hospital. Measures should be taken to achieve 100 per cent segregation by each hospital.
- Hospitals could join a common facility for treatment/disposal of bio-medical waste and PCBs should ensure that each common facility has the requisite and complete infrastructure to handle waste safely.

- The plastic waste rules should clearly specify actions to be taken by the DCs/DMs for the enforcement of the plastic rules, relating to use, collection, segregation, transportation and disposal.
- Surprise checks should be conducted to verify whether vendors were following the provisions of the plastic waste rules. Database of manufacturers of plastic carry bags/containers should be built to ensure that all manufacturers seek authorization of PCB before they take up manufacture of such items.

6. Effectiveness of monitoring in checking non-compliance.

- Monitoring of the municipal solid waste rules, bio-medical waste rules and plastic rules, at the central level, was not effective. Systems were also not in place to check non-compliance of rules by municipalities, hospitals and district authorities.
- State PCBs were not monitoring regularly whether municipal solid waste was being disposed in an environmentally safe manner and in a manner not to pose health risks.
- Monitoring by state governments was taking place only in 11 per cent of the sampled municipalities and as such, no effective check was being exercised to see that waste processing and disposal facilities meet the compliance criteria outlined in the municipal solid waste rules.
- Only 13 per cent of sampled hospitals were being monitored for compliance to bio-medical waste rules.
- Only in 35 per cent of the sampled states, the District Collectors of the district were monitoring the implementation of plastic rules.
- In Delhi, analysis report of Bhalaswa open landfill showed that Total Dissolved Solids (TDS) and hardness content of the ground water was 800 per cent and 633 per cent respectively in excess of the desirable limits. TDS at Okhla open landfill site was also in excess of the desirable limit which showed that the ground water of both the open landfills sites has been critically contaminated with leachate generated from the landfill site.
- In Punjab, samples of ground water from hand pumps at four places had been collected from the municipal solid waste open dumpsite in Amritsar. It revealed that none of the collected samples met the acceptable limit for drinking water and were thus, not fit for drinking purposes.

- In Tamil Nadu, two water samples collected from the dumpsite at Pallikaranai swamp area revealed that dissolved solids, chlorides and cadmium was far above the prescribed desirable limits.

Recommendations

- At the central level, MoEF/CPCB/MoH&FW and at the level of the states, the PCBs should draw up comprehensive schedules for sustained monitoring of municipalities and hospitals.
- Regular monitoring of waste disposal facilities like compost plants, incinerators etc., should be done by CPCB/PCBs.

7. Adequacy of funding and manpower for the implementation of rules on waste management.

- The states did not make enough provision for creating infrastructure for the management of waste. Only 30 per cent and 27 per cent of the sampled states made some provisions in the budget for management of municipal solid waste and bio-medical waste respectively.
- Chhatisgarh diverted Rs.60 lakh for the construction of drainage and mini stadium, though funds were released for management of municipal solid waste. Similarly, Karnataka diverted Rs.17.44 crore for purposes such as street lighting, road work etc., Instead of utilizing money for upgrading two dumpsites, Chennai Corporation in Tamil Nadu kept Rs.18 crore, released during 2003-05, in fixed deposits.
- There was a shortage of staff/technically qualified manpower in municipalities/PCBs. 55 per cent of the sampled states reported shortage of manpower in the municipalities hampering municipal solid waste management, while, PCBs in 54 per cent of the sampled states had cited shortages hampering their work.

Recommendations

- States should make provisions in the budget for waste management activities relating to municipal solid waste and bio-medical waste and ensure that municipalities and hospitals have adequate funds for waste management.
- State governments and PCBs may assess their manpower requirement and accordingly, raise a staff dedicated to the implementation and monitoring of waste management activities.

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

1 According to the Basel Convention

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 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

2 Commonly referred to as WEEE

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.

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.

- 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 filed 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 reponses 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.

CHAPTER 2

Generation of Data and Risk identification

Objective 1: Whether the quantum of waste being generated in the country had been assessed and had the risks to environment and health posed by waste been identified.

Data provides information about the magnitude and scope of the problem faced. It can guide decision-making, and if broken down into various parameters of relevance, it becomes an accurate assessment of the quantum of any problem faced by the country. Hence, collection of data is the first step towards effective policymaking.

Articles 21.8, 21.9 and 21.11 of Agenda 21 of the World Commission on Sustainable Development (Rio 1992) emphasised the need for strengthening procedures for assessing waste quantity and composition changes of waste and declared that by the year 2000, countries should have the capacity to access, process and monitor waste trend information. It also emphasised the need for undertaking data gathering and analysis and to utilise data to assess the environmental soundness of national waste policies. According to United Nations Environment Programme (UNEP), the national government should develop and maintain a database on solid waste in the nation. Such database may include, among other things, data about generation, such as demographic information and quantities of waste generated, waste characteristics, such as waste composition etc,.

2.1 Assessment of waste being generated

2.1.1 At the central level

MoEF and CPCB were queried about the availability of data on the different kinds of waste generated in India for the period 2002-03 to 2006-07. The data provided by MoEF and CPCB is depicted in the table below:

Kinds of waste (in million Tonnes)	2006-07	2005-06	2004-05	2003-04	2002-03
Municipal solid waste	NA	NA	NA	NA	NA
Bio-medical waste	0.16	0.17	0.12	0.12	0.12
Hazardous waste	8.14	4.4	4.4	4.4	4.4
E waste	0.15	NA	NA	NA	NA
Waste from power plants	122.09	112.2	111.3	106.6	103.3

NA: Not available

In this regard the following observations are made:

(a) Municipal solid waste

MoEF did not make available data about quantum of municipal solid waste generated annually for the period under review and stated that the Ministry of Urban Development (MoUD) was the nodal ministry at the central level for solid waste issues. MoUD, while formulating proposals for the Twelfth Finance Commission, estimated that urban India produced approximately 48 million tonnes of municipal solid waste annually. This estimate

did not include the amount of municipal solid waste generated in the rural areas. Thus, there was no comprehensive data either with MoEF or with MoUD about the amounts of municipal solid waste being generated in the country.

(b) Bio-medical waste

As per the information provided by MoEF/CPCB, the quantity of biomedical waste generated in India varied from 0.12 MT to 0.17 MT per annum during 2004-05 to 2006-07. These figures could not be confirmed with the Ministry of Health and Family Welfare (MoH&FW) as it did not maintain a database about the amount of bio-medical waste generated all over the country.

(c) Plastic Waste

Neither MoEF nor CPCB were aware about the amount of plastic waste being generated in the country. This information was also not available with the Department of Chemicals and Petrochemicals.

(d) Hazardous waste

According to the X plan document, India generated 7.2 MT of hazardous waste annually. As per the information provided by MoEF, the quantity of hazardous waste generated varied between 4.4 MT and 8.14 MT during 2002-03 to 2006-07.

(e) E-waste

CPCB stated that during 2006-07, the amount of e-waste was 0.15 MT. The amount of the e-waste generated for the other years under review were not available with CPCB.

(f) Other waste

For any of the years under review, MoEF had no information about the amounts of waste being generated by electrical items, construction & demolition waste/debris, agricultural waste, packaging waste, mining waste, end of life vehicles waste and waste tyres. As no separate legislation or rules have been laid down for safe disposal of these kinds of waste, the generation of these wastes would escape detection, leading to harmful health and environmental consequences.

Some of the possible parameters according to which data about waste can also be collected, like done in European Union (EU) countries, are population size and geographical size; size and number of main sectors generating waste; data about the amount of waste generated from activities like industries, commercial undertakings, agriculture and tourism; composition of waste according to seasonal fluctuations etc,. These parameters give an accurate picture about the sources of origin and amount of each kind of waste generated and thus, help in planning. It was observed in audit that such parameters were not taken into account while collecting data on waste.

Thus, MoEF and CPCB had incomplete information about the amounts of municipal solid waste, plastic waste, e- waste and other kinds of waste like construction and demolition waste, waste electrical items, end of life vehicles etc, being generated in the country. Waste data

broken down into parameters of significance was also not available. This rendered any kind of trend analysis impossible. MoEF was also unaware of the amounts of various kinds of waste being generated in different states in the country.

2.1.2 At the state/ Pollution Control Board (PCB) level

(i) State governments and Pollution Control Boards (PCBs) in 24 states were queried about the availability of data on the different kinds of waste generated in India for the period 2002-03 to 2006-07. It was observed that no state or PCB, out of the sampled 24 states, had completely assessed the quantum of the different kinds of waste like municipal solid waste, bio-medical waste, hazardous waste, plastic waste, e-waste, construction and demolition waste etc., generated during the last five years. Amongst the sampled states, it was observed:

- Only 42 per cent of the sampled states had partial data on wastes. In the sample, Madhya Pradesh and West Bengal had the most comprehensive data wherein they had assessed the amounts of municipal solid waste, bio-medical waste and hazardous waste generated over a few years. Uttar Pradesh had assessed the amounts of municipal solid waste and bio-medical waste generated. Meghalaya had assessed the amounts of municipal solid waste and hazardous waste generated. Delhi, Gujarat, Rajasthan, Andhra Pradesh and Karnataka had assessed the amounts of municipal solid waste generated and Haryana had assessed the quantum of hazardous waste generated in the state.

- No data about the amounts of waste generated according to source was available in 42 per cent of the sampled states and was not verifiable in 16 per cent of the sampled states. List of the states is attached in Annexure 2.

(ii) In addition, it was observed that in the 24 sampled states, assessment of waste, according to population size and geographical area was done as follows:

- Assessment of waste, according to population size and geographical size of the area from which waste is generated was done by state government/PCB only in Madhya Pradesh, Maharashtra, Andhra Pradesh and partially in Delhi and J&K.

- Delhi, Madhya Pradesh, Gujarat and Punjab had collected some data about the size and number of main sectors generating waste or data about the amount of waste generated from activities like industries, commercial undertakings, agriculture and tourism. Delhi stated that it had collected data under domestic and non-domestic categories and Uttar Pradesh stated it had collected data about hazardous waste generated from industries.

- Composition of waste according to seasonal fluctuations was either not analysed or could not be verified in audit.

Thus, even in the states, data about the various kinds of waste and its analysis was incomplete. Agenda 21 of the World Commission on Sustainable Development and UNEP had also emphasised the need for data gathering, analysis and maintenance of a detailed database on

waste for the nation. MoEF/CPCB and state governments need to intensify efforts to build up a comprehensive database on waste.

With respect to municipal solid waste, MoEF replied in August 2008 that CPCB in association with the National Environmental Engineering Research Institute (NEERI) had carried out assessment of municipal solid waste generation in 35 metro cities and 24 State capitals during 2004-05 and the report in this regard had been published in April 2006. It also stated that assessment of waste generation at state level was the responsibility of the local bodies and that CPCB had emphasised the preparation of inventories on waste generation and characterisation by the PCBs. With respect to bio-medical waste, MoEF stated that since all the PCBs did not submit annual reports every year, data was not comprehensive and may not be comparable year-wise. With respect to plastic waste, MoEF stated that CPCB had not undertaken specific studies on assessment of plastic waste generation in the country. With respect to hazardous waste, MoEF stated that as per rules, it was the responsibility of the PCBs to maintain the records with regard to sector-wise hazardous waste generated in the respective states. However, as directed by the Supreme Court, presently, CPCB had requested all the PCBs for submission of the inventory of generation of hazardous wastes and the report are being received from the PCBs. MoEF had no comments to offer on the lack of data regarding e-waste, waste electrical and electronic items, other waste like construction & demolition waste, agricultural waste, waste from agriculture etc., MoEF also had no comments to offer on lack of waste data on significant parameters like population, geographical area etc,.

Thus, the fact remains that despite being the nodal body for the control of pollution, MoEF/CPCB did not have complete data about the amounts of waste being generated all over the country. They also did not have data according to parameters of significance affecting the increasing amount of waste and in the absence of this, planning for effective management of waste was deficient.

International good practices:

- Sweden, Germany, Norway, Spain, Poland and United Kingdom have a detailed waste database about various types of waste like packaging waste, construction & demolition waste, waste end of life vehicles, agricultural waste, waste from mining and quarrying etc,.

- Denmark's Information System for Waste and Recycling gives year-wise details of the total waste generation since 1994, the amount of waste analysed by source (households, manufacturing), type of waste (hazardous waste) and kind of treatment (recycling, incineration).

- Italy and Norway have database on amounts of waste generated by each sector like household, commercial, agriculture, manufacturing etc,.

Recommendations

- CPCB, as the nodal agency for pollution related issues should carry out, periodically, a comprehensive assessment of the amounts of waste being generated, according to the major waste types. All the states in India should be involved in this exercise so that a comprehensive database on waste is generated for aiding policy-making and intervention.

- Besides the total amount of waste being generated according to types, the waste data may also be collected according to parameters like geographical areas, sectors-wise (industrial, household, commercial, agriculture, tourism etc,.) and according to seasonal fluctuations to give accurate inputs for policy-making and intervention.

2.2 Projections of the quantities of waste generated and identification of significant parameters affecting waste quantities

The kinds of waste and amounts may be significantly influenced, over time, by a number of parameters. In order to make realistic projections about the growth of waste in the future, the dominant parameters should be identified and their expected influence on the waste amounts should be described and evaluated. An absolutely certain and unambiguous forecast of future waste generation cannot be prepared but there is a need for some basis for creating additional capacity in the waste management methods to tackle the growth of waste over time.

2.2.1 At the central level

MoEF/CPCB did not make available information about the projected growth in quantity and composition of municipal solid waste, bio-medical waste, hazardous waste and plastic waste. Only projection figures were available for e-waste which was projected to increase to eight lakh tonnes by 2012 and that waste generated by power plants which would increase to 170 MT by the end of the XI plan period.

MoEF/CPCB also did not make available information to establish that it had collected information about or taken into account the increase in waste due to significant parameters that affect waste like:

- increase in waste due to increase in population,
- increase in waste due to greater economic growth,
- increase in waste due to increase in demand for consumer goods, and
- increase in waste due to changes in manufacturing methods.

2.2.2 At the level of states/PCBs

With respect to projections about growth in waste, it was observed in audit that out of the 24 sampled states:

- Only 25 per cent of the sampled states had made projections about the growth in waste. Among the sampled states, Delhi and Gujarat had projected growth of waste based on anticipated population growth. West Bengal had projected the growth in quantity of municipal solid waste, after taking into account the anticipated

population growth in 41 out of 126 municipalities. Rajasthan and Meghalaya had also projected the growth in quantity of municipal solid waste. In Karnataka, geometric progression method was followed to arrive at projected increase in waste.

- 38 per cent of the sampled states had made no projections while it could not be verified in audit whether 37 per cent of the sampled states had made any projections. List of the states is attached in Annexure 2.

- Increase in waste due to factors like greater economic growth, increase in demand for consumer goods and changes in manufacturing methods was not estimated by any of the 24 sampled states, except in Delhi which stated that cognisance had been taken of factors like economic situation, demand for consumer goods, changes in manufacturing methods and new treatment methods. However, this could not be verified in audit.

All the factors discussed above can significantly increase the quantities of waste being generated and non-recognition of these factors would hamper any kind of planning. In the absence of such information with MoEF/states, it would be difficult to arrive at accurate estimations and specific strategies that can be tailored for waste management.

MoEF replied in August 2008 that estimations regarding the projected growth in quantity and composition of municipal solid waste and plastic waste were not available with CPCB. Hence, MoEF had not given recognition to these factors which affect the quantity of waste being generated and in the absence of such information, waste management plans and strategies were rendered ineffective.

International good practices:

- The Commission of the European Countries has predicted that municipal solid waste generation will grow until 2020 and the increase will be 42.4 per cent by 2020 compared to 1995 levels.

- USA has projected the trends on municipal solid waste generation, recovery & disposal and aggregate data on the infrastructure created for municipal solid waste management.

Recommendation

- MoEF, with involvement of all the states, may collect data about growth of the various kinds of waste, analyse the factors contributing to its growth and the increase in waste quantities to arrive at strategies for waste management.

2.3 Assessment of current and future capacity to handle waste

Assessment of waste currently being generated and the current waste disposal infrastructure like incinerators, landfills etc., help in assessing the adequacy of waste infrastructure.

Projections about growth of waste would also indicate whether there is a need to create new facilities to handle the increase in waste in the coming years. This is especially important as waste infrastructure is costly to build and requires planning in advance.

2.3.1 At the central level

(a) Municipal solid waste

MoEF stated that assessment of current capacity to handle municipal solid waste had been made and found to be inadequate to enable environmental friendly disposal of municipal solid waste. CPCB replied that no such assessment was done, as it would vary from one urban local body to the other. With respect to future estimation of disposal capacities for municipal solid waste, which needed to be created, while MoEF stated that it was carried out, CPCB replied that this estimation was under consideration. However, MoEF did not make available any reports that suggested that such estimation was carried out.

(b) Bio-medical waste

MoEF and CPCB did not make available any current or estimated future capacities for safe disposal of biomedical waste. CPCB stated that such estimation was the responsibility of the SPCBs/PCBs.

(c) Hazardous waste

MoEF had assessed the current capacity to handle hazardous waste and stated that there were 18 hazardous waste disposal facilities located in 7 states, which, according to MoEF, were inadequate. CPCB stated that future capacity, which needed to be created, was not estimated, as the PCBs were yet to submit hazardous waste generation data. MoEF stated that assessment of future capacity depended on receipt of inventory from the states. Thus, MoEF/CPCB did not have complete information as to the facilities, which needed to be created so that hazardous waste would not be dumped, with serious consequences to health and the environment.

(d) E-waste

No records were made available to show whether MoEF had assessed capacity to dispose e-waste. However, CPCB stated that being a new area, there are only two recycling facilities and recycling facilities were already coming up for the recycling of e-wastes.

(e) Other wastes

No rules existed for the management of other kinds of waste like packaging waste, agricultural waste, waste generated by construction & demolition activities, mining waste and waste generated by end of life vehicles. Hence, no records were available to suggest that assessment had been made by either MoEF or CPCB, of the current or the future capacity that were needed to be created for effective handling of such wastes.

2.3.2 At the level of states/PCBs

(i) Regarding current capacity to handle municipal solid waste, bio-medical waste and hazardous waste, it was observed that out of the 24 sampled states:

- Only 29 per cent of the states had assessed current capacity for handling some kinds of waste. Karnataka, Gujarat, Punjab and West Bengal governments/PCBs had assessed the current capacity to handle municipal solid waste, bio-medical waste, plastic waste and hazardous waste. Delhi and Meghalaya had assessed the current capacity to handle municipal solid waste; Madhya Pradesh has assessed the current capacity to handle bio-medical waste and hazardous waste.

- 42 per cent of the sampled states had not made this assessment, while it could not be verified in audit whether 29 per cent of the sampled states had made this assessment. List of the states is attached in Annexure 2.

(ii) Regarding creation of new and additional capacity to handle municipal solid waste, bio-medical waste and hazardous waste and plastic waste, it was observed that out of 24 sampled states:

- Only 33 per cent of the states had assessed the creation of new and additional capacity to handle waste safely. Delhi, Rajasthan, Tamil Nadu, Karnataka and Meghalaya had assessed whether creation of new and additional capacity to handle municipal solid waste safely in the near future was required. Gujarat had assessed the new capacity that needed to be created to ensure that municipal solid waste and bio-medical waste was treated safely in the near future and Madhya Pradesh had only assessed the new capacity that needed to be created to ensure that bio-medical waste and hazardous waste was treated safely in the near future. Punjab stated it had estimated that it had sufficient capacity to handle bio-medical waste for the next ten years and hazardous waste for the next 15 years.

- 38 per cent of the sampled states had not assessed the current and new capacity needed, while it could not be verified in audit whether 29 per cent of the sampled states had made this assessment. List of the states is attached in Annexure 2.

Assessment of the current capacity to handle waste and the future capacity that needed to be created for waste disposal was essential to ensure that all waste being generated was disposed off in an environmentally safe manner and that no waste remained untreated posing hazards to public health. In the absence of any meaningful assessment of current capacity and future capacity to handle waste by MoEF and the states, any waste management plan or programme would be rendered ineffective.

MoEF replied in August 2008 that as per the municipal solid waste rules, the Secretary-in-Charge of the Department of Urban Development of the State had the overall responsibility for the enforcement of the provisions of these rules and that it was the role of the state to develop the necessary infrastructure for collection, storage, segregation, transportation, processing and disposal of municipal solid waste. MoEF also stated that with respect to municipal solid waste, CPCB had not categorically studied the capacities required by the local bodies for handling of

waste generation at the state level and as per rules, each local body was required to prepare a detailed project report which would enable the local body to set up the requisite infrastructure and also to make provisions to handle the waste expected to be generated in future. With respect to hazardous waste, MoEF replied that at present there were 21 Treatment, Storage & Disposal Facilities (TSDFs) in the country spread in nine states and PCBs were in the process of finalisation of the inventory. MoEF did not offer any comments on the estimation of current and future capacity for bio-medical waste, e-waste and other waste.

However, MoEF being the nodal body for pollution control measures was expected to be aware of the current and future capacities which have to be created, so that waste being generated does not cause pollution. Also, as is evident, projections for future capacities were not taking place even at the level of the states, leaving the safe handling of waste doubtful. This would have deleterious effects on health of the public as well as the environment.

International good practices:

- Portugal estimates that it has sufficient capacity to handle all wastes till 2016. Thereafter, it will need to create 10 new biological treatment plants and a third incineration plant.

Recommendation

- MoEF/CPCB, in conjunction with the states, may estimate the current capacity to handle all kinds of waste all over the country and ensure that additional capacity of waste infrastructure, if required, is created for safe disposal.

2.4 Identification of risks to the environment posed by waste

Risk is exposure to a chance of loss or damage. Identification of risks is required to control loss or damage or to plan for the minimisation of damage or loss. Identification of risks to environment and health posed by waste is essential so that damage to health and environment can be minimised.

Article 21.29 of Agenda 21 of World Commission on Sustainable Development declared that by the year 2000, countries should establish sufficient capacity to undertake waste related pollution impact monitoring and conduct regular surveillance, including epidemiological surveillance6. Further according to UNEP, the disposal and treatment of waste can produce emissions of several greenhouse gases (GHGs)7, which contribute to global climate change. Landfill is the most common method for waste disposal and results in the release of methane

6 Epidemiological surveillance is the systematic collection, analysis and dissemination of health data for planning, implementation and evaluation of public health programmes.

7 Greenhouse gases (GHGs) are gaseous constituents of the atmosphere, both natural and anthropogenic and are essential to maintaining the temperature of the Earth; without them the planet would be so cold as to be uninhabitable. An excess of GHGs can raise the temperature of a planet to lethal levels.

from the anaerobic decomposition of organic materials. Methane is around 20 times more potent as a GHG than carbon dioxide. Landfills also have potential for soil acidification due to deposition of acid gases, increases in soil metals, vegetation damage due to oxides of nitrogen and sulphur dioxide etc,. Landfills can also result in contamination of ground and surface water with metals, organic compounds and bioaccumulation of toxic materials. These risks to the environment are compounded if the waste is dumped in open sites.

2.4.1 At the central level

MoEF did not make available records to show whether it had analysed and assessed the:

- Risks to quality of ambient air due to incinerators emitting noxious gases while disposing waste and the risks to environment from the green houses gases released by landfills/ dumpsites.
- Risks of contamination of ground water, rivers & streams and contamination of soil by wastes like bio-medical waste, industrial waste, plastic waste, municipal solid waste and other kinds of waste.

Thus, it could not be verified whether MoEF had assessed the environmental degradation that can be caused by improper handling and disposal of various kinds of waste.

While CPCB stated that it had assessed the risks to environment posed by hazardous waste, no assessment report was made available for review by audit. CPCB stated that it had not assessed the risks to environment posed by bio-medical waste. Further, CPCB was silent on whether it had assessed the risks to environment caused by other kinds of waste like municipal solid waste.

2.4.2 At the level of the state/PCBs

(i) Identification of all the risks to environment posed by waste like contamination of ground water and surface water, contamination of ambient air and contamination of soil, by state government/PCBs in 24 sampled states was not comprehensive as shown below:

- Only 50 per cent of the sampled states had partially identified some risks to the environment posed by waste. In the sample, the risks to environment posed by waste like contamination of groundwater and surface water, contamination of ambient air and contamination of soil was done by Rajasthan, Gujarat, Tamil Nadu (except contamination of soil) and Andhra Pradesh (except contamination of ambient air). Himachal Pradesh, Uttar Pradesh and Bihar had assessed the risks of contamination of ground water and surface water by waste while West Bengal had assessed the risks of contamination of soil by waste. Karnataka had carried out assessment of greenhouse gases for eight fast track cities while Assam and Orissa had assessed the risks of contamination of ground water by waste and Madhya Pradesh had assessed the risks of contamination of surface water by waste.
- 21 per cent of the sampled states had not assessed the risks to environment posed by waste while it could not be verified in audit whether 29 per cent of the sampled states had made this assessment. List of the states is attached in Annexure 2.

In the absence of comprehensive information at the apex as well as the state level about the risks to the environment caused by improper handling and disposal of waste, the potential damage to the environment would continue to escape detection.

MoEF replied in August 2008 that all landfill sites need authorisation from the concerned PCB, who in turn prescribe the conditions for monitoring of underground water and ambient air in the vicinity of the site and as per the Environment Impact Assessment Notification, 2006, environment clearance was needed for all such common sites. CPCB/PCBs were also required to be involved in monitoring, appraisal and interventions required from environmental angle.

The reply of MoEF has to be viewed in light of the fact that no risk assessment was carried out on the specific hazards to environment caused by waste. In the absence of such information, it was apparent that risks to environment would escape detection.

International good practices:

- United Kingdom has assessed that methane emission from biodegradable waste in landfills account for 40 per cent of the total methane emissions and 3 per cent of all greenhouse gas emissions in the country, with methane being 23 times as damaging a greenhouse gas as carbon dioxide.

- Canada has produced a document called "Health and Environmental Effects of Burning Municipal Solid Waste" which identifies specific risks to environment and health. It lists the pollutants from burning municipal solid waste like particulate matter, sulphur oxides, carbon monoxide, volatile organic compounds, CFCs etc., and states the damage to environment and health caused by each pollutant.

Recommendation

MoEF may carry out waste related pollution impact monitoring, on a regular basis, to study the effects of improper disposal of waste on the environment.

2.5 Identification of risks to health posed by waste

Surface and ground water contamination and soil contamination have direct consequences on human health. Contaminants in the soil can harm plants when they take in the contamination through their roots. Ingesting, inhaling or touching contaminated soil, as well as eating plants or animals that have accumulated soil contaminants can adversely affect the health of humans and animals. Leachate8 is the liquid that forms as water trickles through contaminated areas, leaching out the chemicals. In agricultural areas, leaching may concentrate pesticides or fertilisers and bacteria may be leached from the soil. The movement of contaminated leachate may result in hazardous substances entering surface water, groundwater or soil. When wastes are incinerated at low temperatures or when plastics that contain polyvinyl chloride are

8 Leachate is the liquid that drains or 'leaches' from a landfill; it varies widely in composition regarding the age of the landfill and the type of waste that it contains.

incinerated, dioxins, furans, and other toxic air pollutants may be produced as emissions and/or fly ash. Exposure to dioxins, furans and polychlorinated by-phenyls may lead to adverse health effects.

2.5.1 At the central level

CPCB had not carried out any assessment of risks to public health posed by various kinds of waste. Further:

- Effects on health from the release of noxious gases from incinerators burning municipal solid waste, bio-medical waste, e-waste etc., were not assessed.
- Risks to human health from factors like contamination of soil and ground water and chemical poisoning from improper disposal of municipal solid waste, bio-medical waste, plastic waste or e-waste were not assessed.

Waste handlers are exposed to infectious and hazardous materials every day in the process of disposal of waste. Hence, they are at considerable risk while handling wastes like bio-medical waste, hazardous waste and even municipal solid waste. CPCB stated that it had studied the risks to waste handlers from municipal solid waste for Kolkata and Chennai only. It had not studied the risks to waste handlers from other kinds of waste.

2.5.2 At the level of states/PCBs

(i) Assessment of risks to public health posed by municipal solid waste, bio-medical waste, hazardous waste and other kinds of waste by the sampled 24 states revealed that:

- Assessment of risks was done partially only in 25 per cent of the sampled states. Karnataka had assessed health risks like spreading of vector borne diseases like dengue, chikungunya, malaria because of unclean garbage were identified while in West Bengal, Punjab and Himachal Pradesh; health risks due to bio-medical waste and municipal solid waste have been identified. In Bihar, MoEF had sanctioned a project called "Environmental health Study" in Patna in October 2003 and the project was yet to be completed. Delhi had identified health risks to the general population because of dumping of waste.
- In 33 per cent of the sampled states, identification of health risks because of waste was not done, while it could not be verified in audit in 42 per cent of the sampled states whether health risks because of waste had been assessed. List of states is attached in Annexure 2

(ii) With respect to identification of risks to waste handlers, it was noticed that in the 24 sampled states:

- Only 8 per cent of the sampled states had identified health risks to waste handlers. Himachal Pradesh PCB in June 2007 has identified the risks to waste handlers that can arise due to handling of municipal solid waste, bio-medical waste and

hazardous waste on a regular basis. Karnataka had made provisions for providing safety gear to municipal solid waste handlers, where handling of waste was outsourced as well as where waste was handled by municipality workers.

- 54 per cent of the states had not assessed the risks to waste handlers while it could not be verified whether assessment of risks to waste handlers had been carried out in 38 per cent of the sampled states. List of states is attached in Annexure 2.

(iii) It was also noticed in audit that none of the sampled states had a clear-cut law for the protection and safety of waste handlers against deleterious effects of waste handling.

Thus, in the absence of comprehensive studies by MoEF/CPCB and the states, on risks posed by waste to public health and improper disposal of waste, public would remain unaware of the health risks posed by waste.

MoEF replied in August 2008 that identification of the risks to the health posed by waste fall under the purview of the health departments at central/state level. Further, CPCB/MoEF has to carry out/ perform only the responsibilities stipulated under Schedule 7 of the hazardous waste rules. MoEF was silent on the lack of law/rule framed for the safety and protection of waste handlers.

However, being the nodal agency for pollution control, responsibility rests with MoEF to take a lead in undertaking such studies so that risks can be identified and safeguards be put in place in the pollution control laws, which are framed by MoEF for the control of such risks.

Good practices in India:

- Karnataka had formed a committee (IPD Saalappa committee) to look after the welfare and safety of waste handlers and its recommendations were implemented in the state by means of conditions built into tender documents to take care of safety of workers.

- In Punjab, Post Graduate Institute, Chandigarh was carrying out an epidemiological study on the effect of open drains on health.

International good practices:

- Denmark has brought out a comprehensive study of environmental factors, including waste, on health. The report focuses on consequences of exposure from a variety of factors including waste, how it affects human health and the extent of such effects on health.

- Department for Environment, Food & Rural Affairs (Defra) of the United Kingdom has reviewed the environmental and health effects of waste management in detail. The report has studied the health and environment impacts of emissions from various waste management methods and the consequent health impacts like asthma, cancer, respiratory disease etc,.

Recommendations

- MoEF along with the states may also carry out regular surveillance, including epidemiological surveillance of waste related impacts on public health.
- MoEF may consider framing laws/ rules for protection of waste handlers.

Conclusion

MoEF/states had not assessed completely the quantity of various kinds of waste being generated in the country, the different sources of waste and the points of origin of different kinds of waste. In addition, MoEF/states were not aware about the quantity of waste that would be generated in the coming years as the country moves towards greater industrialisation and consumerism. Hence, they were not in a position to make any assessment about the amounts of waste that might be produced in future and whether the capacity to handle waste currently and in the future was adequate. In the absence of data about waste, broken into parameters of significance, policy-making and waste management programmes would be rendered ineffective.

Risks to health and environment had not been adequately assessed by MoEF/states. Non identification of risks to health and environment caused by waste, would lead to insufficient recognition, both by policy makers as well as general public, to the problems caused by ineffective management of wastes.

CHAPTER 3

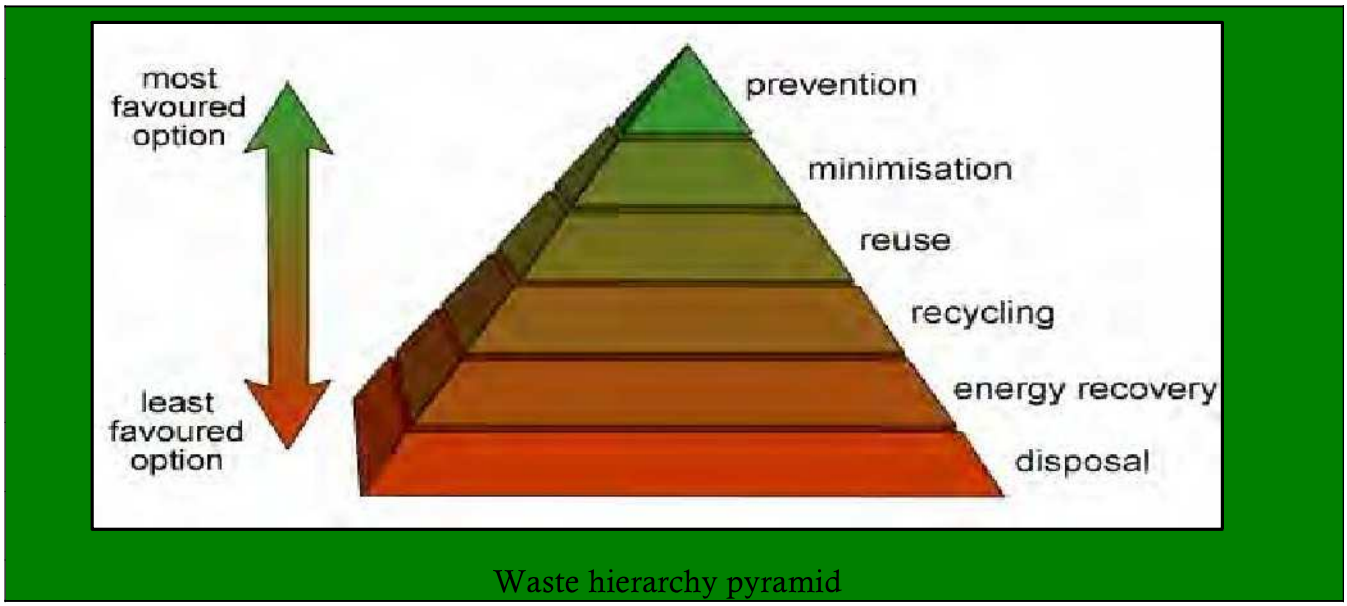
Waste policy and strategies for waste reduction, reuse and recycling

Objective 2: Whether a specific policy for management of wastes existed and whether policies and strategies for the management of waste gave priority to waste reduction and waste minimisation as against waste disposal.

A policy is a deliberate plan of action to guide decisions and achieve rational outcomes and provides a focused thrust to the activities towards achievement of the desired results. Relevant and timely strategies aid in operationalising policy. United Nations Conference on Environment and Development, in 1989, affirmed that environmentally sound management of wastes was among the environmental issues of major concern in maintaining the quality of the Earth's environment and especially in achieving environmentally sound and sustainable development in all countries. Further, Agenda 21 stated that governments should "promote waste prevention and minimisation as the principal objective of national waste management programmes" and that governments should "develop and implement national plans for waste management that take advantage of, and give priority to waste reuse and recycling".

An overall national or regional waste policy determines and governs the framework for activities in the waste sector. A clear, concise and consistent policy is a necessary requirement

for the waste industry to establish and set up waste management systems and make necessary investments. Thus, a well-established and supported waste policy is of crucial importance in waste management. According to UNEP, one element common to most waste policies is a waste hierarchy. This hierarchy is a stepwise approach to waste management in the order of environmental priority for different waste management options as illustrated in the waste pyramid below.



Waste hierarchy pyramid

The general principles of the waste hierarchy are prevention, minimisation, reuse, recycling, energy recovery and disposal with prevention being the most favoured and disposal being the least favoured option.

3.1 Existence of a defined waste policy

3.1.1 At the central level

MoEF did not make available information as to whether it had framed a separate waste management policy. However, audit analysed all the policies, laws and rules framed by MoEF and it emerged that MoEF had not framed a separate policy governing the management of waste. Further, a clear hierarchy for the management of waste had also not been defined. In 2006, MoEF laid down the National Environment Policy (NEP) that did reflect some concerns on recycling and waste reduction strategies; but these were not organised into a coherent waste management policy, reflecting the waste hierarchy (further discussed in Paragraph 3.2.1).

Thus, due to absence of a policy on the management of waste, it was not apparent whether the objectives and programmes outlined in Agenda 21 of the World Commission on Sustainable Development had been adequately represented in the waste management programmes being implemented all over India.

3.1.2 By the states

In the absence of a waste policy framed by MoEF, which, as the nodal ministry for the control of pollution would guide the implementation of '3 Rs'9 all over the country, it was noticed that the state governments had not paid sufficient attention to the implementation of 3Rs. Of the sampled 24 states it was observed in audit that:

- Only 16 per cent of the sampled states had accorded some priority to the '3 Rs'. West Bengal had made efforts for reduction of the use of plastic bags and reduction of some categories of industrial waste while in Rajasthan, state government had framed waste management policy for utilisation of municipal solid waste and bio-medical waste in generation of power, compost and other products in 2001 and had also defined priority in the guidelines. State governments in Maharashtra and Gujarat had accorded priority to waste minimisation/reduction of municipal solid waste and industrial waste respectively.

- 38 per cent of the sampled states had not made any efforts to implement the '3 Rs' while it could not be verified in audit whether 46 per cent of the states had made any efforts to implement the '3 Rs'. List of states is attached in Annexure 2.

Thus, at the level of the states, disposal remained the most favoured solution to the management of waste, instead of waste minimisation and waste reduction. This was further brought out by the fact that only disposal of waste was taking place in the sampled municipalities and no attention was paid to waste processing, as discussed in Paragraph 6.2.1 in Chapter 6 of this Performance Audit report. Absence of separate waste management policy incorporating the '3 Rs' would mean that waste management initiatives would continue to be haphazard.

MoEF replied in August 2008 that with regard to policies for management of hazardous waste, MoEF had already prepared a National Environment Policy, 2006 which included management of hazardous waste keeping in view the importance of waste reduction/reuse/recycle and final disposal. It was silent on the issue of a separate waste policy, incorporating the waste hierarchy.

As reported by Audit in Paragraph 3.2.1, the action plan outlined in National Environment Policy, 2006 have remained only on paper and had not been translated into action. Also, MoEF had not enacted any policy for the management of waste as a whole, and especially municipal solid waste which is most amenable to reduction, reuse and recycle. As a result, policy initiatives do not drive waste reduction, reuse and recycling in India.

International good practices:

- Denmark follows the Lansink's ladder for preferences in managing waste: Prevention, Design for prevention and design for beneficial use, Product recycling (reuse), Material recycling, Recovery for use as fuel, Disposal by incineration and Disposal to landfill.

9 Waste reduction, reuse and recycle.

- In Japan, waste is seen not simply as things to be disposed off, but rather as a valuable resource. Japan has reinforced its policy measures toward tackling waste issues and strengthened its "3R" (recycle, reduce, and reuse) framework.

- Korea's waste management policy seeks to provide clean environment to people and the natural ecosystem by minimising waste generation, optimising waste recycle and treating waste generated in an environmentally sound manner and the strategic approach to promote '3 Rs' (reduce, reuse and recycle) is the core measure.

- South Africa's waste management policy seeks "to reduce the amount of waste that is generated and, where waste is generated, to ensure that waste is recycled, reused or recovered in an environmentally sound manner before being safely treated and disposed off".

- Ireland's policy is the "integrated waste management" approach, based on the internationally adopted hierarchy of options which places greatest emphasis on waste prevention, followed by minimisation, reuse, recycling, energy recovery and, finally, the environmentally sustainable disposal of residual waste.

- Philippines waste management policy promotes a systematic, comprehensive and ecological solid waste management programme, which ensures the protection of public health and environment, utilises environmentally sound methods that maximises the utilisation of valuable resources and encourages resource conservation and recovery.

- Finland's waste legislation defined waste management activities in the order of precedence i.e. preventing wastes and reducing their harmful impacts, recovering wastes - including primarily their material content and secondarily their energy content and finally safe treatment of wastes and the rehabilitation of any related damage.

Recommendation

- MoEF may consider framing a specific waste policy for the management of wastes in India, incorporating the internationally accepted hierarchy for management of wastes. States may adopt this policy to give thrust to the '3 Rs' for the management of waste.

3.2 Strategies for waste reduction/reuse/recycle

Strategies are required to achieve the objectives set out in the waste policy/legislation. They put a plan, policy or law into operation. Strategies to recycle, reuse and reduce waste lessen the amount of waste meant for final disposal and thus, the cost of disposal. Article 21.4 and 21.5 of Agenda 21 of World Commission on Sustainable Development states that "environmentally sound waste management should focus on (a) minimising wastes (b) maximising environmentally sound waste reuse and recycling (c) promoting environmentally sound waste disposal and treatment and (d) extending waste service coverage." According to Article 21.10 of Agenda 21, governments should initiate programmes to achieve sustained minimisation of waste generation and according to Article 21.9 (b) of Agenda 21, by the year 2000, all industrialised countries should have in place programmes to stabilise or reduce, if practicable,

production of wastes destined for final disposal, including per capita wastes, at the level prevailing at that date; developing countries as well should work towards that goal without jeopardising their development prospects. Audit findings with respect to strategies for waste reduction/reuse/recycle are discussed below:

3.2.1 At the central level

As discussed in Paragraph 3.1.1, MoEF had not enunciated a separate waste management policy and had not laid down a waste hierarchy for the management of waste. It had framed rules for the management of bio-medical, municipal and hazardous waste, all of which focused only on the disposal of the generated waste. The rules do not talk about strategies to reduce, reuse or recycle waste. Thus, priority had not been given to '3 Rs' and waste disposal remained the most preferred solution to the problem of waste management. This was in contrast to the practice of '3 Rs' being followed internationally.

Government of India had enunciated a National Environment Policy (NEP) in 2006, which laid some waste reduction and minimisation strategies. Specifically, the NEP, 2006 declared that industrial and municipal waste is a major cause of soil pollution and proposed an action plan, which among other things, envisaged to:

- Strengthen the capacities of local bodies for segregation, recycling and the reuse of municipal solid waste;
- Give legal recognition to, and strengthen the informal sector systems of collection and recycling of various materials;
- Promote biodegradable and recyclable substitutes for non-biodegradable materials, and develop and implement strategies for their recycle, reuse, and final environmentally benign disposal, including through promotion of relevant technologies, and use of incentive based instruments;
- Promote adoption of clean technologies by industry, in particular in the small and medium sector, through regulatory and fiscal measures, and standards setting;
- Consider use of revenue enhancing fiscal instruments to promote shifts to clean technologies in both existing and new units;
- Set up a mechanism to network technology research institutions in the country, public and private, for cooperation in technology research and development and adaptation, information, and evaluation of clean technologies. Create a database of such technologies, and promote dissemination of new technologies developed both in India and abroad.

MoEF did not state whether it had taken any action to implement the waste reduction strategies laid down in NEP. Thus, despite identifying industrial and municipal waste as a major source of pollution and laying down an action plan to reduce these wastes, it appeared that the government has not operationalised these strategies.

(a) Municipal Solid Waste

MoEF did not make available any information to show whether strategies to reduce municipal solid waste and plastic waste like deposit refund schemes10, promoting the use of refill packs etc., had also been introduced in India which would be vital in reducing the generation of these wastes. Other strategies which were increasingly being used internationally, specially to reduce the waste generated by consumer and household goods like eco audit11, life cycle analysis12, extended producer responsibility13, product stewardship14 etc,. also appear not to have been introduced in India as MoEF did not make available any information to show that these had been proposed or introduced.

(b) Hazardous Waste

It was also noticed during audit that though CPCB had proposed the introduction of strategies for the reduction and reuse of hazardous waste like promotion of clean technologies and products, establishment of technical standards to limit the presence of certain dangerous substances in products, reuse of scrap material, waste exchanges15, ship to the point of use16 and remanufacturing17, no information was provided by MoEF to show whether these strategies had been made operational. In March 2003, MoEF signed Charter on "Corporate Responsibility for Environmental Protection (CREP)" with 17 categories of polluting industries for the prevention and control of pollution through various measures including waste minimisation. MoEF stated that the charter had resulted in commitment from the industries to reduce pollution and waste and to increase recycling. However, MoEF stated that since the CREP scheme had a voluntary compliance approach, it had led to mixed response from the various categories of industries. The effect of the CREP scheme in reducing pollution and waste could not be verified in audit in the absence of any records.

3.2.2 At the level of the states

(i) Most of the states in India had not introduced any strategy for the reduction, reuse and recycling of waste. Out of the 24 sampled states, it was observed that:

10 These offer customers a financial incentive to return packaging for reuse.
11 Eco auditing is most frequently thought of as an environmental management tool employed by businesses to facilitate better management of their environmental performance. It is the assessment made by a company or organisation of the financial benefits and disadvantages to be derived from adopting a more environmentally sound policy.
12 The goal of Life Cycle Analysis is to compare the environmental performance of products and services, to be able to choose the least burdensome one. The term 'life cycle' refers to the notion that a fair, holistic assessment requires the assessment of raw material production, manufacture, distribution, use and disposal including all intervening transportation steps. This is the life cycle of the product.
13 Extended Producer Responsibility (EPR) is a strategy designed to promote the integration of environmental costs associated with products throughout their life cycles into the market price of the products. Extended producer responsibility imposes accountability over the entire life cycle of products and packaging introduced in the market. This means that firms, which manufacture, import and/or sell products, are required to be financially or physically responsible for such products after their useful life.
14 Product stewardship is a concept whereby environmental protection centers on the product itself, and everyone involved in the lifespan of the product is called upon to take up responsibility to reduce its environmental impact. For manufacturers, this includes planning for, and if necessary, paying for the recycling or disposal of the product at the end of its useful life. For retailers and consumers, this means taking an active role in ensuring the proper disposal or recycling of an end-of-life product.
15 Where the waste product of one process becomes the raw material for a second process. Waste exchanges represent another way of reducing waste disposal volumes for waste that cannot be eliminated.
16 Making deliveries of incoming raw materials or components direct to the point where they are assembled or used in the manufacturing process can minimise handling and the use of protective wrappings or enclosures.
17 The most extensive reuse economies are "repair and overhaul" industries which take valuable parts, such as engine blocks , toner cartridges, "one use" cameras, aircraft hulls, and cathode ray tubes and refurbish them in a factory environment, hoping to meet the same specifications as new products.

- Only eight per cent of the sampled states had introduced strategies for reduction, reuse and recycling. State government of Rajasthan had encouraged industrial units for the adoption of clean technology norms and Haryana had established technical standards to limit the presence of dangerous substances in products to reduce the quantum of waste being generated.

- Specific strategies like promotion of clean technologies and products, establishment of technical standards to limit the presence of certain dangerous substances in products, eco-audit, life-cycle analysis, reuse of scrap material, waste exchanges, ship to the point of use, remanufacturing, deposit refund schemes, promoting the use of refill packs, extended producer responsibility and product stewardship to reduce the quantum of waste being generated have not been implemented in 63 per cent of the sampled states. It could not be verified whether these strategies had been implemented in 29 per cent of the sampled states. List of the states is attached as Annexure 2.

(ii) With respect to charters/agreements/pacts signed by industries with the state governments/PCBs to introduce greener technologies which would lead to less waste, it was noticed that out of 24 sampled states:

- Only 17 per cent PCBs/state governments had signed charters/agreements with industries. In the sample, PCB of West Bengal had signed charters/agreements/pacts with industries for the introduction of greener technologies which would lead to less waste. The government had signed Charter on CREPs with 17 categories of industry like aluminim, cement, copper, distillery, pesticides, sugar, tannery etc,. These industries committed themselves to the introduction of greener technologies leading to less waste. Action points and targets with timelines were set for each of the 17 categories of industries. This Charter had lead to the introduction of norms, which are not necessarily limited to compliance of end of the pipe solutions and emission standards to be followed by industries to reduce pollution. CREPs was also signed in Uttarakhand where it was applicable to 17 categories of industries and this led to introduction of cleaner technology and reduction of water pollution by adopting chemical recovery plant in agro based paper mills, installing electrostatic precipitator and bag filters in sugar mills. CREPs was also signed in Orissa where it resulted in commitment from industries to reduce pollution and waste and increase recyling. Madhya Pradesh had cited a case where green technology was being used and stated that the process has resulted in clean technology norms and in decrease in pollution.

- 33 per cent of the sampled states had not signed charters/pacts/agreements with industries to reduce pollution and waste and introduce greener technology. It could not be verified in audit whether 50 per cent of the sampled states had done so. List of the states is attached as Annexure 2.

Thus, waste reduction, recycling and reuse strategies which are beginning of the pipe solution to the issue of waste management and which would result in lessening the amount of waste for final disposal, need to be introduced by MoEF and adopted more effectively by the states.

MoEF replied in August 2008 that the concept and strategy of waste reduction had already been very much envisaged in the bio-medical waste rules with necessary provisions such as segregation of infectious bio-medical waste from other wastes, packaging and colour coding. It was silent on lack of waste reuse, recycle and reduction strategies for other kinds of waste like municipal solid waste, plastic waste, hazardous waste etc,.

However, the bio-medical waste rules only talk about segregation of different kinds of bio-medical waste and its disposal, and do not talk about reduction, reuse and recycling. In addition, no strategies for reduction, reuse and recycling have been introduced for municipal solid waste, e-waste, hazardous waste etc., all of which are significant contributors to waste in India.

Good practices in India:

- West Bengal PCB along with India-Canada Facility, New Delhi undertook a scheme for adoption of clean technology norms by small and medium scale industries and waste minimisation circles for the Kolkata metropolitan area which has led to reduction of particulate emission being generated by these small and medium scale industries by 98 per cent.

International good practices:

- Ireland's strategies include kerbside collection of recyclable materials in urban areas, bring bank for the collection of glass and aluminum materials, Civic Amenity sites for the collection of bulky recyclables and household hazardous wastes and Materials Recovery Facilities & Transfer Stations to support recovery facilities such as composting or thermal treatment plants.

- USA has introduced strategies like Jobs Through Recycling programme which awards grants for fostering recycling initiatives, Pay as You Throw which requires customers who place more solid waste at curb for disposal pay more for the collection and disposal service, Resource Conservation Challenge which seeks to increase the rate of municipal solid waste recycling and helping the country meet a national goal of 35 per cent. It also identifies targeted waste streams, proposes 2008 goals for each of the targeted streams and lists criteria for identifying projects that will help reach the goals.

- New Zealand employs strategies like Design for the Environment which involves developing tools and techniques of product design that reduce waste, Clean Production which focuses on production processes rather than on the product itself to improve resource efficiency and reduce waste generated during production, Extended Producer Responsibility which encourages businesses to prevent wastes at source and set up Take back and recycling schemes.

- In Netherlands, producers are required to take back and reprocess their products; product recycling is encouraged by introducing refundable deposits.

- Korea's strategies include Volume-Based Waste Fee System which imposes the cost of waste disposal on individual waste generators to reduce the amount of waste, Waste Charge System which imposes charges on products that are hard to recycle or that contain hazardous

chemicals, Regulations on Packaging Material which bans the use of some substances like PVCs and polysterene in packaging and encourages the use of environment friendly packaging material and Deposit Refund System for Glass Bottles and Packaging Container Reuse System to promote collection and reuse of used containers and packaging material etc,.

Recommendations

- MoEF and the states may consider introducing effective strategies for the reduction and recycling of household waste like deposit refund schemes, promoting the use of jute bags rather than plastic bags, waste exchanges, etc., for reduction of waste at source.
- MoEF and the states may consider introducing programmes for the reduction of hazardous waste like incentive scheme for the introduction of cleaner technology, remanufacturing, reuse of scrap materials etc., for the reduction of waste at source.
- MoEF and the states may consider encouraging big manufacturers to introduce eco audits, life cycle analysis, product stewardship/ extended producer responsibility etc., to minimise the waste being produced.

3.3 Targets/timelines set for the reduction and recycling of waste

Targets and timelines are indicators of the progress made towards achievement of objectives of waste management. They provide feedback whether a programme is effective or not. Article 21.18 of Agenda 21 declared that by the year 2000, all industrialised countries, and by the year 2010, all developing countries, have a national programme, including, to the extent possible, targets for efficient waste reuse and recycling. Audit findings with respect to setting of targets and timelines are discussed below:

3.3.1 At the Central Level

Reduction of Waste: MoEF/CPCB had not set any targets for the reduction of municipal solid waste, bio-medical waste, hazardous waste and e-waste. CPCB also stated that no targets had been set for the reduction of other kinds of waste like waste from power plants, plastic waste, waste electronic items etc,. While MoEF was silent on whether it had set timelines for the reduction of all kinds of waste, CPCB stated that no timelines were set for the reduction of all types of waste.

Recycling of Waste: As for recycling techniques, MoEF stated that they had prepared specific guidelines for recycling techniques only for non-ferrous metals and ship breaking activities. MoEF was silent with regard to recycling techniques for other wastes like municipal solid waste, which have high recycling potential.

3.3.2 At the level of the states

(i) With respect to setting up clear targets for the reduction of each kind of waste and timelines for reduction of municipal solid waste, bio-medical waste, plastic waste, hazardous waste, it was noticed in the 24 sampled states that:

- Targets/timelines had not been laid down for reduction of municipal solid waste, bio-medical waste, plastic waste, hazardous waste etc., by 79 per cent of the sampled states and it was not verifiable whether this was done in 21 per cent of the sampled states. List of the states is attached as Annexure 2.

(ii) As regards setting specific recycling techniques for different kinds of waste, out of the 24 sampled states, it was observed that:

- Specific recycling techniques for different kinds of waste had not been laid down by 54 per cent of the sampled states. It was not verifiable in audit whether 46 per cent of the sampled states had done so. List of the states is attached as Annexure 2.

Waste reduction and recycling strategies seek to prevent the generation of waste. Hence, these are the beginning of the pipe solutions to waste management. In the absence of plans, targets and timelines for waste reduction and waste recycling, MoEF and the states would neither be able to focus their efforts towards waste reduction nor would they have a clear picture as to whether waste was actually being reduced.

MoEF did not furnish any reply on the issue of plans, targets and timelines for waste reduction and waste recycling.

International good practices:

- USA has set a national target of 35 per cent recycling rate for municipal solid waste through its Resource Conservation Challenge.
- Ireland has set targets to be achieved by 2013, which are - diversion of 50 per cent of household waste from landfill, minimum 65 per cent reduction in biodegradable wastes, recycling of 35 per cent of municipal waste, recycling of 85 per cent of construction and debris waste.
- Japan has targeted to reduce by 20 per cent the garbage discharged from households per person per day as compared with year 2000.

Recommendation

- MoEF, in consultation with the states, should prepare an action plan for the reduction, reuse and recycling of wastes in India, with clearly defined numerical targets as well as timelines for the achievement of targets.

3.4 Coordination with other ministries for introducing '3 Rs' strategies

Coordination with other ministries would also be essential in promoting recycling and reuse:

- Ministry of Finance (MoF) could be approached for promoting the procurement of recycled products by the government;

- Ministry of Commerce (MoC) could be approached for providing incentives for the reuse of products in manufacturing; and

- Department of Industries could be approached for promoting the use of recycled products and encourage industries to use cleaner technology, to undertake product stewardship and other such waste reduction, reuse and recycling strategies.

All of these initiatives would have to come from MoEF considering that one of its main roles is the control of pollution and waste is one of the major causes of pollution.

MoEF stated that it had approached MoF and Department of Industries for introduction of cleaner technology that would minimise waste. However, efforts made by MoEF did not lead to any significant policy decisions from MoF and Department of Industries with regard to promoting waste reduction, reuse and recycling strategies. MoEF also stated that it had not approached the MoC for providing incentives for the reuse of products in manufacturing.

Thus, MoEF needs to secure the cooperation of other ministries for promoting the use of cleaner technologies, modern recycling techniques, granting incentives for reuse of products in manufacturing etc., more effectively.

Recommendations:

- MoEF should coordinate and impress upon the Ministry of Finance for promoting the procurement of recycled products by the government.

- MoEF should approach the Ministry of Commerce for providing incentives for the reuse of products in manufacturing.

3.5 Role of the informal sector in recycling

According to Article 21.26 (b) of Agenda 21, governments should assist informal sector waste reuse and recycling operations. United Nations Commission on Sustainable Development, in its Working Paper for Agenda 21, recommended increased synergy between the formal and informal sectors and said that despite the significant role of the informal sector in solid waste management, there are few attempts to capitalise on this potential. It recommended that United Nations organisations should assist municipal authorities to recognise and integrate the potentials of the informal sector. The Asia-Pacific Environmental Innovation Strategies, an Asia-Pacific initiative to help realize the Plan of Implementation of the World Summit on Sustainable Development, studied the role of the informal sector in the waste management sector and found that in Asia, there are a large number of informal sectors engaged in garbage collection, which collect recyclable materials from individual households and sell them to the recycling market. Most of these informal sectors work in an unorganised manner. Therefore, their work of collecting these materials is not effective and sustainable. It suggested that it would be beneficial to formalise this sector in order to enhance its performance by developing a registration system and providing capacity building, thus to improve its efficiency and minimise the adverse social and environmental impacts from its operations. Audit findings

with respect to efforts of MoEF/states in promoting the role of the informal sector in recycling are discussed below:

3.5.1 At the central level

MoEF had not recognised the role of ragpickers in recycling and reducing municipal solid waste formally by an Act/ legislation. Thus, any kind of legal protection was not envisaged for them. In addition, MoEF had not assessed the economic value of the role of ragpickers in recycling and reducing waste. Further, the health risks they were exposed to when sorting out garbage had also not been studied.

3.5.2 At the level of the states

(i) Regarding recognition given to ragpickers, it was noticed in the 24 sampled states that:

- Only in 17 per cent of the sampled states had the role of ragpickers been recognised. Governments of Delhi, Maharashta, Andhra Pradesh and Punjab recognised the role of ragpickers in recycling and reducing waste. In Maharashtra, directives had been issued to all the municipalities to take the help of ragpickers for the segregation of waste.

- In 54 per cent of the sampled states, the role of ragpickers in reduction of waste has not been recognised while it was not verifiable whether in 29 per cent of the sampled states, this had been done. List of states is attached in Annexure 2

(ii) It was also noticed in audit that out of the 24 sampled states:

- The economic value of ragpickers in recycling and waste had not been regognised by 63 per cent of the sampled states while it was not verifiable in audit whether 37 per cent of the sampled states had done so. List of states is attached in Annexure 2.

Recommendation

- MoEF/states should consider providing legal recognition to rag pickers so that recycling work becomes more organised and also ensure better working conditions for them.

3.6 Government procurement

Since government procures a lot of goods and services, the role of the government as a purchaser is very significant. As a major purchaser, it can influence the providers of goods and services to provide more environmentally friendly goods and services. According to Article 4.23 of Agenda 21, "governments themselves also play a role in consumption, particularly in countries where the public sector plays a large role in the economy and can have a considerable influence on both corporate decisions and public perceptions. They should, therefore, review the purchasing policies of their agencies and departments so that they may improve, where possible, the environmental content of government procurement policies, without prejudice to international trade principles." The 1997 Programme for the Further

Implementation of Agenda 21 further encourages governments to take the lead in changing consumption patterns by improving their own environmental performance with action-oriented policies and goals on procurement, the management of public facilities and the further integration of environmental concerns into national policy-making. More recently, the Plan of Implementation adopted at the World Summit on Sustainable Development called for promotion of public procurement policies that encouraged development and diffusion of environmentally sound goods and services. Audit findings with respect to efforts made by the government in procurement of environmentally friendly goods for its use are discussed below:

3.6.1 At the central level

There was no evidence on record to show that MoEF has (a) mooted the proposal that government procurement systems be altered to include Environmentally Preferable Purchasing (EPP) or sustainable procurement and (b) recommended practices for obtaining recycled products. Introduction of EPP would give a big boost to taking environmental aspects of products like printers, computers, paper etc., into consideration and not just price, before any department of the government makes any purchase decision.

3.6.2 At the level of the states

With regard to alteration of government procurement systems in 24 sampled states, it was observed that:

- Government procurement systems had not been altered in 46 per cent of the sampled states to include EPP. It could not be verified if EPP had been introduced in 54 per cent of the sampled states. List of states is attached in Annexure 2

Thus, initiatives taken by MoEF and the states in promoting green procurement practices needs to be strengthened.

International good practices:

- Canada government's green procurement policy seeks to reduce the environmental impacts of government operations and promote environmental stewardship by integrating environmental performance considerations in the procurement process.

- Japan's Law concerning the Promotion of Procurement of Eco-friendly Goods and Services by the State and Other Entities aims to establish the necessary provisions to encourage the State and local governments to procure eco-friendly goods and to encourage a shift in demand towards eco-friendly goods.

- USA's Comprehensive Procurement Guidelines is a key component of the government's "buy-recycled" programme, which recommends recycled-content levels for items to be purchased.

Recommendation

- MoEF should consider the introduction of Environmentally Preferred Purchases and lay down guidelines for the purchase of recycled products to promote the purchase of eco friendly goods by the government and the agencies controlled by it.

3.7 Consumer information

Consumers as well as the general public need to be educated about the benefits of the '3 Rs' so that there is significant public support for recycling and reduction strategies.

Article 4.26 of Agenda 21 talks about reinforcing values that supports sustainable consumption. It says that governments should promote more positive attitudes towards sustainable consumption through education, public awareness programmes and such means. With reference to waste management, Article 21.20 (e), Agenda 21 says that governments should intensify efforts at collecting, analysing and disseminating to key target groups, relevant information on waste issues.

3.7.1 At the central level

MoEF was silent on the efforts undertaken for promotion of '3 Rs' through the audio-visual and the print media for municipal solid waste and plastic waste. MoEF was also silent on the efforts undertaken to educate citizens on reuse and recycling of wastes and threats posed to environment and health by open dumping of waste. CPCB stated that it had promoted the '3 Rs' for bio-medical and hazardous waste, though no records were made available to support this claim in respect of bio medical waste.

3.7.2 By the states

Scrtutiny of the efforts made by the state governments in the 24 sampled states for the promotion of reduction, reuse and recycling of waste through the print or the audiovisual media and educating the citizens about the threat to environment and health posed by waste and how reuse, recycling can promote a cleaner and healthier environment, revealed that:

- Only 34 per cent of the sampled state governments had promoted reduction, reuse and recycling of waste through the print or the audiovisual media and to educate citizens about the threat to environment and health posed by waste. Eight per cent of sampled states had not conducted such publicity. There was no evidence to indicate whether any publicity had been carried out in 58 per cent of the sampled states. List of states is attached in Annexure 2.

Thus, efforts of MoEF and the states to create awareness about waste and '3 Rs' were inadequate. A sustained public awareness campaign would go a long way in creating more awareness about the necessity of inculcating the values of '3 Rs' which would, in turn, result in less generation of waste.

International good practices:

- Austria's traveling exhibition "entSORGEN", encourages Austrians to ask themselves questions such as "What can I do to avoid hazardous household waste?", "What are the alternatives?" and to motivate them to act.

- New Zealand's Life after waste programme is aimed at changing how the waste industry and the general public think about waste.

- Ireland's 'Race against Waste campaign' was launched in 2003 for better awareness and turning that awareness into action.

Recommendations

- MoEF and the states should consider launching an effective and visible public awareness campaign to educate the general public about the advantages of recycling and reduction of waste, especially municipal solid waste.

- MoEF should take up the matter of introducing waste management concepts in schools with the Ministry of Human Resource Development and NCERT.

3.8 Environment labeling

According to Article 4.20 of Agenda 21, Governments and international organisations, together with the private sector, should develop criteria and methodologies for the assessment of environmental impacts and resource requirements throughout the full life cycle of products and processes. Results of those assessments should be transformed into clear indicators in order to inform consumers and decision makers. Governments, in cooperation with industry and other relevant groups, should encourage expansion of environmental labeling and other environmentally related product information programmes designed to assist consumers to make informed choices.

3.8.1 At the central level

MoEF introduced a scheme on environmental labeling called "ECOMARK" in 1991. The goal of the scheme was to provide accreditation and labeling for household and other consumer products which met certain environmental criteria along with quality requirements of the Indian Standards for that product. The specific objectives of the scheme were to provide an incentive for manufacturers and importers to reduce adverse environmental impact of products; to reward genuine initiatives by companies to reduce adverse environmental impact of their products; to assist consumers to become environmentally responsible in their daily lives by providing information to take account of environmental factors in their purchase decisions; to encourage citizens to purchase products which have less harmful environmental impacts and ultimately to improve the quality of the environment and to encourage the sustainable management of resources. As per the Scheme, a Steering Committee was set up in MoEF by the Central Government to decide the product categories to be taken up under the scheme, and to formulate the strategies for promotion, future development and improvement of this scheme. The product categories were to be notified from time to time.

It was observed in audit that the Steering Committee was set up in MoEF and a Technical Committee in CPCB, as envisaged in the scheme. The Steering Committee chose the logo for the ECOMARK scheme and the Technical Committee and Steering Committee identified specific products and product categories for classifying the products as environment friendly. CPCB stated that 20 licenses to 15 companies under three product categories had been issued the ECOMARK label. MoEF stated that it had involved the industry in this programme as well as undertaken activities for the creation of mass awareness for promotion and acceptance of the scheme. However, the effectiveness of the ECOMARK scheme could not be evaluated by Audit as MoEF did not produce the records relevant to the working of the ECOMARK scheme.

Further, it was observed that neither MoEF nor CPCB had evaluated the environmental impacts of these products from time to time to ensure that there is continued adherence to the standards laid down. MoEF stated that the ECOMARK products were not being widely used.

Thus, the implementation of ECOMARK scheme had been ad hoc, even though it was launched as early as 1991. As a result, the government did not appear to be in a position to effectively promote the consumption of environment friendly products.

International good practices:

- Japan's Eco Mark was introduced in 1989 as a seal of approval programme that aims to spread information on the environmental effects of products and to encourage consumers to choose environmentally friendly products and has 64 product categories and has been awarded to 5,176 products.

- Germany's Blue Angel Programme was introduced in 1977, making Germany the first country to implement a national eco-labeling programme.

- Norway, Sweden, Finland, Iceland, and Denmark participated in a programme called 'The Nordic Swan', introduced in 1989 as a voluntary and neutral seal of approval programme. It has developed 60 product categories and awarded the label to over 1,200 products.

- Taiwan's Environmental Protection Administration launched Taiwan's Green Mark Programme in 1992. The programme aims to promote recycling, pollution reduction, and resource conservation and has 41 product categories and has awarded the label to 451 products.

Recommendation

- The Ministry should review its ECOMARK scheme and include more products under it and monitor adherence to environmental standards of these products. It should also prescribe standards for classifying products as environmentally friendly and carry out environmental impact studies of such products.

Conclusion

Many countries had a clearly enunciated waste management policy, which also spelt out the hierarchy that would govern the waste management efforts in their respective countries. Despite being a signatory to Agenda 21 of the World Commission on Sustainable Development of the United Nations Conference on Environment and Development, waste management efforts in India were not directed by a policy, which incorporated a clear-cut waste hierarchy. The order of priority for management of wastes had not been defined in India leading to the current focus being only on disposal strategies. No effective strategies have been introduced by MoEF or the states to implement the '3 Rs' (recycle, reduce and reuse).

The National Environmental Policy, 2006, which promoted certain waste reduction strategies, had not been translated into action. Further, role of informal sector in reducing waste had not been adequately addressed. In addition, MoEF had not taken effective action in promoting green procurement practices. Its environment education, consumer information and environment labeling programmes also need strengthening.

CHAPTER 4

Existence of Waste legislation

Objective 3: Whether legislations specifically dealing with disposal of each kind of waste existed and whether penalty for violation had been incorporated in the legislations already enacted.

Legislation is a means to secure compliance to government's policies and lays down the steps to be taken to implement policy. To be effective, legislation should also contain suitable penalty for violation, which can serve as deterrent to non-compliance. According to UNEP, "apart from the adoption of a detailed and well-structured waste policy, the waste industry requires a legal framework that enables it to reach set objectives and targets. A well-elaborated legal framework will assist in the effective implementation of those targets. The legal framework must also be provided with an effective enforcement system." In addition, according to Article 8.20 and 8.21(a) of Agenda 21, "for developing effective national programmes for reviewing and enforcing compliance with national, state, provincial and local laws on environment and development, each country should have enforceable, effective laws, regulations and standards that are based on sound economic, social and environmental principles and appropriate risk assessment, incorporating sanctions designed to punish violations, obtain redress and deter future violations". Audit findings related to existence of legislations for all kinds of waste and penalty specified for violation of these legislations are discussed below:

4.1 Legislation for all kinds of waste

4.1.1 At the Central Level

The types of waste generally recognised by most countries are: household/municipal waste, bio-medical waste, e-waste, waste electronic & electrical equipment, waste from construction and demolition activities, waste from end of life cars, mining waste, waste from power plants, hazardous waste, waste from agriculture/forestry etc,.

MoEF had not enacted laws/rules that would govern the management of all kinds of waste in India. MoEF had enacted the following rules:

- Management and Handling of Municipal Solid Waste (2000),
- Management and Handling of Bio-Medical Waste (1998, amendment 2003),
- Management and Handling of Hazardous Waste (1989, amended in 2000 and 2003),
- Recycled Plastics Manufacture and Usage Rules (1999),
- Notifications for the disposal of fly ash, and
- Management and Handling of batteries.

In addition, it has circulated draft guidelines for the management of e-waste (2007). However, no rules/ guidelines had been enacted in India for the disposal of the following kinds of waste:

1. construction and demolition activities
2. end of life vehicles
3. packaging
4. waste tyres
5. agriculture/ forestry
6. waste electrical and electronic items.

Though MoEF claimed that rules had been enacted for the management of mining wastes, no supporting documents were furnished.

In the absence of legislation/rules governing the disposal of all kinds of waste, the possibility of waste disposal in a manner that is hazardous to the health of citizens and the environment cannot be ruled out.

MoEF stated in August 2008 that Municipal Solid Waste (Management & Handling) Rules, 2000 were already in place and these were in the process of revision for further improvement. MoEF also stated that the Plastics Manufacture, Sale & Usage Rules, 1999 as amended in 2003 mainly emphasises on sale and manufacture of plastics products and no specific clause exists on management and handling of plastics waste.

MoEF, however did not dispute the fact that laws/rules/guidelines for the disposal of waste from construction & demolition, end of life vehicles, packaging, waste tyres, waste electrical and electronic items and waste from agriculture/forestry have not been framed.

International good practices:

- Finland's waste legislation covers all types of waste like end of life vehicles, waste electrical and electronic equipment, construction waste, packaging and packing waste, etc., except certain special wastes such as radioactive wastes, which are controlled by separate laws.
- In Ireland, Portugal and United Kingdom, waste legislations exist for bio-medical waste, packaging, waste electrical and electronic equipment, end of life vehicles/tyres, batteries etc,.

Recommendation

- MoEF should consider framing laws/rules governing the safe disposal of all major kinds of waste like construction & demolition waste, end of life vehicles, packaging waste, mining waste, agricultural waste and e-waste being generated in the country.

4.2 Polluter pays principle

According to Article 21.40 of Agenda 21, governments should "apply the polluter pays principle, where appropriate, by setting waste management charges at rates that reflect the costs of providing the service and ensure that those who generate the wastes pay the full cost of disposal in an environmentally safe way".

4.2.1 At the central level

No information was made available by MoEF to show whether the rules governing the management and handling of municipal solid waste, bio-medical waste, plastic waste, e-waste etc., incorporated penalty for violation of these rules. MoEF stated that the rules for the management and handling of hazardous waste did incorporate penalty and CPCB claimed that all the rules governing waste in India incorporated a penalty for violation. However, audit scrutiny revealed the following:

(a) Municipal Solid Waste (Management and Handling) Rules, 2000 does not contain any provision for levying penalty on the generator of wastes or the operator of the facility for the collection, segregation, transportation, processing and disposal of municipal solid wastes, if the wastes are not disposed in the prescribed manner. Similarly, the Rules prescribe no penalty if the incinerator or landfills disposing municipal solid waste do not meet operating standards. Thus, there is no disincentive provided in the rules for the unsafe disposal of waste.

(b) Bio-medical Waste (Management and Handling) Rules, 1998 and its amendment in 2003 do not specify any penalty for hospitals and operators of waste disposal facilities if the autoclaves, incinerators, microwaves etc., do not meet the standards prescribed in the rules.

(c) Hazardous Wastes (Management and Handling) Rules, 1989 and its amendments in 2000 and 2003 do not contain any provision for penalty to be imposed for the violation of these rules, nor is the waste generator/ operator of the waste treatment facility to be held responsible for cleaning up the damage caused to the environment as a result of improper disposal of hazardous wastes. This needs to be viewed in light of the fact that improper disposal of hazardous waste can cause significant damage to the environment as well as public health.

The Environment (Protection) Act (EPA) introduced in 1986, sought to take steps for the protection of environment and prevention of hazards to human beings, other living creatures, plants and property. Section 15 of the act laid down that "whoever fails to comply with or contravenes any of the provisions of this Act, or the rules made or orders or directions issued there under, shall, in respect of each such failure or contravention, be punishable with imprisonment for a term which may extend to five years or with fine which may extend to one lakh rupees, or with both, and in case the failure or contravention continues, with additional fine which may extend to five thousand rupees for every day during which such failure or contravention continues after the conviction for the first such failure or contravention." Thus,

EPA specified penalty for violations of act/rules made there under. The laws governing management of wastes in India - Municipal Solid Wastes (Management and Handling) Rules, 2000, Bio-medical Waste (Management and Handling) Rules, 1998 and its amendment in 2003 and Hazardous Wastes (Management and Handling) Rules, 1989 were all made in exercise of the powers conferred by section 3, 6 and 25 of the EPA, 1986. Thus, even though no specific provision was incorporated in the rules, MoEF/CPCB could always take recourse to EPA for punishing the violators of waste management rules. However, MoEF was silent when asked whether there had been cases of imposition of penalty for illegal dumping of wastes and if the polluter was held responsible for cleaning up the damage caused to the environment as a result of improper disposal of wastes.

4.2.2 At the level of the states/PCBs

Action taken by the PCBs/state governments for illegal dumping of waste and the polluter being held responsible for cleaning up the damage caused to the environment as a result of improper disposal of waste in the 24 sampled states was as follows:

- Only in 25 per cent of the states action had been taken by PCB/government for illegal dumping of waste. In the sample, only one case of imposition of penalty was seen in the last 5 years in West Bengal. In Kerala, penalty was levied in two sampled municipalities. In Karnataka, one case had been filed for unauthorised dumping of municipal solid waste. In Himachal Pradesh, notices were issued to municipalities for illegal dumping of waste and in Rajasthan, cases were filed in the courts for illegal collection of bio-medical waste by kabadis. In Madhya Pradesh, PCB filed court cases against 17 health care facilities for non-compliance of bio-medical waste rules.

- No cases of levy of penalty or the polluter being held responsible for cleaning up the damage caused to the environment as a result of improper disposal of wastes were found in 46 per cent of the sampled states. In 29 per cent of the sampled states, it could not be verified whether any penalty was levied or action taken by the PCBs for illegal dumping of waste, despite they being empowered to do so under EPA. List of states is attached in Annexure 2.

Rules for management of waste did not pin responsibility for degradation of the environment on the polluter and did not make him pay for restoring the environment. Even though provision existed in EPA for taking action against polluters, penalty was seldom imposed for violation of these rules, as could be seen from the situation prevailing in the states. Hence, open dumping of wastes as well their improper disposal had no deterrent effect in the rules.

MoEF stated in August 2008 that imposition of penalties were as per the provisions made under the Environment (Protection) Act, 1986 since the Municipal Solid Wastes (Management & Handling) Rules, 2000 were framed under this Act. MoEF also stated that as per Rule 16 of the Hazardous Waste Rules, 1989 as amended, liability lay with the occupier or operator of a facility or transporter of hazardous wastes for improper handling and disposal of hazardous wastes, including restoration of damage caused to the environment. MoEF also stated that penalties could also be imposed as per the provisions of Environment Protection Act since

hazardous waste rules were made under this Act. In addition, MoEF stated that in the existing rules, provision for Polluter Pay Principle (PPP) was not available and that CPCB was suggesting inclusion of the Extended Producer Responsibility (EPR) in the amendments to the rules. According to MoEF, National Environment Policy–2006 also recommended that the polluter should, in principle, bear the cost of pollution with due regard to the public interest.

International good practices:

- Sweden charges a "Nitrogen Oxide Charge on Energy Production" on large combustion plants in which heating plants, power plants, and combustion plants run by pulp and paper industry, chemical industry and incineration plants which exceed capacity of 10 MW or annual energy production exceeding 50 GWh pay a charge of SEK 40 per kilogram of nitrogen dioxide emitted.
- Finland, Sweden, Denmark levy a carbon dioxide tax for emissions of carbon dioxide above a limit fixed by the government.
- United Kingdom levies a fuel duty escalator based on the load carried by trucks, as heavier trucks use more fuel and contribute more to emissions.

Recommendation

- Considering the fact that the provisions of Environment Protection Act are seldom used, both at the central and the state level for punishing the polluter, there is a need to incorporate the Polluter Pays Principle (PPP) in the waste rules/legislations itself. This would act as a deterrent against open dumping of waste.

Conclusion

Laws/rules were not framed for all kinds of waste, leaving the safe disposal of many kinds of waste unmonitored. In addition, the polluter was not effectively held responsible for unsafe disposal, thus creating no deterrence for non-implementation of the rules. Non-levy of penalty may result in no deterrence for illegal dumping of waste; which would have a harmful impact on health and environment.

CHAPTER 5

Allocation of responsibility and accountability

Objective 4: To assess whether 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.

Allocation of roles, responsibilities and accountability to agencies is important to ensure that the rules/laws are being implemented in line with the desired objectives. According to UNEP, one of the roles of state/provincial/regional governments in integrated solid waste is to establish agencies to implement and to regulate solid waste management practices. Thus, apart from policy and legislation, allocation of responsibilities to various actors for policymaking, implementation and monitoring in the waste management process is essential in securing the implementation of national legislation and policies. Audit findings with respect to allocation of responsibilities and accountability for waste management at the central level and at the level of the states are discussed below.

5.1 Nodal body for waste management and policy making on waste issues

According to UNEP, "The national government should establish an environmental protection agency that includes a department that is responsible for solid waste management. This agency and/or department should be responsible for developing and updating environmental legislation and policies and monitoring and coordinating these activities at an international level."

5.1.1 At the central level

MoEF stated that it was the nodal body only for hazardous waste management legislation. However, CPCB stated that MoEF is the nodal agency for waste management legislation and it was the role of MoEF to bring legislations regarding waste management at the central level to protect the environment. Thus, MoEF takes ownership of management of hazardous waste only and there is no ownership of other kinds of waste like municipal solid waste, bio-medical waste, e-waste etc., for which it has, however, framed rules.

In the absence of a single body taking ownership of waste issues in India, the efforts made to manage waste would largely remain ineffective.

5.1.2 At the level of the states

(a) Municipal solid waste

Out of the 24 states sampled, it was observed that:

- In 54 per cent states, certain departments were assigned responsibility for municipal solid waste management. In Assam, certain specific departments were assigned responsibility for municipal solid waste management. In West Bengal, Department of Environment stated that PCB was allocated responsibility for management of municipal solid waste, whereas PCB stated it was the responsibility of the

Department of Municipal Affairs and Urban Development Department. Thus, no agency in West Bengal owned responsibility. In Sikkim, Urban Development Department and Housing Department had been assigned the responsibility and in Delhi, Department of Environment Management Services was allocated responsibility. In Maharashtra, the government had established the Solid Waste Management Cell. In J&K, Rajasthan and Uttar Pradesh urban local bodies were assigned this responsibility and in Andhra Pradesh and Bihar municipalities were assigned this responsibility. In Madhya Pradesh, PCB and district administration were assigned this responsibility. In Gujarat, the Gujarat Urban Development Corporation was assigned responsibility for municipal solid waste management.

- In 21 per cent of the sampled states, no agency was assigned responsibility for the management of municipal solid waste and in 25 per cent of the sampled states; records were not made available to audit to verify whether any department/body had been assigned responsibility for the management of municipal solid waste. List of states is attached in Annexure 2.

(b) Bio-medical waste

Out of the 24 states sampled, it was observed that:

- In 42 per cent states, responsibility for the management of bio-medical waste was allocated to the respective PCBs. Responsibility for management of bio-medical waste was not allocated to any body/agency in 21 per cent of the sampled states and in 37 per cent of the states, it was difficult to verify which body had been allocated this responsibility. List of states is attached in Annexure 2.

(c) Plastic waste

Out of the 24 states sampled, it was observed that:

- Responsibility for the management of plastic waste had been allocated to bodies in 37 per cent of the sampled states.

- Responsibility for the management of plastic waste had not been allocated to any body or agency in 38 per cent of the sampled states while in 25 per cent of the sampled states, it was not verifiable whether any body or agency had been assigned responsibility for the management of plastic waste. List of states is attached in Annexure 2.

(d) Hazardous waste

Out of the 24 states sampled, it was noticed that:

- Responsibility for the management of hazardous waste had been allocated to bodies only in 29 per cent of the sampled states.

- Responsibility for the management of hazardous waste had not been allocated to bodies in 25 per cent of the sampled states. In addition, it could not be verified

whether bodies had been allocated responsibility for the management of hazardous waste in 46 per cent of the sampled states. List of states is attached in Annexure 2.

There was thus, some kind of uncertainty in MoEF/CPCB as to their exact role, and this uncertainty may not be conducive to providing effective leadership on these issues. At the state level, though different bodies were allocated responsibilities for the management of various kinds of waste, it was not clear whether there was a nodal body to deal with waste, as a single issue, in a holistic manner.

MoEF replied in August 2008 that with regard to municipal solid waste, since the responsibility of municipal solid waste management was with the local urban bodies which were under the Ministry of Urban Development, it is suggested that Ministry of Urban Development may be designated as the nodal point for management of municipal solid waste. With respect to bio-medical waste, MoEF stated that it was the nodal body for all waste management legislations, in which CPCB acts as technical advisor. MoEF further added that since PCBs had been notified as the prescribed authority for implementation of the provisions of the bio-medical waste rules in the states, so PCBs had the responsibility for implementation of the provisions of the bio-medical waste rules and the management of bio-medical waste generated. With respect to plastic waste, MoEF stated that responsibility of "Implementation of Plastics Manufacture, Sale & Usage Rules, 1999 as amended in 2003" lies with the PCBs and that CPCB had taken initiatives for facilitating PCBs to take effective steps on plastics waste management.

The reply of MoEF needs to be viewed in the light of the fact that being the nodal body for pollution control issues, the onus for addressing all waste related issues rested with it. It is also pertinent to note here that MoEF wants the Ministry of Urban Development to be designated as the nodal point for management of municipal solid waste. However, MoUD had already stated that MoEF was the responsible ministry. This pointed to lack of clarity in demarcation of role and responsibilities in dealing with major waste issues in a holistic manner.

International good practices:

- In Finland, Ministry of the Environment is the nodal body for waste management, formulates waste management policies and carries out strategic planning. It is also responsible for preparing legislation and setting binding standards.

- In Austria, the Federal Ministry of Agriculture and Forestry, Environment and Water Management is the nodal body for waste management and is charged with issuing and publishing a Federal Waste Management Plan for the whole of Austria.

- In New Zealand, central government takes a lead in developing and implementing all national waste policies.

Recommendations:

- Since waste causes pollution and pollution is necessarily the responsibility of the MoEF, the Central Government should consider appointing MoEF as the nodal body for managing all kinds of waste. A body/division within MoEF could be created to separately handle all issues related to waste.

- MoEF at the central level and Environment Departments at the state level should clearly delineate the responsibilities of the various bodies/agencies for managing different kinds of waste.

- The states should have a nodal department for dealing with issues related to all kinds of waste.

5.2 Implementing bodies

Laws/ rules should specify implementing agencies as it makes the process of implementation effective and streamlined, apart from aiding accountability. Where waste rules exist in India, bodies for the implementation of waste rules had been identified in the rules itself. Hospitals were responsible for the safe disposal of biomedical waste; municipalities were responsible for the safe disposal of municipal solid waste; industries generating hazardous waste were responsible for its safe disposal and districts were responsible for implementing the plastic rules. Thus, responsibility has been allocated to bodies for the safe disposal of some kinds of waste. However, many kinds of wastes have been left outside the legislative ambit of MoEF and thus, no agency is responsible for its safe disposal.

5.2.1 At the central level

At the central level, MoEF stated that the Ministry of Urban Development was the nodal agency responsible for implementation of the municipal solid waste rules and that the Ministry of Health and Family Welfare was the nodal agency for the implementation of rules relating to bio-medical waste. It was silent about the nodal ministries for implementation of plastic waste, e-waste and hazardous waste rules.

Thus, though MoEF was responsible for policy-making with respect to municipal solid waste, it did not take responsibility for its implementation. This was an anomalous situation as MoEF would be unaware whether the rules it had framed were facilitating the safe management of municipal solid waste. In addition, if there was any violation of the waste rules by a hospital or by a municipality, there was no authority at the central level to invoke sanctions against them. In the absence of a central agency responsible for implementation, there would be lack of coordinated activity to deal with implementation issues, which were often spread across two or more municipalities/ hospitals across states. This issue assumed more importance in light of the fact that Ministry of Urban Development, Ministry of Health and Family Welfare and Department of Chemicals and Petrochemicals stated that it was not their responsibility but the responsibility of MoEF to monitor the implementation of waste rules as discussed in Chapter 7.

5.2.2 At the level of the states

(a) Municipal solid waste

CPCB had recommended in 2004-05 that all states set up a Solid Waste Mission to look at common facilities, which could be developed at the municipal level. Audit observed that among the 20 sampled states:

- Only 15 per cent of the states had set up the Solid Waste Missions. West Bengal had set up the Solid Waste Mission, Kerela had set up the Clean Kerela Mission and Maharashtra had set up the Solid Waste Management Cell.
- Solid Waste Missions had not been set up in 60 per cent of the sampled states and it could not be verified in audit whether the Mission had been set up in 25 per cent of the sampled states. List of states is attached in Annexure 2.

(b) Bio-medical waste

According to the Bio-Medical Waste (Management and Handling Rules), 2000, the government of every State/Union Territory shall constitute an advisory committee to advise the Government of the State/Union Territory about matters related to the implementation of these rules. The committee was to include experts from the field of medical and health, animal husbandry and veterinary sciences, environmental management, municipal administration and any other related department or organisation including non-governmental organisations. Out of the 15 sampled states, it was observed that:

- Advisory committees have been set up in 60 per cent of the sampled states, not been set up in 20 per cent of the sampled states and it could not be verified in audit whether 20 per cent of the sampled states had set up the advisory bodies. List of states is attached in Annexure 2.

Thus, there is lack of clarity at the central level as to which agency would be responsible for the implementation of the waste rules. In addition, bodies have not been set up at central and more importantly, at the state level for the implementation of rules relating to specific kinds of waste.

MoEF stated in August 2008 that CPCB had requested PCBs to co-ordinate with the state urban development departments to explore the possibility to set up common waste disposal sites and that CPCB had indicated that states may follow the methodology as adopted by the Gujarat government. MoEF also stated that the constitution of Advisory Committees is the responsibility of the respective State/UT Government.

MoEF did not clear the confusion regarding responsibility for implementation of the waste rules, at the central as well as the state level. In the absence of clear responsibility for implementation, accountability would be diffused, leading to poor performance.

International good practices:

- In Philippines, The Commission on Solid Waste oversees the implementation of solid waste management plans and prescribes policies to achieve the objectives of Ecological Solid Waste Management Act of 2000.

- In Slovenia, Environmental Agency is responsible for the implementation of waste legislation, waste management information system development and maintaining, licensing in the waste management field.

- In Austria, since 1 October 1995, it has been mandatory for all companies with 100 or more employees to appoint a qualified waste officer and a deputy in writing and to report their names to the authorities. The duties of the waste officer include monitoring of compliance with the stipulations of the Waste Management Act.

Recommendations

- MoEF should clearly identify, at the central level, bodies which would be responsible for the implementation of the waste management rules relating to municipal solid waste, biomedical waste and plastic waste. The states should also identify the agency responsible for implementation of the waste rules.

- MoEF should have a formal mechanism in place for discussions with MoUD and MoH&FW regarding implementation of the rules and whether the rules need modification, based on the problems encountered by the municipalities and hospitals in implementation of these rules.

- Solid Waste Mission for dealing with overall issues relating to implementation of municipal solid waste rules should be set up in all the states.

5.3 Monitoring bodies

Monitoring bodies keep a check on implementation and thus, are good feedback mechanisms on the efficacy of any law/rule.

5.3.1 At the central level

Despite framing the rules for the management and safe disposal of municipal solid waste, bio-medical waste, plastic and hazardous wastes, MoEF did not own responsibility for monitoring the implementation of these rules.

(a) Municipal solid waste

MoEF stated that it was the responsibility of Ministry of Urban Development to monitor the implementation of the municipal solid waste rules. However, according to the Ministry of Urban Development, it was the responsibility of MoEF to monitor the implementation of the Municipal Solid Waste (Management and Handling) Rules. Ministry of Urban Development

had not set up any body for monitoring the implementation of these rules and did not provide any waste related data or monitoring reports to MoEF. It also did not receive any reports from CPCB on waste management and did not have a formal coordination mechanism for sharing information with MoEF. In the absence of clarity about the agency that would be responsible for monitoring of these rules, it was noticed in audit that monitoring was ineffective as discussed further in Chapter 7.

(b) Bio-medical waste

MoEF stated that it was the responsibility of Ministry of Health and Family Welfare to monitor the implementation of the bio-medical waste rules. However, according to Ministry of Health and Family Welfare, it was not its responsibility to monitor the implementation of Bio-Medical Waste (Management and Handling) Rules. It did not have a mechanism/ body to monitor the implementation of these rules and it neither sent any bio-medical waste related information to MoEF nor did it receive any data regarding waste from MoEF/CPCB. It also does not have a coordination mechanism for sharing bio-medical waste information with MoEF. In the absence of clear allocation of responsibility to any agency for monitoring these rules, it was noticed in audit that monitoring was ineffective as discussed further in Chapter 7.

(c) Plastic waste

According to the Department of Chemicals and Petrochemicals, MoEF had issued the notification and the information regarding monitoring could be obtained from MoEF. However, MoEF was silent about its role of monitoring of implementation of plastic rules.

5.3.2 At the level of the states/PCBs

(a) Municipal solid waste

With respect to monitoring of solid waste rules, it was noticed that out of the 24 sampled states,

- Bodies like PCBs had been allocated responsibility for monitoring in 33 per cent of the sampled states while in 21 per cent of the sampled states, bodies had not been allocated responsibility for monitoring the implementation of municipal solid waste rules. In 46 per cent of the sampled states, it was not verifiable in audit whether any body had been allocated this responsibility. List of states is attached in Annexure 2.

(b) Bio-medical waste

With respect to monitoring of bio-medical waste, it was noticed that out of the 24 sampled states,

- State PCBs / Pollution Control Committees were monitoring the implementation of the bio-medical waste rules in 46 per cent of the sampled states while in 13 per cent of the states; no agency was monitoring implementation of bio-medical waste rules. It was not verifiable by audit whether bodies were monitoring the implementation of

bio-medical waste rules in 41 per cent of the sampled states. List of states is attached in Annexure 2.

(c) Plastic waste

As regards monitoring of implementation of plastic waste, out of the 24 sampled states, it was observed in audit that:

- Bodies were monitoring implementation of rules in 37 per cent of the sampled state while in 13 per cent of the sampled states; no body/agency was allocated this responsibility.
- It was not verifiable in audit whether bodies in 50 per cent of the sampled states were monitoring the implementation of rules related to plastic waste. List of states is attached in Annexure 2.

(d) Hazardous waste

As regards bodies monitoring the implementation of hazardous waste rules, it was observed that out of the 24 sampled states:

- In 17 per cent of the sampled states, there were bodies for monitoring the implementation of hazardous waste rules while in eight per cent of the sampled states, bodies were not monitoring the implementation of hazardous waste rules.
- In 75 per cent of the sampled states, there was not enough evidence to show whether bodies were monitoring implementation of hazardous waste rules. List of states is attached in Annexure 2.

It, thus, seems that agencies responsible for monitoring the implementation of municipal solid waste, bio-medical waste and plastic waste rules had not been clearly identified at the state and the central level. MoEF was also unaware of its responsibility regarding monitoring of these rules. In the absence of regular and sustained monitoring, it would be difficult to assess whether the rules for the disposal of wastes were being followed. In addition, there appears to be no central monitoring Ministry, which can ensure the safe disposal of all kinds of waste by different agencies and flag major non-compliance issues and environmental issues at the central level.

MoEF replied in August 2008 that with respect to municipal solid waste, as per the rules, CPCB owed responsibility of submitting Annual Reports based on the consolidated reports received from the PCBs and that the overall responsibility at the state level lay with the Secretary, Urban Development Department. It also stated that CPCB was coordinating with PCBs by providing standards for operation of waste processing and disposal facilities. With respect to bio-medical waste, MoEF stated that PCBs were the prescribed authority to implement the provisions of the bio-medical waste rules and monitor the compliance. With respect to plastic waste, MoEF stated that responsibility for implementation of plastic waste rules lay with PCBs and that CPCB had taken initiative for facilitating PCBs to take effective steps on plastics waste management.

The reply of MoEF has to be viewed in light of audit observation that there was no central monitoring body for the waste rules to ensure the safe disposal of all kinds of waste by different agencies and to flag major non-compliance issues and environmental issues at the central level. With respect to monitoring at the level of states, though agencies have been prescribed in the rules, monitoring was either not taking place by the prescribed agencies or monitoring was very weak, as further commented by Audit in Chapter 7. This pointed to the fact that monitoring agencies needed to clearly delineated and responsibility and accountability allocated to them to ensure effective monitoring.

International good practices:

- The Finnish Environment Institute 'SYKE' monitors and maintains a master register of waste data and is thus the primary monitoring agency for waste legislations/rules.
- In Philippines, the National Solid Waste Management Commission reviews and monitors the implementation of local solid waste management plans.
- In USA, the Office of Solid Waste regulates waste under the Resource Conservation and Recovery Act.
- In New Zealand, monitoring and evaluating progress towards targets is carried out by the Ministry for the Environment, in collaboration with local governments.

Recommendations

- The government should assign clear responsibility to MoEF or any central body/agency for monitoring the implementation of all waste management rules throughout the country.
- MoEF must also put in place a mechanism by which performance of the states could be monitored and ensure penalty for weak compliance by states.
- Bodies should be clearly allocated responsibility for monitoring the implementation of all the waste rules at the state level so that violations to rules can be regularly identified.

Conclusion

Identification of nodal agencies/bodies and the allocation of responsibility and accountability among them are essential for ensuring smooth and effective compliance with laws and rules. In the absence of clear ownership of waste management in totality, there appears to be an absence of a single body taking ownership of waste issues in India. Further, there was no clear identification of bodies for monitoring of waste rules at the centre. This caused a mismatch/gap in responsibility and accountability and led to the rules for management of waste being rendered ineffective.

Compliance to rules governing municipal solid, bio-medical and plastic waste

Objective 5: Whether effective compliance to rules/laws regulating municipal solid waste, bio-medical waste and plastic waste was taking place in the state.

The United Nations Conference on Human Environment held in Stockholm in June 1972 led to decision on part of India to enact a law on the protection of the environment. As a result, the Environment (Protection) Act was promulgated in 1986 in order to take appropriate steps for the "protection and improvement of human environment" and to implement decisions relating to "protection and improvement of the environment and for the prevention of hazards to human beings, other living creatures, plant and property". Though there is no specific provision addressing waste in this Act, the Act gave power to the central government to take measures for protecting the quality of the environment and preventing, controlling and abating environment pollution. It also defined environmental pollutant as any solid, liquid or gaseous substance present in such concentration to be injurious to the environment and environment pollution as the presence in the environment of any environment pollutant.

Realising the seriousness of the problem of waste management and therefore, to regulate the management and handling wastes in India, the government notified the following under the powers conferred by the Environment (Protection) Act, 1986:

- Municipal Solid Wastes (Management and Handling) Rules, 2000: The objective of this rule is to make every municipal authority, within the territorial area of the municipality, responsible for the implementation of the provisions of these rules, and for any infrastructure development for collection, storage, segregation, transportation, processing and disposal of Municipal Solid Wastes. The State Pollution Control Board was given responsibility for granting authorisation for setting up waste disposal facilities and monitoring to ensure that disposal of municipal solid waste meets the compliance criteria set out by the Central Pollution Control Board in the rule.

- To ensure proper Bio-Medical Waste Management, The Bio-Medical Waste (Management and Handling) Rules, were notified in 1998 with an amendment in 2003.The institutions generating bio medical waste were given the responsibility of ensuring that all such waste is segregated, transported, processed and disposed off without any adverse effect to human health and the environment. It had set up a time schedule for ensuring that institutions set up waste disposal and processing facilities that were to be authorised by a body to be set up by the state governments and compliance to the waste disposal methods as specified in the rules were to be monitored by the PCBs.

- The Recycled Plastics Manufacture and Usage Rules were notified in 1999 with an amendment in 2003. The responsibility for enforcement of rules relating to use, collection, segregation, transportation and disposal of plastic waste was entrusted to the District Commissioner/ District Magistrate of each district and SPCBs were given the responsibility for monitoring of these rules.

- The Hazardous Waste (Management & Handling) Rules were notified in 1989 with amendments in 2000 and 2003. The role and responsibilities of the waste generator, state/central pollution