

- Water: Surface (rivers, lakes and reservoirs, estuaries); coastal seas and ocean, underground; quality; temperature; recharge; snow, ice, and permafrost;
- Atmosphere: Quality (gases, particles); climate (micro, macro); temperature;
- Flora: Trees; shrubs; grass; crops; microflora; aquatic plants; endangered species; barriers; corridors;
- Fauna: Birds; land animals including reptiles; fish and shellfish; benthic organisms; insects; micro-fauna; endangered species; barriers; corridors;
- Land use: Wilderness and open space; wetlands; forestry; grazing; agriculture; residential; commercial; industrial; mining and quarrying;
- Recreation: Hunting; fishing; boating; swimming; camping and hiking; picnicking; resorts.

8.8. EIA INDIAN SCENARIO

Environmental clearance from the Central Government is required for 32 categories of developmental projects broadly categorized under the following industrial sectors EIA Scenario in India:

1. Mining
2. Thermal power plants
3. River valley
4. Infrastructure (road, highway, ports, harbors and airports)
5. Industries including very small electroplating or foundry units

Certain activities permissible under the Coastal Regulation Zone Act, 1991 also require similar clearance. Donor agencies operating in India like the World Bank and the ADB have a different set of requirements for giving environmental clearance to projects that are funded by them.

8.8.1. Solid Waste Management Indian scenario

The rapid urbanization is changing the nature of solid waste management from a low priority, localized issue to a pervasive social and environmental problem with risks to public health and environment. Municipal Solid Waste (MSW) management is constrained by institutional weakness, lack of proper funding, lack of proper management and operational systems, public apathy, lack of municipal will to become financially self-sufficient through municipal taxation, etc. In Indian towns, MSW storage is at a centralized place. Individuals deposit their waste in bins/enclosures located at street corners at specific intervals. The containers generally are constructed of metal, concrete, or brick masonry. Indiscriminate littering of roads and drains is additionally common in most cities and towns. Community storage may reduce the value of waste collection, but chances of littering remains. Scavenging of the wastes by rag pickers and stray animals causes further scattering of solid waste. it's often perceived by the municipal authorities that the shortage of civic awareness among city residents is proving to be a serious hurdle in maintaining the cleanliness. the matter is most acute in slums and in areas where the lower and middle income groups reside. due to the poor conditions for temporary storage of wastes, in some areas, NGOs are involved in making arrangements for waste collection from households resulting in improvement in street cleanliness. Differing types of vehicles, varying from bullock carts to compactors, are used for transportation of waste.

However, the general-purpose open body trucks of 5 to 9 tones capacity are in common use. In smaller towns, tractor-trailers are used despite being slow. In few cities, compactor vehicles also are getting used. The waste is transported mostly by municipal vehicles; though, in some large towns, private vehicles also are hired to reinforce the fleet size. The upkeep of the vehicles is administered within the general municipal workshop alongside other municipal vehicles where usually the municipal refuse vehicles don't receive the priority. Most of those workshops have facilities for minor repairs only. Although preventive maintenance is important to take care of collection fleet in proper operating condition, this aspect is usually neglected. Transfer stations are available only in few metropolitan cities. Several thousands of urban dwellers in India make their living upon waste processing by working in small industries, which recycle plastics, tin cans, bottles, bones, hair, leather, glass, metal etc., recovered from MSW. Most of the fabric containing metals, unsoiled paper, plastics, glass, cardboard, etc. are marketable and hence recycled by householders themselves or by the rag-pickers.

By the time waste reaches the community bins, it contains only a little portion of recyclable material and consists mainly of vegetable/fruit peelings, scraps of soiled paper and plastic, used toiletries, and inert material like sand and stones, etc. The larger proportion of organic matter in MSW indicates the desirability of biological processing of waste like composting. Though composting has been the prevalent biological processing practiced in India, there are problems thanks to transportation, poor acceptance by farmers (may be due to quality concerns), marketing, price etc. Recently efforts are being taken to popularize waste segregation and composting. Characteristics of the Indian MSW bring out the very fact that a self-sustaining combustion reaction can't be obtained with a majority of Indian MSW and auxiliary fuel are going to be required to assist waste combustion.

In majority of urban centers, waste is being disposed of in low-lying areas. The disposal sites are selected on the idea of their proximity to the gathering areas and new disposal sites are normally identified only the prevailing ones are filled. In most cases, the waste is just dumped at such sites and, except within the major cities, bulldozers are rarely used for compaction at the disposal site. Even in these cities, they're used mainly for leveling of the deposited waste. Proper weighing, filling and soil layering aren't practiced in many areas. Provisions for leachate and gas control don't exist at many places. A soil cover is never provided, except at the time of ultimate closure of the location. Most of the disposal sites are unfenced and therefore the waste picking is usually hip, posing problems within the operation of the sites. it's a standard practice to light a fireplace on the dumpsite by the rag-pickers either to scale back the menacing flies and volume or odour and facilitate waste picking.

In sight of the problem in acquiring land for establishing waste management and disposal facilities, it's imperative that the prevailing dumpsites are redesigned to receive present and future wastes. As haphazard dumping across the dumpsites has been a standard practice, and contamination of the encompassing areas isn't uncommon, those dumpsites got to be rehabilitated and redesigned to recover space for future wastes. The rehabilitation measures should include measures to contain the contaminant migration and where possible

lining the bottom of the fill and style it to receive future wastes for a period of 20 years of more through innovative designs and strategically operations and maintenance.

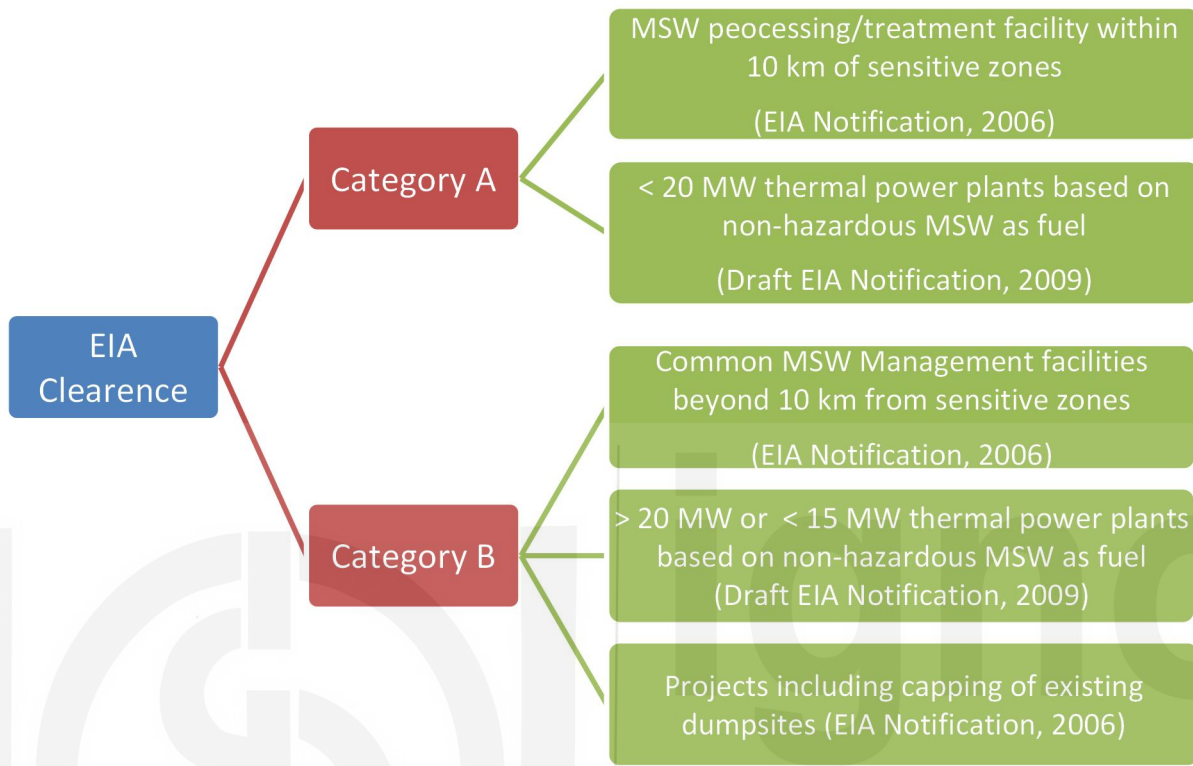


Figure 8.9: Environmental Impact Assessment Clearance Requirements for Municipal Solid Waste Management (MSW) Projects

8.8.2. Various Aspects of Solid Waste Management and indicators

There are several aspects of solid waste management: technical, financial, institutional and social. Each of these aspects has certain issues, which need to be deliberated upon to achieve sustainable and effective waste management. The implementation and progress can be monitored by evolving certain indicators, which are discussed below:

A. Technical Aspects

- Inadequate technical expertise and planning capability in most of the Urban Local Bodies (ULBs)
- Technical expertise available with a number of of the metro and mega cities is not fully utilized and not given due weightage in decision making
- Inadequate solid waste management plans in the system at local and national levels
- Low priority for research and development in solid waste management sector
- Selection of appropriate technology for handling and disposal of solid waste is frequently left open in the tenders

- Considerable work is required to be done on recycling, parameters of health and safety of recycled products, etc.
- Competitive market not yet developed for procurement of plant and equipment for processing MSW and other solid waste materials

Indicators

- Quality and extent (coverage) of service provided
- Impact on health and environment

B. Financial Aspects

- ULBs are unable to generate adequate funds from their own sources, such as municipal taxes (as mandated by the 74th Constitutional Amendment Act)
- Good financial management and planning for the available resources by the local government
- Additional support from users through user charges as supplement to property tax

C. Institutional Aspects

- Coordination of solid waste management projects and activities by dedicated department or cell in each ULB
- Inadequate coordination between the relevant agencies
- Enforcement of applicable Rules and regulations by the ULB
- Provision of clear mandates and sufficient resources to fulfill the mandates by the ULBs
- Only environment friendly sustainable options to be implemented by local government
- Nodal department in the State Government (Municipal Administration / Urban Development) should provide guidance and oversee implementation of applicable Rules

Indicators

- Self-sufficiency within the ULBs for tackling MSW management

D. Social Aspects

- Lack of public awareness and school education programmes
- Lack of genuine interest amongst the public and other stakeholders
- Low paid employment for waste workers
- Waste workers have very low social status

Indicators

- Public cooperation
- Social equity for the waste workers

8.8.3. Sustainable development:

Sustainable development is development that meets the requirements of this without compromising the power of future generations to satisfy their own needs. It's built on three basic premises i.e., economic process, ecological (and environmental) balance and social progress. Economic process achieved during a way that doesn't consider the environmental concerns, won't be sustainable within the end of the day. Therefore, sustainable development needs careful integration of environmental, economic, and social needs so as to

realize both an increased standard of living briefly term, and a net gain or equilibrium among human, natural, and economic resources to support future generations within the future. It's necessary to know the links between environment and development so as to form choices for development which will be economically efficient, socially equitable and responsible, also as environmentally sound.



Figure 8.10: Sustainable development Elements

8.8.4. Types of EIA:

Environmental assessments might be classified into four types i.e. strategic environmental assessment (SEA), regional EIA, sectoral EIA and project level EIA. These are precisely discussed below:

i. Strategic Environmental Assessment (SEA):

SEA refers to systematic analysis of the environmental effects of development policies, plans, programmes and other proposed strategic actions. SEA represents a proactive approach to integrate environmental considerations into the upper levels of decision making – beyond the project level, when major alternatives are still open.

ii. Regional EIA:

EIA within the context of regional planning integrates environmental concerns into development planning for a geographic region, normally at the sub-country level. Such an approach is referred to as the economic-cum-environmental (EcE) development planning. This approach facilitates adequate integration of economic development with management of renewable natural resources within the carrying capacity limitation to achieve sustainable development. It fulfills the need for macro-level environmental integration, which the project-oriented EIA is unable to address effectively. Regional EIA addresses the environmental impacts of regional development plans and thus, the context for project-level EIA of the subsequent projects, within the region. In addition, if environmental effects

are considered at regional level, then cumulative environmental effects of all the projects within the region can be accounted.

iii. Sectoral EIA:

Instead of project-level-EIA, an EIA should take place in the context of regional and sectoral level planning. Once sectoral level development plans have the integrated sectoral environmental concerns addressed, the scope of project-level EIA will be quite minimal. Sectoral EIA helps in addressing specific environmental problems that may be encountered in planning and implementing sectoral development projects.

iv. Project level EIA:

Project level EIA refers to the developmental activity in isolation and therefore the impacts that it exerts on the receiving environment. Thus, it's going to not effectively integrate the cumulative effects of the event during a region. From the above discussion, it's clear that EIA shall be integrated in the least the amount i.e. strategic, regional, sectoral and therefore the project level. Whereas, the strategic EIA may be a structural change within the way the items are evaluated for decision-making, the regional EIA refers to substantial information science and drawing complex inferences. The project-level EIA is comparatively simple and reaches to meaningful conclusions. Therefore in India, project-level EIA studies happen on an outsized scale and are being considered. However, within the re-engineered Notification, provisions are incorporated for giving one clearance for the whole industrial estate for e.g., Leather parks, pharma cities etc., which may be a step towards the regional approach. As we progress and therefore the resource planning concepts emerge in our decision-making process, the mixing of overall regional issues will become a part of the impact assessment studies. Thus the ocean , Regional EIA, and Sectoral EIA evaluate environmental, social and ecological effects on a bigger scale and should be considered as tools for the event of framework of designing at country, sub-country and regional levels, while the project level EIA focuses on developmental activity of a proposed project during a given location. In identifying the project (site also because the proposed activities), due consideration to the urban land use planning issues should tend.

8.9. GENERAL FLOWCHART AND STRUCTURE OF EIA STUDY

The professional Team identified for a selected EIA study should contains qualified and experienced professionals from various disciplines so as to deal with the critical aspects identified for the precise project. supported the character and therefore the environmental setting, professionals could also be identified for EIA studies are like Environmental management specialist, Air and noise quality, Geology/geo-hydrology, Ecologist, Chemical engineer, Transportation Specialist, Health specialist, Scientist, etc.

A better EIA practice requires technical understanding of relevant issues and therefore the measures that employment in such given circumstances: The priority of selection of mitigation measures should be within the order:

2. **First Step-Impact avoidance:** This step is best when applied at an early stage of project planning. It are often achieved by not undertaking certain projects or elements that would end in adverse impacts, avoiding areas that are environmentally sensitive and fixing place the preventative measures to prevent adverse impacts from occurring, for instance , release of water from a reservoir to take care of a fisheries regime.
3. **Second Step-Impact minimization:** This step is typically taken during impact identification and prediction to limit or reduce the degree, extent, magnitude, or duration of adverse impacts. It are often achieved by cutting down or relocating the proposal, redesigning elements of the project, and taking supplementary measures to manage the impacts.
4. **Third Step-Impact compensation:**
This step is typically applied to remedy unavoidable residual adverse impacts. It are often achieved by rehabilitation of the affected site or environment, for instance , by habitat enhancement and restocking fish, restoration of the affected site or environment to its previous state or better, as typically required for mine sites, forestry roads and seismic lines and replacement of an equivalent resource values at another location. for instance , by wetland engineering to supply the same area thereto lost to drainage or infill.

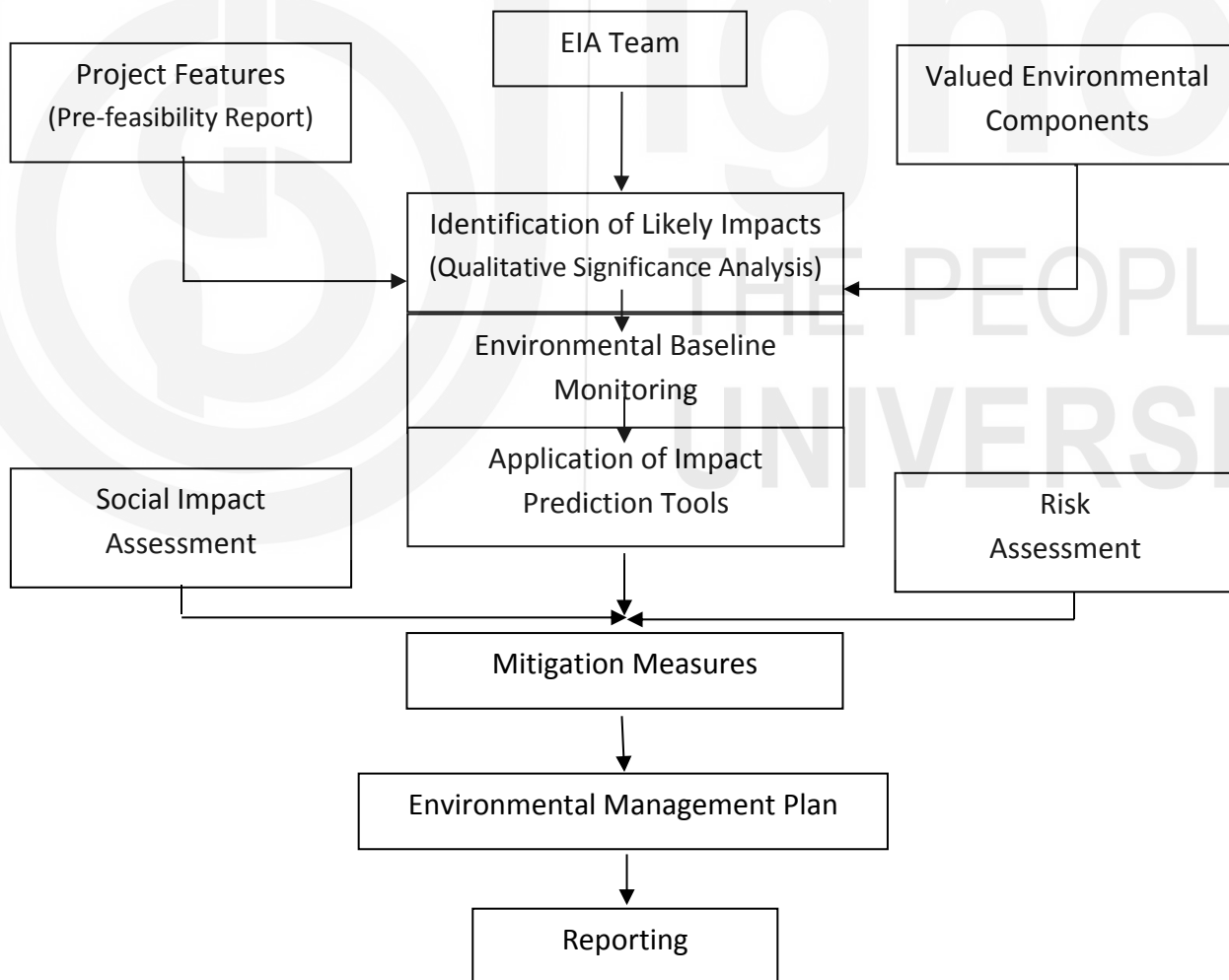


Figure 8.11: Flowchart of EIA Study

Table 8.3: Structure of Environmental Impact Assessment (EIA) Report

Sr. No.	EIA Structure	Content
1	Introduction	Purpose of the Report
		Identification of project and project proponent
		Brief description of project & its importance
		Scope of study-Detailed
2	Project Description	Type of project
		Need of project
		Location, layout of project
		Size and activities of project
		Proposed schedule for approval and implementation
		Technology & process description
		Description of mitigation measures incorporated into the project to meet environmental standards or EIA requirements
3	Description of the Environment	Study area, period, components & methodology
		Establishment of baseline as identified in the scope
		Base maps of all environmental components
4	Anticipated Environmental Impacts & Mitigation measures	Details of investigated Environmental impacts due to project location, possible accidents, project design, project construction, operations of completed project
		Measures for minimizing and/or offsetting adverse impacts identified
		Assessment of significance of impacts
		Mitigation measures
5	Analysis of Alternatives (Technology & Site)	Incase, the scoping exercise results in need for alternatives: Description of each alternative
		Summary of adverse impacts of each alternative
		Mitigation measures proposed for each alternative and selection of alternative
6	Environmental Monitoring Program	Technical aspects of monitoring the effectiveness of mitigation measures (incl. measurement methodologies, frequency, location, data analysis, reporting schedules,
7	Additional Studies	Public consultation
		Risk assessment
		Social impact assessment
8	Project Benefits	Improvements in social and physical infrastructure
		Employment potential –skilled; semi-skilled and unskilled
		Other tangible benefits
9	Environmental Cost Benefit Analysis	If recommended at the scoping stage
10	Environmental Management Plan (EMP)	Description of the administrative aspects that ensures proper implementation of mitigative measures and their effectiveness monitored, after approval of the EIA
11	Summary & Conclusion (This will constitute the	Overall justification for implementation of the project
		Explanation of how, adverse effects have been mitigated

	summary of the EIA Report)	
12	Disclosure of Consultants engaged	Names of the Consultants engaged with their brief resume and nature of Consultancy rendered

SAQ 3

- Enlist various fields of experts included in the committee of EIA as per EIA notification 1994.
- Write a note on: Solid Waste Management Indian scenario.
- What are the various aspects of Solid Waste Management (write 3 points each). Also mention one indicator of each aspect.
- What are the types of EIA?
- Draw the flowchart of EIA study.

8.10 SUMMARY

This unit covered history of EIA, objectives of EIA and different kinds of environmental impacts due to a project proposal. Also, it covered importance of impacts, criterion to work out the importance of the identified Impacts. This unit gives methods for identification of impacts as well as its advantages and disadvantages.

In this unit basic principles and key stages carried out in India are described. Here Solid Waste Management Indian scenario and various aspects of it are described briefly. In this unit, types of EIA, flowchart of EIA study and structure of EIA report with the roles of stakeholders is given.

8.11 ANSWERS TO SAQs

SAQ 1

- Refer section 8.3.2.
- Refer section 8.4 and sub-section 8.4.1.
- Refer section 8.4.2.
- Refer sub-sections 8.4.4 and 8.4.5.

SAQ 2

- Refer section 8.5.
- Refer sub-section 8.5.2.
- Refer section 8.6.

SAQ 3

- Refer section 8.7.
- Refer sub-section 8.8.1.
- Refer sub-section 8.8.2.
- Refer sub-section 8.8.4.
- Refer figure 8.11.

UNIT 9 ENVIRONMENTAL MANAGEMENT PLAN AND MONITORING

Structure

9.1. Introduction

Objectives

9.2. Scope of Environmental Management Plan (EMP)

9.2.1. Purpose of EMP

9.2.2. Components of EMP

9.2.3. Importance of EMP

9.3. The Integrated Solid Waste Management (ISWM) System

9.3.1. Integrated Solid Waste Management (ISWM) System Hierarchy

9.4. Role of Central, State and Local Governments

9.4.1. Central Government

9.4.1.1. Duties of Ministry Of Environment, Forest and Climate Change (MoEFCC)

9.4.1.2. Duties of Ministry of Urban Development

9.4.1.3. Duties of Central Pollution Control Board (CPCB)

9.4.2. State Government

9.4.2.1. Duties of the Secretary–In-Charge

9.4.2.2. Duties of State Pollution Control Board (SPCB)

9.4.3. Duties of District Magistrate or District Collector or Deputy Commissioner

9.4.4. Duties and Responsibilities of Local Authorities and Village Panchayats

9.5. Public Consultation

9.6. Project Appraisal

9.7. Decision Making

9.7.1. Approval / Rejection / Reconsideration

9.7.2. After Approval

9.8. Post-Clearance Monitoring

9.9. Planning for Centralized and Decentralized Facilities

9.9.1. Decentralized Waste Management Systems

9.10. Arrangements for Informal Sector Integration

9.11. Monitoring Solid Waste Management By MIS System

9.1. INTRODUCTION:

As many of the municipal authorities are still to develop in-house capabilities to independently govern their solid waste, the central and state governments continue to play a crucial role by

formulating policies, programmes, and regulations and by providing technical and financial assistance for infrastructure development including management of municipal solid waste (MSW) in urban areas. Although Municipal Solid Waste Management (MSWM) is an essential service and a mandatory function of municipal authorities across the country, it is still being managed in an unplanned manner, giving rise to environmental degradation and serious health problems especially for women and children. This clearly underlines the need for preparing a strategic and detailed SWM plan by the urban local bodies (ULBs). Every ULB should undertake the preparation of a SWM plan, addressing short term and long term actions. Therefore, the goals of Environmental Management Plan (EMP) are to develop procedures to implement project's mitigation measures & monitoring requirements; provide auditable commitments to practical and achievable strategies and design standards; to develop an integrated plan for comprehensive monitoring and control of project impacts, and; to ensure the community that the environmental management of the project is acceptable. Some of the aspects covered by EMP are water, air, soil, noise, flora & fauna, disruption to users, worker's accidents and health risks including hygiene, and enhancement of natural and man-made features

Objectives:

After studying this unit, you should be able to

- study purpose, components and importance of environmental management plan
- understand the Integrated Solid Waste Management (ISWM) System
- know the roles/duties of central, state and local governments/authorities
- describe public consultation, project appraisal and decision making
- describe post-clearance monitoring and planning for Centralised and Decentralised Facilities
- know the arrangements for Informal Sector Integration
- understand about monitoring of Solid Waste Management By MIS system

9.2. SCOPE OF ENVIRONMENTAL MANAGEMENT PLAN (EMP)

The Solid Waste Management plan should consider a long term planning horizon of 20–25 years. Short term implementation plans covering 5 years each should be slotted within the long term plan for ease of implementation. The short term plan should be reviewed and updated once every 2–3 years for any midcourse correction as required. Local authorities should ensure that the short term plan is aligned with long term planning and implementation. EMP covers the following activities:

- Management and mitigation measures;
- Institutional arrangements;
- Implementation and supervision responsibilities;
- Monitoring and evaluation requirements;
- Implementation schedule;
- Training needs and Budget.
- Includes measures to consider during project implementation and operation; and

- Provides actions to be taken to implement these measures.

9.2.1. Purpose of EMP

- Minimize negative impacts;
- Enhance positive impacts;
- Ensuring environmentally sustainable planning, construction and operations management;
- Reduce problems & delays during project implementation;
- Improve overall project quality; and
- Add value to the project.

9.2.2. Components of EMP

A typical EMP shall be composed of the following:

1. **Summary of impacts:** The predicted adverse environmental and social impacts for which mitigation measures are identified in earlier sections to be briefly summarized with cross referencing to the corresponding sections in the EIA report.
2. **Description of mitigation measures:** Each mitigation measure should be briefly described w. r. t. the impact to which it relates and the conditions under which it is required. These should be accompanied by/referenced to, project design and operating procedures which elaborate on the technical aspects of implementing various measures.
3. **Description of monitoring programme to ensure compliance with relevant standards and residual impacts:** Environmental monitoring refers to compliance monitoring and residual impact monitoring. Compliance monitoring refers to meeting the project-specific statutory compliance requirements. Residual impact monitoring refers to monitoring of identified sensitive locations with adequate number of samples and frequency. The monitoring programme should clearly indicate the linkages between impacts identified in the EIA report, measurement indicators, detection limits (where appropriate), and definition of thresholds that signal the need for corrective actions.
4. **Allocation of resources and responsibilities for plan implementation:** These should be specified for both the initial investment and recurring expenses for implementing all measures contained in the EMP, integrated into the total project costs, and factored into loan negotiation. The EMP should contain commitments that are binding on the proponent in different phases of project implementation i.e., pre-construction or site clearance, construction, operation, decommissioning. Responsibilities for mitigation and monitoring should be clearly defined, including arrangements for coordination between various factors responsible for mitigation. Details should be provided w.r.t deployment of staff (detailed organogram), monitoring network design, parameters to be monitored, analysis methods, associated equipments, etc.

5. **Implementation schedule and reporting procedures:** The timing, frequency and duration of mitigation measure should be specified in an implementation schedule, showing links with overall project implementation. Procedures to provide information on progress and results of mitigation and monitoring measures should also be clearly specified.
6. **Contingency Plan when the impacts are greater than expected:** There shall be a contingency plan for attending the situations where the residual impacts are higher than expected. It is an imperative requirement for the entire project Authorities to plan additional programmes to deal with the situation, after duly intimating the concerned local regulatory bodies.

9.2.3. Importance of EMP

As EMP is an instrument for implementing environmental management commitments, conditions, and requirements of project. It promotes self-regulation & integration of environmental issues in planning and operations. Also, addresses relevant environmental management issues. EMP can be drafted in a consultative manner and incorporates regulatory requirements. EMP facilitates environmentally sustainable development and decision-making process i.e. it is able to forms the basis for consultation and negotiation of outcomes, flexible, comprehensive, and a tool for promoting accountability.

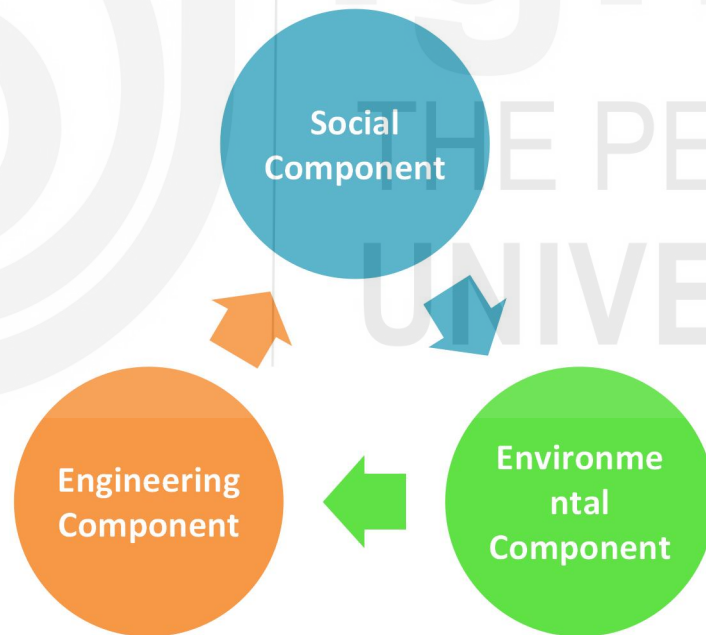


Figure 9.1: “Good environmental management means good project management”

9.3. THE INTEGRATED SOLID WASTE MANAGEMENT (ISWM) SYSTEM

The Solid Waste Management and adoption of processing technologies are dependent on the quantity and characteristics of the total waste generated in a local authority, the financial resources available, and in-house capability of local authorities to oversee project implementation. The Integrated Solid Waste Management (ISWM) proposes a waste management hierarchy with the aim to reduce the amount of waste being disposed, while maximizing resource conservation and resource efficiency. The ISWM hierarchy ranks waste management operations according to their environmental, economic, and energy impacts. Source reduction or waste prevention, which includes reuse, is considered the best approach; followed by recycling; and composting of organic matter of waste, resulting in recovery of material. The components of waste that cannot be prevented or recycled can be processed for energy recovery. Finally, disposal of waste in sanitary landfill, which is the least preferred option. Based on this waste management hierarchy and local conditions, an appropriate system and technology should be selected in the Solid Waste Management plan.

9.3.1. Integrated Solid Waste Management (ISWM) System Hierarchy

The hierarchy in following figure indicates that all options of source waste minimization should be utilized before appropriate treatment technologies are selected and implemented.

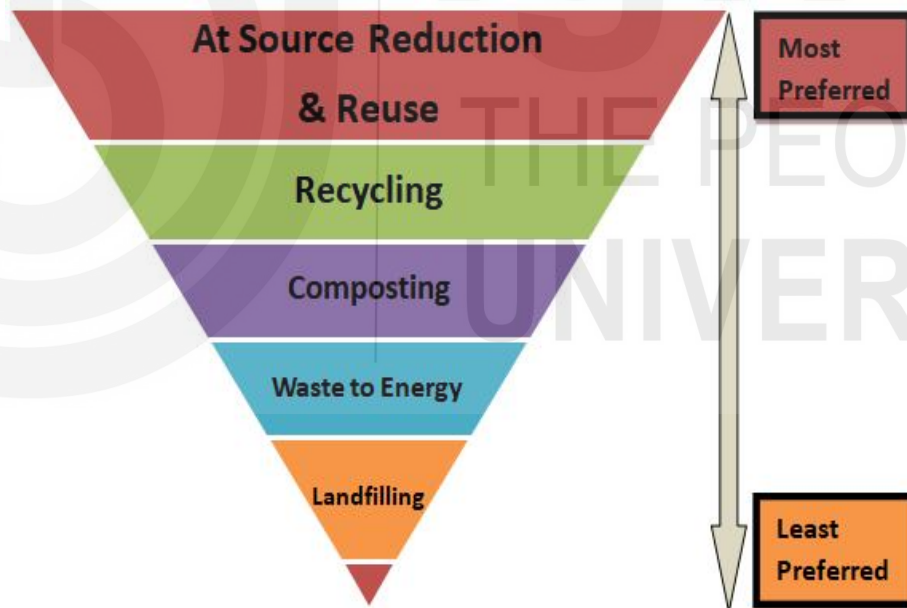


Figure 9.2: ISWM System Hierarchy

1. **At source reduction and reuse:** The most preferred option for waste management in the ISWM hierarchy is to prevent the generation of waste at various stages including in the design, production, packaging, use, and reuse of products. Waste prevention helps to reduce handling, treatment, and disposal costs and various environmental impacts such as leachate, air emissions, and generation of Greenhouse gases. Minimisation of waste

generation at source and reuse of products are the most preferred waste prevention strategies.

2. **Waste recycling:** The next preferred option for waste management in the ISWM hierarchy is recycling of waste to recover material resources through segregation, collection, and re-processing to create new products. In the waste management hierarchy, composting is considered as an organic material recovery process and is often considered at the same hierarchical level as inorganic waste recycling.
3. **Waste to energy:** Where material recovery from waste is not possible, energy recovery from waste through production of heat, electricity, or fuel is preferred. Biomethanation, waste incineration, production of refuse derived fuel (RDF), co-processing of combustible non-biodegradable dry fraction from MSW in cement kilns and pyrolysis or gasification are some waste-to-energy technologies.
4. **Land Filling:** Residual inert wastes at the end of the hierarchy are to be disposed in sanitary lined landfills, which are constructed in accordance with stipulations prescribed in SWM Rules, 2016. All over the world, landfills which integrate the capture and use of methane are preferred over landfills which do not capture the landfill gas. As per the hierarchy, the least preferred option is the disposal of waste in open dumpsites. However, Indian laws and rules do not permit disposal of organic matter into sanitary landfills and mandate that only inert rejects (residual waste) from the processing facilities, inert street sweepings, etc. can be land-filled. In cases where old dumps are to be closed, there is a possibility of capturing methane gas for further use. However, repeated burning of waste significantly decreases the potential of capturing methane.

SAQ 1

- (a) What is the scope of Environmental Management Plan (EMP)? Which activities are included in EMP?
- (b) What are the purposes of EMP? What are the components of EMP?
- (c) Write a short note on Integrated Solid Waste Management (ISWM) System.

9.4. ROLE OF CENTRAL, STATE AND LOCAL GOVERNMENTS

While the responsibility of providing SWM services in urban areas lies with the ULBs, central and state governments have a significant role to play in defining the framework within which service provision can be planned and executed by ULBs. The following are prescribed authorities and their roles and responsibilities in relation to ensuring the implementation of the provisions of the Solid Waste Management Rules, 2016.

9.4.1. Central Government

9.4.1.1. Duties of Ministry of Environment, Forest and Climate Change (MoEFCC)

- 1) The Ministry of Environment, Forest and Climate Change shall be responsible for overall monitoring the implementation of these rules in the country. It shall constitute a Central Monitoring Committee under the Chairmanship of Secretary, Ministry of Environment, Forest and Climate Change comprising officer not below the rank of Joint Secretary or

Advisor from the following namely- Ministry of Urban Development, Ministry of Rural Development, Ministry of Chemicals and Fertilizers, Ministry of Agriculture, Central Pollution Control Board, Three State Pollution Control Boards or Pollution Control Committees by rotation, Urban Development Departments of three State Governments by rotation, Rural Development Departments from two State Governments by rotation, Three Urban Local bodies by rotation, Two census towns by rotation, Two subject experts.

- 2) This Central Monitoring Committee shall meet at least once in a year to monitor and review the implementation of these rules. The Ministry of Environment, Forest and Climate Change may co-opt other experts, if needed. The Committee shall be renewed every three years.

9.4.1.2. Duties of Ministry of Urban Development:

The Ministry of Urban Development shall coordinate with State Governments and Union territory. They administrations:

- 1) To take periodic review of the measures taken by the states and local bodies for improving solid waste management practices and execution of solid waste management projects funded by the Ministry and external agencies at least once in a year and give advice on taking corrective measures;
- 2) To formulate national policy and strategy on solid waste management including policy on waste to energy in consultation with stakeholders within six months from the date of notification of these rules;
- 3) To facilitate States and Union Territories in formulation of state policy and strategy on solid management based on national solid waste management policy and national urban sanitation policy;
- 4) To promote research and development in solid waste management sector and disseminate information to States and local bodies;
- 5) To undertake training and capacity building of local bodies and other stakeholders; and
- 6) To provide technical guidelines and project finance to states, Union territories and local bodies on solid waste management to facilitate meeting timelines and standards.

9.4.1.3. Duties of Central Pollution Control Board (CPCB)

- 1) The CPCB shall co-ordinate with the State Pollution Control Boards and the Pollution Control Committees for implementation of these rules and adherence to the prescribed standards by local authorities;
- 2) They formulate the standards for ground water, ambient air, noise pollution, leachate in respect of all solid waste processing and disposal facilities;
- 3) They review environmental standards and norms prescribed for solid waste processing facilities or treatment technologies and update them as and when required;
- 4) They review through State Pollution Control Boards or Pollution Control Committees, at least once in a year, the implementation of prescribed environmental standards for solid waste processing facilities or treatment technologies and compile the data monitored by them;
- 5) They review the proposals of State Pollution Control Boards or Pollution Control Committees on use of any new technologies for processing, recycling and treatment of

solid waste and prescribe performance standards, emission norms for the same within 6 months;

- 6) They monitor through State Pollution Control Boards or Pollution Control Committees the implementation of these rules by local bodies;
- 7) They prepare an annual report on implementation of these rules on the basis of reports received from State Pollution Control Boards and Committees and submit to the Ministry of Environment, Forest and Climate Change and the report shall also be put in public domain;
- 8) They publish guidelines for maintaining buffer zone restricting any residential, commercial or any other construction activity from the outer boundary of the waste processing and disposal facilities for different sizes of facilities handling more than five tons per day of solid waste;
- 9) They publish guidelines, from time to time, on environmental aspects of processing and disposal of solid waste to enable local bodies to comply with the provisions of these rules; and
- 10) They provide guidance to States or Union territories on inter-state movement of waste.

9.4.2. State Government

9.4.2.1. Duties of the Secretary–in-charge

- 1) To prepare a state policy and solid waste management strategy for the state or the union territory in consultation with stakeholders including representative of waste pickers, self help group and similar groups working in the field of waste management consistent with these rules, national policy on solid waste management and national urban sanitation policy of the ministry of urban development, in a period not later than one year from the date of notification of these rules;
- 2) While preparing State policy and strategy on solid waste management, lay emphasis on waste reduction, reuse, recycling, recovery and optimum utilisation of various components of solid waste to ensure minimisation of waste going to the landfill and minimise impact of solid waste on human health and environment;
- 3) State policies and strategies should acknowledge the primary role played by the informal sector of waste pickers, waste collectors and recycling industry in reducing waste and provide broad guidelines regarding integration of waste picker or informal waste collectors in the waste management system.
- 4) To ensure implementation of provisions of these rules by all local authorities;
- 5) To direct the town planning department of the State to ensure that master plan of every city in the State or Union territory provisions for setting up of solid waste processing and disposal facilities except for the cities who are members of common waste processing facility or regional sanitary landfill for a group of cities; and
- 6) To ensure identification and allocation of suitable land to the local bodies within one year for setting up of processing and disposal facilities for solid wastes and incorporate them in the master plans (land use plan) of the State or as the case may be, cities through metropolitan and district planning committees or town and country planning department.

9.4.2.2. Duties of State Pollution Control Board (SPCB)

- 1) To enforce these rules in their State through local bodies in their respective jurisdiction and review implementation of these rules at least twice a year in close coordination with concerned Directorate of Municipal Administration or Secretary-in-charge of State Urban Development Department;
- 2) To monitor environmental standards and examine the proposal for authorization and make such inquiries as deemed fit, after the receipt of the application
- 3) While examining the proposal for authorisation, the requirement of consents under respective enactments and views of other agencies like the State Urban Development Department, the Town and Country Planning Department, District Planning Committee or Metropolitan Area Planning Committee and other relevant agencies shall be taken into consideration and they shall be given four weeks time to give their views, if any;
- 4) To issue authorisation within a period of sixty days to the local body or an operator of a facility or any other agency authorised by local body stipulating compliance criteria and environmental standards including other conditions, as may be necessary;
- 5) To synchronise the validity of said authorisation with the validity of the consents;
- 6) On receipt of application for renewal, renew the authorisation for next five years, after examining every application on merit and subject to the condition that the operator of the facility has fulfilled all the provisions of the rules, standards or conditions specified in the authorisation, consents or environment clearance.
- 7) SPCB may give directions to local bodies for safe handling and disposal of domestic hazardous waste deposited by the waste generators at hazardous waste deposition facilities.

9.4.3. Duties of District Magistrate or District Collector or Deputy Commissioner

- 1) To facilitate identification and allocation of suitable land for setting up solid waste processing and disposal facilities to local authorities in his district in close coordination with the Secretary-in-charge of State Urban Development Department within one year from the date of notification of these rules;
- 2) To review the performance of local bodies, at least once in a quarter on waste segregation, processing, treatment and disposal and take corrective measures in consultation with the Commissioner or Director of Municipal Administration or Director of local bodies and secretary-in-charge of the State Urban Development.

9.4.4. Duties and responsibilities of local authorities and village Panchayats

- 1) To prepare a solid waste management plan as per state policy and strategy on solid waste management within six months from the date of notification of state policy and strategy and submit a copy to respective departments of State Government or Union territory Administration or agency authorised by the State Government or Union territory Administration;
- 2) To arrange for door to door collection of segregated solid waste from all households including slums and informal settlements, commercial, institutional and other non residential premises. From multi-storage buildings, large commercial complexes, malls, housing complexes, etc., this may be collected from the entry gate or any other designated location;

- 3) To establish a system to recognise organisations of waste pickers or informal waste collectors and promote and establish a system for integration of these authorised waste-pickers and waste collectors to facilitate their participation in solid waste management including door to door collection of waste;
- 4) To facilitate formation of Self Help Groups, provide identity cards and thereafter encourage integration in solid waste management including door to door collection of waste;
- 5) To frame bye-laws incorporating the provisions of these rules within one year from the date of notification of these rules and ensure timely implementation;
- 6) To prescribe from time to time user fee as deemed appropriate and collect the fee from the waste generators on its own or through authorised agency;
- 7) To ensure safe storage and transportation of the domestic hazardous waste to the hazardous waste disposal facility or as may be directed by the State Pollution Control Board or the Pollution Control Committee;
- 8) To direct street sweepers not to burn tree leaves collected from street sweeping and store them separately and handover to the waste collectors or agency authorised by local body;
- 9) To provide training on solid waste management to waste-pickers and waste collectors;
- 10) To collect waste from vegetable, fruit, flower, meat, poultry and fish market on day to day basis and promote setting up of decentralised compost plant or biomethanation plant at suitable locations in the markets or in the vicinity of markets ensuring hygienic conditions;
- 11) To collect separately waste from sweeping of streets, lanes and by-lanes daily, or on alternate days or twice a week depending on the density of population, commercial activity and local situation;
- 12) To involve communities in waste management and promotion of home composting, biogas generation, decentralised processing of waste at community level subject to control of odour and maintenance of hygienic conditions around the facility;

9.5. PUBLIC CONSULTATION

Public consultation refers to the process by which the concerns of local affected people and others who have reasonable stake in the environmental impacts of the project or activity are ascertained.

- Public consultation is not a decision making process, but is a process to collect views of the people having plausible stake. If the SPCB/Public agency conducting public hearing is not convinced with the plausible stake, then such expressed views need not be considered.
- Public consultation involves two components, one is public hearing, and other one is inviting written responses/objections through Internet/by post, etc., by placing the summary of EIA report on the web site.
- Public hearing shall be carried out at the site or in its close proximity, district-wise, for ascertaining concerns of local affected people.
- Project proponent shall make a request through a simple letter to the Member-Secretary of the SPCB/UTPCC to arrange public hearing.
- Project proponent shall enclose with the letter of request, at least 10 hard copies and 10 soft copies of the draft EIA report including the summary EIA report in English and in the

official language of the state/local language prepared as per the approved scope of work, to the concerned Authority.

- Simultaneously, project proponent shall arrange to send, one hard copy and one soft copy, of the above draft EIA report along with the summary EIA report to the following Authorities within whose jurisdiction the project will be located:
 - District magistrate/District Collector/Deputy Commissioner(s)
 - Zilla parishad and municipal corporation or panchayats union
 - District industries office
 - Urban local bodies (ULBs)/PRIs concerned/development authorities
 - Concerned regional office of the MoEF/SPCB

Above mentioned Authorities except Regional office of MoEF shall arrange to widely publicize the draft EIA report within their respective jurisdictions requesting the interested persons to send their comments to the concerned regulatory authorities. They shall also make draft EIA report for inspection electronically or otherwise to the public during normal office hours till the public hearing is over. Concerned regulatory Authority (MoEF/SEIAA/UTEIA) shall display the summary of EIA report on its website and also make full draft EIA report available for reference at a notified place during normal office hours at their head office. SPCB or UTPCC concerned shall also make similar arrangements for giving publicity about the project within the State/UT and make available the summary of draft EIA report for inspection in select offices, public libraries or any other suitable location, etc. They shall also additionally make available a copy of the draft EIA report to the above five authorities/offices as mentioned above. The Member-Secretary of the concerned SPCB or UTPCC shall finalize the date, time and exact venue for the conduct of public hearing within seven days of the date of the receipt of the draft EIA report from the project proponent and advertise the same in one major National Daily and one Regional vernacular Daily/Official State Language.

A minimum notice period of 30 (thirty) days shall be provided to the public for furnishing their responses. No postponement of the date, time, venue of the public hearing shall be undertaken, unless some untoward emergency situation occurs and then only on the recommendation of the concerned District Magistrate/District Collector/Deputy commissioner, the postponement shall be notified to the public through the same National and Regional vernacular dailies and also prominently displayed at all the identified offices by the concerned SPCB/UTPCC. In the above exceptional circumstances fresh date, time and venue for the public consultation shall be decided by the Member-Secretary of the concerned SPCB/UTPCC only in consultation with the District Magistrate/District Collector/Deputy commissioner and notified afresh as per the procedure.

The summary of the public hearing proceedings accurately reflecting all the views and concerns expressed shall be recorded by the representative of the SPCB/UTPCC and read over to the audience at the end of the proceedings explaining the contents in the local/vernacular language and the agreed minutes shall be signed by the District Magistrate/District Collector/Deputy commissioner or his or her representative on the same day and forwarded to the SPCB/UTPCC concerned. A statement of the issues raised by the public and the comments of the proponent shall also be prepared in the local language or the official State language, as the case may be, and in English and annexed to the proceedings.

The proceedings of the public hearing shall be conspicuously displayed at the office of the Panchayats within whose jurisdiction the project is located, office of the concerned Zilla Parishad, District Magistrate/District Collector/Deputy commissioner, and the SPCB or UTPCC. The SPCB or UTPCC shall also display the proceedings on its website for general information. Comments, if any, on the proceedings, may be sent directly to the concerned regulatory authorities and the proponent concerned. The public hearing shall be completed within a period of forty five days from date of receipt of the request letter from the proponent. Therefore the SPCB or UTPCC concerned shall send the public hearing proceedings to the concerned regulatory authority within eight days of the completion of the public hearing. Simultaneously, a copy will also be provided to the project proponent. The proponent may also directly forward a copy of the approved public hearing proceedings to the regulatory authority concerned along with the final EIA report or supplementary report to the draft EIA report prepared after the public hearing and public consultations incorporating the concerns expressed in the public hearing along with action plan and financial allocation, item-wise, to address those concerns.

SAQ 2

- (a) What are the duties of CPCB and SPCB in Solid Waste Management?
- (b) What are the duties of MoEFCC and local authorities in Solid Waste management?
- (c) Explain 'Public Consultation' in EIA process.

9.6. PROJECT APPRAISAL

Appraisal means the detailed scrutiny by the EAC/SEAC of the application and the other documents like the final EIA report, outcome of the public consultation including public hearing proceedings submitted by the proponent for grant of prior environmental clearance. The appraisal shall be made by EAC to the Central Government or SEAC to SEIAA. Project proponent either personally or through consultant can make a presentation to EAC/SEAC for the purpose of appraising the features of the project proposal and also to clarify the issues raised by the members of the EAC/SEAC. On completion of these proceedings, concerned EAC/SEAC shall make categorical recommendations to the respective Authority, either for grant of prior environmental clearance on stipulated terms & conditions, if any, or rejection of the application with reasons. In case EAC/SEAC needs to visit the site or obtain further information before being able to make categorical recommendations, EAC/SEAC may inform the project proponent accordingly. In such an event, it should be ensured that the process of prior environmental clearance is not unduly delayed to go beyond the prescribed timeframe. Upon the scrutiny of the final report, if EAC/SEAC opines that ToR for EIA studies finalized at the scoping stage are covered by the proponent, then the project proponent may be asked to provide such information. If such information is declined by the project proponent or is unlikely to be provided early enough so as to complete the environmental appraisal within prescribed time of 60 days, the EAC/SEAC may recommend for rejection of the proposal with the same reason. Appraisal shall be strictly in terms of ToR for EIA studies finalized at the scoping stage and the concerns expressed during public consultation. This process of appraisal shall be completed within 60 days from the receipt of the updated EIA and EMP reports, after completing public consultation.

The EIA report will be typically examined for following:

- Project site description supported by topographic maps & photographs – detailed description of topography, land use and activities at the proposed project site and its surroundings (buffer zone) supported by photographic evidence.
- Description of the project site – how well the interfaces between the project related activities and the environment have been identified for the entire project cycle i.e. construction, operation and decommissioning at the end of the project life.
- How complete and authentic are the baseline data pertaining to flora and fauna and socio-economic aspects?
- Citing of proper references, with regard to the source(s) of baseline data as well as the name of the investigators/investigating agency responsible for collecting the primary data.
- How consistent are the various values of environmental parameters with respect to each other?
- Is a reasonable assessment of the environmental and social impact made for the identified environmental issues including project affected people?
- To what extent the proposed environmental plan will mitigate the environmental impact and at what estimated cost, shown separately for construction, operation and closure stages and also separately in terms of capital and recurring expenses along with details of agencies that will be responsible for the implementation of environmental plan/conservation plan.
- How well the concerns expressed/highlighted during public hearing have been addressed and incorporated in the EMP giving item wise financial provisions and commitments (in quantified terms)?
- How far the proposed environmental monitoring plan will effectively evaluate the performance of EMP? Are details for environmental monitoring plan provided in the same manner as the EMP?
- Identification of hazard and quantification of risk assessment and whether appropriate mitigation plan has been included in the EMP?
- Does the proposal include a well formulated time bound green belt development plan for mitigating environmental problems such as fugitive emission of dust, gaseous pollutants, noise, odour, etc?
- Does EIA make a serious attempt to guide the project proponent for minimizing the requirement of natural resources including land, water energy and other non renewable resources?
- How well has the EIA statement been organized and presented so that the issues, their impact and environmental management strategies emerge clearly from it and how well organized was the power point presentation made before the expert committee?
- Is the information presented in the EIA adequately and appropriately supported by maps, imageries and photographs highlighting site features and environmental attributes?

9.7. DECISION MAKING

The Chair person reads the sense of the Committee and finalizes the draft minutes of the meeting, which are circulated by the Secretary to all expert members invited to the meeting. Based on the response from the members, the minutes are finalized and signed by the Chairperson. This process for finalization of the minutes should be so organized that the time prescribed for various stages is not exceeded.

9.7.1. Approval / Rejection / Reconsideration

The Authority shall consider the recommendations of concerned appraisal Committee and convey its decision within 45 days of the receipt of recommendations. If the Authority disagrees with the recommendations of the Appraisal Committee, then reasons shall be communicated to concerned Appraisal Committee and proponent within 45 days from the receipt of the recommendations. The Appraisal Committee concerned shall consider the observations of the Authority and furnish its views on the observations within further period of 60 days. The Authority shall take a decision within the next 30 days based on the views of appraisal Committee. If the decision of the Authority is not conveyed within the time, then the proponent may proceed as if the prior environmental clearance sought has been granted or denied by the regulatory authority in terms of the final recommendation of the concerned appraisal Committee. For this purpose, the decision of the Appraisal Committee will be a public document, once the period specified above for taking the decision by the Authority is over. In case of the Category B projects, application shall be received by the Member Secretary of the SEIAA and clearance shall also be issued by the same SEIAA. Deliberate concealment and/or submission of false or misleading information or data which is material to screening or scoping or appraisal or decision on the application shall make the application liable for rejection, and cancellation of prior environmental clearance granted on that basis. Rejection of an application or cancellation of a prior environmental clearance already granted, on such ground, shall be decided by the regulatory authority, after giving a personal hearing to the applicant, and following the principles of natural justice.

9.7.2. After Approval

The Concerned MoEF/SEIAA will issue a prior environmental clearance for the project. The project proponent should make sure that the award of prior environmental clearance is properly publicized in at least two local newspapers of the district or state where the proposed project is located. For instance, the executive summary of the prior environmental clearance may be published in the newspaper along with the information about the location (website/office where it is displayed for public) where the detailed prior environmental clearance is made available. The MoEF and SEIAA/UTEIAA, as the case may be, shall also place the prior environmental clearance in the public domain on Government Portal. Further copies of the prior environmental clearance shall be endorsed to the Heads of local bodies, Panchayats and Municipal bodies in addition to the relevant offices of the Government. The prior environmental clearance will be valid from the start date to actual commencement of the production of the developmental activity. Usual validity period will be 5 years from the date of issuing environmental clearance, unless specified by EAC/SEAC. A prior environmental clearance issued to a project proponent can be transferred to another legal person entitled to undertake the project, upon application by the transferor to the concerned Authority or submission of no-objection of the transferor by the transferee to the concerned Authority for the concurrence. In this case, EAC/SEAC concurrence is not required, but approval from the concerned authority is required to avail the same project configurations, validity period transferred to the new legally entitled person to undertake the project.

9.8. POST-CLEARANCE MONITORING

The MoEF, Government of India will monitor and take appropriate action under the EP Act, 1986. In respect of Category A projects, it shall be mandatory for the project proponent to make public the environmental clearance granted for their project along with the environmental conditions and safeguards at their cost by advertising it at least in two local newspapers of the district or State where the project is located and in addition, this shall also be displayed in the project proponents website permanently. In respect of Category B projects, irrespective of its clearance by MoEF/SEIAA, the project proponent shall prominently advertise in the newspapers indicating that the project has been accorded environment clearance and the details of MoEF website where it is displayed. The MoEF and the SEIAA/UTEIAA, as the case may be, shall also place the environmental clearance in the public domain on Government Portal. Copies of environmental clearance shall be submitted by the project proponents to the Heads of the local bodies, Panchayats and Municipal bodies in addition to the relevant offices of the Government who in turn have to display the same for 30 days from the date of receipt.

The project proponent must submit half-yearly compliance reports in respect of the stipulated prior environmental clearance terms and conditions in hard and soft copies to the regulatory authority concerned, on 1st June and 1st December of each calendar year. All such compliance reports submitted by the project management shall be public documents. Copies of the same shall be given to any person on application to the concerned regulatory authority. Such compliance report shall also be displayed on the web site of the concerned regulatory Authority. The SPCB shall incorporate EIA clearance conditions into consent conditions in respect of Category A and Category B projects and in parallel shall monitor and enforce the same.

9.9. PLANNING FOR CENTRALISED AND DECENTRALISED FACILITIES

Conventionally, Solid Waste Management (SWM) systems were planned for and implemented at the city level, with centralized systems catering to the entire ULB. Resource, technology, and capital-intensive SWM services are best planned and executed at the city level; centralized systems are preferred for waste processing and treatment plants like RDF plants and municipal sanitary landfills, which can benefit from economies of scale and for easy management and environmental monitoring. Decentralized waste management systems or community level waste management systems reduce the burden of handling large volumes of solid waste at a centralized location, with a corresponding reduction in costs of transportation and intermediate storage. Especially for decentralized facilities, their success depends on segregated doorstep collection. All decentralized schemes should be assessed for long term sustainability and their impact on the overall SWM system of a city should be identified and considered while planning for citywide waste management facilities. Interactive planning along with the community is required to decide the extent of centralized and decentralized SWM systems for continued efficiency.

Advantages of centralized systems include:

- (i) Economies of scale,
- (ii) Single monitoring point,
- (iii) High-end technology, and
- (iv) Environmental controls.

Limitations of centralized systems include:

- (i) Larger tract of land,
- (ii) Fund limitations,
- (iii) Experience of ULBs in managing large contracts,
- (iv) High potential for environmental failure of systems where environmental controls are not in place or monitored.

9.9.1. Decentralized Waste Management Systems

Decentralized community level waste management systems are preferred to centralized waste management solutions under certain circumstances. Decentralized waste management systems or community level waste management systems reduce the burden of handling large volumes of MSW at a centralized location, with corresponding reduction in costs of transportation and intermediate storage. Some of the advantages of decentralized waste management include the following:

- Decentralized systems allow for lower level of mechanisation than the centralized solutions, and provide job opportunities for informal workers and small entrepreneurs.
- Decentralized options can be tailor made for the local waste stream, climate, social, and economic conditions.
- Decentralized systems reduce the cost incurred for the collection, transportation, and disposal of waste by the ULBs.

Nevertheless, ULBs should be aware of some of the limitations of decentralized waste management such as the following:

- Difficulty in obtaining land in many urban areas;
- Difficulty in maintaining scientific and hygienic conditions due to lack of sufficient space and training and capacity of workers;
- Uncertain quality of end products; and
- Difficulty in ensuring economic viability of the system, especially when qualified staff is required.

9.10. ARRANGEMENTS FOR INFORMAL SECTOR INTEGRATION

The informal sector, constituting of both kabadi system and waste pickers, plays an important role in the SWM value chain by recovering valuable material from waste. It helps reduce environmental impacts by improving resource recovery and reducing disposal requirements. The integration of the informal sector into the formal SWM system will contribute to the reduction of the overall system costs, provide support to the local recycling industry, and create new job opportunities. The waste pickers have significant expertise in sorting municipal waste and are an asset for processing and material recovery facilities. The integration of the informal waste sector into formal waste management systems is made possible through a set of formal or informal arrangements between waste pickers or organisations of waste pickers or organisations working with waste pickers and the local authorities, in their operational area. The integration process would typically result in the accrual of social benefits to waste pickers. SWM Rules, 2016 recognises the role of informal sector in waste management, and emphasise on establishing a system for integration of these waste collectors in order to facilitate their participation in SWM.

Certain enabling conditions and supportive actions for promoting the integration of the informal sector include:

- Organizing informal sector into recognized membership-based associations or cooperatives, with true representation of women as part of their leaders and members;
- Recognizing these associations for SWM service delivery;
- Creating a policy framework for informal waste sector recognition and an inclusive framework to facilitate their participation in the delivery of service;
- Promoting social security and health benefits to members of these associations;
- Encouraging informal sector, NGO, and CBO through linkage to National Urban Livelihoods Mission;
- Providing low-interest loans to organisations of waste pickers seeking to bid for tenders and contracts;
- Providing exemptions on fees and deposits for participation of informal sector associations in bidding for SWM contracts;
- Encouraging informal sector involvement in waste collection and sorting services;
- Reserving land in development plans for decentralised processing of biodegradable wastes and collection of recyclables.

9.11. MONITORING SOLID WASTE MANAGEMENT BY MIS SYSTEM

A comprehensive monitoring and evaluation system should be adopted for proper implementation of the Solid Waste Management plan and for assessing progress toward meeting the targets of the plan. In analysis for monitoring, the first step towards implementing a monitoring and evaluation system is to acquire the requisite data for assessing the performance of the SWM system. Reports generated should contain critical information and should be effectively used for decision making, identifying gaps and corrective measures. Standard formats should be developed for producing reports on daily, monthly, quarterly, or annual basis as per the requirement. This information can be collected and analysed at the city level, zone level, or ward level depending on the monitoring requirements. The best way to achieve this is through a computerized management information system (MIS). The information collected and reported through MIS should also be used as a basis for midterm review of the SWM plan and for defining goals of future planning. Collection and analysis of data related to MSWM is required to assess the existing situation and propose adequate measures for improving service delivery. Management Information System (MIS) is a computerized system which can help capture, store, and retrieve data or information for decision makers. MIS can manage large amounts of data such as waste collection points, location of bins, designated secondary storage points, ward level vehicle movement, information on transportation of waste and its weight, and other related information. All cities need to maintain a basic MIS system either through manual records or electronically. Once this system has been established, level two is to connect this basic database on solid waste to be analysed through map based tools and applications. The use of integrated technologies over the basic MIS system such as geographic information systems (GIS), global positioning system (GPS), radio frequency identification (RFID), and general packet radio services (GPRS) have resulted in the development of integrated and comprehensive solutions for Solid Waste Management.

SAQ 3

- (a) Explain in detail about Project Appraisal?
- (b) Write note on: Decision making in EIA.
- (c) What is Post-Clearance Monitoring?
- (d) Write on: i) Centralized System
ii) De-centralized System
- (e) Explain monitoring of Solid Waste Management by MIS system.

9.12. SUMMARY

In this unit theory related to Environmental Management Plan (EMP) as well as Integrated Solid Waste Management (IWSM) system explained in detail. This unit includes roles and responsibilities of central, state and local authorities or panchayats under the EIA system. Central government includes duties of Ministry of Environment, Forest and Climate change (MoEFCC), Ministry of Urban development and Central Pollution Control Board (CPCB). State government includes duties of Secretary in-charge, State Pollution Control Board (SPCB), District Magistrate, Collector and local authorities.

Public consultation process involved on EIA report is explained herein. After public consultation process, project appraisal, approvals and post-clearance monitoring process are mentioned in detail. Also planning of centralized and de-centralized systems for Solid Waste Management are presented in this unit. At last arrangements of informal sectors with integration and monitoring of SWM by MIS are described.

SAQ 1

- (a) Refer section 9.2.
- (b) Refer sub-sections 9.2.1 and 9.2.2.
- (c) Refer section 9.3 and sub-section 9.3.1.

SAQ 2

- (a) Refer sub-sections 9.4.1.3 and 9.4.2.2.
- (b) Refer sub-sections 9.4.1.1 and 9.4.4.4.
- (c) Refer section 9.5.

SAQ 3

- (a) Refer section 9.6.
- (b) Refer section 9.7; sub-sections 9.7.1 & 9.7.2.
- (c) Refer section 9.8.
- (d) Write on: i) Refer section 9.9 & sub-section 9.9.1.
ii) Refer section 9.9 & sub-section 9.9.1.
- (e) Refer section 9.11.