Chapter 6
6. Management and Monitoring in EIA
6.1 Environmental Management Plan

Definition of an "Environmental Management Plan": A plan or program that seeks to achieve required end state and describes how activities, which have or could, have an adverse impact on the environment, will be mitigated, controlled, and monitored during the commissioning, mobilization, construction, operation, maintenance and decommissioning of a project; and that the positive benefits of the projects are enhanced.

Purpose of the EMP

- Encourage good management practices through planning and commitment to environmental issues concerning any project;
- It tells how the management of the environment is reported and performance evaluated periodically;
- To provide rational and practical environmental guidelines that will assist in minimizing the potential environmental impact of activities;
- Helps in minimizing disturbance to the environment (physical, biological and ecological, socioeconomic, cultural, and archeological,) ;
- Combat all forms of pollution through monitoring air, noise, land, water, waste, and energy and natural resources;
- Protection of sensitive and endangered flora and fauna;
- Prevent land degradation;
- Comply and adhere to all applicable laws, regulations, standards and guidelines for the protection of the environment;

- Adopt best practicable waste management for all types of waste (liquid and solid) with objective on prevention, minimization, recycling, treatment or disposal of wastes;
- Describe all monitoring procedures required to identify impacts on the environment;
- Train and bring awareness to employees and contractors with regard to environmental obligations and compliance.
- Reduce environmental risk and provide better Health, Safety and Environment (HS&E)
- Increase efficiency through minimum consumption and conservation of energy deplete-able resources
- An EMP also provides with a plan answering - what, where, when, how and who?
- Establishing the reporting system to be undertaken during the construction.
- The EMP also serves to highlight specific requirements that will be monitored during the development and should the environmental impacts not have been satisfactorily prevented or mitigated, corrective action will have to be taken.

Table 11: Environmental and Social Management Plan of Tana Kebele Market Upgrading Project

Phases of the project	Project Activity	Potential Impact	Recommended Mitigation Measures,	frequency	Responsible Institutions	Estimated Cost
Preconstruction Phase	Site Clearing	Solid waste generation	▪ Transport and dispose the wastes at the municipal disposal site ▪ sell the topsoil to users		Contractor and Proponent	
		Dislocation of business operators	Leasing the land, provide in rent form, compensate in kind and monetary form		The proponent	Refer RAP document
Construction phase	Excavation and construction	▪ Solid waste generation ▪ affect the aesthetic value of the area	▪ Sorting recyclables disposing appropriately in to the municipal disposal site. ▪ Site clearing		Contractor	-
		Air pollution	Water showering	As required	contractor	-
		Workers safety and health	Supply of safety cloths and materials	Once per 6month	contractor	20,000.00
Operation Phase	Operation of business transaction and parking lots	Solid waste generation	Collection of wastes and transfer of the collected wastes to the waste collectors	Four times per month	Business operators & City administration	37,980.00
			Placement of dust bins		▪ Business operators ▪ City administration	127,940.00
			Provide awareness creation workshop to reduce the solid waste generation at source		The proponent, BoH and BoEPLAU	10,000.00
		Air pollution	Set emission standards and conduct emission monitoring	Twice a year	BoEPLAU	2000.00
		Noise pollution	Awareness creation Enforce legislations	Once a year	Municipality, BoEPLAU	20,000.00
		Fire hazard	▪ Fitting of fire extinguisher ▪ create an access road for fire hazard prevention vehicles		contractors	Included in construction cost
	Operation of toilets and business centers	sanitation Waste generation	Emptying and transport to the Municipal waste treatment site	Once per 6 month	The proponents of the buildings	26,000

6.2 Environmental Monitoring

Environmental monitoring is defined as ***"an activity undertaken to provide specific information on the characteristics and functions of environmental and social variables in space and time.“***

Environmental monitoring is defined as the continuous assessment of environmental or socio-economic variables by the systematic collection of specific data in space and time.

Environmental monitoring is therefore one of the most important components of an EIA which is essential for:

- ensuring that impacts do not exceed the legal standards,
- checking the implementation of mitigation measures in the manner described in the EIA report, and
- providing early warning of potential environmental damages.

Environmental monitoring cont…

Environmental monitoring can be used to:

- Document the baseline conditions at the start of the EIA
- Assess performance and monitor compliance with agreed conditions specified in construction permits and operating licenses and modify activities or mitigation measures if there are unpredicted harmful effects on the environment.
- Identify trends in impacts.
- Verify the accuracy of past prediction of impacts and the effectiveness of mitigation measures in order to transfer this experience to future activities of the same type.

An environmental monitoring plan provides a delivery mechanism to address the adverse environmental impacts of a project during its execution, to enhance project benefits, and to introduce standards of good practice to be adopted for all project works. An environmental monitoring program is important as it provides useful information and helps to:

- Assist in detecting the development of any unwanted environmental situation, and thus, provides opportunities for adopting appropriate control measures, and
- Define the responsibilities of the project proponents, contractors and environmental monitors and provides means of effectively communicating environmental issues among them.
- Define monitoring mechanism and identify monitoring parameters.
- Evaluate the performance and effectiveness of mitigation measures proposed in the Environment Management Plan (EMP) and suggest improvements in management plan, if required,
- Identify training requirement at various levels.

6.2.1 Principles of monitoring

If the EIA monitoring process is to generate meaningful information and improve implementation of mitigation measures, it must accomplish the following:

- **Determine the indicators** to be used in monitoring activities,
- **Collection of** meaningful and relevant **information,**
- **Application of** measurable **criteria** in relation to chosen indicators,
- **Reviewing** objective **judgments** on the information collected,
- **Draw** tangible **conclusions** based on the processing of information,
- **Making** rational **decision** based on the conclusion drawn,
- **Recommendation** of improved mitigation measures to be undertaken.

6.2.2. Types of Monitoring

- Various types of monitoring activity are currently in practice, and each has some degree of relevance to an EIA study. The main types are briefly described below:

Baseline Monitoring	a survey should be conducted on basic environmental parameters in the area surrounding the proposed project before construction begins (pre-audit study). Subsequent monitoring can assess the changes in those parameters over time against the baseline.
Impact Monitoring	the biophysical and socio-economical (including public health) parameters within the project area, must be measured during the project construction and operational phases in order to detect environmental changes, which may have occurred as a result of project implementation.
Compliance Monitoring	this form of monitoring employs a periodic sampling method, or continuous recording of specific environmental quality indicators or pollution levels to ensure project compliance with recommended environmental protection standards.

The following are the most common ones with common issues.

No.	Types	Definitions	Issues to be considered	Systems of approach
1	**Baseline monitoring**	It is the measurement of environmental parameters during a pre-project period	Identifying the resource base before the implementation of the proposed activities	Baseline data collection
2	**Impact monitoring**	It is the measurement of environmental parameters during project construction and implementation	Identify/detect changes in the parameters	▪ Visual observation ▪ Interview ▪ Document review
3	**Compliance monitoring**	Unlike the previous monitoring activities, takes the form of periodic sampling or process emissions to ensure that regulatory requirements are observed and standards are met.	Check against regulatory requirements and standards e.g. in relation to emission of pollutants.	▪ Document review ▪ Interview ▪ Visual observation ▪ Sample testing

6.2.3.Environmental Monitoring Plan

The monitoring plan includes the description of types of monitoring, the parameters to be monitored, methods to be used and schedules for operating monitoring activities.

Table 12: Environmental monitoring plan

Institutional Aspect

Institutional factors determining the effectiveness of monitoring should not be underestimated. There needs to be a firm institutional commitment by the agencies responsible for the monitoring process, particularly in regard to the following:

- willingness on the part of the institutions involved and organizational personnel to support the monitoring process with the necessary level of resources and authority,
- maintaining continuity in the monitoring programme.

Cont…

- technical capabilities of the personnel involved must be developed,
- integrity or honesty of the process must be maintained,
- decisions must be taken based on a thorough review of results,
- monitoring information must be made available to all agencies concerned, and
- necessary institutional reforms need to be made within the planning and implementation agencies.

The costs involved in EIA monitoring should be borned by the project proponent.

The reporting structure for EIA monitoring depends upon the nature of the project and the analysis undertaken by the agencies concerned.

6.3 Environmental Auditing

Definitions of Auditing

•The United States Environmental Protection Agency (EPA, 1997) defines environmental auditing as a „documented, periodic and objective review of facility operations and practices related to meeting environmental requirements". An auditing protocol will also ensure consistency in the level of compliance. The aims of an environmental audit should be to: verify compliance with environmental requirements, evaluate the effectiveness of Environmental Management Systems, and to assess the risks from regulated and unregulated practices (EPA, 1997).

•The International Chamber of Commerce defines an environmental audit as „a management tool comprising a systematic, documented, periodic and objective evaluation of how well environmental organisation, management and equipment are performing with the aim of helping to safeguard the environment by:

(1) facilitating management control of environmental practices; and

(2) assessing compliance with company policies, which includes meeting regulatory requirements

The International Standards Organisation (ISO) defines environmental audit as a „systematic, documented verification process of objectively obtaining and evaluating audit evidence (verifiable information, records or statements of fact) to determine whether specified environmental activities, events, conditions, management systems, or information about these matters conform with audit criteria (policies, practices, procedures or requirements against which the auditor compares collected audit evidence about the subject matter), and communicating the results of this process to the client (organisation commissioning the audit).“

Environmental audits help in assuring the accuracy and relevance of environmental monitoring, and the identification of issues via the audit process may also lead to environmental standards that exceed regulatory requirements.

Environmental Auditing cont…

- Auditing refers to the examination and assessment of a certain type of performance.
- Environmental auditing is part of the overall environmental management system. It is used to check systems and procedures against legal requirement, standards, best practices and professional judgment.
- In the case of an EIA, an audit assess the actual environmental impact, the accuracy of prediction, the effectiveness of environmental impact mitigation and enhancement measures, and the functioning of monitoring mechanisms.
- The audit should be undertaken upon a project run in operation, for some time, and is usually performed once or twice in the entire project cycle.
- The following types of audit that are recommended to be implemented in different phases of the EIA process:

➢In order to capitalize on the experience and knowledge gained, the last stage of an EIA is to carry out an **Environmental Audit** some time after completion of the project or implementation of a programme.

➢It will therefore usually be done by a separate team of specialists to that working on the bulk of the EIA. The audit should include an analysis of the technical, procedural and decision-making aspects of the EIA.

- Technical aspects include:
- the adequacy of the baseline studies,
- the accuracy of predictions and
- the suitability of mitigation measures.

•Procedural aspects include:
• the efficiency of the procedure,
• the fairness of the public involvement measures and
•the degree of coordination of roles and responsibilities.
•Decision-making aspects include:
•the utility of the process for decision making and
• the implications for development, (adapted from Sadler in Wathern, 1988).
•The audit will determine whether recommendations and requirements made by the earlier EIA steps were incorporated successfully into project implementation.
•Lessons learnt and formally described in an audit can greatly assist in future EIAs and build up the expertise and efficiency of the concerned institutions.

6.3.1 Types of and issues to be considered

The following are few of major environmental auditing and the most common issues to be considered.

Types of Audit	Definition	Issues to be considered	Systems of approach
Compliance audit	It is the verification process where by the company established the extent to which it is complying with environmental legislation, discharge and emission consent limits, building permit (standards).	Check against that all relevant environmental legislation and standards are being considered	▪ Interview ▪ Visual observation ▪ Document review
Environmental risk audit	It is the process of conducing an assessment to identify potential risk points in the chain from receipt of raw material through the production processes to storage and distribution	▪ Assess conditions & working procedures ▪ Assess the likelihood of an environmentally damaging occurrence and the consequences of the event.	▪ Interview ▪ Visual observation ▪ Document review
Reacquisition audit	This is commonly undertaken before the transfer of ownership from one individual to another.	▪ Assess contaminated land buildings ▪ Undertake historical survey through identifying past and current activities ▪ Undertake site assessment ▪ Undertake sample test	▪ Interview ▪ Document review ▪ Visual observation ▪ Laboratory testing
Management systems audit	It is the process of checking the system or procedures against the existing policy and standard and relevance of those standards and procedures for ensuring continual improvement in environmental performance.	▪ Check operations against written procedures ▪ Check their continual improvement program	▪ Interview ▪ Visual observation ▪ Document review

Types of Audit

Decision Point Audit	examines the effectiveness of EIA as a decision-making tool
Implementation Audit	ensures that approved conditions have been met
Performance Audit	examines the responses of agencies concerned with project management
Project Impact Audit	examines environmental changes arising from project implementation
Predictive Technique Audit	examines the accuracy and utility of predictive techniques by comparing actual against predicted environmental effects
EIA Procedures Audit	critically examines the methods and approach adopted during the EIA study

6.3.2 Environmental Auditing Plan

- Environmental Audit should be carried out upon the completion of project construction and after 2 years of project operation in order to obtain information on:
- the condition of natural/social/economical resources prior to project implementation after the project construction is completed,
- whether or not, all the mitigation measures implemented are effective to control adverse impact, or enhance beneficial impacts,
- whether or not mitigation measures implemented are effective to control adverse impact, or enhance beneficial impact,
- whether or not all degraded landscape due to project implementation have been restored into original condition,
- what are the impacts of boom-bust scenario among the workforce involved in project implementation and the local economy, and
- the effect on the local economy of project implementation.
- Information from monitoring output should also be utilized for carrying out environmental audit

For effective EIA study there is need to:

- increases the trained EIA professionals,
- involvement of private sector companies /firms and consultancies in EIA study,
- institutionalize EIA study, research and accrediting EIA professionals and institution in order to maintain the quality, and
- involvement of academic institutions for preparing trained human resources required.

6.4. Environmental impact assessment report writing

6.4.1. Background

Report writing is an important part of any EIA study that enable to communicate the findings of the study to a wide range of professionals, decision makers, administrators and the public. Each individual EIA report should ideally be tailored to fit the circumstances of the project. However, it is useful to follow certain general guidelines to fit together the essential components of the study so as to generate a coherent advisory report helpful to the decision makers as well as the general public. A brief description of the typical contents of each section of an EIA report is given below.

6.4.2. Contents of EIA report

I) Executive summary

The summary has to be concise and present the highlight of the main issues pertinent to decision makers on the project. It should be developed in non-technical terms such that decision makers and other stakeholders may readily understand it.

II) Details of the report

1. Introduction

This part would be introductory in nature and should provide a background of the project. It presents a review of the existing situation and demonstrates the need for the proposed project. Details regarding the composition of the EIA study team, the budget adequacy (in professional person), work plan and the report organization should also form a part of this category.

2. The site and surroundings

The site and surrounding area should be described in this part. This part should include the following information.

- A description of the location and layout, including a vicinity map.
- Existing land use patterns should be described.
- Existing water body and water use in the area.
- Demographic profile which includes population density, sex, age, etc
- Soil profiles, including identification of soil types, erosion, geology etc
- Hydrology and water quality, resources.
- Meteorological data and air quality etc.
- Ecological data would be included.

3) About the project

This part should describe the relevant systems of the proposed project. This should include the plant layout, inclusive of the drainage system, description of materials utilized and produced (mass balance), design criteria adopted and the access ways to be used. Project information should be described in terms of the following activities, such as site preparation, operation on site, transportation, welfare and closure.

4) Environmental effects of project operation

The anticipated impacts of the project operation on the environment should be described in this part. EIA methods such as matrix and network, together with tools such as predication models, may be useful at this stage. All direct and indirect impacts should be speculated at this stage.

5) Evaluation and analysis of impact

The type of evaluation method or tool, for example, matrix, network, GIS, cost-benefit analysis, etc used to quantitatively evaluate the impact due to the proposed action, should be highlighted in this part of the report.

6) Design of mitigation measures

In this part of the report, mitigative measures, which are established to prevent, reduce or compensate for impacts mentioned under part 5 are detailed. Finding better ways of doing things, minimize or eliminate negative impacts, enhance benefits and protect public and individual rights to compensation are common mitigative measures.

7) Environmental Management Plan (EMP)

This part should describe in detail the implementation plan to be adopted by the proponent during implementation for mitigation, protection or enhancement measures which are recommended in part 6. This part is the most crucial and significant part of the entire EIA report. It is therefore essential that this part should be presented with precision and clarity. The outline may be structured as follows:

- Objective;
- Work plan/Implementation schedule;
- Resources requirements;
  - Manpower
  - Material provision/availability
  - Budgetary provision for EMP.

8) Environmental monitoring programs

The proposed monitoring programs to be implemented to monitor environmental impacts due to the operation of the project should be described in this part. The programs should be initiated prior to the commencement of the construction activities.

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