Chapter V: Environment Analysis

Environmental assessment is increasingly getting importance in any project appraisal.

- **Ignoring the environmental aspects or underestimating its importance may resulted in negative outcomes such as**
- Poor human health,
- Socioeconomic problem
- Depletion of natural resources,
- Decreasing productivity and thereby undermining development
- And other irreversible consequences

Environment Analysis (Cont…)

- Thus, when a new project is planned an environmental assessment should be carried out.
- In most jurisdiction (country) an environmental assessment is mandatory before permission is given
- This is the case for major development projects such as
  - Power Plants,
  - Flood control system,
  - Dam construction,
  - Mining projects, etc

Environment Analysis (Cont…)

- If a project is believed to have a significant environmental impact
- then suggest ways how the impact could be reduced at a reasonable cost.
- After the environmental impact assessment has been taken, the next step is planning an action with regard to the environment.

What is Environmental Impact Assessment ?

- The term **‘Environmental Impact Assessment' (EIA)** refers to a procedure that must be followed for certain types of project before they can be given 'development consent'.
- The procedure is a means of systematically assessing a project's likely environmental effects
- This is important because,
  - the scope of the predicted effects
  - and ways of reducing them,

  will be properly understood by the public **and** by the concerned authority before making any decision.

Background of EIA

Early 1950 EIA for development projects were undertaken particularly

- **North America,**
- **Europe, and**
- **Japan**

- The main objective was to ensure that public safety and health were adequately protected.
- Separate documents were submitted to each of the regulatory agencies.
  - **water authority**
  - **air pollution control branch, etc.**
- The document were reviewed by the appropriate regulatory bodies.

Background of EIA (Cont…)

- At early stage the focus was **on measurable physical factors**, (for factors there were **standards and cods**)
  - air quality,
  - water quality,
  - solid waste disposal
- After a few years EIA, began to include **biological and ecological factors** even if they were difficult to quantify.
- More recently the EIA were broadened further to include **socioeconomic factors (employment opportunity, cultural impact, etc**) so that trade off among socioeconomic and environment factors could be evaluated.

Why EIA?

i. Environmental impact assessment enables environmental factors to be given weight, along with economic or social factors, when any project is considered.

ii. It helps to promote a sustainable approach to
- physical development,
- land and natural resource use,
- and property use

in cities, towns and the countryside.

Why EIA? (Cont…)

iii. **For developer's** EIA may indicate ways in which the project can be modified to avoid possible adverse effects,

(through considering more environmentally friendly alternatives (taking such steps will make the approval of the project more smooth)

iv. **For the authority** with environmental responsibilities, EIA provides them a basis for better decision making.

- The provision of more comprehensive information should enable them to make swifter decisions.

Why EIA? (Cont…)

v. **For the general public's,** EIA provide a full analysis of a project's effects, and the developed document called an Environmental Impact Statement can help to allay fears created by lack of information

In general, with the EIA the likely effects of new development project on the environment are fully understood before the development activity is allowed to go ahead

EIA

At the outset the EIA will starts by determining

- whether a project falls within the relevant act or regulation
- whether the development is likely to create significant environmental damage

If so an assessment is undertaken, leading to the preparation of an **Environmental Impact Statement (EIS).**

EIS is the resulting public document written in a format specified by authorized national, regional, or local government agencies or relevant bodies

EIA (Cont…)

In many countries the EIS is open to public scrutiny and may be reviewed at public hearing

But the decision is made at political level. The decision can be ,

- **Accepting the development**
- **Accept an amended form of the proposed development**
- **Accept an alternative proposal or**
- **Reject the development**

Often a base line report must be prepared for submission in advance the EIS

Environmental Impact Statement

- The base line report contains an environmental inventory.
- **The Environmental inventory:** is factual account of environmental conditions in the region at the time of the report, with trends that may have recently occurred.

Contents of the EIS

The EIS is expected to describe the following facts

- **Define the criteria** to be used in measuring the environmental change, including their relative weight
- **Estimate the nature and types** of the likely environmental effects of all alternatives
- **Identify the relevant human concerns**
- **Estimate the significance** of the predicted environmental change

Contents of the EIS (Cont…)

- **Describe a proposed action,** as well as alternatives (including no action)
- **Estimate the impact of the proposed action**
- **Make recommendations for monitoring procedures** to be followed during and after implementation of the action.

The nature and magnitude of the environmental change that are likely to occur and that must be estimated and included in the EIS fall into **three main classes**

Contents of the EIS (Cont…)

a) Physical: These are, for instant,

- earthquake probabilities,
- water quality in ground water,
- rivers, and lakes;
- soil and air quality

- Using scientific practices prediction of physical impact are relatively easy to make. There are several method that can be employed to do this analysis

Contents of the EIS (Cont…)

b) Biological and Ecological: here included issues related to

- **Vegetations,**
- **wildlife,**
- **and endangered species are some of the examples**

Prediction of biological and ecological impact is much more uncertain.

This is because, living organisms are subjected to many natural stresses like,

- drought,
- floods,
- overgrazing as well to stresses created by society.

Contents of the EIS (Cont…)

In addition living organisms are highly adaptive. As a result their reaction to multiple environmental stress are not always predictable

c) Socioeconomic: These include,

- Demographic,
- economic,
- and social value and attitude:

- Prediction of socioeconomic impact are also extremely uncertain even in a qualitative sense.

Contents of the EIS (Cont…)

- **These impacts are fundamentally important to the person affected and may cause biological or ecological changes**.
- Note that environmental impact may vary across a commonalty.
- For instance, some people may support the a highway proposal other may oppose because of its of its problems like,
    - noise,
    - air pollution etc.
- Generally, determining which environmental changes are relevant is critical to the validity and credibility of the impact assessment process

Stages of EIA

- **The process EIA involves a number of clearly defined stages.**
- **Identification:** This implies listing of key impacts such as,
  - noise levels
  - air pollution,
  - water quality deterioration, etc
- identifying the sources of these impacts such as,
  - vehicle emissions,
  - deforestation,
  - waste disposal,

Stages of EIA (Cont…)

Prediction: This includes scientific prediction of causes and effects (Prediction of the scope of the impact)

Indication as to the level of uncertainty of the prediction.

Assessment: It is about examining whether or not the identified and predicted changes are environmentally significant. This involves,

- **consultation with relevant experts and decision makers,**
- **reference to existing criteria,**
- **comparison with relevant laws, standards and regulations**.

Stages of EIA (Cont…)

Mitigation: It is about consideration of alternative measure that could reduce the project's environmental impacts.

This includes:

- changing design,
- treatment of waste materials
- and compensating affected population are some of the measures

Practical questions

Verities of approaches are used to EIA

- Regardless of the approaches used the following practical list of questions should be consider in the design of an EIA

Project design and construction

- What type of project is being considered?
- What are the physical dimension of the area under consideration?
- How much time will be required to implement the project?

Practical questions (Cont…)

- Does the project make optimal use of local workers, renewable resources, and other benefits?
- Will there be serious environmental disruption during construction?

Project Operations

- How will hazardous waste and waste products be handled?
- What provisions have been made for training employees in environmental protection?
- What contingency plan have been developed to cope with accidents?
- What plans have been made for environmental monitoring?

Practical questions (Cont…)

Site characteristics

- Is the landscape complex, creating difficulties in predicting such things like groundwater quality, soil characteristics and air pollution?
- Is the site particularly susceptible to natural disaster?
- Will many people be displaced by the project?
- Will historic site be endangered?
- Will the project interfere with the movement of important migratory animal and fish population?

Practical questions (Cont…)

Institutional sociopolitical frame work

- What are governmental regulations and procedures?
- What are the political factors to be considered?
- What implementation difficulties can be expected during construction and operation of the project?

Possible impact

- What are the possible impacts on the environment? (During construction, after construction, and long term)
- Who would be affected with this impact?

Practical questions (Cont…)

Socioeconomic analysis

- Who will gain and who will loss from the proposed project?
- What are the trade offs
- Will the project reduce inequality between occupants, gender, and age group
- Will it enhance valuable, elements and patterns in the local, national or regional culture

Alternatives

- Could the project proposal be modified to reduce environmental impacts?
- Is there an alternative proposal (some project in different site, or different project at the same site)

Practical questions (Cont…)

Availability of Information

- What are the relevant environmental standard, criteria, objectives, and bylaws?
- Is there information on the impacts of similar projects?
- What are the sources of relevant environmental data?
- What are the views of the general public and of specialist group about the project proposal?

Practical questions (Cont…)

Availability of resources

- Are there local experts from whom advice can be sought with respect to specific impacts?
- Is there a possibility of seeking outside advice from a specialist?
- Are there publication (technical memoranda, guideline, etc) that would help in identifying possible impacts?

After the possible impacts have been determined the EIA is essentially compete..

Project category

Not all projects need EIA to the same degree and intensity.

Environmental Impact Assessment is undertaken for those projects that might causes serious Environmental problems.

To identify such project preliminary screening is carried out on the basis of their likely impact on the environment.

Some of the criteria used in the environmental screening include

Project category (cont…)

Size: large projects are more likely to require more detailed assessment.

Location: Projects that are being implemented in environmentally sensitive areas are liable to need further assessment.

Complexity: A project that has a number of different components is likely to have many environmental impacts thereby it needs more consideration.

Type of project: Projects such as mines and dams are liable to cause more environmental impacts than other projects thereby they need careful consideration.

Project category (cont…)

We can have two possible results of such screening:

- **The project can continue as planned with no further environmental appraisal.**
- **There is a need to prepare a more detailed preliminary assessment**

The UN environmental program, categorized projects under four categories:

Project category (cont…)

- **Category A:** category “A” projects are those projects and components that have diverse and significant environmental impacts. These are projects like,
  - Dams,
  - mineral development,
  - resettlement and urban development are some of the examples.
- **These types of projects require full EIA.**
- **Category B:** Category “B” projects are those projects that have specific environmental impacts. Small scale projects can be categorized under this category

Project category (cont…)

- **Category C:** Category “C” projects are those projects that do not result in significant environmental impact. Here belongs,
  - Technical assistance,
  - training and workshops
- Such projects do not require environmental impact assessment
- **Category D:** Category “D” projects are environmental projects such as,
  - **Waste disposal management ,**
  - **Desalination and**
  - **Wild life protection**

are some of the examples.

Assessment of Mitigation Measures

- To overcome some of environmental impacts of a project, it is possible to list out many mitigation measures and strategies.

Some of the measures that can be considered are,

1. **Avoid negative impacts:** The most extreme example of this strategy is to abandon the project altogether because the potential impacts are too serious..
    - Changing the projects location,
    - establishing buffer zones around sensitive ecosystems,

are some of the avoidance strategies

Assessment of mitigation measures (Cont…)

2. **Reduce negative impact:** This involves comparing the cost of reducing impacts with the potential cost of the unmitigated impact.
    - treatment plants to reduce pollution,
    - landscaping and using local materials to reduce impacts of new structures,
    - scheduling project activities during the dry season to reduce problems of soil erosion and sedimentation
    - and introducing training schemes to educate project workers as how to reduce environmental change are among the reduction activities

Assessment of mitigation measures (Cont…)

3. **Compensate for the negative impact:** Sometimes it is difficult to avoid environmental damages.

In this case, it will be necessary to provide compensation for the affected populations either through financially or by providing benefits through compensated projects.

When we choose a strategy we have to consider the associated costs.

Environment management plan (EMP)

An environmental management plan includes

- various mitigation measures
- monitoring and institutional arrangements to carried out mitigation activities

Although it is not required for all types of projects, it is often prepared for category “A” and “B” projects.

- According to World Bank (1999), a project’s environmental management plan should consist the following components:

Environment management plan (EMP) (cont…)

1. **Mitigation: In this case, the EMP:**

- Summarizes each potentially negative impact
- Provides a detail description of the mitigation strategy for each impact.
- Encompasses further assessment of the impacts of the mitigation strategy in bringing the desire effect
- Links the mitigation strategies with each impact to produce a cohesive whole.

Environment management plan (EMP) (cont…)

2. **Monitoring:** Monitoring is important to identify potential impacts that may have been over looked or underestimated.

In this case, the EMP:

- Provides detailed technical information about the types of monitoring to be utilized.
- Identifies the relevant monitoring objectives and links with the potential environmental impacts.
- Provides details as to who will be responsible for monitoring environmental impacts.

Environment management plan (EMP) (cont…)

- Specifies the reporting and feedback procedures

2. **Institutional arrangements:** This is related to the establishment of environmental units with the specific task of EM

- This may include capacity building such as training, recruitment arrangement and organizational structure.

Environment management plan (EMP) (cont…)

4. Implementation schedule and costs: In this case, the EMP provides:

- A project implementation schedule, monitoring and institutional arrangements
- A detailed breakdown of the costs related to the implementation of mitigation, monitoring and institutional arrangements