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Environmental Impact Assessment

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Abstract: ***An Environment is everything that is around us, which includes both living and nonliving things such as soil, water, animals and plants, which adapt themselves to their surroundings. It is nature's gift that helps in nourishing life on Earth. The environment plays an important role in the existence of life on the planet earth. The word Environment is derived from the French word "Environ" which means "surrounding." An ecosystem refers to all the living and non-living things present in the environment and it is a foundation of the Biosphere, which determines the health of the entire planet earth. An impact can be defined as any change in physical, chemical, biological, cultural or socio-economic environmental system as a result of activities relating to a project or adverse effects caused by industrial, infrastructural projects or by the release of a substance into the environment. Impact assessment is the process of identifying the future consequences (bad results) of a proposed project. Impact Assessment ensures that projects, programs and policies are economically viable, socially equitable and environmentally sustainable. In this paper we are focusing & reviewing impact of environment assessment & their characteristic.***

Keywords: Environment, Impact & assessment, Eco-system, Diversity, Geology

1. Introduction

Environment Impact Assessment (EIA) is a planning tool to integrate the environmental concerns into developmental process right at the initial stage of planning and suggest necessary mitigation measures. EIA essentially refers to the assessment of environmental impacts likely to arise from a project. Impact assessment is the process of identifying the future consequences (bad results) of a proposed project. Impact Assessment ensures that projects, programs and policies are economically viable, socially equitable and environmentally sustainable. Environmental Impact Assessment (EIA) is a tool used to identify the environmental, social and economic impacts of a project prior to decision-making.

Environmental Impact Assessment (EIA) is a process of evaluating the likely environmental impacts of a proposed project or developments, taking into account inter-related socio-economic, cultural and human-health impacts, both beneficial and adverse. Environment Impact Assessment in Libya Law No.7 of 1982 on the protection of the environment is statutorily backed by the Environment Protection Act, which contains various provisions on EIA methodology and process. Environmental Impact Assessment (EIA) is an important management tool for ensuring optimal use of natural resources for sustainable development. It covers developmental sectors such as industries, thermal power projects, mining schemes etc. It aims to predict environmental impacts at an early stage in project planning and design, find ways and means to reduce adverse impacts, shape projects to suit the local environment and present the predictions and options to decision-makers.
EIA systematically examines both beneficial and adverse consequences of the project and ensures that these effects are taken into account during project design.

It helps to identify possible environmental effects of the proposed project, proposes measures to mitigate adverse effects and predicts whether there will be significant adverse environmental effects, even after the mitigation is implemented.

By considering the environmental effects of the project and their mitigation early in the project planning cycle, environmental assessment has many benefits, such as protection of environment, optimum utilization of resources and saving of time and cost of the project.

Properly conducted EIA also lessens conflicts by promoting community participation, informing decision makers, and helping lay the base for environmentally sound projects. Benefits of integrating EIA have been observed in all stages of a project, from exploration and planning, through construction, operations, decommissioning, and beyond site closure. The EIA process finds its origin from United States where due to huge public pressure; the government enacted National Environmental Policy Act (NEPA) in 1970s.

2. Definition of Environmental Impact Assessment

The United Nations of Environmental Programme (UNEP) defined that EIA is a tool used to identify the environmental and economic impacts of a project prior to decision making regarding the project planning, design, adverse impacts, etc. . For all proposed and development projects, whether Government or Private, the Ministry of Environment and Forests (MoEF) requires an Environmental impact assessment report related to the following parameters: The report must define what impact it would have on water; soil and air including flora and fauna. Effect on the lives of local people. To ensure that no way harm the environment on a short term or long term basis. Why is EIA important? By identifying potential alternatives and adverse impacts, Nations can better achieve goals for sustainable development; avoid adverse environmental; social and cultural impacts; reduces cost, provides better plan for infrastructure etc.

Classification of impacts:
Environment impacts arising from any development projects fall into three categories:

- Direct impacts
- Indirect impacts

- Cumulative impacts

According to their nature, these three groups reveal:
- Positive and negative impacts
- Reversible and irreversible impacts
- Light, moderate and severe impacts
- Local and widespread impacts
- Short-term and long-term impacts

Direct impacts are related to:
- Aesthetics in the area (understanding of beautiful things);
- Traffic at nearby junctions,
- Removal of natural vegetation;
- Interference with natural water ways;
- Additional housing or commercial shops to support employees.

Significance of effects:
Significant effects are likely to occur where valuable resources are subject to impacts of severity. EIA is recognized by adopting the five levels of significance as described in the draft to good practice and procedures. These five levels of significances are:
- Severe: Sites of national importance and unique resources (to exist in only one place) if lost, cannot be replaced or relocated.
- Major: These effects are to be important considerations at a regional or district scale during the decision making process.
- Moderate: These effects at a local scale are likely to be key decision making issues.
- Minor: These effects may be raised as local issues but are unimportant in the decision making process.
- Neutral: No effect, not significant.

Baseline Data Acquisition
Baseline information is important reference point for conducting EIA. The term "baseline" refers to the collection of background information on the biophysical, social and economic settings proposed project area. An Environmental Baseline Study (EBS) is an investigation conducted to establish the level of contaminants in the project areas and to assess the extent of contamination. The information needed to conduct an EBS can be acquired from the available sources:

Baseline data are collected for two main purposes:
1) To provide a description of the status and trends of environmental factors (e. g., air pollutant concentrations) against which predicted changes can be compared and evaluated in terms of importance, and
2) To provide a means of detecting actual change by monitoring once a project has been initiated
- **Land features** include topography; climatology (temperature, rainfall)
- **Geology & Hydrogeology** (Lithology of rock formations, drainage pattern, ground water table)
- **Air environment** (study of SPM, SO_x; NO_x)
- **Noise environment**
- **Water Environment** (PH; TDS; F; dissolved Oxygen; BOD etc.)
- **Soil quality** Soil analysis reflect the presence of nutrients like N, P, K, Ca, Mg, Fe, Mn and Al
- **Flora and Fauna** of the proposed area
- **Socio economic** study include Population density; Literacy rate; Category of workers viz., cultivators, agriculture laborers, etc.); Medical facilities; Main sources of availability of water viz., rivers, canals, hand pumps, taps etc.

Environmental Impact Assessment Process
Following are the steps involved in a systematic EIA of a highway project:
1) Project definition: The importance and need of the project is defined here and its relation with regional and national developmental activity is mentioned in this section.
2) Screening: Screening is done as per the statutory notification. Screening criteria are based upon:
   - Scales of investment;
   - Type of development;
   - Location of development

Scoping: Scoping is a process of detailing the terms of reference of EIA. It is done by the consultant in consultation with the project proponent and guidance, if needed, from Impact Assessment Agency. Quantifiable impacts will be assessed based on magnitude, prevalence, frequency and duration and non-quantifiable impacts (such as aesthetic or recreational value). Significance is commonly determined through the socioeconomic criteria. After that the areas, where the project could have significant impact are identified and the baseline status of these will be monitored and then the likely changes in these on account of the construction and operation of the proposed project will be predicted.

Baseline information: Baseline data describes the existing environmental status of the identified study area. The site-specific primary data is monitored for the identified parameters and supplemented by secondary data if available.

Impact prediction: Impact prediction is a way of mapping the environmental consequences of the significant aspects of the project and its alternative. Environmental impact can never be predicted with absolute certainty and this is all the more reason to consider all possible factors and take all possible precautions for reducing the degree of uncertainty.

Evaluation of impacts and alternative criteria: For the project possible alternatives are identified and environmental attributes are compared. These alternatives cover both project location and process technologies. Alternatives consider no project. Also, Alternatives are then ranked for selection of the best environmental option for optimum economic benefits to the community at large.

Management plan: This section of the EIA will describe about the mitigation measures to reduce the harmful effects of the proposed project. Particularly, it will also contain the provision for rehabilitation of the people affected and displaced by the project.

Public participation: Law requires that the public must be informed and consulted on a proposed development after the completion of EIA report. Public participation can be assured by: i. consulting the public directly affected by the proposed project and the voluntary groups like NGOs or pressure groups having a concern with a specific aspect of the environment. ii. Conducting direct interviews with the sample from public or by sending questionnaire to the people from public. iii. Publishing the summary of EIA report for objections and suggestions from people.

Decision making: Decision making process involves the consultation between the project proponent (assisted by a consultant) and the assessment authority (assisted by an expert group if necessary). The final decision on acceptance, rejection or clearance is arrived at through a number of steps including evaluation of EIA and environmental management plan.

Monitoring Plan: Monitoring should be done both during construction and operation phases of a project. Monitoring will enable the regulatory agency to review the validity of predictions and the conditions of implementation of the Environmental Management Plan.

3. Methods for Impact Identification

Introduction: A logical and systematic approach needs to be taken to impact identification. The aim is to take account of all of the important environmental/project impacts and interactions, making sure that indirect and cumulative effects, which may be potentially significant, are not inadvertently omitted.

Process: This process begins during screening and continues through scoping, which identifies the key issues and classifies them into impact categories for further study. In the next phase, the likely impacts are analyzed in greater detail in accordance with terms of reference specifically established for this purpose. Over time, a number of EIA methodologies and tools have been developed for use in impact identification.

Methods
The most common formal methods used for impact identification are:

- Checklists;
- Matrices;
- Networks;
- Overlays and geographic information systems (GIS)

A) **Checklists** Checklist annotates the environmental features or factors that need to be addressed when identifying the impacts of projects and activities. They can vary in complexity and purpose, from a simple checklist to a structured methodology or system that also assigns significance by scaling and weighting the impacts (such as the Battelle Environmental Evaluation System). Both simple and descriptive checklists can be improved and adapted to suit local conditions as experience with their use is gained. Checklists provide a systematized means of identifying impacts. They also have been developed for application to particular types of projects and categories of impacts (such as dams or road building). Sectoral checklists often are useful when proponents specialize in one particular area of development. **Matrices** A matrix is a grid-like table that is used to identify the interaction between project activities, which are displayed along one axis, and environmental characteristics, which are displayed along the other axis. Using the table, environment-activity interactions can be noted in the appropriate cells or intersecting points in the grid. 'Entries' are made in the cells to highlight impact severity or other features related to the nature of the impact, for instance:

- Ticks or symbols can identify impact type (such as direct, indirect, and cumulative) pictorially;
- Numbers or a range of dot sizes can indicate scale;
- Descriptive comments can be made.

Networks
Networks illustrate the cause-effect relationship of project activities and environmental characteristics. They are, therefore, particularly useful in identifying and depicting secondary impacts (indirect, cumulative, etc.). Simplified networks, used in conjunction with other methods, help to ensure that important second-order impacts are not omitted from the investigation. More detailed networks are visually complicated, time-consuming and difficult to produce unless a computer programme is used for the task. However, they can be a useful aid for establishing 'impact hypotheses' and other structured science-based approaches to EIA.

Overlays and geographic information systems
Overlays can be used to map impacts spatially and display them pictorially. The original overlay technique, popularized by McHarg, is an environmental suitability analysis in which data on topographic features, ecological values and resource constraints are mapped onto individual transparencies and then aggregated into a composite representation of potential impacts. This approach is useful for comparing site and planning alternatives, for routing linear developments to avoid environmentally sensitive areas and for landscape and habitat zoning at the regional level. Disadvantages: lack of precision in differentiating the likelihood and magnitude of impacts and relating them to project actions. A modern version of the overlay method is the computer based geographical information system (GIS). In simple terms, a GIS stores, retrieves, manipulates and displays environmental data in a spatial format. A set of maps or overlays of a given area provide different types of information and scales of resolution. The use of GIS for EIA purposes is not as widespread as commonly imagined. The main drawbacks are the lack of appropriate data and the expense of creating a usable system. However, the potential application of GIS to EIA is widely acknowledged and its use is expected to increase in the future, particularly to address cumulative effects.

	Advantages	Disadvantages
Checklists	• East to understand and use • Good for site selection and priority setting • Simple ragging and weighting	• Do not distinguish between direct and indirect impacts • Do not link action and impact • The process of incorporating values can be controversial
Matrices	• Link action to impact • Good for displaying EIA results	• Difficult to distinguish direct and indirect impacts • Have potential for double counting of impacts
Networks	• Link action to impact • Useful in simplified form for checking for second order impacts • Handles direct and in direct impacts	• Can become very complex if used beyond simplified version
Overlays	• Easy to understand • Focus and display spatial impacts • Good sitting tool	• Can be cumbersome • Poorly suited to address impact duration or probability

4. Environmental Management Plan (EMP)

Preparation of environmental management plan is required for formulation, implementation and monitoring of environmental protection measures during and after commissioning of projects. The plans should indicate the details as to how various measures have been or are proposed to be taken including cost components as may be required. Cost of measures for environmental safeguards should be treated as an integral component of the project cost and environmental aspects should be taken into account at various stages of the projects

- Conceptualization: preliminary environmental assessment
- Planning: detailed studies of environmental impacts and design of safeguards
- Execution: implementation of environmental safety measures
- Operation: monitoring of effectiveness of built-in safeguards.

The management plans should be necessarily based on considerations of resource conservation and pollution abatement, some of which are:

- Liquid Effluents
- Air Pollution
- Solid Wastes
- Noise and Vibration
- Occupational Safety and Health
- Prevention, maintenance and operation of Environment Control Systems
- House-Keeping
- Human Settlements
- Transport Systems
- Recovery-reuse of waste products
- Vegetal Cover
- Disaster Planning
- Environment Management Cell

Liquid Effluents

1) Effluents from the industrial plants should be treated well to the standards as prescribed by the Central/State Water Pollution Control Boards.
2) Soil permeability studies should be made prior to effluents being discharged into holding tanks or impoundments and steps taken to prevent percolation and ground water contamination.
3) Special precautions should be taken regarding flight patterns of birds in the area. Effluents containing toxic compounds, oil and grease have been known to cause extensive death of migratory birds. Location of plants should be prohibited in such type of sensitive areas.
4) Deep well burial of toxic effluents should not be resorted to as it can result in resurfacing and ground water contamination. Re-surfacing has been known to cause extensive damage to crop and livestock's.
5) In all cases, efforts should be made for re-use of water and its conservation.

Air Pollution

The emission levels of pollutants from the different stacks should conform to the pollution control standards prescribed by Central or State Boards.

- Adequate control equipment should be installed for minimizing the emission of pollutants from the various stacks.
- In-plant control measures should be taken to contain the fugitive emissions.
- Infrastructural facilities should be provided for monitoring the stack emissions and measuring the ambient air quality including micro-meteorological data (wherever required) in the area.

- Proper stack height as prescribed by the Central/State Pollution Control Boards should be provided for better dispersion of pollutants over a wider area to minimize the effect of pollution.
- Community buildings and townships should be built up-wind of plant with one half to one kilometer greenbelt in addition to physiographical barrier.

Before World War II, the chemical nicotine chemical present in the tobacco plants was used as the pest controlling substance in agricultural practices. However, DDT was found to be extremely useful for malaria control and as pest control of many insects during World War II. Therefore, it was used for controlling many diseases.

Hence, post-war, people started using it as pest control in agriculture for killing rodents, weeds, insects, etc and avoiding the damages due to these pests. However, everyone gradually the adverse effects of this chemical which led to the ban of this chemical in many parts of the world including India.

Solid Wastes

1) The site for waste disposal should be checked to verify permeability so that no contaminants percolate into the ground water or river/lake.
2) Waste disposal areas should be planned down-wind of villages and townships.
3) Reactive materials should be disposed of by immobilizing the reactive materials with suitable additives.
4) The pattern of filling disposal site should be planned to create better landscape and be approved by appropriate agency and the appropriately pretreated solid wastes should be disposed according to the approved plan.
5) Intensive programs of tree plantation on disposal areas should be undertaken.

5. Role of NGOs in the Protection of Environment

The protection of environment is a pressing issue. Every person, organization and Institution has an obligation and duty to protect it. Environmental protection encompasses Not only pollution but also sustainable development and conservation of natural resources and the ecosystem. Today, the necessity of environmental awareness and enforcement is more demanding and urgent than ever before. NGOs are simply agencies or groups, which are different from government bodies. However, NGOs are distinctive in containing a voluntary component and also because they do not operate for profit. Over the past quarter of a century and especially during the past few decades there has been a rapid growth in the numbers of NGOs involved in the development, in the number of people working for NGOs and in the amount of money that flows into these voluntary agencies working in the activities such as -Disaster management and relief, development, public health, rehabilitation, environment protection etc. However, this paper focuses on the role played by NGOs particularly in the protection of environment The emergence of NGOs represents an organized response by civil society especially in those areas in which the state has either failed to reach or done so in adequately. The importance of public awareness and NGOs involvement in environmental protection is acknowledged worldwide. NGO's have been taking a number of steps to promote discussion and debate about environmental issues, outside the broad spheres of popular media and the educational system.

NGOs can make the following Contributions:

- Conducting education and citizen awareness programmes in the field of environment
- Fact-finding and analysis
- Filing public interest litigations
- Innovation and experimenting in areas which are difficult for government agencies to make change.
- Providing expertise and policy analysis
- Providing factual and reliable information with a network of professional expert staff
- Remaining independent while passing relevant information to the public and governmental bodies
- Solidarity and support to environmental defenders
- Working in collaboration with the government for capacity building and promotion of community participation in environmental awareness and protection and
- Working out at the grass root level and reaching far-flung areas with or without the government invitation.

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