

ENVIRONMENTAL MANAGEMENT AND IMPACT ASSESSMENT

CEPE24

ASSIGNMENT 1

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Q 1) Discuss what are primary and secondary impacts that can be visualized in dredging and pulp mill projects?

Answer:

Dredging Project

PRIMARY IMPACT	SECONDARY IMPACT
<ol style="list-style-type: none"> 1. Direct removal of habitat and species during excavation. 2. Increase in the turbidity of water. 3. Increase in water depth. 4. Mass production of solid wastes. 	<ol style="list-style-type: none"> 1. Increase in turbidity and sedimentation due to dredging affects coral reef habitats. 2. Occurrence of coastal erosion. 3. Due to dredging action, the area has the ability to hold more water thus reducing the risks of flooding. 4. Improves navigation.

Pulp mill project

PRIMARY IMPACT	SECONDARY IMPACT
<ol style="list-style-type: none"> 1. Acquiring the land for the project affects the production of agricultural products. 2. The main raw material for pulp mill project is wood and thus causes deforestation. 3. Project constructed near forest affects the wildlife due to noise pollution. 4. Modification of surface water course because water is the primary ingredient for pulp industry. 	<ol style="list-style-type: none"> 1. Employment opportunity increases. 2. Sulphur compound and nitrogen oxides used for wood pulping is emitted in the air, thus causes air pollution that affects human health. 3. Chlorinated, organic compounds and nutrients are discharged during pulp bleaching, thus causes water pollution. 4. Hazardous substances mixed in water affects the aquatic life.

Q 2) What are overlay methods? How GIS is useful as advanced tool in overlay methods? Explain with an example.

Answer:

Overlay method is one of the important methodologies for assessing impacts of development activities by preparing **transparent maps representing spatial distribution of environment characteristics** such as water, forest, settlements etc. and **overlaid to produce a composite map** which helps to characterize area's physical, social, ecological and other relevant characteristics for **validating the assessment**.

Nowadays, GIS is being used as layered overlay technique. The computer model can store data relating to the characteristics of surrounding area as well as proposed development, enabling the **introduction of impact weighting into assessment that helps us to indicate possible implications of our decision**. This was not possible in the conventional overlay method.

Also **complex mathematical operations can be performed by computer involving many numbers of variables**, which was restricted to 10 in conventional method.

The satellite images of the given area which are used in GIS are updated from time to time which gives us the present data. The technology used in GIS doesn't require physical examination of the environmental characteristics, use of RADAR gives us the appropriate information.

For example, for spatial mapping of drought risk in an area we can generate probabilistic maps using GIS from biophysical indicators such as climate, vegetation, soil for drought hazard map and indicators such as land use, proximity to water to generate drought vulnerability map. These maps when weighted overlay produces drought risk map that is helpful for implementation of irrigation projects for most vulnerable area.

Q 3) Explain the Legal provisions on EIA and Environment Impact Assessment notification.

Answer:

The MoEF is the apex administrative body in India, established in 1985 for regulating and ensuring environmental protection and lays down legal regulations. Several environmental legislations have been put up together by MoEF and pollution control board of India. Some of the most important legislations for environmental protection are as follows:-

- 1. The Environmental Protection Act, 1986-** It establishes the framework for studying, planning and implementing long term requirements of environmental safety and laying down a system of speedy and adequate response to situations threatening the environment.
- 2. The Water (Prevention and Control of Pollution) Act, 1974-** This act provides prevention and control of water pollution and to maintain or restore wholesomeness of water in the country; the act prohibits the discharge of pollutants into water bodies beyond a given standard and lays down penalties for non-compliance.
- 3. The Air (Prevention and Control of Pollution) Act, 1981-** This act provides prevention, control and abatement of air pollution and for the establishments of Boards at the Central and State levels with a view to carrying out the aforesaid purposes; it empowers the State Government, after consultation with the SPCB's to declare any area or areas within the State as air pollution control area or areas.
- 4. Hazardous Wastes Management Regulation-** It consists of three rules as, Hazardous Wastes (Management, Handling and Transboundary) Rules, 2008; Biomedical Waste (Management and Handling), 1998; Municipal Solid Wastes (Management and Handling), 2000.

5. **Protection of Plant Varieties and Farmers' Right Act, 2001**- This acts provide establishment of an effective system for protection, the rights of farmers and plants breeders, and to encourage the development and cultivation of new varieties of plants.
6. **Wildlife protection Act, 1972**- This act is for the protection of wild animals, birds and plants; and for matters connected there with or ancillary or incidental thereto. It extends to whole of India.

Q 4) What are different types of models used in EIA?

Answer:

The different types of models used are Physical, Experimental and Mathematical models.

Physical Models

These are the small scale models of environment system under investigation in which experiments can be performed to predict future changes. These are of two types, **Illustrative** or **visual models** and **Working physical models**.

Visual models depict the changes in an environment system caused by the proposed future project using sketches, photographs, films, three-dimensional scale model, digital terrain models etc.

Working physical models use reduced models to simulate the processes occurring in the environment. The changes can be observed and measured. However this cannot satisfactorily model the real life situation because of the scaling difference.

Experimental Models

The data acquired from laboratory and field experiments provide basic information on the relationship between environmental components and human activities. Empirical models are constructed from research activities that can infer the likely effects of an activity on environmental components.

Example of an experiment conducted in lab includes the toxicological test on living organisms using pollutes water, air, food etc.

Example of an experiment done in the fields includes in-situ tracer to monitor the movement of releases into the environment.

Mathematical Models

This uses mathematical equations to represent the functional relationship between variables. The equations are combined to simulate the behaviour of environmental system. The number of variables is limited as much as possible without compromising the accuracy of representation. A simple mathematical model based on mass balance equation for predicting changes in downstream effluent concentration water is;

$$Cl = \frac{QoCo + QeCe}{Qo + Qe}$$

Where, Cl= downstream concentration, Qo= upstream flow, Qe= effluent flow, Co= upstream concentration and Ce= effluent concentration

There are different types of mathematical models such as empirical descriptive, generalized or site-specific, static or dynamic etc.

Q 5) Discuss various direct and indirect impacts likely to occur for typical a) Land Clearing Activity b) Road Construction Activity c) River side residential project d) Mining project in forest area.

Answer: **Land Clearing Activity**

Direct Impact	Indirect Impact
<ol style="list-style-type: none"> 1. The major impact immediately following is deforestation. 2. Destruction site specific flora and fauna. 3. Compaction of soil due to heavy equipments used for clearance. 4. Disturbance due to the excessive noise to wild lives or even humans living nearby. 5. Soil erosion loss 	<ol style="list-style-type: none"> 1. Modification of water table below soil. 2. Disappearance of reproduction and food zones for migratory birds, animals. 3. Increase in poaching activity. 4. Developmental works such as road construction or setup of industries following the land clearance. 5. Increase conflicts for land tenure.

Road Construction Activities

Direct Impact	Indirect Impact
<ol style="list-style-type: none"> 1. Compaction of alluvial soils by earth moving equipments. 2. Loss of topsoil. 3. Modification of watercourse during construction and after construction. 4. Destruction of vegetation. 5. Destruction of flora and fauna. 6. Loss of farms and homes that might lie along the map of road. 	<ol style="list-style-type: none"> 1. Increase in land costs. 2. Increase in poaching activities if road is constructed near forest area. 3. Influence the water table underground. 4. Increases the population around. 5. Mobility gradually increases, even providing positive impacts on economy. 6. Causes pollution due to increase in human settlement.

Riverside Residential Project

Direct Impact	Indirect Impact
<ol style="list-style-type: none">1. Loss of effective agricultural area around the river.2. Destruction of river side vegetation.3. If a forest has to be cleared, causes deforestation.4. Causes erosion of soil.5. Excessive noise pollution due to construction activities.	<ol style="list-style-type: none">1. Pollution in the river increases due to human settlement.2. Increase in consumption of fish.3. Speed of propagation of endemic diseases increases.4. Increase in the flow of tourism due to availability of accommodation and transportation facilities.5. Disappearance of species such as migratory birds, animals

Mining Project in Forest Area

Direct Impact	Indirect Impact
<ol style="list-style-type: none">1. Since mining is done in forest area, the immediate effect is deforestation.2. Excavation impacting the sub-surface animals such as rabbits, snakes, rodents etc.3. Excessive noise due to the heavy equipments used.4. Modification of the watercourse if any lies on the plan.5. Erosion of soil.	<ol style="list-style-type: none">1. Loss of biodiversity in the area.2. Contamination of soil, ground water, surface water by chemicals emitted from mining process.3. Pollution due to carbon emission.4. Formation of sinkholes which is a very dangerous.5. The project might give employment opportunity for people living nearby.

Q 6) Suppose you are an Environmental Engineer assigned in an EIA Committee to submit the EIA report for a 'Dam construction project' across the river. How you do the EIA assessment. What criteria you will adopt for selecting EIA Methodologies and finally which methodology you may prefer for the particular EIA. Explain the reason. Step by Step assessment should be detailed.

Answer:

The various steps that are included for EIA Assessment are briefly described below. Before the start of the project, EIA concept should be involved in the initial planning stages of 'Dam construction project' for receiving optimum result. The very first step of EIA assessment includes the preparation of Environmental Base Map.

Preparation of Environmental Base Map- The essential background information on the environmental situation is necessary so that the reviewer can interpret conclusions and provide recommendation. Preferably a simple schematic drawing portrayed is better instead of voluminous texts.

Identification of Study area- The study area should include water bodies, lands and population centres where project activity will have significant effect. The size of the area varies according to type and size of project activities and characteristics of the surrounding area.

Classification of Environmental Parameters- Environmental resources are classified into four categories, natural physical resource, natural ecological resource, human/economic development resources and quality-of-life values.

Formation of EIA study team- The team requires expertise from all disciplines who may have involved in a similar type of project. The composition of the team mostly also depends on nature of activity.

Preparation of Terms of Reference- A skilled environmental analyst identifies the resources which are likely to be significantly affected, make preliminary estimates of magnitude and draw conclusion if detailed EIA is required or not. If it is needed a terms of reference is prepared and budget is recommended. If detailed EIA is not required a report is prepared of the initial works which itself becomes the final EIA.

Preparation of EIA report- The project proponent is free to choose the method most appropriate for specific situation. However, the Central Board of India has given a standard format for EIA reports which must contain,

1. Introduction- Constituting the purpose of the report.
2. Description of Project
3. Description of existing environment- The area of influence is identified and then the environmental resources within the area of influence/
4. Anticipated environmental impacts and plans for protection
5. Consideration of alternatives- For every alternative listed the environmental agency receives monitoring reports which ensure that necessary environmental protection measures is being carried out as approved.
6. Monitoring programme- This contains the level of plan implementation and effectiveness of environmental protection provision.
7. Summary and conclusion- It is complete and comprehensive document in itself.

Draft Environmental Impact Statement- It is a draft where comparison between all proposed alternatives is made and upon which the decision to proceed with any particular alternative is made. The DEIS is a tool

through which public and agency input is incorporated into decision-making process. It consists of purpose of and need for proposed action, alternative section, affected environment section and environmental consequences section.

Impact Analysis- The preparation of separate methodologies and technical reports supporting the DEIS have to be in accordance with the area of discipline and contain the detailed information on existing conditions, methodologies, analysis and results.

DEIS processing- The DEIS is circulated among the Central, State and local agencies concerned. Notices will be published in newspaper to notify to the public of the availability of the DEIS and locations in the community where it will be received. After the public hearing and the review period the comments received are evaluated and required additional analysis is conducted. Based on the review of comments and the results of additional studies, the sponsoring agency selects the preferred alternative. The process then continues for the preparation of the Final EIS.

Final Environment Impact Statement- The FEIS document is the preferred alternative consisting of the DEIS with modifications. A new section is added at the end of the document as 'Comments received on the DEIS and responses'. The FEIS is circulated among all interested agencies and person.

Now for the selection of methodologies the criteria needed are described below:-

1. **General Criteria-** The method should be simple, flexible to allow necessary modifications and changes through the course of the study and must be able to be applied by smaller groups with limited budget and time constraints.

2. Impact Identification- This includes the comprehensiveness, speciality, isolation of project impacts and timing /duration.
3. Impact Measurement- This includes magnitude, objective criteria etc.
4. Impact Interpretation and Evaluation-This includes the significance, uncertainty, risk, etc.
5. Impact Communication- This includes affected parties, settling description, key issues, etc.

For the 'Dam construction project' I would mostly use Predictive and Simulation method because a dam project is huge having the potential to impact many facets of surrounding environment. A proper simulation model will provide necessary data for the dimensions of impact and the specific impacts that may require additional work for reducing the overall impact. Also, modelling such as pictorial model gives us the idea of how the structure might fail under adverse condition impacting thousands of life. We can then incorporate necessary design parameters to avoid such failure in the future or safety measures respectively.

THE END