RGPVNOTES.IN

Program : **B.Tech**

Subject Name: **Environmental Impact Assessment**

Subject Code: **CE-604**

Semester: **6th**

UNIT-III

Impact analysis: Framework, statement predication and assessment of impact of air, water, noise and socio-economic environment.

Impact analysis (IA) is defined by Bohner and Arnold as "identifying the potential consequences of a change, or estimating what needs to be modified to accomplish a change", and they focus on IA in terms of scoping changes within the details of a design.

Types of Impact:-

1) Biological and Physio-chemical impacts:-

It relate to effects on biological resources such as vegetation, wildlife, crops and aquatic life. Interaction with Physical elements like air, water, soil, rocks and solar radiation. Chemical impacts like chemical change in air, water , soil quality etc.

2) Social impacts:-

- **Demographic – Displacement and relocation effects and changes in population characteristics.**
- **Cultural – Traditional patterns, family structure religious, archaeological features, social networks.**
- **Gender – implication of projects on roles of women in society, employment opportunity and equity**
- **Institutional – Housing , schools, Criminal justice , Health, welfare**

3) Health impacts:-

Examples of health impacts by sector

	Communicable disease	Non Communicable disease	Nutrition	Injury	Psychosocial disorder & loss of Well being
Mining	Tuberculosis	Dust Induced lung disease		Crushing	Labor migration
Agriculture	Parasitic infection	Pesticide Poisoning	Loss of Subsistence		
Industry					
Forestry			Loss of Production	Occupational Injury	
Dams and Irrigation Schemes	Water borne disease			Drowning	Involuntary displacement
Transportation		Heart disease		Traffic injury	
Energy		Indoor air pollution		Electromagnetic radiation	

Table 2. Health sector information

4) Economic impacts: - Duration of construction and operation Workforce requirements for each period Skill requirements (local availability) Earning Raw material and other input purchases Capital investment Outputs the characteristics of the local economy.

Impact Framework- At the national level, new environmental policies are being introduced, perhaps including a National Environmental Action Plan or National Plan for Sustainable Development. Such policies are often supported by legislation. Government policies in areas such as water, land distribution and food production, especially if supported by legislation, are likely to be highly significant for irrigation and drainage projects. An EIA should outline the policy environment relevant to the study in question. Results are also likely to be most easily understood if they are interpreted in the light of prevailing policies. Policies and regulations are sometimes conflicting and can contribute to degradation.

It is within the scope of an EIA to highlight such conflicts and detail their consequences in relation to the irrigation and drainage proposal under study. An example of conflicting policies would be an agricultural policy to subsidize agro-chemicals to increase production and an environmental policy to limit the availability of persistent chemicals. A totally laissez-faire policy will result in unsustainable development, for example through uncontrolled pollution and distortions in wealth.

This creates problems which future generations have to resolve. On the other hand, excessive government control of market forces may also have negative environmental impacts. For example, free irrigation water leads to the inefficient use of this scarce and expensive resource, inequities between head and tail users and water logging and salinity problems.

Legal and policy issues have far-reaching consequences for the environment and are included here to illustrate the complex nature of environmental issues. The FAO Legislative Study 38, "The environmental impact of economic incentives for agricultural production: a comparative law study", is a useful reference. A forthcoming FAO/World Bank/UNDP publication, "Water Sector Policy Review and Strategy Formulation: A General Framework", will address the need for environmental issues to be integrated into water policy. If a regional, sector or basin-wide EIA is needed; such issues will form an important part.

Institutional framework and EIA

Environmental, water and land issues involve many disciplines and many government bodies. Data will therefore have to be collected and collated from a wide range of technical ministries, other government authorities and parastatals. The interests of some bodies may not initially appear to be relevant to irrigation and drainage. However, they may hold important information about the project and surrounding area on such topics as land tenure, health, ecology and demography.

The link between different ministries and departments within ministries are often complex and the hierarchy for decision making unclear. There is a tendency for each ministry to guard "its project" and not consult or seek information from other government bodies unless forced to. This is directly contrary to the needs of an EIA. Even if formal structures exist there may be a lack of coordination between different organizations. Informal links may have been established in practice in order to overcome awkward bureaucratic structures. These issues must be understood and not oversimplified.

There may be conflict between government organizations, particularly between the institution promoting the development and that given the mandate for environmental protection. In countries where some planning processes are undertaken at the regional or district level, the regional or district councils make it

easier for affected communities to put forward their views, which may differ from those of the central authorities. They will have different agendas and approaches. The EIA process must be interactive and be sympathetic to the differing views; not biased towards a particular organization.

One of the main conflicts arising from irrigation and drainage projects is between those responsible for agriculture and those for water. In some countries, there are several key ministries with differing responsibility, such as agriculture, public works and irrigation, plus several parastatals organizations and special authorities or commissions, some perhaps directly under the Office of the President. The institutional aspects are complex; for example in Thailand, over 15 institutions have responsibility for various aspects of soil conservation work.

Legal framework for EIA

Environmental policy without appropriate legislation will be ineffective as, in turn, will be legislation without enforcement. Economic and financial pressures will tend to dominate other concerns. In many developing countries legislation on environmental issues has been in existence for many years. For example, laws exist in most countries for the prevention of water pollution, the protection of cultural heritage and for minimum compensation flows. Much of the existing legislation or regulations have not been considered "environmental". Recently, much specific new environmental legislation has been enacted. This may be as a response to major disasters, or may result from government policy, public pressure or the general increased international awareness of the environmental dangers that now exist in the world. Relevant water and land law as well as environmental protection legislation needs stating, understanding and analyzing as part of an EIA.

New legislation may include a statutory requirement for an EIA to be done in a prescribed manner for specific development activities. When carrying out an EIA it is thus essential to be fully aware of the statutory requirements and the legal responsibilities of the concerned institutions. These are best given as an annex to the terms of reference. The legal requirements of the country must be satisfied. New laws can impose an enormous burden on the responsible agencies.

The statutory requirement to carry out an EIA for specific projects will, for example, require expert staff to carry out the study, as well as officials to review the EIA and approve the project. Laws designating what projects require EIA should, ideally, limit the statutory requirements to prevent EIA merely becoming a hurdle in the approval process.

This will prevent large volumes of work being carried out for little purpose. Most legislation lists projects for which EIA is a discretionary requirement. The discretionary authority is usually the same body that approves an EIA. This arrangement allows limited resources to be allocated most effectively. However, it is essential that the discretionary authority is publicly accountable.

When external financial support is required it will also be necessary to satisfy the obligations of the donor organization. Most major donors now require an EIA for projects relating to irrigation and drainage. Chapter 6 gives details of publications outlining the requirements of the main donors. The function of environmental legislation can vary. It is not easy to give a precise definition of when an EIA is needed. Therefore the

statutory requirement for an EIA is not particularly well suited to law. On the other hand many of the most important environmental hazards are easily addressed by law. For example, it is straightforward to set legal limits for pollution, flow levels, compensation etc: here the problem is one of enforcement. It is normal for an EIA to assess the acceptability or severity of impacts in relation to legal limits and standards. However, it is important to highlight cases where existing standards are insufficiently stringent to prevent adverse impacts and to recommend acceptable standards. Enforcement problems can be partially addressed by changing institutional structures.

Laws relating to irrigated lands are complex and according to an FAO study of five African countries they are not generally applied (FAO, 1992). There are conflicts between modern and customary laws: the former tend to be given prominence although the latter are usually strong locally. Traditional and customary rights have often developed in very different historical and political contexts and can vary greatly over a short distance. They may also be mainly oral and imprecise. Local participation in the preparation of the EIA will help to understand important customary rights and highlight possible weaknesses in any proposed development.

Impact Prediction:- EIA is all about prediction and is needed at the earliest stages when the project, including alternatives, is being planned and designed, and this continues through to mitigation, monitoring and auditing. Evaluation follows from prediction and involves an assessment of the relative significance of the impacts.
The methods of evaluation range from intuitive to the analytical, from qualitative to quantitative, and from formal to informal. Cost benefit analysis, monetary valuation techniques, and multi-criteria/multiattribute methods, with their scoring and weighting systems, provide a number of ways for the evaluation issues. Mitigation of significant adverse effects involves the measures to avoid, reduce, the accumulated knowledge of the findings of the environmental investigations form the basis for the prediction of impacts. Once a potential impact has been determined during scoping process, it is necessary to identify which project activity will cause impact, and its magnitude and extent. Remedy or compensate for the various impacts associated with projects.

Statement Prediction:-
Environmental impact is any alteration of environmental conditions or creation of a new set of environmental conditions – adverse or beneficial – caused or induced by the project under consideration. The impact depends on the nature, scale and location of the proposed activity and it includes the effect on the natural resource
Base (i.e., the quality of air, water, noise, biological) and socioeconomic components of the environment which determine the cost of environmental management. The impacts can be classified as primary, which can be attributed directly to the project, and secondary, which are indirect changes and typically include the changed patterns of socio-economic activities likely to be stimulated or induced by the proposed activity. If a preliminary assessment is carried out, it will broadly review the project's effects. Also, scoping helps the decision-makers identify the most important issues. Taking these findings into account and after collecting the baseline environmental data, the full EIA study formally identifies such of the impacts as are to be assessed in detail. The methods used at the identification phase of the study include the following:

(i) Compile a candidate list of key impacts such as changes in air quality, noise levels, wildlife habitats, species diversity, landscape views, social and cultural systems, settlement

Methods of impact prediction:-

1. Best estimate professional judgment.
2. Quantitative mathematical models.
3. Experiments and physical models.
4. Case studies as analogues or references.

Impact Evaluation:- Its purpose is to assign relative significance to predicted impacts associated with the projects and to determine the order in which impacts are to be avoided , mitigated or compensated. This step evaluates the predicted adverse impacts to determine whether they are significant enough to warrant mitigation. The judgment of can be based on one or more of the following: Comparison with laws, regulations or accepted standards. Reference to pre-set criteria such as protected sites, features or species. Assessment of impact of air, water, noise and socio-economic environment

Water

Surface water the significance of any potential impact on water quality and quantity will depend on the current (or designated) use of the resource (e.g. for drinking water, irrigation, industrial process water, fishing, domestic use) or its importance to ecology and the nature and magnitude of change caused by the Project. Therefore defines receptors with regard to the use they make of the water resource or the ecological importance of the resource. For pipeline and associated construction activities, there are likely to be three main types of impact:

Planned discharges of treated sanitary sewage and process wastewater (e.g. storm water run-off from construction camps, run-off from vehicle wash-down areas and hydrostatic test water)

Disturbance of watercourses directly through physical works, and indirectly due to run-off containing suspended solids from working and reinstated areas accidental events or pollution.

Ecology

Ecology Ecological impacts have been evaluated taking account of the following factors:

- The magnitude of the impact, as determined by its intensity, its extent in space and time
- The vulnerability of the habitat or species to the change caused by the impact
- The ability of that species or habitat to recover
- The value, in nature conservation and ecological terms of affected receptors including species, populations, communities, habitats, landscapes and ecosystems.

Both indirect and direct impacts are included in the assessment of the significance of impacts – for example, the loss or alteration of a feeding area for a rare bird and impacts on a protected area off-site because they are connected to the pipeline route, e.g. by a watercourse. Impacts on species behavior or interactions have also been assessed, for example, consideration of impacts from noise and lighting. The scientific value of habitats for nature conservation is assessed according to widely accepted criteria of which the most important are naturalness, extent, rarity, and diversity.

These and others are described in an extensive literature (Radcliffe, 1977; Usher, 1986). Rarity and extent are assessed at several scales: in the context of occurrence on the proposed pipeline route, in the context of the surrounding ecosystem, and at a national and international scale. For example, habitats that are rare at an international scale would be considered the most important for nature conservation, while habitats that are rare on the proposed pipeline route or facility locations, but common in the context of the surrounding ecosystem, would be considered important at a site level. The ability of habitats to recover from change is also assessed based on the experience gained from monitoring of the BTC and SCP pipelines following construction. The ecological importance of species is assessed according to two main criteria:

Air quality

The main sources of emissions to air during construction are likely to be dust, vehicle emissions and emissions from sources such as temporary generators at construction sites and work camps. With regard to emissions other than dust, the key concern is the potential impact to human health due to carbon monoxide (CO), nitrogen oxides (NOx), sulphur.The oxides (SOx) and fugitive hydrocarbons. However, these emissions are not considered to be of a scale or longevity to have more than a highly localized and minor air quality effect, as the Project is not burning liquid fuels in significant quantities during operations. With regard to dust during construction this can have "nuisance" impacts (soiling, visual amenity), lead to reductions in crop productivity and adverse ecological impacts depending on the scale of dust emissions and the sensitivity of the flora and fauna affected. It is difficult to predict dust impacts as these depend on the duration and location of construction activities, meteorological conditions, soil and subsoil type, and background dust levels. However, by their nature, construction activities are of limited duration.

Noise

During construction the main sources of noise emissions are likely to include the operation of heavy machinery along the pipeline ROW; vehicle movements to and from the ROW and construction camps and pipe storage areas; and noise associated with the construction camps, for example, from the operation of temporary generators. During operation the sources of noise will be minimal and be limited to operation of the generators at the pigging station and occasional (approximately once every two years) maintenance venting when pigging activities are taking place.

For construction activities greater than one month, the guidelines within BS 5228-1:2009 'Code of practice for noise and vibration control on construction and open sites. Noise' has been used. Construction noise activities less than one month in duration such as nitrogen venting have been assessed against these limits for benchmarking purposes only.

Social impacts

Potential social impacts can affect individuals, households and entire communities and they can be caused directly by Project activities (e.g. land take or job creation) or by environmental changes such as increased ambient noise levels, reductions in air quality and increased traffic. The significance of impacts depends on many variables including past experience and perception of previous impacts from Project development. In addition, local factors can be very important as individuals, households and communities vary in their sensitivity and reactions to actual or expected changes. People can also react to actual or expected changes and become part of impact cause–effect relationships thus altering the nature and progression of likely

impacts. For pipeline construction there are likely to be a range of potential key impacts, of varying durations (many short-term) including:

• Land acquisition and restriction of access to natural resources (e.g. grazing or recreation areas) and adverse effects on livelihoods and incomes

• Economic changes affecting job opportunities, business viability and potential to enhance incomes.

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