CHAPTER - 6

ENVIRONMENTAL IMPACT ASSESSMENT

Environmental Protection and Sustainable Development has been the cornerstones of the policies and procedures governing the industrial and other developmental activities in India. Ministry of Environment & Forests has taken several policy initiatives and enacted environmental and pollution control legislations to prevent indiscriminate exploitation of natural resources and to promote integration of environmental concerns in developmental projects.

One such initiative is the Notification on Environmental Impact Assessment (EIA) of developmental projects 1994 under the provisions of Environment (Protection) Act, 1986 making EIA mandatory for 29 categories of developmental projects. One more item was added to the list in January, 2000.

Environment Impact Assessment Notification of 2006 has categorized the developmental projects in two categories, i.e., Category A and Category B.

'Category A' projects are appraised at national level by expert appraisal committee.

India has constituted the State Level Environment Impact Assessment Authority (SEIAA) and State Level Expert Appraisal Committee (SEAC) to decentralize the environmental clearance process.

These institutions are responsible for appraising certain categories of projects, termed as 'Category B' projects, which are below a prescribed threshold level.

EIA is a planning tool that is now generally accepted as an integral component of sound decision-making. The objective of EIA is to foresee and address potential environmental problems/ concerns at an early stage of project planning and design. EIA/ Environment Management Plan (EMP) should assist planners and government authorities in the decision making process by identifying the key impacts/issues and formulating the mitigation measures.

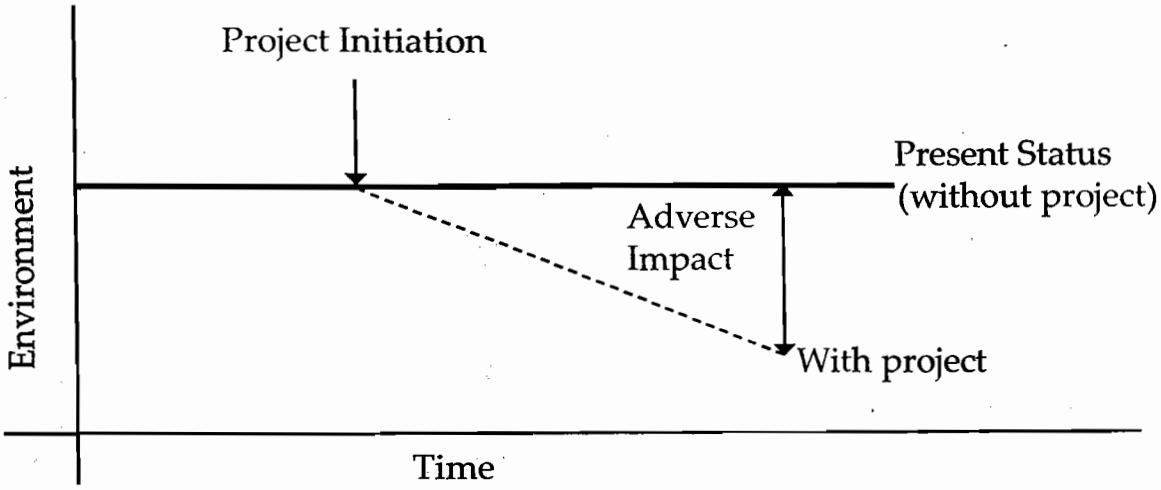
THE NEED FOR EIA

- Every anthropogenic activity has some impact on the environment. More often it is harmful to the environment than benign. However, mankind as it is developed today cannot live without taking up these activities for his food, security and other needs. Consequently, there is a need to harmonise developmental activities with the environmental concerns. Environmental impact assessment (EIA) is one of the tools available with the planners to achieve the above-mentioned goal.
- It is desirable to ensure that the development options under consideration are sustainable. In doing so, environmental consequences must be characterised early in the project cycle and accounted for in the project design.
- The objective of EIA is to foresee the potential environmental problems that would arise out of a proposed development and address them in the project's planning and design stage. The EIA process should then allow for the communication of this information to:
  - the project proponent;
  - the regulatory agencies; and,
  - all stakeholders and interest groups.

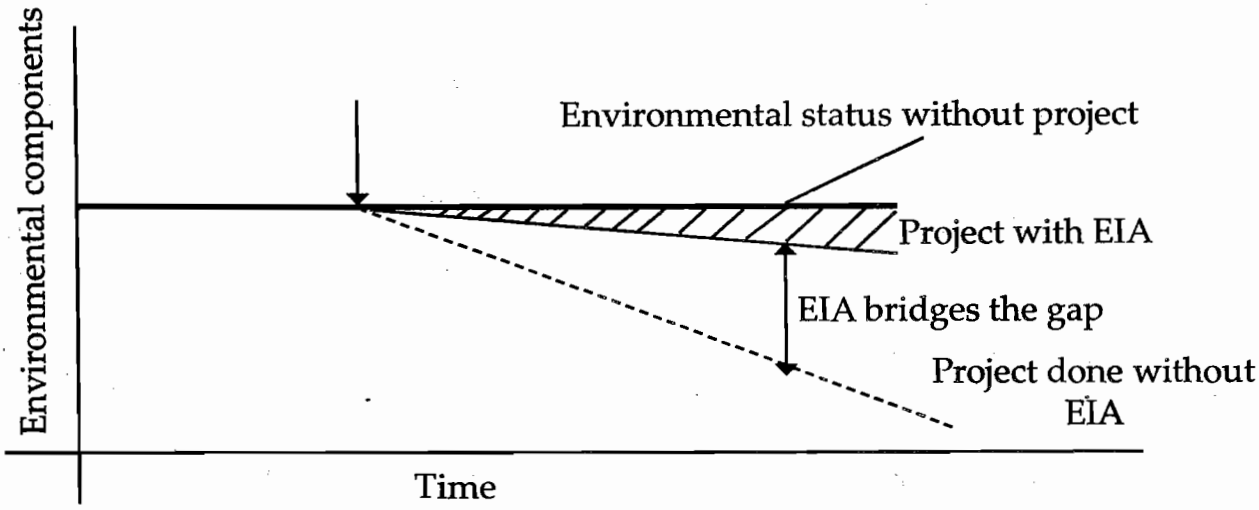
EIA integrates the environmental concerns in the developmental activities right at the time of initiating for preparing the feasibility report. In doing so it can enable the integration of environmental concerns and mitigation measures in project development. EIA can often prevent future liabilities or expensive alterations in project design.

Do you know?

India has the worst air pollution in the entire world, according to a study released by World Economic Forum. Of 132 countries, India ranks dead last in the 'Air (effects on human health)' ranking.



(a) Anticipated environment impact of development project.



(b) Environent impact rectification after EIA

6.1. INDIAN POLICIES REQUIRING EIA

➢ The environmental impact assessment in India was started in 1976-77 when the Planning Commission asked the then Department of Science and Technology to examine the river-valley projects from environmental angle. This was subsequently extended to cover those projects, which required approval of the Public Investment Board. These were administrative decisions, and lacked the legislative support. The Government of India enacted the Environment (Protection) Act on 1986. To achieve the objectives of the Act, one of the decisions that were taken is to make environmental impact assessment statutory. After following the legal procedure, a notification was issued on 1994 and subsequently amended on 1994, 1997 and 2000 (Annex 1) making environmental impact assessment statutory for 30 activities.

Besides this the Government of India under Environment (Protection) Act 1986 issued a number of other notifications, which are related to environmental impact assessment. These are limited to specific geographical areas. They are

- Prohibiting location of industries except those related to Tourism in a belt of 1 km from high tide mark from the Revdanda Creek up to Devgarh Point (near Shrivardhan) as well as in 1 km belt along the banks of Rajpuri Creek in Murud Janjira area in the Raigarh district of Maharashtra (1989)
- Restricting location of industries, mining operations and regulating other activities in Doon Valley (1989)
- Regulating activities in the coastal stretches of the country by classifying them as coastal regulation zone and prohibiting certain activities (1991)
- Restricting location of industries and regulating other activities in Dahanu Taluka in Maharashtra (1991)
- Restricting certain activities in specified areas of Aravalli Range in the Gurgaon district of Haryana and Alwar district of Rajasthan (1992)
- Regulating industrial and other activities, which could lead to pollution and congestion in an area north west of Numaligarh in Assam (1996)

SALIENT FEATURES OF EIA NOTIFICATION, 1994

- Any person who desires to undertake any new project in any part of India or the expansion or modernization of any existing industry or project listed in the Schedule-I shall submit an application to the Secretary, Ministry of Environment and Forests, New Delhi.
- Cases rejected due to submission of insufficient or inadequate data and Plans may be reviewed as and when submitted with complete data and Plans. Submission of incomplete data or plans for the second time would itself be a sufficient reason for the Impact assessment Agency to reject the case summarily.
- In case of the following site specific projects:
  a. mining;
  b. pit-head thermal power stations;
  c. hydro-power, major irrigation projects and/or their combination including flood control;
  d. ports and harbours (excluding minor ports);
  e. prospecting and exploration of major minerals in areas above 500 hectares;
- The project authorities will intimate the location of the project site to the Central Government (MoEF) while initiating any investigation and surveys. The Central Government (MoEF) will convey a decision regarding suitability or otherwise of the proposed site within a maximum period of thirty days. The said site clearance shall be granted for a sanctioned capacity and shall be valid for a period of five years for commencing the construction, operation or mining.
- The reports submitted with the application shall be evaluated and assessed by the Impact Assessment Agency, and if deemed necessary it may consult a committee of Experts. The Impact Assessment Agency (IAA) would be the Union Ministry of Environment and Forests. The Committee of Experts mentioned above shall be constituted by the Impact Assessment Agency or such other body under the Central Government authorised by the Impact Assessment Agency in this regard.
- The said Committee of Experts shall have full right of entry and inspection of the site or, as the case may be, factory premises at any time prior to, during or after the commencement of the operations relating to the project.
- The Impact Assessment Agency shall prepare a set of recommendations based on technical assessment of documents and data, furnished by the project authorities, supplemented by data collected during visits to sites or factories if undertaken, and details of public hearing.
- The assessment shall be completed within a period of ninety days from receipt of the requisite documents and data from the project authorities and completion of public hearing and decision conveyed within thirty days thereafter.
- The clearance granted shall be valid for a period of five years for commencement of the construction or operation of the project.
- A No construction work, preliminary or otherwise, relating to the setting up of the project

may be undertaken till the environmental and site clearance is obtained.

- In order to enable the Impact Assessment Agency to monitor effectively the implementation of the recommendations and conditions subject to which the environmental clearance has been given, the project authorities concerned shall submit a half yearly report to the Impact Assessment Agency. Subject to the public interest, the Impact Assessment Agency shall make compliance reports publicly available.
- If no comments from the Impact Assessment Agency are received within the time limit, the project would be deemed to have been approved as proposed by project authorities.

Nothing contained in this Notification shall apply to:

a. any item falling under entry Nos. 3, 18 and 20 of the Schedule-I to be located or proposed to be located in the areas covered by the MoEF Notifications.

b. any item falling under entry Nos.1, 2, 3, 4, 5, 9, 10, 13, 16, 17, 19, 21, 25 and 27 of Schedule-I if the investment is less than Rs.50 crores.

c. any item reserved for Small Scale Industrial Sector with investment less than Rs. 1 crore.

d. defence related road construction projects in border areas.

- Concealing factual data or submission of false, misleading data/reports, decisions or recommendations would lead to the project being rejected. Approval, if granted earlier on the basis of false data, would also be revoked. Misleading and wrong information will cover the following:
  a. False information
  b. False data
  c. Engineered reports
  d. Concealing of factual data
  e. False recommendations or decisions

SCHEDULE-I

LIST OF PROJECTS REQUIRING ENVIRONMENTAL CLEARANCE FROM THE CENTRAL GOVERNMENT

1. Nuclear Power and related projects such as Heavy Water Plants, nuclear fuel complex, Rare Earths.
2. River Valley projects including hydel power, major Irrigation and their combination including flood control.
3. Ports, Harbours, Airports (except minor ports and harbours).
4. Petroleum Refineries including crude and product pipelines.
5. Chemical Fertilizers (Nitrogenous and Phosphatic other than single superphosphate).
6. Pesticides (Technical).
7. Petrochemical complexes (Both Olefinic and Aromatic) and Petro-chemical intermediates such as DMT, Caprolactam, LAB etc. and production of basic plastics such as LLDPE, HDPE, PP, PVC.
8. Bulk drugs and pharmaceuticals.
9. Exploration for oil and gas and their production, transportation and storage.
10. Synthetic Rubber.
11. Asbestos and Asbestos products.
12. Hydrocyanic acid and its derivatives.
13. (a) Primary metallurgical industries (such as production of Iron and Steel, Aluminium, Copper, Zinc, Lead and Ferro Alloys).
    (b) Electric arc furnaces (Mini Steel Plants).
14. Chlor alkali industry.
15. Integrated paint complex including manufacture of resins and basic raw materials required in the manufacture of paints.
16. Viscose Staple fibre and filament yarn.
17. Storage batteries integrated with manufacture of oxides of lead and lead antimony alloys.
18. All tourism projects between 200m 500 metres of High Water Line and at locations with an elevation of more than 1000 metres with investment of more than Rs.5 crores.
19. Thermal Power Plants.
20. Mining projects *(major minerals)* with leases more than 5 hectares.

21. Highway Projects **except projects relating to improvement work including widening and strengthening of roads with marginal land acquisition along the existing alignments provided it does not pass through ecologically sensitive areas such as National Parks, Sanctuaries, Tiger Reserves, Reserve Forests**
22. Tarred Roads in the Himalayas and or Forest areas.
23. Distilleries.
24. Raw Skins and Hides
25. Pulp, paper and newsprint.
26. Dyes.
27. Cement.
28. Foundries (individual)
29. Electroplating
30. Meta amino phenol

6.2 THE EIA CYCLE AND PROCEDURES

The EIA process in India is made up of the following phases:

- Screening
- Scoping and consideration of alternatives
- Baseline data collection
- Impact prediction
- Assessment of alternatives, delineation of mitigation measures and environmental impact statement
- Public hearing
- Environment Management Plan
- Decision making
- Monitoring the clearance conditions

6.2.1 Screening

- Screening is done to see whether a project requires environmental clearance as per the statutory notifications. Screening Criteria are based upon:
  - Scales of investment;
  - Type of development; and,
  - Location of development.
- A Project requires statutory environmental clearance only if the provisions of EIA notification and/or one or more statutory notification mentioned in Box 1 cover it

6.2.2 Scoping

- Scoping is a process of detailing the terms of reference of EIA. It has to be done by the consultant in consultation with the project proponent and guidance, if need be, from Impact Assessment Agency.
- The Ministry of Environment and Forests has published guidelines for different sectors, which outline the significant issues to be addressed in the EIA studies. Quantifiable impacts are to be assessed on the basis of magnitude, prevalence, frequency and duration and non-quantifiable impacts (such as aesthetic or recreational value), significance is commonly determined through the socio-economic criteria. After the areas, where the project could have significant impact, are identified, the baseline status of these should be monitored and then the likely changes in these on account of the construction and operation of the proposed project should be predicted.

6.2.3 Baseline Data

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

6.2.4 Impact Prediction

- Impact prediction is a way of mapping the environmental consequences of the significant aspects of the project and its alternatives. 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.

The following impacts of the project should be assessed:

Air

- changes in ambient levels and ground level concentrations due to total emissions from point, line and area sources
- effects on soils, materials, vegetation, and human health

Noise

- changes in ambient levels due to noise generated from equipment and movement of vehicles
- effect on fauna and human health

Water

- availability to competing users
- changes in quality
- sediment transport
- ingress of saline water

Land

- changes in land use and drainage pattern
- changes in land quality including effects of waste disposal
- changes in shoreline/riverbank and their stability

Biological

- deforestation/tree-cutting and shrinkage of animal habitat.
- impact on fauna and flora (including aquatic species if any) due to contaminants/pollutants
- impact on rare and endangered species, endemic species, and migratory path/route of animals.

Impact on breeding and nesting grounds

Socio-Economic

- impact on the local community including demographic changes.

Impact on economic status

- impact on human health.
- impact of increased traffic

6.2.5 Assessment of Alternatives, Delineation of Mitigation Measures and Environmental Impact Assessment Report

- For every project, possible alternatives should be identified and environmental attributes compared. Alternatives should cover both project location and process technologies. Alternatives should consider no project option also. Alternatives should then be ranked for selection of the best environmental option for optimum economic benefits to the community at large.
- Once alternatives have been reviewed, a mitigation plan should be drawn up for the selected option and is supplemented with an Environmental Management Plan (EMP) to guide the proponent towards environmental improvements. The EMP is a crucial input to monitoring the clearance conditions and therefore details of monitor should be included in the EMP.
- An EIA report should provide clear information to the decision-maker on the different environmental scenarios without the project, with the project and with project alternatives. Uncertainties should be clearly reflected in the EIA report.

6.2.6 Public Hearing

- Law requires that the public must be informed and consulted on a proposed development after the completion of EIA report.
- Any one likely to be affected by the proposed project is entitled to have access to the Executive Summary of the EIA. The affected persons may include:
  - bonafide local residents;
  - local associations;
  - environmental groups: active in the area
  - any other person located at the project site/ sites of displacement
  - They are to be given an opportunity to make oral/written suggestions to the State Pollution Control Board.

6.2.7. Environment Management Plan

Environment Management Plan should include:

- Delineation of mitigation and compensation measures for all the identified significant impacts
- Delineation of unmitigated impacts
- Physical planning including work programme, time schedule and locations for putting mitigation and compensation systems in place
- Delineation of financial plan for implementing the mitigation measures in the form of budgetary estimates and demonstration of its inclusion in the project budget estimates.

6.2.8 Decision Making

- Decision making process involve consultation between the project proponent (assisted by a consultant) and the impact assessment authority (assisted by an expert group if necessary)
- The decision on environmental clearance is arrived through a number of steps including evaluation of EIA and EMP.

6.2.9 Monitoring the Clearance Conditions

- Monitoring should be done during both construction and operation phases of a project. This is not only to ensure that the commitments made are complied with but also to observe whether the predictions made in the EIA reports were correct or not. Where the impacts exceed the predicted levels, corrective action should be taken. Monitoring will enable the regulatory agency to review the validity of predictions and the conditions of implementation of the Environmental Management Plan (EMP).

6.3 COMPONENTS OF EIA

- The difference between Comprehensive EIA and Rapid EIA is in the time-scale of the data supplied. Rapid EIA is for speedier appraisal process. While both types of EIA require inclusion/ coverage of all significant environmental impacts and their mitigation, Rapid EIA achieves this through the collection of one season (other than monsoon) data only to reduce the time required. This is acceptable if it does not compromise on the quality of decision-making. The review of Rapid EIA submissions will show whether a comprehensive EIA is warranted or not.
- It is, therefore, clear that the submission of a professionally prepared Comprehensive EIA in the first instance would generally be the more efficient approach. Depending on nature, location and scale of the project EIA report should contain all or some of the following components.

Air Environment

- Determination of impact zone (through a screening model) and developing a monitoring network
- Monitoring the existing status of ambient air quality within the impacted region (7-10 km from the periphery) of the proposed project site
- Monitoring the site-specific meteorological data, viz. wind speed and direction, humidity, ambient temperature and environmental lapse rate
- Estimation of quantities of air emissions including fugitive emissions from the proposed project
- Identification, quantification and evaluation of other potential emissions (including those of vehicular traffic) within the impact zone and estimation of cumulative of all the emissions/ impacts
- Prediction of changes in the ambient air quality due to point, line and areas source emissions through appropriate air quality models
- Evaluation of the adequacy of the proposed pollution control devices to meet gaseous emission and ambient air quality standards
- Delineation of mitigation measures at source, path ways and receptor

Noise Environment

- Monitoring the present status of noise levels within the impact zone, and prediction of future noise levels resulting from the proposed project and related activities including increase in vehicular movement
- Identification of impacts due to any anticipated rise in noise levels on the surrounding environment
- Recommendations on mitigation measures for noise pollution

Water Environment

- Study of existing ground and surface water resources with respect to quantity and quality within the impact zone of the proposed project
- Prediction of impacts on water resources due to the proposed water use/pumping on account of the project
- Quantification and characterisation of waste water including toxic organic, from the proposed activity
- Evaluation of the proposed pollution prevention and wastewater treatment system and suggestions on modification, if required
- Prediction of impacts of effluent discharge on the quality of the receiving water body using appropriate mathematical/simulation models
- Assessment of the feasibility of water recycling and reuse and delineation of detailed plan in this regard

Biological Environment

Survey of flora and fauna clearly delineating season and duration.

- Assessment of flora and fauna present within the impact zone of the project
- Assessment of potential damage to terrestrial and aquatic flora and fauna due to discharge of effluents and gaseous emissions from the project
- Assessment of damage to terrestrial flora and fauna due to air pollution, and land use and landscape changes
- Assessment of damage to aquatic and marine flora and fauna (including commercial fishing) due to physical disturbances and alterations
- Prediction of biological stresses within the impact zone of the proposed project
- Delineation of mitigation measures to prevent and / or reduce the damage.

Land Environment

- Studies on soil characteristics, existing land use and topography, landscape and drainage patterns within the impact zone
- Estimation on impacts of project on land use, landscape, topography, drainage and hydrology
- Identification on potential utility of treated effluent in land application and subsequent impacts
- Estimation and Characterisation of solid wastes and delineation of management options for minimisation of waste and environmentally compatible disposal

Socio-economic and Health Environment

- Collection of demographic and related socio-economic data
- Collection of epidemiological data, including studies on prominent endemic diseases (e.g. fluorosis, malaria, fileria, malnutrition) and morbidity rates among the population within the impact zone
- Projection of anticipated changes in the socio-economic and health due to the project and related activities including traffic congestion and delineation of measures to minimise adverse impacts
- Assessment of impact on significant historical, cultural and archaeological sites/places in the area
- Assessment of economic benefits arising out of the project
- Assessment of rehabilitation requirements with special emphasis on scheduled areas, if any.

Risk Assessment

- Hazard identification taking recourse to hazard indices, inventory analysis, dam break probability, Natural Hazard Probability etc.
- Maximum Credible Accident (MCA) analysis to identify potential hazardous scenarios
- Consequence analysis of failures and accidents resulting in fire, explosion, hazardous releases and dam breaks etc.
- Hazard & Operability (HAZOP) studies
- Assessment of risk on the basis of the above evaluations
- Preparation of an onsite and off site (project affected area) Disaster Management Plan

Environment Management Plan

- Delineation of mitigation measures including prevention and control for each environmental component and rehabilitation and resettlement plan.
- Delineation of monitoring scheme for compliance of conditions
- Delineation of implementation plan including scheduling and resource allocation

6.4. KEY ELEMENTS OF AN INITIAL PROJECT DESCRIPTION AND SCOPING

- The key environmental issues to be considered in relation to a project characteristics are discussed in Sectoral Guidelines published by MoEF from time to time.
- An Initial Project Description (IPD) should at the very least, provide the reviewer with all the information necessary to enable project screening and scoping.

Specific information that must be covered by the IPD includes:

- Location/current land use along with contours and whether it conforms to the development plans proposed for that area
- Details of proposed project activity including the project cost
- Outlining the key project elements during the pre-construction, the construction and the operation phases etc. as per the

list of documents to be attached with the questionnaire

- The IPD may also include.
- Off-site activities
- Associated activities
- Expected project induced activities
- Project activities as PERT chart and process as a flow chart delineating unit processes with input-output.

➢ This would facilitate the reviewers task. The project proponent after suitable scoping should provide environmental information for consideration in detailed EIA. The reviewer while assessing the report should focus on the crucial aspects involving project location and characteristics.

6.4.1 Project Location(s)

➢ The site(s) selection can be an effective approach in minimising the requirement of mitigation measures.

➢ Proposed project locations should be reviewed based upon regulatory and non-regulatory criteria.

➢ Project siting restrictions depend on the sensitivity of the surrounding environment. Sensitivity should be assessed in relation to proximity of the project to the places/sites listed in the identified ecologically sensitive zones (ESZ) notified by MOEF.

The siting criteria delineated by MoEF include:

I. As far as possible prime agricultural land/forest land may not be converted into an industrial site

II. Land acquired should be minimum but sufficient to provide for a green belt wherein the treated wastewater, if possible/suitable, could be utilised from wastewater treatment systems

III. Enough space may be provided for storing solid wastes. The space and the waste can be made available for possible reuse in future

IV. Layout and form of the project must conform to the landscape of the area without unduly affecting the scenic features of that place

V. Associated township of the project if any to be created must provide for space for phyto- graphic barrier between the project and the township and should take into account predominant wind direction.

In addition the following distances should be maintained:

➢ **Coastal Areas:** at least 1/2 km from the high tide line (within 0.5 km of High Tide Line (HTL), specified activities as per CRZ notification, 1991 are permitted)(The HTL is to be delineated by the authorised agency only.)

➢ **Estuaries:** At least 200 metres from the estuary boundaries

➢ **Flood Plains of the Riverine systems:** at least 500 metres from flood plain or modified flood plain or by flood control systems

➢ **Transport/Communication System:** at least 500 metres from highway and railway

➢ Major Settlements (3,00,000 population) at least 25 km from the projected growth boundary of the settlement

In addition to the siting criteria listed above, the proposed project location should be reviewed in relation to the following salient issues:

➢ Ambient air, water and noise quality standards

➢ Critically polluted areas

➢ Natural disaster prone areas

➢ Ecologically sensitive areas

➢ Availability of water and other critical infrastructures like electricity, roads with adequate width and capacity

PROCEDURE FOR PUBLIC HEARING

(1) Process of Public Hearing: -

Whoever apply for environmental clearance of projects, shall submit to the concerned State Pollution Control Board twenty sets of the following documents namely: -

i. An executive summary containing the salient features of the project both in English as well as local language.

ii. Form XIII prescribed under Water (Prevention and Control of Pollution) Rules, 1975 where discharge of sewage, trade effluents, treatment of water in any form, is required.

iii. Form I prescribed under Air (Prevention and Control of Pollution) Under Territory Rules, 1983 where discharge of emissions

are involved in any process, operation or industry.

iv. Any other information or document, which is necessary in the opinion of the Board for their final disposal of the application.

(2) Notice of Public Hearing: -

i. The State Pollution Control Board shall cause a notice for environmental public hearing which shall be published in at least two newspapers widely circulated in the region around the project, one of which shall be in the vernacular language of the locality concerned. State Pollution Control Board shall mention the date, time and place of public hearing. Suggestions, views, comments and objections of the public shall be invited within thirty days from the date of publication of the notification.

ii. All persons including bona fide residents, environmental groups and others located at the project site/sites of displacement/sites likely to be affected can participate in the public hearing. They can also make oral/ written suggestions to the State Pollution Control Board.

Explanation: -

- For the purpose of the paragraph person means:
  a. any person who is likely to be affected by the grant of environmental clearance;
  b. any person who owns or has control over the project with respect to which an application has been submitted for environmental clearance;
  c. any association of persons whether incorporated or not, like to be affected by the project and/or functioning in the field of environment;
  d. any local authority within any part of whose local limits is within the neighbourhood, wherein the project is proposed to be located.

(3) Composition of public hearing panel: -

The composition of Public Hearing Panel may consist of the following, namely: -

i. Representative of State Pollution Control Board;

ii. District Collector or his nominee;

iii. Representative of State Government dealing with the subject;

iv. Representative of Department of the State Government dealing with Environment;

v. Not more than three representatives of the local bodies such as Municipalities or panchayats;

vi. Not more than three senior citizens of the area nominated by the District Collector.

List of Environmentally Sensitive Places

- Religious and historic places
- Archaeological monuments/sites
- Scenic areas
- Hill resorts/mountains/ hills
- Beach resorts
- Health resorts
- Coastal areas rich in corals, mangroves, breeding grounds of specific species
- Estuaries rich in mangroves, breeding ground of specific species
- Gulf areas
- Biosphere reserves
- National park and wildlife sanctuaries
- Natural lakes, swamps Seismic zones tribal Settlements
- Areas of scientific and geological interests
- Defense installations, specially those of security importance and sensitive to pollution
- Border areas (international)
- Airport
- Tiger reserves/elephant reserve/turtle nestling grounds
- Habitat for migratory birds
- Lakes, reservoirs, dams
- Streams/rivers/estuary/seas
- Railway lines
- Highways
- Urban agglomeration