
UNIT 1 ENVIRONMENTAL SITING

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1.0 INTRODUCTION

Development and globalisation ironically takes away from our planet essential components that make it great, thus endangering the health and wellbeing of future generations. Sustainability and innovation are buzzwords for the future with special emphasis on using smarter and more environmentally conscious development solutions. We need bold strategies to combat global threats like climate change and ozone layer depletion. In the past few decades key shifts in public attitude towards ecology and energy consumption has been noticed. Environmental issues have redefined the perspectives of business organisations from being merely profit accountable to those being more sensitive and responsive, striving for a balance between environment and profit in a sustainable way. In order to reduce the effect of development projects on the environment most countries have adopted Environmental Impact Assessment, an important management tool which ensures the optimal use of natural resources for sustainable development.

Environmental Impact assessments were implemented as early as the 1960's in many countries. However in India it was implemented for river valley projects in the year 1978-79. Later other development sectors like industries, thermal power projects, mining schemes etc. were included. EIA has been made mandatory for 29 development categories under the Environmental Protection Act of 1986 involving investments of Rs.50 Crores and above. Guidelines have been evolved and circulated to the concerned Central and State Government departments to facilitate collection of environmental data and preparation of management plans.

Before the commencement of any developmental project, a complete assessment of the environmental effect has to be carried out. This refers to a change in the environment in response to the project activity. Environmental assessment methods address both project related and cumulative environmental effects. Even before an assessment is to be carried out, it is necessary to identify the best location for different projects whether industrial or development. Previously industries were located with an economic point of view and environmental considerations were not prominently taken into consideration. However after laying down The Environment (Siting for Industrial Projects) Rules 1999, corporate have taken many measures to protect the environment while selecting industrial sites.

Here in this unit we will study the different siting regulations laid down by the Ministry of Environment and Forests. We will also make a study of the different types of impacts on the Air, Water, Noise, and Social environment. Another aspect that will be focussed on is Environmental Audit which has to be carried out on a regular basis to assess and monitor whether Environmental standards are adhered to.

DID YOU KNOW?

A synthetic drugs plant was established near River Musi at Hyderabad. At the time of establishment it was outside the city limits. Other small scale industries were set up around the facility to cater to its needs. However these small scale industries started polluting the river by discharging untreated effluents into it. After a few years the city limit was increased to include this area and a residential area mushroomed around the facility. The air and water pollution in the residential area started affecting the people. This case study highlights the need for proper siting of industries and urban planning taking into consideration long-term goals of city advancement. Zoning of areas is necessary so that the health of the people and the natural ecosystem is protected.

From the above case study it is evident that proper guidelines are needed for developmental processes and setting up of industries. The ministry of environment and forests have specific guidelines for industries. Given below are the siting guidelines for industries.

1.1 OBJECTIVES

After studying this unit you should be able to:

- understand the importance of siting of industries and developmental projects;
- discuss the importance of Environmental Impact assessment on air, water and biological environment; and
- explain the environmental auditing processes.

1.2 SITING GUIDELINES FOR INDUSTRIES

These are the guidelines set by the Ministry of Environment, Forests and Climate change for siting of industries:

- Industrial development significantly contributes towards economic growth. However, industrial progress brings along with it a host of environmental problems. Many of these problems could be avoided if industries are located on the basis of environmental considerations. Injudicious siting of industry can seriously affect the environmental features such as air, water, land, flora, fauna, human settlements and health of people. The entrepreneur should be fully aware of these implications and he should take necessary steps while setting up the industry so as to minimise the possible adverse effects on the environmental resources and quality of life. Often, an entrepreneur finds it very costly to install pollution control equipment and other mitigative measures after the industry is already set up. As such, preventive steps are needed at the time of siting rather than going in for curative measures at a later stage.
- The Industrial Policy Statement of July 1980 recognises the need for preserving ecological balance and improving living conditions in the urban centres of the country. On the basis of this Policy, indiscriminate expansion of the existing industries and setting up of new industrial undertakings within the limits of metropolitan cities and the larger towns should not be permitted. However, the Policy has not touched upon the implications of setting up an industry in sensitive areas, both ecological and otherwise, which would have an effect on the overall development process.

Framework of Environmental Assessment

- At present, industries are being located on the basis of raw material availability, access to the market, transport facilities and such other techno-economic considerations without adequate attention to environmental considerations are recognised as an important criterion for setting of industry.
- To prevent, air, water and soil pollution arising out of industrial projects, the industrial Licensing procedure requires that the entrepreneurs before setting up the industry obtain clearance from Central/State Air and Water Pollution Control Boards. The Central State Pollution Control Boards stipulate that air(gases) and water(effluents) emanating from the industry should adhere to certain quality standards. However, these stipulations do not prevent the industry from affecting the total environment by wrong siting. Also, the cumulative effect of a number of industries at a particular place is not being studied upon, with the result that an industry or an industrial area over a period of time could cause significant damage to the surrounding environment and ecological features.
- In respect of certain industrial development projects it is not only necessary to install suitable pollution control equipment but also to identify appropriate sites for their location. To give a concrete shape to this requirement, a select group of 20 industries has been notified by the Department of Industrial Development. A formalised procedure has been stipulated for site selection from environment angle with regard to these projects.
- According to this procedure for the select group of industries, the letters of intent should be converted to industrial licences only after the following conditions have been fulfilled:
 - The State Director of Industries confirms that the site of the project has been approved from environmental angle by the competent State Authority.
 - The entrepreneur commits both to the State Government and Central Government that he will install the appropriate equipment and implement the prescribed measures for the prevention and control of pollution.
 - The concerned State Pollution Control Board has certified that the proposal meets with the environmental requirements and that the equipment installed or proposed to be installed are adequate and appropriate to the requirement.
- The State Department of Environment will be the competent authority for approval of project sites from environmental angle. In those States where such Departments have not yet been set up, approval should be obtained from the nodal agency designated for looking after environmental matters. With regard to projects where support from the Central Government/International Agencies is envisaged and which come under the purview of Industrial Licensing, approval of the project site from environmental angle should be obtained from the Ministry of Environment and Forests, Government of India. The entrepreneur should provide the details of proposed project site, pollution abatement measures and such other relevant information as required for review from environmental angle.
- The entrepreneur will be required to submit half-yearly progress report on installation of pollution control devices to the respective State Pollution Control Boards.

- Depending on the nature and location of the project, the entrepreneur will be required to submit comprehensive Environmental Impact Assessment Report and Environment Management Plans.

1.3 ENVIRONMENTAL GUIDELINES FOR INDUSTRIES

In order to help the concerned authorities and the entrepreneurs, it is necessary to frame certain broad guidelines for siting an industry. It is also necessary to identify the parameters that should be taken into account while setting up an industry. With this in view, the following environmental guidelines are recommended for siting of Industries to ensure optimum use of natural and man-made resources in sustainable manner with minimal depletion, degradation and/or destruction of environment. Those are in addition to those directives that are already in existence under the Industries (Development and Regulation) Act.

1.3.1 Areas to be Avoided

In siting industries, care should be taken to minimise the adverse impact of the industries on the immediate neighbourhood as well as distant places. Some of the natural life sustaining systems and some specific land uses are sensitive to industrial impacts because of the nature and extent of fragility. With a view to protecting such industrial sites distances shall be maintained from the areas listed:

- Ecologically and/or otherwise sensitive areas: at least 25 km; depending on the geo-climatic conditions the requisite distance shall have to be increased by the appropriate agency.
- Coastal areas: at least 1/2 km from High Tide Line.
- Flood Plain of the Riverine Systems: at least 1/2 km from flood plain or modified flood plain affected by dam in the upstream or by flood control systems.
- Transport/Communication System: at least 1/2 km from highway and railway.
- Major settlements (3,00,000 population): distance from settlements is difficult to maintain because of urban sprawl. At the time of siting of the industry if any major settlement's notified limit is within 50 km, the spatial direction of growth of the settlement for at least a decade must be assessed and the industry shall be sited at least 25 km from the projected growth boundary of the settlement.

Prerequisite: State and Central Governments are required to identify such areas on a priority basis.

Note: Ecological and/or otherwise sensitive areas include (i) Religious and Historic Places; (ii) Archaeological Monuments (e.g. identified zone around Taj Mahal); (iii) Scenic Areas; (iv) Hill Resorts; (v) Beach Resorts; (vi) Health Resorts; (vii) Coastal Areas rich in Coral, Mangroves, Breeding Grounds of Specific Species; (viii) Estuaries rich in Mangroves, Breeding Ground of Specific Species; (ix) Gulf Areas; (x) Biosphere Reserves; (xi) National Parks and Sanctuaries; (xii) Natural Lakes, Swamps; (xiii) Seismic Zones; (xiv) Tribal Settlements; (xv) Areas of Scientific and Geological interest; (xvi) Defence Installations, specially those of security importance and sensitive to pollution; (xvii) Border Areas (International) and (xviii) Airports.

1.3.2 Siting Criteria

Economic and social factors are recognized and assessed while siting an industry. Environmental factors must be taken into consideration in industrial siting. Proximity of water sources, highway, major settlements, markets for products and raw material resources is desired for economy of production, but all the above listed systems must be away for environmental protection. Industries are, therefore, required to be sited, striking a balance between economic and environmental considerations. In such a selected site, the following factors must be recognized.

- No forest land shall be converted into non-forest activity for the sustenance of the industry (Ref: Forest Conservation Act, 1980).
- No prime agricultural land shall be converted into industrial site.
- Within the acquired site the industry must locate itself at the lowest location to remain obscured from general sight.
- Land acquired shall be sufficiently large to provide space for appropriate treatment of waste water still left for treatment after maximum possible reuse and recycle. Reclaimed (treated) wastewater shall be used to raise green belt and to create water body for aesthetics, recreation and if possible, for aquaculture. The green belt shall be 1/2 km wide around the battery limit of the industry. For industry having odour problem it shall be a kilometre wide.
- The green belt between two adjoining large scale industries shall be one kilometre.
- Enough space should be provided for storage of solid wastes so that these could be available for possible reuse.
- Lay out and form of the industry that may come up in the area must conform to the landscape of the area without affecting the scenic features of that place.
- Associated township of the industry must be created at a space having physiographic barrier between the industry and the township.
- Each industry is required to maintain three ambient air quality measuring stations within 120 degree angle between stations.

1.4 IMPACT PREDICTION AND ASSESSMENT

In order to understand the necessity of impact prediction and assessment, we need to understand the basic steps of the EIA Process in India. Listed below are the various steps involved in EIA.

- Screening
- Scoping
- Consideration of alternatives
- Baseline data collection
- Impact prediction
- Assessment of alternatives
- Delineation of mitigation measures and environmental impact statement

- Public Hearing
- Environmental Management plan
- Decision making
- Monitoring the clearance conditions

The EIA studies should address all the guidelines published in The Ministry of Environment and Forest (MOEF) for different sectors. The impacts that have to be assessed generally are:

Air: Emissions from point, line and area sources are to be assessed and its impact on soil, materials, vegetation and human health is to be evaluated. Both ambient levels and ground level concentrations are to be taken into consideration.

Water: Availability of water to different users and any reduction in quality of the same is assessed. A study of salt water intrusion and transportation of sediments through the water body is also to be made.

Land: Any change in land use, land quality and drainage patterns is assessed. The effects of waste disposal and stability of the shoreline or riverbank on land is also taken into consideration.

Noise: The effects of noise from machines and vehicles on animals and the human population is assessed. The change in ambient noise levels for various zones and its impact is studied.

Biological: The impact of deforestation on animal habitat, shrinkage of flora and fauna including aquatic organisms due to pollution is also assessed. The Impact on breeding and nesting grounds, migratory routes, depletion of endangered, rare and endemic species are to be assessed.

Socio-economic: The possible impact on the local people like changes in population, economic status, human health and possibility of increased traffic due to the facility is to be assessed.

Once all the baseline studies and prediction of impacts are assessed possible alternatives are to be identified and environmental attributes compared. After a thorough review a mitigation plan supplemented with an environmental management plan is drawn up for environmental improvement. The details of Environmental Management plan should contain details of monitoring. Thus an EIA report must contain necessary information to the decision-maker on status of the environment before the project, after the project along with project alternatives.

In order to obtain clearance the MOEF demands the following documents:

- Filled in application form (as per Schedule II of EIA Notification).
- A summary of the project/feasibility report (1 copy).
- EIA (EIS)/EMP report (20 copies).
- Risk analysis and on-site emergency preparedness plan (20 copies) for projects involving hazardous substances.
- Site clearance from MOEF for site-specific projects mentioned in the EIA notification.

Framework of Environmental Assessment

- Consent to establish the facility from the State Pollution Control Board (SPCB).
- NOC from the local authorities (e.g., District Collector).
- A Commitment regarding the availability of water and electricity from the appropriate agencies.
- In case of hazardous substances, an approval from the Chief Controller of Explosives under the Petroleum Act and Rules for layout and storage and an approval from the Directorate of Industrial Safety and Health under the Factories Act and Rules.
- If a wildlife habitat or migration path exists within 25 km of project site, comments, observations and recommendations of the Chief Wildlife Warden is mandatory.
- A summary of the rehabilitation plan in case of displacement of more than 1000 people.
- In case of diversion of forest land, a copy of the application form forwarded to the state government is to be enclosed. So also in case if CRZ notification applies.
- If applicable clearance from the Airport Authority of India to be obtained.
- Advertisement copies of the public hearing notification along with details of the procedure conducted.
- Environmental appraisal questionnaires issued by MOEF along with relevant attachments to be enclosed.

Public hearing is an important step since it affects residents in the area concerned and each and everyone is entitled to have access to the executive summary of the EIA.

The Advantages of Environmental Assessment:

Environmental Assessment carried out before starting a project using relevant techniques can prove to be beneficial in various ways. They are:

- A reduction in time and cost of project implementation
- Modifications in the design of the project which cut down costs
- Increased acceptability of the project
- Reduced impacts and concurrence with laws and regulations
- Better performance of the project
- Avoiding unnecessary costs of waste treatment and clean up

When locals are involved in the assessment it gives rise to the following benefits:

- Cleaner and healthier environment including water, air, forests, land etc.
- Improvement in human health
- Reduction in use of natural resources
- Conservation of biodiversity

- Increase in community skills and knowledge
- Lesser conflicts over the use of natural resources

EIA must become part of the project appraisal system in developing countries. THE BHOPAL ACCIDENT clearly indicates the need for a proper industrial siting procedure co-ordinated with a comprehensive urban planning system under the broad framework of project evaluation, linking environmental impact assessment and project appraisal. Usually developing countries do not give much importance to environmental issues due to the prevalence of widespread poverty, overpopulation and underdevelopment. But the magnitude of environmental degradation is high in developing countries due to the following reasons:

- High population growth and density leads to poor drainage and sanitation, existence of squatter settlements, poverty, unemployment and illiteracy resulting in poor environmental safeguards.
- Unavailability of proper project appraisal systems
- Improper link between policy formulation, implementation and review
- Focus is on short term gains rather than sustainability
- Main occupations are agriculture, forestry and animal husbandry which are key to environmental degradation and pollution
- Siting of industries based on availability of infra-structure rather on suitability
- Socio politico factors also affect siting due to corruption, lack of skill, unplanned decisions, administrative weakness, lack of information, poor communication and coordination and lack of consultation etc.

Traditionally industries were usually located considering the economic criteria, cost of transportation of raw materials and finished product. Only in recent times the various rules and regulation pertaining to the environment has forced industries to consider technical, economic and sociocultural considerations while siting.

A number of critical questions to be addressed during the siting of facilities and which constitute the principal dimensions of alternative classification schemes are as follows.

1. The economy-environment relationship

The facility use natural resources like air, water, land etc and give out wastes which affect the same resources'. So we need to find out which aspect of the relationship is important in the location of the facility. For this a seven categories are identified and assigned a classification scheme.

- (1) A characterizations of the environment in general
- (2) Characterisation of environmental components;
- (3) A measurement of the magnitude and intensity of the activity;
- (4) Quantitative and qualitative measure of wastes
- (5) Assessment of impacts on separate environmental media and receptors;
- (6) General characterizations of environmental quality; and
- (7) An assessment of impacts on local people.

2. Purpose

What is the purpose of using this criterion? The answer to this question is

- (1) To find out the suitability of the location to site this facility.
- (2) To find out how this facility will impact the environment.

3. Complexity

The next question to be addressed is whether only a particular environmental component is to be considered or a holistic measure of suitability and impacts of all components are to be considered.

4. Spatial Scale

The criterion for siting of a facility is different when moving from a higher to a lower spatial level. The characteristics of the environment and the type of economic activity are different for different geographical areas (local, regional, national and international)

Temporal scale

In the same way, the duration of impacts varies from case to case (short, medium and long-term)

5. Level of measurement

An appropriate level of measurement such as judgemental, objective or quasi-objective is chosen to operationalize environmental criteria. The first one relies on expert judgment to provide scores for environmental criteria, while the second employs scientific techniques to produce these scores. The third approach combines the first two whenever scientific measures exist but the analyst uses them judgementally to produce scores. A number of factors like interdependent factors, the complexity and intended purpose of the criterion, the state of the art in the relevant scientific field, availability of data and resources (money, time, expertise), and spatial and temporal level of analysis dictate the mode used. Depending on the level of measurement, the criteria are distinguished into nominal, ordinal, ratio, and indexes.

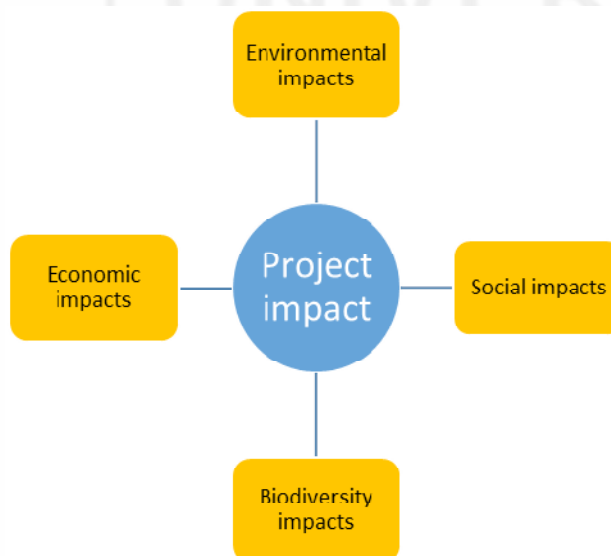


Fig. 1.2: Multi-dimensional impacts of projects

1.4.1 Is Impact assessment necessary?

The need for impact assessment stems from the fact that:

- Impact assessment help in implementing positive and sustainable practices
- Incorporation of social and environmental characteristics into decision making process is enhanced.
- Minimisation of both environmental and social impacts either due to individual subprojects or the cumulative effects of many subprojects take place.
- Human health, cultural and heritage property is protected

1.5 PREDICTION OF IMPACTS

Predicting the magnitude of a development, its likely impacts and evaluating their significance is core of environmental assessment process (Morris & Therivel, 1995). Prediction should be in quantitative or qualitative terms based on the available environmental baseline of the project area.

1.5.1 Considerations in Impact Prediction

Some of the most important considerations in impact prediction include

1. **Magnitude of the Impact:** This is to ascertain the severity of the impact and also to assess whether it is irreversible or reversible and also to estimate the rate of recovery.
2. **Extent of Impact:** This is to ascertain whether the impact is site-specific impacting local areas or trans-boundary areas (national or international).
3. **Duration of Impact:** This is to ascertain whether the impact is short-term (extending for 3-9 yrs), Medium-term (extending for 10-20yrs) or Long-term (extending beyond 20 yrs).
4. **Significance of the Impact:** This is to ascertain the value or amount of the impact. The most important criterion are:
 - Specific rules and regulations to be followed like national laws, standards, international agreements, conventions etc.
 - Views of the public along with complaints.
 - Degradation of sensitive ecosystems and resources
 - Extent of the impact in terms of area
 - Mitigation costs.
 - Time period of impact
 - Probability of occurrence
 - Reversibility of impacts
 - Number of people affected
 - Cumulative impacts

Precautionary principle should be advocated in case there is a doubt in the prediction or in case there is insufficient data.

DID YOU KNOW?

Direct environmental impacts arise directly from a project such as loss of footprint in the site area. For example in a road project the direct environmental impact will be the loss of habitat. **Indirect environmental impacts** indirectly result from a project. For road projects, they are vehicular emission and noise pollution associated with the roadwork. **Cumulative impacts** are the sum total of environmental impacts from a project and other works in the vicinity. For road projects, the rule of thumb for emission impact is the accumulation of project-induced emissions and those from other pollutant-emitting activities within 500m radius of the project site.

1.6 PREDICTION AND ASSESSMENT OF IMPACT ON THE CULTURAL AND SOCIO-ECONOMIC ENVIRONMENT

Dear Learners, let us now read about prediction and assessment of impact on the cultural and socio-economic environment in the following sentences:

1.6.1 What are Social impacts?

The Inter-organisational Committee on Guidelines and Principles for Social Assessment (1994) (cited in Glasson 2000) defined social impacts as ‘the consequences to human populations of any public or private actions that alter the ways in which people live, work, play, relate to one another, organize to meet their needs, and generally cope as members of society’. Social impacts are the ‘people impacts’ of development actions. Social impact assessments focus on the human dimension of environments, and seek to identify the impacts on people who benefits and who loses. SIA can help to ensure that the needs and voices of diverse groups and people in a community are taken into account.

Table: 1.1 Projects with significant social –economic impacts

TYPE OF PROJECT	SOCIAL IMPACT
Landfill and hazardous waste disposal sites	health risks, loss of amenity
Power and industrial plants	community stress from influx of work force, pressure on infrastructure
Dams and reservoirs	lifestyle disruption resulting from relocation, land use alteration or long lead time to full impoundment
Roads and linear developments	dislocation of activity networks and relationships

1.6.2 Classification of Social Impacts

Social impacts can be classified into five categories:

- **Lifestyle impacts** – on the way people behave and relate to family, friends and cohorts on a day-to-day basis

- **Cultural impacts** – on shared customs, obligations, values, language, religious belief and other elements which make a social or ethnic group distinct
- **Community impacts** – on infrastructure, services, voluntary organisations, activity networks and cohesion
- **Quality of life impacts** – on sense of place, aesthetics and heritage, perception of belonging, security and liveability, and aspirations for the future
- **Health impacts** – on mental, physical and social wellbeing, although these aspects are also the subject of health impact assessment

1.6.3 What is Social Impact Assessment?

Social Impact Assessment (SIA) can be defined in terms of efforts to assess or estimate, in advance, the social consequences that are likely to follow specific policy actions (including programs/ projects and the adoption of new policies), and specific government actions. It is a process that provides a framework for prioritizing, gathering, analysing, and incorporating social information and participation into the design and delivery of developmental interventions. The SIA ensures that the development interventions: (i) are informed and take into account the key relevant social issues; and (ii) incorporate a participation strategy for involving a wide range of stakeholders. Social Assessment (SA), on the other hand, is a process that provides framework for prioritizing, gathering, analysing and incorporating social information and participation into the design and delivery of development operations (Rietbergen McCracken and Narayan 1998).

Table: 1.2 SEIA Questions

<i>Impact definition</i>	<ul style="list-style-type: none"> • What are the potential socio-economic and cultural impacts of the proposed development?
<i>Direction of impacts</i>	<ul style="list-style-type: none"> • Is the direction of the potential impacts adverse or beneficial? • Does impact direction shift between different groups and sub-populations? Do some benefit while others don't? • Are the trade offs between potential adverse impacts and potential beneficial impacts acceptable?
<i>Impact causes</i>	<ul style="list-style-type: none"> • How could the proposed development cause socio-economic impacts?
<i>Impact attribution</i>	<ul style="list-style-type: none"> • Will the proposed development create new impacts or accelerate/exacerbate existing impacts? • How responsible could the proposed development be for causing an impact? If this is immeasurable, how can the developer estimate the level of responsibility in a manner that is fair and precautionary?
<i>Impact scope and scale</i>	<ul style="list-style-type: none"> • Which populations and communities will the proposed development most likely impact? • How far and wide, geographically, could individuals and communities feel the impacts of the proposed development?
<i>Impact manageability</i>	<ul style="list-style-type: none"> • Will potential impacts support or undermine the affected communities' aspirations and goals? • How resilient are the potentially affected communities? How vulnerable are they to adverse impacts? • Will the impacts cause unmanageable change for a community?
<i>Impact significance</i>	<ul style="list-style-type: none"> • Are the potential impacts likely, adverse and/or significant? • Is mitigation available to manage, reduce or eliminate the potential impacts?
<i>Impact mitigation and monitoring</i>	<ul style="list-style-type: none"> • Are there existing mitigation measures that have worked for these types of impacts? If so, how can we use them? • How do we track the accuracy of our predictions and use adaptive management to alter mitigation if required?

SIA is a process of analysing the impact of public/government intervention on the social aspects of the human environment. These aspects include:

- The ways people cope with life through their economy, social systems, and cultural values.
- The ways people use the natural environment, for subsistence, recreation, spiritual activities, cultural activities, and so forth.
- The ways people use environment for shelter, making livelihoods, industry, worship, recreation, gathering together, etc.
- Organization of the community, social and cultural institutions and beliefs
- Preservation of the community identity.
- Art, music, dance, language arts, crafts, and other expressive aspects of culture.
- A group's values and beliefs about appropriate ways to live, family and extra-family relationships, status relationships, means of expression, and other expressions of community.
- The aesthetic and cultural character of a community or neighbourhood-its ambience.

SIA essentially involves characterizing the existing state of such aspects, forecasting how they may change if a given action or alternative is implemented and developing means of mitigating changes that are likely to be adverse from the point of view of an affected population.

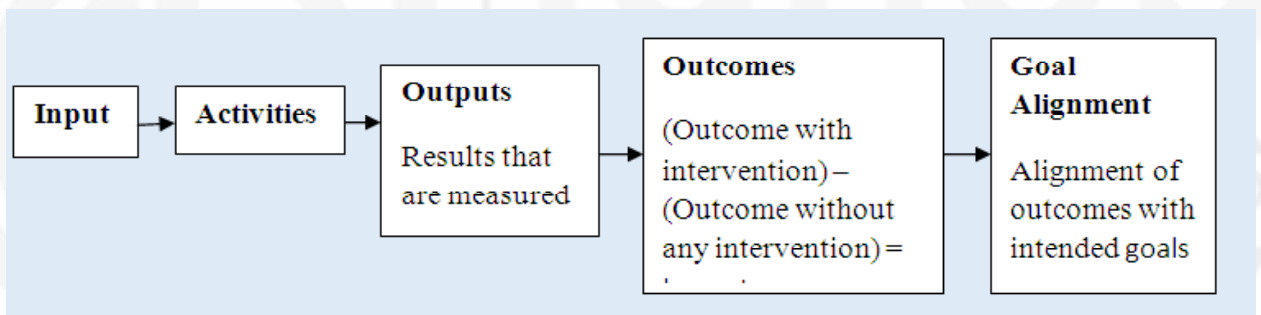


Fig. 1.2 : The impact value chain

(Adopted from The Goldman Sachs Foundation, 2003)

The output could be any measurable results from an organization's activities, e.g., units of housing, number of people placed into employment, number of youth served, etc. The outcomes would be the specific changes in attitudes, behaviours, knowledge, skills, status, or level of functioning that result from enterprise activities, such as finding a job, avoiding getting sick, or reducing emissions by a certain amount. Social Impact Assessment uses any of the tools of social science, program evaluation, or business practice to determine the social outputs, outcomes, or impact of an intervention, program, organization, or company. Many a times, these make use of workshop-based methods and participatory assessment methods.

The major advantages of undertaking a systematic SIA include:

- Identifying project/ programme stakeholders
- Identifying and prioritizing social issues associated with project
- Mitigating negative impact on communities or individuals

- Enhanced benefits to those affected
- Avoids delays and obstruction in gaining development approval
- Acts as a precautionary measure and avoids costly errors in the future
- Builds the trust and cooperation between community and stakeholders that is necessary for successful implementation of the project.

1.6.4 The Social Impact Assessment Process

Social Assessment or Social Impact Assessment is process for ensuring that development activities are (i) informed by and take into account the key relevant social issues and formulate mitigative measures, and (ii) incorporate a strategy for participation of wide range of stakeholders. Social Assessment is an iterative process that has to be organized in a phased manner in several stages. It follows that the process of an SIA (or SA) is similar to the EIA process. Although, the major stages involved/steps followed in conducting SIA (or SA) are logically sequential, they often overlap in practice.

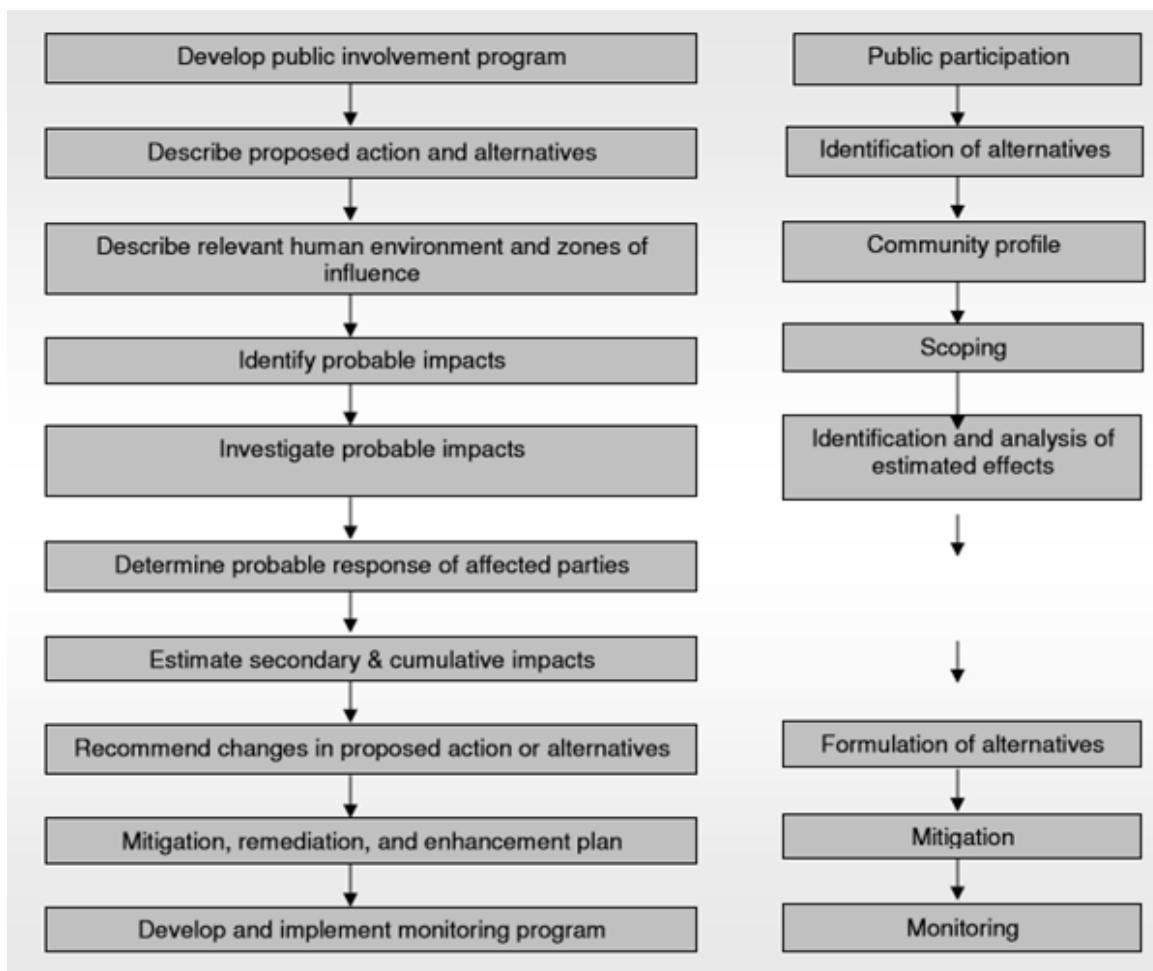


Fig. 1.5: Stages in Social Impact Assessment
(Adapted from Impact Assessment and Project Appraisal, 2003)

According to the Inter-organizational Committee on Guidelines and Principles for Social Impact Assessment (1994), the SIA involves undertaking various actions in the following major stages which are explained hereunder

1. Public Participation:

Developing and implementing an effective public participation plan to involve all interested and affected stakeholders is the vital first step. This involves

identifying the client population that will either benefit or be adversely affected by the project.

2. Identification of Alternatives:

It involves describing the proposed action and reasonable alternatives to it, including the no action alternative. During this stage, the proposed action is described in detail so as to identify the data requirements needed for the proponent to do a preliminary assessment.

3. Profile of Baseline condition:

Document the relevant human environment/area of influence of the project and the existing social conditions and trends. Baseline simply means geographical and time line to start the assessment.

Social impact assessment can be performed some times to get an overview of the social issues associated with the project in terms of some of the parameters:

- (a) **Demographic factors:** number of people, location, population density, age etc.
- (b) **Socio-economic determinants:** factors affecting income and productivity, such as risk aversion of the poorest groups, land tenure, access to productive inputs and markets, family composition, kinship reciprocity, and access to labour opportunities and migration.
- (c) **Social organization:** organization and capacity at the household and community levels affecting participation in local level institutions as well as access to services and information.
- (d) **Socio-political context:** implementing agencies' development goals, priorities, commitment to project objectives, control over resources, experience, and relationship with other stakeholder groups.
- (e) **Needs and values:** stakeholder attitudes and values determining whether development interventions are needed and wanted, appropriate incentives for change and capacity of stakeholders to manage the process of change.

DID YOU KNOW?

Identifying Social Impact Assessment Variables Social impact assessment variables are measurable changes in human population, communities, and social relationships resulting from a development project or policy change. A list of social variables is suggested below after intensive research. **1. Population Characteristics** refers to the present population and the expected changes in population due to migration /immigration whether temporary or permanent. **2. Community and Institutional Structures** refers to the size, structure, and level of organization of local government including linkages to the larger political systems. It also encompasses historical and present patterns of employment and industrial diversification, the size and level of activity of voluntary associations, religious organizations and interests groups, and their relationships. **3. Political and Social Resources** refer to the distribution of power authority, the interested and affected publics, and the leadership capability and capacity within the community or region. **4. Individual and Family Changes** refer to factors which influence the daily life of the individuals and families, including attitudes,

perceptions, family characteristics and friend-ship networks. **5. Community Resources** refers to patterns of natural resource and land use; the availability of housing and community services to include health, police and fire protection and sanitation facilities. A key to the continuity and survival of human communities are their historical and cultural resources. Under this collection of variables we also consider possible changes for indigenous people and religious sub-cultures.

1.6.5 Scoping of the Impacts

This essentially involves identification and prioritization of the range of likely social impacts through a variety of means, including discussions or interviews with members of all potentially affected. The principal methods to be used by experts are reviews of the existing social science literature, public scoping, public surveys and public participation techniques.

The methods for social analysis and participation include (Rietbergen-McCracken and Narayan 1998):

- (a) **Workshop based methods:** Collaborative decision making often takes place in the context of stakeholder workshops, which bring stakeholders together to assess issues and design development projects collaboratively.
- (b) **Participatory Assessment Methods:** Social assessments can also be informed by field visits to communities and other local-level stakeholders to learn about their perspectives and priorities.

1.6.6 Identification and Analysis of Estimated Effects

This essentially involves analysing and predicting probable impacts of the project proposal and the alternatives against baseline conditions (with versus without the action). This involves investigating the probable social impacts in terms of (i) predicted conditions without the actions (baseline condition) and (ii) predicted conditions with the actions and the predicted impacts.

Investigation of the probable impacts involves five major sources of information: (a) detailed data from the sponsoring agency on the proposed action; (b) record of previous experience with similar actions as represented in reference literature to include other SIAs; (c) census and vital statistics; documents and secondary sources; (d) field research, including informant interviews, hearings, group meetings and, if funds are available, (e) surveys of the general population.

Methods of predicting the future impacts are at the heart of the SIA process. Care must be taken to ensure the quality and transparency of methods and data, and to provide for critical review. The following are some of the methods for analysing and predicting social impacts [adapted from Taylor et al., 1998 and Impact Assessment and Project Appraisal, 2003]:

- **Comparative method:** This method examines how an affected community has responded to change in the past, or the impact on other communities that have undergone a similar action. The present is compared to the future with the proposed action.
- **Straight-line trend projection:** This method takes an existing trend and simply projecting the same rate of change into the future; we assume that what happened in the past is likely to happen in the future.

- **Population multiplier methods:** In this method, each specified increase in population implies designated multiples of other variables, such as jobs, housing units and other infrastructure needs.
- **Statistical significance means:** It involves calculations to determine probabilistic differences between with and without the proposed action.
- **Scenarios:** These refer to logical-imaginings based on construction of hypothetical futures through a process of mentally modelling the assumptions about the SIA variables in question.
- **Consulting experts:** Use of expert knowledge such as researchers, professional consultants, local authorities, or knowledgeable citizens.
- **Calculation of 'futures forgone':** a number of methods have been formulated to determine what options would be given up irrevocably as a result of a plan or project.

1.6.7 Prediction and Evaluation of Responses to Impacts

This is made to determine the significance of the identified social impacts to those who will be affected. Projecting the impacts through analysis is an important and also a difficult task, but the responses of affected parties frequently will have higher order significance impacts. After the direct impacts have been estimated, the assessor must next estimate how the affected public would respond in attitude and actions.

1.6.8 The indirect and Cumulative Impacts

Secondary or indirect impacts are those caused by the primary or direct impacts; they often occur much later, both in time and geographic distance, than primary impacts. Cumulative impacts are those resulting from the incremental impacts of an action added to other past, present, and reasonably foreseeable future actions regardless of which agency or person undertakes them.

1.6.9 Evaluation of Alternatives and Impact Mitigation

This involves evaluating alternatives in terms of projection of their consequences for affected and interested stakeholders. Each alternative or modification to the proposed action should be assessed separately. Subsequently, a mitigation plan needs to be developed and implemented, in order of preference to firstly avoid, secondly minimise and thirdly compensate for adverse impacts.

1.6.10 Monitoring Plan

This involves developing and implementing a monitoring programme to identify deviations from the proposed action and any important unanticipated impacts. This should track project and program development and compare real impacts with projected ones.

1.6.11 Principles of Social Impact Assessment

Some of the most important principles involved in social impact assessments are

- Involve the diverse public
- Analyse impact equity
- Focus the assessment

- Identify methods and assumptions and define significance
- Provide feedback on social impacts to project planners
- Use SIA practitioners
- Establish monitoring and mitigation programs
- Identify data sources
- Plan for gaps in data

The importance of social impact assessment and its application in specific projects can be understood clearly by the example or application case-study that is provided in the box.

Social impact of the Sardar Sarovar scheme, India: Key findings and conclusions from SIA (Berger, 1994)

Sardar Sarovar became the focus of the debate, in India and internationally, on how to balance economic development on the one hand, and human rights and environmental protection on the other. The environmental and social impact of the project components is immense and extends over a wide area. At least 100,000 people, in 245 villages, live in the area affected by submergence. In Gujarat and Maharashtra almost all of those affected are tribal people. In addition, there are 140,000 families who will be disrupted by the construction of the canal and irrigation system. The issues in Sardar Sarovar were complicated because the majority of those displaced were tribal people who usually have no formal title to the land they occupy and were considered by two state governments of Gujarat and Maharashtra to be encroachers and not entitled to resettlement. The review found this position to be non-compliant with recognized norms of human rights. In addition, it concluded that a number of issues of related to the environmental impact of the scheme were unresolved and questioned the assumptions used in project design and mitigation.

1.7 POTENTIAL IMPACTS OF A PROPOSED HYDROELECTRIC PROJECT: A STUDY

Based on the project details and the baseline environmental status, potential impacts as a result of the construction and operation of a proposed hydroelectric project have been identified. The Environmental Impact Assessment (EIA) for quite a few disciplines is subjective in nature and cannot be quantified. Wherever possible, the impacts have been quantified and otherwise, qualitative assessment has been undertaken. The anticipated positive as well as negative impact of the proposed project has been enumerated both during the construction and operation phases. The construction and operation phase comprises of various activities each of which is likely to have an impact on environment. Thus, it is important to understand and analyse each activity so as to assess its impact on environment. The key activities have been categorized for construction and operation phases.

Construction Phase Activities:

This includes Site preparation, excavation, construction of various structures from new roads to bridges, offices and colonies for workers, diversion of river water, disposal of effluents etc.

Operation Phase Activities:

Maintenance of equipment, disposal of sewage and effluents, mushrooming of allied activities etc.

The impact on the different environments have been explained in detail below: Categorized below are: - Impacts on Water Environment - Impacts on Air Environment - Impacts on Noise Environment - Impacts on Land Environment - Impacts on Biological Environment - Impacts on Socio-Economic Environment

1.7.1 Impacts on Water Environment

The various aspects covered under water environment are:

- Water quality - Sediments - Water resources and downstream users

Construction Phase

The major sources of surface water pollution during project construction phase are as follows:

- Sewage from labour camps/colonies
- Effluent from crushers
- Pollution due to muck disposal
- Effluents from other source

Operation Phase

The major sources of water pollution during project operation phase include:

- Effluent from project colony.
- Impacts on reservoir water quality.
- Eutrophication risks
- Sediments

1.7.2 Impacts on Air Environment

In a water resources project, air pollution occurs mainly during project construction and operation

Construction Phase:

The major sources of air pollution during construction phase are:

- Pollution due to fuel combustion in various equipments
- Emission from various crushers
- Fugitive emissions from various sources.
- Blasting Operations
- Pollution due to increased vehicular movement
- Dust emission from muck disposal

Operation Phase:

- Blasting Operations will result in vibrations

- Particulate matter produced as a result of tunnelling process
- Pollution due to vehicular movement
- Dust emission from muck disposal

1.7.4 Impacts on Noise Environment

Studies on the noise levels during the construction and operation phases have to be undertaken.

Construction Phase

In a water resource project, the impacts on ambient noise levels are expected only during the project construction phase, due to earth moving machinery, etc. Likewise, noise due to quarrying, blasting, vehicular movement will have some adverse impacts on the ambient noise levels in the area. In addition there is attenuation due to the following factors. • Air absorption • Rain • Atmospheric in homogeneities. • Vegetal cover. Hence, no significant impact is expected on this account.

Operation Phase

No significant noise pollution is seen during this phase.

1.7.4 Impacts on Land Environment

Impacts on land have to be assessed during construction and operation phases

Construction Phase

The major impacts anticipated on land environment during construction are as follows:

- Quarrying operations
- Operation of construction equipment
- Soil erosion
- Muck disposal
- Acquisition of land

1.7.5 Impacts on Biological Environment

Biological diversity may be impacted as a result of river projects.

Construction Phase

- Impacts on Terrestrial flora
- Impacts on Terrestrial fauna
- Impacts on aquatic flora and fauna

Operation Phase

- Increased accessibility resulting in human interference in the form of illegal logging, lopping of trees, collection of non-timber forest produce, etc.
- Change in riverine ecology due to changes in flow
- Impacts due to discharge of sewage from labour camp/colony

- Impacts due to human activities (indiscriminate fishing)
- Impacts on migratory fish species

1.7.6 Impacts due to Land Acquisition

In case of river projects large areas of land is necessary and land acquisition is inevitable. Rehabilitation has to be provided for all the displaced villagers.

1.7.7 Impacts on Cultural/Religious/Historical Monuments

A study is to be conducted to see if any monuments of cultural, religious, historical or archaeological importance will be impacted due to the project .

1.7.8 Increased Incidence of Water Related Diseases

Increased incidence of water-related diseases can occur due to breeding of vectors, aggregation of labour and excavations of borrow pits.

1.7.9 Impact on Geological Environment

Since the project may exert pressure on the land below a thorough study of the rocks in the upstream, central and downstream areas of the project has to be done.

1.8 ENVIRONMENTAL AUDITING

Dear Learners, let us now read about environmental auditing in the following sentences:

1.8.1 Background

There is increasing need for companies to demonstrate good environmental management practice to a wide range of interested parties. ISO 14001 require that participating organisations have their environmental performance measured and verified.

Environmental auditing is not a legal requirement under any specific law or regulation. Rather, it is a proactive management tool that is used to consciously identify environmental problems before they occur in order to take preventative measures. Environmental auditing is an internal management tool for use by an organization or activity in carrying out its environmental management responsibilities.

Auditing is a long-established tool commonly used to evaluate and monitor financial and production performance.

In recent years, the audit tool has been adapted to workplace environmental programs, systems and practices to evaluate their effectiveness and to identify deficiencies that require corrective action.

Auditing all or part of that system can measure the performance of a company's environmental management system. The results of such audits can assist companies in demonstrating their commitment to continuously improving their environmental performance. Full commitment from senior company management is essential if the audit process is to be a success. This commitment requires an involvement and interest in the whole audit process.

1.8.2 Why audit?

It is important to establish the purpose of the audit; this will help in deciding when to audit and what approach to use. An environmental audit can provide valuable information to help a company to meet the agreed standards of environmental performance (which should be defined in company policy) and stay ahead of the requirements placed on them by law.

The possible functions and benefits of an environmental audit are:

Management

- Demonstrate a visible commitment to improving an organisation's environmental performance.
- Use as a basis for the development of environmental management policies or efforts to improve existing plans.
- Identify environmental risks, impacts and review of management controls and systems and associated liabilities, liabilities and risks from past and present activities of the site or surroundings and implementation of recommendations.
- Review process and plant operating procedures or activity's current environmental standards of operation and company environmental management procedures, including emergency response planning, monitoring and reporting systems and planning for future changes in Processes or Regulations.
- Increasing actions undertaken or needing to be undertaken by an organization or activity to meet environmental goals such as sustainable development, Responsible Care®, recycling and efficient use of resources.

Financial

- Prevention of financial losses: through remediation or the closure of an organization or activity; government restrictions or negative publicity caused by bad management or monitoring of the environment.
- Fair assessment of financial implications of environmental issues, liabilities and impact of new regulations.
- Highlight where costs can be saved (e.g. through energy conservation or minimisation, improved use of raw materials, process changes, waste reduction, reuse and recycling etc.)

Legal

- To measure and improve an organization's or activity's compliance with environmental legislation and regulations such as operating permits, air emission standards, effluent standards, waste management standards, transport regulations, etc. thus avoiding legal sanctions against an organization or activity or its management under prevailing laws and regulations.
- Provision of evidence of the implementation of environmental management in court if requested.

Training

- To facilitate the sharing of best environmental practices and increase in the awareness of the management and staff of an organization regarding environmental policies and responsibilities.

- Assessment of training, knowledge and awareness of employees.

Reporting

- Provision of an environmental audit report for use by an organization, or activity in dealings with environmental groups, government and the mass media.
- Provision of information required by insurance companies, financial institutions, shareholders and other stakeholders.

1.8.3 Types of Audit

A different type of audit may be chosen based upon why the audit is being conducted. Three broad types of audit can be identified:

Self-Audit/ Self-assessment

Team members are selected from the staff of the business, operating unit or department to be audited

Internal Audit

Team members are selected from employees of the organisation, but not from the business, operating unit or department to be audited. In some circumstances it may, however, be of benefit to have a representative of the unit on the audit team. They should not be team leaders.

External Audit

Team members are drawn from outside the organisation -for example, consultants. The team may, however, be assisted by employees of the organisation such as business, operating unit or department manager acting as guide and advisor. This type of audit may be useful where third party benchmarking, certification and neutrality is required, or where company resources do not allow internal audits.

Table 1.4 : Environmental Audit Categories

ENVIRONMENTAL AUDIT TYPES		
Liabilities Audits	Management Audits	Activities Audits
Compliance Audit	Corporate Audit	Site Audit
Operational Risk Audit	Systems Audit	Waste Audit
Acquisition Audit	Policy Audit	Product Audit
Health & Safety Audit	Issues Audit	Cross boundary Audit

1.8.4 Basic Principles of Auditing

An environmental audit has the following characteristics;

Comprehensive Methods

An environmental audit requires the use of detailed procedures and methodology. The environmental audit must be conducted using comprehensive protocols and fixed procedures to ensure collection of the required data and the documentation and verification of that information.

Evidence and Verification

The concept of evidence and verification of environmental deficiencies is a main element in an environmental audit. The audit team must verify all procedures, collected data and information through direct field inspection.

Relevant Measures and Standards

The standards and measures of environmental performance must be adjusted to be relevant to the organization or activity and the production process being audited. An audit is meaningless unless there are accepted standards against which performance can be compared.

Written Reports

Reports should contain factual observations and reasoning, and the documentation of the processes. All findings should be presented clearly and accurately, based on valid and documented evidences.

DID YOU KNOW?

The Keys to Successful Environmental Auditing rests in

- **Support from Management**
- **Participation by all parties**
- **Auditor Independence and Objectivity Agreement on Procedure and Scope**

1.8.5 Scope

An environmental audit should be conducted in a manner that allows for the provision of information regarding:

Background

- The history of an organization, land or activity including information on the setting, previous environmental damage/spill at the site, environmental practices, monitoring records and known environmental issues from the site and neighbours including soil and underground water.
- Any changes in the environmental setting that have occurred since the establishment of the organization or activity up to the time of the last audit.
- The natural resources used as input, processing of materials and all finished products (energy, water, raw material use) and wastes including hazardous and toxic wastes.

Compliance with Environmental Management Policy & Objectives

- Environmental risk assessment including compliance to regulations, soil; underground water, solids wastes, emissions, waste waters, hazardous products & nuisances.
- Emergency response plans and procedures.
- Waste minimization and environmental pollution control plans.
- The utilization of energy, water and other natural resources.

- Recycling programs and product life cycle considerations.

Training:

Plans for management and employees training (fundamental environmental concerns, regulations, permits, and policy), objectives and environmental awareness.

Practices

- The handling and storage of chemicals, hazardous and toxic materials and any potential environmental hazards.
- Waste management control systems, transportation route for materials and waste disposal, including facilities to minimize waste disposal impacts and accidents.
- Measure of the effectiveness of pollution control equipment as indicated in inspection reports, maintenance logs, emission test results and routine analytical reports.
- Records regarding waste disposal licenses and compliance with laws, regulations and environmental quality standards.
- Environmental practices of contractors and sub-contractors.

1.8.6 When to audit?

The need to conduct an audit, and the timing and frequency of such an audit, should be determined by considering the following factors:

- Hazard and risk ranking.
- History of past incidents.
- Past performance against standards (results of previous audits, incidents on site).
- Environmental associated costs (e.g. energy, insurance, waste disposal).
- Legal requirements.
- Availability of resources.
- Review before acquisition or sale of sites.
- Changes in process, organisation or activity.
- Third Party certification requirements.

1.8.7 The Audit Process

An audit may range in complexity from a simple inspection of a plant operation against environmental requirements conducted by a local management team over a period of a few hours, through to a comprehensive assessment of performance of a location's entire environmental management system.

Introduction

Implementation of an environmental audit will depend on the type of audit being carried out, the type of organization or activity and the practices of the auditor.

1.8.8 Pre-audit

Pre-audit activity forms an essential part of the environmental auditing procedure. Careful planning at this stage will help to ensure success of both the initial audit and any subsequent audits. Information required at this stage includes detailed information regarding activities carried at the site, the legal status of the facility including permits & monitoring data, management structure and the scope of the organization or activity to be audited. Pre-audit activities also include the selection of the audit protocol team and the financing for the audit program. At this stage the purpose and scope of the audit should have been agreed upon.

1. Obtain management commitment.
2. Agree audit scope, objectives and style.
3. Communicate objectives.
4. Choose audit team.
5. Brief team.
6. Issue pre-audit questionnaire.
7. Gather the necessary information:
 - List of operational permits
 - Mapping of the site & surroundings including soil & underground waters
 - Past & present activities of the site & surroundings
 - Plant layout & processes
 - Relevant regulations
 - Environmental incidents on the site & surroundings:ex: spills
 - Previous audit reports
 - Site safety requirements
 - Risks analysis
 - Visits Interviews
 - Sampling
 - Other methods.
8. Review feedback from questionnaire & prepare for audit (audit protocol).

1.8.9 Site Activities

Audit “kick-off” meeting on site /Preliminary Meeting

The first step in the audit is a meeting between the audit team and the management of the organization or activity to review the purpose of the audit, the procedure and the time schedule.

Site Inspection

The initial site inspection should follow the preliminary meeting. The audit team will receive an overview of the organization and the operations and on this basis can

then focus on specific areas or processes that require attention. In carrying out the site inspection, the audit team may discover matters which are relevant to the audit but which were not identified at the planning stage. Environmental audits should be conducted in accordance with a set procedure. The procedure consists of defined steps which must be followed by the auditor to ensure that there is consistency in the implementation of the audit and the reporting of results. There is a wide variety of protocols depending upon the type of organization and environmental characteristics. Some common protocols used for an audit are:

- **Fill-In Forms.** The simplest form of an audit uses fill-in forms based on reports, which will be produced as an audit guide.
- **Check List.** This type of protocol is commonly used, providing a detailed listing of all issues to be covered.
- **Questionnaires.** Questionnaires are frequently used as an auditing protocol and the list of questionnaires shall be completely replied by the auditor. In general an auditor prepares a standardized format for conducting an audit compiling the final report.
- **Guidance.** Guideline protocols are the most common type of protocol. They provide specific instruction and guidelines to be used by the auditor, and aspects that should be investigated.
- **Photographs** - A picture speaks 1000 words. Use photographs to support findings and to highlight good practices; remember to obtain the permission of the site management and respect any safety requirements (e.g. use appropriate equipment in flammable zones etc).

Data Collection

Data and information collected during the environmental audit will consist of the audit protocol, documentation provided by the owner of the organization or activity, auditor's notes and observation, the sampling and monitoring results, photos, plans, maps, diagrams, working papers and other related items. This information must be well documented to facilitate easy retrieval. The prime purpose of data collection is to support the audit findings and provide the basis for verification.

Verification

A main principle of environmental auditing is that the information presented by the audit team shall be supported on the basis of evidence. Documentation must be produced by the audit team in support of all statements or have been verified under the direct supervision of the audit team.

Evaluation of the Findings

The audit findings should be evaluated against the objectives established for the audit, and the agreed protocol, to ensure that all issues and problems have been covered. The supporting documentation should be carefully reviewed to ensure that proper backup and verification is available for all of the findings.

Closing Meeting on site

On completion of the site investigations, the audit team should present their preliminary findings in a formal exit meeting. This meeting will discuss any matters which have been resolved or for which information is unavailable. The audit team shall provide

a general review of the findings and indicate when the final report will be completed. All documents collected during the audit should be returned to the management of the organization or activity.

1.8.10 Post Audit Actions

Issue draft audit report to site management

The audit team should prepare a comprehensive written report on the results of the audit. The report should include presentation of an action plan for addressing the issues identified. The nature of this report will depend upon the complexity of the audit. The report should state factual findings, particularly compliance with standards, policy and legal requirements where relevant. In addition the report should include recommendations for remedial or improvement actions.

Revise and issue final report

It is important that an opportunity is given for the management of the unit being audited to see and comment upon a draft of the audit report before it is finalised to clarify points and correct inaccuracies. The final report is then issued and a follow up meeting is conducted if necessary.

Action plan

An action plan should be developed from the report. Many actions may be possible to complete quickly and with local resources. There may be some actions that require additional resources. It is essential to obtain the necessary high-level management commitment to progress these actions. There must also be a process to self-check against audit recommendations and action plan and report back the progress of the actions on a regular basis.

Confidentiality

Internal audit reports are the confidential property of the organization or activity that has been audited and often contain a disclaimer. However, the organization or activity may, at their discretion, submit the environmental audit reports to the authorities, the public or other organizations for the purpose of:

- Publicising their environmental management efforts.
- Responding to the requirements for performance rating of the business.
- Any other purposes as defined by the organization activity.

This confidentiality policy should not be interpreted as in any way limiting the following.

The rights of authorities to:

- Verify the audit results;
- carry out routine or special inspections of an organization of activity;
- carry out investigations of an organizations or activity suspected of violations or noncompliance with laws and regulations;
- request specific information as the basis for any scheme for environmental performance ranking of an organization or activity;
- the responsibility of the organization or activity to provide environmental management and monitoring data as prescribed usually under regulations.

1.8.11 Training of the Auditors

To ensure that environmental audits are conducted in a reputable and professional manner, business activities and non-governmental organizations are recommended to establish and implement a code of ethics and certification of environmental auditors. The environmental auditor should have suitable education and professional experience to carry out their duties. The skills needed by environmental auditors include those in the areas of:

- Environmental auditing processes, procedures and techniques.
- Characteristics and analysis of management systems.
- Laws, regulations and environmental policies, environment health and safety protection systems and technology.
- Operation of facilities to be audited.
- Potential environmental impact and worker health and safety risks.

Auditors should also have training and demonstrated ability in areas needed to perform the audit including:

- Communication skills.
- Work scheduling and planning.
- Data analysis and finding.
- Audit report writing.

Environmental auditors should exercise due professional care in ensuring accuracy, consistency and objectivity in the performance of audits. Auditors should conform to a recommended code of ethics.

1.9 ACTIVITIES

1. Visit the website of Ministry of Environment and Forests and check out the air, water and noise quality index.
2. Obtain a form for submission of Environmental Statement from local pollution control board office and list three benefits of this statement.
3. Find out about the Coastal Zone Regulations for siting of different projects.
4. Find out detailed information of ISO 14000.
5. Prepare a waste audit to help in the identification of the possibilities of waste reduction based on the study of the activities of the organisation.

Check Your Progress 1

- Note:** a) Write your answer in about 50 words.
b) Check your progress with possible answers given at the end of the unit.

1. Describe the environmental auditing process.
.....
.....
.....

2. Explain siting guidelines for industries.

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1.10 LET US SUM UP

India although being a developing country with a huge population has come a long way in terms of environmental awareness. However though we have many environmental laws and rules which cover almost every area of concern, lack of implementation due to various factors has resulted in environmental crimes. Environmental impact assessment has been undertaken both by the government and by corporates to restrict the pollution of air, water and land. However evolution and implementation of a comprehensive siting policy can not only bring down project costs but also save the environment. Since urban growth is uncontrollable in developing countries, industrial siting decisions have to be compatible with the long term changes in human settlement patterns. A very critical step towards reduction in pollution and other socio-economic problems is the integration of siting, EIA and urban planning. The unit discusses in detail on the environmental siting and auditing processes.

1.11 KEY WORDS

Environmental siting is the consideration of the surrounding environment, including areas of high conservation value and special significance (Specified Ecosystems), that may be impacted as a result of activities upon or emissions and discharges from prescribed premises.

Social Impact Assessment (SIA) can be defined in terms of efforts to assess or estimate, in advance, the social consequences that are likely to follow specific policy actions (including programs/ projects and the adoption of new policies), and specific government actions. It is a process that provides a framework for prioritizing, gathering, analysing, and incorporating social information and participation into the design and delivery of developmental interventions.

1.12 REFERENCES AND SUGGESTED FURTHER READINGS

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1.13 ANSWERS TO CHECK YOUR PROGRESS

Your answers should include the following points:

Answers to Check Your progress 1

1. Refer to section 1.8
2. Refer to section 1.2