UNIT-I

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Definition:

Environmental Impact assessment is an investigation of the effects on the environment arising from a major Activity (plan/policy/project)

(i) this study proposal means to midigate (or) reducing the significant impacts on the environment.

(ii) In this process the effects of the project undertaken (or) analysed first the effects are recorded in a report followed by a consulting experts on the report and these making a final decision based on the experts comments and informing the public. All these activities Continued to Sestainable development on the environment.

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The phrase EIA has been borrowed from section 102(2) of the national environmental policy act 1969 USA. In India the environment was given serious thought with the active involvement of late Smt. Indira Gandhi in the united nations conference on human environment in Stockholm in 1972

A national committee on environmental planning and coordination (NCEPC) was setup in the dept of science and technology.

→ the tiwari committee has proposed the formation of a dept of environment aimed at environmental protection.

→ To carry out environmental impact assessment of proposed development projects and to leave authority for pollution monitoring uncontrolled.

Aims of EIA:

→ Evaluation (or) assessment of environment impacts of a developmental projects. prior to decision making.

→ planning aid for adopting midigating measures (or) reducing adverse impacts of the proposed projects.

→ To support the goals of environmental production and sustainable development

→ To bring out the proposals to decision makers to

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→ provide an advice to the decision makers on whether the proposal (or) scheme to be allowed to proceed (or) not

→ to facilitate the sustainable development.

Impact:

A change or deviation of the baseline situation arising from a proposed project/plan.

Baseline situation:

It is an existing environmental condition before a proposed project (or) activity.

Environmental Impact:

It refers to a positive (Beneficial) or negative (adverse) changed to ecosystem (or) human health as a consequence of human intervention in the environment through proposed public and private developmental activities such as projects and programmes.

Beneficial:

Afforestation for coastal management projects.

Adverse:

→ land use

→ Drainage problems

→ loss of trees.

→ loss of historical and cultural monuments for mass transist system

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→ Environmental impact assessment:

An activity carried out to determine and minimise the impact of any project on physical, chemical (or) biological parameters of environmental and also human health is termed as environment impact assessment.

Classification:

Enviromental impact assessment is broadly classified into 3 different ways.

① positive (or) negative impacts

② Temporary (short term) (or) permanent (long term) impacts.

③ Reversible (or) irreversible impacts.

① positive (or) negative impacts:

→ Tourism activities have both beneficial and adverse effects on environment.

→ The impacts from Construction of infrastructure facilities like roads, airports, resorts, hotels, restaurant, shops can have positive impacts by raising awarness of environmental values and save as a medium to finance protection of natural areas and increase their economic importance.

→ uncontrolled tourism can leads to adverse effects like soil erosion, increase in pollution (air, noise, solid waste,

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sewage, oils & chemicals) · Discharges into sea, rivers depletion of water resources.

② Temporary (or) permanent impacts:

→ the short term impacts are the construction, traffic, noise, dust, distruption of vehicles and pedestrain traffic.

→ the long term impacts are the consumption of energy resources, generation of waste, increase in impervious surface leading to increased storm water runoff.

Reversible (or) irreversible impacts:

Based on the severity of potential impact by any proposal project the impact may be either reversible or irreversible.

→ Impact of noise due to the construction activities are reversible.

→ they harm to the environment due to more infrastructural facilities like transport, trade, commerce and service sectors are irreversible.

Elements of EIA:

The key elements in environmental impact assessments are

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① Screening
② Scooping
③ Assessment
④ Alternatives
  (i) Feasibility
  (ii) Diverse
  (iii) scheduling
  (iv) public involvement
⑤ mitigating methods
⑥ EIS
⑦ Reviewing & Decision making
⑧ Continuous monitering.

① Screening:

Screening of development program is usually done by an EIA authority (or) Govt. agencies Constituting a variety of experts as a multidisciplinary team like environment scientist, engineers, ecologist, agricultural scientist, zoologist, economist and sociologist.

② Scooping:

This step recognise the important issues of a concern at a preliminary level of the planning process. It helps in site selection possible technical options and avoid all kinds of delays that arise during

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the project. It provides sufficient information to the public about the proposed project and understand this project and issues.

③ Assessment:

The EIA authority must record the Construction operations, maintenance plans of the proposed project and its impact on the ecologist and socio Economic environmental and suggest alternatives for site selection for development solutions, techniques and their impacts

④ Alternatives:

these are included in the EIA to identify and evaluate alternate actions that can be undertaken to achieve similar goals and promote sustainable development. Alternatives in EIA are

(i) Feasibility: The proposed alternatives should be Economically feasible with least negative environment impacts.

(ii) Diverse: the proposed alternatives must have diverse alternatives that include both design and site routes for development.

(iii) Scheduling: the proposed alternative should be timely presented to encourage more environmentally sound and publicity acceptable solutions.

(iv) Public involvement: public participation should be encouraged to integrate citizens into the environmental

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decision making process by arranging public meetings and hearings.

⑤ Mitigation methods:

this step includes the modifications in the proposals to prevent avoid or minimise the potential significant effects of a project. It may also include substitution of an alternative technology.

⑥ EIS:

the findings of the environmental statement assessment are reported as environmental impact statement it is a comprehensive clear and consize non technical summary of the project including location, design, size and mitigation results.

⑦ Reviewing and Decision making:

when the working document of the proposed project reaches the decision making committee (EIA authority or Govt) will consider its simplifications, for projects implementation.

⑧ Continuous monitoring:

Continuous monitoring of the environmental impact by project implementation is essential during the construction and operation stages (or) phases of a project. this phase of EIA ensures effective environment management and protection.

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Factors affecting Of EIA:

① Meteorology & Air quality → It deals with atmosphere its phenomean

② Topography → It deals with (or) It Study about shape & features of an area.

③ water → It studies about hydrological studies.

④ Demographics → statical data about population

⑤ land use → For which the land is used.

⑥ Soil condition → type/classifications of soil, properties.

⑦ mineral resources / Activities:

⑧ Ecological studies → Study of flora, fauna.

The study of the EIA process help to evaluate, analys and repot the environmental conditions from the activities. Resulting from several departments / developments An EIA should include details of the above aspects at the proposed site.

① meteorology and Air quality: the science dealing with the atmosphere and its phenomean including weather and climate. It includes

(i) effect of temperature

(ii) precipitation, relative humidity, evaporation and fog conditions.

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Evaporat
(iii) wind patterns
(iv) severe weathers such as Hurricanes, volcanoes.
(v) Air quality and odour level.
(vi) sound levels and sources of sound at the proposed project development site.
(vii) These studies are carried out with the help of Computer models, satellite data and climate theories.

② Topography: It is the study of the shape and features of land surfaces. It describes the physical features of an area of land. These features typically include natural formations such as mountains, rivers, valleys, lakes etc., man made features such as roads, Dams, and cities may also be included. It includes the local and reasonal geology studies, major land formations, geology structure and resources, seismic Hazardous.

③ water:

The quality of surface water and ground water along with hydrological studies. It is the study of the amount and quality of water being stored or conveyed on the land surface and in soils and in rocks near the surface.

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④ Demographics : (Statical data of population especially) this showing. average age, Income and education etc...,

→ This refers to the population distribution, change in population numbers., population characteristics (such as male to female ratio, Age Structure, rate of migration, municipal services (such as demand for social services, hospital beds, school places, Housing etc.)

⑤ Land use:

This includes the purpose for which the land is used namely agricultural activities, industrial activities (or) mining activities, Regional planning for future use and zoning etc.,

⑥ Soil conditions: classification of soil, properties of soil and soil mapping.

⑦ Mineral resources/activities:

the mineral resources available at the proposed project, development site, minerals like uranium, coal, oil and gas and other minerals.

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⑧ Ecological Studies:

These studies involving data on type and govern
species of flora and fauna, aquatic reptiles, amphibians, threatened species and distribution of species habitant migratory species and species of commercial importance.

All these factors have to be taken into consideration during the EIA process to enable better design buildings to plan heating and cooling systems as well as practising sustainable agricultural activities.

Sustainable development:

the concept of sustainable development aims at improving the quality of life for all the inhabitance of the planet without over consuming the natural resources beyond the capacity of the environment to reproduce them indefinitely. An important aspect which invites serious consideration is the balance between the development and environmental production.

Role of Sustainable development:

Sustainable development is extremely important for the following reasons.

→ ① to manage the resources efficiently.
→ we need to use the natural resources wisely that includes not throwing and away products, they are available use less energy and land fill spaces.

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→ To Comeback Climate Change. (

The latest report indicates that the Climate change and its resulting effect will continue to worsen in the future. the concentration of green house gases like Carbon dioxide, water vapour, CH_4, N_2O, CFC's have been increasing as a result of human activities such as combustion of fossils, deforestation, over use of fertilizers, decay of organic matter, accumulation of CFCs all these results in greater warming of earthsurface, rising sea level, changes in precipitation Factors increase in the frequency of severe weather events, melting of glaciers, scarcity of fresh water resources which will collapse the functioning of ecosystems.

* Life cycle Assessment (LCA)

According to the Iso 14040 life cycle assessment is a technique for assessing the environmental aspects and potential Impacts associated with a product. life cycle assessment is also known as Ecobalance and cradle to grave analysis

→ Complaining a inventory of relevant inputs and outputs of a product system.

→ Evaluating the potential environment impacts associated with those inputs and outputs.

→ Interpreting the results of the inventory analysis and Impact assessment phases in relation to objectives of

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the study.

Aims of the life cycle assesment:

→ It gives an insight to the product inputs related to environmental impacts.

→ It provides an understanding of the independent nature of the state of environment resulting from anthropogenic activities.

→ It enables the decision makers to take appropriate measures for improving the environment by using sustainable materials for the manufacture of products.

→ It helps to analyse the origin of the problem related to the product.

→ It helps to design new products that are ecofriendly and greener.

Example: Fruit juices are packed in two possible alternatives (i-e) glass bottle and carton

A glass bottle may be recused many times whereas a carton can be used only once. Additionally the glass bottles need washing and transportation whereas the carton can be disposed of after single use.

But the carton is more example compare to glass bottles. Thus we can conclude that carton would be the environmentally best choice for packaging procesed juices.

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phases:

The methodology for LCA involves four interrelated phases

① Goal & Scope

② Inventary

③ Impact Assessment

④ Interpretation.

① Goal & Scope:

In this phase, the purpose of study the reason for conducting the study the spatial and temporal scope. The decision taken in support of LCA.

Inventary Analysis:

In this phase the identification and qualification of the inputs and outputs of materials energy, water and pollutants released into the environment.

③ Impact Assessment:

It involves assesment of impacts on resource depletion on human health and ecological impacts.

④ Interpretation:

The inventary analysis and impact assessment results are interpreted by the decision makers to reduce the impact of the products on the environ

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Preparation of Environmental Base map:

A Base map is an aerial photograph which simply means the photograph taken from air with the help of air borne camera fitted to a light aircraft to prepare a base map to require two-three experts (or) specialist, aerial photogrametic camera, field camera, photogrametric scanner, plotter and software (AutoCAD map environmental GIS) the cameras used are film based single lens cameras. The photogrametric scanner enables the conversion of analog images to digital files and represents as pixels.

Environmental Base map is one of the important stages of a project development. It contains the plan of site and final design of the proposed construction in the form of a schematic diagram. It includes the basic information of the project site such as environmental conditions, soil conditions, population distribution, air quality, Quality of surface water and ground water hydrology, land quality and ecological resources.

It provides information on the existing status of the ecosystem potentially threatened by the developmental activities of proposed construction projects

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Environmental parameters:

The environmental data at the site where a particular proposed act on is being considered for an EIA study is collected by the EIA team members as environmental scientist, Biologist, Geologist, agricultural scientist, sociologist, economist and engineers. this multidisciplinary team (or) EIA team considered the following EIA parameters (or) environmental parameters

① Land
② climate
③ Air quality
④ water quality
⑤ Territory
⑥ Flora
⑦ Fauna

① Land:

the following details of the land are necessary for the EIA study. the land details are mainly considered as land owner ship, land tenture, existing land use, crop productivity and natural vegetation. this land data enables less adverse social impacts on the Indigenous people to provide equitable benefits to local communities.

② climate:

The climatic profile of the site is being

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Include the data on the rainfall evaporation, wind speed, relative humidity, minimum and maximum temperatures and barometric pressure.

③ Air quality:

This includes the amount of suspended particulate matter and fall out dust in the concentration of the gaseous emissions like Carbonmonoxide, sulpheur dioxide, Noxious flumes

④ water quality:

the study of water quality data includes the quality of surface water and ground water resources temperature, pH, turbidity, total dissolved solids, hardness of the water, total alkalinity, acidity, contents of Calcium, magnesium, dissolved oxygen, dissolved carbon dioxide Chloride, sulphate, Silica, iron, Copper, Sodium, potassium, phosphate, fluoride, Biological oxygen demand & COD.

⑤ Territory:

The study of terrian analysis at the proposed construction site includes the data of the Geology, classification of the land (Arid land, Grazzing land, wet land & wild land) Drainage, erosion potential and soil classification

⑥ Flora:

The study of the flora at the proposed development site should include the population of different types of

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different types of vegetation

identification of valuable vegetation species, Identification of rare species and equatic flora.

⑦ Fauna :

The study of fauna at the proposed development site should include the population of different types of fauna, density data of different types of fauna, Data on permanent and migratory population. and data on the rare species.

Role of stakeholders in EIA preparation:

when the draft of the proposed project is ready then it is sent to approval from the Covernments agencies. this requires notification in the newspapers and media to lead the general public know about the proposed project. this process involves preparing questions for a survey to be carried out on various aspects of the proposed action. the public decides if the proposed project is beneficial to them Geographically asthetically and economically the entire process is systematic time bound and carried out in transparent manner. ensuring possible public participation at the proposed sight.

Stages in EIA:

The Complete EIA procedure can be divided into two corresponding functions or stages

Initial environmental examination:

It is the first phase of the EIA process

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carried out to review the potential both positive and negative impacts on the environment caused by the proposed development project. It contains a brief information of the major environmental issues based on the readily available recorded information to be used in decision making proces of project planning. the main objective of IEE is to enable the decision makers and project proponents and to compare the alternative project proposals.

It contains a detail information of the proposed project which is reported as environmental impact assessment.

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Unit - I

Environmental Impact Assessment & Management ①

Basic Concept of EIA

Definition: —

What is EIAM:-

EIA is an activity designed to identify and predict the impact of a projet on biogeophysical chemical enviopment and on human health so as to recommended appropriate legislative measures, programms and operational procedures to minimize the impact.

(or)

EIA can be defined as an activity or process to identify predict and accers the impacts on enviroment and human health raised by a proposed activity or development activity.

* An impact can be defined as any change in the physical, chemical, biological, cultural, or socio-economic environmental system as a result of any development activity

⊛ Elements of EIA: —

⊛ EIA must be undertaken "early" in the development of proposed projets, plans and programm and must be completed before a decision to proceed is made.

⊛ EIA must be an objective, impartial analytical proces, not a way of promoting or selling a proposal decision makers it must use accepted scientific principle and methods

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(*) The process of EIA must be open to government officials at all levels, to potential stakeholders (those with direct interest in the proposed action) and to the public.

(*) Government officials responsible for implementing EIA must be encourage (not just tolerate).

(#) Factors affecting EIA:—

There are six factors that should be taken into account when assessing the significance of an environmental impacts arising from a project activity.

(1) Magnitude:— will the impact irreversible? If irriversible, what will be the rate of recovery or adaptability of an impact area.

(2) prevalence:— Each action taken separately, might represent a localized impact of small importance and magnitude but a no. of actions could result in a wide spread effect.

(3) Duration and frequency:— The significance of duration and frequency is reflected in the following questions. will the activity long term or short term?

(4) Risk:— To accurately access the risk, both the project activity and the area of environment impacted must be well known and understood.

(5) Importance:— This is defined as the value that is attached to an environmental component.

(6) Mitigations:— are solutions to problems available? Existing technology may provide a solution to a silting problem.

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EIA procedure :—

Initial environmental Examination :— (IEE)

=> IEE is nothing but reviewing the environmental integrity of the project.

=> In other words, IEE is used to screen and to determine weather the project require a full scale EIA (or) not.

=> EIA is also ensures Environmental Management.

=> IEE helps to minimize the effort, expanse and Time period to carryout to project and its planning.

=> IEE involves assessing the enviromental effects of a proposed project with limited budget.

=> If IEE result indicates that a project is not required a full scale EIA. Then it can be continued without delay.

=> IEE is much helpful in determining & identifying the key issues and merits of EIA with reference to a proje

=> Thus for a development project is desirable from the economic point of view.

Important steps in Full Scale (EIA) :—

Impact assessment methods are Classified into following Analytical ~~situati~~ functions :- Scope, identification, prediction and evolution

=> Methods of identification of environmental impacts can assist in specifying the range of impacts that may occur

=> It can deffeerntiate between various project Alternative in terms of questions Covering "how much or where" the impact may occer.

=> Method of evaluation determine the groups that may be directly affected by the project or action.

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⊛ Preparation of Environmental Base Map (EBM):-

an important requirement is preparation of an environmental Base maps (EBM or Maps) showing the silent information

① The concept of EIA as a planning tool require all phases of projet development, planning, final design, Execution and projet operation.

② The preparation of EBM is an important requirement for EIA to produce the information about planning & final design.

③ EBM provides essential background information about the projet area which can be used to interprete, to report and to conclude the recommendations.

④ Generally an EBM of any projet consists demography landuse, infrastructure, surface and ~~s~~ Ground water resources, soil conditions, ecological resources, metrological conditions and areas of cultural, archilogical, Tourist interest

⑤ The EBM should be very simple and more appropriate than a map drawn stricckling to scale.

⇒ Identification of study Area:-

- The EIA study area should include water bodies, land and population centres where the projet activities will have significant effect.
- General environmental parameters likely to be affected by development activities include - Ground water hydrology and quality surface water hydrology and quality, air quality, land quality land uses, vegitation forests, fisheries asthetics, public and occupational health and socio economics
- The size of the study area and the metrological conditions would also be considering in determining the study Area

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Classification of Environmental parameters :—

Environmental resources or values are classified into four General catogories :—

1. natural physical resources
2. natural ecological resources.
3. Human/economic development resources and
4. Quality of life values including asthetic and cultural values.

Role of Stake holders in the EIA Preparations :-

In the preparation of Conducting EIA process various groups of stake holders may participate. Some of them are.

1. **Developpers :—** They have direct responsibility for the project to implement (EMP) (Environmental Management program) including mitigation (mitigation means prevention)
   - Developpers hire experts to undertake EIA studies on be half of them.
2. **EIA Experts :—** These are experts are professionals to carryout EIA in designing and preparing EIA report.
3. **lead Agencies :—** Agencies are like govt, ministeries, or department and other people from various industries.
   - lead agencies provide Technical information to EIA experts during EIA studies.
4. **Public :—** public involves various Committies which have like to take part in the EIA process.
   - The role of public in the EIA process include contributing the information advising, scoping, during the

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the public hearing process.

(5) Academic institutions:— The no. of academic institutions are generally co-opted in Technical Committies of EIA.

(6) International funding organisation:— There will fund the EIA projects.

(7) Print of media organisations and people:— There will help in creating awareness about the project and to bridge the Communities and public with the project development authority.

Silent Features of EIA:—

* EIA procedure identify the all the possible Types of impacts
* EIA provides a plan for reducing the impacts caused by a developmental activity to control the environmental degradation
* EIA also provides alternatives for impacts to enhance the environmental Quality.
* EIA provides the right to Monitor, to identify also to measure the related impacts
* EIA is not negitively oriented Towards the development of a project but it safe guards the Quality of Enviornment.

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(*) Stages in EIA :—

EIA represents a systematic process that examines the environmental consequences of the development actions in advance. The EIA process involves a no of steps, some of which are listed below.

1. Project screening :— The no of projects that could be subjected to EIA is potentially very large, A screening mechanism seeks to focus on those projects with potentially significant adverse environmental impacts.

Those with little or no impacts screened out and are allowed to proceed to the normal planning and permissions without any additional assessment.

(2) Scoping :— This step seeks to identify, at an early stage, the key significant environmental issues from among a ~~best~~ host of possible impacts of a projects and ~~understand its various characteristics~~ all the available alternatives.

(3) Consideration of alternatives :— This seeks to ensure, that the proponent has considered other feasible approaches including alternative project locations, scales, processes layouts operating conditions and the no-action option.

(4) Description of the environment baseline :—

This includes the establishment of both present and future state of the environment, in the absence of the project taking into account the changes resulting from natural events and from other human activities

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⑥ Identification of key impacts :— This brings together the previous steps with a view to ensuring that all potentially significant environmental impacts (adverse and beneficial) are identified and taken into account in the process.

⑦ The prediction of impacts This steps aims to identify the likely change (impact) in the environment when the project is implemented in comparision with the situations when the project is not carried out.

⑧ Mitigation :— This involves the introduction of measures to avoid, reduce, remedy, or compansate for any significant adverse impacts.

⑨ public Consultation and participation :— This aims to assure the quality and effectiveness of the EIA, as well as to ensure that the public views are adequately taken into consideration in the decision making process.

9. EIS presentation :— Environment impact statement This is the vital step in the process. if done badly much good work in the EIA may be negated.

10. Decision Making :— At this stage, decisions are made by the relavent authority of the EIS) and consultancy together with other material considerations as to weather to accept, defer, or reject the projet.

11. Auditing :— This follows monitoring actual outcomes with the predicted outcomes. It is a vital step in EIA

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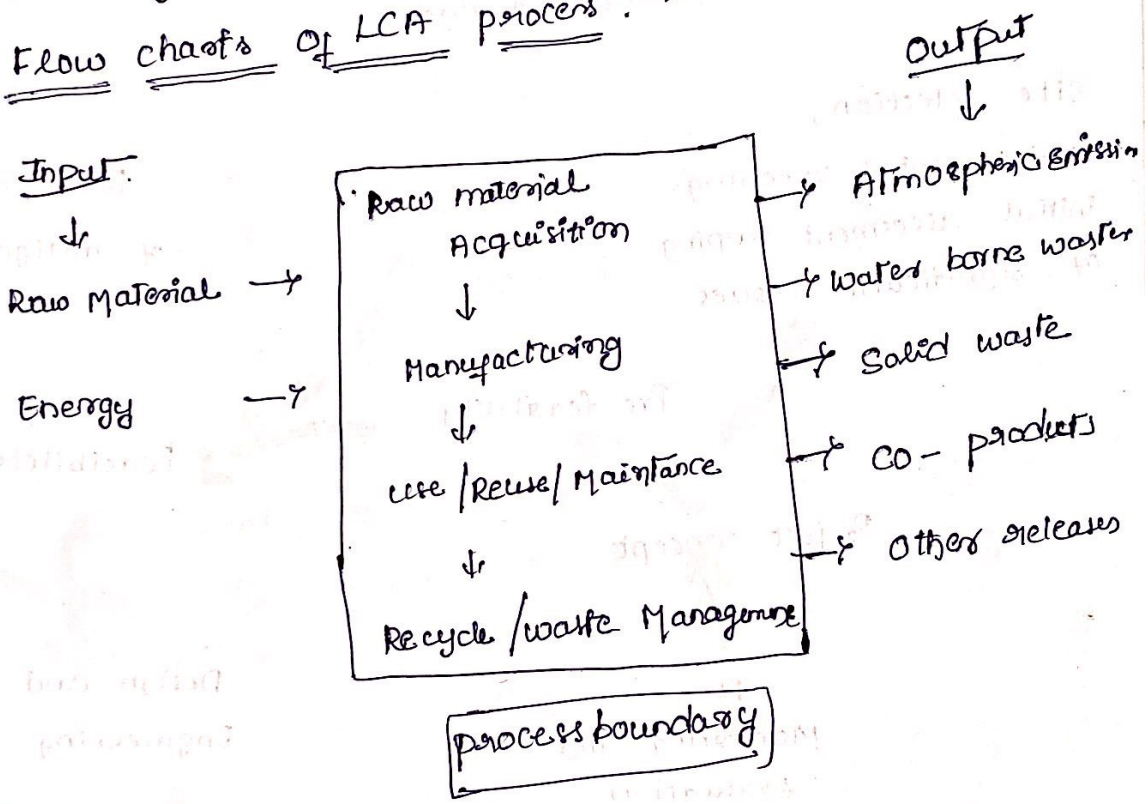
Life cycle Analysis :—

It is a Tool to Evaluate the environmental effects of a product or process throughout its entire life is known as LCA. It is also called as life cycle Assement. It includes identifying & Quantifying the energy and material used and waste released into the environment and accessing their enviromental impacts.

① Flow charts of LCA process :—



② Stages of LCA :—

1. Planning :— It includes statement of object, definition of product, environmental parameters, Evaluate method and data collection.
2. Screening :— It includes exhicution of LCA adjustment of plan
3. Data collection and Treatment :— It includes measures interviews, literature search and comperation of the inventory Table.

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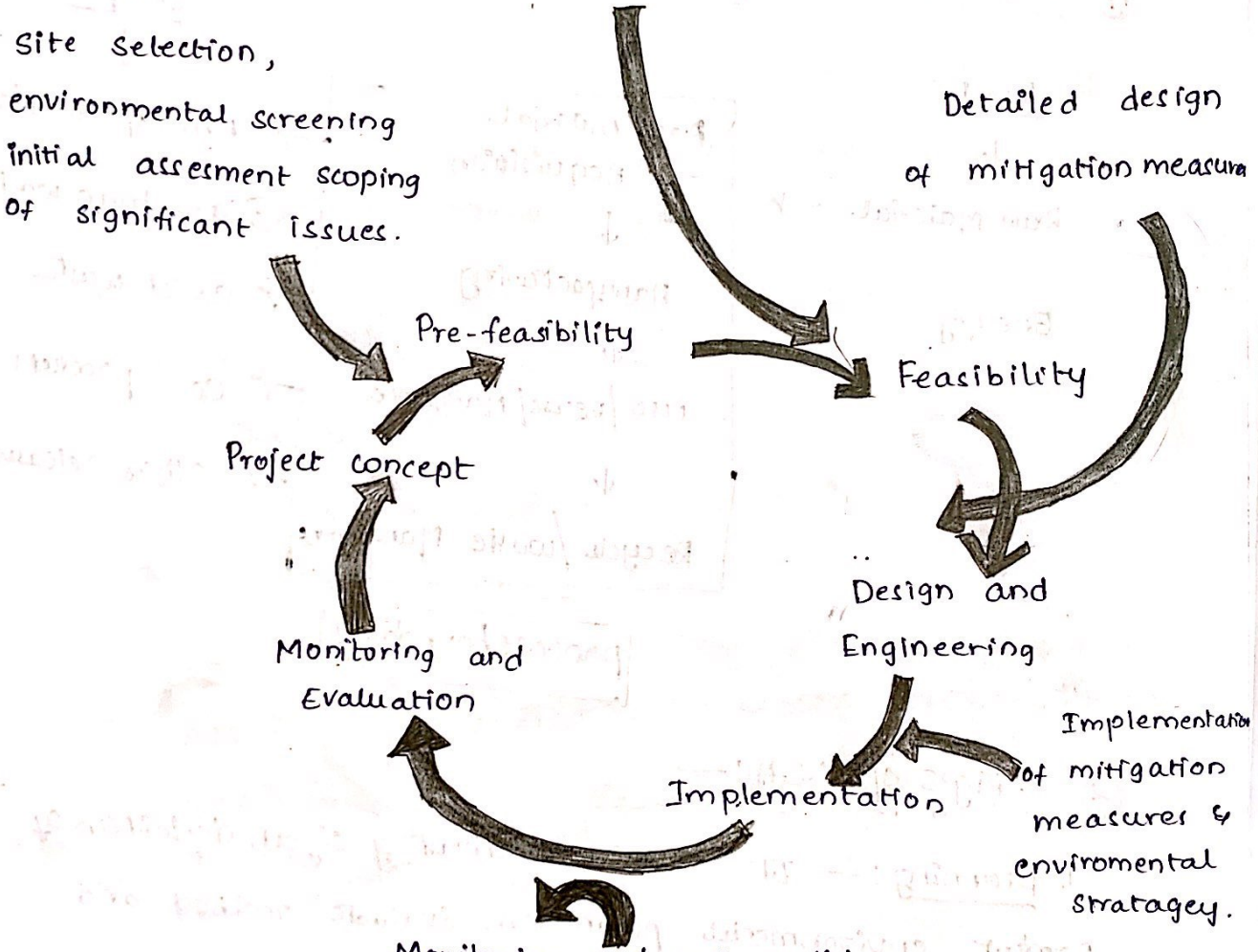
(4) Evaluation:- It includes classification of inventory data and weighing of different categories.

5. Improvement Assessment :- It includes sensivity analysis of improvement priority and feasibility assesment.

Life cycle analysis preparation of Environmental Base Map:

Detailed assesment of significant impacts, identification of mitigation needs, input to cost/benfit analysis.



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** classification of Environmental parameters Explanation

(1) physical Resources: —

(i) Hazard of soil erosion loss without proper resurfacing

(ii) Hazard of soil fertility from physical stresses in clearing and leveling

(iii) loss of rain water infiltrations.

(iv) Micro-effects on increasing Temparature.

(2) Ecological Resources: —

(i) loss of forest resources, which is cleared and associated wildlife habitate

(ii) Hazard from pesticides and other aggricultural Toxics of forest Ecosystems.

(3) Human use Values: —

(i) Impairment (means the act of spoiling something or making it weaker so that is less effective) of downstream water Quality.

(4) Quality of life values: —

(i) loss of forest Tourism / aesthetic values

(ii) Disruption (means) of local forest population Socio economics

(iii) Increased Sanitation deases hazard due to increased population

** EIS (Environment Impact Statement)

1. It is a document required by the 1969 National Environment policy Act (NEPA) for certain actions significantly affecting the Quality of Human Environment

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2. An EIS is a tool for decision making.
3. It describes the paitive and negitive environment effect of a proposed action.
3. and it usually also lists one or more alternative actions that may be choosed instead of the action described in the EIS.

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