Unit -5

* Assesment of Impact development activities on vegitation and wild life

① Many development activities like deforestation, Construction of dams, industries etc, can cause impacts on flora & fauna

② Bio-diversity refers to Various species & Ecosystems in a given region

③ prediction & Assesment of impacts on biological Environment involve a no of Technical & professional Considerations related to the effects.

④ For the assesment of impacts on biological Environment a six step methodology or approach was proposed.

Step 1 : Identification of the activities of biological impacts

Step 2 : Description of Existing biological Conditions status of bio. diversity with their habitates.

Step 3 : Procurement of relavent laws, regulations related To impacts / Condition of bio-diversity.

Step 4 : Impact prediction

Step 5 : Assesment of Impact significance

Step 6 : Identification & Incorporation of mitigation measures.

* Causes of Deforestation :—

① Urbanisation ② Industrialization

③ population explosion ④ Mining

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⑤ Construction of dams and reservoirs

⑥ Modern aggricultural practices etc.

Effects:—

1. Causes global warming & Green-house effect
2. Raise of Sea Levels
3. Submergence of Coastal lands
4. Lack of rainfall
5. Enhanced Soil Erosion
6. Glowering aggricultural protectivity
7. Reduction in ground water level Tables
8. Preventing drought Conditions
9. Enhanced degradation of natural resources
10. loss of marine bio. diversity
11. Prevailing epidemics
12. Raise in Environmental pollutions. etc.

⑧ Environmental Risk Assesment & Managment :—

Environmental risk Assesment can be defined as an Emerging Technique which involves structured gathering of available information about the environmental risk and information of the Judgement about them (ERAM) with reference to issues relating to the human health and ecological issues is a rapidly growing field which can provide information to decision makers about the freqency and and magnitude of adverse environmental Consequences arising from human activities or planned interventions

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Some of the Terms used in Risk Assessment as given below:

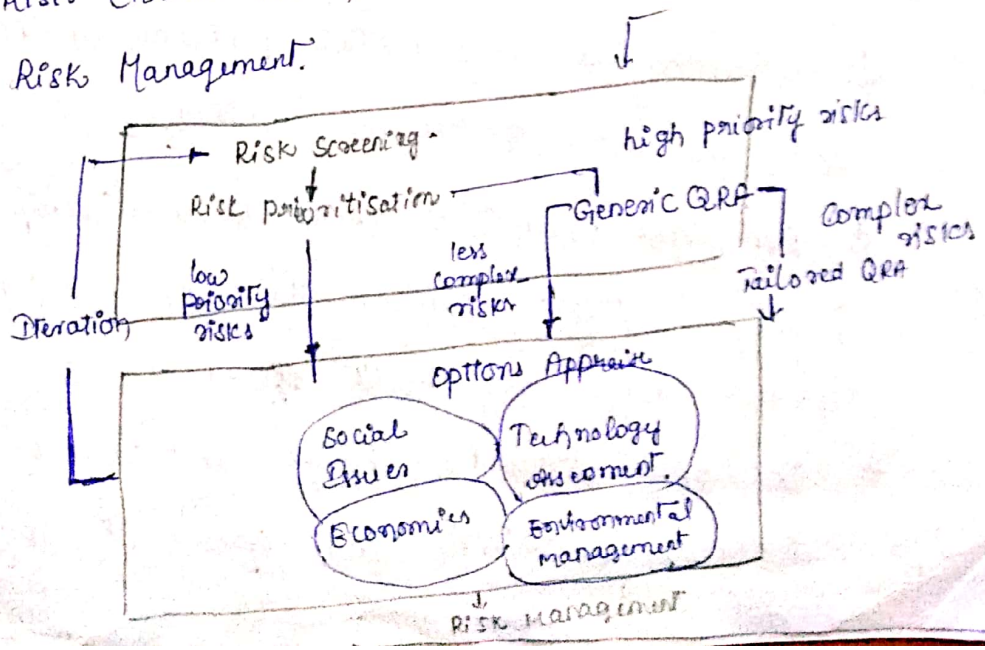
1. Hazard: a property or situation with the potential to cause harm.
2. Risk: a combination of the probability or frequency of the occurance of a particular hazard and the magnitude of the adverse effect or harm arising to the Quality of human health and environment.
3. probability: The occurance of particular event in a given period of Time or as one amongest a no. of possible events.
4. Risk Management: The process of Implementing decisions about accepting or altering Risks.

Key steps in performing an Environment Risk Assessment:

(*) To Analyze uncertainities with reference to human health and ecological issues in ERA Process, the following 5 - steps are performed.

1. Hazard Identification
2. Hazard Accounting
3. Scenario of Exposure
4. Risk Characterization
5. Risk Management.

A Frame work for Environment risk Assessment



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1. Hazard Identification :

* In EIA this step is related to the Qualitative prediction of Environmental impacts.
* This is preliminary risk Assessment of Environmental hazard.

2. Hazard Accounting / Analysis : —

(*) In this step many of hazard accounting will be Covered which is useful for the scoping of EIA.

(*) During hazard accounting flow cycle for hazardous Chemicals to be included in the ERA.

(*) Hazard Analysis should include the Social and natural systems of a project including pollution studies.

(*) Fault tree analysis method should be used to Evaluate failure in Engineering systems of a project as part of the hazard accounting

(3) Scenario of Exposure : —

(*) This stage of ERA&M is used to known how the hazard might be encountered.

(*) To understand and to analyze exposure of hazard some of the constructive models are used

(*) To understand environmental pathway of hazard. body and dose response is Calculated.

(*) ERA Seeks information about the relationship between Quantity, emitions, Environmental Considerations, human exposure doses and health effects.

(*) In ERA different Techniques and units of measurement degree of reliability and specificity is used.

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Risk characterization:

* It is likely hood and seriosity of impact damage due to environmental hazards or hazardous chemicals is known as Risk characterization.
* Risk characterisation facilitate the Judgement of risk acceptability
* Typically risk is characterised in Terms of
  1. Exposure period
  2. potency of Toxic chemicals
  3. no. of persons exposed
  4. Quality of models used.
  5. Confidence and uncertainity in the assesment
  6. Comparision of appropriate risk
  7. probability of frequency of event
  8. Reduction in life expectancy due to exposures.

(5) Risk Management:

* It is a methodology to mitigate or reduce unacceptable environmental risks
* due to hazards is known as risk Management.
* Risk Management depends on identifying limited resources whose they actually needed
* Comparing Risks with their Cost reduction is a valuable decision tool in the Risk Management.

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Advantages of Environmental Risk Assessment:

1. ERA provides greater assurence in hazard Management
2. ERA is used to inform clarify about preparation and study of the project and its impact
3. ERA promotes Efficiency in the EIA process
4. ERA Ensures all the levels of Investigations are proportionate to the environmental risk
5. ERA can play a significant role in managing uncertainity as part of an EIA process.

Disadvantages: —

1. Risk tolerance is relative to different perceptions and acceptence.
2. Isolating the risks associated with a decision can be difficult.
3. ERA as a practical and valuable addition to the management of hazards for EIA.

Risk Treatment of uncertainity: —

- Risk assesment is a scientific method of Identifying and expressing uncertainity in predicting the future of the risk
- Risks may vary based on degree of damage for unit of time, probability and frequency of occurance
- Environmental risk management is the process of Evaluating the likely hood of adverse Effects in the natural Environment.

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(3) uncertainity is the activity of understanding the regulation of the environmental systems

* Ecological uncertainity is of two types
  1. Qualitative uncertainity
  2. unanticipated uncertainity

(4) In EIA the source for uncertainity is basis resulting from measurement & sampling error.

(5) A familiar source of uncertainity is natural variation

(*) Environmental Impact of Deforestation:-

(1) The Carbon cycle:-

The Tree absorb Carbon dioxide from the atmosphere to produce Carbohydrates, fats and proteins in them. This Carbon is released as Co_2. when the trees are either burnt or rot, causing an increase in Co_2 concentration in the atmosphere.

(2) The water cycle:-

The underground water is drawn up by the root system of the Trees and released into the atmosphere by the process of Transpiration.

(3) Erosion of Soil:-

The root system of the Trees holds the soil particles firmly. with the removal of Trees, erosion of soil Takes place

(4) Natural Conflicts with wildlife:-

as the green cover droplets the wild animals are forced to move out of their traditional homes into areas inhabitated by humans, causing dredful encounters with wild animals like elephants, poisonous snakes etc.

(5) Social Effects of deforestation:-

Case studies have document that, the indegeneous people

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people living in the forests have been rendered homeless due to invasion by cattle ranchers, loggers, and land speculators.

Remedial actions for deforestations:—

=> Prevent overgrazing of forest lands

=> overexpoliation of timber should be prevented. which is maintained by the branch of forestry. i.e Silviculture.

Silviculture - development and reproduction of Timber like Teak Sal, Sheesham etc.

=> Recycling of forest products like paper should be practiced

=> Burning of forests should be strongly prevented so as to develop into pasture lands.

=> Forest should be conserved by growing plants tolerent to deaseses, fire and pests.

=> plantation of seedling of forest Trees with crop plants enables the Trees of the forest to grow better

=> we should buy foods (eg. bananas, peppers clover, coffee) that are grown in a substainable way.

=> Encourage the use of environmentally friendly paper

=> Encourage the use of recycled paper

=> Forest Departments and other Communities involved in Conserving Trees have Taken to plantation of eucalyptus Tree, Cassia Trees, Teak Trees, Tammered Trees etc, in the government waste lands, along roadsides, railway line, This has met the basic demands of wood for rural people, prevented the erosion of soil, maintained ecological balance and provide Shade along the roadside

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4-1 civil EIAM 5th UNIT

UNIT :- V

IMPACT ASSESSMET ON VEGETATION AND WILD LIFE

KHIT – CHOWDAVARAM

CIVIL ENGINEERING

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5.1. Assessment of Impact Development activities on Vegetation and Wild life

5.1.1 Biodiversity

The term biodiversity is a contraction of biological diversity, which is the variability among living organisms inhabiting the different ecosystems (Ex. Terrestrial, aquatic ecostyems.)

In general terms, the word "biodiversity" can be defined as the concentration of various entities such as general ecosystem, different species and organisms confined to a particular region.

Types of Biodiversity

1. **Genetic Diversity:**

Genes are the basic units of hereditary information transmitted from one generation to other. Diploid organisms contain two sets of chromosomes and thus two copies of each gene (called alleles). Genes are composed of DNA and are present inside living organisms. They have the instruction to provide all the information necessary for a living organism to grow and live. DNA is combined with specialized proteins to form a complex called as chromatin which organizes into chromosomes during the process of cell division. The information contained in DNA is determined by the sequence of the nitrogenous bases (adenine, cytosine, guanine and thyme) along the chain. The nitrogenous bases are in a different number and order in every living organism on this earth. Different number and order in every living organism on this earth. Differences in the nitrogenous bases result in production of varied sequence of amino acids and the resultant protein. These proteins are responsible for the development of anatomical, physiological and behavioral characteristics of living organism.

Genetic diversity or simply put, variation in the genetic constitution in living organisms is introduced either through mutation in living organisms is introduced either through mutation of one of the alleles, or as a result of sexual reproduction. Mutation is a change in the nitrogenous base sequence of DNA that may cause a change in the product encoded by that gene. During sexual reproduction, the off springs inherit genes from both the parents, which can be exchanged in a process called sexual recombination.

Let us consider a very simple example of genetic diversity. Human beings look very similar to each other as opposed to being like other living forms. All of us have two arms, two legs, two eyes, ten toes, soft skin etc. but all of us have certain genetic trails that which we have inherited from our parents and ancestors(such as facial features, color of hair, eyes, height, behavior, needs) that distinguish us as unique individuals. These genetic traits have been carried from one generation to the next generation in varying degrees.

2. **Species Diversity**

Species diversity refers to the number of species in a habitat or a region or an area along with their relative abundance. The number of species, kinds of species and the number of individuals as per species vary in an ecosystem. For example, a rain forest consists of many thousands of species of different animals and plants where a as a boreal forest may support fewer number of species.

It has been estimated that more than 1.7 million species have been discovered while ecologists are of the view that there are millions more which we do not know about.

Components of Species Diversity

The different components of species diversity are,

(i) ***Species Richness***

The species richness refers to the number of different species present. For example, a biologically diverse community such as a marine ecosystem with a large number of species has high species richness, while a temperate forest may have few species of plants or low species richness.

(ii) ***Species Evenness***

Species evenness refers to the number of individuals of each species present. For example, a tropical forest having the same number of individuals from each of many different species is said to have high species evenness, while a desert containing a large number of individuals of one particular species and relatively low number of individuals from the other species has low species evenness.

3. **Ecosystem Diversity**

Ecosystem diversity refers to the variety of ecosystems in a given area wherein, a community of organism interact with their physical environment (climatic, geological and chemical constituents including temperature, precipitation and topography of the ecosystem). In a simpler sense, ecosystem diversity includes both biotic (living) and abiotic (non-living) components.

An ecosystem can occupy a large are of thousands of kilometers (Ex. Great Barrier Reef) or a whole forest or a small area such as a pond.

Humans and their activities have a considerable effect on species and ecosystem diversity causing.

a) Destruction, modification and/or fragmentation of habitat.
b) Introduction of exotic species.
c) Overharvesting and overexploitation.
d) Global climate change.

Sufficient measures should be undertaken for conserving biodiversity by saving habitants and ecosystems.

5.1.2 Systematic approach for evaluating Biological Impacts

Studies related to the assessment of impact of any proposed projects or floral and faunal species that are components of biological environment include the following steps.

1. Qualitative identification of the potential impacts of the proposed projects on biological environment in the core and buffer areas. The biological environmental refers to the flora and fauna of a particular area which includes species of trees, gases, fishes, reptiles, birds and mammals.
2. Description of the biological environment (including flora, fauna, natural resources and habitats) along with community types and geographical description.
   - The description of flora environment involves a five level classification of vegetation. The different levels are:
     Level – 1: Vegetative structure
     Level – 2: Dominant plant types
     Level – 3: Size and density
     Level – 4: Size and habitat
     Level – 5: Special plant species
   - The description of the faunal environment should include different species of animals of various groups, such as amphibians, reptiles, birds, mammals, rare faunal species etc.
3. Obtain information on legislation regulations criteria or guidelines related to the biological environment.
4. Prediction of impact of the proposed project on the biological environment. The methods used in these steps are **Habitat Evaluation System (HES)** and **Habitat Evaluation Procedure (HEP)**.
5. Interpretation of predicted impact on the overall ecosystem.
   - This steps include the following aspects
     a) The importance of individual species in the food web to maintain stability in the ecosystem.
     b) Assessment of the implication of project activity on species diversity.
     c) Effects of the proposed projects on ecological succession.
     d) Evaluation of effects of the proposed project on the economic importance of some species.
     e) Impacts of a proposed projects (or activity) on threatened or endangered species.
6. Identification of mitigation measures followed by their implementation. This includes prevention, reduction, rectification, and restoration, and conservation, compensation in relation to project location, construction and operating procedures.

5.1.3. Significance of Vegetation and Wild Life

- Regulation of atmospheric chemical composition.
- Regulation of global temperature, precipitation and other climatic processes.
- Regulation of hydrological flows.
- Storage and retention of water.
- Retention of soil within an ecosystem and prevent it from eroding into water bodies.
- Nutrient cycling in the food chain.
- Food production from the plants and animals of the natural ecosystem.
- Rich source of raw materials such as wood, fibers, biochemical / biodynamic compounds, fuel wood, organic matter and animal feed.
- Genetic resources.
- Cultural and Recreational activities.

5.1.4 Mitigation measures

The significant measures for mitigation against biological impact by development activity are,

(i) Restrictors to rights-of-way and limiting the cleared areas.
(ii) Implementation of vegetative stabilization to protect the soil from erosion, water logging and salinization.
(iii) Creation of alternative and accessible habitats within the proximity of the existing population of the species of interest.
(iv) The disturbed areas must be revegatatted to reduce habitat fragmentation.
(v) The area of land that is being disturbed must be reduced.
(vi) Collection and storage of top soil for future use to ensure conservation of exiting seed bank.
(vii) Conducting surveys by ecologists on the different species inhabiting the project area. Clearance of vegetation should take place outside the breeding season.

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5.2. Environmental Impact of Deforestation

5.2.1. Significant Impacts due to Deforestation

Forest supports divert life forms as they can provide three basic ingredients for survival of the species-water, food and shelter.

- Timber products are in high demand almost worldwide. This encourages harvesting, transporting processing buying or selling of timber against the national laws, thus making illegal logging a lucrative industry.
- The main cause of deforestation is illegal logging due to which half of the original forest cover has already disappeared several species of animals like tiger, rhinoceros, elephants are almost nearing extinction due to loss of their habitats.
- Transportation of timber from the forest to the places in demand adds to the greenhouse gases in the atmosphere leading to a global warming trend, where the average temperature becomes higher. The sawing and sanding of the wood products adds dust to the atmosphere.
- The term deforestation refers to destruction of forests and woodland. The tribal hunter gatherers depend on the forests for their livelihood. They rely on the forests for fuel wood and other resources. The forest provides domestic use and hydroelectric power.

Some of the medicines derived from the forests are enlisted below:

- Quinine- cure for malaria
- Curare-anesthetic and muscle relaxant used in surgery
- Rosy periwinkle-cure for Hodgkin's disease and leukemia
- Other drugs-arthritics, hepatitis, insect bites, fever, coughs and colds

The forests are destroyed for the following purposes:

a) To convert forest into agricultural land to feed the increased number of people and for cattle rearing.
b) To earn money by growing cash crops.
c) Logging of commercial wood.
d) Cutting down of trees for fire wood paper and building material.
e) Urbanization.
f) Mining and oil exploration.
g) The acid rain and forest fire too contribute to deforestation.

5.2.2. Problems associated with exploitation of Forests

Some of the Problems associated with exploitation of forests are as given below:

1. ***Change in Local and Global Climates through Disturbance of***

   a) ***The Carbon Cycle:***
   The trees absorb carbon dioxide from the atmosphere to produce carbohydrates, fats and proteins in them. This carbon is then released as co2 when the trees are either burnt or not, causing an increase in CO_2 concentration in the atmosphere. CO_2 contributes to the greenhouse effect.

   b) ***The Water Cycle:***
   Underground cycle is drawn up by the root system of the trees and released into the atmosphere by the process of transpiration. The felling of trees will render a drier climate in the region. Felling of trees also effects rainfall pattern.

   c) ***Erosion of Soil:***
   The root system of the trees holds the soil particles firmly. With the removal of trees erosion of soil takes place.

   d) Owing to soil erosion, silting of rivers, lakes and dams takes place.

   e) ***Extinction of species***
   Forests are home to more than half the world's species. Cutting down of trees leads to extinction of thousands of species of birds and animals. Some of them are the orangutan mountain gorilla, manatee, jaguar and puerlo Rican parrot. The orangutan feeds on various plant parts like, leaves, figs, and fruits bark nuts and insects. The old trees in the forest support the growth of woody vines that serve as aerial ladders, thus enabling the animals to move around, build nests and hunt for food. Thus loss of forest leads to endangering the lives of plants and animals.

2. ***Natural conflicts with wild life***

   As the green cover depletes, the wild animals are forced to move out of their traditional home into areas in habited by humans, causing dreadful encounters with wild animals like elephants, poisonous snakes etc.

3. ***Desertification***
   Deforestation contributes to the desertification of the green canopy.

4. *Effect of ecotourism*
The potential earnings from market suffer due to deforestation. Tourists would be unwilling to travel to see the polluted rivers carcasses of wild animals, stumps of the trees and unused wastelands.

5. ***Social effects of deforestation***
Case studies have documented that the indigenous people living in the forests have been rendered homeless due to invasion by cattle ranchers, loggers and land speculators.

5.2.3. Reasons for Deforestation

The major causes of deforestation are:

1) Rapid urbanization is leading to deforestation as the land is not available.
2) Forests are overexploited so as to develop them into agricultural lands.
3) Overgrazing of forest lands is also leading to deforestation.
4) Shifting of rammers from the production of cocoa exports to growing of cash crops is leading to felling of trees so as to develop agricultural lands.
5) Cutting down of trees for fire wood paper timber and other building materials.
6) Mining of minerals and their ores have also led to destruction of forest extensively.
7) To generate hydroelectricity for irrigation dams are built which have led to felling of trees.
8) Projects undertaken for building of roads, lying of pipelines, construction dams etc. have led to deforestation.
9) Mining and exploration of oil also leads to deforestation.
10) The acid rain and forest fires too contribute to deforestation.
11) Forests are being cleared for the purpose of cattle ranching.

5.2.4. Remedies

Measures taken to mitigate deforestation are as follows:

1. Prevent over grazing of forest lands.
2. Overexploitation of timber should be prevented which is maintained by the branch of forestry, i.e., silviculture. This branch is responsible for the establishment, development and reproduction of timber trees like teak, sal, sheesham etc. Illegal logging should be prevented. The forest officials should cooperate in protecting the forests.
3. Recycling of forests products like paper should be practiced.
4. Burning of forest should be strongly prevented so as to develop into pasture lands.
5. Forests should be conserved by growing plants tolerant to diseases, fire and pests.

6. Plantation of seedling of forest trees, with crop plants, enables the trees of the forests to grow better.
7. Forest departments and other communities involved in conserving forests, have taken to plantation of eucalyptus trees, cassia trees, teak trees, tamarind trees etc, in the government waste lands, along road sides, railway lines, marginal lands of the farms thereby contributing to social forestry. This has met the basic demands of wood for rural people, prevented the erosion of soil, maintained ecological balance and provided shade along the roadside.
8. We should buy foods (Ex: banana, pepper, cloves, coffee) that are grown in a sustainable way.
9. Encourage the use of environmentally friendly paper.
10. Encourage the use of recycled paper.
11. Practice of silviculture helps to replenish the forests.
12. Plant an equal amount of saplings so as to compensate for the fallen trees. Thus, equal balance should be maintained between the growth rates and falling of trees.

5.2.5 Major impacts on forests due to Water Resources Project and Mitigation Measures

Water resource projects are the multi-purpose river valley projects and major irrigation projects / canals. These are concrete structural barriers constructed across rivers and streams to block or control the flow of water in them.

They serve the following major functions,

(i) To store water to compensate for the fluctuations in the discharge by rivers.
(ii) To increase the hydraulic head (difference in the heights of water levels in the upstream of the dam and the downstream river).
(iii) Generations of electricity.
(iv) Supply water for irrigation, industrial and household activates.
(v) Control the effect of flood waters.
(vi) Encourage river navigation and recreational activities like swimming, fishing and boating.

Construction of water resource projects in the prime forests lands may cause flooding, thereby leading to total destruction of the entire forests. The environmental effects associated with such constructions include both the physical and social aspects.

The forests are degraded and devegetated to carry out construction activities related to the water resource projects such as offices, approach roads, residential quarters as well as building for the storage of construction material.

The process of deforestation leads to,

(a) Loss of fruit-bearing trees, loss of timber and scarcity of firewood.
(b) Destruction in the habitats of wildlife.
(c) Hampers the precreation activities of people.
(d) Involuntary displacement of large number of people, causing widespread traumatic psychological and sociocultural consequences.

The alternatives to dams is rainwater harvesting. It is one of the most important and economic tools for water conservation at a time of rapid dwindling of fresh water resources. The different types of harvesting structures that may be used are farm pond, percolation / recharge pits, recharge wells, check dams, and lagoons / lined ponds.

5.3. Environment Risk Assessment and Risk Management in EIA

- According to International Standard ISO 31000, risk is defined as the change of something happening, that will have an impact on objectives.
- According to environment protection Act risk is the chance of harmful effects to human health or to ecological systems resulting from exposure to an environmental stressor.
- In general risk can be defined as anything that has a tendency to cause harm to humans and natural environment medium (including air, water, land, plants and wildlife.)
- Risk management is defined as the culture, processes and structures that are directed towards realizing potential opportunities whilst managing adverse effects.

Environment risk assessment considers the impact on the environment caused by various factors such as,

- Natural events (flooding, drought, extreme weather events)
- Agents (ex: chemical, biological, radiological)
- Technology(ex: unconventional drilling technologies)
- Practices(Ex: silviculture)
- Processes
- Products
- Industrial activities.
- Environmental conditions(Ex: chemical contamination in air, soil, surface water, sediment, biota, changes in climate, introduction of native species)

A simple and classic example of environment risk assessment is that of source – pathway- receptor. Let us consider the source to be hazardous source (such as a source of contamination), the receptor to be ecosystem. The link between the source

and the receptor is the pathway. In the absence of the pathway, no risk exists. But if the source and the receptor are linked by a pathway then the consequences of this is assessed.

5.4 Risk Assessment and Treatment of Uncertainty

5.4.1. Main advantages of Environmental risk assessment with an EIA

1. ***Environmental Risk Assessment(ERA) helps with the scoping of EIA investigations:***

The scoping phase is an early phase of the EIA process that typically recognizes the important issues of concern at a preliminary level of the planning process. It helps in site selection, possible technical options and avoids all kinds of delays that arise during the project.

Hazards are determined by taking into consideration the different ways the proposal might interact with the environment. The priority hazards are identified and assessed during the scoping phase while the other issues are given less attention. The advantages of ERA during the scoping phase are as follows:

i. It contributes to a feeling of satisfaction that the hazards that need thorough inspection have been determined.
ii. It advises the preparation of the proposed study program.
iii. It confirms that the level of inspection is proportionate to the risk.
iv. It encourages efficient processing of EIA.

2. ***ERA Enables prioritization of risk***

If an organization encounters various types of potential environmental risk. Then ERA can be used to setup the risks according to their importance, and prioritize the risks that should be deals with first.

3. ***Site specific risk evaluation***

ERA helps to establish the location of the risks that affect a particular site and enable proper risk treatment.

4. ***Comparative risk assessment***

The relative risk of different types of actions can be compared. For instance, the risk produced by untreated water versus the risk produced by the chemicals used in treating water.

5. ***Quantification of risk***

The risks are quantified to setup controls on the risks (ex: the acceptable concentration of chemicals in drinking water).

6. *ERA manages uncertainty as part of an EIA process*

Thus ERA is very important as it conveys the outcome of environmental decisions. It helps to overcome the potentially negative features of a project to prevent harm to the ecological assets, social values and economic uses.

5.5 Key Stages in performing ERA

Environmental risk assessment (ERA) can be accomplished by the following key stages:

1. ***Establishing the context***

   This stage involves the setting up of the external, internal and risk management contexts to recognize the aim of the organization and for quick and easy identification of risks.
2. ***Risk identification (Also known as problem formulation)***

   This step involves identification of risk that could lead to harm to human health and ecology. The risk identification is carried out thoroughly to depict what, where, when, why and how a particular parameter can occur and its effects. Further, this step should ideally be carried out in a workshop in the presence of stakeholders, trained facilitator and recorder.
3. ***Risk analysis***

   This step involves the following aspects:
   - Identification of consequences produced during risk identification.
   - The effectiveness and dependability of controls.
   - Information about the statement of context.
   - Additional information about statistical data, predictive modeling or expert judgment.
   - The risk involved in establishing the context.

   The risk analysis step provides an understanding of the nature of risk, the extent of its consequences. Each type of risk is evaluated and given proper risk treatment when needed.
4. ***Risk evaluation***

   The information collected during the risk identification and risk analysis is used in decision making whether a particular risk falls under the organization risks, criteria and if it requires any treatment.

   Usually the managers of the organizations are given instructions/advisories about the type of action to be taken for a specific type of risk and the time allotted for their completion.
5. ***Risk treatment***

   This step involves making changes to the risk by changing the consequences that is likely to occur.

Risk treatment involves three basic methods:

(a) ***Avoid the risk:***

An activity that can lead unacceptable risk can be avoided altogether or adopt an alternative activity that causes less risk to meet the aspirations and purpose of the organization.

(b) ***Transfer the risk***

This step involves the transfer of the organization's risk to an outside party (insurer). Generally the method involves the purchase of insurance and indemnity. The expenses in occurred in the process depends upon the extent of assurance the organization can give to the insurer with regard to recovery of claims. The insurer needs information about the type of risk an organization can encounter the robustness of the organization's system and the updated claim history.

(c) ***Risk control***

This is considered as the ideal method to lower the likelihood of the risk occurrence of the impact of the risk or both. The best method of risk control is to modify the systems and processes so that the potential for adverse impact can be lowered.

The risk treatment plans should consider the following aspects,

1) Proposed actions
2) Resource requirements
3) Individuals responsible for action
4) Time frames.