UNIT 4 CASE STUDIES

Structure

4.0 INTRODUCTION

Environmental impact assessment processes take into consideration the environmental implications of a proposed project. This includes all environmental, social and economic impacts of proposed projects. These aspects include impacts of the project to hazards to health and environment, natural resources, displacement of local communities, problems to rivers, problems to endangered species, waste disposal due to proposed projects and their environmental impacts. EIA procedures ensure environmental considerations before finally approving and giving clearance to a proposed project. Further involving local communities in decision making may prove worthwhile. Some of the benefits of involving the local communities in decision making are given below. The benefits to local communities from taking part in environmental assessments include:

- Clean, healthy environments;
- Improvement in human health and sanitation;
- Maintain biodiversity;
- Reduced use of natural resources;
- Enhanced community skills and knowledge.

After analyzing and predicting the possible problems, EIA studies help to reduce the problems and works on solutions to improve the project's suitability for its proposed environment. Therefore an environmental impact assessment is a very important

task of any project planning. Let us now learn about some case studies in environmental impact assessment.

4.1 OBJECTIVES

After reading this unit, you should be able to:

- describe the various environmental impact assessment case studies related to rivwr valley projects, thermal power plant projects, mining projects, oil refineries and cement industry projects.

4.2 EIA OF RIVER VALLEY PROJECTS

Case Study

The Karnataka Power Corporation Limited constructed a dam in 1964 across the river near Linganamakki. It is reported to be one of the oldest Hydro electric power projects in our country. The dam is located at an altitude of 512 m. The reservoir capacity is ~152 Thousand Million Cubic feet. It receives water from the Chakra and Savahaklu reservoirs that are connected through Linganamakki by means of a canal. The construction of the Linganamakki dam resulted in submersion of a large area along with a decline in biodiversity in the area. The soil and aquatic environments were also threatened. So the construction of the dam caused impacts on the river ecosystem. Large dams and development of river valley projects cause significant environmental degradation. Cumulative Environmental Impact Assessment (CEIA) can help minimize the impacts of these projects. The following steps are important for any river valley project to be considered environmentally sensitive:

- A complete environmental impact assessment should be conducted before the proposed project is considered for clearance.
- Once the proposed project is considered viable and desirable with respect to the socio-economic and environmental grounds, preventive measures should be taken for the negative environmental impacts.
- When the project is commissioned, environmental impacts should be monitored and action should be taken on the preventive measures to address the impacts.

4.3 THERMAL POWER PLANTS

Thermal Power plants are an important and major source of power generation. In India approximately 60% of electricity generation comes from the thermal power plants. These power plants cause environmental degradation on the soil, water, air and so on. They also emit mercury and fly ash that destroy the surrounding habitat. So thermal power plants require good and proper environmental impact assessment before a proposed project is commissioned.

4.3.1 Thermal power plant at Sompeta

Environmental impact assessment of a thermal power plant at Sompeta was done by Boddu et al. 2016. The potential environmental negative and positive impacts were identified and evaluated using rapid impact assessment matrix method. The negative impacts identified included problems to surface and ground water quality, disturbances in land use, soil fertility, decrease in biodiversity and pollution due to fly ash. Some socio-cultural aspects such as: rehabilitation of local communities, loss of

lives due to accidents, aesthetics were also noted. The positive impacts of the proposed project were upliftment of the backward areas, employment opportunities and so on. So the study concluded that there are both positive and negative impacts of the project. It was concluded that the negative impacts could be minimized by adopting mitigation measures.

4.3.2 Jindal thermal power plant, Dongamahua

This is a Rapid Environment Impact Assessment (REIA) report evaluated by the Centre for Science and Environment, New Delhi. The EIA was done by the Min Mec Consultancy Pvt Ltd., New Delhi. The study is regarding Jindal Steel and Power Ltd. That planned to start a thermal power plant at Dongamahua, Raigarh, Chattisgarh. The project site is about 50 kms from Raigarh and 30 kms from the Raigarh-Ambikapur highway. The river Kelo Nadi flows 3.5 km from the proposed site. Further there are other tributaries of the Kelo which all join the Kelo river. The area is rich in coal and many coalmines are operating and proposed. The report concluded that the upcoming project would require 7.46 million cubic meters of water that would be sourced from groundwater. Regarding the landuse patterns, the project would require 56 acres of land. The land acquired is either agricultural or wasteland. 26.5 % of the area within the EIA's study area is forestland and 77 % of the forest land in the study area is under reserve or protected forests. There are 94 inhabited revenue villages within a 10-km radius. Around 85,000 people reside in a 10 km radius. The environmental impact of the projects include:

1. *Impact of water consumption by the project*

   Thermal power projects us a lot of water. The breaching of groundwater by mining activity will alter the local groundwater regime.

2. *Impact of the project on local air quality*

   Thermal power projects cause lot of air pollution. The EIA for the project estimated the particulate emissions as 511 tonnes of particulate emissions per year. The EIA estimated the SO_2 emissions as 3120 kg/hr which can cause damage to plants, cause decreased yields, chlorophyll loss and greater leaf fall. EIA report estimated the NO_x emissions as 4,000 tonnes per year. Mercury emissions from the proposed plant is 618 kg/annum.The plant will release 9.47 lakh tonnes of carbon dioxide per year.

3. *Local biodiversity*

   The site is rich in biodiversity and is home to mammals like foxes, bandars, spotted deer, the rheasus macaque, bear, and the leopard. The region surrounding the plant is also rich in mahua plantations. This is of very good economic value to the local communities.

4. *Solid wastes*

   The plant is estimated to generate fly ash and bottom ash. Around 1.37 million tonnes of solid wastes will be generated.

Therefore, the proposed project has impacts on the local groundwaters, forests and local biodiversity. It can affect the forests and the livelihood of the communities. Hence appropriate measures have to be taken to ensure the protection of the environment and the local communities.

4.4 MINING PROJECTS

EIA analysis of coal mining project by M/s Jayaswals Neco Limited

This is a Rapid Environment Impact Assessment (REIA) report evaluated by the Centre for Science and Environment, New Delhi. Jayaswals Neco Ltd. proposed a coal mining project in Raigarh, Chattisgarh. The Nagpur-based Enviro Techno Consult conducted the EIA study. The area around proposed site is rich in coal. The project requires 491 hectares of land and the area around the site is densely forested. The EIA report shows that agriculture is a major occupation in the study area. The project is likely to impact local biodiversity, the forest ecology, and the livelihoods of the local communities. The villages around the area will be affected with noise and air pollution, and blasting and ground vibrations. The environmental impact of the project includes;

1. *Impact on local groundwater resources:* According to the EIA report, open cast coal mining will result in breaching of the groundwater table. The report emphasizes that the rate of dewatering from the mine pit should not exceed 65 % of the rate of groundwater recharge in the mine lease area, in order to maintain the "safe" groundwater category. All the rivers in the region are polluted and stressed due to existing industrial activities. The mine pit water has higher Total Dissolved Solids values.

2. *Impact of the project on local air quality:* Mining can cause significant air pollution. The EIA report for the proposed project has made estimations of fugitive emissions. The emission potential from top soil removal, drilling, blasting, transportation, material handling, and also from the coal handling plant have been estimated. 3,510 tonnes of dust per year can be generated. The Environment Management Plan (EMP) suggests adequate steps for dust suppression such as water spraying, bag filters to be attached to the drilling machines and so on. Also covered storages and covered conveyor belts are suggested.

3. *Local biodiversity:* The area around the site is rich in biodiversity and it can impact the local biodiversity. The EIA report shows that important wildlife in the area include: bear, bandar, pea fowl and leopards.

4. *Noise impacts:* The impact of noise and vibrations generated due to mining will be high and can impact the local community in nearby villages.

5. *Disaster management:* Coal mining and that too underground coal mining can cause accidents and occupational hazards. The hazards include: roof collapse, flooding, suffocation due to methane, carbon dioxide and carbon monoxide and so on. So disaster management plans, risk management to underground mining should have taken into account.

Therefore, the proposed project is a large-scale project. The EIA analysis estimates the impacts include the impact due to coal mining. The impacts include those on the local water regime, pollution to the air, noise and vibration pollution, impact on forests and the local biodiversity. The area region is eco-sensitive and the forests are the lifeline of the people inhabiting this area.

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. Write a case study of EIA of a river valley project.

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2. Write a case study of EIA of a thermal power plant project.

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4.5 OIL REFINERIES AND PETROCHEMICALS

Dear Learners, let us now read about oil refineries and petrochemicals in the following sentences:

4.5.1 EIA of an oil refinery in Iran

This study was reported by Narimisa and Basri 2011 for the Tehran oil refinery in Iran. Oil refineries and petrochemical projects definitely are good for the economic growth of a country. But at the same time these projects have negative environmental impacts like: air, water and land pollution, loss in biodiversity and loss in ecosystem service functions. Their study reported that the major environmental impacts of the oil refinery include gas emissions, effluents, solid wastes, noise, odour and aesthetic impacts. In their study they reported that the following impacts were significant.

1. *Air pollution:* This comes from processes like: firing, steam boilers, furnaces, pumps, compressors, reserve tanks and distillation towers. The air pollutants include: sulfur oxides, nitrogen oxides, carbon monoxide, aldehydes, ammonia, particles and hydrocarbons. During combustion process, nitrogen oxides formed in boilers, compressors, catalytic reducers and are released into the environment.

2. *Water pollution:* The effluents discharged bring about surface and ground water pollution. They can also be released from leaking pipelines.

3. *Solid wastes*: They can produce significant solid wastes. They can come from processes such as: cracking, coke production, sludge production and treatment, water and oil separators and effluent treatment system.

4. *Ecosystem*: Oil and gas prospecting and extraction also destroy marine and land environments.

Therefore EIA studies help to understand the impact of the oil refineries on our environment. Further social impact assessments are also important as they can help to understand the impacts of the project on individuals and organizations. They concluded that future developmental projects should include all the above aspects for a healthy planet.

4.5.2 EIA of an oil refinery in the North Atlantic (Sólnes, 2000)

The study reports a case study of an oil refinery in the North Atlantic the Reyðarfjörður, Iceland. The pollution sources are identified and the environmental impacts are given in detail. This six million ton oil refinery at an approximate cost of US$2 billion is reported to have a very big social and economic impact on the rural communities on the East Coast of Iceland where the proposed refinery is to be located. The main sources of livelihood for the people are agriculture, fisheries and tourism. The environmental impacts include:

1. *Air pollution:* High emissions of greenhouse gases, VOCs, other gases and airborne dust will arise. The VOCs can also react with nitrogen oxides to form harmful low atmospheric ozone. This can be reduced by using storage tanks with floating roofs. SO_2 emissions can be reduced using scrubbers. The refinery will be a major source of green house emissions and the annual emissions could reach as far as 500,000 tons.

2. *Toxic Wastes:* The refinery will also release toxic wastes that have to be treated. The refinery wastewaters mainly can arise from: the process systems; the SO_2 sea-water scrubber; sewage; and unpolluted wastewater. The waters can be contaminated with oil, emulsified oil, phenols, polyaromatic hydrocarbons, ionised sulphides, ammonia, inorganic particulate matter and traces of heavy metals that are hazardous for marine life. Therefore all wastewaters from the refinery should be treated.

3. *Solid waste:* They can come from crude oil, silt from surface drainage, silt from water supply, corrosion particles from the process units and sewer system, solids from maintenance and cleaning operations, and water treatment plants, ash from the sludge incinerator, spent catalyst, and contaminated soil because of spilt oil. Solid-oil waste and oily sludges generated at the refinery are can be disposed of in landfills, through land farming or by incineration. The Icelandic refinery can be expected to generate some 3000 tons of solid waste per year. Out of this around 900 tons can be considered as hazardous. Thus hazardous waste from the refinery could be sent to Akranes for disposal.

4. *Socio-economic impacts:* The proposed industrial development would have both positive and negative impacts on the people in the east coast region, who sustain on agriculture, fisheries, tourism and some minor service industries. So the socio-economic benefits should also be measured.

They concluded that building an oil refinery in the North Atlantic such as Iceland will definitely cause environmental risks.

4.6 CEMENT INDUSTRIES

EIA of a proposed cement plant at Southwestern Nigeria

This study by Ilalokhoin et al. 2013, focuses on an EIA of a proposed cement plant at Southwestern Nigeria. Manufacture of portland cement cause environmental pollution. Dust, gases, noise and vibrations occur during blasting in quarries. Carbon dioxide is also released. The study reported that soil erosion will occur as the topsoil will be exposed as a result of bush clearing and excavation. There will be a loss of flora and fauna and significant impacts on the ecology and biodiversity. The loss of

vegetation canopy will also occur. Dusts can be released from point or diffuse sources. This cement dust can affect the health of the employees working in the plant and also the communities living nearby. Therefore mitigation measures such as electrostatic precipitators and fabric filters will have to be installed. Operation phases will create significant noise pollution. Hence sufficient hearing protection should be provided. The potential sources of vibration include blasting in quarries, pilling in construction, road traffic and heavy machinery. This can also cause distress among the communities. These were some of the main conclusions of the study.

4.7 TOURISM INDUSTRY

EIA of tourism industries

The tourism industry is the world's largest industry. It is estimated that the world tourism will increase to 1.6 billion by 2020. Developmental activities due to tourism can also have negative impacts on the environment. Therefore an EIA is required before the undertaking of any tourism development in order to identify potential environmental impacts. Islands are sensitive areas that are threatened by serious environmental problems. Mauritius Island hosts endemic species but now the Mauritian ecosystem is threatened and there is decrease in the population of native birds and reptiles. In addition to habitat destruction, tourists also litter and pollute the islands. Pollution from cruises also arises. These wastes cause degradation of the water quality and destroy the marine organisms. The coral reefs are at risk from tourism development. They are destroyed by boats. The rapid tourism developments around the coast and lack of EIA monitoring have negative impacts on the coastal environment. They can affect the sustainable development of the tourism industry. Hence it is pertinent for the people living in islands to understand and implement preventive strategies. Environmental impact assessment (EIA) bring improvements in the planning, designing and decision making process.

Check Your Progress 2

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

1. Write a case study of an EIA of an oil refinery.

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2. Write a case study of an EIA of a cement industry.

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4.8 LET US SUM UP

In this unit we have studied about some case studies of environmental impact assessment in some proposed industrial projects. The industries and projects include the river valley projects, thermal power plants, mining sector, cement industry and

the tourism industry. The projects can negatively impact the environment and the communities living around these areas. Therefore complete environmental impact assessment reports are most essential before clearance is given by the authority in the respective country for the benefit of our environment and healthy individuals.

4.9 KEY WORDS

Environmental impact assessment : An analytical process that systematically examines the possible environmental consequences of the implementation of projects, programmes and policies. It is the process of assessing the likely environmental impacts of a proposal and identifying options to minimize the environmental damage. The main purpose of EIA is to inform decision makers of the likely impacts of a proposal before a decision is made.

Tourism : It is defines as travel for pleasure or business. It also refers to the theory and practice of touring, the business of attracting, accommodating, and entertaining tourists, and the business of operating tours. Tourism can be international, or within the traveller's own country.

Fly ash : It is a byproduct from burning pulverized coal in electric power and thermal power plants. It is a coal combustion product composed of the particulates that are released from coal-fired boilers together with the flue gases.

4.10 REFERENCES AND SUGGESTED FURTHER READINGS

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4.11 ANSWERS TO CHECK YOUR PROGRESS

Your answers should include the following points:

Answers to Check Your progress 1

1. Your answer should include the following points:
   - Any case study of a river valley project
   - the pollution sources
   - the environmental impacts
   - Mitigation measures
   - Conclusions
2. Your answer should include the following points:
   - Any case study of a thermal power plant
   - the pollution sources
   - the environmental impacts
   - Mitigation measures and conclusions

Answers to Check Your Progress 2

1. Your answer should include the following points:
2. Any case study of an oil refinery
3. the pollution sources
4. the environmental impacts
5. Mitigation measures

2. Your answer should include the following points:

- Any case study of a cement industry
- the pollution sources
- the environmental impacts
- Mitigation measures