

# Environmental Impact Assessment (Eia) Study of Metal Mines: A Critical Review

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**Abstract-** Environmental Impact Assessment (EIA) is a study to assess the impact of mining and processing of metal ores on the environment. The extraction of metals produce large amount of waste materials begins with exploration of mineral deposits which continues ore extraction. The potential environmental impacts occur at all of these stages can be classified into physical, chemical, biological and occupational health impacts. This paper describe in brief metal mining legislation with standards which defines to minimize the impacts and to be assessed regularly through Environmental Impact Assessment studies.

**Index terms:-** EIA, Metal mining, Iron ore.

## I. INTRODUCTION

Metals are obtained by mining that involved extraction and processing huge amount of ore bodies. Metal extraction and processing cause environmental impacts that results in ecological imbalances, contamination of environmental components (Air, water, Soil), Wildlife and fisheries habitat disturbances, Acid mine drainage generation etc; despite of its economic importance. The released contaminants such as high level of dust and gas drastically affect the quality of air in the surrounding areas. It also creates the noise pollution which is affecting natural habitat & animals. The extraction of metals disfigure the landscape and causes flooding, soil erosion and create problems to the agricultural land. This also create problems in the survival of so many species which being considered to be endangered [1]. The leaching of heavy metals like iron (Fe) is the another major problem for the disturbance of environmental components, especially for water resources and trigger to form Acid Mine Drainage (AMD). This has negative impact on aquatic habitat as well as wild life habitat and human environment by causing serious health problems within the mining areas [2].

The Environmental impact assessment (EIA) is an essential environmental management tool by which the environmental consequences are examined. The EIA is a multi step procedure to ensure the decisions regarding projects that may impact the environment. It helps to identify the possible environmental impacts of a developmental activity and how those impacts can be mitigated [3].

The purpose of the EIA is used to inform discussion makers and the public about the environmental consequences of

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implementing proposed project. The EIA document itself is a technical tool that identifies and analyses impacts on the physical social, cultural and health impacts. It also provides alternatives and mitigation measures to reduce the environmental impacts of the project. Thus EIA has three main function for better environmental management i.e; to predict problems, find ways to avoid them and to enhance positive effects which is strive for better practice [4].

## II. PROCEDURES

The EIA represents a systematic process that examines the environmental consequences of any developmental activities. The impact evaluating agency is referred to as the project approving agency. The process involves a number of steps as Screening, which is done partly by the EIA regulations at the time of assessment [5]. Scoping is used to identify the environmental impact at an early stage and it is conducted by project approving agency. Further it is proceeded with consideration of alternatives for the project proponent to clarify and decides an EIA required for environmental examination. Description and environmental base line data are the major part of the EIA process to understand the various characteristics of the proposed project. This established both the present and future state of the environment. The process involves to mitigate the adverse impact of the project on its environment [6]. The EIA report is submitted by project proponent and the public participation takes place for the inspection of the report then project approving agency review the report and public is allowed to submit the observations within 30 days. Public participation is a novel feature which is introduced through EIA in project planning [7].

## III. EIA LEGISLATION

The environmental legislation has covered many areas including EIA to ensure the project which are ecologically destructive. The Ministry of Environment and Forest [MoEF] New Delhi has been in a great efforts to formulate guidelines and directives for EIA. The main laws, rules and regulations followed in EIA studies are:

- i) The water (prevention and control of pollution) Act, 1974.
- ii) The Air (prevention and control of pollution) Act, 1981.
- iii) The Environment (protection) Act, 1986. The Forest (conservation) Act, 1980.
- iv) The Wildlife (protection) Act, 1972.
- v) The Biological Diversity Act, 2002.
- vi) The Forest Conservation Act, 1980.

The CPCB is the responsible body to implement these rules. The mineral concession rule (1960) states obtaining license and mining lease [8]. This also includes the conservation of

water, forest areas, land surface to reduce environmental pollution by adopting control standard and mining equipments as per the direction of central and state government agencies [9]. The Mineral Conservation and Development Rule (MCDR, 1988) states the guidelines to ensure mining with standard recommended technology for the conservation of the environment [10].

#### IV. ASSESSMENT METHODS

The EIA sets out methods for the assessment for the better environmental management.

##### A. Surface & Ground Water Assessment:-

This requires chemical monitoring specially in the iron ore mining area to determine the quality status of the following:-

- Discharge existing on-site sources for iron.
- Discharge existing the property boundary.
- On-site water bodies (flora & fauna) with down stream from the site for iron and its adverse impact.
- To analyze the physico-chemical properties of the water sources to determine its quality for drinking purposes for iron with other metals.
- To assess the heavy metal contamination especially Iron (Fe) within the mine area.

##### B. Air Assessment:-

It includes the following assessment:-

- Regular assessment of significant air pollutants (SPM, RPM, Sox, NOx & Iron in dust).
- Weather Conditions (like wind speed, Humidity, Temperature, Rain fall etc.)
- Topography [11].

##### C. Land Assessment:-

It includes the assessment of the following:-

- Alteration of land.
- Assessment of excavated land.
- Assessment of fertility of the surface soil due to metal toxicity.
- Assessments of metal contaminants especially iron (Fe) to determine its pollution.

##### D. Ecological Assessment:-

This includes the information on aquatic, terrestrial and wet land ecosystem in vicinity of the iron ore mining.

- Study this adverse impact on flora & fauna excuser of iron ore on their body or magnification their physico-chemical & biological test. This should be done periodically each after weekly, monthly, or quarterly.
- Identification of particular species that may be under threat by excess of iron & other related metals.

##### E. Socio-economic Assessment:-

The EIA describes the existing social and economical conditions in the vicinity of the project area specially any negative impact of iron on human body or any diseases resultant by the excess deposition of iron within human body. Food quality check for the vicinity of excess upload of iron & its derivative metals [12].

#### V. CONSTRAINTS

The major constraints are as follows:-

- i) The lack of detail studies.
- ii) Insufficient secondary data of environmental consequences of the project.
- iii) No trained man power to conduct the studies in detail.
- iv) Lack of standard method to conduct the study & evaluation matrix to perform this job for optimal satisfaction [13].

#### VI. ECONOMICAL VIEW

The total capital cost for conducting EIA studies requires near about 6 lakhs per annum depends on the intensity of study, frequency of study area and nature of mining impacts on environment [14].

#### VII. FUTURE SCOPE

EIA study require further assessment for its following:-

- i) Framing of more specific rules & regulations.
- ii) Setting specific standards, method & matrix to conduct study, evaluation & results more quickly.
- iii) Setting of free agency to conduct these studies.
- iv) Allotting sufficient money to monitor [15].

#### VIII. CONCLUSION

EIA based study leads to control the negative impact of metal mines like iron ore mining. This exercise control and made the companies to follow all rules, regulation and control measure at each steps of metal excavation, processing, transportation and waste management. Based on the EIA study it is observed that metal mining have specific problem on our ecosystem. Proper management can minimize the impacts intencity of effects as well as improve the quality of the environmental. The main issue in iron ore mining is to control acid mine drainage (AMD) and of the erosion of waste rock and tailings deposits during and after the closer of a mine which can be take care through this effective tool.

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