

REGULATIONS ARE GOOD TOOLS FOR ACHIEVING ENVIRONMENTAL EXCELLENCE IN MINING SECTORS

V P Upadhyay

Ministry of Environment and Forests
Eastern Regional Office, Bhubaneswar

> PREAMBLE

There has been significant achievement in bringing out legislations in India concerning environmental conservation, environmental pollution and forest and wild life protection. The Environmental Impact Assessment Notification (1994) made it mandatory to mining projects with lease area more than 5 ha to carry out study of Environmental Impact Assessment (EIA) and make Environmental Management Plan to address the adverse impacts. EIA Notification 2006 has superseded the EIA Notification 1994. New provisions of EIA Notification 2006 for mining projects are described in this chapter (at pointed details in appendix). Most of the mining areas in eastern and north east regions are in clusters and several projects either contiguous or adjacent to each other are being operated. The individual EIA exercises in such areas do not cover the impacts generated by other associated developments and also the cumulative impacts. The Regional Environmental Impact Assessment (REIA) for such areas may generate more meaningful information. The REIA exercises in Joda-Barbil-Kiriburu-Barsua-Bolani areas of Orissa and Jharkhand, Sukinda chromite belt, Talcher and Ib valley coalfields in Orissa, Coalfields of Assam, Raniganj-Asansol, Dhanbad and Ranchi-Hazaribagh areas and Coal and Limestone mines of Meghalaya may address the impacts in a better way than that of individual project specific EIAs. The environmental impacts generated outside the project boundary is not addressed by a project specific EIA exercise. Such impacts load the environment with toxic and hazardous pollutants, thus, causing harm to surrounding communities and natural terrestrial and aquatic ecosystems. There could be a legislation making it mandatory for mining clusters to carry out study for REIA and the impacts could be addressed at regional level than at individual project level. The chapter also suggests several measures to improve the environmental compliance in mining projects.

> INTRODUCTION

The industrial developmental activities and rapid growth in urbanization have put tremendous pressure on natural resources leading to deterioration of environmental quality. Air and water quality impacts in industrial and urban areas, higher noise levels and increasing vehicular emission are signs of increasing pollution. The Ministry of Environment and Forests adopted a 'Policy for Abatement of Pollution' which provides for several mechanisms in the form of regulations, legislation, agreements, fiscal incentives and other measures to prevent and abate pollution (MoEF, 1992). The statement emphasizes the need for shift from conventional 'End of the Pipe Treatment' approach to pollution prevention and control through promotion of clean and low waste technology, re-use and recycling, natural resource accounting, environmental audit and institutional and human resource development to achieve desired benefits in terms of resource conservation including effecting stringent regulations. The Environmental Impact Assessment notification 1994 (EIA Notification) was one such measures with an objective to ensure legal compliance and encourage environmentally sound technology in new or expansion projects. The EIA Notification (2006) which superseded EIA Notification 1994 is also expected to achieve the above objectives viz. reduction in local concentration of pollutants in industrial sites and developing strategies for areas having high pollution loads. The cumulative effects of the various types of pollutants in existing and new units in industrial estates have also been covered under EIA Notification, (2006). Mining projects and mineral beneficiation plants are under Environmental Clearance process. The mining projects with lease area less than 5 ha area are not covered under clearance as EIA Notification (2006) is not attracted. There is need to follow some other approach for better environmental management in case of mine clusters in a region without limiting to mandatory 5 ha provision. The concept of Regional Environmental Impact Assessment fits well in such cases and benefits derived from such exercise will be substantial towards achieving the objective of sustainable development.

> LEGAL PROVISIONS

The EIA Notification (2006) includes all mining projects with lease area more than 5 ha to prepare EIA and EMP reports and obtain Environmental Clearance from Central Government or State Environmental Impact Assessment Authority (SEIAA). Before environmental clearance is accorded, the authority as applicable stipulates for carrying out EIA studies by suggesting 'Terms of Reference' (TOR) to broadly ensure that impact study covers aspects of the natural significance of the proposed area in terms of diversity, endemism and status of the flora and fauna of the area, importance of the ecosystem and socio economic impact. The public consultation has also been made mandatory for mining projects attracting provisions of EIA Notification, (2006). This helps the project authorities to know the views of the public and concerned citizens of the area about their perception

regarding socio economic and environment impact of the project. The rules framed under Environmental (Protection) Act (1986), specify standard of Air, Water and noise parameter for the mining projects to comply. Any new mining project with lease area more than 50 ha is appraised in Central Government for according environmental clearance. The projects with lease area between 5 and 50 ha are appraised at state level by State Level Environmental Appraisal Committee (SEAC). Coal washeries with > 1 MPTA and mineral beneficiation plants with > 0.1 MTPA throughput will obtain clearance from Central Government and plants with lower threshold will be appraised at state level by SEAC. Similarly, expansion and modernization components of projects will require environmental clearance as per above threshold from respective authorities. The Prior Environmental Clearance (EC) process for Expansion or Modernization or Change of product mix in existing projects as per provision of para 7(ii) of the notification is as follows:

"All applications seeking prior environmental clearance for expansion with increase in the production capacity beyond the capacity for which prior environmental clearance has been granted under this notification or with increase in either lease area or production capacity in the case of mining projects or for the modernization of an existing unit with increase in the total production capacity beyond the threshold limit prescribed in the Schedule to this notification through change in process and or technology or involving a change in the product -mix shall be made in Form I and they shall be considered by the concerned Expert Appraisal Committee or State Level Expert Appraisal Committee within sixty days, who will decide on the due diligence necessary including preparation of EIA and public consultations and the application shall be appraised accordingly for grant of environmental clearance."

As per the provisions of Mineral Concession and Development Rule (1988), the mining projects shall take precautions for the protection of environment and control of pollution.

> DEVELOPMENT AND ENVIRONMENT

The northeastern and eastern regions are rich in minerals. Several projects with both Open pit and underground mining technologies are under development in various areas. Open pit mining is comparatively safe, easy and economically better process of extraction. The environmental implications of opencast mining are much more significant in cluster areas as these operations generate high level of cumulative impact on land and affect environmental settings. The impacts are discussed in Table. 1 with reference to regions. These areas are expected to attract more and more number of projects as demand for these minerals has been rising. The NE regions, for example, with large Coal and limestone reserves in Khasi -Jaintia and Garo Hills may encourage setting up of collieries and cement plants and Eastern Region with large bauxite reserves in Koraput and Kalahandi districts may attract new projects. Low ash (<10%) and high volatile tertiary coals are the uniqueness of coal reserves of North East with high sulphur content.

In these regions, in addition to environmental impact created by mining sectors, pollution load is expected to be very high due to urban expansion, downstream industries and other such projects operating as small scale sector and do not attract the EIA legislation of the country. The larger projects in the region act as a centre point for development and encourage creation of various project activities partly or wholly depending on the output and performance of large units. These activities like hotels, municipal and biomedical wastes and other automobile and transport infrastructure do not come under EIA notification. These may be better addressed at policy, plan or programme level assessments. Regional Environmental Impact Assessment (REIA) exercise addresses such issues (Lee and Walsh, 1992) and removes the deficiencies of individual EIAs.

> REGIONAL ENVIRONMENT ASSESSMENT

EIA procedure and effectiveness has now been widely accepted and a number of developing countries have enacted legislations. The EIA exercise helps in identifying the environmental implications of individual projects and facilitate decision making. In individual EIAs there is no emphasis on outside boundary impact caused by an individual project, hence, no provisions on EMP are made to mitigate such impacts which are generated outside the project boundary. Development may be subjected to EIA procedure on regional scales to assess impacts of multiple projects. A regional or sectoral EIA can reduce the time and effort required for project-specific EIAs in the region by identifying issues, initiating baseline data collection, and assembling existing data in advance. In many cases need for the project-specific EIA can be fully avoided. These projects often cause significant impacts individually as well as collectively. For new projects, the assessment done earlier through REIA may help collecting environmental information for the purpose of screening and scoping of project level EIAs. Regional EIAs are generally more efficient than individual EIAs which may identify the level of interactions among various activities of the region and their impact on environment. Regional EIAs compare alternative development scenarios and recommend environmentally sustainable development and land use pattern and policies (World Bank, 1991).

According to World bank (1993) the Regional EIAs are effective to serve as planning tools, assisting in the identification of environmentally sound projects; contribute to implementation strategies which take into account the combined impacts of asset of projects already being pursued; and assist in project preparation by supporting plans and designs which are sensitive to cumulative impacts, synergisms, interactions, and competition for natural and socio cultural resources. Regional EAs are desirable when a number of development activities are planned or proposed for a relatively localized geographic area, such as several projects in one watershed. They serve a number of useful purposes as elaborated in World Bank EA Source book (1993).

- Study areas may be defined on the basis of river catchment basin, air shed, coastal zone, etc.
- REIA helps in identification of cumulative impacts of different types of activities in the region e.g. the combined effects of the effluents of different municipal and industrial treated wastewater discharges on the natural water course will facilitate design or implementation schedule changes and other measures to avoid or mitigate such impacts.
- REIA shall help identifying environmental interactions or conflicting demands on resources among projects in which the impacts of one project may reduce the benefits of another, and of measures to avoid such a result.
- The one of the most important outcomes of the REIA Exercise could lead to formulation of criteria for environmentally sustainable development in the region, including treatment of environmentally sensitive areas and resources, site selection criteria, design criteria, region-specific measures to mitigate adverse impacts, and land-use planning guidelines.
- Identification of monitoring data needs and definition of data collection programs to support EA and development decisions; and
- Examination of policy alternatives and institutional elements needed for achieving sustainable development in the region.

There are certain aspects that were not critical during the early phases of EIA structuring. However, they are important now.

Impacts not covered under Individual EIAs

- > Migration of fauna due to long term project related activities and other human induced changes like, development of markets, transport and urban settlements around the project.
- > The ancillary activities around the project do not often come in the purview of environmental legislation but individual environmental impacts created by such establishment are significant.
- > Regional changes in climate due to adding up of pollutant by various units of the region are not monitored. These significantly affect the ecological setting of the region.
- > The local population who were otherwise depending for their livelihood substantially on natural resources become vulnerable to health ailments and become economically poorer.

Regional EIAs shall be of much help reducing the time and effort spent on project-specific EIAs. Regional EIA will help identifying the major issues that need to be considered in studying individual projects. The collection of existing environmental information at regional scale shall be of much help to future projects proposed in the region. The gaps in some of the important baseline information during REIA could also be highlighted which perhaps can form part of terms of reference in project specific EIAs for future studies. Post regional EIA monitoring shall further strengthen the data base collection exercise to fill up the deficiencies during project specific EIAs. Once regional EIA defines criteria and guidelines for individual projects and institutional arrangements for ensuring their implementation, the project-specific EIAs may only cover specific environmental effects linked to such projects. The individual EIAs suffers from deficiencies in dealing with impacts generated by surrounding activities which do not fall under the scope of project specific EIAs. The change in environmental conditions arising due to other developments in the region is ignored or incorrectly estimated in specific EIAs. For example the project attracts human population with different skills and expectations for employment. The pressure on housing, water, sanitation and other infrastructure is alarmingly increased in the area resulting into many environmental problems of health, sanitation, slums, water pollution, vector breeding etc. To some extent, REIA may help promoting or regulating multiple development in conformity with development plan/land use plan.

> RECOMMENDATIONS

Environmental Management Options

The existing mining projects implement the environmental safeguards on the basis of approved EMP and conditions stipulated while according environmental clearance. The projects in mining sectors should pay serious attention to safeguards stipulated under Environment (P) Act and provision of MCDR Rules (1988) during mineral extraction to ensure protection of environment and sustaining productivity. Important provisions of the above legislations are covered in the following paragraph:

The top soil shall be utilized for restoration or rehabilitation of the abandoned land and external dumps. If top soil cannot be utilized concurrently, it shall be stored separately for future use. The overburden, waste rock, rejects and fines generated during prospecting and mining operations or tailings, slimes and fines produced during sizing, sorting and beneficiation or metallurgical operations shall be stored in separate dumps. The dumps shall be managed properly during storage so as not to cause degradation of environment. The sites of dumps, tailings or slimes shall be on impervious ground to ensure minimum leaching effects due to precipitations. The waste rock, overburden, etc. shall be back-filled into the mine excavations with a view to restoring the land to its original use as far as possible. If back-filling of waste rock is not feasible, the waste dumps shall be suitably terraced and stabilized and reclaimed.

The fines, rejects or tailings from mine, beneficiation or metallurgical plants shall be disposed in tailings disposal areas and not be allowed to flow away and cause land degradation or damage to agricultural field, pollution of surface water bodies and ground water or cause floods. Reclamation and rehabilitation of lands affected by mining should be ensured before abandonment of mine. Scientific investigations should be carried out to keep the ground vibrations caused by blasting operations within safe limit and to avoid damage to public buildings or monuments. Stopping in underground mines shall be done to keep surface subsidence under control.

Air pollution due to fines, dust smoke or gaseous emissions during prospecting, mining, beneficiation or metallurgical operations and related activities shall be controlled and kept within 'permissible limits' specified under various environmental laws of the country including the Air (Prevention and Control of Pollution) Act, 1981 (14 of 1981) and the Environment (Protection) Act, 1986 (29 of 1986) by the holder of prospecting license or a mining lease. Every holder of prospecting license or a mining lease shall take all possible precautions to prevent or reduce the discharge of toxic and objectionable liquid effluents from mine, workshop, beneficiation or metallurgical plants, tailing ponds, into surface water bodies, ground water aquifer and usable lands to a minimum. These effluents shall be suitably treated, if required, to conform to the standards laid down in this regard under Water (Protection and Conservation) Act 1974 and Environment (Protection) Act, (1986).

Noise arising out of the prospecting, mining beneficiation or metallurgical operations shall be abated or controlled by the holder of prospecting license or a mining lease at the source as to keep it within the permissible limit as per provision of E(P) Act 1986. The standards and permissible limits of pollutants and noise have been notified by the concerned authorities under the provision of the relevant rules under above Acts.

Mining operations should cause least damage the flora of the mining lease and nearby areas. Mining project shall take measures for planting in the same area or any other area not less than twice the number of trees destroyed by mining operations. These areas shall be handed over to the State Forest Department or any other authority as after cease of mining activity to the extent possible, flora destroyed by prospecting or mining should be restored.

Improving the environmental data base and compliance:

1. Most of the minerals are available in biodiversity rich forest areas. Thus, the biodiversity issues are highly significant in case of mining projects. The EIA exercise should cover following vital components during Biodiversity assessment:
 - a. EIA should cover primary assessment data/information on the basis of field visit. The ecological structural parameters should be collected by following standard

methods applicable to plants and animals and should be described in EIA report to ensure the soundness of data.

- b. The assessment of lower forms of biodiversity is generally not given much importance during EIA study. These groups of plants and animals act as indicator of ecosystem health. The quantitative data on lower group of Angiosperms and Gymnosperms and Pteridophytes, Bryophytes, Algae and Fungi as a rapid survey information must be provided in the report. The wildlife assessment (animals, birds etc) should as far as possible be done as a primary survey on representative locations.
2. The mining projects should regularly review the progress of status of implementation of environmental safeguards.
3. There are stipulations for carrying out REIA, Carrying Capacity, biodiversity survey and assessment which need to be implemented in true sense. The project should identify institutions/centres and meet the cost of such study. Additional safeguards on the basis of outcome of such studies may be implemented.
4. The environmental consultancy organizations should be chosen after ensuring that the organization has competency to carry out EIA studies/environmental monitoring. Involvement of competent institutions/experts will help making a good EIA report and repository of good data base.
5. Both opencast and underground mining projects are known to affect the aquifers. Appraisal mechanism provides a tool to ensure water conservation. The projects should commission rain harvesting and recharge facility in all the construction buildings.
6. We may consider declaring cluster mine areas as 'Mining Estates' and commission REIA and/or carrying capacity studies for such areas.
7. Suitable guideline is needed for classifying and assessing the fugitive emissions and ambient air quality in existing mining projects where residential and industrial establishment are contiguous. Similarly a safe distance between residential and industrial areas should be maintained to remove the cumulative mixed up of pollutants of biological and chemical types.
8. All mining projects should use only bricks made up of fly ash in all the constructions.
9. The mining projects exporting the ore to foreign firm should be levied with environmental cess, as decided and this cess shall be utilized by Central Government for reclamation of abandoned mines in the country.
10. To conserve ground water source, the mining project should not use ground water for process purpose. Central Ground Water Board shall not allow such mining projects

and there should be a mechanism that approval from Central Ground Water Authority is required.

11. In addition to impact created by mining projects in and around lease areas, significant load is created by transporting the minerals up to the place of its use. The transport vehicles of fully covered type and having valid 'Pollution Under Control' certificate should only be allowed to be used by project in case of road transport.
12. Generally Railway sidings are not provided with measures to control fugitive emission. No facility is created to arrest run off from these stock areas. Suitable measures are needed on this aspect.
13. Large numbers of mine owners do not operate the mines themselves. Instead the mining operation is contracted out. The workers carrying the job of mineral production, transport, beneficiation, OB transport are not provided with basic requirement of safety, health and pollution control devices. Their families neither get any education, health and sanitation facilities from the contractors nor from project. We need to adopt mechanism so as to address these issues.
14. For the projects coming up with good medical infrastructure, the provisions of Bio Medical rules should be implemented.
15. Similarly, all efforts should be made to implement Municipal wastes (M & H) Rules, Recycled Plastics Rules, ODS Rules, Hazardous Chemicals Rules, which are not specifically covered in EIA appraisal.

Safeguards stipulated during Environmental Clearance:

- Retaining walls on the toe of OB dump and garland drains on all sides with settling pond. Check dams to arrest silt flow/erosion.
- Blacktopping of roads to reduce the fugitive emissions.
- Safety area to be taken up for plantation again.
- Water harvesting and water conservation measures to be implemented.
- Monitoring AAQ as per norms of E (P) Rules and fugitive dust emission monitoring.
- Provisions of in-house laboratory in the project.
- Implement time-bound plan for OB dump slope reclamation.
- Complete garland drains; check dams and siltation ponds have not been constructed.
- Installation of the piezometers for ground water level monitoring.
- Enforce "Pollution under Control" Certificate for the vehicles.

- Assist in implementation of regional WLMP.
- Plan of Conservation measures for protection of flora and fauna in the core & buffer zone to be drawn up.
- Provision for treatment of oil bearing effluents from the workshop.
- A separate environmental Management cell to be created.
- The approval from State Land use Department to be obtained.
- Proper terracing and benching for OB Dumps to check severe gully formations and heavy erosion and loss of good nutrients.
- The garland drains, settling facility for the run off water, retaining wall on the toe of OB dumps for controlling of silt loss and also pollution.
- Suitable conservation measures to augment ground water resources in the area.
- The permission from the competent authority for drawl of groundwater to be obtained.
- Sewage Treatment Plant to be constructed treated water reused/recycled.
- Develop good monitoring infrastructure.
- Work zone air quality monitoring to be done.
- Ensure use of protective devices by the workers in these areas.
- Garland drains of required size, gradient and length, so that the system remains functional even in peak sudden rain fall.
- Draw clearly defined action plan for phase wise plantation in the mining lease area.
- To achieve water conservation, the project to take up construction of check dam, ponds and water holes etc.
- Carry out OB dumping in new OB dump areas with proper terracing at preferably 15m height. Slope stability study should to be done. Modelling exercise should be carried out to decide the dimension of the retaining wall to take care of run off and siltation
- Survey of all the drainage channels flowing from the mining lease area followed with construction of check dams and siltation ponds.
- Survey all the natural streams flowing in and around the lease area and water quality analysis should be carried out to ensure the water quality within the prescribed limits.
- Impervious concrete pits for safe disposal of sludge.
- Transport minerals and Ob in trucks covered with tarpaulins.
- Clearance from the Chief Wildlife Warden, Orissa has not been obtained as yet, thus the condition has been violated.

- Discourage planting fast growing fuel wood low ecological value species. Instead fruit-bearing local indigenous species should be preferred.
- Explore use of geotextiles for dump stabilization.

Restriction in opening of new mines may help preserving the gene pool of the plants and animals from where they can regenerate/reproduce to ensure availability of their population in surroundings. Optimization of technology to scale up the production in the existing mines and reclamation of exhausted mines as early as possible should be considered. Wherever feasible, the monitoring should be carried out in block and not in individual areas so as to know the factors within and outside mine boundary contributing to pollution load to develop strategy for pollution control. REIA may help integrating the environmental parameters with mine operations and other associated activities. Post mine land use plan with the help of remote sensing for whole region may work out cheaper and effective than individual post mining land use plan, which most of the times remains un-implemented. These projects often cause significant impact individually as well as collectively. These impacts could be easily addressed by regional level EIAs. For new projects, the assessment done earlier through REIA may help collecting environmental information for the purpose of screening and scoping of project level EIAs. (Table - 1 & 2)

Table 1. Impacts associated with mining activities

Region	Type of mining	Major issues	Impact
Joda-Barbil (Orissa) Kiriburu-Meghatburu Noamundi (Jharkhand)	Iron and Mangnese Opencast Method Iron ore beneficiation	Silt, tailings, SPM	Suspended solid, Fe in natural water course, land degradation, vegetation loss, air pollution
Ranchi-Hazaribagh Dhanbad Angul- Talcher Ib (Orissa) Raniganj-Asansole	Coal Opencast/ underground, beneficiation	SPM, Rehabilitation Mine water discharge Overburden, mine fire	Air pollution Socio-economic impact, Water pollution, land pollution
Sukinda region (Orissa)	Chronite Opencast/ underground, beneficiation	Hexavalent chromium discharge in Mine water, Overburden	Human health, River pollution, land degradation, Air pollution
Assam Coal fields Margheretta-Makum North Assam	Coal mining opencast	pH very high, Sulphur Acid Mine Discharge Overburden.	Water pollution, Air pollution, land degradation
Meghalaya Coal Jaintia, Tura	Rat hole mining Unorganized, Unsystematic	SPM, abandoned pits, Acid Mine Discharge High S in coal, pH	Water pollution, mine workers safety, land pollution, change in topography

The views expressed in this paper are of the author and not of the organization to which he belongs.

Table 2. SCHEDULE (EIA NOTIFICATION 2006)

(See paragraph 2 and 7 of the Notification)

List of Projects or Activities Requiring Prior Environmental Clearance

Project or Activity	Category with threshold limit		Conditions if any	
	A	B		
1	Mining, extraction of natural resources and power generation (for a specified production capacity)			
	(2)	(3)	(4)	(5)
1(a)	Mining of minerals	<p>≥ 50 ha. of mining lease area</p> <p>Asbestos mining irrespective of mining area</p>	<50 ha ≥ 5 ha .of mining lease area.	<p>General Condition shall apply</p> <p><u>Note</u> Mineral prospecting (not involving drilling) are exempted provided the concession areas have got previous clearance for physical survey</p>
1(b)	Offshore and onshore oil and gas exploration, development & production	All projects		<p><u>Note</u> Exploration Surveys (not involving drilling) are exempted provided the concession areas have got previous clearance for physical survey</p>
2	Primary Processing			
2(a)	Coal washery	≥ 1 million ton/annum throughput of coal	<1million ton/annum throughput of coal	<p>General Condition shall apply</p> <p>(If located within mining area the proposal shall be appraised together with the mining proposal)</p>
2(b)	Mineral beneficiation	≥ 0.1million ton/annum mineral throughput	<0.1million ton/annum mineral throughput	<p>General Condition shall apply</p> <p>(Mining proposal with Mineral beneficiation shall be appraised together for grant of clearance)</p>

> REFERENCES

- Lee, N. and F Walsh, 1992. Strategic Environmental Assessment: An overview. Project Appraisal.7:126-136.
- MoEF, 1992. Policy statement for abatement of pollution. Ministry of Environment and forests, Government of India, New Delhi.
- World Bank, 1993. Sectoral Environmental Assessments. Environmental assessment resource book update. No. 4. Environment Department. The World Bank, Washington DC.
- World Bank, 1991. Environmental assessment. Sourcebook vol.1. Environment Department. The World Bank, Washington DC.
- World Bank, 1991. Operational Directives 4.1. Environmental Assessments. Environment Department. The World Bank, Washington DC.