

# **SOCIAL AND ENVIRONMENTAL ISSUES IN MINING**

**N C Saxena**

2 Preet Vihar Cottages

Dhiya

Dhanbad 826004 (India)

**Mining of coal and minerals is an essential activity for industrial and societal development. These are site specific diminishing and non-renewable natural resources, which are necessary raw materials for almost all the core industries and energy generation, e.g., thermal power generation, steel making, cement manufacture, agriculture, etc. Mining of these resources is to be done at the locations where they exist in the nature.**

**Mining is generally considered a socially and environmentally unfriendly activity as it causes several impacts on all the components of the environment including the society.**

**The impacts are not restricted to the mining sites only but also can be experienced regionally as well as in some situations nationally.**

**Keeping the importance of mining in view, the leading coal and mineral producing countries in the world have formulated various policies, legislation and procedures.**

**In the South Asian region India is the most prominent coal and mineral producing country. The country stands third in the production of coal after China and USA.**

**Nearly 70-75 percent of the coal produced is being used in thermal power generation.**

**Mining complexes present typical social and environmental dimensions, which need immediate attention.**

**This is the only industrial activity which can be planned for reclaiming the land and developing the resources needed for the post mining land use.**

**The social and environmental dimensions of the coal mining industry in India are briefly outlined later.**

# *Policies*

**Mineral Policy**

**Integrated Energy Policy**

**Industrial Policy**

**Environmental Policy**

**Forest Policy**

**Rehabilitation and Resettlement Policy**

# *Legislation*

**Mining Legislation**

**Environmental Legislation**

**Civil Laws**

**Land Acquisition Legislation**

# *Procedures*

**For prospecting of coal & minerals**

**For the grant of mining leases**

**For developing the mines**

**For obtaining mining permissions**

**For environmental clearance**

**For diverting forest land for mining**

**Mining is a site specific industry and most of the minerals and fossil fuels exist in forest-cum-agricultural areas, which in general are socially and economically underdeveloped.**

**The mining companies besides taking care of the people directly involved in their activities have responsibility for making efforts for overall societal development of the mining complexes and surrounding areas as a part of their 'Corporate Social Responsibility (CSR).**

**For mining land is not only required for citing the mines but also for various other activities, e.g., coal/mineral preparation plants, dumps, colonies, workshop, etc. which facilitate mining. In the process of land acquisition and establishing the mines all the people living on the land used by mining and associated activities are displaced and those dependent on the land loose their livelihood. The families who are displaced and who loose their livelihood are called the *Project Affected Families* (PAFs). These families are to be suitably taken care by re-establishing them at suitable locations and enabling them to live and earn their livelihood with honor and dignity.**

**In fact mining and associated activities cause several impacts on the society in and around the mineral/coal bearing areas and in the process of establishing the PAFs it is required to take care of these impacts also. Mining also causes several impacts on other components of environment.**

# **SOCIAL DIMENSIONS**

**The total proved coal reserves in the country are about 101.83 billion tonne, which is about 10% of the Global proved reserves.**

**As per the Integrated Energy Policy, with the present rate of production these reserves would last for over 80 years.**

**In the country coal is the primary energy source and it meets about 55% of primary commercial energy needs.**

**The total employment in the coal sector is about 550,000 and hence the total dependents are about 5,500,000.**

**For each person employed there are about ten dependents, which include five members of the families of the employee and another five supporting these families and the mining activities.**

**Studies on quality of life of coal mining complexes have revealed that these areas are not socially and economically developed even though the levels of economic activities have increased manifolds.**

**Out of eleven complexes studied only two had overall fair quality of life and the remaining nine had overall poor quality of life. None of the complexes had overall good quality of life.**

**The mining complexes in the country in general are seen to be having four distinct types of settlements, which develop in accordance with the level of economic assistance they receive from the mining companies.**

**The contribution of the State Governments and other agencies is almost negligible in most situations.**

***Colonies*** – Officers, staff and workers colonies made by mining companies with all facilities provided by the companies.

***R&R villages*** – The villages developed by the mining companies jointly with the PAFs with facilities as per the provisions in the rehabilitation and resettlement (R&R) packages.

***IPDP villages*** – These are the villages within one kilometer distance of the mines with some facilities, e.g., water supply, roads, etc. provided by the mining companies.

***Native villages*** – These are other nearby villages which do not receive practically any facility from the mining companies.

**A study of the level of satisfaction of the emotional, mental and physical needs of the people residing in the four types of locations in two major coal mining complexes revealed that it was different in these locations.**

**A general overview of the level of development of the mining complexes as a whole and the four types of locations in particular indicates that the areas do not represent the nature of development they should have with the level of economic activities taking place.**

**The study of community development at two of the largest opencast coal mines in the country, namely, Gevra and Kusmunda, both in Korba coalfield revealed the following.**

- 1. The mining and associated activities had brought about a marked change in the level of economic activities. But the benefits of the increase in the level of economic activities had not accrued to the entire cross section of the society.**
- 2. The four types of localities in the two complexes developed differently in accordance with the magnitude of assistance they received from the mining company.**

- 3. Only the colonies had an overall fair quality of life of the families while the other three locations had poor quality of life. The percentage of poor families in the four locations was 6 in the colonies, >12 in R&R villages, 84.7 in IPDP villages and 86 in native villages.**
- 4. The colonies and the R&R villages had >70% nuclear families while the IPDP and native villages had 80% combined families.**
- 5. More than 60% of the people in the colonies and R&R villages were engaged in the works of mining and related activities. In the IPDP and native villages this percentage was 50-60.**

- 6. The literacy level in the four locations was 93.5, 64.6, 41.9 and 33.5 percent with the percentage of non-matriculantes being 2, 21.0, 39.4 and 79 respectively.**
- 7. The percentage of families having per capita income less than Rs 1,000/- per month was 15, 60.4, 83.8 and 87 in the colonies, R&R villages, IPDP villages and native villages respectively.**
- 8. In the colonies all the families were using LPG as cooking fuel as this was being supplied by the Company. In the other three locations more than 75% families were using coal, wood, and cow dung for**

**A recent survey amongst the people resettled in the R&R villages in two coal mining complexes revealed that many people are not satisfied with their conditions of living and most of them do not wish to go back to their original place. This was mainly because they are not aware of the possibilities and future prospects as till now there are no such schemes in the mining areas.**

**Till a decade back almost all the coal mines in the country were in Public Sector except some operated by a private company for their own use.**

**Coal India Limited (CIL) is the largest coal mining company.**

**Recently about 200 blocks have been allotted to various public and private sector companies mainly for their captive uses.**

**From the point of social dimensions of the Indian coal industry it would be appropriate to outline some details of one of the world's leading coal mining company, i.e., CIL. Salient features are given in the next slide.**

<b>Total mines</b>	<b>473</b>
<b>Underground mines</b>	<b>283</b>
<b>Opencast mines</b>	<b>155</b>
<b>Mixed mines</b>	<b>35</b>
<b>Coal beneficiation plants</b>	<b>19</b>
<b>Employees</b>	<b>412,350</b>
<b>Total dependents</b>	<b>4,123,500</b>
<b>Production in 2008-09</b>	<b>about 400 MT</b>

**The *Mission* of CLIL is to produce the planned quantity of coal efficiently and economically with due regard to safety, conservation and quality.**

**As a part of the CSR, CIL endeavors to uplift the social life and economic conditions of the people around the mines and projects operated by its subsidiaries. To meet the societal aspirations and needs of the people CIL has a well structured Community Development Activity programme. The guidelines include development of infrastructure facilities, health, education, social/cultural activities, and tree plantation and skill upgradation. Provisions also exist for institutional arrangements and for up keeping and maintenance of assets created.**

**The R&R Policy of CIL is more Project Affected People (PAPs) friendly and aims at overall growth of the affected people while ensuring involvement of the PAPs.**

**CIL has been implementing R&R of PAFs almost since the nationalization of the coal mines in early seventies. The company has a wealth of experience in this field. In order to fine tune its R&R efforts the company has been remodeling its R&R Policy from time to time. For optimizing their R&R efforts CIL implemented a World Bank assisted Project, namely, Coal Sector Environment & Social Mitigation Project (CSESMP) in 25 mining projects.**

# ENVIRONMENTAL DIMENSIONS

**Mining is as an environmentally unfriendly activity as it impacts all the components of environment.**

**The environmental issues in the various stages of mining and the impacts of the mining activities on the environmental components are discussed hereunder.**

# **ENVIRONMENTAL ISSUES IN PROSPECTING**

***Issues related to ecology*** when prospecting is done in forest areas. This may involve restoring of the sites used for prospecting to the extent possible, minimization of noise and vibrations so that the wild life is not affected, effluent management so as not to pollute the water bodies and the soils, etc.

***Issues related to society*** when prospecting is done near the villages and settlements. This may involve restoring of the sites used for prospecting to the extent possible, minimization of noise and vibrations, effluent management so as not to pollute the water bodies and the soils, etc.

***Issues related to land*** when prospecting is done in agricultural areas. This may involve reclamation and restoration of land for the uses nearly akin to the original status, effluent management so as not to pollute the water bodies and the soils, etc.

***Issues related to water regime*** when prospecting is done by the methods which are likely to disturb the surface and underground water sources.

# **ENVIRONMENTAL ISSUES IN EXPLOITATION**

**Fossil fuels and minerals invariably exist in forest-cum-agricultural areas, which are mostly dominated by tribals.**

**Mining is only an intermediate use of land as before and after mining the land area is of no use to the mining companies.**

**Most of the mineral bearing areas have a low level of economic activities and majority of the living in these areas are dependent on agricultural and associated activities.**

**The advent of mining brings about a major jump in the level of economics.**

**The local people although own the mineral bearing land have no stake in the minerals and fossil fuels.**

**Most of the mining areas have not developed commensurate with the level of economic activities.**

# **ENVIRONMENTAL ISSUES IN COAL/ MINERAL PREPARATION**

***Issues related with the society*** – For establishing the coal/mineral preparation units land is required for various uses and the people living on this land will need to be displaced.

***Issues related to ecology*** - The preparation plants established in forest areas or very close to the forests will disturb both the terrestrial and aquatic fauna. When established in agricultural land plants will tend to disturb the characteristics of top soil.

***Issues related to land*** –The preparation plants require land for plant, storage of coals/ minerals to be prepared, washed coal and prepared minerals, and storage of tailings and middlings. The preparation plants contribute to the changes in the land use pattern.

***Issues related to water regime*** – The effluents discharged by plants tend to pollute surface and underground water bodies and soils.

***Issues related to atmosphere*** – The dust generated in various parts of the plants when gets into the atmosphere tends to increase SPM concentration. The noise and

# *Environmental Components*

**Society** - human beings and their activities.

**Ecology**, comprising of various species of terrestrial and aquatic flora and fauna and their interdependence.

**Land**, which provides support to the society and the ecosystems in various ways.

**Water regime**, which sustains life and is an important resource to both the society and the ecology.

**Atmosphere**, which also sustains life and is also an important resource to both the society and the ecology.

**For effective planning and implementation of CSR, R&R and Community Development (CD) it is necessary to understand the impacts of mining and associated activities on the environmental components and then devising the mitigative requirements to be incorporated in mine planning and development of CSR, R&R and CD packages/schemes.**

# **IMPACTS OF MINING AND ASSOCIATED ACTIVITIES ON ENVIRONMENTAL COMPONENTS**

**The impacts of mining start with the declaration of finding the mineral/fossil fuel reserves. People from outside, in anticipation of the financial gains, etc., start buying land, establish shops, business, etc. in and around the mineral/fossil fuel bearing areas.**

**Briefly the impacts on the five environmental components and societal costs of environmental pollution are as follows.**

# IMPACTS ON SOCIETY

- *Changes in population*
- *Dilution of ethnic culture and changes in societal complexion*
  - *Displacement of people*
    - *Losses of livelihood*
    - *Decrease in sex ratio*
  - *Increase in the cost of living*
  - *Development of civic facilities*
    - *Changes in income pattern*
      - *Urbanization*
  - *Education and medical facilities*
    - *Infrastructure facilities*
    - *Aspirations of the society*

# **SOCIETAL COSTS OF ENVIRONMENTAL POLLUTION**

# ***Societal costs of socio-economic impacts***

- *Compensating for loss of livelihood*
- *Taking care of increased cost of living*
- *Disintegration of societal structure*
  - *Dilution of culture*
  - *Taking care of displacement*
  - *Meeting increased aspirations*

# ***Societal costs of ecological impacts***

- *Compensating for the loss of ecological products*
  - *Losses due to ecological imbalances*
    - *Possible changes in climate*

# ***Societal costs of land degradation***

- *Compensating for loss of production and productivity*
- *Compensating for soil pollution and soil erosion*
- *Costs as a result of the changes in land use*

# ***Societal costs of water regime disturbances***

- *Management of water due to its loss from surface and underground sources*
- *Management of disturbances in surface drainage pattern*
  - *Losses due to flooding and leaching*
    - *Water poisoning*
- *Increased consumption of fuels, soaps and detergent*
  - *Domestic water purification*
  - *Acidic rain and acid mine drainage*

# ***Societal costs of air pollution and noise***

- *Loss of life*
- *Expenditure on taking care of diseases*
  - *Acid rain*
- *Maintenance of in-house cleanliness*
- *Maintenance of personal cleanliness*
  - *Costs on health impacts of noise*
- *Costs on the ambient noise management*

# IMPACTS ON ECOLOGY

- *Clearing of all vegetation*
- *Deforestation for mining activities*
- *Disturbances to wild life and other fauna*
- *Retardation in growth of vegetation*
- *Degradation of aquatic flora and fauna*

# IMPACTS ON LAND

- *Changes in topography*
- *Changes in land use pattern*
- *Changes in surface drainage pattern*
- *Alterations in characteristics of soils*

# IMPACTS ON WATER REGIME

- *Removal of all water bodies*
- *Damages to the underground water sources*
- *Management of surface drainage pattern*
  - *Management of acid mine drainage*
- *Pollution of water in the surface and underground water bodies*

# IMPACTS ON ATMOSPHERE

- *Air pollution*
- *Acid rain*
- *Noise levels*

# **SUSTAINABLE MINING**

**Mining is an intermediate use of land and impacts all the five components of environment. It is necessary look into prospects of development of sustainable mining practices (SMPs), which are not only technologically sound but are also human and environmentally friendly to achieve an overall societal development of mineral bearing areas with an improved environment. The practices should also achieve zero accident potential.**

# Objectives

- **The benefits of the activities should accrue to the entire cross-section of the society.**
- **The activities should be safe and environmental friendly, i.e., they should tend to improve upon the pre-mining environment.**
- **The selection of the technologies for the exploitation of the minerals should be appropriate for achieving maximum possible conservation and optimal utilization of resources for given geological and structural settings.**
- **The SMPs should be designed for zero accident potential not only during mining but also in the post mining period.**
- **The overall activities of mining operations inclusive of implementation of mine closure should be economically viable.**

# Ingredients

- ***Establishment of a national data bank***
- ***Creation of awareness among masses***
- ***Achieving active participation of all concerned***
- ***Amending land acquisition legislation***
- ***Environmentally and human friendly mine planning and design***
- ***Suitable mine closure planning and design***
- ***Realistic EIA and EMP***
- ***Technical audit of the mining and environmental management activities***
- ***Self regulatory mining and environmental management***
- ***Establishment of separate central funds for R&R, reclamation and mine closure***

***Thanks***