



THE IMPACT OF SURFACE COAL MINING ACTIVITIES ON THE ENVIRONMENT : A REVIEW

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Abstract

Exploration mining and beneficiation of coal is associated with variety of environmental problems. Coal mining specially opencast mining has substantial effect on the environment. In opencast mining vegetation and topsoil are completely removed, causing a loss of habitat for plants and animals and increasing soil erosion and air and water pollution. Opencast mining results in serious disruption of surface topography and water courses due to digging of huge opencast pits and massive overburden dumps.

Key words: Surface coal mining, environmental pollution, overburden dumps.

Introduction

The challenge of creating and maintaining a sustainable environment is probably the most pressing issue of our times throughout the world. As humans increasingly alter earth's land, water and atmosphere on local, regional and global levels, the resulting environmental problems can seem insurmountable. Technological civilization uses the atmosphere, hydrosphere and lithosphere both as resource and as medium for discharge of waste products. This results in physico-chemical changes in the quality of air, water and soil that have harmful biological consequences. The chemical composition of the atmosphere is being modified by the injection into it of particulates gases and volatile substances, all more or less toxic to living organisms. These changes upset the normal functioning of the environment at varying degrees and run the risk of inducing irreversible ecological changes.

Our society greatly depends on energy. We use it to grow and cook our food, to warm our homes in winter and cool them in summer, to extract and process natural resources, to manufacture items of daily use, to power various forms of transportation. Currently energy consumption is increasing worldwide with most of the increase in developing countries.

There are variety of source of energy. Earth is store

house of various minerals and sources of energy. Today most of the energy required is supplied by fossil fuels, coal, oil and natural gas. Contribution of coal to total energy supply is increasing tremendously for generation of electricity by burning in thermal power plants.

Coal generally occurs in the geological basins which are covered by the hills and forests. Coal is found in underground layers called seams that vary from 2.5 cm to more than 30 meter in thickness. Coal mines are two types surface or opencast or strip mines and underground mines. When the coal bed is within 30 meter of the surface opencast mining is usually done. In India, opencast coal mining contributed more than 60% of current coal production.

The impact of opencast mining activities on the environment may be summarized as follows :

1- Land: Surface mining in the area drastically disturbed the landscape. Almost all the land actually for mining gets spoiled. During surface mining a vast quantity of soil, overburden and bed rocks from mining sites are removed and dumped at adjoining non coal bearing areas. The pre-existing ecosystems are thus destroyed at both the sites. Surface coal mining results in the dumping of huge amounts of overburden materials in adjacent unmined land leading to serious land degradation. The overburden originates from the consolidated and unconsolidated materials haphazardly mixed during mining activity which is known as mine spoil. These drastically

disturbed mine spoil ecosystem are usually physically, chemically, biologically and nutritionally poor media for plant growth (Mayer, 1973). Mine spoils force undesirable conditions for both plants and microbial growth because it contain low organic matter unfavourable pH, low water retention capacity and compact structure (Baker, 1990).

2- Forest (Flora and Fauna): Due to opencast mining, forest land would get disturbed, consequently flora and fauna of the area also gets disturbed. Forest plays an important role in maintaining rain fall and temperature in the area. Extensive damage to this national wealth without any compensatory afforestation would disturb the ecosystem greatly. Most of the coal mines are in forest land. Blasting of the hill tops and stripping of land is routine operation in the coal field area. This results in a complete destruction of tree cover and other vegetation. Destruction of forest is a major threat to wild life. Loss of the habitat due to large scale changes in land use and likely poaching by the growing population drawn to the area due to variety of other developmental activities result in total loss of wild life in mining and adjoining areas.

3- Noise Pollution: Blasting for coal and overburden, operation of heavy duty vehicles, drilling operation etc. create huge noise pollution in the area. People generally experience a noise level above 90 dB for more than 4 to 5 hours per shift.

4- Villages and settlements: Due to mining and allied activities population in the area increases. So the new settlements would come up in the area to accommodate them. Further, village locating in the mining area would be displaced. Rehabilitation of the land oustees in terms of occupation as well as housing amenities etc. would be a major impact in the area. Operation of coal mining projects and allied activities have direct and indirect impact on the socio-economic conditions of the existing inhabitants. Although, projects have created ample job opportunities but are not sufficient enough to employ all the effected ones with the impact that major proportion of the population has been shifted from this region. The public amenities like educational institutions, health care, communication facilities, markets etc. have increased but its major share goes to project personals, while huge tertiary service population are left out. This has created a chaotic and un-coordinated development at the fringes of colonies, colliery and power plants. The cause of the problem is influx of outsiders for livelihood and other necessities making tremendous impact from the demographic and behavioural pattern in the area.

5- Water quality: The operation of opencast mines generally affect the natural drainage network,

underground aquifers and also the water quality of the area. Effluents from mine colony and mining areas besides the surface run off passing through coal piles and over burden dumps pollute the nearby surface water. The water has objectionable odour, colour and pH and may not be fit for drinking purpose. The water generally has high turbidity and affect the aquatic life due to poor oxygen content. In some cases it may contain certain pathogenic bacteria causing health hazards. Further, high oil and grease in water may affect the aquatic life.

6- Air quality: Due to blasting, drilling, loading and conveying of over burden and coal in opencast mines, dust and gases are produced leading to air pollution in and around the opencast mining areas. Mining is a very ancient and one of the most useful industrial activity through it is dirty and dangerous. Opencast mining can be hazardous to the environment as the dust and gases are emitted directly into the atmosphere. Particulates, SO₂, NO₂, CO and hydrocarbons are considered major air pollutants in mining areas. The particulates may be released into the atmosphere from point source such as a centralized vent system to exhaust dust laden air from crushing and screening plants. The important non point sources of particulates and other gaseous pollutants are :

- 1- Operation of various coal mining and over burden removal equipments such as shovel, frontend loaders, draglines, bucket, wheel excavators, bulldozers, drilling machines etc.
- 2- Haul roads both of the paved and unpaved types, wind erosion from coal stock piles, benches and overburden dumps.
- 3- Blasting operations.
- 4- Tailing dumps.
- 5- Transportation activities on poorly maintained roads.
- 6- Coal burning activities.

Particulate pollutants are the major threat in the vicinity of opencast coal mines. These pollutants, when released into the atmosphere, remain suspended for varying lengths of time depending upon their size, weight, chemical nature and atmospheric conditions. These particulate matter are very harmful when, they reaches in the respiratory tract of animals and humans. Dust of silica and coal particles are very harmful to lungs and a large number of mine workers suffers from silicosis, tuberculosis, chronic bronchitis, pneumoconiosis, lung cancer etc. (Ramade, 1987).

Mining activities results in the emission of various gaseous and particulate pollutants in the area. There is

dearth of information regarding the impact of air pollution on plants in and around opencast mining areas. Studies have, however, indicated deterioration of air quality due to mining (Bose *et al.*, 1983; Singh *et al.*, 1994). Variety of particulates are known to affect the vegetation adversely under field (Khanam *et al.*, 1990) laboratory conditions (Singh, 1991).

Conclusion

The growing demands of coal for energy production in India have led to the fast expansion of coal mines. It is therefore, important to establish monitoring network over large area around coal mines. Besides chemical measurements, biological monitoring of the situation also serves as an index of environmental stress. The use of native plants or plantation developed at different sites has been in common practice for biological monitoring of pollution status along a concentration gradient around sources of pollution.

References

Baker, R.M. (1990). Investigations into selected properties of opencast spoil related to tree growth. *Arboriculture*

Journal, **14(2)**: 129-137.

- Bose, A.K., P.K. Mullick, B.N. Dalal, A.K. Mukerjee, J.K. Sinha and P.K. Gangopadhyaya (1983). Air pollution study in Jharia coalfield. *Ind. J. Air Pollut. Contr.*, **4**: 56-61.
- Khanam, N., M. Agrawal and D.N. Rao (1990). Evaluation of air pollution impact around Dala cement factory. In : Environmental Degradation of Odra-Renukoot-Singrouli Area and its impact on Natural and Derived Ecosystems. J.S. Singh, K.P. Singh and M. Agrawal (eds.), Final Tech. Rep. of MAB Project Ministry of Environment and forest. Govt. of India. 14/167/84-MAB/En-2/RE. Pp. 305-358.
- Meyer, F.H. (1973). Distribution of ectomycorrhizae in native and manmade forests. In : Ectomycorrhizae : Their Ecology and Physiology, G.C. Marks and T.T. Kozlowski (eds.), Academic Press, New York, pp. 79-105.
- Ramade, F. (1987). *Ecotoxicology*, John Wiley and Sons, Chichester, Great Britain.
- Singh, J. (1991). Response of plants to thermal power plant emission. Ph.D. Thesis, Banaras Hindu University, Varanasi.
- Singh, J., M. Agrawal and D. Narayan (1994). Effect of thermal power plant emission on plant community structure. *Ecotoxicology*, **3**: 110-122.