International Journal of Science, Environment and Technology, Vol. 3, No 3, 2014, 881 – 884

ISSN 2278-3687 (O)

Short Note

ECOLOGICAL DEGRADATION IN NORTHEASTERN COAL FIELDS: MARGHERITA ASSAM

[1]Krishna Giri*, [2]Gaurav Mishra, [3]Shailesh Pandey, [4]P.K. Verma, [5]Rajesh Kumar and [6]N.S. Bisht

[1,2,3,5]Scientist, [4]Research Officer, [6]Director

Rain Forest Research Institute, Jorhat-Assam, India

E-mail: girik@icfre.org (**Corresponding Author*)

Abstract: Coal mining exerts a long lasting impact on landscape, ecosystem and socio-cultural-economic considerations. Mining and its subsequent activities in Northeastern Coal fields, Margherita Assam has been resulted significant forest and top soil loss, acid mine drainage and soil and water pollution in the area. Keeping in view the above facts, eco-restoration of mine degraded land Margherita, Assam is urgent need of the hour.

Coal mining exerts a long lasting impact on landscape, ecosystem and socio-cultural-economic considerations. Mining and its subsequent activities have been found to degrade the land to a significant extent. Overburden removal from the coal field results in significant forest and top soil loss. Most of the mining wastes are inert solid materials and toxic in nature. These toxic substances are inherently present in the ore, e.g. heavy metals such as iron, mercury, arsenic, lead, zinc, cadmium, etc (Guha Roy, 1991). These heavy metals leach out of the stored waste piles and contaminate immediate environment. However, some toxic chemicals are also found in waste, as they are added intentionally during extraction and processing. The major environmental impacts due to coal mining are changes in soil stratification, reduced biotic diversity, and alteration of structure and functioning of ecosystems; these changes ultimately influence water and nutrient dynamics as well as trophic interactions. Land degradation due to coal mining is the cumulative effect of air and water pollution, soil quality degradation and biodiversity loss (Sankar et al. 1993). This process works through a cycle known as land degradation cycle. The magnitude and impact of mining on environment varies from mineral to mineral and also depends on the potential of the surrounding environment to attenuate the negative effects of mining, geographical disposition of mineral deposits and size of mining operations. A list of minerals has been prepared by Department of Environment, which is supposed to have serious impact on environment. These minerals include coal, iron ore, zinc, lead, copper, gold, pyrite,

*Received Apr 10, 2014 * Published June 2, 2014 * www.ijset.net*

manganese, bauxite, chromite, dolomite, limestone, apatite and rock phosphate, fireclay, silica sand, kaolin, barytes. Mineral production generates enormous quantities of waste/ overburden and tailings / slimes (Rai, 1996).

Margherita is a census town in Tinsukia district of Assam state. The small sub-divisional town has scenic beauty though nothing like a tourism business. Margherita is located at 27.28°N, 95.68°E with an average elevation of 162 meters. North Eastern Coalfields is a unit of Coal India Limited, which has its headquarters in Margherita, Assam. The unit came into existence in 1975 after nationalization of coal mines in India. It took over the private mines spread in North Eastern states i.e. Assam, Meghalaya, Nagaland and Arunachal Pradesh. At present there are five working mines three underground and two opencast mines. This coal mining activity in Margherita has resulted significant ecological degradation in the area (Figure 1).

Figure 1. Coal mining in Margherita Assam and Ecological Degradation

Acid mine drainage is a serious environmental issue of coal mining activities. This occurs when sulfide ores are exposed to the atmosphere, which can be enhanced through mining and milling processes where oxidation reactions are initiated. Mining increases the exposed surface area of sulfur-bearing rocks allowing for excess acid generation beyond natural buffering capabilities found in host rock and water resources (Caruccio, 1975). Once acid drainage is created, metals are released into the surrounding environment, and become readily available to biological organisms. When fishes are exposed directly to metals and H^+ ions through their gills, impaired respiration may result from chronic and acute toxicity. Fishes are also exposed indirectly to metals through ingestion of contaminated sediments and food

materials. A common weathering product of sulfide oxidation is the formation of iron hydroxide (Fe $(OH)_{3)}$, a red/orange colored precipitate found in thousands of miles of streams affected by acid mine drainage (Figure 2). Iron hydroxides and oxyhydroxides may physically coat the surface of stream sediments and streambeds destroying habitat, diminishing availability of clean gravels used for spawning, and reducing fish food items such as benthic macro invertebrates. Acid mine drainage, characterized by acidic metalliferous conditions in water, is responsible for physical, chemical, and biological degradation of aquatic ecosystems (Ashraf et al. 2010). Acidic water adversely affects the soil environment by way of making the soil acidic and rich in inorganic component and poor in organic content. Deterioration of soil quality has severely affects the crop growth and yield in the area mainly due to high concentrations of hydrogen ions, which inactivate most enzyme systems, restrict respiration, and root uptake of salts and water by plants. It also leads to deficiency of nitrogen, phosphorous, calcium, magnesium, molybdenum and boron as well as iron and manganese toxicity. Solubilization and transport of phosphorus from soil to the water environment due to acidity is an important issue associated with decreased agricultural productivity.

Figure 2. Acid mine drainage from coal mining in Margherita Assam

It is noteworthy to mention that the actual land mass available to mankind is just 30% of total global surface area. India's land area is about 2-3% of the global land area, whereas it supports more than 18% of the global population. This important statistics reveals that the

poor per capita land holding stands at 0.32 hectares, which calls for due attention to restoration of land after mining in order to utilize the land for useful purpose. Eco-restoration of mine degraded land in Northeastern coal field Margherita is a challenging environmental problem. Natural recovery in mine spoils is a very slow process which may take about 200 years of natural succession on a mine degraded land for the total nutrient pool recovery to the level of native forest soil. The first step in any restoration program is to protect the disturbed habitat and communities from being further wasted followed by to accelerate re-vegetation process for increasing biodiversity and stabilizing nutrient cycling. As a result of natural succession by planting desirable plant species on mine degraded land a self-sustaining ecosystem may be developed in a short period of time (Bhattacharya, 20005).

References

[1] Ashraf, M.A., Maah, M.J. and Yusoff, I.B. 2010. Study of Water Quality and Heavy Metals in Soil & Water of Ex-Mining Area Bestari Jaya, Peninsular Malaysia.

[2] Caruccio, F.T. 1975. Estimating the acid potential of coal mine refuse. *In:* Chadwick, M.J., G.T. Goodman (eds.), The Ecology of resource degradation and renewal. Blackwell Scientific Publications, Oxford, England, 197-205.

[3] Guha Roy, P.K. 1991. Coal mining in Meghalaya and its impact on environment. *Exposure* 4: 31-33.

[4] Bhattacharya, J. 2005. Reclamation methodologies for displaced landforms. Proceedings of Conference on Technological Advancements and environmental Challenges in Mining and Allied Industries in the 21st Century, February 5-6, NIT, Rourkela, pp. 503-514.

[5] Rai, R.K. 1996. Environmental degradation due to coal mining in Meghalaya. Final Report of the project sponsored by Ministry of Environment and Forests. New Delhi.

[6] Sankar, U., Boral, L., Pandey, H.N. and Tripathi, R.S. 1993. Degradation of land due to coal mining and natural recovery pattern. *Current Science*. 65: 680-686.