CHAPTER – 1

INTRODUCTION

CHAPTER 1: INTRODUCTION

The growth of large number of industries, factories, automobiles, coal mines, transportation and communication network are the main characteristic of modern cities. All of these generate various types of pollutants including heavy metal compounds into the air, water and soil ecosystems and finally penetrate into the groundwater in the form of sediment or suspended particles (Mount *et al.,* 1977). Industrial evolution and growing population have created the main problem of heavy metal pollution to aquatic life because of their toxicity, resistance, tendency to accumulate in organisms and food chain amplification (Weis, 1974). A gradual decline in fish population in different water bodies throughout the globe had become a great concern in the recent years (Myashita *et al.*, 1990, Natarajan, 1984).

Mining industry is a vital sector of the economy in any country.The Makum Coal field is located in Tinsukia district of Assam, India in the border of Arunachal Pradesh and occupies a huge area extending about 2587.16 hectare. The area lies between the latitudes 27°15′ and 27°25′N and longitudes 95°40′ and 96°5′E. The general elevation above msl near the plains of river Buri-Dihing is 140 m rising to 300 to 500 m on the Patkai Naga Range.

The present study area, Tikak Open Cast mine belongs to Makum coalfields under the district of Tinsukia is located in the Eastern Himalayan region between 27.30 N/ latitude and 94.59 E/ longitudes. Local people including the businessmen are benefited by the open cast mining of Tikak. Employment opportunities are also

created in this mining. Along with this success, problems are also created in several ways (source: Annual Report, NEC, CIL, 1990).

As a result of mining activity a variety of environmental problems appear i.e. land degradation, water and noise pollution, deforestation, ground vibration and associated socio-economic problems. It has been seen that mining activities affects the hydrology of the area in many ways i.e., lowering of water table and discharge of acid-water affects the agriculture and flora and fauna of that area. The emission of dust particles, gaseous emission i.e., sulphurdioxide, oxides of nitrogen, carbon monoxide contribute in air pollution. Dust particulate produced during handling, blasting and transportation of coal, mine fire during UGM (Under Ground Mining) creates hazardous solid waste. So, it is essential to study the impact of mining on the eco-biology of the area.

Historical Background of Tikak OCM:

Tikak open cast mine is located 8 km away from Margherita in the North –East direction. In the North side of the mine there is National highway No.38. The Southern side is covered by Patkai hill Range; eastern side is by Ledo Pani River and Namdang River covers the Western side. It occupies a foot hill area of the Eastern Himalayan above 150 and 300 m sea level. Past history of the area before mining had started shows that the entire area as well as nearby land of Margherita sub division falls under slightly acidic zone and as such suitable for tea and citrus cultivation.

Impact of Tikak OCM:

Once the Tikak hill was a dense forest (FSI, 2001). The forest was rich in biodiversity as well as underground coal. Manual open cast mining was started at Tikak during 1930 and the process was mechanized during 1981 to replace the old manual method. The mining operation at Tikak continued till 5th April, 1990 when it was stopped as per directives of Ministry of Coal prior to the closure. Tikak Open Cast project (OCP) was reviewed by various committees formed by the government to assess the environmental damages caused due to mining in the area. The expert committee constituted by the Ministry of Environment vide no. J-11015/19/88-1A dated 22.09.98 completed the spot study and submitted the report to the Ministry of Environment and Forest (Source: Coal India Ltd. NEC, Margherita).

The Ministry of Forest and Environment vide No.Z-11011/3/88-A. dated April 7, 1989 to the Ministry of Coal India Limited/ North-Eastern Coalfields (CIL/NEC) recommended certain measures for seeking immediate action over the problem. Till today substantial restoration works have been carrying out by CIL, NEC Ltd., Margherita time to time on the basis of the recommendations made by the committees. At the same time recovery of the ecosystem remains disproportional to the extent at what instant the degradation of the ecosystem is taking place. Thus mining system entirely alters the mining patches into a desert of a mixture of broken rock and rocky soil called spoils.

The spoil over burden (OB) produced by open cast mining has been dumped on the nearby land covering a vast area of otherwise productive soil. The OB is naturally

non-productive or very less productive mixtures of pebbles and of broken rock and coal. The OB dumps not only cover and destroy the flora and fauna but also cause air and water pollution that harms the inhabitants (Barpujari and Saikia, 2002).

The main drainage of the area is two sub-tributaries of the river Buri-dehing. People use water from this drainage for drinking and other purposes.

The immediate village that is affected by the mine is Malugaon, Chipegaon and Rodgaon with more than two hundred fifty families. The mine is situated at the hill top and the over burden (OB) removed had been initially dumped on the hill slopes. The slope dumping had caused land degradation which had attracted severe criticism (Source: Personal communication with Dr. Ranjit Dutta, General Manager, NEC , CIL, Margherita).

As the mining industry running from 1896, in its long history it creates huge excavations and other environmental problems including air, water, noise pollution, vibration of earth, deforestation and other socio-cultural problems greatly affecting the human health, animal life, floral and faunal diversity nearby and far from settlement of mining industry. The largest single environmental problem facing the mining industry is Acid Mine Drainage.Wetlands have the ability to remove metals from mine drainage and to neutralize AMD. Since wetlands are self-sustaining ecosystems, they may be able to remediate contaminated mine drainage as long as it is generated. Thus, they may represent a long-term solution to AMD, and to contaminated mine drainage in general.

On the basis of the prevailing scenario the present work has been taken up to study the effect of the mining on the fish biodiversity in the selected water bodies near Tikak Open Cast mining area.

AIMS & OBJECTIVES:

To study the impact of OCM on the Fish diversity in the water bodies near Tikak Open Cast Mine the following objectives are undertaken:

1. To survey the wetlands in and around the mining area.
2. Physico-chemical analysis of water and soil in selected water bodies namely Patkai wetland (Experimental Waterbody) and Mota Beel (Control water body) near mining region.
3. Elemental analysis in the water and soil of the selected water bodies with reference to heavy metal with the help of standard methodology of AAS (Atomic Absorptive Spectrometry).
4. To record the plankton diversity in the water bodies to know the pollution status.
5. Comparative Study of fish diversity of the selected water bodies.
6. Electron microscopic study of certain organs of the selected fish species *Clarias batrachus* to see alteration in the ultra structure.
7. To suggest measures for reclamation of the wetland near mining area.

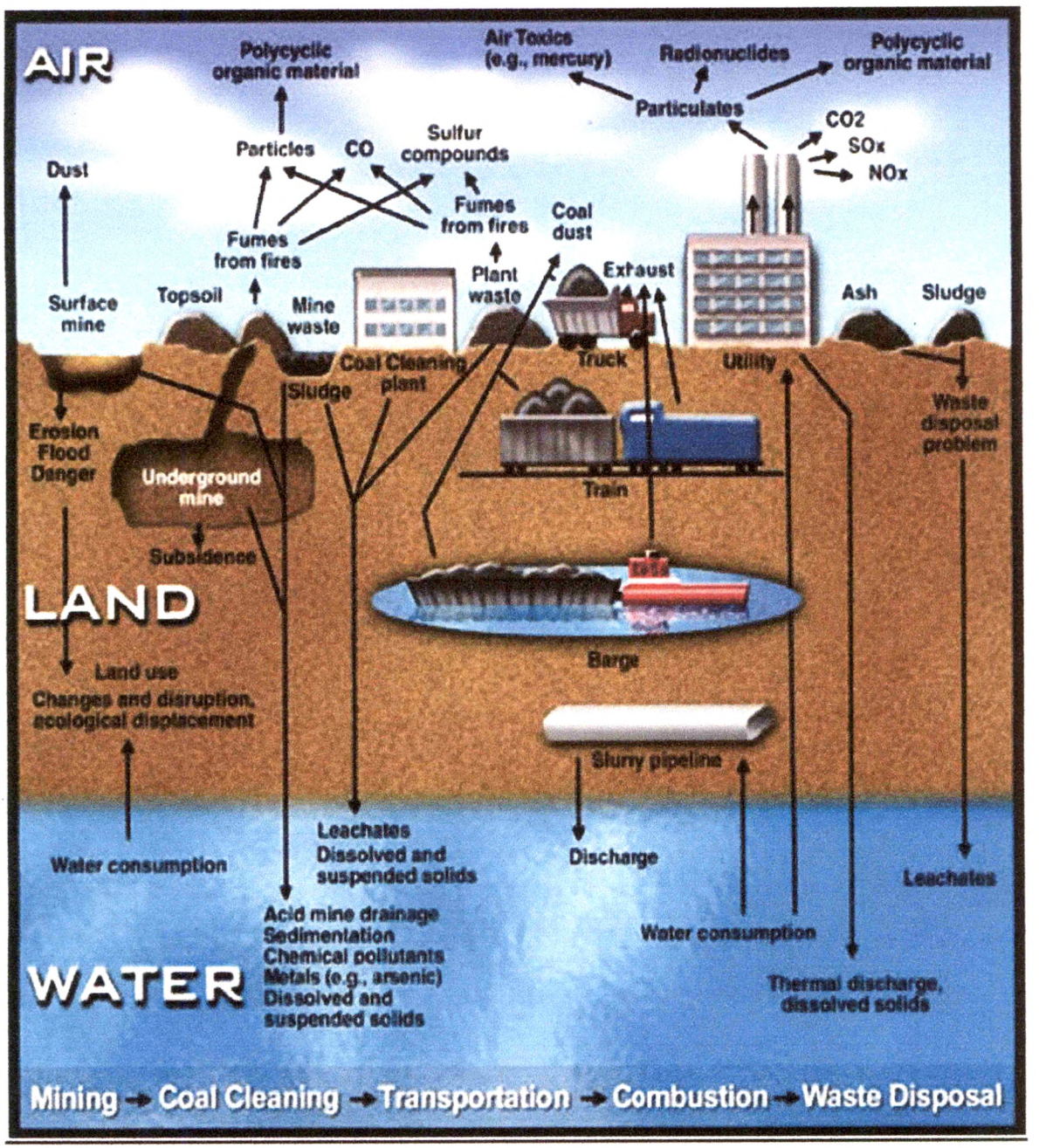

Fig 1 : Schematic presentation of the Mining activities and associated emissions