**THE IMPACT OF MINING INDUSTRY ON ENVIRONMENT THE CONCEPT OF SUSTAINABILITY AND HUMAN BEHAVIOUR**

**Introduction**

Minerals are important parameter of the national economy of any country.However environmental challenges are also an important problem for the mining industry. These are ones which, together with the protection of deposits of mineral materials, and their management, as discussed above, constitute the content of sustainable development.

In practice, every mining activity disturbs, more or less, the condition of the natural environment. One of the major environmental challenges is to manage overburden generated in these open cast mines which is associated with the problems of:

* loss of topsoil
* soil erosion
* water and air pollution
* noise pollution
* loss of forest and biodiversity
* ecological disruption
* social problems,
* deformations of ground surface in the form of subsidence, horizontal deformations, discontinuous deformations, etc.
* seismicity induced changes from mining activities
* impoverishment of soils

**EFFECT ON LAND**

Open cast method of mining has great impact on land as almost 85% of land is left with no use if not rehabilitated.There is massive land disturbance due to use of land for large scale excavation ,dumping of overburden,making industrial and service building ,roads and other infrastructure , township etc. effect is severe if it involves forest land ,agriculture land or inhabited land. In case of forest land, impact depends on whether it is degraded forest or thick forest, and whether area is supplying unique habitat, endemic or threatened species. Inhabited land involves displacement of people. Change in land pattern use pattern – agriculture land used for residential and industrial purpose-reduces agricultural production.

Some mining procedures include blasting of rocks.This may result in seismic activities.Hollow mines can also result to land movements as they cave in and collapse.This can be experienced in both active and abandoned mines.Land around such mines become uneven and undesirable.Such lands are difficult to be inhabited or put to any other use such as agriculture due ro its uneven surface.Soil erosion and soil degradation due to a wide-range of environmental unorganized activities in general and mining in particular have been extensively investigated and documented by scholars and environmental activists.Alteration in characteristic of top soil reduces fertility of land/agriculture production in the surrounding area due to siltation and run off from overburden dumps.Large tracks of land are therefore left unused as they are deemed useless for agriculture.However,if such land is used for agriculture,yields tend to be lower than expected.Polluted water from the mines will reduce the soil quality and fertility if released on the land surface.This renders land useless as it becomes barren and less suitable for agricultural use.Polluted water may as well kill major and important organisms in the soil ecosystem that are important for aeration of the soil.This will prevent soil fertility rejuvenation by organisms such as earthworms.

Mining around an area will result to town development as well as industries being set up.Building construction and other infrastructure development around mining towns will result in change in land use pattern.Land congestion may become a huge problem as industrialist as well as miners try to accommodate more industries as well as residential buildings.Extraction of minerals leaves behind a hunge amount of subsidence.Subsidence from mining will lead to change in topography as well as natural drainage.This is a result of dumping subsidence on the surface.

Disturbance of surface water bodies and underground regime will bring about change in effective land use.Most of the land will be left unattended to due to evacuation of peaople in the mining area as a result of subsidence dumping and flooding.

**EFECT ON THE AIR QUALITY**Air pollution due to emission of gaseous pollutant(Sulphur dioxide, carbon monoxide, nitrous oxide,suspended particulate matter and dust from drilling,blasting,transport of coal and overburden,crushing and screening.

In some instances,mines may be prone to fires.Pollution from mine fires and fires in waste dumping, including those left burning in post mining period,auto-emissions during the mining process and ore processing as well as emissions from soft coke bhattas and coke ovens.

**EFFECT ON WATER AND WATER BODIES**

Before mining is conducted in a specific area,the land has to be cleared and this may include seceral water bodies such as ponds as well as small lakes that may be present in the ore-rich stertch of land.

Mining is an activity that requires plenty of water.From cleaning the ores in gold mines to filter gold as well as refining such ores.This may lead to significant reduction of water supply in the environment. Shortage of water has a great impact on the environment.

Surface and ground water bodies are polluted due to discharge of mine water, run off from coal stocks and overburden dumps especially domestic effluents rendering water unfit for domestic use and in some cases even for agriculture purpose.

Disruption of hydrological regime, ground water regime and lowering of ground water table from loss of land mass from mining and water needed in the mines.

Acid mine drainage due to presence of pyrite bands in coal seams may result in toxic/heavy metals.Toxic water includes the contamination of heavy metals such as lead, mercury, uranium and arsenic.

If subsidence movement on the surface exceeds the safe limit for the surface water bodies, it becomes necessary to drain them out to avoid flooding. Displacement of large water masses will have a great impact on the environment.

With development of cracks upto the surface, rain water from surface finds its way underground.This may carry with it various pollutants from surface.Overlying water bodies are disturbed and water from them finds way into the underground workings .This water is required to be pumped out from the mine.

Polluted underground water when pumped out and discharged on surface ,may result in pollution of pollution of surface water bodies.

**IMPACT ON THE SOCIETY**

Large tracts of land are required to begin a mining project. This resulst in displacement of people from the particular land mass in order to begin extraction. Displacement of people whose land is acquired who already have marginal health status is worsened by stress and trauma of moving.

Displacement of people from their land results in loss of livelihood of people dependent on land directly or indirectly. They may include farmers and pastoralists.This leaves lands unhabited as well as congestion in places of immigration.

Influx of outsiders (officers,skilled workers,contractors,small businessmen , government officials),rapidly decreases when the mine is closed.Their arrival will also result in dilution of ethinc culture of the area as they are in continuous interaction.

Disturbance and health effects on local population and noise produced by blasting and crushing.

The sanitation has be completely damaged people are suffering from many diseases because of the deposition of fed dust everywhere. The mining area has high incidence of lung infections, heart ailments and cancer. The problem of dust during transportation go unachieved to as there are no basic standards fixed and action can be taken according to Karnataka State Pollution Control Board environment officers. Peoples are suffering from epidemic diseases due to mining activities. Pure drinking water, pure air, pure clean food has become a rare thing. The environment has missing its balance.

Urbanization (well organized township,market places) when mining activity is on and leaving behind remnants when mining ends.

Danger to life and property in post mining period. Rise in aspirations of society.

Settlements near to the overburden dump sites are prone to the risk of mud sliding from the dumps in the case of slope failure in mine area. In that situation the entire muck etc. enters in the settlement and affect it in many ways . Displacement of people may ensue,death of residents in the affected area and also blockage and damage of transport and communitarion systems.Water channels in the area are also affected by such med slides.

Impact on the labour-Intensity nature of mining industry. Which is going on to continue as such, with further intensification despite mechanization efforts and leads for serious and sincere efforts in this vital field of environmental problem. Important factors that affect the health of workers in this regard area. Generation of dust more particularly irrespirable dust.

Workplace environment and conditions.

Noise and vibrations, the later particularly hand-transmitted.Investigations on this subject by CMRs (Central Mineral Resources) in some coal mines and industrial areas of Jharia and

Loss of common property resources-Common property resources (CPRs) broadly speaking, are the resources accessible to the whole community of a village and to which no individual has exclusive property right. In the dry regions of India, they include village pastures, community forests, wastelands, common threshing grounds, waste dumping places, watershed-drainages, village ponds, tanks, rivers/rivulets and river beds.The mine owners and middle man have destroyed the property and resources of many people. They have acquired community land and tanks. This has caused lot of inconvenience to the public. Water is not collected in the tanks now, even water collected in the tanks is polluted because of the collection of dust on the surface. Forests are destroyed to bring forth deserts. (Campaigs)

**NOISE POLLUTION**Residents around mining towns suffer from noise pollution from machinery installed in shafts/inclines ,compressor houses and workshop generates noise which becomes ambient noise.The heavy machinery operations in the overburden handling leads to an increase in the noise levels in the nearby residential areas also. However, at the planning stage the proper selection of the dumpsite can eliminate noise impacts to the residents.“Noise mapping” is preferred for visualization and its propagation in the form of noise contours so that preventive measures are planned and implemented (ABH Publishing Corporation). Although in the Recommendations of Tenth Conference on Safety in Mines, noise mapping has been made mandatory in Indian mines (as per Directorate General of Mines and Safety) , still mining industry are not giving proper importance on producing noise maps of mines.**IMPACT ON ECOLOGY**Clearing of vegetation from vegetation from land used for quarry ,dumping of overburden,construction of infrastructure.Occurrence of desert and arid lands due to deforestation when mine is situated in forest area.Humidity and water level may reduce significantly as a result.Poor rains ensue which results in desertification. Disturbance in wild life and other fauna due to clearing of vegetation/deforestation.Some of these plants and animals may also go extinct. Noise and vibrates due to blasting and machine operations drive away animals and birds from the region.

Retardation of of growth of vegetation due to lowering of water table/disruption of waste regime,and due to air and water pollution. Degradation of aquatic flora and fauna due to discharge of polluted water.Oily water from the mines are likely to block oxygen cycle in the water which is important for animals survival.Development of shaft/incline complex ,infrastructure ,township etc.require clearing of the area and thereby drives away the fauna. Water table of the adjoining area gets lowered because of fractures created in the aquifer by underground mining. This has adverse effect on growth of vegetation and agricultural produce.Vegetation supporting capacity of the top soil in the tensile zone of subsiding area may be impaired.Soil errosion is likely to be experienced in such affected areas.Discharge of polluted water from underground mine to surface water bodies affects their aquatic ecology.Fishes die when water bodies are polluted and it really difficult for aquatic plants to grow.Disruption of the air cycle in such water bodies is the major cause of death in aquatic life.Mining is always together with environmental disorder more so, in open caste mining. Opencast mining contributes towards land degradation, vegetation degradation destruction of productive land in addition to effecting river flow, siltation, water pollution,deforestation etc. in many cases, valuable ore bodies are in forest or impending to it. .Development of infrastructural facilities for any type of mining results in destruction of trees and vegetation.This is because trees have to be cleared to set up such infrastructures.The nallas ultimately change into river or reservoir. The water pollution is caused due to increase in total solids, other minerals such as fluorite,mercury etc and leachates from the dumps of mines which are harmful for human health and aquatic fauna and flora. This results decrease the amount of dissolved oxygen of water. This activity affects the aquatic life. In surface waters,elevated concentrations of particulate matter in the water column can produce both chronic and acute toxic effects in fish and other aquatic life.Mining gas damaged the biodiversity of birds, animals, medicine plants, insects, flies, reptiles, sponges etc.The continuous mining activities in nights have further added fuel to the fire to desert wild animals from the forest area. The fine dust generated due to mining activities including transportation, fall on the flowers, fruits, leaves etc. and inhibit setting of seeds would result to loss of biodiversity of the region.

Opencast mining activities changes surface of the earth. Overburden dumps are man-made habitat causing multiple environmental problems ranging from erosion and enhancing sediment load in receiving water bodies, dust pollution, damage to fragmentation of habitat and overall disturbance of ecosystem in the whole area. Sediments deposited in layers in terrestrial ecosystems can develope many impacts associated with surface waters, ground water and terrestrial ecosystems. Minerals associated with deposited sediments may depress the pH of surface runoff thereby mobilizing heavy metals that can infiltrate into the surrounding subsoil or can be carried away to nearby surface waters.

**REFERENCE**

**1. Nriagu, J.O and Pacyna J.M. 1988. Quantitative assessment of worldwide contamination of air, water and soils by trace metals.**

**2.Trivedi .R.N,2001, A textbook of Environmental Science, Anmol Publishers, New Delhi.**

**3.Raymond L Lowrie ,SME Mining Reference Handbook,Society of Mining, Metallurgy and Exploitation.**