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**Research Article****Environmental impacts of mining on biodiversity of Angul - Talcher open mining site, Odisha, India****Gyanranjan Mahalik, Kunja Bihari Satapathy**

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**Abstract:** Biodiversity sustains human livelihoods and life itself. An estimated 40 per cent of the global economy is based on biological products and processes. As the biodiversity harbours a great amount of diversity with respect to species diversity, crop diversity, etc. which provides a rich amount of a well evolved system over time background support for rich resources. In Angul-Talcher area, in recent years, intervention of human activities has been very much noticed. Mining is on rise for last few decades in the area, covering huge belt of land and eventually also harming the forest cover of the Angul-Talcher forest division. Environmental Impact Assessment is a study of the effect of a proposed mining project, plan or program on the environment. The present paper attempts to reveal the base line environmental quality and socio-economic setting in and around such mining sites with special reference to the effects on the biodiversity, air, water, changes of land use pattern and occupational health effects of mine workers etc.

**Keywords:** Angul-Talcher, Biodiversity, EIA, Fauna, Flora, Mining.

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**INTRODUCTION**

The Angul-Talcher in India is a land rich in variety of resources and dense forests. Environmental impact assessment is an objective analysis of the probable changes in the physical, bio-physical, and socio-economic characteristics of the environment. The prediction and evaluation of the environmental consequence enables the planners to plan better so as to avoid irreparable damage to biodiversity and to ensure sustainable development [1]. Mining tends to make a notable impact on the environment, the impact varying in severity depending on whether the mine is working or abandoned, the mining methods used, and the geological condition. It causes massive damage to landscape and biological communities of the earth. The unscientific way of mining possess a serious threat to the biodiversity, resulting in the reduction of forest cover, erosion of soil in a greater scale, pollution of water, air and land and reduction in forests. The

problems of waste rock dumps become devastation to the landscape around mining areas [2]. Mining is achieved through several activities from exploration through exploitation to processing and finally to the consumer. Through every phase of the mining activity, extensive man-made damage is caused to the environment [3]. Due to improper planning and negligence of regulations, mining activities results in an appreciable damage, degradation and deterioration of the biodiversity, some medicinal plants and ecological damage to water, air and soil occurs [4].

**Study Area**

Angul, a centrally located district of Odisha covers a geographical area of 6232 square kilometers and lies between 20° 31' N and 20° 40' N Latitude, 84° 15' E and 85° 23' E Longitude. The study area (Fig. 1) is located in Angul-Talcher forest division in the central part of Odisha [5].



Fig. 1: Study area of Angul-Talcher mining sites

## MATERIALS AND METHODS

Field studies (15 trips) were conducted from time to time during both winter and summer. Data and literature were gathered from various sources. The information related to the status of health of the inhabitants and socio-economic impacts were collected by using structured questionnaires. The respondents include randomly selected mine workers and head of families residing in mine areas. The present paper is aimed at studying of the Environment Impacts of mining on biodiversity of the Angul-Talcher, one of the mineral rich regions in India. Also the paper focuses on other impacts of the long standing mining in the study site such as the impacts on the quality of air, water, rivers and forests, etc. There is theoretical agreement that EIA methodologies are important and are gradually becoming an integral part of environmental planning and major development projects. The brief methodology is being discussed below:

### Floral environment:

The vegetation was studied by laying nested quadrats of varying sizes. For example trees were sampled in 20m x 20m quadrats, shrubs in 5m x 5m quadrats and herbs/grasses in 1m x 1m quadrats. However, the size and shapes of the sampling plots were modified according to the terrain, area and the requirement of the study. The vegetation growth in the different areas with progressing age of restoration was studied.

### Air environment:

The surface meteorological data like wind speed, wind direction, relative humidity, rainfall, ambient temperature etc. were collected. Measurement of 24 hourly average background concentrations of

SPM, RSPM (size<10 $\mu$ m), SO<sub>2</sub>, NO<sub>x</sub> and hydrocarbon were also done by following standard methods [6].

### Noise environment:

Existing status of noise levels in residential, commercial, industrial areas and silence zones within the core and buffer zone have been established.

### Land environment:

Representative soil samples within the study area were collected and the status of the soil pollution was assessed. The productivity and fertility of soil found within the study area have also been assessed by following standard methods.

### Water environment:

Analyses of water quality were done by collecting water samples from hand pumps and ponds located in and around mining area during pre-monsoon, monsoon and post-monsoon. The hand pumps were operated 10 minutes before collecting the samples. Samples were collected in clean polythene bottles having air tight stoppers [7].

### Anticipated environmental impacts:

Identification of Environmental Impacts associated with exploratory drilling was made. Adverse impacts due to activities related to proposed exploratory drilling was predicted through modeling or advance mathematical tools. Quantification of assessment of adverse impacts due to the proposed activity on air, land, water, biological and on human interests was also done [8].



Fig. 2: Mining activities in Angul-Talcher mining area

## OBSERVATIONS AND DISCUSSION

People of the study sites had a complain that from growing three crops a year earlier are reduced to none. Even their cashew plantations are affected due to the dust by mining. Plants do not yield any fruits. Villagers in Bainda, Debipatnapur, Kakudia and Badabirabarapur have their fields rendered useless, which are choking with mining rejects, while dairy farming has been unsustainable since there is no fodder or adequate water available for their animals. In mining areas the agricultural lands, plantations and other vegetations that thrived in abundance previously are struggling to grow ever since the onset of mining. Mining in Angul-Talcher region are mainly carried out by open cast extraction method. Open cast mining involves the removal of overburden including the valuable top soil as well as the natural vegetative cover. These activities are associated with harmful effects to the local environment and also biodiversity. Mining activities are carried out in various stages, each of them involving specific environmental impacts. The emerging environmental hazards associated with open cast mining practices are many but the major problems may be summarized as follows:

### Loss of flora:

During the course of investigation it was found that some trees denote an evolving or expanding population, which needs to be maintained. The unsustainable way of coal mining destroys flora including some important medicinal plants such as *Oroxylum indicum*, *Gloriosa superba*, *Rauvolfia serpentina*, *Andrographis paniculata*, *Calotropis procera*, *Scoparia dulcis*, *Wedelia chinensis*, *Leucas aspera*, *Uraria picta* and *Saraca asoca*. The loss of these valuable medicinal plants needs to be checked to maintain the favourable population structure. The reverine vegetation patch was dominated by valuable tree species such as *Syzygium cumini*, *Mangifera indica* and *Terminalia arjuna*. Due to open cast mining activities these floral patches will also be destroyed.

### Loss of aquatic habitat:

Aquatic habitat of Bankuli Nala is the home to a variety of frogs, fishes, crustaceans, crabs etc. Gentle slopes provide access to large wild animals. With the

steep lined diversion channels will lead to inaccessibility of large wild animals. The plankton life will be lost. Recovery of aquatic life in changed scene will be slow.

### Soil erosion:

The soil erosion will be because of clayey nature of soil, poor vegetal cover and general surface drainage to north east side. Soil erosion will take place on external overburden (OB) dumps which will be 5 m high to begin with but ultimately will be 30 m high.

### Forest fire:

Forest fire is mainly controlled by active participation of VSS members in forest protection particularly of Bainda, Debipatnapur, Kakudia and Badabirabarapur. Reason of fire is due to man. Intensive use of the area by labourer and transport contractor from outside will pose a threat of frequent fires. Accidental fires may occur in coal stacks spreading to forest/plantations which will cause damage to plantation/regeneration of forest growth. Natural regeneration from stool of wild animals, root suckers and fallen seed may also be affected.

### Noise pollution:

Drilling, blasting, movement of shovel, dumper and water pumps etc. will create noise. Similar noise will be produced in adjacent coal blocks. Such noise and vibration will repel out most of the animals from this area.

### Water pollution:

Run-off water from OB dumps to ground levels may increase turbidity of water. Water may also get contaminated by fine dust of coal. Most Nalla water is alkaline in the area. This mine will minimize water pollution as no coal washing is envisaged. Polluted water spells doom for all animals' particularly aquatic life.

### Weed's invasion:

A few gregarious weeds with less soil and nutrient requirement with air borne seeds is *Callotropis gigantea*, *Parthenium hysterophorus*, *Chromolaena odorata*, *Mikania micrantha* etc. may strike a strong

hold invading the area where soil is raw and exposed as in OB slopes and Back-fill area. This will slow down the establishment of plantation and regeneration of forest growth.

#### CONCLUSION AND SUGGESTED MEASURES

Mining activity in Angul-Talcher should make several changes in the way it is done. The Open-cast method is one of the destructive methods in the industrialized world which is substantially proved by the mining sector of that area. This demands a replacement by a suitable method which will be less harmful to the environment and surrounding forests, other biodiversity areas and also for the agriculture and human health. Mining and transportation of mineral ore needs to be carefully done to avoid any kind of harmful hazards and pollution being created that would adversely affect the well-being of the society in the state. Also there needs to be a proper storage of overburden once it is removed. If it is left untreated it results in washing off into fields and river basins due to the rainfall. The effects have been experienced severely in Angul-Talcher area, where several agricultural fields and rivers have been polluted. Water being one of the scarce resources needs to be conserved properly for biodiversity which is dependent on equal balance in the nature of all the existing resources. In order to maintain or increase the biodiversity of the area following measures should be employed in the area.

- The mining area has a number of exotic species. Though the existing exotic species should be allowed to grow, introducing and adding new species should be avoided in the mining area as they are affecting the survival of the native plants. The exotic plants provide food and shelter to a number of insects that are harmful to the native plants as well as human wellbeing.
- The mining area has a good number of exotic species saplings which should be replaced by the native fruit and flower bearing species to increase the insect (butterfly) and bird life. Moreover, there are some areas in the buffer zone like the hill side where plantation of native species can be undertaken. Even if plantation is not undertaken the existing flora can be conserved by avoiding construction in places that have a healthy plant life.
- The survey area especially buffer zone has several vegetation. These vegetational patches should be conserved, and can be enclosed by proper biological fences which will help the faunal movement at the same time restrict anthropogenic activities. The area can have several interpretation zones e.g. Butterfly zone, herb and shrub zone, bird watching zone, etc.

#### ACKNOWLEDGEMENT

The authors are thankful to the Head, P.G. Department of Botany, Utkal University, Vani Vihar, Bhubaneswar, Odisha, India for providing necessary facilities to conduct the study.

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