RESEARCH PAPER:

Bio diversity loss due to mining activities at Chiria mines, Dist. W. Singhbhum, Jharkhand

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SUMMARY

Chiria mines is situated at the top of Budhaburu hill in the heart of Saranda forest.It is famous in the world for the largest iron ore depository in Asia continent.The present study deals with the mining activities at Chiria mines and the effect during the excavation process.Here iron – ore is excavated by two methods Reaching through shaft and Open cast method. In the first method quiet a lot of vegetation is lost in prospecting and in the second method the entire vegetation and soil in which mining is done is destroyed and lost, making it difficult for trees and vegetation to grow. Solid dust particles released during mining activities, exploitation of mineral, crushing, sizing,grading and screening of iron – ore heavy metal containing heavy metals Cd, Fe, Zn, Ni etc. as pollutant. These dust particles deposited on the surface of leaves and environmental condition create alarming situation by interrupting the photosynthesis which results death of some plants. These air pollutants are directly added to near by running river or stream choking the natural drainage system, degrading air, water and changing the soil and water quality. Further the washing of iron ore produces high concentration of solid particle of Zn, Cu, Mn, Pb, Ni, Fe. These heavy metal has hazardous effect causing severe ecological problem like change in topoghaphy, deterioration of quality of top soil, soil erosion, air, water pollution etc. The phytosociological survey and documentation of various plant species in the existing vegetation reveals that the original vegetation has been replaced by new exotic species such as Lantana camera, Adhatoda sp. etc. The vegetation pattern shows that many plant species have lost their existence and some are on the verge of disappearance.

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Land of 700 hills Saranda forest is located in the Chibasa sub- division in the district of West Singhbhum, Jharkhand.It is situated at $85^0$16'44'' E longitude and $22^0$18'34'' N latitude.It is famous in the world in Asia continent Sal forest. It constitute 37.62% of the land area occupied by Saranda forest. The area forming the Chiria mines is a part of the Chhota Nagpur Plateau and is situated at 85^0 16' 44" E latitude and 22^0 18' 34" N longitude in the woodland of Saranda forest and is aggregation of different mines like Ajitaburu, Budhaburu and Dhobil. Among the all Dhobil is the most active mines

With the increasing of population as well as industrialization, the demand of mineral has greatly increased. Various mining activities such as explotion of mineral by reaching through shaft and by open cast method. In the first method, quiet a lot of vegetation is lost in prospecting and in the second method soil in which mining is done is destroyed and lost making it difficult for trees and vegetation to grow. Ultimately the biodiversity loss take place due to unfavourable conditions in the disturbed site. As per Raunkier's normal biological spectrum for phenerogamic flora include 46% phanerophytes and 9% chamaephytes and the study area is a very dense forest due to the presence of flowing rivers, nala, natural springs running throughout the forest and making it most dense forest of India. Some of the dominant flora are *Madhuca indica, Delbergia sissoo,Ficus religiosa,Terminalia bellerica, Syzygium cumini, Madhuca indica, Azadarichta indica,Terminalia chebula, Terminalia tomentosa, Emblica officinale* etc., Mangifera indica, Melabaricum, Albizzia procera, Acacia nilotica. All these genera are medicinally and economically very important.

MATERIALS AND METHODS

The present investigation was made from April 2007 to September 2009.Plants were recorded in different seasons regularly.

The study area has been divided on the basis of their locations and type of waste produced:-

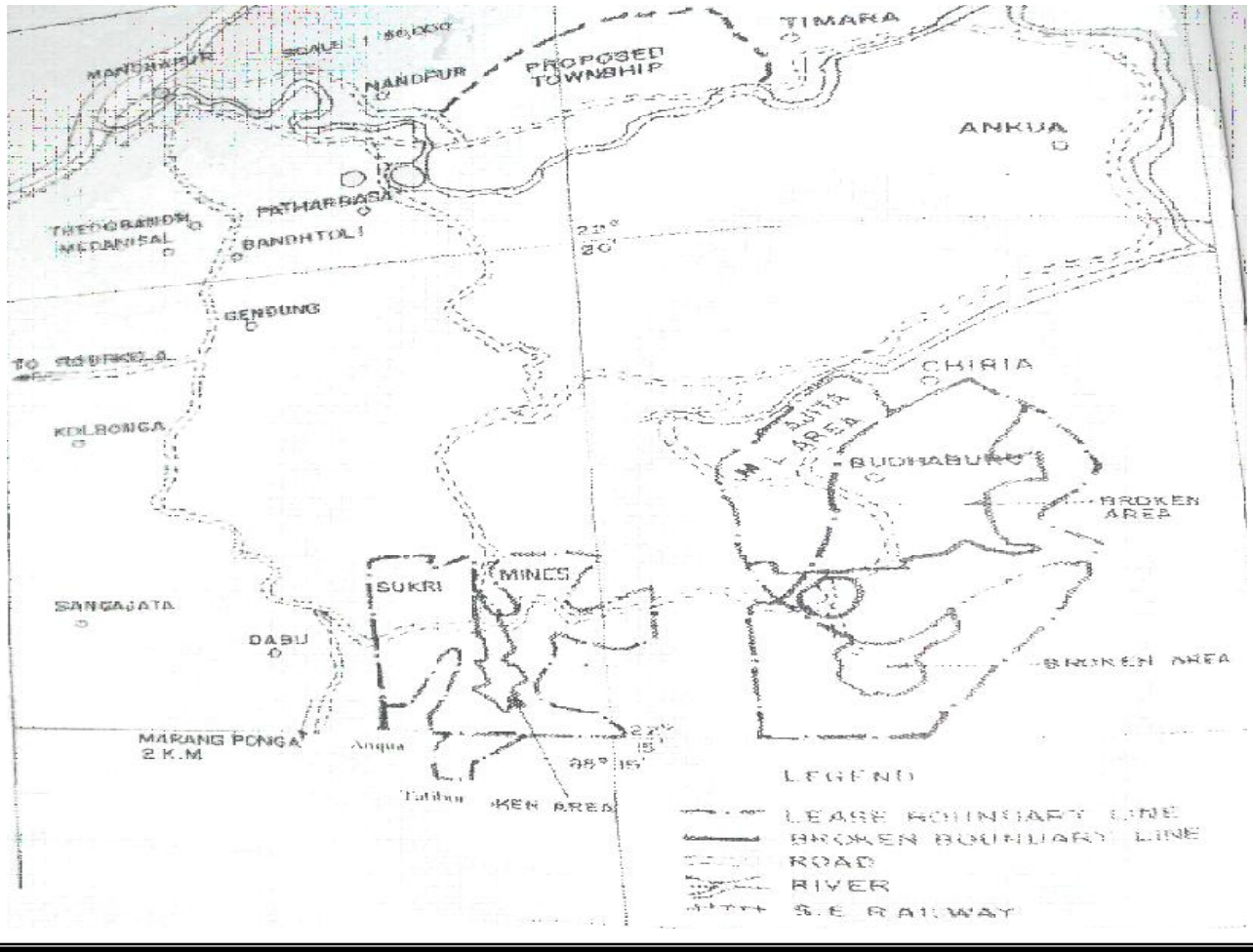

Fig. 1 : Location map of study area

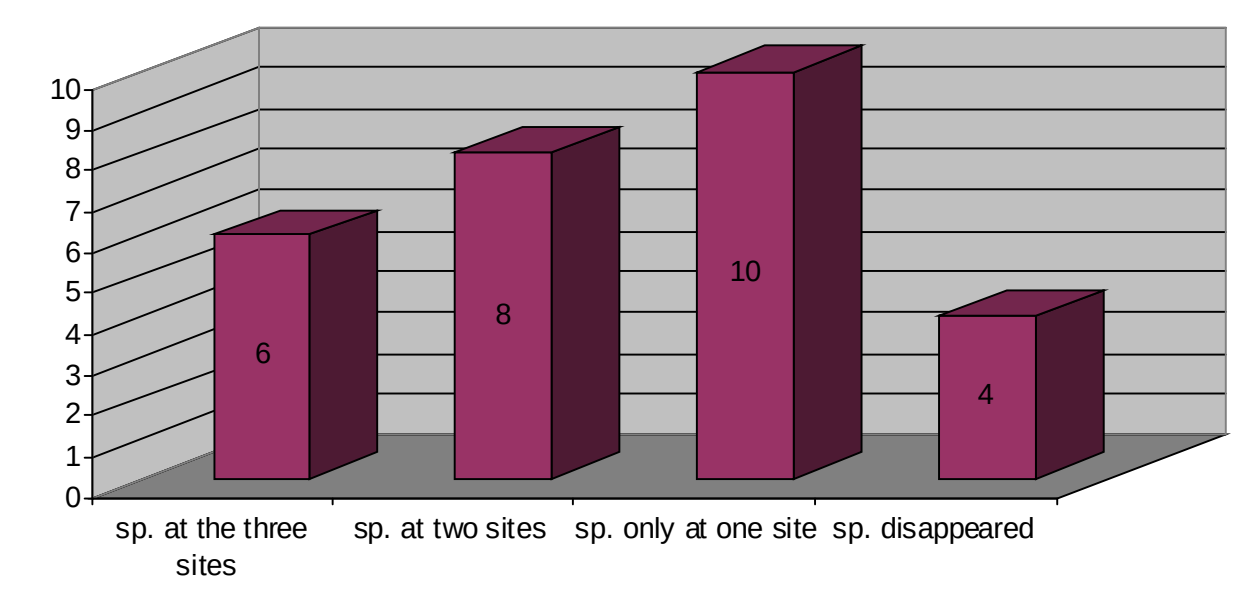

Fig. 2 : Statistics of dominant species at differente sites

Site I : Area surrounding the exploitation and excavation through open caste and shaft method :

Mining extract coming from the excavation process are dumped and form large heaps of about 8-10 metre.

Site II : Transportation of crude iron by dumphers :

Solid dust particle released during excavation and transportation is major solid waste product and major environment which adversely affect the flora and fauna of the region. The various plant species growing on different sites are collected, recorded and made into herbarium. Photographs of some dominant flora were also taken for future reference.

Site III : Natural vegetation along bank of rivers:

The present investigation is undertaken to workout the comparision of present vegetation with that of the vegetation pattern described in the previous records of this region. The phytosociological studies clearly indicates that this area is highly disturbed by mining activities. The various plant species growing on different sites are collected, recorded and made into herbarium.Photographs of some dominant flora were also taken for future reference. A comprehensive loss of the plant species found in whole of the study area are listed in Table 1.

Attention was principally focused on the air and surface water quality- containing heavy metals.Data has been taken from NEERI, 2005 in Table 2 and 3.

RESULTS AND DISCUSSION

The phytosociological studies clearly indicates the replacement of natural species with that of exotic ones showing the change in vegetation pattern. This clearly indicates that this area is highly disturbed by mining activities which produce solid, liquid and gaseous pollutant and contaminate the air, water and soil (in Table 1, 2 and 3).

Close observation of the plant species showed deformed morphology with the change of colour of the plant as reddish green, the coiling of branches and folded leaves with inconspicuous venation, abnormal growth of nodes and internodes, the branches bend downwards due to the dust particle deposited on the whole surface of the plant, the size of flowers and fruits are very small, sour in taste and its production is very much reduced. The plants species which have lost their existence due to unfavourable environmental condition are *Mentha viridis, Mimosa pudica, Ocimum sanctum, Polygonum glabrum, Pongamia pinnata, Salmia melabaricum, Sonchus oleraceus*

Some plants species are on the verge of

Table 1 : Plant species found in the study area

Sr. No.	Name of the species	Different sites		
		Site I	Site II	Site III
1.	*Acacia nilotica*	-	_	_
2.	*Achyranthus aspera*	-	_	_
3.	*Adina cordifolia*	-	-	_
4.	*Ageratum conizoids*	-	+	+
5.	*Albizzia procera,*	-	+	+
6.	*Amaranthus mangostanus*	+	_	_
7.	*Azadarichta indica*	-	_	+
8.	*Butea monosperma*	+	+	+
9.	*Bombax ceiba*	+	_	_
10.	*Carica papaya*	-	_	_
11.	*Cassia tora*	+	_	+
12.	*Cathranthus roserus*	+	+	+
13	*Croton sparciflorus*	-	+	+
14.	*Cuscuta reflexa*	+	+	+
15.	*Cynodon dactylon*	-	_	_
16.	*Cyperus rotundus*	-	+	_
17.	*Datura stramonium*	-	+	_
18.	*Delbergia sissoo*	+	+	+
19.	*Emblica officinale*	+	+	+
20.	*Euphobia hirta*	+	_	+
21.	*Ficus religiosa*	+	+	+
22.	*Ipomea palmate*	-	+	+
23.	*Lantana camera*	+	+	+
24.	*Madhuca indica*	+	+	+
25.	*Mangifera indica*	+	+	+
26.	*Mentha viridis*	-	_	_
27.	*Mimosa pudica*	-	_	_
28.	*Ocimum sanctum*	-	_	_
29.	*Polygonum glabrum*	-	_	_
30.	*Pongamia pinnata*	-	_	_
31.	*Ricinus communis*	-	+	+
32.	*Salmia melabaricum*	-	_	_
33.	*Saccharum spontaneum*	+	_	_
34.	*Shorea robusta*	+	+	+
35.	*Sonchus oleraceus*	+	+	+
36.	*Sterculia villosa*	-	_	_
37.	*Syzygium cumini*	-	_	_
38.	*Tabernaemontana divaricata*	-	+	+
39.	*Terminalia bellerica*	+	+	+
40.	*Themeda arundinacea*	-	_	_
41.	*Vitex negundo*	-	+	+
42.	*Woodfordia fruticosa*	-	_	_
43.	*Zizyphus jujuba*	+	+	+

Table 2 : Air quality status (Winter 2005) Unit mg/m^3

Sampling location	8 hourly average		1hourly average		
	SPM	RSPM	SO2	NOx	CO
	Average	Average			
1.Quarry no.8	232 (74-387)	86 (42-136)	8 (6-14)	16 (4-46)	767 (600-900)
2 Manoharpur mining siding	157 (107-204)	62 (49-79)	7 (6-9)	22 (3-37)	467 (400-500)
3. Ankua village	95 (42-175)	43 (23-77)	6 (6-6)	13 (7-26)	500 (400-600)

Table 3 : Surface water quality – Heavy metals (Winter 2005) Unit mg/l

Sampling location	Ni	Cd	Pb	Fe	Mn	Zn
River Koina (Near Timra village)	0.02	0.04	0.04	0.14	0.57	0.04
River Koel (Near siding office)	0.05	0.02	0.22	0.48	0.54	0.44
Hamsadagara	0.01	-	0.07	0.54	0.34	1.26

disappearance are *Acacia nilotica, Achyranthus aspera.*

Conclusion :

Above observation reveals that the SPM generated during the different mining activities in the different sites of Chiria mines has hazardous effect on the environmemt and the vegetation of the area in the whole ecosystem.It is a serious ecological problem unless we do not take any preventive measure to solve this problem. Afforestation programme and recycling of the waste should be done to minimize the pollution of air, water and soil. New scientific technique like conveyor method should be adopted to minimize pollution.

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