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Geomorphological Analysis of Gare Pelma Sector – III for the Environmental Impact Assessment due to Coal Mining

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Abstract

The land use in the Gare pelma sector III will undergo gradual changes during mine life due to mine development. The associated activities of coal extraction, storage, washing, loading/ unloading, transportation, reclamation and rehabilitation , needs space beyond the mining area . It is the need of the hour to analyze the landscape usages and the need in future perspective of the environmental impact assessment. Raigarh area has abundant coal and the extraction of coal deposit is going on rampantly at the stake of environment.

Keywords: Gare Pelam, Coal Mining.

Introduction

Gare Pelma Sector – III is a captive source of coal for thermal power generation. The coal block is located in the revenue villages of Dholnara, Bajarmuda, Khamaria, Karwahi and Millupara in Tamnar tehsil, Raigarh district, Chhattisgarh State. The block is proposed to be developed by a combination of opencast and underground method(Fig.1).

Location

The Gare Pelma Sector-III coal block is a part of Mand Raigarh Coalfields. The area is located in Survey of India topo sheet No. 64 N/8 & 64 N/12 on 1:50000 scale. The geographical coordinates of the Block boundary are as in table 1.

Table 1

STATION	LATITUDE	LONGITUDE
A	N 22° 10' 53.30"	E 83° 27' 57.38"
B	N 22° 11' 14.67"	E 83° 28' 52.13"
C	N 22° 11' 12.23"	E 83° 29' 38.49"
D	N 22° 10' 57.05"	E 83° 30' 22.21"
E	N 22° 10' 54.60"	E 83° 31' 26.24"
F	N 22° 10' 39.45"	E 83° 32' 07.87"
G	N 22° 10' 22.00"	E 83° 28' 16.27"

Land Use Pattern of Core & Buffer Zone

1. Land use Pattern of the Core Zone

The land use pattern in Gare Pelma Sector-III coal block is covered with forest land, government waste land and private land. The allotted area of coal block is 6.39 sq. km. The details are as table 2.

Table 2

LAND DETAILS	AREA (Ha)	AREA (sq.km)
Protected /Reserve/Orange Forest	165.10	1.651
Chhote Jhad ka Jungle	24.44	0.2444
Bade Jhad ka Jangle	8.18	0.0818
Government Land	44.74	0.4474
Tribal Tenancy Land (ST)	155.31	1.5531
Others Tenancy Land	241.33	2.4133
T O T A L	**639.10**	**6.391**

The elevation of the area varies from 377.747 m near the northern boundary to 260 m in the eastern part. Gare sector III Block is generally characterized by a gently undulating topography with general slope towards south.

Drainage Pattern is mainly towards south and westward which flows as small streamlets and makes part of catchment area of Kelo River. Hence, no adverse affect on the drainage system of the area is apprehended.

2. Land use Pattern of the Buffer Zone

In order to establish the land use pattern in the study area, the total geographical area of each settlement has been considered, though many villages located in the peripheries of the study block have been covered partially in the study area. These areas

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were studied in detail to get the idea of land use pattern in the study area.

The Geo-coded Satellite Imagery for the study area covering 10 Km study area procured from National Remote Sensing Agency (NRSA), Hyderabad was used. Considering the availability, and the scale of resources information, the Indian Remote Sensing (IRS) Geocoded satellite data in the form of Geocoded False Colour Composite (FCC) products in digital format is used.

The land use scenario for 10km radius at Gare III coal block is given in table 3.

Table 3

Sr. No.	FEATURES	DETAILS	ML BOUNDARY DISTANCE
1.	River	• Kelo Nadi • Pajhar Nala	• Extreme East • 5.5 Km West
2.	Reserved Forest	• Silot RF • Tolge East RF • Tolge West RF • Jamkani RF • Deodongar	• Within • 0.5 km (S) • 0.05 km (E & NE) • 8.0 Km (SE) • 4.0 Km (N)
3.	Protected Forest	• Rampur PF • Un-named PF • Dongamukha PF • Tolge south PF • Piprahi PF	• 2.5 Km – East • Within • 3.0 Km (S) • 9.0 Km (NE) • 8.5 Km (NE)
4.	Industries	• Thermal Power plant & Coal washery of M/s JSPL	7 km
5.	TPP	• Jindal Power & Steel Ltd.	7.0 Km - SW
6.	Mines	• Jindal Power & Steel Ltd. (IV/6, IV/1) • Jindal Power (IV/2, IV/3) • Jayaswal NECO Industries Ltd. (IV/4 IV/8) • Monnet Ispat Ltd. (IV/5) • Sharda Energy & Ispat (IV/7)	• 3-6 Km – S • 5 Km – S • Adjoining – S & SW • Adjoining – S • Adjoining
7.	Railway Line	• None	•
8.	Archeological Monument	• None	-

Observation

The main interpreted land use / land cover classes of the study area and their respective areas are given in hectares in table 4.

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Table 4
Landuse / Landcover Statistics Of Buffer Zone (10 Km Radius) Based On Satellite Data Interpretation

LANDUSE	AREA (sq.km)	AREA (Ha)	PERCENTAGE (%)
Agriculture	222.76	22275.6	47.13
Forest	202.11	20210.77	42.77
Wasteland	21.1	2110.06	4.47
Industrial Storage Pond	2.32	232.17	0.49
Present Active Mining Area by opencast	12.3	1230.42	2.6
(Allocated Coal Mining Area – Gare Cluster)	-168.3	-16827.5	-35.6
River (Kelo)	7.24	723.58	1.53
Water body (Tank)	2.61	260.98	0.55
Thermal Power Plant	1.87	187.15	0.4
Built up	0.3	29.51	0.06
Total	472.6	47260.24	100

1. Forest Land

Based on the interpretation of satellite imagery, Forest area comprises of 202.11 sq. km. out of 472.600 sq. km. total area in buffer zone which comes out to be 42.77 % of total area. Forest area in the cluster is 18 % of the Gare-Pelma Coal block area. Forest areas are mainly in the northern & eastern part of the study area, while southern part which consists of coal blocks has substantial revenue area and private land. Thus, mining activities are mainly on southern peripheral areas of forest area under study incorporating revenue land and private land in the periphery. Kelo River crosses through the area in the eastern side.

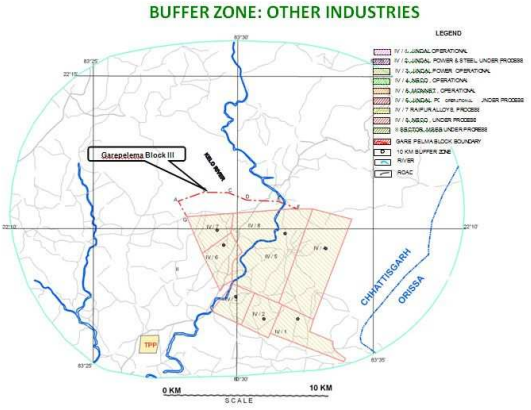

Fig.1 Location of study area

2. Anticipated impact on landscape

The new land use at the end of mine life will be as follows.

1. Mined out area will be back filled with over-burden to the maximum possible extent as per mining plan.
2. There will be initially some external overburden dumps, which will be stabilized once it becomes inactive.
3. Remaining mine void (92 Ha) will be converted in a water body.
4. Infrastructure like roads, railway siding etc. will be developed in due course of time.
5. Plantation on overburden dumps, roads & rationalization area etc. will be carried out in a phased manner.

3. Impact on Agriculture land :

There is 222.76 km² of agriculture land involved in the buffer zone of the project. It is proposed that the tenants of the agricultural land from one village in the core-zone of the project will be shifted to the revenue and rehabilitation site besides proper compensation as per the state government & national policy [1]. In view of the above policy, no adverse effect in the agricultural land is apprehended. Regarding adjoining agricultural land which is away from the core area, it is worth mentioning that slope stabilization, soil & moisture conversation will help in reducing soil and moisture removal from the forest

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area and will result in ground water re-charge which will be beneficial for agriculture fields.

4. Impact on Forest Vegetation

Forests within the project area in the mining block will be cut in phased manner, which is inevitable. But the area which will be deforested will be taken up for plantation activity after stabilizing the soil. The excavated area will be reclaimed regularly by carrying out soil and moisture conservation operation and plantation of locally growing forest species, grasses etc.,

5. Impact due to slope pattern

The study area has gentle slope and flat at many places and has good self drainage system mainly towards south & west. [2] There will not be any appreciable change in drainage pattern due to slopes of the mining area.

Conclusion

The overburden dumps shall be scientifically managed, so that dump sites is well sustained. Plantation activities will be taken up to stabilize soil so dumped. Sowing of grass seeds followed by plantation of fast growing local species will be taken up. Enough budgetary provision has been made in Wild Life Conservation Plan for soil and moisture conservation works. Moreover the area under mining block is almost flat and will not have adverse effect in the drainage system in the area. As per the study it is established that there will not be any adverse impact on present ecological system due to proposed coal mining project.

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