Octa Journal of Environmental Research
International Peer-Reviewed Journal
Oct. Jour. Env. Res. Vol. 10(1): 011-033
Available online http://www.sciencebeingjournal.com

Oct. – Dec., 2022
ISSN 2321 3655

Research Article

Octa Journal of Environmental Research
(Oct. Jour. Env. Res.) ISSN: 2321-3655
Journal Homepage: http://www.sciencebeingjournal.com

ECOLOGICAL STATUS OF FOREST ECOSYSTEM NEAR UNDERGROUND COAL MINES IN PARASIA, DISTRICT CHHINDWARA, MP INDIA

Vineet Kumar[a] and Ashok K. Rathoure[b]

a. Dr. Yashwant Singh Parmar Govt. P.G. College, Nahan, Distt. Sirmour, (HP)- 173001, India
b. M/s Akone Services, Pashchim Vihar Colony, Lucknow (UP)- 227107, India
Corresponding Author's Email: **asokumr@gmail.com**

Received: 15th Nov. 2022 **Revised:** 15th Dec. 2022 **Accepted:** 16th Dec. 2022

Abstract: The current study aims to provide the current scenario of ecological status near underground coal mines in Parasia, Chhindwara (Madhya Pradesh) India. Over the surface of the coal mine lease; 12 tree species with a Total Basal Area (TBA) of 537.7 m^2/ha have been found within the mine lease area. The density values (stems per hectare) for the various tree species ranged from 4.25 to 91.34 stems per hectare. The highest density was recorded for Sagaun (*Tectona grandis*) species while dominance was recorded for babool (*Acacia nilotica)* and vilayati babool (Shrub) over the lease area. Varying shrub species have different density values (stems/ha), ranging from 3.56 to 119.7. The IVI value of *Lantana camara* was the highest (151.57). This shrub has a high potential for regrowth. In the mining lease area, 29 kinds of herbaceous plants were found. Herbaceous species had a stand density of 407373 stems/ha, with *Cynodon dactylon* and *Tridex procumbens* (131660 and 64433 stems/ha, respectively) dominating this stratum. Biodiversity is an important the constituent of environment which provide a niche to wildlife and encompasses the food chain resulting to the food web. Sagaun (*Tectona grandis*), babool (*Acacia nilotica*), neem (*Azadirachta indica*), tamarind (*Tamarindus indica*), and mango (*Mangifera indica* L) are among the most common trees in the research region. A total of 50 tree species from 26 families were identified in the research region, with 29 of them having medicinal value and being utilized by local communities and vaidya.

Keywords: Underground coal mines, scheduled species, protected forest, reserve forest.

Postal Address: Akone Services, Pachim Vihar Colony, Lucknow-227107. Phone: +91 9450501471

INTRODUCTION

Coal is a primary source of energy supply and fuel for industrial manufacturing in India. About 55% of the current commercial energy and cement is met by coal. Cement and electricity (energy) are cyclical commodities having a strong link to GDP. The demand for cement is inextricably tied to the country's general economic development, notably in the housing and infrastructure sectors. The rising demand for cement and energy will raise the demand for coal as the primary raw material and shall contribute overall growth of the country. In the current study, we have selected Parsia area in the Chhindwara district where some of the coal mines are active and some are proposed now by private miners on lease from the Ministry of Coal, Govt of India.

EXPERIMENTAL

Study Area: 39716.98 Ha. covered w.r.t. expected underground coal mine. The study area has villages, agricultural land, forests, ponds, water reservoirs and all natural habitats.
Core Zone: Expected coal site and 2.0 km radii from the underground coal mine. The mine lease was accorded to lessee on lease for balance life of mine to extract coal using underground mining method as prescribed in mining plan by Ministry of Coal.
Buffer Zone: 10 km radii w.r.t. project site excluding core zone.

Table 1. Mode of data collection and parameters considered during the survey

#	Aspect	Data	Mode of Data Collection	Parameters	Remarks
1.	**Terrestrial Ecology**	Primary data collection	Using a field survey The following sources were consulted: • Misra, R. (2013). Scientific Publishers, Ecology Workbook (Page 31 to 45). • Welsh, B.H., Jr., H.H., 1987. A method for monitoring herpetofauna in the woods of northern California and southern Oregon. Pages 203 to 214 • Lind, A., and Welsh, H.H. Jr., H.H. Jr., H.H. Jr., H.H. Jr., H. Northwest California and southwest Oregon's Douglas-fir/hardwood forest herpetofauna assemblage structure. 395-411, 395-411, 395-411, 395-411, 3 • R.L. Hutto, S.M. Pletsechel, and P. Hendrick, R.L. Hutto, R.L. Hutto, R.L. Hutto, R.L. Hutto, R.L. A non-breeding season point count technique with a set radius. The Auk, vol. 103, no. 6, pp. 593-602. • Allen, L., Engeman, R., and Krupa, H. 1996Relative abundance metrics for the dingo population are compared. 197-206 in Wildlife Research. • Thommpson, I.J. Davidson, S. O'Donnell, and F. Brazeau. 1989. Measurement of the relative occurrence of several arboreal animals in uncut forests and regeneration stands using track transects. 67:1816-1823 in Canadian Journal of Zoology.	**For Floral diversity, Vegetation measurements:** Tree, Shrub, Herbs, Grasses, Climbers, Plants that have been cultivated in the research area, The research area's floral composition, Medicinal plants found in the research area The state of the forest and its classification in the research area Flora is rare or endangered in the research region. In the research region, there are endemic flora. Fauna in the research area: -Reptiles, -Amphibians, -Birds, -Fish that live in fresh water -Mammals, In the research region, there are rare and endangered species of animals. In the research region, there are endemic animals. The relevance of wildlife conservation in the study area.	Random scanning, opportunistic observations, daytime bird watching, active reptile search, animal habitat assessment, active microbial habitat search, scratching, footprints, animal call, pug tags, de-husk tag, nest, claws, manure, information from local villages.
2.		Secondary data collection	• SF Circle Chhindwara's Parasia SF Division	Secondary data interpretation for ecologically sensitive	Bentham and Hooker, 1862-1883; Hunter, 1879; Dixit,

			• Department of Fisheries data • Scientific papers and books published by academic and research institutes. • Formalized reports (Research reports, previous EIA reports etc.)	places such as national forests, wildlife refuges, lakes, ravines, hills, hillocks, and reserve forests, including vegetation, type, and significance.	1984; Ghosh *et al.,* 2004; Lushington, 1915; Wilson and Reeder, 1993; BirdLife International, 2000; BirdLife International, 2004a, b; Wilson and Reeder, 2005; Bird Life International, 2010; Kumar and Srivastava, 2012; Kumar, 2013; Kumar *et al.,* 2013; Kumar and Aggarwal, 2013a,b). The status of individual species was assessed using the revised IUCN/SSC category system (WCMC, 1988; IUCN, 1994; WCMC, 2000; IUCN, 2001, 2003, 2008, 2010.
3.	**Evaluation of Ecological sensitivity**	Secondary	Review and Discussion	The significance of wild life endemicity of flowers, flora endemicity, flora endemicity, floor condition of the terrestrial vegetation the status of the vegetation on wetland areas, vegetation of mangroves, the significance of conservation, legal standing (national park, wild life sanctuary, reserve forest, wetlands, agricultural lands), lakes, reservoirs, and dams Natural lakes and wetlands, migratory and resident birds' nesting grounds.	-
4.	**Green Belt development**	Primary	Guidelines for developing green belts, Central Pollution Control Board	List of trees, shrubs, ornamental, Budgetary outlay	-

			(CPCB), New Delhi, Program Objective Series: PROBES/75/1999-2000, pp. 195. Phytoremediation of particulate matter from ambient environment through dust-capturing plant species. Central Pollution Control Board (CPCB), New Delhi, 2007. Green belts for Pollution Abatement (Concepts, Design, Applications) by S.A. Abbasi and E.I. Khan 2000.	along with green belt map for 3-tier developments.	
5.	**Phyto-sociological Studies**	Secondary & Secondary	Calculation	Frequency, Density, Abundance, Dominance, Relative Density, Relative Frequency, Relative Dominance, Importance Value Index, *etc.*	Equations are provided separately.
6.	**Ecological Impact Assessment**	Primary & Secondary	Review and Discussion	Scoring Matrix	Impact assessment, mitigation strategy, conservation plan, and financial expenditure are all included in the budget.

The following quantitative characteristics are computed using the standard equations below:

i. *Frequency:* The degree of dispersion of specific species in a given region is referred to as frequency, and it is commonly stated as a percentage (Sarkar, 2016). The following equation is used to compute it:

$$Frequency\ (\%) = \frac{No.of\ Quadrants\ in\ which\ species\ occurred}{Total\ no.of\ sampling\ units\ studied} X\ 100$$

ii. *Density:* The density of a species is the number of individuals in a given region. The formula is as follows:

$$Density\ (\%) = \frac{Number\ of\ individuals\ of\ the\ species}{Total\ area\ studied} X\ 100$$

iii. *Abundance:* This is the number of individuals per square metre in a region in which a species occurs. The formula is as follows:

$$Abundance = \frac{Total\ no.of\ individuals\ of\ species\ in\ all\ quadrants}{No.of\ quadrants\ in\ which\ species\ occurred} X\ 100$$

iv. *Dominance:* The area filled by a species' stems in any given region is referred to as dominance. It's computed by summing the areas of the stems in a specific region for each species and multiplying by the diameter of the individual stems.

$$Basal\ area\ of\ a\ species = Sum\ of\ basal\ areas\ of\ all\ the\ stems$$
$$Basal\ area\ of\ individual\ stem = \pi D^2/4$$

Where D=Diameter of stem

v. *Relative Density:* Relative Density measures a species' numerical strength in proportion to the overall number of species (Sarkar, 2016). The following formula is used to determine this:

$$Relative\ Density = \frac{Density\ of\ the\ species}{Total\ density\ of\ all\ the\ species} X\ 100$$

vi. *Relative Frequency:* Relative Frequency: The number of particular species that exist in a given region in proportion to the total number of species that occur (Sarkar,

2016). The following formula is used to compute the species' relative frequency:

$$RF = \frac{Frequency\ of\ the\ species}{Total\ Frequency\ of\ all\ the\ species} X\ 100$$

vii. *Relative Dominance:* The value of the basal area determines the parameter of dominance. For the sake of comparison, it's decided who has relative dominance. It is the value of a species' coverage in relation to the total coverage of all other species in the region (Sarkar, 2016). The following formula is used to determine this:

$$Relative\ Dominance = \frac{Dominance\ (cover)\ of\ the\ species}{Total\ dominance\ of\ all\ the\ species} X\ 100$$

$$Basel\ Area = \frac{(Circumference\ at\ breast\ height)^2}{12.56}$$

viii. *Importance Value Index (IVI):* The Importance Value Index measures how much each species contributes to the overall structure of the community. Relative frequency, density and dominance (Relative Basala Area) percentages are combined to produce the total (Sarkar, 2016).

$$IVI = Relative\ Density + Relative\ Dominance + Relative\ Frequency$$

ix. *Abundance/Frequency ratio (A/F):* This is the proportion of a species' abundance to its frequency. This term is used to define the species distribution pattern in a given region.

x. *Mean Basal Area = $C^2/4\pi$*

xi. *Total Basal Area = Mean basal area × Density*

xii. *Mean of the Circumference (C) = Sum of GBH / Total Number of Individual of a species*

RESULTS AND DISCUSSION

Phyto-Sociological Studies

By setting nested quadrants of 1m x 1m, 3m x 3m, and 10m x 10m sizes in the chosen places, the vegetation is investigated. A random sampling approach was used to choose the locations for vegetation data. To analyze the tree layer in the mine rent region and encompassing mine rent region, an equivalent number of quadrates of 10 m x 10 m were put. Sub-plots of 3 m x 3 m were randomly placed inside these sample plots to investigate the shrub layer and tree regrowth. Within the tree quadrate, 1 m x 1 m quadrats containing information on the ground layer, including herbaceous species, were placed down. During the transect walk, all species seen were documented and herbarium specimens were prepared for identification and future use. All species of trees and woody climbers had their girth at breast height (gbh) measured. Individuals having a gbh more than 10 cm were classified as trees (Parthasarathy and Karthikeyan, 1997). Saplings and bushes with a height of less than 10 cm gbh were evaluated. During the fieldwork, this hypothesis was further tested. Plants' basal area was determined using Philips' method (1959). Haines (1921-25), Saxena, and Brahmam identified the plants with the help of floras (1994-1996).

Terrestrial Floral & Faunal Components

Chhindawara district falls under Satpura Plateau and Agro-Ecological Sub Region as per ICMR is Central Highlands (Malwa and Bundelkhand). The area falls under VIII of the Agro-Climatic Zone (Central Plateau and Hills Region). The soil type of the area is shallow black medium. The rain falls ranges 1000-1200 mm. The area falls under agro-climatic zone VIII as per IASRI http://www.iasri.res.in/agridata/12data/chapter1/db2012tb1_2.pdf. The major crops in this area are soybean, sorghum, maize, cotton, groundnut, wheat, chickpea, pea, sugarcane, black gram, green gram, sunflower, rice, etc.

Table 2. List of villages/hot spots of ecological survey

S. No.	Name of Hotspot/Village	S. No.	Name of Hotspot/Village
1.	Expected mine site	**17.**	Dhabera
2.	Bichhua Pathar	**18.**	Palatwara
3.	Sethiya	**19.**	Mandla
4.	JP Coal Mines	**20.**	Rawanwada
5.	Western Coalfield Ltd.	**21.**	Kosmi
6.	Shivpuri	**22.**	Sirgori Khurd

7.	Chhinda	**23.**	Barur
8.	Sirgora	**24.**	Deori
9.	Haran Batta	**25.**	Khairi Ojha
10.	Phutara	**26.**	Pipariya
11.	Kharichetu	**27.**	Duddi
12.	Barangateli	**28.**	Sonpur
13.	Biskhan	**29.**	Sawla Dhana
14.	Sonkhaba	**30.**	Bagbardhiya
15.	Chhitari	**31.**	Toomdi
16.	Jaithari	**32.**	Bamhni

Vegetation of Expected Coal Mine Over Surface

A variety of woody and herbaceous plants were identified in the study plots, as shown in the Table below. In the mining lease area, a total of 12 tree species with a total basal area (TBA) of 537.7 m^2/ha were discovered. Basal area (r^2) is a commonly used phrase to describe the average area taken up by tree stems in a given area (usually an acre). a unit of land area equal to the cross-sectional area of all the stems in a stand when measured at chest height (typically square feet per acre). The density values (stems per hectare) for the various tree species ranged from 4.25 to 91.34 stems per hectare. The highest density was recorded for sagaun (*Tectona grandis*) species while dominance recorded for Babool (*Acacia nilotica)* and Vilayati Babool (shrub) over the lease area. Different shrub species have density values ranging from 3.56 to 119.7 stems per hectare. The highest IVI was found in Lantana camara (151.57). This shrub has a high regenerative capability. In the mining lease area, 29 kinds of herbaceous plants could be found. Herbaceous species had a stand density of 407373 stems/ha, with Cynodon dactylon and Tridex procumbens (131660 and 64433 stems/ha, respectively) dominating this stratum. In terms of the Importance Value Index, a species' dominance and ecological success are stated as a single number (IVI). It is based on frequency, density, and basal area, which are all three of the requirements. Because of the comparatively favorable growth circumstances, riparian forests have a density and basal area that is equal to or larger than upland forests. Regardless of the way that qualities differ extraordinarily inside districts as per successional stage and soil conditions, the differences are regularly under a significant degree. When it comes to riparian forests, the greater the temperature and humidity, the dense and larger the stem and root systems are found. The proposed mine is an upland area where no river or riparian forest is observed, hence density is low as compared to another riparian area.

Table 3. Tree in the project-affected area (mine area)

S.No.	Species Name	TBA (m^2/ha)	Den./ha	RD	RF	R.Do	IVI
1.	*Tectona grandis*	123.45	91.34	5.12	4.17	8.11	17.4
2.	*Albizia odoratissima*	97.82	99	5.25	5.56	9.21	20.02
3.	*Acacia nilotica*	36.73	40.33	47.36	36.43	39.87	123.66
4.	*Butea monosperma*	23.8	14.44	9.82	11.15	2.49	23.46
5.	*Madhuca indica*	19.85	4.25	5	6.94	5.04	16.98
6.	*Pterocarpus marsupium*	38.14	55.56	4.59	2.78	4.48	11.85
7.	*Semecarpus anacardium*	31.85	66.63	6.73	4.78	4.4	15.91
8.	*Mangifera indica*	27.16	39.44	4.83	8.24	6.24	19.31
9.	*Zizypus xylopyrus*	64.84	77.66	2.73	6.94	3.25	12.92
10.	*Bamboo sps.*	31.62	24.44	2.82	5.78	4.59	13.19
11.	*Emblica officinalis*	15.49	33.33	2.36	2.78	5.16	10.3

12.	*Azadirachta indica*	26.95	39.28	3.39	4.45	7.16	15
-	*Total*	**537.7**	**585.7**	**100**	**100**	**100**	**300.00**

Table 4. Shrubs in project-affected area (mine area)

S.No.	Species Name	TBA (m^2/ha)	Den./ha	RD	RF	R.Do	IVI
1.	*Prosopus juliflora*	22.87	89.58	11.61	19.19	14.33	45.13
2.	*Dendrocalamus arandunacea*	6.93	19.71	5.32	5.29	11.16	21.77
3.	*Lantana camara*	4.72	119.7	51.35	44.24	55.98	151.57
4.	*Dendrocalamus strictus*	25.74	41.45	3.35	4.84	5.38	13.57
5.	*Ventilago maderaspatana*	5.52	54.86	7.63	11.15	3.82	22.6
6.	*Randia spinosa*	1.13	13.72	6.92	4.78	2.15	13.85
7.	*Anogeissus latifolia*	1.73	21.43	7.85	4.14	2.51	14.5
8.	*Cactus sps*	1.92	3.56	5.97	6.37	4.67	17.01
	Total	**70.56**	**364.01**	**100**	**100**	**100**	**300**

Table 5. Herbs in the project-affected area (mine area)

S.No.	Species Name	TBA (m^2/ha)	Den./ha	RD	RF	R.Do	IVI
1.	*Achyranthus aspera*	244.31	21219	5.2	9.01	13.94	28.15
2.	*Ageratum conyzoides*	111.11	8187	2.1	1.67	6.44	10.21
3.	*Anacyclus pyrethrum*	13.21	1117	0.42	0.54	1.49	2.45
4.	*Bidens pilosa*	13.19	1908	0.53	1.17	0.81	2.51
5.	*Calendula officinalis*	8.91	3182	0.91	1.5	1.39	3.8
6.	*Calotropis procera*	38.81	3987	1.18	3.46	1.61	6.25
7.	*Cenchrus cilliaris*	7.89	4390	1.12	0.55	0.39	2.06
8.	*Commelina benghalensis*	74.1	6572	2.23	4.45	4.16	10.84
9.	*Cynodon dactylon*	181.33	131660	27.23	11.23	11.12	49.58
10.	*Eleusine indica*	69.6	31090	8.5	7.65	9.59	25.74
11.	*Eragrostis tenella*	2.92	11576	2.17	2.14	0.18	4.49
12.	*Euphorbia hirta*	22.28	7211	1.36	1.73	1.12	4.21
13.	*Evolvulus alsinoides*	26.81	8111	3.11	1.63	1.48	6.22
14.	*Evolvulus nummularis*	2.78	551	0.19	1.55	0.18	1.92
15.	*Ocimum americanum*	32.3	8880	2.06	6.82	3.12	12
16.	*Paspalidium flavidum*	1.9	1160	0.43	0.86	0.19	1.48
17.	*Paspalum distichum*	26.89	32668	7.2	4.55	2.39	14.14
18.	*Paspalum scrobiculatum*	6.66	2122	0.51	2.5	0.42	3.43
19.	*Phyllanthus niruri*	9.2	13770	3.22	3.42	0.54	7.18
20.	*Ricinus communis*	17.81	1666	0.43	1.13	0.91	2.47
21.	*Sida acuta*	26.1	2120	0.55	1.12	1.42	3.09
22.	*Solanum vivarum*	63.9	4534	2.28	5.24	3.53	11.05
23.	*Tribulus terrestris*	117.51	11090	4.61	6.21	6.92	17.74
24.	*Tridex procumbens*	300.92	64433	15.15	9.13	18.62	42.9
25.	*Triumfetta rhomboidea*	116.3	20198	5.4	6.86	6.87	19.13
26.	*Withania somnifera*	4.98	675	1.17	1.69	0.23	3.09
27.	*Xanthium indicum*	6.6	1221	0.29	0.49	0.35	1.13
28.	*Zizyphus nummularia*	8.49	765	0.16	0.58	0.31	1.05
29.	*Zizyphus oenoplia*	19.3	1310	0.29	1.12	0.28	1.69
-		**1576.11**	**407373**	**100**	**100**	**100**	**300**

Floral Diversity of The Study Area

The reason for this botanical stock is to give essential data on the floristic construction of the review region. so that suitable administration and preservation methodologies might be created. Climate, edaphic, and biotic changes, as well as their complex inter-relationships and species compositions, have adapted to these changes, resulted diversified plant cover that is unique to each location (Ohasi, 1975). This first survey recorded important tree, grass, shrub, climbers, and crop species (Jain, 1968; 1991). Some of the most common tree species found in the research region were sagaun, babool, neem, Tamarindus indica, mango trees, and tamarind. According to our research area, there are a total of 50 kinds of trees from 26 families. 29 medicinal plant species were observed from the study area as listed below.

Table 6. List of trees in the study area

S.No.	Family and Scientific name	Vernacular name
1	**Anacardiaceae**	
1/1	*Mangifera indica L*	Aam
2/2	*Lannea coromandelica*	Mohin
2	**Annonaceae**	
3/1	*Polyalthia longifolia L.*	Ashoka
3	**Apocynaceae**	
4/1	*Plumeria rubra L.*	Champa
5/2	*Tamarindus indica L.*	Imli
4	**Bombacaceae**	
6/1	*Bombax ceiba*	Semal
5	**Boraginaceae**	
7/1	*Cordia myxa*	Lasoda
6	**Burseraceae**	
8/1	*Commiphora wightii L.*	Guggal
7	**Caricaceae**	
9/1	*Carica papaya* L.	Papita
8	**Combretaceae**	
10/1	*Anogeissus latifolia*	Bakli
11/2	*Terminalia chebula*	Haritaki
12/3	*Terminalia elliptica*	Asna
9	**Dipterocarpaceae**	
13/1	*Shorea robusta*	Sal tree
10	**Fabaceae**	
14/1	*Dalbergia sisoo L.*	Sisam
15/2	*Delonix regia* (Boj)	Gulmohar
16/3	*Parkinsonia aculeate* L.	Rambaval
17/4	*Peltophorum pterocarpum* (DC.)	Tamrafal
18/5	*Albizia lebbeck* L.	Siris
19/6	*Albizia odoratissima*	Kala Siris
20/7	*Butea monosperma*	Palash
21/8	*Cassia fistula*	Amaltas
22/9	*Ougeinia dalbergioides*	Tinsa
23/10	*Pterocarpus marsupium*	Vijaysar
24/11	*Pithecellobium dulce*	Junlge Jalebi
11	**Lamiaceae**	
25/1	*Tectona grandis*	Sagoun
12	**Leguminosae**	
26/1	*Derris indica* (Lam.)	Karanj
27/2	*Parkinsonia aculeata L.*	Ram babool

13	**Lythraceae**	
28/1	*Lagerstroemia parviflora*	Dhaura
14	**Malvaceae**	
29/1	*Grewia tiliifolia*	Dhamani
30/2	*Sterculia urens*	Katira
15	**Meliaceae**	
31/1	*Azadirachta indica* A.Juss	Neem
16	**Mimosaceae**	
32/1	*Acacia nilotica L.*	Babool
33/2	*Leucaena leucocephala* (Lam.) De	Subabool
34/3	*Prosopis cineraria (L.)*	Sami
35/4	*Acacia senegal* (L.) Willd,	Kumta
17	**Moraceae**	
36/1	*Ficus benghalensis* L.	Bargad
37/2	*Ficus religiosa* L.	Peepal
18	**Moringaceae**	
38/1	*Moringa oleifera* Lam	Sahjan
19	**Myrtaceae**	
39/1	*Eucalyptus citriodora* Hk.	Safeda
40/2	*Syzygium cumini L.*	Jamun
20	**Phyllanthaceae**	
41/1	*Bridelia retusa*	Kaji
42/2	*Emblica officinalis*	Aonla
21	**Rhamnaceae**	
43/1	*Zizyphus mauritiana*	Ber
44/2	*Zizyphus xylopyrus L.*	Kathber
22	**Rubiaceae**	
45/1	*Adina cordifolia*	Kadam
23	**Rutaceae**	
46/1	*Aegle marmelos*	Bel
24	**Sapotaceae**	
47/1	*Madhuca indica*	Mahua
48/2	*Madhuca latifolia*	Mahua
25	**Salicaceae**	
49/1	*Flacourtia indica*	Falkurtia
26	**Simaroubaceae**	
50/1	*Ailanthus excelsa*	Mahanim

Table 7. Medicinally important plants observed in the study area

S.No.	Scientific Name	Part Used	Economic/Ethnobotanic Importance
1.	*Adina cordifolia*	Root, Bark, Wood	Medicinal and timber
2.	*Aegle marmelose*	Fruit, Whole plant	Medicinal Anthelmintic
3.	*Albizia odoratissima*	Bark	Bronchitis, Diabetes, Ulcers
4.	*Anogeissus latifolia*	Flowers, Fruit	Blood disorders, Diabetes
5.	*Azadirachta indica*	Whole Tree	Skin Diseases, Hepatitis B, etc.
6.	*Ailanthus excelsa*	Bark, Root, Leaves	Antibacterial, Tonsillitis, Fever
7.	*Bombax ceiba*	Resin, Leaves, Bark	Burns, Kidney failure, Diarrhoea
8.	*Bridelia retusa*	Bark, Root, Leaves	Jaundice, Rheumatism, Urinary
9.	*Butea monosperma*	Seed, Bark, Leaf, Gum	Leucorrhoea, Night blindness, TB
10.	*Cassia fistula*	Leaves, Bark, Fruit	Skin disease, Abdominal disorder
11.	*Cordia myxa*	Leaf, Fruit, Bark	Asthma, Ascaris, Digestive
12.	*Emblica officinalis*	Whole plant	Anti-aging, Asthma, Baldness
13.	*Ficus benghalensis*	Latex, Root, Bark, Leaves	Infertility, Asthma

14	*Ficus religiosa*	Bark, Fruits, Tender shoots, Leaves, Bud	Constipation, Heart disease, Low BP, Internal bleeding etc.
15.	*Flacourtia indica*	Whole plant, Leaves	Snake Bite, Arthritis etc.
16.	*Grewia tiliifolia*	Bark and fruits	Diarrhea and Ulcers
17.	*Lannea coromandelica*	Bark and Leaves	Heart disease, Muscle sprains etc.
18.	*Lagerstroemia parviflora*	Gum, Bark, Fibre, Stem	Edible, Tannins, Timber
19.	*Madhuca indica*	Bark, Flowers, Fruits	Diabetes, Lung disease
20.	*Madhuca latifolia*	Bark, Flowers, Fruits	Diabetes, Lung disease
21.	*Ougeinia dalbergioides*	Stem, Root, Leaves	Asthma, Hepatitis, Timber
22.	*Pterocarpus marsupium*	Flower, Seed, Leaf, Bark	Edible, Chronic diarrhoea, Colitis
23.	*Pithecellobium dulce*	Fruit, Bark, Seed, leaves	Dye, Edible, Diarrhoea, Ulcers
24.	*Shorea robusta*	Seed, Stem, Leaf	Resin, Timber, Edible, Medicinal
25.	*Sterculia urens*	Stem, Seed, Bark	Edible gum & Seed, Timber & handicraft
26.	*Syzygium cumini*	Bark, Seed, Fruit, Leaves, Flowers Stem	Edible, Diabetes, Epilepsy, Honey, Sports Equipment etc.
27.	*Tectona grandis*	Bark, Leaves, Stem	Timber, Dye, Medicinal & agro-forestry
28.	*Terminalia chebula*	Seed, Fruit	Tannin, Medicinal
29.	*Terminalia elliptica*	Bark, Stem, Gum	Edible, Medicinal, Timber

Cultivated Plants in the Study Area

During the monsoon, juwar (*Sorghum vulgare*) and paddy (*Oryza sativa*) were planted, while during the winter, wheat (*Triticum aestivum*) was planted.

Major Horticultural Crops: Mango trees (*Mangifera indica*), kela (*Musa* sp.), papaya (*Carica papaya*), amla (*Phyllanthus em*blica), and pomegranate (*Punica granatum*) plantations were seen in certain areas. Almost all communities had mango trees (*Mangifera indica*) and tamarind trees (*Tamarindus indica*) growing near to residential areas and along the roadside.

Major Vegetable Corps: The most commonly cultivated veggies in the research region were:

- Bhindi (*Abelmoschus escelentus*),
- Brinjal, (*Ringana Solanum melongena*),
- Cabbage (*Brassica oeraceae*),
- Tomato (*Lycopersicon lycopersicum*),
- Karela (*Momordica charantia*),
- Cholai (*Vigna unguilata*)

Rare & Endangered Flora in the Study Area

In the Red Data Book of Indian Plants and Vascular Plants Red List at Risk, none of the species found in the study area are endangered (Jain and Shastri, 1984; Nair and Shastri, 1987; 1988; 1990; Oldfield and others, 1998; Khulia and Baconi, 2009). (IUCN, 2010).

Wildlife Reserve/National Park/Reserve Forest in the study area

There are no national parks, animal sanctuaries or wildlife corridors in the proposed project research area. However, the expected coal mine site is surrounded by reserve and protected forest. Thaonri RF-Within lease area on N side Sethiya PF-Within lease area Chhinda PF-Within lease area Pench River-1.5 km towards West Gunor Nadi-9.0 km towards East Ghatamali Nadi-3.0 km towards N Duddi RF-2.0 km towards NNW Nawegaon RF-1.6 km towards West Rawanwara RF-6.5 km towards West Khairi RF-4.5 km towards South Dhabera RF-5.5 km towards SE Thesgora RF-6.0 km towards East Bhandariya RF-9.5 km towards WSW Kirwari RF-8.0 km towards WNW Lakra RF-9.5 km towards North. List of reserve & protected forest within study area is given below:

1.	Lakra RF	RF
2.	Duddi RF	RF
3.	Thaorni RF	RF
4.	Urdhan RF	RF
5.	Thesgora RF	RF
6.	Khirsadhoh RF	RF
7.	Khairi RF	RF
8.	Pandrapani RF	RF
9.	Dhabera RF	RF
10.	Chhitri RF	RF
11.	Satnur RF	RF
12.	Patha RF	RF

Faunal Biodiversity of the Study Area

A baseline survey was done to record the faunal biodiversity of the research region in terms of

birds, reptiles, amphibians, and butterfly species.

Birds: The bird observed from core and buffer zone is listed in table below with their status.

Table 8. Detailed listings of birds in the Core and Buffer Zones with their status

#	Family	Scientific Name	Common Name	Status	Core	Buffer
1.	Accipitridae	*Accipiter badius* (Gmelin, 1788)	Shikra	R	+	+
2.		*Elanus caeruleus* (Desfontaines, 1789)	Black-winged Kite	R	-	+
3.	Alcedinidae	*Halcyon coromanda* (Latham, 1790)	Ruddy Kingfisher	R	-	+
4.		*Halcyon smyrnensis* (Linnaeus, 1758)	White-throated Kingfisher	R	+	+
5.	Anhingidae	*Anhinga melanogaster* (Pennant, 1769)	Darter	R	-	+
6.	Apodidae	*Apus apus* (Linnaeus, 1758)	Common Swift	R	-	+
7.		*Apus affinis* (JE Gray, 1830)	Little Swift	R	+	+
8.	Ardeidae	*Bubulcus ibis* (Linnaeus, 1758)	Cattle Egret	R	+	+
9.		*Egretta garzetta* (Linnaeus, 1766)	Little Egret	R	+	+
10.		*Mesophoyx intermedia* (Wagler, 1827)	Intermediate Egret	R	-	+
11.	Caprimulgidae	*Caprimulgus asiasticus* (Latham, 1790)	Nightjar	R	-	+
12.	Charadriidae	*Vanellus indicus* (Boddaert, 1783)	Lapwing	R	-	+
13.	Ciconiidae	*Ciconia ciconia* (Linnaeus, 1758)	White Stork	V	+	+
14.		*Ephippiorhynchus asiaticus* (Latham, 1790)	Black necked Stork	R	+	+
15.		*Mycteria leucocephala* (Pennant, 1769)	Painted Stork	R	-	+
16.	Columbidae	*Columba livia* (Gmelin, 1789)	Rock Pigeon	R	-	+
17.		*Streptopelia decaocto* (Frivaldszky, 1838)	Eurasian Collared-Dove	R	-	+
18.		*Streptopelia orientalis* (Latham, 1790)	Rufous Turtle Dove	R	-	+
19.	Coraciidae	*Coracias benghalensis* (Linnaeus, 1758)	Indian Roller	R	+	+
20.	Corvidae	*Corvus splendens* (Vieillot, 1817)	Crow	R	+	+
21.	Cuculidae	*Centropus sinensis* (Stephens, 1815)	Coucal	R	+	+
22.		*Surniculus lugubris* (Horsfield, 1821)	Drongo Cuckoo	R	-	+
23.	Dicruridae	*Dicrurus macrocercus* (Vieillot, 1816)	Black drongo	R	+	+
24.	Fringillidae	*Carduelis carduelis* (Linnaeus, 1758)	Goldfinch	R	+	+
25.	Glareolidae	*Cursorius coromandelicus* (Gmelin, 1789)	Courser	R	+	+
26.	Gruidae	*Antigone antigone* (Linnaeus, 1758)	Crane	R	+	+
27.	Laridae	*Larus brunnicephalus* (Jerdon, 1840)	Gull brown headed	R	-	+
28.		*Sterna albifrons* (Pallas, 1764)	Little Tern	R	-	+

29.	Leiothrichidae	*Turdoides caudate* (Dumont, 1823)	Common Babbler	R	+	+
30.	Megalaimidae	*Megalaima haemacephala* (Statius Muller, 1776)	Coppersmith barbet	R	+	+
31.	Meropidae	*Merops leschenaultia* (Vieillot, 1817)	Chestnut-headed Bee-eater	R	+	+
32.	Motacillidae	*Anthus campestris* (Linnaeus, 1758)	Tawny Pipit	R	-	+
33.		*Anthus spinoletta* (Linnaeus, 1758)	Water Pipit	W	+	+
34.		*Motacilla cinerea* (Tunstall, 1771)	Grey Wagtail	W	+	+
35.		*Motacilla flava* (Linnaeus, 1758)	Yellow Wagtail	S	+	+
36.	Muscicapidae	*Ficedula parva* (Bechstein, 1792)	Red breasted Flycatcher	R	+	+
37.		*Muscicapa striata* (Pallas, 1764)	Spotted Flycatcher	S	-	+
38.	Nectariniidae	*Nectarinia asiatica* (Latham, 1790)	Purple Sunbird	R	-	+
39.		*Nectarinia minima* (Sykes, 1832)	Crimson-backed Sunbird	R	-	+
40.	Paridae	*Cyanistes caeruleus* (Linnaeus, 1758)	Blue Tit	R	+	+
41.		*Parus major* (Linnaeus, 1758)	Great Tit	R	+	+
42.	Passeridae	*Passer domesticus* (Rafinesque, 1815)	Sparrow	R	+	+
43.	Phalacrocoracidae	*Phalacrocorax fuscicollis* (Stephens, 1826)	Cormorant	R	-	+
44.	Phasianidae	*Francolinus pondicerianus* (Gmelin, 1789)	Gery Francolin	R	-	+
45.		*Pavo cristatus* (Linnaeus, 1758)	Indian Peafowl	R	+	+
46.	Phoenicopteridae	*Phoenicopterus minor* (Geoffroy Saint-Hilaire, 1798)	Lesser Flamingo	R	-	+
47.	Picidae	*Picus viridis* (Linnaeus, 1758)	Green Woodpecker	R	+	+
48.	Ploceidae	*Ploceus philippinus* (Linnaeus, 1766)	Baya weaver	R	+	+
49.	Podicipedidae	*Tachybaptus ruficollis* (Pallas, 1764)	Little Grebe	R	+	+
50.	Psittaculidae	*Psittacula krameri* (Cuvier, 1800)	Rose-ringed Parakeet	V	+	+
51.	Pteroclidae	*Pterocles exustus* (Temminck, 1825)	Sandgrouse	V	+	+
52.	Pycnonotidae	*Pycnonotus cafer* (Linnaeus, 1766)	Bulbul	R	-	+
53.	Rallidae	Amaurornis phoenicurus (Pennant, 1769)	White-breasted Water hen	R	+	+
54.		*Fulica atra* (Linnaeus, 1758)	Common Coot	R	+	+
55.	Rallidae	*Gallinula chloropus* (Brisson, 1760)	Moorhen	R	-	+
56.	Scolopacidae	*Actitis hypoleucos* (Linnaeus, 1758)	Sandpiper	W	-	+
57.		*Limosa limosa* (Linnaeus, 1758)	Black Tailed Godwit	R	+	+
58.		*Philomachus pugnax* (Linnaeus, 1758)	Ruff	R	+	+
59.	Striidae	*Athene noctua* (Scopoli, 1769)	Little Owl	R	+	+

60.	Sturnidae	*Acridotheres ginginianus* (Latham, 1790)	Bank Myna	R	+	+

Key to Status

R	Resident	**O**	Occurs most years
V	Vagrant	**VS**	Vagrant summer
S	Summer only	**VP**	Vagrant passage
W	Winter only	**PB**	Passage and breeds
P	Spring or autumn passage	**PW**	Passage and winter

Herpetofauna: Toads were seen throughout the research period in the amphibian group. The reptiles that have been seen in the area include the Common Garden Lizard, House Gecko, and Fan-Throated Lizard, as well as the Common rat Snake.

Table 9. Reptiles and Amphibian in the Study Area

S. No.	Family	Common Name	Scientific name	Schedule as IWPA, 1972
1.	Agamidae	Common Garden Lizard	*Calotes versicolor* (Cuvier, 1817)	Not listed
2.		Fan-Throated Lizard	*Sitana ponticeriana* (Cuvier, 1817)	Not listed
3.	Bufonidae	Toad	*Bufo bufo* (Gray 1825)	Not listed
4.	Chamaeleonidae	Indian chameleon	*Chameleon calcaratus* (Rafinesque, 1815)	Schedule II
5.	Colubridae	Common Rat Snake	*Ptyas mucosus* (Linnaeus, 1758)	Schedule II
6.	Elapidae	Common Indian Krait*	*Bungarus caeruleus* (Schneider, 1801)	Schedule II
7.		Indian Cobra*	*Naja naja* (Linnaeus, 1758)	Schedule II
8.	Gekkonidae	House Gecko	*Hemidactylus flaviviridis (Ruppell, 1835)*	Not listed
9.	Scincidae	Brahminy Skink	*Mabuya carinata* (Schneider, 1801)	Not listed
10.	Varanidae	Indian Monitor*	*Varanus bengalensis* (Daudin, 1802)	Schedule II

*Not sighted but included as per the secondary information from the villagers.

Mammals: The table below lists the wild animals that were seen in addition to the farmed ones. Schedule -I of the Wildlife Protection Act of 1972 protects the leopard (*Panthera pardus*). The jackal (*Canis aureus*), common mongoose (*Herpestes edwardsii*), jungle cat, Moneky (*Macaca mulatta*), and common langur (*Boselaphus tragocamelus*) were seen, which are protected under Schedule II of the Wildlife Protection Act 1972. Other mammals observed in study area are listed in table below:

Table 10. Mammals in study area

S. No.	Family	Common Name	Scientific Name	Status as per IWPA 1972
1.	Antilopinae	Nilgai (Blue Bull)	*Boselaphus tragocamelus* (Pallas, 1766)	Schedule-III
2.	Canidae	Jackal	*Canis aureus* (Linnaeus, 1758)	Schedule-II
3.	Felidae	Common Jungle Cat	*Felis chaus* (Schreber, 1777)	Schedule II
4.		Leopard	*Panthera pardus* (Linnaeus, 1758)	Schedule I
5.	Herpestidae	Common Mongoose	*Herpestes edwardsii (É. Geoffroy Saint-Hilaire, 1818)*	Schedule II
6.	Cercopithecidae	Monkey	*Macaca mulatta*	Schedule II

7.		Common langur	*Semnopithecus entellus (*Dufresne, 1797)	Schedule II
8.	Cervidae	Sambar	*Rusa unicolor* (Kerr, 1792)	Schedule III
9.		Chital	*Axis axis* (Erxleben, 1777)	Schedule III
10.	Suidae	Wild Boar	*Sus scrofa* (Linnaeus, 1758)	Schedule III
11.	Leporidae	Hare	*Lepus nigricollis (*F. Cuvier, 1823*)*	Schedule IV
12.	Muridae	Common House Rat	*Rattus rattus (Linneaus 1758)*	Schedule V
13.	Sciuridae	5 striped Palm Squirrel	*Funambulus pennanti* (Wroughton, 1905)	Schedule IV
14.		Grey Musk Shrew	*Suncus murinus (Linneaus 1766)*	-

Domestic Animals: The research region was home to domestic animals such as a dog, cow, buffalo, goat, sheep, and chicken.

Insect: Except for a few insects like honey bees (*Apis* sp.) and gum leaf grasshoppers, there is no substantial faunal assemblage here (*Goniaea australasiae*).

Fisheries: The study area is mainly drained by Pench river and other tributaries *viz*. Gunor nadi, Ghatmali nadi, Sukri River, Devrain nadi, etc. There are no major fish activities in the study area or no any aquaculture observed. The main fishes of the fresh water were katla, rohu, bam, padan, etc. The water reservoir (mine pit) within study area is used by wildlife animals of the nearby forest and villagers using electric operated motor.

Rare and Endangered Fauna of Study Area

The Indian Wild Life (Protection) Act, 1972, provided protection to some of the seen fauna by placing them in several schedules, notably Schedule -1. As a national bird of India, *Pavo cristatus* is protected under Schedule I of the Wildlife Protection Act 1972. According to Schedule-II of the Wild Life Protection Act, the Indian cobra (*Naja naja*), Indian chameleon, rat snake, Indian krait, and Indian monitor are protected reptiles (1972). The leopard (*Panthera pardus*) is an animal that is protected under Schedule I of the Wildlife Protection Act of 1972. The jackal (Canis aureus), common mongoose (*Herpestes edwardsii*), jungle cat, monkey (*Macaca mulatta*), and common langur (*Boselaphus tragocamelus*) are all protected under Schedule II of the Wildlife Protection Act 1972, while sambar, chital, wild boar, and nilgai (*Boselaphus tragocamelus*) are all protected under Schedule Squirrels, hares, and other animals are protected under Schedule IV. The conservation of schedule -I species is need to be required *in situ.*

Anticipated Impact on Wildlife

The anticipated impacts were identified during the survey as well as from the discussion with villagers, proponent and by visiting the similar project of underground coal mine. Major area of threat on wildlife due to operation of underground coal mine are:

- Poaching/hunting
- High noise due to vehicular traffic
- Animal collisions due to transportation
- Noise due to workers during shift change
- Noise due to drilling
- Vibration due to blasting
- Fugitive dust due to loading and unloading
- Transportation of coal from pit bunker to cement plants.

Mitigation Measures

To maintain ambient noise levels far below the guidelines, the following control techniques should be used.

a) Drilling should be done using sharp drill bits, which will assist to reduce noise.
b) Secondary blasting should be avoided at all costs, and coal should be broken using a hydraulic rock breaker.
c) Proper spacing, burden, stemming, and charge/delay must all be maintained during blasting.
d) For blasting, a delayed detonator should be utilized.
e) The blasting should take place when the weather is suitable and there are less people around;

f) By employing an excel nonelectrical initiating method instead of a detonating fuse, a minimum amount of detonating fuse will be utilized.
g) To limit noise production, proper maintenance, oiling, and greasing of machinery must be done at regular intervals.
h) The prime movers/diesel engines must be kept in good working order;
i) Sound insulated rooms for people working on devices that produce greater levels of noise (hemm);
j) Proper plant and machinery design, including noise-generating components silencers, mufflers, and enclosures, as well as shock-absorbing pads at the foundation of vibrating equipment;
k) Around the mining operation area and a long haul routes, a green belt/plantation will be established. The planting reduces noise propagation.
l) To minimize overcharging and for safe blasting, the right amount of explosive, the right stemming materials, and the right delay system must be used.
m) Blasting activities must only be carried out during daylight hours;
n) The charge per delay should be kept to a minimum, and a larger number of delays should be employed each blast;
o) Other operations in the surrounding area must be temporarily halted during blasting;
p) For appropriate blasting, drilling characteristics such as overburden, depth, diameter, and spacing must be correctly specified.

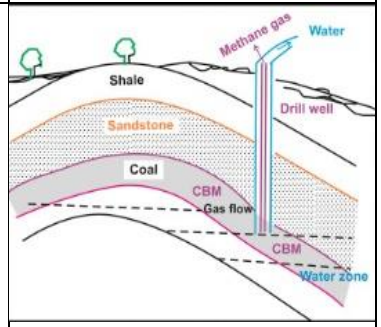
Table 11. Ecological Impact Assessment in the study area

Ecological criteria	Identified Impact	Significance of Impact	Magnitude	Duration/Timing/Frequency	Reversibility	Mitigation	Cumulative impact
Zone of influence	Site Clearance	Site clearance require felling of tree cause ecological damage	Moderate	Short time	Irreversible	The operation site of working should be selected where no tree felling required.	 No cumulative impact
	Ecological impact due to fugitive emission	Fugitive dust emission will reduce stomal index of existing trees/herbs/ shrubs etc.	High	Longer time	Reversible	Regular water sprinkling is required to avoid dust emission. Anti-smog gun is highly recommended. The air-borne respirable dust surveys should be conducted monthly as per G.S.R. 978(E) dtd 1st October, 2018. The sample should be collected from following area: • 30 m from the first operating face on the input side of District. • A distance of about 30 m out from the last working face on this side of the mine working faces	 The high impact reduces to low impact.

						• Loading/ Unloading/Transfer Points • Bunkers/chutes And other places as per the requirement.	
	Noise & vibration due to blasting	Wildlife movement will be hindered due to vibration & noise.	Moderate	During operation phase of mine	Reversible	Wet drilling, controlled blasting, use of approved explosive as per DGMS with delayed detonator is highly recommended. The Coal Mines Regulations 2017 should be complied for every activity of u/g mining. The shelves should be designed such that their fall in the case of an explosion is not hindered by the placement of stone dust barriers. G.S.R. 984(E) dtd 1st Oct 2018 should be followed for ammonium nitrate handling. No smoking and no open flames should be permitted in or near the vans containing blasting agents	 Moderate impact reduces to zero.
	Poaching/hunting	Animal-human conflict will create nuisance and it allows illegal hunting of small animals like hares etc.	Moderate	During operation phase	Irreversible	No worker/person allowed to hunt/kill the animal in any area. No hunting policy should be included in Integrated corporate policy and adequate training should be provided to deal with	 Moderate impact should be

						reptiles/avifauna and mammals in the area.	reduced to zero by providing the training.
	High noise due to vehicular traffic	Vehicular movement will cause hinderance of wildlife movement in the area.	Moderate	Longer time	Irreversible	The vehicle with valid PUC should be utilized, proper maintenance of trucks etc should be done frequently, speed should be fixed 20-30 km/hr in forest area, NO U TRUN & NO HORN policy should be followed in forest area/approach road. Adequate training should be provided.	 Moderate impact reduces to low.
Accessibility	Approach road construction	Site clearance and tree felling will be involved in construction of new road, may have impact ecological balance.	High	Short time	Irreversible	Conditions for haul road G.S.R. 976(E) dtd. 1st October, 2018 should be followed. All roadways for trucks, tippers, dumpers, and other mobile equipment must be developed and maintained in accordance with their load capacity. No vehicle other than HEMM shall be used on haul roads except between designated points and when permitted in writing by the manager.	 High Impact reduce to Low impact
	Animal collisions due to transportation	Vehicular traffic may cause animal collision. Leopard movement was observed in the study area.	High	During Transportation	Irreversible	Animal rescue team (ART) followed by Quick Response Team (QRT) should be in place. Emergency numbers should be displayed along the approach road. Sign board with proper labeling should	 High Impact reduces to low.

						be displayed in mammal prone area.	
Zone of influence	Noise due to workers during shift change	Huge number of workers are required to work, during shift change; noisy environment may affect the movement of reptiles, avifauna & other fauna.	Low	Short time	Reversible	Silence zone should maintain with low pitch during talk. No loud speaker or high noise celebration allowed within premises.	 No impact
	Transportation of explosive in Bulk	Risk of explosion during transportation, cause the habitat destruction	High	During transportation of explosive – short time	Irreversible	G.S.R. 982(E) dtd. 1st Oct. 2018 should be followed for transportation of explosive in bulk. Only the exact number of explosives needed for one round of shots may be delivered in bulk at once to the location of blasting, and no more than 30 minutes prior to the start of charging holes. Only a vehicle duly approved by the Competent Authority shall only be used for transport of explosives in bulk. The vehicle shall be properly earthed with chain links while loading.	 High impact reduces to low impact
	Transportation of coal from pit bunker to cement plants	It leads the noise and dust emission which may cause detrimental effect on existing ecological conditions.	Moderate	During operation phase	Irreversible	The place has no overhanging sides or prominent undercuts. The roof and sides are adequately supported and kept white-washed.	

						The place is kept clean, is free from loose debris and is adequately fenced. The place is adequately ventilated.	Low impact
	Emission of methane gas	Rise in temperature may affect the crop as well as wildlife of the area.	Moderate	During operation phase	Irreversible	G.S.R. 980(E) dtd 1st October, 2018 should be followed for ventilation. No auxiliary fan shall be installed at a point within or less than 4.5m from the nearer side of the entrance to the place to be ventilated by it. The percentage of CH4 in the return air in any heading ventilated by an auxiliary fan shall not exceed 0.5%. Gas detector should install and handheld gas detector should be provided to supervisors while working in the mine.	 Methane gas is greenhouse gas which is responsible for temperature rise in the area. Moderate impact reduces to low impact by taking proper mitigation measures.
	Unused/fused/ waste detonators	Hazardous waste may affect the soil fertility and ecology.	Moderate	During operation phase	Irreversible	The waste should be collected properly and handled as per hazardous waste rule 2016.	 No cumulative impact

CONCLUSION

Sagaun (*Tectona grandis*), babool (*Acacia nilotica*), neem (*Azadirachta indica*), tamarind (*Tamarindus indica*), and mango (*Mangifera indica* L) are among the most common trees in the research region. A total of 50 tree species from 26 families were identified in the research region, with 29 of them having medicinal value and being utilized by local communities and vaidhya. Over the surface of coal mine lease; 12 tree species with a Total Basal Area (TBA) of 537.7 m^2/ha have been found within the mine lease area. The density values (stems per hectare) for the various tree species ranged from 4.25 to 91.34 stems per hectare. The highest density was recorded for sagaun (*Tectona grandis*) species while dominance recorded for babool (*Acacia nilotica)* and vilayati babool (Shrub) over the lease area. Varying shrub species have different density values (stems/ha), ranging from 3.56 to 119.7. The IVI value of Lantana camara was the highest (151.57). This shrub has a high potential for regrowth. In the mining lease area, 29 kinds of herbaceous plants were found. Herbaceous species had a stand density of 407373 stems/ha, with *Cynodon dactylon* and *Tridex procumbens* (131660 and 64433 stems/ha, respectively) dominating this stratum. The Indian cobra (*Naja naja*), the Indian chameleon, the rat snake, the Indian Krait, and the Indian monitor are among the reptiles protected under Schedule II of the Wild Life Protection Act (1972). The leopard (Panthera pardus) is an animal that is protected under Schedule I of the Wildlife Protection Act of 1972. The jackal (Canis aureus), common mongoose (*Herpestes edwardsii*), jungle cat, monkey (Macaca mulatta), and common langur (*Boselaphus tragocamelus*) are all protected under Schedule II of the Wildlife Protection Act 1972, while sambar, chital, wild boar, and nilgai (*Boselaphus tragocamelus*) are all protected under Schedule Squirrels, hares, and other animals are protected under Schedule IV. Conservation plan is strongly recommended to implement within the study area as frequent movement of Schedule-I and Schedule -II species were observed within the area. Sometime it may cause animal collision due to transportation. The anticipated impacts due to underground mining activity are envisaged on existing wildlife and ecology of the area along with mitigation measures presented; should be followed to negate those impact during operation phase. Proper green belt development should be developed and maintained to negate the fugitive emission from the bunker, loading, unloading, transportation, etc.

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Source of Financial Support: Nil
Conflict of Interest: None, Declared.