



e-ISSN: 2319-8753 | p-ISSN: 2347-6710

IJRSET

International Journal of Innovative Research in
SCIENCE | ENGINEERING | TECHNOLOGY



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 13, Issue 6, June 2024

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 8.423

9940 572 462

6381 907 438

ijirset@gmail.com

www.ijirset.com

A Detailed Study on Environmental Impact Assessment Indicating Pollution Status and Mitigation Measures in Three Different Zones Surrounding the iron Ore Mining Area in Hospet Bellary Karnataka state

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ABSTRACT: Mining plays a major role that has been granted as the second endeavor of humans after agriculture. In modern history, Mining play's major key role in the Indus Valley civilization in the establishment of Industries. Sandur belt has a multiple reserves of Iron ores that has the large amounts of fines that are generated during the mining, screening, crushing and processing. Rapid increase in the exploration of mines releases fines below 10mm in size with the dump material. The study's main objective is to assess the environmental impact and mitigation measures in Hospet Bellary Karnataka. 1. The pollution status by mining activities. 2. The entire study is a comparative description of the environmental issues in three different zones 3. The study on environmental mitigation measures in the mining area is figured out. From mining, the dissolved constituents pollute the ground water quality. The study is subjected to the various impacts of water environmental issues. Detailed environmental conditions are shown in the study area.

KEYWORDS: EIA, Water Pollution, Mitigation Measures, Mining Pollution.

I. INTRODUCTION

Mining minerals is an unfriendly activity for the environment after the land mining the land area is left off without use for the mining companies. The impacts of mine may be varied from different perspectives; it may be harmful or useful, but it is associated with damage to environmental components. The paper deals with the pollution status and effects of the iron ore mining and problems due to exploitation of open cast mining. The methods of mining are confined to the process of recovering and loading transportation along with these the water pits are arranged for logging to the post-reclamation process. Karnataka is defined as one of the best Mineral based rich state in India. (Mining and Quarrying, environment report 2003). Water pollution, Soil degradation, and Noise pollution are the various impacts due to mining. Bellary district is the study area which is located at eastern part of Karnataka state. The Impact of mining is environmental detrimental and it has been found that the environmental changes cause Urbanization, deforestation and environmental intensification ([1], [2], [3], [4], [5]). Mining operations will have the effects on downstream ecosystems, the impacts will be severe ([6], [7], [8], [9], [10]). Estimation and identification of soil loss from a place are necessary to measure sediment deposition ([11], [12]). Mining plays an important role in industrial land mostly in the economic growth of the country.

II. IMPORTANCE OF IRON ORE MINING WITH ITS OPERATIONS

Iron ore is the essential mineral for the iron and steel industries, which influences the large economic status and demand of the country. The total of 33.276 billion tons haematite (Fe_2O_3) and magnetite (Fe_3O_4) are produced in India. India is the leading producers of Iron ore the total of 79% of hematite (Fe_2O_3) ore deposits are found in the states of Assam, Bihar, Chhattisgarh, UP Odisha, and Jharkhand. Magnetite deposits of 93% are found in AP, Goa, Karnataka, Kerala, and Tamil Nadu among states of India Karnataka contributes 72% of Magnetite deposits in India. The production of iron ore Lumps, Fines, and concentrates at 204 million tonnes in 2021-22 reduced by almost 16.9% as compared to 246 million tonnes in the compare to the previous year. For the FY22, production of minerals is estimated at Rs. 190,392 crores (US\$ 24.95 billion). In terms of iron ore production India ranks fourth globally. The Production of iron ore in other states except Karnataka in the year FY21 stood at 246 million tons. From the month April 2021- January 2022, Production of iron ore in India stood at 204 million tons (MT). The volume drop is due to several mines in the state having almost exhausted their annual EU supply limits. This is also expected to affect the figures for the current year among other iron ore-producing states in India except Karnataka. Iron ore production in the

state of Karnataka was estimated about 3.4 million tons increase in the production of iron ore and it extends to 250 million tons FY 2023.

III. STUDY AREA

The Study area has demarcated on the toposheet of Survey of India D43E07, D43E08, D43E11, and D43E12 (Fig.1). The area is marked between latitude and longitudes at 15°12'0 N, 15°20'0 N, 76°17'0 E, 76°35'0 E. The total area is 213.93 sq. km. The geology of study area is with rock formations belonging to iron stage of the Dharwar super group of Karnataka state. The lithological formations of this area are on the basis of field observations contains float up to 2m depth on an average. The float iron ore is with the Fe content between 60 to 65 %. The study was carried out in and around Hospet village, Sandur taluka Bellary district. Two Iron ore mines were selected in the study area one open mine and other (closed) and adjacent steel industries. Its Environmental Impact on surrounding villages will be carried within the buffer zone of a 7 km radius in Bellary.

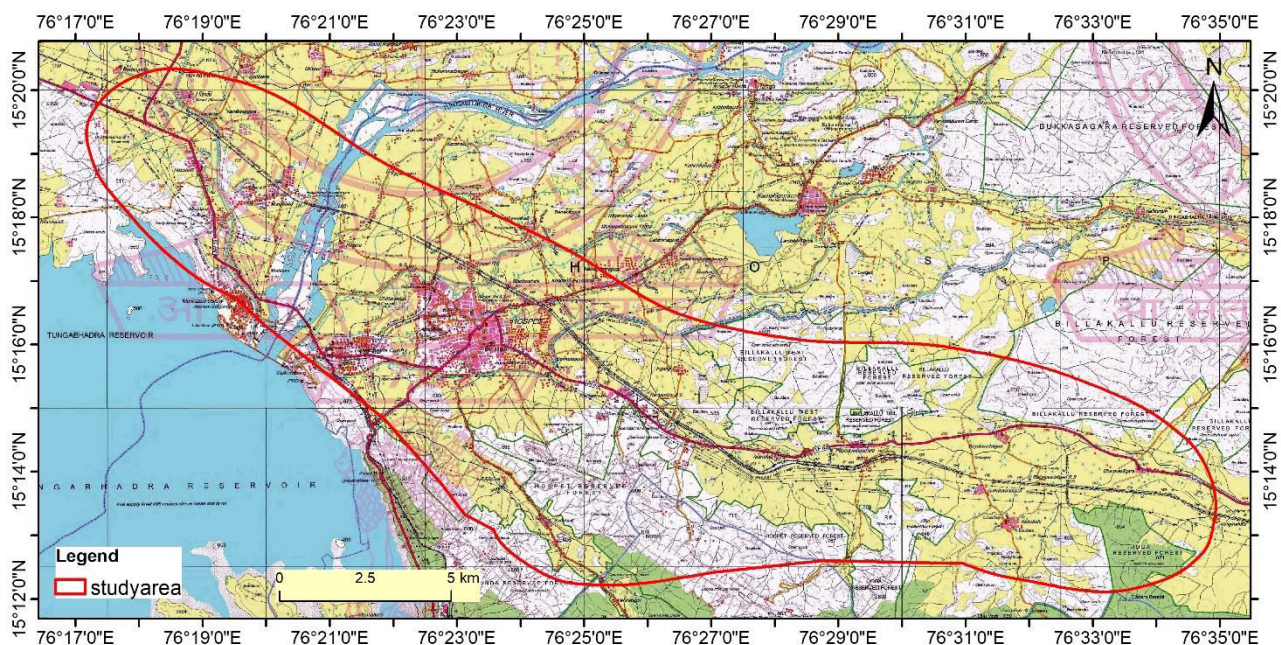


Fig. 1 Illustrates the Topographic map of the studyarea

IV. MINING ACTIVITY

The process of mining is the open cast method which is carried with crushing and screening and loading with mechanized iron ore truck. The systematic and scientific mining operation is carried out. The recovered ore will be stacked and dispatched to the destination through hired trucks. The boulders encountered will be transported to the lease crushing and screening plant located in the adjoining lease area and processed by sizing and screening, finally the activity of mining depends on the mine excavated.

V. IMPACT OF MINING

The extraction of Mineral resources of mining have the negative impact on surrounding environment. Total impact affects on land, water environment. In this paper, the study area is Bellari District of Karnataka state. In recent years, there is an increase in production of iron ore due to the regular use of heavy machinery and field equipment's, particularly for open-cast mining. Open-cast mining is the process where the dumping of a huge volume of land in addition to a pit-scarred landscape. Major problem of iron ore mining is the disposal of tailings and deleterious silica minerals and phosphorus which results in dust concentration, which poses environmental problems. iron ore mining activities in Ballari District threaten severe impact on the community and environment in one of the highly exploited

iron ore belts of Karnataka State i.e., Sandur-Hospet-Ballari Belt. Sandur Hospet region has abundant reserves of Iron ores which include the land, water, air, and biological resources as well as the socioeconomic situation of the local population. Nearly 50-60% of the total burden removed from the surface is below 10mm in size and these fines are dumped at mine sites as the waste. During the rainy seasons, these fines, carried by runoff water, spread to the surrounding land and thereby reducing the fertility of soil and productivity of the pedosphere and leading to the deforestation. The dissolved constituents from the mining process pollutes the surface and groundwater. Fig. 2 indicates that the Land use Land cover map of the study area and Table 1 shows the statistics of the LULC.

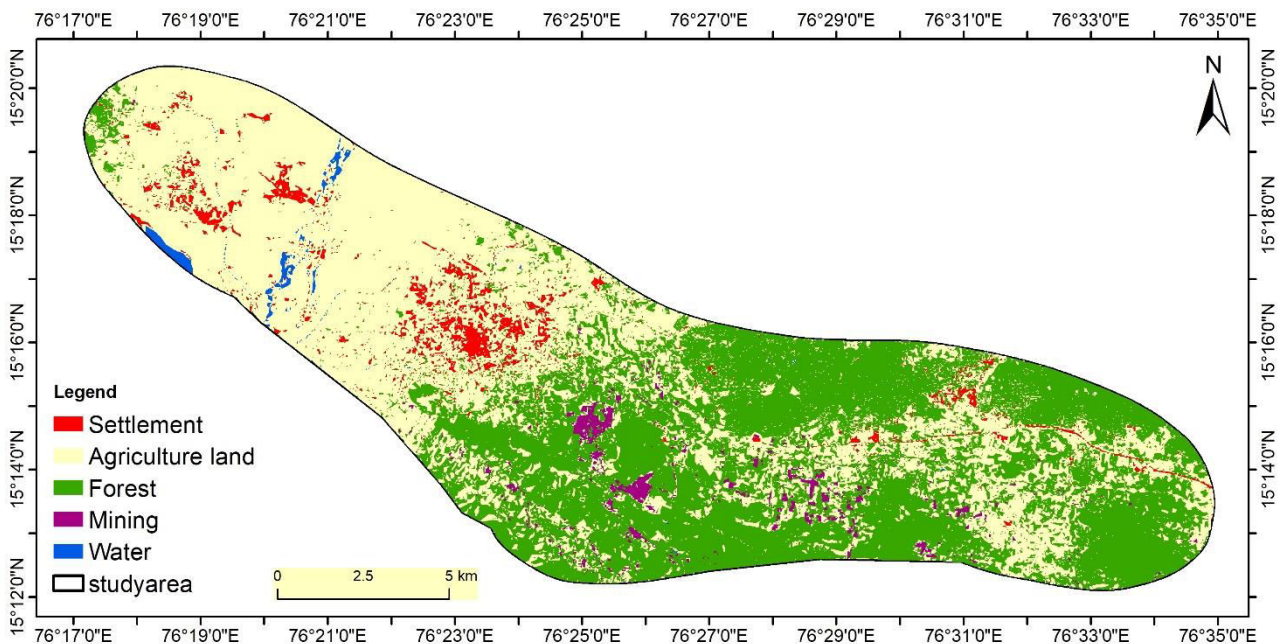


Fig.2 Illustrates the LULC map of the study area

Table 1 Statistics of the Land Use and Land Cover

S.no	LULC_Description	Area_Sq.km	Percentage
1	Settlements	7.57	3.54
2	Agriculture land	109.61	51.24
3	Forest	92.00	43.01
4	Mining	3.57	1.67
5	Waterbody / Canal	1.17	0.55
	Total Area	213.93	100.00

VI. METHODOLOGY

Environmental impact assessment of iron ore mining is carried out in areas of Hospet, Sandur taluka Bellary, Karnataka state. Industrial activity in a given area can often lead to environmental pollution. It is imperative to know the original conditions of different environmental parameters both core zone and buffer zone area. The study provides immense reference to the researchers, environmental regulators to understand and evolve the remedial measures. Gathering baseline data or presenting information with reference to environmental quality plays a vital role in assessment of the impacts and with the effective proposition of control measures. Research was carried out with the reconnaissance survey of Iron Ore mining in the Bellary Hospet region. Collection and interpretation of the data from

the mining area, surrounding village areas, and steel industrial area. Generation baseline data from closed/ abandoned mines. Collection of weather parameters viz., Temp. Wind speed, Wind direction, Relative Humidity, Sunshine, Rainfall, etc. Collection of water samples near the mining (core zone) within 10 km radius buffer zone. Collection of wind data in mining area is to be analyzed for Heavy metals, trace elements and major oxides for water samples. Fig.3 shows the sample locations of the above parameters.

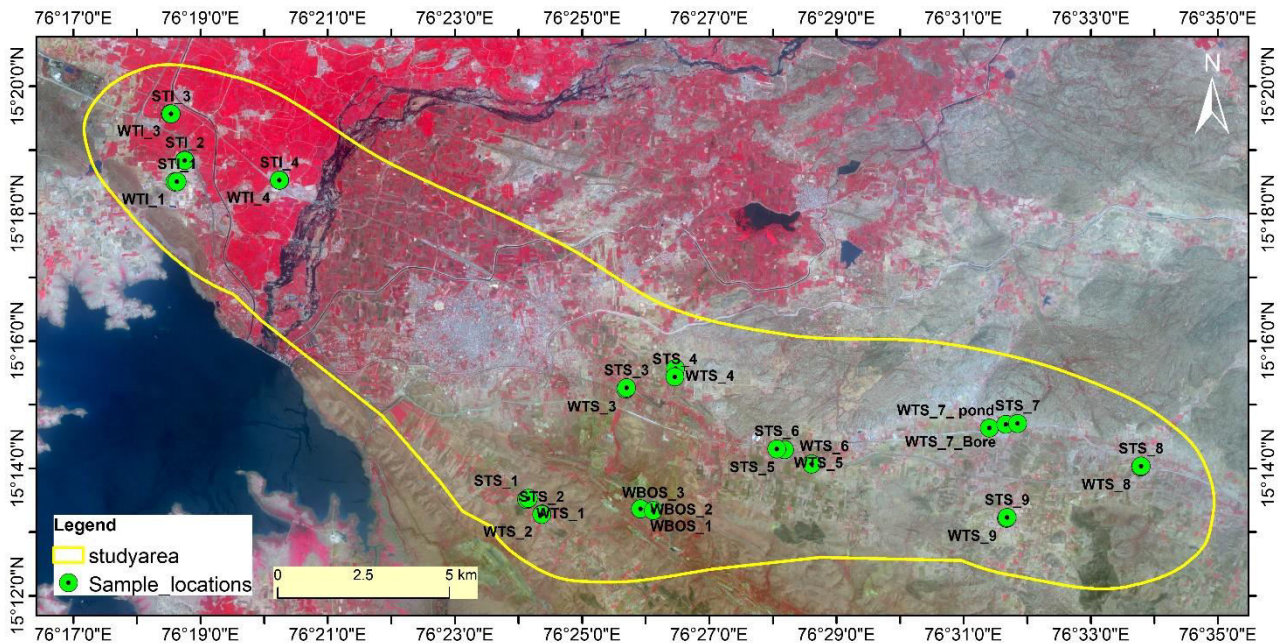


Fig.3 Sample locations of the study area

LOCATIONS OF SAMPLING

Table 2: Site- 1 Mining area Locations

Sample - ID	Latitude	Longitude	Location
SITE-1- ON	15.22271	76.43199	Mine – 1
SITE-2- ON	15.22229	76.43531	Mine – 2

Table 3: Site-2 Village sample locations

S.no	Sample -ID	Latitude	Longitude	Location
1	WTS-1	15.22545	76.4026	Rajapur
2	WTS-2	15.22126	76.40612	Kallahalli
3	WTS-3	15.25442	76.42831	Kariganur
4	WTS-4	15.2573	76.44096	Ingallagi
5	WTS-5	15.23826	76.46969	Vadrahalli
6	WTS-6	15.23843	76.467676	P.K.Halli (papinaik)
7	WTS-7	15.24508	76.53078	Bailvadigiri
8	WTS-8	15.23392	76.56316	Dharmasagara
9	WTS-9	15.22048	76.52805	Gundlavadagiri

Table 4: Site-3 Steel industries Locations

Sample –ID	Latitude	Longitude	Location
STI-1	15.30833	76.31052	Hirekasankandi
STI-2	15.3139	76.31253	Hosahalli
STI-3	15.32609	76.30894	Hithanala
STI-4	15.30873	76.33734	Hulugi

The base data collected from the three different zones from core zone 5km area and Buffer Zone 10km area. The site area comprises of two mines one is existing and other is closed mine. The Water and Wind data is collected from the site area, village area and steel industrial area. All the samples are analysed with the following parameters Heavy metals, Major Ions, major oxides. The results are framed and plotted along with the mitigation measures provided further.

VII. RESULTS AND DISCUSSION

The list of samples and their results are plotted below in the above tables. The impact of mining process on water is moderate and the environmental impact assessment study with detailed mitigation measures is given. This study helps us to know the Environmental Impact assessment in mining area and mitigation measures.

WIND

The weather conditions that influence Air pollution is directed by the Wind speed at the core area which is predicted with the wind study. In the present study wind speed is towards Northwest, direction, Temperature, and Relative Humidity are listed in table. The predominant wind data is interpreted in the table 9. Wind pattern collected during the study period was used to establish their influence on Air quality within the study zone. Anemometer, La Crosse Technology V40-Pro-INT is installed at 10mt height above the ground level in the plant site. Wind percentage frequencies in sixteen directions were collected on 24 hourly bases at the plant site.

DESCRIPTION

Fig.4 shows the wind rose diagram of the study area. The direction of the wind blows from west north west and predominant wind speed is 70 % here the wind moves 0.5 to 2.0 mt/s at different intervals of time the maximum wind recorded 5.5 and minimum as 2.4 m/s. The status of air pollution is normal due to the moderate wind frequency. Hence the study area is predicted with the emission of dust which is settled down by water spraying techniques. This indicates the direction of air and the air pollution is depicted in the further studies.

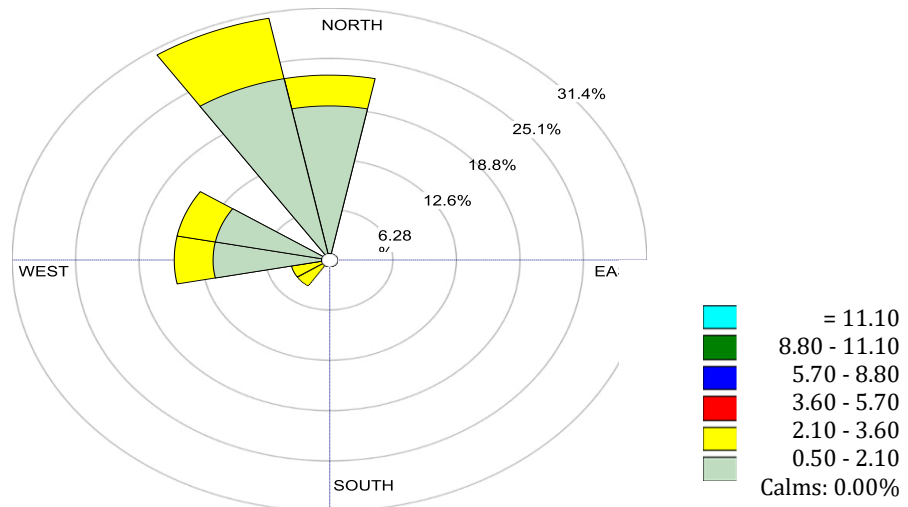


Fig.4 Wind rose diagram of the study area

Table 5: Wind Frequency clause

Station month	ID day	year	1 hour	Temp Deg C	Precipitation Mm	Pressure mb	RH %	Wdir10m Deg	Wspeed10m ms-1
03	19	2021	0	29.4	0	997.1	58	236	5.1
03	19	2021	100	27.3	0	996.8	63	266	4.2
03	19	2021	200	27.8	0	996.6	62	268	4
03	19	2021	300	28.3	0	997	63	277	3.1
03	19	2021	400	29.4	0	997.6	55	279	2.7
03	19	2021	500	28.8	0	998.3	40	290	2.4
03	19	2021	600	28.5	0	998.7	41	294	4.8
03	19	2021	700	28.2	0	998.9	55	303	4
03	19	2021	800	27.9	0	999.3	44	328	4.2
03	19	2021	900	27.6	0	999.3	35	332	3.2
03	19	2021	1000	27.3	0	999.3	30	336	3.1
03	19	2021	1100	27.2	0	999.1	44	337	4
03	19	2021	1200	26.7	0	998.5	20	341	3.1
03	19	2021	1300	29.3	0	998	24	350	3.2
03	19	2021	1400	28.3	0	997.4	25	356	3.9
03	19	2021	1500	29.8	0	996.9	33	353	4
03	19	2021	1600	28.3	0	996.9	28	352	4.2
03	19	2021	1700	31.8	0	997	20	350	3.5
03	20	2021	1800	30.1	0	997.4	23	338	3.5
03	20	2021	1900	30.7	0	997.6	28	344	3.9
03	20	2021	2000	28.3	0	998.1	22	355	3.9
03	20	2021	2100	29.8	0	998.3	25	290	3.9
03	20	2021	2200	29.4	0	998.2	22	255	4.7
03	20	2021	2300	28.8	0	998.1	20	345	5.5

Table 6: wind data

Sl.No	Component	Percentage	Values
1	Wind Speed	65.4	0.5 M/s to 2.0 M/s
		26.9	2.0 M/s to 3.0 M/s
		Calm	----
2	Predominant wind Direction	WNW	70%
3	Temperature	Maximum	31.8 °C
		Minimum	26.7 °C
4	Rainfall	Study period	0%
5	Relative Humidity	Maximum	40%
		Minimum	23%

Table 7: Shows the Heavy metal data in Village area

Parameters	Rajapur -WTS-1	Kallaha lli-WTS-2	Kariganu r-WTS-3	Ingallagi -WTS-4	Vadrahali-WTS-5	P.K. Halli-WTS-6	Bailvadi giri (Pond)	Dharma sagar-WTS-8	Gundlavada giri-WTS9
Aluminium	0.05	0.02	0.05	0.02	0.03	0.06	2.72	0.02	0.04
Arsenic	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Barium	0.08	0.04	0.05	0.08	0.04	0.13	0.06	0.04	0.02
Boron	0.09	0.08	0.16	0.14	0.1	0.18	0.06	0.15	0.16
Cadmium	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

Copper	0.04	0.01	0.03	<0.01	0.02	0.03	0.04	0.01	0.02
Iron	0.07	<0.02	0.06	<0.02	0.03	0.1	2.25	0.02	0.03
Lead	<0.01	0.02	<0.01	<0.01	<0.01	0.02	<0.01	0.01	<0.01
Lithium	<0.01	<0.01	0.02	0.04	0.06	<0.01	<0.01	0.03	0.01
Manganese	0.04	0.03	0.03	0.02	0.03	0.03	0.27	0.03	0.04
Molybdenum	6.6	9.9	5.74	5.57	6.72	5.69	5.6	11.9	7.25
Nickel	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Rubidium	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Silicon	21.4	16.6	26.7	35.1	36.9	33.2	12.8	52.8	34.5
Strontium	0.55	0.52	0.91	1.54	1.28	2.47	0.27	0.9	1.16
Vanadium	0.01	0.25	0.23	0.16	0.2	0.42	<0.01	0.15	0.27
Zinc	0.09	0.03	0.27	0.01	0.04	0.06	0.05	0.02	0.22
Cobalt	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Selenium	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Beryllium	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

Table 8: Heavy metal data in steel Industrial area and mine area

Parameters	Harikaran Kandi-TI-1	Hosanhalli- TI-2	Hithnala- TI-3	Havigi- TI-4	Mine-1 Pond/Pit	Mine -2
Aluminium	0.05	0.04	0.05	0.18	1.94	0.34
Arsenic	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Barium	0.07	0.15	0.19	0.08	0.08	0.03
Boron	0.05	0.08	0.05	0.04	0.09	0.03
Cadmium	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Copper	0.04	0.03	0.03	0.03	0.03	0.03
Iron	0.12	0.06	0.08	0.29	1.1	0.31
Lead	0.01	<0.01	<0.01	0.02	0.03	0.25
Lithium	0.03	0.02	<0.01	<0.01	<0.01	0.04
Manganese	0.03	0.03	0.03	0.06	0.23	0.04
Molybdenum	4.3	4.3	4.34	2.1	1.87	4.1
Nickel	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Rubidium	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Silicon	36.9	45.8	16.4	9.8	6.87	3.1
Strontium	0.62	2	0.76	0.52	0.36	0.2
Vanadium	0.06	0.15	0.08	0.04	0.02	0.03
Zinc	0.04	0.03	0.06	0.04	0.03	0.09
Cobalt	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Selenium	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Beryllium	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

Sno	Parameters	Desirable Limits IS-10500	Permissible limits IS:10500	WTS1	WTS2	WTS3	WTS4	WTS5
1	PH	6.5 to 8.5	No relaxation	7.77	7.66	8.42	7.66	7.76
2	EC (µs/cms)	-	-	1096.5	1183.5	126.76	1380.8	1027.7
3	TDS (mg/L)	500	2000	734.65	792.96	849.26	925.12	688.59
4	Total Hardness (Cac03)(mg/L)	300	600	66	67	70	62	72
5	Calcium	75	200	3.2	3.8	6.7	4.2	2.7
6	Magnesium	30	100	7.28	8.5	7.5	10.2	8.9
7	Sodium	-	-	4	5	5	7	4
8	Potassium	-	-	0.4	0.3	0.3	0.4	0.4
9	Chlorides	250	1000	29.9	86.47	82.47	80.1	72.4
10	Sulphates	200	400	5	11	14	12	10
11	Alkalinity	200	600	45	50	40	54	42
12	Acidity	-	-	1.47	1.5	1.4	1.51	1.39
13	Nitrates	45	100	5.72	5.54	3.82	2.45	1.35
14	Flourides	1	1.5	0.18	0.15	0.12	0.11	0.14
15	Dissolved Phosphates as P	-	-	0.2	0.3	0.1	0.2	0.3

Table 9: Major Ions data in steel Industrial area and mine area

Sno	Parameters	Desirable LimitsIS-10500	Permissible limits IS:10500	WTS6	WTS7-Pond	WTS7-Bore	WTS8	WTS9
1	PH	6.5 to 8.5	No relaxation	7.98	7.68	7.83	7.95	8.18
2	EC (µs/cms)	-	-	1768.7	341.9	654.3	968.3	112.9
3	TDS (mg/L)	500	2000	1488.02	229.08	438.38	661.76	745.62
4	Total Hardness (Cac03)(mg/L)	300	600	84	70	86	96	92
5	Calcium	75	200	1.4	2.7	2.4	2.8	3.7
6	Magnesium	30	100	9.5	7.5	6.5	6.8	5.7
7	Sodium as Na (mg/L)	-	-	4	3	4	5	4
8	Potassium	-	-	0.3	0.2	0.4	0.4	0.3
9	Chloride	250	1000	71.2	50.2	40.5	48.5	52.4
10	Sulphates	200	400	14	9	6	10	13
11	Alkalinity as CaCo3 (mg/L)	200	600	40	39	42	48	50
12	Acidity	-	-	1.38	1.29	1.4	1.42	1.49
13	Nitrates as No3 (mg/L)	45	100	4.8	5.7	6.7	7.5	7.2
14	Flouride	1	1.5	0.12	0.9	0.8	0.12	0.9
15	Dissolved Phosphates as P	-	-	0.1	0.2	0.3	0.1	0.1

Table 10: Major Ions data in steel Industrial area and mine area

Table 11: Steel Industrial area and onsite Major Ions Data

Sno	Parameters	Desirable Limits IS-10500	Permissible limits IS:10500	TI1	TI2	TI3	TI4	Onsite
1	PH	6.5 to 8.5	No Relaxation	8.01	8.19	8.73	8.06	7.82
2	EC (µs/cms)	-	-	877.8	1272.7	629.4	430.7	446.9
3	TDS (mg/L)	500	2000	588.13	832.61	421.68	288.58	299.45
4	Total Hardness (Cac03)(mg/L)	300	600	90	94	85	89	74
5	Calcium	75	200	2.4	0.6	0	2.2	3.2
6	Magnesium	30	100	7.01	7.4	8.2	9.6	19.2
7	Sodium as Na (mg/L)	-	-	5	3	3	3	5
8	Potassium	-	-	0.4	0.3	0.2	0.2	0.4
9	Chlorides	250	1000	98.2	89.5	98.5	99.5	89.5
10	Sulphates	200	400	12	15	16	14	13
11	Alkalinity	200	600	52	50	51	52	50
12	Acidity	-	-	1.5	1.49	1.49	1.47	1.48
13	Nitrates	45	100	6.8	7.5	5.7	8.5	7.5
14	Fluorides	1	1.5	0.12	0.14	0.12	0.11	0.12
15	Dissolved Phosphates as P	-	-	0.2	0.2	0.1	0.2	0.2

Table 12: Water samples Major Oxides data

Sample location	Test Method	UOM	Rajapur-WTS-1	Kallahalli-WTS-2	Kariganur-WTS-3	Ingallagi-WTS-4	Vadrahalli-WTS-5	P.K.Halli-WTS-6	Bailvadigiri-(Pond)-WTS-7
Aluminum as Al ₂ O ₃	IS 3025 Part 2	mg/l	0.09	0.04	0.09	0.04	0.06	0.11	5.1
Sillica as SiO ₂	IS 3025 Part 3	mg/l	45.8	35.5	57.1	75.1	79	71	27.4
Titanium as TiO ₂	IS 3025 Part 4	mg/l	0.02	<0.01	<0.01	0.01	<0.01	<0.01	<0.01
Calcium as Cao	IS 3025 Part 5	mg/l	160	156.2	82.8	96.3	133.7	133.7	127.9
Magnesium as MgO	IS 3025 Part 6	mg/l	66.2	63.6	62.1	54.9	55.4	75.9	15.1
Potassium as K ₂ O	IS 3025 Part 7	mg/l	4	5.7	0.24	30.6	1.4	0.6	4.3
Sodium as Na ₂ O	IS 3025 Part 8	mg/l	117.2	132	233.1	154	116.5	273.2	60.8
Phosphorus as P ₂ O ₅	IS 3025 Part 9	mg/l	0.5	0.14	0.05	<0.01	0.18	0.41	0.41

Table 13: Water samples Major Oxides data

Sample location	Test Method	UOM	WTS-7	WTS-8	WTS-9	WTI-1	WTI2	WTI3	WTI-4	G.G.Brosilt Pond/Pit	Jambunath Pit
Aluminum as Al ₂ O ₃	IS 3025 Part 2	mg/l	0.08	0.04	0.08	0.09	0.08	0.09	0.34	3.7	0.6
Silica as SiO ₂	IS 3025 Part 3	mg/l	95.2	113	73.8	79	98	35.1	20.9	14.7	6.6
Titanium as TiO ₂	IS 3025 Part 4	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Calcium as Cao	IS 3025 Part 5	mg/l	117	114.6	171.2	124.2	188.4	96.3	75.9	82.2	39.5
Magnesium as MgO	IS 3025 Part 6	mg/l	30.7	59.9	63.7	20.8	53	34.4	21.4	28.1	22.4
Potassium as K ₂ O	IS 3025 Part 7	mg/l	4.2	5.2	1	1.2	324.6	3	1.9	8.9	1.2
Sodium as Na ₂ O	IS 3025 Part 8	mg/l	84.2	154.2	116.2	143	284.4	73.6	48.9	25.4	34
Phosphorus as P ₂ O ₅	IS 3025 Part 9	mg/l	0.5	0.07	0.37	2	0.2	0.5	0.23	0.41	0.25

The above water samples collected in three different zones Mining area(Mine-1 & 2),Village area and Steel Industrial area.The analysis performed for the heavy metals,major Ions and major oxides.Since the area is iron ore mining area the heavy metal concentraions identified are molybdenum,silicon and strontium are identified with the near by desirable values.With respect to the major ions chlorides concentrations identified in the kalahali and kariganur village areas where as in the steel industrial area huligi hithenhalli,are identified with the increased concentrations.

Mine area: The Heavy metal concentration values are identified in the permissible range in the village some amounts of silica in ingilligi village and molybdenum in dharmasagar village identified at the average levels.PH values identified with the alkaline range.Only the concetraion related to the silicon are identified in the core area.

Village area: The Heavy concentration values are identified in the permissible range in the village some amounts of silica in ingilligi village and molybdenum in dharmasagar village identified at the average levels.PK halli and hosanhalli predicted with the higher values of calcium,magnesium concentrations.

Steel Industrial area: The concentration values are identified in the permissible range in the Steel Industrial area some amounts of silica in Hosahalli and molybdenum in hithanhalli identified at the average levels.calcium,potasium and sodium concentrations identified in the steel industrial area.

Overall concentraions noted are silica,molybdenum in all the regions with the higher ranges.The comparative study of the three different zones idicataes the higher level concentrations of heavymetlals are in village areas like ingilligi and dharmasagar and steel industrial areas like hosanhalli ans hithanhalli villages.Where as major oxides like silica ,calcium and potasium are present in mine silt pond ,Pk Halli village,hosanhalli (steel industrial area).The three different region are noted with the varied concentrations but in the permissile limits only. Further stud may be onducted based on the health aspects of the workers.In the abve study we can see the concetrations are higher in steel industrial area ad village area where compared to the mining area.Hence the level of contamination is Steel industrail area>village area>Mine area.

ENVIRONMENTAL IMPACT ASSESSMENT OF MINES

The continuation extraction of the minerals leads to wide changes in the environmental conditions. Even though many governments have formulated national policies with the proper conservation along with the effective utilization of mineral wealth. The effects like deforestation, employees dis health, and other effects are noticed during the mineral exploration. The study main aim is to justify EIA of mining of the surrounding areas with the environmental conditions and to correlate the effects of water pollution from three different zones with relation to the environmental aspects. The study is not to extract the faults of the mining but to provide the proper plan to protect the natural environment and

health of the laborers spoiled by the mining activity. In this paper, authors have discussed the water pollution along with the mitigation measures. The water samples are collected from the three different zones. The effects of mines and their activity and the complete EIA study with respect to village areas and steel industrial areas is mentioned. The pollution status with respect to water (heavy metal, major ions and major oxides) are mentioned. Concentrations of heavy metals mentioned in three different zones detailed EIA study framed with mitigation measures along with the pollution.

WATER POLLUTION

The complete dust suppressing wash off from waste and tailing dumps, spent water from handling plants, pumping of the mine water, effluents, and runoff water with silt and suspended particles leads to the effects of water and leads to the pollution. Finally, the mineral constituents pollute the surface and groundwater. The water results containing major ions, heavy metals, and major oxides are found adequate. During the mine construction the runoff water and overburden is properly maintained. It is clearly mentioned in the mitigation measures.

MITIGATION MEASURES

Mine management proposes to construct additional 5 gully plugs at about 600m length of retaining wall during first five years to protect silt going from the dump slope to the adjoining area. These gully plugs and the retaining walls reduce the velocity of water and increase the retention time for suspended particles to settle. The dumping of rejection will be systematic with concurrent backfilling with maximum height of 2 m from the extracted pit during first five years and subsequently to a height of only 1m till the life of the mine. This will ensure any silt flowing out of worked.

VIII. CONCLUSION

Iron ore is the leading producer in India. The Indian steel sector achieved a global benchmark in terms of quality standards and quality technology. The entire study states that there is no possibility of encountering groundwater as the mining is carried out on a sloping hill there is no possibility of the leaching of chemicals carry over to the depth. Hence there is no effect of the groundwater contamination in the mining area and the baseline data reveals appreciable adverse impact on water quality but identified to be taken care on the water pollution status, with open cast manual mining methods. But the health condition must be noted for the further studies biological reclamation of backfilled area will be taken up sooner the area becomes inactive. Dumping of backfilling is done eco-friendly without creating the environmental problems. Hence the Environmental impact assessment in the study area is moderate and completely protected and ecofriendly manner. Therefore, the government policy needs to conserve and preserve the iron ore deposits for the consumption to enhance grade of the country. The main emphasis of mining must be taken by the government and mining research institutes for sustainable mining operations within the eco-friendly methods.

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