

Exploitation of Earth Resources in Joda-Barbil Region of Odisha, India: a Prospective of Development

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Abstract

Joda- Barbil area in Keonjhar District of Odisha has vast reserves of high quality Iron and Manganese ore on which the Iron and Steel Industries of Odisha greatly depends upon. It enjoys a strategic location in terms of transport of the ore to East and South-East Asia. In the recent decades, as an effect of globalization of economy, our natural bounties have been opened to international industrial and business communities. Now due to replacement of older tools and technologies of production with the modern efficient ones, the pace of exploitation of mineral resources, universal growth of the economy, ever growing market demands in this area has been multiplied manifolds over the recent years. The unprecedented and widespread growth of industrial activities in this region has created a number of impacts on the natural environment. In the present paper, attempts are made to outline the historical background of exploitation of the resources in the area, impact of the exploitation on the natural environment as well as the response from the environment. Further, efforts have been taken to formulate strategies for management of the negative impacts.

Key words: Joda- Barbil area, Iron and Manganese, Steel Industries, industrial activities.

1. INTRODUCTION

Physiographically Joda- Barbil area is a part of the Middle Mountainous realm of Odisha with old and matured topography which exhibit rugged surface. Elevation of the region is varies between 150 to 600 meter above the MSL (Fig. 1). The area falls in the Survey of India toposheet No. 73F/8. This area is a part of the Jharkhand-Odisha iron ore belt which runs along the northern border of Odisha (Jones, 1934). It stretches westward from Gorumahisani hills of Mayurbhanja district through Keonjhar and Sundergarh district of Orissa upto Singhbhum district of Jharkhand. The iron ore belt runs NNE-SSW direction in a horse-shoe synclinerium (Jones, 1934; Dunn, 1940; Dunn and Dey 1942; Acharya, 2005). The area has multiple approaches both by road and rail. NH-215 runs through the area connecting NH-5 at Panikoili and Rourkela in the other end at Rajamunda. The railway line linking Tatanagar-Nuamundi-Barajamda-Barbil is a part of the Howrah-Chennai rail link which provides connectivity to this area with the river port at Haldia near Calcutta. The other railway line running between Howrah and Mumbai, a part of which connects Banspani-Daitari-Paradeep. Haldia and Paradeep are respectively the riverine port and sea ports available on the eastern coast of Odisha (Fig. 2).

Structures and rock types of the area dates back to Pre-Cambrian era with vulcanism in sequence (Murty and Acharya, 1975, Saha 1977). The Pre-Cambrian volcano-sedimentary rocks of the area comprise

gritty quartzite, volcanics and tuffs, banded iron formations and shale (Sarkar and Saha, 1962, 1963, 1977, 1983; Prasad et al., 1964; Chatterjee and Mukherjee, 1981; Saha, 1994; Mukhopadhyay, 2001).



Fig-1. Physiography of Joda-Barbil mining region
(source: google earth)

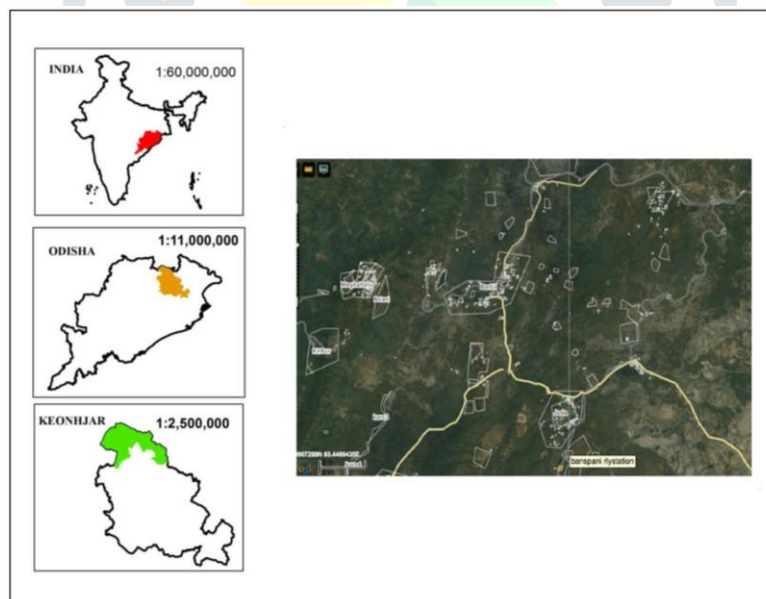


Fig.-2. Location map of the study area

2. INDUSTRIAL HISTORY IN BRIEF

The Banded Iron ore Formation is the host rocks of the huge iron ore deposit and lower manganese shale is hosting the high grade manganese ore (Jones, 1934; Dunn, 1940; Dunn and Dey 1942). Iron ore mining activities started in Odisha in the year 1904, after discovery of Iron ore deposits in Gorumahisani and Badampahad region (Bose, 1908). Even before assessment of the quantity and quality of the ore, a company in the name of 'Bird Company' started initial mining activity in the area in the year 1918. Orissa Sponge-Iron Ltd. brought the dawn of production of sponge iron in the year 1984. This industry was also the first of its kind in Asia.

Mining activity in the area has gained momentum due to availability of high quality iron and manganese ore. Though the reserve area has not been properly demarcated till date, total quantity of reserve is not assessed in exact, still mining of ore is going on by private parties from the leases in their holds. In fact the quality and quantity of the ore available has allured the leaseholders who have assessed the quantity of the available ore as per their own. At present there are 63 no. of working mines (Fig-3) in the region for which the Revenue authority of the area has leased 249.98 square kilometer of land in which it is estimated that 2005.41 million tones of iron ore is available (Table-1). The grade of the ore varies between 60 to 65%. Similarly, there are about 24 non-working mines in the area covering 43.53 square kilometer of land has been leased out, in which the reserve is estimated to be 62.02 million tones (Table-2). The grade of the ore has increased its demand in the international market. In the recent years almost 100% of the fine dust of iron ore is exported to China which was earlier a waste product or a road building material at best.

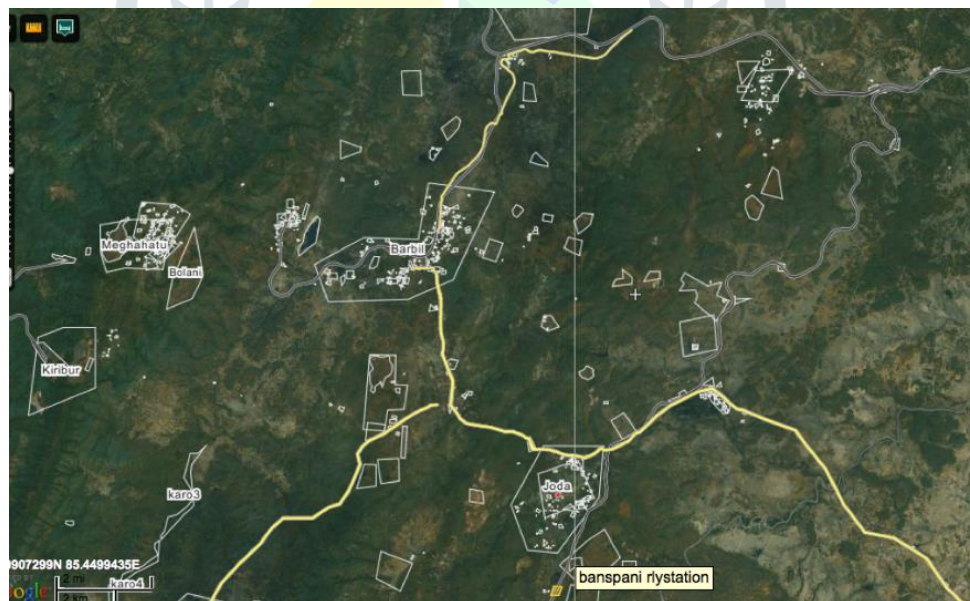


Fig.-3. Area demarcated by white border showing the leasehold of iron ore mines (source: google earth)

Table-1. List of lessees of iron ores in Keonjhar district with reserve and grade

Ref. No.	Name of the Mines	Name of the Lessees	Area in Hectare	Reserve in MT	Avg Grade %
W-1	Gandhamardhan Iron Mines, Block-A	M/S O.M.C. Ltd	618.576	255.20	63
W-2	Gandhamardhan Iron Mines, Block-B	M/S O.M.C. Ltd	1590.8673		63
W-2	Putulpani Iron Mines	M/S G.S.I. Pvt. Ltd.	100.1632	18.32	65.05
W-4	Urumunda Iron Mines	M/S B.D. Agrawala	82.03	0.16	63.5
W-5	Bagiabur Iron Mines	M/S O.M.D.C. Ltd	21.52	1.88	62
W-6	Thakurani Iron Mines	M/S B.P.M.E. Ltd	1546.55	85.01	62.5
W-7	Belkundi Iron Mines	M/S O.M.D.C. Ltd	1276.79	27.59	63
W-8	Bhadrasahi Iron Mines	M/S B.P.M.E. Ltd	254.95	40.26	65
W-9	Bhadrasahi Iron Mines	M/S O.M.D.C. Ltd	99870	54.94	65
W-10	Siljora-Kalimati Iron Mines	M/S M.L. Rungta	715.639	0.30	60
W-11	Jajang Iron Mines	M/S Rungta Mines Ltd	656.150	49.14	60
W-12	Jilling -Langalata Iron Mines	M/S Essel M & Ind Pvt. Ltd	456.100	77.36	63
W-13	Kasia Fe & Dolomite Mines	M/S Essel M & Ind Pvt. Ltd	194.196	89.71	62.5
W-14	Roida -C Iron & Mn Mines	M/S I.D.C. Ltd	192.810	8.71	63
W-15	Nuagaon Iron Mines.Guali	M/S S.K.J.S.Ahluwalia	767.284	70.00	64.3
W-16	Baitarani Iron Mines	M/S Dr S. Pradhan	52.892	2.96	63
W-17	Baitarani Iron Mines	M/S Dr S. Pradhan	34.75	0.86	63
W-18	Thakurani Iron Mines, Block-B	M/S Sarda Mines Pvt.Ltd.	947.046	122.53	63.5
W-19	Gurubeda Iron Mines	M/S S.C.Padhee	49.776	2.13	63.5
W-20	Banspani Fe & Mn Mines	M/S S.C.Padhee	37.838	1.99	62
W-21	Roida Fe Mines II	M/S K.N.Ram	74.867	29.59	62.5
W-22	Balda Iron Mines	M/S Serajudin & Co	335.594	19.10	64.5
W-23	Murgabeda Fe Mines	M/S B.d.Pattnaik	15.378	1.02	65
W-24	Deojhar Fe Mines	M/S Tarini Minerals Pvt. Ltd.	34.365	0.80	65
W-25	Jurudi Fe Mines	M/S Tarini Minerals Pvt. td.	9.63	0.28	63
W-26	Unchabali Fe Mines	M/S S.N.Mohanty	9.63	0.80	65
W-27	Bhulbeda Fe Mines	M/S M.T. syndicate	62.322	0.04	63.38
W-28	Uliburu Fe, Mn & L.St. Mines	M/S B.K.Mohanty	56.94	5.91	63.07
W-29	Thakurani Fe Mines	M/S Kaypee Enterprises	228.04	35.42	63.5
W-30	Surguturia Fe mines	M/S Narayani & sons pvt.ltd	99.784	.20	64
W-31	Jajang Fe Mines	M/S T.B lal	22.69	0.95	63
W-32	Jurudi Fe & Mn Mines	M/S K.M.C	135.569	0.94	63
W-33	Jurudi Fe & Mn Mines	M/S K.M.C	12.690	3.96	63
W-34	Jurudi Fe & Mn Mines	M/S K.M.C	27.170	0.14	63
W-35	Bolani Fe mines	M/S SAIL	1321.45	280.15	62
W-36	Chamakpur Fe mine	M/S K.C Pradhan	31.693	2.18	64
W-37	Lakraghat Fe mines	M/S K.C Pradhan	10.72	1.51	63
W-38	Horomtto Fe & Mn mines	M/S K.C Pradhan	61.05	1.59	63.5
W-39	Jajang Fe & Mn mines	M/S H.G Pandya & others	100.137	4.90	60
W-40	Jaribahal Fe mines	M/S PMP ltd.	106.533	9.13	63
W-41	Roida Fe mines	M/S Mesco ltd	104.68	12.15	64.5
W-42	Kalaparbat Fe mines	M/S B D Pattnaik	25.633	0.47	63
W-43	Inganjharan Fe & Mn mines	M/S Bhanja minerals Pvt. Ltd	246.313	25.61	65
W-44	Jalahari Fe & Mn mines	M/S Malaroy & others	182.109	34	63.5
W-45	Inganjharan Fe & Mn mines	M/S B C Deb	114.93	3.80	65
W-46	Joda East Fe mines	M/S Tisco Ltd	671.093	155	63
W-47	Katamati Fe mines	M/S Tisco Ltd	403.3238	119.78	62
W-48	Khondband Fe & Mn mines	M/S Tisco Ltd	1293.433	86.15	64

W-49	Bamebari Fe & Mn mines	M/S Tisco Ltd	464	0.60	60.5
W-50	Tiringpahar Fe & Mn mines	M/S Tisco Ltd	169.00	N.A	N.A
W-51	Manmora Mn mines	M/S Tisco Ltd	16.35	N.A.	N.A.
W-52	Joda west Fe & Mn mines	M/S Tisco Ltd	1437.719	75.00	60.5
W-53	Banspani Fe mines	M/S O M C Ltd	380.400	12.35	62
W-54	Barpada-Kasia Fe & Mn mines	M/S O M C Ltd	1734.719	4.74	62
W-55	Dubuna-sakradihi Fe mines	M/S O M C Ltd	564.550	14.23	60.5
W-56	Khondbandh Fe mines	M/S O M C Ltd	366.311	4.16	65
W-57	BPJ Fe mines	M/S O M C Ltd	861.521	5.21	64
W-58	Balgunda Fe & Mn mines	M/S Arjun Lodha	326.50	0.80	62.5
W-59	Paredipada Fe & Mn mines	M/S K C Pradhan	12.60	N.A.	N.A.
W-60	Guali Fe mines	M/S R P Sao	365.026	58.80	64.5
W-61	Raika Fe & Mn mines	M/S S D Sharma	26.243	0.50	62
W-62	Kundurupani Fe & Mn mines	M/S R B Das	10.255	0.35	64
W-63	Daitari Fe mines	M/S O M C Ltd	1812.99	84.00	62.5

(Sources: Deputy Director of Mines, Joda Circle, Odisha)

Table-2. List of non -working mines of Keonjhar district.

Ref. No.	Name of the Mines	Name of the Lessees	Area in Hectare	Reserve in MT	Average Grade %
NW-1	Bandubeda Fe mines	M/s Rungta & sons pvt ltd	22.226	N.A	Surrendered
NW-2	Unchbali Fe mines	M/s Essel M& IP Ltd	107.306	17.69	63
NW- 3	Panduliposi Fe&Mn mines	M/s KJS Ahlluwalia	40.47	0.49	60
NW-4	Lnganijharan Fe&Mn mines	M/s Dr. S Pradhan	18.70	1.40	63
NW-5	Near Baitarani Fe mines	M/s Dr. S Pradhan	12.505	N.A	N.A
NW-6	Thakurani Fe&Mn mines	M/s D R Pattnaik	121.385	N.A	N.A
NW-7	Khuntapani Fe mines	M/s S N mohanty	15.378	0.99	63.5
NW-8	Kasia Fe mines	M/s T B LAL	77.50	0.46	63
NW-9	Bolani Fe mines	M/s SAIL	1786.74	N.A	N.A
NW-10	Tiring pahar Fe mines	M/s OMC Ltd	79.30	2.58	62
NW-11	SGBK Fe&Mn mines	M/s OMC Ltd	1011.50	3.14	63.5
NW-12	Dalki Mn mines	M/s OMC Ltd	265.29	N.A	N.A
NW-13	Deojhar Fe mines	M/s Bhanja minerals Pvt ltd	399.02	20	62.5
NW-14	Uliburu Fe quartz&Mn mines	M/s B K Mohanty	62.726	4.58	63.5
NW-15	Dhalpahar Fe mines Block-A	M/s D C Jain	89.961	1.76	63.5
NW-16	Dhalpahar Fe mines Block-B	M/s D C Jain	0.607	N.A	63.5
NW-17	Dhalpahar Fe mines Block-B2	M/s D C Jain	7.689	N.A	63.5
NW-18	Dhalpahar Fe mines Block-B3	M/s D C Jain	1.012	N.A	63.5
NW-19	Dhalpahar Fe mines Block-C	M/s D C Jain	1.902	N.A	63.5
NW-20	Bhulbeda Fe&Mn mines	M/s M R Das	5.139	0.31	62
NW-21	Deojhar Fe mines	M/s M R Das	11.533	0.31	62
NW-22	Unchpali Fe & Mn mines	M/s Indrani Pattnaik	106.1127	6.69	63.5
NW-23	Naibaga Fe&Mn mines	M/s T P Mohanty	99.204	1.61	64
NW-24	Kalparbat Fe&Mn mines	M/s Kusaleswar Minerals.	9.8136	N.A	N.A

(Sources: Deputy Director of Mines, Joda Circle, Odisha)

SUMMARY

Status of mines	Total area in hector	Total reserve in million Tonnes	Grade %
Working mines (W1-W63)	24997.1673	2005.41	60 to 65
Non working mines (NW-1 to NW-24)	4353.0193	62.02	60 to 64
TOTAL	29350.1866	2067.43	60 to 65

The area experienced an industrial boom around 2004 after China started buying iron ore including iron ore fines. Production statistics of six major mines of the area from 2001-02 to 2007- 08 is depicted in figure 4. The trend of production of iron ore over the years in itself justifies the rate of exploitation. The sudden and sharp rise in the production of iron ore after 2003 created huge demand for transporters in the area. Most of the local people get involve themselves in iron ore transport business along with its allied activities.

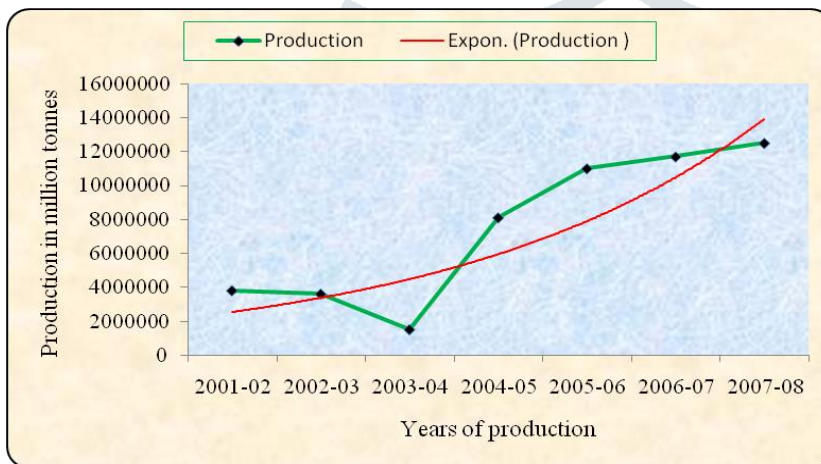


Fig-4. Trend of production of six major iron ore mines in Joda- Barbil region from 2001-2008.

3. INCREASE OF TRANSPORTATION SERVICE

The momentum that crept in mining of the ore has immediately manifested its impact in several ways. Firstly, employment Secondly, the number of trucks plying in the area carrying the ores to the nearest railhead and ports increased tremendously. It is estimated that around 15000 no. of trucks were plying in the area every day, transporting ores during the year 2007-08. Before the year 2004 hardly 1000 trucks were plying everyday in the area. The increase in the number of trucks was primarily due to increased hiring carrying iron ore to rail heads and seaports which were almost double the rate prevailing outside the area for carrying goods other than iron ore (Table 4 and Fig. 5). At the same time the rate of incentive to truck drivers also went up. These factors combined together allured many to start with a lucrative business in transport service.

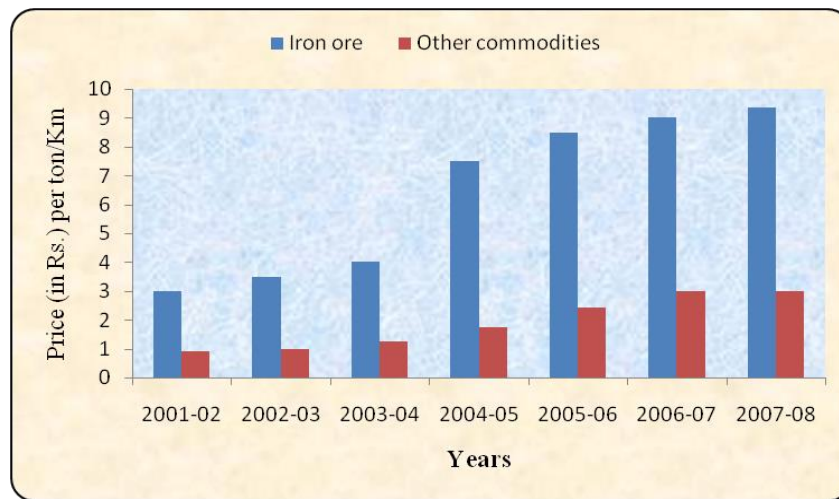


Fig.5 Transport charges of Iron Ore and other commodities on the National Highway- a comparison

Table. 4 Comparison table of transport of iron ore and others goods

Sl No.	Transportation of iron ore from	Destination Point	Appro distance in Km	Charges during the year 2003-05 in Rs	Charges during the year 2005-08 in Rs	Charges during the year 2003-08 in Rs (Mumbai-Kolkata) around 2100 Km
1	Joda-Barbil	Paradeep	320	1500	3200	1900-2100
2	Joda-Barbil	Haladia	350	1000	2000	1900-2100
3	Joda-Barbil	Jharsuguda	300	1000	1900	1900-2100
4	Joda-Barbil	Rourkela	300	900	1800	1900-2100
5	Joda-Barbil	Manpur (Jajpur)	180	950	1850	1900-2100
6	Joda-Barbil	Kenduapada	180	950	1850	1900-2100
7	Joda-Barbil	Sukruli	120	700	1200	1900-2100
8	Joda-Barbil	Angul	260	1000	1800	1900-2100
9	Joda-Barbil	Raipur	475	1525	2500	1900-2100
10	Joda-Barbil	Jintgarh	60	600	100	1900-2100

Golden card was introduced during the year 2001-04 to get permission for overloaded transportation of goods including iron and manganese ores. At that time even 6 wheeler trucks were transported 20 tonnes to 25 tonnes of goods (permissible limit is 9-10 tonnes) and 10 wheeler trucks were transported up to 40 tonnes of material (permissible limit is 15.5-16 tonnes). During that period road net work was severely damaged and provision of Golden card was withdrawn to minimize the damage. But due to plying of large number of vehicle near about 15000 trucks per day on each sides of the roads i.e. on NH-215 and all others rural roads have been worstly damaged and there was no road only imprint of roads with deep pot hall (up to 1.5m depth) On the other hand the area has also experienced positive impact of the mining activities i.e. due to high income from transportation of iron ore from the area and other ancillary mining activities vegetable vendor became the truck owner and many others became the man of lakhs.

4. EVOLUTION OF SPONGE IRON PLANTS IN THE REGION

Keeping in view on vast reserve of high grade hematite iron ore and easy accessible coal in Odisha industrialist of steel sector setup their sponge iron plant in the state. In the year 1979 the Orissa Sponge Iron Limited (OSIL) in association with TFRI and Industrial Promotion and Investment Corporation of Orissa

Limited (IPICOL, A Government of Orissa Undertaking) constructed the first sponge iron plant at Palaspanga area of Keonjhar district of Odisha (Patra et al., 2012). Subsequently, good numbers of sponge iron plants have been emerged as this region offered resources, raw materials, infrastructure, manpower and favorable environment for the steel producer. The impact of iron ore boom during 2004 put impetus to flourish growth of sponge iron plants in the region (Table-5). During the period from 2004-2008 more than 100 numbers (unrecorded growth) of iron ore crusher were engaged for beneficiation activities. Mining and its allied activities provided huge job opportunity to the nearby people and form other part of the state.

Table-5. List of sponge iron plant operating in the Keonjhar district

Sl No.	Name and Location	DRI Kiln No/capacity in TPD
1	Orissa Sponge Iron Ltd. Palaspanga	1x350
2	Tata Sponge Iron Ltd. Bileipada	1x500 2x375
3	Aditya Sponge & Power (P) Ltd. Telkoi, Dubulapal	1x500 2x100
4	Beekay Steel & Power Ltd. Uliburu, Nalda	1x300
5	Crackers India Alloys Ltd. (Sponge) Gobardhanpur, Deojhar	2x100
6	Deepak Steel & Power Ltd. Topadihi	2x50 2x100
7	Deepak Steel & Power Ltd., Uliburu	2x100
8	Grewal Associates, Matkambada, Barbil	4x100
9	Hima Ispat Pvt. Ltd. Barapada, Guali	1x300
10	Kusum Power Met. Ltd Kutugaon, Chipinda	2x50 2x100
11	MSP Sponge Iron (P) Ltd. Haladiaguna, Gabardhanpur	2x40 2x50
12	N.K.Bhojani (P) Ltd. Rugudi, Guali	3x40
13	OMDC Sponge Iron Plant, Thakurani	1x100
14	Orissa Ispat Ltd. ramchandrapur	3x100
15	Rungta Mines (Sponge Iron Division), Karakol	5x100
16	Shri Ganesh Sponge Iron Ltd. Pvt. Kutugaon, Chpinda	2x100
17	Sree Metaliks Ltd. Loidapara	2x50 4x100 1x300
18	Sri Jagannath Mettalicks, Ltd. Khaprakhai, Palasponga	2x100
19	Sumrit Metallicks (P) Ltd. Soyabali, Barbil	2x50
20	Patnaik Steel & Alloys, Purunapani, Dubuna	1x350

(Sources: Pollution Control Board, Odisha)

5. CONCLUSION

Both positive and negative impacts have crept in the region after mining and industrialization gained momentum in the area. In general the labour employment in the area increased significantly. The private mines, industries have provided employment to many. The level of income of the local people has gone up. There has also been a boost in the field of education, electricity water supply and medical services as the industrial houses are bound by law to spare certain part of their turnover for betterment of the local people.

Despite of huge investment, technological up-gradations and upward trend of figures of some of the indicators of human development, the quality of life in the area has shown a down word trend as a negative impact of the development. The earth resources have been depleted at a faster rate that has degraded the quality of the environment as a whole. Forest resources have been very severely affected by the mining and allied activities. Mining activity has adversely affected the flora and fauna of the area. It has brought some of the human occupations like collection of forest products and forest based activities, which were eco friendly were greatly dwindle. There are under arable land has been reduced over the year. Shifting of people from agriculture to other activities has changed the agrarian lifestyles to the modern ones, which is an ecologically hostile life style.

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