

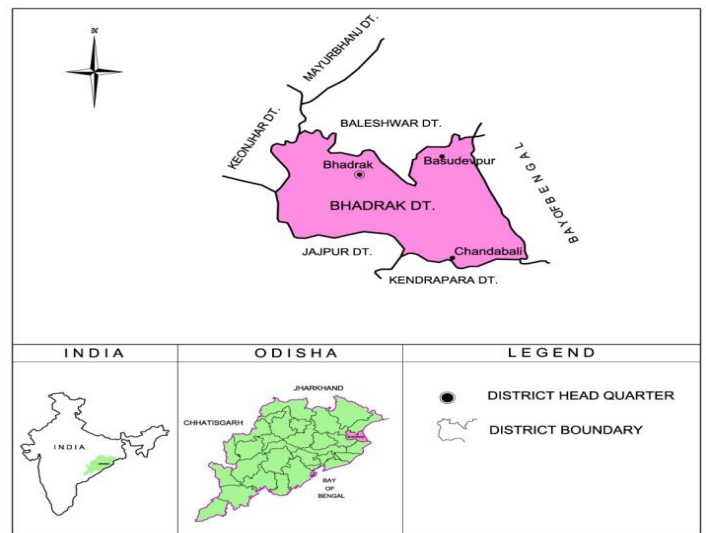
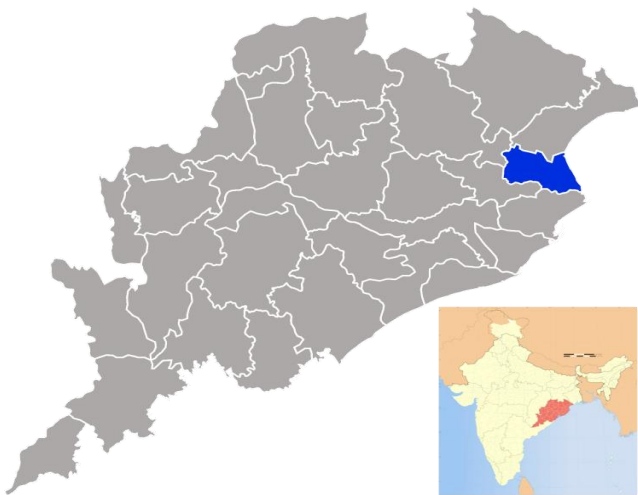


DISTRICT SURVEY REPORT (DSR)
OF
BHADRAK DISTRICT, ODISHA
FOR
RIVER SAND

(FOR PLANNING & EXPLOITATION OF MINOR MINERAL RESOURCES)

ODISHA

BHADRAK



AS PER NOTIFICATION NO. S.O. 3611(E) NEW
DELHI DATED 25TH JULY 2018 OF
MINISTRY OF ENVIRONMENT, FOREST & CLIMATE
CHANGE (MOEF & CC)

COLLECTORATE BHADRAK

PREPARED BY DELAA BHADRAK

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PREAMBLE

Odisha is the major mineral reach in India. Bhadrak is a unique district in Odisha lies on the north-eastern most part of the state with varied mineral resources. In pursuance of the order of Hon'ble Supreme Court Petition (C) No. 19628-19629 of 2009, dated 27th Feb. 2012 in the matter of Deepak Kumar Vs State of Haryana and others etc., prior environmental clearance has now become mandatory for mining of minor minerals irrespective of the area of Mining Lease. And also in view of the Hon'ble National Green Tribunal, order dated the 13th Jan. 2015 the matter regarding Sand, Brick earth, & burrowed earth cutting for Road Construction has to take prior E.C. for Mining Lease area more or less than 5 hectares also suggested making a policy on E.C for minor minerals lease in cluster. As per MOEF & CC Notification S.O.-1533(E) dated 14th Sept. 2006 and subsequent MoEF & CC Notification S.O. 141(E) dated 15th Jan. 2016, District Environment Impact Assessment Authority (DEIAA) & District level Expert Appraisal Committee (DEAC) has been formed for Category –B2 Minor Minerals having area less than or equal to 5 ha. In compliance to the notification issued by the Ministry of Environment and Forest and Climate Change Notification no. S.O.3611 (E) New Delhi dated 25-07-2018; the preparation of District Survey Report of river sand mining has been prepared in accordance with Clause II of Appendix X of the notification.

Keeping in view of the prior information of Odisha Minor Mineral Concession Rule 2004, (OMMCR -2004) the mining operation for minor mineral was carried out in unscientific manner. Identifying this fact in exercise of power, Conferred by Section 15 by Mines and Minerals (Development and Regulation) Act 1957 as amended in 2015 and all other powers enabling it in that behalf, the Mining & Geology Department, Govt. of Odisha framed the aforementioned rule. Further, this report will act as a compendium of available mineral resources, geological set up, environmental and ecological set up of the district and based on data of various departments like Revenue, Water Resources, Forest, Geology and Mining in the

district as well as statistical data uploaded by various state Government departments for preparation for district survey report.

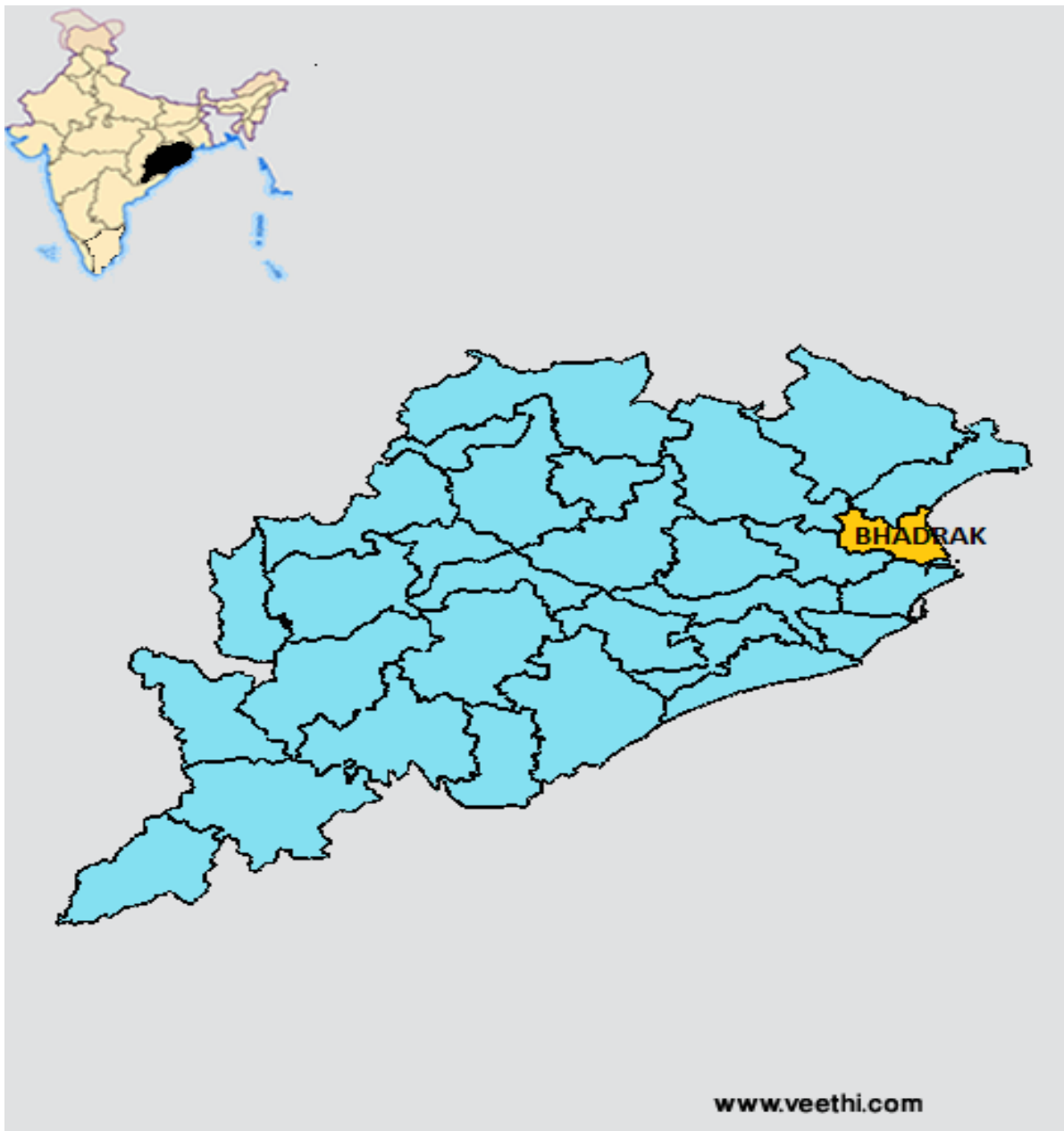
1. INTRODUCTION

Bhadrak at a Glance:

1.1 Location and Geographical Area:

Bhadrak District is an administrative District of Odisha state in eastern India. The District is named after the town of Bhadrak, which is the District headquarters. It came into existence on 1st April 1993. This District has a rich heritage and history and according to legends, it also derives its name from the Goddess Bhadrakali, whose temple stands on the banks of the river Salandi. This District is bounded by Balasore District on the north, Jajpur District and river Baitarani on the south, Keonjhar District on the west and Bay of Bengal and Kendrapada District are on the east. It is located at 21°06' Latitude and 86°50' Longitude. The Bhadrak District covers an area of 2505 Sq. Km. with geographical area of 2,46,529 Hect. The total population of the District is 1,506,337 with total male population as 760260 and female population as 746077. Total SC Population of the District is 286723 whereas the total ST population is 25141. Total OBC Population is 15142. The Bhadrak District has got only one sub division namely Bhadrak. There are 07 Tahasils and 07 blocks functioning in the District. Two Municipality, Two NAC, 17 Police stations, 218 Gram Panchayats are there in the Bhadrak District. The climate of this District is generally hot and humid with May being the hottest month. December is the coldest month with monsoon generally arriving during the month of June. The rainfall during June to October constitutes at least 75 Percent of the actual rainfall of this District. Agriculture is the main source of income of the District. Paddy is grown as the main crop in Kharif, covering approximately 94 Percent of the total cultivable area. But people in the sea coast area (Dhamara, Chudamani of Basudevpur and Chandabali area of Chandabali Block) also depend upon fishing for their livelihood. As per District's economy is concerned Bhadrak District has some big industries like FACOR, one of the largest manufacturers of quality Ferro Chrome in the country and a large number of small industries like AB Electricals, Abhigoura Rice Mill and Aloknath Ice

Factory etc. Bhadrak District has a District Industries Centre, which in addition to the promotion of the different industries, performs other functions like implementation of different self employment programmes. There are many historical places and monuments to visit in the **Bhadrak District**. Palia is **famous** for Biranchi Narayan Temple. Sri Radha Madanmohan Temple is one of the most visited temples of Bhadrak District. Aradi situated at a distance of 10 km from Chandabali is famous for the temple of Akhandalamani.



1.2 Administrative Units:-

Bhadrak is the administrative headquarter of Bhadrak district. It is located at a distance of 130 km from Bhubaneswar, state capital of Odisha. In order of size, the district is the one of the 2nd largest costal districts of Odisha. It has 1370 villages covering 7 Blocks, 7 Tehasils. The district is divided into 7 Blocks & Tehasils, namely i) Bhadrak N ii) Basudevpur iii) Bhandaripokhari iv) Bonth v) Chandabali vi) Dhamnagar vii) Tihidi. The population of the district 15, 06,337 according to the 2011 Census. As per provisional reports of Census India, population of Bhadrak in 2011 is 1,07,463; of which male and female are 55,090 and 52,373 respectively. Although Bhadrak city has population of 107,463; its urban / metropolitan population is 129,228 of which 66,320 are males and 62,908 are females.



1.3 Connectivity facilities:-

Road Network

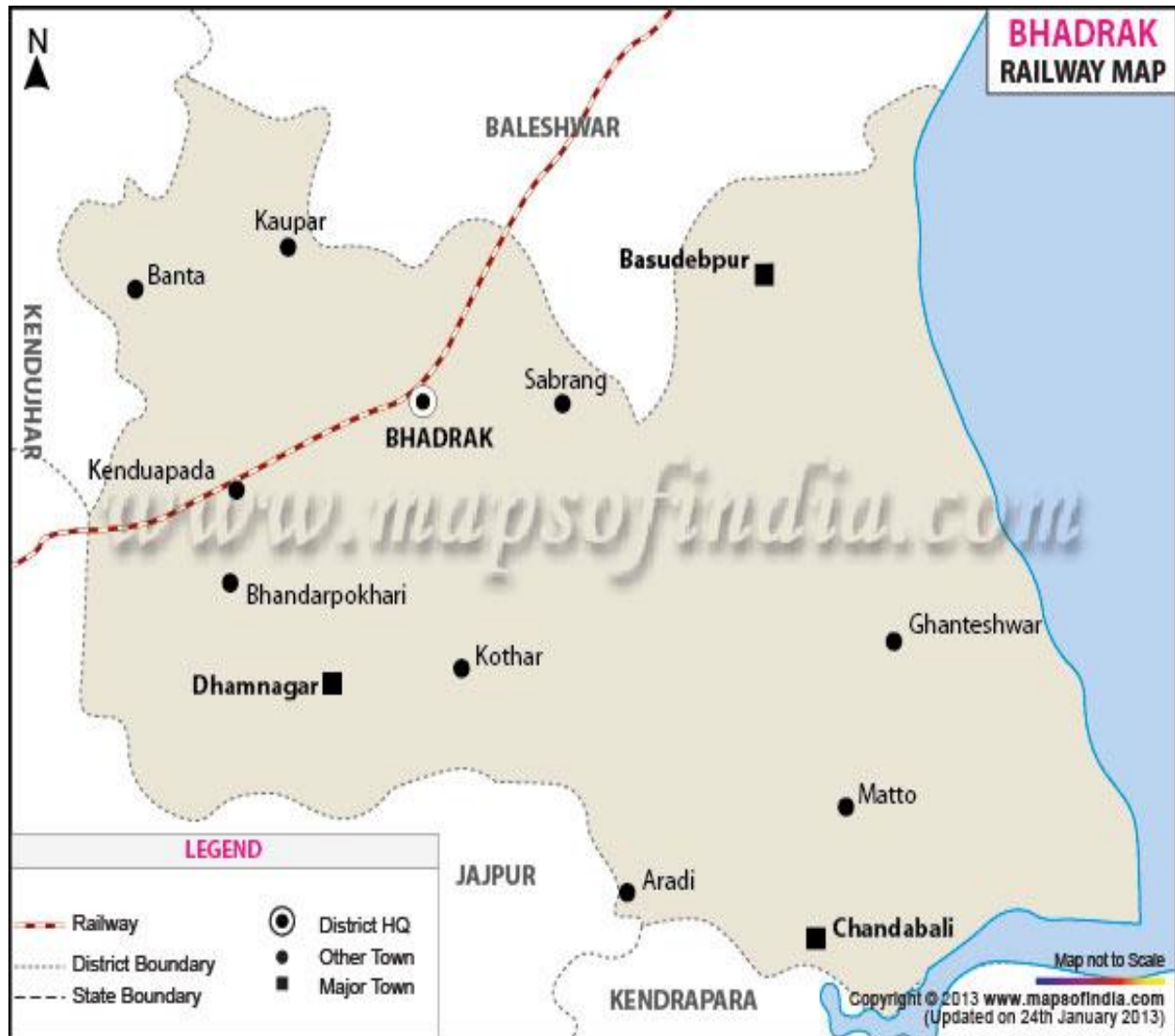
The district is well served by a network of good roads and has been called the motorists paradise. The chief roads emanating from Bhadrak town are NH-16 and NH-60 passes the district. Bhadrak is 60 Kms from Baripada, 122 Kms from Kharagpur, 199 Kms from Jamshedpur, 177 Kms from Cuttack, 199 Kms from Bhubaneswar and 226 Kms from Rourkela. It is also connected with other cities such as Sambalpur, Puri, Bolangir, Bhadrak, Jhargram, Angul, Ranchi and Kolkata via Odisha State Road Transport Corporation and some private travel services.



Rail Network

Bhadrak district is well connected by rail link to different places, Bhadrak railway station is an important station on the Howrah-Chennai main line of the South

Eastern Railway. The distance to Kolkata is approximately 288 km, while the distance to Bhubaneswar is about 131 km; the city of Bhadrak is well connected to many places in India like Baripada, Bhubaneswar, Kolkata, Jamshedpur and Cuttack,



Air Network

At present, Bhadrak has no connection by airway. The site selection for aerodrome is presently under process. Nearest airport is Biju Patnaik Airport, Bhubaneswar, 114 Kms from Bhadrak. Netaji Subhas Chandra Bose International Airport in Kolkata is 254 Kms from Bhadrak.

3.0 LIST OF MINING LEASES WITH LOCTION, AREA, AND PERIOD OF VALIDITY IN THE DISTRICT:

3.1 List of Mines is operation in the district:

Attached as Annexure-I

3.2 List of Mines is not operation in the district:

Attached as Annexure-I

4.0 DETAIL OF ROYALTY OR REVENUE RECEIVED IN LAST THREE YEARS:

Sl. No.	Name of the Tahasil	2016-17	2017-18	2018-19	Total Amount (Lakh)
1	Bhadrak	0	0	1353291	1353291
2	Basudevpur	0	0	0	0
3	Bhandaripokhari	1181203	1181203	1181203	3543609
4	Bonth	0	0	108500	108500
5	Chandabali	0	0	620000	620000
6	Dhamnagar	473438	312006	925232	1710676
7	Tihidi	0	0	0	0
Grand Total		1654641	1493209	4188226	7336076

5.0 DETAILS OF PRODUCTION SAND OR BAJRI OR MINOR MINERAL IN LAST THREE YEARS:

Details of Production in Cum:

Sl. No.	Name of the Tahasil	2016-17	2017-18	2018-19	Total in Cum.
1	Bhadrak	0	0	4381	4381
2	Basudevpur	0	0	0	0
3	Bhandaripokhari	12480	12480	12480	37440
4	Bonth	0	0	0	0
5	Chandabali	0	0	4000	4000
6	Dhamnagar	18186	6866	1809	26861
7	Tihidi	0	0	0	0
Grand Total		30666	19346	22670	72682

6.0 PROCESS OF DEPOSITION OF SAND OR BAJRI OR MINOR MINERAL IN LAST THREE YEARS:

Sl. No.	Name of the River	Financial Year	Process of Deposition of Sediments
1	Baitarani	2016-17	Modorate
		2017-18	---do---
		2018-19	---do---
Total Volume of Sand in three years			
2	Salandi	2016-17	Slow
		2017-18	---do---
		2018-19	---do---
Total Volume of Sand in three years			
3	Dhamara	2016-17	Slow
		2017-18	---do---
		2018-19	---do---
Total Volume of Sand in three years			
4	Mantei	2016-17	Slow
		2017-18	---do---
		2018-19	---do---
Total Volume of Sand in three years			
5	Kapali	2016-17	Slow
		2017-18	---do---
		2018-19	---do---
Total Volume of Sand in three years			
6	Genguti	2016-17	Slow
		2017-18	---do---
		2018-19	---do---
Total Volume of Sand in three years			

Total Volume of Sand in three years			
7	Kochila	2016-17	Slow
		2017-18	---do---
		2018-19	---do---
Total Volume of Sand in three years			
Grand Total			

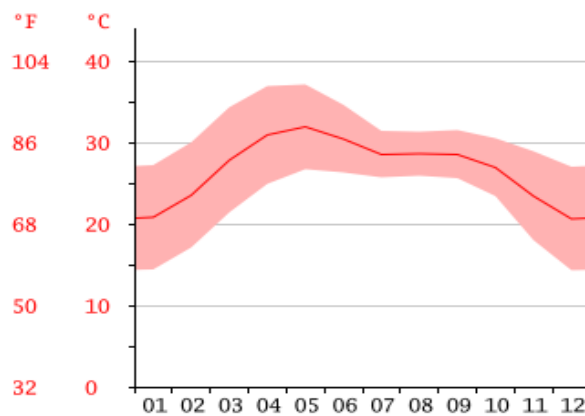
7.0 GENERAL PROFILE OF THE DISTRICT:

7.1 Demography:

Census - 2011	
Geographical Area	2505 Sq. Km.
Total population	15,06,337
Male Population	7,60,260
Female Population	7,46,077
Male Literacy	6,81,192
Female Literacy	5,65,526
Rural Population	13,20,499
Urban Population	1,85,838
Schedule Cast Male	1,68,687
Schedule Cast Female	1,66,209
Schedule Tribe Male	15,361
Schedule Tribe Female	15,067

7.2 Climate:

The climate in Bhadrak has a tropical climate that is warm and temperate. In winter, there is much less rainfall than in summer. This location is classified as Aw by Köppen and Geiger and this climate classification is Cwa. May is the warmest month of the year. The temperature in May averages 38.8 °C. January has the lowest average temperature is 14.8 °C of the year. In a year, the average rainfall is 1530 mm. There is a difference of 320 mm of precipitation between the driest and wettest months. During the year, the average temperature of Bhadrak District is 26.8 °C. (Source:-Indian Meteorological Department).



8.0 LAND UTILIZATION PATTERN IN THE DISTRICT

8.1 Forest and non forest land

The forest of this division of Bhadrak district covers almost pure mangrove forest and its few associates. The important species present including plantations are *Avicennia alba*, *Ipomoea pes-carpae*, *Canavalia maritime*, *Hydrophlyx maritime*, *Sesuvium portulacastrum*, *Casuta reflexa*, *Avicennia marina*, *Avicennia officinalis*, *Sonneratia alba*, *Sueda maritime*, *Sesuvium portulacastrum*, *Casuarina equistifolium*, *Azadirachata indica*, *Pongamia pinnata*, *Opuntia stricta*, *Ficus bengalensis*, *Calotropis gigantia*, *Ziziphus oenoplia*, *Acacia auriculiformis*, *Tamarindus indica*, *Borassus flabellifer*, *Sueda nudiflora*, *Vernonia cinera*, *Tylophora tenuissima*, *Ipomoea tuba* etc. A wide range of carnivorous & herbivorous wild animals also available in this forest. The district has no Wildlife Sanctuaries. The mangroves support rich marine life including crabs, prawns, mudskippers and variety of fishes which form the base of biological pyramid. Besides, mangrove sustains a wide range of reptiles like water monitor lizards, pythons, king cobras, kraits, other snakes and mammals such as fishing cat, mongoose, otter etc. The mangrove wetland serve as a potential habitat for variety species of birds. Apart from that, the rivers like Baitarani, Mantei and Salandi supports fauna like crocodiles.

District-wise Forest Cover Area in Odisha (Area in Km²)

2017 Assessment								
District	Geographical Area Km ²	Very Dense Forest	Moderate. Dense Forest	Open Forest	Total	Percent of GA	Change	Scrub
Angul	6375	371	1380	1004	2755	43.22	43	84
Bolangir	6575	70	224	837	1131	17.2	151	142
Balasore	3806	23	127	234	380	9.98	30	48
Bargarh	5837	176	371	484	1031	17.66	88	47
Bouda	3098	263	546	480	1289	41.61	27	57
Bhadrak	2505	0	9	66	75	2.99	2	0
Cuttack	3932	53	226	517	796	20.24	11	68
Deogarh	2940	191	667	614	1472	50.07	-3	14
Dhenkanal	4452	174	418	825	1417	31.83	9	82
Gajapati	4325	84	1490	946	2520	58.27	12	262
Ganjam	8206	164	1075	864	2103	25.63	15	655
Jagatsinghpur	1668	0	5	131	136	8.15	6	0
Jajpur	2899	6	72	225	303	10.45	3	50
Jharsugada	2114	3	140	179	322	15.23	9	36
Kalahandi	7920	362	729	1327	2418	30.53	36	362
Kandhamal	8021	661	2588	2143	5392	67.22	16	380
Kendrapada	2644	84	88	133	305	11.54	14	2
Keonjhar	8303	289	1404	1519	3212	38.68	4	55
Khorda	2813	21	186	250	457	16.25	0	92
Koraput	8807	94	740	1255	2089	23.72	120	944
Malkangiri	5791	158	709	1475	2342	40.44	20	45
Mayurbhanj	10418	1335	1718	1027	4080	39.16	42	34
Nabarangpur	5291	168	428	507	1103	20.85	8	47
Nayagarh	3890	189	965	556	1710	43.96	28	173
Nuapada	3852	86	482	705	1273	33.05	33	109
Puri	3479	0	54	160	214	6.15	8	11
Rayagada	7073	422	853	1851	3126	44.2	7	349
Sambalpur	6624	499	1675	1106	3280	49.52	13	40
Subarnapur	2337	2	187	161	350	14.98	26	29
Sundargarh	9712	1019	1814	1431	4264	43.9	107	89
Grand Total	155707	6967	21730	23008	51345	32.98	885	4306

(Source: India State of forest report 2017-Odisha)

The very less portion of the district is covered by forest (2.99 % of TGA) and has scattered settlement pattern. The forest is full of variety of medicinal plants, kendu leaves, bamboo, sal, teak and other timber species. The district has considerable flat land, which provide suitable site for agricultural use. The hilly areas are mostly under forest with patches of cultivation on scarp areas. Major crops grown in the district are rice and pulses. Only 16.35 percent area of agricultural use are net irrigated and major source of irrigations are well and tube wells.

Tahasil	Forest Area	Misc Tree	Permanent Pasture	Cultivated waste	Non Agricultural uses	Barren land	Current Fallow	Other Fallow	Net area sown
Basudevpur	32	583	1682	1955	3994	382	250	800	29321
Bhadrak	-	762	1493	1664	4288	32	840	872	21502
Bhandari Pokhari	-	220	1551	737	2862	884	418	260	16873
Bonta	-	268	1536	705	3332	1	143	607	18727
Chandabali	-	415	2764	2200	7129	362	2460	271	39602
Dhamnagar	-	727	852	1496	1981	-	694	405	18706
Total									

8.2 Agriculture Land:

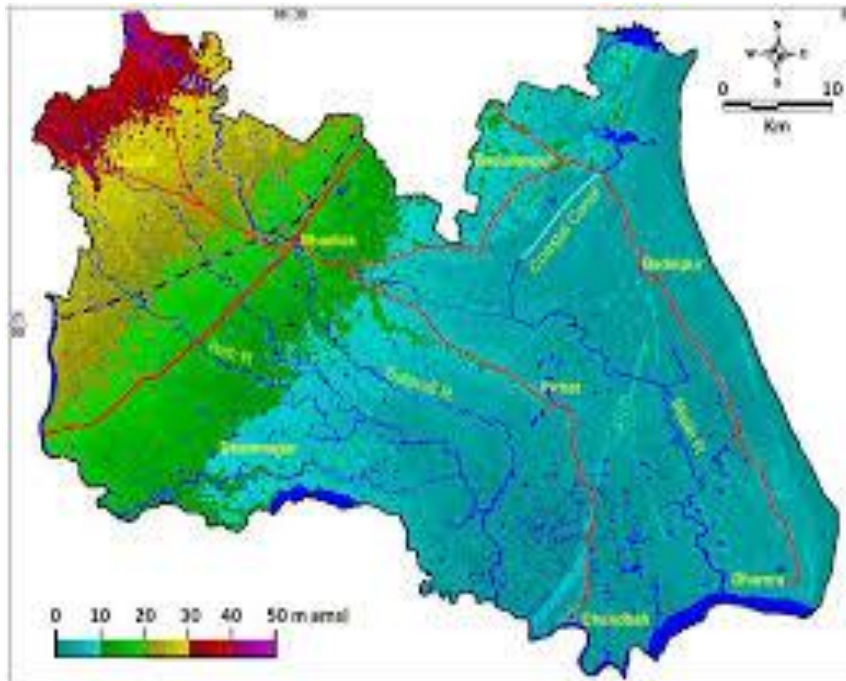
The primary objective of Agriculture Department is increase of production as well as productivity of major crops like paddy, groundnut, mustard, Mung, Biri & vegetables which is widely covered in this District in both Kharif & Rabi season. Another key objective is the all round development of the farming community of the District. At present the district has one Deputy Director, 2 District Agriculture Officers (DAO) and 119VAWs to implement to supervise agricultural programme of the district. Before at became a separate district, Bhadrak was an agricultural district since 1960. A Krushi Vigan Kendra has been established at Ranital since 2004 for taking farm testing, demonstration and production of quality seeds and awareness program. Rice is the principal crop grown in this district, followed by other cereals, pulses, oilseeds, vegetables, spices and sugarcane. The agricultural statistics for the district is shown in subsequent tables below:

8.3 Horticulture Land:

The primary objective of Horticulture Department to increase the production as well as productivity of major fruits like Mango, Guava, Citrus etc., which is widely covered in this District. Another key objective is the all round development of the farming community of the District. The Deputy Director of Horticulture is the head of office. The horticulture statistics for the district is shown in subsequent tables below:

9.0 PHYSIOGRAPHY OF THE DISTRICT:

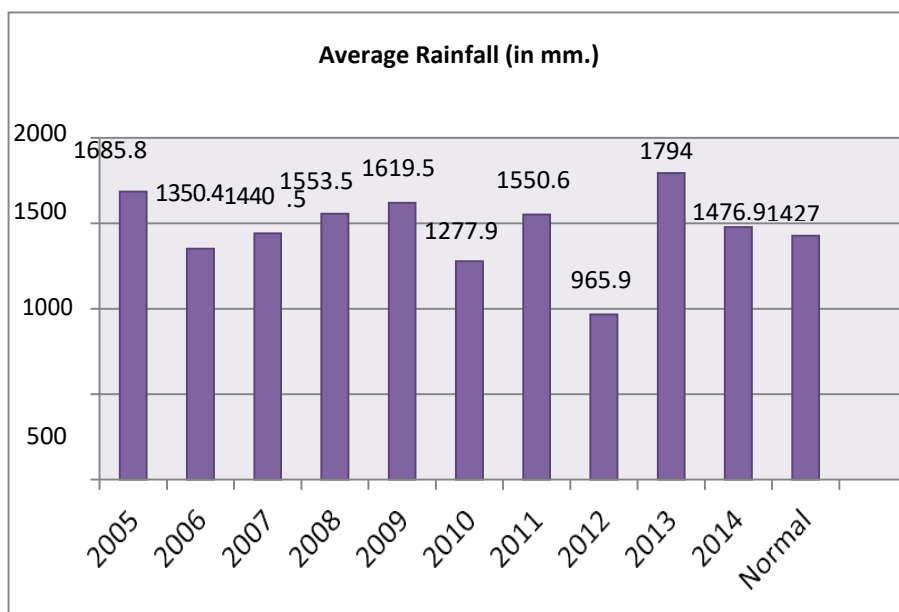
The District of Bhadrak is having unique physiographic setup. It is bounded by Balasore District on the north, Jajpur District and river Baitarani on the south, Keonjhar District on the west and Bay of Bengal & Kendrapada District on the east part it is marked by a set of hillocks and mounds. The land elevation varies from as low as near mean sea level in the eastern part. A major part covering more than 75% of the geographical area is having elevation within the range of 2-10 meters above mean sea level. In the extreme eastern part of the district, within the alluvial tracts of the River Salandi & Dhamara etc. the average elevation is within 1 – 2 meters above mean sea level. The gently sloping alluvial plain occurs to the west of the coastal plain and forms the most fertile part of the district. The alluvial plain can be further divided into two i.e. (i) Older alluvial plain (ii) Younger alluvial plain. The North-western part of the district constitutes the older alluvial plain. This is attributed mainly due to earlier cycle of deposition of sediments carried by rivers / streams and constitutes gravel, sand, and clay. At places, lateritisation at the top down to a depth of few meters has also occurred. The younger alluvial plain spreads over a large area and it represents major part of the district. This has developed due to depositional activities of the major river systems in a fluvial environment. It also encompasses geomorphic units like palaeo channels, meander scars, ox-bow lakes of smaller dimensions.



10.0 RAINFALL OF THE DISTRICT AND CLIMATE CONDITION

10.1 Month wise rainfall:

The annual normal rainfall of Bhadrak District is 1428 mm. More than 75% of the precipitation is concentrated over 5 months from June to October. The district is characterized by tropical monsoon climate having three distinct seasons in the year, viz. winter, summer and rainy seasons. The Bay of Bengal, which forms the eastern boundary of the district, plays a prominent role in controlling the climate of the district. The winter commences from late November and continues till end of February. The winter is followed by the summer season, which extends up to mid June. During the period between April and May, 3 to 4 cyclonic storms accompanied with rains generally occur in the district. The rainy season sets-in at the advent of the southwest monsoon, generally from the middle of June and continues till end of September. The relative humidity, on an average, varies from 40 to 90% during the year and during monsoon it is much more. The mean monthly potential evapotranspiration varies from 4.51 cm during January to 27.68 cm during May



Year		2016	2017	2018	Average
Sl. No.	Month	(mm)	(mm)	(mm)	(mm)
1	Jan	0	0	0	0
2	Feb	51.11	0	0	17.03
3	Mar	3.40	32.90	0	12.10
4	Apr	4.71	7.00	103.90	38.53
5	May	233.00	44.89	139.39	139.09
6	Jun	178.73	169.24	227.80	191.92
7	Jul	324.32	275.37	322.26	460.975
8	Aug	309.21	215.40	293.96	272.85
9	Sep	257.01	120.87	455.54	277.80
10	Oct	88.63	242.03	229.51	186.72
11	Nov	56.71	75.61	0	44.10
12	Dec	0	15.60	3.26	6.28
Total		1506.83	1198.91	1775.62	1647.395

The Indian Meteorological Department, Bhubaneswar, vide Letter No. BBS/RMC/CS-312, dated 18th January, 2016 has provided the period of Rainy Season viz. Normal dates of Onset and Withdrawal of South West Monsoon over India as state-wise. The duration for the period is 10th June to 15th October.

11.0 GEOLOGY AND MINERAL WEALTH OF THE DISTRICT:

11.1 Geology:

The coastal tract of Orissa is underlain by the Tertiary and Quaternary Formations. Bhadrak is a unique district in Odisha with varied geology, of these the Tertiaries are least exposed on the surface, whereas the Quaternaries are extensively developed along the coast and further inland. The Quaternary Formations cover almost the entire study area while the Tertiaries are exposed near Baripada town and extended towards Bhadrak. The Pre-Cambrian ciystallines occur as hills and mounds in the west just outside the present area. Chatterji and Raghava Rao (1960) made studies on the sub-surface geology and tectonic framework of sedimentation in the crescentic coastline of Bhadrak. Exploratory drilling reveals that in the subsurface the warped Pre-Cambrian basement is overlain by Miocene marine sediments, Mio-Pliocene estuarine sediments, laterites and alluvium. The Mio-Pliocene sediments and alluvial sections contain the principal ground water reservoirs. The marine sediments are dominantly composed of finer elastics and non-clastics (Bhatnagar *et al*, 1970). Small outcrops of ultramafic rocks are exposed in and around Bhalukasoni area under Nilgiri subdivision of Balasore district. Ultramafic rocks comprising serpentinitised dunite, peridotite and pyroxenite largely under soil and laterite cover intermittently spreading over an area of 1.8m × 800m. A 100m long E-W trench has exposed two chromite ore bodies on its either end, the dimensions being 500m × 3.5m × 4.5m and 5.5m × 2m × 3.3m lying within a plutonic mass of gabbroic rocks.

11.2 Geomorphology:

The district presents gently undulating to flat topography with the altitude varying from 37m in the North-Western part to around 3m, in the extreme eastern part along the coast line. The general slope is towards east and south-east which varies from 5 to 1.1 meter per kilometer from North West to south east. The district can broadly be divided into four distinct geomorphic units (1) Tidal flat (2) Coastal plain (3) Alluvial plain (4) Flood plain. The fine sediments carried by the rivers get deposited along the coast because of tidal action, as

tidal flat / mud flat. The width of this tidal flat varies from 2 to 5 Kms. Tidal flats and mud flats support growth of varieties of mangrove. The coastal plain is a gently sloping plain occurring parallel to the coast and mainly formed by fluvio-marine action and is intersected by network of creeks, which are mainly saline due to tidal action. The area is marshy with shrubby vegetation. The width of this coastal plain varies from 5 to 25 Kms. The coastal plain encompasses a series of beach ridges characterized by sand dunes of varied relief and extends for kilometers, almost parallel to the coast. Dhamra Coast. Of the five islands, Outer Wheeler is the biggest with an area of Ac. 263.13 and the other islands are Coconut Island (Ac. 97.50), Long Wheeler (Ac. 52.50), Shortts Island (Ac.41.25) and Small Wheeler (Ac.10.63) .These islands have been handed to Defence Research and Development Organization (DRDO) and the outer Wheeler Island has been developed as a Missile Launching Station and related research activities. Now the Government has re-named the island as "A.P.J Abdul Kalam Islands" in fond memory of Late President Dr. APJ Abdul Kalam. "A.P.J Abdul Kalam Islands" in fond memory of Late President Dr. APJ Abdul Kalam.

11.3 Stratigraphy:

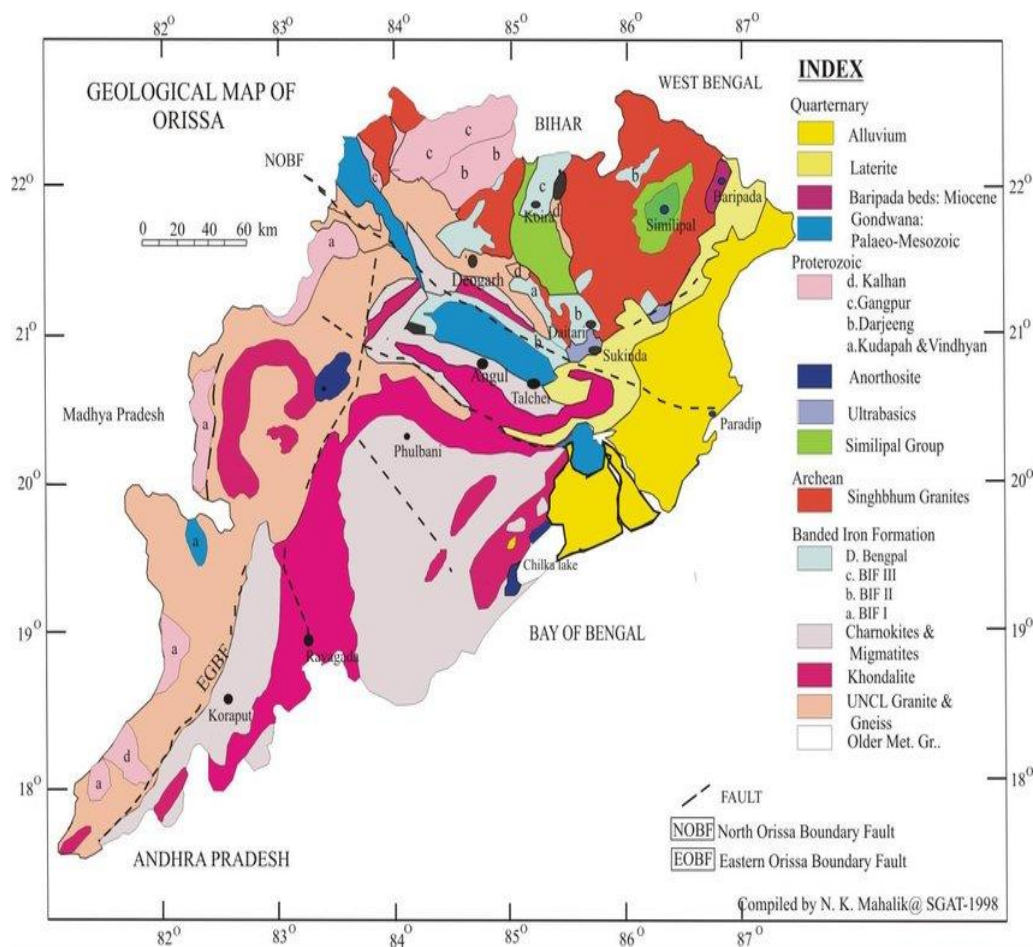
The study area comprises the following distinct geomorphic units:

- i) Younger alluvial plain
- ii) Older alluvial plain
- iii) Lateritic upload

<u>Geological Age</u>	<u>Geological Formation / Group</u>
Quaternary	: Recent Alluvium, Clays, silt, Sand, Gravel
Tertiary	: Older Alluvium, Laterite, Baripada Beds.
Mesozoic/ Palaeozoic	: Volcanics / Epidiorite
Precambrian	: Slate/ Phyllite/ Schist / Gneiss
Archean	: Granite/ Granite Gneiss

11.4 Mineral Resources:

Minerals like minor minerals, stones, sands & Soils are available in the district. The deposits of granite stones provides tremendous scope for development of few more industries based on this resources. Except these, no other mineral deposits which can be explored for commercial purpose found in the district. As the district boundary are situated the adjacent to Jajpur district a Charge Chrome Plant situated in D.P. Nagar at about 04 KMs towards the West of Bhadrak Town in the Village Randia has been set up by M/S Ferro Alloys Corporation Ltd. It has commenced production since 7th March. 1983. At present 1,000 persons are working in this unit. The basic raw materials of this industry is Chromite which is procured from Boula Mines of Keonjhar Dist. and Sukinda Valley Mines of Jajpur Dist. It is an Export oriented Industries and its product are being exported to the countries of Europe and Japan etc. However, it has not spawned any downstream industries.



11.5 Soil:

Three types of soils, viz. Alfisols, Aridisols and Entisols occur in the district. As per agro-climatic classification, the district falls under North Eastern Coastal plain.

Alfisols: These include deltaic and older alluvial soils. The deltaic soils are found along the course of Baitarani River while the older alluvial soils occur in the extreme north-western part. The deltaic alluvial soils are generally deficient in phosphate (P₂O₅) and nitrogen (N). Both the total and available potassium (K₂O) are fairly adequate and pH varies between 6.5 and 7.3.

Aridisols: These are saline and saline alkali soils, occurring along the coastal area and are rich in calcium, magnesium and also consist of half decomposed organic matter.

Entisols: These soils include coastal alluvial soils, which are deficient in nitrogen, phosphoric acid and humus, but not in potash and lime. The soil texture varies from loam to clayey loam. It is alkaline in nature and the most fertile soil in the area

a) DRAINAGE SYSTEM WITH DESCRIPTION OF MAIN RIVERS:

The district has considerable flat land, which provide suitable site for agricultural use. The hilly areas are mostly under forest with patches of cultivation on scarp areas. Major rivers flowing in the district are Baitarani, Salandi, Mantei & Genguti. Major crops grown in the district are rice, only. 16.35 percent area of agricultural use are net irrigated and major source of irrigations are wells and tube-wells.

Sl. No.	Name of the River	Area drained (Sq. Km.)	% Area drained in the District
1	Baitarani	14482	23%
2	Salandi	1473	100%
3	Dhamara	65	2.5%
4	Mantei	659	26.30%
5	Kapali	107	4.27%
6	Genguti	323	12.89
7	Kochila	28	1.1%

b) Salient Features of Important Rivers and Streams:

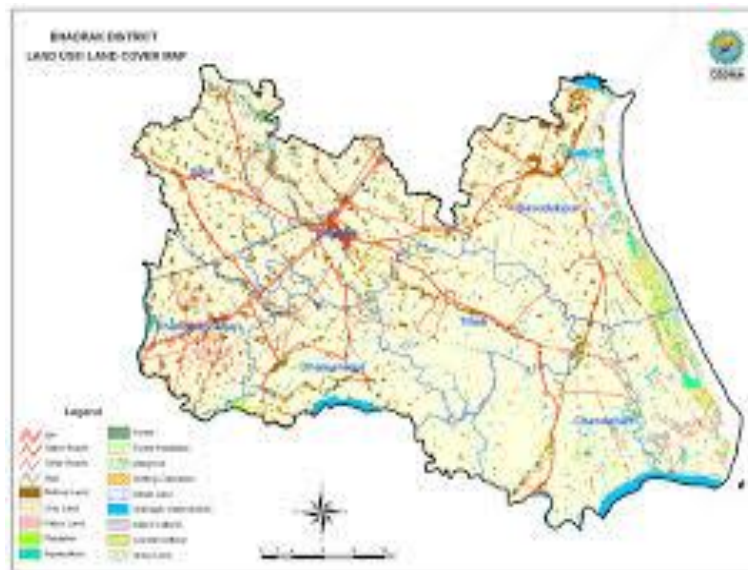
All the rivers have their source inside the State and thus they are midstreams and shortstreams. The main Rivers of the District are (1) Baitarani, (2) Salandi, (3) Gamei, (4) Kansbans, (5) Mantei, (6) Kochila, and (7) Genguti, etc. The river system in the district is classified mainly into two categories i.e (i) Baitarini River System and (ii) Salandi River System. The main distributaries river of Baitarini are Genguti and Kochila. Kapali and Mantei are the tributaries of Salandi. Maps indicating river Baitarani and Salandi systems are at annexure. Baitarani rises among the hills in the north-west of Keonjhar District (Gonasika) and enters Bhadrak near Balipur. After flowing in a winding easterly course across the delta, it marks the boundary line between Jajpur and Bhadrak districts. After crossing National Highway, Baitarani branches out to a delta. Salandi also branches out to a delta. Some of the distributaries join together to form Dhamara river. Dhamara was an important port and had an important advantage. Owing to the multiple rivers originating in different catchments, the flow of water in Dhamara river was continuous. Besides, several branches of the rivers formed estuaries, providing another dependable source of water. The Dhamara river remained desilted and had good tidal flow. Baitarani is navigable as far as Olekh, 24.15 k.m from Dhamara mouth; but beyond this point, it is not affected by the tide and is fordable moderately only during the hot season. The river is subject to annual heavy floods which travel inland to an average distance of 6.44 k.m to 19.32 k.m., when it causes considerable damage to the standing crop. A weir has been constructed across the stream at Akhuapada in order to dam the water during the dry season and supply water to the High Level Canal between that place and Bhadrak. Kochila is a distributary of river Baitarani and bifurcates from the main river at Ramarakul under Dhamanagar block and after running a length of 10 kms merges with river Baitarani at Saanlpur village under Dhamanagar block. Genguti is a distributary of river Baitarani and bifurcates from the main river near Anandpur under Keonjhar district. After crossing Dhamanagar and Tihidi blocks it merges with river Salandi at Nandpur under Chandabali block. The Mantei (in earlier records of colonial government called Matai) brings down the drainage of

the country between the Kansbansh and the Salandi and after a tortuous course over a muddy bed and between densely wooded banks, joins Dhamara near its mouth. This river attains a considerable volume at Charbatia, where it is joined by the Coast canal. It is tidal as far as Rukunadeipur, 12.88 km. east of Bhadrak and is navigable up to that point by country boats.

1	2	3	4	5
Sl. No.	Name of the River or Stream	Total Length in District (in Km.)	Place of Origin	Altitude at Origin
1	Baitarani	10	Gonasika, Guptaganga Hills, Keonjhar	900 mrl
2	Salandi	88	Hadagarh Reservoir (Baula R.F)	335 mrl
3	Dhamara	17	Brahmani-Baitarani Chandbali	Below 20 mrl
4	Mantei	60	Narendrapur.	---do---
5	Kapali	8	Kansbans	---do---
6	Genguti	51	Baitarani	---do---
7	Kochila	12	---do---	---do---
6	7	8	9	10
Portion of River or Stream Recommended for Mineral Concession	Length of area Recommended for Mineral Concession (in Km.)	Average width of area Recommended for Mineral Concession (in meter)	Area Recommended for Mineral Concession (in Sq. meter)	Mineable mineral potential (in metric ton) (60%of total mineral potential)
Details enclosed in Annexure-I				

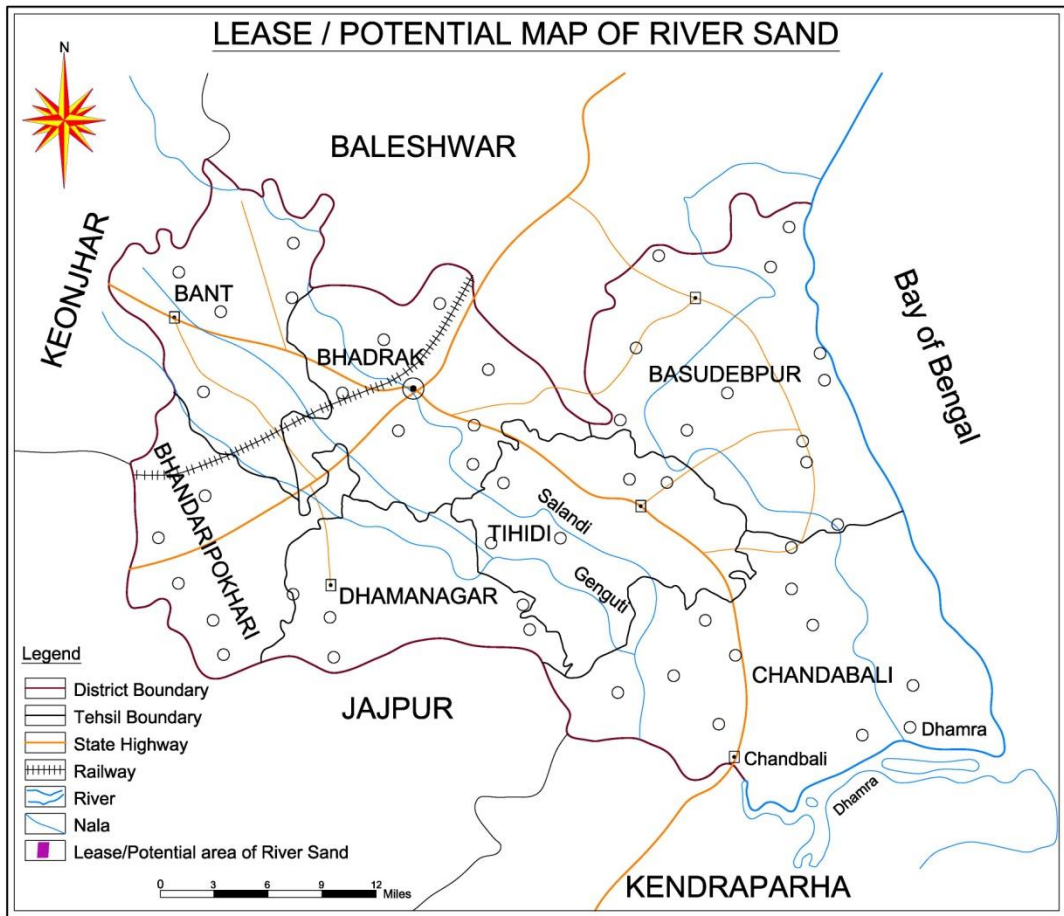
Mineral Potential				
Name of the River or Stream	Boulder (MT)	Bajri (MT)	Sand (MT)	Total Mineable Mineral Potential (MT)
Baitarani	Nil	Nil	209477	149477
Salandi	Nil	Nil	56269	33702
Dhamara	Nil	Nil	Nil	Nil
Mantei	Nil	Nil	Nil	Nil
Kapali	Nil	Nil	Nil	Nil
Genguti	Nil	Nil	Nil	Nil
Kochila	Nil	Nil	Nil	Nil

Annual Deposition				
Name of the River or Stream	Boulder (MT)	Bajri (MT)	Sand (MT)	Total Mineable Mineral Potential (MT)
Baitarani	Nil	Nil	209477	149477
Salandi	Nil	Nil	56269	33702
Dhamara	Nil	Nil	Nil	Nil
Mantei	Nil	Nil	Nil	Nil
Kapali	Nil	Nil	Nil	Nil
Genguti	Nil	Nil	Nil	Nil
Kochila	Nil	Nil	Nil	Nil


Drainage pattern of Bhadrak District**CONCLUSION:**

Since it is an interim report, to meet the requirement of minerals in the present scenario, it is proposed to identify such potential areas at certain interval and get the data bank of DSR to be updated. The insitu mining activity in any area is on one hand bring revenue and employment (Direct and indirect) and on other hand if not done properly potential pollution and ecological imbalance increases, the ability of the ecosystem can also be reduced. Particulate matter transported by the wind as a result of excavations, blasting, transportation of materials, heavy equipments used raise these particulate levels; and Gas emissions from the combustion of fuels in stationary and mobile sources, explosions, and mineral processing. All these activities indirectly affected the biodiversity of area. Larger potential and smaller areas have been identified in Bhadrak district on the basis of geological study carried out during field observation, which can be considered for mining concession after all the parameters for statutory clearances are verified by consulting with concerned authorities.

Plate-I



The District Survey Report for Sand Mining (Minor Mineral) in respect of Bhadrak district is prepared in accordance with Appendix-X, Para- 7 (iii) (a) of S.O. 3611 (E) dated 25.07.2018 of Ministry of Environment , Forest and Climate Change, Government of India, New Delhi is approved for final publication in district website.


Collector & DM-cum- Chairman, DEIAA,
Bhadrak (Odisha)

SAND SOURCES

Name of the Tahasil- Bhandaripokhari

Sl. No.	Name of river or stream	Portion of the river or stream recommended for mineral concession with Vill/GP, Khata No. , Plot No & kissam	Length of area recommended for mineral concession (in kilometer)	Average width or area recommended for mineral concession (in meters)	Area recommended for mineral concession (square meter)	Mineable mineral potential (in metric tones/ cums (60% of total minerals/ potential)	Geological mineral potential metric tones/ Cums)	Name of the lessee with address	Period of lease		Status of working or non-working / Temporary permit working for despatch
									from	To	
1	2	3	4	5	6	7	8	9	10	11	12
1	Baitarani River, Akhuapada-1	Vill-Nerada, GP- Nerada, Khata No. 682, Plot No.19, Kissam-Nadi Area-Ac. 16.00	136 M	47 M	12644 metre square	7586	6322 metre cub	Santosh Kumar Sahoo, At/po- Akhguapada	2015-16	2019-20	Not working
2	Baitarani River, Akhuapada-2	Vill- Akhuapada, Khata No. 682, Plot No. 19 Kissam-Nadi Area-Ac.16.50	118 M	89 M	15683 metre square	9409 M	15683 metre cub	Rahasmani Sahoo, Vill-Uttarbad, PO- B. Pokhari	2015-16	2019-20	Not working
3	Baitarani River, Nerada-1	Vill-Nerada, Khata No.1128, Plot No.947- Area-Ac.18.56 and Plot No. 1025-Area-Ac.13.00, total Area-31.56		37 M	19741 metre square	11844 M	9870 metre cub	Banabihari Routray, At/Po- Jasotikiri	2015-16	2019-20	Not working
4	Baitarani River, Nerada-2	Vill- Nerada, Khata No. 1129, Plot Noi. 840, Kissam-Nadi Area-50.06	188 M	86 M	31882 metre square	19129 M	47823 metre cub	Umakanta Boity, At/po- Nerada	2015-16	2019-20	Not working
5	Baitarani River, Tikira-2	Vill-Nerada, GP- Nerada, Khata No. 154, Plot No.01, Kissam-Nadi Area-52.99	150M	16 M	5174 metre square	3104 M	1010 Metre square		2015-16	2019-20	Not working

6	Baitarani River, Tikira-1	Vill-Nerada, GP- Nerada, Khata No. 154, Plot No.01, Kissam-Nadi Area-Ac.30.00										Not working
7	Baitarani River, Jasotikiri-1	Vill-Nerada, Khata No. 414, Plot No.01, Kissam - Nadi, Area-Ac.26.90	260 M	80 M	15300 metre square	9180 M	15300 square	Krupasindhu Prusty, At/po- Jasotikiri	2016-17	2021-22		Not working
8	Baitarani Reiver, Jasotikiri-2	Vill-Nerada, Khata No. 414, Plot No. 01, Kissam-Nadi Area-AC.26.90	186 M	86 M	19147 metre square	5743 M	9573 SQ	Banabihari Routray, At/Po- Jasotikiri	2016-17	2021-22		Not working
9	Baitarani River, (Balipokhari sand source)	Vill- Jagannathprasad . Khata No. 799, Plot No. 1653/2734, Area- Ac.12.50, Kissam-Nadi				445500 cum			2021-22	2024-26		working
10	Baitarani River , Maninathur	Vill- Maninathpur, Khata No. 242, Plot No. 765, Kissam-Nadi, Area- Ac.36.56				249500 cum						No working
11	Baitarani River, Jhutuna	Vill-Jhutuna, Khata No. 531, Plot No. 1884/2980, Area- Ac.10.33, Kissam-Nadi				310275 cum						working

SAND SOURCES

Name of the Tahasil- Bhadrak

Sl. No.	Name of river or stream	Portion of the river or stream recommended for mineral concession with Vill/GP, Khata No. , Plot No & kissam	Length of area recommended for mineral concession (in kilometer)	Average width or area recommended for mineral concession (in meters)	Area recommended for mineral concession (square meter)	Mineable mineral potential (in metric tones/ cums (60% of total minerals/ potential)	Geological mineral potential metric tones/ Cums)	Name of the lessee with address	Period of lease		Status of working or non-working / Temporary permit working for despatch
									from	To	
1	2	3	4	5	6	7	8	9	10	11	12
1	Salandi River	Vill- Nalagara, GP-Nalagara, (old) Khata No. 269, Plot No.01,12, Kissam-Nadi,	1.187 M	30 M	35612	7700		Debakanta Pati, At-Sahapur, Gabasahi, Bhadrak	2017-18	2021-22	working
2	Salandi River	Vill- Nalagara, GP- Nalagara, (new) Khata No. 269, Plot No.17,531& 554 Kissam-Nadi,	1.28 M	30 M	38404	2000		Basanta Kum. Mahala, At-Banitia, Ambroli, Bhadrak	2017-18	2021-22	working
3	Salandi River	Vill-Edadei, Khata No. 240, Plot No. 235(P),473, 487,488,	1.442 M	30 M	43260	20702		Amirik Singh, Koonjhore	2017-18	2021-22	working
4	Salandi River	Vill- Daisingh, Khata No. 912, Plot No.1511(P), 1625(P)	1.348 M	30 M	40468	10000		Ananta Kishore Dixit, Daisingh, Kaupur	2018-2019	2022-2023	working
5	Salandi River	Vill-Boudpur, Khata No.404,654, Plot No.909(P), 2840(P), Kissam - Nadi	1.241 M	30 M	37231			Bhagirathi Mohanty, At-Bagurai, Madhabnagar			Not working

SAND SOURCES

Name of the Tahasil- Bonth

Sl. No.	Name of river or stream	Portion of the river or stream recommended for mineral concession with Vill/GP, Khata No. , Plot No & kissam	Length of area recommended for mineral concession (in kilometer)	Average width or area recommended for mineral concession (in meters)	Area recommended for mineral concession (square meter)	Mineable mineral potential (in metric tones/ cums (60% of total minerals/ potential)	Geological mineral potential metric tones/ Cums)	Name of the lessee with address	Period of lease		Status of working or non-working / Temporary permit working for despatch
									from	To	
1	2	3	4	5	6	7	8	9	10	11	12
1	Salandi River	Vill-Kandaba, GP- Gopinathpur, Khata No. 395, Plot No.899 & 897, Kissam-Nadi	0.31	102 M	31620 sqm	5000 cum	7000 MT	Chitaranjan Ghadai, Vill-Kandaba	2020-21	2024-25	working
2	Salandi River,	Vill- Mohantipada, Khata No.817, Plot No. 2228, Area-Ac.5.40 and Plot No.3108-Area-Ac.7.10	305 M	98 M	29890 Sqm	10000 cum	100000 MT		2020-21	2024-25	working
3	Salandi River,	Vill-Charigaon, Khata No. 551, Plot No.01, Area-Ac.3.38, Plot No.02- Area-Ac.2.63, Plot No. 791, Area-Ac.6.45	302 M	96 M	28992 Sqm	5000 cum	60000 Mt		2020-21	2024-25	working
4	Salandi River,	Vill- Chakrapadhi-I Khata No. 419, Plot No. 1235- Area-Ac.1.80,	248 M	175 M	43400 Sqm	8000 cum	80000 MT		2020-21	2024-25	working
5	Salandi River,	Vill- Chakrapadhi-II Khata No. 419, Plot No. 1243- Area-Ac.8.30	248 M	175 M	43400 Sqm	8000 cum	80000 MT		2020-21	2024-25	working
6	Salandi River,	Vill-Haripur, Khata No. 31, Plot No. 84, Area-Ac.7.92	198 M	88 M	17424 Sqm	10000 cum	60000 MT		2020-21	2024-25	working

7	Salandi River,	Vill- Gopinathpur, Khata No. 414, Plot No. 941, Area-Ac.10.36	259 M	75 M	19425 Sqm	7500cum	100000 MT		2020-21	2024-25	working
8	Salandi River,	Vill- Sahupada, Khata No. 269, Plot No. 325, Area-Ac.12.32	308 M	82 M	25256 Sqm	7500cum	100000 MT		2020-21	2024-25	working

SAND SOURCES

Name of the Tahasil- Chandbali

Sl. No.	Name of river or stream	Portion of the river or stream recommended for mineral concession with Vill/GP, Khata No. , Plot No & kissam	Length of area recommended for mineral concession (in kilometer)	Average width or area recommended for mineral concession (in meters)	Area recommended for mineral concession (square meter)	Mineable mineral potential (in metric tones/ cums (60% of total minerals/ potential)	Geological mineral potential metric tones/ Cums)	Name of the lessee with address	Period of lease		Status of working or non-working
									from	To	
1	2	3	4	5	6	7	8	9	10	11	12
1	Baitarani River	Vill- Sundarpur, Khata No. 697, Plot No. 2467, Kissam-Nadi	4.5	1800 M	2.8	4000	6665	Akhaya Kum Sahoo, Vill-Dankari, Po-Dharmasala, Dist-Jajpur	2018-19	2022-23	working

SAND SOURCES

Name of the Tahasil- Dhamnagar

Sl. No.	Name of river or stream	Portion of the river or stream recommended for mineral concession with Vill/GP, Khata No. , Plot No & kissam	Length of area recommended for mineral concession (in kilometer)	Average width or area recommended for mineral concession (in meters)	Area recommended for mineral concession (square meter)	Mineable mineral potential (in metric tones/ cums (60% of total minerals/ potential)	Geological mineral potential in (metric tones/ Cums)	Name of the lessee with address	Period of lease		Status of working or non-working
									from	To	
1	2	3	4	5	6	7	8	9	10	11	12
1	Baitarani River, Anandapur	Vill-Anandapur, G.P.-Anandapur, Khata No.597, Plot No.678-Area-Ac.23.25, Plot No.1144-Area-Ac.8.91, Total Area-Ac.32.16, Kissam-Nadi	800 M	440 M	352000	67782 cum	150715 cum	Muralidhar Majhi, Vill-Uteipur, Po-Dehudi Anandapur PS-Dhamnagar	2015-16	2019-20	Not working
2	Baitarani River, Uteipur-1	Vill-Uteipur, GP-Anandapur, Khata No. 479, Plot No.01-Area-Ac.7.20 and Plot No. 208-Area-Ac.5.25 out of Ac.17.27, Kissam-Nadi	460 M	70 M	32200	39500 cum	50384 cum	Babuli Majhi of Vill-Uteipur, Po-Dehudi, PS-Dhamnagar	2017-18	2021-22	working
3	Baitarani River, Astak	Vill-Astak GP-Astak, Khata No.-636 Plot No.2536/3234-Area-Ac.5.00, Plot No. 845/3233-Area-Ac.6.95 and Plot No. 2536/3265-Area-Ac.1.15 out of Ac.6.15, Kissam-Nadi	800 M	40 M	32000	17500 cum	53014 cum	Satyabrata Jena, Vill-Nisimal, Po-Sunguda, Dist-Jajpur	2017-18	2021-22	Not working

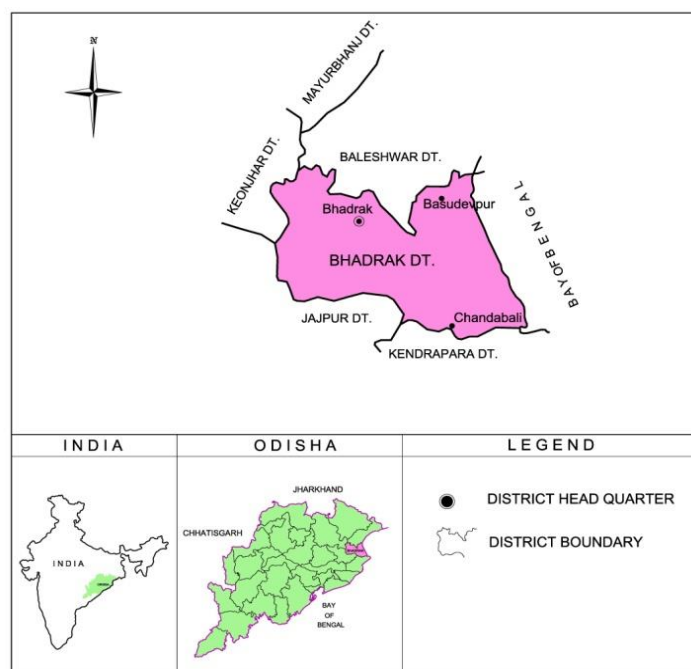
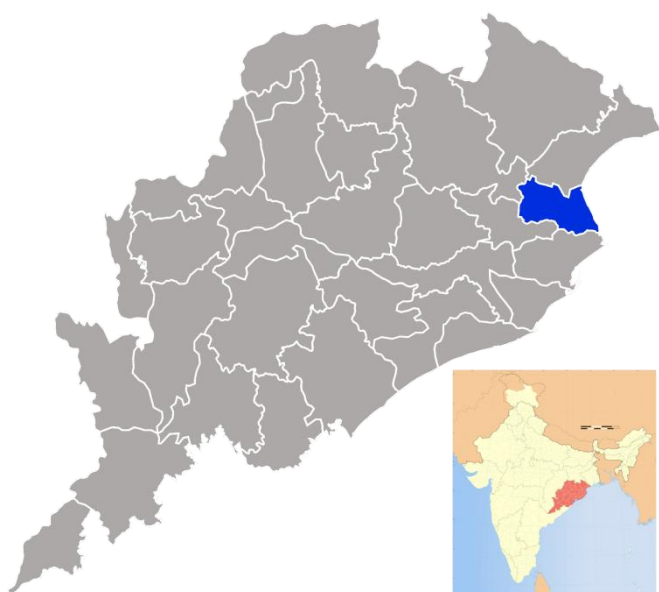
4	Baitarani River, Arjunpur	Vill-Arjunur, GP- Arjunpur,, Khata No. 768, Plot No.4027-Area- Ac.9.67 and plot No.3239/4182- Area-Ac.2.69 out of Ac.6.89, Kissam-Nadi	820 M	20 M	16400	16500 cum	50019 cum	Binaya bhusan Pattnaik, Vill- Laliteswarnar, PS-Jajpur	2017-18	2021-22	working
5	Baitarani River, Uteipur-2	Vill-Uteipur, GP-Arjunpur,, Khata No.479, Plot No.208- Area-Ac.12.02 out of Ac.17.27, Kissam-Nadi	876 M	33 M	28908	23640 cum	48643 cum	Sarat Chandra Majhi, Vill-Uteipur	2017-18	2021-22	under processing



DISTRICT SURVEY REPORT (DSR)
OF
BHADRAK DISTRICT, ODISHA.
FOR
ORDINARY EARTH/BRICK EARTH
(FOR PLANNING & EXPLOITATION OF MINOR MINERAL
RESOURCES)

ODISHA

BHADRAK



AS PER NOTIFICATION NO. S.O. 3611(E) NEW
DELHI DATED 25TH JULY, 2018 OF
MINISTRY OF ENVIRONMENT, FOREST &
CLIMATE CHANGE (MOEF & CC)

COLLECTORATE BHADRAK.
Prepared By DEIAA, Bhadrak. Odisha

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PREAMBLE

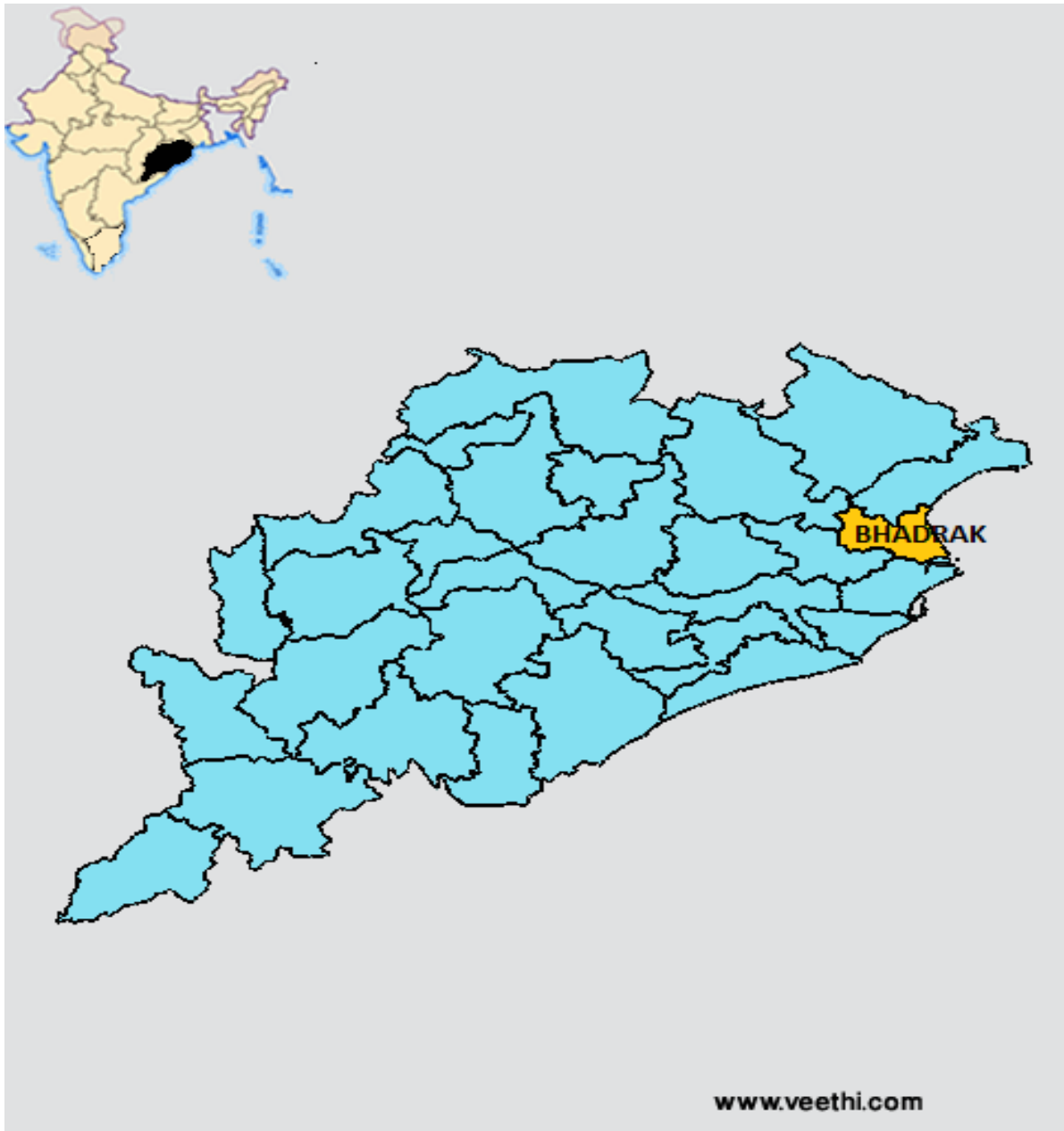
Odisha is the major mineral reach in India. Bhadrak is a unique district in Odisha lies on the north-eastern most part of the state with varied mineral resources. In pursuance of the order of Hon'ble Supreme Court Petition (C) No. 19628-19629 of 2009, dated 27th Feb. 2012 in the matter of Deepak Kumar Vs State of Haryana and others etc., prior environmental clearance has now become mandatory for mining of minor minerals irrespective of the area of Mining Lease. And also in view of the Hon'ble National Green Tribunal, order dated the 13th Jan. 2015 the matter regarding Sand, Brick earth, & burrowed earth cutting for Road Construction has to take prior E.C. for Mining Lease area more or less than 5 hectares also suggested making a policy on E.C for minor minerals lease in cluster. As per MOEF & CC Notification S.O.-1533(E) dated 14th Sept. 2006 and subsequent MoEF & CC Notification S.O. 141(E) dated 15th Jan. 2016, District Environment Impact Assessment Authority (DEIAA) & District level Expert Appraisal Committee (DEAC) has been formed for Category –B2 Minor Minerals having area less than or equal to 5 ha. In compliance to the notification issued by the Ministry of Environment and Forest and Climate Change Notification no. S.O.3611 (E) New Delhi dated 25-07-2018; the preparation of District Survey Report of Ordinary Earth/Brick Earth mining has been prepared in accordance with Clause II of Appendix X of the notification.

Keeping in view of the prior information of Odisha Minor Mineral Concession Rule 2004, (OMMCR -2004) the mining operation for minor mineral was carried out in unscientific manner. Identifying this fact in exercise of power, Conferred by Section 15 by Mines and Minerals (Development and Regulation) Act 1957 as amended in 2015 and all other powers enabling it in that behalf, the Mining & Geology Department, Govt. of Odisha framed the aforementioned rule. Further, this report will act as a compendium of available mineral resources, geological set up, environmental and ecological set up of the district and based on data of various departments like Revenue, Water Resources, Forest, Geology and Mining in the district as well as statistical data uploaded by various state Government departments for preparation for District Survey Report.

1. INTRODUCTION:**Bhadrak at a Glance:****1.1 Location and Geographical Area:**

Bhadrak District is an administrative District of Odisha State in Eastern India. The District is named after the town of Bhadrak, which is the District headquarters. It came into existence on 1st April 1993. This district has a rich heritage and history and according to legends, it also derives its name from the Goddess Bhadrakali, whose temple stands on the banks of the river Salandi. This District is bounded by Balasore District on the north, Jajpur District and river Baitarani on the South, Keonjhar District on the west and Bay of Bengal and Kendrapada District are on the east. It is located at 21°.06' Latitude and 86°.50' Longitude. The Bhadrak District covers an area of 2505 Sq. Km. with geographical area of 2,46,529 Hect. The total population of the district is 1,506,337 with total male population as 760260 and female population as 746077. Total SC Population of the District is 286723 whereas the total ST population is 25141. Total OBC Population is 15142. The Bhadrak District has got only one sub division namely Bhadrak. There are 07 Tahasils and 07 Blocks functioning in the District. Two Municipality, Two NAC, 17 Police stations, 218 Gram Panchayats are there in the Bhadrak District. The climate of this District is generally hot and humid with May being the hottest month. December is the coldest month with monsoon generally arriving during the month of June. The rainfall during June to October constitutes at least 75 Percent of the actual rainfall of this District. Agriculture is the main source of income of the District. Paddy is grown as the main crop in Kharif, covering approximately 94 Percent of the total cultivable area. But people in the sea coast area (Dhamara, Chudamani of Basudevpur & Chandabali area of Chandabali Block) also depend upon fishing for their livelihood. As per District's economy is concerned Bhadrak District has some big industries like FACOR, one of the largest manufacturers of quality Ferro Chrome in the country and a large number of small industries like AB Electricals, Abhigoura Rice Mill & Aloknath Ice Factory etc. Bhadrak District has a District Industries Centre, which in addition to the promotion of the different industries, performs other functions like implementation of different self employment programmes. There are many historical places and monuments to visit in the Bhadrak District. Palia is famous for Biranchi Narayan Temple. Sri Radha Madan

Mohan Temple is one of the most visited temples of Bhadrak District. Aradi situated at a distance of 10 km from Chandabali is famous for the temple of Akhandalamani.



1.2 Administrative Units:

Bhadrak is the administrative headquarter of Bhadrak district. It is located at a distance of 130 km from Bhubaneswar, state capital of Odisha. In order of size, the district is the one of the 2nd largest costal districts of Odisha. It has 1370 villages covering 7 blocks, 7 tahasils. The district is divided into 7 blocks & Tehasils, namely i) Bhadrak N ii) Basudevpur iii) Bhandaripokhari iv) Bonth v) Chandabali vi) Dhamnagar

vii) Tihidi. The population of the district 15, 06,337 according to the 2011 Census. As per provisional reports of Census India, population of Bhadrak in 2011 is 1,07,463; of which male and female are 55,090 and 52,373 respectively. Although Bhadrak city has population of 107,463; its urban / metropolitan population is 129,228 of which 66,320 are males and 62,908 are females.



1.3 Connectivity facilities:-

Road Network

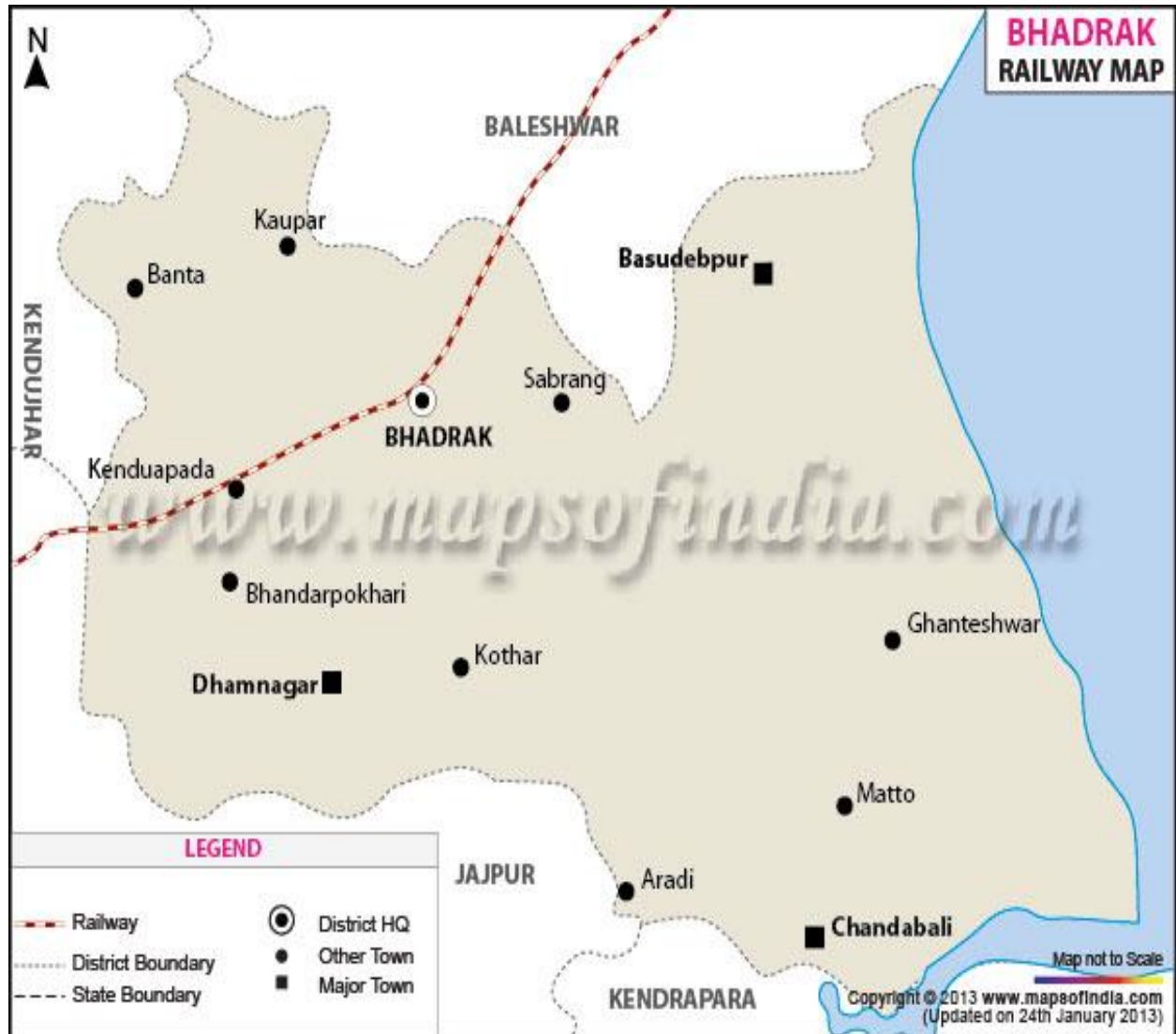
The district is well served by a network of good roads and has been called the motorists paradise. The chief roads emanating from Bhadrak town are NH-16 and NH-60 passes the district. Bhadrak is 60 Kms from Baripada, 122 Kms from Kharagpur, 199 Kms from Jamshedpur, 177 Kms from Cuttack, 199 Kms from Bhubaneswar and 226 Kms from Rourkela. It is also connected with other cities such as Sambalpur, Puri,

Bolangir, Bhadrak, Jhargram, Angul, Ranchi and Kolkata via Odisha State Road Transport Corporation and some private travel services.



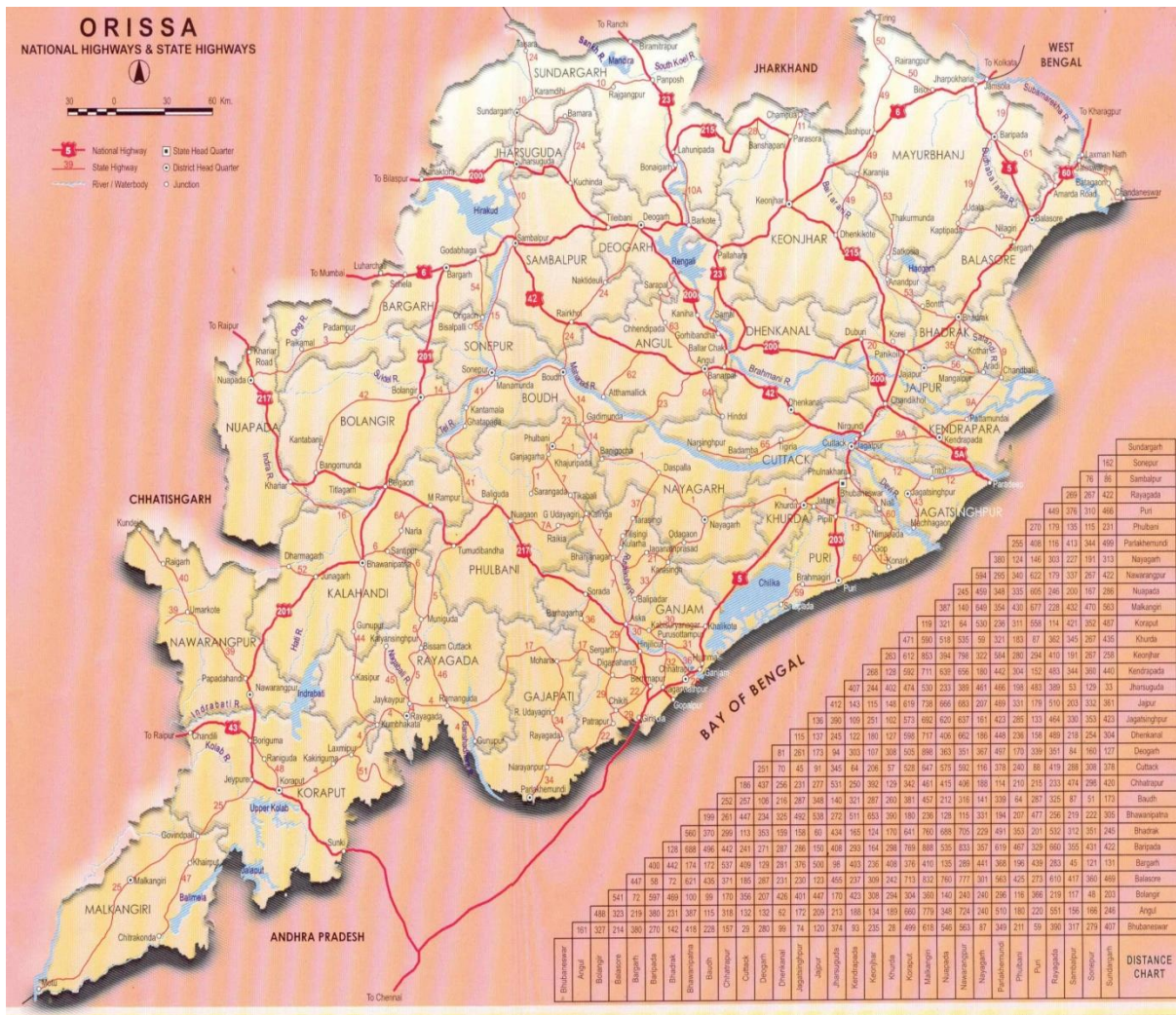
Rail Network

Bhadrak District is well connected by rail link to different places, Bhadrak railway station is an important station on the Howrah-Chennai main line of the South Eastern Railway. The distance to Kolkata is approximately 288 km, while the distance to Bhubaneswar is about 131 km; the city of Bhadrak is well connected to many places in India like Baripada, Bhubaneswar, Kolkata, Jamshedpur and Cuttack,



Air Network

At present, Bhadrak has no connection by airway. The site selection for aerodrome is presently under process. Nearest airport is Biju Patnaik Airport, Bhubaneswar, 114Kms from Bhadrak. Netaji Subhas Chandra Bose International Airport in Kolkata is 254 kms from Bhadrak.



2. OVERVIEW OF MINING ACTIVITY IN THE DISTRICT:

Bhadrak district is a transition land features of both coastal plain and hilly region. Most of the mining activity in the district is only restricted to minor minerals i.e. of sand, granite stone, and brick clays. Altogether there are leases have been granted to the district is regulated as per minerals concession rules of Odisha. No minerals in large quantity which can be explored in commercial purpose found in the district. This district is divided in to three zones according to its soil condition.1 Saline Soil, 2 Alluvial Soil & 3 Sandy Soil. This district is naturally divided into two well-designed tracks. 1. The salt tracks along the coasts which is not arable 2.The arable track, which is called the granary of the state. As per the agro climatic condition of the district the areas may be divided into four zones. a) Rain fed Zone, b) Perennial irrigated Zone, c) Flooded Zone d) Saline Zone.

3.0 GENERAL PROFILE OF THE DISTRICT:**3.1 Demography:**

Census - 2011	
Geographical Area	2505 Sq. Km.
Total population	15,06,337
Male Population	7,60,260
Female Population	7,46,077
Male Literacy	6,81,192
Female Literacy	5,65,526
Rural Population	13,20,499
Urban Population	1,85,838
Schedule Cast Male	1,68,687
Schedule Cast Female	1,66,209
Schedule Tribe Male	15,361
Schedule Tribe Female	15,067

4.0 GEOLOGY OF THE DISTRICT:

The coastal tract of Orissa is underlain by the Tertiary and Quaternary Formations. Bhadrak is a unique district in Odisha with varied geology, of these the Tertiaries are least exposed on the surface, whereas the Quaternaries are extensively developed along the coast and further inland. The Quaternary Formations cover almost the entire study area while the Tertiaries are exposed near Baripada town and extended towards Bhadrak. The Pre-Cambrian ciystallines occur as hills and mounds in the west just outside the present area. Chatterji and Raghava Rao (1960) made studies on the sub-surface geology and tectonic framework of sedimentation in the crescentic coastline of Bhadrak. Exploratory drilling reveals that in the subsurface the warped Pre-Cambrian basement is overlain by Miocene marine sediments, Mio-Pliocene estuarine sediments, laterites and alluvium. The Mio-Pliocene sediments and alluvial sections contain the principal ground water reservoirs. The marine sediments are dominantly composed of finer elastics and non-clastics (Bhatnagar *et al*, 1970). Small outcrops of ultramafic rocks are exposed in and around Bhalukasoni area under Nilgiri subdivision of Balasore District. Ultramafic rocks comprising serpentinitised dunite, peridotite and pyroxenite largely under soil and laterite cover intermittently spreading over an area of 1.8m × 800m. A 100m long E-W trench has exposed two

chromite ore bodies on its either end, the dimensions being 500m × 3.5m × 4.5m and 5.5m × 2m × 3.3m lying within a plutonic mass of gabbroic rocks.

4.1 Physiography & Geomorphology:

Bhadrak district presents diverse physiographic features, Physiographically the study area presents gently undulating to flat topography with the altitude varying from 37m in the North-Western part to around 3m, in the extreme eastern part along the coast line. The general slope is towards east and south- east which varies from 5 to 1.1 meter per kilometer from North West to south east. The district can broadly be divided into four distinct geomorphic units (1) Tidal flat (2) Coastal plain (3) Alluvial plain (4) Flood plain. The fine sediments carried by the rivers get deposited along the coast because of tidal action, as tidal flat / mud flat. The width of this tidal flat varies from 2 to 5 Kms. Tidal flats and mud flats support growth of varieties of mangrove. The coastal plain is a gently sloping plain occurring parallel to the coast and mainly formed by fluvio-marine action and is intersected by network of creeks, which are mainly saline due to tidal action. The area is marshy with shrubby vegetation. The width of this coastal plain varies from 5 to 25 Kms. The coastal plain encompasses a series of beach ridges characterized by sand dunes of varied relief and extends for kilometers, almost parallel to the coast. Dhamra Coast. Of the five islands, Outer Wheeler is the biggest with an area of Ac. 263.13 and the other islands are Coconut Island (Ac. 97.50), Long Wheeler (Ac. 52.50), Shortts Island (Ac.41.25) and Small Wheeler (Ac.10.63) .These islands have been handed to Defence Research and Development Organization (DRDO) and the outer Wheeler Island has been developed as a Missile Launching Station and related research activities. Now the Government has re-named the island as "A.P.J Abdul Kalam Islands" in fond memory of Late President Dr. APJ Abdul Kalam. "A.P.J Abdul Kalam Islands" in fond memory of Late President Dr. APJ Abdul Kalam.

4.2 Stratigraphy:

The study area comprises the following distinct geomorphic units:

- i) Younger alluvial plain
- ii) Older alluvial plain
- iii) Lateritic upland

↑	↑	<u>Geological Age</u>	<u>Geological Formation / Group</u>
		Quaternary	: Recent Alluvium, Clays, silt, Sand, Gravel
		Tertiary	: Older Alluvium, Laterite, Baripada Beds.
		Mesozoic/ Palaeozoic	: Volcanics / Epidiorite
		Precambrian	: Slate/ Phyllite/ Schist / Gneiss
		Archean	: Granite/ Granite Gneiss

4.3 Mineral Resources:

Minerals like minor minerals, stones, sands & Soils are available in the district. The deposits of granite stones provides tremendous scope for development of few more industries based on this resources. Except these, no other mineral deposits which can be explored for commercial purpose found in the district. As the district boundary are situated the adjacent to Jajpur district a Charge Chrome Plant situated in D.P. Nagar at about 04 KMs towards the West of Bhadrak Town in the Village Randia has been set up by M/S Ferro Alloys Corporation Ltd. It has commenced production since 7th March. 1983. At present 1,000 persons are working in this unit. The basic raw materials of this industry is Chromite which is procured from Boula Mines of Keonjhar Dist. and Sukinda Valley Mines of Jajpur Dist. It is an Export oriented Industries and its product are being exported to the countries of Europe and Japan etc. However, it has not spawned any downstream industries.

4.4 Soil:

Three types of soils, viz. Alfisols, Aridisols and Entisols occur in the district. As per agro-climatic classification, the district falls under North Eastern Coastal plain.

Alfisols: These include deltaic and older alluvial soils. The deltaic soils are found along the course of Baitarani River while the older alluvial soils occur in the extreme north-western part. The deltaic alluvial soils are generally deficient in phosphate

(P₂O₅) and nitrogen (N). Both the total and available potassium (K₂O) are fairly adequate and pH varies between 6.5 and 7.3.

Aridisols: These are saline and saline alkali soils, occurring along the coastal area and are rich in calcium, magnesium and also consist of half decomposed organic matter.

Entisols: These soils include coastal alluvial soils, which are deficient in nitrogen, phosphoric acid and humus, but not in potash and lime. The soil texture varies from loam to clayey loam. It is alkaline in nature and the most fertile soil in the area

5. DRAINAGE OF IRRIGATION PATTERN

The district has considerable flat land, which provide suitable site for agricultural use. The hilly areas are mostly under forest with patches of cultivation on scarp areas. Major rivers flowing in the district are Baitarani, Salandi, Mantei & Genguti. Major crops grown in the district are rice, only. 16.35 percent area of agricultural use are net irrigated and major source of irrigations are wells and tube-wells.

Sl. No.	Name of the River	Area drained (Sq.Km.)	% Area drained in the District
1	Baitarani	492	19.64%
2	Salandi	455	18.16%
3	Dhamara	65	2.5%
4	Mantei	659	26.30%
5	Gamei	107	4.27%
6	Genguti	323	12.89
7	Kochila	28	1.1%



5.1 River System

All the rivers have their source inside the State and thus they are midstreams and shortstreams. The main Rivers of the District are (1) Baitarani, (2) Salandi, (3) Gamei, (4) Kansbans, (5) Mantei, (6) Kochila, and (7) Genguti, etc. The river system in the district is classified mainly into two categories i.e (i) Baitarini River System and (ii) Salandi River System. The main distributaries river of Baitarini are Genguti and Kochila. Kapali and Mantei are the tributaries of Salandi. Maps indicating river Baitarani and Salandi systems are at annexure. Baitarani rises among the hills in the north-west of Keonjhar District (Gonasika) and enters Bhadrak near Balipur. After flowing in a winding easterly course across the delta, it marks the boundary line between Jajpur and Bhadrak districts. After crossing National Highway, Baitarani branches out to a delta. Salandi also branches out to a delta. Some of the distributaries join together to form Dhamara river. Dhamara was an important port and had an important advantage. Owing to the multiple rivers originating in different catchments, the flow of water in Dhamara river was continuous. Besides, several branches of the rivers formed estuaries, providing another dependable source of water. The Dhamara river remained desilted and had good tidal flow. Baitarani is navigable as far as Olekh, 24.15 k.m from Dhamara mouth; but beyond this point, it is not affected by the tide and is fordable moderately only during the hot season. The river is subject to annual heavy floods which travel inland to an average distance of 6.44 k.m to 19.32 k.m., when it causes considerable damage to the standing crop. A weir has been

constructed across the stream at Akhuapada in order to dam the water during the dry season and supply water to the High Level Canal between that place and Bhadrak. Kochila is a distributary of river Baitarani and bifurcates from the main river at Ramarakul under Dhamanagar block and after running a length of 10 kms merges with river Baitarani at Saanlpur village under Dhamanagar block. Genguti is a distributary of river Baitarani and bifurcates from the main river near Anandpur under Keonjhar district. After crossing Dhamanagar and Tihidi blocks it merges with river Salandi at Nandpur under Chandabali block. The Mantei (in earlier records of colonial government called Matai) brings down the drainage of the country between the Kansbansh and the Salandi and after a tortuous course over a muddy bed and between densely wooded banks, joins Dhamara near its mouth. This river attains a considerable volume at Charbatia, where it is joined by the Coast canal. It is tidal as far as Rukunadeipur, 12.88 km. east of Bhadrak and is navigable up to that point by country boats.

1	2	3	4	5
Sl. No.	Name of the River or Stream	Total Length in District (in Km.)	Place of Origin	Altitude at Origin
1	Baitarani	10	Gonasika, Guptaganga Hills, Keonjhar	900 mrl.
2	Salandi	88	Hadagarh Reservoir (Baula R.F)	Below 20mrl
3	Dhamara	17	Brahmani-Baitarani Chandbali	---do---
4	Mantei	60	Narendrapur.	---do---
5	Gamei	8	Kansbans	---do---
6	Genguti	51	Baitarani	---do---
7	Kochila	12	---do---	---do---

6.0 LAND UTILIZATION PATTERN IN THE DISTRICT

6.1 Forest and non forest land

The forest of this division of Bhadrak district covers almost pure mangrove forest and its few associates. The important species present including plantations are *Avicennia alba*, *Ipomoea pes-carpae*, *Canavalia maritime*, *Hydrophlyx maritime*, *Sesuvium portulacastrum*, *Cascuta reflexa*, *Avicennia marina*, *Avicennia officinalis*, *Sonneratia*

alba, Sueda maritime, Sesuvium portulacastrum, Casuarina equisetifolium, Azadirachata indica, Pongamia pinnata, Opuntia stricta, Ficus bengalensis, Calotropis gigantea, Ziziphus oenoplia, Acacia auriculiformis, Tamarindus indica, Borassus flabellifer, Sueda nudiflora, Vernonia cinera, Tylophora tenuissima, Ipomoea tuba etc.. A wide range of carnivorous & herbivorous wild animals also available in this forest. The district has no Wildlife Sanctuaries. The mangroves support rich marine life including crabs, prawns, mudskippers and variety of fishes which form the base of biological pyramid. Besides, mangrove sustains a wide range of reptiles like watermonitor lizards, pythons, king cobras, kraits, other snakes and mammals such as fishing cat, mongoose, otter etc. The mangrove wetland serve as a potential habitat for variety species of birds. Apart from that, the rivers like Baitarani, Mantei and Salandi supports fauna like crocodiles.

District-wise Forest Cover Area in Odisha (Area in Km²)

2017 Assessment								
District	Geographical Area Km ²	Very Dense Forest	Moderate. Dense Forest	Open Forest	Total	Percent of GA	Change	Scrub
Angul	6375	371	1380	1004	2755	43.22	43	84
Bolangir	6575	70	224	837	1131	17.2	151	142
Balasore	3806	23	127	234	380	9.98	30	48
Bargarh	5837	176	371	484	1031	17.66	88	47
Bouda	3098	263	546	480	1289	41.61	27	57
Bhadrak	2505	0	9	66	75	2.99	2	0
Cuttack	3932	53	226	517	796	20.24	11	68
Deogarh	2940	191	667	614	1472	50.07	-3	14
Dhenkanal	4452	174	418	825	1417	31.83	9	82
Gajapati	4325	84	1490	946	2520	58.27	12	262
Ganjam	8206	164	1075	864	2103	25.63	15	655
Jagatsinghpur	1668	0	5	131	136	8.15	6	0
Jajpur	2899	6	72	225	303	10.45	3	50
Jharsuguda	2114	3	140	179	322	15.23	9	36
Kalahandi	7920	362	729	1327	2418	30.53	36	362
Kandhamal	8021	661	2588	2143	5392	67.22	16	380
Kendrapada	2644	84	88	133	305	11.54	14	2
Keonjhar	8303	289	1404	1519	3212	38.68	4	55

Khorda	2813	21	186	250	457	16.25	0	92
Koraput	8807	94	740	1255	2089	23.72	120	944
Malkangiri	5791	158	709	1475	2342	40.44	20	45
Mayurbhanj	10418	1335	1718	1027	4080	39.16	42	34
Nabarangpur	5291	168	428	507	1103	20.85	8	47
Nayagarh	3890	189	965	556	1710	43.96	28	173
Nuapada	3852	86	482	705	1273	33.05	33	109
Puri	3479	0	54	160	214	6.15	8	11
Rayagada	7073	422	853	1851	3126	44.2	7	349
Sambalpur	6624	499	1675	1106	3280	49.52	13	40
Subarnapur	2337	2	187	161	350	14.98	26	29
Sundargarh	9712	1019	1814	1431	4264	43.9	107	89
Grand Total	155707	6967	21730	23008	51345	32.98	885	4306

(Source: India state of forest report 2017-Odisha)

The very less portion of the district is covered by forest (2.99 % of TGA) and has scattered settlement pattern. The forest is full of variety of medicinal plants, kendu leaves, bamboo, sal, teak and other timber species. The district has considerable flat land, which provide suitable site for agricultural use. The hilly areas are mostly under forest with patches of cultivation on scarp areas. Major crops grown in the district are rice and pulses. Only 16.35 percent area of agricultural use are net irrigated and major source of irrigations are well and tube wells.

Tahasil	Forest Area	Misc Tree	Permanent Pasture	Cultivated waste	Non Agricultural uses	Barren land	Current Fallow	Other Fallow	Net area sown
Basudevpur	32	583	1682	1955	3994	382	250	800	29321
Bhadrak	-	762	1493	1664	4288	32	840	872	21502
Bhandari Polhari	-	220	1551	737	2862	884	418	260	16873
Bonta	-	268	1536	705	3332	1	143	607	18727
Chandabali	-	415	2764	2200	7129	362	2460	271	39602
Dhamnagar	-	727	852	1496	1981	-	694	405	18706

6.2 Agriculture Land:

The primary objective of Agriculture Department is increase of production as well as productivity of major crops like paddy, groundnut, mustard, Mung, Biri & vegetables which is widely covered in this District in both Kharif & Rabi season. Another key

objective is the all round development of the farming community of the District. At present the district has one Deputy Director, 2 District Agriculture Officers (DAO) and 119VAWs to implement to supervise agricultural programme of the district. Before it became a separate district, Bhadrak was an agricultural district since 1960. A Krushi Vigan Kendra has been established at Ranital since 2004 for taking farm testing, demonstration and production of quality seeds and awareness program. Rice is the principal crop grown in this district, followed by other cereals, pulses, oilseeds, vegetables, spices and sugarcane.

6.3 Horticulture Land:

The primary objective of Horticulture Department to increase the production as well as productivity of major fruits like Mango, Guava, Citrus etc., which is widely covered in this District. Another key objective is the all round development of the farming community of the District. The Deputy Director of Horticulture is the head of office.

7.0 SURFACE WATER AND GROUND WATER SCENARIO OF THE DISTRICT

7.1 Hydrogeology

Distribution of Saline / fresh water aquifers:

The district is underlain by unconsolidated formations belonging to Quaternary and Tertiary periods down to a depth varying from 165 m in the northwestern part to more than 600m in the eastern part along the coast line and are composed of sand, gravel, clay, laterites and lateritic gravel, silt, mud stone, shale, lime stones etc. The ground water occurs within the unconsolidated geological formations having primary porosity. Hence the hydrogeological unit of the district has been identified as porous formation. Sand and gravel horizons of porous formation form the main repository of ground water in the entire district. The laterites and lateritic gravels form aquifers, which are limited to shallow depth and restrict its occurrence in the northwestern part of the district. A considerable area, about 1300 sq km of the district in the east suffers from salinity problem, where occurrence of saline ground water at depths restricts the thickness of fresh ground water aquifers.

7.2 Depth of water level:

The depth to water level map for pre and post monsoon periods 2011 are prepared based on the ground water monitoring data. The depth to water levels during pre monsoon period (April 2011) varies from 1.92 m to 7.20m below ground level while during post monsoon period (November 2011) it ranges from 1.14 to 4.01 m below ground level.

7.3 Ground Water Quality

Chemical analysis results of ground water samples indicate that ground water is extremely fresh to saline in shallow as well as in deeper aquifers of the district. The limit of freshness is fixed considering the maximum prescribed limit of dissolved solids concentration (2000 mg/l) for potable water. The ground water from both shallow and deeper aquifers is Na-HCO₃, NaCl and Ca-HCO₃ types and Na-HCO₃, Na-Cl types are predominating, which may be due to Base Exchange process and also due to proximity of the sea. Hydrochemistry of shallow and deep aquifers is described below.

7.4 Ground Water Development

In the rural areas the entire water supply is dependent on ground water. Ground water development is mainly carried out in the district through dug wells and Hand pumps. In general dug wells are of 2 m diameter and the depth ranges between 8 to 15 m depending on the thickness of the weathered zone, tapping the shallow aquifer in the weathered zone and uppermost slice of the basement. Large number of dug wells used for drinking water is under private ownership for which there is no reliable data. Over the years hand pumps are being drilled in large numbers for ground water development. These hand pumps have the following two major advantages i) less susceptible to contamination from surface sources and ii) tap fractures between 20-60m depth which have been found to be less affected by seasonal water level fluctuation and thus have lesser chances of failure even during extreme summer. The Present stage of ground water development in different blocks of the district varies from 23.84 to 73.82% with minimum in Basudevpur Block and Maximum in Bhandaripokri Block of the district. Thus there is further scope for development of groundwater in the district to augment irrigation potentials.

7.5 Ground Water Related Issue and Problems

Some of key ground water related issues are

- I. Locating suitable sites for bore wells
- II. Suitable design of dug wells and hand pumps
- III. Taking up artificial recharge projects to augment the resource availability in Bhadrak district.
- IV. Optimal development of irrigation potential by developing ground water available for future uses.
- V. Creating public awareness for conserving ground water through awareness camps, NGO's and mass media.

7.6 Mass Awareness Campaign (MAP) & Water Management Training Programme (WMTP) by CGWB

NIL

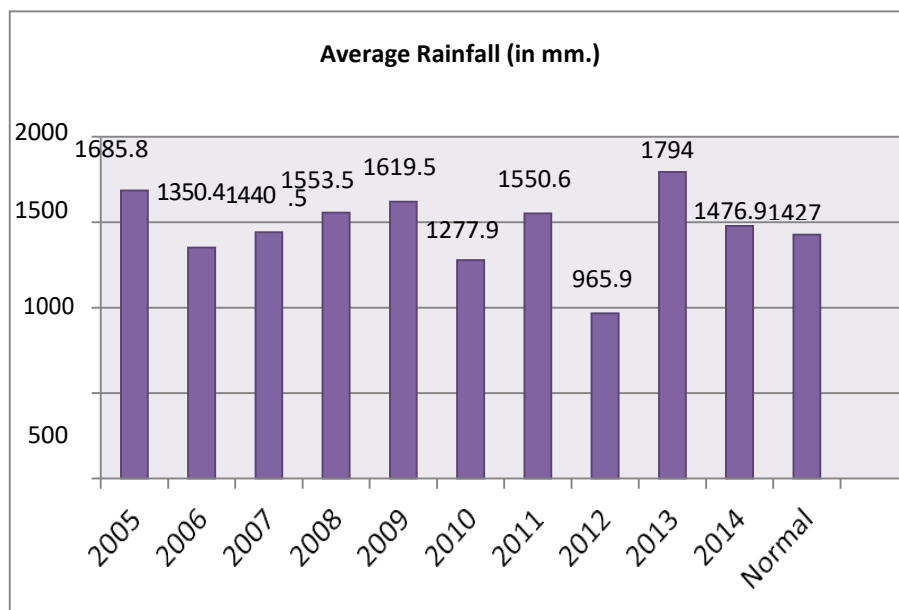
Area Notified by Cgwb/Sgwa

None.

8.0 RAINFALL OF THE DISTRICT AND CLIMATE CONDITION

8.1 Month wise rainfall:

The annual normal rainfall of Bhadrak district is 1428 mm. More than 75% of the precipitation is concentrated over 5 months from June to October. The district is characterized by tropical monsoon climate having three distinct seasons in the year, viz. winter, summer and rainy seasons. The Bay of Bengal, which forms the eastern boundary of the district, plays a prominent role in controlling the climate of the district. The winter commences from late November and continues till end of February. The winter is followed by the summer season, which extends up to mid June. During the period between April and May, 3 to 4 cyclonic storms accompanied with rains generally occur in the district. The rainy season sets-in at the advent of the southwest monsoon, generally from the middle of June and continues till end of September. The relative humidity, on an average, varies from 40 to 90% during the year and during monsoon it is much more. The mean monthly potential evapotranspiration varies from 4.51 cm during January to 27.68 cm during May.



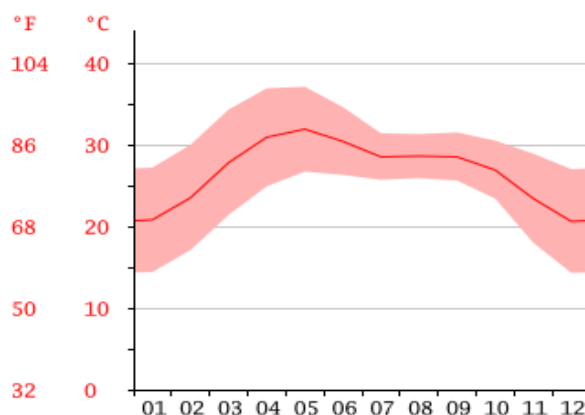
Year		2016	2017	2018	Average
Sl. No.	Month	(mm)	(mm)	(mm)	(mm)
1	Jan	0	0	0	0
2	Feb	51.11	0	0	17.03
3	Mar	3.40	32.90	0	12.10
4	Apr	4.71	7.00	103.90	38.53
5	May	233.00	44.89	139.39	139.09
6	Jun	178.73	169.24	227.80	191.92
7	Jul	324.32	275.37	322.26	460.975
8	Aug	309.21	215.40	293.96	272.85
9	Sep	257.01	120.87	455.54	277.80
10	Oct	88.63	242.03	229.51	186.72
11	Nov	56.71	75.61	0	44.10
12	Dec	0	15.60	3.26	6.28
Total		1506.83	1198.91	1775.62	1647.395

Source: Indian Meteorological Department

8.2 Climate

The climate in Bhadrak has a tropical climate that is warm and temperate. In winter, there is much less rainfall than in summer. This location is classified as Aw by Köppen and Geiger and this climate classification is Cwa. May is the warmest month of the year. The temperature in May averages 38.8 °C. January has the lowest average temperature is 14.8 °C of the year. In a year, the average rainfall is 1530 mm. There

is a difference of 320 mm of precipitation between the driest and wettest months. During the year, the average temperature of Bhadrak district is 26.8 °C.



9.0 DETAILS OF MINING LEASE OF ROAD METAL IN THE DISTRICT

9.1 List of Mines is operation in the district:

Attached as Annexure-I

9.2 List of Mines is not operation in the district:

Attached as Annexure-I

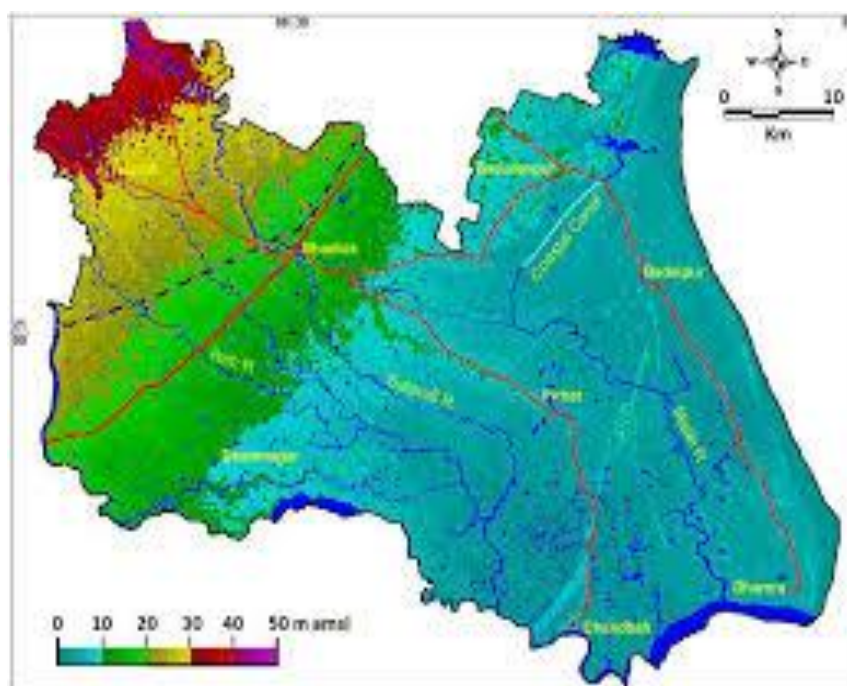
10. DETAIL OF ROYALTY OR REVENUE RECEIVED IN LAST THREE YEARS:

Sl. No.	Name of the Tahasil	2016-17	2017-18	2018-19	Total Amount (Lakh)
1	Bhadrak	Nil	Nil	Nil	Nil
2	Basudevpur	Nil	Nil	Nil	Nil
3	Bhandaripokhari	Nil	Nil	Nil	Nil
4	Bonth	Nil	Nil	Nil	Nil
5	Chandabali	Nil	Nil	Nil	Nil
6	Dhamnagar	Nil	Nil	Nil	Nil
7	Tihidi	Nil	Nil	Nil	Nil
Grand Total		Nil	Nil	Nil	Nil

11. DETAIL OF PRODUCTION OF Brick Earth MINOR MINERALS IN LAST THREE YEARS:

Sl. No.	Name of the Tahasil	2016-17	2017-18	2018-19	Total in Cum.
1	Bhadrak	Nil	Nil	Nil	Nil
2	Basudevpur	Nil	Nil	Nil	Nil
3	Bhandaripokhari	Nil	Nil	Nil	Nil
4	Bonth	Nil	Nil	Nil	Nil
5	Chandabali	Nil	Nil	Nil	Nil
6	Dhamnagar	Nil	Nil	Nil	Nil
7	Tihidi	Nil	Nil	Nil	Nil
Grand Total		Nil	Nil	Nil	Nil

12. MINERAL MAP OF THE DISTRICT:



13. LIST OF LETTER OF INTENT (LOI) HOLDERS IN THE DISTRICT ALONG WITH ITS VALIDITY.

Sl. No.	Name of the Mineral	Name of the Lessee	Address	Letter of Intent Grant Order No. & date	Area of Mning lease to be allotted	Validity of LoI	Use (Captive/ Non-Captive)	Location of the Mining lease (Latitude & Longitude)
1	2	3	4	5	6	7	8	9
Attached as Annexure-I								

14. TOTAL MINERAL RESERVE AVAILABLE IN THE DISTRICT

Total mineral reserve of Brick Earth will access after detail study or grant of potential area, which may investigate as per details below.

- (i) Blocks were identified based on geological studies through field observation.
- (ii) Mineable resource was calculated by considering detail prospecting.
- (iii) Area calculated as per GPS co-ordinates and information obtained from local people. Land detail need to be verified from revenue record.
- (iv) Since this is an interim report, as per the present requirement of minerals, more such blocks need to be identified and the data should be updated periodically, after certain intervals to update the data bank of DSR.

Summary of Identified Mineral Potential:

Sl. No.	Name of the mineral	Name of the lessee	Address and contact No. of the lessee	Letter of Intent Grant Order No. and date	Area of mining lease to be allotted	Validity of LoI	Use (Captive / Non-Captive)	Location of the Mining lease (Latitude & Longitude)
1	2	3	4	5	6	7		

Attached as Annexure-I

Sl. No.	Name of the Tahasil	Mineral Resources in cum.	Mineable Reserve in cum.
1	Bhadrak	Nil	Nil
2	Basudevpur	Nil	Nil
3	Bhandaripokhari	Nil	Nil
4	Bonth	Nil	Nil
5	Chandabali	Nil	Nil
6	Dhamnagar	Nil	Nil
7	Tihidi	Nil	Nil

15. QUALITY/GRADE OF MINERAL AVAILABLE IN THE DISTRICT:**Rocks and Minerals found in Bhadrak District:-**

The district is endowed with only two types of mineral resources like Sand and Ordinary soil/brick earth. The availability of mineral deposits mineral deposits have not been utilized to maximum extent for industrial purpose. Some of the items like Sand and Ordinary soil/brick earth can be used in small scale sector. So the

available resources of the district need harnessing properly for industrial and productive use. Sand and Ordinary soil/brick earth of the district are very much suitable for various construction purposes.

16. USE OF MINERAL**Uses of Soil/Brick earth:**

- Soil/Brick earth have been extensively used for making of raw bricks and filling of new road construction and various public and commercial purposes.

17. DEMAND AND SUPPLY OF THE MINERAL IN THE LAST THREE YEARS:

As such there are huge infrastructural activities such as road, building, railways are coming up by state govt. under Govt. of India & PSUs under "Make in India" programme. The Brick Earth/ Ordinary Earth are the main raw minerals for the above activities and considering the last three years' actual production of Bhadrak district with respect to the requirement of the state has a huge gap. It is proposed to start the production from larger block/area to at least double the production of the district which will enhance the revenue of the district and also support the livelihood of the local people.

18. MAP OF EXISTING MINING LEASES IN THE DISTRICT:

Enclosed as Plate-I

19. DETAILS OF THE AREA OF WHERE THERE IS A CLUSTER OF MINING LEASE VIZ. NUMBER OF MINING LEASES, LOCATION (LATITUDE AND LONGITUDE)

There is no cluster of mining leases in the district. However, it is proposed to consider the cluster of mining lease while planning for new lease area in coming years.

20. DETAILS OF ECO-SENSITIVE AREA, IF ANY, IN THE DISTRICT:

Bhitarkanika wild life sanctuary is part of area of Bhadrak District.

21. IMPACTS OF MINING ON ENVIRONMENT:

The most important environmental impact of mining projects is:-

Transportation sources:

Transportation sources of air pollutants include vehicles used in excavation operations that transport at the mining site. The level of polluting emissions from these sources depends on the fuel and conditions of the equipment. Even though individual emissions can be relatively small, collectively these emissions can be of real concern. In addition, mobile sources are a major source of particulate matter, carbon monoxide, and volatile organic compounds that contribute significantly to the formation of ground-level ozone.

Noise and vibration:

Noise pollution associated with mining may include noise from vehicle engines, loading and unloading, power generation, and other sources. Cumulative impacts of vibrations are associated with many types of equipment used in mining operations. Vibration has affected the stability of infrastructures, buildings, and homes of people living near mining operations.

22. REMEDIAL MEASURES TO MITIGATE THE IMPACT OF MINING ON THE ENVIRONMENT:

Following are the remedial measures to mitigate the impacts:

1. Water sprinkling on haul road, loading and unloading points.
2. Plantation along the safety zone and dump area.
3. Providing dust masks to workers.
4. Regular monitoring of ambient air quality.
5. Regular and proper maintenance of working equipments.
6. Periodic medical examination of the workers and organize medical camp in the area.
7. Regular training program to the mines workers and operators.

23. RECLAMATION OF MINED OUT AREA**Necessity of Reclamation & Rehabilitation:**

Reclamation – Reclamation means return the mined-out land with useful life. It implies restoring the land to a form and productivity that is useful and inconformity with a prior land use. Reclamation always may not be a single- phase operation.

Rehabilitation – Rehabilitation is to bring bach the degraded land to a normal stage by a special treatment. It is a process of taking some mitigation measures for disturbed environmental condition created through mining activities.

Statutory requirement:

The Mineral Conservation Development Rule-2017 should be followed by the mine owner/agent/manager.

24. RISK ASSESSMENT AND DISASTER MANAGEMENT PLAN:

By the nature of the mining operation, there is no very high risk and hazard identification is carried for undesirable events that can lead. The activities which can cause high risk related to face stability observed that on a working face of the mine. Working of the face should be in the direction taking into account the geology of the area such that face and quarry side remain stable. In the mine a large number of vehicles by incompetent drivers, brake failure, lack of all-around visibility from the driver position, vehicle movements particularly reversing, roll over, and maintenance. Those most at risk are the driver and pedestrians likely to be struck by the vehicle, and drivers of smaller vehicles, which cannot be seen from the rear side. Edge protection is always necessary to prevent inadvertent movement over the edge of roadway. Seatbelt will protect driver in case of roll. Good maintenance and regular testing are necessary to reduce the possibility of brake failure. Access to the vehicles should always be restricted to those people necessary for the work in hand. The use of personal protective equipment and proper arrangements is essential to check if the person is wearing protective equipment or not. The personal protective equipment includes helmet, non-skid safety boots, safety glasses etc. The required personal protective equipment should be provided and used in a manner that protects the individual from injury. Few minor injuries which can be prevented are slip, trip, or fall. A disaster management plan should be prepared for taking care of for any disaster. There are problems related to road traffic in and out issues; inappropriate exposure of moving machines; mechanical failure is large quantity of dust present in roadways which affects the operators and can lead to accidents causing injury. Other problems like occurrence of lots of mosquitoes in the area due to unhygienic conditions which affect the human health causing malaria, dengue etc. and causing a person to be hospitalized. According to MMR act 1961 a standard operating procedure should be drawn for involvement different category of staff and officers. One or two standby should be there to replace the person in Emergency situation.

25. DETAILS OF THE OCCUPATIONAL HEALTH ISSUE IN THE DISTRICT:

The persons employed in the mines are exposed to a number of hazards at work which adversely affect their health. Some of the important ones are dust, noise, heat, humidity, vibration etc. In recent times, there has been increasing awareness among mining industry and the workers about occupational diseases like Pneumoconiosis, Silicosis, Tuberculosis, Hearing Impairment etc. caused by exposure to health hazards at work. Almost all occupational diseases can be prevented by adopting proper occupational health measures and engineering control on airborne dust pollution at workplace. Occupational Diseases in mines or industry is required to conduct medical examinations and health surveillance of workers as per the provisions of Mines Act. The present efforts of mines management are concentrated on detection of silicosis, Pneumoconiosis and other notified diseases. The essential features of health surveillance programme required to be carried out in mines are:

- (a) Initial Medical Examination of persons to be conducted at the time of appointment.
- (b) Periodic Medical Examination or General physical examination to be conducted once in every year.
- (c) Maintenance of medical records and health services till the person is in service.

26. PLANTATION/GREEN BELT DEVELOPMENT IN RESPECT OF LEASE ALREADY GRANTED IN THE DISTRICT:

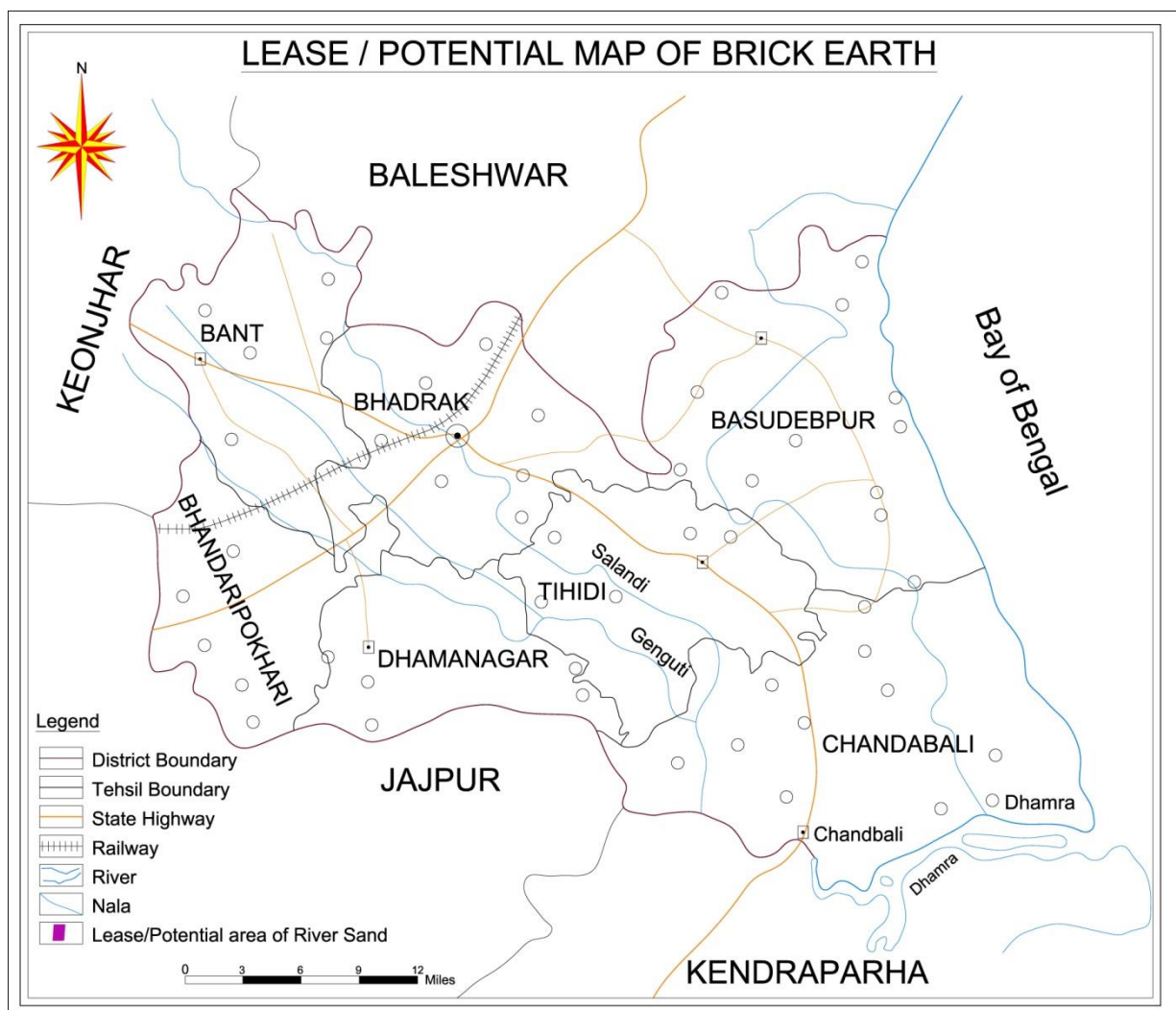
During mining operation green belt development through plantation is most important for environment safe guard, which should be supervision by mining department. Different type of species should be planted near lease periphery to keep environment clean at post mining period through reclamation. Where specific usefulness of land could be decided, a forestation is normally planned through the site could have been considered for better possibilities of land use.

27. CONCLUSION:

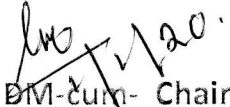
Since it is an interim report, to meet the requirement of minerals in the present scenario, it is proposed to identify such potential areas at certain interval and get the data bank of DSR to be updated. The mining activity in any area is on one hand bring revenue and employment (Direct and indirect) and on other hand if not done properly

potential pollution and ecological imbalance increases, the ability of the ecosystem can also be reduced. Particulate matter transported by the wind as a result of excavations, blasting, transportation of materials, heavy equipments used raise these particulate levels; and Gas emissions from the combustion of fuels in stationary and mobile sources, explosions, and mineral processing. All these activities indirectly affected the biodiversity of area. Larger potential and smaller areas have been identified in Bhadrak district on the basis of geological study carried out during field observation, which can be considered for mining concession after all the parameters for statutory clearances are verified by consulting with concerned authorities.

Plate No.-I



The District Survey Report for ordinary Earth/Brick Earth (Minor Mineral) in respect of Bhadrak district is prepared in accordance with Appendix-X, Para- 7 (iii) (a) of S.O. 3611 (E) dated 25.07.2018 of Ministry of Environment , Forest and Climate Change, Government of India, New Delhi is approved for final publication in district website.


Collector & DM-cum- Chairman, DEIAA,
Bhadrak (Odisha)

