



DISTRICT SURVEY REPORT (DSR)

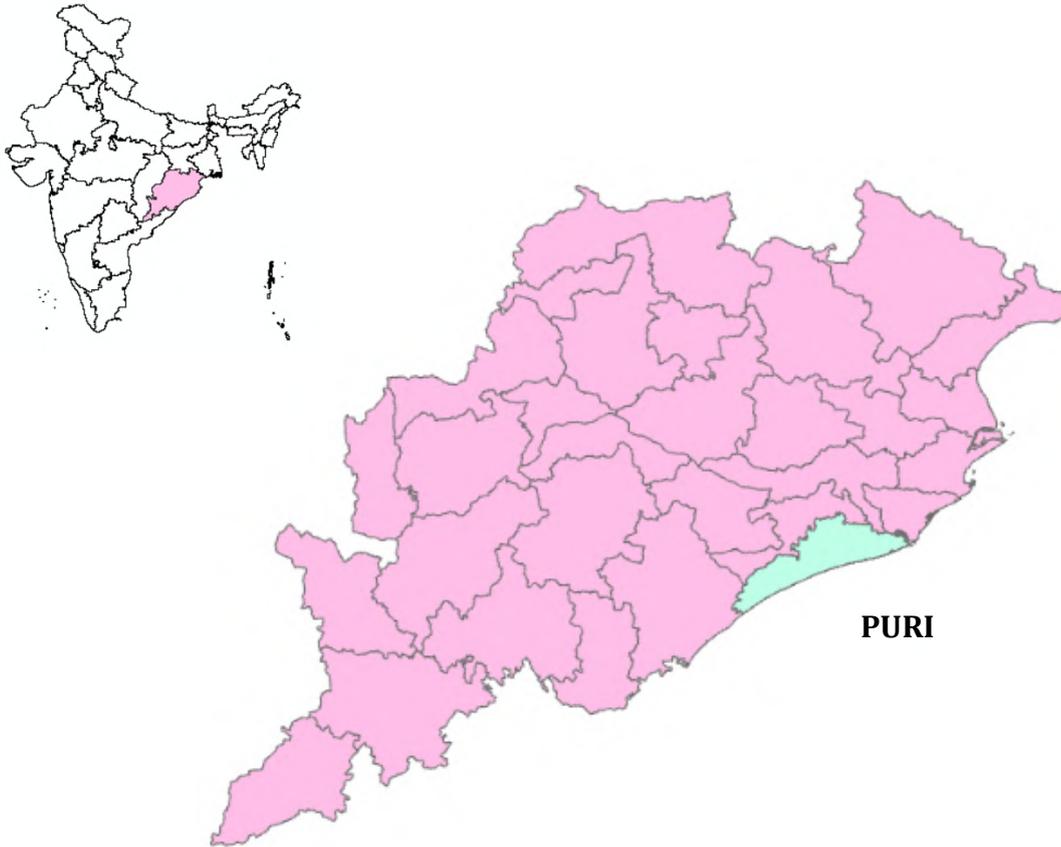
OF

PURI DISTRICT, ODISHA.

FOR

MORRUM QUARRY

(FOR PLANNING & EXPLOITATION OF MINOR MINERAL RESOURCES)



PURI

As per Notification No. S.O. 3611(E) New Delhi
dated 25th July 2018 of
Ministry of Environment, Forest & Climate Change(MoEF & CC)

COLLECTORATE PURI.

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PREFACE

Odisha is one of the Major Mineral rich State in India. Puri is a unique District in Odisha lies on the Southern part of the State with rich and varied mineral resource. It is a paradise for Geoscientists of India and abroad. It has preserved many important rock groups from the earliest of crust formation to the geologically recent times. The landmass constituting the Puri District, explorers to many Entrepreneurs on account of its diverse geological setting and rich and varied mineral resources.

In pursuance of 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. Prior to the formation of Odisha Minor Mineral Concession Rule 2004, (OMMCR -2004) the mining operation for minor mineral were 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 industry Mines & Geology Department, Govt. of Odisha framed the aforementioned rule, which has been amended with period of times in the year 2014, 2015 and 2016.

Keeping in view of experience gained in period of decade, the MoEF & CC came out with Environmental Impact Assessment Notification S.O.-1533(E) dated 14th Sept. 2006. It has been made mandatory to obtain environmental clearance for different kinds of development projects as listed in Scheduled -I of notification. Further, 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 etc., 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 irrespective of the fact that whether the area involved is more or less than 5 hectares. They also suggested to make a policy on E.C for minor minerals lease in cluster.

MoEF & CC in consultation with State Government has prepared Guidelines on Sustainable Sand Mining & Minor minerals other than sand mining in 2016, detailing the provisions on Environmental Clearance for cluster. Creation of District Environmental Impact Assessment Authority (DEIAA) & proper monitoring of Minor Minerals. Mining, using Information Technology to track the mineral out material from source to destination.

DEAC will scrutinize and recommend the prior environmental clearance of mining of minor mineral to DEIAA on basis of District Survey Report. This will model and guiding document which is a compendium of available mineral resources, geographical setup, Environmental and Ecological set up of the District and replenishment of minerals and is based on data of various

departments, published reports, Journal and websites. Subsequently, Hon'ble Supreme Court vide their order dt. 18.01.2022 in connection with Civil Appeal Nos. 3661-3662 of 2020, the State of Bihar and others Vrs- Pawan Kumar and others at Paragraph 14 " We therefore find it appropriate to substitute the directions issued by Tribunal vide judgment and order dated 14th October-2020 with the following directions,

(i) The exercise of preparation of DSR for the purpose of mining of the State of Bihar in all the Districts shall be under taken afresh. The Draft DSRs shall be prepared by the Sub-Divisional Committees consisting of the Sub-Divisional Magistrate, Officers from Irrigation Department, State Pollution Control Board or Committee, Forest Department, Geological or Mining Officer. The same shall be prepared by undertaking site visits and also using by modern technology. After the Draft DSRs are prepared the District Magistrate of the concerned District shall forward the same for examination and evaluation by the SEAC. The same shall be examined by the SEAC and its report shall be forwarded to SEIAA. The SEIAA will thereafter consider the grant of approval such DSRs.

(ii) Needless to state that while preparing DSRs and appraisal thereof by SEAC and SEAI. It should be ensured that a strict adherence to the procedure and parameters laid down in the policy of January-2020 should be followed.

The District Survey Report will form the basis for application for Environmental Clearance, preparation of reports and appraisal of projects. District Survey Reports are to be reviewed once in every five years as per statute.

In lieu of above guideline and orders of Hon'ble Supreme Court and in compliance to the orders of Hon'ble NGT, EZ, Kolkata, in connection with O.A No. 63/2020, the Member Secretary, SEIAA, Bhubaneswar issued a Letter on 27th December, 2022 to Collector & District Magistrate, Puri with a direction " the DSR is to be signed afresh by the Collector and District Magistrate, along with members of the designated sub-committee consisting of Sub-Divisional Magistrate, and District Level Officers from Irrigation Department, State Pollution Control Board, Forest Department, Geology and /or Mining Department. Keeping in view of the orders of Hon'ble Supreme Court, Hon'ble NGT and directions of SEIAA, Bhubaneswar a fresh DSR has been prepared observing all formalities in the year 2024.

The Main objective of the preparation of District Survey Report is to ensure the following:-

1. Identification of Mineral Resources in the District.
2. Identification of areas of minor minerals having the potentiality where mining can be allowed.
3. Identification of area and proximity to infrastructure and installations where mining should be prohibited.

1. INTRODUCTION

1.1 History:

The District of Puri has been named after its headquarters, Puri. According to Cunningham, the ancient name of this town was Charitra, mentioned by the Chinese pilgrim Hiuen Tsang as Che-li-ta-lo. But the restoration of the word Che-li-ta-lo as Charitra and its identification with the town of Puri are open to doubt. The importance of the town as a seat of Vaisnavism increased when Chodaganga Deva constructed the temple of Purusottama Jagannath and installed the images of the deities. Thereafter, it became famous as the abode of Purusottama and was popularly called Purusottama Kshetra.

Purusottama name was applied to this town from the drama Anargharaghava Natakam attributed to cir. 9th century A.D. In the Nagari Plate of Anangabhima III of the Saka year 1151-52, i.e., 1229-30 A.D., the place is called Purusottama Kshetra. This name in the form of Purusottama Chhatar or only in the form Chhatar was used by the Mughals, the Marathas as well as the early British rulers in their official records. Even in Yoginitantra and Kalikapurana, the city is referred to as Purusottam. Puri region was also known as Utkal.

The name Purusottama Kshetra was also for sometime known as Purusottama Puri and as the word Purusottama Kshetra was contracted into Kshetra or Chhatra, so also Purusottama Puri was expressed in the contracted form, Puri. In fact, in many early British records this town is known by the name "Pooree". In modern times, Puri has become the most popular name amongst all other names of this town.

Under Mughal Rule (1592-1751), Odisha for the purpose of revenue administration was divided into three circars, namely Jaleswar, Bhadrak and Kataka, each of which under the Mughals was subdivided into Bishis. Puri formed a part of Kataka circar. After their occupation of Odisha in 1751, the Marathas brought about some changes in the revenue divisions of the province. They divided Odisha, which then extended from the river Suvarnarekha in the North to the lake Chilika in the South, into four Chakalas viz. Pipli, Kataka, Soro and Balasore. The Chakala of Pipli comprised major portions of the modern District of Puri.

The Chakalas were divided into Parganas and again into Mahals or Taluqs. The conquest of Odisha by the British in 1803 set fourth great changes in revenue divisions and political relations.

In June 1804, the province was divided into two divisions, namely the Northern and Southern Divisions, with the river Mahanadi forming the boundary. Robert Ker and Charles Groeme were appointed as Judge, Magistrate and Collector in Northern and Southern Divisions respectively. By 1805 both divisions were amalgamated and G. Webb succeeded Groene as Collector and Robert Ker became the Judge and Magistrate of the whole province.

As the Raja of Khurdha revolted the 1804, he was arrested and was placed in confinement in the

Fort of Barabati at Cuttack. His territory was confiscated and the Raja was subsequently released. In 1807 he was permitted to live at Balisahi in the town of Puri and functioned as superintendent of the

temple of Jagannath. Puri was the capital of the province of Odisha and the headquarters of the Collector till 1816. In 1806 there was a proposal to move the head quarters to Jajpur, but it didn't get Governments' sanction. In August 1814, a part of the Collector's establishment was removed to Cuttack, which was again brought back to Puri in December.

By 1916 the head quarter was permanently shifted to Cuttack, which was the head quarter during the Mughals and Marathas. By 1818, the office of the Commissioner was established and Robert Ker became the first Commissioner.

From 1813 to 1819, there was a joint Magistrate at Puri with the jurisdiction over the thanas of Pipli, Gop, Hariharpur and Kiran. By 1819 this office was abolished and the joint magistrate of Khurdha was given the charge of the above thanas. On 11th February 1822, the office of the joint magistrate of Khurdha was abolished and Odisha was again divided into two divisions with the river Baitarani as the dividing line. Willkinson, the collector of Cuttack, was placed in charge of Cuttack and Khurdha and Ricketts with powers of a collector was given the charge of Balasore and Bhadrak.

Finally on 23rd October 1828, the province was divided into three Districts, namely Balasore, Cuttack and Jagannath, which was later known as Puri. Regulation IV of 1821 had provided that the power of a magistrate and collector might be vested in one and the same person and accordingly one magistrate and collector was appointed in each of the above three Districts. H. Ricketts, R. Hunter and W. Willkinson were the first magistrate and collectors of Balasore, Cuttack and Puri Districts respectively.

In 1912, the new province of Bihar and Odisha was formed and subsequently Odisha became a separate province in 1936. After integration with Odisha on 1st January 1948, of the feudatory states of Nayagarh, Daspalla, Khandapara and Ranapur with a total area of 3941 sq. km., a separate sub-division comprising these ex-states was added to Puri District with its headquarters at Nayagarh. The fourth sub-division of Bhubaneswar was established on 26th January 1959. The old Puri District consisted of four sub-divisions i.e. Puri Sadar, Khurdha, Bhubaneswar and Nayagarh. Puri Sadar sub-division consisted of four Tahasils i.e. 1) Krushna Prasad 2) Sadar 3) Pipili and 4) Nimapara. Again by the year 1995, Puri District was divided into 3 Districts i.e.

1. Nayagarh District comprising of Nayagarh sub-division.
2. Khurda District comprising of Khurda and Bhubaneswar sub-divisions.
3. Puri District comprising of Puri Sadar sub-division only.

1.2 Location and Geographical Area:

Puri is one of the Districts of Odisha. Puri is the District Head Quarter, spreading over an area of 3479 sq.km. The District is surrounded by Jagatsingpur & Cuttack District in its northern side, Khordha District in its West, Ganjam District in its South and Bay of Bengal lies in the Eastern side. Puri is in the coastal delta of the Mahanadi River on the shores of the Bay of Bengal. In the ancient days it was near to Sisupalgarh (also known as "Ashokan Tosali"). Then the land was drained by a tributary of the Bhargavi River, a branch of the Mahanadi River. This branch underwent a meandering course creating many arteries altering the estuary, and formed many sand hills. These sand hills could be cut through by the streams. Because of the sand hills, the Bhargavi River, flowing to the south of Puri, moved away towards the Chilika Lake. This shift also resulted in the creation of two lagoons, known as Sar and Samang, on the eastern and northern parts of Puri respectively. Sar lagoon has a length of 5 miles (8.0 km) in an east-west direction and a width of 2 miles (3.2 km) in north-south direction. The estuary of the Bhargavi River has a shallow depth of just 5 feet (1.5 m) and the process of siltation continues. According to a 15th-century Odia writer Saraladasa, the bed of the unnamed stream that flowed at the base of the Blue Mountain or Neelachal was filled up. Katarajavamsa, a 16th-century chronicle (c.1600), attributes filling up of the bed of the river which flowed through the present Grand Road, as done during the reign of King Narasimha II (1278-1308) of Eastern Ganga dynasty.



1.3 Administrative Units:-

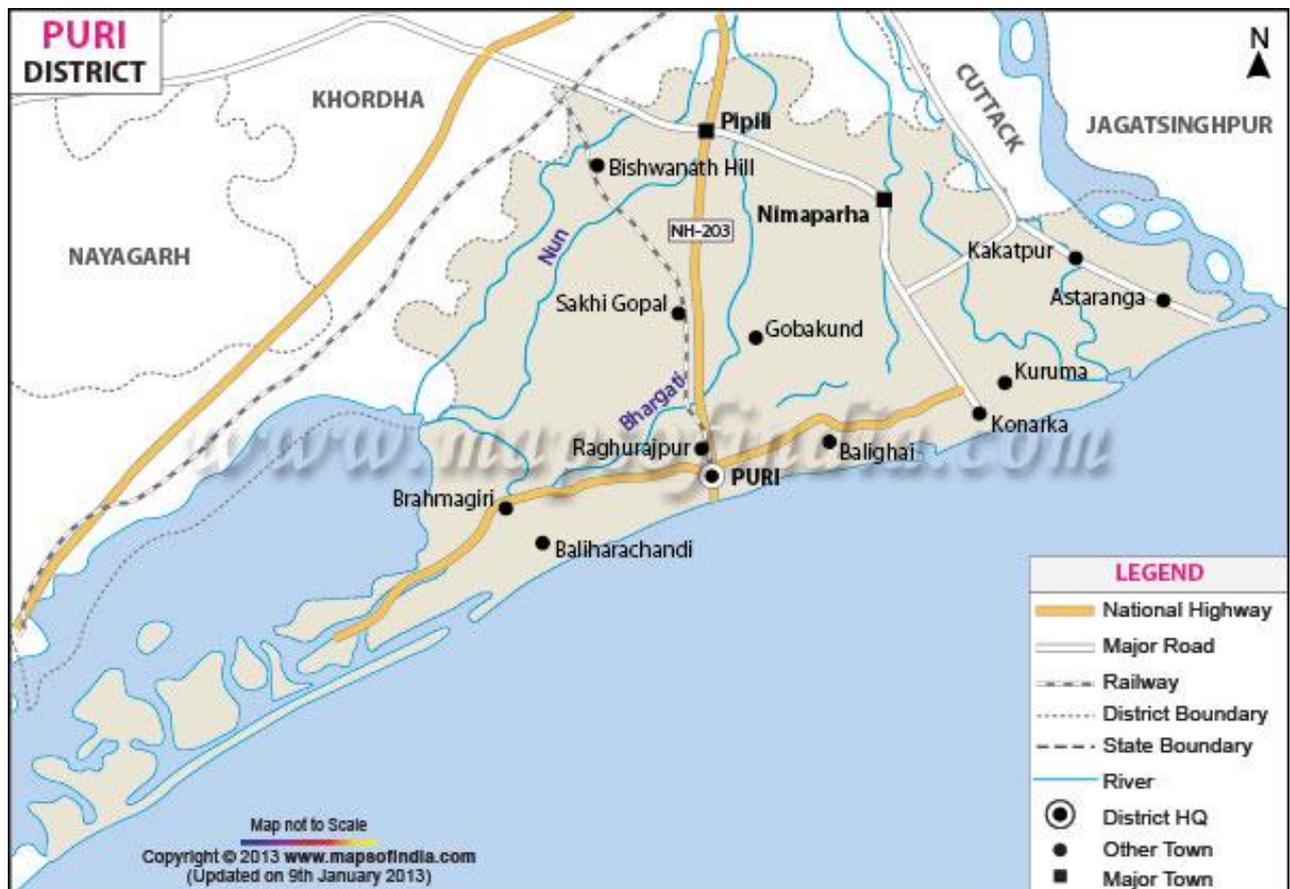
Puri is the Administrative Headquarter of Puri District. It is located at a distance of 50 km from Bhubaneswar, State Capital of Odisha. It has 1722 villages covering 11 Blocks, 11 Tahasils and 1 sub-division. The district Tahasils namely 1) Astaranga 2) Brahmagiri 3) Delanga 4) Gop 5) Kakatapur 6) Kanas 7) Krushnaprasad 8) Nimapara 9) Pipili 10) Puri sadar 11) Satyabadi. The population of the District is 1698730 according to the 2011 Census. The District accounts for 2.23% of the State's territory and about 4.04% of State's population. The density of population of the District is 488 per square km as against 610 per square km of the State. As per 2011 census, the population of Scheduled Caste is 325133 (19.14%), and Scheduled Tribe is 6129 (0.36%). The literacy percentage of the District covers 76.05 against 84.67 of the State.



1.4 Connectivity facilities:-

The District is well served by a network of good roads and has been called the motorists paradise. The chief roads emanating from Puri town are NH-203 pass through the District. Puri Town is about 60 Kms from the state capital Bhubaneswar, 80 Kms from Cuttack, 170 Kms from Berhampur, 380 Kms from Rourkela. It is also connected with other cities such as Jagatsingpur, Kendrapara and Jajpur.

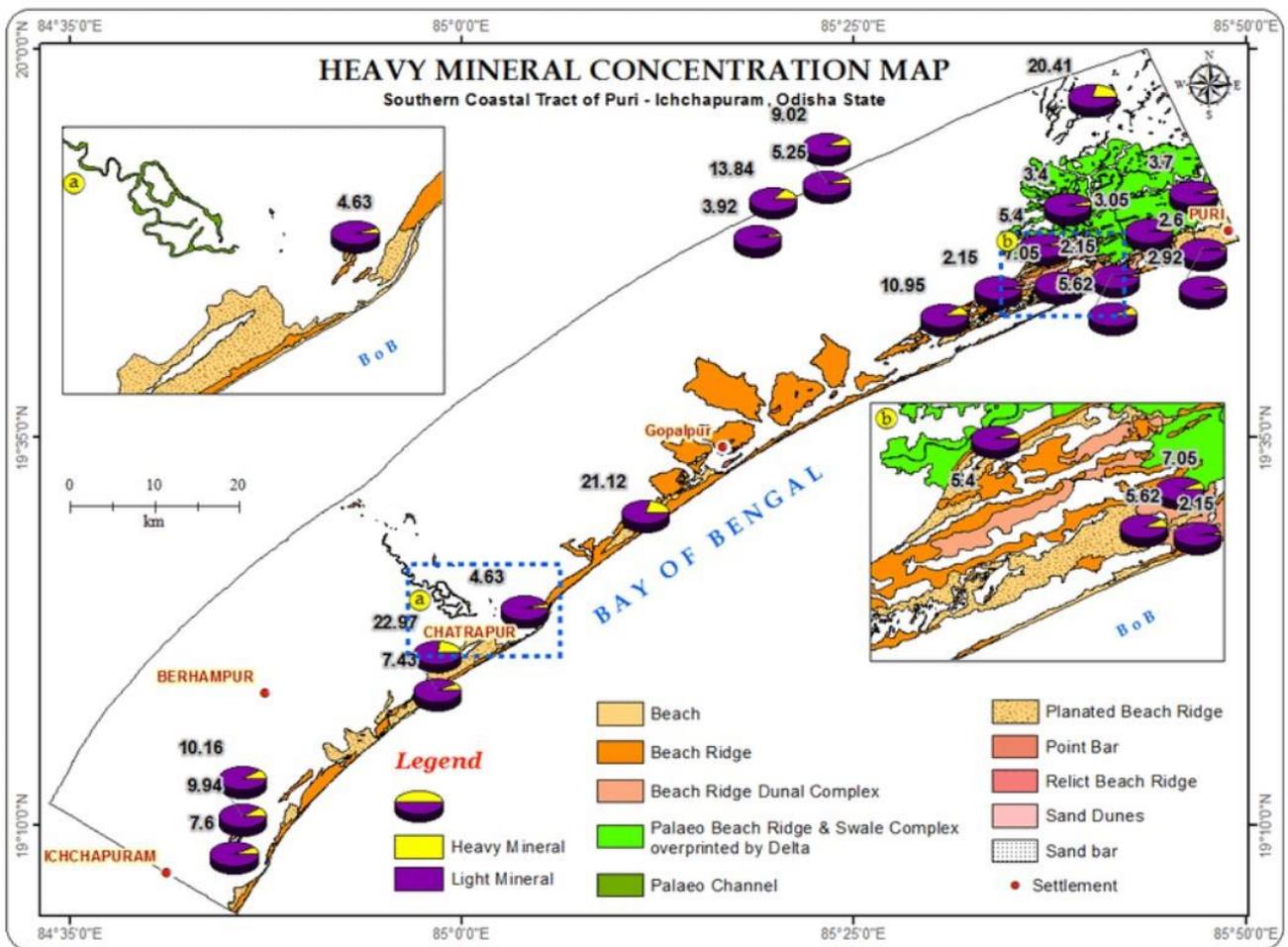
Rail Connectivity: Puri District is well connected to the Railway network. It connect to the Khordha Road Railway stations through which it goes to Bhubaneswar, Cuttack, Jajpur, Bhadrak, Balesore, Kolkota in the northern side of the district & Berhampur, Visakhapatanam, Chennai to the southern side of the district.



2. OVERVIEW OF MINING ACTIVITIES IN THE DISTRICT:

Heavy minerals: The beach and sand dune deposit contains heavy minerals like monazite, rutile, illmenite, zircon etc. Such deposits are seen around Paikrapur, Nandala, Brahmandeo, Bajrakot and Udegiri over a length 91.23km. The total reserve of heavy minerals in these areas has been estimated as 147 million tonnes and the average grade of the heavies in beach sand is 11.8%.

Morrum deposits: Morrum deposits occur around Bayakuda, Gop, Ganeswarpur, Begunia, Sovanpur, Balanga, Haripur, Dhirapur and Chhenua villages of the district and used as construction material for buildings and roads.



3. GENERAL PROFILE

3.1 Demography:

Descriptions	Area / Numbers
Area	3479.00 sq.km.
No. of Subdivision	01
No. of Blocks	11
No. of Tahasils	11
No. of Municipality	01
No. of NAC	03
No. of Grampanchayat	268
No. of Villages	1722

Category	Population	Percentage
Total Population	1698730	
Male	865380	50.94
Female	833350	49.06
Rural	1433800	84.40
Urban	264930	15.60
Scheduled cast	325133	19.14
Scheduled cast Male	164366	50.55
Scheduled cast Female	160767	49.45
Scheduled Tribe	6129	0.36
Scheduled Tribe male	3240	52.86
Scheduled Tribe Female	2889	47.14

POPULATION DENSITY 488 per sq. Km.

LITERACY TOTAL LITERACY =76.05

LITERACY MALE =54.56

LITERACY FEMALE =45.44

3.2 Education

Primary School (2017-18)	No. of Schools	1294
	Enrolment (No)	120142
	Pupil Teacher Ratio	16.34
Upper Primary School 2017-18	No. of Schools	871
	Enrolment (No)	75134
	Pupil Teacher Ratio	17.02
General College 2017-18	Junior	62
	Degree	45
Secondary School	No. of Schools	378
	Enrolment (No)	49227
	Pupil Teacher Ratio	23.99
Literacy Rate, 2011	Male	90.8
	Female	78.3
	Total	84.7

3.3 Health

The medical facilities are provided by different agencies like Govt., Private individuals and voluntary organizations in the district.

Sub divisional hospitals including mobile	6 No
Beds facilities	698 No
Homoeopathic dispensaries	24 No
Ayurvedic dispensaries	16 No

3.4 Culture & Heritage

Puri is one of the fascinating littoral districts of Odisha. The cultural heritage of Puri with its long recorded history beginning from the third century B.C., The monuments and religious sanctity, way of life of the people with their rich tradition possess emphatically to be the cultural heart of Odisha. Puri is considered to be a cultural capital of Odisha.

The district has a conglomeration of different religions, sects and faiths in course of its history. Majority of the people are Hindus. The other important communities are Muslims, Sikhs, Jains, Christians and indigenous groups are found in the district. The Hindu monuments of various sectors like Shaivism, Vaishnavism, Sakticult, Ganapatya, Mahabir etc. are found. Similarly Muslim Mosques, Christian Churches are also noticed here.

3.5 Festivals, Art, Weaving and Paintings

Puri District, renowned for its cultural heritage, is rich in festivals, art, weaving, and traditional paintings that reflect the region's vibrant traditions.

Festivals

Puri is famous for its grand festivals, the most notable being the Rath Yatra (Chariot Festival), held in June or July. This event attracts thousands of devotees who come to witness the procession of the deities Jagannath, Balabhadra, and Subhadra on massive chariots. Other important festivals include Maha Shivaratri, Anla Nabami, and Durga Puja, each celebrated with great enthusiasm, showcasing elaborate rituals and community participation.

Art

The district is home to unique artistic traditions, including Pattachitra, a traditional cloth-based scroll painting characterized by intricate details and mythological narratives. These paintings often depict stories from Hindu scriptures and are recognized for their vivid colors and fine craftsmanship. Local artisans also create beautiful stone carvings and woodwork, which reflect the religious and cultural themes of the region.

Weaving

Puri is famous for its handwoven textiles, particularly ikat fabrics. The intricate tie-dye technique used in weaving produces stunning patterns and designs, making these textiles highly sought after. Local artisans create sarees, stoles, and other garments that are not only beautiful but also reflect the rich cultural heritage of Odisha.

Paintings

In addition to Pattachitra, the region is known for other painting styles, such as Saura paintings, which are tribal art forms depicting folklore and daily life using natural pigments. These artworks often incorporate themes from nature and are created on walls or canvas, celebrating the local culture and traditions.

Overall, the festivals, art, weaving, and paintings of Puri District form a vibrant tapestry that showcases the area's rich cultural identity and continues to thrive through generations of artisans and community participation.

3.6 Tourist Places

There are 20 nos. of tourist centers such as Astaranga, Balighai, Baliharchandi, Barala (Balunkeswarpatha), Biswanath Hill, Beleswar, Brahmagiri, Chaurasi, Chilika, Jhaniapira, Kakatpur, Konark, Kuruma, Manikpatna, Pipli, Puri, Raghurajpur, Ramachandi, Satyabadi and Baligoan and identified by department of Tourism and Culture, Odisha. During the year 2011, the numbers of Domestic tourists were 15833106 and foreign tourists were 69539 who visited the tourist spots of the district.

Jagannath Temple



Konark Temple



Ramachandi Temple



Pipili



Manikpatna



Kakatapur



Jahaniapira



Chourasi



Chilika

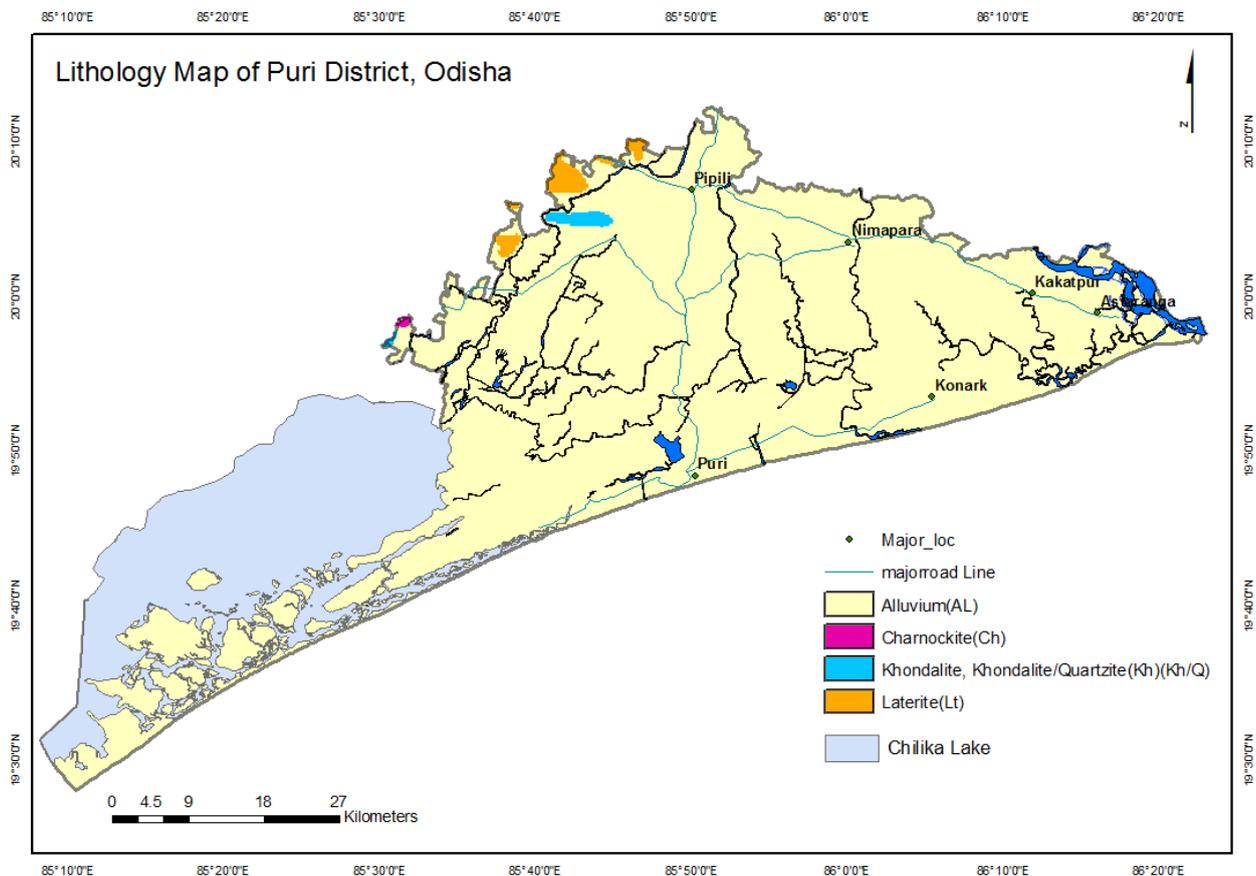


Astaranga



4. GEOLOGY OF THE DISTRICT:

Puri District, located in eastern India in Odisha, features a diverse geological framework that includes both sedimentary and metamorphic rocks. The coastal areas primarily consist of recent sediments, such as sandy beaches and alluvial deposits, shaped by the rivers flowing into the Bay of Bengal. In contrast, the western parts of the district are dominated by ancient crystalline rocks, mainly granite and gneiss, dating back to the Precambrian era. Additionally, laterite soils formed through weathering processes are prevalent in the region. The area is influenced by tectonic activities, although major fault lines are not prominent, and it lies in a seismically active zone, with occasional seismic events recorded. While Puri is not rich in minerals compared to other districts in Odisha, it does have some mineral occurrences associated with its crystalline rocks. The coastline features sandy beaches and dunes shaped by wave and current action, and coastal erosion alongside sediment deposition are significant environmental concerns influenced by both natural processes and human activities. Overall, the geological diversity of Puri contributes to its rich natural beauty and ecological significance, making it an intriguing area for study in geology and environmental science.



4.1 Physiography & Geomorphology:

Physiography:

Physiographically the district can be broadly divided into three natural divisions.

1. The Saline marshy tract along the coast.
2. The very gently sloping plain.
3. Undulating hard rock areas with lateritic capping and isolated hillocks.

1. The Saline marshy tract along the coast.

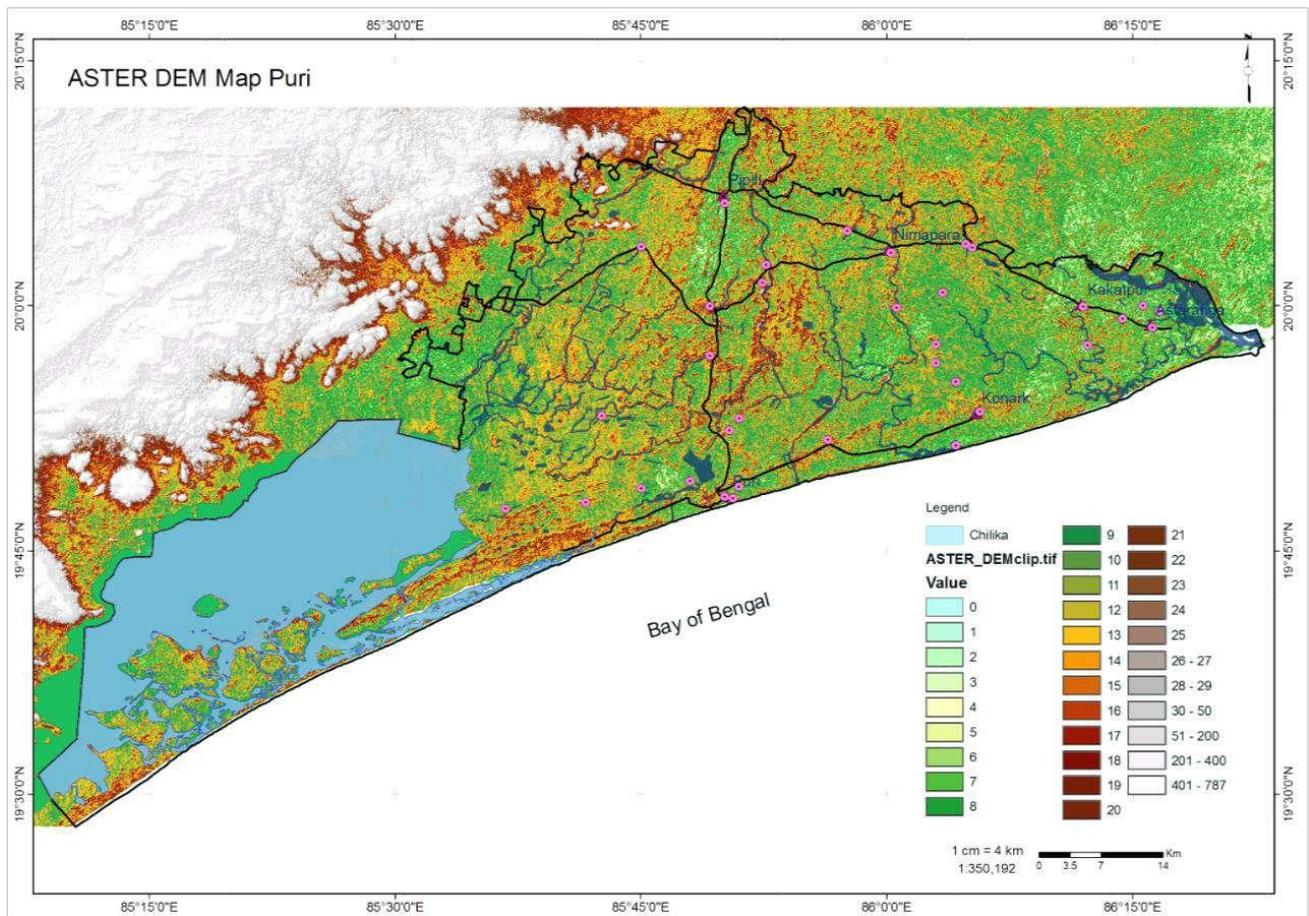
The coastal sand dunes occur as a linear strip, running parallel to the shoreline, which maintain a higher altitude than the immediate interior part. The width of this tract varies from a few hundred meters to 7km. Swamps and tidal flats are also common in this tract. The deltaic plains may be divided into three parts: lower, middle, and upper. The lower deltaic plains occur adjacent to the coastal sand dunes, having a width of 5 to 10km. Extensive flood plains, meandering stream curves, swamps, minor ridges etc. characterize this geomorphic unit. The Sar and Samang lake near Puri were important features in this terrain which have been silted up at present. The middle deltaic plains have characteristic parallel to sub-parallel drainage pattern and splitting distributaries. The upper deltaic plains occur along the course of the Daya river with a width of 2 to 3 km. This alluvial plain is characteristically flat. The altitude of the deltaic plain varies from 1 to 10m above mean sea level (CGWB District report 2004).

2. The very gently sloping plain.

The coastal plain is a gently sloping plain occurring parallel to the coast and mainly formed by fluvio-marine action and is intersected by a 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 km. The coastal plain encompasses a series of beach ridges characterized by sand dunes of various relief and extends for kilometers, almost parallel to the coast. The Deltaic alluvial plain spreads over a large area, and it represents a major part of the district. This has developed due to depositional activities of the major river systems in a fluvial environment. Human and agricultural activities are intense in this area. It also encompasses geomorphic units like paleochannel, meander scars, ox-bow lakes of smaller dimensions. The area is well drained by Rivers.

3. Undulating hard rock areas with lateritic capping and isolated hillocks.

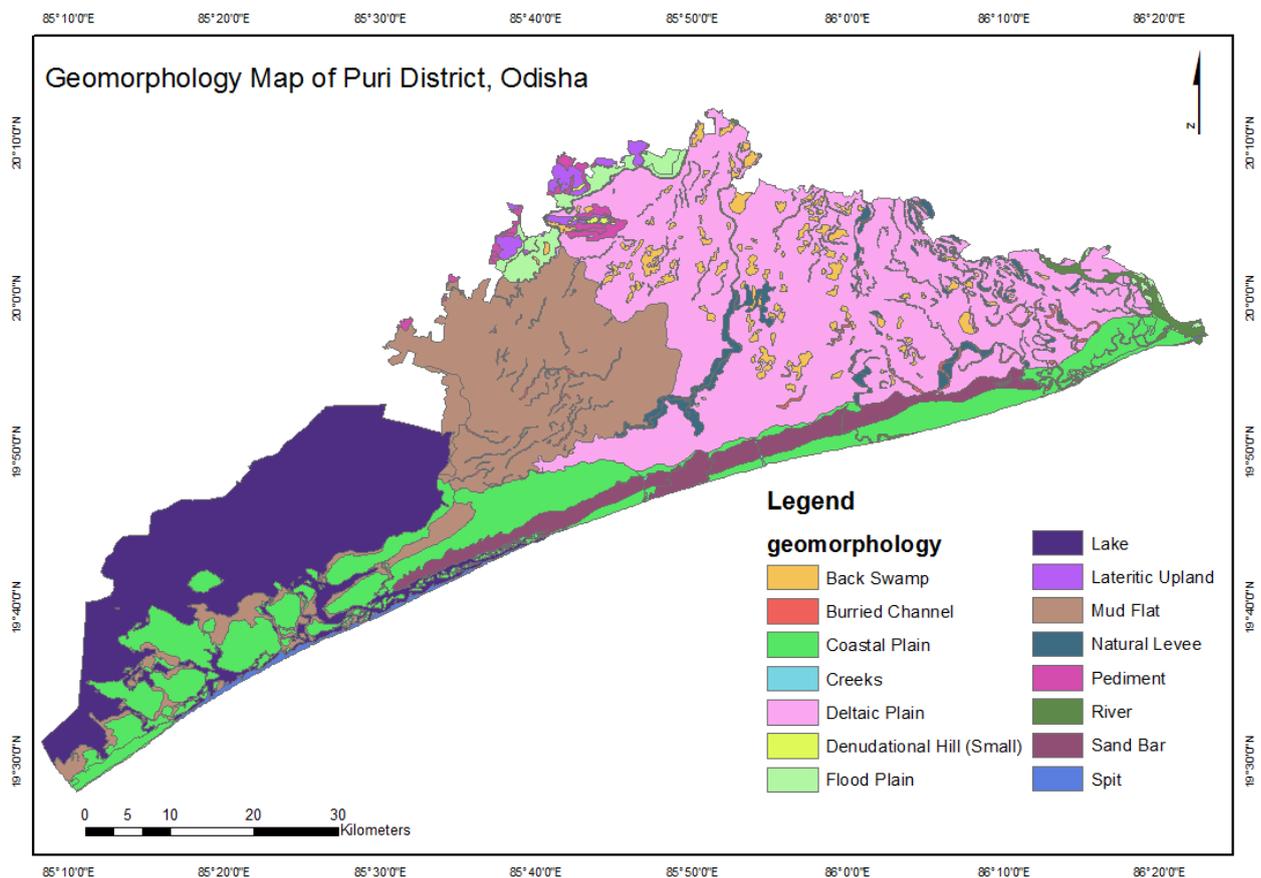
The undulating hard rock terrain occurring over a limited area in the western parts covering Delang and Kanas blocks maintain a general slope towards the south. The country rocks are often covered by laterites, and the general elevation varies from 8 to 15m above mean sea level. The geomorphological map is given in fig. 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 km. Tidal flats and mudflats support the growth of varieties of mangroves.



Geomorphology:

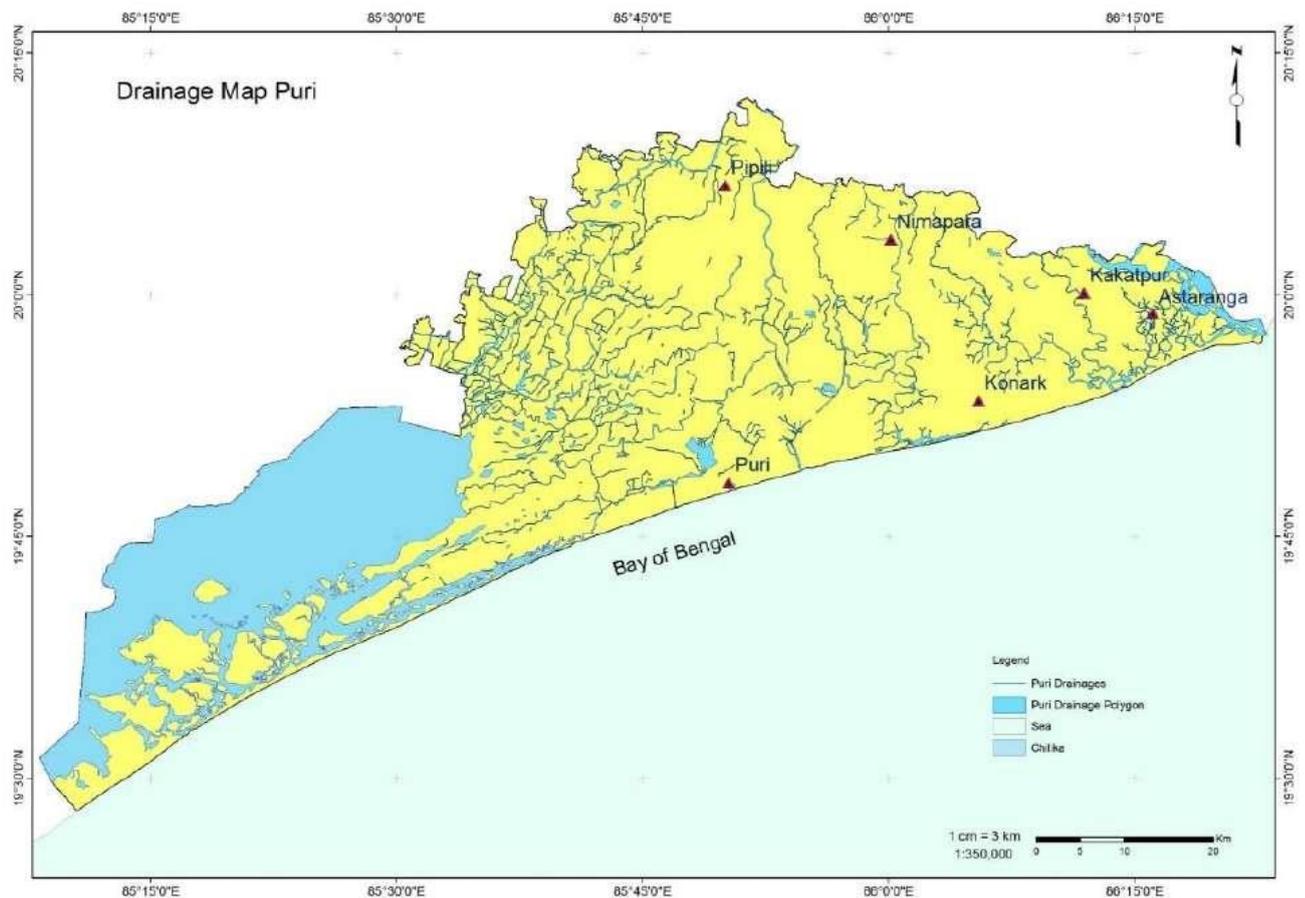
The analysis of geomorphological data and thematic maps collected from ORSAC (Odisha Remote Sensing Application Centre), Bhubaneswar, reveals that The undulating hard rock terrain occurring over a limited area in the western parts covering Delang and Kanas blocks, maintain a general slope toward south. The country rocks are often covered by laterites, and the general elevation varies from 8 to 15 m above mean sea level.

The geomorphology of the area is shown. Major portions of the study area are covered by deltaic plain with a 2-3 degree slope towards the coast. Sanddunes or sand bar are the important geomorphic features as they are the repository of ground water. They are spread all along the coast. Mudflats are located in the southwestern part in Kanas, Delang, and Brahmagiri block. These features are mainly the area where major rivers debouch to the lake chilika. The siltation, carried by the rivers are deposited at the mouth where the rivers meet the lake.



1. Rivers and Drainage

Puri district falls in the Mahanadi river basin, and the main drainage is formed by the rivers Daya, Devi, Kushabhadra, Bhargavi, and Prachi, which have southerly, south-easterly and south-westerly courses. The river Bhargavi changes its course from north-south to southwest near Sakhigopal, and further downstream, it bifurcates into numerous channels. All the rivers have reached their old stage and are meandering in nature, branching into several distributaries draining into the sea or the Chilika Lake. Other important rivers flowing in the area are Kadua, Ratnachira, Dhanua, and Kandal. The tidal effects are observed upstream, even up to 10kms from the confluence point. All the rivers maintain sluggish flow during the summer months but swell menacingly during the rainy season. The other important surface water bodies in the district are Sar and Samang lakes. Another important water body in Chilika, which is a lagoon separated long back from the Bay of Bengal by a linear extending spit. pattern of the district is dendritic to subparallel.



All the rivers of the Puri district have common characteristics. In the hot weather, they are beds of sand with tiny streams or none at all, while in the rains, they receive more water than they can carry. Generally, all rivers are distributaries of Mahanadi rivers.

- a. **Kushabhadra River-** A branch of the Kuakhai river originates from Baliana and meets the sea of Bay of Bengal at the shrine of Ramachandi, located 15 miles east of Puri. Its tributary Mugei joins with Kushabhadra.
- b. **Daya River-** A branch of Kuakhai river drains into the Chilika lake. Two small rivers join with Daya river, i.e., the Gangua and the Managuni below Kanas. Daya river has been attributed with the problem of causing silt build-up in Chilika Lake.
- c. **Bhargavi River-** A branch of Kuakhai meets the sea of Bay of Bengal after breaking up into numerous distributaries in the last two and a half miles of its course. There are four main branches all branching off from the left bank viz. Kanchi, the East Kania, the Naya Nadi and the South Kanchi (which drains into Sar Lake); and by various channel the first three are interconnected and finally join the Suna Munhi river which falls into Bali Harchandi and ultimately drains to the Bay of Bengal sea via the mouth of Chilika. The South Kania gets lost in the marshes on the western shore of Chilika.
- d. **Kadua River-** It is a monsoon fed river that drains into the Prachi river.
- e. **Prachi River-** It is a branch commencing from Puri and Jagatsinghpur district. It has its origin near Kantapara on Cuttack-Gop road and passes through the village of Kakatpur before draining into the sea of Bay of Bengal.
- f. **Devi River-** It is a branch of Kathajori. It runs into Puri district near the extreme east forming numerous branches.

There are also a few small rivers worth a mention, chiefly Ratnachira and Nuna, which drain into the Bhargabi River and Daya River, respectively.

2. Soil Types

There are mainly five types of soil found in the study area, i.e., Alfisols, Ardisols Coastal sandy soil, Entisols, Ultisols.

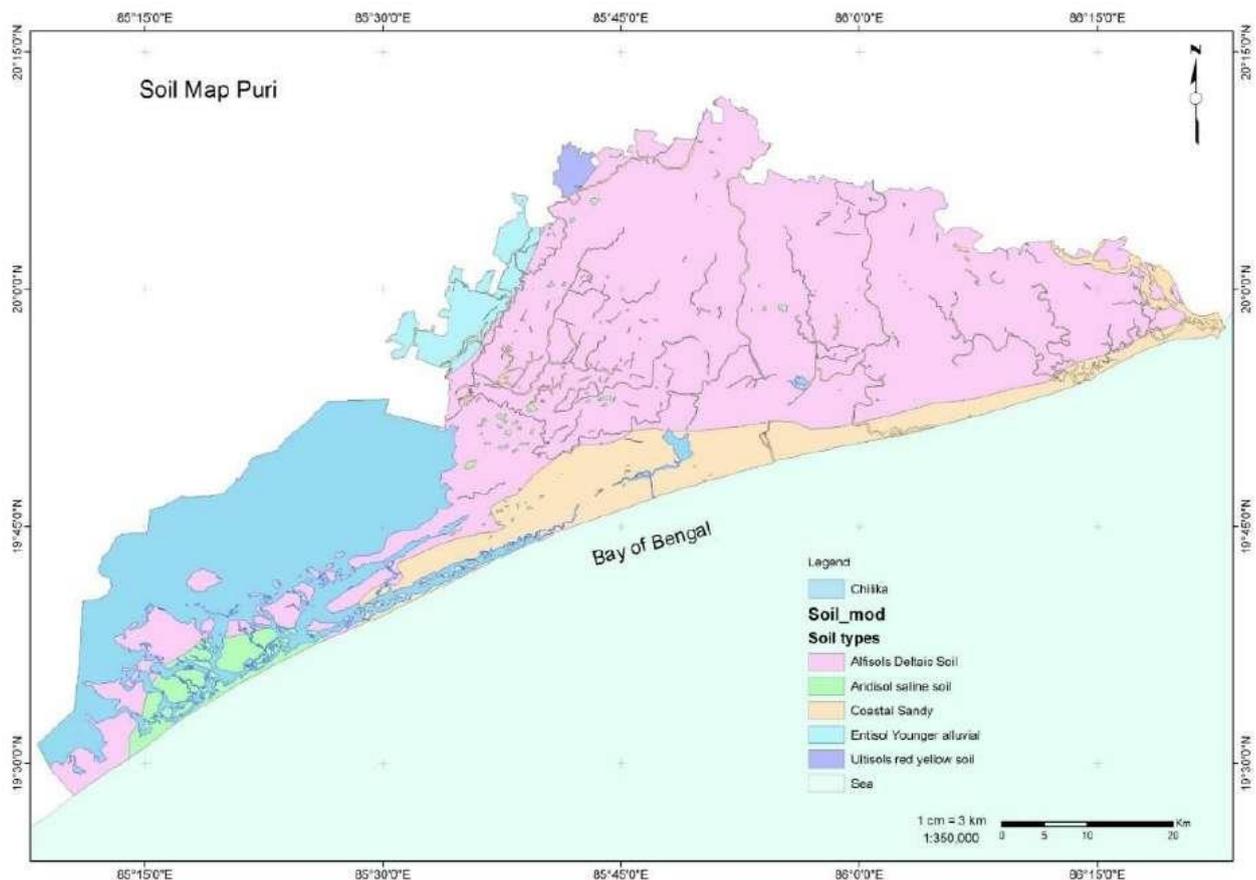
Alfisols: Alfisols form in semiarid to humid areas. They have a clay-enriched subsoil and relatively high fertility. They are rich in aluminum (Al) and iron (Fe). Because of their productivity and abundance, the Alfisols represent one of the most important soil orders for food and fiber production. Calcium, magnesium, and potassium are relatively abundant in these types of soil. This contrasts with Ultisols described later. The deltaic alluvial soils belong to this group and occupy major parts of the area. These deltaic soils are generally deficient in P2O5 and N2. The K2O is adequate, and pH varies between 6.5 and 7.3. These types of soil support paddy crops.

Aridisols: These are saline and saline-alkali soils found near the coast and are restricted to Krushnaprasad block. Aridisols have a very low concentration of organic matter reflecting the paucity of vegetative production on these dry soils. Accumulation of salts on the surface can result in salinization. Dry climate and low humus content limit their arability without irrigation.

Entisols: These include youngest alluvial soils occurring in the western parts of the district may be called as fluvisols.

Coastal Sandy Soils: These types of soil are found along the coastal tract. Coastal sandy soils are deficient in nitrogen, phosphoric acid, and humus material, but rich in potash and lime. The pH values are on the alkaline side. The texture varies from sandy to loamy sand. These are fertile soils and can produce a wide variety of crops, including paddy, wheat, sugarcane, cotton, banana, and tobacco. These types of soil support the growth of plantations like Casuarina equisetifolia and Eucalyptus tereticornis.

Ultisols: Ultisols vary in color from purplish-red to a bright reddish-orange tone. They are typically quite acidic, often having a pH of less than 5. The red and yellow colors result from the accumulation of iron oxide (rust), which is highly insoluble in water. Major nutrients, such as calcium and potassium are typically deficient in ultisols. The Ultisols soil includes the laterite and lateritic soils are confined to a small area in the northern part of the district in and around Delang, characterized by compact vesicular mass. The fertility of the soil is low.



3. Geological Formation

The geology of Puri is diverse, with significant formations from the Precambrian era:

Eastern Ghats Rock Formations: The rocks in the Eastern Ghats are primarily of ancient metamorphic origin, including gneisses, schists, and granites.

Sedimentary Rocks: In the river valleys and plains, sedimentary rocks and alluvial deposits are common.

4. Erosion and Soil Conservation

Given the district's hilly and plateau terrain, erosion is a concern, particularly in areas with deforested slopes. Soil conservation efforts are important to prevent loss of fertile topsoil and maintain agricultural productivity.

5. Land Use and Human Impact

The geomorphology influences land use patterns:

Agriculture: The fertile valley soils are extensively used for agriculture, with crops such as rice, pulses, and oilseeds being commonly cultivated.

Forestry and Mining: The hilly and forested areas support various types of forestry activities, and there is also mining activity, which can impact the geomorphological balance if not managed properly.

Understanding these geomorphological aspects helps in planning sustainable development, managing natural resources, and mitigating natural hazards in Puri District.

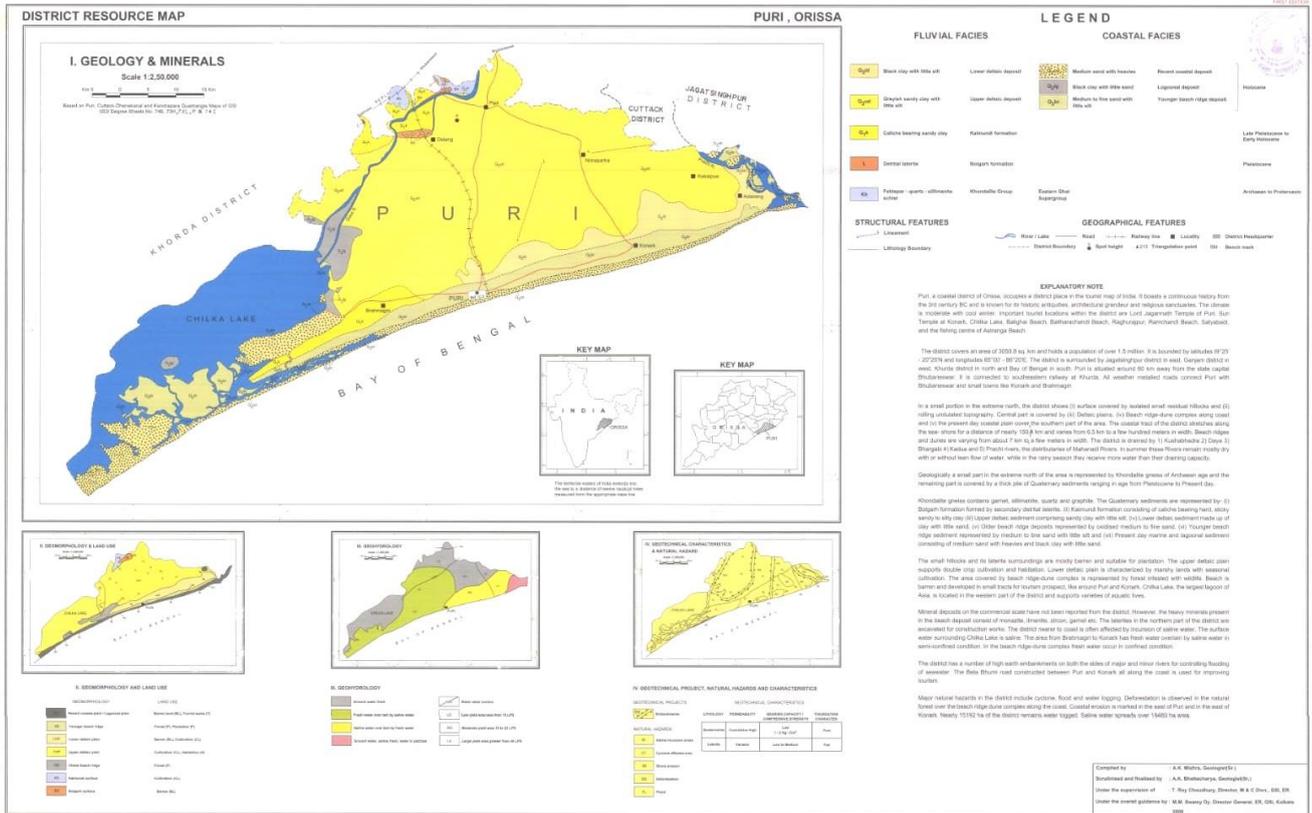
4.2 Stratigraphy:

The geological formations in the district span in age from Archean to Recent (Quaternary). The Tertiary and Quaternary formations occur over major parts of the district while the Archeans occupy the hilly areas at higher altitudes in the west. The generalized geological succession of the area and brief description described as follows.

Geological Time	Age	Lithology
Quaternary	Recent to Pleistocene	Dune sand, younger alluvium, older alluvium and laterites
Tertiary	Mio - Pliocene	Brown, yellowish-brown and grey clays, sand and gravel with fossils and calcareous concretions.
Mesozoic	Lower Jurassic to Lower Cretaceous	Sandstone, carbonaceous shale, conglomerate, etc. of Upper Gondwana Group.
Precambrian	Precambrian	Quartz and pegmatitic veins, Khondalites

4.3 Mineral Resources:

Puri district in Odisha is rich in minerals including significant deposits of Ilmenite, Silimanite, and Garnet essential Product. These resources play a crucial role in the region's economy and industrial development.



5. DRAINAGE OF IRRIGATION PATTERN

Puri district falls in the Mahanadi river basin, and the main drainage is formed by the rivers Daya, Devi, Kushabhadra, Bhargavi, and Prachi, which have southerly, south-easterly and south-westerly courses. The river Bhargavi changes its course from north-south to southwest near Sakhigopal, and further downstream, it bifurcates into numerous channels. All the rivers have reached their old stage and are meandering in nature, branching into several distributaries draining into the sea or the Chilika Lake. Other important rivers flowing in the area are Kadua, Ratnachira, Dhanua, and Kandal. The tidal effects are observed upstream, even up to 10kms from the confluence point. All the rivers maintain sluggish flow during the summer months but swell menacingly during the rainy season. The other important surface water bodies in the district are Sar and Samang lakes. Another important water body in Chilika, which is a lagoon separated long back from the Bay of Bengal by a linear extending spit. pattern of the district is dendritic to subparallel.

5.1 River System

- g. Kushabhadra River-** A branch of the Kuakhai river originates from Baliana and meets the sea of Bay of Bengal at the shrine of Ramachandi, located 15 miles east of Puri. Its tributary Mugei joins with Kushabhadra.
- h. Daya River-** A branch of Kuakhai river drains into the Chilika lake. Two small rivers join with Daya river, i.e., the Gangua and the Managuni below Kanas. Daya river has been attributed with the problem of causing silt build-up in Chilika Lake.
- i. Bhargavi River-** A branch of Kuakhai meets the sea of Bay of Bengal after breaking up into numerous distributaries in the last two and a half miles of its course. There are four main branches all branching off from the left bank viz. Kanchi, the East Kania, the Naya Nadi and the South Kanchi (which drains into Sar Lake); and by various channel the first three are interconnected and finally join the Suna Munhi river which falls into Bali Harchandi and ultimately drains to the Bay of Bengal sea via the mouth of Chilika. The South Kania gets lost in the marshes on the western shore of Chilika.
- j. Kadua River-** It is a monsoon fed river that drains into the Prachi river.
- k. Prachi River-** It is a branch commencing from Puri and Jagatsinghpur district. It has its origin near Kantapara on Cuttack-Gop road and passes through the village of Kakatpur before draining into the sea of Bay of Bengal.
- f. Devi River-** It is a branch of Kathajori. It runs into Puri district near the extreme east forming numerous branches.

6.0 LAND UTILIZATION PATTERN IN THE DISTRICT

6.1 FOREST & NON-FOREST LAND

The forest of Puri District is full of varieties of medicinal plant. Kendu leaves, Bamboo, Sal, Teak, Mango other timber species and a wide range of carnivorous & herbivorous wild animals live in the forest. The District has one Wildlife Sanctuary known as Chlika Wildlife Sanctuary & Balukhand-Konark Wild Life Sanctuary. This sanctuary is home to many wildlife species like Birds, Crocodiles, mouse deer, a wide variety of birds like green munia, Great Eared-nightjar and various reptiles. The sanctuary is home to a herd of Blackbuck and Spotted Deer. Other animals found in the sanctuary include monkey, squirrel, jungle cat, hyena, jackal, mongoose and variety of birds and reptiles. Olive ridley sea turtles nest on the beaches.

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	Percentof GA	Change	Scrub
Angul	6375	371	1380	1004	2755	43.22	43	84
Bolangir	6575	70	224	837	1131	17.2	151	142
Baleswar	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 total geographical area of the district is 3,48,102 ha, out of which total net sown area is 1,88,229 ha, and the gross cropped area is 2,84,633 ha. Area sown more than once is 117381 ha. The cropping intensity is highest (194%) in Pipili, followed by Kakatpur block (193%). In other blocks, the cropping intensities are 166% in Astaranga, 141% in Brahmagiri, 180% in Delanga, 150% in Gop, 154% in Kanasa, 113% in Krushna Prasad, 169% in Nimapara, 160% in Puri Sadar and 174 % in Satyabadi block. The irrigated area of the district is 1,89,972 ha, and the rainfed area is 1,16,093 ha, out of which Kharif irrigated area is 1,11,900 ha, and Rabi irrigated area is 78,072 ha. Agriculture occupies an important place in the economy of the Puri district. The total land use pattern is shown.

Source: Fertilizer and Agriculture Statistics, Eastern Region (2006-2007).

LAND USE PATTERN OF PURI DISTRICT

Block	Forest Area	Misc. tree	Barren & Uncultivable	Land put to non-	Cultivable	Permanent	Current	Other fallow	Net area
Astaranga	620	480	43	4126	1062	1258	152	326	7827
Bramhagiri	845	5159	1008	5376	1002	2076	2027	1269	13029
Delanga	0	346	647	4408	61	976	138	323	13661
Gop	1053	2702	110	5228	732	1496	1661	1074	20292
Kakatapur	490	493	0	3057	729	745	318	361	10151
Kanas	0	341	0	4426	238	594	2392	314	13998
Krushnaprasad	235	2139	1362	15666	839	3112	605	3519	10533
Nimapara	131	1277	4	5000	476	1761	450	670	18748
Pipili	17	1301	0	3750	479	431	226	1521	12218
Purisadar	40	2207	0	4106	247	344	4550	682	13523
Satyabadi	0	2164	0	2647	141	270	2164	482	9307
URBAN	828	614	69	2701	196	1063	447	447	1182
Total	4259	19223	3243	60491	6202	14126	15130	10988	144469

6.2 Agriculture Land:

The primary objective of Agriculture Department is to increase the production as well as productivity of major crops like Paddy, Cereals, Pulses, Oilseeds, vegetables, Fibres, Spices, Sugarcanes & Fodder which is widely cultivated in this District in both Kharif & Rabi season. Another key objective is to bring all round development among farming community of the District. The Chief District Agriculture officer is the head of office so far as agriculture is concerned. As it has already been pointed out that agriculture is the main livelihood of the people in Kendrapara District, it is therefore designated as the food bowl of Odisha. 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 tables below:

Table - 3.6a: Crop Coverage Area of Puri District, Odisha.

Sl No.	Block	Geographical Area in Ha.	Cultivated Area in Ha.				Paddy Area	Non-Paddy Area
			High	Medium	Low	Total		
1	Puri Sadar	31112	595	4058	11855	16508	12500	595
2	Brahmagiri	33178	490	5190	11770	17450	9400	490
3	Lrushnaparasad	78743	895	6739	7147	14781	11100	895
4	Satyabadi	20295	1778	5710	5924	13412	10100	1778
5	Pipili	25127	3248	6774	9357	19379	15800	3248
6	Delanga	24301	1195	5833	11037	18065	16700	1195
7	Kanas	25611	673	3800	12604	17077	11300	673
8	Nimapada	31824	4903	8500	12830	26233	19500	4903
9	Gop	40718	2944	5653	16779	25376	19700	2944
10	Kakatapur	18788	1305	3173	4991	9469	7800	1305
11	Astaranga	18405	1074	2224	4697	7995	8100	1074
		348102	19100	57654	108991	185745	142000	19100

Land Use Pattern

Sl No.	Land Use	Area In '000 Ha.
1	Forest Area	14.225
2	Misc. Tree & Groves	8.881
3	Permanent Pasture	8.374
4	Culturable Waste	3.299
5	Land put to Non-Agril. use	115.01
6	Barren & Uncultivated land	9.568
7	Current Fallow	0.046
8	Other Fallow	0.516
9	Net Area Shown	188.183
10	Mining	130.581
	Geographical Area	348.102

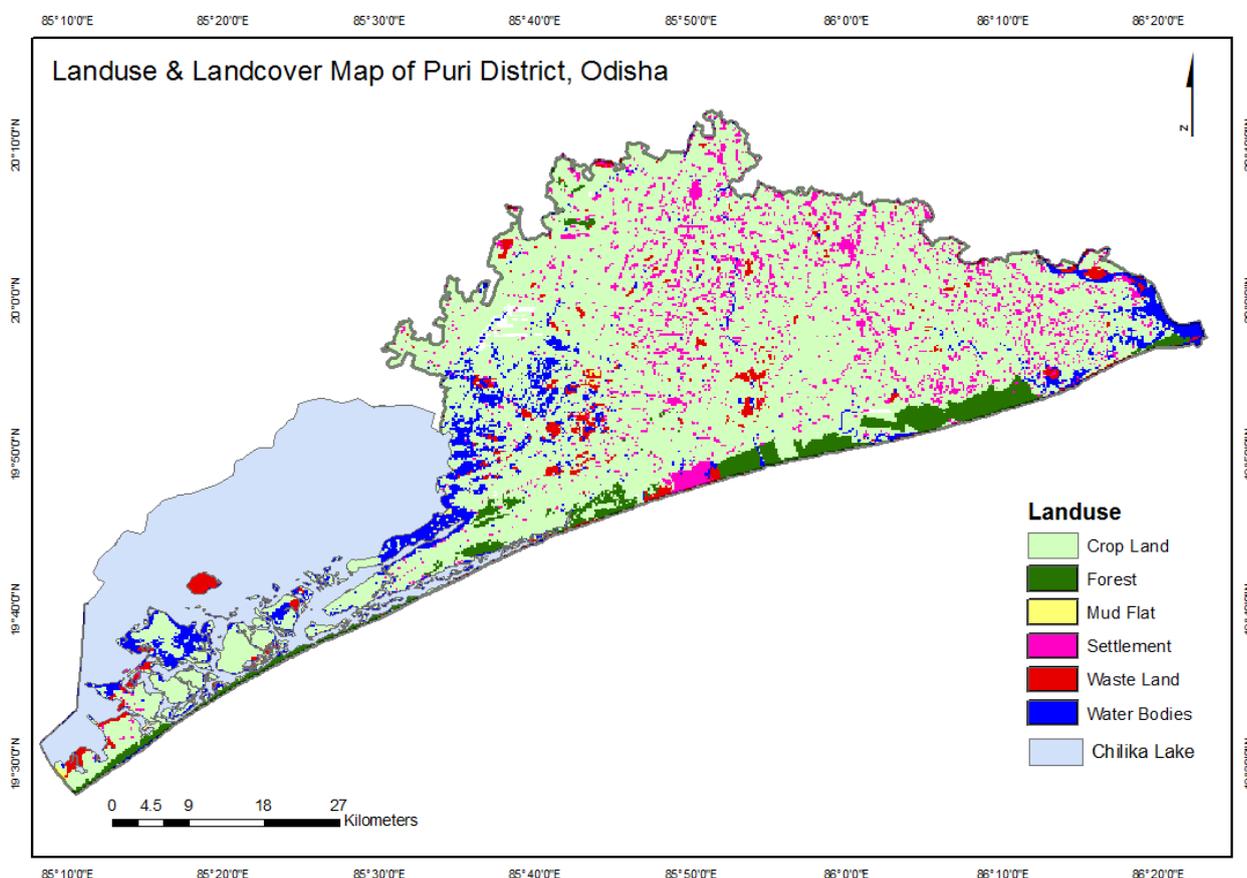
Source: Deputy Director of Agriculture, Puri.

6.3 Horticulture Land:

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

Block Name	Gross Cropped Area	Net Sown Area	Area Sown more than Once (1-2)	Cropping Intensity (%)
Astaranga	17033	10915	7163	166
Bramhagiri	21825	17448	7212	141
Delanga	34188	18014	14442	180
Gop	38652	25325	12757	150
Kakatpur	17022	9406	8749	193
Kanas	28291	17023	9129	154
Krushna Prasad	18833	14708	1877	113
Nimapara	45394	26205	18090	169
Pipili	19480	19305	18081	194
Puri sadar	25025	16482	9903	160
Satyabadi	18890	13398	9978	174
Total	284633	188229	117381	1794

Source: Deputy Director of Horticulture, Puri.



7.0 SURFACE WATER AND GROUND WATER SCENARIO OF THE DISTRICT

7.1 Hydrogeology

The geological formations in the district spans in age from Archean to Recent (Quaternary). The Tertiary and Quaternary formations occurring over major parts of the district while the Archeans occupy the hilly areas under higher altitudes in the west.

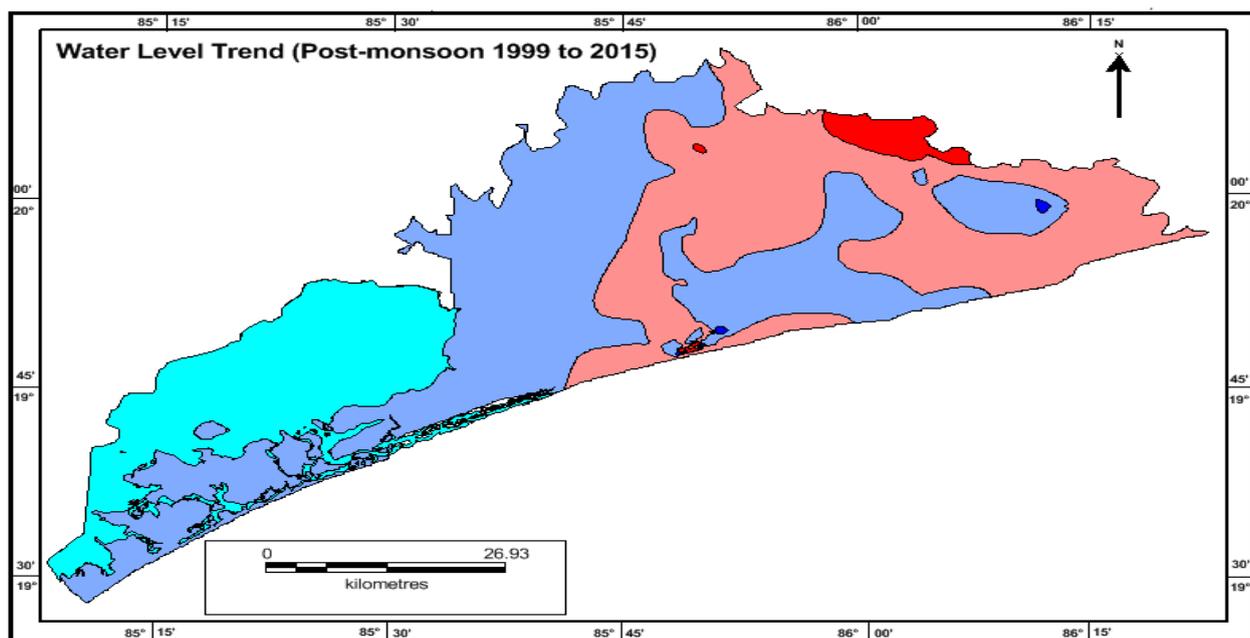
The Quaternary deposits consist of laterites and alluvium. While the laterite occurs only in the western and northwestern parts, major parts of the district are covered by alluvium of varying thickness. The average thickness of laterite is around 8 to 10m. The older alluvium is generally exposed in the northwestern parts including a sequence of sand, clay and kankars of grey to brown in colour. The younger alluvium, which covers nearly 90% of the area, occurs as flood plain deposits along the course of major rivers and streams. These sediments consist of an admixture of silt, sand, gravel and pebble in varying proportions. These layers increase in thickness towards the sea, showing a gentle dip. Discontinuous ridges of sand dunes occur along the coast and are formed due to wind action.

1. Areas underlain by alluvium.
2. Areas underlain by fractured, fissured and consolidated basement rock formations.

7.2 Depth of water level:

The depth to water level is measured from the National Hydrograph Stations situated in different blocks of the Puri district. The Pre monsoon, 2011 water level data varies from 0.16 mbgl (Pratapramchandrapur) to 5.96 mbgl (Satpada). The depth to water level map of pre -monsoon, 2011.

The depth to water level data of Post-monsoon, 2011 represents 0.08 mbgl (Sadanandapur) to 5.13 mbgl (Ramchandi). Plate III represents depth to water level map of post -monsoon, 2011.



7.3 Ground Water Quality

The chemical quality of ground water in the district has been assessed on the basis of ground water samples collected during ground water monitoring, hydrogeological surveys and ground water exploration. The range of different chemical constituents in shallow and deeper aquifers is given.

Range of Chemical Constituents in Different Aquifers

Chemical constituents	Shallow aquifer		Deeper aquifer	
	Range	Average	Range	Average
E.C. ($\mu\text{s}/\text{cm}$ at 25°C)	155-4882	353-2829	159-8920	524-4086
p ^H	-	-	7.1-8.2	7.13-8.1
Bicarbonate (mg/l)	-	-	20-439	116-390
Chloride(mg/l)	14-1389	57-695	3-3332	46-1536
Nitrate(mg/l)	0-164	2.54-8.61	0-13	0.5-10
Fluoride(mg/l)	0.34-12	0.48-2.65	0.07-1.9	0.2-1.3
Total Hardness (mg/l)	40-940	90-580	25-1640	70-351
Calcium(mg/l)	-	-	8-409	14-84
Magnesium(mg/l)	-	-	4.9-151	8.5-40
Sodium(mg/l)	-	-	7.2-1449	53-463
Potassium(mg/l)	-	-	4-36	7.7-33
Carbonate(mg/l)	-	-	-	-
Sulphate(mg/l)	-	-	0-448	11-240
Iron(mg/l)	0.07-8.63	0.51-2.47	0.01-9.93	0.25-0.89
Silica(mg/l)	-	-	18-66	18-29

7.4 Ground Water Development

Ground water development in the district is mainly through dug wells, shallow tube wells and deep tube wells. Ground water is mainly used for domestic and irrigation purpose and in limited scale for industrial purposes. The stage of development of ground water in the district is low. So far only 10.51% of its resources has been exploited. Hence a strategy for detailed ground water development is required. Depth range, probable thickness of aquifers and yield of different groundwater structures in Puri district is given. The hydrogeological, remote sensing studies and ground water exploration so far carried out in the district depict the tentative possibilities of ground water development through suitable ground water abstraction structures in various hydrogeological settings. Total ground water recharge is 66009.63 Ham. From this total extraction is 31857 Ham from which annual extractable ground water resource is 60836.05 Ham.

Medium deep Tube wells: The medium deep tube wells are feasible in alluvial areas in Gop, Kakatpur, Nimapara, Pipli. The depth of wells may range from 60-100 m tapping 20-30 m of aquifer thickness. The diameter of the wells can be 150 mm and the yield may range from 15-40 lps. Submersible pumps 7.5 to 20 HP can be installed depending on yield.

Shallow Tubewells: The shallow tube wells are feasible in Gop, Kakatpur, Astarang, Nimapara, Pipli blocks covering alluvial formations. The depth of these wells will be less than 50 m. and the diameter of these wells can be 100 mm and the yield is expected to be less than 10 lps.

Filter point Tubewells:- The filter point tube wells are feasible in alluvial areas covering parts of Gop, Kakatpur, Nimapara, Pipli blocks. The depth of these wells are generally within 45 m tapping a aquifer thickness of 10-15 m. The yield of filter point tube wells is expected to be up to 10 lps. The diameter of the filter point tube well may be 100 mm and borewell may be 150 mm and submersible pump of 2 to 3 HP can be installed.

Dug wells: The dug wells are feasible in all the blocks. In the blocks like Brahmagiri, Krushnaprasad, which are beset with salinity problems, where the ground water is saline from top to bottom, the dug wells are feasible only in pockets where fresh water is available in a limited area. Depth of the dug wells in the alluvial areas vary from 9 to 12 meters with a dia of 4.5 to 6 meter. The yield of the wells is expected to be less than 3 lps and centrifugal pumps of 2 HP can be installed.

7.5 Ground Water Related Issue and Problems

Ground Water Problems:

Salinity Hazard: The area lies in eastern coastal tract where salinity prevails in phreatic as well as in deeper aquifer. In Krushnaprasad, Brahmagiri, Delang, Kanas, Gop, Astaranga, Puri Sadar block etc. salinity hazard is widespread. In Pipli, Nimapara, Kakatpur salinity hazard is less prevalent. In Puri district 19480ha (7.3%) is affected with salinity and 15192ha (5.72%) is waterlogged. In 2006, crop of 1606 villages of 232 grampanchayat was submerged (submergence more than 50%) due to flood . Total area affected was 58465 ha which 22 % of the total area is.

Water logging and Crop submergence: In Puri district 19480 ha (7.3%) is affected with salinity and 15192ha (5.72%) is waterlogged. In 2006, crop of 1606 villages of 232 grampanchayat was submerged (submergence more than 50%) due to flood. Total area affected was 58465 ha which 22 % of the total area is. Waterlogged area, saline area and crop submergence (in 2006) in Puri district.

Waterlogged Areas/ Saline area/ Crop Submergence (in 2006) in Puri District (Area in ha)

Sl.No	Block	Total area	Saline area	% of area affected by salinity	Waterlogged area	% of area waterlogged	Submergence in 2006			
							No. of GP affected	No. of village affected	Total area affected	% of area affected
1	Astaranga	16223	2500	15.41	185	1.14	14	97	2663	16.41
2	Brahmagiri	30289	3000	9.90	6621	21.86	18	164	2948	9.73
3	Delang	20189	80	0.39	128	0.63	18	135	7765	38.46
4	Gop	33340	1500	4.50	628	1.88	30	209	7904	23.70
5	Kakatpur	16706	2000	11.97	3378	20.22	14	115	3251	19.46
6	Kanas	22668	700	3.09	146	0.64	22	138	6344	27.98
7	Krushnaprasad	32873	8000	24.34	705	2.14	20	110	5535	16.83
8	Nimapara	28403	0	0	890	3.13	29	211	4092	14.40
9	Pipli	20324	0	0	425	2.09	20	178	5755	28.31
10	Puri Sadar	26082	1700	6.52	1703	6.53	25	153	6412	24.58
11	Satyabadi	18309	0	0	383	2.09	22	96	5796	31.65
	Total	265406	19480	7.3	15192	5.72	232	1606	58465	22.03

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

The program was organized twice on 16-03-2001 and 19-11-2004 at Puri town, Puri district. More than 250 persons including farmers, Block Development Officers, District level officers/ officials have participated in program. Deliberations on ground water development protection and conservation were held among the participants and CGWB scientists.

The exhibition was arranged in which the achievements of CGWB were displayed through different models, plates, photographs and instruments. Different posters were displayed for conservation of ground water, ground water pollution and its effects and slogans protecting this valuable resource. The programme have received high appreciation and were widely covered by press as well as electronic media.

7.7 Area Notified by CGWB/SGWA

The stage of groundwater development is well within safe category and there is no overexploitation and major threat of groundwater pollution and depletion. Hence no area has been notified by CGWA.

7.8 RECOMMENDATIONS

1. Large scale planning for Ground Water Resources development should be preceded by intensive hydrogeological and geophysical survey aided by Remote Sensing studies and ground truth data.
2. As the district is a part of coastal area salinity hazard is prevalent in the area. In Puri district 19480 ha (7.3%) is affected with salinity. In Krushnaprasad block adjacent to Chilika lake and Brahmagiri, Kanas block salinity hazard is acute.
3. Though in most part of the district water level is between 2-4 mbgl but deeper water level of more than 8mbgl is reported in both Pre- and Post-monsoon in Puri urban area. Roof top rain water harvesting can only enhance ground water recharge and check the depleting water table.
4. Renovation of old ancestral structures like ponds/tanks etc. should be renovated which enhances ground water recharge and stores rainwater. Experiments have shown that removal of bottom clay enhances ground water recharge upto 10 times.
5. Though 55 % of the cultivable area of the district is covered with irrigation facilities Krishnaprasad block is having no irrigation facilities yet. Harvesting of rainwater is the only viable alternative by development of minor irrigation facilities.
6. As it is a coastal district the water level is shallow and 15192ha (5.72%) of the area is waterlogged. In 2006, crop of 1606 villages of 232 grampanchayat was submerged. So appropriate drainage clearance measured has to be taken to check waterlogging.

7. Siltation is the main problem Chilika lake is facing and it is calculated to be 1.5 sq. km. per year. Due care must be taken to reduce this load by suitable plantation and watershed development programme in the catchment areas.

8. In Puri district 19480ha (7.3%) is affected with salinity and 15192ha (5.72%) is waterlogged. In 2006, crop of 1606 villages of 232 grampanchayat was submerged (submergence more than 50%) due to flood. Total area affected was 58465 ha which is 22 %of the total area. Total area affected was 58465 ha which is 22 % of the total area.

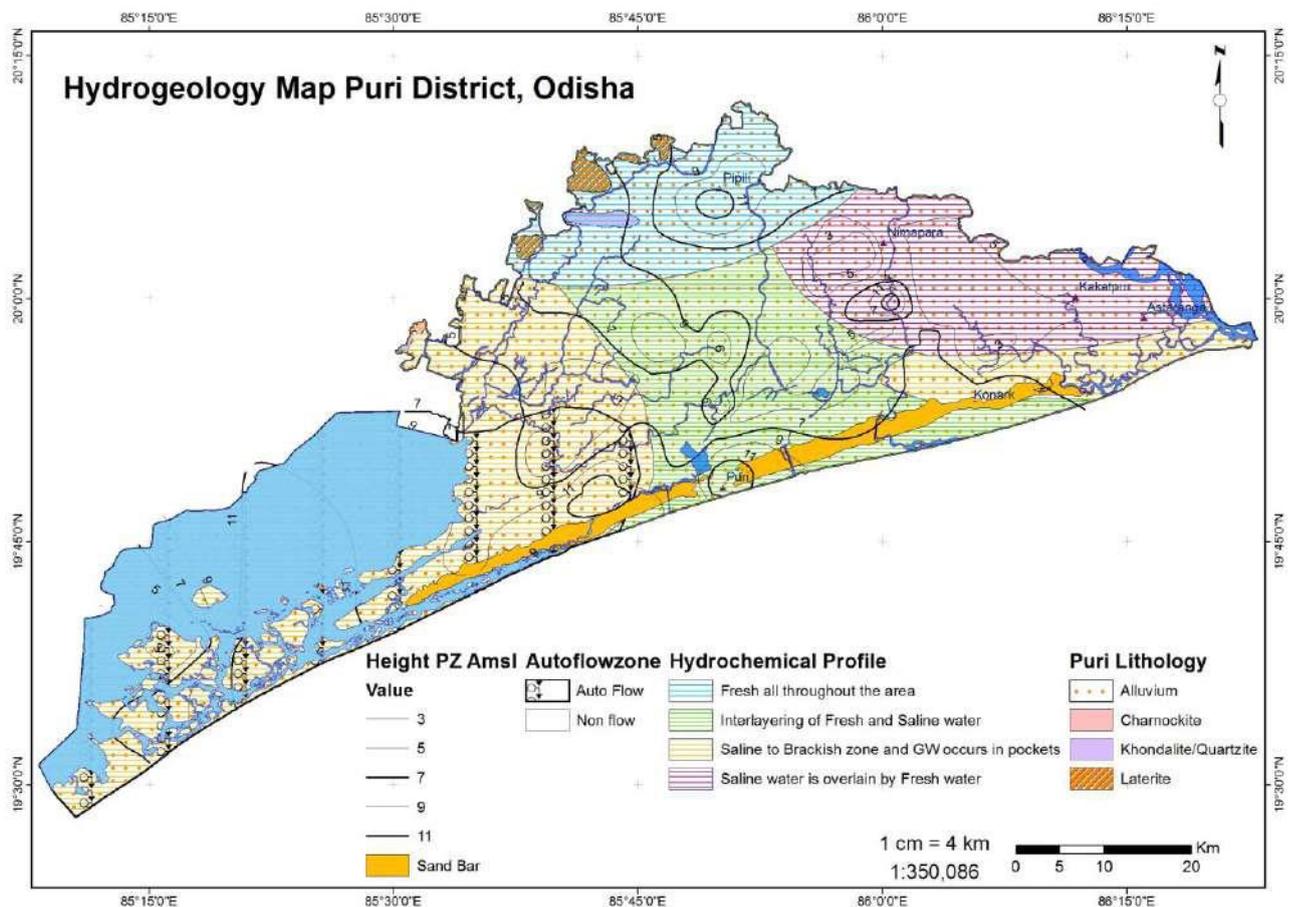
9. In the islands of the Chilika lake area there is acute salinity problem and shortage of fresh water so rainwater harvesting is the only scope for fresh water.

10. In Jagannath Temple area there is decline in ground water table because of overexploitation and decreasing recharge to ground water. So Roof Top Rainwater harvesting is the only alternative. Due to overexploitation of ground water along the Puri coast there are chances of sea water intrusion. Overexploitation of ground water has to be stopped.

11. The ground water of the area surrounding the famous temple of Sri Jagannath is contaminated with high PO_4^{3-} and NO_3^- . Proper measures has to be taken up to protect the ground water.

12. The sweet water recharge in Chakratirtha and Baliapanda areas needs to be protected to enhance ground water recharge.

Source : Department of Jal Shakti.



8.0 RAINFALL OF THE DISTRICT AND CLIMATE CONDITION

The area experienced the sub-tropical to tropical, temperate monsoon climate and characterized by a hot summer and general dryness throughout the year except during the south-west monsoon season, i.e., June to September. December is the coldest month with a mean daily maximum temperature at 26.90C and the mean daily minimum temperature at 13.40C. Both day and night temperature increases rapidly from March, and by May, the mean daily maximum temperature reaches to 420C, while the mean minimum temperature is 26.80C.

As per the IMD observation in the district, the air is generally dry except during the monsoon period. In the summer months, the relative humidity is low in the range of 30%. During monsoon, the humidity goes up to 82% or more. Wind velocity, in general, is low to moderate with some increase in summer and monsoon season. Winds are mostly blown from southwest and northeast direction during the monsoon period. In the cold season, winds are mainly from west or north. In the summer months, the wind flows from variable directions. The mean annual wind speed is 6.8 km./hr. The mean monthly potential evapotranspiration value range from 40 mm in December to 326 mm in May.

The South-west monsoon is the principal source of rainfall in the area. The normal rainfall of the district is 1401.9 mm. The rainfall pattern is erratic, and drought is a common feature of the district. The long term analysis of rainfall data recorded at block headquarters for the period 1995-2014 has been carried out, and the salient features of rainfall analysis are presented.

8.1 Month wise rainfall:

	2021	2022	2023
Month	(mm)	(mm)	(mm)
Jan	0.00	10.93	7.3
Feb	0.00	2.00	15.00
Mar	0.09	0.00	20.96
Apr	7.38	0.00	8.57
May	165.96	57.09	99.4
Jun	205.86	14.77	108.24
Jul	232.67	343.69	175.16
Aug	168.12	326.74	245.77
Sep	556.32	233.15	291.00
Oct	56.58	210.83	118.71
Nov	69.39	56.20	11.62
Dec	114.03	7.7	3.6
Total	1576.4	1263.1	1105.33

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.

8.2 Climate

The area experienced the sub-tropical to tropical, temperate monsoon climate and characterized by a hot summer and general dryness throughout the year except during the south-west monsoon season, i.e., June to September. December is the coldest month with a mean daily maximum temperature at 26.90C and the mean daily minimum temperature at 13.40C. Both day and night temperature increases rapidly from March, and by May, the mean daily maximum temperature reaches to 420C, while the mean minimum temperature is 26.80C.

As per the IMD observation in the district, the air is generally dry except during the monsoon period. In the summer months, the relative humidity is low in the range of 30%. During monsoon, the humidity goes up to 82% or more. Wind velocity, in general, is low to moderate with some increase in summer and monsoon season. Winds are mostly blown from southwest and northeast direction during the monsoon period. In the cold season, winds are mainly from west or north. In the summer months, the wind flows from variable directions. The mean annual wind speed is 6.8 km./hr. The mean monthly potential evapotranspiration value range from 40 mm in December to 326 mm in May.

Source: Indian Meteorological Department.

9. DETAILS OF MINING LEASE OF MORRUM QUARRIES IN THE DISTRICT

Attached as Annexure – I

Sl. No.	Name of the Mineral	Name of the Lessee	Address & Contact No. of Lessee	Mining lease Grant Order No. & date	Area of Mining lease (ha)	Period of Mining lease (Initial)		Period of Mining lease (1 st /2 nd ...renewal)	
						From	To	Form	To
1	2	3	4	5	6	7	8	9	10

Date of commencement of Mining Operation	Status (Working/Non-Working/Temp. Working for dispatch etc.)	Captive/ Non-Captive	Obtained Environmental Clearance (Yes/No), If Yes Letter No with date of grant of EC.	Location of the Mining lease (Latitude & Longitude)	Method of Mining (Opencast/Underground)
11	12	13	14	15	16

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

SL. NO.	Name of the Tahasil	Amount of revenue received from minor mineral sources (Amount in Rs.)			
		2020-21	2021-22	2022-23	2023-24
1	Astaranga	--	--	--	--
2	Brahmagiri	--	--	--	--
3	Delanga	--	--	--	--
4	Gop	--	--	--	--
5	Kakatapur	--	--	--	--
6	Kanas	--	--	--	--
7	Krushnaprasad	--	--	--	--
8	Nimapada	--	--	--	--
9	Pipili	--	--	--	--
10	Puri Sadar	--	--	--	--
11	Satyabadi	--	--	--	--
Total		--	--	--	--

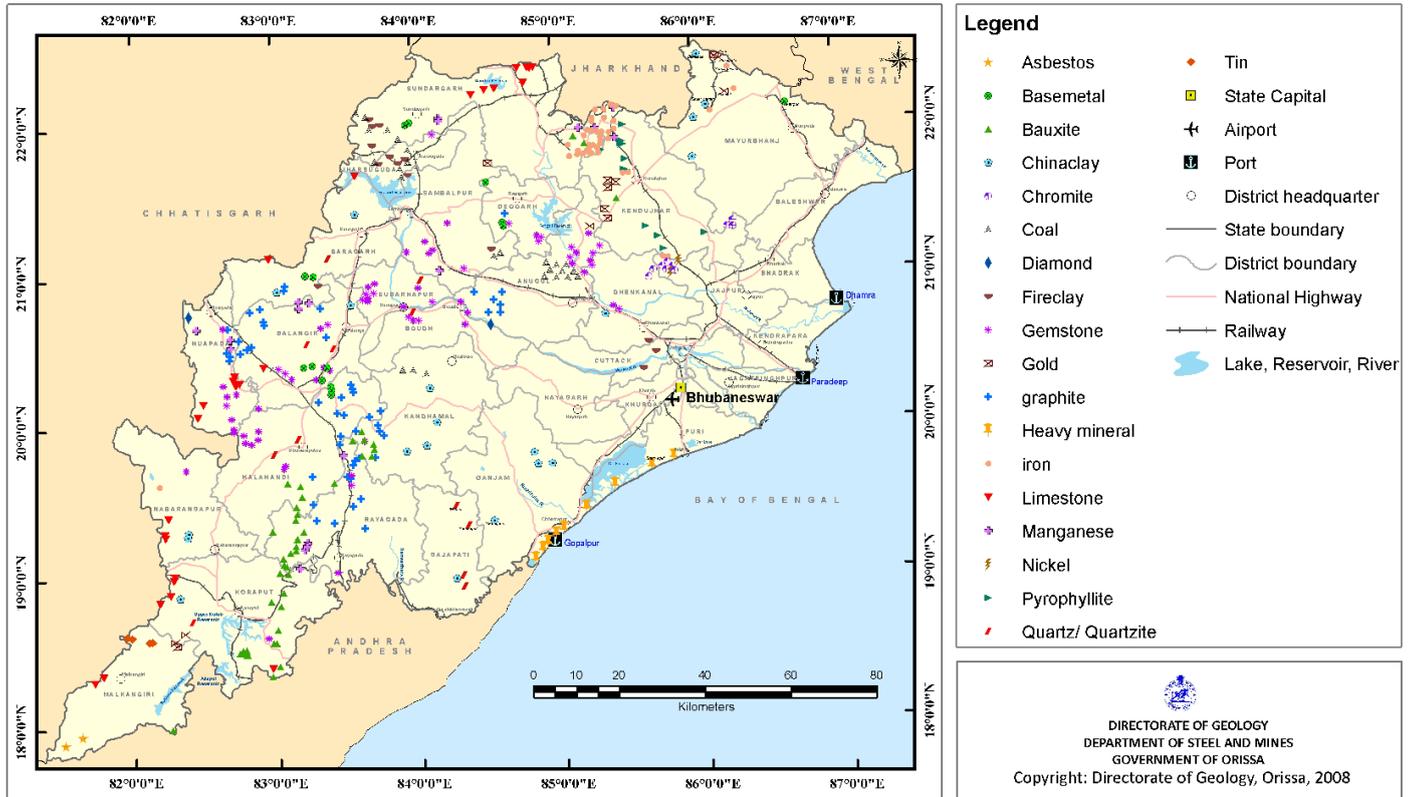
As there is no existing sources of morrum present in the district the royalty not collected.

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

Sl. No.	Name of the Tahasil	2020-21	2021-22	2022-23	Total in Cum.
1	Astaranga	--	--	--	--
2	Brahmagiri	--	--	--	--
3	Delanga	--	--	--	--
4	Gop	--	--	--	--
5	Kakatapur	--	--	--	--
6	Kanas	--	--	--	--
7	Krushnaprasad	--	--	--	--
8	Nimapada	--	--	--	--
9	Pipili	--	--	--	--
10	Puri Sadar	--	--	--	--
11	Satyabadi	--	--	--	--
Grand Total		--	--	--	--

As there is no existing sources of morrum present in the district, the production is nil.

12. MINERAL MAP OF THE DISTRICT:



13. LIST OF 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 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	8	9
Attached as Annexure-I								

14. TOTAL MINERAL RESERVE AVAILABLE IN THE DISTRICT

Total mineral reserve of Morrum which may increase after detail investigation 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.

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	8	9
Attached as Annexure-I								

LIST OF THE PROPOSED MORRUM QUARRY IN THE DISTRICT:

Sl. No.	Tahasil Name	Name of the mineral	Area of mining lease to be allotted	Khata No.	Plot No.	Location of the Mining lease (Latitude & Longitude)
1	2	3	4	5	6	7
Attached as Annexure -I						

15. QUALITY/GRADE OF MINERAL AVAILABLE IN THE DISTRICT

Morrum found in Puri District:-

Morrum of the District are very much suitable for making various construction purposes.

16. USE OF MINERAL

Uses of Morrum-

Morrum, a type of mud or clay, has various applications across multiple fields. In construction, it serves as a binding material for bricks and stabilizes foundations. In agriculture, it enhances soil structure and fertility, improving water retention and nutrient availability. Additionally, morrum is used in ceramics for shaping and firing objects, and it finds its place in landscaping projects to create natural ponds or shape terrain. Artists may also utilize morrum in sculpting and crafting due to its texture and malleability, making it a versatile resource in both practical and creative endeavors.

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 Govt. of India & PSUs under “Make In India” programme.

The Morrum are the main raw minerals for the above activities and considering the last three years’ actual production of Puri with respect to the requirement of the state has a huge gap.

It is proposed to start the stone 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.

Sl No.	Mineral Type	2021-22	2022-23	2023-24
1	Sand	74976	81789	98538
2	Morrum	56229	57795	81444
3	Black stone	120891	102227	233190
4	Laterite	-	-	-
5	Brick Earth	28670	22785	54741

18. MAP OF EXISTING MINING LEASES IN THE DISTRICT:

No Existing Mining Leases present in the district.

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

Currently there are no such clusters of mining leases in Puri 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:

Eco sensitive zone of Chlika Wildlife Sanctuary & Balukhand- Konark Wild Life Sanctuary is located within the District.

21. IMPACTS OF MINING ON ENVIRONMENT:

The most important environmental impact of mining projects are:-

Transportation sources:

Transportation sources of air pollutants include heavy vehicles used in excavation operations, cars that transport personnel at the mining site, and trucks that transport mining materials. 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.

Fugitive emissions:

Common sources of fugitive emissions include: storage and handling of materials; mine processing; fugitive dust, blasting, construction activities, and roadways associated with mining activities; leach pads, and tailing piles and ponds; and waste rock piles. Sources and characteristics of fugitive emissions dust in mining operations vary in each case, as do their impacts. Impacts are difficult to predict and calculate but should be considered since they could be a significant source of hazardous air pollutants.

Noise and vibration:

Noise pollution associated with mining may include noise from vehicle engines, loading and unloading of rock into steel dumpers, chutes, power generation, and other sources. Cumulative impacts of shoveling, ripping, drilling, blasting, transport, crushing, grinding, and stock-piling can significantly affect wildlife and nearby residents.

Vibrations are associated with many types of equipment used in mining operations, but blasting is considered the major source. Vibration has affected the stability of infrastructures, buildings, and homes of people living near large-scale open-pit mining operations. According to a study commissioned by the European Union in 2000: "Shocks and vibrations as a result of blasting in connection with mining can lead to noise, dust and collapse of structures in surrounding inhabited areas. The animal life, on which the local population may depend, might also be disturbed."

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

1. Following are the remedial measures to mitigate the in Water sprinkling on haulroad, 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. Provision of air conditioned cabin of Excavators and Dumpers.
6. Regular and proper maintenance of working equipments.
7. Periodic medical examination of the workers and organize medical camp in the area.
8. Use Milli Second Delay Detonator in blasting operation.
9. Provisions of ear plug to the workers.
10. Regular training program to the mines workers and operators.

23. RECLAMATION OF MINED OUT AREANecessity of Reclamation & Rehabilitation:

- Exponential growth in mineral production since 1980.
- Mining activities causes physical, chemical, biological and socio-economic changes in the area.
- Surface mining activities disturb the original land profile.

- In India, mineral production comes mostly from opencast mines & hence Land degradation problems is of serious concern.
- An intricate, in-depth and site-specified techniques involving integrated approach is necessary.

Reclamation has three vital roles:

- i. **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 in conformity with a prior land use. Reclamation always may not be a single- phase operation.
- ii. **Rehabilitation** – Rehabilitation is to bring back 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.
- iii. **Restoration** – Restoration is the process of returning the mined out land being fit to an acceptable environmental condition. However, the general acceptable meaning of the term is bringing the disturbed land to its original form. Restoration is often used to indicate that biological properties of soil are put back to what they were. This is a rare phenomenon.
- iv. When active mining ceases, mine facilities and the site are reclaimed and closed. The goal of mine site reclamation and closure should always be to return the site to a condition that most resembles the pre-mining condition. Mines that are notorious for their immense impact on the environment often made impacts only during the closure phase, when active mining operations ceased. These impacts can persist for decades and even centuries.

Mine reclamation and closure plans must describe in sufficient detail how the mining company will restore the site to a condition that most resembles pre-mining environmental quality; how it will prevent – in perpetuity – the release of toxic contaminants from various mine facilities (such as abandoned open pits and tailings impoundments); and how funds will be set aside to insure that the costs of reclamation and closure will be paid for.

Proposed future land use after reclamation:

Forestry, b. Recreation, c. Water Reservoir, d. Crop Land, e. residential/Commercial, f. Fish & wildlife Habitat, g. Undeveloped Land, h. Grazing/Pasture Land.

Statutory requirement:

As per the Mineral Conservation Development Rule, 2017, the following rules must be bare in mind by the mine owner/agent/manager, which is a part of reclamation activities –

Rule 22, Mine Closure Plan

Rule 23, Submission of Progressive Mine Closure Plan Rule 24, Submission of Final Mine Closure Plan

Rule 26, Responsibility of holder of mining lease Rule 27, Financial Assurance Rule 35, and Sustainable Mining.

24. RISK ASSESSMENT AND DISASTER MANAGEMENT PLAN:

Mining activity because of the very nature of the operation, complexity of the systems, procedures and methods always involves some amount of hazards. Hazard identification and risk analysis is carried for identification of undesirable events that can lead to a hazard, the analysis of hazard mechanism by which this undesirable event could occur and usually the estimation of extent, magnitude and likelihood of harmful effects. The activities which can cause high risk related to face stability and the person blasting the shots. It was observed that on a working face of the mine, there were large cracks and unsupported rocks were present, which can lead to a serious hazard and injure workers engaged in loading operation and machineries because of rock falls or slides. This type of condition turn out because improper dressing of the bench and improper supervision. To avoid the hazards due to fall of rocks the face must be examined, made suitable for working and the remedial measures must be taken to make it safe if there is any doubt that a collapse could take place. 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. Another major risk identified in mines is due to the firing of explosive by an unqualified person. In the mines there is problem of fly rocks and the village is located close to the mine and so it is rated high as it can affect many people. Explosives by nature have the potential for the most serious and catastrophic accident. Planning of round of shots, holes correctly drilled, direction logged, weight of explosive suitable for good fragmentation are the few of the steps necessary to ensure its safe use and if the shots are not properly designed can result in misfires, early ignition and flying rocks. No person is allowed to use explosives without being properly trained in its handling. In the mine a large numbers of heavy vehicles were in operation and the roads were not proper for haulage purpose. The haulage roads were not even and were not wide enough for the crossing purpose and hence the chances of hazards are very high. The main hazards arising from the use large earth moving vehicles are 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 cabs of large vehicles. Edge protection is always necessary to prevent inadvertent movement over the edge of roadway or a bench. 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, earmuffs 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 hazards; hazards due to rock falls and collapse of unstable rocks, atmosphere containing toxic or combustible gases; protects from chemical or hazardous material

etc. A disaster management plan should be prepared for taking care of for any disaster. Other risk which are included in this category are noise, as it occurs and it can lead to permanent disability. There are problems related to road traffic in and out issuers; inappropriate exposure of moving machines; mechanical failure and because of large number of moving trucks and dumpers there is large quantity of dust present in roadways which affects the operators and can lead to accidents causing injury. They are in acceptable range because of precautions measures taken but no step is taken it can cause hazard hence steps should be taken to reduce the hazards such as for dust suppression system should be installed. 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.

Disaster in the mines like fires, explosions, entrapments, and inundations can occur any time, so emergency preparedness is a must. The Disaster Management Plan and risk assessment in the mines will include all sorts of above mentioned emergency and the extent that this plan will be implemented will depend on the nature and scope of the emergency. The basic purpose of Disaster Management Plan and risk assessment to ensure that mine rescue and recovery activities are conducted safely for rescuer and survivors. According to MMR act 1961 a standard operating procedure should be drawn for involvement different category of staff and officers. The SOP should be updated periodically to reduce the chaos and response to the emergency should be quick and smooth. The responsible person should be familiar with his responsibility during the mock drills. One or two standby should be there to replace the person in Emergency situation. Rescue operations should not include the survivors for any assistance.

First Information of Disaster / Emergency should go to the attendance clerk on duty. Duties of attendance Clerk (Emergency Siren) the attendance clerk or other designated person should on getting information of major accident, sound a hooter or a siren immediately declaring a state of emergency at the mine and then to contact the manager and on his advice to call key personnel using the information listed in the Emergency Organization Chart. It is important that all telephone calls are recorded in a telephone log book. Duties of Other Officials should be displayed and handed over to all concerned. Copy the same should be kept at Manager's Office for ready reference. Establishment of Control Room at Unit Level, Area Level and Company Level is essential. Control Room should keep the contact information about –

- Company Manager
- Company owner/ Administrative officer.
- District Administration
- Govt. Hospitals in Nearby Localities,
- Private Nursing Homes of Localities

Attendance roaster and duty charge register should be properly maintained so the record of missing people can be obtained.

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

As per the guidelines of the Mine Rules 1995, occupational health safety has been stipulated by the ILO/WHO. The proponent's will take necessary precautions to fulfill the stipulations. Normal sanitary facilities have to be provided within the lease area. The management will carry out periodic health checkup of workers. Occupational hazards involved in mines are related to dust pollution, noise pollution, blasting and injuries from moving machineries & equipment and fall from high places. DGMS has given necessary guidelines for safety against these occupational hazards. The management has to strictly follow these guidelines. All necessary first aid and medical facilities are to be provided to the workers. The mine shall be well equipped with personal protective equipment (PPE). Further, all the necessary ported equipment such as helmet, safety goggles, earplugs, earmuffs etc are to be provided to mine workers as per Mines Rules. All operators and mechanics are to be trained to handle firefighting equipment. There is no case of Silicosis found in the district within the time frame mentioned above.

TUBERCULOSIS DATA RNTCP,PURI

YEAR	APR	MAY	JUNE	JULY	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	TOTAL
15-16	94	89	91	84	82	81	89	92	90	92	93	93	1036
16-17	86	84	90	88	84	91	74	76	76	84	86	86	1005
17-18	94	89	99	94	91	97	73	75	73	94	96	97	1072
18-19	102	103	103	86	88	85	91	89	89	104	102	108	1150
TOTAL	376	365	383	352	345	354	327	332	328	374	377	384	4297
AVG	94	91	96	88	86	89	82	83	82	94	94	96	1074

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, afforestation is normally planned through the site could have been considered for better possibilities of land use.

27. CONCLUSION:

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 regularly. 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 equipment 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 Puri 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.

MINERAL CONCESSION DETAILS IN RESPECT OF MORRUM UNDER PURI DISTRICT, ODISHA.

SL NO.	Tahasil	Name of the mineral	Name of the Lessee & Address	Mining Lease grant order no.	Area of mining Lease in Ha.	Period of mining lease (Initial)		Period of Mining lease (1st/2nd renewal)	Date of commencement of Mining Operation	Status (Working/ Non Working/T emp. Working for dispatch etc.)	Captive/ Non Captive	Obtained Environmental Clearance (Yes/No), If Yes Letter No with date of grant of EC.	Location of the Mining lease (Latitude & Longitude)	Method of Mining (Opencast/ Underground)	LOI Issued	Existing / Proposed
						From	To									
1	Delanga	Godiput Matiapada Morrum Quarry	NA	NA	2.023 Ha. Khata No. 1344 Plot No. 2357	NA	NA	NA	NA	Non-Working	Non- Captive	NA	20° 08' 05.68" N 85° 41'30.29" E	Opencast	No	Proposed
2	Delanga	Saunria Morrum Quarry	NA	NA	4.046 Ha. Khata No. 1465 Plot No. 27	NA	NA	NA	NA	Non-Working	Non- Captive	NA	20° 04' 46" N 85° 42'03" E	Opencast	No	Proposed
3	Delanga	Chainpur Morrum Quarry	NA	NA	1.618 Ha. Khata No. 630 Plot No. 1813	NA	NA	NA	NA	Non-Working	Non- Captive	NA	20° 04' 50.67" N 85° 44'47.98" E	Opencast	No	Proposed
4	Delanga	Gada Motari Morrum Quarry	NA	NA	2.428 Ha. Khata No. 499 Plot No. 1657	NA	NA	NA	NA	Non-Working	Non- Captive	NA	20° 04' 50.67" N 85° 44'47.98" E	Opencast	No	Proposed
5	Delanga	Chaa Daudi Morrum Quarry	NA	NA	1.214 Ha. Khata No. 198 Plot No. 17	NA	NA	NA	NA	Non-Working	Non- Captive	NA	20° 04' 43" N 85° 43'16" E	Opencast	No	Proposed

DETAILS OF THE CLUSTER APPROCHED MORRUM QUARRIES IN PURI DISTRICT

Cluster NO.	Quarry No.	Lease Name	Tahasil	Khata No.	Plot No.	Area in Ha.	Total Cluster Area in Ha.	Existing / New
1	1	Saunria Morrur Quarry	Delanga	1344	2357	2.023	10.115	New
	2	Chainpur Morrur Quarry	Delanga	630	27	4.046		New
	3	Gada Motari Morrur Quarry	Delanga	499	1813	1.618		New
	4	Chaa Daudi Morrur Quarry	Delanga	198	1657	2.428		New

ANNEXURE-II

DETAILS OF THE CONTIGUOUS CLUSTER APPROCHED MORRUM QUARRIES IN PURI DISTRICT

Contiguous Cluster No.	Cluster No.	Number of Leases in the cluster	Distance Between the clusters	Villages	Total cluster area in Ha.	Total Excavation in TON
1	1	4	500 mtr	Saunria, Chainpur, Gada Motari , Chaa Daudi	10.115	NA

ANNEXURE-III

Transportation Routes for individual leases present in Puri District

Sl. No.	Tahasil Name	Lease Name	Lease No	Transportation Route No	Number of tippers / day of lease	Number of tippers / day of all the lease on route	Length of Route in KM	Type of Road (Black Topped/ unpaved)	Recommendation for road (Black Topped/ unpaved)	The road will be Constructed by Govt/ Lease Owner	Route Map & Location
1	Delanga	Godiput Matiapada Morrum Quarry	NA	VILLAGE ROAD	NA	NA	NA	Unpaved	Unpaved	Lease Owner	Attached
2	Delanga	Saunria Morrum Quarry	NA	VILLAGE ROAD	NA	NA	NA	Unpaved	Unpaved	Lease Owner	Attached
3	Delanga	Chainpur Morrum Quarry	NA	VILLAGE ROAD	NA	NA	NA	Unpaved	Unpaved	Lease Owner	Attached
4	Delanga	Gada Motari Morrum Quarry	NA	VILLAGE ROAD	NA	NA	NA	Unpaved	Unpaved	Lease Owner	Attached
5	Delanga	Chaa Daudi Morrum Quarry	NA	VILLAGE ROAD	NA	NA	NA	Unpaved	Unpaved	Lease Owner	Attached

ANNEXURE-III

Transportation Routes for Cluster leases present in Puri District

Sl No.	Tahasil	Lease Name	Cluster No	Transportation Route No	Number of tippers /day of lease	Number of tippers /day of all the lease on route	Length of Route in KM	Type of Road (Black Topped/ unpaved)	Recommendation for road (Black Topped/ unpaved)	The road will be Constructed by Govt/ Lease Owner	Route Map & Location
1	Delanga	Saunria Morrum Quarry	1	VILLAGE ROAD	NA	NA	NA	Unpaved	Unpaved	Lease Owner	Attached
2	Delanga	Chainpur Morrum Quarry		VILLAGE ROAD	NA	NA	NA	Unpaved	Unpaved	Lease Owner	Attached
3	Delanga	Gada Motari Morrum Quarry		VILLAGE ROAD	NA	NA	NA	Unpaved	Unpaved	Lease Owner	Attached
4	Delanga	Chaa Daudi Morrum Quarry		VILLAGE ROAD	NA	NA	NA	Unpaved	Unpaved	Lease Owner	Attached

FINAL POTENTIAL MORRUM QUARRIES PRESENT IN PURI DISTRICT, ODISHA.

SL NO.	Tahasil	Name of the mineral	Name of the Lessee & Address	Mining Lease grant order no.	Area of mining Lease in Ha.	Period of mining lease (Initial)		Period of Mining lease (1st/2nd renewal)	Date of commencement of Mining Operation	Status (Working/ Non Working/T emp. Working for dispatch etc.)	Captive/ Non Captive	Obtained Environmental Clearance (Yes/No), If Yes Letter No with date of grant of EC.	Location of the Mining lease (Latitude & Longitude)	Method of Mining (Opencast/ Underground)	LOI Issued	Existing / Proposed
						From	To									
1	Delanga	Godiput Matiapada Morrur Quarry	NA	NA	2.023 Ha. Khata No. 1344 Plot No. 2357	NA	NA	NA	NA	Non-Working	Non-Captive	NA	20° 08' 05.68" N 85° 41'30.29" E	Opencast	No	Proposed
2	Delanga	Saunria Morrur Quarry	NA	NA	4.046 Ha. Khata No. 1465 Plot No. 27	NA	NA	NA	NA	Non-Working	Non-Captive	NA	20° 04' 46" N 85° 42'03" E	Opencast	No	Proposed
3	Delanga	Chainpur Morrur Quarry	NA	NA	1.618 Ha. Khata No. 630 Plot No. 1813	NA	NA	NA	NA	Non-Working	Non-Captive	NA	20° 04' 50.67" N 85° 44'47.98" E	Opencast	No	Proposed
4	Delanga	Gada Motari Morrur Quarry	NA	NA	2.428 Ha. Khata No. 499 Plot No. 1657	NA	NA	NA	NA	Non-Working	Non-Captive	NA	20° 04' 50.67" N 85° 44'47.98" E	Opencast	No	Proposed
5	Delanga	Chaa Daudi Morrur Quarry	NA	NA	1.214 Ha. Khata No. 198 Plot No. 17	NA	NA	NA	NA	Non-Working	Non-Captive	NA	20° 04' 43" N 85° 43'16" E	Opencast	No	Proposed

Annexure -V								
FINAL DETAILS OF THE CLUSTER APPROCHED MORRUM QUARRIES IN PURI DISTRICT								
Cluster NO.	Quarry No.	Lease Name	Tahasil	Khata No.	Plot No.	Area in Ha.	Total Cluster Area in Ha.	Existing / New
1	1	Saunria Morrur Quarry	Delanga	1344	2357	2.023	10.115	New
	2	Chainpur Morrur Quarry	Delanga	630	27	4.046		New
	3	Gada Motari Morrur Quarry	Delanga	499	1813	1.618		New
	4	Chaa Daudi Morrur Quarry	Delanga	198	1657	2.428		New

ANNEXURE-V						
FINAL DETAILS OF THE CONTIGUOUS CLUSTER APPROCHED MORRUM QUARRIES IN PURI DISTRICT						
Contiguous Cluster No.	Cluster No.	Number of Leases in the cluster	Distance Between the clusters	Villages	Total cluster area in Ha.	Total Excavation in TON
1	1	4	500 mtr	Saunria, Chainpur, Gada Motari , Chaa Daudi	10.115	NA

ANNEXURE-VI

Final Transportation Routes for individual leases present in Puri District

Sl. No.	Tahasil Name	Lease Name	Lease No	Transportation Route No	Number of tippers / day of lease	Number of tippers / day of all the lease on route	Length of Route in KM	Type of Road (Black Topped/ unpaved)	Recommendation for road (Black Topped/ unpaved)	The road will be Constructed by Govt/ Lease Owner	Route Map & Location
1	Delanga	Godiput Matiapada Morrum Quarry	NA	VILLAGE ROAD	NA	NA	NA	Unpaved	Unpaved	Lease Owner	Attached
2	Delanga	Saunria Morrum Quarry	NA	VILLAGE ROAD	NA	NA	NA	Unpaved	Unpaved	Lease Owner	Attached
3	Delanga	Chainpur Morrum Quarry	NA	VILLAGE ROAD	NA	NA	NA	Unpaved	Unpaved	Lease Owner	Attached
4	Delanga	Gada Motari Morrum Quarry	NA	VILLAGE ROAD	NA	NA	NA	Unpaved	Unpaved	Lease Owner	Attached
5	Delanga	Chaa Daudi Morrum Quarry	NA	VILLAGE ROAD	NA	NA	NA	Unpaved	Unpaved	Lease Owner	Attached

ANNEXURE-VI

Final Transportation Routes for Cluster leases present in Puri District

Sl No.	Tahasil	Laese Name	Cluster No	Transportation Route No	Number of tippers /day of lease	Number of tippers /day of all the lease on route	Length of Route in KM	Type of Road (Black Topped/ unpaved)	Recommendation for road (Black Topped/ unpaved)	The road will be Constructed by Govt/ Lease Owner	Route Map & Location
1	Delanga	Saunria Morrum Quarry	1	VILLAGE ROAD	NA	NA	NA	Unpaved	Unpaved	Lease Owner	Attached
2	Delanga	Chainpur Morrum Quarry		VILLAGE ROAD	NA	NA	NA	Unpaved	Unpaved	Lease Owner	Attached
3	Delanga	Gada Motari Morrum Quarry		VILLAGE ROAD	NA	NA	NA	Unpaved	Unpaved	Lease Owner	Attached
4	Delanga	Chaa Daudi Morrum Quarry		VILLAGE ROAD	NA	NA	NA	Unpaved	Unpaved	Lease Owner	Attached

POTENTIAL MORRUM QUARRIES PRESENT IN PURI DISTRICT

