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# GEM OCCURRENCES OF ODISHA

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## Introduction

In Odisha, gemstone occurrences are mostly confined in the Eastern Ghat Granulite Belt (EGGB), which consists largely of high-grade metamorphic rocks with a strike along NNE-SSW. The Quaternary sediments particularly the gravel beds in Mahanadi River have garnet, topaz and diamond. Gemstones occur as disseminations, pockets, patches and narrow linear veins in the host rock (Mishra and Mohanty, 2006, Sinha et al. 2015, Chowdhury and Lahiri-Dutt, 2016; Sahoo et al., 2016a; Behera and Chattopadhyay, 2013; Das, 2014; Sahoo et al., 2016b; Behera and Hussain, 2019, Kumar et al., 2019, Vertriest et al., 2019).

### a. Eastern Ghats granulite belt: -

The Eastern Ghats granulite belt comprising mainly Khondalite-Charnockite suite of rocks and their variants interbanded with mafic and ultramafic complexes; anorthosites and alkaline complexes and intruded by potassic granites, pegmatites and quartz veins.

The above said rocks are the products of intense polyphase deformation and granulite facies metamorphism during Proterozoic.

### b. High grade Supracrustal rocks: -

The high grade supracrustal rocks include the older- metamorphic group (OMG) and the Iron Ore Supergroup (IOS). The supracrustal sequence of Older metamorphic group are constituted of pelitic to psammopelitic schists, amphibolites and minor BIF. These are the oldest lithologic components of (NOC) North

Orissa Craton, occur as enclaves within granite gneisses.

There are 2500 mineral species known, out of that 100 possess all the attributes required in gems. The cut stones are known as "Gems", while the uncut stones are known as "Gem stones". The beauty of a gemstone based on lusture, transparency, brilliance and colour. Silicates constitute the greatest number of gem variety, oxides are the second largest group, sulphides, carbonates and sulphates make up a small group (Mishra and Mohanty, 2006, Sinha et al. 2015, Chowdhury and Lahiri-Dutt, 2016; Sahoo et al., 2016a; Behera and Chattopadhyay, 2013; Das, 2014; Sahoo et al., 2016b; Behera and Hussain, 2019, Kumar et al., 2019). Due to high value the diamond is an exclusive species.

The standard international weights of gems are in metric carat which is 1/5 of gramme (200 mg.)

## MAJOR GEMSTONE BELTS OF ODISHA

The gemstone occurrences of Odisha are localized in the following geological domain (Fig.1).

- Easternghat granulite belt
- High grade supracrustal rock
- Mafic and ultramafic complexes
- Nephilinesynite
- Quaternary sediments and gravel beds

Table 1 shows the gemstone district-wise occurrences of gemstones in Odisha. Table 2 depicts the list of gemstone and the associated host rocks in Odisha. Recently 52 gem belts have been identified.

**Table 1.** Gemstone belts of Odisha

Sl. No.	Name and location of the gemstone belt	Type of Gemstone
<b>NUAPARA DISTRICT</b>		
1.	Kotamal-Amhera-Babebir	Blue Sapphire
2.	Durkapara-Sargimura	Garnet
3.	Rohinpadar-Jubamal	Zircon & Blue Apatite
4.	Damijhar-Budhapara	Garnet
5.	Thalkodebri-Thagpali	Garnet
6.	Khariar-Gurramura	Coloured Chert
7.	Lanji-Mantritarai	Garnet
8.	Junapani-Dhonrapara	Zircon
<b>DHENKANAL DISTRICT</b>		
9.	Mangarmohan-Jhilli	Kyanite Cat's Eye
10.	Nuagaon Area	Garnet & Red Corundum
<b>KALAHANDI DISTRICT</b>		
11.	NandgaonPatialpara	Garnet
12.	Antarla-Khaliakhani	Garnet
13.	Ghutia Area	Blue Corundum
14.	Banjipadur-Dumerguda	Garnet
15.	Dharamgarh-Kebari	Enstatite Cat's Eye
16.	Hinjilibhal-Manickpadar	Ruby/Corundum
17.	Tilajhori-Karatikili	Aquamarine
18.	Odbahali-Urharanga	Lolite & Ruby
19.	Jillingdhar-Sinakuti	Ruby
20.	Sirjapalli	Chrysoberyl Cat's Eye
<b>JHARSUGUDA DISTRICT</b>		
21.	Bagidihi Area	Green & Transparent Tourmaline
<b>BOLANGIR DISTRICT</b>		
22.	Guchhepara-Antarala	Aquamarine, Heliodor & Topaz
23.	Jurabandh-Dukarchachra	Aquamarine, Heliodor & Topaz
24.	Sangamara-Barkani	Aquamarine & Zircon
25.	Saraibahal-Suklimuri	Aquamarine
26.	Mathkai-Deogaon	Zircon
27.	Dongapara-Jamutjhula	Zircon
28.	Tetelkhunti-Lakhan	Zircon
29.	Tetelpara-Chhatarang	Zircon
30.	Ghumsar	Chrysoberyl Cat's Eye
31.	Muribhal-Ghantabahali	Chrysoberyl
<b>SAMBALPUR DISTRICT</b>		
32.	Badamal-Badkhol	Aquamarine, Heliodor & Topaz
33.	Jujumura-Tabloi	Aquamarine, Heliodor & Topaz
34.	Charbati-Sardhapur	Aquamarine, Heliodor & Topaz
35.	Kulabira-Bhatlaida	Aquamarine
36.	Meghpal Area	Red & Blue Corundum
37.	Ranchipada Area	Alexandrite

Sl. No.	Name and location of the gemstone belt	Type of Gemstone
<b>SUBARNAPUR DISTRICT</b>		
38.	Biranaharajpur-Badmal	Aquamarine, Heliodor & Topaz
39.	Siali-Naktammunda	Rhodolite Garnet
<b>ANUGUL DISTRICT</b>		
40.	Kulad-Nanguliabera	Aquamarine & Topaz
<b>RAYAGADA DISTRICT</b>		
41.	Dahikhāl-Karadanga	Hessonite Garnet
42.	Murtili	Chrysoberyl
43.	Sikampadar	Chrysoberyl
44.	Bitarapara-Majhi	Hessonite Garnet
45.	Guchhepara	Chrysoberyl Cat's Eye
46.	Paika-Dhakulaguda	Chrysoberyl Cat's Eye
47.	Gunsar	Chrysoberyl Cat's Eye
48.	Laxmipur	Chrysoberyl Cat's Eye
49.	San-Irukubadi	Sillimanite Cat's eye
<b>KORAPUT DISTRICT</b>		
50.	Umpavalli-Gondivalsa	Zircon, Apatite & Tourmaline
<b>BOUDH DISTRICT</b>		
51.	Manmunda-Sagada	Aquamarine
52.	Boudh	Kelakata Gem gravels with Garnet, Topaz, Zircon, Diamond etc.

#### DIAMOND Occurrences of Orissa

- In Orissa Diamond can be found as placer deposit along Mahanadi coast in Boudh and Angul district.
- In Nawaparadistrict Lamproites are found which indicate the occurrence of Diamond in Odisha.

**Table 2.** List of gemstone and the associated host rocks in Odisha (Mishra and Mohanty, 2006, Sinha et al. 2015, Sahoo et al., 2016a, b)

Name of Gemstone		Host Rocks	
1.	Ruby and sapphire	a.	Contact of pegmatite and ultramafic rocks.
		b.	High grade polytic (Kyanite-sillimanite) schists
		c.	Nepheline syenite
		d.	Cordierite-sillimanite-garnet schists and para gneisses.
2.	Emerald and aquamarine	Contact of beryl bearing pegmatite with ultramafic rocks	
3.	Alexandrite and Chrysoberyl cat's eye	Pegmatites in Khondalite suite of rocks	
	Rhodolite, almandine and uvarovite garnets, fibrolite cat's eye, iolite	High grade polytic schists	
	Amethyst topaz, aquamarine, heliodor, goshenite, tourmaline, moonstone, labradorite, microcline.	Pegmatite	

## Conclusion

Gemstone occurrences are widely distributed and are not converted into a deposit, so the exploration of gem occurrences should be done in a very systematic and scientific manner by professionals not by amateur persons.

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