Indian Minerals Yearbook 2013

(Part- I)

52nd Edition

STATE REVIEWS
(Kerala)

(FINAL RELEASE)

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MINISTRY OF MINES
INDIAN BUREAU OF MINES

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September, 2015

KERALA

Mineral Resources

Kerala is well-known for its deposits of excellent quality china clay (Kaolin) and beach sands containing valuable minerals like ilmenite, rutile, sillimanite, zircon, garnet, leucoxene and monazite. The State is the principal producer of china clay (kaolin), limeshell and sillimanite. The State also accounts for 88% zircon, 33% titanium minerals, 25% china clay, 13% kyanite and 11% sillimanite of the country's resources. Important mineral occurrences in the State are: **bauxite** in Kannur, Kasaragod, Kollam & Thiruvananthapuram districts; **china clay** in Alappuzha, Ernakulam, Kannur, Kasaragod, Kollam, Kottayam, Palakkad, Thiruvananthapuram & Thrissur districts; **limestone** in Alappuzha, Ernakulam, Kannur, Kollam, Kottayam, Kozhikode, Malappuram, Palakkad & Thrissur districts; **quartz/silica sand** in Alappuzha, Kasargod, Thiruvananthapuram & Wayanad districts; **sillimanite** in Kollam and Thiruvananthapuram districts; and **titanium minerals** in Kasaragod, Kollam, Pathanamthitta & Thiruvananthapuram districts; and **zircon** in Kollam district.

Other minerals that occur in the State are **fire clay** in Alappuzha, Ernakulam, Kannur & Kollam districts; **garnet** in Kollam & Thiruvananthapuram districts; **gold** in Malappuram & Palakkad districts; **granite** in Palakkad and Thiruvananthapuram districts; **graphite** in Ernakulam, Idukki, Kollam, Kottayam & Thiruvananthapuram districts; **iron ore (magnetite)** in Kozhikode and Malappuram districts; **kyanite** in Kollam and Thiruvananthapuram districts; **lignite** in Alappuzha, Kollam and Kannur districts; **magnesite** in Palakkad district; and **steatite** in Kannur and Wayanad districts (Tables - 1 and 2).

Exploration & Development

GSI carried out exploration for PGE at Attapady Valley in District Palakkad in 2012-13. Details of exploration carried out by GSI & DGM are furnished in Table-3.

Production

The value of mineral production in Kerala during 2012-13 at ₹3156 crore decreased marginally as compared to that in the previous year. The important minerals produced in the State during 2012-13 were kaolin, laterite, limeshell, limestone, silica sand and sillimanite which together accounted for around 2% of the value of mineral production in the State, while rest of the value accrued from minor minerals. Kerala was the largest producer of limeshell in the country contributing to almost the entire output. It is also second largest producer of kaolin and third largest producer of sillimanite with a share of 24% and 11% to the total production of respective minerals in the country.

Among important minerals, production of kaolin increased by 17% whereas it decreased for silica sand 5%, limestone 8%, laterite 13% and sillimanite 31% as compared to the previous year. (Table-4).

The value of minor minerals' production was estimated at ₹3,104 crore for the year 2012-13.

The number of reporting mines in Kerala was 48 during 2012-13 as against 43 in the previous year.

The index of mineral production in Kerala (base 2004-05=100) was 233.8 in 2012-13 as compared to 204.5 in the previous year.

Table –1: Reserves/Resources of Minerals as on 1.4.2010 : Kerala

Mineral	Unit	Reserves			Total (A)	Remaining resources							Total (B)	Total resources (A+B)
		Proved STD 111	Probable			Feasibility STD211	Pre-feasibility		Measured STD331	Indicated STD332	Inferred STD333	Reconnaissance STD334		
			STD121	STD122			STD221	STD222						
Bauxite	'000 tonnes	-	-	-	-	29	-	24	2037	9284	2722	-	14096	14096
China clay	'000 tonnes	3352	792	-	4144	2447	463	2985	43930	20439	569226	20200	659690	663834
Fireclay	'000 tonnes	-	-	-	-	-	-	-	8200	51	9929	-	18181	18181
Garnet	tonne	-	-	45797	45797	-	-	-	100874	-	52190	-	153064	198861
Gold					-									
Ore (Primary)	tonne	-	-	-	-	-	-	-	462280	96180	-	-	558460	558460
Metal (Primary)	tonne	-	-	-	-	-	-	-	0.17	0.03	-	-	0.20	0.20
Ore (Placer)	tonne	-	-	-	-	-	-	-	-	2552000	23569000	-	26121000	26121000
Metal (Placer)	tonne	-	-	-	-	-	-	-	-	2.29	3.57	-	5.86	5.86
Granite (Dimn. Stone)	'000 cu m	140	-	-	140	-	-	-	-	99	2570	-	2669	2808
Graphite	tonne	-	-	-	-	-	8300	17762	134900	1088550	335818	-	1585330	1585330
Iron Ore (Magnetite)	'000 tonnes	-	-	-	-	-	-	-	-	59912	23523	-	83435	83435
Kyanite	tonne	-	-	-	-	-	-	-	192360	-	10000	-	202360	202360
Laterite	'000 tonnes	180	-	1500	1680	-	-	-	-	-	-	16717	16717	18397
Limestone	'000 tonnes	12959	-	-	12959	122659	77	1576	21161	2888	35228	-	183589	196548
Magnesite	'000 tonnes	-	-	-	-	-	-	-	2	-	38	-	40	40
Quartz-silica sand	'000 tonnes	-	38	-	38	404	1959	3354	14611	30241	77528	-	128096	128135
Sillimanite	tonne	698056	-	-	698056	317569	120000	-	2479816	165408	3369200	-	6451993	7150049
Talc-Steatite-Soapstone	'000 tonnes	-	-	-	-	-	-	-	-	-	14390	-	14390	14390
Titanium Minerals*	tonne	13796194	-	-	13796194	5198882	-	-	-	22668876	87048716	-	114916474	128712668
Zircon	tonne	972624	-	-	972624	649938	-	-	81741	338525	716279	-	1786483	2759107

Figures rounded off.

** Resources as per Department of Atomic Energy are provided in the respective Mineral Reviews.*

Table –2 : Reserves/Resources of Lignite as on 1.4.2013 : Kerala

(In million tonnes)

District	Proved	Indicated	Inferred	Total
Total	**-**	**-**	**9.65**	**9.65**
Kannur	-	-	9.65	9.65

Source: *Coal Directory of India, 2012-13.*

Table –3 : Details of Exploration Activities in Kerala, 2012-13

Agency/ Mineral/ District	Location	Mapping		Drilling		Sampling	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
GSI							
Base metal							
Wayanad	Padinjarattara area	1: 12,500	20.0	-	-	105	Reconnaissance stage (G-4) investigation was carried out in area to trace the massive sulphide bearing zone and to delineate potential areas for base metal mineralisation. Large scale mapping was carried out in and around Padinjarattara to delineate sulphide bearing zones. The mapped area comprises predominantly of charnockites. Other associated rock types are mafic granulites, hornblende – biotite gneisses, sulphide bearing BIF, garnet-bearing quartzo-feldspathic granulite and minor metapyroxenite and porphyritic granite. The predominant structural fabric in the area is in the NW- SE direction. The sulphide bearing BIFs occur as two separate bands 1) Northern band 2) Southern band. The northern band extends for a length of about 570 m and southern band has been traced for a strike length of about 650 m. The sulphide bearing BIF bands trends NW-SE to NS and range in thickness from 2 m to 12 m and are discontinuous. Bed rock and groove samples were collected. In addition to these, soil samples were also collected in grid pattern from the northern sulphide bearing BIF band. Analytical results of groove samples indicated copper values varying from 42 to 639 ppm and zinc from 40 to 129 ppm. The investigation has been completed.

(Contd.)

Table-3 (Contd.)

Agency/ Mineral/ District	Location	Mapping		Drilling		Sampling	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
DGM Platinum Group of Elements	Nilambur Valley	1:12,500	45.0	-	-	90	Reconnaissance stage investigation (G-4) was carried out in the ultramafic-mafic rocks of Nilambur Valley to delineate the ultramafics/mafic bands and to identify PGE for targeting follow up investigation in the area. Aerial reconnaissance and PGRS studies have been carried out over 300 sq km area with ErDAS image processing software. Large scale mapping was carried out in and around Manapara, Manaipadam, Karakkody, Mundapotti, Putharipadam, Maruda, Vendanukum-potti, Kanappada valley, Allikadu, Vetuu-kathikota, Vazhikadavu, Para-lunda, Kuttipara, Narokkavu and Kariam Reserve Forest area in Nilambur valley. The predominant rock types, which form the country rock in the study area are hornblende-biotite gneiss and biotite-hornblende gneiss with migmatite structures at places. The Archaean Supracrustals exposed in the area include amphi-bolites, metagabbro, meta-pyroxenite, talc-tremolite actinolite schist, banded magnetite quartzite + grunerite, quartz + sericite, fuchsite, kyanite quartz-mica schist, felsic volcanics (?) and calc gneiss, gabbro/dolerite dykes. The auriferous quartz/pegmatite veins are the younger intrusive. Metapyroxenite /talc-tremolite-actinolite rocks occur as linear conformable bands to the regional foliation and vary in length from few tens of metres to several kilomatres and in width from ten metresto more than 30 m. Ninety (90) nos. of BRS have been collected from these maficultramafic bodies for PGE analysis. The investigation will be continued in F. S. 2013-14.

(Contd.)

Table-3 (Contd.)

Agency/ Mineral/ District	Location	Mapping		Drilling		Sampling	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
DGM							
Bauxite/ Aluminous laterite							
Kasargod	Vidhyanagar & Manjeshwarm	-	-	-	-	-	The area comprises of rock types of khondalite group belonging to Eastern ghat Supergroup, Amphibolite, Hornblende biotite gneiss intruded by granite & syenite and basic intrusives of dolomitic composition. Irrespective of lithology, all of them have been subjected to lateritisation. Bauxite/Aluminous laterite occurs in the form of massive sheets or blankets capping plateaus. Resources were not estimated.
Bauxite/ China clay							
Dist. Kannur	Aravanchal	-	-	02	41.5	-	Objective of exploration was to identify the china clay as well as Aluminous laterite & to assess the resource for the development of clay based industries. The average thickness of variegated clay was found out to be about 9 m. Resources were not estimated.
Bauxite/ Aluminous laterite							
Kannur	Taliparambu	-	-	40	791.5	-	Objective of exploration was to identify the bauxite bearing areas of Kannur district. The average thickness of China clay/variegated clay was about 11 m and that of overburden laterite was about 7 m. The estimation of resources will be made after completion of drilling and chemical analysis.
China clay							
Kollam	Kundara Kaniracode	-	-	09	407	-	Area partly covered with laterite underlain by sedimentary formation of cross-bedded ferruginous sandstone variegated clay to sandy clay, pinkish clayey sand, pale white clay, dull white clay, yellowish white sandy clay, black carbonaceous clay has been established. The residual clay vary in colour from dull white to yellow and occasionally with pink garnet specks of parent crystalline charnockite/leptynite. The average thickness of dull white to slightly greyish sandy clay was 26 m in the north area, whereas it is 19 m and 3 m respectively in NW & SE area. Tentative resources of about 0.97 million tonnes of dull white to slightly greyish sandy clay were estimated.
Kollam	Pattamukku	-	-	1	17	-	Area partly covered with laterite underlain by sedimentary formation of cross-bedded ferruginous sandstone and variegated clay

(Contd.)

Table-3 (Contd.)

Agency/ Mineral/ District	Location	Mapping		Drilling		Sampling	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
Kollam	Pattamukku (Concld.)	-	-	1	17	-	to sandy clay, pinkish clayey sand, pale white clay, dull white clay, yellowish white sandy clay, black carbonaceous clay has been established. The residual clay vary in colour from dull white to yellow and occasionally with pink garnet specks of parent crystalline charnockite/leptynite. The tentative resources of sandy clay were estimated at 0.25 million tonnes.
DGM							
China clay							
Kannur	-	-	-	04	82	-	The objective of exploration was to identify the china clay resources and to assess the reserve for the development of clay-based industries. Resources are yet to be estimated.
Kundara, Kollam	Pattamukku area	-	-	06	-	-	The investigated area is partly covered with laterite. The laterites underlain by sedimentary formations of cross-bedded ferruginous sandstone, variegated clay to sandy clay, pinkish clayey sand, pale white clay, dull white clay, yellowish white sandy clay and black carbonaceous clay have been identfied. The residual clay lies uncomformable below the sedimentary clay. Garnetiferous quartz of felspathic gneiss form the basement rock. About 0.25 million tonnes resources of clay (sandy clay and variegated clay) were estimated.
-do-	Kakkolil area	-	-	02	-	-	The objective of exploration is to identify the china clay resources and to assess the reserve for development of clay-based industries. The investigated area is partly covered with laterite. The laterites underlain by sedimentary formations of cross-bedded ferruginous sandstone, variegated clay to sandy clay, pinkish clayey sand, pale white clay, dull white clay, yellowish white sandy clay and black carbonaceous clay have been identified. The residual clay lies uncomformable below the sedimentary clay. Garnetiferous quartz of felspathic gneiss form the basement rock. The average thickness of clay was found to be 20 m. Resources are yet to be estimated.

Table – 4 : Mineral Production in Kerala, 2010-11 to 2012-13 (Excluding Atomic Minerals)

(Value in ₹ '000)

Mineral	Unit	2010-11			2011-12			2012-13 (P)		
		No. of mines	Qty	Value	No. of mines	Qty	Value	No. of mines	Qty	Value
All Minerals		**30**		**12790336**	**43**		**31650899**	**48**		**31563949**
Clay (others)	t	-	-	-	-	-	-	1	-	-
Kaolin	t	15	704360	228105	17	747307	149883	20	870713	190288
Sillimanite	t	1	8243	89981	1	7205	79255	2	4936	45194
Laterite	t	3	88444	34913	3	112703	45688	2	97909	36707
Limestone	'000t	1	530	115506	1	539	216493	1	495	119709
Limeshell	t	2	18467	23020	3	23450	33038	5	23123	39696
Silica Sand	t	8	30975	26188	18	62683	83680	17	59502	89493
Minor Minerals[@]		-	-	12272623	-	-	31042862	-	-	31042862

Note : *The number of mines excludes minor minerals.*
@ Figures for earlier years have been repeated as estimates, wherever necessary, because of non-receipt of data.

Mineral-based Industry

The important large and medium-scale mineral-based industries in organised sector in the State are given in Table - 5.

Table – 5 : Principal Mineral-based Industries in Kerala

Industry/plant	Capacity ('000 tpy)
Abrasives	
Carborandum Universal Ltd, Ernakulam.	NA
Carborandum Universal Ltd, Thrissur.	NA
Carborandum Universal Ltd, Pathanamthitta.	NA
Asbestos Products	
Hyderabad Industries Ltd (formerly Malabar Building Products Ltd) Mulagunnathukavu, Dist. Thrissur.	84
Cement	
Malabar Cements, Walayar, Dist. Palakkad.	620
The Travancore Cements Ltd, Kottayam.	81
Ceramic	
Kerala Ceramics Ltd, Kundara, Dist. Kollam.	23
Tata Ceramics, Kozhikode.	NA
Chemical	
Tecil Chemicals and Hydro Power Ltd, Chingavanam, Dist. Kottayam.	30 (calcium carbide) 2 (acetylene black) 7.5 (ferro silicon)

(Contd.)

Table - 5 (Concld.)

Industry/plant	Capacity ('000 tpy)
Synthetic Rutile	
CMRL, Ernakulam.	45
KMML, Chavara.	50
TiO_2 Pigment	
TTPL, Thiruvananthapuram.	17.5
KMML, Chavara	40
Fertilizer	
FACT Ltd, Udyogmandal, Dist. Ernakulam.	225 (AS) 148.5 (AP)
FACT Ltd, Ambalamedu, Dist. Ernakulam.	485 (NP)
Ferro-alloys	
INDSIL Electrosmelts Ltd, Pallatheri, Dist. Palakkad.	14
The Silcal Metallurgic Ltd, Wayalur.	3.6
Glass	
Excel Glass Ltd, Pathirapally, Dist. Alleppey.	72
Lead-Zinc	
BZL Zinc Smelter, Binanipuram.	38 (Zn ingot) 80 (Cd ingot) 50 (H_2SO_4)
Petroleum Refinery	
KRL, Cochin.	7500