



GOVERNMENT OF TAMIL NADU
DEPARTMENT OF GEOLOGY AND MINING

DISTRICT
SURVEY REPORT FOR
ROUGHSTONE
KANNIYAKUMARI DISTRICT

(Prepared as per Gazette Notification S.O 3611(E)
Dated 25.07.2018 of Ministry of Environment,
Forest and Climate Change MoEF & CC)

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DISTRICT SURVEY REPORT *OF* KANNIYAKUMARI DISTRICT

PREAMBLE:

In conjunction to the Ministry of Environment, Forest and Climate Change, the Government of India Notification No.SO 141 (E) dated 15.01.2016 and SO 190 (E) dated 20.01.2016 the District Level Environment Impact Assessment Authority (DEIAA) and District Environment Appraisal Committee (DEAC) were constituted in Kanniyakumari District for the grant of Environmental Clearance for category “B2” projects for quarrying of Minor Minerals.

The main purpose of preparation of District Survey Report is to identify the mineral resources and develop the mining activities along with relevant current geological data of the District. The DEAC will scrutinize and screen scope of the category “B2” projects and the DEIAA will grant Environmental Clearance based on the recommendations of the DEAC for the Minor Minerals on the basis of District Survey Report. This District Mineral Survey Report is prepared on the basis of field work carried out in Kanniyakumari district by the official from Geological Survey of India and Directorate of Geology and Mining, (Kanniyakumari District), Govt. of Tamilnadu. The following District Survey Report (DSR) report prepared based on the guidelines by MOEF S.O. 3611(E). dt 25.July 2018.

1.0 INTRODUCTION:

Kanniyakumari is the southernmost district of Tamil Nadu .It is named after the goddess, “Kanniyakumari”. The district headquarters is at Nagercoil, endowed with all kinds of natural resources from land, sea, forest, and mountains. This district is by nature and heritage, predominantly agrarian with 66 percent of the land utilized for agricultural purposes.

This district is blessed with its vast stretches of green paddy fields, rich forests, coconut groves and coast line. This district has a coastline of about 68 km. There are minor ports in the district at Colachel, Thengaipattinam, Muttom and Chinnamuttom. In Kanniyakumari three seas merge, which symbolizes unity. Moreover it is a place of Pilgrimage. Pilgrims keeps the link between north and south India situated in the southernmost part of India. In the Indian Sub-continent, Kanniyakumari cherishes a history of its own. Kanniyakumari before its formation was a revenue district under the rule of the Maharajas of Travancore.

LOCATION:

Kanniyakumari is the Southernmost district of the Peninsular India, It is bound by Tirunelveli District on the North and the East. The South Eastern boundary is the Gulf of Mannar. On the South and the South West, the boundaries are the Indian Ocean and the Arabian Sea. On the West and North West it is bound by Kerala. The district lies between 77° 15' and 77° 36' of the Eastern longitudes and 8° 03' and 8° 35' of the Northern latitudes. (Fig No.1)



Fig No.1.Location Plan

2. OVERVIEW OF MINING ACTIVITY IN THE DISTRICT

In Kanniyakumari District, major minerals like Garnet, Ilmenite, Rutile, Zircon and Monazite are available in the coastal areas. Apart from major minerals, the minor minerals like Rough Stone, Brick Earth and Gravel are noticed. The District Collector has vested with powers for the grant of licence for minor minerals like Rough Stone, Brick Earth and Gravel in patta lands as per Rule 19 of TNMMCR 1959. The minor minerals noticed in poromboke lands are leased out through Tender Cum Auction system. With regard to major minerals, in patta lands powers vested with Commissioner of Geology and Mining for the grant of mining leases. In poromboke lands power is vested with the Government.

In Kanniyakumari district most of the Rough stone quarries are found in foot hill of hillock. The patta land quarries are the quarries which are mined out in patta land and owner of the mines would be the pattadhar himself. These are the private quarries, although these quarries are private but permission for quarrying of rocks is given by District Collector, poromboke quarries are known as the Government quarries.

Kanniyakumari district is enriched with Beach Sand Heavy Minerals like Garnet, Ilmenite, Rutile, Zircon and Monazite. These beach minerals are occurred in the south east coast and south west coast of the district. In east coast majorly Garnet and Ilmenite deposits are observed. The colour of Ilmenite is black and garnet is dark red and its concentration is found continuously along the beach between Alagappapuram to Kanniyakumari for an strip of about 4 km. In Midalam to Keezhmidalam, the concentration of Ilmenite bearing sand occur as detached patches along the coast, but due to grass and bushes it is not visible clearly.

PROCEDURE FOR GRANT OF LEASE FOR ROUGH STONE QUARRIES

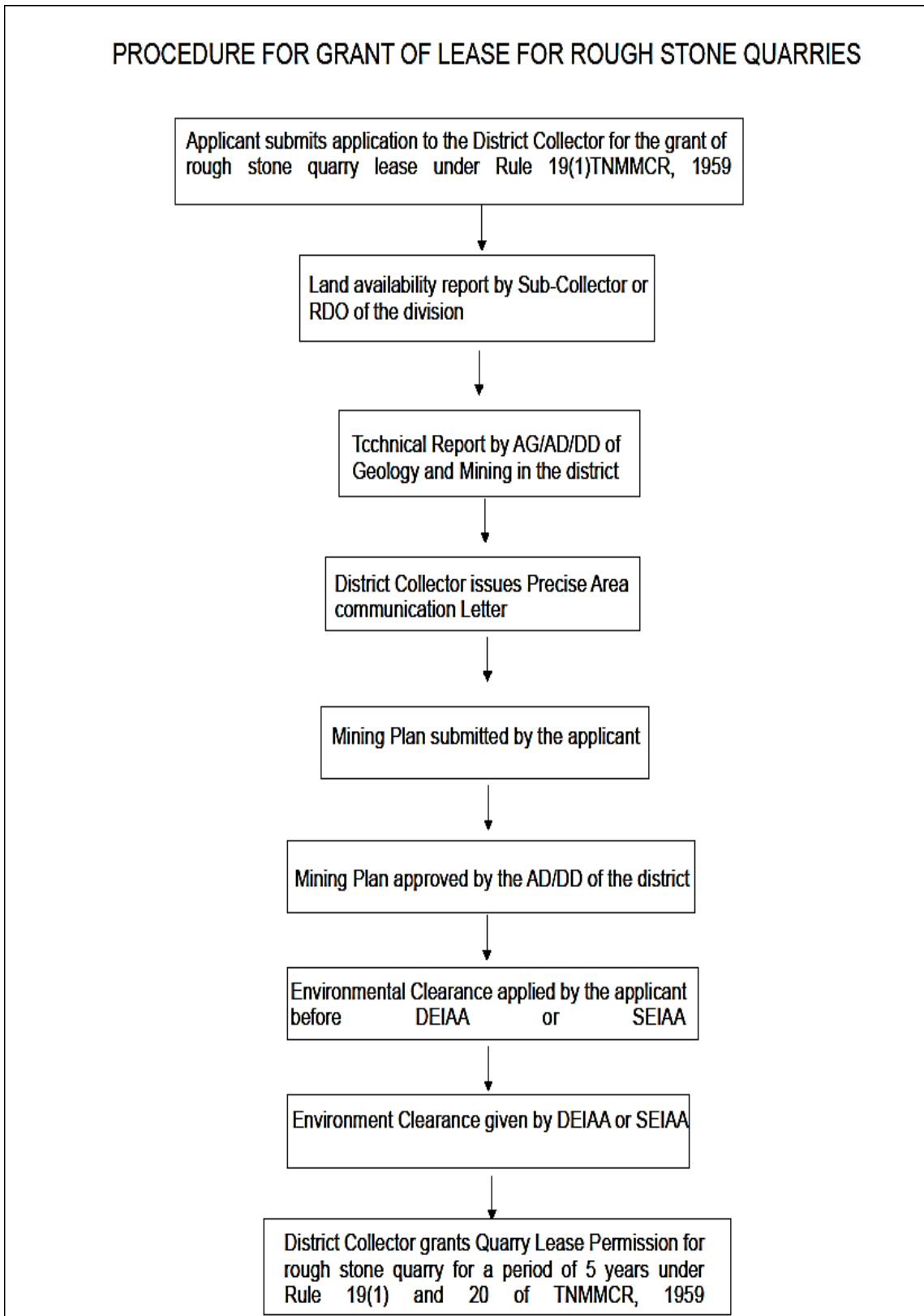


Fig No.2 Procedure for Grand lease of for Rough stone Quarry

3. GENERAL PROFILE OF THE DISTRICT

GEOGRAPHICAL POSITION-

- North Latitude Between: 8°03' to 8° 35'
- East Longitude Between: 77° 15' to 77°36'

Kanniyakumari district is the smallest district in Tamil Nadu. Even though it is the smallest in terms of area (1672/Sq.Km), the density of population is the highest 1119/Sq.Km in Tamil Nadu next to Chennai. In literacy it stands first. By its very location, the District occupies a unique place amongst the districts of Tamil Nadu. It is the only place in the entire world where one can witness both the rising and setting of the sun. It has a coastal line of 71.5 kms stretched on the three sides. This small district is famous on its vast green stretches of paddy fields, coconut groves, Rubber garden and luxurious forests and the rare earth of the Western Sea Shore and stretched valley mountain of the Western Ghats. Kanniyakumari District is named after the goddess 'KANNIYAKUMARI'. The District lies at the southernmost tip of the Indian peninsula, where Indian Ocean, Arabian Sea and Bay of Bengal confluence. The District is bound by Tirunelveli District on the North and the East. The South Eastern boundary is the Gulf of Mannar. On the South and the South West, the boundaries are the Indian Ocean and the Arabian Sea. On the West and North West it is bound by Kerala.

The district is bifurcated into two Revenue Divisions Padmanabhapuram and Nagercoil having the headquarters at Thuckalai and Nagercoil respectively. There are six Taluks, viz Vilavancode, Kalkulam, Agasteeswaram, Thovalai, Thiruvattar and Killiyoor. This district owns four Municipalities i.e. Nagercoil, Padmanabhapuram, Colachel and Kuzhithurai and nine Rural Development Blocks. Six blocks Melpuram, Munchirai, Killiyoor, Thiruvattar, Thuckalai and Kurunthencode forms a part of Padmanabhapuram Development Division and the remaining three Agasteeswaram, Rajakkamangalam and Thovalai come under Nagercoil Development Division. There are 55 Town Panchayats in this district whereas there are only 529 Town Panchayats throughout the State. The District comprises in six Assembly segments and one Parliament Constituency.



Fig No.3 Kanniyakumari District Map

Sl. No.	Name of the Division	Name of Taluk		No. of Firka	No. of Revenue Villages
1	Nagercoil	1	Agastheeswaram	4	43
		2	Thovalai	3	24
2	Padmanabhapuram	3	Kalkulam	4	45
		4	Thiruvattar	2	21
		5	Vilavancode	3	28
		6	Killiyoor	2	27
			Total	18	188

Table No.1. Kanniyakumari District Administrative Details

Kanniyakumari district has many tourist spots, which can be classified as places of interest for religious tourism, historical tourism, manmade attractions, nature tourism such as water falls, bird watching and wild life sanctuaries, medical tourism and heritage tourism.

The District has no major industry except Indian Rare Earths Ltd., Manavalakurichi, Kannya Spinning Mill, Aralvaimozhi in the Co-operative sector and Nagammal Mills Nagercoil, Tapioca flour, Cape Wheat Flour Mill, Chunkankadai and coir industry, Ammandivilai and Cape wheat flour mill, Chunkankadai, in private sector. Forty two fishing centres are located in the sea shore. Next to Agriculture, people are engaged in fishing. A meager 1% of the population is engaged in handloom weaving. Coir manufacturing is also to be mentioned. Palmgur production is almost dwindled in view of scarce palmyrah climbers and reduced palmyrah crop area in this district. As a major source of private sector of employment more than 30000 female employees are employed in the cashew nut processing of roasting, shelling, peeling and grading.

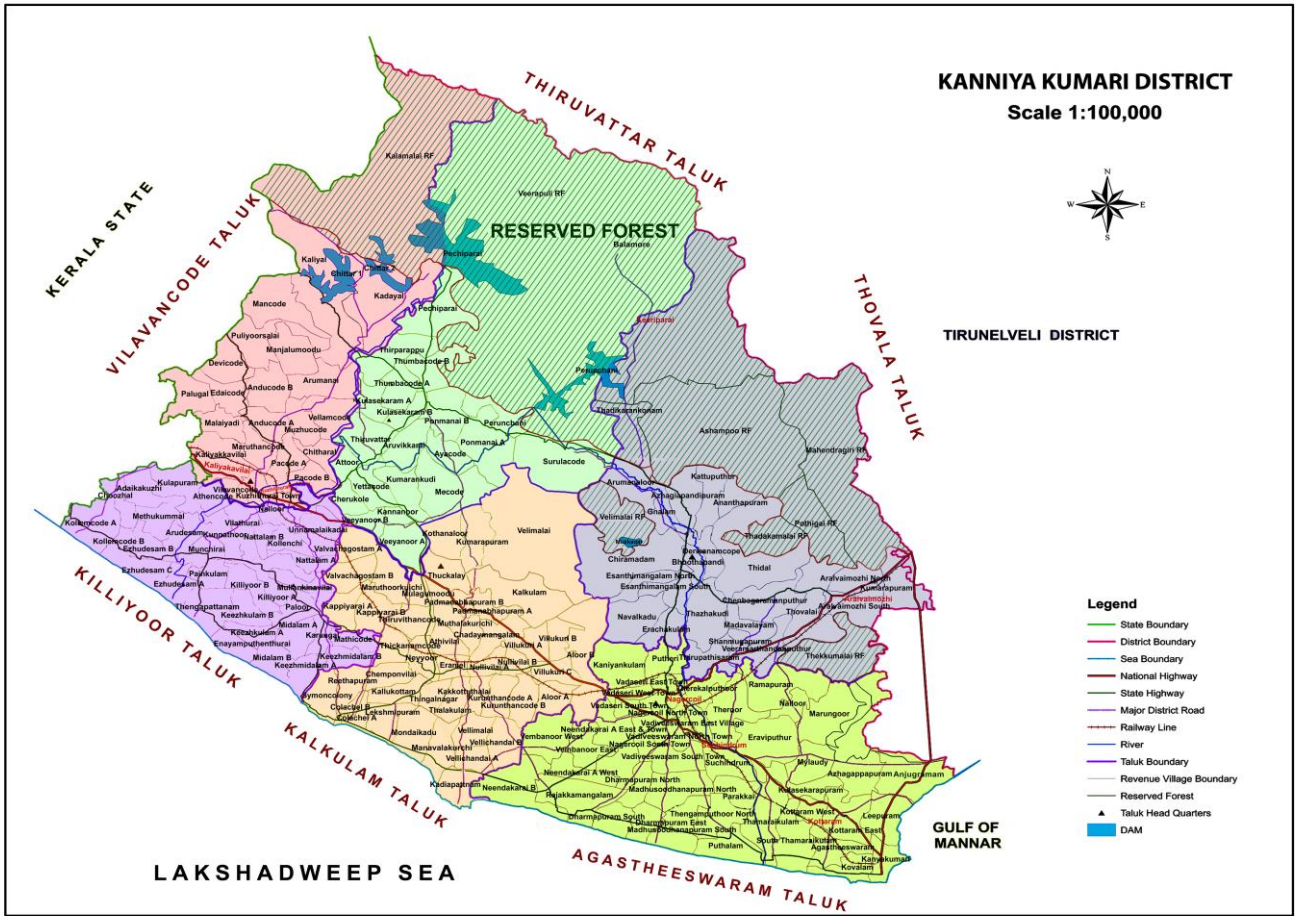


Fig No.4 Kanniyakumari District Taluk Map

3.1 POPULATION

AREA & POPULATION (2011 Census) in table form:

➤ Area (Sq.km.)	1672
➤ Population	1870374
• Male	926345
• Female	944029
• Rural	330572
• Urban	1539802
➤ Density	1119
➤ Literate	1548738
• Male	780541
• Female	768197
➤ Language spoken in the District	Tamil & Malayalam
➤ Workers	679620
• Male	524629
• Female	105763
➤ Main Agricultural labourers	51350
Male	44394
Female	6956
➤ Main Household Industry Worker	21078
• Male	8626
• Female	12452

Table No. 2 Area & Population details of the district.

VITAL STATISTICS

- Birth: 33308
- Death:14464
- Infant Death: 165
- Birth rate (Per 1000 Population): 11.05
- Death rate (Per 1000 Population): 6.2
- Infant Mortality rate (Per 1000 live birth): 9.2

4. GEOLOGY OF THE DISTRICT

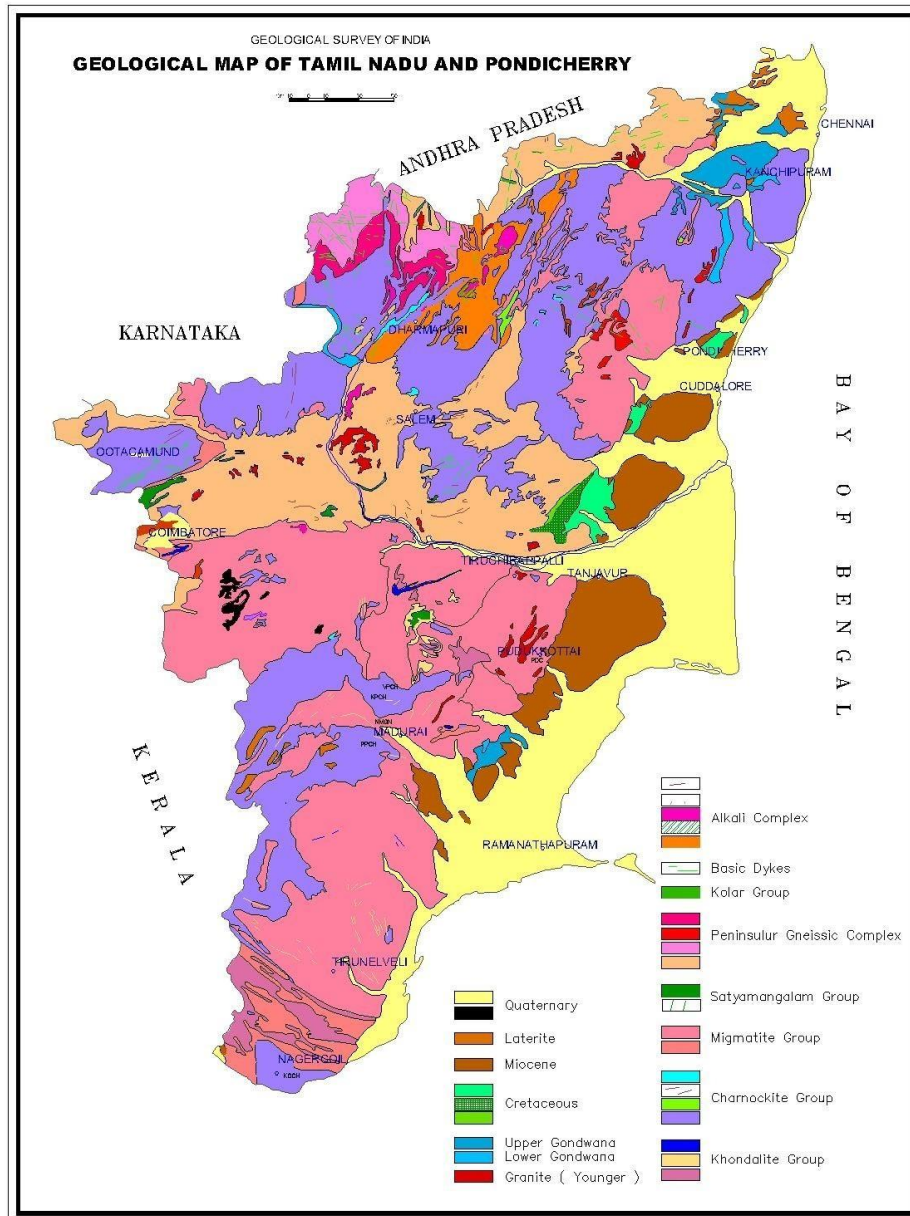
4.1 An outline on Geology of Tamil Nadu

Crystalline rocks of Archaean to late Proterozoic age occupy over 80% of the area of the Tamilnadu, while the rest is covered by Phanerozoic sedimentary rocks mainly along the coastal belt and in a few inland River valleys. The hard rock terrain comprises predominantly of Charnockite and Khondalite groups and their migmatitic derivatives, supracrustal sequences of Sathyamangalam and Kolar groups and Peninsular Gneissic Complex (Bhavani Group), intruded by ultramafic-mafic complexes, basic dykes, granites and syenites. The sedimentary rocks of the coastal belt include fluviatile, fluvio-marine and marine sequences, such as Gondwana Supergroup (Carboniferous to Permian and Upper Jurassic to Lower Cretaceous), marine sediments of Cauvery basin (Lower Cretaceous to Paleogene), Cuddalore /Panambarai Formation (Mio-Pliocene) and sediments of Quaternary and Recent age.

The Southern Granulite Terrain (SGT) of India, covering the states of Tamil Nadu and Kerala and the marginal zones of Southern Karnataka, was earlier considered to be the southern extension of the Granite-Greenstone terrain of Dharwar Craton exposed at a deeper tectonic level. This concept was based on the observation that the grade of metamorphism gradually increases from north to south. Geochronological and isotopic studies have brought to light that the southern part of the SGT lying south of Palghat-Cauvery Lineament (PCL) has a geological history distinctly different from the Dharwar Craton. These studies have shown that the terrain lying north of PCL shows crustal growth during the period from 3400 to 2500 Ma. In contrast, crustal growth in the terrain south of PCL is considered to have taken place predominantly during Post-Archaean times, as constrained by Nd model ages (Harris et al., 1994). This terrain might have witnessed several cycles of metamorphism, the most pervasive being the 550Ma Pan-African granulite facies event as constrained by various isotopic systematics (Unnikrishnan Warriar et al.,1995b; Jayananda et al., 1995, Bartlett et al., 1995).

In view of the contrasting geological history recorded by the terrains north and south of PCL, the SGT has been divided into the northern Archaean Craton (Dharwar Craton) and the southern Proterozoic (Pandyan) Mobile Belt (GSI, 1994) with the PCL marking the boundary between them. Subsequent work by Ghosh et.al (1998) has

shown that the Archaean terrain continues south of PCL atleast upto the northern margin of Kodaikkanal massif and according to them Karur-Kambam- Painavu-Thrissur (KKPT) shear-zone marks the boundary between the Dharwar Craton and the Proterozoic Mobile Belt. Geological map of Tamilnadu and Puducherry is given below:



Source: Miscellaneous publication, GSI, SU:TN&P, Chennai

Fig.No. 5 Geological Map of Tamilnadu And Pondicherry

4.2 PHYSIOGRAPHY OF KANNIYAKUMARI DISTRICT

Kanniyakumari district has a varied topography with sea on three sides and the mountains of the Western Ghats bordering the northern side. Geologically, the landmass of the district is much younger when compared to the rest of state - faulted as late as 2.5 million years during the Miocene, after which numerous transgression, as well as regression of sea, had shaped the western coast of the district. Kanniyakumari district is bordered by Western Ghats (Ridge and valley complex) in the West. Western Ghats form an elevation of 200 m amsl from these foothills in the west. The areas gently slope to southeast towards the Gulf of Mannar attaining an elevation of 25 to 30 m amsl. The eastern and central tracts are quite barren, but there are a few isolated knife edged hillocks. The coastal tracts are occupied by the marshy swamps and number of sand dunes (Teri sands).

4.3 GEOMORPHOLOGY

Geomorphologically, the district can be divided into four major regions; (1) hilly terrain, forming part of the Western Ghats, exhibiting prominent strike ridges (2) the highly dissected upland region comprising the pediments and pediplains, (3) the flood plains of Kodaiyar, Pazhayar and their minor distributaries and (4) the coastal plains.

In the hilly region, the prominent strike ridges are Varalatti Mudi, Manjanamparai, Mukkuttukal, Mahendragiri, Talchen Malai, Velimalai and Tekku Mala, oriented along NW-SE direction with moderate to steep slopes. Tea and Cardamom plantation is grown on the Plateau tops of hill ranges. The two prominent lakes, viz Kodayar and Perunchani, formed due to the construction of dams, are located on the north and northwest of Kulasekaran. Apart from these, a 70 m waterfall is seen SW of Nallkal Mottai. The general elevation of the ridges ranges between 700 m and 1829 m above mean sea level. A few isolated hills are also seen SW of Nagercoil and NW of Agastheeswaram.

The upland region comprises pediments and sloping dissected plains with an elevation ranging between 60 m and 100m. On the low undulating plains, adjacent to hill ranges, rubber plantation are fed by the rivers and rivulets. Kodayar River, draining the western part and Paraliyar River in The central part are the major rivers.

Flood plains, which form narrow slivers on either side of the major rivers exhibit land forms like levees, flood basin, channel bars, point bars, terraces, etc. The coastal plain is developed along the southern and south-eastern part, with width ranging between 1to 5 km.

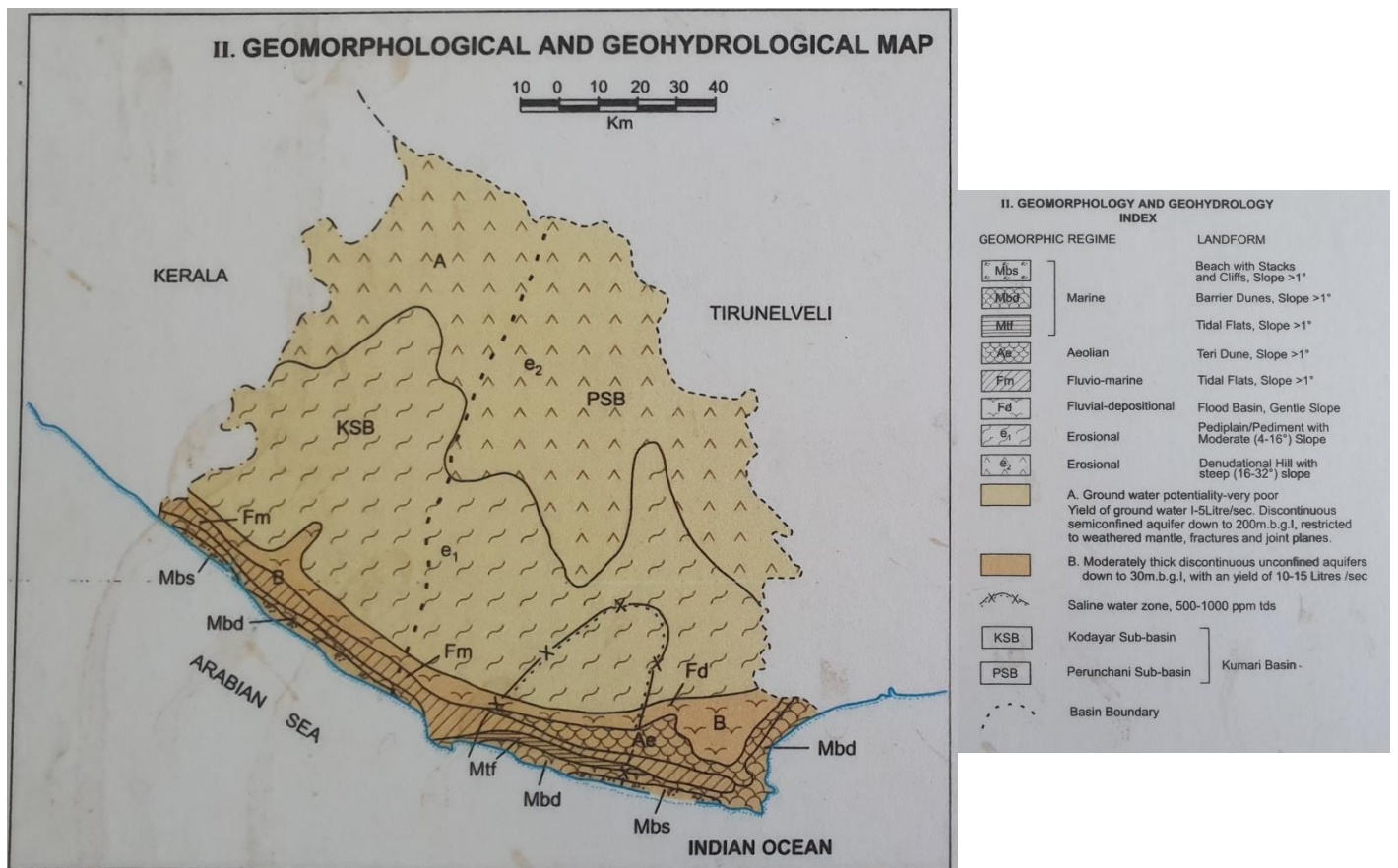


Fig .No. 6. Geomorphology Map

4.2 GEOLOGY OF KANNIYAKUMARI DISTRICT

The rocks of the district belong mainly to Archaean age, except for- a narrow girdle along the coast in the southwest and south, occupied by sediments of Tertiary and Quaternary ages, respectively. Rocks of Eastern Ghats Supergroup of Archaean age include three divisions, viz, khondalite, Charnockite and migmatite. The Khondalite Group comprises garnet-biotite-sillimariite \pm graphite, with thin bands and lenses of quartzite, calc granulite and crystalline limestone. The Charnockite litho unit of the Charnockite Group is well exposed in the southern and southwestern parts of the district, occurring mainly as concordant bands and lenses of variable dimension, associated with Khondalite Group of rocks. The migmatite complex comprises garnet-biotite gneiss, garnetiferous quartzofeldspathic gneiss and quartzofeldspathic granulites.

Cuddalore Formation of Mio-Pliocene age (correlatable with Warkalli/ Quilon beds of Kerala), comprising calcareous sandstone and Limestone. Limestone is exposed as thin capplngs southwest of Kuzhitura nearer to the coast, bordering Kerala State. Quaternary sediments of fluvial, fluviomarine, aeolian and marine origin occupy a width of 3 to 5 km. all along the southern part of the district, adjacent to coast.

The basement of the area consists of Charnockite, Granite Gneiss, Leptinite, Leptinitic Gneiss, Peninsular Gneiss, Laterite, Warkalli Sandstone, Variegated clay, river alluvium, etc. Two types of Aeolian deposits in the South Travancore, the red sands forming the Teris and white sands forming - the coastal dunes. The geological formations represented in Kanniyakumari district are Archaean metamorphic rocks, Warkalli beds considered Tertiary in age, and two types of blown sands consisting of the red teris (older) and the white coast dunes. Archaean gneisses are by far the most dominant rocks in the area and form the lofty 87 ridges of the Western Ghats, which separate Kanniyakumari from Tirunelveli district. In the low flat area lying between the Western Ghats and the Arabian Sea, the gneisses are very much reduced by erosion and appear as subdued hills. The terrain comprises largely of Precambrian crystalline rocks of Charnockites, Khondalites and Migmatitic gneisses. Beach deposits are derived from the adjacent hinterlands mainly from Charnockites, Khondalites, Biotite gneisses. The topography is mild with an elevation not exceeding 60 m at places in the coastal belt in which crystalline rocks are highly weathered to laterite (GSI, 1999). The basementrocks

are overlain by red soil, lateritic soil, clayed soil, river alluvium and coastal alluvium, black, red and red sandy soils of thickness ranging from 1 to 1.5 m in most places. The area is underlain by the peninsular gneissic terrain of India. Sediments of Miocene were also deposited and identified as the Warkalli sandstones. Also, the sands of recent origin are noticed along the coast. In general, according to the GSI, the geological formations in the study area comprises of unconsolidated sandy formation of different depositional environment belonging to quaternary age. The alluvial deposits are comprised of interlayer clay, silt, sand, gravel and pebble beds. Borehole lithology depicts that the aquifer material comprises of fine to coarse grain sand, sandy clay, clayed sand and small patches of clay occurring as lenses. The clay that exists as thin lenses or small patches was mostly deposited in fluvial and shallow marine environments. These formations overlie the Charnockites of Archean age, Charnockites existing below this formation function as impermeable strata or bed rock (Perumal et al., 2008). Lateral deposits or bay deposits of sand, Zircon, Rutile, Ilmenite and garnet minerals are very common phenomena along the entire coast of Kanniyakumari. Near Manavalakurichi, monazite is deposited (Chacko, 1966). Bulk of the gneisses in the southern part of Tamil Nadu is made up of garnet-biotite gneiss and garnetiferous quartzo-feldspathic gneiss representing the migmatized and retrograded equivalents of Charnockite and Khondalite groups (Narayanaswamy and Purnalakshmi, 1967, Narayanaswamy 1971).

Geological Formations:

The general geological formations met with in the area comprise the following rock types in the descending order of succession:-

Recent and Sub-Recent	\ Red ferruginous soils derived from charnockites, \ transported alluvial sandy soils, kankar and laterite. -----Non conformity-----
Pre-Cambrian (chiefly metamorphic group)	/ Granite, pegmitite and quartz veins, Basic Dyke Rock / (Dolerite?) Charnockite-acid charnockite and basic / charnockite / Garnetiferous-granitoid -biotite gneisses and- / grannulite (Leptynite)

Table No.3 Period Age Formation Lithology

(Source: Progress Report for the field season 1959-60) by A.S. Narasimhan, Assistant Geologist, GSI)

5. DRAINAGE OF IRRIGATION PATTERN

The major part of Kanniyakumari district is drained by the principal rivers namely Kodayar and Paralayar and their tributaries. Kodayar River rises in the Agastiar Malai and flows in a southerly direction flowing for a length of 10 km from its origin, leading to natural drainage called the Kodayar Lake, which serves as the main source of irrigation system with an extensive command area in the district. Later, it flows in a South-westerly direction and South of Kuzhithurai and joins the Arabian Sea near Thengapatnam, which is at a distance of 56 km West of Cape Commerin. The river flows through rugged terrain through a succession of water falls and cascades. One such fall lies South of Tiruparappu. Chittar-I and Chittar-II are the major tributaries of Kodayar.

Tamirabarani, which is one of the important rivers of the district, which is flowing in the central part of the district and drain in the Melpuram, Kuzhithurai, Munchirai and Killiyur blocks.

The river falls into Indian Ocean after traversing Killiyur block. The Pazhayar River originated at an altitude of 1300 m amsl in the Mahendragiri hills and the river water taken away through channels for irrigation. The river is benefited by both SW-NE monsoons. It completes its 20 km journey after joining the Arabian Sea. Its creek can be seen near Manakudi, 12 km south of Nagarcoil.

The river Valliyar originated at an altitude of 950 m MSL at the Vallimalai Hills and has a very limited irrigation system. The length of the river is nearly 29 km, and period of flow of water in this river is for 6 months. Near Manavalakurichi the river joins in the Arabian Sea. The Bahrali river also flows through the district. The Mathur hanging trough, the highest and longest aqueduct in Asia, was built over it near Mathur.

The Pazhayar river, another small river, starts at Surulacode, a place about 18 km north-west of Nagercoil. This is mainly a drainage river, mostly collecting the drainage of Thoivalai, Ananthanar and N.P. Channels.

5.1 IRRIGATION OF THE DISTRICT

No	Name of the Block	Canals		Wells used for irrigation purpose only	Tube Wells	Wells used for Domestic Purpose only	Resorvoirs	Tanks (Nos.)
		Number	Length (Km)					
1	2	3	4	5	6	7	8	9
1	Agasteeswaram	17	28	597	432	2095	0	134
2	Rajakaman-galam	19	35	401	1038	2901	0	113
3	Thovalai	6	97	289	76	1387	1	272
4	Kurunthancode	1	132	521	16	3101	0	592
5	Thuckalay	3	92	48	1	3060	0	329
6	Thiruvattar	3	35	11	-	2101	2	296
7	Killiyoor	0	58	182	6	3003	0	361
8	Munchirai	2	35	90	29	3126	-	203
9	Melpuram	2	28	6	-	6142	2	323
Total	53	540	2145	1598		26916	5	2623

Source : G Return Fasli 1425 (2015-16)

Table No.4 Irrigation Details

6. LAND UTILISATION PATTERN IN THE DISTRICT

6.1. FOREST RESOURCES

The forests in Kanniyakumari District are verdant and virgin forests and said to be of 75 million years old. Of the total district area of 1,67,130 ha Government Forests occupy an area of 50486 ha which comes to about 30.2% the total district geographic area. The Reserve Forest of the district such as 1. Therkumalai East and West R.F, 2. Thadagaimalai R.F, 3. Poigaimalai R.F, 4. Mahendragiri R.F, 5. Veerapuli R.F, 6. Velimalai R.F, 7. Old kulasekaram R.F, 8. Kilamalai R.F and 9. Asambu R.F.

The forests of Kanniyakumari District were transferred from Kerala to Tamil Nadu on 1st November 1956 as a result of the reorganization of states. The forests of this divisions (Part) i.e Boothapandy Mahendragiri R.F. etc. were previously managed by the District Forest Officer, Tirunelveli South Division with Headquarters at Tirunelveli. Consequent on the formation of Kalakad and Mundathurai sanctuary, Kanniyakumari division was formed exclusively to manage the forests of Kanniyakumari district with headquarters at Nagercoil from 01.04.1977 as per G.O.Ms.No. 261, dated : 26.03.1977.

From tourism angle, the forests are highly enchanting with pleasant shola hill top forests, beautiful grass lands, panoramic valleys, hillocks, singing streams, vast stretches of rubber plantations valuable teak plantations and excellent climate. Nobody should miss seeing Mahendragiri, Maramalai, Sea field and Balamore estate area, Ecology farm, Kalikesam, Pechiparai dam, Perunchani dam, Upper Kodayar, Maruthamparai and Mukkudal areas for their scenic beauty. All areas in forests are worth seeing in Kanniyakumari district only.

The forests consist of soaring and lofty trees of *Mesua ferrea*, *Bischofia Javanica*, *Vitex altissima* to smaller trees of *Dillini* a species festooning climber, shrubs valuable herbs, variety of orchids, 2 types of canes and many indigenous palms and cycas. The important timbers are Teak, Rosewood, Vengai and Aijeni. This district is worth mentioning here for the easy availability and quality of the above timbers. Various types of forest produces like bamboos, reeds, canes soft wood, tamarind, lemon grass, rubber, coconut, arecanut, kadukai, chinnamom bark, nelli, cardamom, mango and many medicinal plants of high value are harvested in this district. The maruthuval-malai located among green paddy fields and fluttering coconut palms is famous for valuable medicinal plants. This is the only district in Tamil Nadu, where rubber and clove plantations have been raised in reserve forests in an area of 4785.70 ha and 110 ha respectively. The district is rich in wildlife with at least 25 types of mammals, about 60 species of birds including 14 species of migratory birds and many species of fishes, reptiles and amphibians. In short, these forests are a veritable trove of biological treasure.

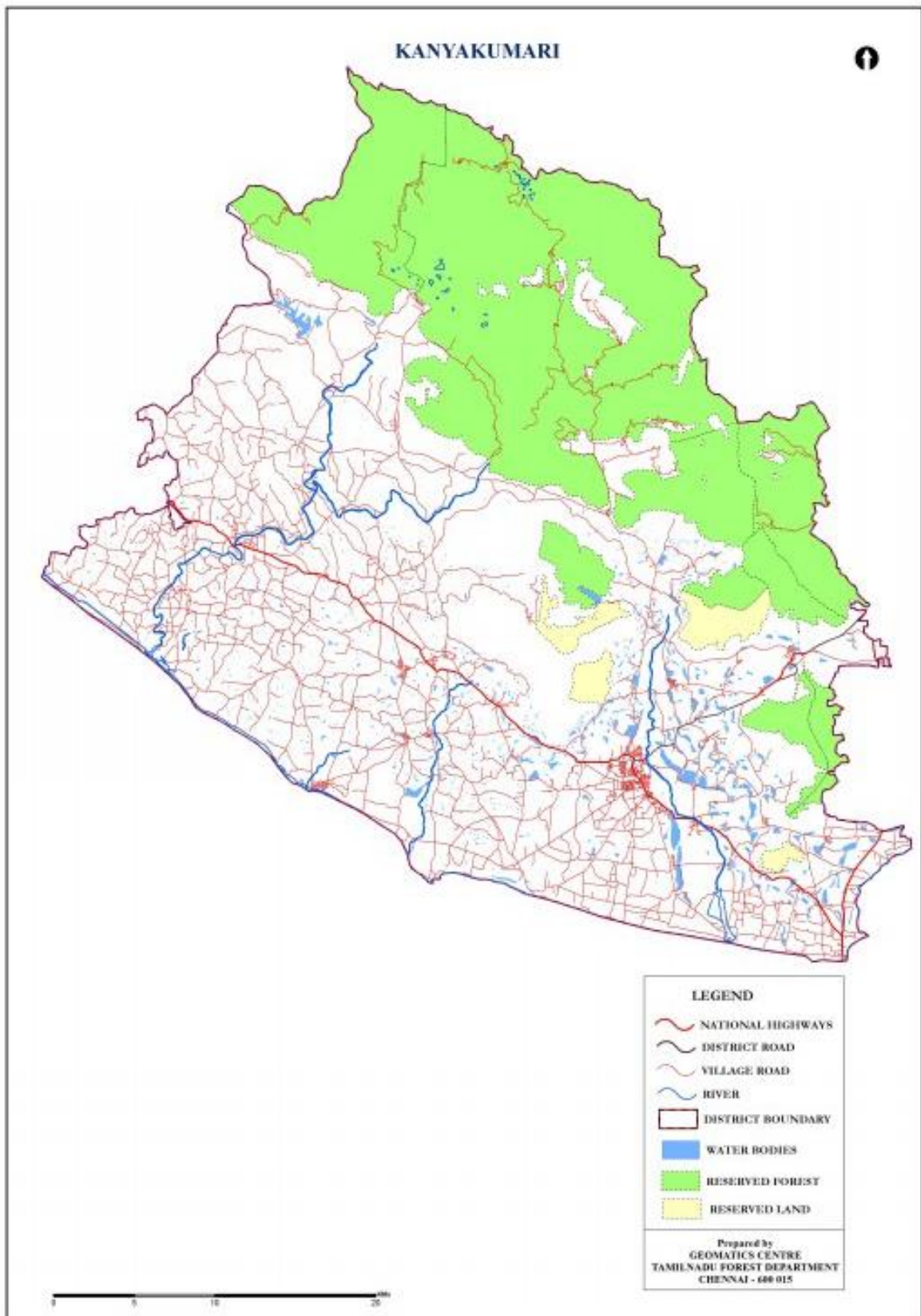


Fig No.7 Forest Map of the District

6.2 AGRICULTURE

Soil in the district is mostly of the red loam variety. In the seacoasts, however, the sandy type of soil prevails and gravel soil is seen in the mountain regions. In the low lands there is neither white sand or sandy loam while in the midlands and high lands there prevails fairly fertile soil of fine type particularly in the valleys. A variety of crops are raised. In the hills Plantain, Tea, Coffee, Rubber, coconuts and pepper are being cultivated. In the plains, paddy, tapioca, coconut and vegetables are the major crops under cultivation. Out of the total area 167,200 hectare, forest accounts for 54,155 hectare. The area for cultivation is 77,314 hectare. The agricultural cultivation in the district reads as: Nanjai (wet lands 19,376 ha.) Punjai (dry land 73,159 ha.) and poramboke (Govt. land 8,235 ha.). Paddy is cultivated in 9,627 hectare, coconut in 24,102 hectare, tapioca in 1338.86 hectare, banana in 5,650 hectare, cashew in 1,002 hectare, rubber in 27,315 hectare, mango grove in 1,310 hectare, Tea in 225 hectare, and coffee in 54 hectare, pepper in 80 hectare.

6.3 HORTICULTURE

Major horticulture crops cultivated in this district are fruit crops like mango, banana, jack and aonla, vegetables like tomato, brinjal, bhendi and tapioca, spices and condiments like pepper, clove and nutmeg, plantation crops like areca nut and cashew and flowers like jasmine, pitchi and crossandra. Its unique climate favours production of off- season mangoes.

6.4 SOIL

The soils of Kanniyakumari district can be classified into i) Red Soil, ii) Red lateritic soil, (iii) Brown soil and iv) Coastal sand. The soils are mostly in-situ in nature, lateritic, earthy and pale reddish in colour. They are derived from laterisation of gneisses. The soils derived from gneisses are mostly brownish. The thickness of soils in the mounts is almost negligible whereas in the valleys it is around 2 m.

The lateritic type of soil occurs in Thiruvattar, Munchirai, Maruthancode, Rajakkamangalam, Killiyur, Thuckalay and Melpuram blocks. The mixed type of Red and alluvial soils, occur in Agastheeswaram and Thoivalai blocks. The coastal sand is seen in occurs in the Western side of the district. The coastal alluvium sand is of high fertility.

7. SURFACE WATER AND GROUND WATER SCENRIOOF THE DISTRICT

Geo Hydrologically, the district can be divide into two domains; (1) an unconsolidated format on of Quaternary age, consisting of clay, silt and sand in the south and (2) consolidated formation of Archaean age, consisting of crystalline igneous and metamorphic rocks, in the north. In the Quaternary Format, ground water occurs in the marginal basins, having lenticular aquifers. In phreatic zone or within shallow depth up to 100m, with ground water yield of 10 to 1 lps. In the hard rock area, the ground water is restricted to soil, regolithic cover, weathered and fissure zones under phreatic unconfined conditions. Moderately thick, discontinuous unconfined aquifers also exist down to 30 m depth below ground level, (Geohydrlogical map of India, GSI 1969). The overall quality of ground water is good, excepting for a lobular zone f saline I brackish water, having 500-1000 ppm of total dissolved solids. The district receives good annual precipitation (1144 mm) for the major part of the year, via NE and SW monsoons.

The major river in the district is Tambaraparani locally known as Kuzhithuraiar. This river has got two major distributaries namely Kodayar and Paralayar with the pechiparai and perunchani dams respectively. There are many distributaries for Kodayar river of which Chittar I and Chittar II, with their dams, are the major ones. The origin of Tambaraparani River is Western Ghats and the river confluences with Arabian Sea near Thengapattanam, at a distance of about 56 km. West of Cape Cammorin, the southern most tip of India.

Valliar, another small river and its tributary Thoovalar, originate from Velimalai Hills, collect the drainage from P.P. Charnel and its branches, wind power is a major renewable energy source in this district, wind mills are located near Aralvaimozhi.

8. RAINFALL OF THE DISTRICT AND CLIMATIC CONDITIONS

8.1 Climate

Climatic Conditions and rain fall seasons. The district has a favourable agro-climatic condition, which is suitable for growing many varieties of crops. Its proximity to the equator, its topography and other climatic factors favour the growth of various crops. The paddy varieties grown in the second crop season in Thovalai and Agasteeswaram Taluks are grown during the first crop season in Kalkulam and Vilavancode Taluks. This shows that there is distinct variation in the climatic conditions

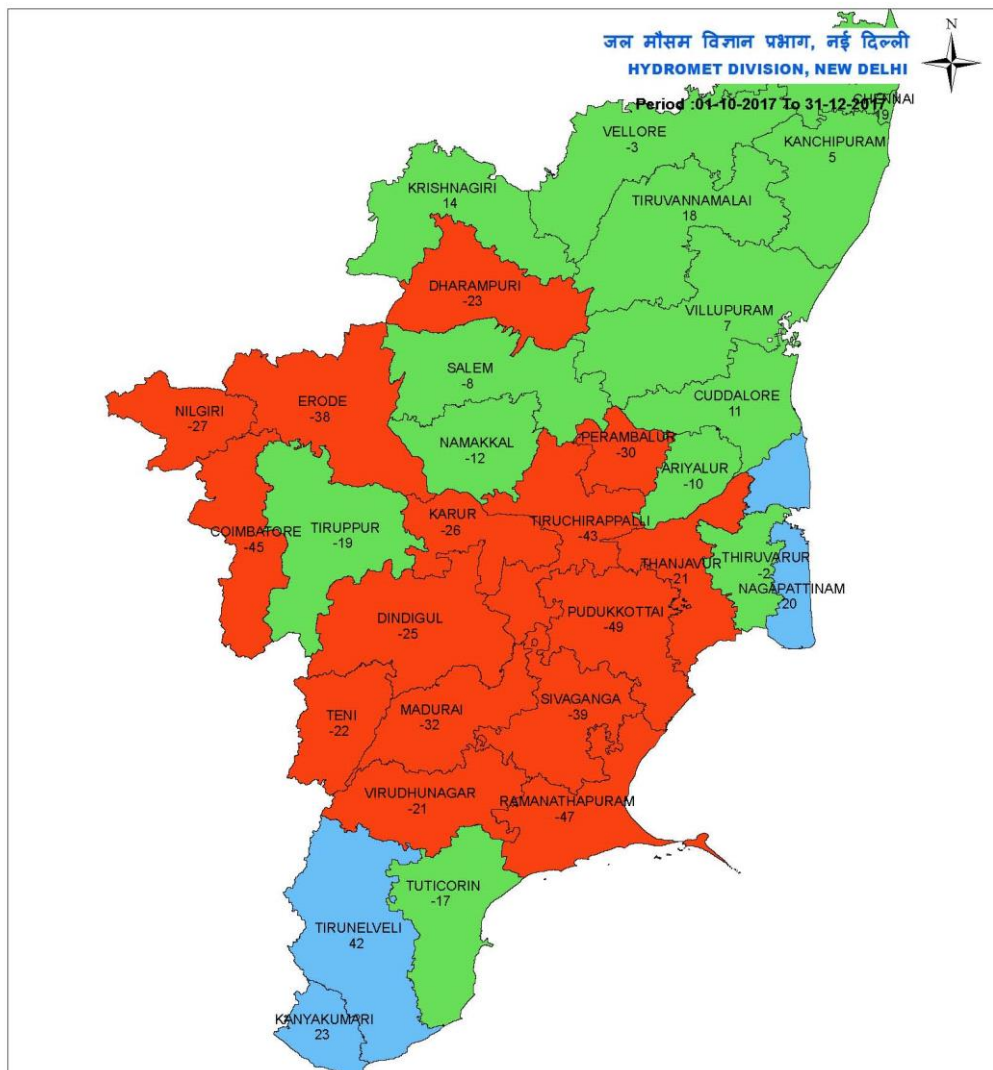
prevailing within the district. Unlike the other districts in Tamil Nadu, it has rainfall during both the South-West and the North-East monsoons. The South-West monsoon period starts in the month of June and ends in September, while the North-East monsoon period starts October and ends in the middle of December.

8.2 Rainfall



भारत मौसम विज्ञान विभाग
INDIA METEOROLOGICAL DEPARTMENT

DISTRICT RAINFALL MAP : TAMIL NADU



Legend
 Large Excess [60% or more] Excess [20% to 59%] Normal [-19% to 19%] Deficient [-59% to -20%] Large Deficient [-99% to -60%] No Rain [-100%] NO DATA

NOTES :
 a) RainFall figures are based on operation data.
 b) Small figures indicate actual rainfall (mm), while bold figures indicate Normal rainfall (mm).
 c) Percentage Departures of rainfall are shown in brackets.

Fig No.8 District Rainfall Map

The Kanniyakumari district received the rain under the influence of both Southwest and Northwest monsoons. The Southwest monsoon chiefly contributes to the rainfall in the district. Most of the precipitation occurs in the form of cyclonic storms caused due to the depressions in Bay of Bengal. The normal annual rainfall over the district varies from about 826 to 1456 mm. It is the minimum around Kanniyakumari in the South-eastern part of the district. It gradually increases towards west, north and northwest and attains a maximum around Thuckalay. The District has a favourable agro-climatic condition, which is suitable for growing a number of crops. The proximity of equator, its topography and other climate factors favour the growth of various crops. The paddy varieties grown in the second crop season in Thoivalai and Agasteeswaram Taluks are grown during the first crop season in Kalkulam and Vilavancode Taluks. This shows that there is distinct variation in the climatic conditions prevailing within the district. Unlike other district in Tamil Nadu, it has a rainfall both during the South West and the North East monsoons. The South West monsoon period starts from the month of June and ends in September, While the North East monsoon period starts from October and ends in the middle of December.

(unit - mm)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
2017	2.24	0.00	61.39	31.64	133.97	162.48	16.97	69.67	208.69	203.390	211.99	285.89
2018	12.35	21.73	30.98	85.46	211.54	230.51	94.10	291.28	41.99	254.16	192.45	4.21

Table No. 5 The actual rainfall of year 2017 and 18 is as shown

9. DETAILS OF ROUGHSTONE QUARRY LEASES IN THE DISTRICT

A. LIST OF ROUGHSTONE QUARRY LEASES

Name of the District : Kanniyakumari

Name of the Mineral : Roughstone

Table No.6. EXISTING ROUGH STONE QUARRY LEASES

Sl. No.	Name of the mineral	Name of the lessee	Address & Contact No. of lessee	Mining lease grant order No. and date	Area of mining lease (Ha)	Period of mining lease (Initial)		Period of mining lease (1 st & 2 nd renewal)		Date of commencement of Mining Operation	Status (Working / Non-Working / Temp. Working for dispatch etc.)	Captive / Non-Captive	Obtained Environmental Clearance (Yes / No)	Location of the Mining Lease (Latitude & Longitude)	Method of Mining (Open cast / Under ground)
						From	To	From	To						
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.
1.	Rough stone	Thiru.M.Mohamed Sherif	Door No. 1/88, MMK, Manzil, Verkilambi Post.	368/G&M/2008 Dt: 28.12.2014	Kalkulam / Mecode 866/1 1.47.50 Hects	28.12.2014	27.12.2019	-	-	28.12.2014	Non-working	Non-Captive	Yes	08°19'01"N 77°20'01"E	Open cast
2.	Rough stone	Thiru. L.Charles	Pandaravilai, Kandavilai-Post.	292/G&M/2008 Dt: 31.12.2014	Kalkulam / Villukuri 350/3B(P) and 350/4 1.00.0 Hects	31.12.2014	30.12.2019	-	-	31.12.2014	Non-working	Non-Captive	Yes	08°13'35"N 77°22'31"E	Open cast
3.	Rough stone	Thiru. R.George Antony	Kaliankadu, Chunkankadai - Post	49/G&M/2011 Dt: 25.12.2014	Kalkulam / Villukuri 385/1, 385/2A(P) 4.19.0 Hects	25.12.2014	24.12.2019	-	-	25.12.2014	Non-working	Non-Captive	Yes	08°13'08"N 77°22'43"E	Open cast

4.	Rough stone	Thiru.R.Karthikeyan	Thuthuvilagam Veedu, Kalluketty, Kuzhithurai Post	576/G&M/2012 Dt: 25.12.2014	Kalkulam /Kappiyarai 1/1 0.80.90 Hects	25.12.2014	24.12.2019	-	-	25.12.2014	Non-working	Non-Captive	Yes	08°15'13"N 77°14'55"E	Open cast
5.	Rough stone	Tmt. M.S. Sreema	KU Street, Nagercoil.	406/G&M/2008 Dt: 22.01.2015	Kalkulam / Villukuri 411/6B 1.32.0 hecets	22.01.2015	21.01.2020	-	-	22.01.2015	Non-working	Non-Captive	Yes	08°13'08"N 77°22'14"E	Open cast
6.	Rough stone	Thiru. C. Gangatharan	Valiyattumugam, Vendalicode Post	169/G&M/2009 Dt: 22.01.2015	Kalkulam / Aruvikarai 472/2A(P) and 472/2B 1.13.5 hecets.	22.01.2015	21.01.2020	-	-	22.01.2015	Non-working	Non-Captive	Yes	08°20'04"N 77°19'07"E	Open cast
7.	Rough stone	Thiru. G. Jasper	Pandarakadu, Irenipuram	233/G&M/2008 Dt: 22.01.2015	Vilavancode / Kunnathoor 462/2,3,33 and 463/3B 0.39.0 hecets.	22.01.2015	21.01.2020	-	-	22.01.2015	Non-working	Non-Captive	Yes	08°16.987'N 77°11.844'E	Open cast
8.	Rough stone	Thiru. A. Viyakulamuthu	8F/74, Karankadu Post	400/G&M/2008 Dt: 22.01.2015	Kalkulam / Villukuri 433/2A1(P) and 433/2A2(P) 0.84.5 hecets.	22.01.2015	21.01.2020	-	-	22.01.2015	Non-working	Non-Captive	Yes	08°12'51"N 77°21'58"E	Open cast
9.	Rough stone	Thiru. John Peter	Kanjiravilai, Thiruvudhan-code	43/G&M/2010, Dt: 01.04.2015	Kalkulam / Kappiyarai 23/8 and 24/10 2.12.0 hecets.	01.04.2015	31.03.2020	-	-	01.04.2015	Non-working	Non-Captive	Yes	08°14'39"N 77°15'10"E	Open cast
10.	Rough stone	Thiru.T.Kumaresan	Moolakottuvilai, Painkulam Post	735/G&M/2008, Dt: 16.04.2015	Vilavancode / Painkulam 214/1C2 and 221/1 0.47.5 hecets	16.04.2015	15.04.2020	-	-	16.04.2015	Non-working	Non-Captive	Yes	08°15'06"N 77°09'57"E	Open cast

11.	Rough stone	Thiru.R.Karthikeyan	Thuthivilagam House, Kallukatti, Kuzhithurai Post	346/G&M/2015 Dt: 25.08.2015	Vilavancode / Painkulam 214/1C1, 214/3B and 214/3C 2.01.0 hecets	25.08.2015	24.08.2020	-	-	25.08.2015	Non-working	Non-Captive	Yes	08°15'06"N 77°09'53"E	Open cast
12.	Rough stone	Thiru.Alex Paul	Koottalil House, Kunnackal Post, Muvattupuzha	61/G&M/2012 Dt: 31.08.2015	Kalkulam / Ponmanai 521/6 1.77.0 hecets	31.08.2015	30.08.2020	-	-	31.08.2015	Non-working	Non-Captive	Yes	08°19'30"N 77°20'03"E	Open cast
13.	Rough stone	Thiru.R.Sankar	Thuthivilagam Veedu, Kalluketty, Kuzhithurai Post	87/G&M/2009 Dt: 16.10.2015	Kalkulam / Mecode 804/4(P), 804/5(P) and 804/6(P) 1.99.0 hecets	16.10.2015	15.10.2020	-	-	16.10.2015	Non-working	Non-Captive	Yes	08°19'24"N 77°19'41"E	Open cast
14.	Rough stone	Thiru.A.Ani kumar	Kuzhinjanvilai, Sooriyacode Post	55/G&M/2009 Dt: 10.11.2015	Kalkulam / Mecode 722/1B & 722/2 0.86.0 hecets	10.11.2015	09.11.2020	-	-	10.11.2015	Non-working	Non-Captive	Yes	08°19'12"N 77°18'57"E	Open cast
15.	Rough stone	Thiru.P.Kishore	187, Poonga Street, Nesamony Nager, Nagercoil.	130/G&M/2012 Dt: 18.11.2015	Thovalai / Thazhakudi 453/1, 2, 3, 4, 5 & 7 1.67.0 hecets	18.11.2015	17.11.2020	-	-	18.11.2015	Non-working	Non-Captive	Yes	08°15'02"N 77°27'42"E	Open cast
16.	Rough stone	Thiru.K.Rajeswaran	Pallikonam, Near Krishnankoil, Arumanai Post.	181/G&M/2004 Dt: 18.11.2015	Vilavancode / Kaliyal 486/5 1.22.0 hecets	18.11.2015	17.11.2020	-	-	18.11.2015	Non-working	Non-Captive	Yes	08°23'53"N 77°14'28"E	Open cast
17.	Rough stone	Thiru.N.Krishnavarman	Lakshmi Bhavan, Paraseri, Chunkankadai Post	30/G&M/2012 Dt: 18.11.2015	Kalkulam / Villukuri 397/1B 0.53.0 hecets	18.11.2015	17.11.2020	-	-	18.11.2015	Non-working	Non-Captive	Yes	08°13'18 "N 77°22'17"E	Open cast

18.	Rough stone	Tmt.M.Valsala kumari	Moolakottuvilai Veedu, Painkulam Post,	226/G&M/2011 Dt: 29.11.2015	Vilavancode / Nattalam 409/4A5A (P), 409/4A5C and 409/4A5D 0.40.5 hec	29.11.2015	28.11.2020	-	-	29.11.2015	Working	Non-Captive	Yes	08°16'11"N 77°13'51"E	Open cast
19.	Rough stone	Thiru.J.Shaji	Pinkulam Road, Arukathu Puthenveedu, Kakavilai Post	254/G&M/2008 Dt: 29.11.2015	Kalkulam / Velimalai 447/3C2 and 454/2A 1.33.70 hec	29.11.2015	28.11.2020	-	-	29.11.2015	Non-working	Non-Captive	Yes	08°17'25"N 77°20'15"E	Open cast
20.	Rough stone	Thiru.K.P.Hari-chandran,	Kuntuvilai, Keezhkulam Post	190/G&M/2015 Dt: 06.12.2015	Vilavancode / Thengapattanam 508/2B3 and 508/2B4 0.56.66 hec	06.12.2015	05.12.2020	-	-	06.12.2015	Non-working	Non-Captive	Yes	08°14'06"N 77°10'43"E	Open cast
21.	Rough stone	Tmt.C.Leela,	Kollathattuvilai, Puthukadai Post	191/G&M/2015 Dt: 06.12.2015	Vilavancode / Thengapattanam 514/8C, 10B, 2A, 2B1A, 1, 2B1B, 7B & 513/7 1.59.73 hec	06.12.2015	05.12.2020	-	-	06.12.2015	Working	Non-Captive	Yes	08°14'03"N 77°10'43"E	Open cast
22.	Rough stone	Thiru.Y.Kumar-chelliah,	No.20/158, Pottavilai, Arasakulam, Thengapattanam Post	597/G&M/2014 Dt: 06.12.2015	Vilavancode / Thengapattanam 381/10 0.91.0 hec	06.12.2015	05.12.2020	-	-	06.12.2015	Working	Non-Captive	Yes	08°14'24"N 77°10'59"E	Open cast
23.	Rough stone	Thiru. M.N.Muthiah	Annai Illam, Monvilagam, Reethapuram Post	420/G&M/2011 Dt: 08.12.2015	Kalkulam / Mecode 722/1A(P) and 725/3B(P) 0.70.0 hec	08.12.2015	07.12.2020	-	-	08.12.2015	Non-working	Non-Captive	Yes	08°19'12"N 77°18'56"E	Open cast

24.	Rough stone	Thiru.S.Dhas	No.1/52A, Kadamalai-kuntu, Meekka-mandapam Post.	691(A)/G&M / 2015 Dt: 08.12.2015	Kalkulam / Mecode 480/2(P) 1.00.0hects	08.12.2015	07.12.2020	-	-	08.12.2015	Non-working	Non-Captive	Yes	08°19'25"N 77°18'46"E	Open cast
25.	Rough stone	Tmt.M.D.Remadevi	Marthandavilasam Bunglow, Nattalam Post	226/G&M/2 011 Dt: 16.12.2015	Vilavancode 926/47, 59(P), 60(P), 72(P) and 73(P) 0.86.0 hects	16.12.2015	15.12.2020	-	-	16.12.2015	Non-working	Non-Captive	Yes	08°16'51"N 77°14'35"E	Open cast
26.	Rough stone	Thiru. V. Christhudas	Tharavilai, Thickenamcode Post	707/G&M/2 015 Dt: 14.12.2015	Vilavancode / Killiyoor 656/2A2 2.69.5 hects	17.12.2015	16.12.2020	-	-	17.12.2015	Non-working	Non-Captive	Yes	08°14'38"N 77°12'32"E	Open cast
27.	Rough stone	Thiru.T.Jegan	Sree Sakthi Bhavan, Main Road, Paraseri, Chunkankadai Post	730/G&M/2 010 Dt: 23.12.2015	Kalkulam / Aloor 10/3A 1.53.0 hects	23.12.2015	22.12.2020	-	-	23.12.2015	Non-working	Non-Captive	Yes	08°13'02"N 77°22'46"E	Open cast
28.	Rough stone	Thiru. N.Mathias	Pilankalavilai, Mathoor, Aruvikarai Post	615/G&M/2 014 Dt: 10.01.2016	Kalkulam / Ayacode 473/1B 0.54.65 hects	10.01.2016	09.01.2021	-	-	10.01.2016	Non-working	Non-Captive	Yes	08°20'04"N 77°19'13"E	Open cast
29.	Rough stone	Thiru.Arun Varghese	Kottakal House, Kumarapuram Junction, Kumarapuram Post	365/G&M/2 008 Dt: 10.01.2016	Kalkulam / Mecode 861/7(P) & 861/20(P) 0.45.0 hects	10.01.2016	09.01.2021	-	-	10.01.2016	Non-working	Non-Captive	Yes	08°19'04"N to 08°19'00"N 77°20'09"E to 77°20'05"E	Open cast
30.	Rough stone	Thiru.Arun Varghese	Kottakal House, Kumarapuram Junction, Kumarapuram Post	366/G&M/2 008 Dt: 10.01.2016	Kalkulam / Mecode 490/2B(P) 0.21.0 hects	10.01.2016	09.01.2021	-	-	10.01.2016	Non-working	Non-Captive	Yes	08°18'59"N 77°18'31"E	Open cast

31.	Rough stone	Thiru. G.Abraham	Mottavilai, Karankadu-P.O	395/G&M/2 009 Dt: 10.01.2016	Kalkulam / Villukuri 397/1A2 2.00.0 hecets	10.01.2016	09.01.2021	-	-	10.01.2016	Non-working	Non-Captive	Yes	08°13'19"N 77°22'19"E	Open cast
32.	Rough stone	Thiru.V.Junar	Gnarakadu, Kappukadu Post	768/G&M/2 015 Dt: 17.01.2016	Vilavancode / Kunnathoor 432/16A, 19A and 434/15 0.32.0 hecets	17.01.2016	16.01.2021	-	-	17.01.2016	Non-working	Non-Captive	Yes	08°17'25"N 77°11'56"E	Open cast
33.	Rough stone	Thiru. M.Varghees Rajkumar	Kalimar, Colachel	822/G&M/2 011 Dt: 17.01.2016	Kalkulam / Villukuri 398/5B4 0.90.0 hecets	17.01.2016	16.01.2021	-	-	17.01.2016	Non-working	Non-Captive	Yes	08°13'28"N 77°22'19"E	Open cast
34.	Rough stone/ Earth	Thiru.R.Sankar	Thuthivilagam Veedu, Kallukatti, Kuzhithurai	345/G&M/2 015 Dt: 31.05.2016	Vilavancode / Mullankinavil i 210/10 and 211/1(P) 3.45.0 hecets	31.05.2016	30.05.2021	-	-	31.05.2016	working	Non-Captive	Yes	08°15'16"N 77°14'49"E	Open cast
35.	Rough stone	Thiru.Joseph Jacob	Katachel, Kaliyal Post.	245(A)/G&M / 2013 Dt: 01.06.2016	Vilavancode / Kaliyal 473(P) 4.90.0 hecets	01.06.2016	31.05.2021	-	-	01.06.2016	Non-working	Non-Captive	Yes	08°24'40"N 77°14'41 E	Open cast
36.	Rough stone	Thiru. V.Jeba Dhas	Shalom House, Iniya Nager, Verkilambi Post	100/G&M/2 012 Dt: 18.06.2016	Kalkulam / Mecode 852/4, 854/1, 854/7 and 854/8 1.37.5 hecets	18.06.2016	17.06.2021	-	-	18.06.2016	Non-working	Non-Captive	Yes	08°19'16"N 77°19'44"E	Open cast
37.	Rough stone	Thiru.C.Suresh	No.22/2A, Sri Ram Illam, Keezhakarupucodu, Chunkankadai Post	108/G&M/2 012 Dt: 22.06.2016	Kalkulam / Villukuri 408/6A, 6B, 7(P) 0.99.5 hecets	22.06.2016	21.06.2021	-	-	22.06.2016	Non-working	Non-Captive	Yes	08°13'26"N 77°22'06"E	Open cast
38.	Rough stone	Thiru. P.Madhavadhas	Paraseri, Chunkankadai Post	160/G&M/2 001 Dt: 03.07.2016	Kalkulam / Aloor 10/4A(P) 1.00.0 hecets	03.07.2016	02.07.2021	-	-	03.07.2016	Non-working	Non-Captive	Yes	08°12'53"N 77°22'36"E	Open cast

39.	Rough stone	Thiru. C.Mohandas	Painkulam, (PO)	148/G&M/2 012 Dt: 23.10.2016	Vilavancode / Painkulam 214/1B, 2B 0.63.0hects	23.10.2016	22.10.2021	-	-	23.10.2016	Non-working	Non-Captive	Yes	08°15'09"N 77°09'58"E	Open cast
40.	Rough stone	Thiru.Thavasumani	Chettivilai-puthen Veedu, Keralapuram Post	293/G&M/2 014 Dt: 15.02.2017	Kalkulam / Kalkulam 165(P) 0.59.51 hects (1.47 Acres)	02.05.2017	03.04.2020	-	-	02.05.2017	Non-working	Non-Captive	Yes	08°15'45"N 77°19'58"E	Open cast
41.	Rough stone	Thiru.T.V.Rajendrakumar,	Kannanvilagam, Kappukadu & post	271/G&M/2 009 Dt: 23.05.2017	Vilavancode / Mancode 189/ 1 (P) 1.00.0 hects	04.06.2017	03.06.2022	-	-	04.06.2017	Non-working	Non-Captive	Yes	08°24'09"N 77°14'06"E	Open cast
42.	Rough stone	Tmt.Anitha Raja Bai	No.1/52A, Kadamalaimandu, Mekkamandapam Post	655/G&M/2 014, dt:18.08.2017	Kalkulam / Mecode 521/3A and 4B 1.43.50 hects	18.08.2017	17.08.2022	-	-	18.08.2017	Non-working	Non-Captive	Yes	08°19'24"N 77°20'07"E	Open cast
43.	Rough stone	Thiru. A.Ajikumar	Kuzhinjanvilai, Sooriyacode P.O	350/G&M/2 008 Dt: 25.09.2017	Kalkulam / Mecode 483/1 1.40.00 hects	15.12.2017	14.12.2022	-	-	15.12.2017	Non-working	Non-Captive	Yes	08°19'22"N 77°18'50"E	Open cast

10.0 - DETAILS OF THE ROYALTY OR REVENUE RECEIVED IN THE LAST 3 YEARS

Table No.7. Reconciled Revenue collection for Roughstone during the period from 2016-2017 to 2018-2019 in kanniyakumari

Year	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Total
2016-2017	2339605	3047750	3386100	2938780	3417525	4441125	4053025	3787850	4244275	3755175	4520875	8207250	4,81,39,335
2017-2018	3206860	4765791	4831200	4856600	4495275	4012875	3726675	5140575	3761800	4543760	4874740	5558300	5,37,74,451
2018-2019	3350360	3463950	13513394	5098470	5541930	6067550	5942755	7014595	8445300	4610220	9149366	3927175	7,61,25,065

11.0 - DETAILS OF PRODUCTION OF MINOR MINERALS (ROUGH STONE) IN LAST THREE YEARS

Table No.8		
YEARWISE MINERAL PRODUCTION FOR THE YEAR 2016 - 2019		
Sl. No.	Year	Minor Minerals (Cbm)
		Roughstone
(1)	(2)	(3)
1	2016-17	10,94,343
2	2017-18	9,58,444
3	2018-19	12,97,521
Total		33,50,308

12. MINERAL MAP OF THE KANNIYAKUMARI DISTRICT:

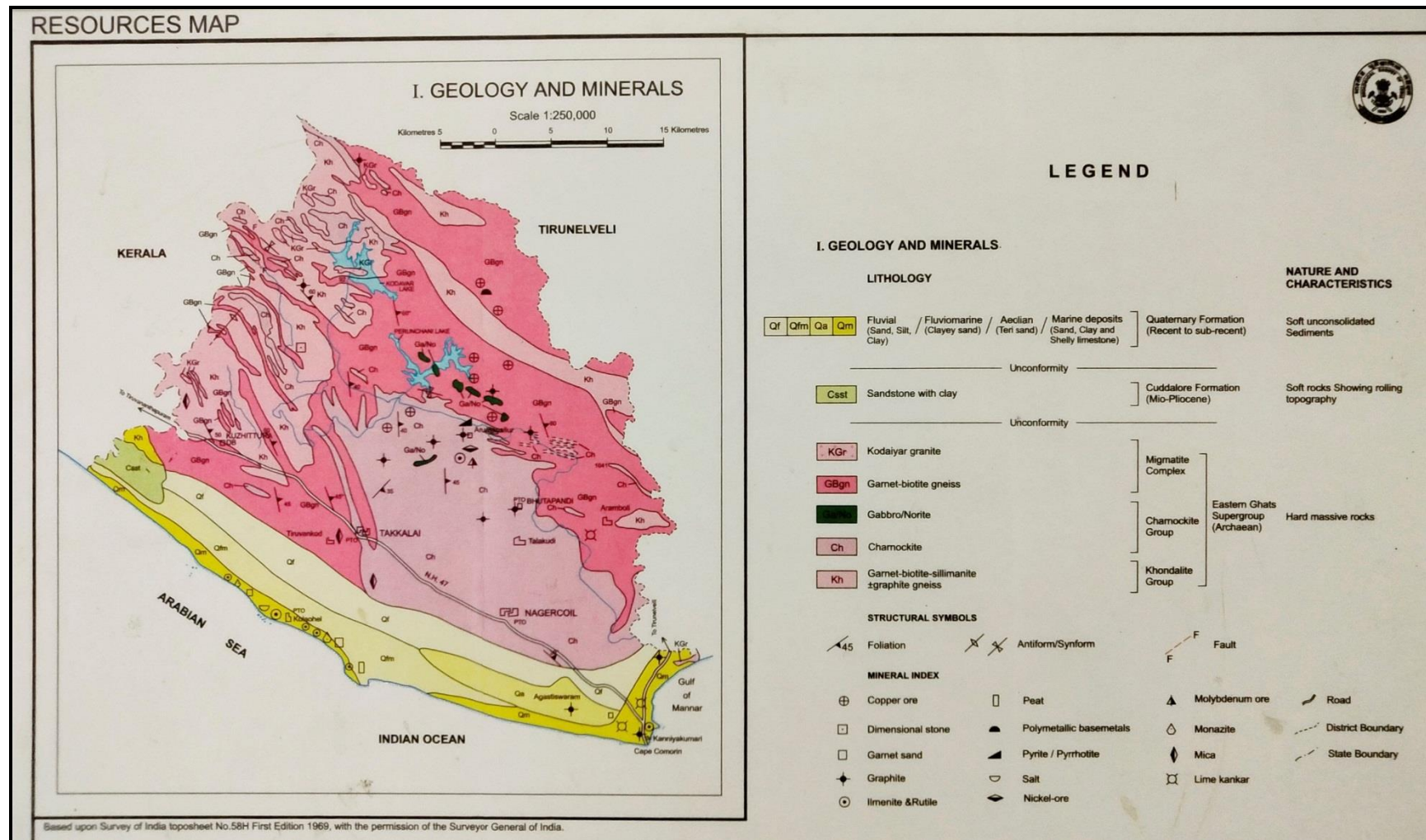


Fig No.9 District Resource map (Mineral Map)

**13.0 LIST OF LETTER OF INTENT (LOI) HOLDER IN THE DISTRICT ALONG
WITH ITS VALIDITY**

Table No 9.0 LIST OF LETTER OF INTENT (LOI) HOLDER.

Sl. No.	Name of the Mineral	Name of the Lessee	Address & Contact No. of letter of intent holder	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	Rough stone	Thiru.P.Suresh kumar	S/o.Perumal-kutty Nadar, No.6/16-1, Elanchoi-kottuvilai, Veeyanoor, Kanniyakumari District.	629/G&M/2017-5, dated 15.12.2017	Kalkulam Kappiyarai 'A' 10/1(P) 0.68.0 hecets	5 Years	Non-Captive	08°14'48"N to 08°14'55"N 77°14'58"E to 77°14'59"E
2	Rough stone	Thiru.A.Bellar mine Jose	S/o.A.Ambrose, Managing Patner, Grand Metals, Mullanganavilasi Post, Kanniyakumari District	20/G&M/2017, dated 11.05.2017	Vilavan-code / Nattalam 409/4A5 B 2.66.03 hecets	5 Years	Non-Captive	08°16'04.27"N to 08°16'11.19"N 77°13'44.25"E to 77°13'54.83" E
3	Rough stone	Tmt.S.Geetha	W/o.K.Rajeshwaran, Velagam, Near Krishnankoil, Pallikonam, Arumanai Post.	67/G&M/2017, dated: 18.05.2017		5 Years	Non-Captive	08°23'42.91" to 08°23'50.04"N 77°14'25.06"E to 77°14'35.97"E

14. TOTAL MINERAL RESERVE AVAILABLE IN THE DISTRICT

Minor Mineral

The minor minerals are mainly Charnockite (Rough stone), Granite (Dimensional Stone), and Earth / Clay. In Kanniyakumari district rock quarries are found in foot hill of mountains. The patta land quarries are the quarries which are mined out in patta land and owner of the mines is pattadar or owner of land. These are the private quarries, although these quarries are private but permission for quarrying of rocks is given by the District Collector.

The rocks quarries are located in Kalkulam, Vilvancode, Thiruvattar, killiyur, Ageesthewaram and Thovalai Taluks of district. The maximum rock quarries are observed in the Kalkulam taluks and one quarry is noticed in Thovalai Taluks. Old Abandoned rock quarries are noticed in Agasthewaram Taluks.

Charnockite :

The typical massive Charnockite occurring in the area is medium grained with quartz, potash or plagioclase feldspar and hypersthene. Charnockite is a minor mineral mainly noticed Kalkulam, Vilvancode, Thiruvattar, killiyur, Ageesthewaram and Thovalai Taluks of the Kanniyakumari district. These charnockites are quarrying for various purposes, for example blue metal, rock chips, random stone and different sizes of the gravels for using in road construction and for building construction. Blue metal is comprised of stones three basically of different sizes. First one belongs to .75" x .75" dimension and second one belongs to .5"x .5" dimension and third one is not come under any dimension. It is very small in size so it is also called as baby metal. Baby metal is great demand for producing of concrete boards. These quarries are mainly rough stone not for dimension stone. In kalkulam Taluk, it is located in Villikuri, Aloor, Mecode, Ponmanai, Surulacode, Kappiyarai, Ayacode, Aruvikaria and Velimalai village. In Vilavancode major rock quarries are in Kalial. Mancode, Kunnathur, Painkulam, Thengapattanam, Nattalam, Middalam, Killiyur and Mullankanavilai. Only one quarry visited to Thazhakudi Village of Thovalai Taluk. In Ageesthewaram Taluk at present time no quarry is operating. The old quarry of Charnockite was seen in the around of Ramanapudur and Kottaram village.

The Madurai bench of Madras High court in W.p.7607/ 2019 has passed an order dated 01.04.2019 to stop all the existing quarry lease in Echo- Sensitive Zone of Kanniyakumari wild life sanctuary . Based on that, Out of 43 existing Roughstone quarry , 29 quarries in Kalkulam and Thovalai Taluk has been suspended.

Total Roughstone reserves available in existing 44 Roughstone quarry lease as per Mining plan is 1,82,13,280 Cbm and Gravel reserves is 15,49,379 Cbm.

Fig No. 10. FIELD PHOTOGRAPHS OF STONE QUARRY



Fig: 14.1. Charnockite quarry located in Villikuri Village



Fig:14.2. Charnockite quarry located in Villikuri village

Fig:14.3. Charnockite quarry located in Mecode Village



Fig: 14.4. Charnockite quarry located in Surulacode Village



Fig: 14.5. Charnockite quarry located in Mecode Village



Fig:14.6.Rough stone quarry located in Mancode Village

Fig:14.7.Rough stone quarry located in Kaliyal Village



Fig:14.8.Rough stone quarry located in Thengapattanam Village

Fig:14.9. Rough stone quarry located in Thengapattanam Village

Fig.No.14 Field Photographs of Rough stone quarry

15: QUALITY /GRADE OF MINERAL AVAILABLE IN THE DISTRICT

The Charnockite includes felsic and rich in quartz and microcline, others mafic and full of pyroxene and olivine, a special feature, recurring in many members of the group, is the presence of a strongly pleochroic, reddish or green orthopyroxene (formerly known as hypersthene).

Rocks of the Charnockite series may be named by adding orthopyroxene to the normal igneous nomenclature. Chemical composition of the charnockite available in the district is given below.

Chemical composition	Ranges in %
SiO ₂	46-49
Al ₂ O ₃	1-3
Fe ₂ O ₃	1.16
FeO	21-33
MgO	12-20
MnO	0.3-0.8
CaO	0.04-2.0
Na ₂ O	0.02-0.50
K ₂ O	0.02-0.30

Gneiss is a high grade metamorphic rock. This means that gneiss has been subjected to more heat and pressure than schist. This banding has alternating layers that are composed of different minerals.

Chemical composition	Ranges in %
SiO ₂	55
Al ₂ O ₃	15-18
Fe ₂ O ₃	2-3
MgO	2.5-3.5
CaO	1.5-2
Na ₂ O	0.50-1
K ₂ O	3.5-4.0
Specific Gravity	1.5 gm/cc
Bulk Density	2.7 gm/cc

16. USE OF MINERAL

Charnockite and granitic gneisses are extensively quarried as rough stone which is used as aggregates for construction of building, laying of roads and for preparation of value added products like hollow blocks, pillar stones, M-sand etc.

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

In respect of Kanniyakumari District, there is a drastic increase in the production of Rough stone / gravel minerals, due to the on-going NHAI project and construction works in and around the District.

18.0 MINING LEASE MARKED ON THE MAP OF THE DISTRICT

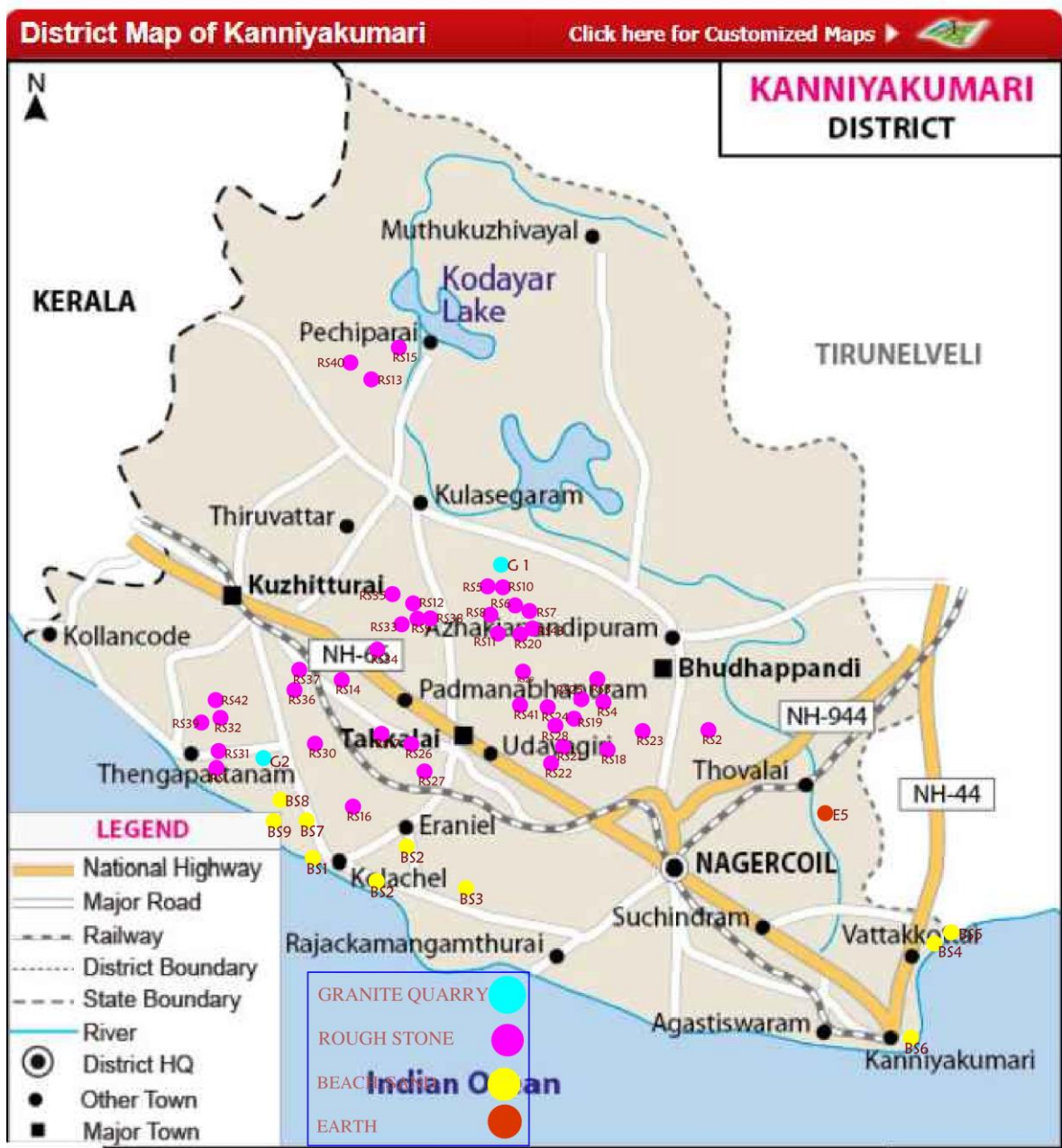


Fig No. 11.1 MINING LEASE MARKED ON THE MAP OF THE DISTRICT

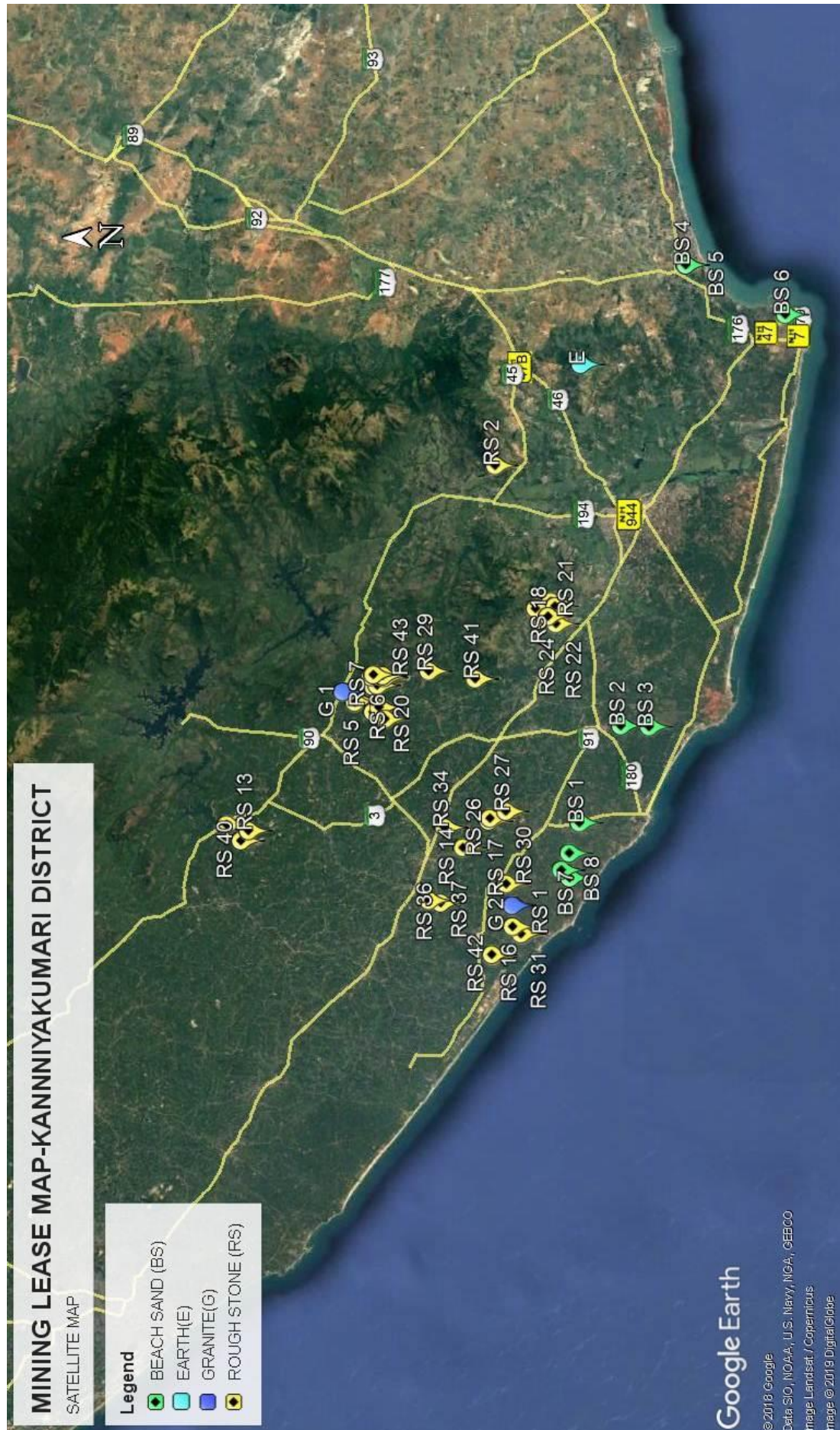


Fig.No 11.2 Mining lease marked on the Map of the district

19.0 Details of the area where there is a cluster of mining leases viz., number of mining leases, location (latitude & longitude)

Sl. No	No.of quarrying leases	Name of Village & Taluk	Location	
			Latitute	Longitude
			--NIL --	

20. DETAILS OF ECO-SENSITIVE AREA.

Kanniyakumari Wildlife Sanctuary is the Southern-most sanctuary of India and forms the part of Southern-most end of Southern Western Ghats, and also forms a part of the Agasthiyarmalai Biosphere Reserve. The Kanniyakumari Forest Division was declared as Wildlife Sanctuary comprising on area of 40239.55 Ha or 402.39 Sq.km vide G.O.(Ms)No.128(E&F) dated 20.11.2017.

Administratively out of 45,777.57 ha area of Kanniyakumari Forest Division, an area of 40239.55 ha is carved out from Reserved Forests of Kanniyakumari Forest Division, is declared as Kanniyakumari Wildlife Sanctuary. The ecological significance of the Kanniyakumari Wildlife Sanctuary is of paramount importance as the forests play a vital role in sustaining the water security of the district.

The Madurai bench of Madras High court in W.p.7607/ 2019 has passed an order dated 01.04.2019 to stop all the existing quarry lease in Echo- Sensitive Zone of Kanniyakumari wild life sanctuary . Based on that, Out of 43 existing Roughstone quarry , 29 quarries in Kalkulam and Thovalai Taluk has been suspended.

20.2 ECOLOGICAL SIGNIFICANCE:

The richness and diversity of the flora of this region are due to the variation in its elevation from sea level to about 1800m, tropical climate, heavy rainfall and the mountainous configuration. The dry deciduous forests of the Panagudi side of the Mahendragiri, the moist deciduous forests of the Asambu Hills and the wet evergreen forests of the Veerapuli and Kilamalai forests are a joy to behold with bamboos, canes, reeds, orchids, endemic palms like *Bentinckia condapanna* and grasslands abound. The peaks of Varayattumottai, Mahendragiri, Muthukuzhivayal, Upper Kodayar and waterfalls such as Olakkai aruvi, Kutharaipanchan aruvi and Kalikesam enchant the unsuspecting tourists. The area is a part of wildlife corridor with high biodiversity, and in addition to tigers, is home to the threatened species: Indian Bison, elephant, Indian Rock Python, Lion-tailed Macaque, Mouse deer, Nilgiri Tahr and Sambar deer. There are a few tribal villages in the sanctuary and adjoining Reserve Forests. In addition to large number of species of birds, arthropods and other invertebrates a variety of wildlife can be seen in the division. (Source:: /www.forests.tn.gov.in)

21. IMPACT ON THE ENVIRONMENT DUE TO MINING ACTIVITY

Mining and allied operations may affect the existing environmental setup in the area unless proper mitigation measures are not taken. Hence it is essential to assess the impacts of mining on various environmental parameters so that abatement measures could be planned in advance for systematic, sustainable and eco-friendly mining in the area.

21.1 Air Environment

The mining and allied operations may cause deterioration of air quality due to pollution if prompt care is not taken. The principal sources of air pollution in general due to mining and allied activities will be the dust generation in the mine due to:

- Excavation of Minerals and overburden.
- Movement of HEMM such as Excavators, tippers etc.
- Loading and unloading operation
- Overburden & Mineral transportation

Besides the above mentioned fugitive dust emissions, atmospheric pollution can occur as a result of emission of SO₂, NO_x, CO etc., from diesel driven mining equipment, compressors, generator sets, etc. Larger suspended particles are generally filtered in the nose and throat and do not cause problems.

Particulate matter smaller than 10 microns, referred to as PM₁₀, can settle in the bronchi and lungs and cause health problems like Bronchitis, Emphysema, Bronchial Asthma, Irritation of mucus membranes of eyes, etc. Particles smaller than 2.5 micrometers (PM_{2.5}), tend to penetrate into the lungs and very small particles (<100 nanometers) may pass through the lungs to affect other organs.

21.2 Water Environment

The major sources of water pollution normally associated due to mining and allied operations are:

- Generation of industrial effluent water from workshop, service building.
- Disturbance to drainage course or water bodies in the project area, if any.
- Washouts from waste dumps / embankment, if any.
- Domestic effluent

- Mine discharge water pumped out from opencast mines, if any and effect on ground water table.

Direct impact on human beings due to poor water quality consequent to mining operation can lead to various water borne diseases like diarrhea, jaundice, dysentery, typhoid, etc. Besides, the polluted water may not be useful for animal or human consumption, vegetation and may affect aquatic life, if effluents are not properly treated to remove the harmful pollutants.

21.3 Noise & Vibration

The impact prediction and control measure for noise environment due to mining and allied activities are described below:

Noise is one of the inevitable causes of pollution in mining operations, largely due to the extensive mechanization adopted. Hence the major source of noise will be from the equipment"s, such as Blasting, Excavation, loading & unloading & movement of vehicles, etc. will produce noise of considerable magnitude in mining operations. Prolonged exposure to a high noise level is harmful to the human auditory system and can create mental fatigue, rebellious attitude, annoyance and carelessness, which may lead to neglect of work and also result in accidents.

21.4 Impact on Land Environment

Due to mining and its allied activities there will some changes to the pre mining land status due to the following activities:

- Excavation of Ore and Waste / Overburden.
- Temporary side casting / Backfilling of Waste / Overburden.
- Construction of infrastructure facilities such as, office, road. Site services, etc.

21.5 Impact on Biological Environment

The major possible impact on biological environment due to mining are given below

- Clearance of vegetation due to mining and allied activities
- Retardation of tree growth, tip burning, etc., due to deposition of dust and the Particulate matter generated from the mining operation.
- Presence of Schedule-I fauna in the mining area
- Proposed impact on surface water quality that also provides water to wildlife

- Risk of fall/slip or cause death to wild animals due to project activities
- The project releases effluents into water bodies that also supplies water to wildlife
- Diversion of Agricultural lands for mining
- Diversion of Forest Lands for mining

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

The following remedial measures to be taken during mining

22.1 Remedial Measures to mitigate Air Pollution

- Water sprinkling on mineral transport road from the mines to the main road
- Black topping of the main transportation roads to the possible extent
- Avoiding crowding of trucks by properly spacing them to avoid the concentration of dust emission at any time
- Covering the trucks by tarpaulin sheets during ore transportation
- Proper maintenance of HEMM to minimize gaseous emission
- Imparting sufficient training to operators on safety and environmental parameters
- Proper maintenance of haul road and other roads
- Development of green belt/ plantation around mine, along the roads, backfilled area, in various undisturbed areas within the mine lease areas etc.

22.2 Remedial Measures to mitigate Water Pollution

- Industrial effluent treatment systems wherever necessary to be introduced and maintained properly.
- Safety barriers to be provided for all water bodies and no mining activities should be carried out in the safety barrier area
- Mitigative measures like construction of garland drains formation of earth bunds to be followed in the waste dumping areas to avoid wash off.
- Domestic effluents to be treated in scientific manner.
- Required statutory clearances to be obtained and all precautionary measures to be adopted wherever pumping of ground water is involved.

22.3 Remedial Measures to reduce Noise & Vibration

- Planting rows of native trees around mine, along the roads, other noise generating centres to act as acoustic barriers.
- Sound proof operator's cabin for equipment like Excavators, tippers etc.
- Proper and regular maintenance of equipment may lead to less noise generation.
- Air silencers of suitable type that can modulate the noise of the engines of machinery to be utilized and will be maintained effectively.
- Providing in-built mechanism for reducing sound emissions.
- Providing earmuffs to workers exposed to higher noise level and to those persons operating or working close to any machine.
- Conducting regular health check-up of workers including Audiometric test for the workers engaged in noise prone area.

22.4 Remedial Measures to reduce Impact on Land Environment

Scientific reclamation measures to be adopted to reduce the impact of land environment due to mining.

22.5 Remedial Measures to reduce Impact on Biological Environment

- The mineral bearing areas in the District is mostly of dry areas, afforestation to be carried out in the mining areas.
- Necessary mitigative measures like dust suppression, proper maintenance of equipments, black topping of roads etc., to be carried out to prevent dust generation & any further impact on the vegetation
- Conservation plan for schedule-I species if any to be prepared in consultation with Forest Department and the proposals given in the conservation plan to be strictly implemented.
- Effluents generated in the mining areas to be treated properly.

23. RECLAMATION OF MINED OUT AREA (BEST PRACTICE ALREADY IMPLEMENTED IN THE DISTRICT, REQUIREMENT AS PER RULES AND REGULATION, PROPOSED RECLAMATION PLAN)

In the post mining period, the mined out pit it will be used for Rain Water Harvesting. Waste dumps will be reclaimed with suitable type of plantation with necessary garland drain system.

24. RISK ASSESSMENT & DISASTER MANAGEMENT PLAN

Risk Assessment and Disaster Management Plan in connection with mining and allied operations should be spelt out in detail to cover possible dangers /risks/explosions/accidents, etc. likely to arise from the project operations, including onsite and off-site emergency plans to meet the disastrous situations if any. The mine management should be able to deal with the situation efficiently to reduce confusion keeping in view of the likely sources of danger in the project.

24.1. Outline of Disaster Management Plan :-

The purpose of disaster management plan is to restore the normalcy for early resumption of mining operation due to an unexpected, sudden occurrence resulting to an abnormality in the course of mining activity leading to a serious danger to workers or any machinery or the environment.

24.2. System of Communication:-

An internal communication system should be provided. Telephone nos and addresses of adjoining mines, rescue station, police station, fire service station, local hospital, electricity supply agency and standing consultative committee members should be propely updated and displayed.

24.3. Consultative Committee:-

A standing consultative committee should be formed under the Head of Mines. The members consists of Mines Manager / Safety Officer / Medical Officer / Public Relation Officer/ Foreman/ and Environmental Engineer.

24.4. Facilities & Accommodation:-

Accommodation and facilities for medical centre, rescue room and for various working groups should be provided. Regular checking of these facilities shall be undertaken.

24.5. First Aid & Medical Facilities:-

The mine management should be having first aid / medical centre for use in emergency situation. All casualties should be registered and should be given first aid. The centre should have facilities for first aid & minor treatment, resuscitation, ambulance and transport. Proper telephone / wireless set should be provided for quick communication with hospitals where the complicated cases are to be referred. Regular checking of these facilities shall be under taken by the doctor and the in-charge of the first aid room.

24.6. Stores and Equipment :-

A detailed list of equipment available, its type and capacity and items reserved for emergency should be maintained.

24.7. Transport Services:-

A well-defined transport control system should be provided to deal with the situation.

24.8. Functions of Public Relations Group:-

Liaison with representatives of the mine workers is required to ameliorate the situation of panic, tension, sentiments, grievances and misgivings created by any disaster. Management is required to ameliorate the injured, survivors and family members of affected persons by providing material, finance, moral support and establishing contact with relatives of victims. The consultative committee formed, especially the nominated public relation officer shall look into these aspects.

24.9. Security:-

Manning of security posts is very essential during the disaster management.

24.10. Catering & Refreshment: -

Arrangement will be made for the victims, rescue teams and others.

25. Details of occupational health issue in the district (last five –year data of number of patients of silicosis

Sl.No.	Year	Number of patients treated for silicosis
1	2017	Nil
2	2016	Nil
3	2015	Nil
4	2014	Nil
5	2013	Nil

26. Plantation and green belt development in respect of leases already granted in the district

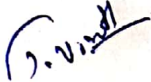
It is necessary to develop Green belt in and around the polluted site with suitable species to reduce the air pollution effectively. Implementation of afforestation program is of paramount importance. In addition to augmenting existing vegetation, it also checks soil erosion, make the ecosystem more complex and functionally more stable and make the climate more conducive.


Simultaneous backfilling method will be followed in most of the mining areas. During the operations, the plantation will be proposed and will be carried out on the safety barrier areas and also on the mined out and backfilling areas.

27. Any other Information

RECOMMENDATIONS

The District Survey report was prepared for the updating of mining activity in the Kanniyakumari district and it should be update in time to time because it helps us to gathering the whole information about running mining in the district of the different commodities. It also help for the investigation for new mineral occurrence area for mining lease. District survey report tells about the mining lease with quantity in a report form and it attracts to the new leases for mining. The introduction of E-permit system and implementation of Mineral Dealers Rule and the dispatch slips / transit permits with tampered proof security features and tracking of mined out minerals will fetch more revenue to the State Exchequer as well as sustainable development.


Assistant Director (I/c)
Geology and Mining
Kanniyakumari District


COLLECTOR
KANNIYAKUMARI