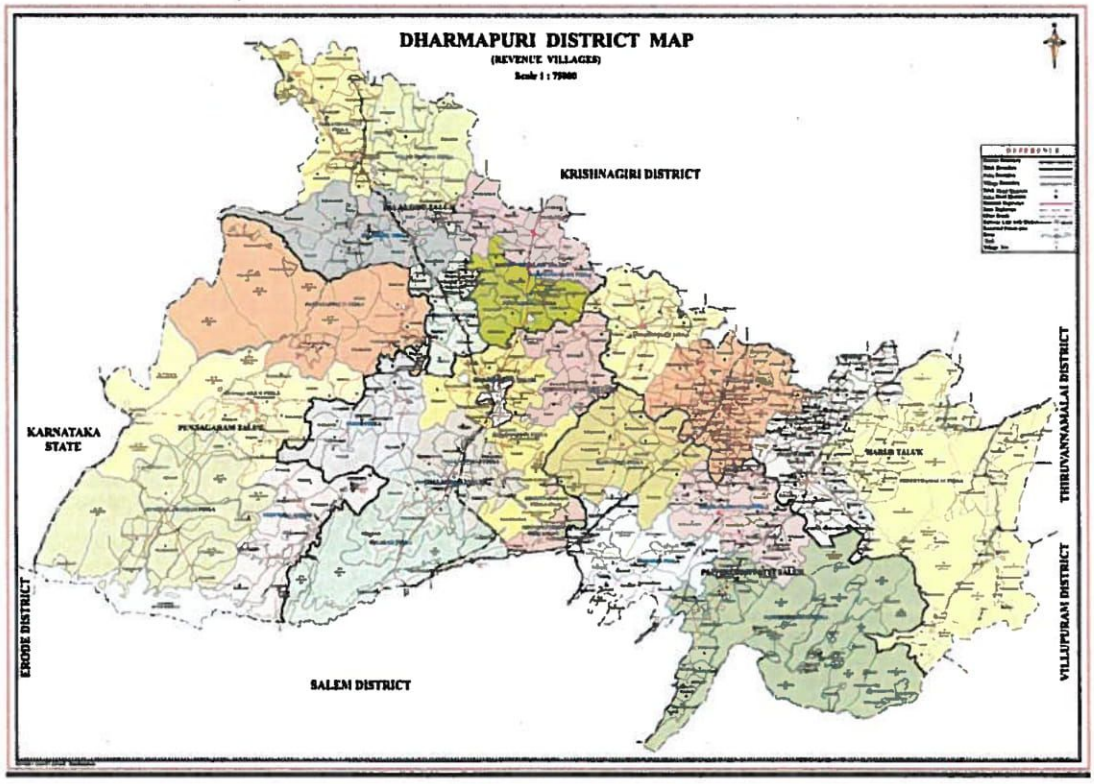
DISTRICT SURVEY REPORT FOR QUARTZ AND FELDSPAR

DHARMAPURI DISTRICT

TAMILNADU STATE

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



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DISTRICT SURVEY REPORT -QUARTZ AND FELDSPAR

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1. INTRODUCTION

The District Mineral Survey Report of Dharmapuri District was prepared with the assistance of Geological Survey of India State Unit, Tamil Nadu as per 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 survey report has been approved by the District Collector, Dharmapuri on 19.3.2019 and same was uploaded in the Dharmapuri District NIC portal. Now the Dharmapuri District Mineral Survey report has updated as per Ministry of Environment, Forest and Climate Change, the Government of India Notification No.SO 3611 (E) dated 25.7.2018. The main purpose of preparation of District Survey Report is to identify the mineral resources and developing the mining activities along with other relevant data of the District.

Dharmapuri district, which came into existence from 02.10.1965 is situated in the North western corner of Tamil Nadu and is bounded by Tiruvannamalai and Villupuram Districts on the east, Salem District on the South, Krishnagiri District on the north and Kaveri River on the west (Fig.1). It is located between latitudes N 11° 47' and 12° 33' and longitudes E 77° 02' and 78° 40'. The total geographical area of Dharmapuri District is 4497.77 Sq Kms, i.e. 3.46% of Tamil Nadu.

District is situated in the north-western part of Tamil Nadu. It is bounded in the west and north by Karnataka State, in the northeast by Andhra Pradesh. The district economy is mainly agrarian in nature. Nearly 70% of the workforce is dependent on agriculture and allied activities. The district is one among the most backward and drought prone area in the state. Dharmapuri district was created in 1966, when it was separated from Salem district. Krishnagiri district was formerly part of Dharmapuri district, becoming separated district in 2004. The old name of Dharmapuri was Tagadur. The climate of the district is generally warm. The hottest period of the year is generally for the month of March to May, the highest temperature going up to 38°C in April. The climate become cool in December and continues so up to February, touching a minimum of 17°C in January. On an average the district receives an annual rainfall of 1012 mm. Chinnar and Thenpanniyar are the major rivers in the district. The major source of the irrigation is dug well. Two Revenue Divisions of the district are Dharmapuri and Harur. There are Seven district Taluks, Dharmapuri, Harur, Palakkodu, Pennagaram, Pappireddipatti, Nallampalli and Karimangalam. (Fig.2)

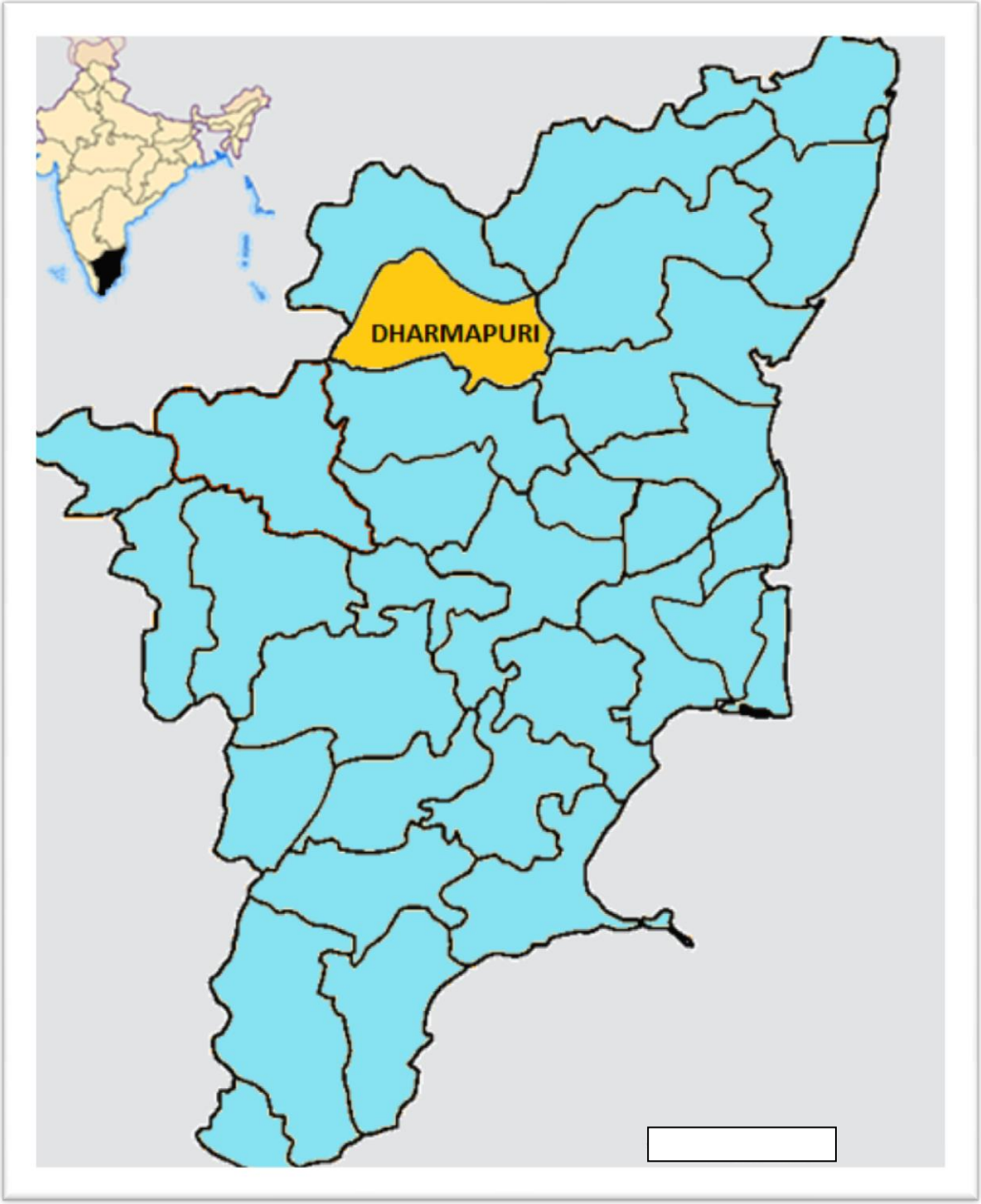


Fig. 1. Location map of Dharmapuri district Tamil Nadu.

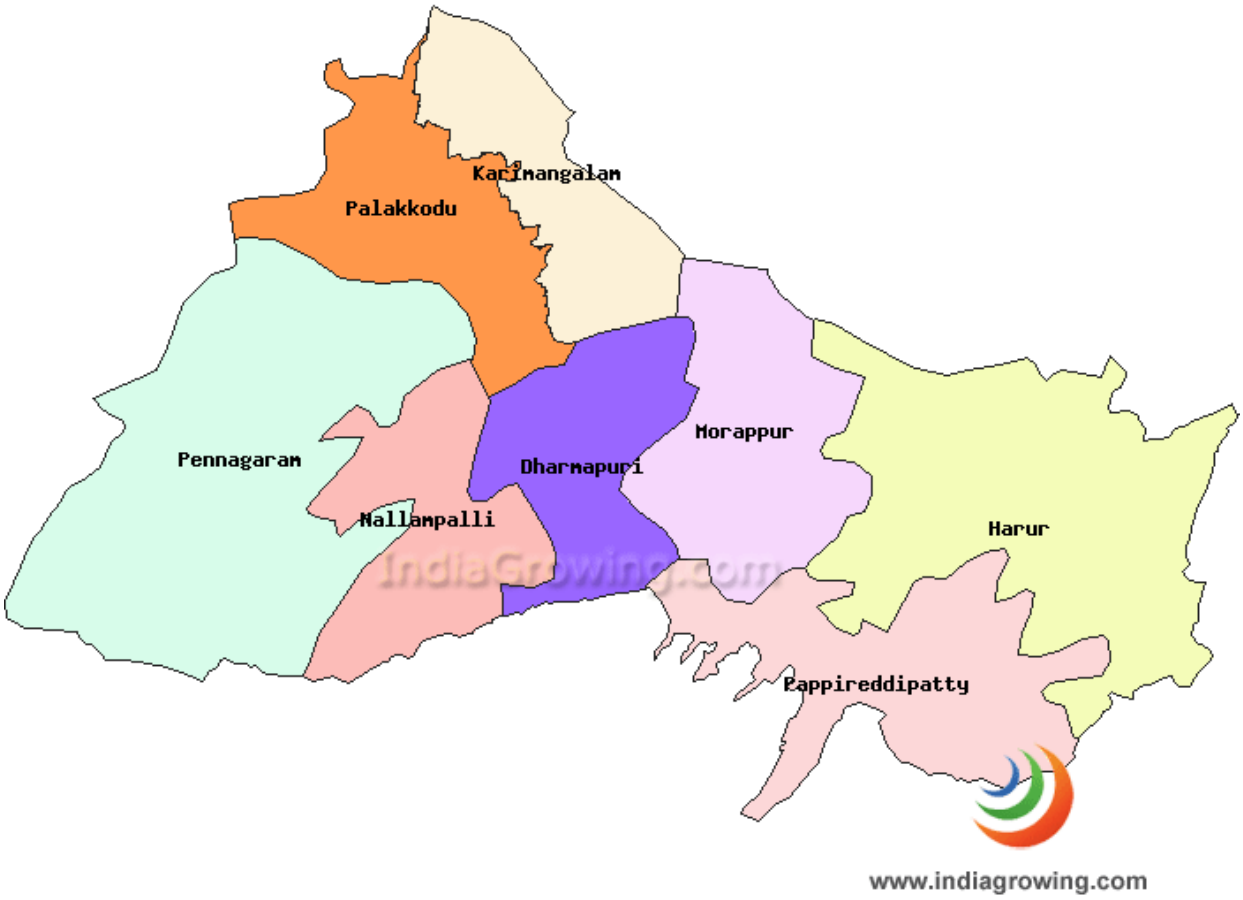


Fig. 2 Map of Dharmapuri District with Taluks

2. OVERVIEW OF THE MINING ACTIVITY IN THE DISTRICT

Minerals of Economic importance found in Dharmapuri district of Tamil Nadu are mainly corundum, gold, iron ore, lead, limestone, Magnesite, Molybdenum, Vermicululite and steatite. Mining activities based on these minerals are very less in the district. Besides that, the district is endowed with sizeable reserves of Black granite (Dolerite). High quality black granite is available in Pennagaram, Harur and Palacode Taluks. Occurrence of good quality of Quartz and feldspar mining is situated at Kendenahalli and Ramakondahalli villages in Pennagaram Taluk. Rough stone mining is extensively located in Dharmapuri district. Occurrence of molybdenum is reported and studied in detail at A.Velampatti and Maruthipatti villages and its surrounding areas of Harur and Pappireddypatti Taluks. Brief details of mining activities in the district are tabulated below:

The Department of Geology and Mining is functioning in Dharmapuri district under the control of District Collector, Dharmapuri. The Assistant Director, Geology and Mining is assisting the District Collector in the mineral administration works.

Sl. No.	Mineral	No. of Existing Leases				Total No. of Leases	Total Extent (in hects.)
		Patta land	Extent (in hects.)	Govt. land	Extent (in hects.)		
1.	Quartz & feldspars	3	5.07.50	--	--	3	5.07.50
2.	Black granite	14	30.15.2	12	151.18.31	26	181.33.51
3.	Colour granite	1	3.18.5	--	--	1	3.18.5
4.	Rough stone	13	27.35.5	22	62.92.5	35	90.28.0
Total		**31**	**65.76.7**	**34**	**214.10.81**	**65**	**279.87.51**

Table.1 Details of existing leases in Dharmapuri district, Tamil Nadu.

3. GENERAL PROFILE OF THE DISTRICT

Dharampuri district is a district of the Tamil Nadu state with its administrative headquarters located at Dharampuri town. During the Sangam era the place, Dharmapuri was popularly known as Dhagadur or Tagadur. The term Tagadur is derived from the two words one is "Thagadu" meaning iron ore and another one is "Oor" meaning place. After the end of the sangam period, probably during the period of Vijayanagar Empire or Mysore empire period the name of the place was changed from Tagadur to Dharmapuri. During the Sangam era, Adigaman Naduman Anji is the first renowned chieftain who ruled the place Tagadur and also admired by the famous Tamil poetess called Avvaiyar. In the 8th century the place was under the control of the Pallava regime. In the early period of the 9th century, the place was ruled by the Rashtrakutas whose rule continued in it for the next two centuries. After sometime Cholas came to the region and defeated the Rashtrakutas. Later in the 18th century the place, Dharmapuri was a part of the Mysore kingdom. Finally, the British rule was started in the whole country and the present district of Dharmapuri became a part of the Salem district until India got its independence in the year 1947. At last Dharmapuri was emerged as a separate district in the map of the state of Tamil Nadu on 2nd October, 1965.

Geographically, the district lies at 12°13'N latitude, 78°16'E longitude and 468 m altitude. The district encompasses a geographical area of 4,497 sq km and it is bounded by Krishnagiri district on the North, Salem district on the South, Tiruvannamalai and Viluppuram districts on the East and Chamarajanagar district of Karnataka on the West. The climate of the district is not too hot in the summer and not too cold in the winter. The actual rainfall in the district was 1041.5 mm in the year of 2015-16. Administration wise, the district is divided into 7 Taluks namely Dharmapuri, Harur, Palacode, Pennagaram, Pappireddipatti, Karimangalam and Nallampalli. Moreover, it comprises into 13 towns and 486 villages. There are 1 parliamentary and 5 assembly constituencies in the district.

According to 2011 census the district has a population of 15,06,843 out of which 7,74,303 are males and 7,32,540 are females. The district has a sex ratio of 946 (females for every 1000 males). In the year 2001-2011 the population growth rate in the district was -

47.24% including -47.45% are males and -47.02% are females. The major religion in the district is Hindu with 96.42% of the total population.

Agriculture is the backbone of the economy of the district. More than half of its population are engaged in agriculture in order to earn their livelihood. Most of the lands in the district are use for agricultural purposes. The chief agricultural products in the district are paddy, millets, pulses, sugarcane, chilli, etc. The adoption of the new agricultural technologies amongst the farmers of the district helps to increase the production of various agricultural items. In the whole state of Tamil Nadu , Dharmapuri is one of the core horticultural belts and mango is the prime horticulture crop of the district. Since it is an inland district hence fishing is a source of extra income for its natives. The district is rich in mineral resources as well . Granite, quartz, molibdinum, etc are the commonly found mineral resources in the district. Industrially, also the district is quite well developed. Industries of textile, mineral based, chemical based, electronic products, etc are some of the principal industries in the district. In the year 2005-2006 the gross domestic product in the district was Rs 4,07,523 lakhs at current price.

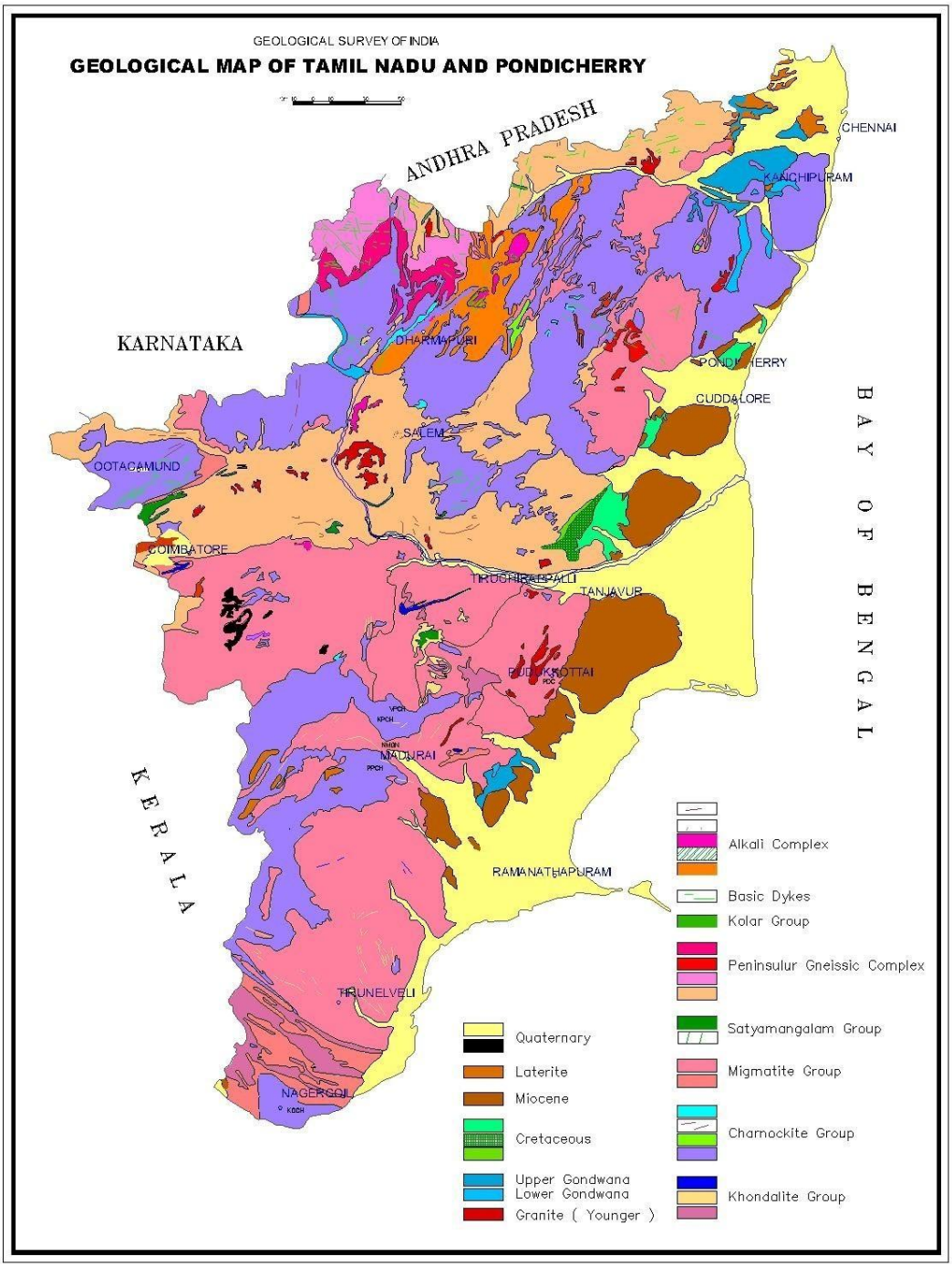
The district is well known as an abode of several reputed educational institutions. It provides a platform for higher education. As per 2011 census the literacy rate in the district is 68.54% including 76.85% are males and 59.8% are females.

The district has several centres of attraction which allures many travellers from different parts of the country as well as world. Hogenakkal Falls, located at a distance of 46 km from the Dharmapuri town got its name a Kannada term “Hogenakal” which means smoky rocks since the gushing force of its water creates a smoke-like mist when it falls on the rock below. Theerthamalai, a sacred place in the district has a famous temple called Theerthamalai temple which is located at the top of a hillock. During the occasion of Maha Shivarathiri, devotees from far off places come to this temple to offer their prayers. Hanumanthathirtham, another pious place located on the bank of Pennaiyar almost 10 km away from Uthangarai in the district is associated with an interesting mythological story of Hanuman, a mythological character. Some other places of interest in the district are Kottai Kovil, Adhiyamankottai, Subramanya Siva Memorial, Mount Carmel Church, Sitheri hills and many more.

4. GEOLOGY OF DHARMAPURI DISTRICT

A Brief of Geology of Tamil Nadu

Crystalline rocks of Archaean to late Proterozoic age occupy over 80% of the area of the state, 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 (Fig.3). Geological map of Tamilnadu and Puducherry is given below:



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

Fig.3 Geological map of Tamil Nadu.

Geology of Dharmapuri District

The geological formations of the district belong mainly to Archaean age along with rock of Proterozoic age. The former is represented by Khondalite Group of rocks, Charnockite Group of rocks, Migmatite Complex, Sathyamangalam Group of rocks, Bhavani Group of rocks and Kolar Alkaline rocks. The Khondalite Group includes garnet-sillimanite gneiss and quartzite which occur as small patches. The Charnockite Group occupies a major part of southern part of this district, and it is mainly charnockites along with some small bands of pyroxene granulites and magnetite quartzite. Two small patches of pyroxenite and gabbro are seen to occur in the pyroxene granulite near about 10 km. NE of Harur. The Migmatite Complex includes garnetiferous quartzofeldspathic gneiss and hornblende-biotite gneiss, the former exposed on the western part of the district. The Sathyamangalam Group of rocks include fuchsite quartzite, sillimanite mica schist and amphibolites. The Bhavani Group in this area includes fissile hornblende-biotite gneiss, granitoid gneiss and pink migmatite. Amphibolites with banded ferruginous quartzite and associated quartzo-feldspathic rocks (Chapion Gneiss) represent the Kolar Group and are found west and southwest of Veppanapalli. Following this there are basic intrusions occurring as dykes. The Alkaline Complex is represented by epidote-hornblende gneiss, ultramafics, syenite and carbonatite and these are distributed in the eastern part of the district. Innumerable basic dykes and felsites, quartz, barites and pegmatite veins form part of the Alkali Complex. The tentative stratigraphy of the district is furnished bellow:

Lithology	Group	Age
Aplite: Quartz-barites veins: pegmatite	Alkali/Ultramafic Complex	Upper Proterozoic
Felsites porphyre biotite dyke		
Carbonatite		
Syenite		
Anorthosite		
Pyroxenite, Gabbro, Dunite		
Epidote-hornblende gneiss		

Dolerite		
Granite		Archaean to Lower Proterozoic
Metabasalt, Metagabbro	Kolar Group	
Pink migmatite	PGC	Archaean
Granitoid gneiss		
Amphibolite	SargurGroup/Sathyamangalam Group	
Cordierite-sillimanite-mica schist		
Fuchsite quartzite		
Hornblende-biotite gneiss	Migmatite complex	
Garnetiferous quartzo-feldspathic gneiss		
Gabbro/proxenite	Ultrabasic Complex	
Magnetite quartzite	Charnockite Group	
Pyroxene granulite		
Charnockite		
Quartzite	Khondalite Group	
Garnet-sillimanite gneiss		

Table.2 Tentative stratigraphy of Dharmapuri district. *(source: DRM Dharmapuri, GSI)*

Dharmapuri Shear Zone

This 200 km long 50 km wide zone extends from Bhavani in SSW to Gudiyattam in the NNE. The bounding lineament of this zone are Mettur – Palakkadu lineament in the west and Javadi Hills West lineament in the east. Neoproterozoic alkali magmatism and significant molybdenite mineralisation are reported in this zone. A number of diatreme breccia plugs are intermittently exposed along the eastern boundary of this zone near Singarapettai and Alangayam.

Main rock unit exposed in the district is charnockite. It covers most area of the district and mainly in the western part. The rock trend in general NE-SW. Within the charnockite NNE-

SSW trending syenite is seen. It is exposed NE of Pennagaram area, Hokkanaikkal and in Harur. Eastern part of the area is dominated by Epidote-hornblende gneiss.

MINERAL OCCURRENCES IN DHARMAPURI DISTRICT.

A vast range of minerals are reported from this area. They include apatite, corundum, copper, gold, iron ore, molybdenum, lead, limestone, Kankar, vermiculite, black granite and rough stones. Of them, the gold occurrence in the Veppanapalli area and molybdenum in Velampatti and its surrounding areas of Harur taluk has been studied in detail by GSI. The gold mineralization in Veppanapalli area is confined to the silicified zones showing gold values between 0.3 and 2.6g/t. Dimensional stones of the district are unique and possessing multicoloured and black granite. There is only one existing lease for colored granite in this district locating at Thimmarayanahalli, Palacode Taluk.

Brief note on Harur-Uttangarai Belt : Dharmapuri District

Preliminary investigation by GSI has brought to light a NNE-SSW trending shear zone with incidence of molybdenum and galena in SE part of Dharmapuri District (Rao, 1991). The shear zone extends over a strike length of 24km from Velampatti in the south to Uttangarai in the north separated by Ponnaiyar River. Yet another parallel shear zone, 4 km in extent has been identified in the Vellakkal Reserve Forest i.e. north of Ponnaiyar River. The mineralisation is confined to the shear zone within which emplacement of quartz and carbonate veins are present. The mineralisation is both in the veins as well as sheared altered country rock.

In Velampatti South Block, detailed work was carried out by drilling upto the fourth level over a length of 1.38 km, which proved the depth persistence of molybdenite mineralisation upto the vertical depth of 320m. The resources estimated in this block are of the order of 2.74 million tonnes with an average grade of 0.102% Mo at 0.03% cut-off or 5.75 million tonnes of ore with an average grade of 0.064% Mo at 0.01% cut-off. In the other blocks of Harur sector, a tentative resource of 12.68 million tonnes of ore with an average grade of 0.032% Mo has been estimated (Singanenjam et al, 1994).

In the Velampatti Central Block (Palanisamy et al, 1997), the extension of the above said mineralized zone has been proved further north over a strike length of 0.50km. A reserve of 0.336 million tonnes with an average grade of 0.079% Mo at 0.05% cut-off and 0.723 million tonnes with the average grade of 0.059% Mo at 0.03% cut off is established. The other nine blocks existing north of Ponnaiyar River in Uttangarai Sector are being explored, some of the borehole core samples show values as high as 2000 ppm of Mo.

1. QUARTZ AND FELDSPAR

There are two existing lease for minor mineral, namely feldspars and quartz in this district (Fig.4a to 4d). It is located at Ramakondahalli viilage of Pennagaram taluk of Dharmapuri district.

FIELD DATA SHEET OF DGM, DHARMAPURI DISTRICT, TAMIL NADU

COMMODITY/MINERAL: QUARTZ & FELDSPAR (TABLE. 3)

Sl. No.	Name & Address of Lessee	Location of the lease	Latitude & Longitude	Geology of the area
1	Thiru.Soundappan, S/o.Ramanathan, No.44/22A, Ramakrishan Road, Salem - 7.	S.F.No.723/1 Ramakondahalli Village, Pennagaram (Taluk), Dharmapuri Railway St., Dharmapuri DT.	N11°59'4.86" E77°48'16.28"	Two types of rock unit exposed. Granite gneiss and pegmatoidal granite. Number of quartz reef seen. Trend is N97°E/24°SW. quartz is milky quartz with vugs. Host rock is highly weathered and posses phyllitic nature and trending N270°/38°S. Max. width is 2.3 m
2	Thiru.Soundappan, S/o.Ramanathan, No.44/22A, Ramakrishan Road, Salem - 7.	S.F.No.718/1B, 719/1 & 719/3 Ramakondahalli Village, Pennagaram (Taluk), Dharmapuri Railway St., Dharmapuri DT.	N11°59'8.34" E77°48'24.78"	Same rock exposure. Max. Thickness is 3 m.

Fig.4a. Field photographs of quartz quarry showing NW/SE trending milky quartz vein at S.F.No.723/1Ramakondahalli Village.

Fig.4b. Field photographs of thick quartz quarry of milky quartz vein at S.F.No.723/1Ramakondahalli Village, Dharmapuri

Fig.4c. Field photographs of quartz quarry showing NW/SE trending milky quartz vein at S.F.No.718/1B, 719/1 & 719/3Ramakondahalli Village.

Fig.4d. Field photographs of quartz quarry of milky quartz vein at S.F.No.718/1B, 719/1 & 719/3Ramakondahalli Village.

5. DRAINAGE OF IRRIGATION PATTERN

Drainage

Dharmapuri district is drained by Cauvery and Ponnaiyar rivers and their tributaries. Cauvery river flows along the south western boundary of the district. It flows in aneasterly direction up to Bellgundla and then takes a more or less southerly course tillit reaches the Stanley Reservoir. The Doddahalla and the Chinnar R. are important tributaries of Cauvery river in the district.

Ponnaiyar is the major river draining the district and is ephemeral in nature. It originates from Nandhi hills in Karnataka, enters Tamil Nadu west of Bagalur and flows almost in a south easterly direction till it reaches Daddampatti from where it takes an easterly course. Pambar, Vaniyar and Kallar are the important tributaries of Ponnaiyar draining the eastern part of the district whereas the Chinnar and Markandeya Nadhi drain the northern part of the district.

Irrigation Practices

The nine-fold lands use classification for the district is given below. (2017-18)

Land Classification	DISTRICT TOTAL
Forest	57398.975
Barren and Uncultivable	15803.549
Land put to Non –Agricultural use	51875.528
Cultivable waste	2727.494
Permanent Pastures and other Grazing Land	6209.74
Land Under Miscellaneous Tree Crops and Groves not included in	2874.167
Current Fallows	52847.492
Other Fallows Land	9803.429
Net Area sown	143458.486

Table.4 Details of lands use classification for the Dharmapuri District.

The chief irrigation sources in the area are the Canals, tanks, wells and bore wells and other sources. Irrigation is highest in Harur, Morappur and Karimangalam block followed by Palacode, Papireddipatti, Nallampalli, Dharmapuri, and Pennagaram blocks. The block wise and source wise net area irrigated (Ha) (2017-18) is given below.

Sl. No	Name of the Block	Tube Wells	Bore Wells	Dug Bore Wells	Dug Open Wells	Canals	Tanks	Water Bodies	House Hold Usage	Industrial Usage
1	Dharmapuri	165	72	0	6882	0	149	0	3306	29
2	Nallampalli	56	29	0	9370	5	141	1	1186	30
3	Pennagaram	0	0	0	10822	3	89	0	2801	0
4	Harur	0	20	0	12479	1	178	1	2736	7
5	Morappur	85	923	0	11783	1	136	1	800	1
6	Pappireddipatti	96	103	3	8399	2	50	1	1616	23
7	Palacode	56	4	0	12208	57	106	2	2850	19
8	Karimangalam	17	52	0	12077	16	166	1	2084	10
	TOTAL	475	1203	3	84020	85	1015	7	17379	119

Source: G - Return 2017-18

Table.5 Details of Block wise and Source wise Net area irrigation sources in Dharmapuri District

6. LAND UTILISATION PATTERN IN THE DISTRICT

Forest

The whole district is predominantly covered with forests. Spider valley located near Hogenakkal is home for many wild animals. The district falls in the migratory path of elephants. Man and elephant conflicts are most common in these parts. Many tribal communities depend on these forests. Vathalmalai, a mountain hamlet on top of Shervarayan hill chain has suitable conditions to cultivate coffee and jack fruit. Wild boars and spotted deers are commonly seen in Morappur and Harur forest region. Gore's sometimes stroll near villages near Bommidi region. Thoppur ghat section has one of the scenic highways surround by mountains and forests. This district lies in a geography where both Western and Eastern ghats make their presence. The total forest area in the district is 1614.32 sq. Km. area. Among this area of deciduous forest is 1089.15 sq. Km., evergreen/ semi-evergreen forest is 436.12 sq. Km., scrub forest is 87.05 sq. Km. and forest plantation area is around sq. Km.

Agriculture

The District economy is mainly agrarian in nature. Nearly 70% of the workforce is dependent on agriculture and allied activities. The district is one among most backward and drought prone area in the state. Total area under agriculture is 2525.55 sq. Km.

Year: 2017-18

Sl.No.	Crop	Irrigated Area	Area (in Hec.)
1	Paddy	22229.6	22233.125
	Other Cereals	9276.365	51304.57
2	Pulses	815.125	41047.285
3	Spices and Condiments		
	1. Arecanut	510.48	510.48
	3. Chillies	363.005	365.52
	5. Pepper	0.02	2.16
	6. Mint	0	4
	7. Coriander	38.465	47.035
	8. Turmeric	5151.18	5298.33
	9. Tamarind	12.54	639.165
4	Sugar Crops	8101.15	8113.735
5	Fruits and Vegetables	11999.505	29476.191
6	Fibre Crops	3151.39	14465.205

7	Food oil crops		
	a) Ground nut	4040.335	10872.795
	b) Gingelly	3.2	346.69
	c) Coconut	5787.903	7751.093
	d) Others	11.17	61.2
8	Non Food Oil Crops		
	a) Castor	55.74	290.625
	b) Neem	11.43	53.275
	c) Punnai & Niger		2.325
9	Dye Crop	0.1	0.1
10	Medicinal Crops		
	a) Tobacco	4.13	4.13
	b) Coffee	0.665	41.635
	c) Betal wine	101.04	103.74
	d) Samanthi	246.325	246.325
	e) Cocoa	4.2	4.2
	f) Thulasi	0.1	0.1
	e) Colius	1.53	1.53
	g) Thailaapul	3.78	221.145
	h) Others		16.925
11	Fodder Crops	1239.86	3221.87
12	Manure Crops	53.77	128.63
13	Flowers	2264.149	2265.799
14	Grove Varieties	41.59	453.24
15	Other Varieties		
	a) Mulberry	109.87	158.125
	d) Others		20.29
	TOTAL	75629.712	199772.588

Source: G - Return 2017-18

Table.6 Land utilization in agricultural sector.

Horticulture

Dharmapuri district forms a major horticultural belt in the state. As the area is drought prone it has become essential to switch over to cultivation of drought tolerant perennial fruit crops in this district. Mango is the main horticulture crop of this District. It has the highest area under the fruit crops . The district accounts for nearly one-third area under mango and nearly one-half of the mango yield in the state. Palacode is the main area where tomato is cultivated. Chilli is cultivated mainly at Pennagaram.

Different types of the soils such as black or mixed loams, red ferruginous and gravel are found in the district. The black or red loam is very fertile due to its moisture

absorbing character. Red and sandy clay loam soils are seen in Vannampatti area. Block Clay loam soils are seen in Dharmapuri Taluk and Jayapuram. Sandy and Slity clay loam soils are seen in Harur, Nattam and Mariyampatti Area. Red and Sandy Clay loam soils are seen in Thoppur and Salem. Considerable stretches of good loam and black soil are found in Dharmapuri district. In general, the soil in the district is quite loose and fresh with its colour varying from red to dark brown. The soil has low nitrogen and phosphate content with marked variations between different Taluks.

Year: 2017-18

Sl.No.	Block	Type of soil
1	Dharmapuri	Loamy sand, Clay loam, Sandy Loam
2	Nallampalli	Clay Loam, Loamy Sand, sandy Loam
3	Palacode	Loamy Sand, Sandy Loam, Clay Loam
4	Karimangalam	Loamy Sand
5	Pennagaram	Loamy sand, Sandy loam
6	Morappur	Loamy Sand, Sandy Loam, Clay loam
7	Harur	Sandy Loam, Clay Loam
8	Pappireddipatti	Sandy Loam, Clay Loam

Source: Joint Director Agriculture, Dharmapuri.

Table.7 Soil type ranges of the Dharmapuri district

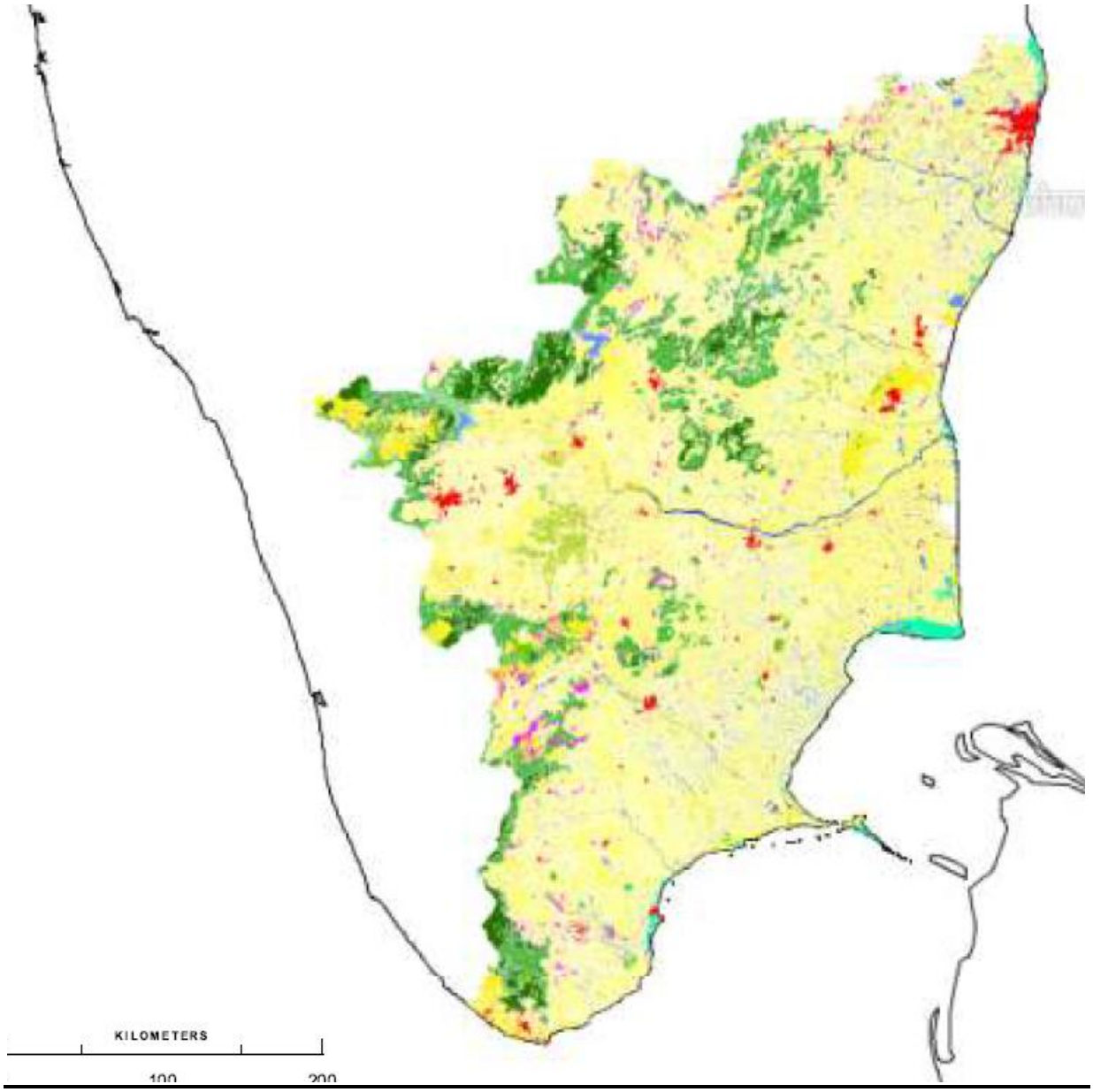


Fig. 5 Land use pattern of Dharmapuri district, Tamil Nadu

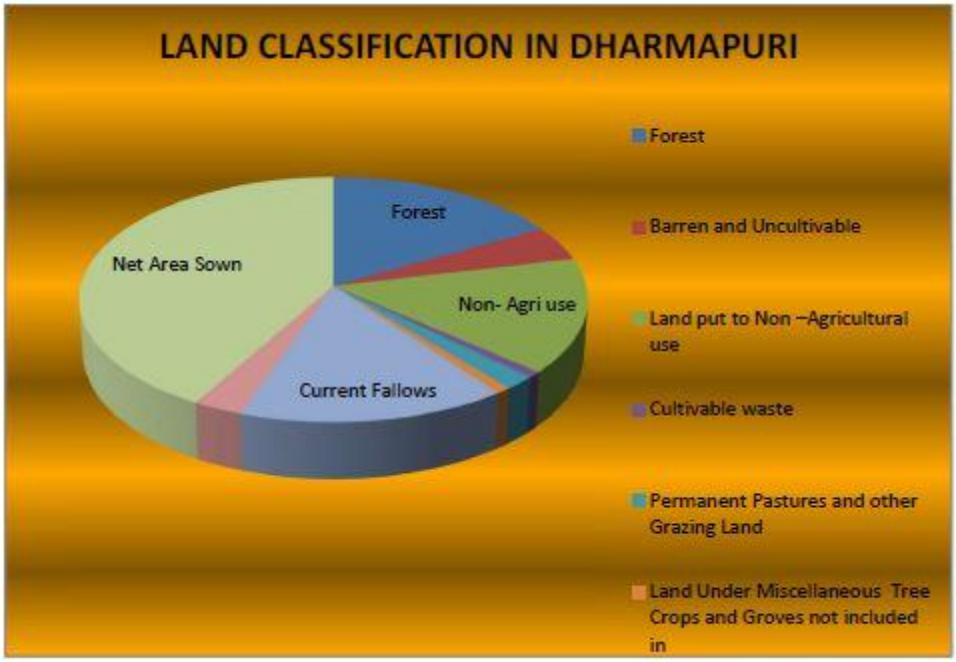


Fig. 6 Land use and land cover chart of Dharmapuri district, Tamil Nadu

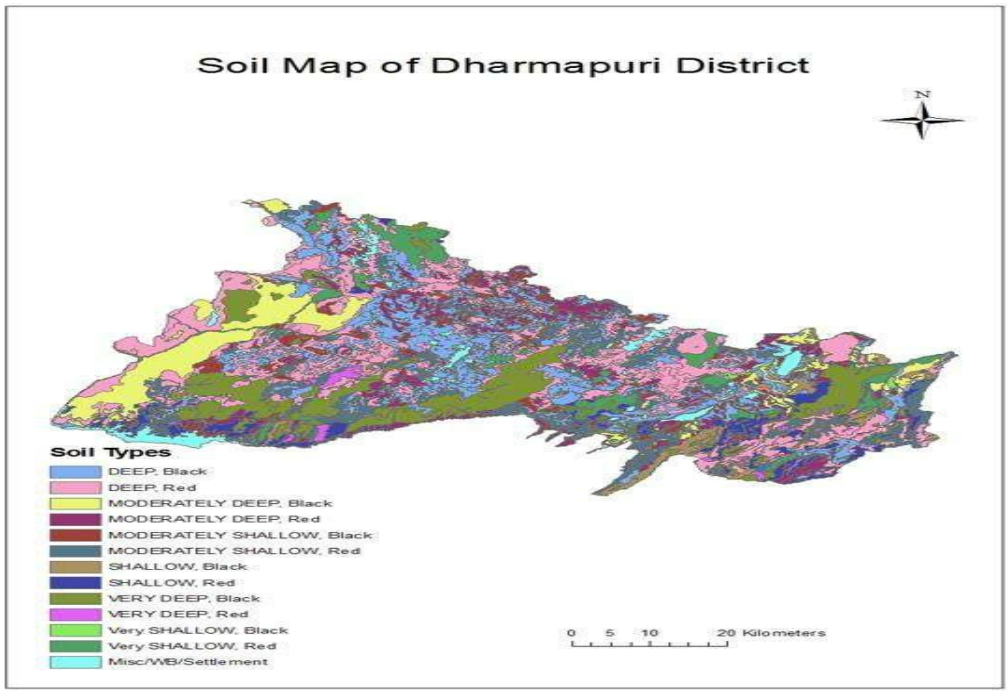


Fig. 7 Soil Map of Dharmapuri district

7. SURFACE WATER AND GROUND WATER SCENARIO OF THE DISTRICT

GROUND WATER SCENARIO

Hydrogeology

The district is underlain by Archaean Crystalline formations with recent alluvial deposits of limited areal and vertical extents along major rivers. The important aquifer systems in the district are constituted by i) unconsolidated & semiconsolidated formations and (ii) weathered and fractured crystalline rocks.

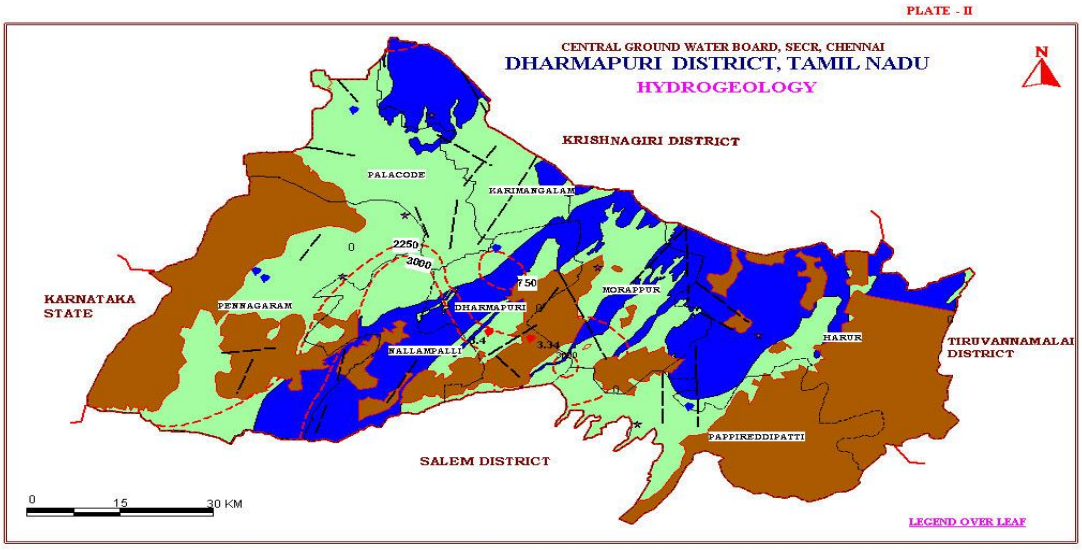


Fig. 8 Hydrology Map of Dharmapuri District

In the areas underlain by crystalline rocks, occurrence of ground water is essentially limited to zone of weathering and fracturing. Generally the hard rock aquifers are heterogeneous in nature, which is indicated by the variations in lithology, structure and texture. Ground water occurs under phreatic condition in the weathered mantle and semi confined to confined condition in the fracture and fissured zones of these rocks. Thickness of weathered material varied widely from less than 1m bgl to more than 20m bgl.

The Alluvium with intervening crystalline outcrops are noticed as patches west of Dharmapuri, and Pappireddipatti areas. The ground water occurs under water table to semi-confined conditions. The discharge ranges from 10 to 20 m3 /day.

The yield of large diameter wells in the district, tapping the weathered mantle of crystalline rocks ranges from 150-200 m3 /day and are able to sustain pumping for 2 to 4 hours per day. The yield of large diameter wells tested in crystalline rocks ranges from 150 to 200 m3 /day for drawdown of 1 to 3 m. The yield characteristics of wells vary considerably depending on the topographic set-up, litho logy and nature of weathering. The transmissivity of weathered formations computed from pumping test data using empirical methods range from 12 to 22 m2 /day. The specific capacity in the fissured formation ranges from 2.89 to 153.74 lpm/m/dd. In the porous formation the specific capacity values vary from 6.31 to 28.7 lpm/m/dd.

The yield of bore wells drilled down to a depth of 36 to 200 m bgl, by various state agencies mainly for domestic purposes. The discharge ranged from 2 to 33 lps. The yield of successful bore wells drilled down to a depth of 200 m bgl during the ground water exploration programme of Central Ground Water Board ranged from 1 to 12 lps. The aquifer and well parameters of the wells show wide variation, both in crystalline and sedimentary formations.

The depth to water level in the district varied between 5.27 and 16.70 m bgl during pre-monsoon (Plate-III) and varied between 2.47 and 11.32 m bgl during post monsoon. The seasonal fluctuation shows a rise in water level, which ranges from 3.71 to 7.06 m bgl. The piezometric head varied between 2.66 to 20.06 m bgl during pre monsoon and 1.19 to 14.57 m bgl during post monsoon.

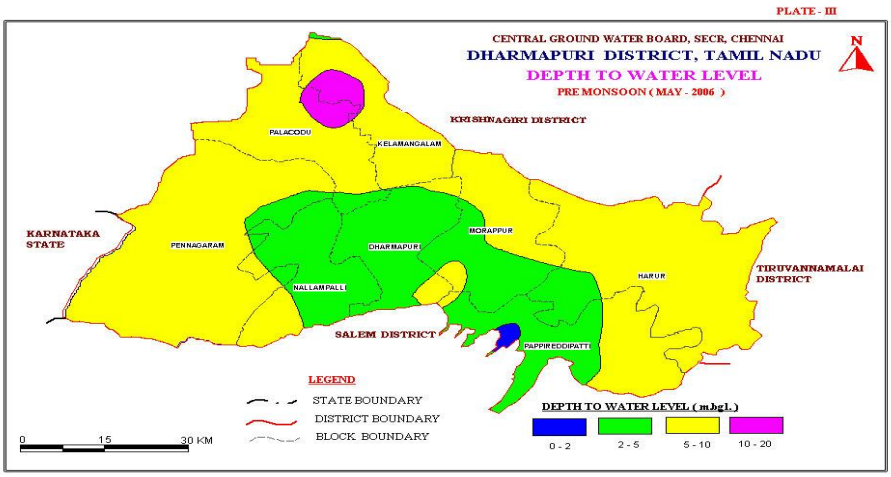


Fig. 9 Depth to Water level map of Dharmapuri district

Aquifer Parameters

The Transmissivity values in weathered, partly weathered and jointed rocks vary from 12 to 300 m2 /day and specific yield in this formation is less than 2% and the Transmissivity values ranged from 4 to 16 m2 /day. The specific yield varied formations is around 2% to 4%.

Ground Water Resources

The ground water resources have been computed jointly by Central Ground Water Board and State Ground & Surface Water Resources and Data Center (PWD, WRO, Government of Tamil Nadu) as on 31st March 2004. The salient features of the computations are furnished below. The computation of ground water resources available in the district has been done using GEC 1997 methodology.

Ground Water Quality

The chemical characteristics of ground water in the phreatic zone in Dharmapuri district has been studied using the analytical data of ground water samples collected from Network Hydrograph Stations of Central Ground Water Board. The study of quality of ground water in deeper aquifers in the district has been attempted using the data collected from exploratory bore/tube wells constructed in the district.

Ground water in phreatic aquifers in Dharmapuri district in general, is colourless, odourless and slightly alkaline in nature. The specific electrical conductance of ground water in phreatic zone (in MicroSeimens at 25 oC) during May 2006 was in the range of 320 to 6010 in the district. It is between 750 and 2250 µS/cm at 25oC in the major part of the district. Conductance below 750 µS/cm have been observed in ground water in only one sample is Dharmapuri block Whereas Conductance exceeding 2250µS/cm have been observed in parts of Papireddipatti, Pennagaram and Morappur block.

It is observed that the ground water is suitable for drinking and domestic uses in respect of all the constituents except total hardness and Nitrate in more than 90 percent of samples analysed. Total Hardness as CaCO3 is observed in all samples have with in the excess of permissible limits in about 40 percent of samples analysed whereas Nitrate is found in excess of 45 mg/l in about 32 percent samples. The incidence of high total hardness is attributed to the composition of lithounits constituting the aquifers in the district, whereas the Nitrate pollution is most likely due to the use of pesticides and fertilizers for agriculture.

With regard to irrigation suitability based on specific electrical conductance and Sodium Adsorption Ratio (SAR), it is observed that ground water in the phreatic zone may cause high to very high salinity hazard and medium to high alkali hazard when used for irrigation. Proper soil management strategies are to be adopted in the major part of the district while suing ground water for irrigation.

Status of Ground Water Development

The estimation of groundwater resources for the district has shown that all block is under "Over Exploited" category. The shallow alluvial aquifers along Cauvery and Ponnaiyar rivers serve as an important source of drinking water irrigation development for Dharmapuri district. Dug wells are the most common ground water abstraction structures used for irrigation in the district. The yield of dug wells range from 150 to 200 m3/day in weathered crystalline rocks and 20 to 200 m3/day in Recent alluvial formations along major drainage courses.

8. CLIMATE AND RAINFALL OF THE DISTRICT

The normal annual rainfall over the district varies from about 760mm to about 910mm. It is lowest around Rayakota (766.5mm) in the northern part of the district. Itgradually increases towards south, west and east and attains a maximum around Denkanikota (912.0mm) in the northwestern part small area the northwestern part around Thally. It increases towards the north and reaches a maximum in the northern part around Rayakota.

The district temperature is a gradual decrease of both day and night temperatures from June onwards till December, when the mean daily maximum is about 30°C and the mean daily minimum about 19°C in the plains. The day temperatures increase gradually from January onwards. The lowest temperature is reached in January when the mean daily minimum is about 19°C. April and May are the hottest months in the year with the mean daily maximum temperature of about 37°C and the mean daily minimum temperature of about 25°C in the plains. However, in the higher areas in Hosur, Thally and Krishnagiri taluks day and night temperatures are lower by about 2°C to 3°C. In these areas weather is comparatively pleasant round the year. In the lower plains weather is also pleasant except on individual days in May, June and July when weather becomes occasionally oppressive and sultry due to high temperatures (about 42°C).

The climate of the district on the whole is slightly humid. The driest months are February and March with average relative humidity of about 30% in the afternoons. During the rainy months the average humidity is appreciably below the saturation level.

Skies are generally clear or lightly clouded during the period January to about the middle of April. The cloudiness increases from the latter half of April and from middle of June onwards when the skies are generally clouded till about the middle of November.

Winds are generally light to moderate in strength round the year. In open areas, winds blow from northeasterly to easterly directions during the period November to March and from southwesterly to westerly directions during the period May to September. April and October are the transition months. During March, winds are mainly from easterly directions, and in October, winds are mainly from southwest direction in the morning and easterly direction in the afternoon. However, winds in the higher and sheltered places or valleys may differ very much.

The normal rainfall of the district is 902.1 mm. During the year 2017-18 the actual rainfall of the district is 820.8 mm.

(Table 8.) **MONTHLY RAINFALLL DATA OF DHARMAPURI-**

(In Millimetres)

Year: 2017-18

Period	Actual	Normal	Deviation
	(in mm)		
South West Monsoon (June - September)	402.4	393.4	2.29
North East Monsoon (October - December)	254.6	330.1	-22.87
Winter Season (January - February)	1.4	18.2	-92.31
Hot Season (March - May)	162.4	160.4	1.25
Grand Total	**820.8**	**902.1**	**-9.01**

Source: Department of Economics & Statistics, Chennai-6

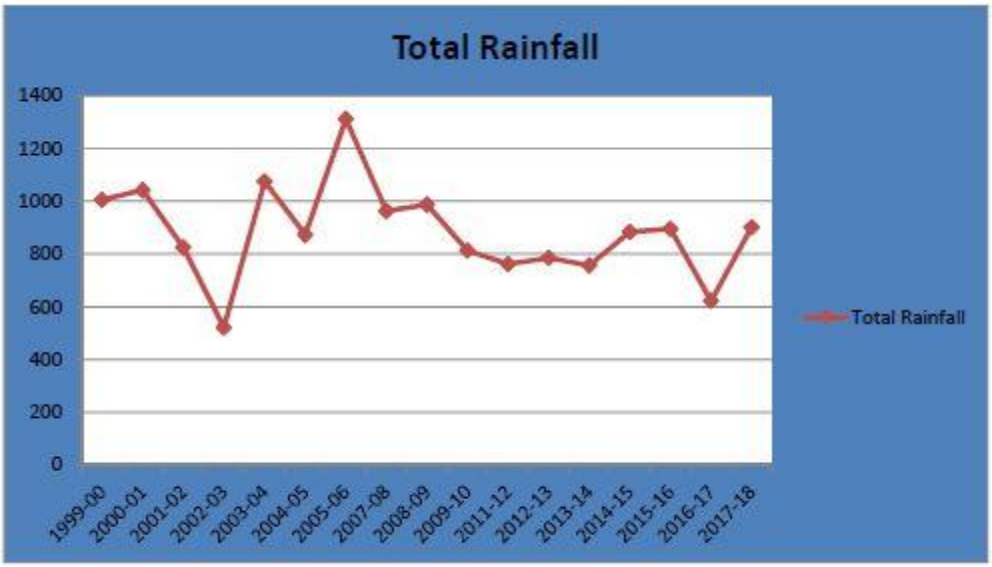


Fig.10 Histogram plot of rain fall data of 2017-18

TIME SERIES DATA OF RAINFALL BY SEASONS (LAST 14 YEARS)

Year:1999-2000 To 2017-2018 (TABLE. 09)

Year	South West Monsoon	North East Monsoon	Winter Season	Hot Weather Season	Total
Normal	393.4	330.1	18.2	160.4	902.1
1999-00	370.1	448.4	47.8	140.1	1006.4
2000-01	596.2	285.7	0.4	160.2	1042.5
2001-02	451.3	253.4	2.8	118.3	825.8
2002-03	228.6	148.4	0	144.6	521.6
2003-04	377	295.1	2	401.5	1075.6
2004-05	389.3	260.9	0.5	222	872.7
2005-06	390.4	720.1	3	199	1312.5
2007-08	380.26	337.36	18.3	227.48	963.4
2008-09	397.7	396.5	3.8	189.6	987.6
2009-10	379.8	244.3	1.2	187.4	812.7
2011-12	261.7	363.9	0	136	761.6
2012-13	298.9	285.2	22	179.6	785.7
2013-14	284.6	314.4	5.2	153.2	757.4
2014-15	260.3	347	26.1	250.2	883.6
2015-16	341.5	449.6	0	104.6	895.7
2016-17	247.95	95.46	140.64	138.36	622.41
2017-18	393.4	330.1	18.2	160.4	**902.1**

Source: Department of Economics & Statistics, Chennai-6

9. DETAILS OF THE MINING LEASES IN THE DISTRICT

The commodity/item wise details of mining lease in Dharmapuri district is given below:

QUARTZ & FELDSPAR LEASES (Table. 10)

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	Period of Mining Lease		Period of Mining Lease (1st / 2nd ... Renewal)		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/ Under Ground)
						From Date	To Date	From	To						
1.	Quartz and Feldspar	Thiru.Soundappan	Thiru.Soundappan, S/o.Ramanathan, No.44/22A, Ramakrishan Road, Salem - 7.	DGM Rc.No. 270/MM3/ 2001 dated 14.02.2001	S.F.No. 887/3, 895/2, 895/3 Extent: 1.27.0 Hects Kendenahalli (Vill), Pennagaram (Taluk), Dharmapuri Railway St., Dharmapuri DT.	04.05.2001	03.05.2021	--	--	04.05.2001	Non Working	Non Captive	No	N11°54'30" E77°57'00"	Opencast Semi mechanized
2.	Quartz and Feldspar	Thiru.Soundappan	Thiru.Soundappan, S/o.Ramanathan, No.44/22A, Ramakrishan Road, Salem - 7.	DGM Rc.No. 7868/MM6 /2006, dated 02.11.2006	S.F.No.723/1, Extent. 1.26.0 Hects., Ramakondahalli Village, Pennagaram (Taluk), Dharmapuri DT.	07.12.2006	06.12.2026	--	--	07.12.2006	Non Working	Non Captive	No	N11°59'4.86" E77°48'16.28"	Opencast Semi mechanized
3.	Quartz and Feldspar	Thiru.Soundappan	Thiru.Soundappan, S/o.Ramanathan, No.44/22A, Ramakrishan Road, Salem - 7.	DGM Rc.No. 7869/MM6 /2006 dated 02.11.2006	S.F.No.718/1B, 719/1 & 719/3 Extent. 2.54.5 Hects., Ramakondahalli Village, Pennagaram (Taluk), Dharmapuri DT.	07.12.2006	06.12.2026	--	--	07.12.2006	Non - Working	Non Captive	No	N11°59'8.34" E77°48'24.78"	Opencast Semi mechanized

10. DETAILS OF ROYALTY OR REVENUE RECEIVED IN LAST THREE YEARS

(in Rs.)

Mineral wise revenue for the last three years of Dharmapuri district is given below:

(Table-11)

Sl. No	Year	Royalty for Quartz & Feldspar …
1.	2016-17	...
2.	2017-18	...
3.	2018-19	

11. DETAILS OF PRODUCTION OF MINOR MINERALS IN LAST THREE YEARS

Year wise production of Quartz and Feldspar during last three years is given below:

(Table-12)

Sl. No	Year	Quartz & Feldspar (Tonnes)
1.	2016-17	…
2.	2017-18	...
3.	2018-19	...

12. MINERAL MAP OF THE DISTRICT

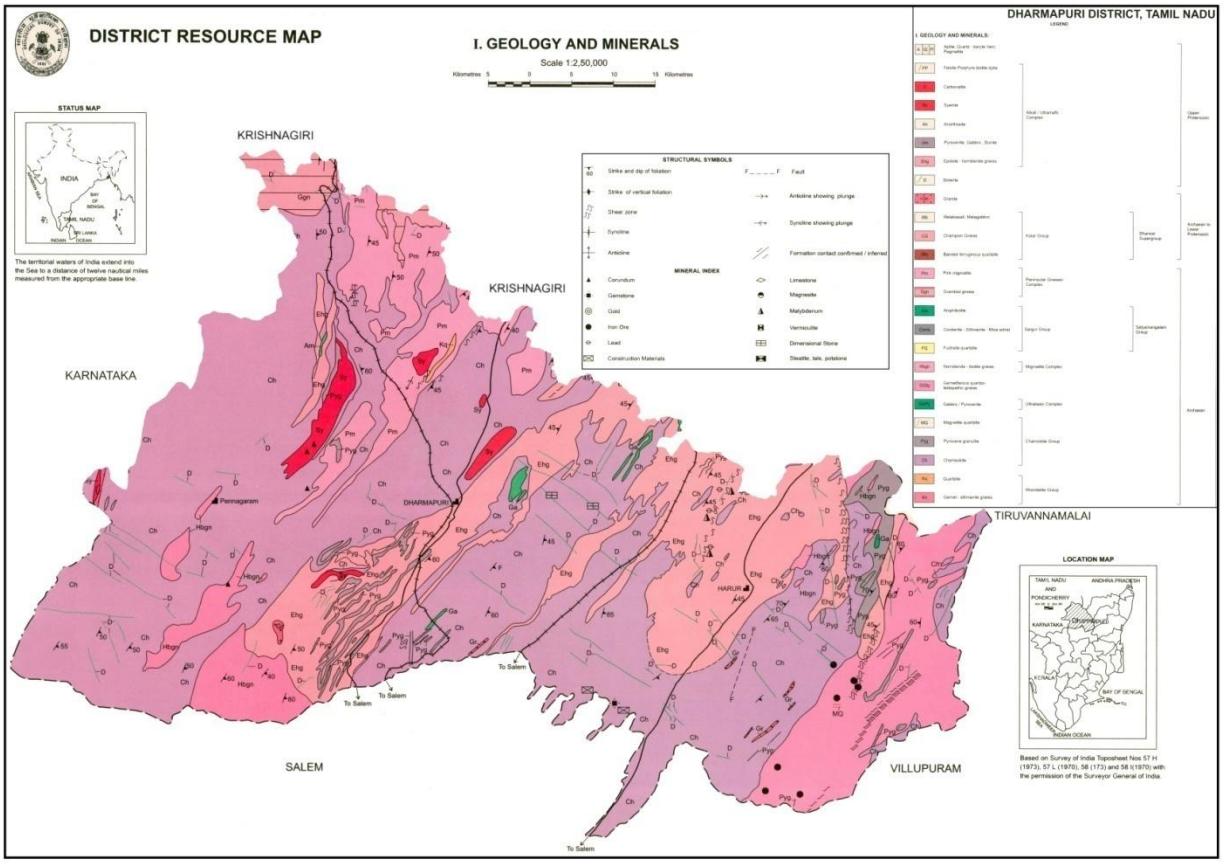


Fig.11 Mineral Map of the District

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

Sl. No.	Name of the Mineral	Name of the Lessee	Address and Cotact No. of Letter of Indent Holder	Letter of Intent Grant order No. & date	Area of Mining lease to be allotted	Validity of LoI	Use (Capitive /Non-capitive)	Location of the Mining lease (Latitude & Longitude)
-----Nil----								

14. TOTAL MINERAL RESERVE AVAILABLE IN THE DISTRICT

(Table-13)

Sl. No.	Name of the Mineral	Reserve Available as per the Mining Plan
1.	Quartz and Feldsper	32932 Tonnes

15. QUALITY/GRADE OF MINERAL AVAILABLE IN THE DISTRICT

QUARTZ AND FELDSPAR:

Quartz (SiO_2) is present in almost all rocks. The hardness of Quartz is 7 and it can easily scratch glass. Quartz is not soluable in ordinary acids and has a vitreous lustre. Some Quartz crystals are perfectly transparent, some are translucent and others are opague. This region is traversed by Archean rocks consisting of mixed granitic gneisses (Penisular gneisses) which are intruded by pegmatites and granites. In shallows areas, where it is hard, resistant to chemical weathering and has no cleavage, which means it is also resistant to physical weathering. It is abundant in silica-rich igneous rocks, like granite and rhyolite. Because it is so resistant to erosion, it is also found in most sedimentary rocks (even if as very small grains). It is pervasive in most metamorphic rocks.

Feldspar (K,Na,Ca) ($AlSiO_4$) is probably the most common mineral in the earth's crust. They are present in abundance in all and in many igneous rocks. Feldspars are susceptible to both chemical and physical weathering, breaking down into clays.

16. USE OF MINERAL

QUARTZ AND FELDSPAR:

Quartz is used as a gemstone and has electronic applications. Feldspar is widely used in the making of dinnerware and tiles.

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

(Table-14)

Sl. No	Year	Quartz & Feldspar (Tonnes)
1.	2016-17	…
2.	2017-18	...
3.	2018-19	...

18. MINING LEASES MARKED ON THE MAP OF THE DISTRICT

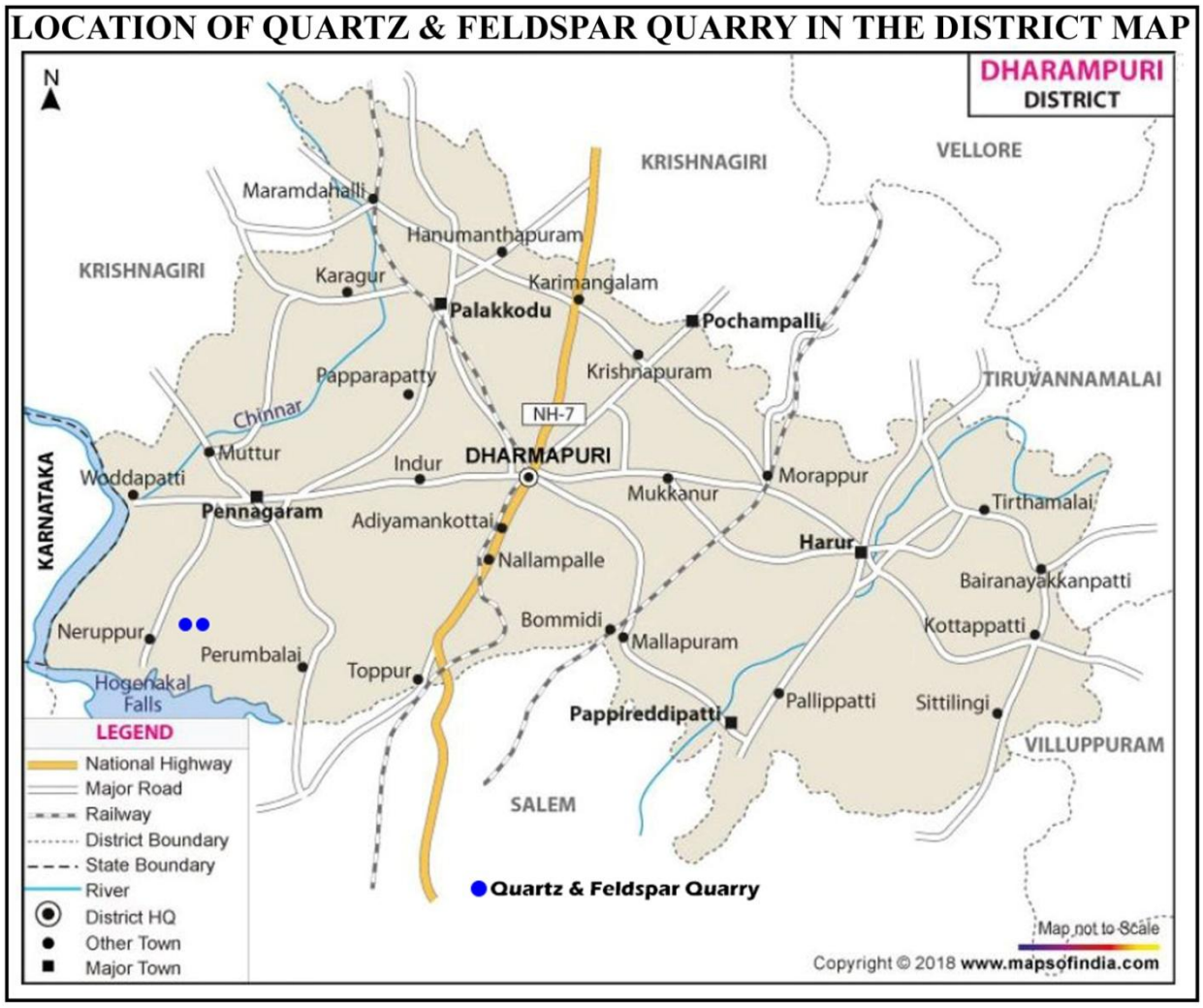


Fig.12 Location of the Quartz and Feldspar Quarry Marked in the District Map

19. DETAILS OF THE AREA OF WHERE THERE IS A CLUSTER OF THE MINING LEASES

Sl. No.	Name of the Mineral	Letter of Intent Grant order No. & date	Area of mining lease to be allotted (Ha)	Village	Taluk	District	Geological Reserves (Mill.Tons)	Use (Capitive /Non-capitive)	Location of the Mining lease (Latitude & Longitude)
----Nil----									

20. DETAILS OF ECO-SENSITIVE AREA

Cauvery North Wild Life Sanctuary was established vide G.O. (Ms).No. 30 Environment and Forest Department dated 24.02.2014 and published in the TamilNadu Government Gazette Notification Bulletin No.10 dated 12.03.2014.

It is situated within the North Latitudes of 12.2557 N to 12.6846 N and East Longitudes 77.5812 E to 77.9739 E and is located North Western Part of Krishnagiri District. The total geographical area of the Sanctuary is 504.33 Sq. Km and spreads across twenty four Reserved Forests of Hosur and Dharmapuri Forest Divisions. Out of the Total area, 493.33 Sq.Km is located in Denkanikottai Taluk of Krishnagiri District and 11 Sq. Km is located in Palacode Taluk of Dharmapuri District.

The Sanctuary is rich in floral and faunal diversity. It accounts for 468 species of plants, 36 species of Mammals, 272 Species of Birds and 172 species of Butterflies which includes rare, endemic and endangered species such as Grizzled Giant Squirrel, Four-horned antelope, Leopard, Elephants, Dhole, Sloth bear, etc., The plan showing the Proposed Eco Sensitive Zone for North Wild Life Santuary is given below:

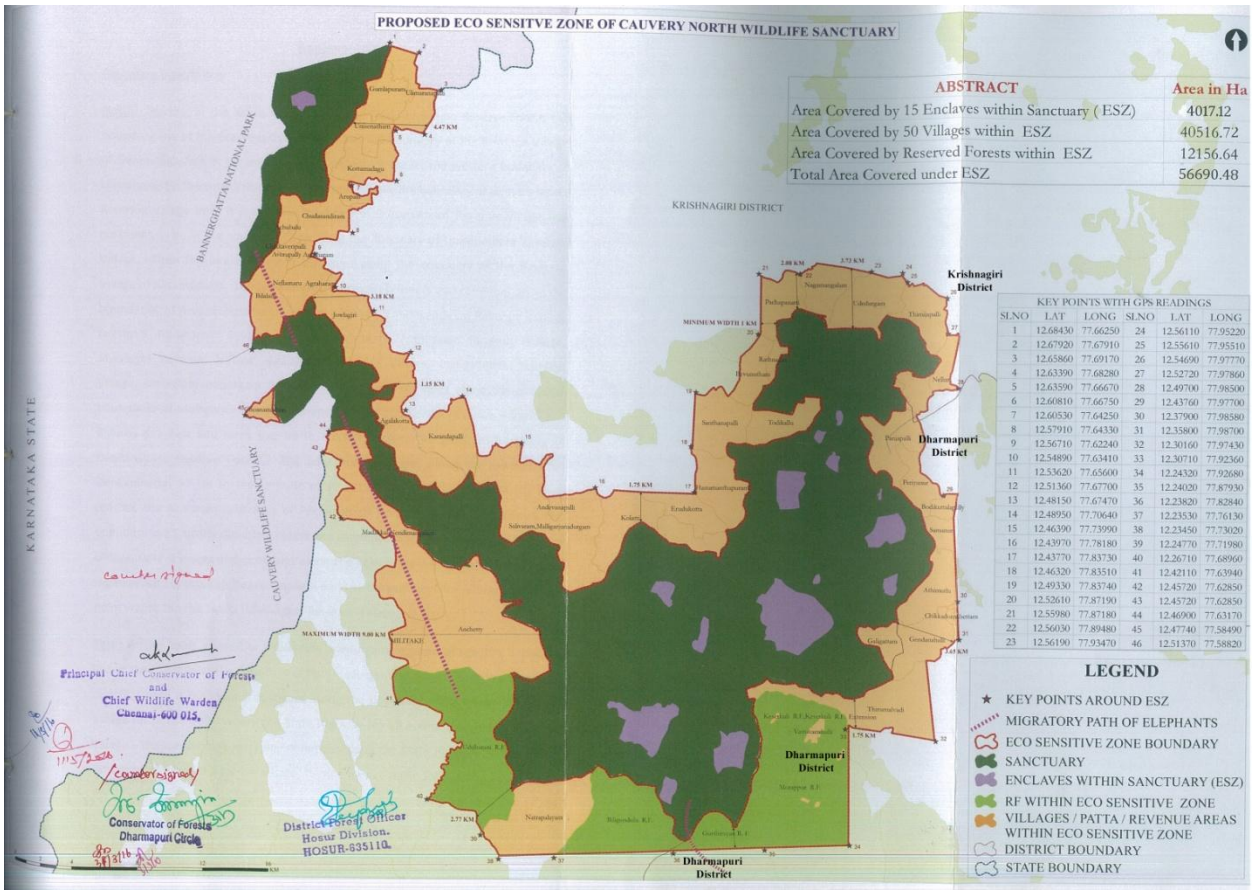


Fig: 13 Proposed Eco Sensitive Zone for North Wild Life Santuary Plan

21. IMPACT ON THE ENVIRONMENT DUE TO MINING ACTIVITY

Environmental impacts of mining can occur at local, regional, and global scales through direct and indirect mining practices. Impacts can result in erosion, sinkholes, loss of biodiversity, or the contamination of soil, groundwater, and surface water by the chemicals emitted from mining processes. These processes also have an impact on the atmosphere from the emissions of carbon which have effect on the quality of human health and biodiversity. Some mining methods may have such significant environmental and public health effects that mining companies in some countries are required to follow not so strict environmental and rehabilitation codes to ensure that the mined area returns to its original state.

The impact produced on the water:

- in the quarry perimeter do not repair the technical malfunctions of the equipment, do not fuel and do not locate constructions and fixed instalations of which operation affects the surface waters
- they are affected by the deforestation of the vegetation in the normal limits, the effect on these being low
- at the granite quarry levels does not result waste domestic waters, and on the location are mounted ecological toilets which are periodically emptied by the specialised companies
- the effect on these is insignificant

The impact on the air

- at the granite quarry levels is produced dust, powders, exhaust gases at the derocking, precrushing, loading and transport; the produced quantities could be limitated by the judicious design of the mine holes and of the explosive loading, the sprinkling of the crushing stone heaps, of the working platforms and of the access road in the drought periods

The impact produced on soil and subsoil

- the excavations made for the execution of the industrial limestone resource works
- the accidental drains of the fuel and lubricants at the fuel of the equipments or at the execution of the maintenance and repair works
- the solide waste (household waste, used pieces)

The impact produced on biological environment

- affected by the exploitation, the negative effect on this being low, the replacement of the vegetation is temporary
- it should be considered the high regeneration capacity of the grasses forest or meadow vegetation
- after the finnish of the exploitation, the land will regain the status of forest land

Fauna

- it is affected in insignificant limits

- the most prominent effect is on the soil fauna which is removed together with the soil blanket
- Removal of all vegetation (flora) and thereby fauna from the area required for mining and other purposes.

Ecological Impacts of Opencast Mining:

1. Removal of all vegetation (flora) and thereby fauna from the area required for mining and other purposes.

2. Pollution of water in the surrounding water bodies due to leaching from overburden dumps and due to the pollutants from the other activities. This affects the aquatic ecology of these water bodies.

3. Dust in atmosphere, contributed by mining and associated activities, when deposited on the leaves of the plants in the surrounding areas may retard their growth.

4. Noise and vibrations due to blasting and operation of the machines drive away the wild animals and birds from the nearby forests.

5. Water scarcity caused due to the impacts of opencast mining on water regime affects the growth of vegetation and agriculture in and around the complexes.

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

Action to Minimize the Impacts:

It is evident that mining and associated activities have considerable impacts on the ecology of the mining and the surrounding areas. These impacts are evident in most of the mining complexes in the country.

In order to minimize the impacts the following actions can be thought out:

- Plan the mining layout so as to have the least requirement of the forest land and take necessary steps for reclamation of the mined out land so that the forest land taken for the mining purposes can be brought back to forest use.
- Develop a suitable compensatory forest.
- Cut the trees to the minimum possible extent and to preserve the flora it would be appropriate to uproot the trees and plants and then establish them at suitable locations, may be in the areas for compensatory afforestation.
- Develop a flora bank to preserve the typical floral species of the area so that these can be replanted and developed as and when needed.
- Surface layout of the mining complexes be designed to have the least impacts on the ecology of the area.
- The noise and vibration producing activities in the mines and the associated activities be planned to have the minimum possible intensity and impact on the wild life in the surrounding area.

Remedial Measures:

It is noted from the above mentioned impacts of the different activities on the atmosphere that the mining and associated activities not only contribute to the ambient air pollution but also to the ambient noise situation.

Atmospheric pollution due to the mining and associated activities can be minimized by planning the activities in such a manner that the generation of the pollutants is minimum

possible. In addition provisions may be made for arresting the dust by making suitable green belts.

Some of the measures are as outlined below:

- Generation of dust in the removal of the vegetation and soils can be minimized by maintaining adequate moisture in the soil. This can also be expected to improve the efficiency of these operations as in dusty atmosphere the efficiency decreases.
- Use of dust extractors with the drill machines can be expected to minimize air pollution due to drilling.
- By optimizing the blast design the generation of dust due to blasting can be reduced.
- Proper maintenance of the haul roads can minimize the generation of air borne dust due to movement of dumpers on them.
- Water spraying at the transfer points tends to reduce air pollution.
- Enclosing the mineral handling and preparation units tend to reduce the contribution of SPM to the atmosphere.
- Proper maintenance of the equipment and machines in the mines and other places in the complexes helps not only in minimizing the contributions to the air pollution but also the noise generation.
- In the residential locations playing of the loud speakers specially after 9.00 pm should be avoided to minimize the noise levels.
- The locations of the residential locations should be planned such that they are on the up wind side of the mines and plants so that for most of times the atmospheric pollutants are taken away rather than being brought towards these locations.
- Green belts of adequate widths, say 25 -50 m, may be planned between the residential areas and the mines not only to attenuate noise but also to arrest dust.

23. RECLAMATION OF THE MINED OUT AREA

Quarrying of Granite and Rough stone pits simultaneous back filling and development of plantation in the back filled areas will be the best practice of reclaimation and the unfilled quarry pits may be used for ground water recharge and also as fishery ponds.

There is no proposal for back filling, reclamation and rehabilitation. Dumps are properly terraced systematically by multi-level dumping. When the quarry reach its ultimate pit limit or at the end of life of quarry, pit will be allowed to collect seepage and rainwater and the water storage will be kept as temporary reservoir for changing the nearly wells and will be used for afforstation purpose. After completion of quarry operation quarried out land will be fenced with barbed wire also an earth bund will be constructed around the quarry to prevent inadvertent entry of public and cattle. Hence backfilling does not arise.

The top earth soil from nearby area will be carted and spread over a portion of waste dump raising of plants.

24. RISK ASSESSMENT & DISASTER MANAGEMENT PLAN

1. Introduction

Mining and allied activities are associated with several potential hazards both to the employees and the public at large. A worker in a mine should be able to work under conditions that are adequately safe and healthy. At the same time the environmental conditions should be such as not to impair his working efficiency. The various safeguards to be taken to ensure the safety of the mine and that of employees are provided in the Mines Act, 1952.

2. Identification of Hazards

There are various factors, which can cause disaster in the mines. These hazards are as follows:

- Drilling;
- Blasting;
- Overburden handling;
- Heavy Machinery; and
- Explosives storage.

2.1 Drilling and Blasting

Most of the accidents from blasting occur due to the projectiles, as they may some times go even beyond the danger zone, mainly due to over charging of the shot holes as a result of certain special features of the local ground. Flying rocks are encountered during initial and final blasting operations. Vibrations also lead to displacement of adjoining areas. Dust and noise are also problems commonly encountered during blasting operations.

2.2 Overburden Handling

The overburden dumps may cause landslides. High overburden dumps created at the quarry edge may cause sliding of the overburden dump or may cause failure of the pit slope due to excessive loading, thereby causing loss of life and property. Siltation of surface water may also cause run-off from overburden dumps.

2.3. Heavy Machinery

Most of the accidents during transport of dumpers, trucks, proclains, ripper dozers and other heavy vehicles are often attributable to mechanical failures and human errors.

3. Disaster Management

3.1. Measures Suggested to Avoid Accidents due to Blasting

- Shots shall not be fired except during the hours of day light or until adequate provision is made for artificial lighting and the holes charged on a particular day shall be fired on the same day;
- Shots, if fired after hours of daylight, should be muffled so that the flying fragments from the blasting material do not project beyond a distance of 10 m from the place of blasting;
- Adequate shelters or other protective structures shall be provided to the workers at all times;
- The shot fired shall give sufficient warning by effective signal over the entire area falling within a radius of 500-m;
- Where any permanent building or structure is damaged within the danger zone, the aggregate maximum change in all the holes fired at any particular time shall not exceed 2 kg;
- If a single shot exploder is used or if blasting is done with ordinary detonator, the shot-firer shall not fire more than fifty shots in one shift, but if multishot exploder is used, the number can go up to eighty;
- During the approach and progress of an electrical storm, adequate precaution shall be taken;
- No shot hole shall be drilled in the overburden above the underground galleries.

3.2 Measures to Prevent the Danger of Overburden

- A stone wall should be built around the toe of each active dump at a distance of about 50-m from the toe;

To prevent the failure of overburden slopes, especially during the rainy season, the following precautions shall be taken:

- Proper terracing of the dump slopes, with a maximum dump height of 10 meters should be maintained;
- In flat areas where the dumping operations have come to an end, the slope angle should be flattened by about 5^o lower than the angle of repose, which varies from site to site but not less than 25^o;
- Planting vegetation as early as possible over the overburden dump slopes;
- Provide drainage channels along the overburden dump toe for additional protection, in such a way that a distance of 15-m should be maintained left between the overburden dump and the bench; and
- If a mine is abandoned, the bench and overburden dump should be separated from each other by digging a trench of 6 to 10 m width.

3.3 Measures to Prevent Accidents Due to Trucks and Dumpers

- All transportation within the main working area should be carried out under the direct supervision and control of the management;
- The vehicles must be maintained in good repairs and checked thoroughly at least once a week by a competent person authorized for this purpose by the management;
- Broad signs should be provided at each and every turning point specially for the guidance of the drivers at night;
- To avoid dangers while reversing the trackless vehicles, especially at the embankment and tripping points, all areas for reversing of lorries should, as far as possible, be made man free, and there should be a light and sound device to indicate reversing of trucks; and
- A statutory provision of the fence, constant education, training etc will go a long way in reducing the incidence of such accidents.

25. DETAILS OF OCCUPATIONAL HEALTH ISSUE IN THE DISTRICT

The details of number of patients treated for silicosis and Tuberculosis for the last five years in the district is given below:

Sl.No.	Year	Number of patients treated for silicosis	Number of patients treated for Tuberculosis
1	2014-15	----Nil----	----Nil----
2	2015-16		
3	2016-17		
4	2017-18		
5	2018-19		

26. PLANTATION AND GREEN BELT DEVELOPMENT IN RESPECT OF LEASES ALREADY GRANTED IN THE DISTRICT

The project proponents during the quarry operatins, 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 by planting 250 to 500 Neem and pungan trees is paramount importance. In addition to augumenting existing vegetation, it also checks soil erosion, make the eco system more complex and functionally more stable and make the climate more conductive.

Safety distance along the lease area has been identified to be utilized for afforestation. Appropriate speces of trees will be planted in a phased manner. Such Fauna or Flora which can be successfully grown over such granite rubbles and the methodology to be followed for afforestation will be identified with the technical assistance of Forest Department, suitable variety of soil will be brought from outside if necessary, for utilizing for stabilizing the dumps as well as for growing vegetation over the dumps.

27. ANY OTHER INFORMATION

District survey report of Dharmapuri District of Tamil Nadu was prepared in a short period of time. For the preparation of this report immense corporation was provided by District Geology and Mining Department Officials of Dharmapuri district. While opening and after closing of a mine, lot of care should be taken, so that the minimal impact to the ecosystem can achieve. While the mine/quarry is closed, care and maintenance to be organized so that management of environmental risks, associated with tailings dumps, hazardous materials and open bit filled with water can be reduced.

Protection of natural resources and of the environment means concern for the bed and the protection of its resources by its rational acquisition, which is characterised by savings in its depletion. This also means taking measures that minimise the negative impact of the different processes related to the extraction of mineral resources on the various forms of the geological environment and natural environment on the surface. Mining can become more environmentally sustainable by developing and integrating practices that reduce the environmental impact of mining operations. These practices include measures such as reducing water and energy consumption, minimizing land disturbance and waste production, preventing soil, water, and air pollution at mine sites, and conducting successful mine closure and reclamation activities.

Quarries visited are well planned and some of them are planned trees on the mine premises that will help in the development of good mining atmosphere. Old working can be subjected to land reclamation.

Assistant Director,
Geology and Mining,
Dharmapuri.

District Collector,
Dharmapuri.