

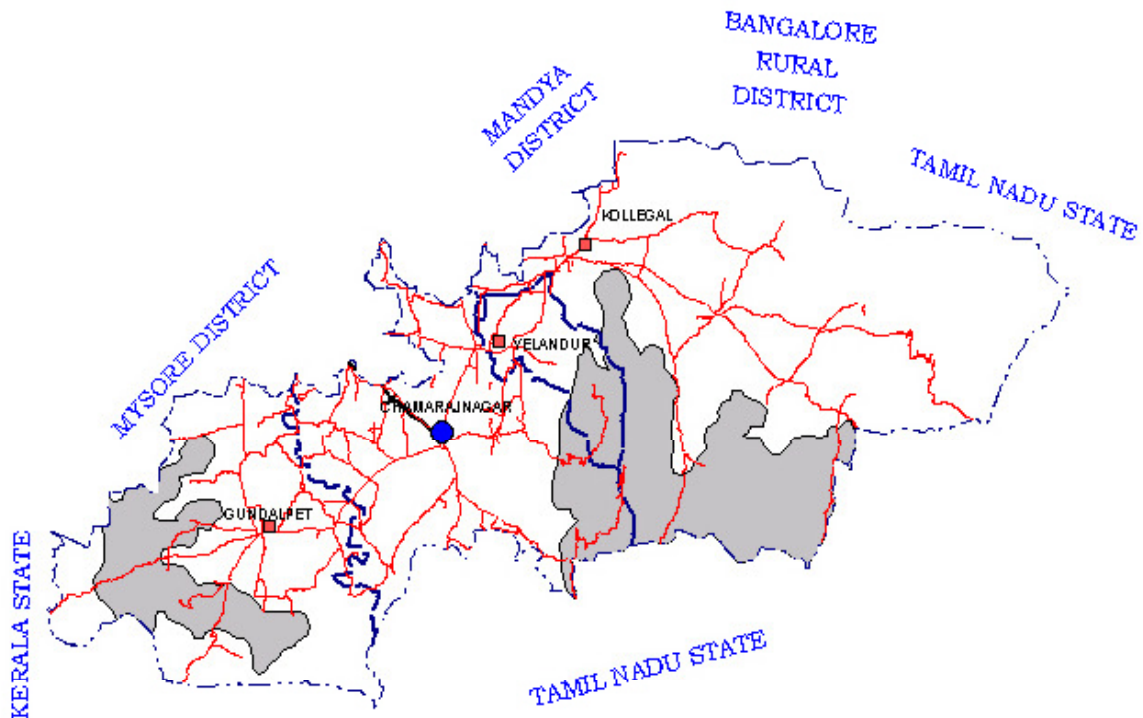


स्वच्छ सुरक्षित जल – सुन्दर खुशहाल कल

CONSERVE WATER - SAVE LIFE



GOVERNMENT OF INDIA
MINISTRY OF WATER RESOURCES
CENTRAL GROUND WATER BOARD
GROUND WATER INFORMATION BOOKLET
CHAMARAJNAGAR DISTRICT,
KARNATAKA



SOUTH WESTERN REGION
BANGALORE
NOVEMBER 2008

FOREWORD

Ground water contributes to about eighty percent of the drinking water requirements in the rural areas, fifty percent of the urban water requirements and more than fifty percent of the irrigation requirements of the nation. Central Ground Water Board has decided to bring out district level ground water information booklets highlighting the ground water scenario, its resource potential, quality aspects, recharge – discharge relationship, etc., for all the districts of the country. As part of this, Central Ground Water Board, South Western Region, Bangalore, is preparing such booklets for all the 27 districts of Karnataka state, of which six of the districts fall under farmers' distress category.

The **Chamarajnagar** district Ground Water Information Booklet has been prepared based on the information available and data collected from various state and central government organisations by several hydro-scientists of Central Ground Water Board with utmost care and dedication. L.J.Balachandra, Scientist 'B' has prepared this booklet under the guidance of Dr.K.Md. Najeeb, Superintending Hydrogeologist, Central Ground Water Board, South Western Region, Bangalore. The figures were prepared by S/Sri. H.P.Jayaprakash, Scientist-C and K.Rajarajan, Assistant Hydrogeologist. The efforts of Report processing section in finalising and bringing out the report in this format are commendable.

I take this opportunity to congratulate them for the diligent and careful compilation and observation in the form of this booklet, which will certainly serve as a guiding document for further work and help the planners, administrators, hydrogeologists and engineers to plan the water resources management in a better way in the district.

(T.M.HUNSE)
Regional Director

CHAMARAJANAGAR DISTRICT AT A GLANCE

Sl.No.	Items	Statistics	
1	General Information		
	i) Geographical area (sq. km)	5,101	
	ii) Administrative Divisions	1	
	Number of Taluks	4 (C.R.Nagar, Kollegal, Gundlupet, & Yalandur)	
	No. of Panchayat /Villages :	120/509	
	iii) Population (As on 2001 Census)	9,65,462	
	iv) Annual normal rain fall (1971-2000)	704.4 mm	
2	Geomorphology		
	Major Physiographic Units	Southern maidan region, plain to undulating mountainous. The southern and eastern ghat ranges converging into group of hills. The principal hill ranges are B.R. hills, lofty mountains runs north south direction about 16 kms. MM hills with 77 hill ranges, and Gopalaswamy hill ranges etc., The highest peak of the district is in B.R.hills with 1687m amsl. The average altitude of the district is 658.58m amsl.)	
	Major Drainages	Drained by Cauvery river, which runs along the border of the Kollegal taluk in the district. Suvarnavathy and Chikkahole drain the rest of the area, which are the tributaries of cauvery.	
3	Land use (ha)		
	Forest area	275609	
	Net area sown	176,979	
4	Major soil types	Reddish brown forest soil, Yellowish grey to greyish sandy loam soils and mixed soils.	
5	Area under principal crops (2005-2006) in ha	Crop	Area
		Paddy	18231
		Ragi	23203
		Jower	26434
		Bajra	915
		Maize	23458
		Total cereals	92261
		Gram	2496
		Tur	1850
		Other pulses	35353
		Total Pulses	39699
		G. nut	22934
		Sun flower	6817
Others	3218		
Total oil seeds	32969		

		Cash crops Sugar cane Tobacco Cotton Others Total Cash crops	9507 180 6842 60234 76763
6	Irrigation by different sources (ACSR 2005-2006) Dug wells Bore wells Tanks/ Ponds Canals Lift Other Sources Net Irrigated Area (ha) Gross irrigated area (ha)	Number 12395 22988 218 8 4 - 51900 54415	Area (ha) 3595 40592 6204 7936 400 - 51900 54415
7	Number of ground water monitoring stations of CGWB (as on 31-03-2007) Number Dug wells Number of Piezometers	34 5	
8	Predominant geological formations	The major geological formation is granites, gneisses, and schists. Recent alluvium along the river course.	
9	Hydrogeology		
	Major Water Bearing Formations -		
	Shallow aquifers of alluvium along the stream courses and weathered zones of gneisses Charnockites and occur between the depths of 2 to 20 m bgl.		
	Deeper aquifers of jointed and fractured gneisses and charnockites occur between the depths of 20 to 90 m bgl.		
	Pre-monsoon Water Levels during 2006	1.42 – 6.75 m bgl (average 4.77m)	
	Post-monsoon Water Levels during 2006	0.01– 7.97 m bgl (average 3.47m)	
	Long term water level trends (1997-2006) in m/year:	NHS (DUG WELLS)	At fifteen National Hydrograph Stations (NHS) water levels have shown rising trend in the range of 0.050 to 0.464 m/year, while at eight NH Stations water levels have recorded falling trend in the range of 0.003 to 0.588 m/year.
		NHS (Piezometers)	At four National Hydrograph Stations (Piezometers) water levels have shown rising trend in the range of 0.124 to 0.649 m/year, at one piezometer water level have shown falling trend with 1.038 m/year.
10	Ground water exploration by C.G.W.B. (as on 31-03-2007)		
	No of wells drilled	EW: 16, OW: 8, PZ: 5	
	Depth range	34 – 90 m bgl	

	Discharge	0.20 – 3.90 litres / second
	Transmissivity	07 – 228 m ² / day
11.	Ground water quality	
	Presence of chemical constituent more than the permissible limit	Chemical quality of Ground water is suitable for all purposes in major parts of the district with low sodium type of ground water except in few pockets where Nitrate concentration is high (parts of C.R.nagar & Yalandur taluks) and F is high in eastern parts of Kollegal taluk.
	Type of water	Low sodium type
12.	Dynamic Ground Water Resources (ham) (2004)	
	Net Annual Ground Water Availability	29623 ham
	Existing gross Ground Water Draft for all use	36633 ham
	Projected demand for Domestic and Industrial uses up to 2025	3009 ham
	Stage of Ground Water development as on March 2004 (%)	76%in CR nagar, 3%in Gundlupet, 40% in Kollegal and 100% in Yalandur taluks are falls in SAFE category.
13.	Awareness and Training Activity	
	Mass Awareness Programmes Organised	1 at Kollegal
	Water Management Training Programmes organised:	1 at Chamarajanagar
14.	Efforts of artificial recharge & rain water harvesting	
	Projects completed by CGWB (No and amount spent)	Nil
	Projects under technical guidance of C.G.W.B (numbers)	Nil
15.	Ground water control and regulation	
	Number of OE Blocks	Nil
	Number of Critical blocks	Nil
	Number of blocks notified	Nil
16.	Major ground water problems and issues	Groundwater development has reached 30% for the district as a whole and the district falls in the 'safe' category. As groundwater level, in general, is not declining, revitalising by cleaning and deepening the dug wells will help in augmenting the yield. Adopting watershed treatment is a good option to augment the natural recharge.

CHAMARAJANAGAR DISTRICT

1.0 Introduction

1.1 General

Chamaraja nagar district is one of the 7 new districts formed during 1997, located in the southern tip of Karnataka state. The district is famous for sandalwood and other products of forests. The district does not have any major river flowing, however it is drained by Suvarnavathy and Chikkahole, which are the tributaries of Cauvery River. There are no mineral based industries in the district. The existence of forests helps the economy in various ways as it provides raw materials for industries like paper rayon saw mills, safety matches and sandalwood. Bandipura National Park in the state having a large population of spotted deers and elephants.

The total population in the district is around 9, 65,462 (as per 2001 census), out of which rural population constitutes 8, 17,372 (84.66%). The density of population is 189 per sq. km. The SC population constitutes 207638 and ST population is 84897. The sex ratio in the district is 971 females for every 1000 males. The irrigation in the district is mainly well irrigation, and 80 to 90% of the irrigation is through ground water. Small pockets of Kollegal and Yalandur taluks are covered under canal irrigation. The district falls in Cauvery River basin. The cultivable land is about 2, 09,009 ha, out of which only around 34246 ha (16%) is irrigated. The total number of minor irrigation schemes in the district is about 22307. Out of 22307 schemes 7328 from dugwells, 14879 from tube wells, 96 are surface flow structures and 4 are lift irrigation schemes.

1.2 Location

The geographical area of Chamarajanagar district is about 5,101 Km². The district is located in the southern tip of Karnataka state and lies between the North latitude 11° 40'58" and 12° 06'32" and East longitude 76° 24'14" and 77° 46'55". It falls in the southern dry zone. Topography is undulating and mountainous with north south trending hill ranges of eastern ghats. Salem and Coimbatour districts of Tamilnadu in the east, Mandya and Bangalore districts in the north, parts of Mysore district in the west and Nilgiris district of Tamilnadu in the south, bound the Chamarajanagar district. A map showing administrative set-up of the district is given in Figure 1.

1.3 Administrative set up

The district comprises of four taluks namely Chamarajanagar, Gundlupet, Kollegal and Yalandur. Among the four taluks Kollegal taluk is the largest having an area of 2789 sq. kms, which is 54.61% of the total area of the district. Yalandur taluk is the smallest with total geographical area of 266.34 sq.kms. The district is having one revenue subdivision and the district headquarters at Chamarajanagar. (Fig.1)

1.4 Communication

The district is well connected by highways and other main roads. The Bangalore – Nilgiris, Mysore-Manandavadi Highways pass through the district

in Gundlupet taluk. Fairly good network of roads exists connecting taluk headquarters with district headquarters and hoblis to various taluk headquarters. Total there are 150kms. of NH, 336.40kms. of SH, 866.82Kms of major district roads, 2612kms. length of village roads and other roads serves as road communication in the district. The Chamarajanagar is connected by Mysore-CR Nagar meter gauge railway line with a length of 18 kms.

1.5 Drainage

The district falls in Cauvery river basin. There are no major rivers flowing in the district, however Cauvery the perennial river flows along the border of Kollegal taluk of C.R.Nagar district with its tributaries like Suvarnavathy and Chikkahole. Suvarnavathy rises near Gajalahalli southeastern portion of C.R.Nagar and flows in the depression along the center of C.R.Nagar taluk with a north-south disposition in a northerly direction through C.R.Nagar and Yalandur taluks and joins the river Cauvery at Hampapura in Kollegal taluk. It has a catchment area of 1787 sq.km. with total course of about 88kms. in the district. The stream flows in rainy season only, effluent upto Umbale and influent to the rest of its course. Chikkahole is the tributary of Suvarnavathy, rises at Hasanur ghat range to the south of C.R.Nagar flows in northerly direction. A dam is constructed across this tributary about 12kms. away from C.R.Nagar. Suvarnavathy also dammed at Atgulipura in C.R.Nagar taluk. Besides this Gundal, Thattaihalla, Uduthore halla and Palar are the tributaries of Cauvery river drains parts of Kollegal taluk. The area is characterized by sub-dendritic to sub-parallel drainage pattern. The drainage density of the area varies from 0.25 to 3.58 km/km². The density decreases towards Suvarnavathy river. The drainage map of the district is presented in fig.2.

1.6 Crops and Irrigation Practices

As per 2001 census, 97.25% of land holdings are having less than 4ha., which covers 85.18% of the total area. The area falls under southern dry zone. The major crops grown are the cereals with an area 92261ha where jowar, maize, and ragi are the major cereals. Next follows the cash crops with an area 76763ha in which sugarcane and cotton are the major crops. Then follows pulses with an area of 39699ha and lastly oilseeds with an area of 33069ha in which sunflower as major cash crop. The net sown area comprises 31.05% of the total geographical area, in which 6.95% of the area is being sown more than once. As per the records about 8% of the net sown area is irrigated through surface water source, and about 23% of the area is irrigated through ground water. As per the census records, the district has 22307 minor irrigation schemes, of which 7328 pertains to dugwells, 14879 tube wells, 96 surface water flow schemes and 4 lift irrigation schemes.

1.7 Activities carried out by CGWB

Central Ground Water Board has carried out Systematic Hydrogeological surveys, Reappraisal Hydrogeological surveys and Groundwater Exploration in the district except in Kollegal Taluk due to declaration as disturbed taluk by the state government. The hydrogeological investigations and groundwater exploration have revealed the existence of potential zones with in the depth of 90 meters. Under exploration programme, no deep drilling took place in the

district. Total 5 number of purpose built piezometers constricted in the district and were constructed during 1998-99 for continuous water level monitoring, in which automatic water level indicators being installed. Besides, Central Ground Water Board maintains a good network of observation wells (NHS) in the district, which are monitored periodically to keep a close vigil of water level variations.

2.0 Rainfall and Climate

The climate of C.R.Nagar district is quite moderate through out the year with fairly hot summer and cold winter. March to May is summer months, where mean maximum temperatures ranges from 32.6°C to 34°C. June to September is the southwest monsoon period, October and November is the post monsoon retreating monsoon season with clear bright weather and during December to February weather remains dry. The skies clouded or overcast during southwest monsoon. During October and November some of the depressions and cyclonic storms originates in Bay of Bengal, which passes through the district, causing wide spread heavy rains and high winds. The mean maximum temperature in the district is 34°C. and the mean minimum temperature is 16.4°C. during January month. Relative humidity ranges from 69 to 85% in the morning and in the evening it ranges from 21% to 70%. The wind speed ranges from 8.4 to 14.1 kmph. The potential evop-transpiration in the district ranged from 106mm to 165mm/year.

C.R.Nagar district receives rainfall from southwest monsoon from June to September and northeast monsoon from October to December. Overall on an average, there are 67 normal rainy days, which is minimum in Yalandur taluk with 63 days, maximum in Gundlupet taluk with 73 rainy days. As per the last three decades (1970-2000) rainfall analysis, the precipitation during southwest monsoon accounts for 61.17% of the total amount of rainfall and during northeast monsoon it is 31.88%. September is the wettest month in the year. Annual rainfall for the last three decades in Chamarajanagar- 799.3mm, Gundlupet-785.5mm, Kollegal-768.1mm and in Yalandur-894.1mm. Average rainfall in the district is 811.75mm. The analysis of the last ten years rainfall data (1997-2006) shows that the highest rainfall occurred in C.R.Nagar taluk with 731.80mm and the lowest at Gundlupet with 586.1mm. Deficiency in rainfall is observed in the four taluks for the last ten years except during the years 2000, 2004, and 2005 where excess rainfall in the range of 3% to 40% was observed.

3.0 Geomorphology and Soil Types

The district may be classified as partly maidan and general tableland with plain, undulating and mountainous. The southern and eastern ghats in the district converge into group of hills. The landmass of the area forms an undulating tableland and lofty mountain ranges covered with vast forests. Master slope runs from south to north towards Cauvery River. Normally the slopes are covered by debris and colluvium filled channels. The general elevation is 656.58m amsl. The eastern and southern portions of Kollegal taluk forms continuous lofty hills such as M.M. hills with an elevation of 976m amsl having 77 hill ranges such as Anemale, Kadumale, Jenumale, etc., Dodda sampigae is another hill range runs north to south for 6 kms in Kollegal

taluk. Biligirirangana betta in Yalandur taluk, Gopaldaswamy hills in Gundlupet also forms the hill ranges in the district. Dense forest covered in the southern and southwestern taluks, viz, Kollegal, Yalandur, C.R.Nagar and Gundlupet. The Shivanasamudra island and Edacura village towards north of Kollegal taluk forms the important features formed due to meandering and confluence of Cauvery river. The soils of the district are derived from Granitic gneisses and Charnockite rocks. Red soil is present in upland areas and also noticed at the contact of granites and schist. These soils are admixture of sand and silt. Organic matters in these soils are low and respond well for irrigation menning and other management practices. The thickness of the soil varies from less than a meter to 6.5m. Black soils are clayey and black in colour, mostly of transported in origin, occurring along depressions where regular irrigation practices are in progress. Mixed type of soils localised at places along the contact of schist and other intrusions. These are derived either from gneisses or schist. These are medium to fine grained and moderately permeable. It contains high moisture content. The thickness varies from 1m to 16.5m.

4.0 Ground water scenario

4.1 Hydrogeology

Hydrogeologically, the area forms the part of hard rock terrain comprising of peninsular gneiss, charnockites and alluvium. Among these charnockites are wide spread formation in C.R.Nagar and Kollegal taluks and part of Yalandur taluk, where as entire Gundlupet taluk, parts of C.R.Nagar and Yalandur taluks occupied by gneisses. Alluvium of about 5.00m thickness is occurring along the major tributaries of Cauvery river like Suvarnavathy and Chikkahole etc. The valley fill area extends to very limited stretch with an average thickness of 6 to 18.00m bellow, which the basement is likely to be encountered. Occurrence and movement of ground water are controlled by the degree of weathering, fracturing, the geomorphological set up and precipitation. The hydrogeological details of the area are presented in the figure-3

4.1.1 Occurrence of ground water

The principal crystalline rocks as stated above have no primary porosity. Hence, the water bearing and yielding properties are primarily due to weathering and fractures. The weathered zone is up to 4.00mbgl to 22.00mbgl. Groundwater occurs under water table conditions in weathered and fractured crystalline gneisses and charnockites up to 25m and semi-confined conditions in deep-seated fractures and is common to the depth range of 40mbgl to 90mbgl. The alluvium aquifers up to the depth of 9.00mbgl form a good shallow aquifer system along the river courses. Best example is near Sathegala in Kollegal taluk where number of filter points exists. Alluvium having primary porosity and forms potential aquifer. The principal source of recharge is rainfall. In canal command areas like parts of Yalandur and Kollegal taluks seepage from canal and percolation from applied irrigation water forms additional source of recharge.

4.1.2 Depth to water level

Out of 16 National Hydrograph Stations (NHS) located in C.R.Nagar district, the depth to water levels recorded during May-2006 was in the range of 1.42 to 6.75m bgl. The depths to water levels in the national hydrograph stations (dug wells) recorded during post monsoon period (November 2006) were in the range of 0.01 to 7.97m bgl. The average depth to water level during pre-monsoon is 4.77m and in post monsoon it is 3.47m. The pre-monsoon and post-monsoon depth to water levels is depicted in Figure-4 and Figure-5. The major portion of the district shows 5.00m to 10.00m water level during May-2006, as well as during November 2006. However major part of Kollegal taluk, part of C.R.Nagar and Gundlupet taluk is covered with hill ranges and dense forests and partly bad land topography. Such areas are left out for want of sufficient control over the water level data. In the remaining part, due to uneven topography, the depth to water level changes with a short distance. The water levels in the 5-piezometer national hydrograph stations range from 4.60 to 36.75mbgl during May 2006 and 3.94 to 40.11m bgl during November 2006.

4.1.3 Seasonal water level fluctuation

Consequent upon seasonal rainfall, the water levels record a rise indicating the build up of storage in ground water reservoir. During the non-monsoon period, this gets depleted due to exploitation and natural discharge. Therefore, the water levels, in general show a receding trend from December to May. The seasonal water level fluctuation for the year 2006 is available for 15 dug well national hydrograph network stations. While sixty percent of the NH Stations have shown a rise in water levels in the range of 0.50 – 7.86 m, thirty percent of the stations have recorded a fall in water levels in the range of 1.62 – 3.67m. The seasonal water level fluctuation for the year 2006 is available for five piezometer hydrograph network stations, which is in the range from 0.66 to 16.97m. The average water level fluctuation during 2006 is 1.00m.

4.1.4 Long-term water level trend

The long term water level trend is analyzed for 23 NH Stations for the period from 1997 to 2006, where 15 stations have shown rising trends in the range of 0.05m/y to 0.464m/y and the average rise in water levels is 0.23m/y. Similarly falling trend were observed in 8 national hydrograph network stations in the range of 0.003m/y to 0.588m/y with the average fall of 0.20m/y. The average maximum rise in water levels over the years is observed in Chamarajanagar taluk is 0.29m/y and the least 0.050 m/y in Yalandur taluk. Maximum fall in water levels are observed in Yalandur taluk. Similarly the water level trend in five piezometers in the district showed rise in water level in all the five except at Gundlupet, where falling trends were observed with 1.038m/y since 1997 to 2006. The range of rise in water level in the four piezometers is 0.124m/y to 0.649m/y.

4.1.5 Aquifer systems encountered in the area

The study of aquifer geometry and parameters have been attempted by Central Ground Water Board, South Western Region, Bangalore, under its

ground water exploration programme through drilling exploratory bore wells at selected places except in Kollegal taluk, where ground water exploration could not be taken up due to disturbance. Overall 15 exploratory wells and 11 observation wells were constructed in three taluks of the district. The aquifer zones are weathered / fractured & jointed Charnockites and gneisses, occurring at various depths from 15 to 90m bgl.

The exploratory bore wells drilled in the district have depths ranging from 34.10 to 90.00m bgl. The discharge ranges from <1.0 to 3.90lps. The yield-cum-recuperation tests conducted on the wells show that transmissivity of aquifer material in general range from 0.7 to 228 m²/day. No deep drilling took place in the district to study the deeper aquifer characteristics.

4.2 Ground water resources

Ground water resources for Chamarajanagar district is estimated taluk wise and presented in the table-1, which indicates that the Net annual ground water availability in the district is 29623 ham, gross ground water draft is 34496ham, and ground water balance available for future ground water development is 11930ham. Taluk wise data viz. net ground water availability, existing ground water draft for irrigation, existing gross groundwater draft for domestic and industrial water supply, existing gross ground water draft for all use, allocation for domestic and industrial use for next 25 years, net ground water availability for future irrigation development, average crop water requirement and balance of ground water irrigation potential and the stage of ground water development is shown in the table.

Based on the stage of ground water development, 100% area in Yalandur taluk falls in **safe** category, in CRNagar taluk 76% area falls in **safe** category and in Kollegal taluk 40% area falls in **safe** category, where there is enough scope for further ground water development. 80% of the area in Gundlupet taluk falls in semi critical forcing to adopt proper management practices for avoiding further critical stage. About 60% of the area in Kollegal taluk covered by hilly/forest where there is no ground water development or negligible has taken place. So entire area may be considered as 'SAFE' category. Taluk wise stage of ground development computed as on March 2004 is presented in the figure-6.

Table-1 Taluk-wise groundwater resource of Chamarajanagar district as on March 2004

TALUK	NET ANNUAL GROUND WATER AVAILABILITY	EXISTING GROSS GROUND WATER DRAFT FOR IRRIGATION	EXISTING GROSS GROUND WATER DRAFT FOR DOMESTIC AND INDUSTRIAL WATER SUPPLY	EXISTING GROSS GROUND WATER DRAFT FOR ALL USES	ALLOCATION FOR DOMESTIC AND INDUSTRIAL USE FOR NEXT 25 YEARS	NET GROUND WATER AVAILABILITY FOR FUTURE IRRIGATION DEVELOPMENT	AVERAGE CROP WATER REQUIREMENT	BALANCE GROUND WATER IRRIGATION POTENTIAL AVAILABLE	STAGE OF GROUND WATER DEVELOPMENT (%)			
									SAFE (%)	SEMI-CRITICAL (%)	CRITICAL (%)	OE (%)
	HAM	HAM	HAM	HAM	HAM	HAM	(M)	HAM	%	%	%	%
CR NAGAR	1275	6848	655	7513	926	4932	0.85	5774	76	14		10
GUNDLUPET	12264	15414	781	16195	1123	2822	0.91	3089	3	80		17
KOLLEGAL	13089	10722	553	11275	769	2884	0.84	3437	40			60
YELANDUR	2995	1512	138	1650	191	1292	0.85	1526	SAFE			
TOTAL	29623	34496	2137	36633	3009	11930	0.86	13826				

4.3 Ground water quality

The water samples from NH Stations were analysed to decipher the shallow aquifer water quality. The results indicate that the water is alkaline in nature with average Ph value of 8.4. The average values of other important parameters like Ca-94.47ppm, Mg-361.09ppm, TH-302.21ppm, Cl-270.06ppm, F-1.05ppm etc., which are falling in desirable to permissible class as per "Indian standard drinking water specification" except for Mg concentration which falls beyond the permissible limit. The nitrate and chloride contents are found more in few pockets in C.R.Nagar and Yalandur taluks. Due to intensive irrigational activities in the command area it is observed Nitrate concentrations are beyond 100 ppm. Similarly, Fluoride concentration beyond 1.5ppm is observed in the eastern parts of Kollegal taluk. Based on this, ground water quality of the district is presented in the figure-7. Considering the ground water quality in the district for irrigation purposes it is found that the Specific conductance ranges from 512 to 4850 (average 1668.20 m mhos/cm at 25° c), chloride is in the range of 57 to 852ppm (average 270.06) and sodium is in the range of 6ppm to 856ppm (average 79.54) indicating low sodium type of ground water and good to permissible class of water for irrigational purposes.

4.4 Status of ground water development

4.4.1 Chamarajanagar taluk

About 22% of the total area C.Rnagar taluk is covered by forest. In the remaining part where groundwater is the main source for both drinking and irrigation purposes, to a lesser extent is from surface water source. There are 2523 borewells fitted with hand pumps, 230 borewells used for piped water supply schemes, 240 borewells used for mini water supply schemes. These are the major abstraction structures for drinking water needs in the taluk. Similarly, in the irrigation sector ground water being developed through dugwells, dug cum borewells and shallow tube wells. The net irrigated area of the taluk is 55838 ha, of which 1591 ha are from surface water and 15150ha is through ground water by means of dug wells & bore wells. 8111 shallow irrigation bore wells are the major ground water development structures for irrigation purpose followed by 1299 shallow irrigation dug wells. The ground water developed from these structures is utilized for irrigation through adopting sprinklers (34 dugwells+515 shallow borewells), drip irrigation, (2 dug wells+188 borewells), open channel (1050 dugwells+4419 bore wells), under ground channels (178 dugwells+2470 borewells) and others (35dugwells+515borewells). These are the major ground water development management practices in the taluk. The stage of ground water development is concerned 76% of the area is **safe** as the pre-monsoon water level is in between 4.82 to 6.12m in most of the area. Shallow zone ground water can be developed for irrigation through dugwells in topographic lows and through shallow/deep bore wells in the other areas. The six exploratory borewells drilled by the CGWB have yielded 1.31 to 3.90lps for the drilled depth upto 90.00mbgl. The exploration for deeper aquifer to be done with proper site selection based on sound scientific investigation.

4.4.2 Gundlupet Taluk

Groundwater is the main source of drinking water and irrigational purposes in Gundlupet taluk. About 32% of the total geographical area is covered by forest/hilly. In general, ground water developed through dug wells, dug cum bore wells and bore wells. Bore wells are the main ground water development structures for both drinking and irrigation purposes. There is scope for further development through dug wells and dug cum bore wells. There are 1506 bore wells fitted with hand pumps, 190 bore wells used for piped water supply schemes and 154 mini water supply schemes through bore wells, fulfilling drinking water needs and support the above fact. Similarly, 4949 shallow irrigation tube wells and 535 irrigation dug wells through which groundwater is developed for irrigation purposes. The net irrigated area in the taluk is 51034 ha, of which 7190 ha are from ground water source through bore wells, but not much through dug wells. The ground water thus developed are utilized for irrigation through adopting different ground water distribution system, such as sprinklers (13 dugwells+230 bore wells), drip irrigation (30 dug wells + 94 bore wells), open channel (355dug wells+2758), under ground channel (131dugwells+1825 bore wells), and others (6 dug wells +42 bore wells). Thus the ground water management practices adopted for irrigation in the taluk. The stage of ground water development where in 80%of the area falls in semi critical and 3% in **safe** category. However, further ground water development can be done through by developing deeper aquifers, since no deep exploratory drilling beyond 90.00mbgl is reported in the taluk. The exploratory bore wells drilled by CGWB up to the depth of 90.00 mbgl have yielded 0.20 to 3.0lps. There is a scope for exploring the deeper aquifers.

4.4.3 Yalandur Taluk

40% of the total area of Yalandur taluk falls under forest/hilly track, where the stage of ground water development indicates that the entire area falls in **safe** category. The pre-monsoon water level of the taluk is 4 to 8.00m and it is shallow. So ground water can be developed through dug wells. The status of drinking water supply is by 544 bore wells fitted hand pumps, 52 piped water supply schemes, 58 mini water supply schemes. All are bore wells indicates that bore wells are the major structures of ground water development in the taluk. Similarly, for irrigation there are 661 dug wells and 265 shallow bore wells which are the ground water development structures exist in the taluk. The net irrigated area is 11363ha, of which 6541ha is from ground water and 4822 ha is through surface water. The ground water thus developed through dug wells and bore wells are utilised through adopting different water distribution system like sprinklers (44 dugwells+4 bore wells) drip irrigation (1 dug wells +6 bore wells) open channel (586 dug wells +209 bore wells) underground channel (28 dug wells +45 bore wells), others (2 dug wells +1 bore wells). The exploratory drilling by CGWB up to the depth of 80.00m yielded 0.86 to 3.3 lps. There is enough scope for ground water development from deeper aquifers.

4.4.4. Kollegal Taluk

Ground water development in this taluk is through dug wells and bore wells, which tap both shallow and deep aquifers. Bore well forms the main means of

rural water supply and increasingly more popular for irrigation needs. Bore wells are common ground water structures since sufficient quantity of water is doubtful in dug wells due to erratic rainfall. There are 2308 bore wells fitted with hand pumps, 253 bore wells used for piped water supply schemes, 213 as mini water supply schemes through which ground water developed for drinking water supply. For irrigation, it is through dug wells located with in or close to the canal command in the western part of the taluk and do not retain sufficient water column to support irrigation during summer months, but serve the purpose of supplementing. There are 48133 dug wells, 1554 shallow bore wells as development structures existing for irrigation purposes. The net area irrigated in the taluk is 22249 ha of which 14122 ha is from ground water and 7727 ha is from surface water. Area irrigated through bore wells is 12642ha, and through dug wells is 1480ha, indicating bore wells are the major structures of ground water development. The ground water thus developed are utilised by adopting farm management practices like sprinklers (147+70), drip irrigation (11+47), open channel (4371+1109), under ground channel (296+279) and others (8+49). 69% of the total area of the taluk is covered by forest/hilly where ground water development is negligible and the stage of ground water development indicated that 40% of the area falling in **safe** category. So there is enough scope for further ground water development in the taluk. No exploratory drilling took place in the taluk and no deep drilling is reported. So ground water development can be done form deeper aquifers.

5.0 Ground water management strategy

CR nagar district located in the southern tip of Karnataka. Almost 48% of the total geographical area of the district is covered by forest/hilly. Since, hilly areas which predominated the district, watershed treatment can help in augmenting the ground water resources. The areas where the artificial recharge structures cannot be feasible and rainfall is more, such areas where the base flow is available in the streams and rivers during non-monsoon season may be arrested through construction of vented dams at suitable sites, which can be used either for water supply or for irrigation purposes. The net sowed area comprises 31% of the total geographical area. The contribution of ground water is through dug wells and bore wells, which is 75% of total irrigated area. Similarly, for drinking water also from ground water source through bore wells, i.e. 6881 hand pumps, 725 piped water supply schemes and 665 as mini waer supply schemes. The district is already practicing the ground water management strategies through proper ground water distribution system for irrigation purposes as sprinklers, drip irrigation, open channels, under ground channels and others. Of the above the total number of 14857 ground water structures (both dug wells and bore wells) is utilized as open channel water distribution system. As it is more important that optimum utilization of ground water thus developed, it is suggested that sprinklers and drip irrigation practices should be increased from the existing status, i.e. 1057as sprinklers, and 379 as drip irrigation respectively. It is also envisaged that 7328 shallow dug wells 14879 shallow bore wells are in use for irrigation giving scope to go for deeper zones for further ground water development and management.

5.1 Ground water development

Groundwater resource estimation of the district indicates that the net ground water availability for future irrigation development is 11930 HAM, and the balance of ground water irrigation potential is 13826 HA. Based on this and the present status of ground water development i.e. through shallow dug wells and bore wells alone where the deeper aquifers are not much exploited, it is proposed that the ground water development structures viz. dug wells and dug cum bore wells and bore wells in those areas falling under **Safe** and semi critical category. Dug wells are the ideal structures in command areas of Yalandur taluk and Kollegal taluk. Dug cum bore wells and bore wells are suitable in the other areas. The diameter may be 5.00m to 8.00m and the depth may be 10.00 to 25.00mbgl. Bore wells may be drilled from the bottom of the dug wells up to the depth of 30.00 to 60.00mbgl to tap weathered and fractured zone wherever it is feasible. Bore wells are possible in all topographic conditions.

It may be taken into consideration while designing the various abstraction structures; emphasis for a farm budget model can be evolved for the structure with a designed discharge of 2 to 5 lps with an irrigable command of 1.25 to 3.00ha. The colluviums of Yalandur area also require scrutiny to estimate the total thickness and its spread over area for further development. Ground water development may also be considered on the banks of rivers and streams in Yalandur taluk in general and command areas of Yalandur and Kollegal taluks. Reference to the density of wells in cultivable lands of Kollegal and CRNagar has to be considered for further ground water development.

5.2 Water Conservation and Artificial Recharge

As per the Resource estimation, 60% of the area in Kollegal taluk, 17% and 10% area of Gundlupet and CR nagar taluks falls under Over Exploited category which requires immediate intervention by way of conservation and artificial recharge to ground water in order to arrest further declining trend in water levels. Artificial recharge through percolation tank, check dam and nalla bunds are the solutions to recharge ground water in the district. Kollegal taluk is the largest, where in 70% of the total area is predominately hilly comprising of undulating and rugged terrain where the run off is high. Under these conditions, it is advisable to go for watershed treatment methods, which can help in augmenting the ground water resources. Further considering the topography, the structures like gully plugs, cement plugs, nalla bunds and contour bunds may be constructed by which runoff can be arrested and recharged in to the ground water. As per the statistical data the district has 218 tanks of which 141 tanks have atchcut of more than 40 ha and 77 are less than 40 ha. Maximum of 126 tanks are in Gundlupet taluk, and minimum of 16 tanks are in Kollegal, that is un usual considering its nature of topography with large geographical area. There is a scope for further construction of percolation tanks, check dams and other artificial recharge structures to enhance the recharge in to the ground water system in Kollegal taluk. Most of the existing tanks are silted and dried up. Desilting the tanks and construction of additional tanks will help in recharging the phreatic zone. Sub surface dykes are suitable along the river course where ever thickness of alluvium is more.

6.0 Ground water related issues & problems

Drinking water scarcity exists in number of the villages located at elevated place of hilly region of Kollegal taluk. In many of the villages water scarcity exists due to defunct domestic bore wells. These require proper mechanical maintenance to improve the system. Quality of ground water is getting deteriorated with high Nitrate contents in canal command areas of Yalandur and Kollegal taluks. The farmers of the district are facing problem of non uniform power supply in the district.

7.0 Awareness & Training Activity

Central Ground Water Board has organised Mass Awareness programme in Kollegal on 06/07/2005 at Kollegal shikshakara bhavana. Smt. Bharati Nagraj president Zillah Panchayat was the Chief Guest and inaugurated the programme. Shri. S.M.Somashekar, IFS, CEO, ZP was the guest of honour. As the part of this programme, drawing competition was organised for school children and certificates were distributed. Working models of artificial recharge and rainwater harvesting were exhibited. Documentaries of ARS and rainwater harvesting with case studies and quality of ground water were shown. About 300 representatives from state government, educational institutions, farmer community, self-help and user group particularly from sthree shakti organisation participated in the programme.

Water Management Training Programmes (WMTP) was held at taluk panchayat hall, CRNagar during 27th and 28th July 2005. Sri. Bharadwaj, Chairman, Institutions of Engineers, inaugurated the programme. Sri. S.M.Somashekar, IFS, CEO, ZP, presided over the function. Various topics and documentaries on the theme of water management were presented to the trainees, followed by field visit to rooftop harvesting site was arranged.

8.0 Areas notified by CGWA / SGWA

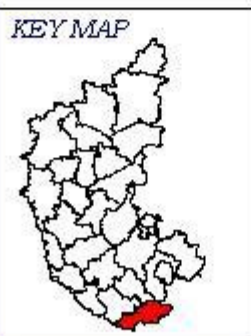
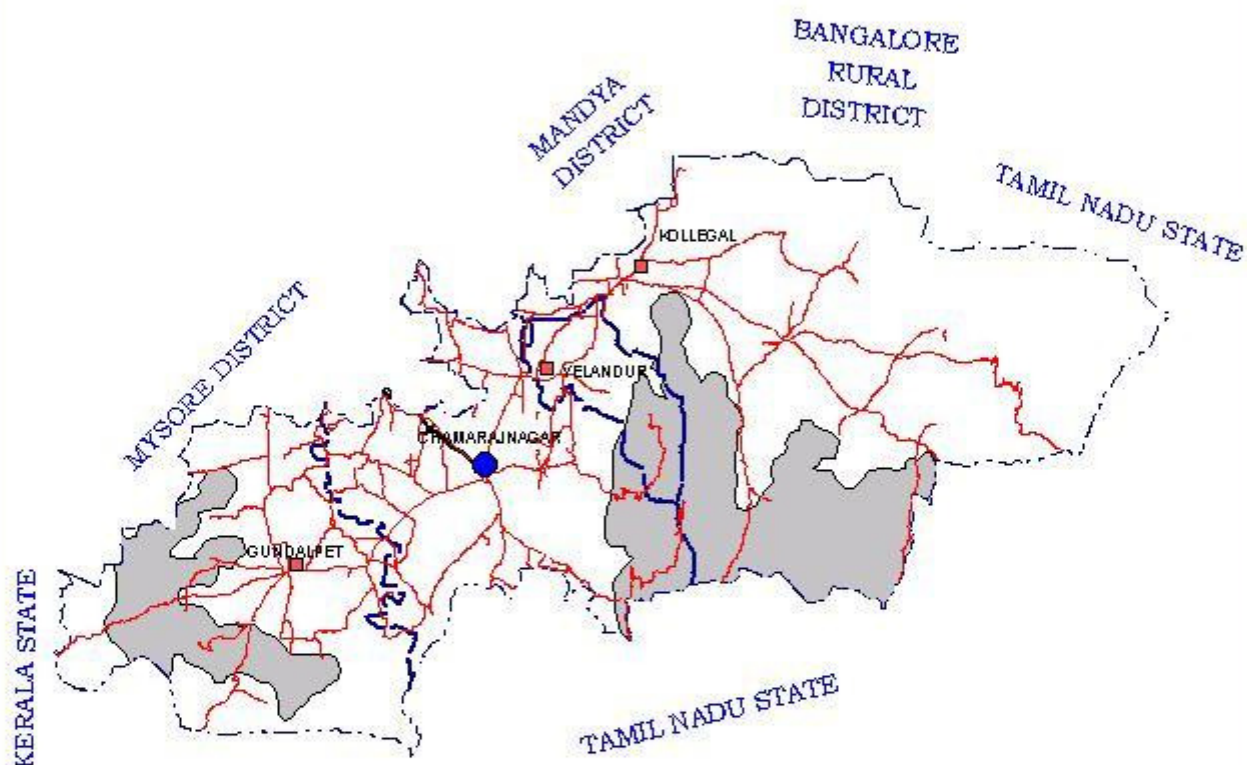
None of the taluks has notified under CGWA / SGWA.

9.0 Recommendations

A major portion of Chamarajanagar district is hilly and undulating terrain. The topographical conditions lead to high runoff. So, adopting water shed treatment is good option in augmenting the natural recharge. Due to the uneven topography, the irrigation is confined to intermountain valleys, resulting in densely spaced wells in a particular area, thus appears to be over exploited as in Kollegal (60% OE). These areas have to be studied in detail by collecting filed data which will enable the ground water Resource Estimation and to implement special projects for new structures for ground water development. The Stage of ground water development as OE in Kollegal 60%, and semi critical in Gundlupet and CRNagar taluk (80% & 14 %) demands department like CGWB to construct pizometers to monitor water levels on long term basis and draw up check measures if there is decline in ground water level and quality. The present management practices for irrigation such as sprinklers, drip irrigation, underground channels etc., where the number of sprinklers and drip irrigation structures is to be increased for

optimum use of available developed ground water depending upon cropping pattern. The villages located in hilly regions of the district facing drinking water scarcity. Special source finding projects may be taken up, and also construction of ARS, since these places are having enough scope for implementing artificial recharge structures to augment ground water. Some of the villages with satisfactory water supply system, facing drinking water scarcity for want of mechanical maintenance of defunct bore wells. So periodical checking of water supply system will improve the system efficiently. In addition to this, the abandoned bore well/dug wells can be utilised for recharging aquifers with surplus runoff during rainy days. Exploratory drilling in the district beyond 90.00mbgl is not reported. So, it is suggested for deep exploratory drilling programme in order to determine the nature and characteristics of deeper aquifers.

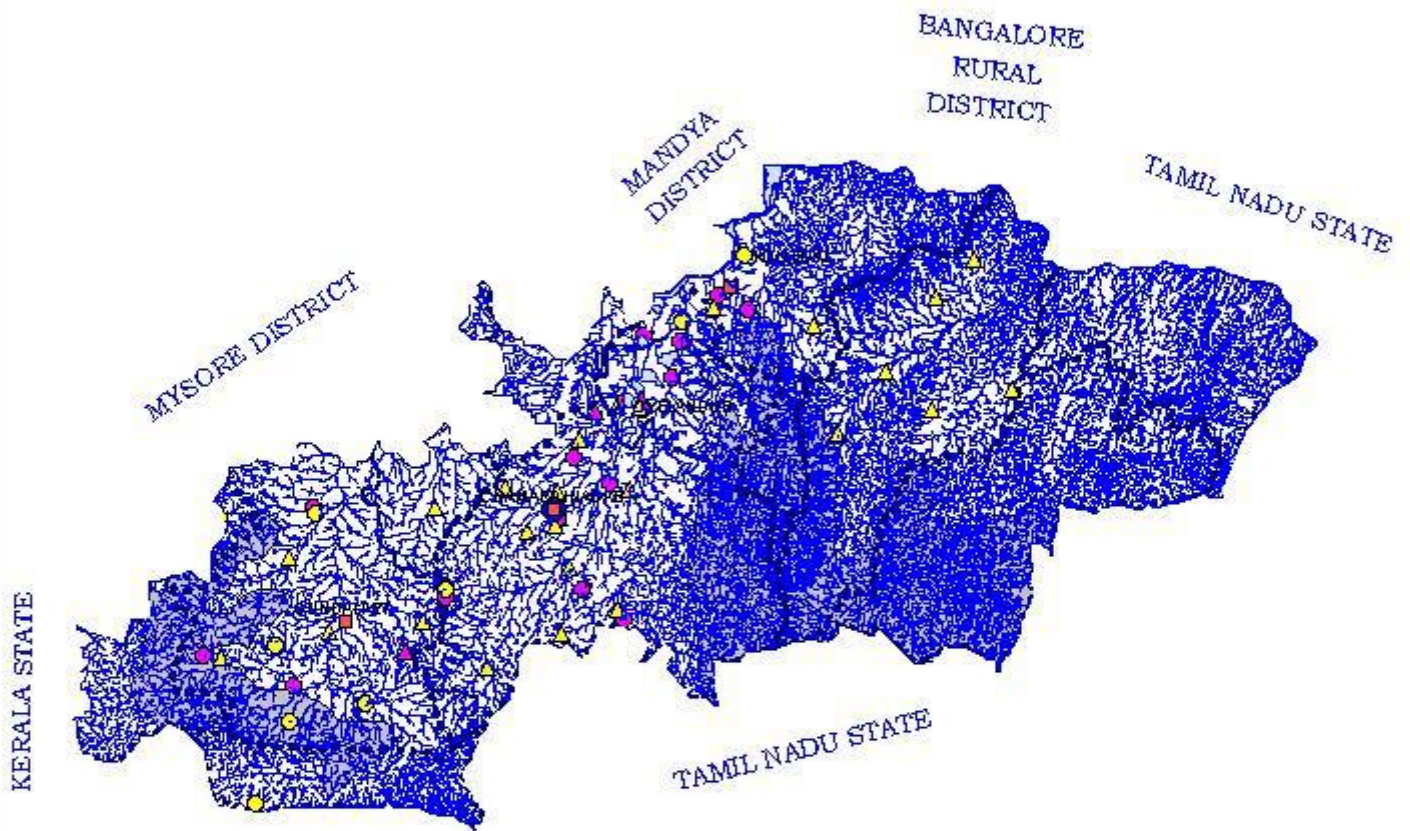
ADMINISTRATIVE SET-UP CHAMARAJANAGAR DISTRICT KARNATAKA



LEGEND

- | | |
|------------------|-----------------------|
| Metalled road | Taluk boundary |
| National Highway | District headquarters |
| Railway track | Taluk headquarters |
| | Hilly area |

DRAINAGE & HYDROGRAPH MONITORING STATIONS CHAMARAJANAGAR DISTRICT, KARNATAKA




LEGEND


CGWB STATIONS

- Dug well
- ▲ Piezometer

DMG STATIONS

- Dug well
- ▲ Piezometer

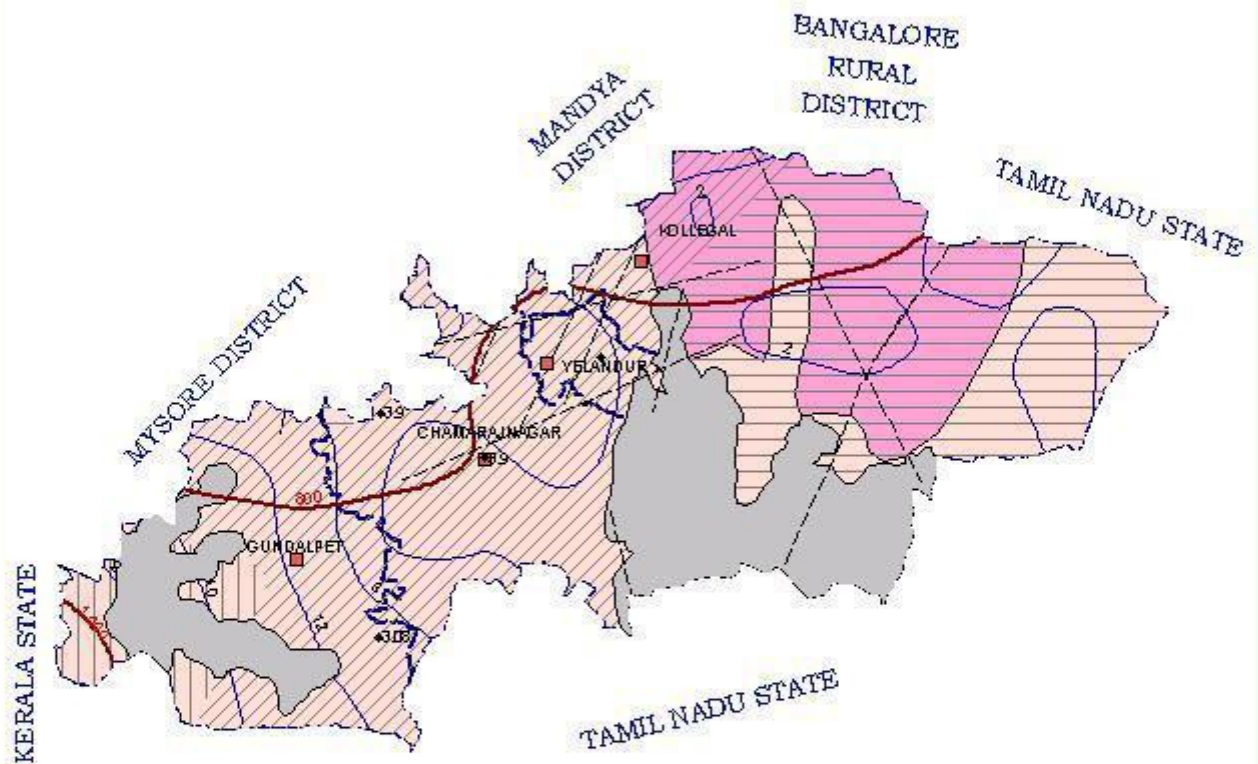
 Surface waterbody

 Drainage

 Watershed Boundary

Fig-3

HYDROGEOLOGY CHAMARAJANAGAR DISTRICT KARNATAKA



Geology

- Granites
- Gneisses

Ground Water Prospects

- Yield upto 1 litres per second
- Yield upto 5 litres per second
- Yield >5 litres per second

39
◆ Borewell with Yield in litres per second

LEGEND

Lineament

Isohyet

Decadal mean water level in m bgl

Taluk boundary

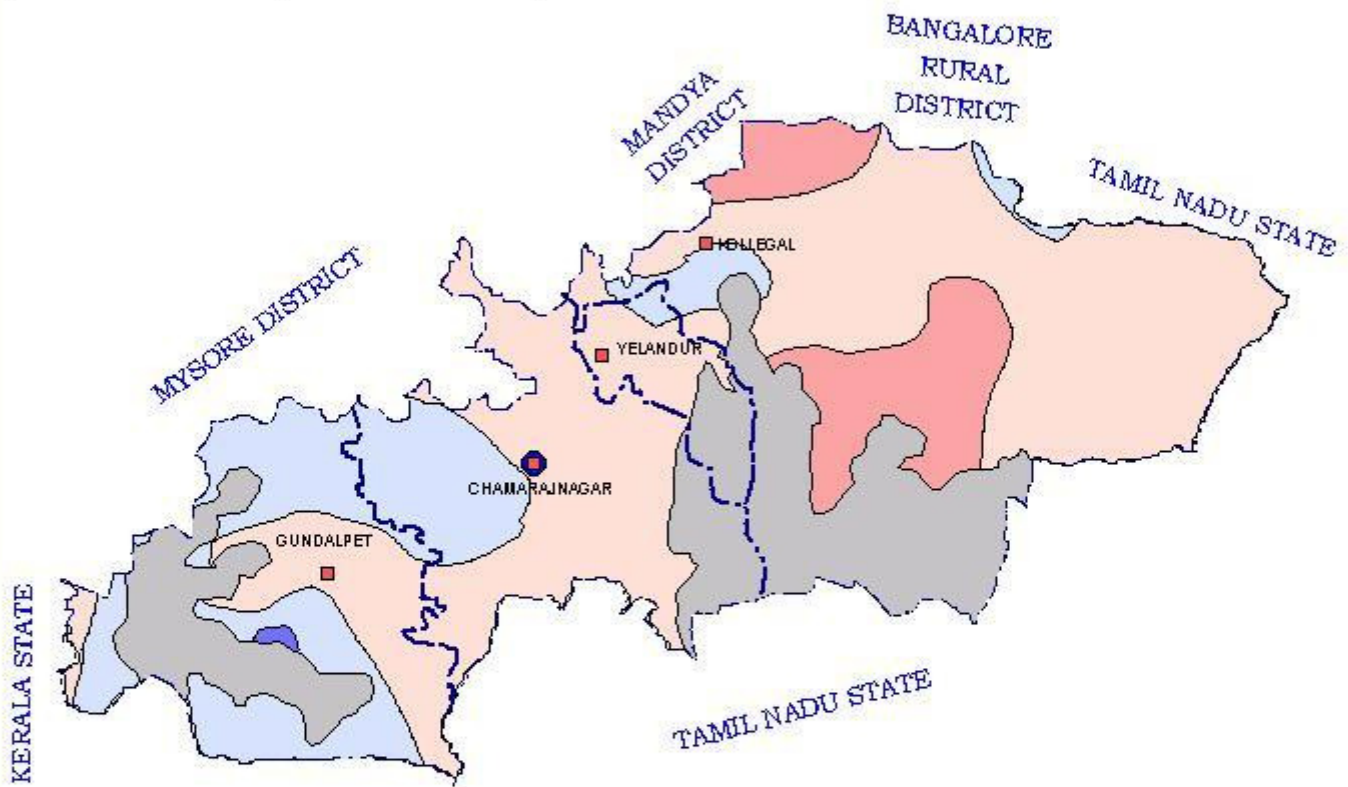
Taluk headquarters

Hilly area

DEPTH TO WATER LEVEL PRE-MONSOON (MAY-2006)



CHAMARAJANAGAR DISTRICT, KARNATAKA



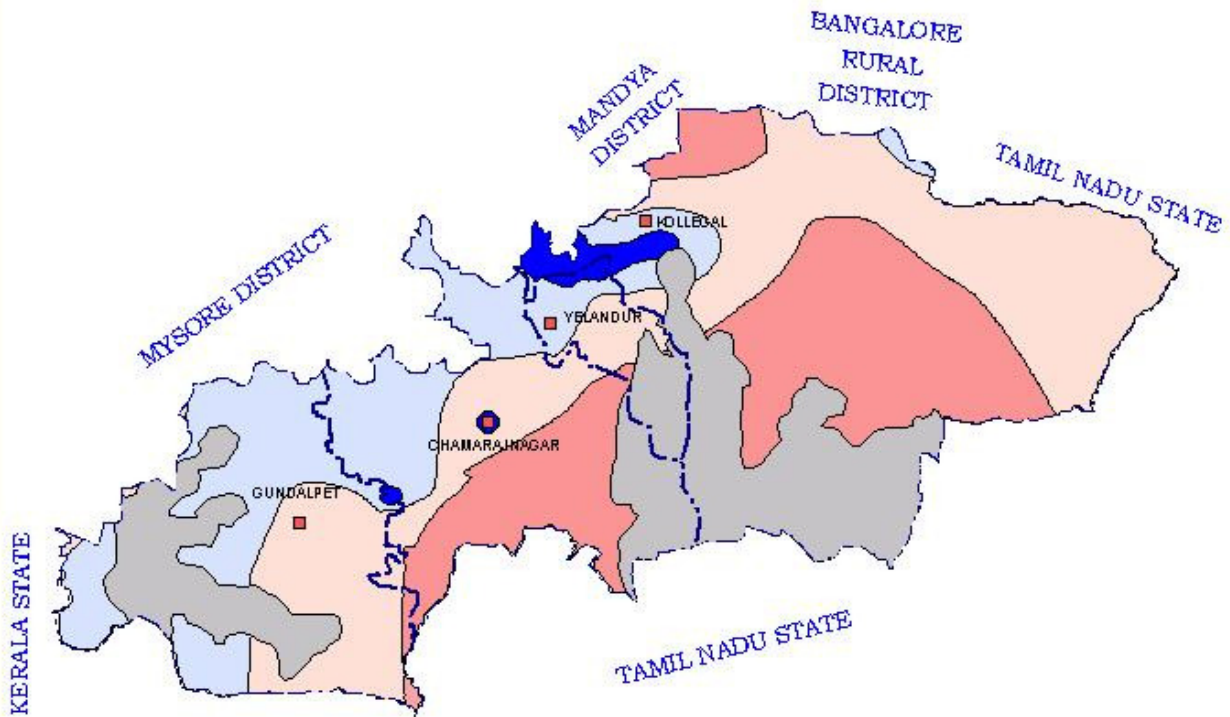
LEGEND

Depth to Water

Level (m bgl)

- < 2
- 2 - 5
- 5 - 10
- 10 - 20

DEPTH TO WATER LEVEL POST-MONSOON (NOVEMBER-2006) CHAMARAJANAGAR DISTRICT, KARNATAKA

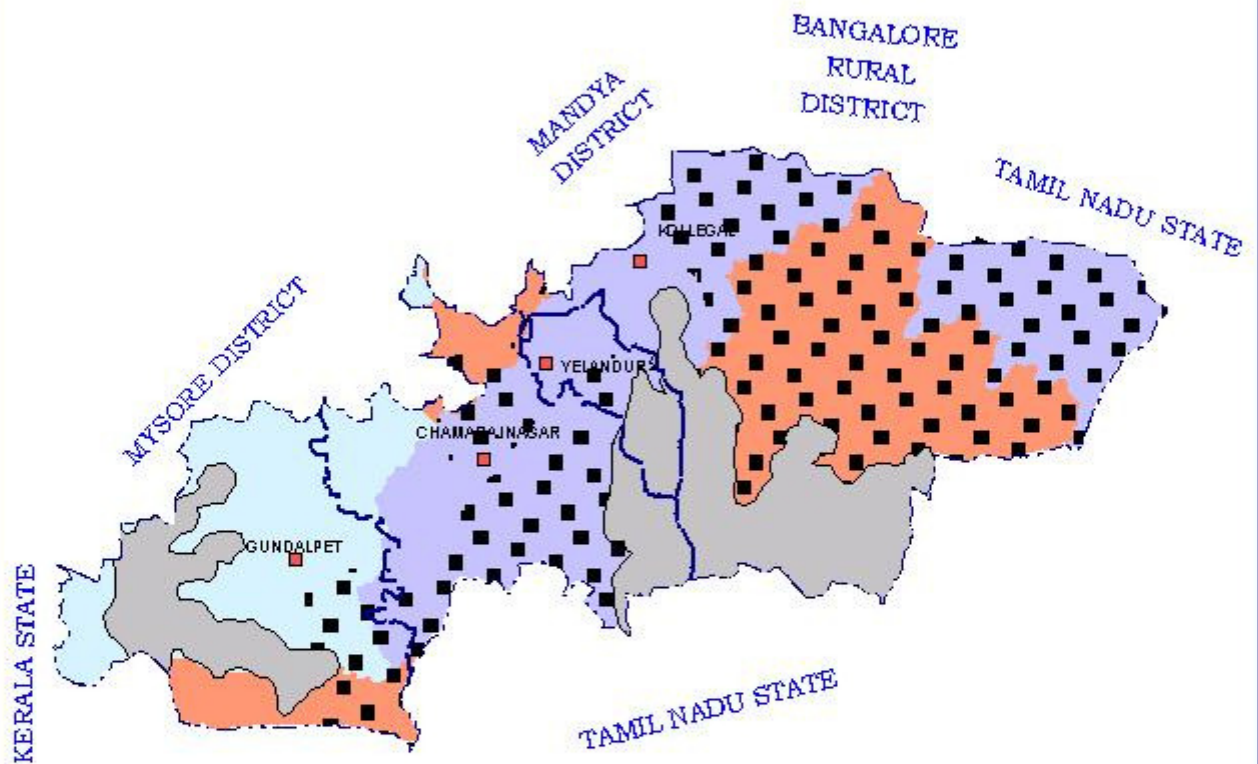


LEGEND








Depth to Water
Level (m bgl)

■	< 2
■	2 - 5
■	5 - 10
■	10 - 20

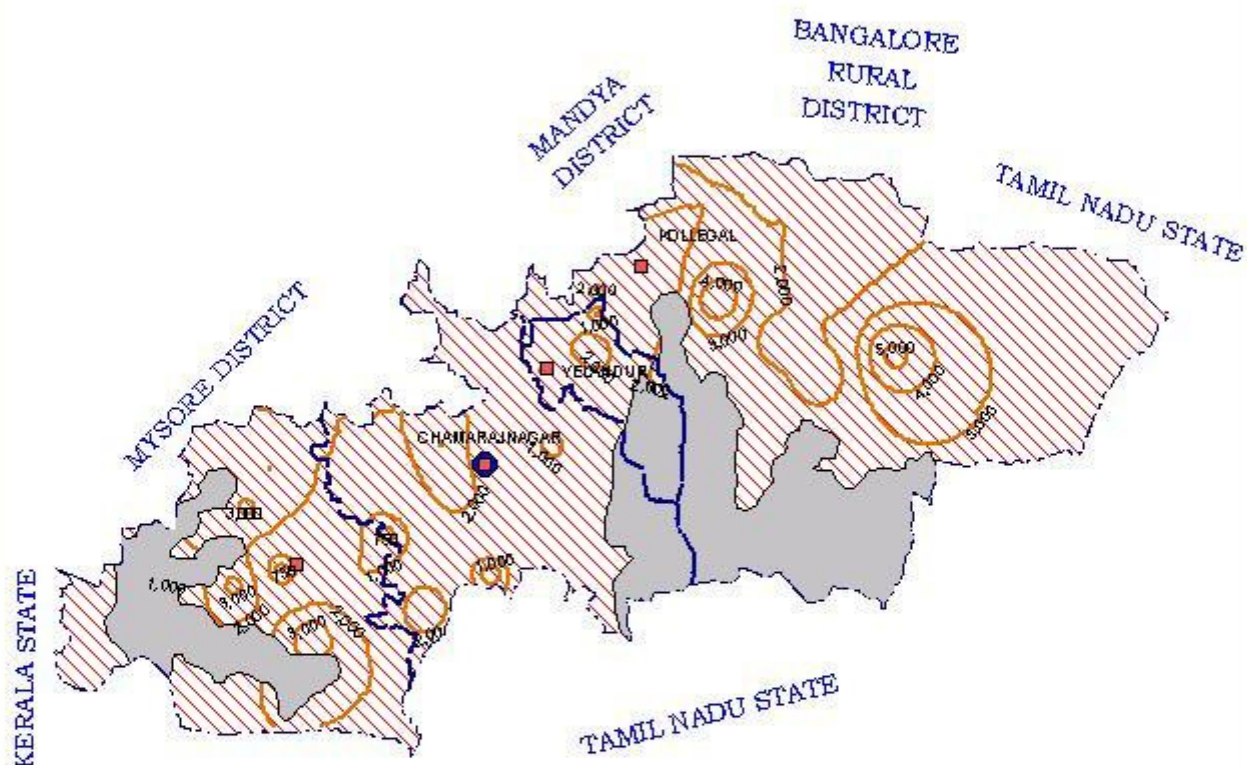
STATUS OF GORUNDWATER UTILISATION CHAMARAJANAGAR DISTRICT



LEGEND

- | | | | |
|---|-----------------------------------|---|--------------------|
|  | Safe |  | Hilly area |
|  | Semi-Critical |  | Taluk boundary |
|  | Over Exploited |  | Taluk headquarters |
|  | Area suitable artificial recharge | | |

GROUND WATER QUALITY CHAMARAJANAGAR DISTRICT KARNATAKA



LEGEND

- | | | |
|---|--|---|
| <p> Nitrate concentration > 45 Mg/L</p> <p> Electrical conductivity (Micro mhos/cm) 1000</p> | <p> Chloride concentration 250-1000 Mg/L</p> | <p> Taluk boundary</p> <p> District headquarters</p> <p> Taluk headquarters</p> |
|---|--|---|