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Technical Report Series

DISTRICT GROUNDWATER BROCHURE VIRUDHUNAGAR DISTRICT, TAMIL NADU

By

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Ministry of Water Resources

Central Ground Water Board

South Eastern Coastal Region
Chennai

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DISTRICT AT A GLANCE (VIRUDUNAGAR DISTRICT)

S. No.	ITEMS	STATISTICS	
1.	**GENERAL INFORMATION**		
	i. Geographical area (Sq. km)	**4243.23**	
	ii. Administrative Divisions (As on 31-3-2007) Number of Taluks Number of Blocks Number of Villages	 8 11 600	
	iii. Population (2001 Census) Total Population Male Female	 1751301 870376 880925	
	iv. Average Annual Rainfall (mm) (1901-2000)	799.8	
2.	**GEOMORPHOLOGY**		
	i. Major physiographic Units	Structural hills, Deep Burried Pediments, Shallow Burried Pediments, Bazada and Flood Plain .	
	ii. Major Drainages	Vaippar, Gundar, & Arjuna Nadhi.	
3.	**LAND USE (Sq. km) (2005-06)**		
	i. Forest area ii. Net area sown iii. Cultivable waste	264.66 1428.82 96.63	
4.	**MAJOR SOIL TYPES**	1. Deep red loam, 2. Black soil, 3. Red sandy soil.	
5.	**AREA UNDER PRINCIPAL CROPS (Ha) (2005-2006)(Figures is bracket are % to the total Geographical area of the district)**	1. Paddy -30433 (50.6%) 2. Groundnut – 467 (0.78%) 3. Pulses – 467 (0.78%) 4. Sugarcane – 3209 (5.33%)	
6.	**IRRIGATION BY DIFFERENT SOURCES (2005-06)**	**Number**	**Area irrigated (Ha)**
	i. Dug wells	36087	33765
	ii. Tube wells	0	0
	iii. Tanks	997	26423
	iv. Canals	0	0
	vi. Net irrigated area	55365 Ha	
	vii. Gross irrigated area	60188 Ha	

7.	**NUMBER OF GROUND WATER MONITORING WELLS OF CGWB (As on 31.03.2007)**		
	i. Number of dug wells	12	
	ii. Number of piezometers	11	
8.	**PREDOMINANT GEOLOGICAL FORMATIONS**	Recent Alluvium, Sandstones, Gneisses Complex, Basic metamorphic rocks, Granites and Charnockites.	
9.	**HYDROGEOLOGY**		
	i. Major water bearing formations	Sandstone, weathered & fractured granitic gneisses etc.	
	ii. Pre- monsoon depth to water level (May 2006) (m. bgl)	0.67 – 12.12	
	iii. Post- monsoon depth to water level (Jan 2007) (m. bgl)	0.49 – 8.78	
	iv. Long term water level trend in 10 years (1998-2007) in (m/year)	**Annual**	
		Rise	**Fall**
		Min : 0.0009 Max :0.3944	Min : 0.0635 Max :0. 2693
10	**GROUND WATER EXPLORATION BY CGWB (As on 31-03-2007)**		
	i. Number of Exploratory wells ii. Number of Observation wells iii. Number of Piezometers under Hydrology Project.	26 5 11	
	iv. Depth range (m bgl)	120 – 200	
	v. Discharge (lps)	0.004 – 1.142	
	vi. Storativity (S)	3.41×10^{-5} -0.7×10^{-2}	
	vii. Transmissivity (m^2/day)	1 – 518.3	
11	**GROUND WATER QUALITY(As on MAY 2006)**		
	i. Presence of chemical constituents more than permissible limit	Cl , F & TH as $CaCO_3$ & NO_3.	
	ii. Type of water	Ca-Cl , NaCl & Ca-HCO_3	
12	**DYNAMIC GROUND WATER RESOURCES (As on 31.03.2004) in MCM**		
	i. Annual Replenishable Ground Water Resources	469.78	
	ii. Total Annul Ground Water Draft for all purposes	312.51	
	iii. Projected demand for Domestic and Industrial Uses up to 2029	271	
	iv. Stage of Ground Water Development	67 %	
13.	**AWARENESS AND TRAINING ACTIVITY**		
	i. Mass Awareness Programmes Organized		
	Year	2002-03	
	Place	Rajapalayam.	
	Number of Participants	300	
	ii. Water Management Training Organized		
	Year	2002-03	
	Place	Rajapalayam.	
	Number of Participants	30	

14.	**EFFORTS OF ARTIFICIAL RECHARGE & RAINWATER HARVESTING**	Technical Guidance were provided as when sought
	i. Projects completed by CGWB Number of structures ii Amount spent	 Vadapatti in Sivakasi Block. Rs 6.510 (Lakhs)
15.	**GROUND WATER CONTROL AND REGULATION**	
	i. Number of OE Blocks	1
	ii. Number of Critical Blocks	1
	iii. Number of Blocks Notified	**Nil**
16.	**MAJOR GROUND WATER PROBLEMS AND ISSUES**	i) Virudhunagar district is characterised by relatively high level of ground water development in both hard rock and sedimentary aquifers. ii) Presence of Black Clayey Soils has resulted in reduced natural recharge to groundwater system iii) It has also resulted in water quality problem iv) Water scarcity in part of the district due to unfavorable hydrogeological set up.

1.0 INTRODUCTION

1.1. Administrative Details

Virudhunagar district is divided into 8 taluks. The taluks are further divided into 11 blocks (Plate-I), which further divided into 600 villages.

S. No.	Taluk	No. of Villages	Block	No. of Villages
1	Srivilliputtur	54	Srivalliputtur	31
			Watrap	23
2	Rajapalayam	35	Rajapalayam	35
3	Virudhunagar	59	Virudhunagar	59
4	Sathur	47	Sathur	47
5	Aruppukottai	40	Aruppukottai	40
6	Thiruchuli	192	Thiruchuli	100
			Narikudi	92
7	Kariyapatti	108	Kariyapatti	108
8	Sivakasi	65	Sivakasi	29
			Vembakottai	36
	Total	**600**		**600**

1.2. Basin and sub-basin

The district is part of the composite east flowing river basin, "Between Gundar and Vaippar" as per the Irrigation Atlas of India. Vaippar, Arjuna River, Gundar, and Deviar, Nichibanadhi, Kovilur and Periyar are the important Sub-basins/Watersheds.

1.3. Drainage

The major part of Virudhunagar district falls in Vaippar - Gundar river basin. Vaippar, Arjuna River, Gundar and Deviar are the important rivers. The drainage pattern, in general, is dendritic. All the rivers are seasonal and carry substantial flows during monsoon period. Vaippar, which is one of the important rivers of the district, flow and drain in the Vembakkam and Sattur blocks. The Arjuna river, flowing in the central part of the district, has its origin from the Sattur Watrap Hills and is formed by Kovillar, periyar and Chittar rivers. The Gundar river originates at an altitude of 500 m. amsl near Kottaimalai of Saptur reserve forest in Varushanadu hills in Madurai district

1. 4. Irrigation Practices

The nine-fold lands use classification (2005-06) for the district is given below.

S. No.	Classification	Area (Ha)
1	Forests	26466
2	Barren & Uncultivable Lands	4525
3	Land put to non agricultural uses	70286
4	Cultivable Waste	9663
5	Permanent Pastures & other grazing lands	804
6	Groves not included in the area sown	6568
7	Current Fallows	3063
8	Other Fallow Lands	160066

9	Net Area sown	142882
	Total	**424323**

(Source: Department of Economics & Statistics, Govt. of Tamil Nadu)

The chief irrigation sources in the area are the tanks, wells and tube/bore wells. Reservoirs and Tank irrigation is highest in Srivalliputtur, Thiruchuli and Kariyapatti blocks followed by Aruppukottai, Rajapalayam, Sivakasi, Sattur, and Virudhunagar blocks.

The block-wise and source- wise net area irrigated (2005-06) (in Ha) is given below

S. No.	Block	Net area irrigated by					Total Net Area irrigated
		Canals	Tanks	Tube/ Bore wells	Ordinary wells	Other Sources	
1	Srivilliputtur	0	1056	4211	439	0	5706
2	Watrap	0	1259	1983	4017	0	7259
3	Rajapalayam	32	2581	2794	1848	15	7270
4	Virudhunagar	98	289	6517	4679	0	11583
5	Sathur	0	650	1417	881	0	2948
6	Aruppukottai	7	481	764	3192	0	4444
7	Thiruchuli	20	1307	769	4678	0	6774
8	Narikudi	253	275	2881	1006	0	4415
9	Kariyapatti	313	1822	484	407	813	3839
10	Sivakasi	28	4756	7797	721	358	13660
11	Vembakottai	0	315	1716	542	93	2666
	Total	**751**	**14791**	**31333**	**22410**	**1279**	**70564**

(Source: Department of Economics & Statistics, Govt. of Tamil Nadu)

1. 5. Studies/Activities carried out by CGWB

Central Ground Water Board carried out the Systematic hydrogelogical surveys in the district during the period of 1976 - 80, Reappraisal hydrogelogical surveys were conducted during the period of 1990 - 95, Detailed exploration were carried out in Vaipar and Gundar basin down to a depth of 200 m bgl to assess the ground water resources of the area. The exploratory drilling of boreholes (26 Nos.) was revealed that the weathered and fracture zone is limited to 25 to 35 m below ground level. The fracture encountered at deeper depths are not productive due to poor yield with higher draw downs. In the sedimentary area of this district the thickness of Alluvial and Tertiary formation ranges from 35 to 50 m.

CGWB is monitoring the groundwater regime for the changes in water levels and water quality through 12 dug wells and 11 piezometers. The monitoring of water levels are carried out during May (Pre monsoon), August (Middle of south west monsoon), November (Post south west monsoon) and January (Post northeast monsoon) to study the impact of rainfall on groundwater regime. Water samples are collected during May for determining the changes in chemical quality of groundwater.

2. 0. RAINFALL AND CLIMATE

The district receives the rain under the influence of both southwest and northeast monsoons. The northeast monsoon chiefly contributes to the rainfall in the district. Most of the precipitation occurs in the form of cyclonic storms caused due to the depressions in Bay of Bengal. The southwest monsoon rainfall is highly erratic and summer rains are negligible. Rainfall data from seven stations over the period 1901-2000 were utilized for analysis and a perusal of the data shows that the normal annual rainfall over the district varies from about 724 to 913 mm. It is minimum around Sathur in the southeastern part of the district. It gradually increases towards west, north and northwest and attains a maximum around Watrap.

The district enjoys a subtropical climate. The period from April to June is generally hot and dry. The weather is pleasant during the period from November to January. Usually mornings are more humid than afternoons. The relative humidity is on an average between 65 and 85% in the mornings. Humidity in the afternoon is generally between 40 and 70%.

The annual mean minimum and maximum temperatures are 23.78 and 33.95° C respectively. The daytime heat is oppressive and the temperature is as high as 40.2° C. The lowest temperature recorded is of the order of 19.3° C.

3. 0. GEOMORPHYLOGY AND SOIL TYPES

3. 1. Geomorphology

Virudhunagar district is bordered by Western Ghats (Ridge and valley complex) in the West. Vally fill area is observed in Watrap block. A major part of the district constitutes a plain terrain with a gentle slope toward East and Southeast, except for the hilly terrain in the west.

The prominent geomorphic units identified in the district through interpretation of Satellite imagery are; 1. Flood Plain, 2. Bazada, 3. Pediment, 4. Shallow & deep buried Pediments and 6. Structural Hills.

3. 2. Soils

Soils in the area have been classified into i) Deep red Loam ii) Black soil iii) Red sandy soil. The majority of the study area is covered by Black soil. Ferruginous red soils are also seen at places. Black soils are deep to very deep and generally occurs in the depressions adjacent to hilly areas, in the western and central part of district. Alluvial soils occur along the river courses. Red sandy soil is seen all around the Sattur, Kariyapatti, Aruppukotai and Thiruchuli blocks.

4. 0. GROUND WATER SCENARIO

4. 1. Hydrogeology

The district is underlain by both porous and fissured formations (Plate-II). Unconsolidated & Semi-consolidated formations and Weathered, Fissured and

Fractured crystalline rocks constitute the important aquifer systems in the district.

The porous formations in the district include sandstones and clays of Recent to sub-recent and Tertiary age (Quaternary).The alluvial formations comprising mainly sands, clays and gravels are confined to major drainage courses in the district.The maximum thickness of alluvium is 35.0 m. whereas the average thickness is about 25.0 m. Ground water occurs under phreatic to semi-confined conditions in these formations and is being developed by means of dug wells and filter points. Alluvium, which forms a good aquifer system along the Vaippar and Gundar river bed, which is one of the major sources of water supply to the villages.

The water-bearing properties of crystalline formations, which lack primary porosity, depend on the extent of development of secondary intergranular porosity . The occurrence and movement of ground water in these rocks are generally confined to such spaces. These aquifers are highly heterogeneous in nature due to variation in lithology, texture and structural features even within short distances. Ground water generally occurs under phreatic conditions in the weathered mantle and under semi-confined conditions in the fissured and fractured zones at deeper levels.

The thickness of weathered zone in the district is in the range of 4 to 15 m. The depth of dug wells ranged from 10 to 15 m bgl. The yield of large diameter wells in the district, tapping the weathered mantle of crystalline rocks ranges from 40 to 110 lpm and are able to sustain pumping for 2 to 6 hours per day. The Specific capacity of large diameter wells tested in crystalline rocks ranges from 6.26 to 183.8 lpm / m. of drawdown. The yield characteristics of wells vary considerably depending on the topographic set-up, lithology and nature of weathering.

The yield of bore wells drilled down to a depth of 40 to 70 m, by various state agencies mainly for domestic purposes ranged from 10 to 250 lpm. The yield of successful bore wells ranged up to 6 lps for the drawdown varying between 5.76 and 17.56 m and drilled down to a depth of 200 m bgl during the ground water exploration programme of Central Ground Water Board..

The depth to water level in the district varied between 0.67 and 12.12 m bgl during pre-monsoon (May 2006) and varied between 0.49 and 8.78 m bgl during post monsoon (Jan 2007). The seasonal fluctuation shows a rise in water level which ranges from 0.35 to 2.8 m. The piezometric head varied between 3.49 and 16.23 m bgl during pre monsoon (May 2006) and 1.29 and 8.06 m bgl during post monsoon (Jan 2007).

4. 1. 1. Long Term Fluctuation (1998-2007)

The long term water level fluctuation for the period 1998-2007 is indicates rise in water level in the range of 0.0009 - 0.3944 m/year. The fall in water level ranging between 0.0635 and 0.2693 m/year.

4. 1. 2. Aquifer Parameters

Formation	Transmissivity (m^2/day)	Storativity	Specific Yield (%)
Weathered Crystallines	-	-	<2
Fractured Crystallines	1-548	$3.41X10^{-5}$ to $7.0X10^{-3}$	-

4. 2. Ground Water Resources

The ground water resources have been computed jointly by Central Ground Water Board and State Ground & Surface Water Resources and Data Centre (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.

Block	Net Groundwater Availability (M.Cu.m)	Existing Gross Draft for Irrigation (M.Cu.m)	Existing Gross Draft for Domestic and industrial water supply (M.Cu.m)	Existing Gross Draft for all uses (M.Cu.m)	Allocation for Domestic and Industrial Requirement supply upto next 25 years (2029) (M.Cu.m)	Net groundwatre Availability for future Irriation Development (M.Cu.m)	Stage of Groundwater Development (%)	Category of Block
Srivilliputtur	45.30	36.89	20.40	38.93	23.3	62.8	86	Semi Critical
Watrap	52.27	49.03	25.80	51.6	26.8	0.55	99	Critical
Rajapalayam	67.37	65.48	20.2	67.5	21.1	-0.22	100	Over Exploited
Virudhunagar	36.17	14.20	30.4	17.24	31.7	18.80	48	Safe
Sathur	26.13	87.60	19.30	10.69	20.1	15.36	41	Safe
Aruppukottai	26.33	86.30	18.00	10.43	18.8	15.82	40	Safe
Thiruchuli	47.35	19.87	18.00	21.66	18.7	25.61	46	Safe
Narikudi	59.86	25.94	16.8	27.62	17.5	32.16	46	Safe
Kariyapatti	50.36	25.93	19.1	27.84	20.0	22.43	55	Safe
Sivakasi	31.82	18.85	46.30	23.48	48.3	8.14	74	Semi Critical
Vembakottai	26.82	13.14	23.7	15.51	24.7	11.22	58	Safe
Total	**469.78**	**443.23**	**258.00**	**312.5**	**271.00**	**212.67**	**66.52**	

4. 3. Ground Water Quality

The chemical characteristics of ground water in the phreatic zone in Virudhunagar district has been studied using the analytical data of ground water samples collected from Ground water monitoring wells 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 Virudhunagar district, in general, is colourless, odourless and slightly alkaline in nature. The specific electrical conductance of ground water in phreatic zone (in Micro Seimens at 25^{o} C) during May 2006 was in the range of 409 to 4350 in the district. It is between 750 and 2250 µS/Cm at 25^{o} C in the major part of the district. Conductance below 750 µS/Cm at 25^{o} C have been observed in ground water in parts of Sathur and Watrap blocks, whereas conductance exceeding 2250 µS/Cm at 25^{o} C have been observed in part of Rajapalayam and Virudhunagar blocks. 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. Total Hardness as $CaCO_3$ is observed to be in excess of permissible limits of treating water standard of BU in about 49 percent of samples analyzed whereas Nitrate is found in excess of 45 mg/l in about 30 percent samples analyzed. 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 Absorption 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 using ground water for irrigation.

4. 4. Status of Ground Water Development

The estimation of groundwater resources of the district shows that one block is over exploited and one block is under "critical" category.

The shallow alluvial aquifers along Vaippar and Gundar rivers serve as an important source of drinking water and irrigation development of Virudhunagar district. Dug wells are the most common ground water abstraction structures used for irrigation in the district. The yield of dug wells range from <50 to 200 m^3/day in weathered crystalline rocks, 20 to 100 m^3/day in Tertiary formations and upto 400 m^3/day in Recent alluvial formations along major drainage courses. The dug wells in hard rock terrain tapping the entire weathered residuum are capable of yielding 6 – 7 lps, requiring the installation of 5 HP centrifugal pumps for extraction of ground water.

5. 0. GROUNDWATER MANAGEMENT STRATEGY

5. 1. Groundwater Development

In view of the presence of balck top soil in the major parts of the district, the recharge potentials are very low an dit has also resulted in quality problem. Hence, it is necessary to exercise causion while planning further devlopment of available groundwater resources in the district. The yields of dug wells in crystalline and Tertiary formations can be improved at favorable locations by construction of extension bores and radial arms respectively to a length of 20-30 m. In recent years, farmers for irrigation purposes have also drilled a large number of bore wells.The development of ground water for irrigation in the district is mainly through dug wells tapping the weathered residuum or recent alluvial deposits. Bore wells have also become popular as the source for irrigation in the district in recent years. Dug wells with extension bores wherever necessary is ideal for hard rock areas whereas large diametert dug wells with radials is suitable for alluvial areas.

The map showing the development prospects for the district is shown in Plate- VI.

5. 2. Water Conservation and Artificial Recharge

CGWB had prepared a master plan to augment groundwater potential by saturating the shallow aquifer taking into consideration the available unsaturated space during post monsoon and available uncommitted surplus run off. Subsequently, computations have been made for Drought Prone Area Program (DPAP) for over exploited and critical blocks in the districts warranting immediate attention. Institute of Remote Sensing, Anna University had prepared block wise maps demarcating potential zones for artificial recharge for the State of Tamil Nadu. Subsequently, State Government

agencies have constructed artificial recharge structures with their own fund or with fund from Central Government, dovetailing various government programs.

Ministry of Water Resources, Government of India has initiated Dug Well Recharge Scheme in the State. The scheme is being implemented by the Nodal Department (SG&SWRDC, PWD, WRO, Government of Tamil Nadu) with the technical guidance of CGWB. The subsidy of Rs. 4000/- for small and marginal farmers and Rs. 2000/- for the other farmers is credited to the beneficiaries' bank account through NABARD. The scheme after implementation will prove to be beneficial to the irrigation sector. The available uncommitted surplus run off has to be recomputed, taking into consideration the quantum of recharge effected through existing irrigation dug wells also. The existing structures and uncommitted surplus flow should be considered for further planning of artificial recharge program.

On the basis of experimental studies, it has been found that de-silting of existing tanks followed by percolation pond with recharge wells, recharge shafts are economical.

There is considerable scope for implementation of roof – top rainwater harvesting in the district. Recharge pits / Shafts / trenches of suitable design are ideal structures for rainwater harvesting in such areas. Central Ground Water Board is also providing free technical guidance for implementation of rooftop rainwater harvesting schemes.

A map showing the development prospects and Artificial recharge structures recommended for various blocks in Virudhunagar district are shown in Plate-VI.

6. 0. GROUND WATER RELATED ISSUES & PROBLEMS

In view of the top black soil in the major parts of the district, the recharge potentials are very low and it has also resulted in water quality problems.

7. 0. Awareness & Training Activity

7. 1. Mass Awareness Campaign (MAP) & Water Management Training Programme (WMTP) by CGWB

One Mass Awareness Campaign on "Ground Water Management, Regulation & Conservation" was organized at Rajapalayam, Virudhunagar district during the period 2002-03 . One WMTP was organized on "Rain Water Harvesting Training" at the meeting hall of District Collectorate complex, Rajapalayam in Virudhunagar district during the period 2002-03.

8. 0. AREA NOTIFIED BY CGWA/SGWA

Central Ground Water Authority has not notified any area in the district. Government of Tamil Nadu vide G.O. No. 53 has banned groundwater development for irrigation in the over exploited blocks of Tamil Nadu. The over exploited block in this district is Rajapalayam.

9. 0 RECOMMENDATIONS

In view of the top black soil in the major parts of the district, the recharge potentials are very low and it has also resulted in water quality problems. In order to increase the recharge, tanks, percolation ponds may be provided with the recharge wells/recharge shafts penetrating this impervious layer to make it more effective in recharging the aquifer.

Waste land development program and micro irrigation system area to be implemented for increasing the agricultural produces to attain more food and income per drop of water in view of the limited water resources in the districts.

PLATE - I

CENTRAL GROUND WATER BOARD, SECR, CHENNAI

VIRUDHUNAGAR DISTRICT, TAMIL NADU

LOCATION

NOT TO SCALE

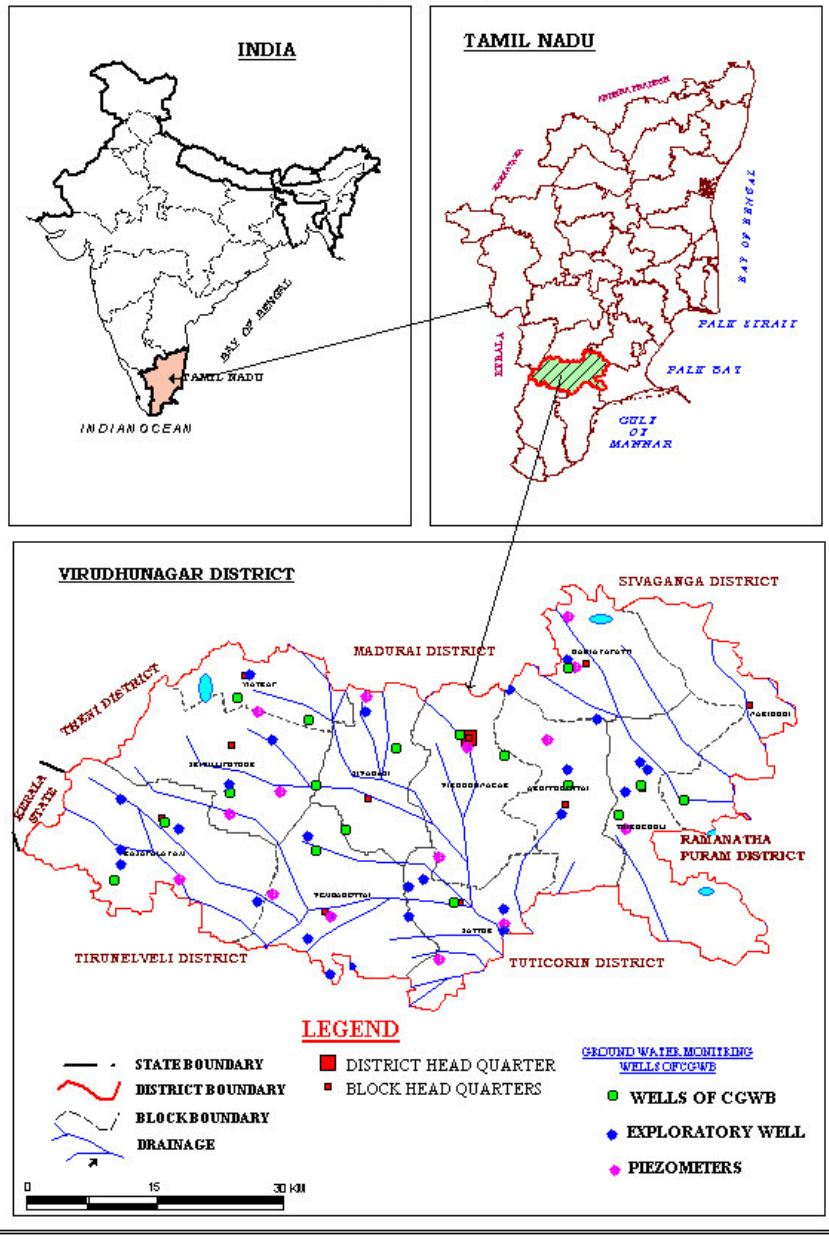
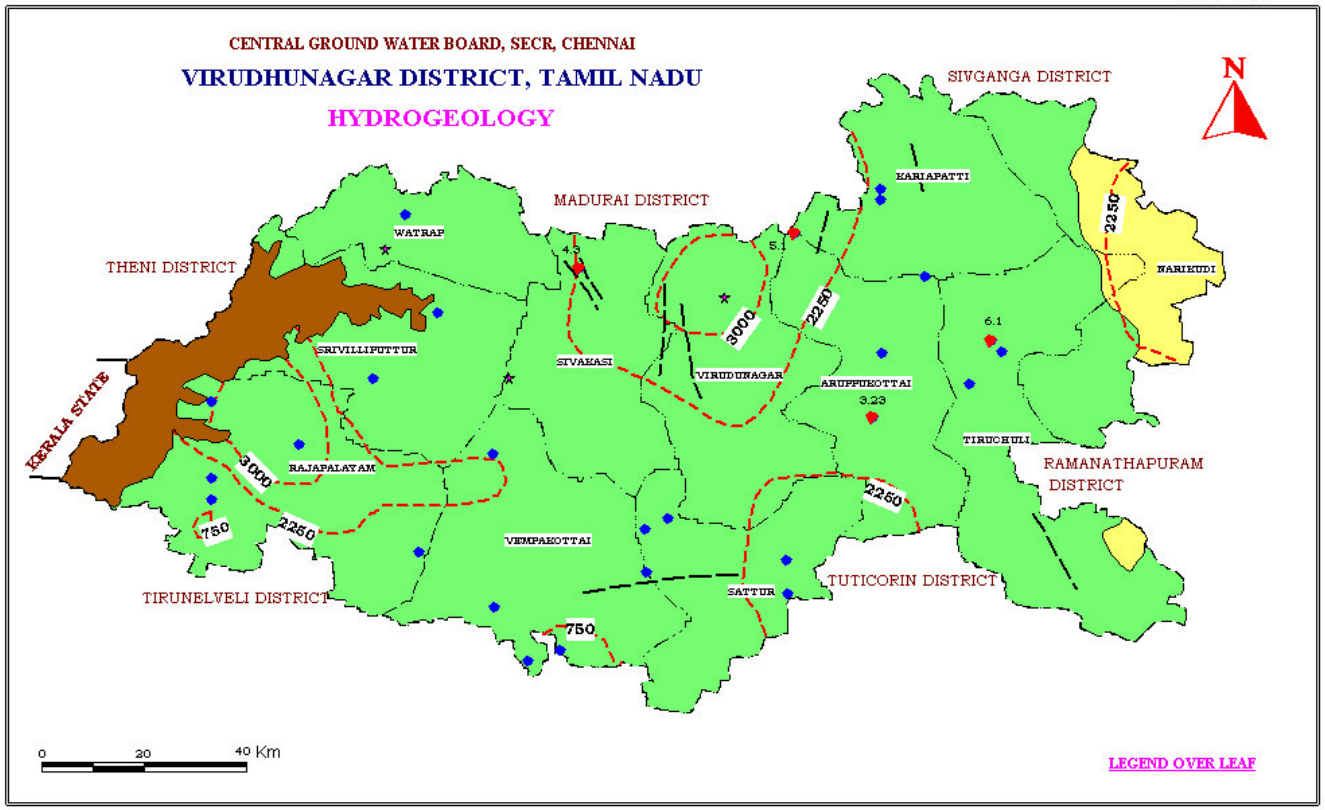


PLATE - II


CENTRAL GROUND WATER BOARD, SECR, CHENNAI
VIRUDHUNAGAR DISTRICT, TAMIL NADU
HYDROGEOLOGY
N
SIVGANGA DISTRICT
MADURAI DISTRICT
THENI DISTRICT
KERALA STATE
TIRUNELVELI DISTRICT
RAMANATHAPURAM DISTRICT
TUTICORIN DISTRICT
KARIAPATTI
WATRAP
SRIVILLIPUTTUR
SIVAKASI
VIRUDUNAGAR
ARUPPUKOTTAI
TIRUCHULI
RAJAPALAYAM
VEMPAKOTTAI
SATTUR
NARIKUDI
4.3
5.1
6.1
3.23
3000
2250
750
0
20
40 Km
LEGEND OVER LEAF

LEGEND FOR PLATE - II

ADMINISTRATIVE SETUP

STATA BOUNDARY

DISTRICT BOUNDARY

BLOCK BOUNDARY

HILLY AREA

GROUND WATER HYDROLOGY

EXPLORATORY BORE WELL [CGWB]

5.1 HIGH YIELDING BORE WELL [CGWB]

HYDROCHEMISTRY

750 ISOCONS [Sp ELECTRICAL CONDUCTANCE [µs /Cm at 25° C]

FLORIDE > 1.5 (mg/l)

STRUCTURE

TRACE OF LINEAMENT

AQUIFER	AGE	LITHOLOGY	GROUND WATER CONDITIONS	YIELD PROSPECTS (CU.M/D)	GROUND WATER DEVELOPMENT STRATEGIES
UNCONSOLIDATED	RECENT	RIVER ALLUVIUM, FLOOD PLAIN-DEPOSITS	DISCONTINUOUS, THIN, UNCONFINED TO SEMI CONFINED	> 200	DEVELOPMENT THROUGH LARGE DIAMETER DUG WELLS AND SHALLOW TUBE WELLS.
CONSOLIDATED	ARCHAEAN	GRANITES, GNEISSES, CHARNOCKITE	DISCONTINUOUS, UNCONFINED TO SEMICONFINED AQUIFERS, RESTRICTED TO WEATHERED RESIDUUM AND FRACTURES	< 50 NEAR WATERSHED DIVIDES & HIGH GROUNDS. 50 - 200 NEAR THIRD ORDER STREAMS AND LOW GROUNDS.	SUITABLE FOR DEVELOPMENT THROUGH DUG WELLS. BOREWELLS FEASIBLE IN FRACTURE ZONES, BEST LOCATIONS BEING INTERSECTION OF FRACTURES

PLATE - III

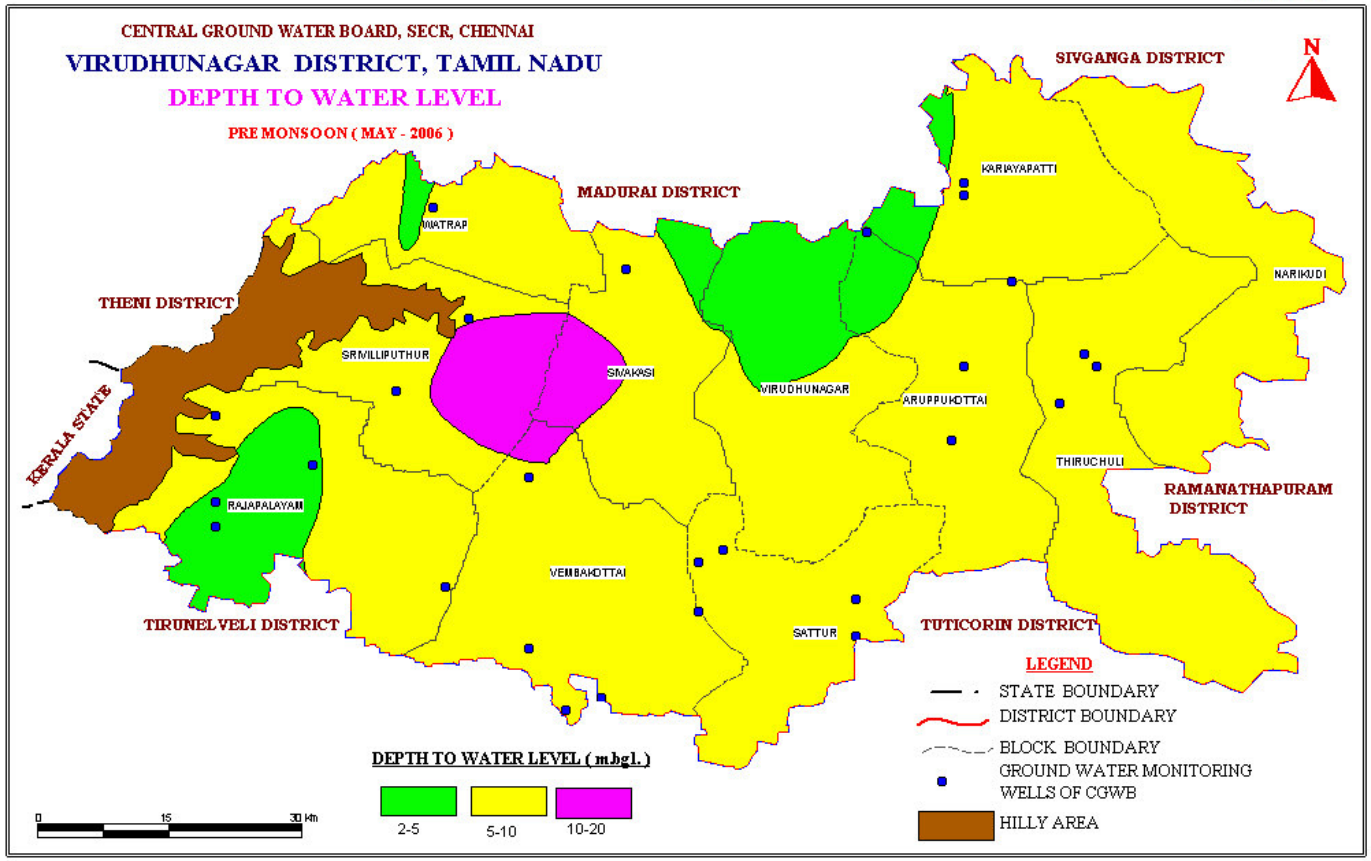

CENTRAL GROUND WATER BOARD, SECR, CHENNAI
VIRUDHUNAGAR DISTRICT, TAMIL NADU
DEPTH TO WATER LEVEL
PRE MONSOON (MAY - 2006)
N
SIVGANGA DISTRICT
MADURAI DISTRICT
KARIAYAPATTI
NARIKUDI
WATRAP
THENI DISTRICT
SRIVILLIPUTHUR
SIVAKASI
VIRUDHUNAGAR
ARUPPUKOTTAI
KERALA STATE
THIRUCHULI
RAMANATHAPURAM DISTRICT
RAJAPALAYAM
VEMBAKOTTAI
TIRUNELVELI DISTRICT
SATTUR
TUTICORIN DISTRICT
LEGEND
STATE BOUNDARY
DISTRICT BOUNDARY
BLOCK BOUNDARY
GROUND WATER MONITORING WELLS OF CGWB
HILLY AREA
DEPTH TO WATER LEVEL (mbgl.)
2-5
5-10
10-20
0
15
30 Km

PLATE- IV

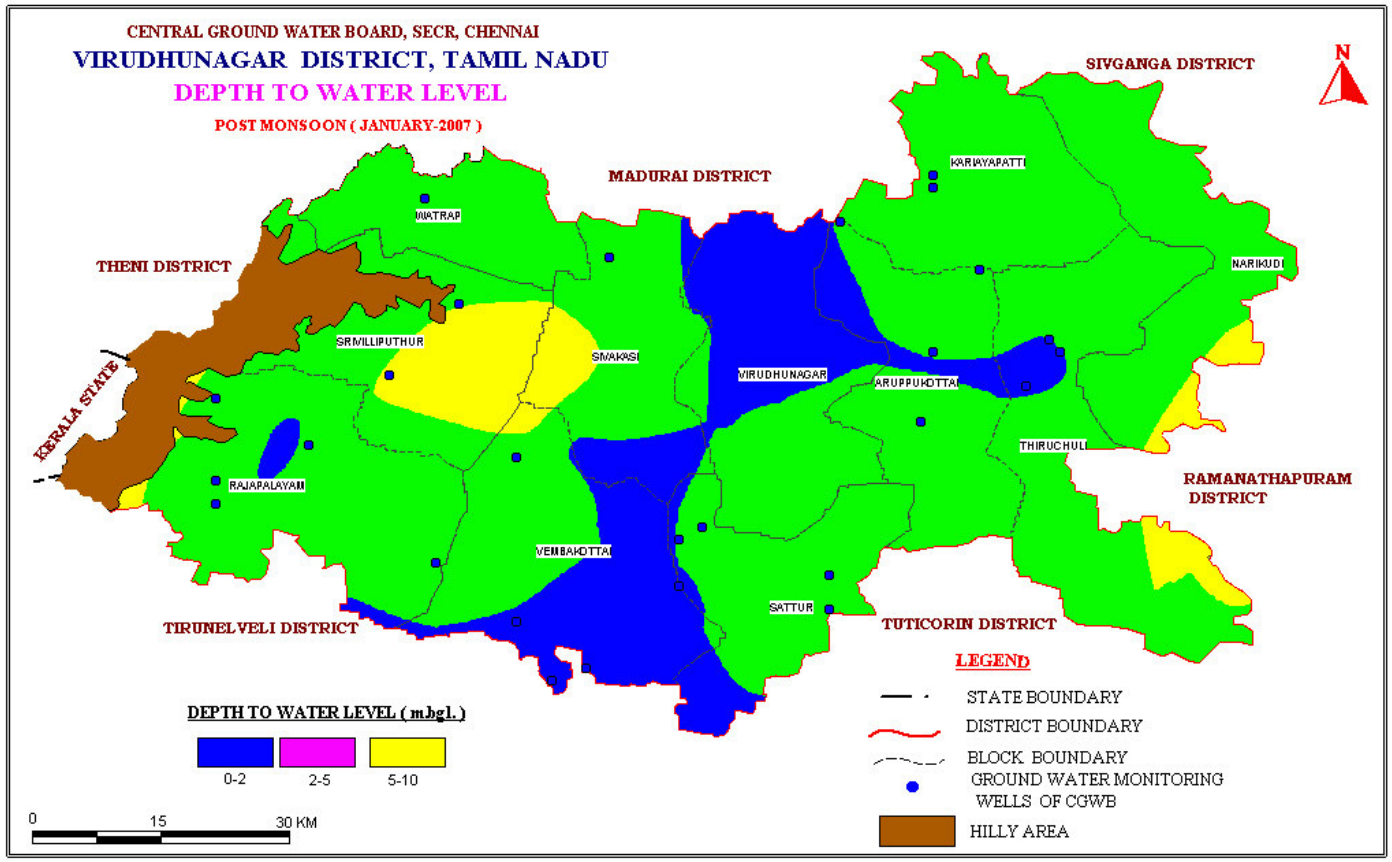

CENTRAL GROUND WATER BOARD, SECR, CHENNAI
VIRUDHUNAGAR DISTRICT, TAMIL NADU
DEPTH TO WATER LEVEL
POST MONSOON (JANUARY-2007)
N
SIVGANGA DISTRICT
MADURAI DISTRICT
KARIYAPATTI
MATRAP
NARIKUDI
THENI DISTRICT
SRIVILLIPUTHUR
SIVAKASI
VIRUDHUNAGAR
ARUPPUKOTTAI
KERALA STATE
THIRUCHULI
RAMANATHAPURAM DISTRICT
RAJAPALAYAM
VEMBAKOTTAI
SATTUR
TIRUNELVELI DISTRICT
TUTICORIN DISTRICT
LEGEND
STATE BOUNDARY
DISTRICT BOUNDARY
BLOCK BOUNDARY
GROUND WATER MONITORING WELLS OF CGWB
HILLY AREA
DEPTH TO WATER LEVEL (mbgl.)
0-2
2-5
5-10
0
15
30 KM

PLATE - V

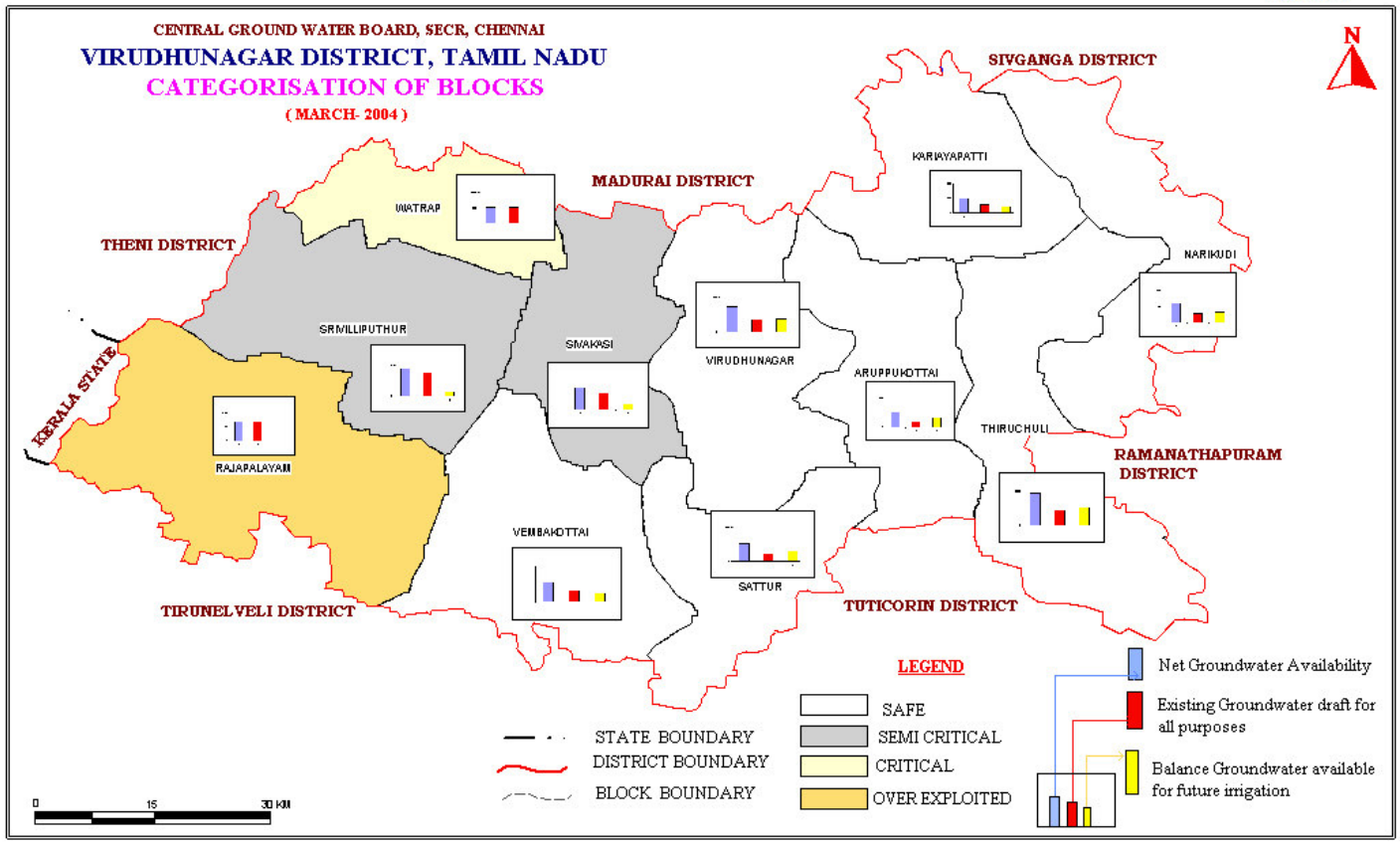
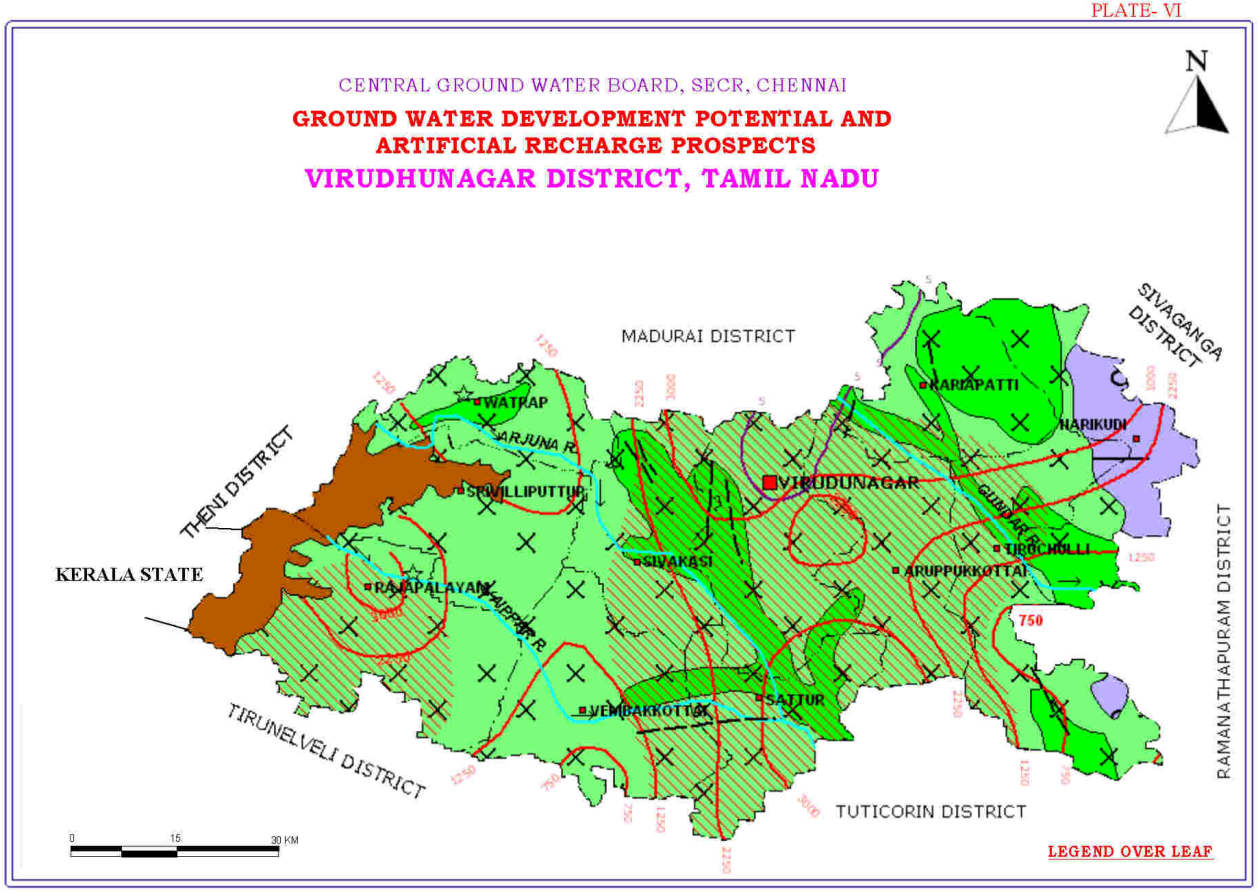

CENTRAL GROUND WATER BOARD, SECR, CHENNAI
VIRUDHUNAGAR DISTRICT, TAMIL NADU
CATEGORISATION OF BLOCKS
(MARCH- 2004)
N
SIVGANGA DISTRICT
MADURAI DISTRICT
THENI DISTRICT
KERALA STATE
TIRUNELVELI DISTRICT
RAMANATHAPURAM DISTRICT
TUTICORIN DISTRICT
WATRAP
SRIVILLIPUTHUR
RAJAPALAYAM
SIVAKASI
VEMBAKOTTAI
KARIYAPATTI
VIRUDHUNAGAR
NARIKUDI
ARUPPUKOTTAI
THIRUCHULI
SATTUR
LEGEND
STATE BOUNDARY
DISTRICT BOUNDARY
BLOCK BOUNDARY
SAFE
SEMI CRITICAL
CRITICAL
OVER EXPLOITED
Net Groundwater Availability
Existing Groundwater draft for all purposes
Balance Groundwater available for future irrigation
0
15
30 KM

PLATE- VI


CENTRAL GROUND WATER BOARD, SECR, CHENNAI
GROUND WATER DEVELOPMENT POTENTIAL AND
ARTIFICIAL RECHARGE PROSPECTS
VIRUDHUNAGAR DISTRICT, TAMIL NADU
N
MADURAI DISTRICT
SIVAGANGA DISTRICT
RAMANATHAPURAM DISTRICT
THENI DISTRICT
KERALA STATE
TIRUNELVELI DISTRICT
TUTICORIN DISTRICT
WATRAP
ARJUNA R.
SRIVILLIPUTTUR
RAJAPALAYAM
VEMBAKKOTTAI
SIVAKASI
VIRUDUNAGAR
KARIAPATTI
NARIKUDI
GUNDAR R.
TIRUCHULLI
ARUPPUKKOTTAI
SATTUR
750
0 15 30 KM
LEGEND OVER LEAF

LEGEND FOR PLATE - VI

DISTRICT – VIRUDUNAGAR

	Wells Feasible	Rigs Suitable	Depth of Well (mbgl)	Discharge (LPM)	Suitable Artificial Recharge Structures
Soft Rock Aquifer	Dug Well	Manual	10-15	10 - 60	Percolation Ponds With Recharge Shaft
Hard Rock Aquifer	Dug Well	Manual	10-15	10 - 60	Check Dams/ Percolation Ponds With Recharge Shaft
Hard Rock Aquifer	Dug Well Dug Cum Bore Well Bore Well	Manual Manual + DTH DTH	10-15 10 - 15+40 60-90	60 - 180	Check Dams/ Percolation Ponds With Recharge Shaft
	District Boundary			Block Boundary	
	District Headquarter			Block Headquarters	
5	Water Level-Pre-Monsoon (Decadal Mean 1993-2002) Mbgl		1250	Ec in Microsiemens / Cm at 25° C	
	River			Lineament	
	Hilly Area			Nitrate Greater Than Maximum Permissible Limit (45 mg/l)	

OTHER INFORMATION

Geographical Area	4243.23 Sq. Km.
Number of Blocks	11
Major Drainage	Vaipar Gundar & Arjuna Nadhi
Population (2001)	17,51,301
Average Annual Rainfall	799.8 Mm
Annual Range of Temperature	24 –40° C
Regional Geology	**Soft Rocks: Clay, Sandstone & Shale** **Hard Rocks:** Granites & Gneisses
Net Ground Water Availability for Future Irrigation	212.67 MCM/Yr
Stage Of Ground Water Development As on January 2003	66.52 %
Name of Blocks Showing Intensive Ground Water Development	☆ **Over Exploited** Rajapalayam **Critical**: Watrap

SAVE WATER

AND

CONSERVE WATER

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