For official use

Technical Report Series

DISTRICT GROUNDWATER BROCHURE THOOTHUKUDI DISTRICT, TAMIL NADU

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Government of India
Ministry of Water Resources

Central Ground Water Board

South Eastern Coastal Region
Chennai

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DISTRICT AT A GLANCE (THOOTHUKKUDI)

S.NO	ITEMS	STATISTICS	
1.	**GENERAL INFORMATION**		
	i. Geographical area (Sq. km)	4590.54	
	ii. Administrative Divisions (as on 31-3-2007) Number of Taluks Number of Blocks Number of Villages	 8 12 462	
	iii. Population (as on 2001 Censes) Total Population Male Female	 1572273 766823 805450	
	iv. Average Annual Rainfall (mm)	661.6	
2.	**GEOMORPHOLOGY**		
	i. Major physiographic Units	Coastal Plain & Upland	
	ii. Major Drainages	Vaipar, Tambrabarani & Karamaniyar	
3.	**LAND USE (Sq. km) during 2005-06**		
	i. Forest area ii. Net area sown iii. Barren & Uncultivable waste	110.12 1718.15 744.89	
4.	**MAJOR SOIL TYPES**	Black Soil, Red Soil & Sandy Soil	
5.	**AREA UNDER PRINCIPAL CROPS (AS ON 2005-2006)**	1. Paddy -19932 Ha – 43% 2. Groundnut – 472 Ha – 0.01% 3. Pulses – 177 Ha – 0.003% 4. Banana – 9790 Ha – 21%	
6.	**IRRIGATION BY DIFFERENT SOURCES (During 2005-06)**	**Number**	**Area irrigated (Ha)**
	i. Dug wells	24817	18035
	ii. Tube wells	755	356
	iii. Tanks	634	10150
	iv. Canals	5	11133
	vi. Net irrigated area	39674 ha	
	vii. Gross irrigated area	46383 ha	
7.	**NUMBERS OF GROUND WATER MONITORING WELLS OF CGWB (AS ON 31.03.2007)**		
	i. No of dug wells	24	
	ii. No of piezometers	12	
8.	**PREDOMINANT GEOLOGICAL FORMATIONS**	Recent River Alluvium, & Coastal Sand , Red Teri Sand, Calcareous Sandstone, Pink Granites Charnockites, and Penninsular gneisses.	
9.	**HYDROGEOLOGY**		
	i. Major water bearing formations	Quaternary Alluvium and	

		Tertiary sediments & Teri Sands, weathered & fractured Pink Granites, Charnockites and Gneisses.	
	ii. Pre- monsoon depth to water level (May 2006)	1.2 – 12.2	
	iii. Pre- monsoon depth to water level (Jan'2007)	0.33 – 9.24	
	iv. Long term water level trend in 10 years (1998-2007) in m/yr	Annual	
		Rise (m/year)	Fall (m/year)
		Min : 0.0153 Max : 2.8106	Min : 0.0123 Max :0.3996
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.	16 5 12	
	iv. Depth range (m)	26 – 200	
	v. Discharge (lps)	0.7 – 3.9	
	vi. Storativity (S)	1.3×10^{-4} –4.7×10^{-1}	
	vii. Transmissivity (m2/day)	<1 – 296	
11.	**GROUND WATER QUALITY (As in May 2006)**		
	i. Presence of chemical constituents more than permissible limit	Cl, NO_3 & SO_4	
	ii. Type of water	Na-Cl	
12.	**DYNAMIC GROUND WATER RESOURCES(as on 31.03.2004) in MCM**		
	i. Annual Replenishable Ground Water Resources	225.23	
	ii. Total Annul Ground Water Draft for all purposes	195.30	
	iii. Projected demand for Domestic and Industrial Uses up to 2029	16.85	
	iv. Stage of Ground Water Development	87 %	
13.	**AWARENESS AND TRAINING ACTIVITY**		
	i. Mass Awareness Programmes Organized		
	Year	2004-05 / 2006-07	
	Place	Pudukottai / Karungulam	
	No of Participants	250 / 200	
	ii. Water Management Training Organized		
	Year	2004-05 / 2006-07	
	Place	Thoothukkudi /Tiruchendur	
	No of Participants	35 / 39	
14.	**EFFORTS OF ARTIFICIAL RECHARGE & RAINWATER HARVESTING**	**Technical Guidance were provided as when sought**	
15.	**GROUND WATER CONTROL AND REGULATION**		
	i. Number of Over Exploited Blocks	7	
	ii. Number of Critical Blocks	1	

16.	**MAJOR GROUND WATER PROBLEMS AND ISSUES.**	i) Limited Fresh water availability in sedimentary areas as floating lenses makes the coastal tract vulnerable for water quality changes. ii) Groundwater in alluvial /tertiary aquifer in the eastern part of the district is in hydraulic connection with the sea and hence it is vulnerable for saline water ingress

1.0 INTRODUCTION

1.1 Administrative Details

Thoothukkudi district is divided into 8 taluks. The taluks are further divided into 12 blocks, which further divided into 462 villages.

S.No.	Taluk	Area in Hectares including Reserved Forest	No.of Villages	Block	No.of Villages
1	Kovilpatti	70918	48	Kovilpatti	48
2	Ettayapuram	49650	55	Ettayapuram	55
3	Vilathikulam	86487	114	Vilathikulam	60
				Pudur	54
4	Ottapidaram	74160	62	Ottapidaram	62
5	Thoothukkudi	34395	33	Thoothukkudi	33
6	Srivaikundam	59495	69	Srivaikundam	36
				Karungulam	33
7	Tiruchendur	47608	61	Tiruchendur	15
				Alwarthirunagari	30
				Udangudi	16
8	Sathankulam	36341	20	Sathankulam	20
	Total	**459054**	**462**	**12 Blocks**	**462**

1.2 Basin and sub-basin

The district is part of the composite east flowing river basin,"Between Gundar and Nambiyar" as per the Irrigation Atlas of India. Nambiyar, Tambraparani, Kallar, Vaippar and Gundar are the important sub basins.

1.3 Drainage

The river originating from the Western Ghats and Tamil Nadu uplands control the drainage network of the district. A few streams originate in the hillocks within the district and confluences directly with the sea after flowing 10 to 20 km . Vaipar, Tambraparani and Karamanaiyar are the major rivers draining the district. All the rivers are ephemeral in nature and run off is generated in heavy rainfall period only.

1.4 Irrigation Practices

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

S.No	Classification	Area (Ha)
1	Forests	11012
2	Barren & Uncultivable Lands	19762
3	Land put to non agricultural uses	74489
4	Cultivable Waste	58139
5	Permanent Pastures & other grazing lands	5132
6	Groves not included in the area sown	39256

S.No	Classification	Area (Ha)
7	Current Fallows	6693
8	Other Fallow Lands	72756
9	Net Area sown	171815
	Total	**459054**

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

The chief irrigation sources in the area are the Canals, tanks, wells and tube/bore well, irrigation is highest in Srivaikundam, Alwarthirunagari and Karungulam block followed by Sathankulam, Ettayapuram, Tiruchendur, Udangudi, Thoothukkudi, Kovilpatti, Vilathikulam, and Pudur blocks.

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

S. No	Block	Net area irrigated by					Total Net Area irrigated
		Canals	Tanks	Tube/ bore wells	Ordinary wells	Other Sources	
1	Thoothukkudi	0	988	51	737	0	1776
2	Srivaikundam	2373	4651	67	291	0	7382
3	Karungulam	1457	1016	15	2355	0	4843
4	Tiruchendur	2877	0	0	209	0	3086
5	Alwarthirunagari	4426	1135	2	873	0	6436
6	Udangudi	0	0	19	2991	0	3010
7	Sathankulam	0	499	18	3193	0	3710
8	Ottapidaram	0	267	10	1608	0	1885
9	Ettayapuram	0	790	0	2559	0	3349
10	Kovilpatti	0	405	0	1334	0	1739
11	Vilathikulam	0	236	165	1203	0	1604
12	Pudur	0	163	9	682	0	854
	Total	**11133**	**9987**	**347**	**17353**	**0**	**38820**

(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 hydrogeological surveys in the district during the period of 1976 - 80, Reappraisal hydrogeological surveys were conducted during the period of 1990-93. Detailed exploration were carried out in Vaipar and Gundar basin down to a depth of26 to 200 m bgl to assess the ground water resources of the area during 1994 - 95.

CGWB is monitoring the groundwater regime for the changes in water level and water quality through 24 dug wells and 12 piezometers. The monitoring of water levels are carried out during May (Pre monsoon), August (Middle of south west monsoon), November (post south west monsoon & initial stage of north east monsoon) & January (Post North east 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 1901-2001 were utilised and a perusal of the data shows that the normal annual rainfall over the district varies from about 570 mm to 740 mm.It is the minimum around Arasadi (577.4 mm) and Thoothukkudi (582.8 mm) in the central eastern part of the district. It gradually increases towards south, west and north and attains a maximum around Kayattar (722.5 mm) and Kovilpatti (734.8 mm) in the northwestern part..

The district enjoys a hot tropical climate. The high relative humidity prevail through out the year between 60 and 75%.

The annual mean minimum and maximum temperature are 23°C and 29°C respectively.

3.0 GEOMORPHOLOGY AND SOIL TYPES

3.1 Geomorphology

The prominent geomorphic units identified in the district are 1) Fluvial, 2) Marine, 3) Fluvio-marine, 4) Aeolian and 5) Erosional landforms depending on the environment of formation. Taruvaikulam- Tuticorin surface, Kulattur surface, Vaippar surface,Nagalapuram-Vedanattham surface and Volinokkam-Vembar surface are some of the erosional geomorphic units in the northern part of the district. Karamaniyar surface, Tambraparni surface, Tiruchendur-Kayapattinam surface and Vallanadu surface are the geomorphic units in the southern part of the district.

The number of red sandy tracts formed of the sand dunes locally known as *Teri* sand complex are the important feature in the coast. These Teri sands extend in width from 6 to 8 km from the coast. Adaippanvilai Teri, Kudiraimozhi teri and Vaippar-Vembar Teri are some of the important Teri areas, which are having elevation in the range of 15 to 62m above MSL.

3.2 Soils

The district is covered by Black Cotton soil in the west with isolated red soil patches in high ground. The sandy soil is present in the coastal tract. Alluvial soil is restricted to river flood plain and coastal part. Alkaline and saline soils are also noticed at places.

4.0 GROUND WATER SCENARIO

4.1 Hydrogeology

The district is underlain by both porous and fissured formations. . The important aquifer systems in the district are constituted by i) unconsolidated & semi-consolidated formations and ii) weathered and fractured crystalline rocks

The porous formations in the district include sandstones and clays of Recent to

subrecent and Tertiary age (Quaternary). The Recent formations comprising mainly sands, clays and gravels are confined to major drainage courses in the district. The maximum thickness of alluvium is 45.0 m bgl, whereas the average thickness is about 25.0 m. Ground water occurs under water table and confined conditions in these formations and is being developed by means of dug wells and filter points. The productive zones are encountered in the depth range of 29.5 to 62 m bgl. 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 under unconfined conditions in the joints & fissures and dependent on the nature and extent of pores and interconnection of fractures zones. The morpho-tectonic analysis of the crystalline tract indicates the presence of deep seated tensile and shear fractures particularly along the fold axes. These tension joints and fractures and shear fractures at deeper depth of 30 to 100 m have been acting as conduits for ground water movement.

The depth of the wells in crystalline rocks ranged from 10.00 to 15.00 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 3.0 to 141 lpm/m. of drawdown. The yield characteristics of wells vary considerably depending on the topographic set-up, lithology and nature of weathering.

The depth of wells drilled in crystalline rocks ranged from 26 to 200 m bgl various state agencies mainly for domestic purposes and the yield wells ranged from 10 to 250 lpm. The yield of successful bore wells drilled down to a depth of 750 m bgl during the ground water exploration programme of Central Ground Water Board ranged from 3 to 10 lpm. 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 1.20 – 12.12 m bgl during pre-monsoon (May 2006) and varied between 0.33 – 9.24 m bgl during post monsoon (Jan 2007). The seasonal fluctuation shows a rise in water level, which ranges from 0.20 to 8.41 m bgl. The piezometric head varied between 2.40 to 11.00 bgl during pre monsoon (May 2006) and 0.33 to 9.24 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 indicates rise in water level in the area 0.0153 – 2.8106 m/year and fall in water level ranging between 0.0123 - 0.3996 m/year.

4.1.2 Aquifer Parameter

Formation	**Transmissivity (m^2/day)**	**Storativity**	**Specific Yield (%)**
Weathered Crystallines	-	-	<2%

Formation	**Transmissivity (m^2/day)**	**Storativity**	**Specific Yield (%)**
Fractured crystallines	7-135	1.32 x 10^{-3} to 1.88 x 10^{-3}	-
Porous Formation	20-610	-	1-8%

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 Development Centre (PWD, WRO, Government of Tamil Nadu) as on 31st March 2004 using GEC-97 methodology and the salient features of the computations are furnished below.

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 up to next 25 years (2029) (M.Cu.m)	Net groundwater Availability for future Irrigation Development (M.Cu.m)	Stage of Groundwater Development (%)	Category of Block
Alwarthirunagari	33.64	0.00	2.19	2.19	2.24	31.40	7	Safe
Karungulam	28.70	22.90	1.35	24.25	1.38	4.42	84	Semi Critical
Ettayapuram	26.04	31.76	2.04	33.80	2.09	Nil (-7.81)	130	Over Exploited
Kovilpatti	14.02	14.81	2.01	16.82	2.06	Nil (-2.85)	120	Over Exploited
Ottapidaram	20.03	27.48	0.81	28.29	0.83	Nil (-8.27)	141	Over Exploited
Pudur	7.58	6.49	0.71	7.20	0.72	0.37	95	Critical
Sathankulam	10.82	15.26	0.85	16.11	0.87	Nil (-5.32)	149	Over Exploited
Srivaikundam	35.44	4.88	1.80	6.69	1.85	28.70	19	Safe
Tiruchendur	16.73	10.21	1.65	11.86	1.69	4.83	71	Semi Critical
Thoothukkudi	15.42	16.50	1.10	17.60	1.13	Nil (-2.21)	114	Over Exploited
Udangudi	12.65	22.81	1.12	23.93	1.14	Nil (-11.30)	189	Over Exploited
Viltthikulam	4.15	5.74	0.82	6.56	0.84	Nil (-2.42)	158	Over Exploited
Total	225.23	178.86	16.45	195.30	16.85	29.52	87	Semi Critical

4.3 Ground Water Quality

The chemical characteristics of ground water in the phreatic zone in Thoothukkudi district has been studied using the analytical data of ground water samples collected during May 2006 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 Thoothukkudi district, in general, is colourless, odourless and slightly alkaline. The specific electrical conductance of ground water in phreatic zone (in Micro Seimens at 25° C) was in the range of 280µS/cm to

12020µS/cm in the district and major parts are having multiplayer aquifer system. Hence the water quality varies with respect to depth of taping.

It is observed that the 50 percent samples of ground water is suitable for drinking and domestic uses but depth of the well should be properly designed, depending on the multilayer aquifer system.

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 using ground water for irrigation.

4.4 Status of Ground Water Development

The estimation of groundwater resources for the district has categorized the blocks as given below.

Over Exploited – 7
Critical – 1
Semi Crtical – 2
Safe – 2

The shallow alluvial aquifers along Vaippar and Gundar rivers serve as an important source of drinking water irrigation development for Thoothukkudi 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 m3/day in weathered crystalline rocks, 20 to 100 m3/day in Tertiary formations and up to 400 m3/day in Recent alluvial formations along major drainage courses.

5.0 Groundwater Management Strategy

5.1 Groundwater Development

In view of the comparatively high level of ground water development in the major part of the district and the quality problems due to lithogenic and anthropogenic factors, it is necessary to exercise caution while planning further development of available ground water resources in the district.

The yields of dug wells in crystalline and Tertiary formations are improved at favorable locations by construction of extension bores which are 20 to 40m. deep. In recent years, a large number of bore wells have also been drilled by farmers for irrigation purposes.

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 diameter 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 Programme (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 programmes.

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 Rs4000/- for small and marginal farmers and Rs2000/- 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 programme.

On the basis of experimental studies, it has been found that desilting 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.

6.0 Groundwater related Issues & Problems

Ground water development in this district is mainly by means of dug wells and hand pumps. The shallow tube wells and dug cum bore wells in Panamparai Sandstone area has increased the agricultural activities locally. The district needs careful management practices in view of the vulnerable seawater intrusion problems and limited scope for artificial recharge schemes in saline tracts of the district.

Water Supply: Ground water development in hard rocks are mainly by means of dug wells and bore wells for irrigation and water supply respectively. Many bore wells are given low yield and are suitable for hand pump only. The irrigation dug wells are in better use. The urban water supply is mainly from the Tambraparni river and supply depends on the saturation of river bed. Scarcity is common in many towns.

Based on the limited fresh water availability in sedimentary areas as floating lenses, it is inferred that a major part of the coastal tract with Teri sands could be considered vulnerable to water quality changes. A considerable amount of ground water is being developed from the tube wells in the thin sedimentary zone in Surankudi area, multiqualty aquifer in Tiruchendur area and Teri sands in Kudiraimoli Teri. As the ground water in the alluvial/Tertiary aquifer in the eastern part of the district is in

hydraulic connection with the sea, the district is also vulnerable to saline water ingress.

7.0 Awareness & Training Activity

7.1 Mass Awareness Campaign (MAP) & Water Management Training Programme (WMTP) by CGWB

Two WMTP was organized on "Rain Water Harvesting Training" at the meeting hall of District Collectorate complex, Thoothukkudi and Tiruchendur in Thoothukkudi district during the period 2002-03 and 2006-07 respectivily. Two Mass Awareness Campaign on "Ground Water Management, Regulation & Conservation" was organized at Pudukottai and Karungulam in Thoothukkudi district during the period 2002-03 and 2006-07 respectivily.

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. 51 has restricted groundwater development for irrigation in the over exploited blocks of Tamil Nadu. The over exploited blocks in this district is Ettayapuram, Kovilpatti, Ottapidaram, Sathankulam, Thoothukkudi, Udangudi and Vilttthikulam

9.0 Recommendations

As the development of ground water has already reached an optimum stage in many of the blocks of this district, further development of ground water for creation of additional irrigation potential has to be carried out with extreme caution, considering the poor sub-surface storage capacity.

Necessary measures for regulating the exploitation of ground water may be implemented in coastal blocks of the district. The Teri sands and fresh water bearing Tertiary sandstone area along the coast has to be notified as ground water sanctuaries and further development has to be only for drinking water purposes. Roof top harvesting and direct use from ground level storage is suggested for coastal habitations including Tuticorin town so that the public water supply from distant source can be managed in a better way. Modeling of coastal aquifer is needed for various stress conditions in view of brine water and fresh water development in this area.

Intensive monitoring of ground water levels and water quality is to be taken up in the coastal areas of the district to monitor the movement of fresh water – saline water interface.

Artificial recharge of ground water through cost-effective rain water harvesting systems may be popularized in the district by providing incentives to individuals/communities embarking upon such initiatives. A concerted effort involving various Government agencies and NGOs can create the necessary awareness among the rural masses.

Waste land development programme and micro irrigation system has to be implemented for increasing the agricultural produces by way of 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

TITUCORIN DISTRICT, TAMIL NADU

LOCATION

NOT TO SCALE

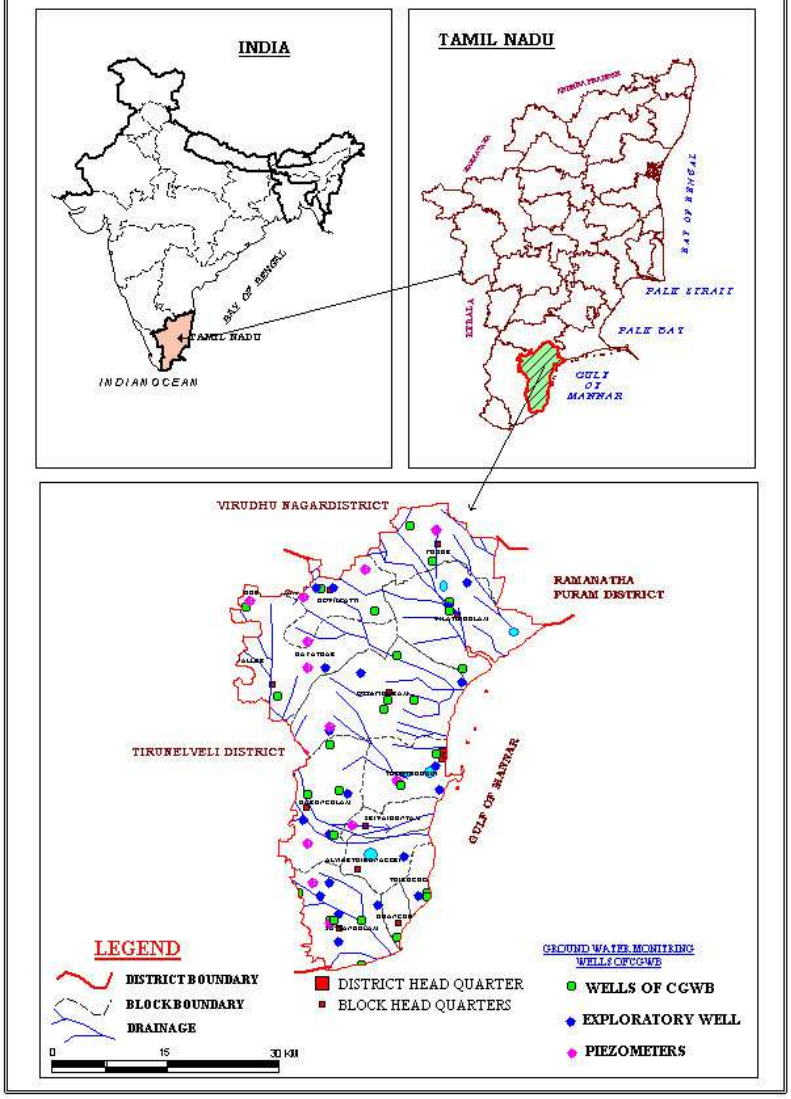
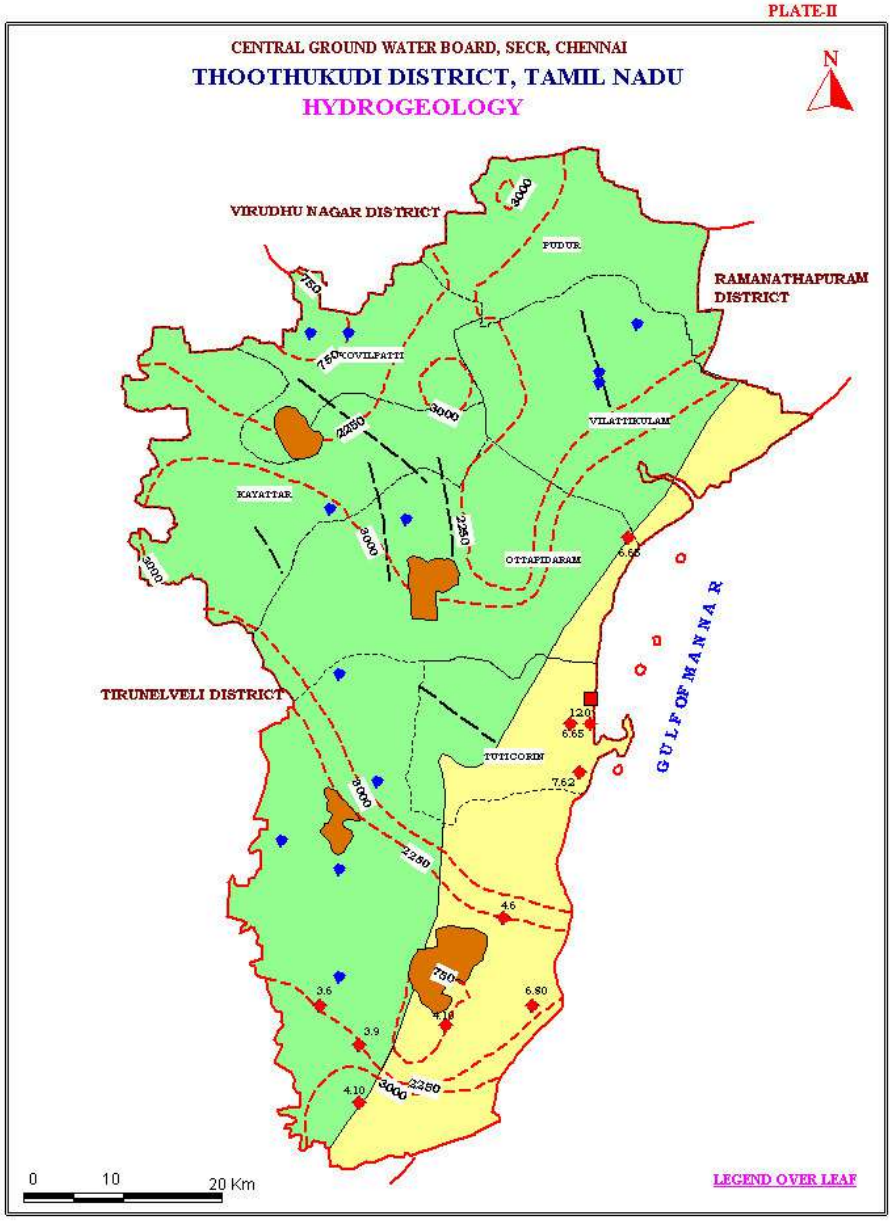


PLATE-II


CENTRAL GROUND WATER BOARD, SECR, CHENNAI
THOOTHUKUDI DISTRICT, TAMIL NADU
HYDROGEOLOGY
N
VIRUDHU NAGAR DISTRICT
PUDUR
RAMANATHAPURAM DISTRICT
KOVILPATTI
VILATTIKULAM
KAYATTAR
OTTAPIDARAM
TIRUNELVELI DISTRICT
TUTICORIN
GULF OF MANNAR
3000
2250
750
6.65
7.62
4.6
6.80
3.6
3.9
4.10
0 10 20 Km
LEGEND OVER LEAF

LEGEND FOR PLATE-II

ADMINISTRATIVE SETUP

- STATE BOUNDARY
- DISTRICT BOUNDARY
- BLOCK BOUNDARY
- DISTRICT HEADQUARTER
- BLOCKHEAD QUARTER
- HILLY AREA

GROUND WATER HYDROLOGY

- EXPLORATORY BORE WELL [CGWB]
- HIGH YIELDING BORE WELL [CGWB]

HYDROCHEMISTRY

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

STRUCTURE

- TRACE OF LINEAMENT

AQUIFER	AGE	LITHOLOGY	GROUND WATER CONDITIONS	YIELD PROSPECTS (CUM)DAY)	GROUND WATER DEVELOPMENT STRATEGIES
UNCONSOLIDATED	RECENT	RIVER ALLUVIUM, VALLEY FILL-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 SEMI-CONFINED 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

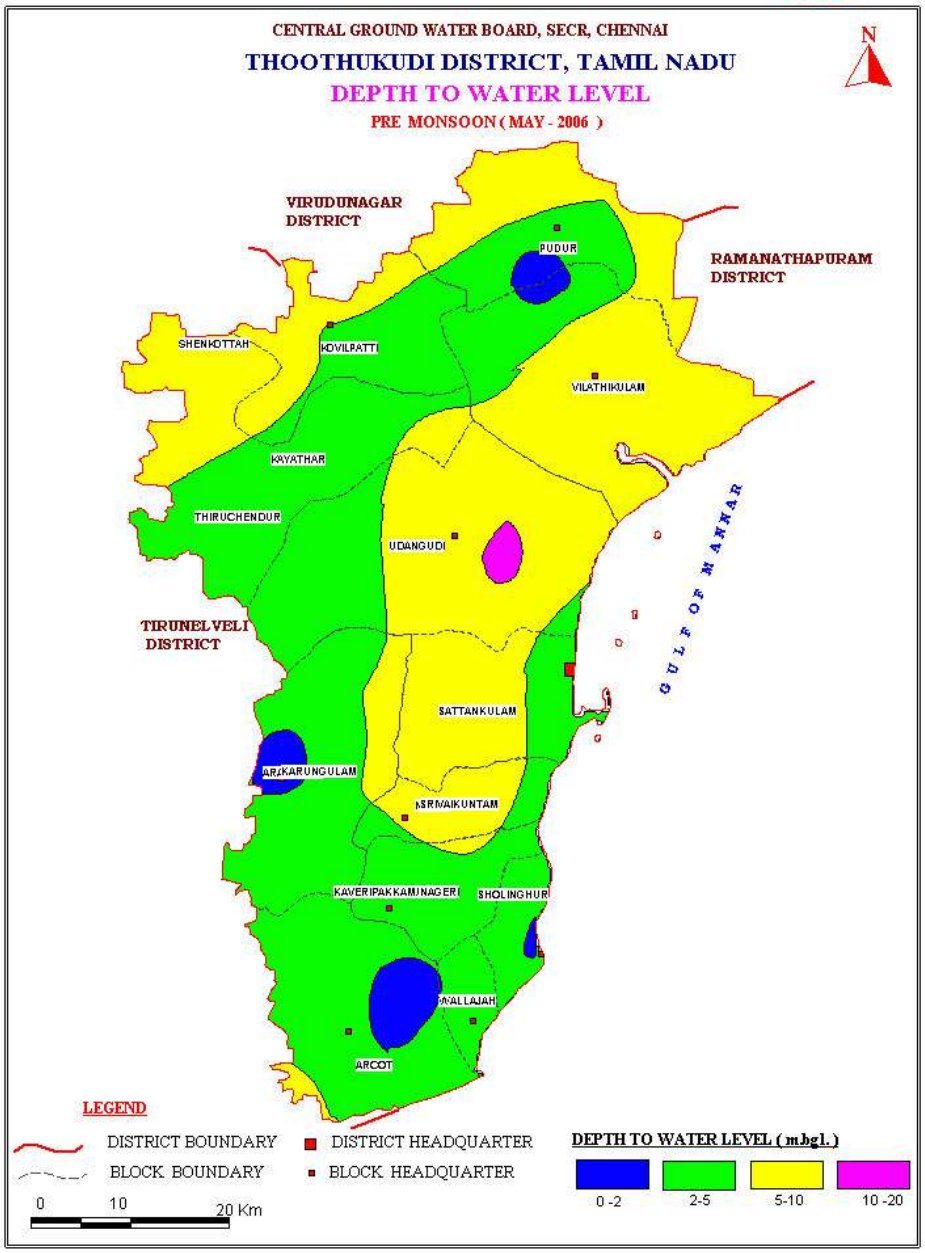

CENTRAL GROUND WATER BOARD, SECR, CHENNAI
THOOTHUKUDI DISTRICT, TAMIL NADU
DEPTH TO WATER LEVEL
PRE MONSOON (MAY - 2006)
N
VIRUDUNAGAR DISTRICT
RAMANATHAPURAM DISTRICT
TIRUNELVELI DISTRICT
PUDUR
SHENKOTTAH
KOVILPATTI
VILATHIKULAM
KAYATHAR
THIRUCHENDUR
UDANGUDI
SATTANKULAM
ARAKARUNGULAM
SRIVAIKUNTAM
KAVERIPAKKAMNAGERI
SHOLINGHUR
WALLAJAH
ARCOT
GULF OF MANNAR
LEGEND
DISTRICT BOUNDARY
BLOCK BOUNDARY
DISTRICT HEADQUARTER
BLOCK HEADQUARTER
0 10 20 Km
DEPTH TO WATER LEVEL (mbgl.)
0 -2
2-5
5-10
10 -20

PLATE - IV

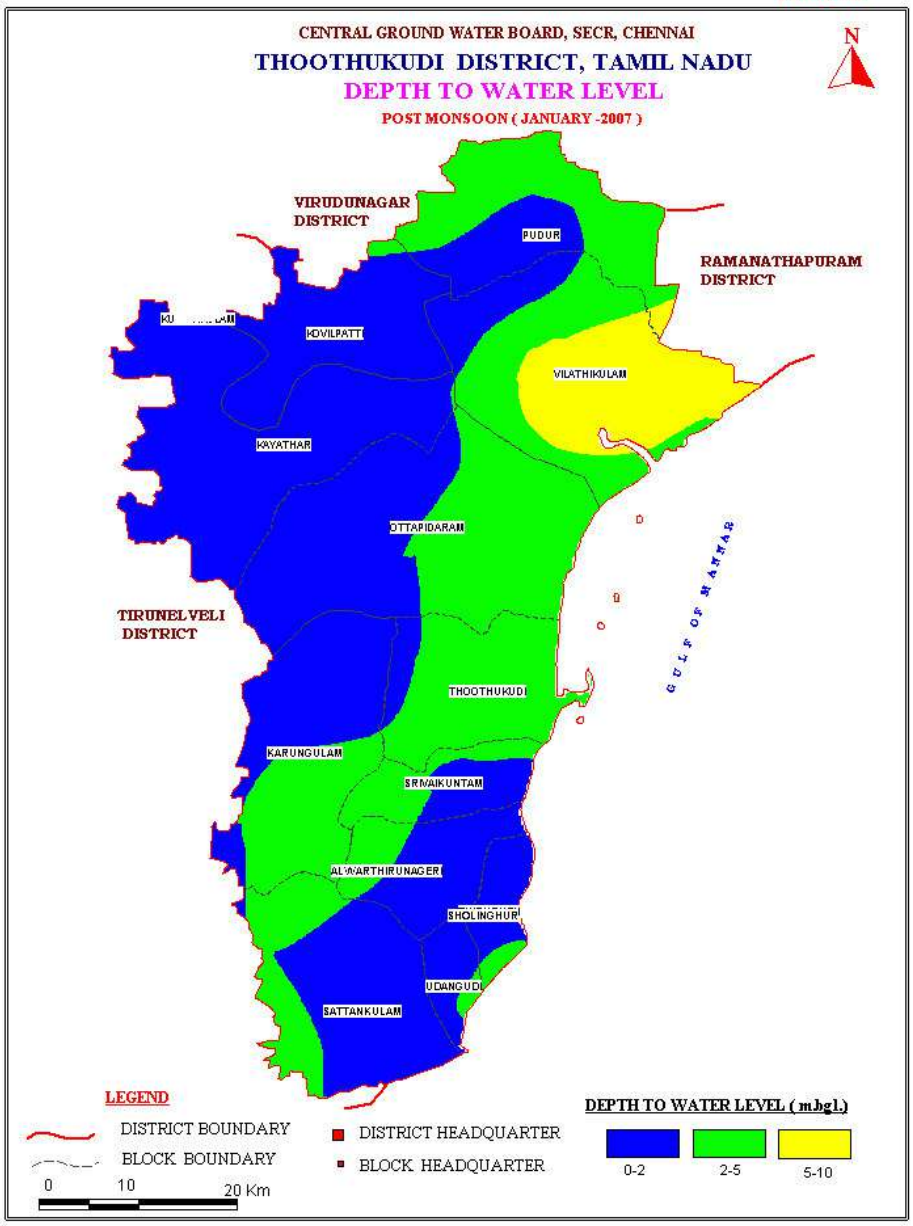
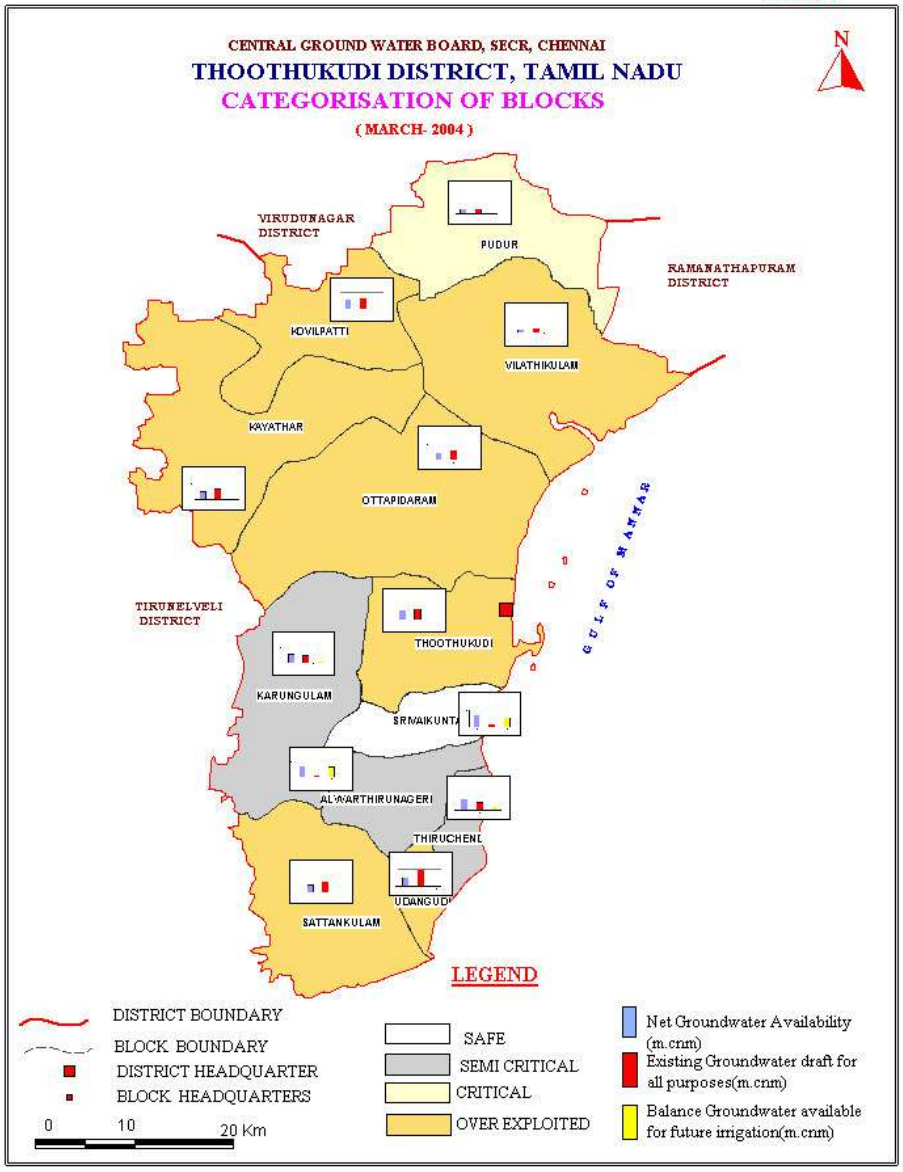
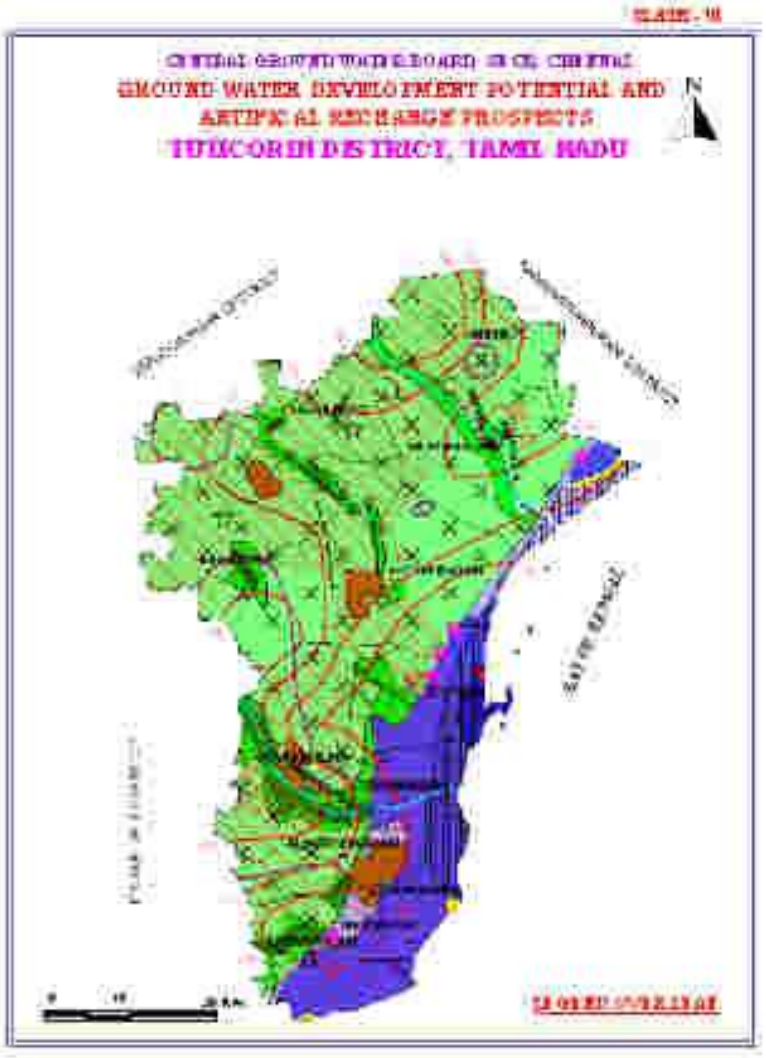

CENTRAL GROUND WATER BOARD, SECR, CHENNAI
THOOTHUKUDI DISTRICT, TAMIL NADU
DEPTH TO WATER LEVEL
POST MONSOON (JANUARY -2007)
N
VIRUDUNAGAR DISTRICT
PUDUR
RAMANATHAPURAM DISTRICT
KOVILPATTI
VILATHIKULAM
KAYATHAR
OTTAPIDARAM
TIRUNELVELI DISTRICT
GULF OF MANNAR
THOOTHUKUDI
KARUNGULAM
SRIVAIKUNTAM
ALWARTHIRUNAGERI
SHOLINGHUR
UDANGUDI
SATTANKULAM
LEGEND
DISTRICT BOUNDARY
BLOCK BOUNDARY
DISTRICT HEADQUARTER
BLOCK HEADQUARTER
0 10 20 Km
DEPTH TO WATER LEVEL (mbgl.)
0-2
2-5
5-10

PLATE-V


CENTRAL GROUND WATER BOARD, SECR, CHENNAI
THOOTHUKUDI DISTRICT, TAMIL NADU
CATEGORISATION OF BLOCKS
(MARCH- 2004)
N
VIRUDUNAGAR DISTRICT
PUDUR
RAMANATHAPURAM DISTRICT
KOVILPATTI
VILATHIKULAM
KAYATHAR
OTTAPIDARAM
GULF OF MANNAR
TIRUNELVELI DISTRICT
THOOTHUKUDI
KARUNGULAM
SRIVAIKUNTA
AL'VARTHIRUNAGERI
THIRUCHEN
UDANGUDI
SATTANKULAM
LEGEND
DISTRICT BOUNDARY
BLOCK BOUNDARY
DISTRICT HEADQUARTER
BLOCK HEADQUARTERS
0 10 20 Km
SAFE
SEMI CRITICAL
CRITICAL
OVER EXPLOITED
Net Groundwater Availability (m.cnm)
Existing Groundwater draft for all purposes(m.cnm)
Balance Groundwater available for future irrigation(m.cnm)


GROUND WATER DEVELOPMENT POTENTIAL AND
ARTIFICIAL RECHARGE PROSPECTS
TUTICORIN DISTRICT, TAMIL NADU
N

LEGEND PLATE FOR VI

DISTRICT –TUTICORIN

	Wells Feasible	Rigs Suitable	Depth Of Well (M)	Discharge (LPM)	Suitable Artificial Recharge Structures
Soft Rock Aquifer	Tube Well	Direct Rotary	15 – 20	2.6to408	Recharge Tube Wells
Soft Rock Aquifer	Tube Well Dug Cum Bore Well	Direct Rotary Manual + Down The Hole Hammer (DTH)	30 - 100 10 - 15	3 –14 llpm	Recharge Tube Wells Rain Water Harvesting
Soft Rock Aquifer	Tube Well DW With Radial Arms	Direct Rotary Manual +DTH	50 - 130 10 - 1	300 - 500	Recharge Wells/ Percolation Ponds
Hard Rock Aquifer	Dug Well Dug Cum Bore Well Bore Well	Manual Manual +DTH DTH	15 - 20 20 +75 75 - 135	10 - 60	Check Dams/Recharge Wells/ Gully Plugs
Hard Rock Aquifer	Dug Well Dug Cum Bore Well Bore Well	Manual Manual +DTH DTH	10 - 20 15 +80 75 - 135	60 - 180	Check Dams/ Percolation Ponds/ Farm Ponds
Hard Rock Aquifer	Dug Well Dug Cum Bore Well Bore Well	Manual Manual +DTH DTH	10 - 16 15 +60 60 - 120	180 - 300	Check Dams/ Percolation Ponds/ Farm Ponds /Gully Plugs
	District Boundary			Block Boundary	
5	Water Level-Pre-Monsoon (Decadal Mean 1993-2002)Mbgl		1250	EC In Microsiemens / Cm At 25°C	
	District Headquarters			Block Headquarters	
	River			Lineament	
	Fluoride (>1.5mg/L)			Nitrate Greater Than Maximum Permissible Limit (45mg/L)	
	Hilly Area			Saline Zone	
R	Recommended Site For Artificial Recharge Structure				

OTHER INFORMATION

Geographical Area	4,590.54 Sq.Km.
Number Of Blocks	12
Major Drainage	Tambaraparani, Nambiyar, Vaippar & Gundar
Population (2001)	15,72,273
Average Annual Rainfall	662 mm
Annual Range of Temperature	23 -40° C
Regional Geology	**Soft Rocks** : Sand, sandstone, Shale & Limestone **Hard Rocks** : Charnockites & Khondalites
Net Ground Water Availability For Future Irrigation	29.52 MCM/Yr
Stage Of Ground Water Development (As On January 2004)	87%
Names Of Blocks Showing Intensive Ground Water Development	☆ **Over Exploited** -, Kovilpatti, Ottapidaram, Sattankulam, Tuticorin, Ulkottai & Vilathikulam ☆ **Critical** - Tuticorin

SAVE WATER

AND

CONSERVE WATER

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