



For official use

Technical Report Series

DISTRICT GROUNDWATER BROCHURE CUDDALORE DISTRICT, TAMIL NADU

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SCIENTIST-D**

**Government of India
Ministry of Water Resources
Central Ground Water Board
South Eastern Coastal Region
Chennai**

October 2009

DISTRICT AT A GLANCE (CUDDALORE DISTRICT)

S.NO	ITEMS	STATISTICS	
1.	GENERAL INFORMATION		
	i. Geographical area (Sq.km)	3677.81	
	ii. Administrative Divisions as on 31-3-2007		
	Number of Tehsils	6	
	Number of Blocks	13	
	Number of Panchayats	682	
	Number of Villages	898	
	iii. Population (as on 2001 Censes)		
	Total Population	22,85395	
	Male	11,50908	
	Female	11,34487	
	iv. Average Annual Rainfall (mm) (1901-2000)	1050 to 1400 mm	
2.	GEOMORPHOLOGY		
	i. Major physiographic Units	The district is more or less plain terrain with small elevated up lands and lateritic hillocks and prominent coastal zone.	
	ii. Major Drainages	Pennaiyar, Gadilam and Vellar	
3.	LAND USE (Ha) during 2005-06		
	i. Forest area	1415	
	ii. Net area sown	1219891	
	iii. Cultivable waste	6072	
4.	MAJOR SOIL TYPES		
	Black, Red, Ferruginous and Arenacious		
5.	AREA UNDER PRINCIPAL CROPS (AS ON 31.3.2006)		
	1. Paddy – 113529 Ha 63%		
	2. Sugarcane – 37228 Ha. 20%		
	3. Groundnut – 21389 Ha. 6%		
	4. Coconut – 2722 Ha. 1%		
	5. Others – 59537 Ha. 6%		
6.	IRRIGATION BY DIFFERENT SOURCES (During 2005-06)		Area irrigated (Ha)
	i. Dug wells	11263	9558
	ii. Tube wells	30687	114011
	iii. Tanks	594	7987
	iv. Canals	270	49006
	v. Other Sources	21	230
	vi. Net irrigated area (Ha)	155013	
	vii. Gross irrigated area (Ha)	180792	
7.	NUMBERS OF GROUND WATER MONITORING WELLS OF CGWB (AS ON 31-03- 2007)		
	i. No of dug wells	15	
	ii. No of piezometers	20	

8.	PREDOMINANT GEOLOGICAL FORMATIONS	Charnockite, Sandstone, Laterite and Alluvium.
9.	HYDROGEOLOGY	
	i. Major water bearing formations	Weathered and fractured Charnockite, sandstone, Limestone and Alluvium
	ii. Pre- monsoon depth to water level (May 2006)	1.5 – 17.54 m.bgl
	iii. Post- monsoon depth to water level (Jan'2007)	0.04 – 7.46 m bgl
	iv. Long term water level trend in 10 years (1998-2007) in m/yr	Annual
		Rise (m/year) Fall (m/year)
		Min : 0.02147 Min : 1.2953
		Max :0.0424 Max : 1.275
10.	GROUND WATER EXPLORATION BY CGWB (As on 31-03-2007)	
	Number of Exploratory wells	
	i) Sedimentary tube wells'	89
	ii) Crystalline area bore wells	3
	iii) Tsunami Relief well	1
	iv. Depth range(m)	50– 750
	v. Discharge(lps)	
	a) Alluvium area	5 – 10 lps, d.d 0.5 to 2 m
	b) Cuddalore formation	20 – 65 lps d.d 2.5 to 9.6 m
	c) Gopurapuram formation	8.5 lps d.d. < 1 to 5.6 m
	d) Madhavapuram formation	< 1 lps
	vi. Storativity (S)	$7.72 \times 10^{-5} - 9.5 \times 10^{-3}$
	vii. Transmissivity (m ² /day)	438 –1900
11.	GROUND WATER QUALITY AS ON MAY 2006	
	i. Presence of chemical constituents more than permissible limit	EC, Cl, NO ₃ and F
	ii. Type of water	Cacl, Nacl and Mixed type
12.	DYNAMIC GROUND WATER RESOURCES (as on 31.03.2004) in MCM	
	i. Annual Replenishable Ground Water Resources	1564
	ii. Total Annul Ground Water Draft for all purposes	1108
	iii. Projected demand for Domestic and Industrial Uses up to 2025	39%
	iv. Stage of Ground Water Development	67%
13.	MAJOR GROUND WATER PROBLEMS AND ISSUES.	<ol style="list-style-type: none"> 1. The quality of ground water in the fissured formation in some local pockets shows higher mineralisation, cases of local pollution. 2. The thermal power plant ashes, toxic traces elements pollute surface and groundwater system in the Thermal plant areas. 3. In the southeastern part of the district, heavy withdrawal from deeper zone is predominant (300 – 350 m bgl). 4. Some pockets show the Brine concentration as high as 1.5 Be.

1.0 INTRODUCTION

1.1 Administrative Details

Cuddalore district is divided into 6 taluks. The taluks are further divided into 13 blocks, which further divided into 898 villages (Plate-I).

Table-1

S.No.	Taluk	Area in Hectares	No.of Villages	Block	No.of Villages
1	Cuddalore	56645	148	1. Cuddalore	77
				2. Kurinjipadi	71
2	Panruti	56097	99	3 Annagramam	55
				4. Panruti	44
3	Chidambaram	64582	189	5. Bhuvanagiri	55
				6. Paranipettai	57
				7. Keerapalayam	77
4	Kattumanarkoil	48523	165	8. Kattumanarkoil	76
				9. Kumaratchi	89
5	Vriddhachalam	82247	135	10.Vriddhachalam	69
				11.Kammapuram	66
6	Thittagudi	59687	162	12.Nallur	77
				13.Mangalur	85
	Total	367781	898		898

(Source: Dept. of Statistics, Cuddalore)

1.2 Basin and sub-basin

Gadilam and Pennaiyar rivers in the north, Vellar and Coleroon river in the south.

1.3 Drainage

The district is drained by Gadilam and Pennaiyar rivers in the north, Vellar and Coleroon in the south. All these rivers are ephemeral and carry floods during monsoon. They generally flow from west towards east and the pattern is mainly sub parallel. The eastern coastal part near Porto-Novo is characterized by lagoons and back waters.

Ponnaiyar is one of the major seasonal river drains the northern part of the district, which originates from the Nandi hills of Karnataka state. Thuringalar and Musukundah rivers are the tributaries, which join the Ponnaiyar river, Malattar river is the distributory of the Ponnaiyar river.

Vellar, is the other major seasonal river, which drains the major portion in the southern part of the district. Manimuktha, Gomukhi and Mayura are the major tributaries which join the Vellar river.

1.4 Irrigation Practices

Generally, for agricultural purpose maximum amount of available water resources are utilized through minor irrigation schemes. The surface flow in the rivers can be observed only during monsoon periods. The deficient monsoon rainfall has effected the flow of surface water into reservoirs, anicuts, lakes etc. Hence under these circumstances the agriculturists have to totally depend upon an alternative source i.e., Ground Water to meet their irrigation requirement.

In Cuddalore district, 593 tanks, 270 canals and one major reservoir serve as the main source for irrigation. Wellington reservoir is the major reservoir in Thittagudi taluk and Veeranam tank is the major irrigation source in Chidambaram and Kattumannarkudi taluks. In Cuddalore taluks Perumal Eri is the major surface irrigation source. The land use pattern of the district is provided as Table -2.

Table-2

S.No	Classification	Area (Ha)
1	Forests	1415
2	Barren & Uncultivable Lands	14647
3	Land put to non agricultural uses	55875
4	Cultivable Waste	6072
5	Permanent Pastures & other grazing lands	608
6	Groves not included in the area sown	19716
7	Current Fallows	35588
8	Other Fallow Lands	19369
9	Net Area sown	219891
	Total	367781

(Source: Asst. Director of Statistics, Cuddalore 2005-06)

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

Table-3

S.No	Block	Net area irrigated by					Total Net Area irrigated
		Canals	Tanks	Tube wells	Ordinary wells	Other Sources	
1	Cuddalore	0	0	13420	0	0	13420
2	Kurinjipadi	2519	3785	10891	0	0	17195
3	Annagramam	0	0	11130	0	0	11130
4	Panruti	90	437	7072	0	0	7599
5	Parangipepttai	8109	134	786	130	0	9159
6	Melbhuvanagiri	8034	155	4448	98	0	12735
7	Keerapalayam	8543	181	6731	318	0	15773
8	Kumaratchi	9795	76	1479	140	0	11490
9	Kattumannarkoil	6950	375	4940	80	0	12345
10	Vridhachalam	136	0	11339	648	0	12123
11	Nallur	1029	456	9814	798	215	12312

S.No	Block	Net area irrigated by					Total Net Area irrigated
		Canals	Tanks	Tube wells	Ordinary wells	Other Sources	
12	Kammapuram	1291	1271	8242	0	0	10804
13	Mangalore	88	234	2159	6432	15	8928
	Total	46584	7104	92451	8644	230	155013

(Source:Asst. Director of Statistics, Cuddalore 2005-06)

1.5 Studies/Activities carried out by CGWB

Central Ground Water Board has taken up deeper drilling and drilled 5 exploratory bore holes, 5 observation wells and on eastern part of the district. The depth of drilling ranged between 430 and 751.60 m bgl. For monitoring the piezometric head of the deeper confined aquifer by the board, the Central Ground Water Board has constructed 4 piezometers in the district.

The Central Ground Water Board has completed systematic Hydrogeological studies and Reappraisal Hydrogeological surveys during the year 1983-84 and 1986-87 respectively.

District Ground Water Management Studies covering parts of the district have been completed during the year 1999-2000, 2001-02. Studies for determination of the ground water extraction for various use in Cuddalore district was taken up as part of studies by the Board in different parts of the country in 2005.06.

Coastal Aquifer Management studies in parts of district were taken up in 2006-07.

In order to monitor the changes in ground water regime, regional monitoring of water levels and water quality and determination of long term trend of water levels and water quality, CGWB is monitoring 4 times in a year and water samples is collected in the months of May.

2.0 RAINFALL AND CLIMATE

The district has a hot tropical climate. The summer season, which is very oppressive, is from March to May. The southwest monsoon, which follows, lasts till September. October to December constitutes northeast monsoon season. January to February is the comparatively cooler period. The annual normal rainfall for the period (1901-2000) ranges from 1050 – 1400 mm.

The normal annual rainfall over the district varies from about 1050 mm to about 1400 mm. It is the minimum around Vriddhachalam (1051.3 mm). It gradually increases and reaches a maximum around Chidambaram (1402.6 mm) and Portonovo (1347.1).

The contributions of individual seasons are as follows: NE-57%, SW-31%, Summer-7% and Winter 5%.

3.0 GEOMORPHYLOGY AND SOIL TYPES

3.1 Geomorphology

The entire district can be broadly divided into following 3 zones.

Western pediplains of entire area covered by Mangalur and Nallur blocks. This area is occupied by denudational landforms like shallow buried pediment, deep buried pediment and pediments.

Central part of the district is characterized by sedimentary high grounds, elevation >80 m of Cuddalore sandstone of Tertiary age. This zone occupies part of Virudhachalam, Kammapuram, Kurinjipadi, Cuddalore and Kattumannarkoil taluks.

Rest of the area in the district is covered by eastern coastal plain, which predominantly occupied by the flood plain of fluvial origin formed under the influence of Penniyar, Vellar and Coleroon river systems.

Marine sedimentary plain is noted all along the eastern coastal region. In between the marine sedimentary plain and fluvial flood plains, fluvio marine deposits are noted, which consists of sand dunes and back swamp areas.

3.2 Soils

The soils of the district are classified as the black, red, ferruginous and arenaceous. They are again subdivided into clays, loam and sands. Black soils are observed in the chidambaram and Vriddhachalam taluks. They sandy soils are seen along the coast in Cuddalore and Chidambaram taluks. The younger alluvial soils are found as small patches along the stream and river courses in the district. Red sandy soil is seen covering the Cuddalore sandstone, laterite and lateritic gravels occur in parts of Vriddhachalam, Panruti and Cuddalore taluks.

Table-5 :Distribution of Major soil types (%)

S.No.	Taluk	Red soil	Black soil	Alluvial soil	Red loamy soil	Sandy soil	Sandy loamy soil	Total
1	Cuddalore	18.3	0.55	0.99	1.32	76.6	2.24	100
2	Vridhachalam	48.0	40.4	6.98	2.7	0.78	1.23	100
3	Kattumannarkoil	35.56	58.9	0.88	2.9	0.42	1.33	100
4	Panruti	76.35	7.39	15.2	-	0.36	0.7	100
5	Tiggagudi	35	60.5	3.48	0.7	1.06	0.17	100
6	Chidambaram	18	75.9	3.58	0.6	1.07	0.85	100

(Source: Soil Testing Laboratory – Agricultural Department, Cuddalore)

4.0 GROUND WATER SCENARIO

4.1 Hydrogeology

Ground water occurs in all the geological formations ranging in age from Archaean to Recent which can be broadly classified into two hydrogeological units namely a) fissured and fractured formations b) porous formation (Plate-II).

Fissured and Fractured formations: The hard consolidated and crystalline rocks of Archaean age represent the fissured and fractured formations and occur in the western part of the district covering major part of Titangudi and western part of Virudhachalam taluks and consists mainly Charnockite and associated rocks of Archaean age. The secondary porosity in the weathered fissured and fractured zones forms the avenues for ground water occurrence and movement, which are more than 12 m bgl at places. Ground water in this terrain is developed by means of dug wells, dug cum bore wells and bore wells/tube wells. The depth of the wells varies from 10 – 15 m bgl with yield varying from 25,000 to 1 lakh litres/day. The bore wells tap the fracture within 100 m bgl can yield up to 5 lps and can sustain a pumping of 4 – 8 hrs in a day.

Porous Formation: The unconsolidated quaternary sediments consisting of laterite and the fluvial and coastal alluvium and the semi consolidated formations comprising the Cuddalore sandstone and Gopurapuram formations of Tertiary era, Calcareous sandstone moral of Upper cretaceous. The unconsolidated quaternary alluvium and the Cuddalore sandstone form the principal and potential aquifers in the district.

In the area underlain by cretaceous formations ground water occurs generally at bedding places and joints siliceous limestones or in the intergranular pore spaces of calcareous Sandstone. In the semi consolidated Gopurapuram formations are essentially argillaceous, comprising silts, clay stones, calcareous sandstones, siliceous limestones and algal limestones. Depth 50 –750 m bgl. Tube wells tapping cretaceous formation are in the depth range of 100 to 250 m bgl with a yield of 8 lps. It can sustain a pumping of 6 hrs per day. It is generally used for drinking/irrigation purposes.

The tertiary aquifer comprising Cuddalore Sandstone is the most productive aquifer and occurs in the depth range of 100 to 457 m. The yield of the wells varies from 20 to 65 lps and can sustain a pumping of 10 – 14 hrs a day. It is mainly used for irrigation purposes.

The quaternary formations in the district consist of sediments of fluvial fluvio-marine and marine facies. It includes various types of soil, fine to coarse-grained sands, silts, clays laterite and lateritic gravels.

Laterite and lateritic gravels occur in major part of the district covering the Cuddalore sandstones. The Laterites are generally ferruginous and sometimes extensive in occurrence as near Vadalur and Maduraipakkam, Laterites are dark brown.

The quaternary formation occurs at shallow depth less than 30 m and is tapped by dug

wells and filter points. The yield of the wells vary from less than 1 to 5 lps and can sustain a pumping of 6 – 8 hrs in a day.

Cuddalore formation, comprising sandstone, sand gravels separated by clay beds and in the unconsolidated sands of alluvium ground water occurs under water table as well as under confined conditions.

Ground Water Exploration by CGWB (As on 31.03.07)	
Number of Exploratory wells	
i) Sedimentary tube wells	89
ii) Crystalline area bore wells	3
iii) Tsunami Relief well	1
Depth range (m)	50 – 75
Discharge (lps)	
a) Alluvium area	5 –10 lps, D.D 0.5 to 2 m
b) Cuddalore formation	20 – 65 lps, D.D 2.5 to 9.6 m
c) Gopurapuram formation	8.5 lps, D.D < 1 to 5.6 m
d) Madhavapuram formation	< lps
e) Storativity (S)	7.72×10^{-5} - 9.5×10^{-3}
f) Transmissivity (m^2/day)	438 - 1900

4.1.1 Long Term Fluctuation (1998-2007)

Long-term water level fluctuation for the period (1996-2006) indicates that the rise is in the order of 0.0214 to 1.295 m/year. The fall is in the order of 0.0424 to 1.275 m/year.

The post monsoon depth to water level (January 2007) is in the order of 0.04 to 7.46m bgl. However, the pre monsoon depth to water level (May 2006) is in the order of 1.5 to 17.54 m bgl (Post monsoon- Plate-III and Pre monsoon- Plate-IV).

4.2 Ground Water Resources

As per the technical report on dynamic Ground Water Resources of Tamil Nadu as on March 2004, the district's Net Ground water Availability is 156458.31 Ham, the gross draft for all users is 110841.93 Ham and Net Ground water Availability for further irrigation is 45561.68 Ham.

Ground Water Draft:

Development of ground water in the district is mainly through dug wells, dug cum bore wells and bore wells/tube wells. The gross draft irrigation is 107124.76 Ham and gross draft for domestic and industrial purposes is 3717.18 Ham. The block wise gross draft for all use ranges from 644.61 (Portanova) to 16199.43 Ham (Cuddalore).

Stage of Ground Water Development:

The level of ground water development ranges from 10% to 90% all the 13 blocks in the district falls under safe to semi critical stage. Portanova, Keerapalayam and

Kattumannarkoil blocks have stage of development less than 70% while rest of the blocks have development between 70 to 90%.

A summary of dynamic ground water resources computed for the district is given 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 upto next 25 years (2029) (M.Cu.m)	Net groundwater Availability for future Irrigation Development (M.Cu.m)	Stage of Groundwater Development (%)	Category of Block
Annagramam	15376.64	13290.04	291.06	13581.10	303.17	1783.42	88	Semi-critical
Cuddalore	18107.29	15847.22	352.22	16199.43	366.88	1893.20	89	Semi-critical
Kammapuram	13178.43	10754.17	316.58	11070.75	329.75	2094.51	84	Semi-critical
Kattumannarkoil	10942.42	5125.23	283.58	5408.81	295.38	5521.81	49	Safe
Keerapalayam	11625.21	5390.23	177.02	5567.26	184.39	6050.59	48	Safe
Kumaratchi	10092.92	1934.82	284.25	2219.07	296.08	7862.02	22	Safe
Kurinjpadi	17625.19	13648.58	446.68	14095.26	465.27	3511.34	80	Semi-critical
Mangalore	9380.53	6834.34	322.56	7156.90	335.98	2210.21	76	Semi-critical
Melbhuvanagiri	9703.62	5152.42	240.23	5392.64	250.22	4300.98	56	Semi-critical
Nallur	11633.89	10187.05	270.57	10457.63	281.83	1165.00	90	Semi-critical
Panruti	10240.26	7946.29	300.42	8246.72	312.92	1981.04	81	Semi-critical
Portonova	6329.05	409.47	235.14	644.61	244.92	5674.66	10	Safe
Vridhachalam	12222.86	10604.88	196.88	10801.77	205.08	1412.90	88	Semi-critical
District Total	156458.31	107124.76	3717.18	110841.93	3871.88	45461.68		

5.0 GROUND WATER MANAGEMENT STRATEGY

Ground water development in 4 blocks viz. Kattumannarkoil, Keerapalayam, Kumaratchi and Portonova are moderate and categorized as Safe blocks. The remaining 10 blocks are semi-critical stage. However, the ground water development in various parts of the district is more or less uniform. It is better to have some control on the ground water development and management of ground water in the semi-critical blocks.

Water Conservation

In view of the increasing development of ground water and consequent environmental impacts in different parts of the country, the need for conserving/augmenting ground water resources in the de-saturated/depleted aquifer zones through suitably designed

artificial recharge/ground water conservation structures become important in Cuddalore district.

The artificial recharge is an important element of water resources management and also helps to improve the quality of ground water. In the areas where the ground water development is more than the natural recharge, there is an urgent need for artificial recharge.

The ever-increasing demand for ground water for irrigation and industrial needs has resulted in the shifting emphasis towards tapping the ground water from deeper aquifers. Large-scale exploitation of deeper aquifers is taking place in the district. This activity coupled with the advent of compressor pumps and availability of free power had led to the indiscriminate pumping of ground water and this has caused the decline in piezometric head of the aquifers and also the depletion of the resources has been observed in the entire district but in small patches. Hence, it has become imperative necessary to take up schemes to recharge the depleted deeper aquifers through appropriate methods such as recharge wells and revitalization of abandoned bore wells.

Different methodologies have been evolved for the successful recharging of sub-surface aquifers in different parts of the district. Recharge can be augmented through (i) contour bunding, (ii) nala bunding, (iii) check dams, (iv) contour trenching, (v) construction of pits, shafts and wells, (vi) percolation tanks and (vii) surface channels/trenches. The storage in the sub-surface can also be enhanced by constructing sub-surface dams.

The construction of artificial recharge structures as mentioned is expected to arrest the declining trends of ground water levels and to bring up the ground water levels in areas where they have declined considerably specialty in the Panruti area.

6.0 AWARENESS AND TRAINING ACTIVITY

Mass awareness campaign (MAP and Water Management Training programme (WMTP) were conducted by CGWB.

One WMTP was organized on Rainwater harvesting training at District Collectorate campus, Cuddalore during 2006-07. The training was attended by 32 offices from various State Govt. agencies, representatives of Panchayat administration, farmers associations, social welfare organization, and voluntary organization.

One mass awareness campaign on “Ground Water Management, regulation and conservation” was organized at Panikkankuppan, Cuddalore district during 2006-07 and about 300 people from Self Help Group, State Govt. officials and local population attended this programme.

7.0 AREA NOTIFIED BY CGWA/SGWA

NIL

8.0 RECOMMENDATIONS

The heavy-duty tube wells can be constructed for drinking water and industrial need as per the design commensurate with requirements.

In the south-eastern part of the district where freshwater aquifers are occurring below the saline aquifers, design of tube wells warrant the adoption of cement sealing techniques in an effective manner to prevent any contamination of fresh water aquifers by the saline water at the top, based on hydrogeological condition prevailing at the site.

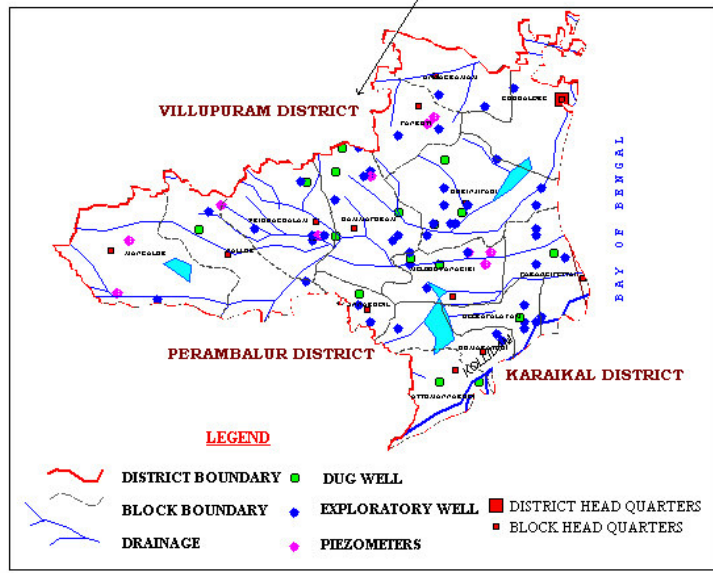
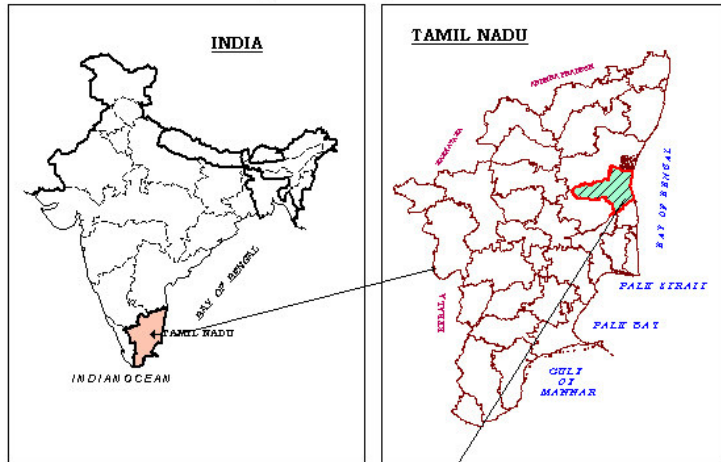
Electrical logging is essential not only to identify the quality variation but also in identifying the correct depth of occurrence of aquifers and proper design of wells.

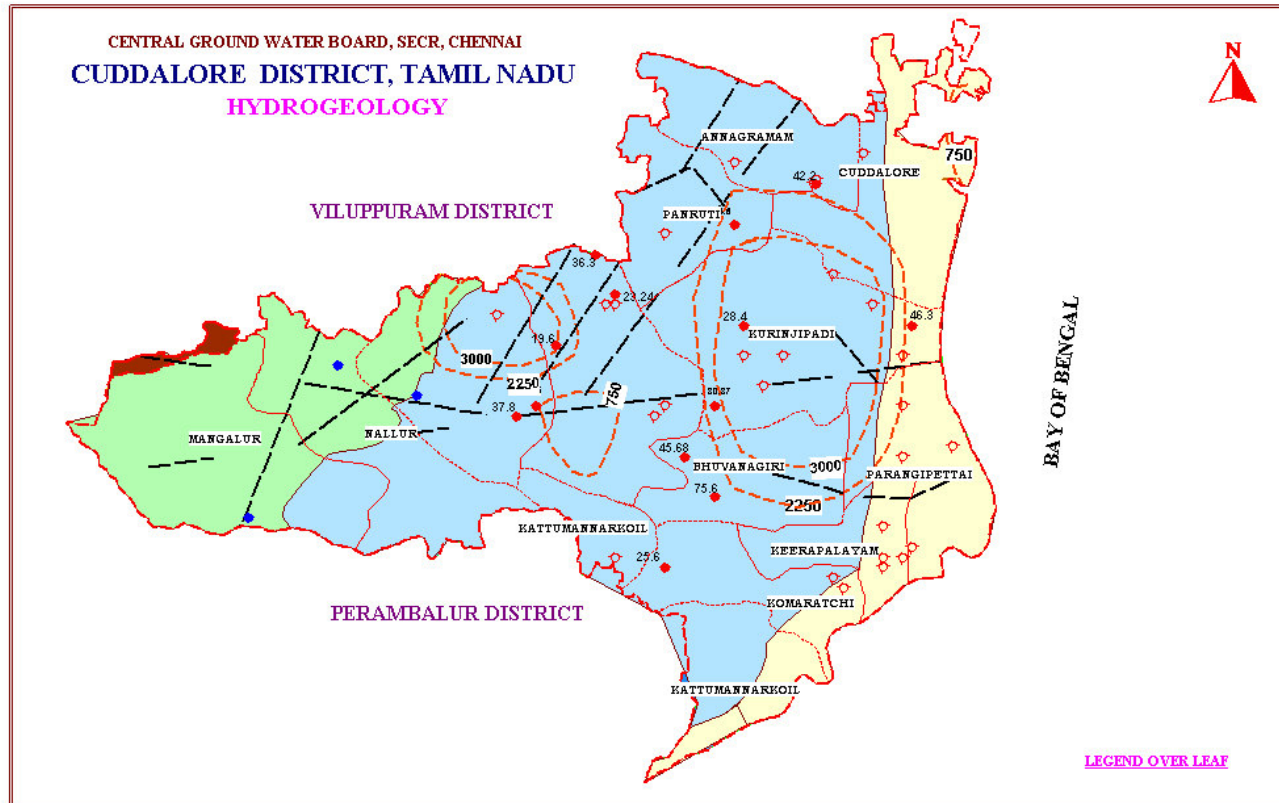
For proper monitoring of ground water system, detailed hydrogeological studies aided by isotope techniques will be helpful in identifying the precise nature magnitude of recharge is essential which will be helpful in proper management of ground water resources.

One exploratory borehole at Parangipettai down to a depth of 199.80 m bgl was drilled. The electrical conductance and the chloride content of the formation water encountered within 84 m bgl was 30,900 micro siemens/cm at 25°C and 15881 m bgl respectively. The brine concentration is 1.5" Be. The formation water can be utilized for the development of aquaculture.

Since pumping of ground water forming for mining of lignite is being carried out, a close monitoring of water level/piezometric head of shallow and deep confined aquifer is more essential for any undue decline for water level in the district. Management by artificial recharge with available resources is recommended.

CENTRAL GROUND WATER BOARD, SECR, CHENNAI
CUDDALORE DISTRICT, TAMIL NADU
LOCATION
 (NOT TO SCALE)







LEGEND FOR PLATE - II

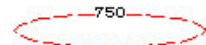
ADMINISTRATIVE SETUP

-  DISTRICT BOUNDARY
-  BLOCK BOUNDARY
-  HILLY AREA


GROUND WATER HYDROLOGY

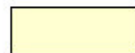

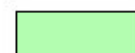
-  EXPLORATORY BORE WELL [CGWB]
-  HIGH YIELDING BORE WELL [CGWB]

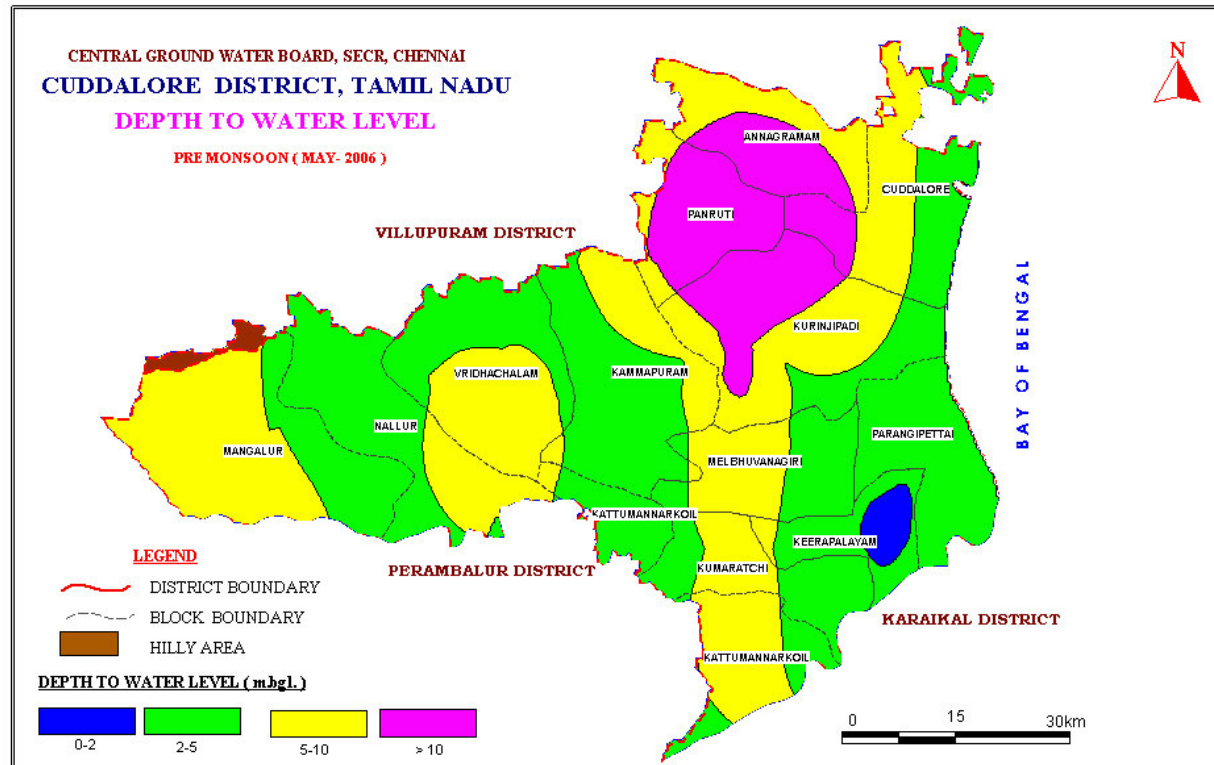
HYDROCHEMISTRY

-  ISOCONS [Sp ELECTRICAL CONDUCTANCE [$\mu\text{s}/\text{cm}$ at 25° C]

STRUCTURE

-  TRACE OF LINEAMENT

<u>AQUIFER</u>	<u>AGE</u>	<u>LITHOLOGY</u>	<u>GROUND WATER CONDITIONS</u>	<u>YIELD PROSPECTS (CU.M/D)</u>	<u>GROUND WATER DEVELOPMENT STRATEGIES</u>	
	UNCONSOLIDATED	RECENT	RIVER ALLUVIUM, FLOOD PLAIN-DEPOSITS SAND,	DISCONTINUOUS, THIN, UNCONFINED TO SEMI CONFINED THICKNES OF ALLUVIUM 10-30 m	300 - 1500 LPM	DEVELOPMENT THROUGH LARGE DIAMETER DUG WELLS, SHALLOW TUBE WELLS AND FILTER POINT
	SEMI UNCONSOLIDATED	QUATERNARY	LIMESTONE, SST & SILT FORMATION	SEMICONFINED & CONFINED CONDITIONS, SST, THICKNES 50 - 450 m	300 - 2000 LPM	SUITABLE FOR SHALLOW & DEEP TUBE WELLS/ DUGWELLS
	CONSOLIDATED	ARCHAIC	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



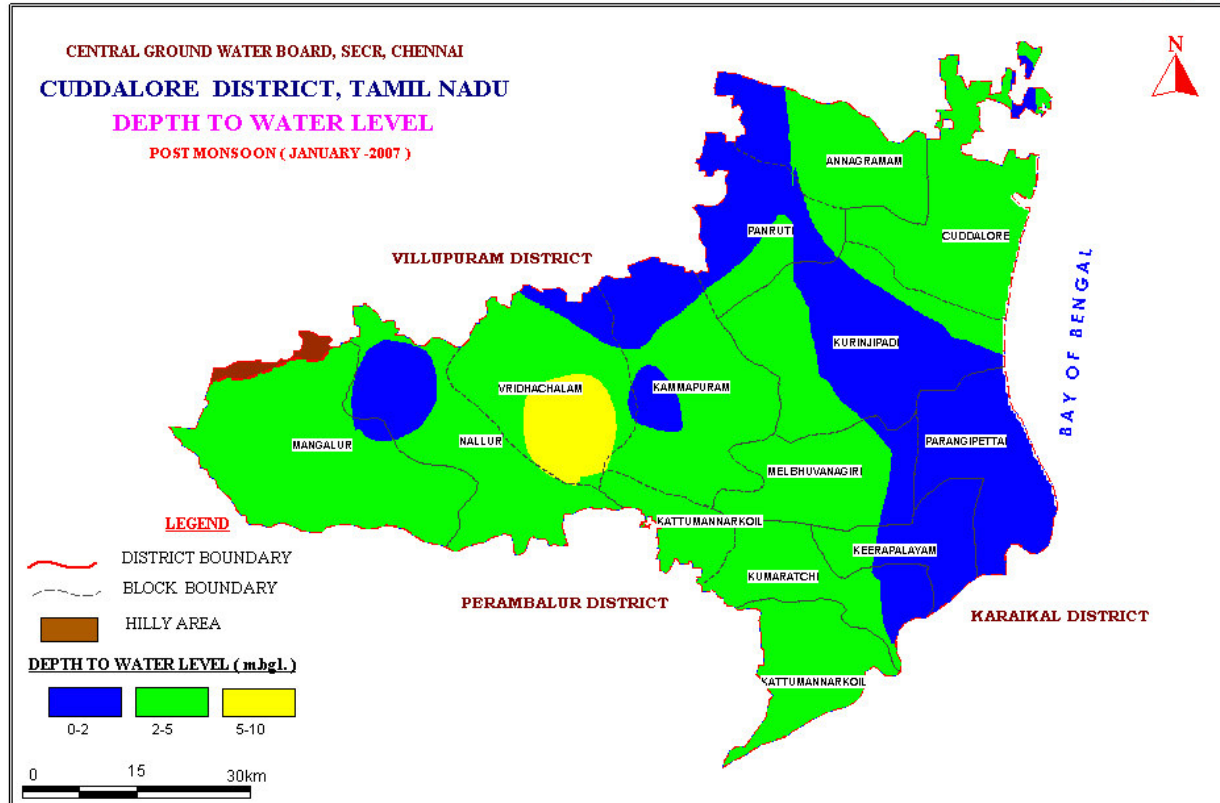
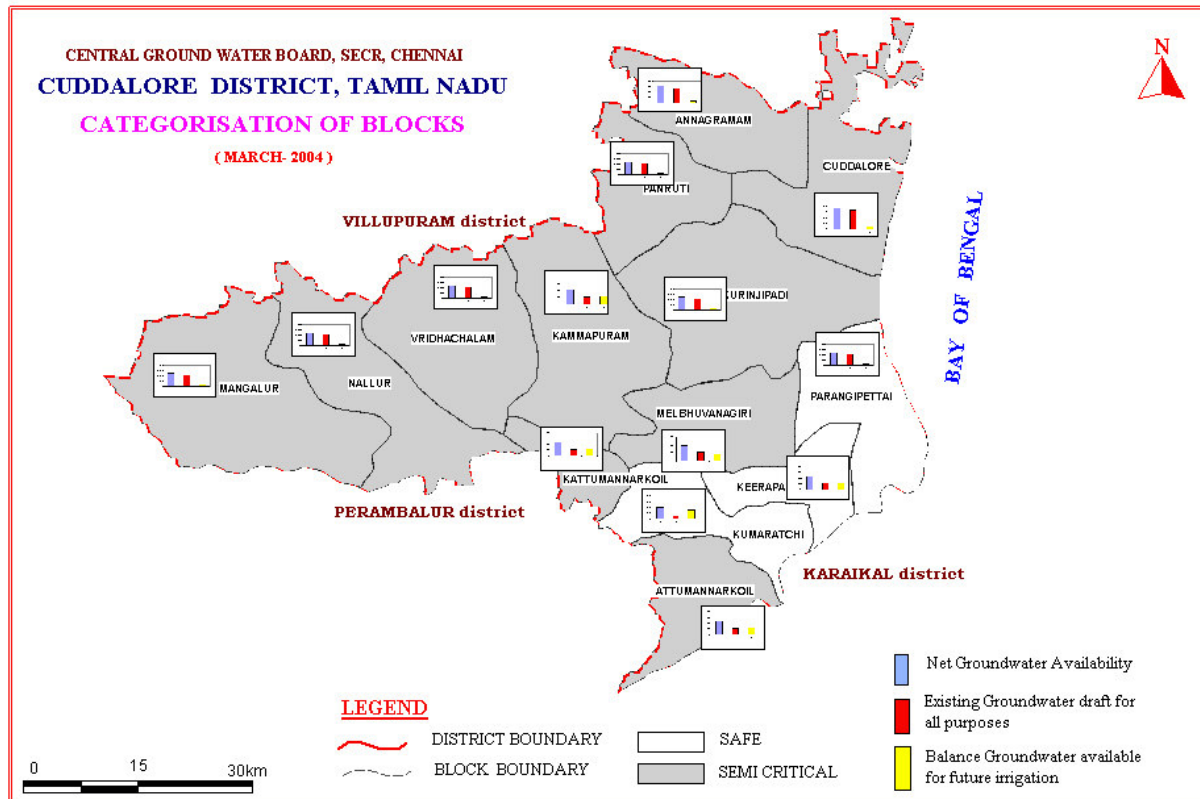
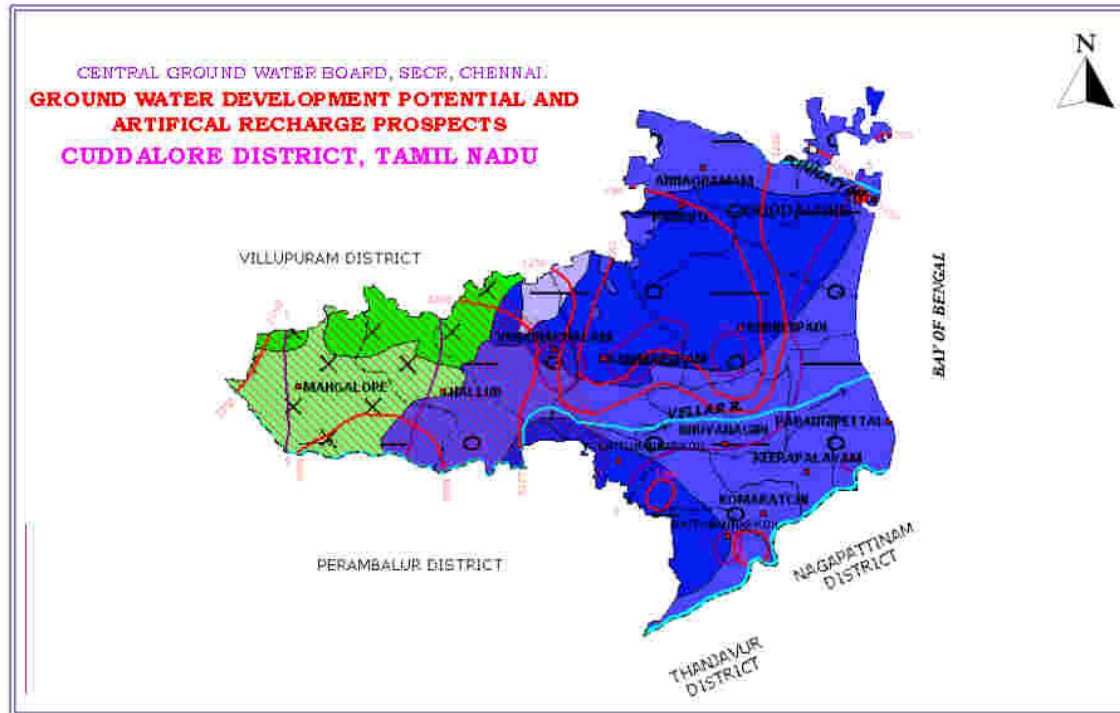














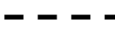


PLATE - V





LEGEND – PLATE VI

DISTRICT – CUDDALORE

	Wells Feasible	Rigs Suitable	Depth Of Well (M)	Discharge (LPM)	Suitable Artificial Recharge Structures
 Soft Rock Aquifer	Tube Well	Direct Rotary	240 – 460	28 – 265	Recharge Tube Wells
 Soft Rock Aquifer	Tube Well	Direct Rotary	30 – 100	162 – 840	Recharge Tube Wells / Recharge Shaft
 Soft Rock Aquifer	Tube Well	Direct Rotary	229 – 751	150 – 4575	Recharge Wells / Injection Wells
 Hard Rock Aquifer	Dug Well Bore Well	Manual DTH	8 – 14 100 - 150	10 - 60 20 - 200	Percolation Ponds
 Hard rock Aquifer	Bore Well	DTH	60 – 100	60 – 180	Percolation Ponds
	District Boundary			Block Boundary	
	District Headquarters			Block Headquarters	
	Water Level-Pre-Monsoon (Decadal Mean 1993-2002) Mbgl			EC In Microsiemens / Cm At 25°C	
	River			Lineament	
	Nitrate Greater Than Maximum Permissible Limit (45mg/L)			Hilly Area	

OTHER INFORMATION

Geographical Area	3678 Sq.Km.
Number Of Blocks	13
Major Drainage	Pennair, Gadilam, and Vellar.
Population (2001)	22,85,395
Average Annual Rainfall	1050-1400 mm
Annual Range of Temperature	21 – 43°C
Regional Geology	Soft rocks: Sand, Clay, Shale & Sandstone Hard rocks: Charnockite, Granite Gneiss
Net Ground Water Availability For Future Irrigation	454.62 MCM/Yr
Stage Of Ground Water Development As on 31 st March 2004	67%
Names Of Blocks Showing Intensive Ground Water Development	OE Blocks – Nil Critical Blocks- Nil

SAVE WATER
AND
CONSERVE WATER

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