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Technical Report Series

# DISTRICT GROUNDWATER BROCHURE CUDDALORE DISTRICT, TAMIL NADU

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**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%<br>2. Sugarcane – 37228 Ha. 20%<br>3. Groundnut – 21389 Ha. 6%<br>4. Coconut – 2722 Ha. 1%<br>5. Others – 59537 Ha. 6% | |
| 6. | **IRRIGATION BY DIFFERENT SOURCES (During 2005-06)** | **Number** | **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<br>Max :0.0424 | Min : 1.2953<br>Max : 1.275 |
| **10.** | **GROUND WATER EXPLORATION BY CGWB (As on 31-03-2007)** | | |
| | Number of Exploratory wells<br>i) Sedimentary tube wells'<br>ii) Crystalline area bore wells<br>iii) Tsunami Relief well | <br>89<br>3<br>1 | |
| | iv. Depth range(m) | 50– 750 | |
| | v. Discharge(lps)<br>a) Alluvium area<br>b) Cuddalore formation<br>c) Gopurapuram formation<br>d) Madhavapuram formation | <br>5 – 10 lps, d.d 0.5 to 2 m<br>20 – 65 lps d.d 2.5 to 9.6 m<br>8.5 lps d.d. < 1 to 5.6 m<br>< 1 lps | |
| | vi. Storativity (S) | $7.72 \times 10^{-5} – 9.5 \times 10^{-3}$ | |
| | vii. Transmissivity (m2/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.** | 1. The quality of ground water in the fissured formation in some local pockets shows higher mineralisation, cases of local pollution.<br>2. The thermal power plant ashes, toxic traces elements pollute surface and groundwater system in the Thermal plant areas.<br>3. In the southeastern part of the district, heavy withdrawal from deeper zone is predominant (300 – 350 m bgl).<br>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.

Ponniyar is one of the major seasonal river drains the northern part of the district, which originates from the Nandi hills of Karnataka state. Thurinjalar 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 arenacious. 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<br>i) Sedimentary tube wells<br>ii) Crystalline area bore wells<br>iii) Tsunami Relief well | <br>89<br>3<br>1 |
| Depth range (m) | 50 – 75 |
| Discharge (lps)<br>a) Alluvium area<br>b) Cuddalore formation<br>c) Gopurapuram formation<br>d) Madhavapuram formation<br>e) Storativity (S)<br>f) Transmissivity ($m^2$/day) | <br>5 –10 lps, D.D 0.5 to 2 m<br>20 – 65 lps, D.D 2.5 to 9.6 m<br>8.5 lps, D.D < 1 to 5.6 m<br>< lps<br>$7.72x10^{-5}$- 9.5 x $10^{-3}$<br>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. Portonova, Keerapalayam and

Katturmannarkoil 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 |
| Kurinjipadi | 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.

PLATE - I

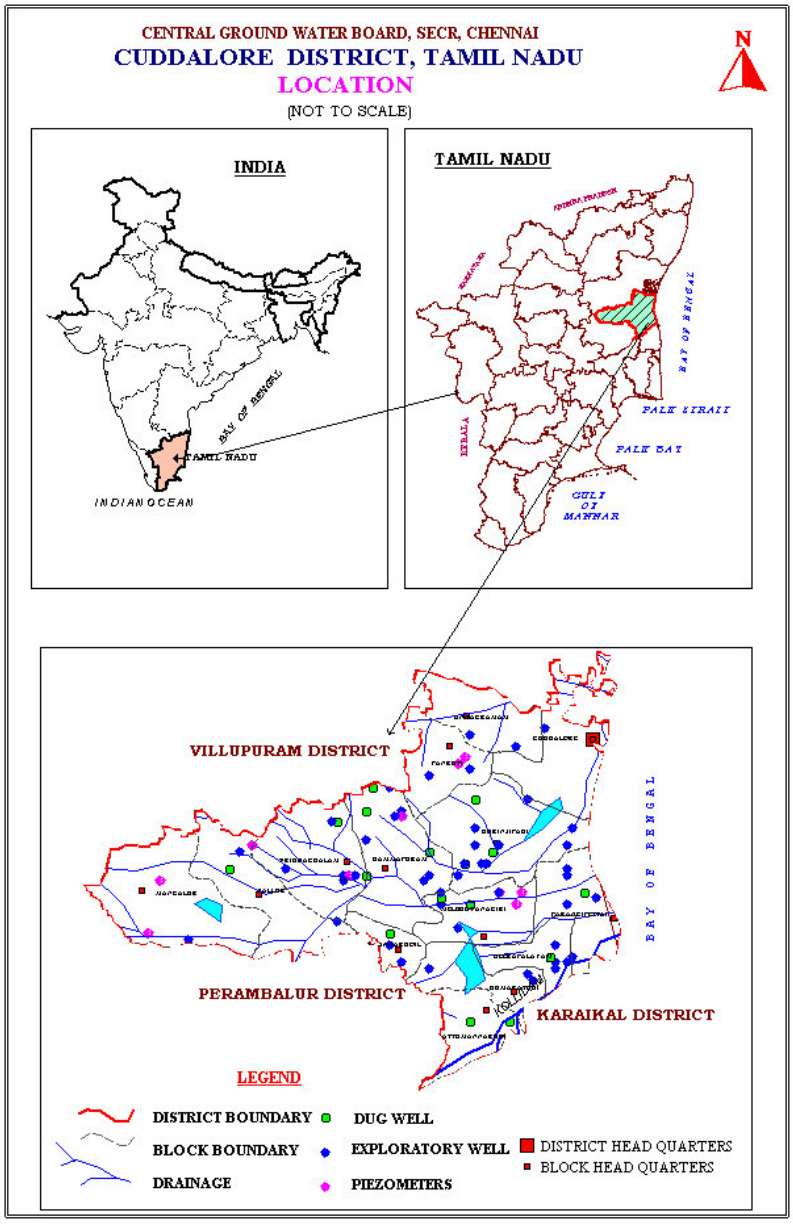
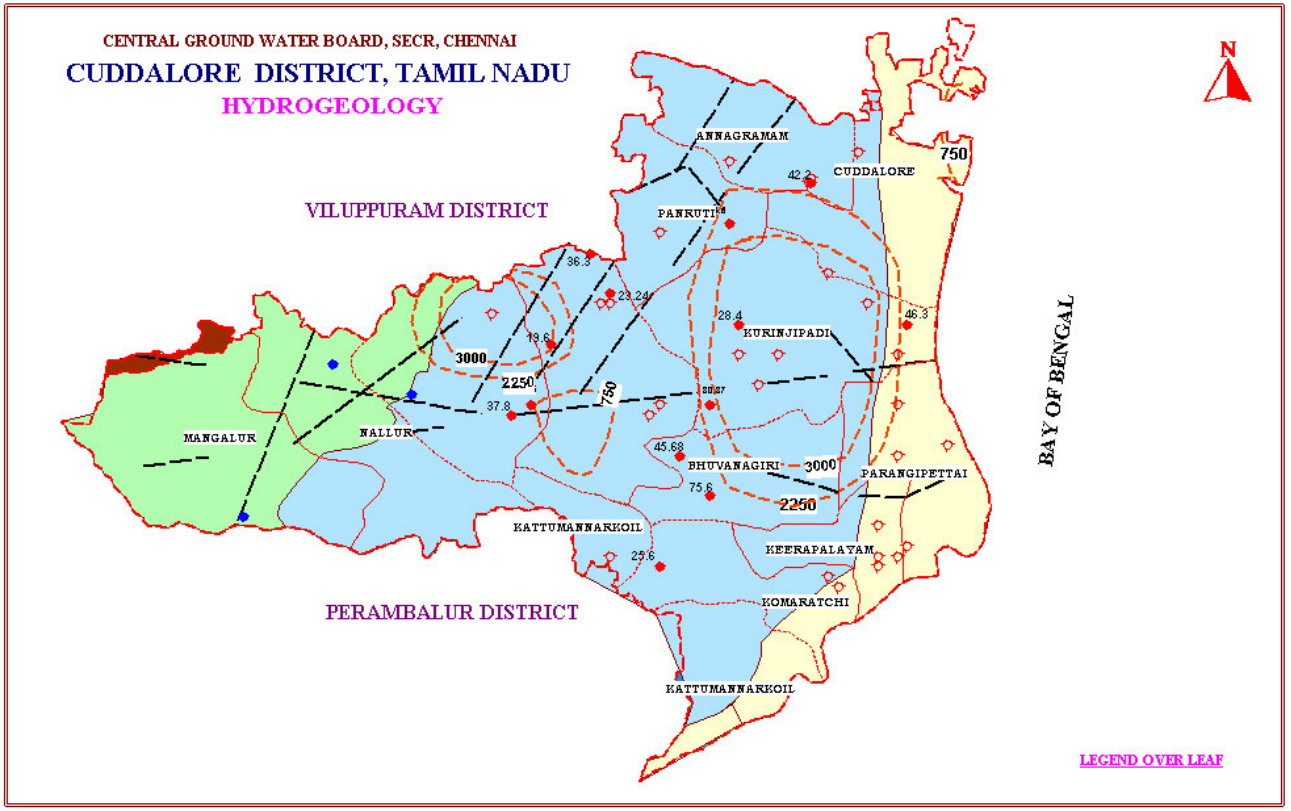

CENTRAL GROUND WATER BOARD, SECR, CHENNAI
CUDDALORE DISTRICT, TAMIL NADU
LOCATION
(NOT TO SCALE)
N
INDIA
TAMIL NADU
BAY OF BENGAL
INDIAN OCEAN
TAMIL NADU
KERALA
BAY OF BENGAL
PALK STRAIT
PALK BAY
GULF OF MANNAR
VILLUPURAM DISTRICT
PERAMBALUR DISTRICT
KARAIKAL DISTRICT
BAY OF BENGAL
LEGEND
DISTRICT BOUNDARY
BLOCK BOUNDARY
DRAINAGE
DUG WELL
EXPLORATORY WELL
PIEZOMETERS
DISTRICT HEAD QUARTERS
BLOCK HEAD QUARTERS

PLATE - II


CENTRAL GROUND WATER BOARD, SECR, CHENNAI
CUDDALORE DISTRICT, TAMIL NADU
HYDROGEOLOGY
N
VILUPPURAM DISTRICT
PERAMBALUR DISTRICT
BAY OF BENGAL
ANNAGRAMAM
CUDDALORE
PANRUTI
KURINJIPADI
MANGALUR
NALLUR
BHUVANAGIRI
PARANGIPETTAI
KATTUMANNARKOIL
KEERAPALAYAM
KOMARATCHI
KATTUMANNARKOIL
42.2
36.3
23.24
28.4
46.3
19.6
37.8
45.68
75.6
25.6
3000
2250
750
LEGEND OVER LEAF

# 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

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

## 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 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 | QUARTERNARY | LIMESTONE, SST & SILT FORMATION | SEMICONFIND & COFINED CONDITIONS, SST, THICKNES 50 - 450 m | 300 - 2000 LPM | SUITABLE FOR SHALLOW & DEEP TUBE WELLS/ DUGWELLS |
| 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 |

PLATE- III

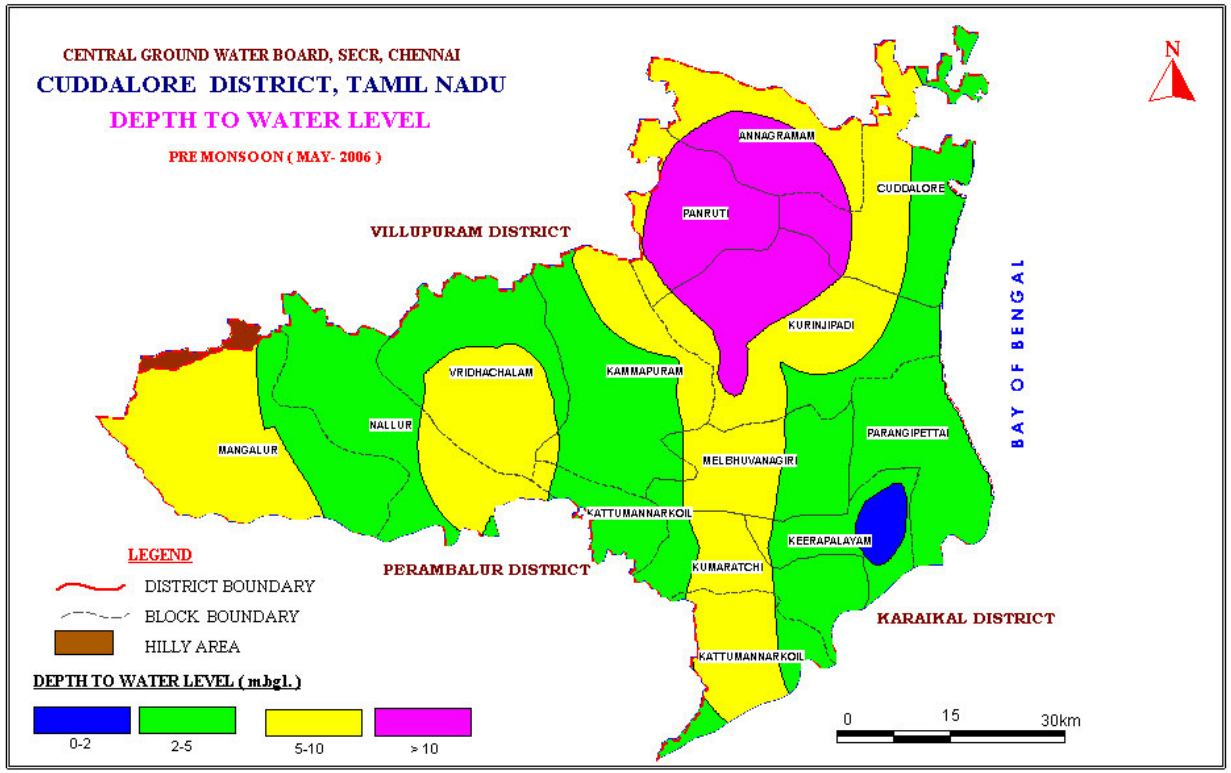

CENTRAL GROUND WATER BOARD, SECR, CHENNAI
CUDDALORE DISTRICT, TAMIL NADU
DEPTH TO WATER LEVEL
PRE MONSOON ( MAY- 2006 )
N
ANNAGRAMAM
CUDDALORE
PANRUTI
VILLUPURAM DISTRICT
KURINJIPADI
VRIDHACHALAM
KAMMAPURAM
NALLUR
MANGALUR
PARANGIPETTAI
MELBHUVANAGIRI
KATTUMANNARKOIL
KEERAPALAYAM
KUMARATCHI
PERAMBALUR DISTRICT
KARAIKAL DISTRICT
KATTUMANNARKOIL
BAY OF BENGAL
LEGEND
DISTRICT BOUNDARY
BLOCK BOUNDARY
HILLY AREA
DEPTH TO WATER LEVEL ( mbgl. )
0-2
2-5
5-10
> 10
0
15
30km

PLATE- IV

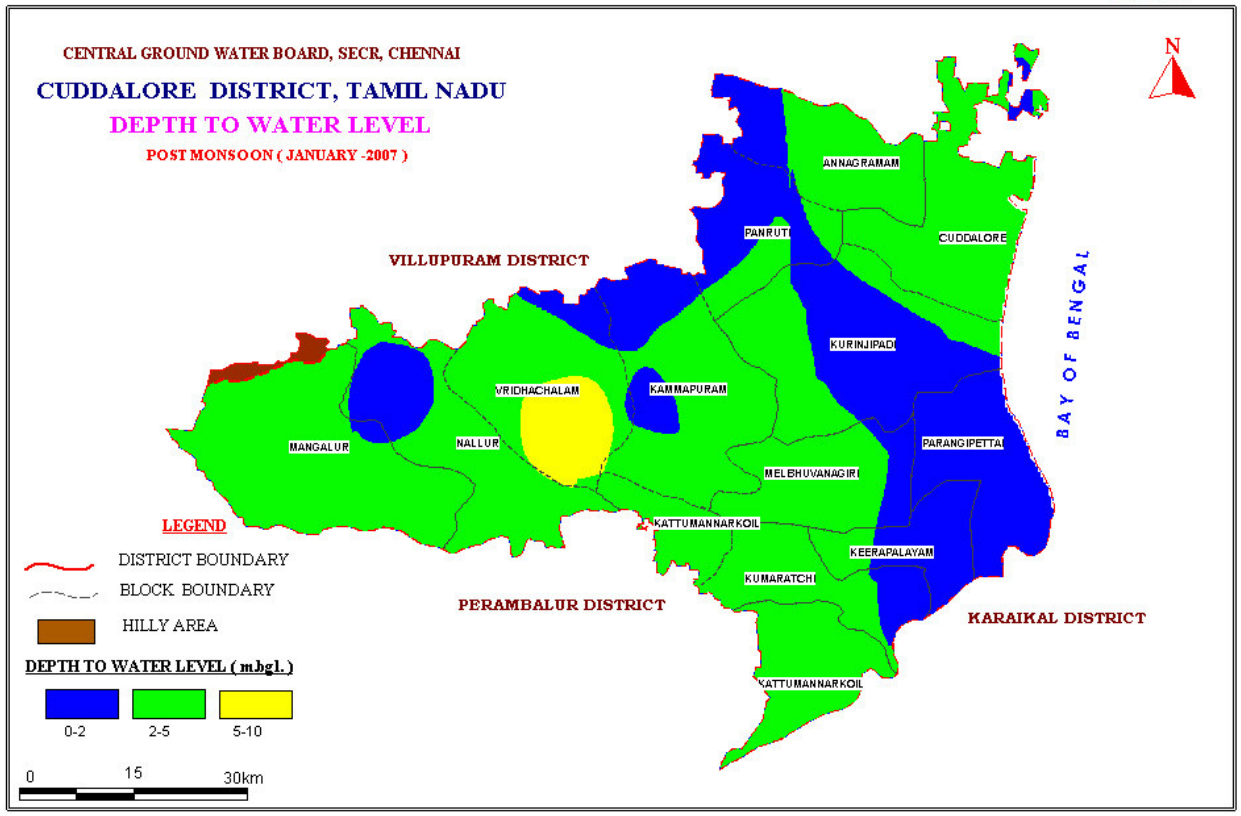

CENTRAL GROUND WATER BOARD, SECR, CHENNAI
CUDDALORE DISTRICT, TAMIL NADU
DEPTH TO WATER LEVEL
POST MONSOON ( JANUARY -2007 )
N
ANNAGRAMAM
PANRUTI
CUDDALORE
VILLUPURAM DISTRICT
KURINJIPADI
BAY OF BENGAL
VRIDHACHALAM
KAMMAPURAM
MANGALUR
NALLUR
PARANGIPETTAI
MELBHUVANAGIRI
KATTUMANNARKOIL
KEERAPALAYAM
KUMARATCHI
PERAMBALUR DISTRICT
KARAIKAL DISTRICT
KATTUMANNARKOIL
LEGEND
DISTRICT BOUNDARY
BLOCK BOUNDARY
HILLY AREA
DEPTH TO WATER LEVEL ( mbgl. )
0-2
2-5
5-10
0
15
30km

PLATE - V

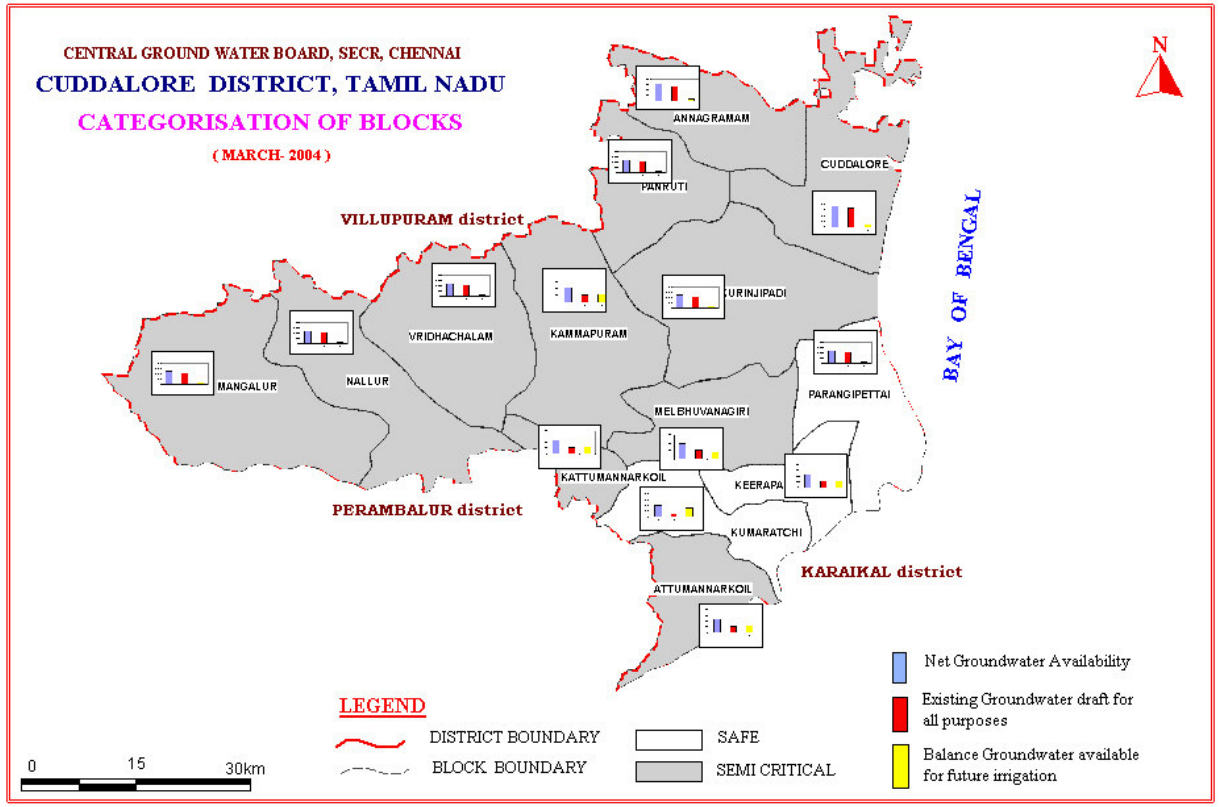
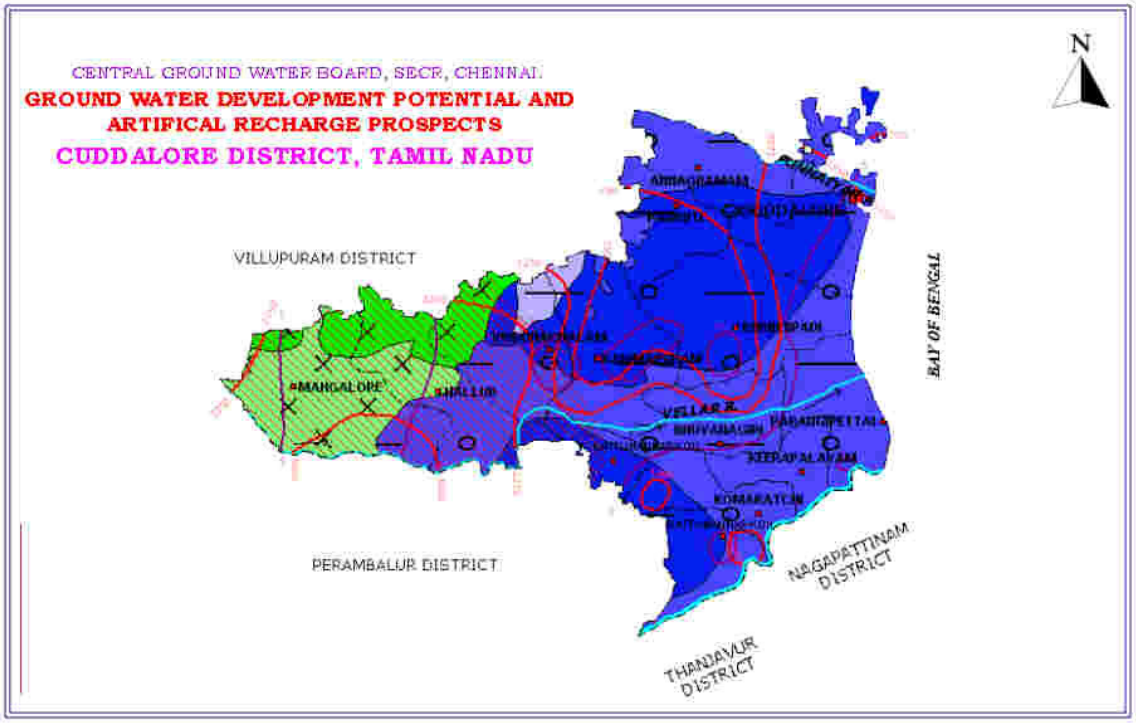

CENTRAL GROUND WATER BOARD, SECR, CHENNAI
CUDDALORE DISTRICT, TAMIL NADU
CATEGORISATION OF BLOCKS
( MARCH- 2004 )
N
ANNAGRAMAM
PANRUTI
CUDDALORE
VILLUPURAM district
URINJIPADI
VRIDHACHALAM
KAMMAPURAM
NALLUR
MANGALUR
PARANGIPETTAI
BAY OF BENGAL
MELBHUVANAGIRI
KATTUMANNARKOIL
KEERAPA
KUMARATCHI
PERAMBALUR district
KARAIKAL district
ATTUMANNARKOIL
LEGEND
DISTRICT BOUNDARY
BLOCK BOUNDARY
SAFE
SEMI CRITICAL
Net Groundwater Availability
Existing Groundwater draft for all purposes
Balance Groundwater available for future irrigation
0
15
30km

PLATE - VI


CENTRAL GROUND WATER BOARD, SECR, CHENNAI
GROUND WATER DEVELOPMENT POTENTIAL AND
ARTIFICAL RECHARGE PROSPECTS
CUDDALORE DISTRICT, TAMIL NADU
N
VILLUPURAM DISTRICT
MANGALORE
VRIDHACHALAM
KURINJIPADI
PANRUTI
CUDDALORE
ANNAGRAMAM
VELLAR R.
PARANGIPETTAI
KEERAPALAYAM
KOMARATCHI
BAY OF BENGAL
PERAMBALUR DISTRICT
NAGAPATTINAM
DISTRICT
THANJAVUR
DISTRICT

## 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<br>Bore Well | Manual<br>DTH | 8 – 14<br>100 - 150 | 10 - 60<br>20 - 200 | Percolation Ponds |
| Hard Rock Aquifer | Bore Well | DTH | 60 – 100 | 60 – 180 | Percolation Ponds |
| | District Boundary | | | Block Boundary | |
| | District Headquarters | | | Block Headquarters | |
| 5 | Water Level-Pre-Monsoon (Decadal Mean 1993-2002) Mbgl | | 1250 | 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 | Pennaiar, 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<br>**Hard rocks:** Charnockite, Granite Gneiss |
| Net Ground Water Availability For Future Irrigation | 454.62 MCM/Yr |
| Stage Of Ground Water Development As on 31st March 2004 | 67% |
| Names Of Blocks Showing Intensive Ground Water Development | OE Blocks – Nil<br>Critical Blocks-Nil |

# SAVE WATER

# AND

# CONSERVE WATER

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rdsecr-cgwb@nic.in