For official use

Technical Report Series

DISTRICT GROUNDWATER BROCHURE

PUDUKOTTAI DISTRICT, TAMIL NADU

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Ministry of Water Resources

Central Ground Water Board

South Eastern Coastal Region
Chennai

February 2008

DISTRICT AT A GLANCE (PUDUKOTTAI DISTRICT)

S.NO	ITEMS	STATISTICS	
1.	**GENERAL INFORMATION**		
	i. Geographical area (Sq.km)	**4663.29**	
	ii. Administrative Divisions as on 31-3-2007 Number of Tehsils Number of Blocks Number of Villages	 7 13 767	
	iii. Population (as on 2001 Census) Total Population Male Female	 1327148 661782 665366	
	iv. Average Annual Rainfall (mm)	910.8	
2.	**GEOMORPHOLOGY**		
	i. Major physiographic Units	Residual hills & Alluvial Plains	
	ii. Major Drainages	Vellar, Agniar, Ambuliar, Koraiyar	
3.	**LAND USE (Sq. km) during 2005-06**		
	i. Forest area ii. Net area sown iii. Cultivable waste	235.35 1602.31 103.92	
4.	**MAJOR SOIL TYPES**	Black, Red, Alluvial Soils & Beach Sand	
5.	**AREA UNDER PRINCIPAL CROPS (AS ON 2005-2006)**	1. Paddy - 95986 Ha – 59% 2. Oil Seeds – 31661 Ha - 20% 3. Vegetables – 16493 Ha – 10% 4. Sugarcane – 9459 Ha – 6%	
6.	**IRRIGATION BY DIFFERENT SOURCES (During 2005-06)**	**Number**	**Area irrigated (Ha)**
	i. Dug wells	38447	8482
	ii. Tube wells	8381	18902
	iii. Tanks	5451	71764
	iv. Canals	28	10679
	v. Other Sources	-	-
	vi. Net irrigated area	109827 Ha	
	vii. Gross irrigated area	111182 Ha	
7.	**NUMBERS OF GROUND WATER MONITORING WELLS OF CGWB (AS ON 31.03.2007)**		
	i. No of dug wells	21	
	ii. No of piezometers	9	
8.	**PREDOMINANT GEOLOGICAL FORMATIONS**	Clayey Sandstone, Silty Clay, Sandstone, Alluvium & Granitic Gneiss	

9.	**HYDROGEOLOGY**		
	i. Major water bearing formations	Sandstone, Alluvium & weathered and fracture d Granitic Gneiss	
	ii. Pre- monsoon depth to water level (May 2006)	0.85 to 9.50 m bgl	
	iii. Post- monsoon depth to water level (Jan'2007)	0.58 to 6.88 m bgl	
	iv. Long term water level trend in 10 years (1998-2007) in m/yr	**Annual**	
		Rise (m/year)	**Fall (m/year)**
		Min : 0.004 Max :0.638	Min : 0.005 Max : 0.542
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.	39 12 9	
	iv. Depth range(m)	Crystalline Rocks: 62 - 200 Sedimentary Rocks: 349 - 545	
	v. Discharge(lps)	Crystalline Rocks: < 1 to 5 Sedimentary Rocks: 9 - 67	
	vi. Storativity (S)	Sedimentary Rocks: 4.9 X 10^{-6} to 4.4 X 10^{-4}	
	vii. Transmissivity (m^2/day)	Crystalline Rocks: < 1 to 50 Sedimentary Rocks: 600 - 4500	
11.	**GROUND WATER QUALITY AS ON MAY 2006**		
	i. Presence of chemical constituents more than permissible limit	TH as Ca CO_3, NO_3 & F	
	ii. Type of water	NaCl, CaCl & $CaHCO_3$	
12.	**DYNAMIC GROUND WATER RESOURCES (as on 31.03.2004) in MCM**		
	i. Annual Replenishable Ground Water Resources	962.42	
	ii. Total Annual Ground Water Draft for all purposes	209.09	
	iii. Projected demand for Domestic and Industrial Uses up to 2025	24.71	
	iv. Stage of Ground Water Development	24	
13.	**AWARENESS AND TRAINING ACTIVITY**		
	i. Mass Awareness Programmes Organized	Nil	
	ii. Water Management Training Organized	Nil	

14.	**EFFORTS OF ARTIFICIAL RECHARGE & RAINWATER HARVESTING**	Technical Guidance were provided as when sought
	i. Projects completed by CGWB Number of structures Amount spent	Nil
	ii. Projects under technical guidance of CGWB Number of structures	Nil
15.	**GROUND WATER CONTROL AND REGULATION**	
	i. Number of OE Blocks	Nil
	ii. Number of Critical Blocks	Nil
	iii. Number of Blocks Notified	-
16.	**MAJOR GROUND WATER PROBLEMS AND ISSUES.**	Insitu salinity of Brine quality in parts of Aranthangi & Avudiarkoil taluks in the sedimentary tract between 116 – 350 m depth ranges.

1.0 INTRODUCTION

1.1 Administrative Details

Pudukottai district is having administrative divisions of 7 taluks, 13 blocks, 539 Panchayats and 341 villages as detailed below:

Sl. No.	Taluk	No. of Villages	Blocks	No. of Villages
1.	Pudukottai	44	Pudukottai	44
2.	Alangudi	50	Karambakudi	50
3.	Arantangi	96	Arantangi	96
4.	Avudaiyarkoil	160	Avudaiyarkoil Manamalkudi	88 72
5.	Gandarvakottai	108	Gandarvakottai Thiruvarankulam	35 73
6.	Tirumayam	147	Thirumayam Ponnemaravathi Arimalam	45 49 53
7.	Kulattur	162	Kunnanthar Koil Annavasal Viralimalai	49 59 54
	Total	**767**		**767**

1.2 Basin and sub-basin

Pudikottai is a part of Cauvery Basin and parts of Vellar, Agniar, Ambuliar, Koraiyur, Kundar and Pambar sub basins.

1.3 Drainage

Vellar is the major river, which flows in an east southeasterly direction and confluences with the Bay of Bengal near Manamelkudi.

Agniar, Ambuliyar, Koraiyar, Kundar and Pambar are the other important rivers draining the district. Almost all the rivers are ephemeral in nature causing floods during rainy seasons, which are structurally controlled.

1.4 Irrigation Practices

The land use classification of Pudukottai district is given below (2005-06)

S.No	Classification	Area (Ha)
1	Forests	23535
2	Barren & Uncultivable Lands	9863
3	Land put to non agricultural uses	129297
4	Cultivable Waste	10392
5	Permanent Pastures & other grazing lands	5126
6	Groves not included in the area sown	28112
7	Current Fallows	7089
8	Other Fallow Lands	92684
9	Net Area sown	160231
	Total	**466329**

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

The chief irrigation sources in the area are the tanks followed by tube wells and canals.

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 wells	Ordinary wells	Other Sources	
1	Pudukottai	0	2705	692	1241	0	4638
2	Gandahravakottai	132	2521	3287	465	0	6405
3	Kunnardarkoil	0	6570	488	743	0	7801
4	Annavasal	29	6409	135	1230	0	7803
5	Viralimalai	0	5377	162	1216	0	6755
6	Thiruvarankulam	96	4786	5006	691	0	10579
7	Karambhakudi	565	3295	2974	760	0	7594
8	Thirumayam	0	4802	460	168	0	5430
9	Ponnamaravathi	0	5146	174	512	0	5832
10	Arimalam	0	6164	509	494	0	7167
11	Aranthangi	5815	5527	4834	871	0	17047
12	Avudayarkoil	1188	12432	104	91	0	13815
13	Manamelkudi	2854	6030	77	0	0	8961
	Total	**10679**	**71764**	**18902**	**8482**	**0**	**109827**

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

1.5 Studies/Activities carried out by CGWB

Systematic hydrogeological surveys were carried out in 1987-88 and subsequently re-appraisal hydrogeological surveys were carried out during the year 1994-95 and 1997-1998.

Ground water exploration by way of drilling, construction and testing of wells were carried out in the sedimentary tract by the Central Ground Water Board during 1979-83.

Exploration to evaluate the brine water resources in the coastal tract of Pudukottai district, was taken up in 1994-95 to study the development of salt and salt based marine chemical industries and aquaculture.

Purpose built observation wells have been constructed both in fissured (9 nos.) and porous formations (2 nos.) for periodical monitoring of water levels and quality at locations in the district under the World Bank Aided Hydrology Project.

Groundwater exploration in hard rock areas were taken up in 2002-03 and drilled down to a depth of 200m.

Regional Groundwater Monitoring is being carried out in the district since 1972 and over the years the well density has been optimized for regional monitoring. Under this work, 21 dug wells and 9 piezometers (as on

31.03.2007) are being monitored for studying the changes in water level and water quality. The monitoring is being carried out 4 times a year for water levels (January, May, August & November) and Water samples are collected during May measurements to study the changes in quality of water with time and space.

2.0 RAINFALL AND CLIMATE

The normal annual rainfall recorded at various rain gauge stations in the area ranged from 833.40 (Viralimalai) to 1033.8 mm (Perungalur) with an average of 910.8 mm for the district. There is a gradual increase in precipitation from east to southwest over the district.

The district enjoys a tropical climate. The period from April to June is generally hot and dry. The weather is pleasant during the period from November to January. The mean maximum temperature is around 33.7^{o}C and mean minimum temperature is 24^{o}C.

The maximum relative humidity in a day varies from 59% to 81% minimum relative humidity in a day varies from 38% to 63%.

3.0 GEOMORPHYLOGY AND SOIL TYPES

3.1 Geomorphology

The district is characterised by an undulating topography with residual hills in the northern, western and southern parts of the district, where as in the eastern part of the district is a flat terrain consisting of alluvial plains. The elevation of the terrain of the western part of the area is about 125 m above msl, where as towards coast it is about 1 m above msl.

The geomorphic evolution of the area is mainly controlled by denudational, structural and fluvial processes. The evolution of various landforms has been governed mainly by the varying resistance of geological formations to these processes. Various landforms are occurring in the area, such as erosional plains, residual hills, pediments, buried pediments and deltaic plain. The shallow pediments possess poor to moderate yields with thin soil cover. The buried pediments and deltaic plain possess good ground water potential

3.2 Soils

The soils of the district can be classified into black, red, ferruginous, lateritic, alluvial and beach soils. Black soils are formed in the western part of the district. Red ferruginous lateritic soils are formed on the high grounds, south of Annavasal, west of Illupur, north of Malaipatti around Kulakurichchi near Gandarvakottai, east of Arantangi around Arimalam and Alangudi. Alluvial soils consisting of blackish and brownish sandy and silty soils are observed along the course of the Vellar, Agniyar and Ambuliyar rivers, where as the beach sands are noticed along the coast of the district.

4.0 GROUND WATER SCENARIO

4.1 Hydrogeology

The major aquifer systems in the district are constituted by (1) weathered and fractured crystalline rocks consisting mainly hornblende gneisses, granitic gneisses and pink granites, (2) sedimentary formations ranging in age from Cretaceous to Recent, consisting of sand stones, lime stones, shales and unconsolidated alluvium. In the former, ground water occurs under phreatic conditions in the weathered mantle at shallow depths and semi-confined conditions in the fractured systems at deeper levels, where as in the latter, it occurs under phreatic to confined conditions depending upon the storage and conduit characterization of the confining layers.

The thickness of weathering in crystalline rock in the district ranges from less than a metre to maximum of 15.0 m bgl depending on the topography, lithology and structural features. The results of groundwater exploration indicate that there is a possibility of encountering 2 fracture zones within 50 m bgl, 2 zones in between 50 – 100 m depth and 1 fracture zone between 100 - 150 m and 150-200m depth ranges. However, all the zones may not be encountered at all places.

In case of porous formations, aquifers can be grouped into shallow aquifers with zones within the depth of 100 m bgl and deeper aquifers between the depth range of 100 – 450 m bgl. In the shallow aquifer zones, area south of Vellar has quality problem and groundwater extraction is only from beyond 100 m depth. In other places, the granular zones are present between 60 – 100 m depth. In case of deeper aquifers, the exploration has revealed that the presence of 2 to 22 aquifer zone with a total thickness varying between 21.43 and 314.5 m. The isopach contour showed an increase in thickness from less than 50 m in the northwestern part to more than 250 m in the southeastern part.

The dug wells tapping weathered formation are 12-15 m deep and can sustain a yield up to 5 lps for a pumping 2-4 hours, while the dug wells tapping the shallow aquifers in porous formations are 12 m deep and can sustain a yield of 5 lps for a pumping of 4-6 hrs.

The shallow aquifer down to 100 m bgl are tapped with shallow tube wells with a diameter of 150 mm with depth varying between 60 – 100m and slotted pipe of length of 10 to 20 m. The wells can yield between 2 to 8 lps and can sustain a pumping of 8 – 10 hrs.

The deeper aquifers are yet to be tapped for irrigation purposes and only tube wells are constructed for providing drinking water supply. The depth of the wells vary between 350 – 450 m bgl with a housing diameter of 20 – 30 cm and assembly diameter of 15 – 20 cm. The wells may yield between 19 – 56 lps.

The depth to water level in the phreatic aquifer varied from 0.85 to 9.50 m bgl during pre monsoon (May 2006) and from 0.58 to 6.88 m bgl during post monsoon (Jan 2007). The depth to piezometric surface varied from 1.90 to 6.60 m bgl during pre monsoon (May 2006) and from 1.70 to 7.60 m bgl during post monsoon (Jan 2007).

4.1.1 Long Term Fluctuation (1998-2007)

Rise (m)		Fall (m)	
Minimum	**Maximum**	**Minimum**	**Maximum**
0.0038	0.6383	0.0049	0.5425

4.1.2 Aquifer Parameters

Parameters	Shallow Aquifer		Deeper Aquifer	
	Crystalline	Sedimentary	Crystalline	Sedimentary
Transmissivity (m^2/day)	19 - 65	7 -145	<1 to 50	600 - 4500
Storativity	-	-	NA	4.9 X 10^{-6} to 4.4 X 10^{-4}
Specific Yield	0.015	0.12	-	-

4.2 Ground Water Resources

The ground water resources have been computed jointly by Central Ground Water Board and State Ground & Surface Water Resources and Data Centre (PWD, WRO, Government of Tamil Nadu) as on 31st March 2004. The salient features of the computations are furnished below.

Stage of Groundwater Development in Puddukkottai District as on 31st March 2004

<----------(in Ham)----------→

Name of Groundwater Assessment Unit (Block)	Net Groundwater Availability	Existing Gross Draft for Irrigation	Existing Gross Draft for Domestic and industrial water supply	Existing Gross Draft for all uses	Allocation for Domestic and Industrial Requirement supply up to next 25 years (2029)	Net groundwater Availability for future Irrigation Development	Stage of Groundwater Development	Category of the Block
1	2	3	4	5= 3+4	6	7 = 2-(3+6)	8 = (5/2)*100	9
Annavasal	6702.93	1450.23	260.01	1710.24	270.21	4982.49	26	Safe
Aranthangi	5969.89	1312.03	113.87	1425.90	118.34	4539.52	24	Safe
Arimalam	6969.76	362.35	138.45	500.80	143.88	6463.53	7	Safe
Avudiarkoil	11757.79	0.00	168.58	168.58	175.19	11582.60	1	Safe
Gandharvakottai	7225.92	1815.84	158.55	1974.39	164.77	5245.31	27	Safe
Karambakudi	7319.02	3257.89	207.33	3465.22	215.47	3845.67	47	Safe
Kunnandarkoil	5865.52	1241.16	173.40	1414.56	180.21	4444.15	24	Safe
Manamelkudi	3901.37	0.00	85.21	85.21	88.55	3812.82	2	Safe
Ponnamaravathi	4071.06	305.08	200.11	505.19	207.96	3558.02	12	Safe
Pudukkottai	5176.33	1833.08	174.08	2007.16	180.91	3162.34	39	Safe
Thirumayam	5070.70	201.49	148.98	350.47	154.83	4714.38	7	Safe
Thiruvarankulam	9031.41	6265.45	312.21	6577.66	324.47	2441.50	73	Semi Critical
Viralimalai	7556.38	486.95	237.10	724.05	246.40	6823.03	10	Safe
District Total	**86618.08**	**18531.55**	**2377.88**	**20909.43**	**2471.19**	**65615.34**	**24**	

4.3 Ground Water Quality

Groundwater in phreatic aquifer in general is colourless, odourless and predominantly alkaline in nature. The specific electrical conductance of the groundwater in phreatic zone during May 2006 was in the range of 190 to 21600 µS/cm. Conductance below 750 µS/cm was observed in 28% of the samples analysed. Brackish groundwater (EC: 750 – 2250 µS/cm) were observed at select pockets of the district and groundwater at Mimisal is highly saline (21600 µS/cm).

It is observed that the groundwater is suitable for drinking and domestic uses in respect of all the constituents except total hardness and nitrate in about 62% of the samples. Total hardness as $CaCO_3$ was observed to be excess of permissible limit in 28% of samples analysed whereas nitrate was found in excess of 45 mg/L in about 28% of samples analysed . Fluoride more than permissible limit of 1.5 mg/L was observed in Viralimalai area and found to be a localized phenomenon. The incidence of high total hardness can be attributed to the composition of lithounits constituting the aquifers, whereas nitrate pollution is most likely due to the use of fertilizers and improper waste disposal.

Irrigation suitability based on specific electrical conductance and Sodium Adsorption Ratio (SAR), it is observed that groundwater in the phreatic zone may cause high to very high salinity hazard and low to very high alkali hazard when used for irrigation. Proper soil management strategies are to be adopted while using groundwater for irrigation.

4.4 Status of Ground Water Development

The estimation of groundwater resources for the district has shown that out of 13 blocks, 1 block is categorized as semi Critical and rest are categorized as Safe.

Dug wells are used to extract groundwater from weathered formation while deeper fractures are tapped through bore wells and dug cum bore wells. Dug wells are also used to tap the porous formation down to a depth of 10 – 12 m bgl.

The yield of open wells in the district tapping the weathered mantle of crystalline rocks generally ranges from 100 to 300 lpm and can sustain a pumping of 3-4 hrs in a day, while in porous formation, the yield generally vary from 200 – 400 lpm and can sustain pumping of 3 – 4 hrs.

The wells tapping the deep seated fracture system can yield about 1 – 5 lps and can sustain a pumping of 6-8 hrs a day. In case of sedimentary formations, shallow tube wells down to 100 m can yield 150 – 500 lpm and can sustain pumping of 6 – 8 hrs and deep tube wells can yield 1000 – 3000 lpm and can sustain a pumping 14 – 16 hrs.

5.0 GROUNDWATER MANAGEMENT STRATEGY

5.1 Groundwater Development

In view of the low level of ground water development in the major part of the district, there is still scope for further groundwater development in the district. The occurrence of fresh water in between poor quality formation water makes it necessary to exercise caution while designing tube wells for development of available ground water resources at depth.

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

5.2 Water Conservation and Artificial Recharge

The stage of development is very low in comparison to other parts of the State and hence CGWB has not planned for artificial recharge to groundwater in the district taking into consideration other priority areas warranting immediate attention.

6.0 GROUNDWATER RELATED ISSUES & PROBLEMS

The occurrence of fresh water in between poor quality formation water makes it necessary to exercise caution while designing tube wells for development of available ground water resources at depth. Insitu salinity of Brine quality in parts of Aranthangi & Avudiarkoil taluks in the coastal sedimentary tract between 116 – 350 m depth ranges have been ascertained by CGWB exploration programme.

Localised pockets around Kattumavadi and Minisal, where shallower water levels are observed and it may lead to water logging.

7.0 AWARENESS & TRAINING ACTIVITY

CGWB has not so far taken Awareness Campaign and Water Management Training and it has been proposed to carry out these programs during 2007-08.

8.0 AREA NOTIFIED BY CGWA/SGWA

Central Ground Water Authority has not notified any area in the district and there is no critical or over exploited blocks in the district that warrant regulation in groundwater development in the district.

9.0 RECOMMENDATIONS

As there is scope for further development of ground water, irrigation can be augmented using groundwater sources.

The occurrence of fresh water in between poor quality formation water makes it necessary to exercise caution while designing tube wells for development of available ground water resources at depth.

On the basis of the experiences in execution of Central Sector Scheme and Demonstrative Projects on artificial recharge, the desilting of existing ponds/tanks will be the most cost effective structures. The provision of recharge wells/shafts in percolation ponds/ check dams will enhance the efficacy of these structures.

Roof Top Rainwater Harvesting (RTRWH) had been made mandatory for all the buildings in the State of Tamil Nadu. However, it is seen that site specific designs can improve the existing RTRWH system and efforts may be made to incorporate the improvements if found necessary. A concerted effort involving various Government agencies and NGOs can make the movement of artificial recharge to groundwater a successful one.

PLATE - I

CENTRAL GROUND WATER BOARD, SECR, CHENNAI

PUDUKKOTTAI DISTRICT, TAMIL NADU

LOCATION

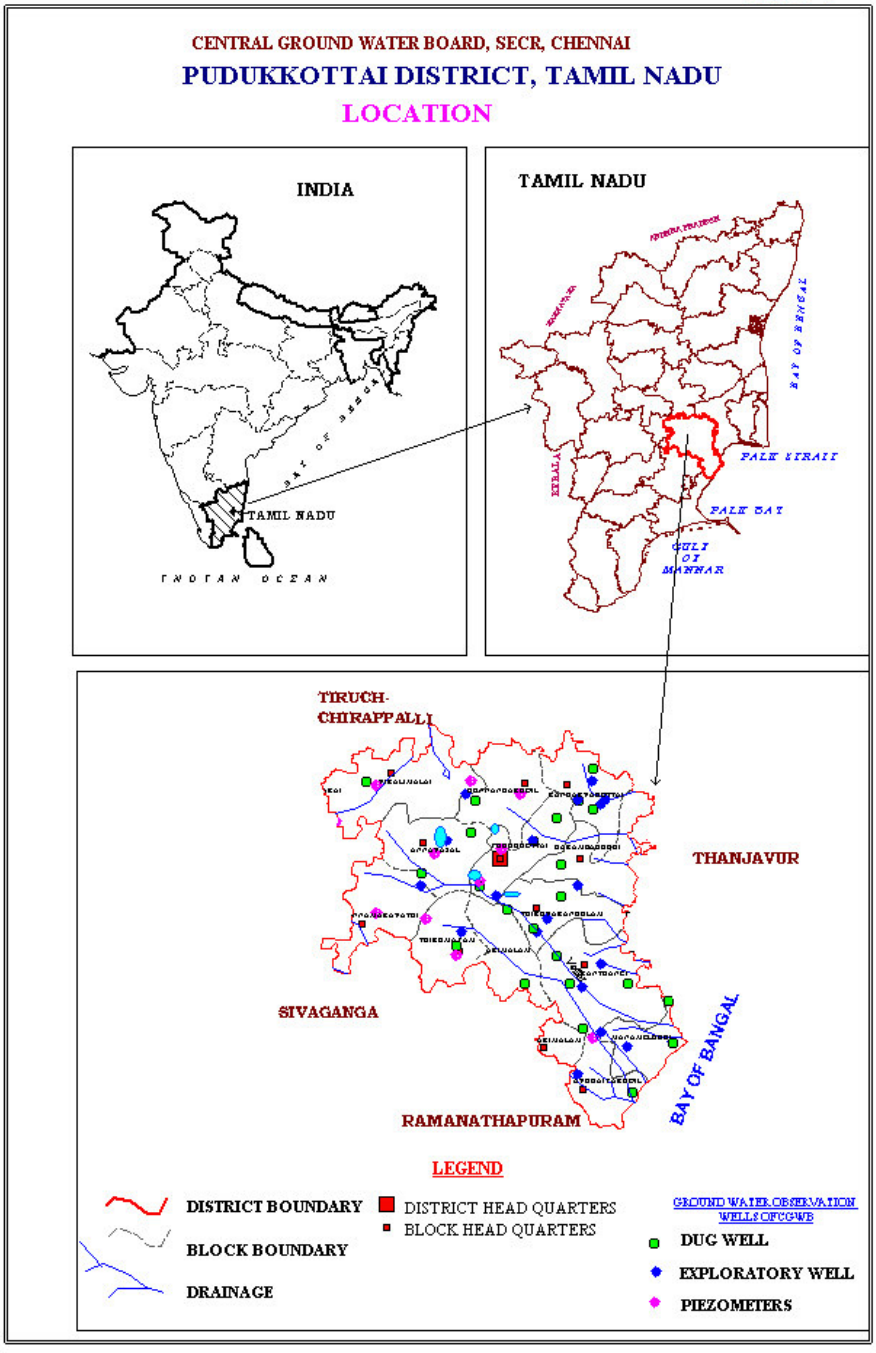


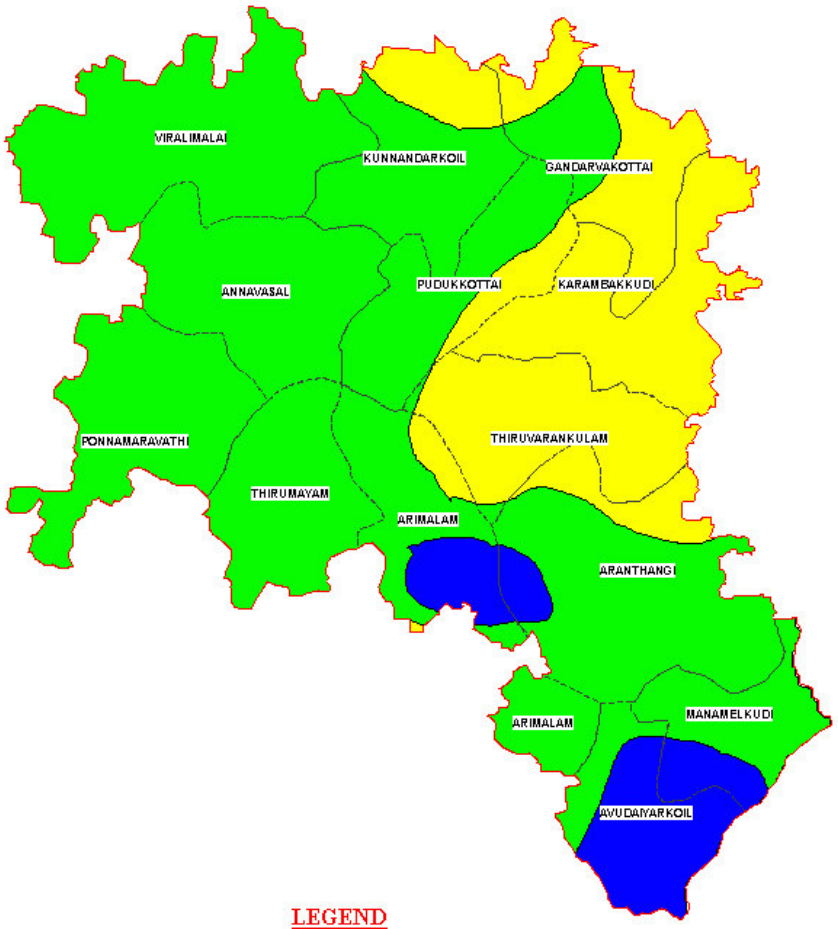
PLATE II

CENTRAL GROUND WATER BOARD, SECR, CHENNAI

PUDUKKOTTAI DISTRICT, TAMIL NADU

DEPTH TO WATER LEVEL

PREMONSOON (MAY - 2006)



LEGEND

DISTRICT BOUNDARY

BLOCK BOUNDARY

DEPTH TO WATER LEVEL (mbgl.)

0-2 | 2-5 | 5-10

PLATE III

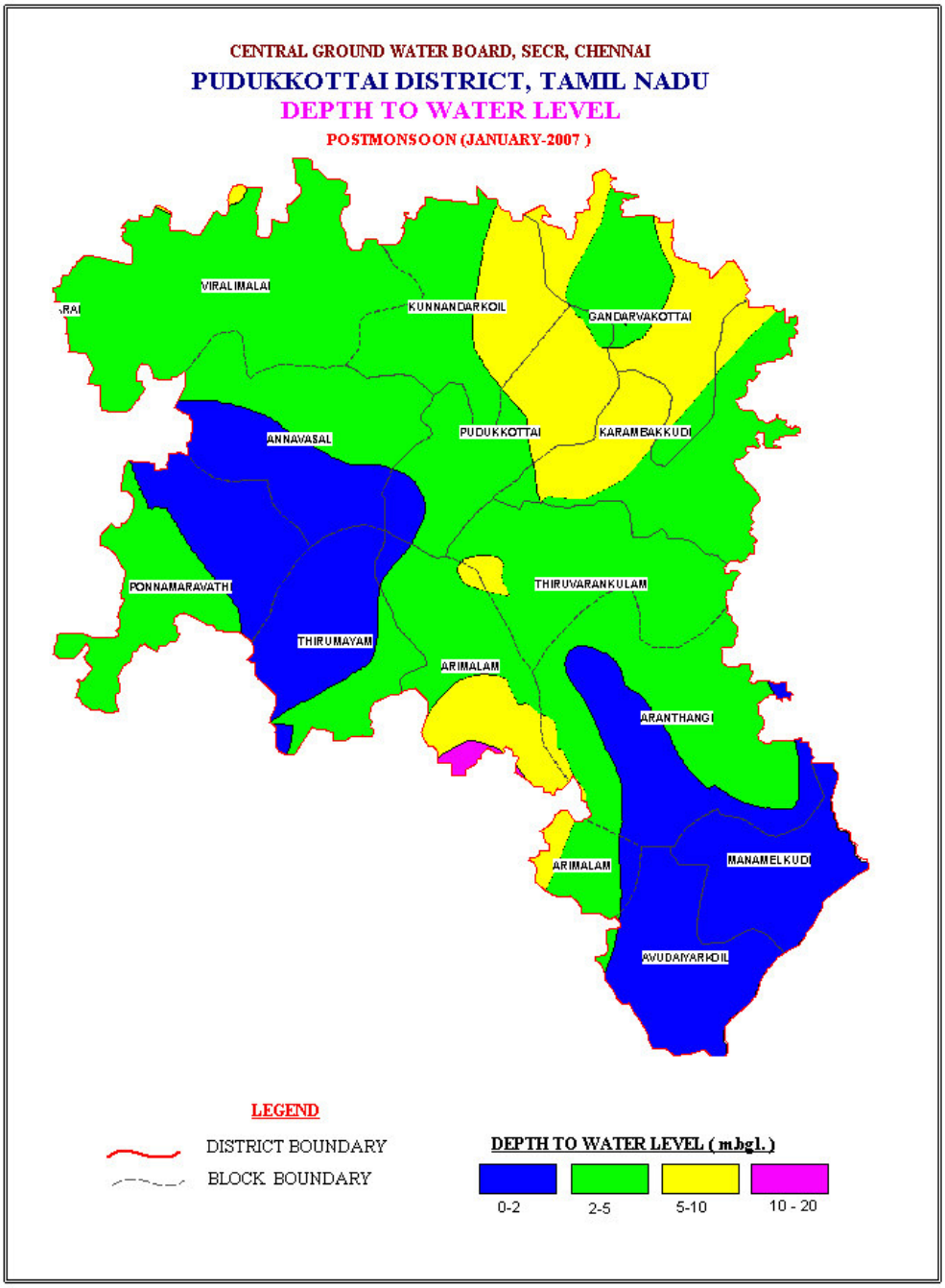

CENTRAL GROUND WATER BOARD, SECR, CHENNAI
PUDUKKOTTAI DISTRICT, TAMIL NADU
DEPTH TO WATER LEVEL
POSTMONSOON (JANUARY-2007)
VIRALIMALAI
KUNNANDARKOIL
GANDARVAKOTTAI
ANNAVASAL
PUDUKKOTTAI
KARAMBAKKUDI
PONNAMARAVATHI
THIRUVARANKULAM
THIRUMAYAM
ARIMALAM
ARANTHANGI
ARIMALAM
MANAMELKUDI
AVUDAIYARKOIL
LEGEND
DISTRICT BOUNDARY
BLOCK BOUNDARY
DEPTH TO WATER LEVEL (mbgl.)
0-2
2-5
5-10
10 - 20

PLATE IV

CENTRAL GROUND WATER BOARD, SECR, CHENNAI

PUDUKKOTTAI DISTRICT, TAMIL NADU

CATEGORISATION OF BLOCKS

(MARCH- 2004)

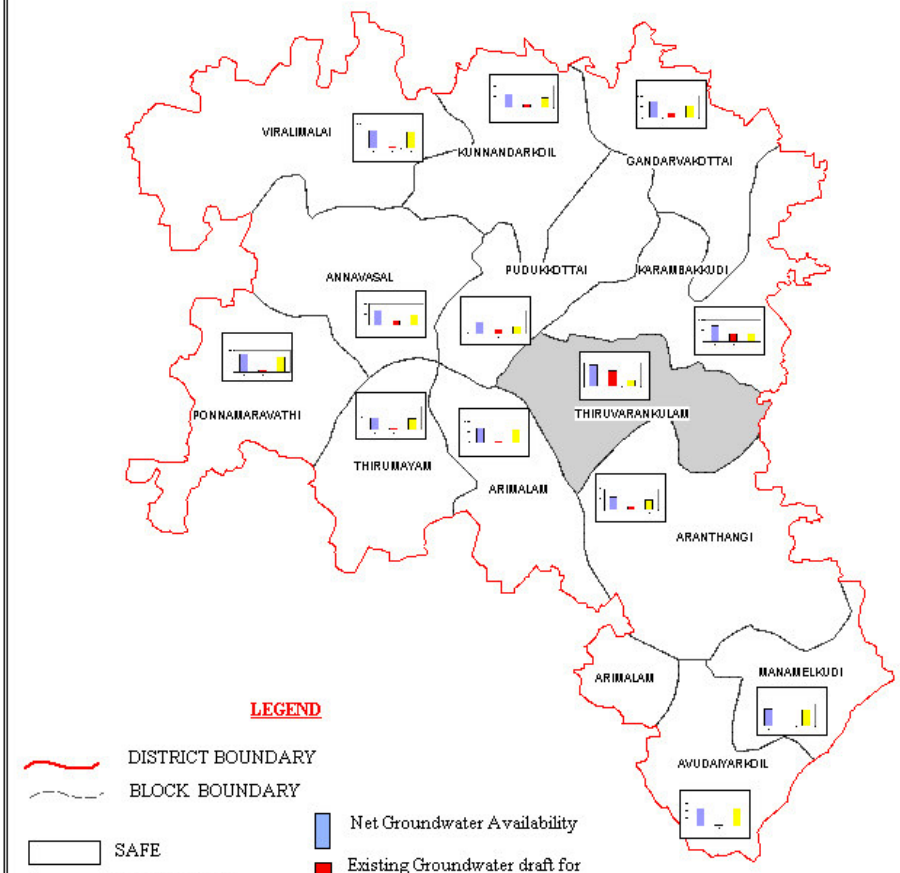
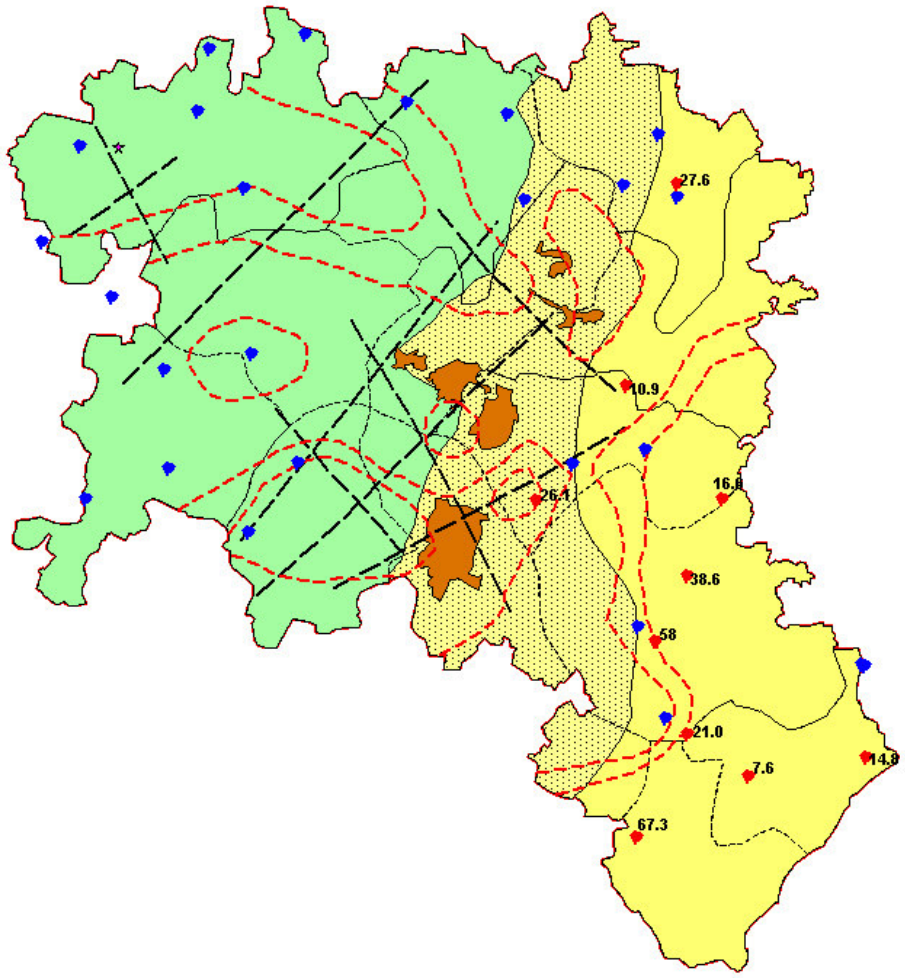


PLATE V

CENTRAL GROUND WATER BOARD, SECR, CHENNAI

PUDUKKOTTAI DISTRICT, TAMIL NADU

HYDROGEOLOGY



LEGEND OVER LEAF

LEGEND FOR PLATE V

ADMINISTRATIVE SETUP

- DISTRICT BOUNDARY
- BLOCK BOUNDARY
- HILLY AREA
- Δ^{752} TRIANGULATION HEIGHT [elevation in m.amsl]
- CREEK

GROUND WATER HYDROLOGY

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

HYDROCHEMISTRY

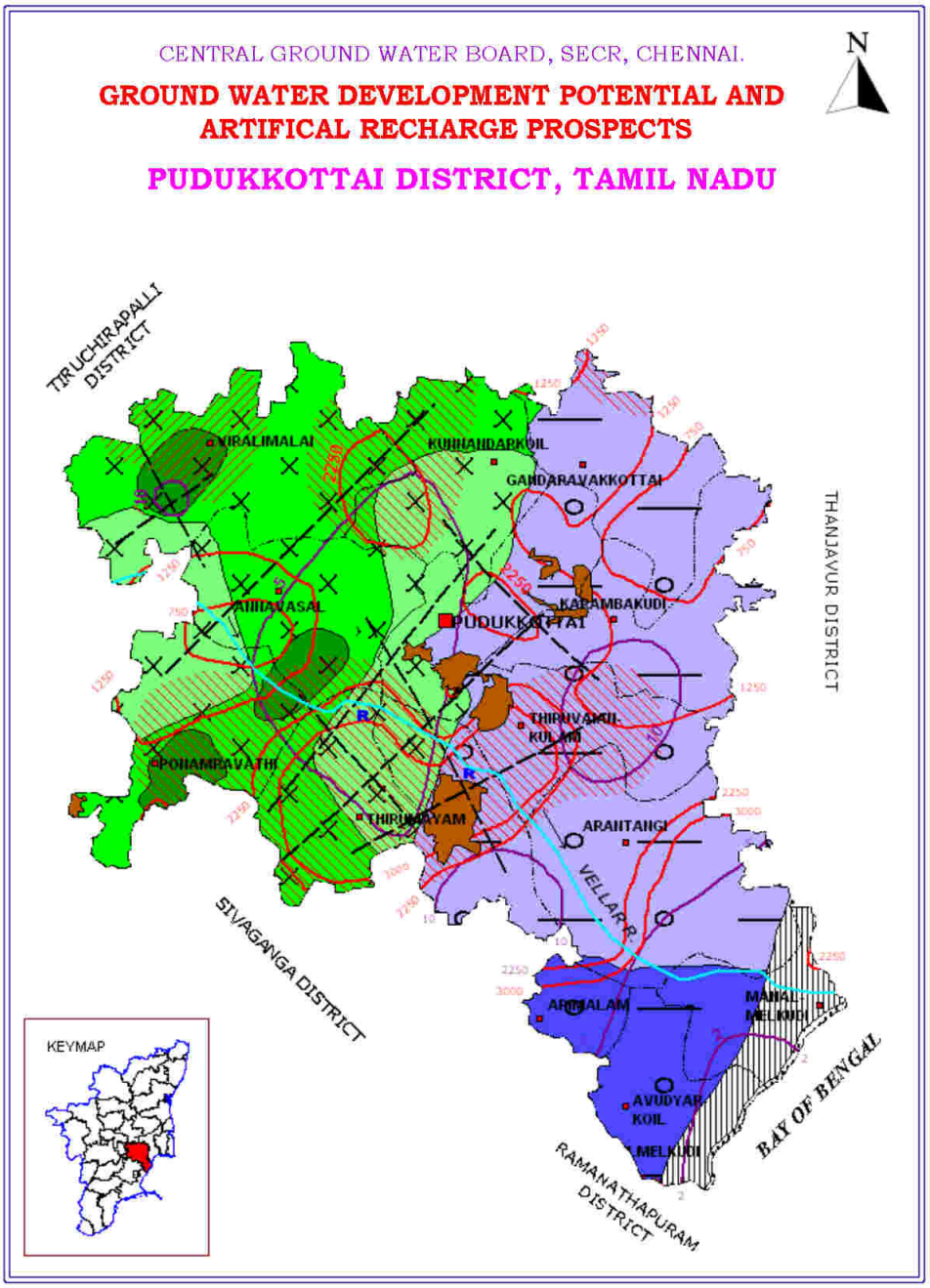
- 750 ISOCONS [Sp ELECTRICAL CONDUCTANCE [µs /Cm at 25° C]

STRUCTURE

- TRACE OF LINEAMENT
- Fluoride > 1.5 mg/L

Aquifer	Age	Lithology	Groundwater Condition	Yield Prospects (Cu.m/day)	Groundwater Development Strategies
Unconsolidated	Recent	Alluvium	Discontinuous, thin, unconfined to semi confined	<200	Development through dug well, shallow tube well
Semi consolidated	Cretaceous to Miocene	Sandstone	Discontinuous, unconfined to semi confined	<200	Shallow aquifer - Development through dug well
				500 - 2000	Deeper aquifer – Development through deep tube well
Consolidated	Archaean	Granite Gneiss, Granites & Charnockites	Discontinuous, unconfined to semi confined, restricted to weathered residuum and fractures	<100	Development of weathered residuum through dug well & fractures through bore well

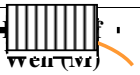
PLATE VI



LEGEND OVER LEAF

LEGEND FOR PLATE VI

DISTRICT – PUDUKKOTTAI

	Wells Feasible	Rigs Suitable		Discharge (LPM)	Suitable Artificial Recharge Structures
 Soft Rock Aquifer	Dug Well Dug Cum Bore Well Tube Well	Manual Manual + Handset Direct Rotary	10-20 20-60 60-100	60-80	Recharge Tube Well
Soft Rock Aquifer	Tube Well	Direct Rotary	150-300	180 - 300	Recharge Tube Well
Hard Rock Aquifer	Dug Well Dug Cum Bore Well Bore Well	Manual Manual + DTH DTH	10 -15 15+50 70-120	10 - 60	Check Dams/ Percolation Ponds/ Farm Pond
Hard Rock Aquifer	Dug Well Dug Cum Bore Well Bore Well	Manual Manual + DTH DTH	10 -15 15+50 80-130	60 - 180	Check Dams/ Percolation Pond/ Farm Pond
Hard Rock Aquifer	Dug Well Dug Cum Bore Well Bore Well	Manual Manual + DTH DTH	10-16 16+55 70-130	More Than 180	Check Dam/ Percolation Pond
	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	
	Fluoride Greater Than Maximum Permissible Limit (1.5mg/L)			Nitrate Greater Than Maximum Permissible Limit (45 mg/L)	
	Hilly Area			Saline Zone	
	Brine Water Zone			Recommended Site For Artificial Recharge Structure	

OTHER INFORMATION

Geographical Area	4663.29 Sq.Km.
Number Of Blocks	13
Major Drainage	Vellar, Agniyar, Ambuliar & Koraiyar
Population (2001)	1327148
Average Annual Rainfall	910.8 mm
Annual Range Of Temperature	26 - 43°C
Regional Geology	**Hard Rocks:** Gneisses And Granites **Soft Rocks:** Sandstone And Shale
Net Ground Water Availability For Future Irrigation	656.15 MCM/Yr
Stage Of Ground Water Development As On January 2003	24 %
Name Of Blocks Showing Intensive Ground Water Development	Nil

SAVE WATER

AND

CONSERVE WATER

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