सरकारी उपयोग के लिए
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तकनीकी रिपोर्ट श्रृंखला
Technical Report Series
SECR/DBR/UT/12-13/02

जिला भूजल विवरणिका
कारैकाल रिज़ोन, यु. टि. आफ़ पुधुचेरि
DISTRICT GROUNDWATER BROCHURE
KARAIKAL REGION, U. T. OF PUDUCHERRY

By
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दक्षिण पूर्वी तटीय क्षेत्र / South Eastern Coastal Region
चेन्नई / Chennai

जनवरी / JANUARY 2014

REGION AT A GLANCE (KARAIKAL REGION, U. T. of Puducherry)

Sl. No.	ITEMS	STATISTICS
1.	**GENERAL INFORMATION**	
	i. Geographical area (Sq. km.)	**160**
	ii. Administrative Divisions as on 31-3-2013 Number of Taluks Number of Communes (Panchayats) Number of Villages	 2 6 100
	iii. Population (Census 2011) Total Population Male Female	 2,00,314 97,796 1,02,518
	iv. Average Annual Rainfall (mm)	1207
2.	**GEOMORPHOLOGY**	
	i. Major Physiographic Units	Sand Dunes, Tidel Inlet and Spit Bars
	ii. Major Drainages	Arasalar, Nandalar, Nattar, Nular, Puravadaiyanar, Thirumalairayanar and Vanjiyar (Distributaries of Cauvery)
3.	**LAND USE (In Hectares) (During 2010-11)**	
	i. Forest area ii. Net area sown iii. Cultivable waste	Nil 5,978 2,978
4.	**MAJOR SOIL TYPES**	1. Red soil 2. Black soil 3. Alluvial soil 4. Colluvial soil
5.	**AREA UNDER PRINCIPAL CROPS (During 2010-11)**	1. Paddy – 6,123 Ha 2.Pulses - 2,216 Ha
6.	**IRRIGATION BY DIFFERENT SOURCES (During 2010-11)**	**Net Area Irrigated (Ha)**
	i. Dug wells	-
	ii. Tube wells	164
	iii. Tanks	-
	iv. Canals	4,232
	v. Other Sources	17
	vi. Net irrigated area	4,413
	vii. Gross irrigated area	6,157

7.	**NUMBERS OF GROUNDWATER MONITORING WELLS OF CGWB (As on 31.03.2013)**				
	i. No of dug wells	3			
	ii. No of piezometers	0			
8.	**PREDOMINANT GEOLOGICAL FORMATIONS**	Recent Alluvium, Sandstones & Claystones of Tertiary Sediments.			
9.	**HYDROGEOLOGY**				
	i. Major water bearing formations	Alluvium, Cuddalore Sandstones & Karaikal beds			
	ii. Pre monsoon (June 2011) Depth to water level (Alluvial Aquifer) Depth to Piezometric surface (Tertiary Aquifer)	 4.70 – 18.60 m bgl 9.35 – 17.70 m bgl			
	iii. Post monsoon Feb 2012) Depth to water level (Alluvial Aquifer) Depth to Piezometric surface (Tertiary Aquifer)	 2.10 – 16.45 m bgl 5.75 – 9.05 m bgl			
	iv. Long - term water level trend in 10 years (2002-2012) in m/yr	**Annual**			
		Rise (m/year)		**Fall (m/year)**	
		Min	Max	Min	Max
	Alluvial Aquifer	0.34	0.39	0.42	
10.	**GROUNDWATER EXPLORATION BY CGWB (As on 31-03-2013)**				
	i. Number of Exploratory wells ii. Number of Observation wells iii. Number of Piezometers under Hydrology Project iv. Number of Slim Holes v. Number of Deposit wells	11 2 2 1 -			
	iv. Depth range(m bgl)	225 – 451			
	v. Discharge(lpm)	84 – 3006			
	vi. Storativity (S)	$1.209 \times 10^{-4} – 1.02 \times 10^{-3}$			
	vii. Transmissivity (m^2/day)	30 - 2640			
11.	**GROUNDWATER QUALITY (As on MAY 2012)**				
	i. Presence of chemical constituents more than permissible limit	F, Fe & Cl			
	ii. Type of water	Na-HCO_3 – Cl type			

12.	**DYNAMIC GROUNDWATER RESOURCES (As on 31.03.2009) in MCM**	
	i. Annual Replenishable Groundwater Resources	58.62
	ii. Total Annual Groundwater Draft for all purposes	8.98
	iii. Projected demand for Domestic and Industrial Uses up to 2025	4.55
	iv. Stage of Groundwater Development	15%
13.	**AWARENESS AND TRAINING ACTIVITY**	
	i. Mass Awareness Programmes Organized	
	Date	-
	Place	-
	No. of Participants	-
	ii. Water Management Training Organized (RGI –III tier on Aquifer management)	
	Date	18th & 19th Feb 2013
	Place	Karaikal
	No. of Participants	250
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.	**GROUNDWATER CONTROL AND REGULATION**	
	i. Number of OE Blocks	-
	ii. Number of Critical Blocks	-
	iii. Number of Blocks Notified	-
16.	**MAJOR GROUNDWATER PROBLEMS AND ISSUES**	i) Saline nature of formation water in the eastern parts of the Region and not suitable for any development. ii) Insitu Salinity.

DISTRICT GROUNDWATER BROCHURE
KARAIKAL REGION, U. T. OF PUDUCHERRY

1.0 INTRODUCTION

1.1 Administrative Details

The Karaikal region liesaAbout 150 km. further south from Puducherry on the east coast between $10^{o}49'$ and $11^{o}01'$ N latitudes and $79^{o}37'$ and $79^{o}53'$ E longitudes with an area of 160 sq. km. It consists of six communes (Panchayats), comprising100 villages. The location of Karaikal Region is shown as **Plate - I**.

1.2 Basin and sub-basin

The Karaikal region of U. T. of Puducherry is part of Cauvery basin.

1.3 Drainage

The region is situated on the tail end portion of the Cauvery delta. This region is drained by seven distributaries of Cauvery viz. (1) Nandalar, (2) Nattar, (3) Vanjiyar, (4) Nular, (5) Arasalar, (6) Tirumalarajanar and (7) Puravadaiyanar and all these rivers confluence into the Bay of Bengal. A network of canals branches out from these rivers to feed the irrigation channels. These rivers flow with a gentle slope of one percent.

1.4 Irrigation Practices

The nine-fold lands use (2010-2011)classification for the district is given below

S. No.	Classification	Area (Ha)
1	Forests	-
2	Barren & Uncultivable Lands	-
3	Land put to non agricultural uses	5,189
4	Cultivable Waste	2,978
5	Permanent Pastures & other grazing lands	-
6	Land under Miscellaneous tree crops	198
7	Current Fallows	614
8	Other Fallow Lands	1,055
9	Net Area sown	5,978
	Total	**16012**

(Source: Directorate of Economics and Statistics, Puducherry)

The region is located on the ayacut system of the Cauvery river, and hence it is fully dependant on canal water for irrigation. Canals are the major source of irrigation and these canals are fed by the distributaries of Cauvery. It is seen that the net area irrigated is 4,413 ha. which is 74 percent of the net area sown. Irrigation through canals constitutes 96 percent of the net area irrigated.

The source - wise net area irrigated(2010-2011), in Ha, is given below

S. No.	Net area irrigated (Ha)	
1	Canals	4,232
2	Tanks	-
3	Tube wells	164
4	Ordinary wells	-
5	Other sources*	17
6	Total Area Irrigated (Net)	4,413
7	Area irrigated more than once	1,744
8	Total Gross Area irrigated	6,157

(Source: Directorate of Economics and Statistics, Puducherry)

1.5 Studies/Activities carried out by Central Ground Water Board (CGWB)

Hhydrogeological surveys for selection of sites for exploration were carried out during 1973. Detailed hydrogeological surveys were carried out during 1976. Groundwater exploration through drilling was commenced during 1976-78. Scientific information was obtained by drilling down to a depth of 450 m bgl. CGWB has carried out aquifer mapping studies during the Annual Action Programme (AAP 2012-13).

2.0 RAINFALL AND CLIMATE

The region receives the rain under the influence of both southwest and northeast monsoons. Most of the precipitation occurs in the form of cyclonic storms caused due to the depressions in the Bay of Bengal chiefly during northeast monsoon period. The normal annual rainfall of the Karaikal region is 1207.13 mm of which the northeast monsoon contributes 69 percent and the southwest monsoon contributes 21 percent. The study of rainfall distribution of the Karaikal region reveals that there is a general increase in rainfall from inland towards coast, while the northeast monsoon shows a decrease in rainfall from the coast towards inland. The area receives maximum rainfall during the month of November.

The region enjoys a humid and tropical climate. The mean monthly temperature varies between 31.8°C (May) and 21.7°C (March). The relative humidity is generally high above 70% during August to April and minimum varying from 60 to 65% during the months of June and about 80% during October to April.

3.0 GEOMORPHOLOGY AND SOIL TYPES

3.1 Geomorphology

The region is a monotonous peneplain with elevation not more than five meters above mean sea level at any point. Aeolian action is evident in the coastal tract in the form of sand dunes and mounds. Being situated on sea coast, coastal geomorphological units like sand dunes, tidal inlet, spit bars, coastal beach with swamps and marshes are common. Sand dunes are found in patches on plains.

3.2 Soils

Soils in the area have been classified into i) Red soils ii) Black soils iii) Alluvial soils and iv) Colluvial soils. Alluvial soils occur along the river courses and eastern part of the coastal areas. Sandy coastal alluvium (arenaceous soil) are seen all along the sea coast as a narrow belt.

4.0 Geology

The study area is mainly covered by the alluvium with a soil cover, namely, sandy loam and loamy sandy soil. The area is underlain by older formations of the Quaternary and Tertiary age. The detailed stratigraphic sequence of the various formations met within the study area is given below and the geology map of the Karaikal Region is given as **Plate - II**.

Geological succession in the study area

ERA	PERIOD	FORMATION	LITHOLOGY
Quaternary	Recent	Alluvium	Sands, gravel, silt and clay
Tertiary	Pliocene	Karaikal formations	Gravelly sands, argillaceous sandstones, conglomerates and fossil beds
	Miocene	Cuddalore sandstones	Coarse grained calcareous sandstones, shales and claystones occasionally lignite

5.0 GROUNDWATER SCENARIO

5.1 Hydrogeology

Groundwater occurs under both phreatic and confined conditions in all the three major group of geological formations, viz., Cuddalore sandstones, Karaikal

formations and Alluvium formations. Occurrence and movement of groundwater in the said geological formations are controlled by the primary porosities of the sediments. Shallow alluvial aquifers and the medium to coarse grained Cuddalore sandstones constitute the major potential aquifer system in the region.

The eastern and northern parts of the region are characterized by saline groundwater and hence there is no development in these parts of the region. Accordingly, observation wells have been established only in the part where fresh groundwater is available and where groundwater development takes place. The hydrogeology map is given in **Plate- III**.

5.1.1 Tertiary Aquifers (Cuddalore Sandstones)

The medium to coarse grained Cuddalore sandstones constitute the potential aquifer. The Cuddalores which underlie the Karaikal beds are separated from the later by an aquiclude with a thickness of 3 to 71 m. The granular zones of Cuddalores occurring beneath the aquiclude are intercalated with clay beds. Groundwater occurs under confined conditions in the granular zones of these formations. The yield of the test wells tapping the productive zones varies between 480 and 2640 lpm for drawdowns varying between 6.10 and 21.92 m. Free flowing conditions also exist with a free discharge of 19 lps.

The specific capacity of the wells tested ranges from 21.49 to 329.8 lpm/m of drawdown. The field permeability of the granular zones is fairly high ranging from 16.01 to 34.16 m/day in the western part as against the low values ranging from 0.90 to 12.17 m/day in the eastern and northeastern parts.

The piezometric head varied between 9.35 and 17.70 m bgl during premonsoon (June 2011) and 5.75 and 9.05 m bgl during post monsoon (Feb 2012).

5.1.2 Karaikal Formations:

The Karaikal formations (beds) occur in between Quaternary and Tertiary formations in the Region. The Karaikal beds vary in thickness from 54 m in the west to 77 m in the east. The sands and sandstones of this formation are water bearing zones whose thickness varies between 11 and 40 m. But due to the marine origin of these beds, the quality of groundwater is saline in nature and found unsuitable for any use. Hence the yields and other aquifer characteristics of these beds were not assessed and it is not tapped in production wells in the Region.

5.1.3 Alluvial Aquifers:

The sands of the alluvium form the potential aquifer with thickness ranging from 9 to 40 m. Groundwater occurs under water table conditions and in semi -

confined to confined conditions in the granular zones, which are encountered between 26 and 43 m bgl. The water table aquifer is developed by dug wells mostly for domestic purposes, whereas the semi - confined/confined aquifers are developed at select areas by means of filter points and shallow tube wells. The reported yield of the filter points and shallow tube wells tapping the potential aquifer zones in the alluvium ranges from 468 to 750 lpm.

The depth to water level in the region varied between 4.70 and 18.60 m bgl during premonsoon (June 2011) and 2.10 and 16.45 m bgl during post monsoon (Feb 2012). The areal distribution of depth to water level during pre monsoon and post monsoon periods in Karaikal Region is given as **Plates - IV & V** respectively

5.1.4 Long - term Fluctuation (2002-2012)

Aquifer	Long - term water level trend (m/yr)	
	Rise	Fall
Alluvial	0.34 – 0.39	0.42

5.1.5 Aquifer Parameters

Aquifer	Transmissivity (m^2/day)	Storativity	Specific Yield
Alluvial	200 – 400	-	6 %
Tertiary	1100 - 2640	1.21 $x10^{-4}$ and 1.02 x 10^{-3}.	-

5.2 Groundwater Resources

The groundwater resources have been computed jointly by CGWB and Groundwater Unit of Department of Agriculture, U. T. of Puducherry as on 31st March 2009. The salient features of the computations are furnished below.

Region	Net Ground water 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 2025 (M.Cu.m)	Net ground watrer availability for future Irriation Development (M.Cu.m)	Stage of Ground water Development (%)	Category of Block
Karaikal	58.62	5.10	3.87	8.98	4.55	48.9	15	Safe

5.3 Groundwater Quality

5.3.1 Alluvial Aquifer

The quality of groundwater from shallow alluvial aquifers is almost neutral in nature, with pH values ranging from 6.74 to 7.92. The water is generally sodium-bicarbonate-chloride type, the bicarbonate predominating over chloride. The chloride content was generally within the permissible limit and reaches maximum of 1150 mg/l at Thennankudi-Melaveli. The fluoride concentrations were less than 1 mg/l, except, a few patches at central and western parts, where it had recorded upto 1.28 mg/l at Keezh Paruthikudi. The concentration of iron ranged from 0.02 to 0.26 mg/l in the region.

The Electrical Conductivity values, in major part of the region ranges between 1500 and 3000 µS/cm at 25°C. It is to more than around 3000 µS/cm at 25°C in few patches at central part and less than 1500 µS/cm at 25°C in the western part.

5.3.2 Tertiary Aquifer

The quality of groundwater tapped from Tertiary aquifers is alkaline with pH ranging from 7.60 to 9.78. The chloride content was generally ranged from 225 to 590 mg/l. The fluoride value varied from 0.07 to 0.33 mg/l. The concentrations of iron were within the permissible limit and recorded upto maximum of 0.30 mg/l at Tirunallar. The Electrical Conductivity values were less than 1500 µS/cm at 25°C in western parts.

The quality of groundwater in the eastern part of the Karaikal region is poor and unfit for both domestic and irrigation purposes. The groundwater in the western part of the region is comparatively better with EC values generally ranging around 1500 µS/cm at 25°C and chloride concentration in most of the samples is well within 500 mg/l. The water from both shallow Alluvial aquifers and deeper Cuddalore sandstone aquifers in this part of the region is fit for domestic needs only. It is generally unsuitable for irrigational needs due to higher concentration of sodium in water. Based on U.S. Salinity Classification, most of the water samples are C3-S3 type and above indicating unsuitability of waters for irrigational needs especially for paddy cultivation.

5.4 Status of Groundwater Development

The entire region is covered by the Alluvium of Quaternary age consisting of sands and clays. The Alluvium is underlain by Karaikal beds and Cuddalore sandstones with thicknesses ranging between 54 to 77 m and 194 to 371 m respectively. The sub-surface configuration reveals that the thickness increases from west to east.

Groundwater occurs in the Alluvial aquifers under both water table and confined conditions. It is being developed by filter-point wells and shallow tube wells. The stage of development is 15%. The entire region falls under " Safe" category (**Plate – VI**). The quality of groundwater of Karaikal aquifers is mostly saline and unfit for development. The Cuddalore sandstone formations constitute several aquifers separated by clay beds with moderate to high permeability. Groundwater occurs in these aquifers under confined conditions and are developed by means of deep tubewells.

The occurrence of potable water bearing aquifers are limited to the western part of the Karaikal Region. The shallow Alluvial aquifers occurring within a depth range of about 50 mbgl and deeper Cuddalore sandstone aquifers occurring below 150 mbgl are potential ones bearing potable water in the Region.

The yield of tubewells in shallow Alluvial aquifers is of the order of 1 to 2 lakhs litres/day. The extraction of groundwater by shallow tubewells in the Alluvium is of the order of 2.5 ha.m./year. The average command area for tubewell is about 3 ha.

The deep tubewells of 200 mm dia and 300 – 350 m bgl depth in Tertiary aquifers can yield as high as 1000 lpm discharge, which can be pumped with 10 to 15 HP submersible pumps. The average annual draft of deep tubewells varies from 70 – 200 m^3/hr, with 200 days pumping in a year and an average daily pumping of 10 hours, the annual draft varies from 0.14 to 0.40 MCM.

6.0 GROUNDWATER MANAGEMENT STRATEGY

6.1 Groundwater Development

The non-availability of surface water in canal in recent times has resulted in groundwater being used as a supplementary source. However, the western half of the region is characterized by the occurrence of poor quality aquifers sandwiched between moderate to good quality water bearing aquifers in and have any developmental programme should be done after sealing the saline zones.

Since the western part of the Region bearing comparatively better quality water both in shallow Alluvial aquifers and in deeper Cuddalore sandstone aquifers, these aquifers can be developed by shallow tube wells as well as by deep tube wells respectively. In view of the saline nature of formation water, the Karaikal aquifers are not suitable for development.

6.2 Water Conservation and Artificial Recharge

The topography of Karaikal region, in general, is suited for construction of percolation ponds and check dams. However, detailed studies are necessary to

formulate a comprehensive scheme for artificial recharge of phreatic groundwater in the district in view of the variations in the geomorphic set-up and the complex hydrological and hydrogeological conditions.

The number and type of artificial recharge structures recommended for Karaikal region are furnished in Table below. The exact locations of these structures, however, are to be decided on the basis of detailed field investigations and implementation of the schemes may be taken up in phases.

Details of number and types of Artificial Recharge Structures recommended in Karaikal Region of U. T. of Puducherry

S. No.	Region	Area Suitable for Groundwater Develop-ment (Sq. km.)	Categorization as on March 2009	Surplus available for AR (MCM) *	Number of Structures	Cost of Structures (Lakhs)
					PP (1 in 15 Sq. km.) Capacity - 0.1 M.Cu.m	PP (Unit Cost - Rs 25 Lakhs)
	Karaikal	89.4	Safe	19.00	6	150

* *Data Source : Groundwater Unit of Department of Agriculture, Government of Puducherry*

It is also recommended that recharge tubewells may also be drilled to recharge the deeper aquifers wherever necessary as the deeper aquifers are also equally being developed in the region.

Free technical guidance for implementation of schemes of rainwater harvesting and recharge to groundwater is also being provided by CGWB.

7.0 GROUNDWATER RELATED ISSUES & PROBLEMS

The quality of groundwater in the east and northeastern parts of the Karaikal region is poor and unfit for both domestic and irrigation purposes. The groundwater in the western part of the region is comparatively better with EC values generally around 1500 µS/cm at 25°C and chloride concentration in most of the samples is well within 500 mg/l. The water from both shallow Alluvial aquifers and deeper Cuddalore sandstone aquifers in this part of the region is fit for domestic needs only. It is generally unsuitable for irrigational needs due to higher concentration of sodium in water. Based on U.S. Salinity Classification, most of the water samples are C3-S3 type and above indicating unsuitability of waters for irrigational needs especially for paddy cultivation. Hence, groundwater can be used as a supplementary source for canal irrigation for paddy cultivation for a limited period only. It is generally not fit for raising nurseries.

8.0 AWARENESS & TRAINING ACTIVITY

Tier – III training course on Block / Village level Aquifer management plan was conducted on 18th & 19th Feb. 2013 at Karaikal. About 250 people from different level of society participated.

9.0 AREA NOTIFIED BY CGWA/SGWA

Karaikal Region has not been notified by either Central Groundwater Authority or Pondicherry Groundwater Authority.

10.0 RECOMMENDATIONS

The western part of the Region bears comparatively better quality water both in shallow Alluvial aquifers and in deeper Cuddalore sandstone aquifers, hence these aquifers can be developed by shallow tube wells as well as by deep tube wells respectively. In view of the saline nature of formation water, the Karaikal aquifers are not suitable for development.

Since the area is characterized by the occurrence of poor quality aquifers sandwiched between moderate to good quality water bearing aquifers in the western half of the region, any developmental programme should take care of sealing the saline zones.

The quality of groundwater in the western half of the region and also in southern part covering Neravy and T.R. Pattinam communes bear potable water for domestic needs only. Since sodium and salinity hazards are recorded in the above areas of the region, it is recommended to initiate conjunctive use of groundwater with canal waters on a limited scale for irrigation in the area.

Intensive monitoring of groundwater levels and water quality is to be taken up in the coastal areas of the region.

Artificial recharge of groundwater through cost-effective rainwater harvesting systems may be popularised 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. For recharging deeper aquifers, recharge tube wells in all favourable locations and coastal areas is recommended.

The brackish water aquifers can be developed for irrigating salt resistant crops. Also, the surface and groundwater can be blended to increase the water availability in water shortage seasons.

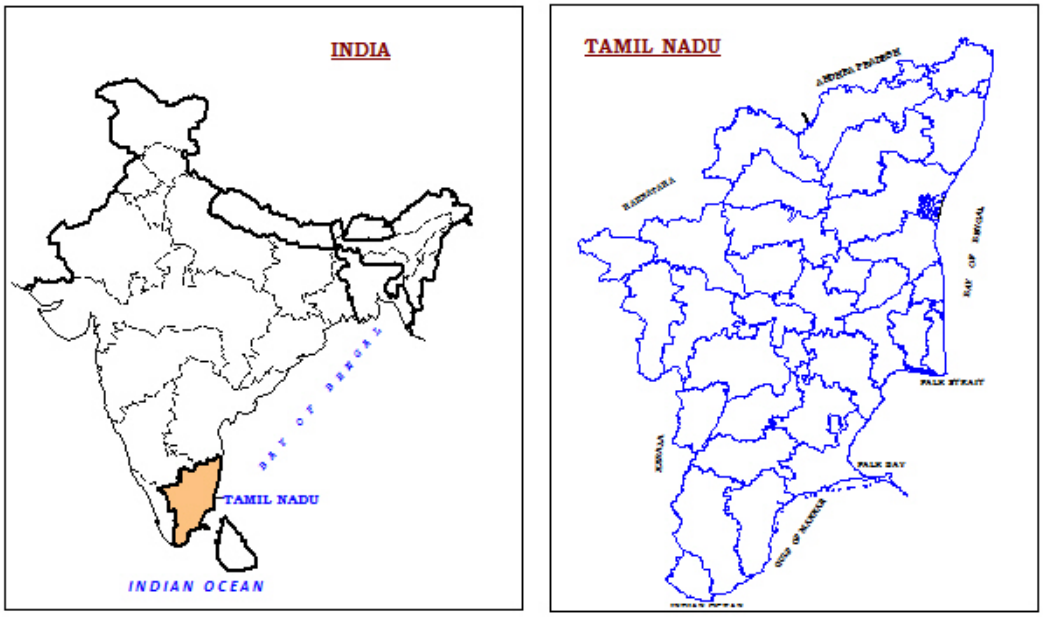
PLATE - I

CENTRAL GROUND WATER BOARD, SECR, CHENNAI

KARAIKAL REGION U.T. OF PUDUCHERRY

LOCATION

(NOT TO SCALE)



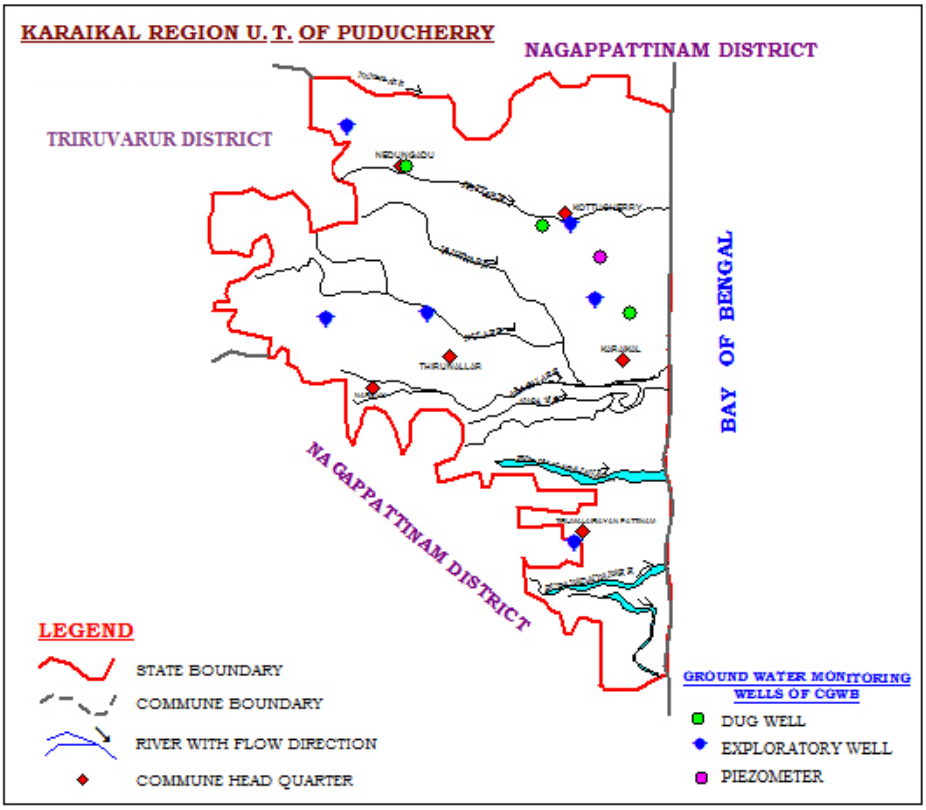


PLATE - II

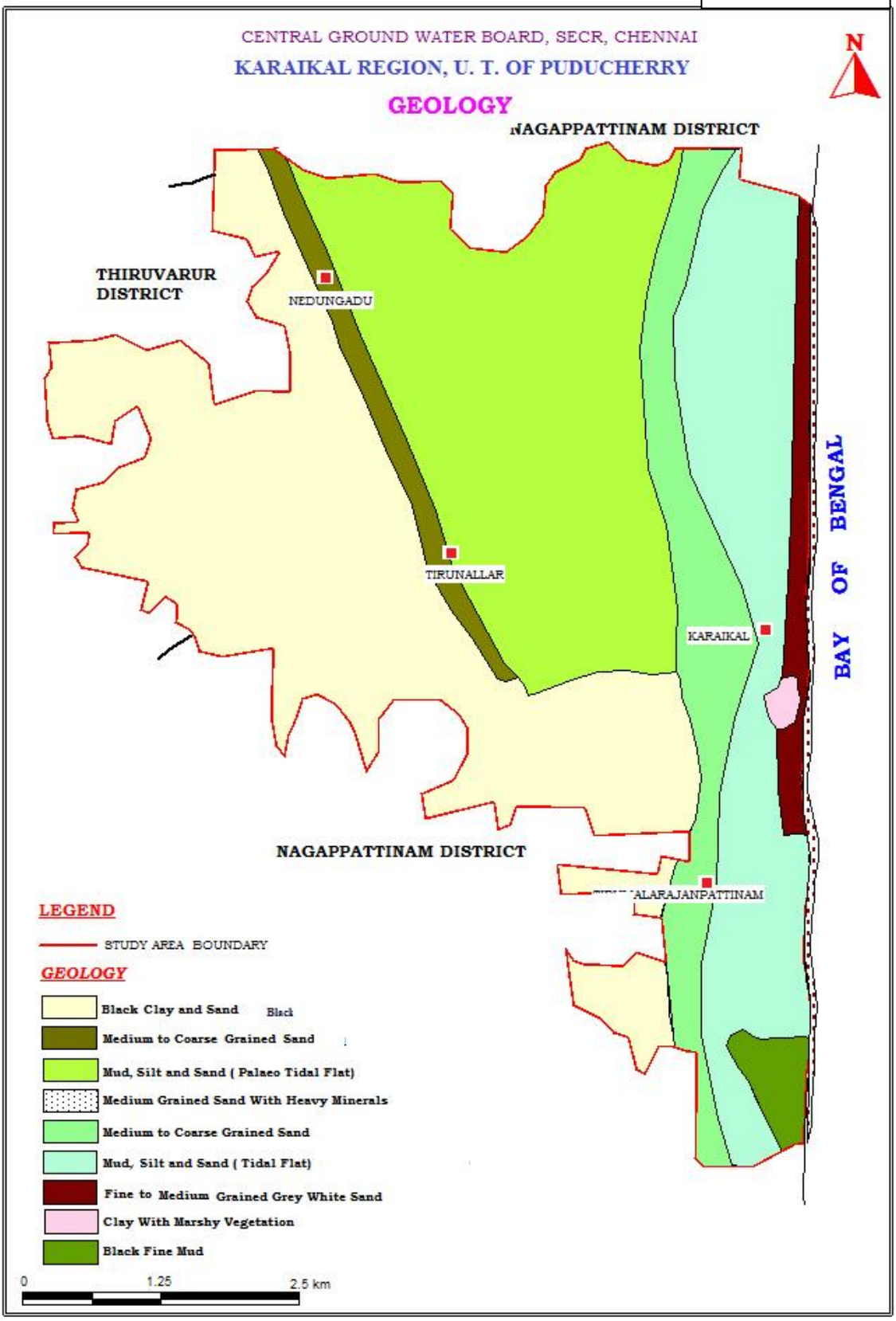
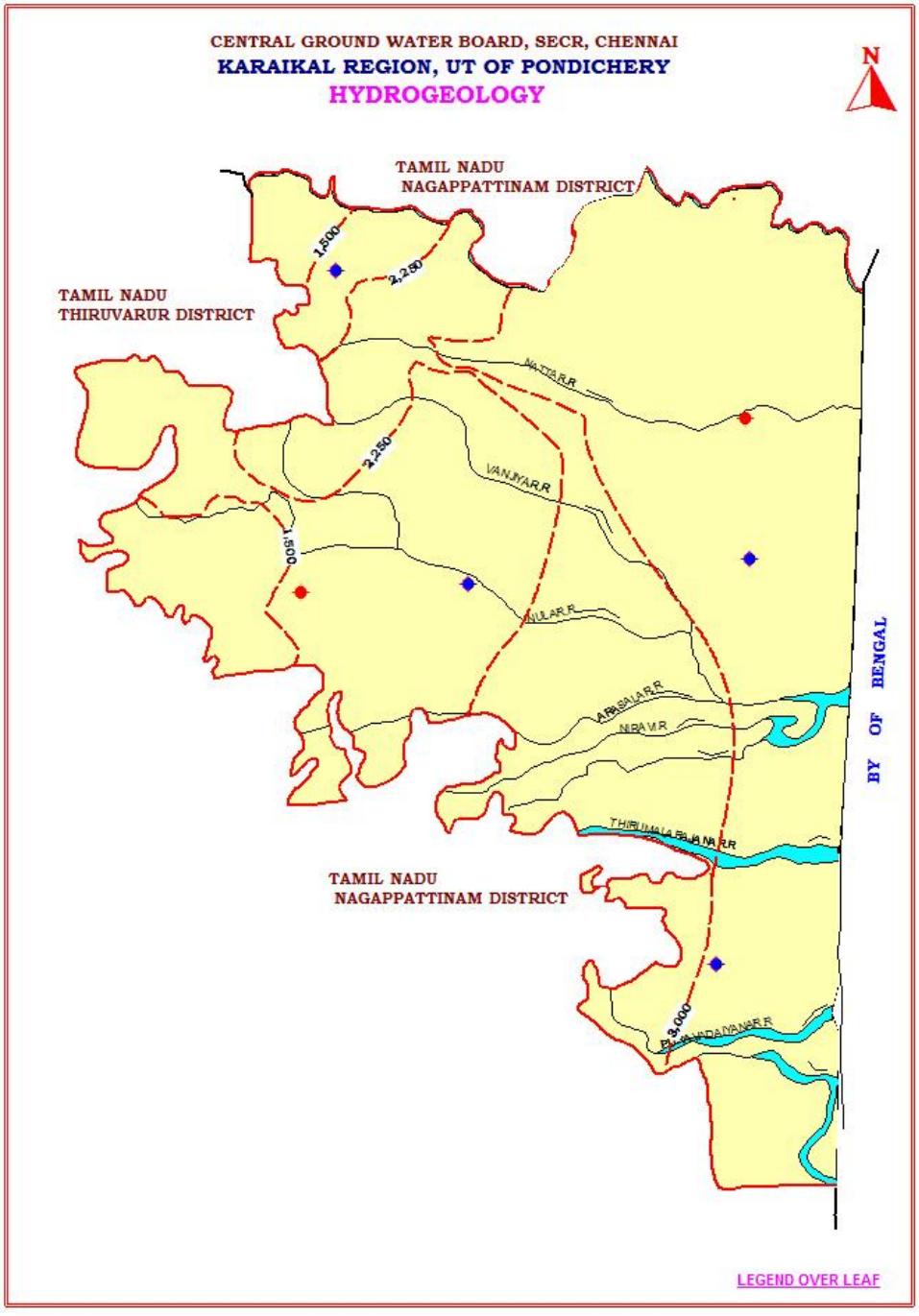

CENTRAL GROUND WATER BOARD, SECR, CHENNAI
KARAIKAL REGION, U. T. OF PUDUCHERRY
GEOLOGY
N
NAGAPPATTINAM DISTRICT
THIRUVARUR DISTRICT
NEDUNGADU
TIRUNALLAR
KARAIKAL
BAY OF BENGAL
NAGAPPATTINAM DISTRICT
ALARAJANPATTINAM
LEGEND
STUDY AREA BOUNDARY
GEOLOGY
Black Clay and Sand
Medium to Coarse Grained Sand
Mud, Silt and Sand (Palaeo Tidal Flat)
Medium Grained Sand With Heavy Minerals
Medium to Coarse Grained Sand
Mud, Silt and Sand (Tidal Flat)
Fine to Medium Grained Grey White Sand
Clay With Marshy Vegetation
Black Fine Mud
0
1.25
2.5 km

PLATE - III


CENTRAL GROUND WATER BOARD, SECR, CHENNAI
KARAIKAL REGION, UT OF PONDICHERY
HYDROGEOLOGY
N
TAMIL NADU
NAGAPPATTINAM DISTRICT
TAMIL NADU
THIRUVARUR DISTRICT
1,500
2,250
NATTARR
2,250
VANJIYARR
1,500
NULARR
ARASALARR
NIRAVIR
THIRUMALARAJANARR
TAMIL NADU
NAGAPPATTINAM DISTRICT
3,000
PUNNADAIYARR
BY OF BENGAL
LEGEND OVER LEAF

LEGEND FOR HYDROGEOLOGY

ADMINISTRATIVE SETUP

STATE BOUNDARY

RIVER WITH FLOW DIRECTION

GROUND WATER HYDROLOGY

EXPLORATORY BORE WELL [CGWB]

HIGH YIELDING BORE WELL [CGWB]

HYDROCHEMISTRY

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

AQUIFER	AGE	LITHOLOGY	GROUND WATER CONDITIONS	YIELD PROSPECTS (CU.M/D)	GROUND WATER DEVELOPMENT STRATEGIES
UNCONSOLIDATED	RECENT	RIVER ALLUVIUN FLOOD PLAIN DEPOSITS	DISCONTINUOUS, THIN, UNCONFINED TO SEMICONFINED	> 200	DEVELOPMENT THROUGH LARGE DIAMETER DUG WELLS AND SHALLOW TUBE WELLSTUBE WELLS
	TERTIARY	SANDSTONE	DISCONTINUOUS CONFINED AQUIFER	1000 - 2000	DEVELOPMENT THROUGH TUBE WELLS OF 150- 350 M DEPTH

PLATE - IV

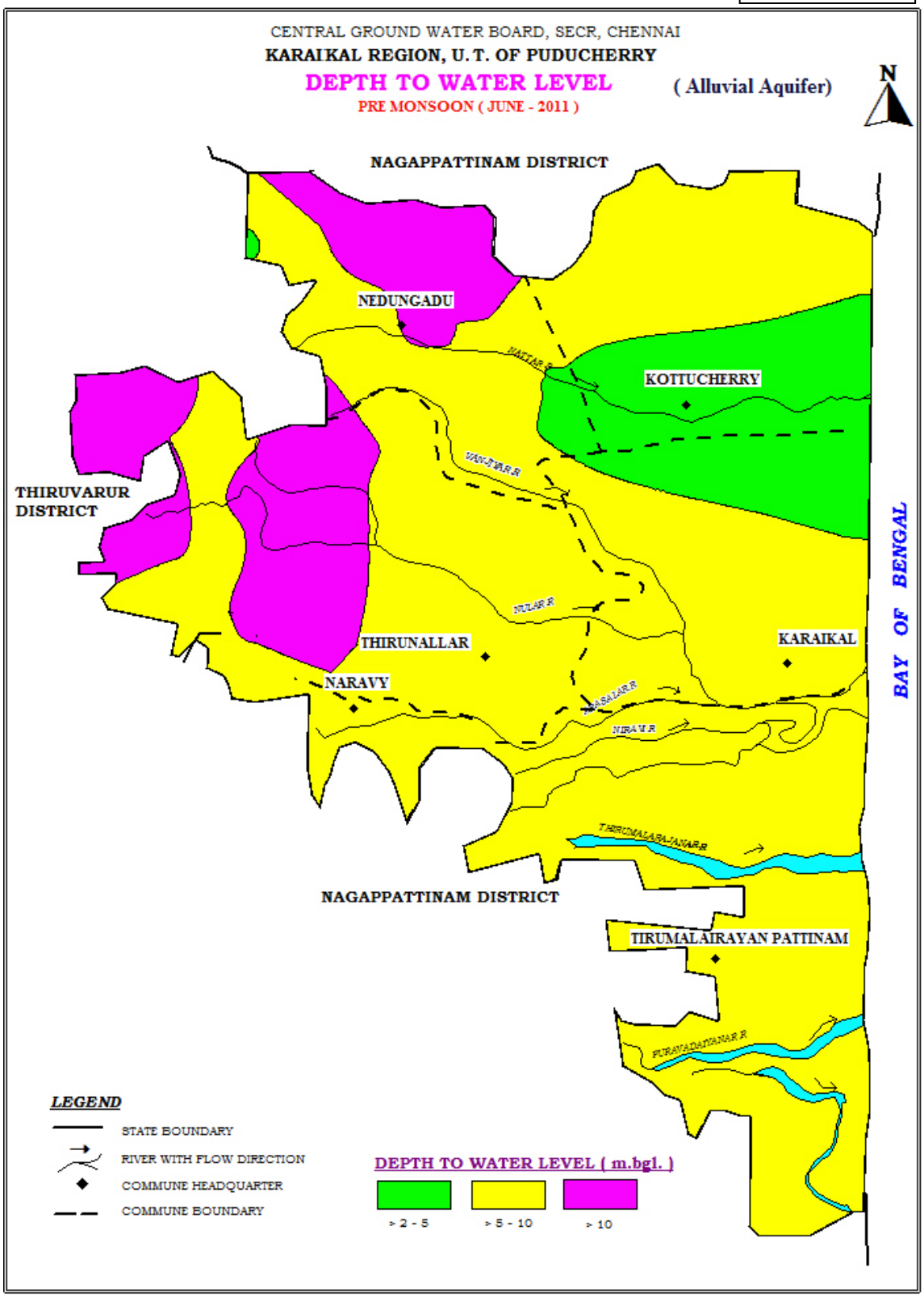

CENTRAL GROUND WATER BOARD, SECR, CHENNAI
KARAIKAL REGION, U.T. OF PUDUCHERRY
DEPTH TO WATER LEVEL
PRE MONSOON (JUNE - 2011)
(Alluvial Aquifer)
N
NAGAPPATTINAM DISTRICT
NEDUNGADU
KOTTUCHERRY
THIRUVARUR DISTRICT
THIRUNALLAR
KARAIKAL
NARAVY
NAGAPPATTINAM DISTRICT
TIRUMALAIRAYAN PATTINAM
BAY OF BENGAL
LEGEND
STATE BOUNDARY
RIVER WITH FLOW DIRECTION
COMMUNE HEADQUARTER
COMMUNE BOUNDARY
DEPTH TO WATER LEVEL (m.bgl.)
> 2 - 5
> 5 - 10
> 10

PLATE - V

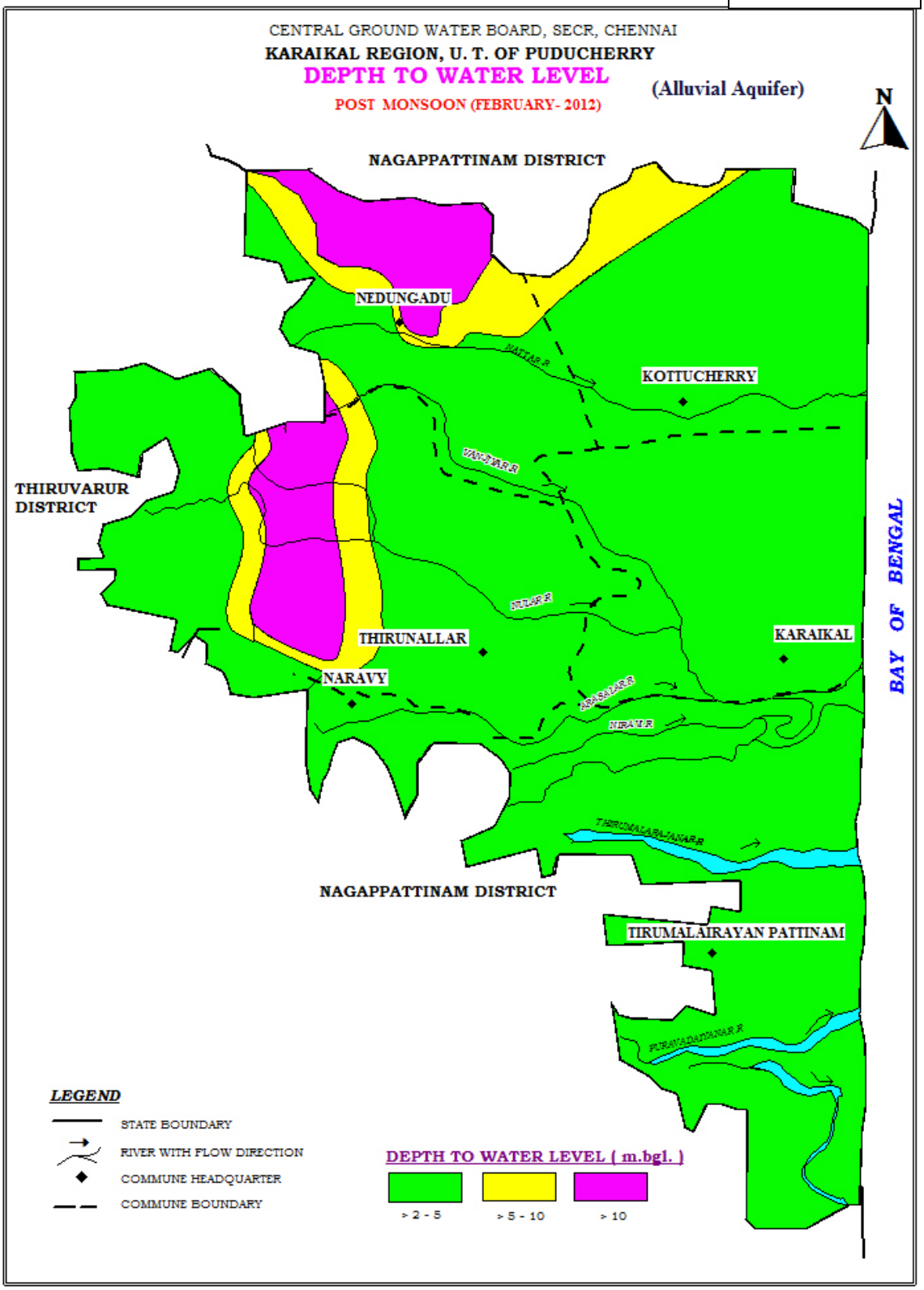
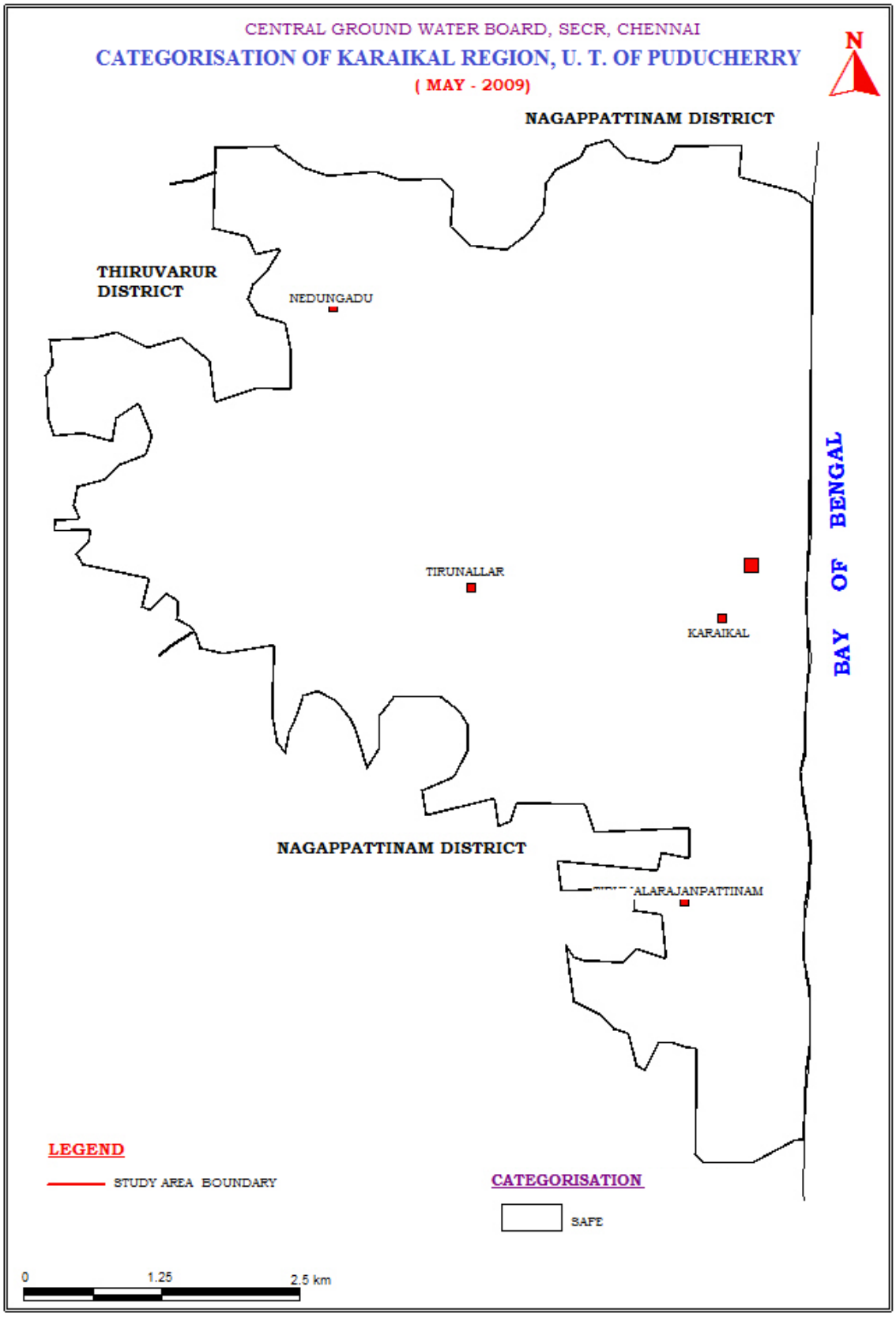

CENTRAL GROUND WATER BOARD, SECR, CHENNAI
KARAIKAL REGION, U. T. OF PUDUCHERRY
DEPTH TO WATER LEVEL
POST MONSOON (FEBRUARY- 2012)
(Alluvial Aquifer)
N
NAGAPPATTINAM DISTRICT
NEDUNGADU
KOTTUCHERRY
THIRUVARUR DISTRICT
THIRUNALLAR
NARAVY
KARAIKAL
BAY OF BENGAL
NAGAPPATTINAM DISTRICT
TIRUMALAIRAYAN PATTINAM
LEGEND
STATE BOUNDARY
RIVER WITH FLOW DIRECTION
COMMUNE HEADQUARTER
COMMUNE BOUNDARY
DEPTH TO WATER LEVEL (m.bgl.)
> 2 - 5
> 5 - 10
> 10

PLATE - VI


CENTRAL GROUND WATER BOARD, SECR, CHENNAI
CATEGORISATION OF KARAIKAL REGION, U. T. OF PUDUCHERRY
(MAY - 2009)
N
NAGAPPATTINAM DISTRICT
THIRUVARUR DISTRICT
NEDUNGADU
TIRUNALLAR
KARAIKAL
BAY OF BENGAL
NAGAPPATTINAM DISTRICT
ALARAJANPATTINAM
LEGEND
STUDY AREA BOUNDARY
CATEGORISATION
SAFE
0
1.25
2.5 km

நீர் பாதுகாப்பு
மற்றும்
நீர் சேமிப்பு செய்

जल का संचयन
एवं
संरक्षण करें

SAVE WATER
AND
CONSERVE WATER

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