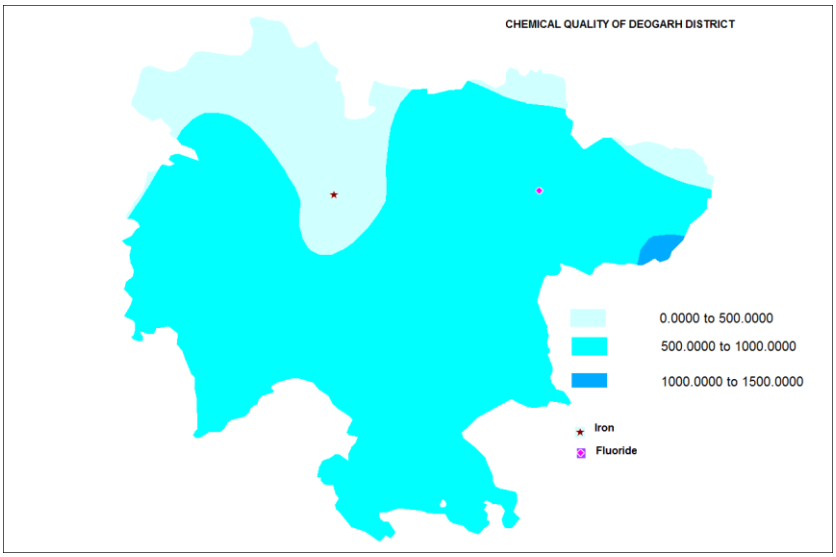
GROUND WATER INFORMATION BOOKLET

DEOGRAH DISTRICT, ORISSA



Ministry of Water Resources
Central Ground Water Board,SER

Bhubaneswar

June, 2013

GROUND WATER BROCHURE OF DEOGARH DISTRICT, ORISSA

CONTENTS

DEOGARH DISTRICT GROUND WATER BROCHURE

DISTRICT AT A GLANCE

S. No.	Items	Statistics
1	**GENERAL INFORMATION**	
	i) Geographical area	2781.66 Km^2
	ii) Administrative division (year 2011)	Deogarh
	Number of Sub divisions	1
	Number of Tehsils	1
	Number of Blocks	3
	Number of Revenue Circles	11
	Number of Gram Panchayats	60
	Number of Villages	774
	Number of Municipality	1
	iii) Population as per 2011 census	3,12, 164
	Male	1, 58, 017
	Female	1, 54, 147
	iv) Average annual rainfall mms	1014.2
	Number of Rainy days	69

2	**GEOMORPHOLOHY** Major physiographic units	Following are major physiographic features in Deogarh district; i) The Khajuria hill range in the northern part of the Deogarh district running in east – west direction in Badbar area having a maximum height of 745 meters above mean sea level. ii) The Pradhanpat & Kaidanta hill ranges having maximum height of 743 and 816 meters above mean sea level respectively in the northern part of the Deogarh district. iii) The pawri hill range on the eastern side of the Brahmani river, which is 678 meters above mean sea level in height. iv) The Ushakothi hill range in Kansar & Reamal blocks. The hill ranges have elevation ranging form 610 – 762 to meters above mean sea level	
	Major drainage	Most part of the district are drained by Bhamhani river and its tributaries flowing from north to south direction.	
3	**LANDUSE**	Pattern	Area in Km^2
		Forest	1301.49
		Net Sown	1427.87
4	**MAJOR SOIL TYPE**	1.	sandy loam

		2.	Red soil	
5	**AREAS UNDER PRINCIPAL CROPS** (As per latest available data)	Name of the Crop	Area in Km^2	
		Paddy	360.40	
		Millates	14.10	
		Pulses	140.400	
		Oil seeds	103.50	
		Fibres	6.20	
		Vegetable	28.00	
		Condiment	15.10	
		Sugarcane	0.30	
		Wheat	-	
		Maize	-	
		Total	668	
6	**IRRIGATION BY DIFFERENT SOURCES**	Source	Quantity used	
		Gross Ground water	18 mcm	
7	**NUMBER OF GROUND WATER MONITORING WELLS OF CGWB** (As on 31.3.2011)	Number of dugwells and piezometers	6 2	
8	**PREDOMINANT GEOLOGICAL FORMATIONS**	Precambrian granitic Khondalite, Charnockite & Calc gneiss rocks.		
9	**HYDROGEOLOGY**	Major water bearing formations	Weathered shallow zones constituting pheratic aquifers and rather deep fractured zones constituting confined aquifers in granitic Khondalite and charnockite rocks of Precambrian age.	
		Premonsoon depth to water level during 2011	Within range of 4 – 10 meters beklow ground level	
		Post monsoon depth to water level during 2011	Up to 4 meters below ground level	
		Long term water level trend in 10 years in meters/year (2001-2011)	Changes not significant excepting some fall in summer water table due to increasing with drawls.	
10	**GROUND WATER EXPLORATION BY CGWB** (As on 31.3.2011)	Number of well drilled	EW, OW, Pz & SH	28
			Total	28
		Depth range in meters	105 - 191	
		Discharge in liters per second	In range of 0 – 20. And 5 in majority wells.	
11	**GROUND WATER QUALITY**	EC	Within permissible limits.	

	(Presence of Chemical constituents more than permissible limits)	F As Fe	31.56 ppm in Barkote well. Within permissible limits. Within permissible limits.	
12	**DYNAMIC GROUND WATER RESOURCES** (In 2009 in mcm)	Annual replishnable ground water resources		206.29
		Net annual ground water draft		27.95
		Projected demand for dometic and industrial uses for next 25 years		9.49
		Stage of ground water development		13.55%
13	**AWARENESS AND TRAINING ACTIVITY**	Mass awareness programmes organized		Nil
		Water management training Programme organized		Nil.
14	**EFFORTS OF ARTIFICIAL RECHARGE & RAINWATER HARVESTING**	Projects completed by CGWB (No. & amount spent)		Nil.
		Projects under technical guidance of CGWB (Numbers)		Nil.
15	**GROUND WATER CONTROL REGULATION**	Nos. of over exploited blocks		Nil.
		Nos. of critical blkocks		Nil.
		Nos. of notified blocks		Nil.
16	**MAJOR GROUND WATER PROBLEMS AND ISSUES**	Overall quality of ground water and its occurrence is satisfactory in the district with sufficient scope for further development of groundwater resources for drinking, irrigation and industrial uses.		

1.0 Introduction

Deogarh is a predominantly hilly and undulating district created form bifurcation of Sambalpur district in the year 1994. It is situated in western portion of Orrisa. Administratively it is only one sub division, one tehsil divided in three development blocks namely Barkote, Reamal and Tileibani comprising of 60 Gram Panchayats and 774 villages. Area of this district is 2781.66 square kilometers.

Georaphical location wise Deograh district is locatec between North latitudes 21° 11 ' - 21° 43 ' and East Longitudes 84° 27 ' - 85° 15 '. Deograh town is district headquarter. It is 90 kilometers east of Sambalpur major town on National Highway No.6, which passes through the district & acts as the main inter- regional communication link. Besides parts of district can be traversed by state highway and other major district, gram panchayat, village and forest roads. District population is 3,12,164 as per 2011 census.

Central Ground Water Board carried out hydrogeological surveys covering Deograh district during the years from 1982-83 to 1994-95 and ground water exploration by drilling by constructing 28 numbers of exploratory wells under its normal and accelerated exploratory drilling programmes. In addition ground water monitoring through six numbers of National Hydrograph Network Stations (GW) located at Barkode, Barkode iii, Kondal, Rengalmela, Riamal and Tilebani is also carried out by Central Ground Water Board four times in a year. (Refer map 1)

2.0 Rainfall and Climate

Majority of the annual rainfall in Deogarh district is caused mainly from south western monsoon, occurring mostly during middle of June to September months. About 2 to 5% of rainfall is also contributed by winter showers occurring in the months of December to February. Average annual rainfall of the district is 1, 014.2 millimeters.

Deograh district experiences tropical monsoon climate with three distinct seasons during the year, namely, winter, summer, and rainy seasons. Winter commencing from last week of November till February with maximum temperature of 26°C and minimum temperature of 11°C. March to June is the summer season with mean maximum temperature of 41°C and mean minimum temperature of 28°C.

3.0 Geomorphology and soil types

The following are the physiographically important features in Deogarh district.

1. In the northern part of district east – west trending Khajuria hill range is ther in Badbar area attaining a maximum height of 745 meters above mean sea level and Pradhanpat & Kaidanta hill ranges having maximum heights of 743 and 816 meters above mean sea level.

2. In the eastern side of Brahmani river Pawri hill range with a maximum height of 678 meters above mean sea level.

3. The Ushakothhi and Kansar hill ranges with elevations of 610 and 762 meters above mean sea levels.

The main soil types occurring in the district are mainly sandy loam and red soils.

4.0 Ground water scenario

Weathered and fractured zones in granite gneiss rocks of Khondalites and Charnockites constitute pheartic and confined aquifers respectively.

Hydrogeological characteristics wise wells sited in favourable locations in weathered residium and fractured zones of granite gneiss rocks yield from 2 to 25 liters per second specific capacity of vary from 6 to 286 lpm/meter.

Charnockitic rocks are rather less weathered and bear poor prospects for ground water development barring in highly fractured and joined zones giving rise to secondary porosity.

Semi consolidated lower gondwana sandstones occurring in small patch in southern parts of district have limited yield with depth to water level ranging from 3 to 10 mbgl.

Laterite and alluvium of quaternary to recent age also occur in very limited extent forming shallow aquifers tapped mostly through dugwells. (Refer map 5)

Overall premonsoon depths to water level vary from 4 to 6 meters below ground levels. Postmonsoon water levels vary from 0 to 4 meters below ground levels. Changes in water levels on long term basis do not show any significant changes. Depth to water levels in six numbers of National Hydrograph Network Stations (GW) for pre and post monsoon period of year 2006 are presented in the following table; (Also refer map 2 & 3)

Central Ground Water Board carried out ground exploration in Deogarh district by constructing 15 numbers of exploratory wells under its normal exploratory drilling activity. Beside under accelerated exploratory drilling programme. CGWB constructed 13 numbers of exploratory wells in the district to mitigate effects of drought. Depth of the exploratory wells ranges from 105 to 191 meters below ground levels. Discharge encountered in the range of 1 to 20 liters per seconds and about 5 liters per second in majority of well.

5.0 Ground water Resources

Estimated annually replishnable ground water resources mostly relating to phreatic aquifers are estimated as 206.29 mcm. Net annual ground water draft is estimated as 27.95mcm and stage of ground water development in the vicinity of 13.55%.

Table: Blockwise Stage of Ground Water Development of Deogarh District (As per March, 2009)

Sl No	Block	Net Annual Ground Water Availability	Existing Gross Ground Water Draft for Irrigation	Existing Gross Ground Water Draft for domestic & Industrial Supply	Existing Gross Ground Water Draft for all uses	Provision for domestic & industrial requirement supply for next 25 years	Net Ground Water Availability for future irrigation development	Stage of Ground Water Development
		(ham)	(ham)	(ham)	(ham)	(ham)	(ham)	(%)
1	2	3	4	5	6	7	8	9
1	Barkote	6729.00	627.00	243.35	871.00	359.00	5742.00	12.94
2	Reamal	8588.00	1021.00	240.60	1261.00	348.00	7219.00	14.68
3	Tileibani	5312.00	496.00	166.88	663.00	242.00	4574.00	12.48
	District Total	**20629.00**	**2144.00**	**650.00**	**2795.00**	**949.00**	**17535.00**	**13.55**

Overall ground water situation in the district leaves lot of scope and potential for ground water development keeping aside about 7.86 mcm for meeting projected drinking and industrial sectors requirements for coming 25 years. As per stage of ground water development, all the three blocks of Deogarh district namely Barkote, Riamal and Tilebani are in safe Category.

6.0 Ground water quality

Overall ground water quality of ground water in Deogargh district is good for drinking, industrial and irrigation uses. All the chemical constituents are within the permissible limits. (Barring slight alkalinity and an isolated instance of presence of Fluride as 1.56 mg/liter in Barkote iii observation well in Barkote block of Deogarh district).

7.0 Ground water management strategy

This district being predominantly occupied by hard rocks of Precambrian age is suitable for ground water resources development mainly by dug cum bore wells. While siting tubewells for ground water resources development for irrigational and industrial purposes, site specific hydrogeological study should be carried out.

8.0 Ground water conservation and artificial recharge

Some decline in depth to water level conditions are observed particularly during premonsoon summer season in north western part of district in Riamal block premosoon depth to water levels reaches up to 10 meters below ground levels (map 2). In such area rain water harvesting and suitable artificial recharge techniques like roof top rain water harvesting, recharge through wells,

construction of percolation tanks, nala/contour bunds, check dams, gully plugs, renovation of old tanks needs to be adopted after site specific studies.

9.0 Ground water related issues and problems

The ground water resources occurring in district are satisfactory quantity and quality wise and possess no problem of imminent or grave nature.

10.0 Awareness and training activity

Central Ground Water Authority has not organized any mass awareness programme and water management & rain water harvesting programme in Deogarh district.

11.0 Area notified by CGWA/SGWA

There are no parts as 'Notified area' by Central Ground Water Authority/ State Ground Water Authority in Deogarh district.

12.0 Recommendations

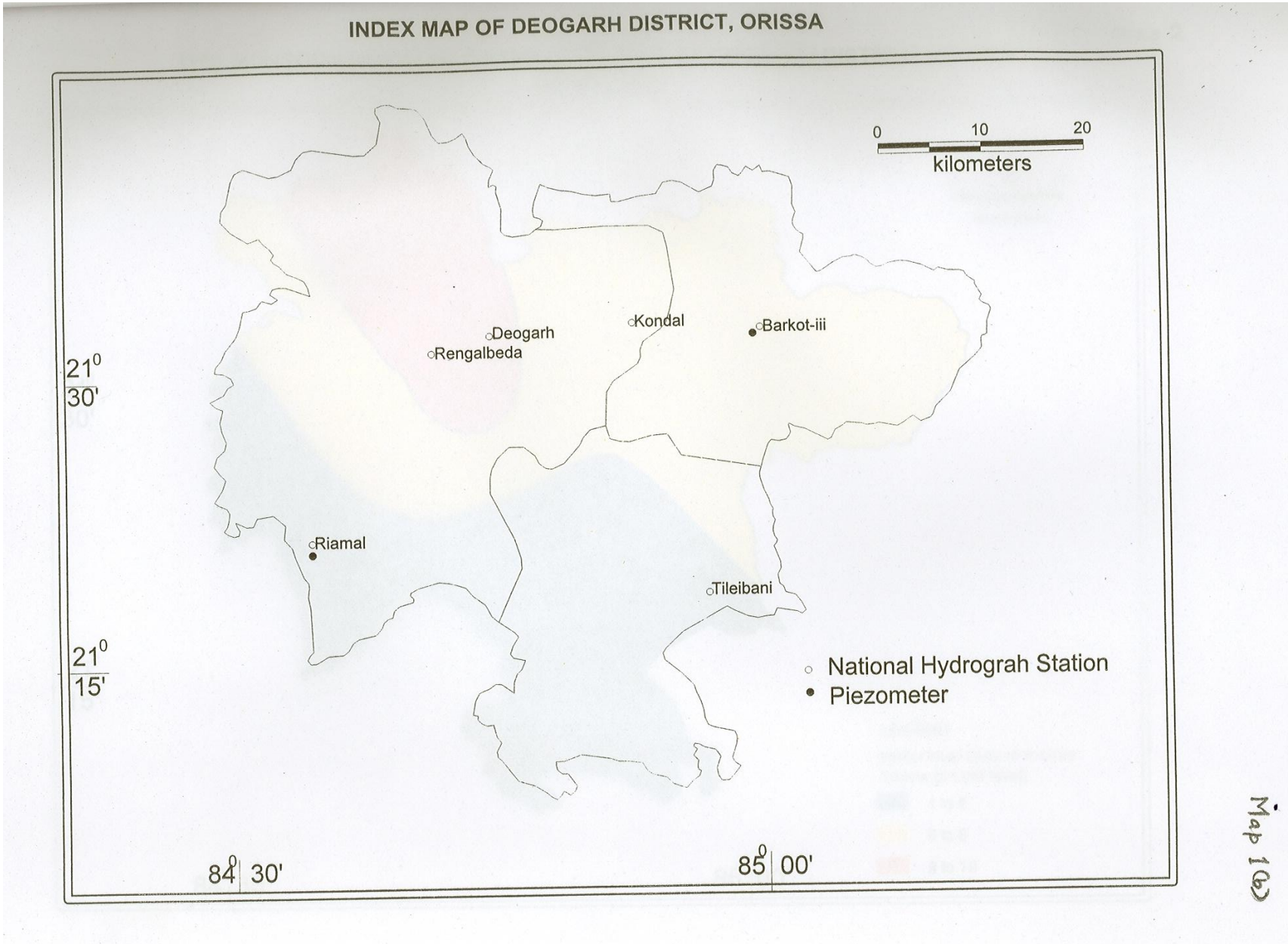
1. More emphasis be given develop ground water resources of Deogarh district by government departments agencies and public efforts for meeting growing water demands of drinking, irrigation and industries.

2. Ground water abstraction structures (dug wells, dug cum bored wells and bore wells) for irrigational purposes be planned keeping in view safe distance of 200-250 meters to avoid interference.

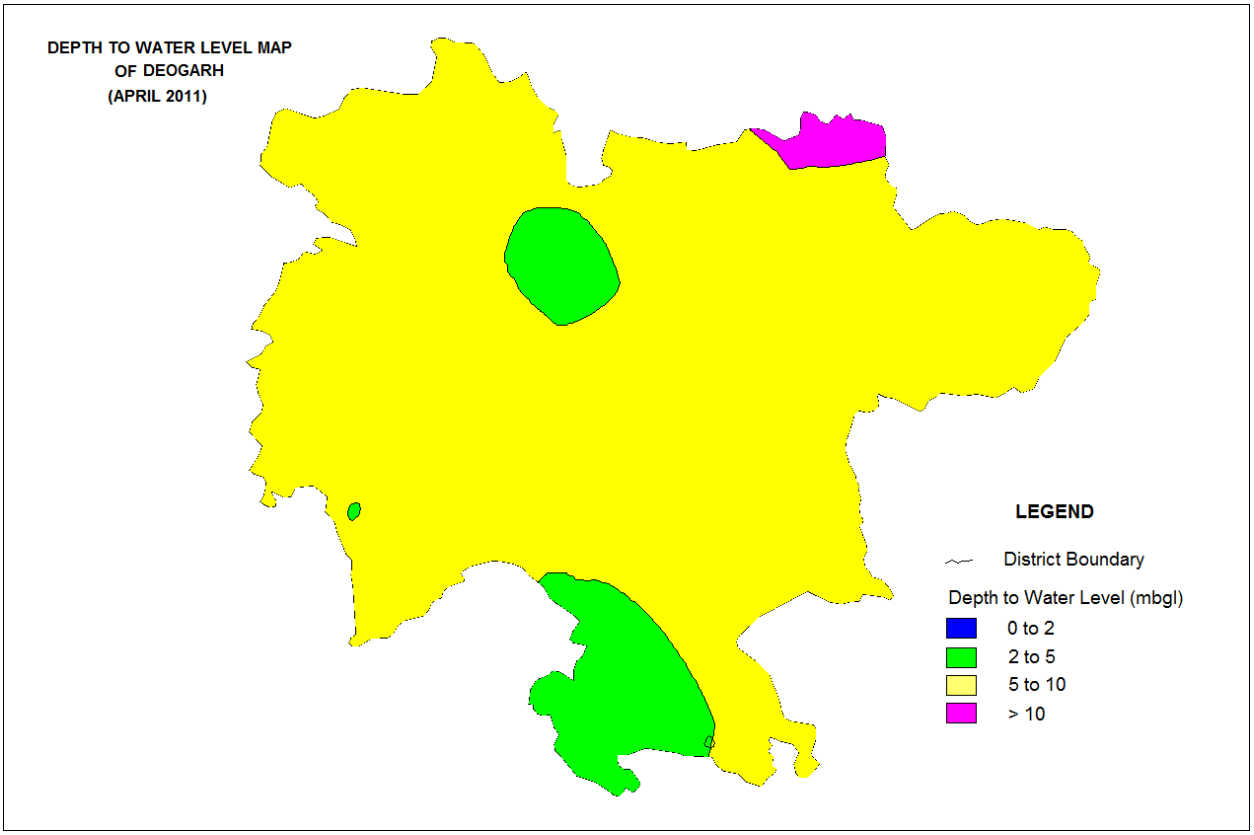
3. Energisation of existing Ground water abstraction structures (dug wells, dug well cum bored wells and bore wells) for irrigational uses to be done for optimum utilization of ground water resources.

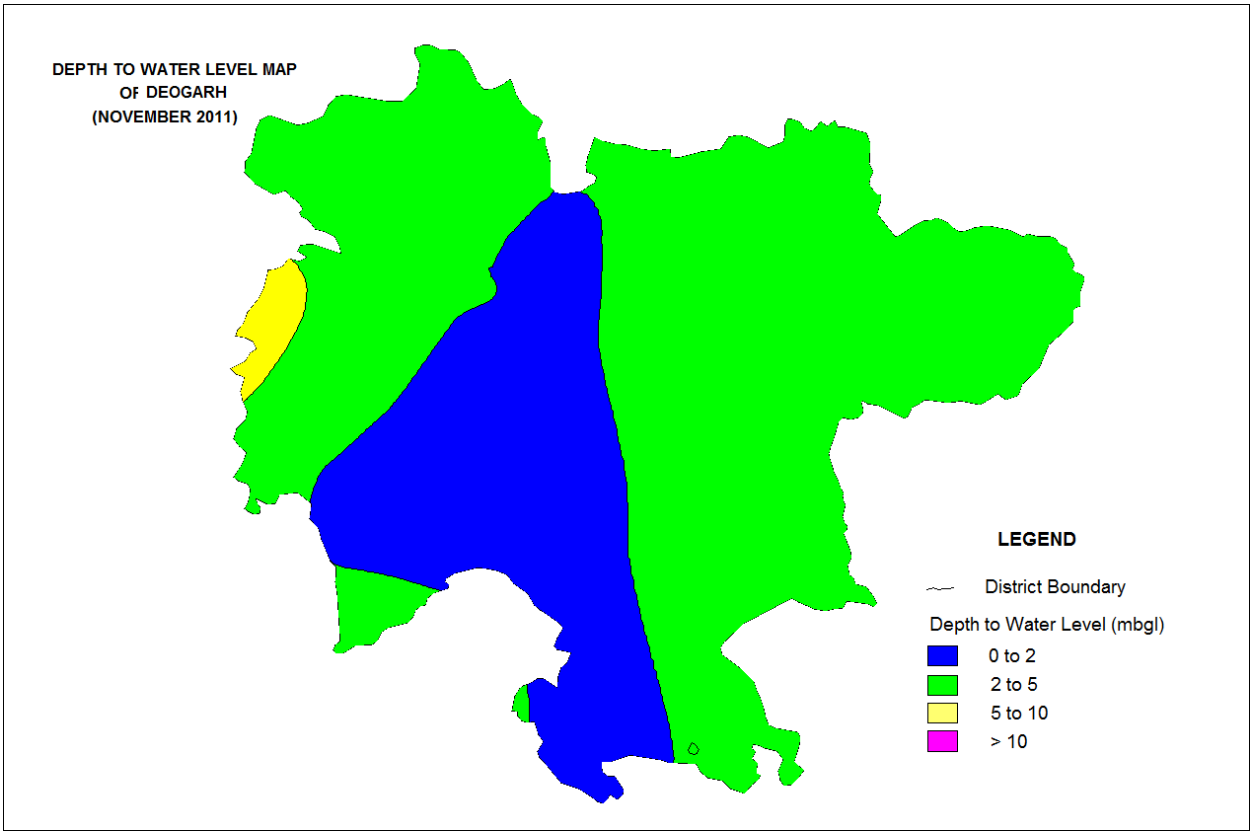
4. Site specific hydrogeological investigations be carried out before digging/drilling groundwater abstraction structures to avoid failures.

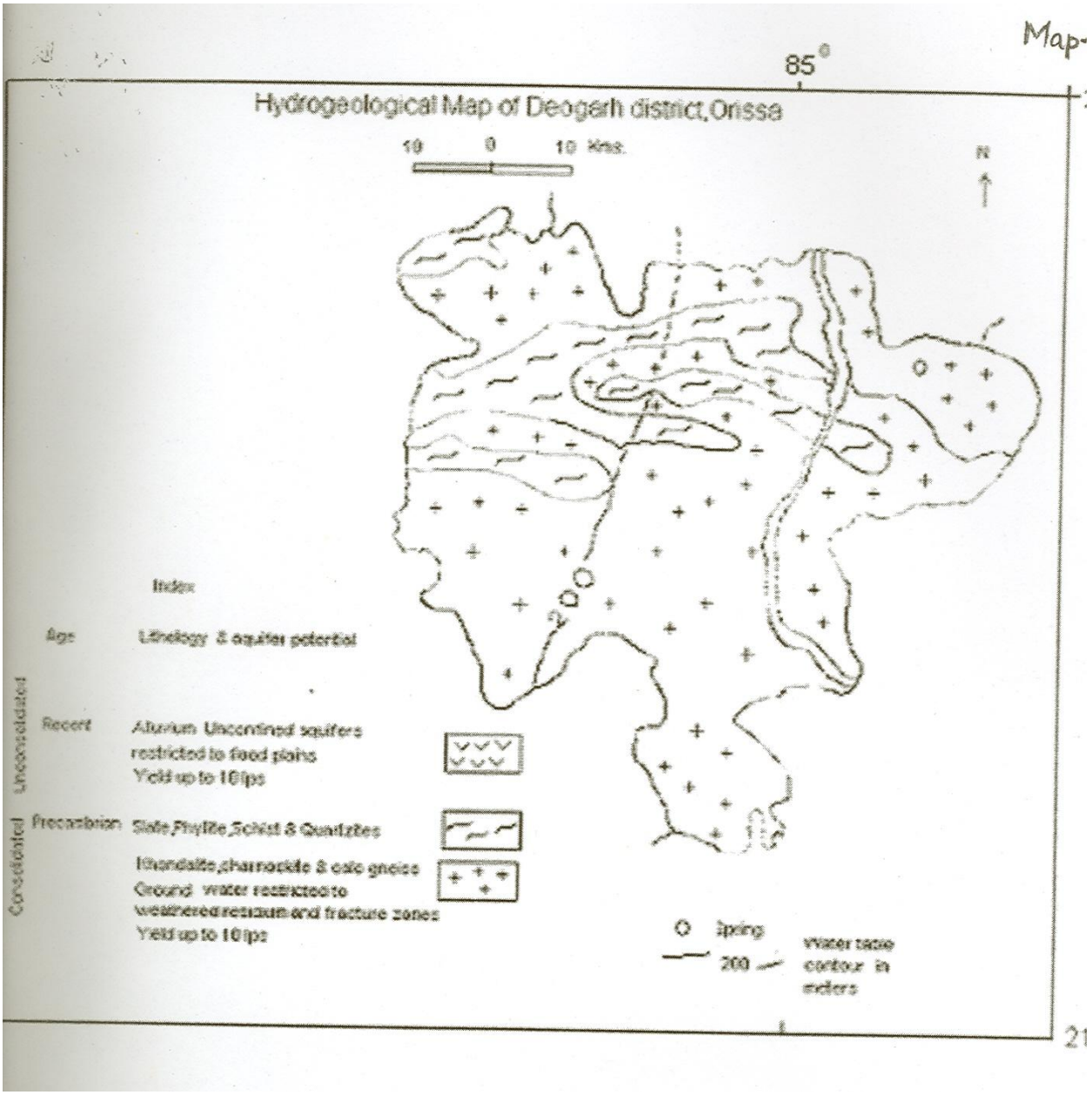
5. Measures to tap excess runoff for recharging aquifers by constructing check dams, nala bunding, contour bunding, gully plugs, percolation tanks etc. needed to be regularly be taken up in addition to roof top rainwater harvesting in big building of urban area.

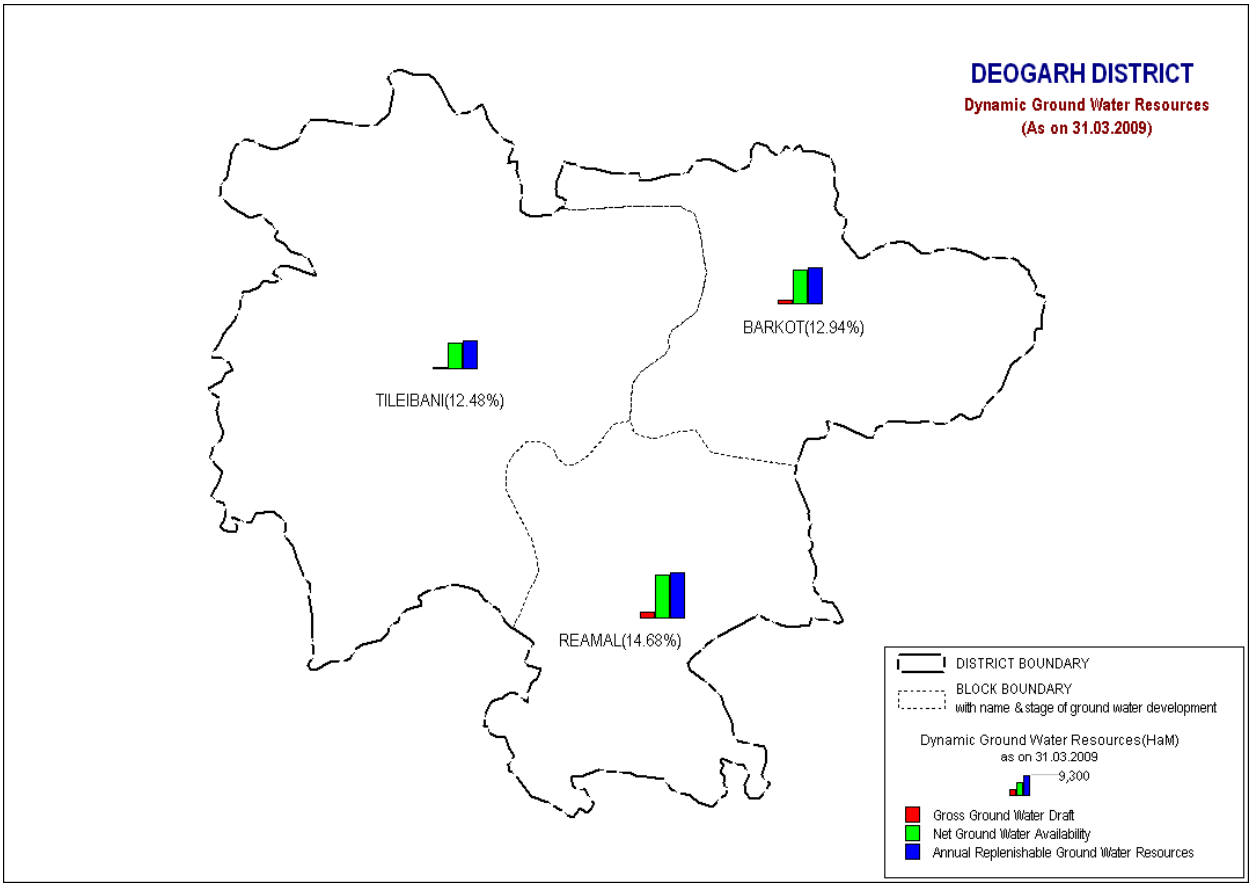

INDEX MAP OF DEOGARH DISTRICT, ORISSA
0
10
20
kilometers
Deogarh
Rengalbeda
Kondal
Barkot-iii
Riamal
Tileibani
National Hydrograh Station
Piezometer
21° 30'
21° 15'
84° 30'
85° 00'

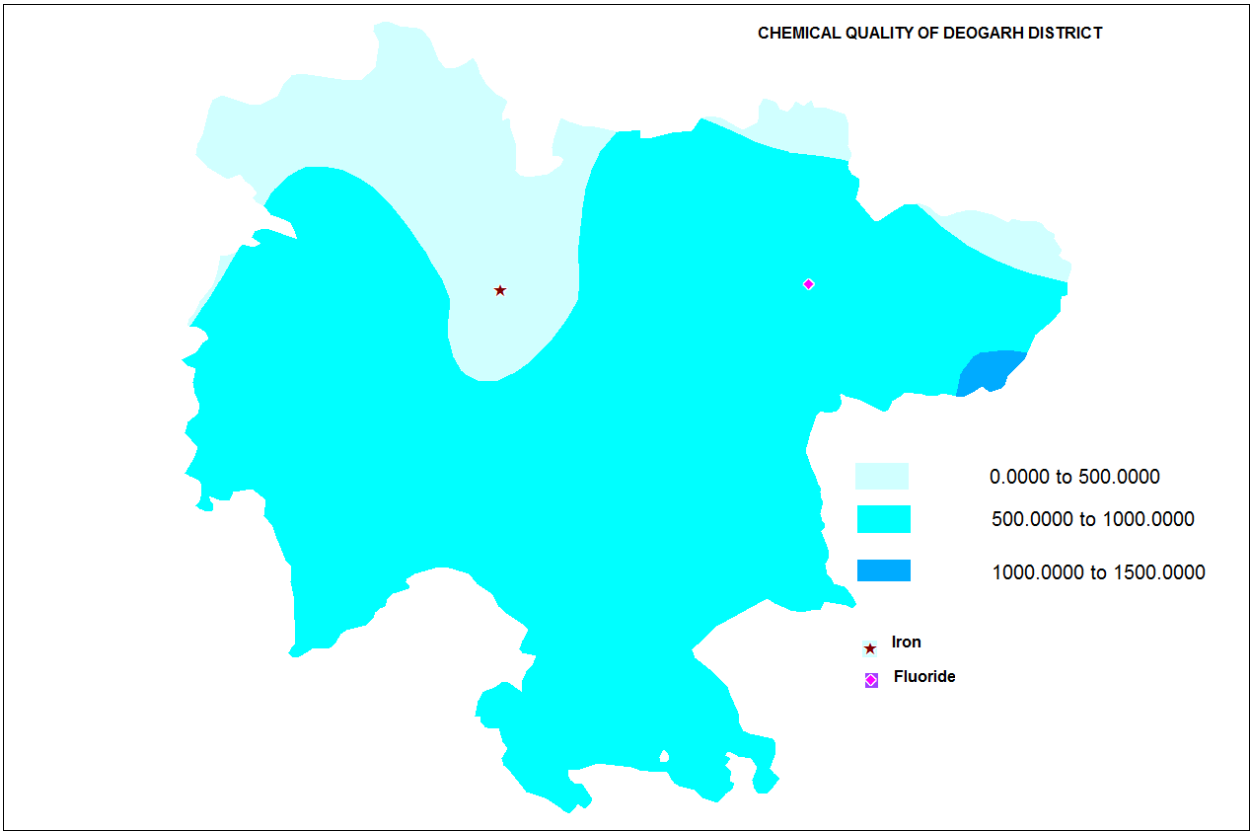
Map 1(b)


DEPTH TO WATER LEVEL MAP
OF DEOGARH
(APRIL 2011)
LEGEND
District Boundary
Depth to Water Level (mbgl)
0 to 2
2 to 5
5 to 10
> 10


DEPTH TO WATER LEVEL MAP
OF DEOGARH
(NOVEMBER 2011)
LEGEND
District Boundary
Depth to Water Level (mbgl)
0 to 2
2 to 5
5 to 10
> 10


Map-
85°
Hydrogeological Map of Deogarh district,Orissa
10 0 10 Kms.
N
200
Index
Age
Lithology & aquifer potential
Recent
Alluvium Unconfined aquifers restricted to flood plains Yield up to 10lps
Precambrian
Slate,Phyllite,Schist & Quartzites
Khondalite,charnockite & calc gneiss
Ground water restricted to weathered regolith and fracture zones
Yield up to 10lps
Unconsolidated
Consolidated
Spring
200
Water table contour in meters
21


DEOGARH DISTRICT
Dynamic Ground Water Resources
(As on 31.03.2009)
BARKOT(12.94%)
TILEIBANI(12.48%)
REAMAL(14.68%)
DISTRICT BOUNDARY
BLOCK BOUNDARY
with name & stage of ground water development
Dynamic Ground Water Resources(HaM)
as on 31.03.2009
9,300
Gross Ground Water Draft
Net Ground Water Availability
Annual Replenishable Ground Water Resources


CHEMICAL QUALITY OF DEOGARH DISTRICT
0.0000 to 500.0000
500.0000 to 1000.0000
1000.0000 to 1500.0000
Iron
Fluoride