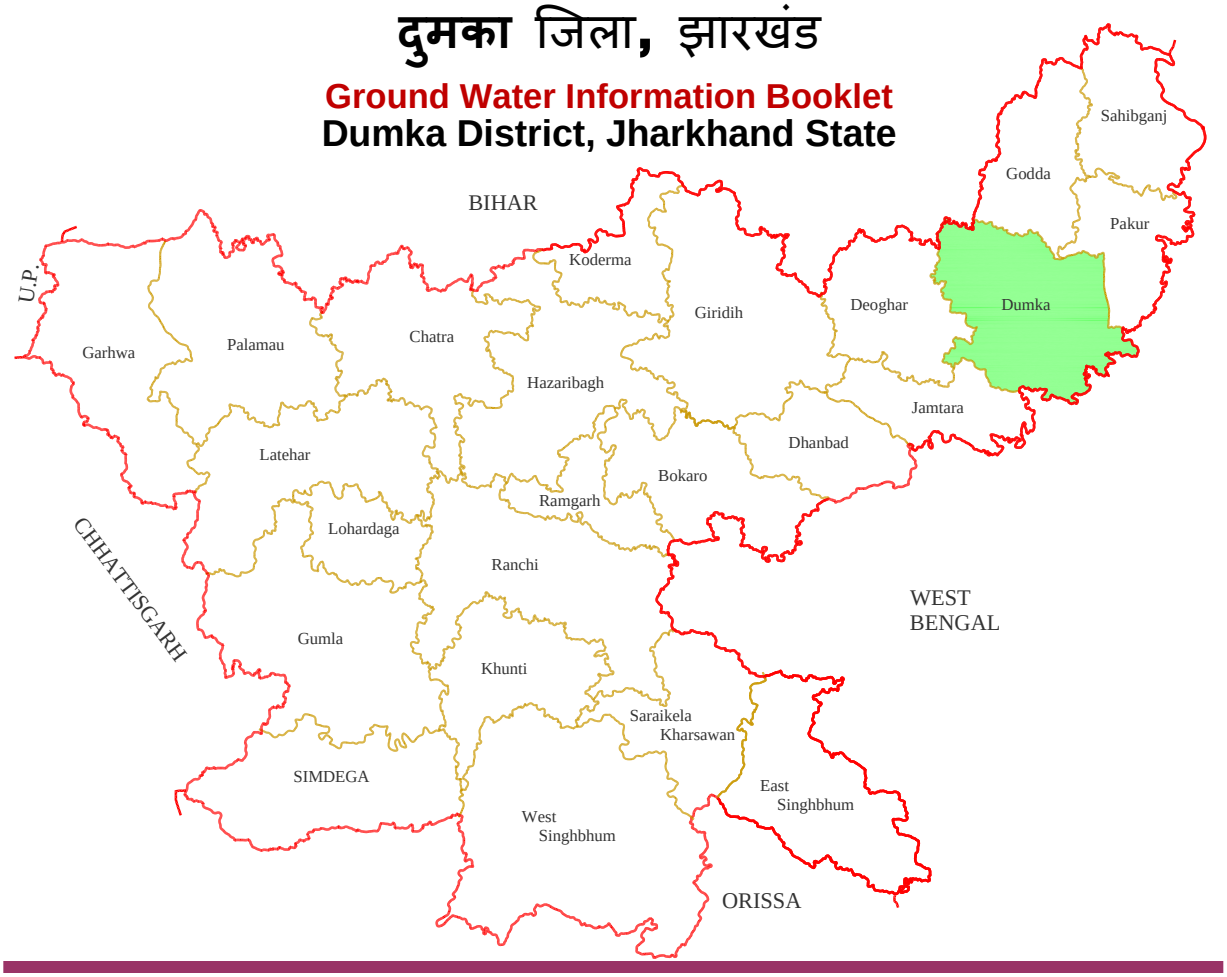
भूजल सूचना पुस्तिका

दुमका जिला, झारखंड

Ground Water Information Booklet
Dumka District, Jharkhand State



केन्द्रीय भूमिजल बोर्ड
जल संसाधन मंत्रालय
(भारत सरकार)
राज्य एकक कार्यालय, राँची
मध्य-पूर्वी क्षेत्र
पटना

Central Ground water Board
Ministry of Water Resources
(Govt. of India)
State Unit Office,Ranchi
Mid-Eastern Region
Patna

सितंबर 2013
September 2013

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State Unit Office, Ranchi
Mid Eastern Region, Patna

GROUND WATER INFORMATION BOOKLET OF DUMKA DISTRICT, JHARKHAND STATE

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	Administrative Division (As on 2011)				
	i)	Number of Tehsil/ Block	10		
	ii)	Number of Panchayat/Villages	256/2944		
	iii)	Population (As on 2011 Census)	1321442		
	iv)	Average Annual Rainfall (mm)	1422.5		
	v)	Maximum Temperature	46°		
	vi)	Minimum Temperature	4°		
	vii)	Relative Humidity	50-60		
2.	GEOMORPHOLOGY				
	Major physiographic unit:		Hills, Plateau and narrow valleys		
	Major Drainages:		Brahmani, Balso and Mayurakshi		
3.	LAND USE (Sq. Km)				
	a)	Net Cultivated Area	2503.13		
	b)	Net Area Sown	2359.28		
	c)	Net Area Irrigated	167.57		
	d)	Percentage of Area Irrigated	7.10%		
	e)	Forest	517.76		
4.	MAJOR SOIL TYPE		Alluvial, Grey eroded scrap, Lateritic and forest soil		
5.	AREA UNDER PRINCIPAL CROPS (2011-2012)		Area (HA)	Production (MT)	Productivity (KG/HA)
	a) Kharif		133097	368505	10840
	b)Rabi		38630	44525	7388
6.	IRRIGATION BY DIFFERENT SOURCES (Areas in Ha) (2007-08)		Area(Ha)147915		
	Canals		113		
	Tubewell / Borewell		3240		
	Tank/ponds		1902		
	Other sources		199		
7.	NUMBER OF GROUND WATER MONITORING WELLS OF CGWB (As on 31-12-2012)		16		
	No of Dug wells		16		
	No of Piezometers		00		
9.	HYDROGEOLOGY				
	Major Water bearing formation		Chotanagpur Granite Gneiss, Gondwana, Rajmahal Traps		
	(Pre-monsoon Depth to water level during 2012) m bgl.		4.45-12.3		
	(Post-monsoon Depth to water level during 2012) m bgl.		3.1-8.4		
	Long term water level trend in 10 yrs (2003 - 2012) in m/yr		Rise	0.0249	
			Fall	0.006 - 0.58	
10.	GROUND WATER EXPLORATION BY CGWB (As on 31-07-2007)				

	No of wells drilled (EW, OW, PZ, SH, Total)	18 (EW), 16(OW)
	Depth range (m)	57-201
11.	GROUND WATER QUALITY	
	Presence of Chemical constituents more than permissible limit (e.g EC, F, As, Fe)	-
	Type of water	Potable
12.	DYNAMIC GROUND WATER RESOURCES(2009)- in ham	
	Annual Replenishable Ground water Resources	27050.58
	Net Annual Ground Water Draft	7382.34
	Projected Demand for Domestic and industrial Uses up to 2034	2454.99
	Stage of Ground Water Development	27.28%
13.	AWARENESS AND TRAINING ACTIVITY	-
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	Date:	-
	Place:	-
	No of participant :	-
	Water Management Training Programmes organized	-
	Date	-
	Place	-
14.	EFFORT OF ARTIFICIAL RECHARGE & RAIN WATER HARVESTING	
	Project completed by CGWB(No & Amount spent)	-
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15.	GROUND WATER CONTROL AND REGULATION	
	Number of OE Blocks	Nil
	Number of Critical Blocks	Nil
	Number of Blocks notified	Nil
18	MAJOR GROUND WATER PROBLEMS AND ISSUES	Long term ground water level decline

GROUND WATER INFORMATION BOOKLET

DUMKA DISTRICT

1.0 INTRODUCTION

1.1 **Administrative Details**

Dumka district is the part of Santhal Paragana Commisionery and is located in the north eastern part of the Jharkhand state, lies between North Latitude 23°47'20" & 24°38'57" and East Longitude 86°28'25" & 86°42'16" and is covered under the Survey of India Toposheet nos. 72 P/2, 3,4,6,7,8,10,11,12,16; 72 L/12, 14, 16; 73 M/1, 5 and 73 I/9, 13. It is bounded by Godda and Banka district in the north, Pakur in the east, West Bengal in the south and Jamtara and Deoghar in the west. **.(Plate – I)** The District has an area of 3716.02 Sq.KM and the total population of Dumka District is 1321442 with 12.31 lakh rural population and 0.90 lakh of urban population. The district comprises only one sub-division, Dumka and it consists 10 blocks: viz. Saraiyahat, Jarmundi, Jama, Ramgarh, Dumka, Gopikander, Kathikund, Shikaripara, Raneshwar and Masalia and 2944 villages. Dumka District is enjoying the status of sub-capital of Jharkhand since 2000. The Block Wise Population based on the census for 2001 and 2011 with growth rate is given in Table – I.

Table:-1 Blockwise population of Dumka district as per 1981, 1991, 2001 and 2011 census.

		Area	Population				
Sl. No	Blocks	(sq.km)	2001	2011			Decadal growth
				Total	Rural	Urban	Total
1	Dumka	378.8	176884	210785	137730	73055	19.17
2	Gopikander	220.6	35541	42063	42063	0	18.35
3	Jama	585.9	117336	137963	137963	0	17.58
4	Jarmundi	399.2	151555	185286	168163	17123	22.26
5	Kathikund	306.2	59522	71458	71458	0	20.05
6	Maslia	460.2	106943	124554	124554	0	16.47
7	Ramgarh	481.4	134626	159911	159911	0	18.78
8	Raneshwar	246.6	89336	101667	101667	0	13.80
9	Saraiyahat	298.1	124646	156291	156291	0	25.39
10	Shikaripara	339.2	110132	131464	131464	0	19.37
		3716.2	1106521	1321442	1231264	90178	

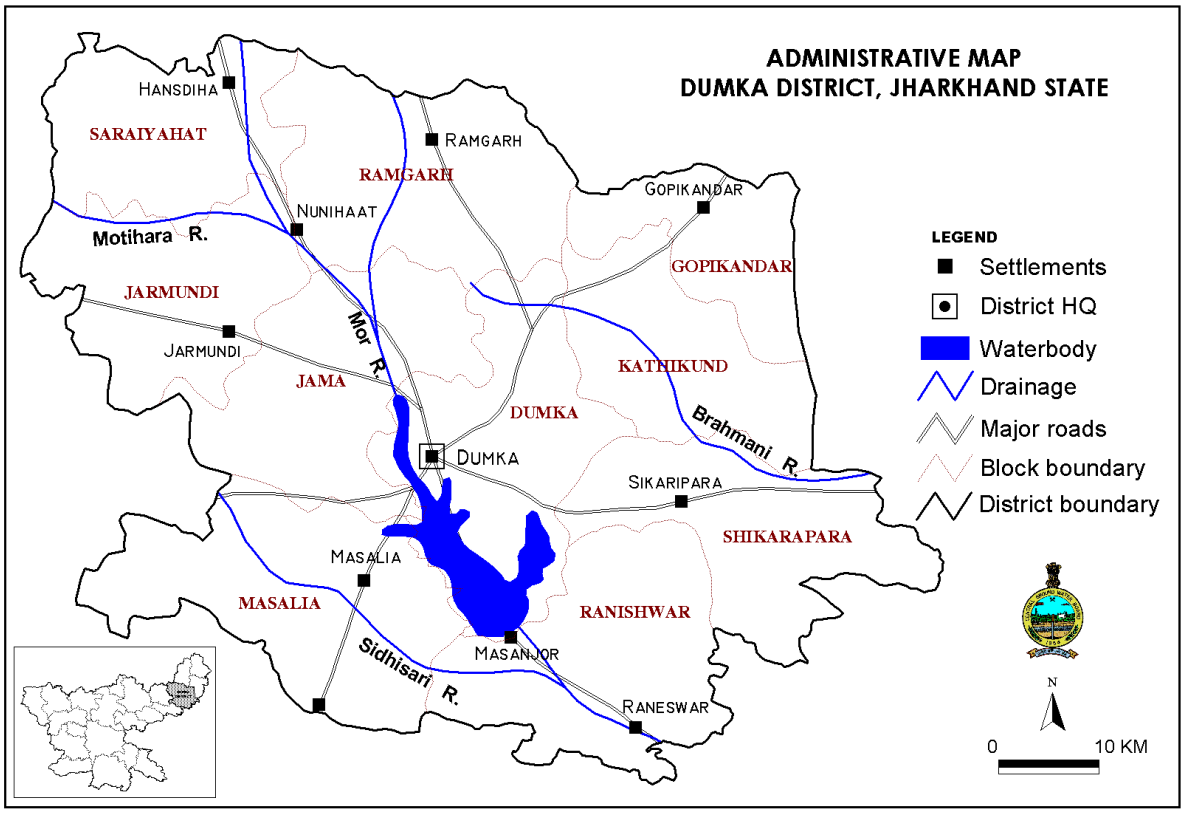


Fig:1 Administrative map of Dumka district

1.2 Drainage

The district is drained by the Brahmani, the Baslo, the Mayurakshi, and their numerous tributaries. These streams are ephemeral in nature. Most of these stream courses are structurally controlled. The district is highly dissected with rivers of varying magnitude. Mor with its tributaries carry the drainage to the western part of the district which finally meet the Bhagirathi river below Murshidabad, West Bengal. The Brahmani rises in the west of the Dudhua hills in the north of the Dumka district. Dendritic drainage pattern, a typical of hard rock terrain has developed over the district. However, radial drainage is also developed locally in some areas. All these drainage are having rapid surface runoff. Surface flow of most of the rivers dries up during summer, however there is sub-surface flow for a considerable part of the year , which indicates the effluent nature of the rivers. The drainage map of Dumka district has been shown in figure:-2

1.3 Studies/Activities carried out by CGWB

Central Ground Water Board has carried out hydrogeological surveys and ground water exploration in the district. Ground water regime monitoring is carried out 4 times annually from

16 HNS wells in the district. Water samples are collected during the month of May to study the changes in water quality along with monitoring of pre-monsoon water level.

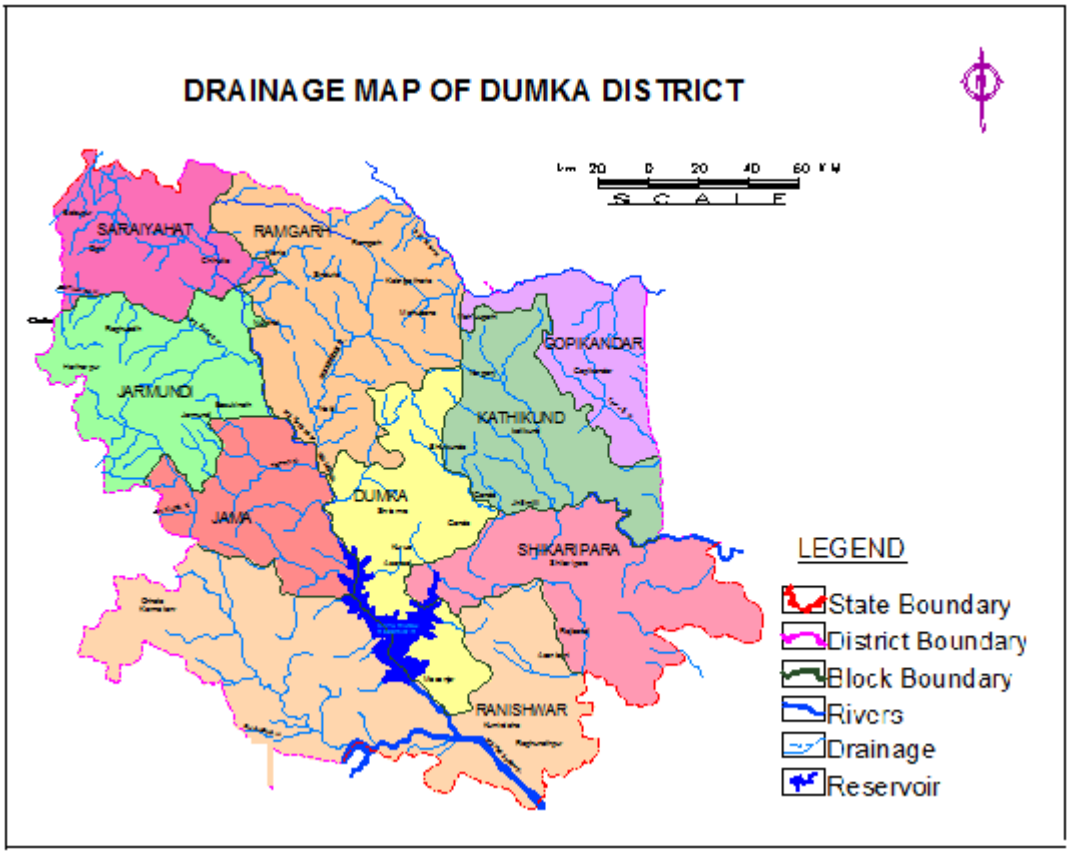


Figure:-2 Drainage map of Dumka District

2.0 HYDROMETEROLOGY

2.1 Rainfall

The district receives a larger share of the annual rainfall mainly by the south – west monsoon during inter-monsoon period which originates in the Bay of Bengal. The district receives 60% of the annual rainfall during monsoon period. July is the month which receives the highest rainfall. The average annual rainfall for the district is 1391.40 mm. The normal annual rainfall of the district is 1422.5 mm with normal monsoon rain fall of 1125.6mm. During the year 2008 the annual rainfall was 1336 mm and monsoon rainfall was 1223.2 mm which was 91.3 % of the annual rainfall.

2.2 Climate

The Climate of Dumka district represents a transition between the dry and extreme climate of northern India and the warm and humid climate of West Bengal. The Winter commences from mid November and extends up to the middle of March, December and January being the

coldest months. The winter is characterised by heavy dew, thick fog and associated with cold waves. The winter is followed by summer which lasts till mid – June and then monsoon sets in which generally lasts till the end of September. During winter the mercury drops to 4^0C and during summer it shoots up to 46^0C. The relative humidity varies between 50 – 60%.

3.0 GEOMORPHOLOGY AND SOIL TYPES

3.1 Geomorphology

The landscape of the district is to a large extent comprises of long undulation ridges forming rugged and coarsely dissected topography between which runs the drainage channels. The trough in between the undulations are full of rich alluvial soil. Geomorphologically the district can broadly be divided into three well defined, physically identifiable and genetically significant units:

(i) the hilly area
(ii) the rolling country or (Valleys) and
(iii) the pediplained flat country.

3.2 Soil

Soils in Dumka District has formed as a result of insitu – weathering of crystalline basement. Climate, topography and vegetation have all contributed to the formation of soil. Soils are sandy loam to clay loam, non-calcareous, slightly to moderately acidic and have location exchange capacity. The soils are generally shallow on the ridges and plateaus and deep in the valleys. The fertility of soil is poor due to extensive erosion, acidic character and low retaining capacity.

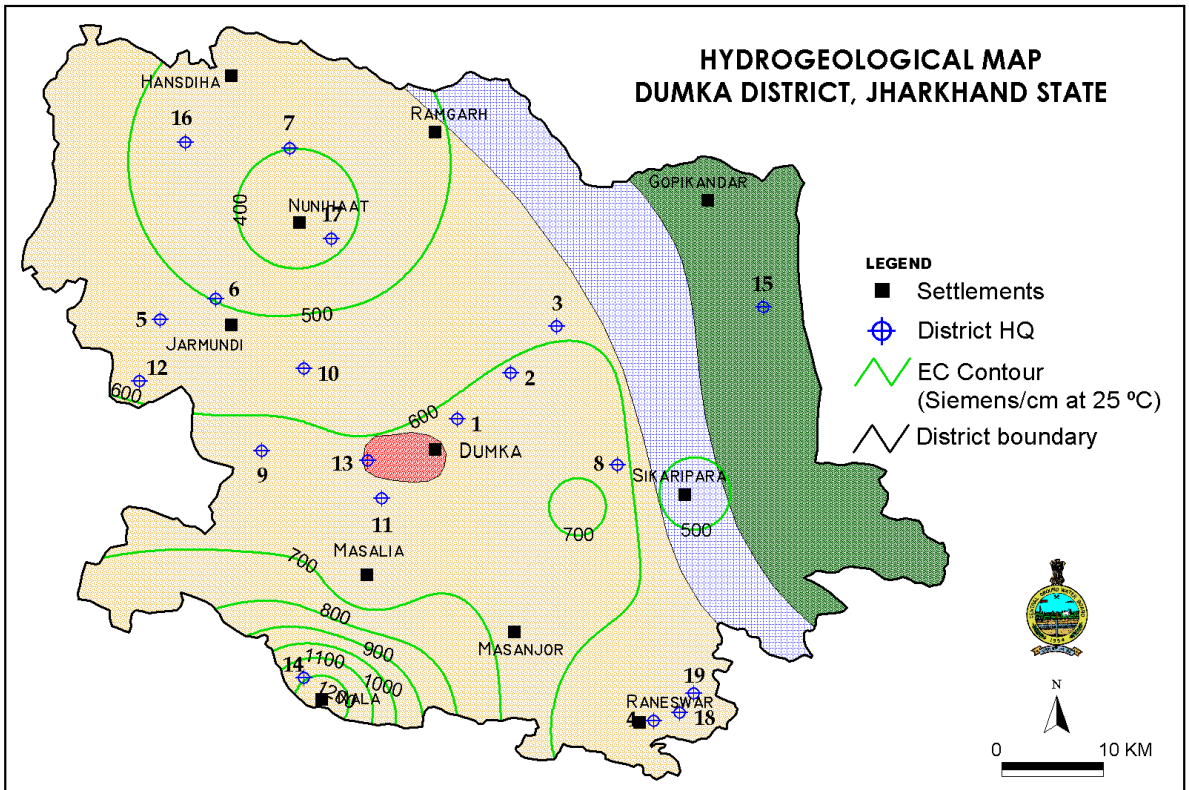
4.0 GROUND WATER SCENARIO

4.1 Hydrogeology

Based on the morpho-genetic and geological diversities, and relative Ground Water potentialities of the aquifer belonging to different geological formations, the district of Dumka can be broadly sub – divided into two hydrogeological units.

(A) Fissured Formation
(B) Porous Formation

Based on the above observation CGWB has declined sixteen exploratory wells at different spot. In general potential fractures are encountered between 30 – 90 mbql, but there are exceptions such as Raneswar, Barmasia, and Sikaripara where fractures encountered between 50 – 125 mbql are found to be potential. (Fig:3)



SYMBOL	AGE GROUP	LITHOLOGY	HYDROGEOLOGICAL CONDITION	GROUND WATER POTENTIAL
	JURASSIC (Rajmahal)	Basalt with intertrappeon Sandstone	Groundwater restricted to weathered residium fractures, joints. Groundwater occurs under un-confined and semi-confined to confined state of disposition.	Limited Yield Prospect below 10 m3/hr.
	UPPER CARBONEFEROUS TO UPPER TRIASSIC (Gondwana)	Sandstone and Shale	Groundwater restricted to weathered zone and fractured zone. Groundwater occurs under water table and semi-confined condition mostly occurs as dykes.	Limited Yield Prospect below 10 m3/hr.
	ARCHAEAN	Amphibolite Metabasics	Groundwater restricted to Fractures, Fissures and Joints. Groundwater occurs under water table and semi-confined to confined conditions.	Limited Yield Prospect below 10 m3/hr.
	ARCHAEAN	Granites and Gneisses	Groundwater restricted to weathered zones and interconnected fractures zones having secondary porosity. Groundwater occurs under watertable and semi-confined to confined state of disposition.	Moderate to good Yield Prospect below 50 m3/hr.

4.1.1 Depth to Water Level: -

There are 16 National Hydrograph Stations (NHS) have been established by Central Ground Water Board for the study of behavior of the water level and their fluctuation.

Pre monsoon depth to water level: - On the basis of the depth to water level of the year 2012 (Table – 2), the pre monsoon depth to water level varies between 4.45 to 12.3 mbgl. Majority of the wells (85%) fall in the water level range of

5– 10 mbgl. About 10% wells fall in the water level range from 2 – 5 mbgl . Pre monsoon depth to water level map is shown in fig.-4.

Post monsoon depth to water level: - The post monsoon depth to water level ranges between 3.10 to 8.4 mbgl. About 69% of the wells fall in the water level ranges between 2 – 5 mbgl and 31% of the wells fall in the depth to water level ranges between 5 -10 mbgl. Post monsoon depth to water level map is shown in figure 5.

4.1.2 Seasonal Fluctuation:- From the pre monsoon and post monsoon depth to water level data collected during May 2012 and November 2012 respectively, water level fluctuation were computed for all NHS of the district. The water level fluctuation between pre monsoon and post monsoon period of the district varies from 1.64 to 6.75 m. About 33% wells are showing water level fluctuation between 0 – 4 m and while 67% wells show fluctuation > 4.0 m.

The pre monsoon, post monsoon and seasonal fluctuation data has been given in table 3.

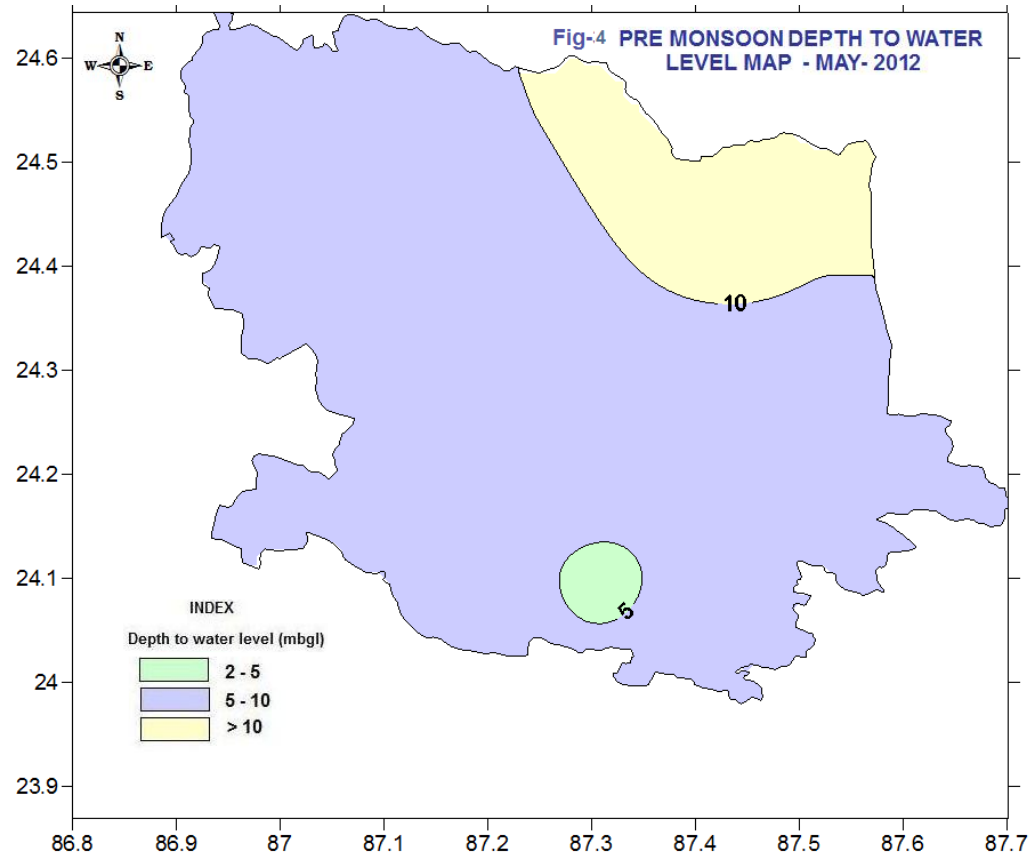
TABLE 3: DEPTH TO WATER LEVEL OF HYDROGRAPH NETWORK STATIONS LOCATED IN DUMKA DISTRICT (2012-13)

Sl No.	Location	May 2012	August 2012	November 2012	January 2013	Seasonal Fluctuation
1	Dumka(db ib)	8.1	4.92	3.21	4.53	4.89
2	Gopikandar	12.3	8.75	8.4	8.4	3.9
3	Chikania	-	5.12	5.4	6.64	-
4	Jama	9.85	6.48	3.1	6.6	6.75
5	Jarmundi db.ib	9.7	8.5	6.33	7.2	3.37
6	Maheshpur templ	8.55	8.4	4.05	9	4.5
7	Nunihaat	-	2.35	1.9	2.15	-
8	Kathikund	9	6.35	4.8	5.68	4.2
9	Masalia	8.35	6.2	1.67	4.94	6.68
10	Masanjor	4.45	2	2.81	2.86	1.64
11	Raneswar	6.8	4.55	4.71	5.03	2.09
12	Hansdiha pwdib	8.8	3.88	5.45	6.52	3.35
13	Ramgarh	11	8.1	4.72	-	6.28
14	Sikaripara	8.3	4.35	6.33	-	1.97
15	Patabari	8.3	-	-	4.29	-

4.1.3 Long term water level trend: - Water level depends upon the storage of ground water development and variation in rainfall over a long period. The water level data of each station has been analysed. The pre monsoon and post monsoon long term water level trend has been calculated for the period of 2003 – 2012 (Table 4). The long term water level trend is showing declining trend between 0.020 – 1.28, 0.001 – 0.52and 0.026 – 0.98 m/ year for pre monsoon, post monsoon and all period respectively.

TABLE 4: LONG TERM WATER LEVEL TREND FOR EXISTING HYDROGRAPH NETWORK STATIONS IN DUMKA DISTRICT (2003 – 2012)

Sl No.	Location	Pre monsoon trend (m/year)		Post monsoon trend (m/year)		All period (m/year)	
		Rise	Fall	Rise	Fall	Rise	Fall
1	Dumka(db ib)	-	0.131939	-	0.1584355	-	0.0264954
2	Gopikandar	-	0.364	-	0.5204622	-	0.2996665
3	Chikania	-	0.587218	-	0.0963677	-	0.195649
4	Jama	-	0.006727	-	0.1175441	-	0.1212348
5	Jarmundi db.ib	-	0.110677	-	0.1381818	-	0.2066881
6	Maheshpur templ	-	0.457353	-	-	-	0.1434805
7	Nunihaat	-	0.062313	0.1137419	-	0.0180081	-
8	Kathikund	-	0.205333	-	0.1294958	-	0.1371415
9	Masalia	-	0.025851	0.1148529	-	0.0768195	-
10	Gamharia	-	-	-	-	-	0.9824332
11	Masanjor	0.0249	-	-	0.0018387	0.0056372	-
12	Raneswar	-	0.119939	-	0.1633824	-	0.0931681
13	Hansdiha pwdib	-	0.131014	-	0.1595	-	0.1822768
14	Ramgarh	-	1.287838	-	-	-	0.6844737
15	Patabari	-	0.273636	0.1125575	-	-	0.0637241
16	Sikaripara	-	0.132242	-	0.3797059	-	0.106495



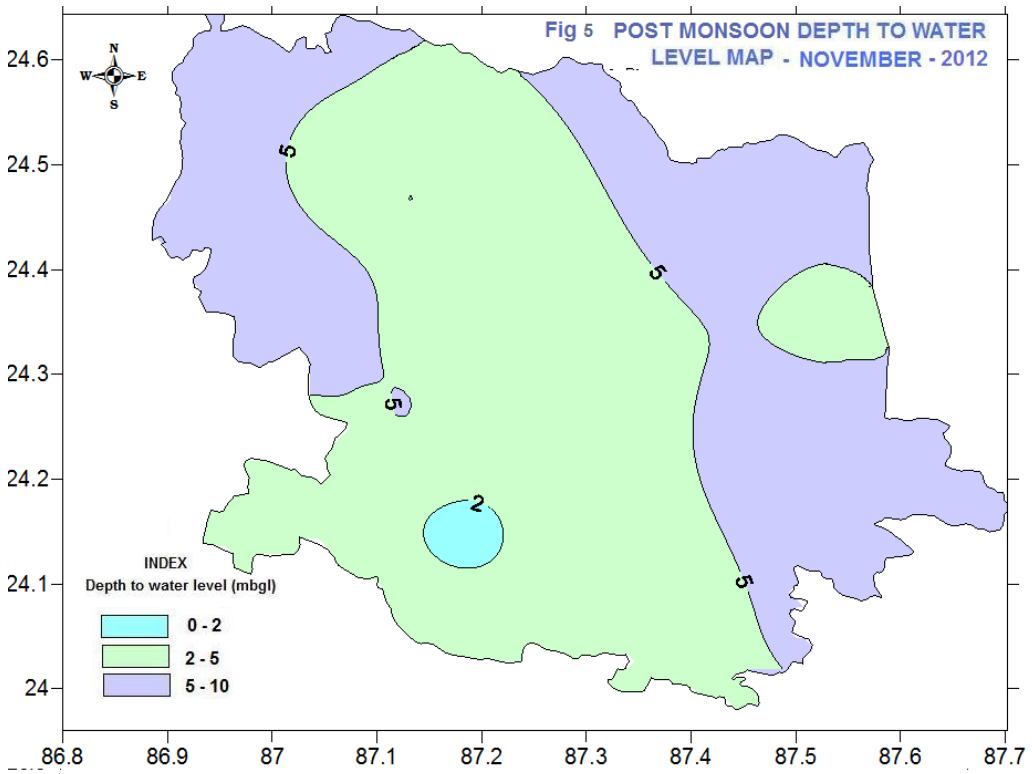


Fig 4&5: Pre & Post Monsoon Maps of Dumka District-2012

4.1.4 Aquifer Parameters

A total of 18 exploratory wells(Plate-V) and 16 observation wells have been constructed down to depth of 200 m in hard rock formation to decipher the potential fracture zones with their yields. The exploratory data reveals presence of potential fractures between 30 and 163 mbgl. The yield of the well in general as evident from the exploratory data has been found to vary between 1 and 76.8 m^3/hr. The piezometric level varies between 0.2 and 25.45 m bgl. Aquifers lying between the depth range of 30-100 m have moderate prospects of ground water development. The summarised hydrogeological data of exploratory drilling in the district has been given in table-4& 4A.

Table-4 Summarised hydrogeological data of exploratory drilling of Dumka district

Location	Depth drilled (mbgl)	Thickness of Weathered mantle (m)	Discharge by Compressor (m^3/hr)	Static Water Level (mbgl)	Formation	No. of Potential Fractured Zone (mbgl)
Hijlapahar	201.00	8.00	7.38	5.41	Granite Gneiss	1
Shivpahar	159.00	9.20	35.40	25.45	- do -	1
Kathikund	140.00	15.82	26.40	9.96	- do -	3
Raneshwar	200.00	18.50	21.00	5.18	- do -	3
Jarmundi	171.44	13.50	2.38	7.38	- do -	-
Basukinath	121.10	15.03	43.56	3.55	- do -	3
Hansdih	115.00	13.00	34.32	5.14	- do -	4
Sikaripara	178.00	21.00	34.32	4.93	- do -	4
Karudih	138.00	22.00	31.20	0.92	Rajmahal Trap DubrajpurS.st.	5
Jama	135.00	9.00	1.38	8.26	Granite Gneiss	1
Nishchintpur	87.62	12.50	28.14	8.25	- do -	3
Masaliya	57.86	9.00	67.80	3.90	- do -	2
Nunihat	94	23	32	-	-do-	6
Nawasar	92.24	8.00	32.94	5.38	- do -	4
Nawadih	84.74	21.50	76.80	5.31	- do -	5
Dalahi	177.15	17.98	22.68	9.14	- do -	2
Barmasia	138.58	19.61	26.10	9.12	- do -	4
Saraiyahat	183	18	4.3	3.91	-do-	1

Table – 4A Aquifer Parameters of Exploratory Well in Dumka District

Location	Draw down (m)	Sp. Capacity m^3/hr/m of dd.	Transmissivity m^2/day	Storativity
Shivapahar	14.91	0.76	107.80	2.2×10^{-2}
Kathikund	12.04	0.94	29.50	8.8×10^{-3}
Raneshwar	20.55	0.85	41.50	5.2×10^{-4}
Basukinath	14.70	2.20	186.00	2.5×10^{-4}

Sikaripara	20.05	0.62	14.00	7.3×10^{-5}
Nischintpur	17.68	1.12	19.04	9.2×10^{-5}
Masalya	10.25	6.48	174.04	9.2×10^{-4}
Nawasar	18.61	1.77	19.66	1.1×10^{3}

4.2 Ground Water Quality

To evaluate the quality of ground water, samples have been collected from representative NHS (dug wells) during the month of May 2011. These samples have been considered to assess the chemical quality of ground water and its suitability for drinking and irrigation purposes. The samples represent the quality of phreatic zone or the shallow zone. The ground water samples were analysed for major chemical constituents by using standard procedure at chemical laboratory in CGWB, MER, Patna. Analysed results are given in table 5. EC contour map is shown in Fig-3.

Table-5 Major chemical parameters of ground water samples of GWMS collected during May 2011

Block	Location	E.C. micro	pH	CO_3	HCO_3	Cl	Ca	Mg	TH as	Na	K
		Siemens/ cm							$CaCO_3$		
		at 25o C		mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
Kathikund	Kathikund	550	7.12	nil	189	78	48	26	225	19	3.9
Dumka	Dumka	960	7.3	nil	360	124	30	43	250	103	2.3
Saraiyahat	Hansdiha	150	8	nil	73	7.1	18	2.4	55	6.9	2.7
Raneshwar	Masanjor	148	7.5	nil	73	7.1	12	6.1	55	6.4	2
Jharmundi	Jarmundi	1380	7	nil	244	294	116	35	435	112	4.7
Gamharia	Maheshpur	600	7	nil	92	160	50	13	180	50	8.2
Jama	Jama	466	7.08	nil	207	39	32	27	190	14	2.3
Raneswar	Raneswar	480	7.25	nil	140	46	40	11	145	41	3.1
Masalia	Masalia	665	7.92	nil	366	18	26	27	175	70	3.5
Nala	Nala	700	7.62	nil	244	103	50	43	300	18	2.3
Sikaripara	Patabadi	600	7.6	nil	183	82	54	28	250	17	2
Jharmundi	Nonihat	454	7.89	nil	226	28	26	4.9	85	64	2.3
Ramgarh	Gamhariya hat	450	7.55	nil	207	35	52	15	190	12	3.5

4.3 Ground Water Resource

As per the latest resource estimation carried out following GEC 97 methodology, the overall stage of ground water development in Dumka district is 27% indicating sufficient scope of development. All blocks are under safe category. (Fig 5 & 6).The ground water resource of Dumka district is shown in the table-6.

Table-6 : Dynamic Ground Water Resource of Dumka district as on 31st March 2009 as per GEC 97 (ham)

Assessment Unit/District	Net Annual Ground water Availability	Existing Gross Ground Water Draft for Irrigation	Existing Gross Ground water Draft for Domestic and Industrial Water Suply	Existing Gross Ground Water Draft For all Uses	Allocation for Domestic and Industrial Requirement supply upto next 25 years	Net Ground Water Availability for future irrigation development	Stage of Ground Water Development (%)
Dumka	2785.42	588.82	260.77	849.59	354.81	1841.79	30.50
Gopikandar	1606.55	54.98	59.92	114.90	81.53	1470.04	7.15
Jama	3336.75	985.54	197.82	1183.36	269.17	2082.05	35.46
Jarmundi	2067.45	836.13	231.70	1067.82	315.26	916.07	51.65
Kathikund	1887.12	353.57	100.35	453.92	136.54	1397.01	24.05
Masalia	3307.85	603.43	180.30	783.73	245.33	2459.09	23.69
Ramgarh	3542.72	1100.14	226.97	1327.12	308.83	2133.75	37.46
Raneshwar	3298.88	217.23	150.62	367.85	204.94	2876.72	11.15
Saraiyahat	1296.07	495.32	210.15	705.47	285.94	514.81	54.43
Shikaripara	3921.75	342.90	185.68	528.57	252.64	3326.21	13.48
Total	**27050.58**	**5578.05**	**1804.28**	**7382.34**	**2454.99**	**19017.54**	**27.28**

Fig-6

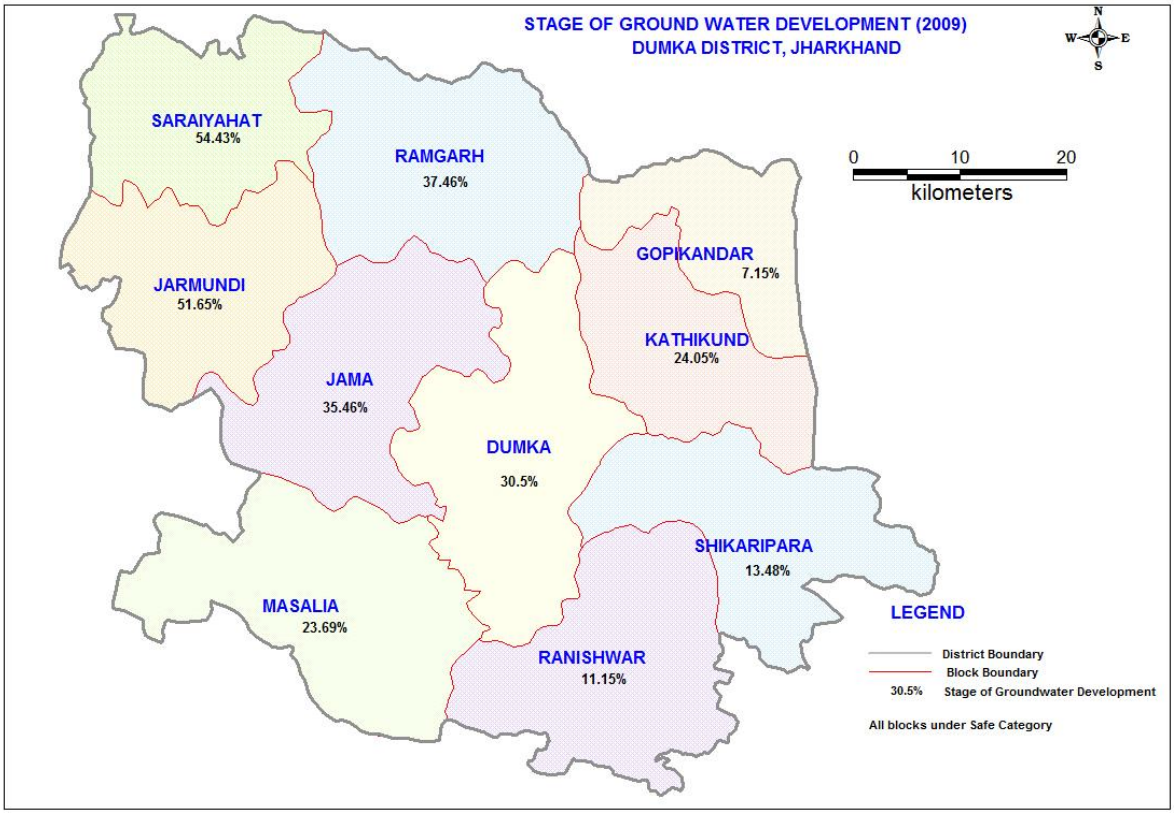
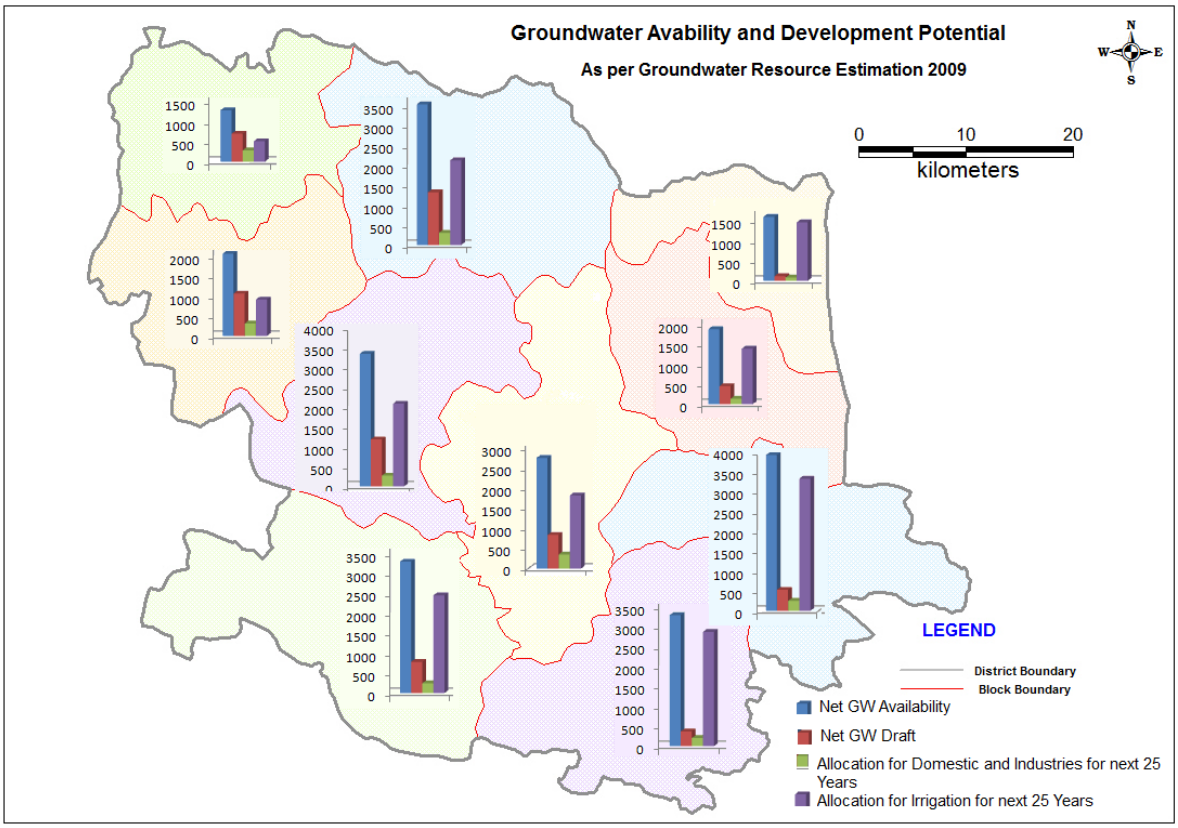

STAGE OF GROUND WATER DEVELOPMENT (2009)
DUMKA DISTRICT, JHARKHAND
N
W
E
S
SARAIYAHAT
54.43%
RAMGARH
37.46%
JARMUNDI
51.65%
JAMA
35.46%
GOPIKANDAR
7.15%
KATHIKUND
24.05%
DUMKA
30.5%
SHIKARIPARA
13.48%
MASALIA
23.69%
RANISHWAR
11.15%
0 10 20
kilometers
LEGEND
District Boundary
Block Boundary
30.5% Stage of Groundwater Development
All blocks under Safe Category

Fig 7


Groundwater Avability and Development Potential
As per Groundwater Resource Estimation 2009
N
W
E
S
0 10 20
kilometers
LEGEND
District Boundary
Block Boundary
Net GW Availability
Net GW Draft
Allocation for Domestic and Industries for next 25 Years
Allocation for Irrigation for next 25 Years

5.0 GROUND WATER MANAGEMENT STRATEGY

5.1 Status of Ground Water Development

In the rural areas the entire water supply is dependent on ground water. Ground water development is mainly carried out in the district through dug wells and Hand pumps. Dug wells are in general of 2 m diameter and between 8 to 15 m depth, depending on the thickness of the weathered zone, tapping the shallow ground water in the weathered zone and uppermost slice of the basement. Large number of dug wells used for drinking water is under private ownership for which there is no reliable data. Over the years Mark II/ Mark III hand pumps are being drilled in large numbers for ground water development. These hand pumps have the following two major advantages i) are less susceptible to contamination from surface sources and ii) they tap fractures between 20-60m depth which have been found to be less affected by seasonal water level fluctuation and thus have lesser chances of failure even during extreme summer. In the urban areas ground water plays a supplementary role in water supply, the major supply being made through dams, reservoirs or weirs across rivers or streams. No authentic data is available on the number of ground water structures catering the urban water supply.

6.0 GROUND WATER RELATED ISSUES & PROBLEMS

Some of key ground water related issues are

1) Long term water level decline has been observed
2) Locating suitable sites for bore wells
3) Suitable design of dug wells and hand pumps
4) Taking up artificial recharge projects to augment the resource availability in Dumka district
5) Optimal development of irrigation intensity by developing ground water available for future uses.
6) Creating public awareness for conserving ground water through awareness camps, NGO's and mass media.

7.0 AWARENESS & TRAINING ACTIVITY

7.1 Mass Awareness Campaign (MAP) & Water Management Training Programme (WMTP) by CGWB

NIL

8.0 AREA NOTIFIED BY CGWB/SGWA

None

9.0 RECOMMENDATIONS

In the hard rock areas, pin pointing suitable sites for bore wells is always a challenge. Considering the anisotropy in distribution of fractures at deeper level, proper selection of sites can be arrived at making use of remote sensing techniques in association with geophysical and hydro-geological investigations.

For deriving optimal benefit from aquifers in areas under fissured formation the dug wells should be so designed that it penetrates the weathered zone as well as top part (1-2 m) of the underlying bed rock so as to derive the benefit of the shallow aquifer. For hand pumps and shallow tube wells the casing provided against the weathered zone should be slotted at the bottom so that the well can extract shallow ground water also. In urban areas use of shallow aquifers should be encouraged.

The surface run off in urban areas and its peripheral parts should be harnessed to augment the ground water resource through appropriate techniques. For urban areas roof top rain water harvesting and artificial recharge is most suitable. Location and design of the structures should be guided by hydro-geophysical surveys. Sites for artificial recharge should be taken up if fractures are available and the depth of the recharge well should be governed by the depth of occurrence of fractures. De-saturated or partially de-saturated fractures / aquifers should be properly demarcated.