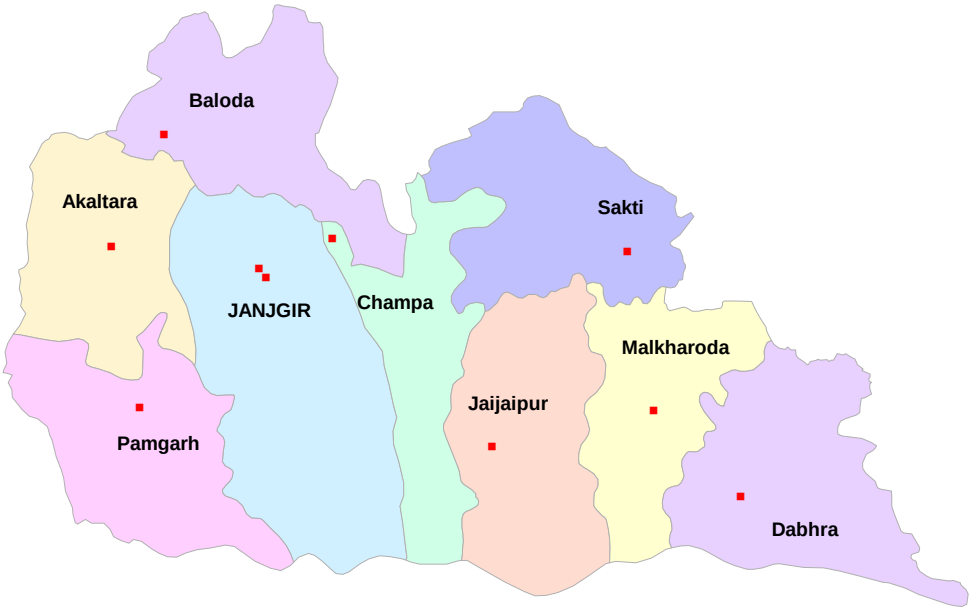
GOVERNMENT OF INDIA
MINISTRY OF WATER RESOURCES
CENTRAL GROUND WATER BOARD

DISTRICT GROUND WATER BROCHURE
JANJGIR-CHAMPA DISTRICT
CHHATTISGARH



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DISTRICT AT A GLANCE (JANJGIR-CHAMPA DISTRICT)

By
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1.	**GENERAL INFORMATION**	
	i) Geographical area (Sq. km)	4467
	ii) Administrative Divisions (As on 2012)	
	a) Number of Tehsil/ Block	8/9
	b) Number of Panchayat/ Villages	528/898
	iii) Population as on 2011 Census	1620632
	iv) Annual Normal Rainfall (IMD,2011)	1282 mm
	v) Average Annual Rainfall (1994-12)	1164 mm
2.	**GEOMORPHOLOGY**	
	i) Major Physiographic Units	Two; Northern Hills, Chhattisgarh Plain
	ii) Major Drainages	Mahanadi, Seonath, Hasdeo, Mand
3.	**LAND USE (Sq. km) As on 2009**	
	i) Forest Area	892
	ii) Net Area Sown	2601
	iii) Cultivable Area	2713
4.	**MAJOR SOIL TYPES**	Red & yellow soil, Black soil
5.	**AREA UNDER PRINCIPAL CROPS, in Sq. km (As on 2011)**	Rice: 2046.55, Pulses:4.5 Wheat: 24.35, Oilseed: 15
6.	**IRRIGATION BY DIFFERENT SOURCES (2011)**	
	(Areas in Sq. km. and Numbers of Structures)	
	i) Dugwells	43/7346
	ii) Tubewells/Borewells	134/ 2825
	iii) Canals	2132/ 13(length: 310 km)
	iv) Ponds	36/7640
	v) Other sources	25
	vi) Net Irrigated Area in Sq. km	1905
	vii) Gross Irrigated Area in Sq. km	2369
7.	**NUMBERS OF GROUND WATER MONITORING WELLS OF CGWB (As on 31.3.2012)**	
	i) No of Dugwells	26
	ii) No of Piezometers	15

8. PREDOMINANT GEOLOGICAL FORMATIONS

Archaeans: Unclassified Metamorphics, Granites and Gneiss
Proterozoics: Chhattisgarh Supergroup (Sedimentaries)

9. HYDROGEOLOGY

i) Major Water Bearing Formation	Proterozoic Sedimentaries (Limestone, Shale and Dolomites of Chhattisgarh Supergroup)
ii) Pre-monsoon Depth to Water Level During 2012 (mbgl)	2.1 to 12.25, Avg.: 6.70
iii) Post-monsoon Depth to Water Level During 2012 (mbgl)	0.40 to 8.50, Avg.: 3.00
iv) Long Term Water Level Trend (Post-Monsoon) in 10 yrs (2000-2011) in m/yr	Fall: 0 to 0.19 Rise: 0.06 to 0.69

10. GROUND WATER EXPLORATION BY CGWB (As on 31.3.2012)

i) No of Wells Drilled	EW: 51, OW: 04, PZ: 15 , Total: 70
ii) Depth Range (m)	67 to 200, Avg.: 140
iii) Discharge (litres per second)	0.2 to 16, Avg.: 4.3
iv) Transmissivity (m^2/day)	Chhattisgarh Supergroup: 5.1 to 130, Avg.: 42.31

11. GROUND WATER QUALITY

i) Presence of Chemical Constituents More Than Permissible Limit (e.g. EC, F, As, Fe)	Some patches underlain by Bamnidih shale have high EC values upto 2200.
ii) Type of Water	Water is potable and fit for irrigation purpose

12. DYNAMIC GROUND WATER RESOURCES (As on March 2009)- in mcm

i) Annual Replenishible Ground Water Resources	393.96
ii) Net Annual Ground Water Draft	161.85
iii) Projected Demands for Domestic and Industrial Uses upto 2025	39.94
iv) Stage of Ground Water Development	43.25 %

13. AWARENESS AND TRAINING ACTIVITY

Mass Awareness Programmes Organised
Date: 15.02.2002, Place: Malkharoda
Date: 21.12.2004, Place: Jaijaipur
Water Management Training Programmes Organised
Date: 2002-03, Place: Arasmeta, Akaltara

14. EFFORTS OF ARTIFICIAL RECHARGE & RAIN WATER HARVESTING

i) Projects Completed by CGWB (No & Amount spent)	Nil
ii) Projects Under Technical Guidance of CGWB (Numbers)	Nil

15. GROUND WATER CONTROL AND REGULATION

i) Number of Over Exploited Blocks (Stage of Development > 100%)	Nil
ii) Number of Critical Blocks (Stage of Development > 90%)	Nil
iii) Number of Blocks Notified	Nil

16. MAJOR GROUND WATER PROBLEMS AND ISSUES

A few areas mostly in Baloda, Malkharoda, Jaijaipur, Bamnidih and Nawagarh blocks show decline in long term water level trend. Some patches underlain by Bamnidih shale have high EC values upto 2200.

1.0 INTRODUCTION

The Janjgir-Champa district is bounded by East longitudes of 82°17' to 83°19' and by North Latitudes of 21°40' to 22°15'30" having geographical area of 4467 sq. km. and is surrounded by Raigarh and Raipur district in South, Bilaspur district in west, Korba and Raigarh district in North and East respectively (**Plate-I**). The district falls under Survey of India toposheet no. 64J/8, 64J/12, 64J/16, 64K/5, 64K/6, 64K/9, 64K/10, 64K/13, 64K/14, 640/1, 64O/2, 64O/5 and 64N/4. The district head quarters Janjgir and Champa – the twin towns are well connected with roads as well as rail. National highway No. 200 passes through both the towns. Janjgir is 180 km from Raipur, 75 km from Bilaspur and 94 km from Raigarh. Both Janjgir and Champa are connected with Howrah and Mumbai by SECR Mumbai- Nagpur - Howrah main line. There is a good network of State Highways in the district.

For the convenience of administration, the district is divided into eight tehsils, nine Community Development blocks and 528 no. of gram panchayats. The district has eight townships out of which five are Nagar Panchayats (Akaltara, Baloda, Kharod, Seorinarayan and Baradwar) 3 are Municipalty (Janjgir-Naila, Champa, Sakti).

As per 2011 census the total population of the district is 1620632. The male population is 816057 and female population is 804575. The urban population is 11% and the rural population is. 89 % of the population in the district lives in the rural area. The population density calculated from 2001 Census is 342 where as in 2011 it is 421, which is the highest in the state. The literacy rate is around 61.72%.

Cement, paper and steel are the main industries in the district. Madhya Bharat paper mill and Prakash Steel are located in Nawagarh and Bamnidih blocks respectively. Lafarge Cement plant, Arasmeta in Akaltara block is the largest industrial unit in the district. Low-grade limestone quarries have been in operation at many places around Champa, Akaltara, Seorinaryan, Chanderpur township for road and building material. Dolomite is being mined around Baradwar.

The entire district comes under Mahanadi basin. Mahanadi, the largest river of the state of Chhattisgarh forms the southern boundary of the district. Hasdeo, Mand and Seonath form the main tributaries of Mahanadi. Hasdeo and Mand flow from north to south in the district. Hasdeo bisects the district into two parts. Mand forms the eastern boundary with Raigarh district. Lilagar the tributary of Seonath River forms the western boundary of the district with Bilaspur district. Kanj, Son, Borai, Bugan the important tributaries of Mahanadi form the network of drainage in the district. The general slope of the area being north to south and south-east, all the tributaries are flowing following the natural slope. Drainage density of the district is 0.427 which is very less implicating that there is less run

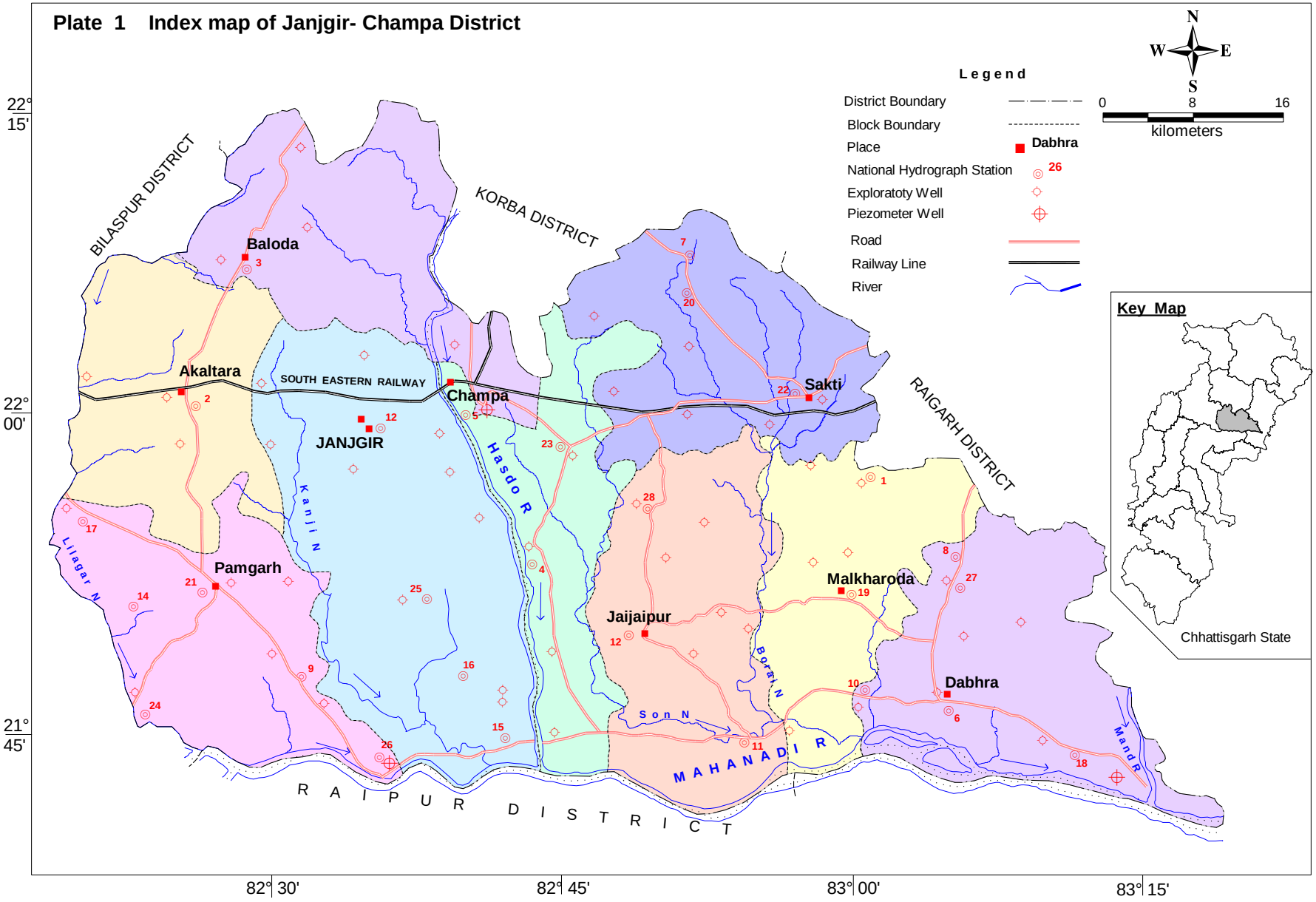


Plate 1 Index map of Janjgir- Champa District
N
W
E
S
Legend
District Boundary
Block Boundary
Place
Dabhra
National Hydrograph Station
26
Exploratoty Well
Piezometer Well
Road
Railway Line
River
0
8
16
kilometers
Key Map
Chhattisgarh State
22° 15'
22° 00'
21° 45'
82° 30'
82° 45'
83° 00'
83° 15'
BILASPUR DISTRICT
KORBA DISTRICT
RAIGARH DISTRICT
RAIPUR DISTRICT
SOUTH EASTERN RAILWAY
Baloda
Akaltara
Champa
JANJGIR
Sakti
Pamgarh
Jaijaipur
Malkharoda
Dabhra
Kanji N
Hasdo R
Lilagar N
Son N
Borai N
MAHANADI R
Mand R

off in the area. Similarly stream frequency of the district is 0.069 which is also very less showing flatness of the area and absence of any structural control.

Around 20% of the total area of the district is covered by forest. About 98% of the district is covered by plain land (dissected pediplain). The land is very
fertile and is mostly used for the agriculture purposes with surface irrigation facilities. However, residual hills are found in parts of northern area, which forms 2 % of the total area of the district. The eastern bank of Hasdeo River and parts of northern bank of Mahanadi is occupied by Alluvial Plain.The district does not have any large or medium

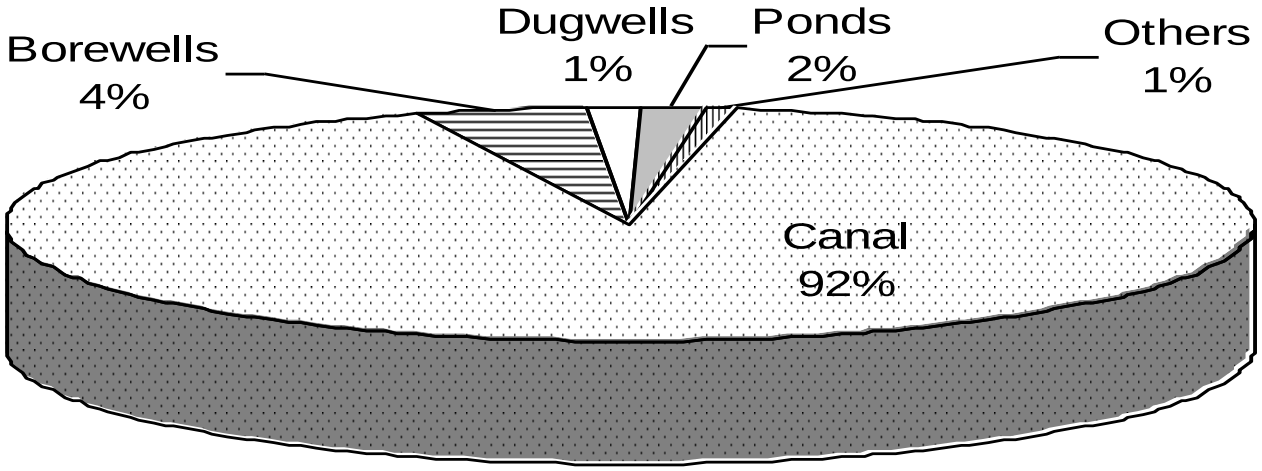


Fig. 1: Area irrigated through different sources (of net irrigated area)

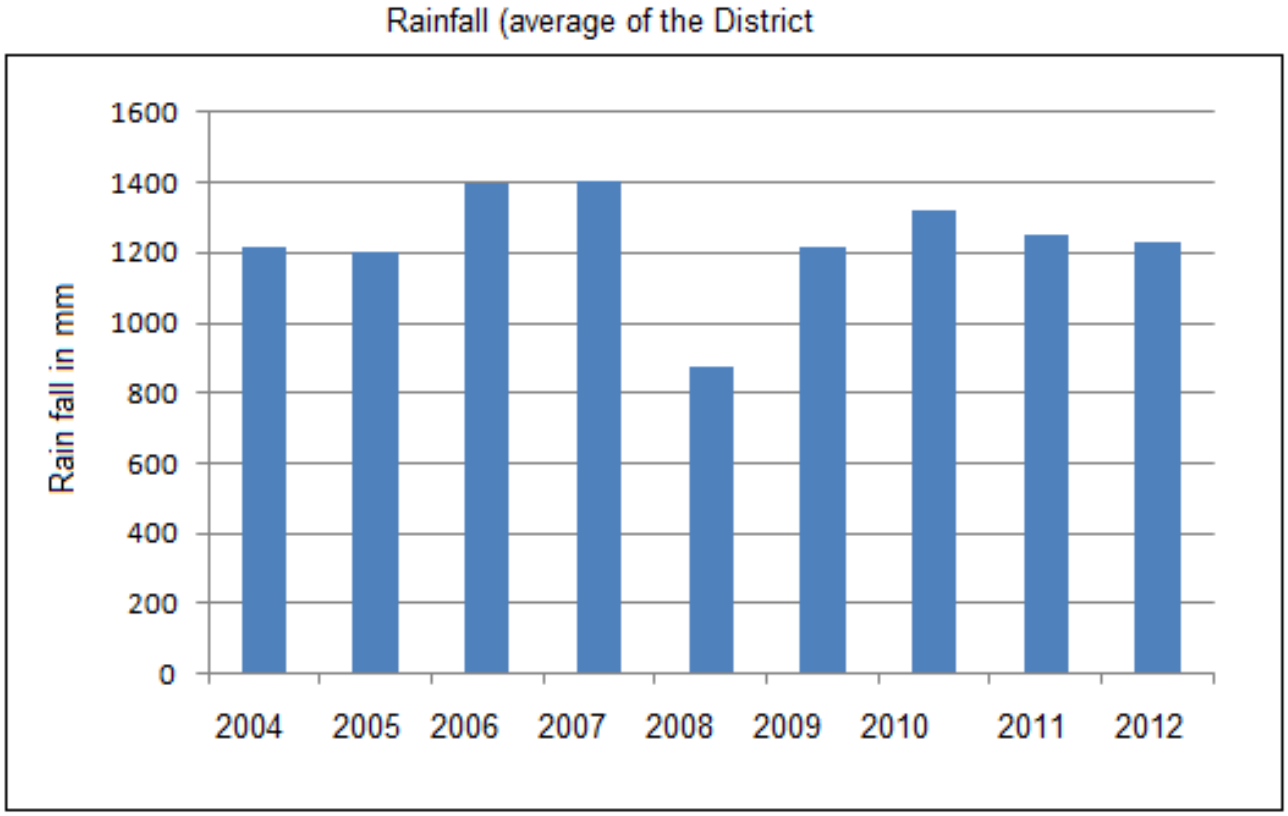
scale irrigation project of its own. However the multipurpose Hasdeo-Bango project of Korba district feeds Janjgir- Champa district through its right bank and left bank canals. The Hasdeo-Bango project has been considered as life supporting canal irrigation facility for the district. Nearly 73% of the net sown area of the district is irrigated by all the sources. Irrigation by surface water alone covers almost 92% of the net irrigated area. The irrigation intensity in the district is the highest in the state. Nearly 113.62 sq. km area spread over the entire district (6% of the net irrigated area) is irrigated by ground water. **Fig. 1** shows the details of different sources used for irrigation in the district.

Central Ground Water Board carries out different hydrogeological studies related to assessing the prevailing hydrogeological conditions, ground water potential, level of development and management of ground water resources through different surveys and studies like exploratory drilling, geophysical studies, geochemical studies, ground water level monitoring, systematic hydrogeological studies, reappraisal hydrogeological studies in the district. The whole district was covered by Systematic Hydrogeological Survey by CGWB in the year 1989. Reappraisal hydrogeological survey was carried out by CGWB in the year 1995 and in 2002-03 to know the ground water potential, behaviour and development in the district. CGWB under its accelerated drilling programme in drought-affected districts of Chhattisgarh has carried out exploration in all the blocks of the district in the year 2000-2001. District hydrogeological report of undivided Bilaspur district (Janjgir-

Champa was a part of undivided Bilaspur) was issued by CGWB in the year 1997 and subsequently for Janjgir-Champa in 2001-02. The Block-wise groundwater resources estimation of the district was carried out jointly by CGWB and Water Resource Department, Govt. of Chhattisgarh in 2004. In the district a total of 51 nos of borewells were drilled under exploration programme using DTH rigs. Thirty-six (36) vertical electrical resistivity soundings (VES) were carried out in the area in order to select best sties for drilling. A total of 26 nos. of dug wells (DW) and 15 no. of piezometers (Pz) are monitored four times a year for water levels and one time for water quality in the area.

2.0 RAINFALL AND CLIMATE

Janjgir – Champa is endowed with high rainfall. Areas of chronic shortfall are few and localized. The rainfall is typically late in coming, very heavy when it comes, concentrated in a few days and early in termination. The district receives its rainfall mainly from the south-west monsoon which usually sets in the third/fourth week of June and spread over a period from mid June to mid September with heaviest shower in the months of July and August. The average rainfall in the district is 1164 mm in the year 1994 to



2012. The district experiences a hot and semi humid climate. The annual temperature of the district varies between 8^0C and 46^0C .The maximum temperature is observed in the month of May and June where as the minimum is observed in the months of December and January.

3.0 GEOMORPHOLOGY & SOIL TYPES

Physigraphically the district forms part of the Chhattisgarh plain and extension of Maikhel hill ranges. The general elevation of the district lies between 210 and 350 m amsl (metres above mean sea level). The elevation of northern part of the district is higher than the remaining parts. The general slope is towards south and south-east. The highest point of the district is in Kumhar Pahar (865 m amsl), located at Sakti block on northern boundary of the district. The prominent hills (Maikhel range) trend roughly ENE- & EW along the northern boundary of the district. The lowest point (200m amsl) is situated in the south-eastern corner of the district on the bank of Mahanadi near Chandarpur in Dabhra block. Geomorphologically the district is having matured type of land forms and can be broadly divided into four prominent geomorphic units. These are 1. Residual Hills (Igneous & Metamorphics) formed by Archaean Crystalline and Metamorphics, 2. Structural Hills (Vindhyans of Chhattisgarh) formed by Proterozoic sandstones, 3. Dissected Pediplain (Vindhyans of Chhattisgarh) made by Proterozoic shale-limestone-dolomite area and 4. Alluvial Plain formed by Mahanadi Alluvium.

The red & yellow soil covers the maximum part of district. However red gravelly and sandy soil covers the northern hilly, crystalline-metamorphic rock terrain. Laterite and deep black soil is found over some parts of limestone terrain.

4.0 GROUND WATER SCENARIO

4.1 Hydrogeology

Hydrogeologically the district can be categorised into three groups.

i) The Archaean rocks consisting of granites, schists and metamorphics
ii) Proterozoic sediments belonging to Chhattisgarh Supergroup mainly consisting of limestone, shales, dolomites and sandstones, and
iii) The unconsolidated alluvium along the major river courses of Hasdeo and Mahanadi.

4.1.1 Archaean Crystallines

The Archaean crystallines covers around 9% of the area of the district in the northern part. These are mainly dominated by granitic gneisses and mica schists with occasional pegmatite and quartz veins. These rocks are weathered and jointed in the shallow depth and gradually with depth the joints close and rocks become almost massive. In the schists and metamorphics, ground water occurs in phreatic condition in the weathered mantle, which extends up to a depth of 25 mbgl and the formation beyond 80 m is hard, compact and devoid of water. These do not form good repository of ground water. The occurrence of fractures at depth in the area is not common. Therefore the ground water potential depends on the thickness of the weathered formation in a well. The ground water development in these formations is mostly by way of large diameter dug wells located at favourable places.

4.1.2 Proterozoic Sedimentaries

Around 89% of the total area of the district is covered with these rocks. These rocks belong to Chhattisgarh Supergroup and are marine in origin and mainly consist of sandstone, limestone, shale and dolomites. The primary porosity and permeability of these formations is very poor. The ground water in these formations occurs under water table and semi confined conditions. The thickness of the weathered mantle varies between 6 and 23 m. The weathered and the cavernous part of the formation and also the fractured zones constitute the aquifers in the area. These formations are most potential in the district and are well developed. Limestone, shale and dolomite form the main aquifer system in the district. Charmuria limestone and Gunderdehi shale in the district are not promising from ground water point of view. The shale dominated Bamnidih formation is also not promising. The karstic Chandi, Bamandihi and Saradihi limestone and dolomite provide good repository of groundwater. Groundwater in the karstic formation occurs in solution cavities and fractures. The intensity of the solution cavities is higher in the upper 80 m. However potential fractures are also obtained down to 146 m depth. The shale dominated Gunderdehi, Raigarh and Bamandihi Formation have water bearing zones in the top 6 to 18 m followed by fracture zone down to 140 m depth. The deeper fractures in shale have yielded around 2 lps discharge whereas the upper zone is dry in premonsoon season. Shale of Raigarh Formation is more brittle in the northern parts of Sakti, Malkharoda blocks where discharge of more than 3 lps has been found. The N-S faulted boundary between Bamandihi shale and Saradihi dolomite have provided sharp contrast in the availability of water in the area with Saradihi dolomite having greater potential.

4.1.3 Unconsolidated Sediments

The district of Janjgir – Champa is covered by very little alluvium blanket (around 2% of the area of the district) along the banks of Hasdeo and Mahanadi. Alluvium along these river channels in the district occurs as detached patches with maximum thickness of 30 m. These aquifers are highly productive and are being used extensively for irrigation of both Kharif and Ravi crops. At places the alluvium shows maximum yield upto 5 lps. This phreatic to semiconfined aquifer is being developed by construction of shallow filter points.

4.1.4 Water Level Scenario

As a part of National Hydrograph Network Observation Stations (NHS), 26 no of dug wells and 15 no of piezometers are established to monitor water levels four times in a year i.e. in January, May (Pre-monsoon0, August and in November (post-monsoon). The dug well depths are varying form 6.2 to 20.81 mbgl. These monitoring wells are distributed throughout the district covering all the lithological formations.

4.1.4.1 Depth to Water Level- Pre-monsoon (May 2012)

The depth to water (DTW) level observed during pre-monsoon period in the month of May 2012 is presented in **Plate-II**. The average depth to water level in the district during pre-monsoon period is 6.70 m bgl. In most of the area the water level lies in the range of 5 to 10 m bgl. The shallow water levels are observed in parts of Akaltara and Pamgarh

blocks which comes under the canal command area. The water levels in the range of 10 to 12.25 m is observed in 15 % of cases and covers mostly in the parts of Baloda and Shakti blocks which are mostly underlain by shales of the Chhattisgarh Supergroup and older metamorphics.

4.1.4.2 Depth to Water Level- Post-monsoon (November 2012)

The depth to water level measured during the post-monsoon period in the month of November 2009 is presented in **Plate-III**. The average depth to water level in the district during post-monsoon period is 3 m bgl. From the Fig. 3 it is clear that the water levels during the post-monsoon period are mostly varying from 0 to 5 m. The water levels in the range of 5 to 8.4 m are observed in Baloda and southern parts Pamgarh, Nawagarh, Jaijaipur and Malkharoda blocks.

In the entire district the water levels in the month of November have shown a rise when compared with that of in the month of May. Least fluctuation of water level was observed in parts of Akaltara and Pamgarh blocks under the canal command area. Highest fluctuation was observed mostly in the northern parts of the district.

The long term water level trend analysis shows that during the pre-monsoon period around 77% of the wells have a rising trend of water levels and the rest 23% have a falling trend. Around 46% of the wells show either rise or fall in the range of 0 to 0.2 m/yr, which is practically insignificant. Most of the falling trends (41%) are in the range of 0 to 0.2 m/yr. The maximum falling trend is observed in the monitoring wells at Dabhra followed by Shakti and Baloda. The rising trend has been observed in Pamgarh, Janjgir and Malkharoda wells. The rising trend is observed mainly in the canal command area and the falling trend is more significant in the shale covered area and areas covered with the older metamorphics in the northern parts of the district. The long-term fall of water level during pre-monsoon period suggests an increase in ground water abstraction over the years.Similarly during the post-monsoon period around 50% of the wells show a rising trend and 50% show falling trend of water level. Around 82% of the wells show either a rise or fall of water level trend in the range of 0 to 0.2 m/yr. All of the falling trends (50%) are observed in the range of 0 to 0.2 m/yr which are insignificant. The maximum rising trend is observed in the Saragaon and followed by Devarghata observation wells during this period. The falling trend of water level is observed in parts of Baloda, Nawagarh, Bamnidih and Jaijaipur blocks. The falling trend during post-monsoon period may be due to inadequate recharge because of declining rainfall over the years

4.1.5 Ground Water Flow

The water table contour map is presented in the **Plate-V**. The entire district is a part of the Chhattisgarh plain except a few hillocks in the northern fringe. The regional ground water flow is in the south to southeast direction. In the northern part of the district the contours are closer indicating steepness of the terrain thereby the gradient of ground water flow is high in comparison to the rest of the district. In southern part, the contours are widely separated indicating flatness of the terrain where the gradient of ground water flow is less. It may also be seen that the flow of ground water is mostly towards the major drainage suggesting that the baseflow is towards the drainage system, which finally joins Mahanadi River.

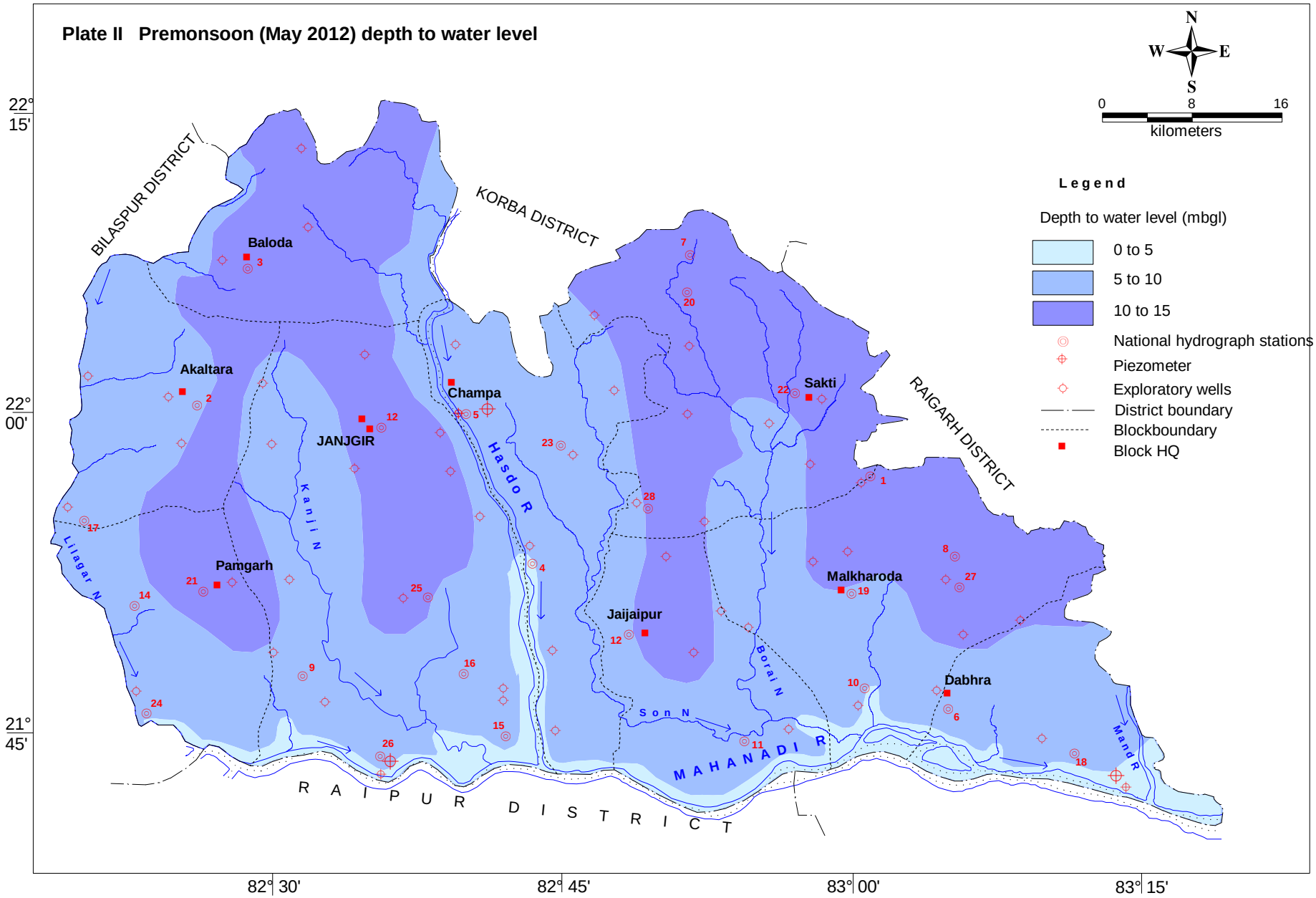


Plate II Premonsoon (May 2012) depth to water level
N
W
E
S
0
8
16
kilometers
Legend
Depth to water level (mbgl)
0 to 5
5 to 10
10 to 15
National hydrograph stations
Piezometer
Exploratory wells
District boundary
Blockboundary
Block HQ
22° 15'
22° 00'
21° 45'
82° 30'
82° 45'
83° 00'
83° 15'
BILASPUR DISTRICT
KORBA DISTRICT
RAIGARH DISTRICT
RAIPUR DISTRICT
Baloda
Akaltara
JANJGIR
Champa
Sakti
Pamgarh
Jaijaipur
Malkharoda
Dabhra
Hasdo R
Kanji N
Lilagar N
Son N
Borai N
MAHANADI R
Mand R

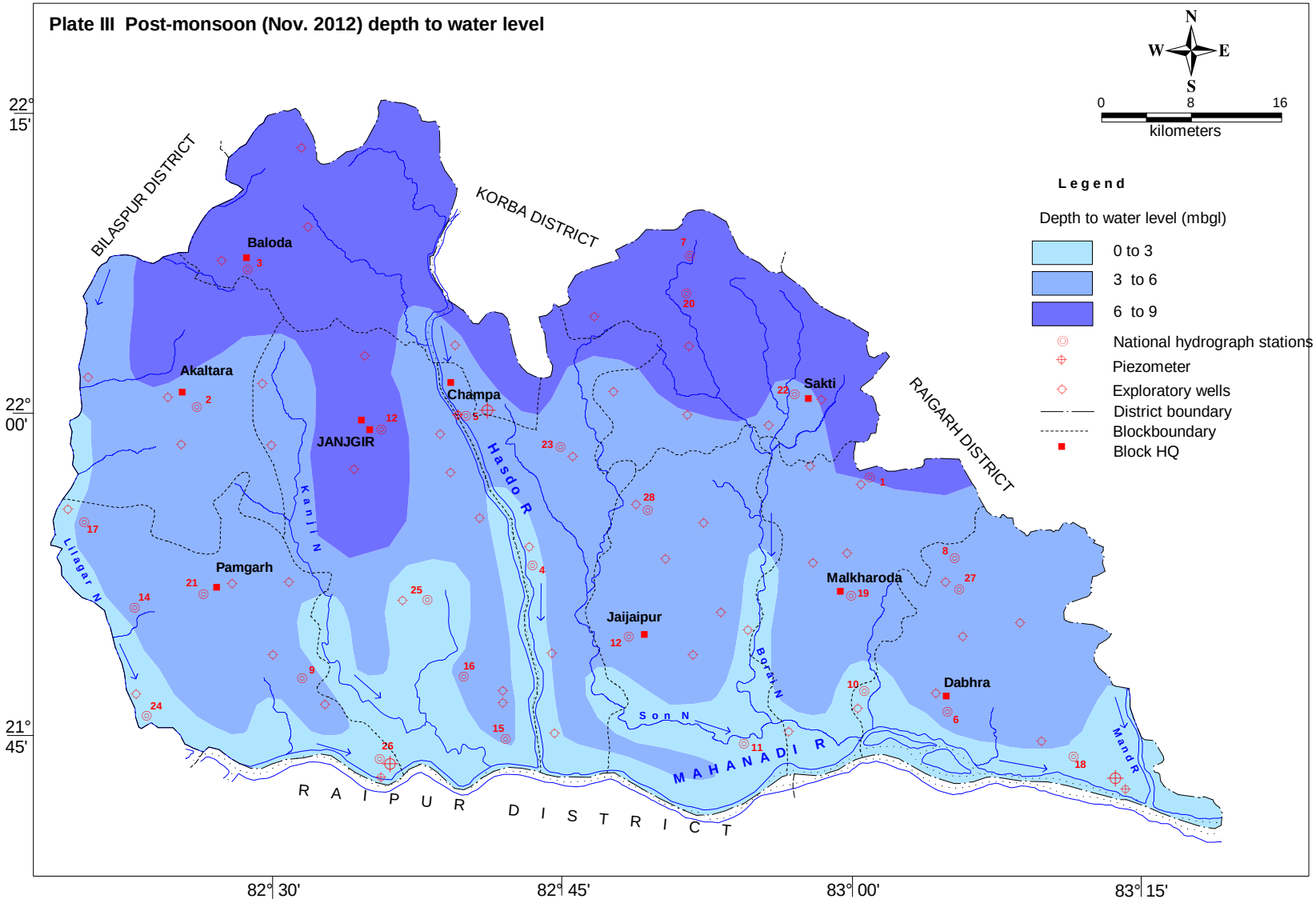
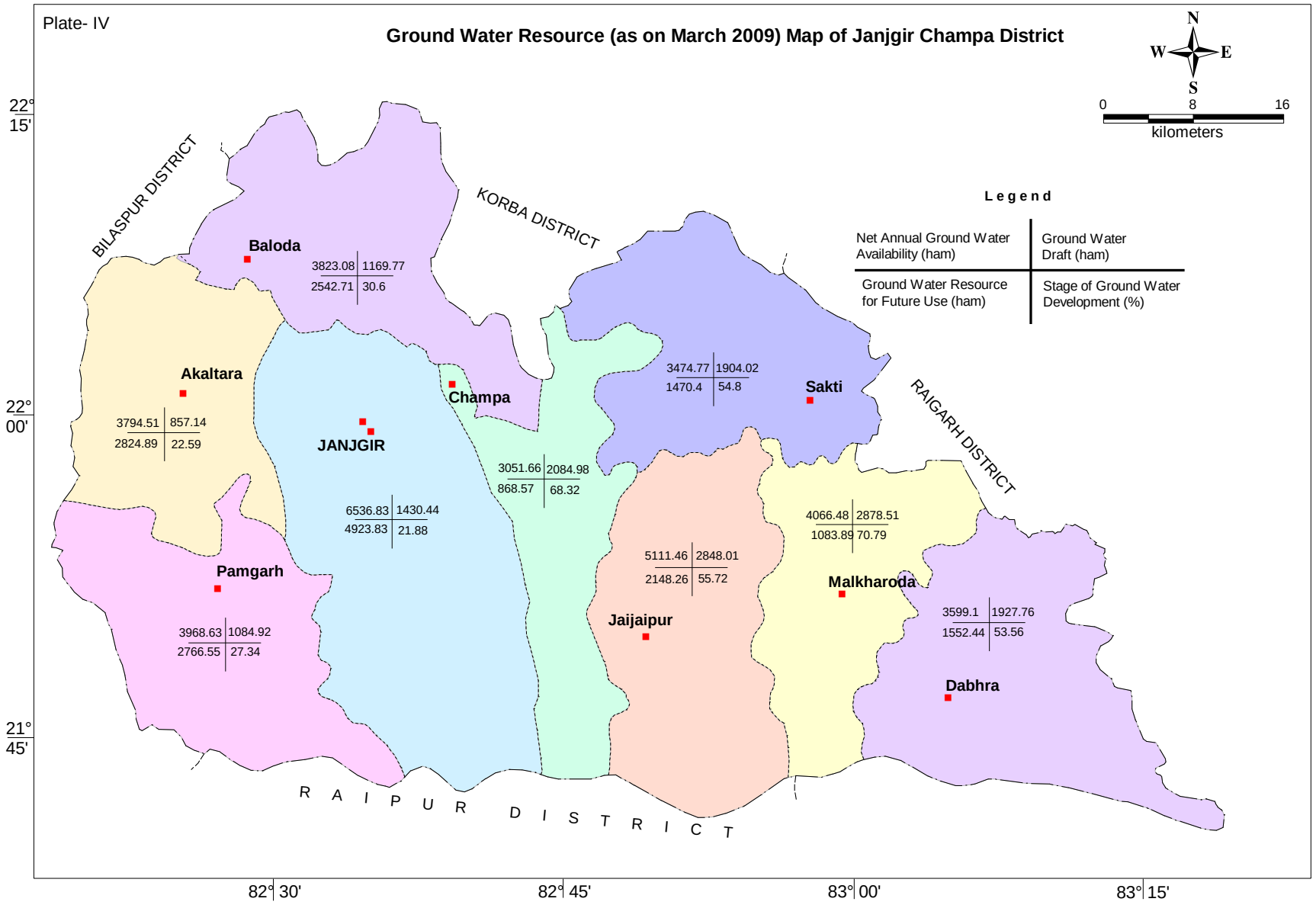


Plate III Post-monsoon (Nov. 2012) depth to water level
N
W
E
S
0
8
16
kilometers
Legend
Depth to water level (mbgl)
0 to 3
3 to 6
6 to 9
National hydrograph stations
Piezometer
Exploratory wells
District boundary
Blockboundary
Block HQ
BILASPUR DISTRICT
KORBA DISTRICT
RAIGARH DISTRICT
RAIPUR DISTRICT
Baloda
Akaltara
Champa
JANJGIR
Sakti
Pamgarh
Jaijaipur
Malkharoda
Dabhra
Hasdo R
Kanil N
Lilagar N
Son N
Borai N
MAHANADI R
Mand R
22° 15'
22° 00'
21° 45'
82° 30'
82° 45'
83° 00'
83° 15'

Plate- IV

Ground Water Resource (as on March 2009) Map of Janjgir Champa District



4.1.6 Aquifer Parameters

A total of 51 exploratory wells and four observation wells are constructed in the district to delineate the aquifer geometry and to estimate different aquifer parameters. The Precambrian sedimentaries are the potential aquifers in the district. The transmissivity and specific yield of different formations varies in wide limits. In Archaean crystallines only four wells are drilled and their discharge is very low i.e. less than 1 lps. The transmissivity (T) value in general is less except a few exceptions and the average specific capacity is less than 5 lpm/m of drawdown. The Chandi, Saradih and Raigarh Formations form good aquifers. The specific capacity value recorded for the exploratory wells at Pota in saradih Formation is exceptionally high and is the order of 965 lpm/m of drawdown. **Table- 2** is presented here to show the transmissivity and specific capacity obtained for different formations in the area.

Table 2: Range of Transmissivity (T) and Sp. Capacity

Sl. No.	Formation	Transmissivity (m^2/day)			Sp Capacity (lpm/m)		
		Min	Max	Average	Min	Max	Average
1	Saradih	7.6	65	41.15	13.18	44.3	28.39
2	Bamnidih	5.1	105.4	23.78	0.75	121.9	14.35
3	Chandi	-	130	-	11	198	213.9
4	Raigarh	57.3	64.4	62	1.18	59.88	20.78
5	Archaeans	-	80.8	-	0.9	8.72	4.82

4.2 Ground Water Resources

The total ground water recharge from all the sources is 39396.34 ham. The net ground water available is **37426.52** ham. Existing gross ground water draft for all purposes is 16185.55 ham out of which **13225.09** ham is for irrigation and **2935.46** ham is for domestic and industrial water supply. The stage of the ground water development in the district is 43.25 %. The Malkharoda block (70.79 %) has the highest stage of ground water development followed by Bamnidih (**68.32** %) and Jaijajpur (**55.72** %) blocks.Except Malkharoda(Semicritical) remoning blocks are safe for future groundwater development. At present the total irrigated area by groundwater in the district is 11362 ha. The block wise resource is presented in **Plate-IV and table 3 .**

Table 3: Ground water resource of Janjgir-Champa district as on March 2009								
Assessment Unit / Block/Command / Non Command	Total Annual Recharge in Ham	Net Ground Water Availability in Ham	Existing Gross Ground Water Draft for Irrigation in Ham	Existing Gross Ground Water Draft for Domestic & Industrial Water Supply in Ham	Existing Gross Ground Water Draft for All Uses in Ham	Allocation For Domestic & Industrial Water Supply in Ham	Net Ground Water Availability for Future Irrigation Development in Ham	Stage of Ground Water Development in %
Akaltara								
Command	2144.27	2037.06	274.5	152.6	427.1	207.68	1554.88	20.97
Non Command	1849.95	1757.45	271.02	159.02	430.04	216.42	1270.01	24.47
Block Total	3994.22	3794.51	545.52	311.62	857.14	424.1	2824.89	22.59
Baloda								
Command	927.31	880.94	172.01	56.63	228.64	77.07	631.86	25.95
Non Command	3096.99	2942.14	691.31	249.82	941.13	339.98	1910.85	31.99
Block Total	4024.3	3823.08	863.32	306.45	1169.77	417.05	2542.71	30.6
Bamnidih								
Command	2076.27	1972.46	919.29	160.14	1079.43	217.93	835.24	54.73
Non Command	1136	1079.2	893.8	111.75	1005.55	152.07	33.33	93.18
Block Total	3212.27	3051.66	1813.09	271.89	2084.98	370	868.57	68.32
Dabhara								
Command	1884.52	1790.29	671.53	137.84	809.37	187.59	931.17	45.21
Non Command	1904.01	1808.81	926.79	191.6	1118.39	260.75	621.27	61.83
Block Total	3788.53	3599.1	1598.32	329.44	1927.76	448.34	1552.44	53.56
Jaijaipur								
Command	3075.57	2921.79	1439.4	179.45	1618.85	244.22	1238.17	55.41
Non Command	2304.92	2189.67	1089.43	139.73	1229.16	190.15	910.09	56.13
Block Total	5380.49	5111.46	2528.83	319.18	2848.01	434.37	2148.26	55.72
Janjgir								
Command	4218.79	4007.85	554.99	274.26	829.25	373.24	3079.62	20.69
Non Command	2662.08	2528.98	369.6	231.59	601.19	315.17	1844.21	23.77
Block Total	6880.87	6536.83	924.59	505.85	1430.44	688.41	4923.83	21.88
Malkharoda								
Command	2896.09	2751.29	1615.91	199.1	1815.01	270.95	864.43	65.97
Non Command	1384.41	1315.19	974.17	89.33	1063.5	121.56	219.46	80.86
Block Total	4280.5	4066.48	2590.08	288.43	2878.51	392.51	1083.89	70.79
Pamgarh								
Command	3116.61	2960.78	290.42	242.88	533.3	330.54	2339.82	18.01
Non Command	1060.9	1007.85	469.89	81.73	551.62	111.23	426.73	54.73
Block Total	4177.51	3968.63	760.31	324.61	1084.92	441.77	2766.55	27.34
Sakti								
Command	2110.26	2004.75	563.71	162.55	726.26	221.23	1219.81	36.23
Non Command	1547.39	1470.02	1062.32	115.44	1177.76	157.11	250.59	80.12
Block Total	3657.65	3474.77	1626.03	277.99	1904.02	378.34	1470.4	54.8
DISTRICT TOTAL	39396.34	37426.52	13250.09	2935.46	16185.55	3994.89	20181.54	43.25

4.3 Ground Water Quality

The quality of the ground water in the phreatic zone is suitable for domestic, agriculture and industrial purposes as all the basic chemical parameters are well within the prescribed limits of BIS. Ground water in the district is mostly calcium bicarbonate type with temporary hardness. The value of electrical conductivity (EC) in the phreatic zone ranges from as low as 241 micro-siemens/cm to 2240 micro-siemens/cm. Concentration of nitrate more than the permissible limit has been observed only in one observation well at Saragaon which might be due to unscientific disposal of waste. Apart from this no ground water quality issue has been observed in the district.

4.4 Status of Ground Water Development

The ground water development in the district is mainly for domestic and irrigation purposes. Nearly 90% of the population is living in the rural areas. The estimated ground water draft for the domestic purposes is only 6.5% of the net available resource. On the other hand the ground water draft for irrigation purposes is around 25.7% of the net available resources. The ground water draft for industrial purposes is very meager. Existing gross ground water draft for all purposes is 16185.55 ham out of which **13225.09** ham is for irrigation and **2935.46** ham is for domestic and industrial water supply. The stage of ground water development is of the order of 43.25% as on March 2009. The stage of ground water development in Baloda, Pamgarh, Akaltara and Nawagarh blocks is very low (22 to 30 %) and in rest of the blocks it is varying in the range of 49.12 to 70.79%. The ground water development is highest in Malkharoda bloc(70.79). The stage of ground water development for the entire district has increased from 12 % to 43.25% between the years considered. At present the stage of ground water development in the district is limited to 43.25% leaving behind a wide scope for further development.

5.0 GROUND WATER MANAGEMENT STRATEGY

Except Malkharoda(Semicritical) remoning blocks are have been categorized as safe from ground water development point of view. There are no serious ground water problems/issues in the district except small patches showing falling ground water levels. Nearly 35% of the area in the district is showing declining water level trend during the post monsoon period in the magnitude of less than 0.2 m/yr which is considered as insignificant. As such there are no issues of decline trend of ground water level in the district. However, the areas where the depth to the water levels during the post monsoon period are more than 3 m and having a decline trend of water level require immediate attention to regain the water levels or to maintain the water levels irrespective of development activities in the area in future. To achieve this target artificial recharge to the ground water is one of the solutions, which may be taken up in these areas. These areas are mostly in Baloda, Malkharoda, Jaijaipur, Bamnidih

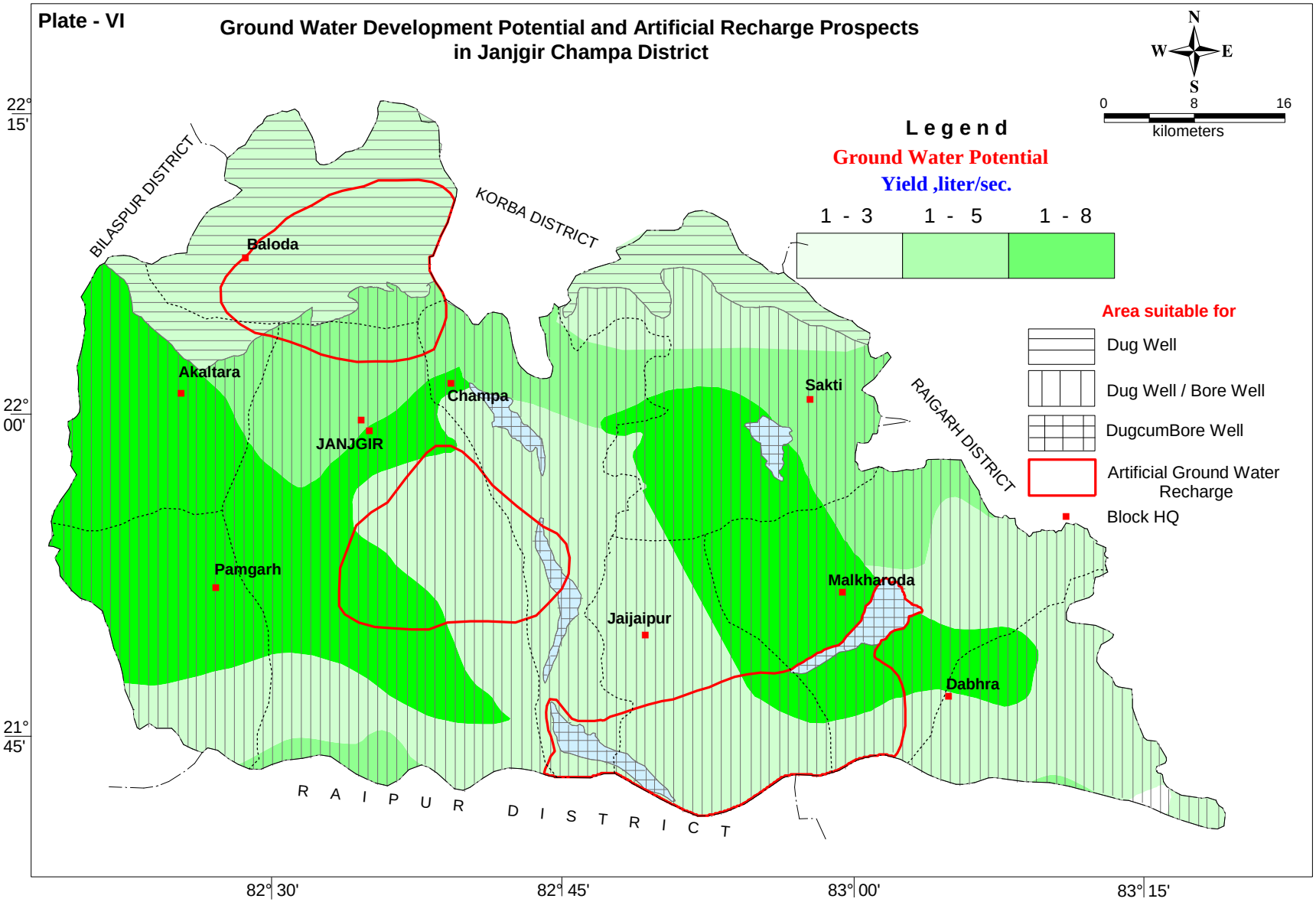


Plate - VI
Ground Water Development Potential and Artificial Recharge Prospects
in Janjgir Champa District
N
W
E
S
0
8
16
kilometers
Legend
Ground Water Potential
Yield ,liter/sec.
1 - 3
1 - 5
1 - 8
Area suitable for
Dug Well
Dug Well / Bore Well
DugcumBore Well
Artificial Ground Water Recharge
Block HQ
22° 15'
22° 00'
21° 45'
82° 30'
82° 45'
83° 00'
83° 15'
BILASPUR DISTRICT
KORBA DISTRICT
RAIGARH DISTRICT
RAIPUR DISTRICT
Baloda
Akaltara
Champa
JANJGIR
Sakti
Pamgarh
Jaijaipur
Malkharoda
Dabhra

and Nawagarh blocks and are suitable for artificial recharge (**Plate-VI**). The rainwater can be harvested by percolation tank and the ground water can be recharged by recharge shaft method. The shale-covered areas can be recharged by injection well method. From ground water contour map (**Plate-V)** it can be observed that the flow of ground water is towards the major drainage indicating that the water in the river is nothing but the base flow. So suitable obstruction structures may be constructed on the tributaries of major rivers like Hasdeo, Borai, Son to check the base flow which can enhance the pre monsoon depth to water level in the district.

6.0 GROUND WATER RELATED ISSUES & PROBLEMS

No problem related to Ground Water was observed in the district except the decline of ground water level during the pre monsoon period in the eastern part of Hasdeo river namely in Malkharoda, Jaijaipur, Dabhra and parts of Bamnidih blocks. The area is famous for paddy crop for which crop water requirement is maximum. As the said area is not entirely covered by canal command area of Hasdeo, which is the lifeline of irrigation in the district, the number of ground water abstraction structures in this area is naturally very high resulting in decline of ground water level in the area.

After the completion of the Kharsia branch canal of the Hasdeo-Bango project, the entire district comes under canal command. The blocks of Malkharoda, Jaijaipur, Bamnidih, Dabhra and Sakti which are mainly underlain by shale of different formations come under canal command. As a result there is a chance that the irrigated water from canal may not percolate down efficiently due to the underlying shale layer which may lead to water logging condition in a long run. On the other hand there may be problems of canal water not reaching at the tail end. Keeping all these in view a conjunctive use study may be taken up in the Hasdeo canal command area to alleviate the problem.

Improper waste disposal in the areas underlain by limestone and dolomite in and around Champa, Akaltara and Baradwar may cause ground water pollution as the solution channels formed in these rocks act as conduits for direct recharge of surface water to ground water and hence require attention.

7.0 AWARENESS & TRAINING ACTIVITY

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

Two mass awareness programme and one water management training programmes are conducted in the district. The details of the programmes are as follows.

Sl. No.	Year	Programme	Venue	Date
1	2001-02	MAP	Malkharoda	15.02.2002
2	2002-03	WMTP	Arasmeta, Akaltara	
3	2004-05	MAP	Jaijaipur	21.12.2004

8.0 AREAS NOTIFIED BY CGWA/SGWA

None of the blocks in the district is categorized as over exploited from ground water abstraction point of view. Only one block i.e Malkharoda is categorized as semi-critical. Hence none of the blocks of the district has been notified by the CGWA/SGWA for regulation of ground water.

9.0 RECOMMENDATIONS

I. It has been observed that the crop water applied for paddy in the district (1.12m) is at the much higher side than the crop water requirement (0.69m) thereby wasting a lot of water as paddy is the main crop in the district. Efficient irrigation practices and proper awareness can creat more irrigation potential and bring more area under irrigation.

II. Technical input for well construction in alluvium covered hard rock area and for highly cavernous zone can help obtaining good yield and successful construction of wells in this area in the district. Combination type of rigs can successfully drill wells in these areas.

III. Large diameter dug wells are recommended as the ground water abstraction structures in the areas underlain by granites and older metamorphic. Similarly dug wells with bore at the bottom are recommended in the low yielding shale area.

IV. Improper waste disposal in the areas underlain by limestone and dolomite in and around Champa, Akaltara and Baradwar may cause ground water pollution as the solution channels formed in these rocks act as conduits for direct recharge of surface water to ground water and hence require attention.

V. The flow of ground water is observed to be towards the major drainage indicating that the water in the river is nothing but the base flow. So suitable obstruction structures may be constructed on the tributaries of major rivers like Hasdeo, Borai, Son to check the base flow which can enhance the pre monsoon depth to water level in the district.

VI. In parts of the Baloda, Malkharoda, Jaijaipur, Bamnidih and Nawagarh blocks rain water harvesting and artificial recharge measures are to be taken to regain the water levels or to maintain the water levels irrespective of development activities in the area in future.

VII. Conjunctive use study should be taken up to avoid water logging condition in the areas underlain by shale and under canal command.

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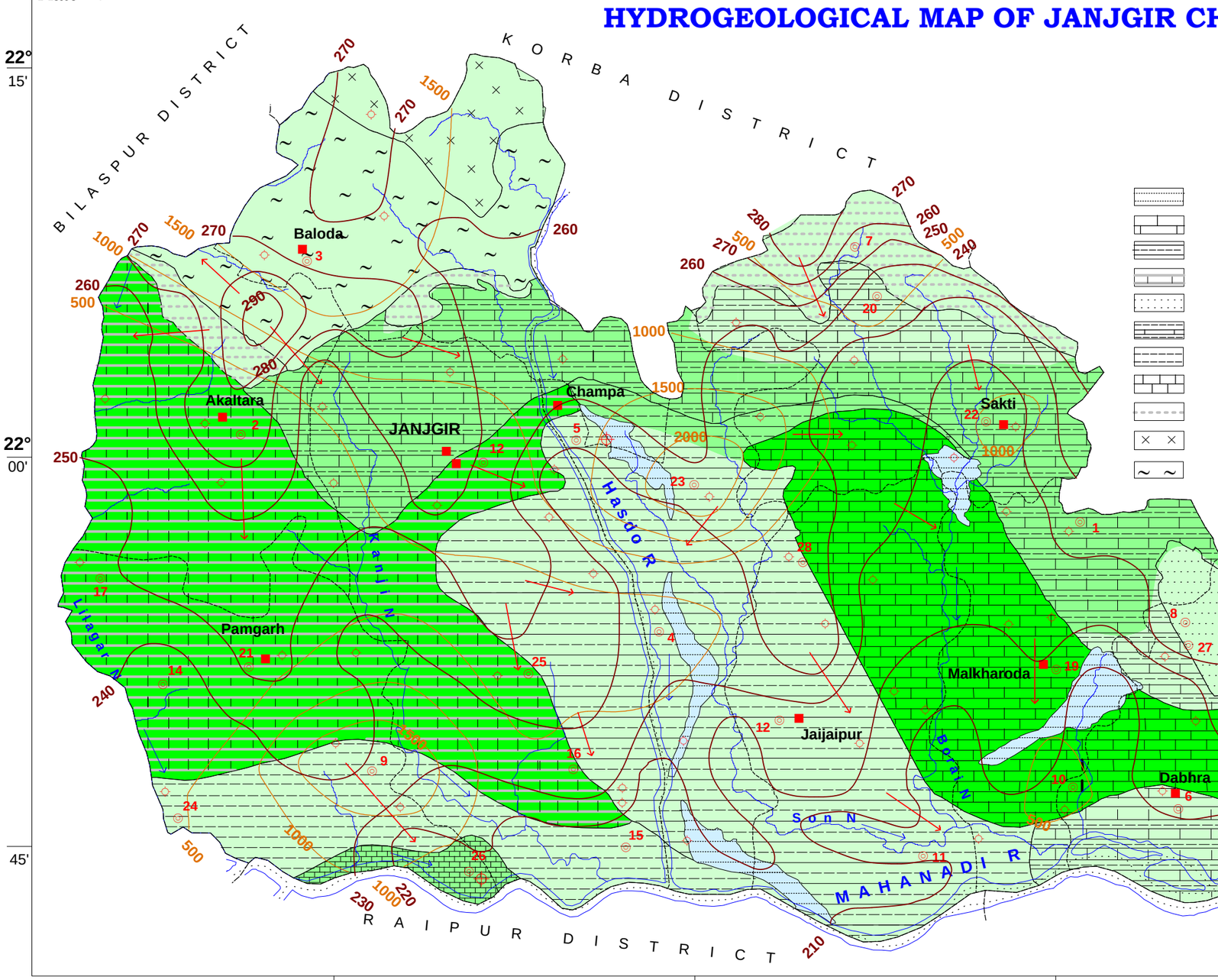
Plate - V

HYDROGEOLOGICAL MAP OF JANJGIR CHAMPA DISTRICT



N
W E
S

0 7 14
kilometres

Legend

Formation	Lithology
Quaternary	Sand, Clay & Gravel
Saradihi Formation	Dolomite
Bamnidihi Formation	Purple Shale
Chandi Formation	Stromatolytic Limestone & Shale
Raigarh Formation (S. St.)	Sandstone
Raigarh Formation	Purple Shale & Stromatolytic Limestone
Gunderdehi Formation	Calcareous Shale
Charmuria Formation	Grey Limestone & purple Shale
Chandrapur Group	Ferugeneous Sandstone
Granites	Granites
Older Metamorphics	Gneiss, Mica Schists

Discharge (lps)

- Upto 5
- Upto 3
- Upto 10
- Upto 15

- Ground Water Contour (m amsl)
- Ground Water Flow Direction
- Drainage
- EC microsiemens/ cm at 25°C
- National Hydrograph Station
- Exploratory Well
- Piezometer Well
- Place Name