



# भूजल सूचना पुस्तिका रांची जिला, झारखंड

**Ground Water Information Booklet  
Ranchi 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

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Ranchi District, Jharkhand State

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## RANCHI – DISTRICT AT A GLANCE

Sl No.	ITEMS	Statistics	
1.	<b>GENERAL INFORMATION</b>		
	i) Geographical Area (Sq km.)	5097	
	Administrative Divisions (As on 2001)		
	Number of Block	18	
	Number of Panchyat	253	
	Number of villages	2143	
	(ii) Population (As on 2011 Census)-	29,14,253	
	(iii) Average Annual Rainfall (mm)	1316 mm	
2.	<b>GEOMORPHOLOGY</b>		
	Major Physiographic units	Buried pediments, pediplain, Valley, Structural ridges	
	Major Drainages	Subarnarekha, South Koel, Karkari	
3.	<b>LAND USE (Sq Km.)</b>		
	a) Forest area:	1591.4	
	b) Net area sown:	2558.5	
	c) Cultivable area:	2723.2	
4.	<b>MAJOR SOIL TYPES</b>	Alfisols (Red gravelly and sandy soils) ultisols (red and yellow soils) Light textured Slightly Acidic Poor in N & P Fairly rich in K	
5.	<b>AREA UNDER PRINCIPAL CROPS (2011-12)</b>	Pulses – 6903 ha Oilseeds – 164 ha Paddy – 101721 ha Maize – 4966 ha Wheat-5997 ha	
6.	<b>IRRIGATION BY DIFFERENT SOURCES (Areas and Number of Structures)</b>	Area (Ha)	Structures
	Dug wells	2287	6610
	Tube wells /Bore wells	0	0
	Tanks / Ponds	64	180
	Canals	--	---
	Other Sources	203	72
	Net irrigated area	--	---
	Gross irrigated area	--	---
7.	<b>NUMBERS OF GROUND WATER MONITORING WELLS OF CGWB (As on 31-03-13)</b>		
	No of Dugwell	20	
	No. of Piezometers	20	

8.	PREDOMINANT GEOLOGICAL FORMATIONS	Chotanagpur granite, Quartzite Schists, Older alluvium, Laterite
9.	Major Water bearing formation Pre-monsoon Depth to water level during 2012 Post-monsoon Depth to water level during 2012	Granite-gneiss, Quartzite, older Alluvium 2.21-12.20 m.bgl  1.81-6.60 m.bgl
10.	GROUND WATER EXPLORATION BY CGWB (As on 31-03-13)	
	No. of wells drilled (EW, OW, PZ, SH, Total)	EW – 81, OW – 21, Pz – 23 125
	Depth Range (m)	23.5 – 200 m.bgl
	Discharge (m <sup>3</sup> /hr)	2 – 23
11.	GROUND WATWER QUALITY	Good
	Presence of Chemical constituents more than permissible limit (e.g. EC, F, As, Fe)	EC 200 to 800 micro mhos /cm at 25 <sup>0</sup> C. Fluoride- 0.5-2.3 mg / l.
	Type of Water	Calcium Bicarbonate
12.	DYNAMIC GROUND WATER RESOURCES (2009) ha-m	
	Annual replenishable Ground Water Resources	35072
	Gross Annual Ground Water Draft	13954
	Projected Demand for Domestic and Industrial uses up to 2034	5080
	Stage of Ground Water Development	40%
13.	AWARENESS AND TRAINING ACTIVITY	
	Mass Awareness Programs Organized Date Place  No. of Participants	One March 2002 Horticulture and Agro-forestry Research Programming Board (HARP), Palandu 100
	Water Management Training Programs Organized Date Place  No. of Participants	Three  March 2004, Feb 2008, March 2009 1.Chotanagpur Chamber of Commerce, Main Road, 2.Dipatoli cantonment, Bunti 3.VISWA Kanke 75,100 and 800
14.	EFFORTS OF ARTIFICIAL RECHARGE & RAINWATER HARVESTING	

	Projects completed by CGWB (No & Amount spent)	Three (1. HARP, Palandu, 2. Defence Engineers line, Kanke, 3. Dipatoli Cantonment),Rs. 7.3 lac Fifteen, Ranchi Urban areas ,Funded by CGWB,Constructed by Ground Water Directorate,Jharkhand,Rs-11.543 Lac
	Projects under technical guidance of CGWB (Numbers)	---
15	GROUND WATER CONTROL AND REGULATION	
	Number of OE Blocks	1(one),Kanke
	No. of Critical Block	Nil
	No. of Semi-critical block	1(one),Ratu
	No. of Blocks notified	Nil
16.	MAJOR GROUND WATER PROBLEMS AND ISSUES	<b>-Declining trend of deeper Aquifers in urban area of Ranchi township -Sporadic fluoride contamination in Ormanjhi, Ranchi sadar and Silli blocks</b>

# GROUND WATER INFORMATION BOOKLET

## RANCHI DISTRICT

### 1.0 INTRODUCTION

#### 1.1 Administration-

Ranchi district lies in the southern part of Jharkhand state. The district is bounded on the north by Ramgarh & Hazaribagh districts, on the south by Khunti & Saraikela Kharsawan, on the west by Gumla, Latehar & Lohardagga district and on the east by Saraikela Kharsawan and Purulia district of West Bengal. It is connected through NH-33 from prominent district headquarters of the state. It is also connected through Gumla and Rourkela by NH-23. The district has total area of 5097 sq.km. and is located between  $22^{\circ} 52'$ -  $23^{\circ} 45'$  North latitude to  $84^{\circ} 45'$ -  $85^{\circ} 50'$  East longitude. Area is included in Toposheet no. 73A, 73B, 73E and 73F. The district is divided into two subdivisions and 18 administrative blocks (**Fig-1**). The district comprises of 253 numbers of Panchayats and 2143 number of villages. The density of population is 572 person per sq. Km. The total population of the Ranchi district as per the 2011 census is 29,14,253 persons. Total urban population is 12, 57,335 and the rural population is 16, 56,918. Percentage of urban population is 56% and Rural population is 44%.

#### 1.2 Drainage:

The district is highly dissected by rivers of varying magnitude. The major water divide in the district runs north to south direction through the Ratu and Lodhma. The area in the eastern part of the water divide is drained by Subarnrekha and the western part of the divide is drained by South Koel and Karo. The important river basins are the Subarnrekha, the South Koel, the Damodar and the Karkari. The Kanchi and Raru are the tributaries of river Subarnrekha. The South Koel originates from Piska near Ranchi. The Karkari river drains the southeastern part of the district (**Fig-2**).



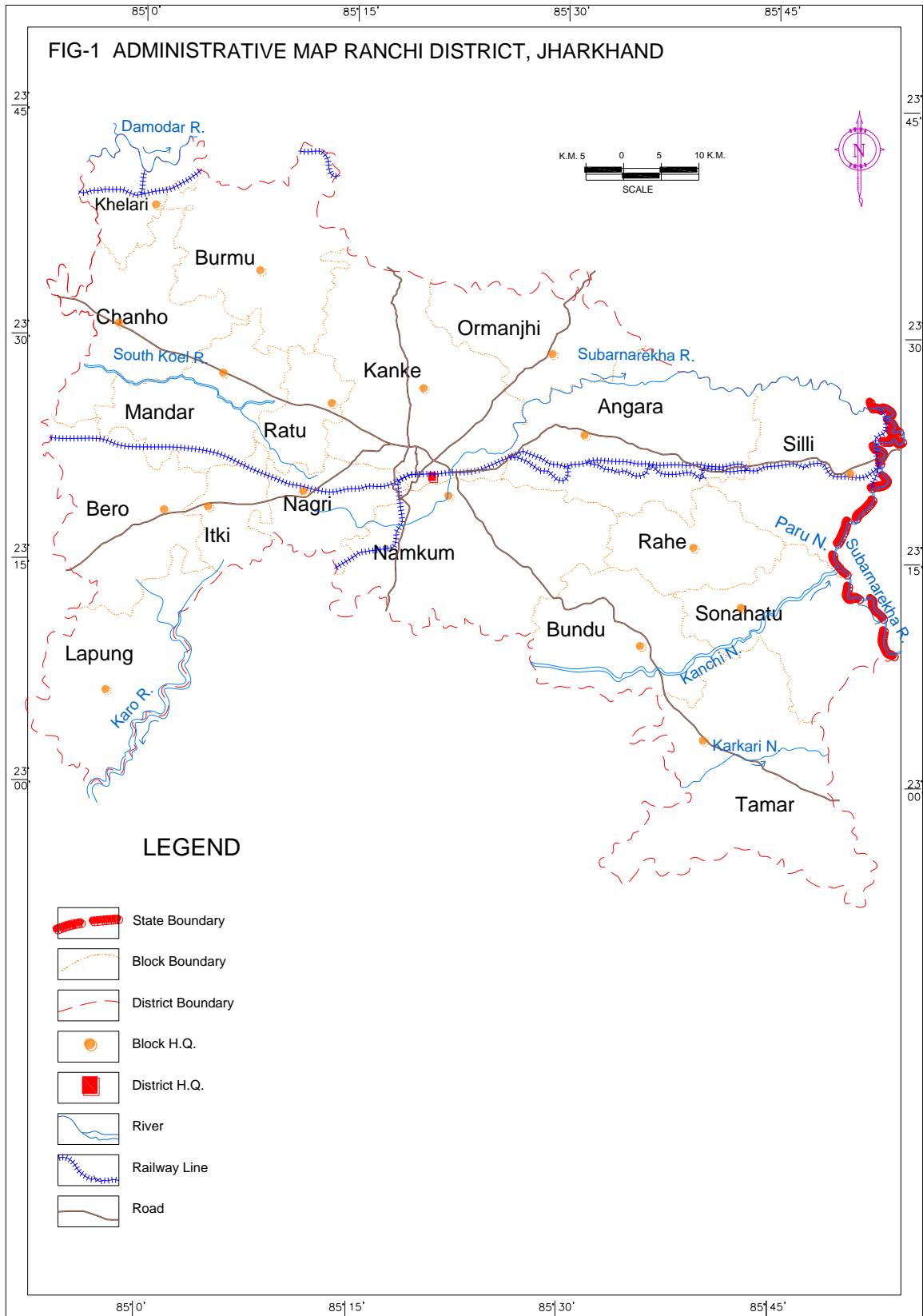
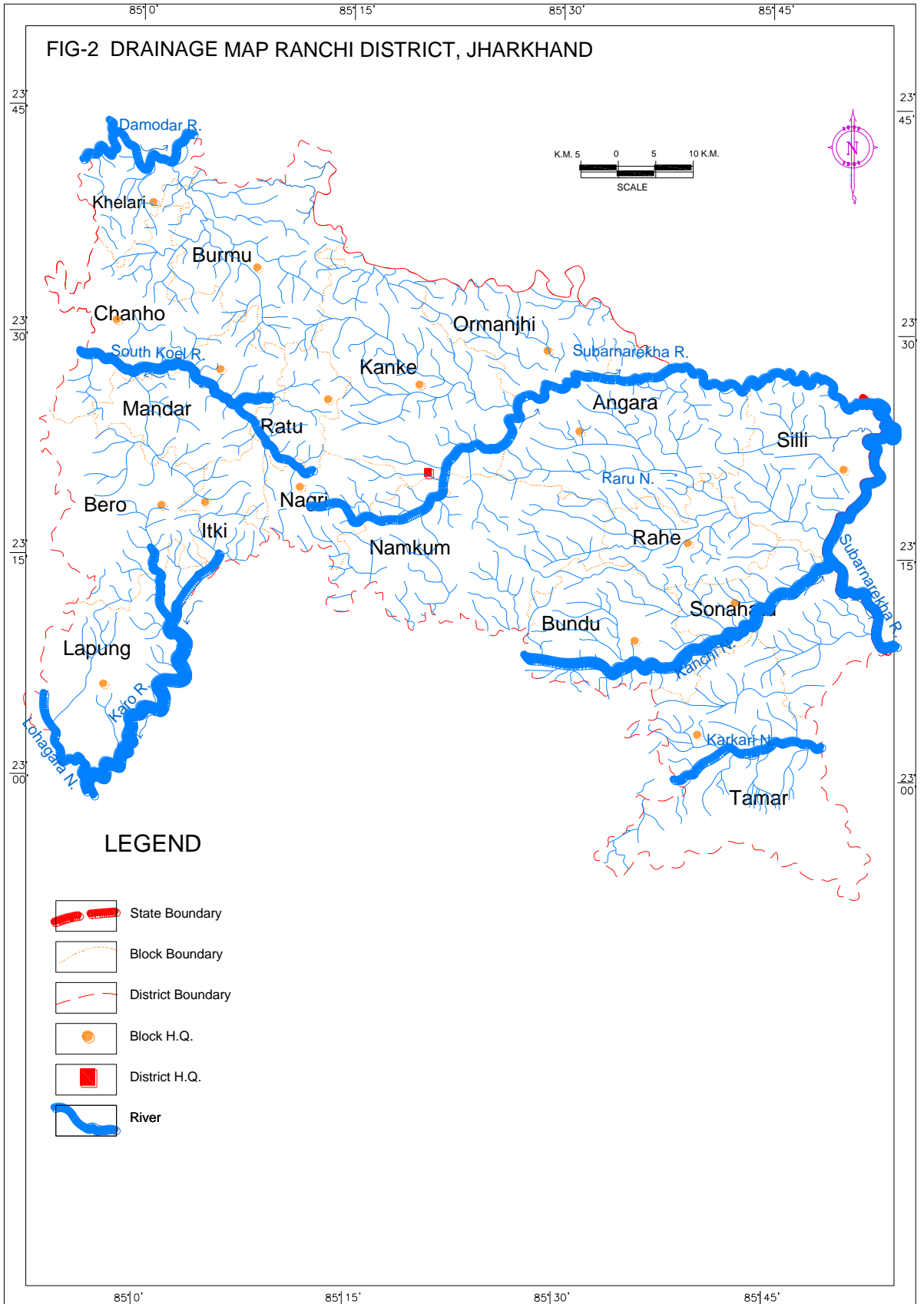








FIG-2 DRAINAGE MAP RANCHI DISTRICT, JHARKHAND



LEGEND

-  State Boundary
-  Block Boundary
-  District Boundary
-  Block H.Q.
-  District H.Q.
-  River

### **1.3 Land use, irrigation and cropping pattern-**

Out of total geographical area of 5,09,700 hectares, forest area is 20.97%, land put to non-agricultural use is 5.6%, Barren land is 4.2%, current fallow is 16.35%, Land other than current fallow is 8.7%, Net area sown is 33.64%, cultivable waste land is 3.4% and area sown more than once is 2.21%. 89 % of Kharif crops are unirrigated and 4 % of Kharif crops are irrigated. 3 % of Rabi crops are irrigated and 2 % of Rabi crops are unirrigated. Only 2 % of summer crops are irrigated.

### **1.4 Previous works**

Geological Survey of India has completed systematic geological mapping in the Ranchi district. The part of district has been covered under Regional Hydrogeological Survey by Sh. S.K.Bose, (1987) and a part by S/Sh. M.Srivastava and S.K.Bose, Junior Hydrogeologist (1983). Further CGWB in Collaboration with the United Nations, Department of Technical Co-operative ad development (UNCTAD) took up a project on ground water resources evaluation of two basin areas of the river Kasai and Subarnarekha in 1985. The project areas cover 18 blocks of Ranchi and contain exploration for ground water in hard rock areas using multidisciplinary approach like Remote Sensing, Geophysics and Hydrogeology.

### **2.0 Climate**

Ranchi district experiences subtropical climate, which is characterized by hot summer from March to May and well distributed rainfall during southwest monsoon from June to October. Winter season in the area is marked by dry and cold weather during the month of November to February.

### **2.1 Rainfall**

The normal annual rainfall data indicate that average rainfall is 1394mm. Maximum rainfall has been observed from June to October months. About 90% of the total annual rainfall is received in the monsoon period.

## **2.2 Temperature-**

January is the coldest month with the mean daily maximum temperature at 22° C and the mean daily minimum temperature at 7° C. From February both day and night temperatures increase rapidly till May which is the hottest month of the year with mean maximum temperature at 36°C.

## **3.0 Geomorphology—**

The northernmost and southernmost parts of the district are covered with hillocks and forests. Altitude of the area varies from 500m to 700m above mean sea level in general. There are many hillocks through the district having altitude 700m above mean sea level. The District is the part of Chotanagpur plateau.

### **3.1 Physiography –**

Major landforms which are situated in the district are as follows-

**Buried pediments-** These are broad gently sloping erosional surface having detritus. Thickness of overburden is considerably high. Mandar, Itki and Ratu area comes in this segment.

**Pediplain-** These are developed over granite gneiss. Undulating erosional surface with interrupting dykes, ridges and inselbergs are prominent features. Bero locality is marked by these features.

**Valley fills-** These are developed over granite gneiss. It consists of boulders, cobbles, pebbles, gravels, sand, silt and clays. These features are developed in Parts of Nagri block.

**Denudational hills-**These features are developed in northernmost portion of the district covering parts of Burmu block. Moderate to low relief and steep slopes characterizes area.

**Structural ridges—** These features are developed over quartzite and having moderate relief and steep slope.

**Laterite capping—** These are developed over metamorphic rocks. Hard laterite cappings are formed on the highland. Its thickness is upto 50-60 metres. They are developed in Ratu and Nagri locality.

### **3.2 Soils—**

The soils of the district are mostly of the residual type. High temperature and high rainfall have led to the formation of lateritic type of soils from rocks of Archean metamorphic complex exposed in the greater part of the district. Texturally the soils of the district have been classified into four classes-

1. Stony and gravelly soils--- These are low grade soils having a large admixture of cobbles, pebbles and gravels generally found at the base of the hills.

2. Red and yellow soils: - This soil is formed by the decomposition of crystalline metamorphic rocks like granite- gneiss etc. These rocks contain mineral particles like biotite, hornblende and iron. Higher areas have soils with light red color but the lower areas have relatively dark color. It lacks nitrogen, Phosphorus acid and humus. Potash and lime are sufficiently found.

3. Lateritic soils: - This type of soil is found in Ratu, Bero and parts of Mandar Blocks. The soil has dark red or brown colour, It has high iron content and has been formed by the process of lateritisation of the weathered material in the favourable climate and topography.

4. Alluvial soils: - River channels in the district are covered with alluvial soils consisting mainly of coarse sand and gravel mixed with silt and clay. Soil thickness depends upon the topographical control.

### **4.0 Ground water scenario**

#### **4.1 Hydrogeology:**

The district is having varied hydrogeological characteristics due to which ground water potential differs from one region to another. It is underlain by Chotanagpur granite gneiss of pre-Cambrian age in three-fourth of the district. In Ratu and Bero blocks thick lateritic capping is placed above granite gneiss. A big patch of older alluvium is found in Mandar block extending from Brombay and murma areas. Khelari (northernmost portion) area consists of Limestone rocks.

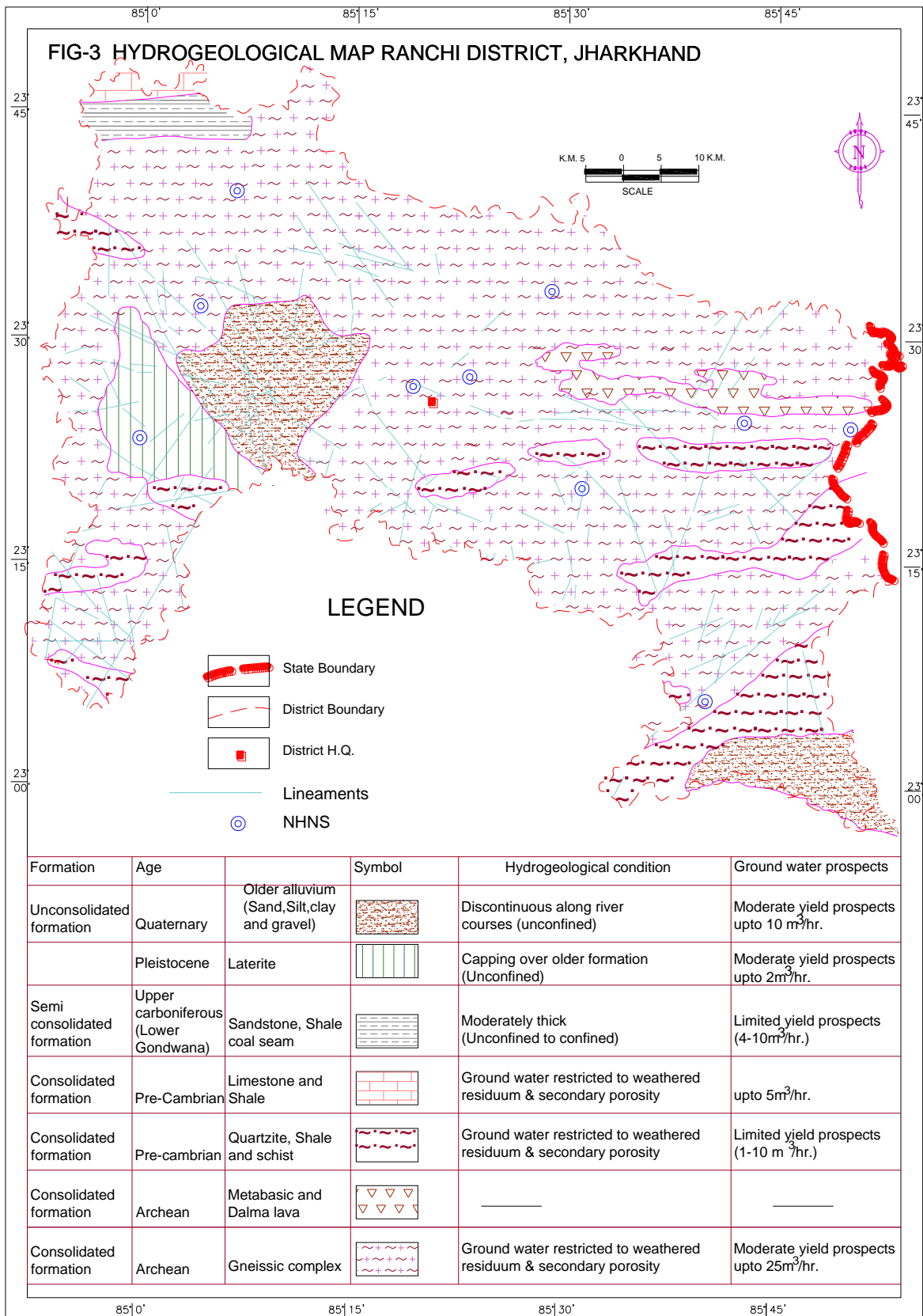
Aquifer systems---Two types of aquifers are found. Weathered aquifer and fractured aquifers. Thickness of weathered aquifers varies from 10-25 m in granite terrain and 30-60m in lateritic terrain. In weathered aquifer ground water

occurs in unconfined condition while in fractured aquifer ground water occurs in semi confined to confined condition.

**Aquifer geometry**---- The aquifer geometry for shallow and deeper aquifer has been established through hydro geological studies, exploration and the surface and sub-surface geophysical studies in the district.

**Shallow aquifer**—The shallow aquifers are being tapped through dug wells, dug-cum borewells and hand pumps. The thickness of weathered mantle varies from 5 to 20 m.bgl. In lateritic terrain many dug wells dry up during summer months. Hand pumps generally tap first fracture zones and its depth is 30-40 m.bgl.

**Deeper aquifer**—In granite gneiss terrain area first fracture occurs between 50-70 m and second fracture is found between 100-120 m depth. Discharge of borewells varies between 10 to 30 m<sup>3</sup>/hr in these areas. Drawdown varies between 13 to 20 m. In lateritic terrain of Nagri first fracture zone is found between 60 to 75 m.bgl and second fracture zone is between 90 to 100 m.bgl. Third set of fracture can be found between 150-200m.bgl depth. Discharge may vary between 15 to 25 m<sup>3</sup>/hr. Drawdown may vary between 20-25 m.



### **Exploratory wells—**

In Ranchi district 81 no. of exploratory wells, 21 no. of observation wells and 23 no. of piezometers were constructed upto 31 st March 2013. Exploratory drilling was done upto 200 metre depth. Thickness of weathered zone varies between 5 m at Silli to 29.75m at Palandu.

**Well design—**In lateritic terrain two types of wells can be constructed. One is having slotted pipes and casing where aquifers can be tapped and other having borewells. Tube wells having 40 to 60m depth can be constructed having 15 to 20m slotted pipe and 25 to 40 m casing depending on alluvial thickness. Borewells having 150 to 200m depth having 40 to 60 m casing pipe (8") and naked borehole of 110 m to 140 m depth.(6"). In Granite Gneiss terrain bore well of 150 m (6" to 8") depth can be constructed depending on presence of fractures in the area.

### **Depth to Water levels-**

**During pre-monsoon season** dug wells were inventoried to know about water level scenario. Depth to water level varies between 6.11 m.bgl. (Dorma) to 10.94 m.bgl in Bero locality. In the lateritic terrain of Ratu, Nagri, Mandar areas water level even goes upto 11 to 12 m.bgl. During summer seasons Dug wells become unsustainable for drinking and irrigation purposes. During peak summer season's deeper water levels may be observed in dug wells. Four zones can be deciphered from the pre-monsoon water level data analysis. Tamar, lapung and Berro areas have water level more than 10 m.bgl., Parts of Bundu, sonahatu, Itki, mandar, Chanho, Burmu and Khelari areas where water level varies between 8-10m.bgl. Nagri, Ratu, Kanke and ormanjhi areas where water level varies between 6-8 m.bgl. Major parts of Namkum, Silli block, Rahe block and parts of angara and Kanke varies between 4-6 mbgl.

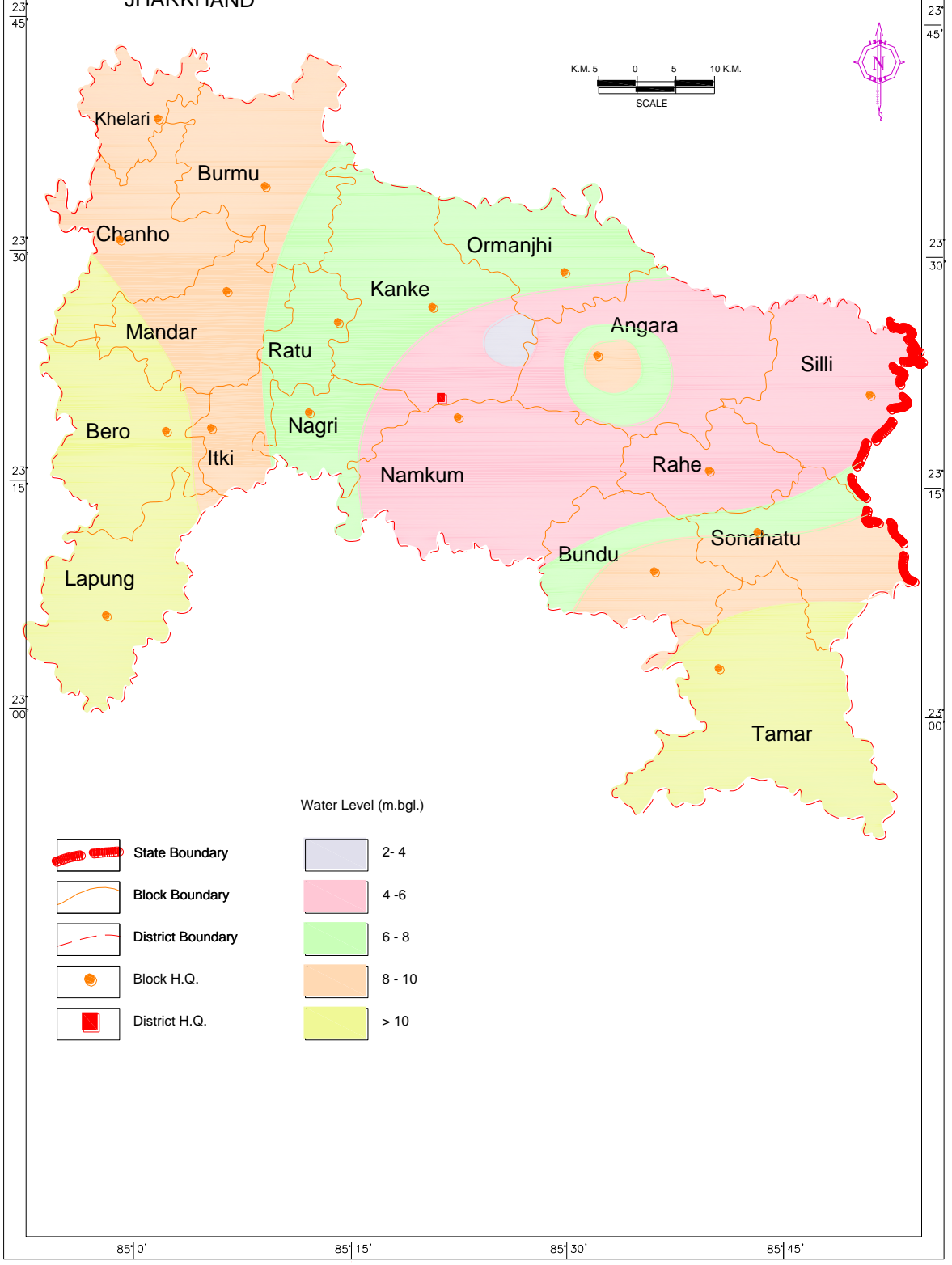
**During post-monsoon season---** Dug wells were monitored during November 2012 to know the post-monsoon depth to water levels in the district. Three zones can be deciphered. Water level varies between 6-8 m.bgl in parts of Tamar, Lapung and Berro blocks. Water level varies between 4-6 mbgl in Parts of Sonahatu, Silli, Angara, Itki, Mandar, Chanho, Burmu and Khelari blocks and in Namkom, Bundu, Rahe, Nagri, Ratu, Kanke, ormanjhi blocks and Parts of Mandar, angara block water level varies between 2-4m.bgl.

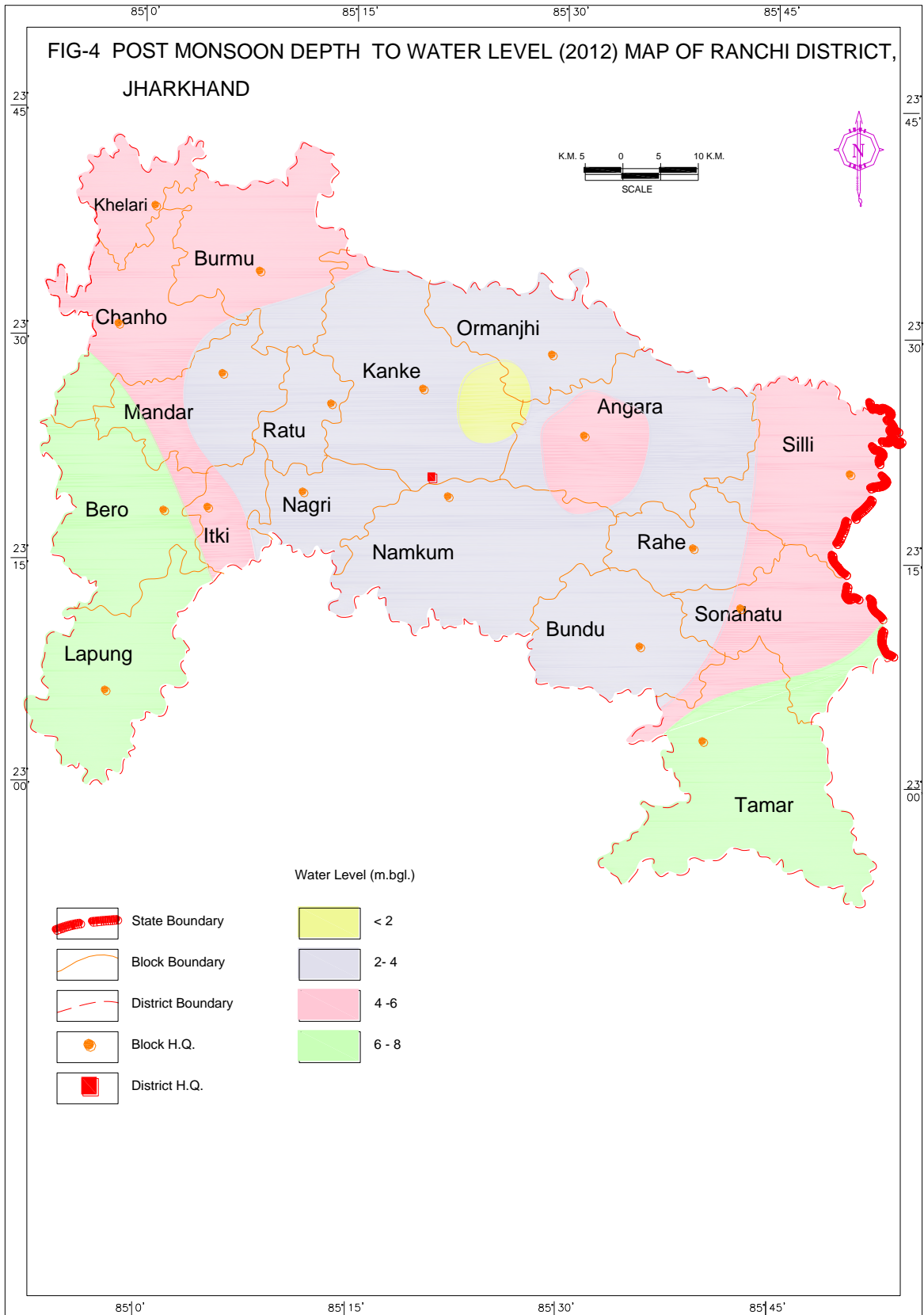


**Table 1- Details of water levels of NHNS wells in Ranchi district**

Sl No.	Location	2012 May (m bgl)	2012 Nov (m. bgl)
1	2	3	4
1	<b>Angara</b>	9.85	4.24
2	<b>Barwadag</b>	5.75	3.03
3	<b>Bero</b>	13.01	6.60
4	<b>Bundu</b>	9.50	3.80
5	<b>Buti</b>	2.21	1.81
7	<b>Kathitanr</b>	6.00	2.86
8	<b>Hatia</b>	---	3.10
9	<b>Kalamati</b>	6.40	4.68
10	<b>Mandar</b>	8.45	2.16
11	<b>Ormanjhi</b>	6.50	2.10
12	<b>Ashoknagar</b>	4.55	3.07
13	<b>Silli</b>	5.86	4.66
14	<b>Tamar</b>	12.20	6.80
15	<b>Chachgura</b>	9.95	4.70
16	<b>Jonha</b>	5.46	3.36

FIG-4 PRE MONSOON DEPTH TO WATER LEVEL (2012) MAP OF RANCHI DISTRICT, JHARKHAND





#### **4.2 Ground water Resources---**

The ground water assessment has been done based on the recommendation of the GEC-1997. The ground water assessment has been carried on block wise basis during 2009 and the assessment varies between Burmu (3832ha-m) and Burmu (1661ha-m). Kanke block is in over-exploited category while Ratu block is in Semi-critical category while other blocks are in safe category. The net annual replenishable ground water resources of the district is 35072 ha-m. The gross ground water draft for all uses is 13954 ha-m and allocation for domestic and Industrial requirement up to year 2034 is 5080 ha-m. The present stage of ground water development of the district as on 31<sup>st</sup> march 2009 is 40% At present maximum ground water development is in Kanke block (112.4%) and minimum ground water development is in Angara block(9%). Details of ground water development and stage of ground water development of all the blocks are given in **(Table 2)**.

**Table-2 Block wise Ground Water Resources (as on 2009) of Ranchi District**

Sl.No	Assessment Unit/Block	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 (10+11)	Allocation for Domestic and Industrial Requirement suply upto next 25 years	Net Ground Water Availability for future irrigation development (9-12-13)	Stage of Ground Water Development (12/9)*100 (%)
1	2	9	10	11	12	13	14	15
1	Angara	2474.69	41.06	173.92	214.98	278.43	2155.19	8.69
2	Bero	2847.15	704.20	222.06	1051.00	355.52	1662.70	36.91
3	Bundu	1660.66	771.00	106.10	465.23	169.86	1131.67	28.01
4	Burmu	3832.05	633.40	207.94	1066.46	332.91	2640.62	27.83
5	Chanho	1808.41	769.00	141.38	901.76	226.35	821.67	49.87
6	Kanke	3495.40	1165.00	1748.75	3928.85	1619.78	818.05	<b>112.40</b>
7	Lapung	1791.21	859.00	89.92	690.57	143.96	1046.61	38.55
8	Mandar	2920.06	1479.40	166.47	1558.47	266.52	1261.54	53.37
9	Namkum	2310.82	671.40	193.09	1323.32	294.77	1451.94	57.27
10	Ormanjhi	1847.23	824.00	128.40	1268.40	205.56	501.66	68.67
11	Ratu	2097.07	1307.00	213.07	1520.15	341.11	448.87	<b>72.49</b>
12	Silli	1773.44	371.00	174.45	545.42	279.29	1123.18	30.75
13	Sonahatu	2583.53	883.00	160.86	584.38	257.53	1902.48	22.62
14	Tamar	3630.35	729.00	192.39	524.04	308.02	2990.69	14.43
	TOTAL	35072.06	11842.40	3918.80	15643.03	5079.62	19956.87	39.78

### **4.3 GROUND WATER QUALITY**

Quality of ground water is just as important as its quantity. This is well-recognized part and accepted fact in present day world. Quality of ground water in nature mostly depends on the geological formations holding it i.e. Aquifers. All ground water contains salts in solution that are derived from the locations, and rocks through which it moves. In addition ground water contamination is caused by discharge containing pollutants, which get mixed with them. Quality of ground water is described with reference to the needs i.e., drinking, industrial and irrigation to assess the quality of ground water for different purposes. The physical and chemical constituents are determined and are compared with the standard ones, recommended each for the drinking, industrial and irrigations requirements.

**CHEMICAL QUALITY**--Ground water quality in general is potable and found as per specification of Bureau of Indian standards

#### **GENERAL RANGE OF CHEMICAL PARAMETER OF RANCHI DISTRICT**

- 1) Electrical conductivity: of ground water of parts of Ranchi District ranges between 60 to 600 micro siemens /cm. at 25<sup>o</sup>C.
- 2) PH: Ground water of the parts of Ranchi districts are slightly alkaline in nature where PH varies between 7.21 to 7.95.
- 3) Chloride: concentration of chloride varies between 18 to 106 mg/l.
- 4) Nitrate: It is present within permissible limit of BIS. Concentration varies between 7.4 to 56 mg/l.
- 5) Sulphate: Its concentration in ground water varies between 2.4 to 19mg/l.
- 6) Bicarbonate: concentration of bicarbonate is between 43 to 171 mg/l.
- 7) Calcium: Calcium is found between 14 to 64mg/l in study area.
- 8) Magnesium: It occurs between 6 to 19mg/l.
- 9) Sodium and Potassium: concentration of sodium is between 4 to 55mg/l while potassium occurs between 0.3 to 1.95mg/l.
- 10) Fluoride: its value varies between 0.3 to 2.6mg/l. Wells at Chutupalu, Ormanjhi and Silli have concentration above permissible limit.

**TABLE-3 BLOCK WISE RESULTS OF CHEMICAL ANALYSIS OF WATER SAMPLES OF RANCHI DISTRICT**

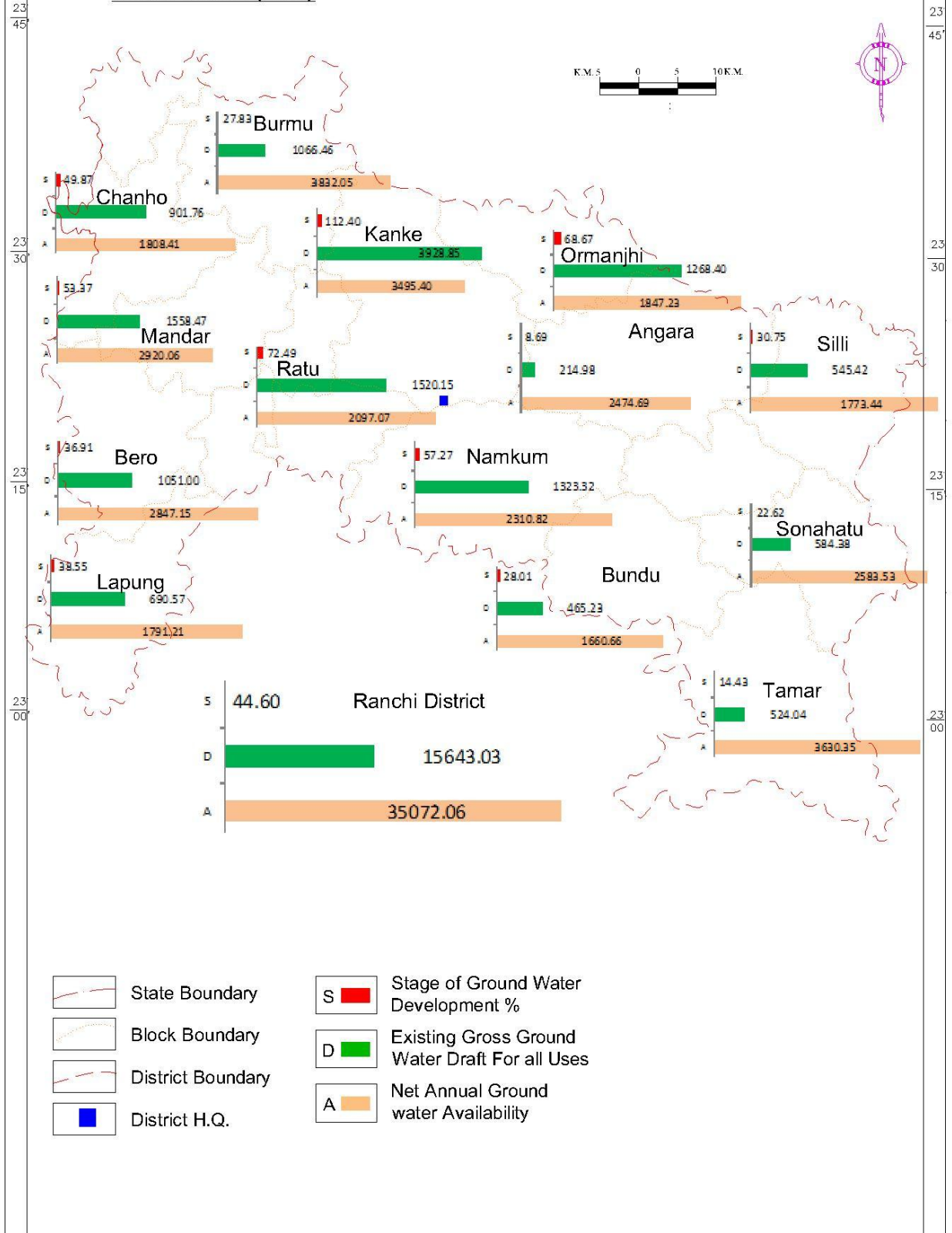
Location	Well no.	E.C.	pH	CO <sub>3</sub>	HCO <sub>3</sub>	Cl	SO <sub>4</sub>	NO <sub>3</sub>	F	Ca	Mg	Total hard Hardness (CaCO <sub>3</sub> )	Na	K
Ormanjhi	BRC1A	472	6.5	ND	118	67	20	45	1.5	60	19	226	14	2.9
Ranchi	BRC3A	325	8.1	ND	79	40	25	20	0.3	33	6	108	25	1.5
Mandar	BRC6	340	7.4	ND	46	63	3.90	50	0.3	23	11	103	29	11
Bero	BRC7	191	8.2	ND	106	6	ND	5.9	0.6	23	6	82	7	1.9
Silli	BRC9	620	6.9	ND	343	27	13	0.1	2.2	74	13	236	48	4.1
Tamar	BRC11	235	8.2	ND	132	8	2.2	4.1	0.7	27	11	113	8	0.9
Chuttupalu	BRC22	325	8.1	ND	165	17	4.8	ND	2.6	27	9	103	33	2.4

#### **4.4 Status of ground water development—**

The ground water is mainly utilized for domestic needs and for irrigation purposes. The ground water abstraction is mainly through dug wells, bore wells. The mode of lifting of water for domestic purpose from dug wells is mainly through rope and bucket. The bore wells / tube wells are fitted with hand pump or submersible power pump. The stage of ground water development is 40% in general. On the basis of stage of development blocks of Ranchi district can be divided into 3 groups- Kanke block having 112% stage of development, Ratu block where stage of development is 72% and rest 16 blocks where stage of development is less than 9-69%. The low development of ground water resources is mainly attributed to lithology of the area, Tribal and backward population, erratic electricity supply, lack of scientific input (adoption of proper drilling and design), inefficient irrigation practices and cropping pattern. In most of the blocks, only one crop is grown-Paddy in Kharif season, which is mostly rainfed.



**FIG-6: STAGE OF GROUND WATER DEVELOPMENT IN RANCHI DISTRICT, JHARKHAND (2009)**



**5.0 Ground water management strategy:**

85° 30'

85° 45'

### **Areas Suitable for artificial Recharge**

Rainwater harvesting is the technique of collection and storage of rainwater at surface or in sub-surface aquifer before it is lost as surface runoff. Artificial recharge to ground water is a process by which the ground water reservoir is augmented at a rate exceeding that under natural condition of replenishment.

Identification of area --- Ranchi urban area especially deeper aquifers of Ratu road, Kutchery, Kanke, Morabadi, Bariatu, Doranda, Hinoo and Harmu areas are suitable for artificial recharge.

### **6.0 Ground water related issues –**

Deeper aquifers of Ranchi Urban area is showing declining trend of water levels. Rain water harvesting should be adopted in those areas where Post Monsoon Water level is more than 7 m bgl. and long term water level trend is declining at the rate of more than 0.1 m bgl.

Fluoride contamination has been observed in parts of Wells at Chutupalu, Ormanjhi and Silli. Dugwells & bore wells constructed in these areas must be tested for Fluoride before being used.

### **7.0 Awareness and Training activity**

#### **7.1 Mass awareness program and training activity---**

Altogether one number of mass awareness program and one number of Rainwater harvesting program was organized in Ranchi district. one mass awareness program was organized at HARP, Palandu in Namkom area during 2003. one training program on Rain water harvesting and artificial recharge to ground water was organized at chotanagpur chamber of commerce, Main road, Ranchi. In the function representatives from different govt. departments, universities, N.G.O.s and builders participated. Training Programme for NGOs and academic Institutes was organised during 2012 at Ranchi.

#### **7.2 Participation in exhibition, Mela .fair etc**

NIL

**7.3** Presentation & lectures delivered in Public forum/Radio/Television/Institute of repute/grass root association/NGO/academic institutes--- Central ground water board and central water commission organized lectures related to Rain water harvesting in the Institution of Engineers, Doranda during world water day functions in 2005. S.N.Sinha and T.B.N.singh delivered lectures.

### **8.0 Area notified by CGWA/SGWA**

From the ground water point of view, all the blocks of the district are under safe category. So far no blocks have been notified by C.G.W.A.

### **9.0 Recommendations**

1. The region being hilly and undulating, the drainage is very intensely developed in areas of Bundu, Ormanjhi and Tamar blocks. The construction of Rain water harvesting structures such as gully plugging, contour bunding, gabion structures, check dams and Percolation tanks would increase the storage in surface which will in turn recharge the ground water in these areas.
2. Valley areas between Nagri – Bero and Ratu - Mandar have good ground water prospects.
3. Ground water wells in ormanjhi, Silli and Chutupalu areas should be analyzed chemically for fluoride before using it.
4. Ranchi urban areas especially deeper aquifers of Ratu road, Hinoo, Doranda, Lalpur, Bariatu and Harmu areas are suitable for artificial recharge.
5. Hydrogeological studies coupled with resistivity surveys can delineate potential Aquifers. Fractures located upto 150 m.bgl are potential ground Water Aquifers in the district.