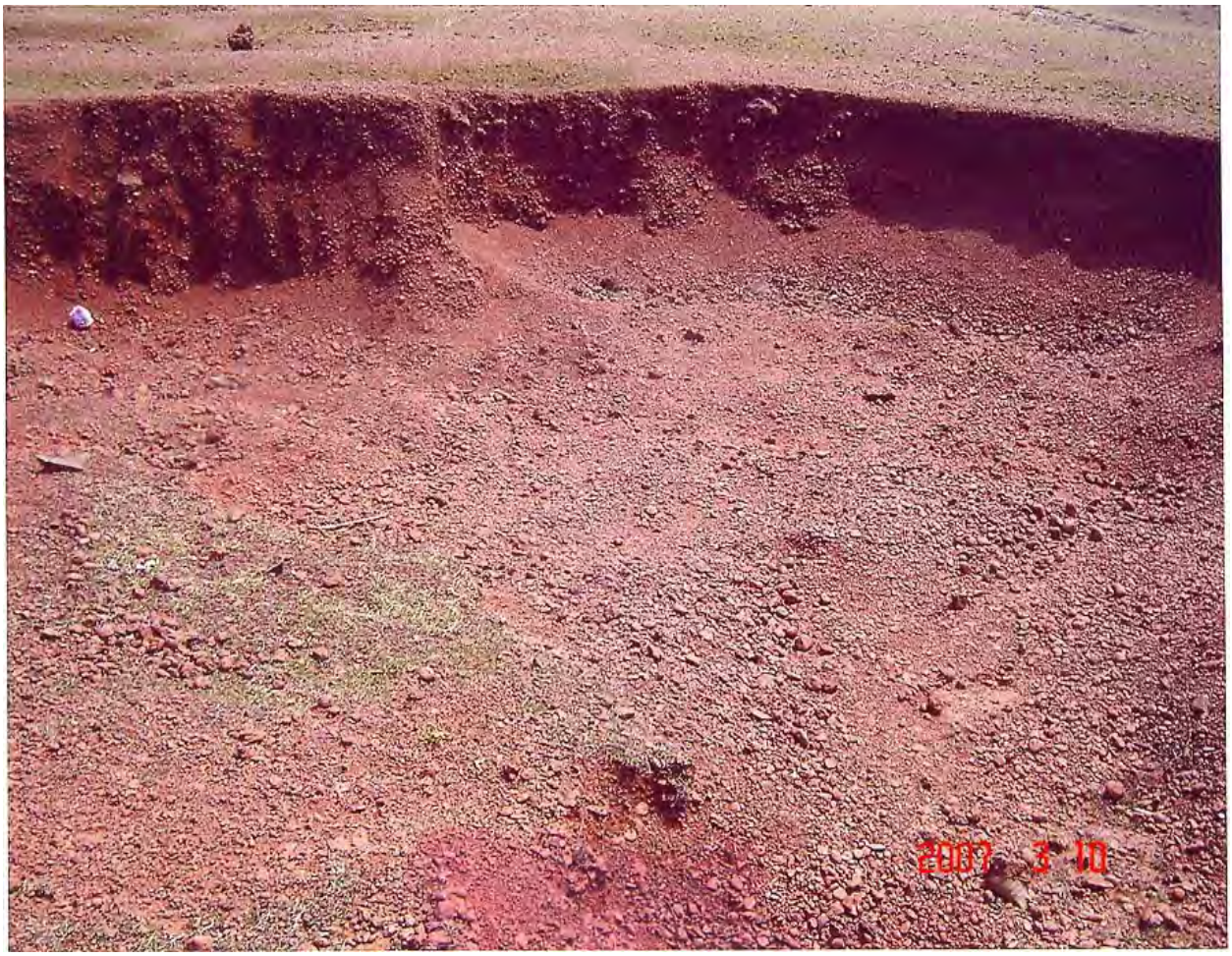
“Ground Water Information Booklet”

Sahebganj District, Jharkhand State



Central Ground Water Board

Ministry of Water Resources
(Govt. of India)
Mid – Eastern Region
PATNA

November, 2008

GROUND WATER INFORMATION OF SAHEBGANJ DISTRICT, JHARKHAND STATE

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SAHEBGANJ – DISTRICT AT A GLANCE

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	(16) Administrative Divisions (As on 2007) Number of Block Number of Panchyat / Villages	 9 132/1807	
	(ii) Population (As on 2001 Census)- in lakhs	9, 27, 584	
	(iii) Average Annual Rainfall (mm)	1575 mm	
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	Major Drainages	Ganga, Gumani and Morang	
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	b) Net area sown:	414.6	
	c) Cultivable area:	473.10	
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5.	AREA UNDER PRINCIPAL CROPS	Pulses – 44.1 Oilseeds – 13.58 Paddy – 284.43	
6.	IRRIGATION BY DIFFERENT SOURCES (Areas and Number of Structures)	Nos.	Area(Ha)
	Dugwell	1361	906
	Tube wells /Bore wells	187	672
	Tanks / Ponds	133	225
	Canals	Nil	-
	Other Sources	797	1261
	Net irrigated area		
	Gross irrigated area (Ha)		3066
7.	NUMBERS OF GROUND WATER MONITORING WELLS OF CGWB (As on 31-03-07) No of Dugwell No. of Piezometers	 8 Nil	
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12.	GROUND WATER EXPLORATION BY CGWB (As on 31-03-07)	
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	Storativity (S)	$1.4x10^{-4}$ to $7.3x10^{-5}$
	Transmissivity (m^2/day)	32.3 – 176 m^2/day
13.	GROUND WATWER QUALITY	Good
	Presence of Chemical constituents more than permissible limit (e.g. EC, F, As, Fe)	EC 380 to 2480 micro mhos/cm at 25^0 C.
	Type of Water	
14.	**DYNAMIC GROUND WATER RESOURCES (2004) in ham.(Net Ground water Availability)**	**15754.76 ham / year**
	Annual Replenishable Ground Water Resources	16645 **ham**
	Net Annual Ground Water Draft	5058 **ham**
	Projected Demand for Domestic and Industrial uses up to 2005	2081 **ham**
	Stage of Ground Water Development	30.89%
15.	**AWARENESSS AND TRAINING ACTIVITY**	
	Mass Awareness Programmes Organized Date Place No. of Participants	Nil
	Water Management Training Programmes Organized	Nil
16.	**EFFORTS OF ARTIFICIAL RECHARGE & RAINWATER HARVESTING**	
	Projects completed by CGWB (No & Amount spent)	Nil
	Projects under technical guidance of CGWB (Numbers)	Nil
17	**GROUND WATER CONTROL AND REGULATION**	
	Number Of OE Blocks	Nil
	No. of Critical Block	Nil
	No. of Blocks notified	Nil
18.	MAJOR GROUND WATER PROBLEMS AND ISSUES	Arsenic occurs more than permissible limits in ground water in some of the villages.

"Ground Water Information Booklet"
Sahebganj District,
Jharkhand State

1.0 Introduction

1.1 Administration

The district Sahebganj is situated in the north – eastern part of the Jharkhand state. It is bounded in the north by a small portion of Bhagalpur and Kathihar districts of Bihar state, in the east by West Bengal, in the south by Pakur district and in the west by Godda district and a portion of Bhagalpur district (Bihar). The district is situated between 24^0 43' 00"and 25^0 50' 45" North latitude and 87^0 27' 30" and 87^0 58' 15" East longitude. The district covers Survey of India toposheets nos. 72 O/ 7, 72 O/ 8, 72 O/ 11, 72 O/ 12, 72 O/ 16, 72 P/5, 72 P/ 9, 72 P/10, 72 P/13 and 72 P/14.

The district has two sub divisions i.e. Sahebganj and Rajmahal and nine blocks namely – Sahebganj, Borio, Taljhari, Rajmahal, Barharwa, Pathna, Barhait, Mandro and Udhwa (Fig. 1). Total population of the district is 1234 (as per census of 2001). The administrative division with population of the district is given in Table – 1.

1.2. River System

The river Ganges forming the northern boundary of the district enters into it along the north – west corner and flow eastward up to Sakrigali. Here it takes a turn to the south and then moves forward forming the eastern boundary of the district up to a little beyond Radhanagar in Rajmahal sub division. The other rivers of the district are Gumani and Morang. The river Gumani flows SW to NE direction up to Barhait then it turns to east direction. The river Morang flows

from north to south direction and joins river Gumani near Barhait. The drainage pattern of the district is dendritic. All these rivers are seasonal in nature except the river Ganges.

1.3. Irrigation

Paddy and maize are important crops grown in the district. Linseed, groundnuts, sweet potatoes and khesari are other crops grown widely in Rajmahal and its adjoining areas. Irrigational facilities are not adequate in this district. The most common source is the dug well, but this is not a very dependable source of irrigation. The major part of the district being rocky in nature, it is difficult to dig wells. The undulating nature of land makes it possible to store rain water by bunding. The district is largely dependent upon rains, these are by no means adequate. The result is that failure of rains invariably involves failure of crops except in small pockets.

1.4 Previous Studies

Central Ground Water Board has established a network of observation wells under National Hydrograph Network programme to study the behavior of ground water level and quality of ground water in the district. The systematic hydrogeological survey has been carried out during the year 1976 – 77 and collected the actual field data for the study of ground water conditions in respect of quality and quantity. The board has also carried out exploratory drilling in the district and drilled five bore wells to know the sub – surface geology, depth and thickness of water bearing formation with their yield and determine the different aquifer parameters (Table - 2).

2.0 Rainfall and Climate

2.1 Rainfall

The area receives rainfall by South-West monsoon. Rainy season sets in the middle of June and lasts till September. The normal average rainfall) in the district is 1575 mm.

2.2 Climate

The district is characterized by humid to sub-humid climate. During summer the hot spell prevails from March to middle of June. Rainy season starts from middle of June to end to September. Winter starts from the middle of November and continues till the end of February. The district experiences great heat from March to May, when the maximum temperature reaches upto 44.4^0c. December being the coldest month when the minimum temperatures fall down up to 6.8^0c.

3.0 Geomorphology and Soil types

3.1Geomorphology

Major part of the district is characterized by undulating topography covered by basaltic flows of Rajmahal Trap. The district is mainly drained by the rivers Ganges, Gumani and Morang. All there rivers are seasonal in nature except the river Ganges. The river Gumani and Morang contribute to the major surface run – off during monsoon The main geomorphological features of the district are scarp on the northern part of the area, flat alluvial terrain in the eastern fringe of the district and resistant lava plateau of Rajmahal which rises above the general level and occupies major part of the district. The general evaluation of the plateaus and hills varies from 57 to 375 m above msl.

3.2 Soil

The major soil type of the district is the Rajmahal type soil witch derived from basaltic lava. These soils are black in colour, very fertile and restricted to Rajmahal lava areas. The other soil type of the district are red soil, eroded scarp soil, foothill soils, Tal soil and alluvial soil. The red soils are light to medium and are red to yellow or light grey in colour. The eroded scarp soil occurs in transverse section of dissected, descending scarp land at various altitude of upland. The yellowish red foothill soils occur in the eastern fringe of the district. The Tal soil is found in the back water belt of the Ganga around Barharwa when

the rain water remains stagnant in the rainy season. The clayey loam type alluvial soil occurs near Sahebganj plains.

4.0 Ground Water Scenario

4.1 Hydrogeology

Rajmahal Trap is the major rock type in the district. The other geological formations of the district are alluvium and Laterite.

The alluvium occurs in the northern and eastern boundary of the district, which is composed mainly of sand and sub ordinate clay. Laterites are mainly of insitu origin and have been formed by sub-aerial eroson of underlying basalts under favorable climatic conditions. Laterites provide a productive ground water reservoir due to its very porous and permeable nature.

Rajmahal traps having a large thickness of basaltic lava flows occurs in the major part of the district. The different units of the lava flows are the main water bearing horizons in basaltic formation. The basic properties such as the ability to receive recharge, capacity to take water in to storage and transmit it as ground water by gravity are different for different litho units of the trappean flows. The massive basaltic unit is hard and compact in nature with negligible primary porosity and permeability. But the process of weathering and development of secondary porosity such as joints and fractures makes it to act as good ground water reservoir. The vesicular units have abundant vesicles that contribute towards hydrogeological properties and thus have high degree of porosity and permeability to serve as potential aquifers. The ground water occurs in near surface in weathered, jointed and fractured basaltic zone under water table conditions. The water bearing zone occurring between depths of 15-40 m are either interflow weathered shear zones or directly connected to shallow aquifer in widely spaced major joints and fractures and forms semi confined aquifer. Below the depth of 40 m, where the fracture porosity is insignificant, the weathered flow contacts are completely cut-off from lower aquifer on account of intervening highly impermeable massive basalts and intertrappean beds and thus give rise to confining conditions.

4.2 Exploratory wells: To understand the sub – surface geology, identify the various water bearing horizons including their depth, thickness and compute the hydraulic characteristics such as transmissivity and storativity of the aquifers, exploratory drilling programme was carried out by Central Ground Water Board during AAP 1982 – 83.5 exploratory wells and 4 observtion wells were drilled in the district. The depth of exploratory wells ranges between 44.20 and 100.00 mbgl. The static water level of these exploratory wells varies from 5.53 to 9.30 mbgl. The Transmissivity value varies from 32.30 to 176.00 m^2/ day while the Storativity value varies from 07.00 X 10^{-5} to 07.70 X 10^{-5}. The details of exploratory wells drilled by Central Ground Water Board in Sahebganj district are given in Table – 2.

Depth to Water Level: -

24 key observation wells were established under Ground Water Management Studies in the district during the AAP 2006-07.

Pre monsoon depth to water level: - The pre monsoon depth to water level was observed to vary between 3.45 to 14.86 mbgl. Majority of the wells (58%) fall in the water level range of 0 - 6 mbgl. About 25% wells fall in the water level range of 6 -9 mbgl and 12.50% wells fall in water level range of 9 – 12 mbgl. In the entire district, the pre monsoon water level ranges between 3 – 6 mbgl except few patches in western and eastern part where the water level was found to vary between 9 – 12 mbgl. The maximum depth of the pre monsoon water level (14.86 mbgl) was found in the eastern part of the district. Pre monsoon depth to water level within the district has been shown in Figure 2.

Post monsoon depth to water level: - The post monsoon depth to water level was found between 0.86 to 7.67 mbgl. About 58.33% of wells fall in the water level ranges between 0 – 3 mbgl and 25 % wells fall in the water level ranges between 3 –6 mbgl. Rest of the wells (16.67%) fall in ranges of water level more than 6.00 mbgl. In the district, the post monsoon water level ranges between 0 – 6 mbgl. The post monsoon water level between 6 – 8 mbgl was

found in the western, southern and eastern part of the district in patches. Post monsoon depth to water level in the district has been shown in figure 3.

4.3.1Seasonal water level fluctuation: - From the pre monsoon and post monsoon depth to water level data collected during May 2006 and November 2006 respectively, water level fluctuations were computed for all key observation wells in the district. The water level fluctuation of the district varies from 1.68 to 7.19 m. The lowest fluctuation of water level was found in the middle – eastern part of the district. About 70.83% wells show fluctuation between 2 – 4 m while 16.67% wells show fluctuation between 4 – 6 m. Similarly, 8.33% wells fall in water level fluctuation more than 6.00 m and rest 13% wells show water level fluctuation less than 2.00 m. The lowest water level fluctuation i.e. 1.68 m was found in the northern part while the highest water level fluctuation i.e. 7.19 m was found in the eastern part of the district. The pre monsoon, post monsoon and seasonal fluctuation in water level have been given in Table 3.

4.4 Long Term Water Level Trend: - Water level of an area depends upon various factors like the storage of ground water development and variation in rainfall over a long period, recharge from rainfall and different sources. Central Ground Water Board has established seven National Hyrdograph Stations (NHS) for the study of water level behavior in the district. The water level data of each station has been analyzed. Pre monsoon and post monsoon long term water level trend has been calculated for the period of 1996 – 2005 (Table 4). The long term water level trend is showing rising trend between 0.031 – 0.224 m/year, 0.003 – 0.481m/ year and 0.036 – 0.254 m/ year for pre monsoon, post monsoon and all season respectively. Similarly, the long term water level trend is showing falling trend between 0.128 – 0.184 m/year, 0.135 – 0.252 m/year and 0.016 – 0.603 m/ year for pre monsoon, post monsoon and all period respectively. About 37.5% of NHS are showing rising trend of ground water while 25% of NHS showing falling trend for pre and post monsoon period. Similarly, about 50% of NHS show rising trend and rest 50% show declining trend for all seasons.

4.2 Ground Water Resources

Based on the recommendation of the Ground Water Estimation Committee – 1997 (GEC – 1997), block wise the ground water resource assessment has been carried out for all the blocks of the district. The area of assessment unit varies from 11700 ha (Rajmahal block) to 28800 ha (Barhait block). The net ground water availability of the district is 15754 ham. The gross ground water draft for all uses of the district is 5058.46 ham. The average stage of ground water development in the district is 30.89 %. All blocks of the district are falling under “Safe” category. The stage of ground water development varies from 10.69% to 59.81% (Table – 6, Fig. 5). The net ground water availability for future irrigation development for the district is 9998.47 ham.

4.3 Ground Water Quality

To evaluate the quality of ground water, samples have been collected from 16 representative dug wells during the May – 2006. These samples were analyzed 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.

The results of ground water samples were analyzed in accordance with the standard (ISI – 1993) for drinking purpose. In general the quality of ground water in the phreatic aquifer is suitable for drinking and irrigation purpose except few samples, which shows nitrate concentration more than permissible limit. The EC value ranges from 380 – 2480 micro Siemens/cm at 25^0c. The EC contour map is shown in Figure 4.

During the Ground Water Management Studies (AAP 2006 – 07), 60 acidified samples were collected form Gangetic alluvium of the district for the study of Arsenic in ground water. As per the analytical results of these samples, the Arsenic concentration is found more than 50 ppb in 20% of the samples and in 16.66% of the samples Arsenic value ranges between 10 – 50 ppb.

4.4 Status of Ground Water Development

There is sufficient scope for ground water development through shallow as wells deep bore wells. State Govt. department has been constructed a large number of bore wells to mitigate the drinking water problem in the district. Central Ground Water Board has drilled 5 bore wells in the district. The depth of bore wells ranges between 44.20 – 100.00 mbgl. The yield of bore wells ranges from 1.08 to 30.00 m^3/hr. The Transmissivity and Storativity value ranges from 32.30 to 176.00 m^2/day and 01.40 x $10^{-4}$to 07.30 x 10^{-5} respectively (Table 2). The stage of ground water development of the district is only 30.89%.

5.0. Ground Water Management Strategy

5.1. Ground Water Development

Dug wells and shallow to medium depth (upto 50 m) bore wells are the main ground water extraction structures in the area to meet the increasing demand of domestic water supply and irrigation. The overall stage of ground water development of the district is 30.89% only. Thus, there is sufficient scope for development of ground water through dug wells, shallow and medium deep bore wells.

Construction of dug cum bore well structure is also suitable for enhancing the yield of dug wells, which will be coast effective. The ground water development varies in different places depending on the availability of favorable potential zones / aquifer. For the construction of ground water structures, knowledge of the local as well as regional hydrogeological condition of the area is necessary.

Ground water potential available for future development, considering the present ground water draft has been worked out as per norms of Ground Water Estimation Committee – 1997 (GEC – 1997) and the details of ground water recharge, net annual ground water availability, annual draft, net ground water balance and stage of ground water development has been assessed and presented in table - 6.

5.2. Water Conservation and Artificial Recharge

In view of the increasing thrust on development of ground water resources, there is urgent need to augment the depleting ground water resources. This gets augmented through natural recharge and can be augmented on an increased scale through artificial recharge. From hydrogeological point of view, rain water conservation is needed to arrest decline in ground water levels and to improve ground water quality by dilution. The construction of water conservation structures, artificial recharge structures, depends on the topographic features, hydrological and hydrogeological conditions of the area. From this point of view, the Sahebganj district may be divided into two parts – 1) the hard rock area i.e. basaltic terrain is on undulating topographic setting with hills suitable for check dam, gabion structures, percolation tank, contour bunding and trenching 2) the alluvial area is suitable for recharge shaft and percolation tank.

6.0 Ground Water Related Issue and Problems

The Arsenic concentration has been found beyond permissible limits in some villages like Hazipur Bihta, Dihari, Bari Kudarjana, Nadhi Dera, Reza Nagar, Baluadiara and Chanan of Sahebganj block.

7.0. Awareness and Training Activity

7.1. The Mass Awareness Programme (MAP) by CGWB -NIL

7.2 Participation in Exhibition, Mela, Fair etc.: - Nil

7.3 Presentation and Lecture deliver in public forum / Radio / T.V / Institution of repute / Grassroots association / NGO / Academic institution etc.: - Nil

8.0 Area Notified by CGWA / CGWA

As per the ground water resource assessment of Jharkhand State, all the blocks of the district fall under the safe category. Thus, the authority has not notified any of the blocks.

9.0 Recommendation

1. The Arsenic concentration in ground water is found more than permissible limit (> 50 ppb) in Hazipur Bihta, Dihari, Bari Kudarjana, Nadhi Dera, Reza Nagar, Baluadiara and Chanan villages of Sahebganj block. The alternate water supply schemes should be developed for arsenic affected villages from surface water source or ground water source after sealing the arsenic affected aquifers.

2. Nitrate concentration in shallow aquifer (dug well) is found more than permissible limit in / around villages like Sakrigali (Sahebganj block) and Borio (Borio block). The bore well may be a better alternate option for the drinking water purposes for the above villages.

3. The exploration data indicates the poor percentage of successful bore wells in the district. Thus the geophysical surveys may be adopted for selection of suitable sites for ground water exploration.

4. In order to conserve run – off water during monsoon, the water conservation and recharge structure may be constructed in and around Barharwa, Sahebganj and Rajmahal villages where the long term (1996 – 2005) water level trend shows declining trend during the pre monsoon as well as post monsoom.

TABLE – 1:ADMINISTRATIVE DIVISIONS OF SAHEBGANJ DISTRICT

Sr. No.	Block	Area (Sq. km)	Rural population			Urban population		
			Male	Female	Total	Male	Female	Total
1	Sahebganj	173.27	31358	28297	59655	42837	37317	80154
2	Mandro	123.52	30237	29543	59780	--	--	--
3	Borio	261.74	41532	40507	82039	--	--	--
4	Barhait	308.82	55695	53725	109420	--	--	--
5	Taljhari	158.28	32535	31557	64092	--	--	--
6	Rajmahal	126.93	58752	54554	113306	9407	8570	17977
7	Udhwa	199.13	67022	63162	130184	--	--	--
8	Pathna	163.16	34335	33395	67730	--	--	--

9	Berharwa	187.25	73952	69481	143433	--	--	--

TABLE 2: DETAILS OF EXLPORATORY WELLS DRILLED BY CGWB IN SAHEBGANJ DISTRICT

Sr. No	Location/ Block	Depth Drilled (mbgl)	Length of casing pipe/ Depth const. (m)	Static Water Level (mbgl)	Discharge (m^3/hr)	Draw-down (m)	Specific Capacity (m^3/hr/m)	Trans-missivity (m^2/day)	Storativity
1	Barharwa	100.00	44.70	9.30	51.60	8.92	5.78	176.00	01.40 X 10^{-4}
	OW	90.70	--	--	--	--	--	--	--
2	Barhait	90.65	16.00	7.65	21.10	15.34	1.70	44.00	--
	OW	100.00	--	--	--	--	--	--	--
3	Borio	75.00	14.20	5.53	21.00	9.65	2.17	32.30	07.00 X 10^{-5}
	OW	44.20	--	--	--	--	--	--	--
4	Rajmahal	74.45	24.30	6.90	6.12	3.67	1.66	88.00	07.30 X 10^{-5}
	OW	74.45	--	--	--	--	--	--	--
5	Sahebganj	54.15	--	--	Abandoned	--	--	--	--

TABLE 3: DEPTH TO WATER LEVEL OF KEY OBSERVATION WELLS OBSERVED DURING GROUND WATER MANAGEMENT STUDIES IN SAHEBGANJ DISTRICT (2006 – 07)

Sr. No.	Village	Block	Depth to water level (mbgl)		Fluctuation (m)
			Pre-monsoon	Post - monsoon	
1	Kusma	Berhait	4.70	1.25	3.45
2	Berhait	Berhait	8.57	6.03	2.54
3	Lakhipur	Pathna	4.99	0.86	4.13
4	Sahri (Leka Tola)	Pathna	4.85	1.00	3.98
5	Palasbona	Berharwa	6.45	1.45	5.00
6	Berharwa	Berharwa	9.92	6.35	3.57
7	Durgapur	Berharwa	6.86	3.31	3.55
8	Khatalbari	Udhwa	5.58	2.20	3.38
9	Udhwa	Udhwa	14.86	7.67	7.21
10	Rajmahal	Rajmahal	4.77	2.43	2.34
11	Dhamdhamia	Taljhari	3.54	1.20	2.34
12	Babhangama	Rajmahal	3.45	1.10	2.35
13	Taljhari	Taljhari	10.07	3.52	6.55
14	Jogi Chak	Rajmahal	6.20	3.34	2.86
15	Sahebganj	Sahebganj	7.60	5.00	2.60
16	Kudarjana	Sahebganj	5.20	3.52	1.68
17	Sakrigali	Taljhari	4.42	2.15	2.27
18	Banjhi	Borio	4.65	1.48	3.17
19	Borio	Borio	5.18	2.77	2.41
20	Rangamatia	Borio	10.82	6.10	4.72
21	Mandro	Mandro	4.00	1.05	2.95
22	Ranga	Berhait	6.05	3.90	2.15
23	Rohara	Berhait	5.65	1.47	4.18
24	Simda	Berhait	5.75	2.18	3.57

TABLE 4: LONG TERM WATER LEVEL TREND FOR EXISTING HYDROGRAPH NETWORK STATIONS IN SAHEBGANJ DISTRICT (1996 – 2005)

Sl. No.	Location	Pre monsoon trend (m/year)		Post monsoon trend (m/year)		All period (m/year)	
		Rise	Fall	Rise	Fall	Rise	Fall
1	Barhrwa	--	0.128	0.161	--	0.036	--
2	Barhait	0.224	--	0.481	--	0.254	--
3	Borio	--	--	--	--	0.155	--
4	Mandro	--	--	--	--	0.065	--
5	Rajmahal	0.031	--	--	0.252	--	0.166
6	Sahebganj	--	0.184	0.003	--	--	0.016
7	Sakrigali	0.160	--	--	0.135	--	0.069
8	Taljhari	--	--	--	--	--	0.603

TABLE 5: CHEMICAL ANALYSIS RESULT OF WATER SAMPLES COLLECTED FROM KEY OBSERVATION WELLS DURING GROUND WATER MANAGEMENT STUDIES IN SAHEBGAJ DISTRICT (2006 –07)

Well No.	Location	Block	EC in micro siemens/ cm at 25^0c	pH	TH as $CaCO_3$	Ca	Mg	Na	K	HCO_3	Cl	SO_4	NO_3	F
						← mg / l →								
1	Kusma	Berhait	470	7.98	180	34	23	18	1.6	183	28	7.7	13	0.13
2	Berhait	Berhait	430	8.10	175	50	12	12	2.7	189	18	3.3	15	0.05
3	Lakhipur	Pathna	610	8.20	210	40	27	37	0.4	189	78	7.2	4.3	0.25
4	Sahri (Leka Tola)	Pathna	630	8.15	225	72	11	37	1.2	275	39	4.3	8	0.26
5	Berharwa	Berharwa	380	7.98	120	40	4.9	22	7.8	165	21	1.9	0.6	0.2
6	Durgapur	Berharwa	530	7.46	160	44	12	41	1.2	250	21	0.96	0.12	0.26
7	Kathalbari	Udhwa	1430	7.12	530	136	46	75	1.5	512	156	39	8.7	0.42
8	Dhamdhamia	Taljhari	540	7.22	210	56	17	24	0.8	207	25	39	14	0.37
9	Taljhari	Taljhari	1700	7.65	590	184	32	106	15.6	207	369	40	46	0.28
10	Jogi Chak	Rajmahal	1600	7.75	570	80	90	92	15.6	512	178	67	19	--
11	Sahebganj	Sahebganj	1020	7.65	310	76	29	8.3	0.8	305	114	28	37	0.27
12	Kudarjana	Sahebganj	2480	7.77	520	108	61	205	195	976	178	39	31	--
13	Sakrigali	Taljhari	1430	7.85	450	136	27	113	4.3	384	178	63	61	0.4
14	Banjhi	Borio	1120	7.45	370	72	46	78	0.8	329	185	6.7	1.9	0.34
15	Borio	Borio	1000	7.67	280	68	27	74	20	171	163	7.2	65	--
16	Mandro	Mandro	2060	7.48	600	176	39	138	90	610	277	53	--	--

TABLE 6: DETAILS OF GROUND WATER RESOURCES AND STAGE OF GROUND WATER DEVELOPMENT OF SAHEBGANJ DISTRICT AS ON 31st MARCH 2004 (in hectare meters)

Sr. No.	Assessment Unit/ District	Net Annual Ground Water Availability	Gross Ground Water Draft for Irrigation	Gross Ground Water Draft for Domestic and Industrial water Supply	Gross Ground Water Draft for all Uses (4+5)	Allocation for Domestic and Industrial Requirement supply upto next 25 years	Net Ground Water Availability for future irrigation development (3 – 4 – 7)	Stage of Ground Water Development (6/3)*100 (%)	Total ground water assessment unit areal extent (in hectare)	Categorisation for future ground water development (safe/ critical/ over - exploited)
1	2	3	4	5	6	7	8	9	10	11
1	Sahebganj	2214.10	1157.20	157.63	1314.83	237.15	819.75	59.38	12600	Safe
2	Mandro	1494.22	158.62	94.00	252.62	141.42	1194.18	16.91	17300	Safe
3	Borio	2072.31	92.40	129.05	221.45	194.16	1785.75	10.69	27000	Safe
4	Taljhari	1047.05	59.84	11.90	160.74	151.80	835.42	15.35	14500	Safe
5	Rajmahal	1013.92	411.73	192.55	604.28	289.69	312.50	59.60	11700	Safe
6	Udhwa	2511.66	1297.45	204.79	1502.24	308.10	906.10	59.81	13500	Safe
7	Pathna	1502.99	123.64	106.55	230.19	160.30	1219.05	15.32	17300	Safe
8	Barharwa	1622.43	174.24	225.63	399.87	339.46	1108.73	24.65	21000	Safe
9	Barhait	2276.09	200.09	172.16	372.25	259.01	1816.99	16.35	28800	Safe
	Total	**15754.78**	**3675.21**	**1383.25**	**5058.46**	**2081.10**	**9998.47**	**30.89**	**163700**	

FIG–1

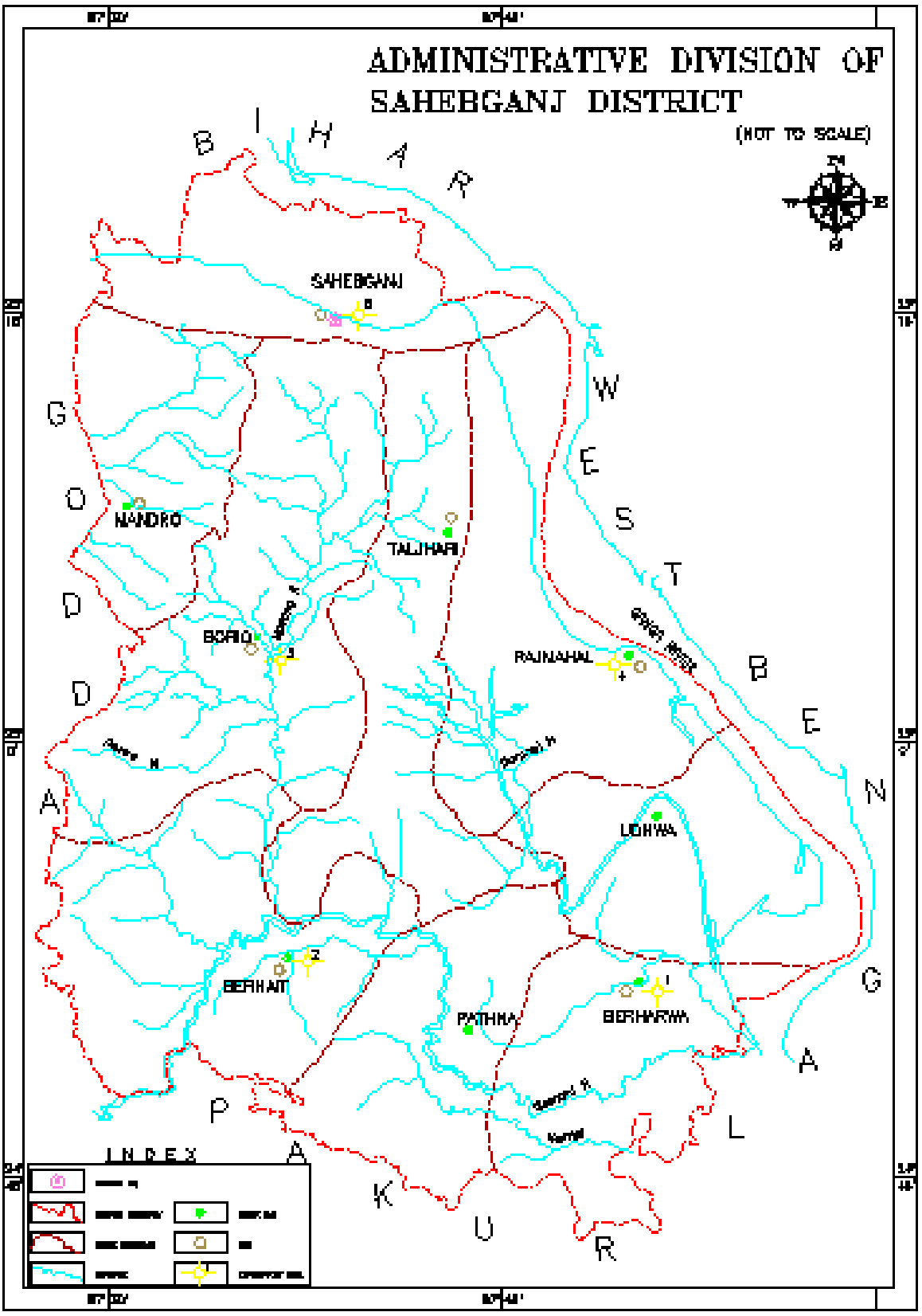

ADMINISTRATIVE DIVISION OF
SAHEBGANJ DISTRICT
(NOT TO SCALE)
BIHAR
WEST BENGAL
GODDA
JHARKHAND
SAHEBGANJ
NANDRO
TALJHARI
BORIO
RAJMAHAL
LOHWA
BERHAIT
PATHNA
BERHARWA
INDEX

Fig-2

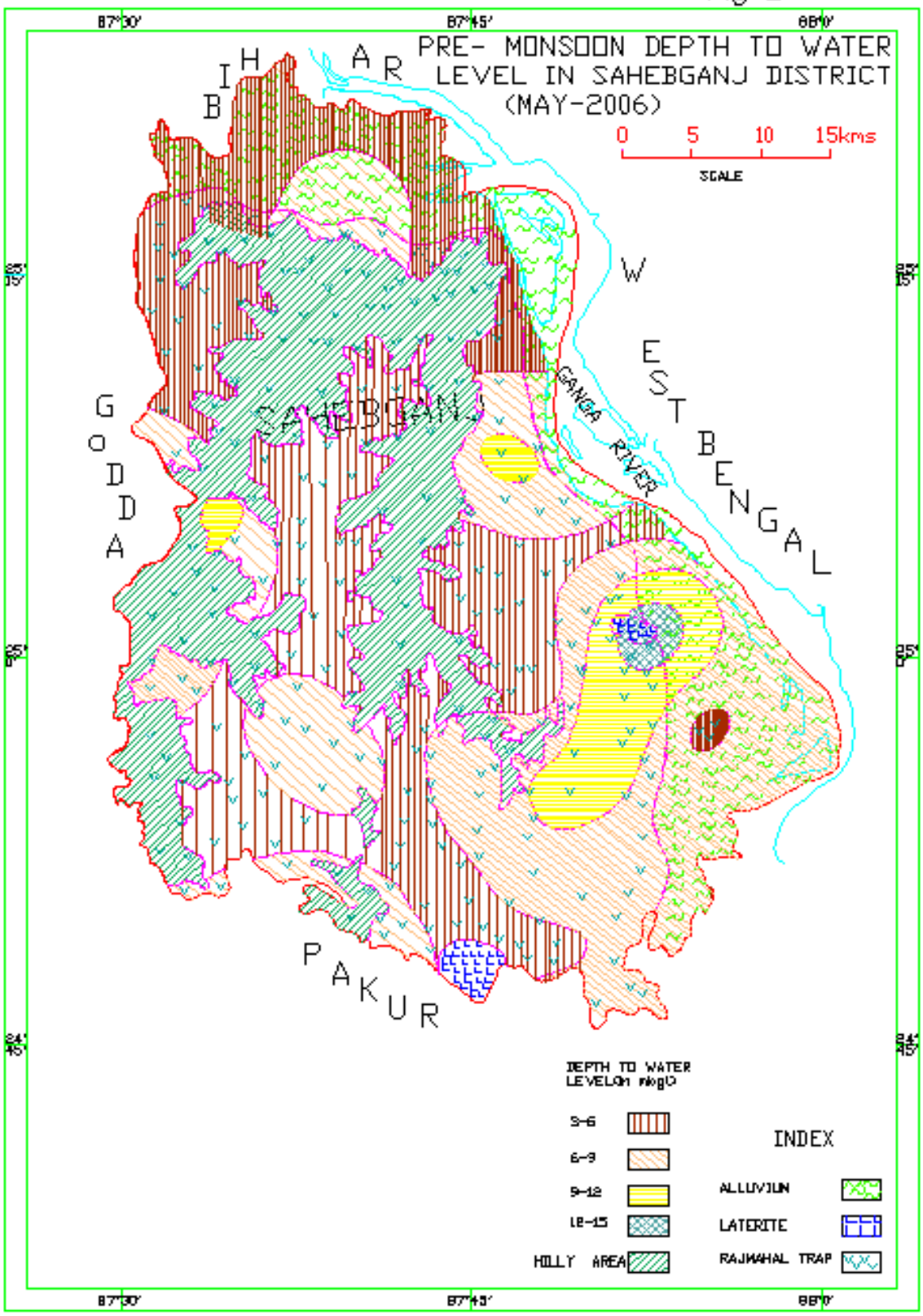
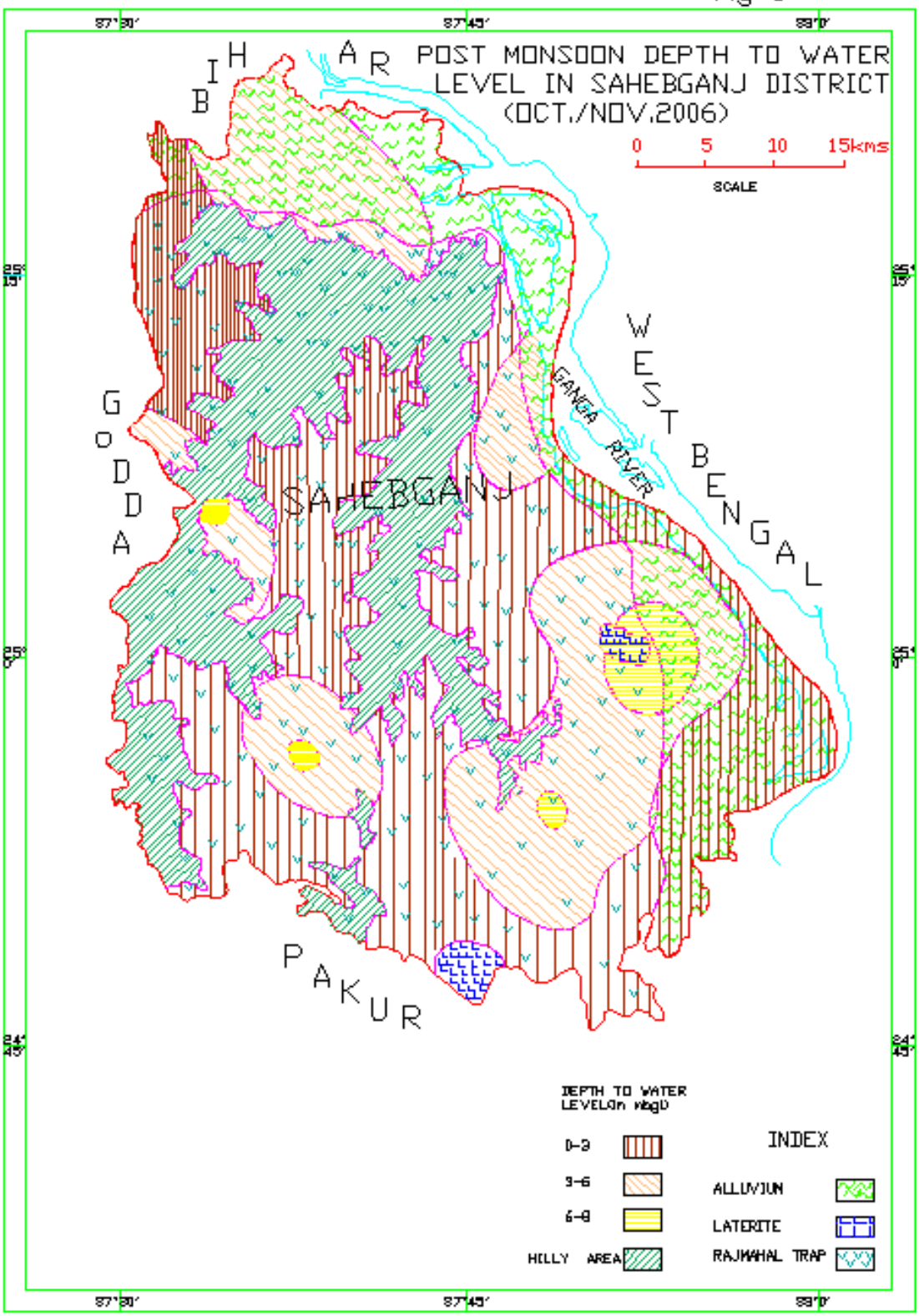
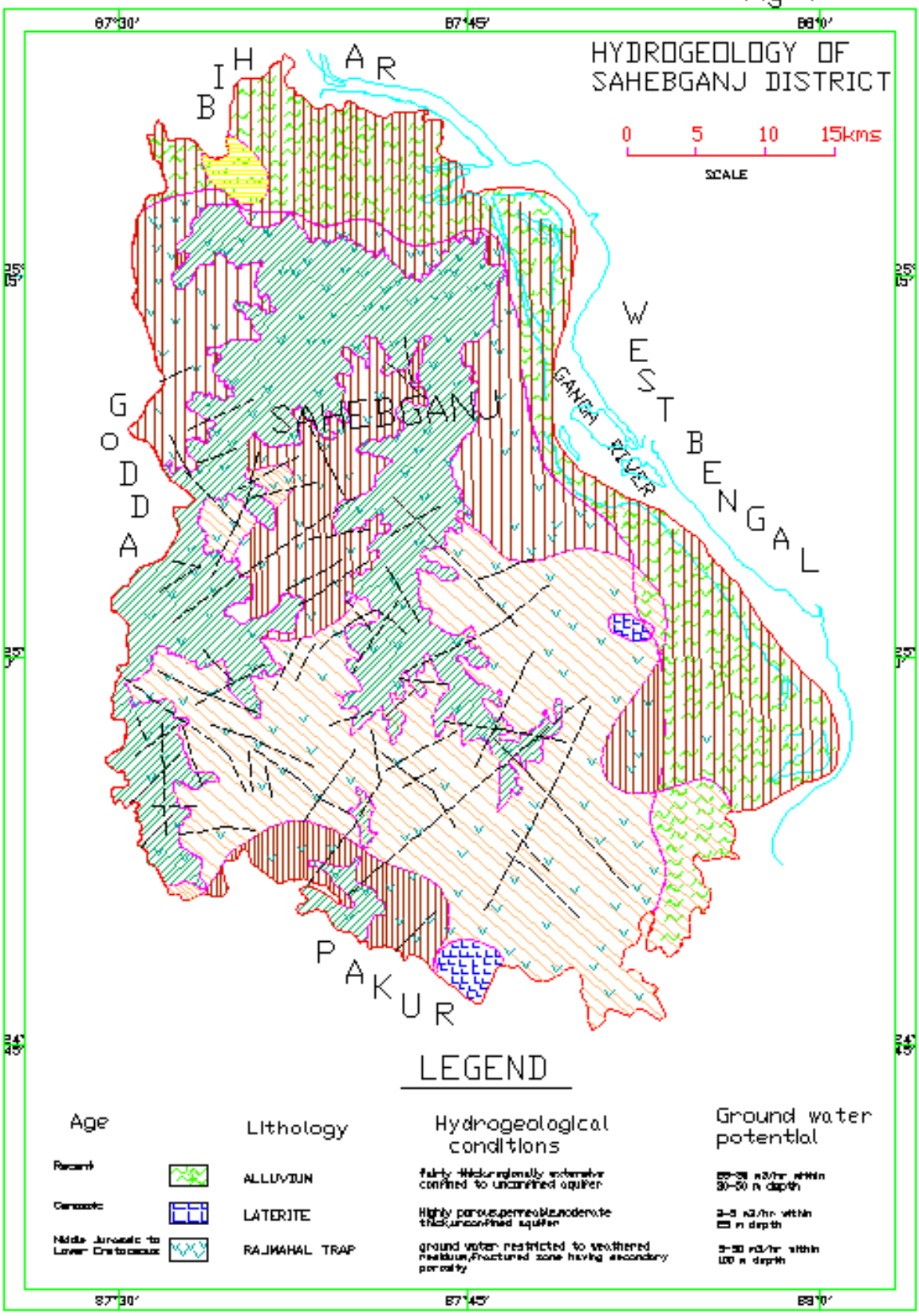

PRE- MONSOON DEPTH TO WATER LEVEL IN SAHEBGANJ DISTRICT (MAY-2006)
0 5 10 15kms
SCALE
BIHAR
WEST BENGAL
GANGA RIVER
GODDA
SAHEBGANJ
PAKUR
DEPTH TO WATER LEVEL in mbgl
3-6
6-9
9-12
12-15
HILLY AREA
INDEX
ALLUVIUN
LATERITE
RAJMAHAL TRAP
87°30'
87°45'
88°0'

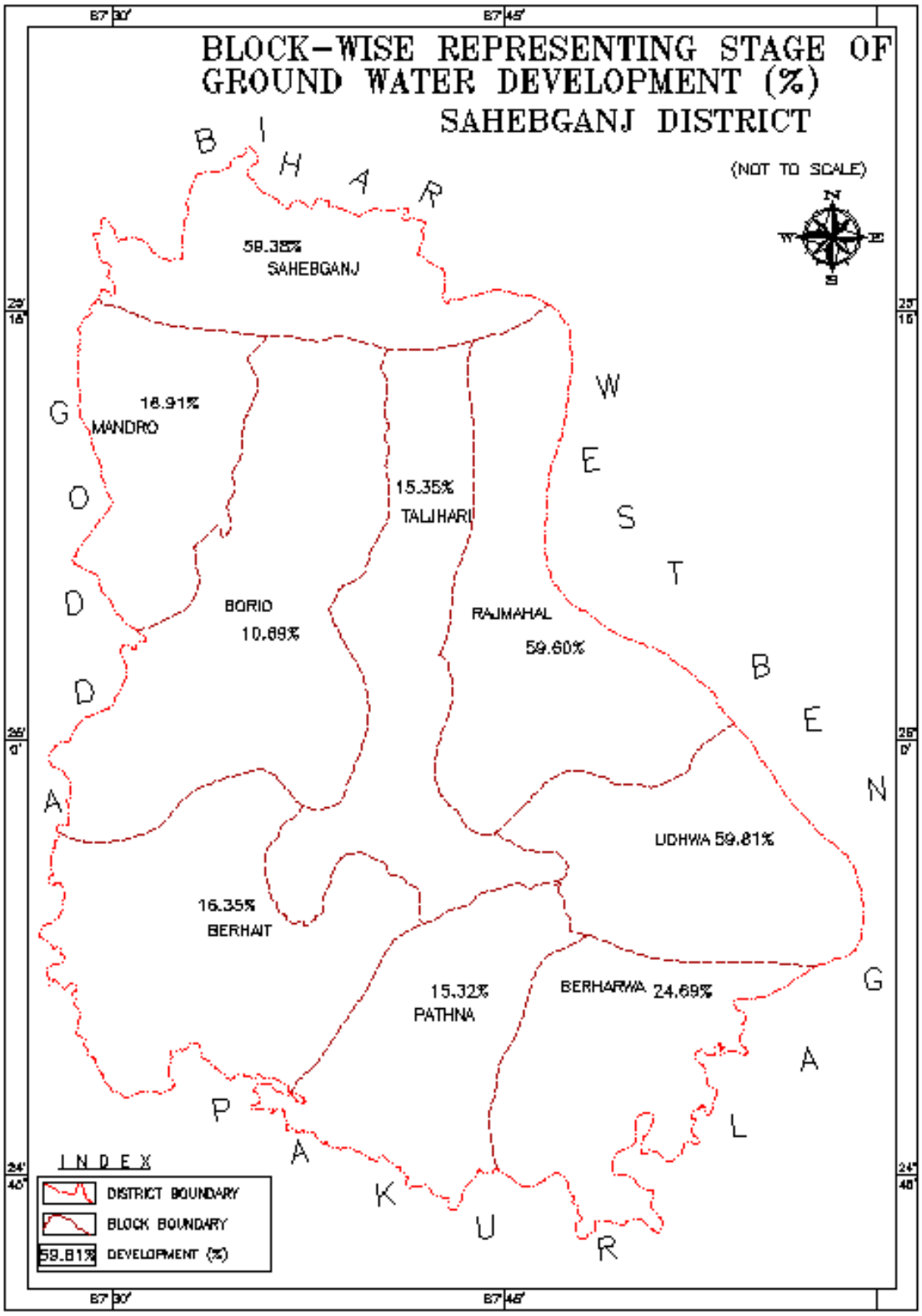
Fig-3


POST MONSOON DEPTH TO WATER LEVEL IN SAHEBGANJ DISTRICT (OCT./NOV.2006)
0 5 10 15kms
SCALE
BIHAR
WEST BENGAL
GODDA
SAHEBGANJ
PAKUR
GANGA RIVER
DEPTH TO WATER LEVEL(in mbgl)
0-3
3-6
6-9
HILLY AREA
INDEX
ALLUVIUM
LATERITE
RAJMAHAL TRAP

Flg-4


HYDROGEOLOGY OF
SAHEBGANJ DISTRICT
0 5 10 15kms
SCALE
BIHAR
WEST BENGAL
JHARKHAND
SAHEBGANJ
GANGA RIVER
PAKUR
LEGEND
Age
Lithology
Hydrogeological conditions
Ground water potential
Recent
ALLUVIUN
Cenozoic
LATERITE
Middle Jurassic to Lower Cretaceous
RAJMAHAL TRAP

FIG–5


BLOCK–WISE REPRESENTING STAGE OF GROUND WATER DEVELOPMENT (%)
SAHEBGANJ DISTRICT
(NOT TO SCALE)
BIHAR
59.38%
SAHEBGANJ
16.91%
MANDRO
15.35%
TALJHARI
BORIO
10.69%
RAJMAHAL
59.60%
UDHWA 59.81%
16.35%
BERHAIT
15.32%
PATHNA
BERHARWA 24.69%
GODDA
WEST BENGAL
PAKAUR
INDEX
DISTRICT BOUNDARY
BLOCK BOUNDARY
59.81% DEVELOPMENT (%)
87°30'
87°45'
25°15'
25°0'
24°45'