

**DISTRICT GROUND WATER BROCHURE OF
RAMPUR DISTRICT, U.P.**

(A.A.P.: 2008-2009)

By

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DISTRICT AT A GLANCE

1. GENERAL INFORMATION

i. Geographical Area (Sq. Km.)	: 2367
ii. Administrative Divisions (as on 2006)	
Number of Tehsil/Block	: 5/6
Number of Panchayat/Villages	: 75/1155
iii. Population (as on 2001 census)	: 1923739
iv. Average Annual Rainfall (mm)	: 967

2. GEOMORPHOLOGY

Major Physiographic Units	: Central Ganga Plain Tarai, Older Alluvium, Younger Alluvium Flood Plain
Major Drainages	: Ram Ganga, Kosi

3. LAND USE (Sq. Km.)

a) Forest area	: 66
b) Net area sown	: 1937
c) Cultivable area	:

4. MAJOR SOIL TYPES

: Loamy, silty soil

5. AREA UNDER PRINCIPAL CROPS (as on 2006-07)

: -

6. IRRIGATION BY DIFFERENT SOURCES

(Area and Number of Structures) (ha)

Dugwells	: -
Tubewells/Borewells	: 912/327, 183811/73618
Tanks/ponds	: -
Canals	: 1431/800 Km.
Other Sources	: 751
Net Irrigated Area	: 186905

	Gross Irrigated Area	:	350599
7.	NUMBER OF GROUND WATER MONITORING WELLS OF CGWB (As on 31-3-2007)		
	No. of Dugwells	:	5
	No. of Piezometers	:	-
8.	PREDOMINANT GEOLOGICAL FORMATIONS		
9.	HYDROGEOLOGY		
	Major water bearing formation	:	Sand, Gravel
	(Pre-monsoon Depth to water level during 2007)	:	4.83-8.68 mbgl
	(Post-monsoon Depth to water level during 2007)	:	2.02-7.10 mbgl
	Long term water level trend in 10 years (1997-2007) in m/yr :		
		Premonsoon :	Rise upto 0.03 m/yr Fall 0.04 to 0.13 m/yr
		Postmonsoon :	Rise Fall 0.05 to 0.26 m/yr
		Annual :	Rise Fall 0.10 to 0.17 m/yr
10.	GROUND WATER EXPLORATION BY CGWB (As on 31-3-2007)		
	No of wells drilled (EW, OW, PZ, SH, Total)	:	EW-4, PH-1, OW-1
	Depth range (m)	:	327-706, 450
	Discharge (litres per second)	:	41-57.2
	Storativity (S)	:	-
	Transmissivity (m ² /day)	:	-
11.	GROUND WATER QUALITY		
	Presence of Chemical constituents more than permissible limit (e.g. EC, F, As, Fe)	:	-
	Type of water	:	-
12.	DYNAMIC GROUND WATER RESOURCES (2004)-in MCM		
	Annual Replenishable Ground Water Resources	:	888
	Net Annual Ground Water Draft	:	684
	Projected Demand for Domestic Industrial Uses upto 2029	:	69.29

	Stage of Ground Water Development	: 77%
13.	AWARENESS AND TRAINING ACTIVITY	
	Mass Awareness Programmes organized	: -
	Date	: -
	Place	: -
	No. of participants	: -
	Water Management Training Programme organized	: NIL
	Date	
	Place	
	No. of participants	
14.	EFFORTS OF ARTIFICIAL RECHARGE & RAINWATER HARVESTING	: NIL
	Projects completed by CGWB (No & Amount spent)	
	Projects under technical guidance of CGWB (Numbers)	
15.	GROUND WATER CONTROL AND REGULATION	: -
	Number of OE Blocks	: 1
	No of Critical Blocks	: -
	No of blocks notified	: -
16.	MAJOR GROUND WATER PROBLEMS AND ISSUES	: One block Chamron is over exploited. Decline in water level trend both in premonsoon & postmonsoon period.

Note : Latest available data may be incorporated.

1.0 INTRODUCTION

District Rampur lies in the Indogangetic Plain in the western part of Uttar Pradesh between latitude 28⁰25' – 29⁰10' N and east longitude 78⁰52' – 79⁰26' E. The area of the district is 2367 sq. km. The district is divided into five tehsils and six blocks. As per census of 2001 total population of the district is 1923739 souls, of which 1023775 are male and 899964 are female. The district is part of Central Ganga Alluvial Plain and is represented by high slopes in the north, which gradually

becomes flatter towards south. The drainage of the area under study is controlled by the river Ram Ganga and its tributaries like Kosi, Ghuga, Bauri, Pilakhau, Saijni, Nahal, Dhimri, Baigul etc. The Ram Ganga river enters the area near south west part of the area and flows in the south eastern direction. The net irrigated area in the district is 186905 hectares. Out of which 99% area is irrigated by ground water & only 1431 ha. is irrigated by canals, having a length of 800 km. in the district.

Table-1

BLOCKWISE TOTAL AREA (HECTARE) IRRIGATED BY DIFFERENT SOURCES IN THE RAMPUR DISTRICT, U.P.

Year/Block	Canals	Tubewell		Wells	Ponds	Others	Total
		Public	Private				
1	2	3	4	5	6	7	8
2004-05	1727	996	185821	3226	238	818	192826
2005-06	1857	1920	125476	35052	452	772	165529
2006-07	1431	912	116646	67165	0	751	186905
Blockwise							
1. Suar	0	0	6829	34493	0	479	41801
2. Bilaspur	1173	187	10085	28869	0	258	40572
3. Saidnagar	215	718	15645	625	0	0	17203
4. Chamraon	0	7	17052	371	0	0	17430
5. Shahabad	0	0	32758	0	0	0	32758
6. Milak	43	0	32323		0	14	32380
Total Rural	1431	912	114692	64358	0	751	182144
Total Urban	0	0	1954	2807	0	0	4761
Total District	1431	912	116646	67165	0	751	186905

Source : 1. Land Record Officer, 2. Economics & Statistics Deptt.

Out of the total ground water irrigation 35% (67165 hectare) is through wells and 65% 116646 hectare is through tubewells. The major part of canal command falls in the blocks of Bilaspur, Milak & Saur. Earlier hydrogeological survey in the district was carried out in (1995-96) by Shri Sunil Kumar scientist 'C'.

2.0 CLIMATE AND RAINFALL

There is no meteorological station in Rampur, hence data of nearest meteorological station in Bareilly has been considered. The climate is subhumid and its is characterised by a hot dry summer and winter. The average annual rainfall of the district is 967 mm. About 85% of the rainfall is received during June to September.

May is the hottest month of the year with mean daily maximum temperature at about 46⁰C and mean daily minimum temperature about 40⁰C. With the advance of the southwest monsoon the day temperature drops appreciably but the night continue to be warm. January is the coldest month with the mean daily maximum temperature at 21⁰C and mean daily minimum temperature about 8⁰C. The mean monthly maximum temperature is 29.4⁰C and mean monthly minimum temperature is 12⁰C.

The air is very humid during the southwest monsoon season to a lesser extent in the post monsoon season. The mean monthly morning relative humidity is 69% and the mean monthly evening relative humidity 51%. Wind are generally light, the mean wind velocity is 5-1 kph. The potential evapotranspiration is 1402.8 mm.

3.0 GEOMORPHOLOGY & SOIL TYPE

Rampur district is a part of Central Ganga Alluvial Plain and represented by high relief in the northern parts, which gradually flatten as towards south. The highest altitude in the district is at village Manunagar (224 mamsl) and lowest being at village Gangapur (172 mamsl) in the Ram Ganga flood plain. The following geomorphic units have been identified.

a) ***Tarai Tract:***

This tract is southerly extension of the Tarai tract of Nanital district. It occupies the northern most part of the district. This tract is marked by shallow water level conditions and flowing wells at places.

- b) ***Meander Flood Plain:***
It is a flat low lying, poorly drained area of little or no relief confined to the river channels of Ram Ganga, Kosi, Pilkhau. Point bars and Sand bars are typical geomorphic features in this unit.
- c) ***Younger Alluvial Plain:***
These plain areas are characterised by a flat to gently sloping and slightly undulating topography and are limited to the areas along Kosi, Pilakhau and Ram Ganga rivers with maximum lateral extension of about 10 Kms. The fluvial landform such as palaeo-channels, meander scars, oxbow-lakes are common features.
- d) ***Older Alluvial Plain:***
The area lying south of Terai tract is older alluvial plain or upland. This plain occupies a much higher elevation than the younger alluvial plain and forms the inter stream area. This plain covers about 80% of the area in the district.
- e) ***Ravinous Tract:***
This tract is formed by erosional activity of runoff water and characterised by the network of gullies along river Kosi, Pilakhau and Ram Ganga.

Soil:

Depending upon the profile of the area various fertile types of soils have been developed in different geomorphic units. Fine textured, organic matter rich soil occur in tarai tract. Loamy soil developed in uplands. Silty soil occur in younger alluvial plains. The type of soil has played a vital role in deciding the land utilization pattern of the district.

4.0 GROUND WATER SCENARIO

4.1 HYDROGEOLOGY:

District Rampur lies over alluvial deposits of the quaternary period brought by river systems of Ganga and Ram Ganga. These comprise sand, silt and clays in various proportions. There are four aquifer groups present in the area down to 440 mbgl. The first aquifer group, comprising fine to medium sand is utilised, mostly for

irrigational purpose follows the top soil and extends down to depth of 60 to 90 mbgl. This aquifer shows presence of clay lenses at places. The first aquifer is followed by a clay layer of varying thickness from 10-24 m. The second aquifer is a intermixing zone in which clay and sand layers are intercalated. This zone extends from 90 m to 160 m at Milak and 125 m to 204 m at Bazpur of Nanital district. The third aquifer occurs at a depth range of 240 to 300 mbgl. The fourth aquifer which is quite thick at Milak extends from 294 m to total explored depth of 440 m. Ground water in shallow zones occurs under unconfined conditions whereas in the deeper zone it occurs under semiconfined to confined conditions.

The depth to water level in year 2007 during premonsoon period varies from 4.83 to 8.68 mbgl. Whereas in postmonsoon period it varies from 2.02 to 7.10 mbgl. The fluctuation in water level between pre & post monsoon period from 0.0 to 3.23 m. The long term water level trend of NHMS well for last 10 years (1997-2007) shows fall in water level from 10 cm/year to 17 cm/year. The maximum decline is observed at Tanda Urmatnag. The tarai belt which occurs only at few places in the northern part, at places shows artesian conditions. The discharge of flowing well varies from 0.3 lps (litre per second) to 12 lps. However non flowing wells in the Tarai belt tapping 10 to 40 meter of saturated granular zone may yield upto 40 lps. In flood plain areas the tubewells tapping shallow aquifers down to 90 meter yield at the rate of 10 to 20 lps. The deep tubewell tapping 30 to 45 meter of granular zone shows a yield of 40 to 57 lps. The Central Ground Water Board has constructed 4 EW (Exploratory Wells one SH (Slim Hole) and one OW (Observation Well) in the district. The depth ranges from 327 to 706 meter and discharge varies from 41 to 58 lps for normal drawdown (Annexure-III).

4.2 GROUND WATER RESOURCES:

As per dynamic ground water resource of Rampur district as on 31.3.2004 the net annual ground water availability is 88848.97 ham (Table-2). The existing gross ground water draft is 68409.82 ham & the stage of ground water development is 77%. One block Chamrana is over exploited with stage of ground water development 113%. All other blocks are in safe category, but the stage of development varies from 57.13 to 89.68%.

4.3 GROUND WATER QUALITY:

The electrical conductivity is in range of 232 to 900 $\mu\text{s}/\text{cm}$ at 25°C . The total hardness is in the range of 250-280 mg/l as calcium carbonate. The Fluoride is also very low and within permissible range of 0.11 to 0.20 mg/l. The Nitrate content varies in range of 1.7 to 48 mg/l., which is also within permissible range.

Table-2

**DYNAMIC GROUND WATER RESOURCES OF RAMPUR DISTRICT, UTTAR PRADESH
AS ON 31.03.2004**

Sl. No.	Assessment Units- Blocks	Annual Ground Water Recharge (in ham)	Net Annual Ground Water Availability (in ham)	Existing Gross Ground Water Draft for All Uses (in ham)	Net Ground Water Availability for Future Irrigation Development (in ham)	Stage of Ground Water Development (in %)	Category of Block	Number of Feasible Deep Tubewell	Number of Feasible Shallow Tubewell	Shallow Boring Pumpsets
<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>	<i>8</i>	<i>9</i>	<i>10</i>	<i>11</i>
1.	Bilaspur	24085.17	21676.65	12382.93	8835.09	57.13	Safe	345	2454	-
2.	Chamraua	8880.83	7992.74	9062.34	-1405.23	113.38	Over Exploited	-	-	-
3.	Milak	17089.61	15380.65	13125.65	1768.87	85.34	Safe	69	491	-
4.	Saidnagar	8640.32	7776.29	6651.80	878.13	85.54	Safe	34	243	-
5.	Shahabad	18094.88	16285.39	9487.60	6446.40	58.26	Safe	251	1790	-
6.	Swar	21930.27	19737.24	17699.50	1606.06	89.68	Safe	62	446	-
	Total	98721.07	88848.97	68409.82	18129.31	77.00		761	5424	-

The Arsenic concentration is within permissible limit (10ppb) with maximum concentration of 4 ppb in ground water samples of the district.

4.4 STATUS OF GROUND WATER DEVELOPMENT:

Rampur is a highly developed district. Agriculture is the main source of populace. To meet the requirement of the irrigation, ground water and surface water are being utilized. The net irrigated area of the district is 186905 ha which is 96% of net cultivated area. 98% of net irrigated area is irrigated by ground water by means of 327 state tubewells 49 Rahat and 73618 pumpsets (shallow private tubewells and borings). The stage of ground water development is 77%. The stage of ground water development varies from 57% (in Bilaspur block) to 113% (in Chamraon block). The Chamraon block is over exploited. All other blocks are in safe category. The total length of cannal is 800 Km. irrigating 1431 hectare area in (2006-07)

Table-3

BLOCKWISE SITUATION OF WATER SUPPLY IN THE VILLAGES OF DISTRICT RAMPUR, UTTAR PRADESH

Year/Block	Village under water supply by Tap/ Hand pump India mark 2				No. of villages using general sources				
	Fully Covered	Partially Covered	Benefited Population	Well	General Hand pump	Hand pump India Mark 2	Tap	Other	Total (fields 5 to 9)
1	2	3	4	5	6	7	8	9	10
2005-06	1092	0	1447333	0	0	1092	0	0	1092
2006-07	1092	0	1446802	0	0	1092	0	0	1092
2007-08	1089	0	1443817	0	0	1089	0	0	1089
Blockwise 2007-08									
Suar	250	0	358309	0	0	250	0	0	250
Bilaspur	223	0	196829	0	0	223	0	0	223
Saidnagar	112	0	182923	0	0	112	0	0	112
Chamraon	120	0	190889	0	0	120	0	0	120
Shahabad	187	0	256855	0	0	187	0	0	187
Milak	197	0	258012	0	0	197	0	0	197
Total Rural	1089	0	1443817	0	0	1089	0	0	1089
Total Urban	0	0	0	0	0	0	0	0	0
Total Distt.	1089	0	1443817	0	0	1089	0	0	1089

The drinking water need is fulfilled by tubewells (pipeline scheme) and India Mark II hand pumps. In the year (2006-07) 1089 villages have Indian Mark II hand pumps benefiting 1443817 persons (Table-3).

5.0 GROUND WATER MANAGEMENT STRATEGY

5.1 GROUND WATER DEVELOPMENT:

The present level of ground water development is 77% leaving net ground water availability for future irrigation development is 18129 ham. for future development which may create an additional irrigation facilities in 36258 ha land. Keeping in view the availability of ground water resource for future development, blockwise ground water development scope for future has been worked out (Table-2). It is further proposed to exploit 50% of balance through state tubewell and 50% through private tubewells (shallow tubewells). Adopting this formulae it is possible to construct 761 state tubewell and 5224 private tubewells. In over exploited Chamraon block emphasis should be given for canal irrigation and artificial recharge to ground water.

6.0 GROUND WATER RELATED ISSUES AND PROBLEMS

WATER LEVEL DECLINE:

The Chamraon block of Rampur district falls under over exploited category and long term water level trend show declining trends in pre and post monsoon period. The net ground water availability of the Chamraon block is 7992.74 ham and gross ground water draft is 9062.34 ham. Hence ground water development is 113%. For arresting the decline in water level, suitable artificial recharge, water conservation techniques should be adopted, with special emphasis on use of surface water for irrigation.

On supply side too, appropriate intervention are required such as growing crops that require less water, using sprinkler / drip irrigation, ensuring minimum

conveyance losses. All these measures would help in reducing ground water draft, thereby bringing down stage of development.

7.0 RECOMMENDATIONS

In conformity with observations and conclusions drawn the following recommendations are made.

- (i) The Chamraon block is in overexploited category hence artificial recharge structure and water conservation structure should be constructed at suitable sites for arresting decline in water level. More emphasis should be given for surface water irrigation (canal and ponds).
- (ii) To minimize the overstress in Aquifer Group I, it is recommended to plan water supply tubewell tapping deeper aquifer groups in future for various uses.

DEPTH TO WATER LEVEL (PRE – POST MONSOON 2007)**DISTRICT RAMPUR, UTTAR PRADESH**

District Rampur : NHMS Wells

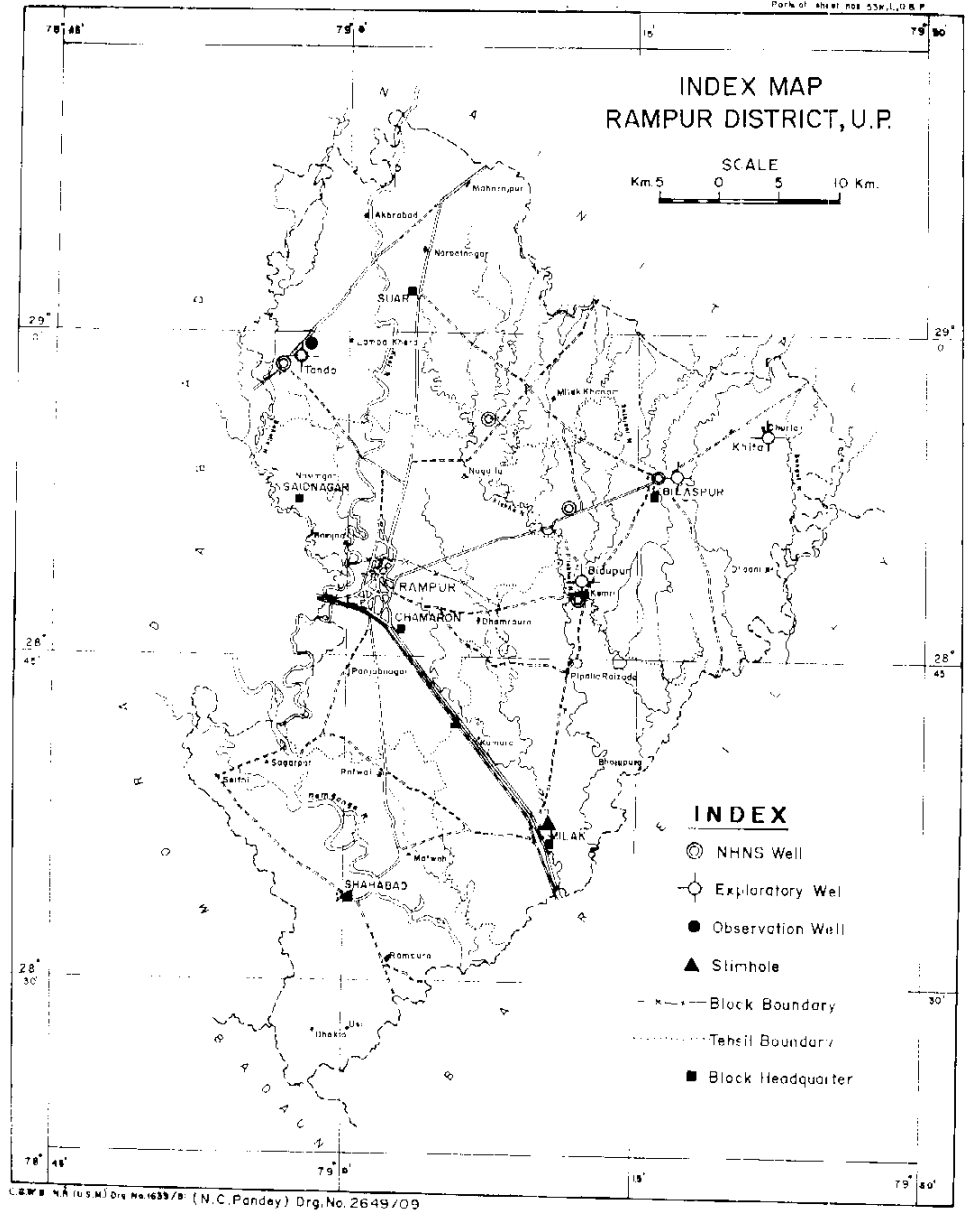
Sl. No.	Well Name	Premonsoon (mbgl)	Postmonsoon (mbgl)	Fluctuation (m)
1.	Azimnagar Thana	7.10	7.10	0
2.	Kemri	8.68	-	-
3.	Tanda	4.83	3.65	1.18
4.	Tanda Urmatnaag	7.05	6.10	0.95
5.	Thunapur	5.25	2.02	3.23

LONG TERM WATER LEVEL TREND (1998-2007)**RAMPUR DISTRICT, U.P.**

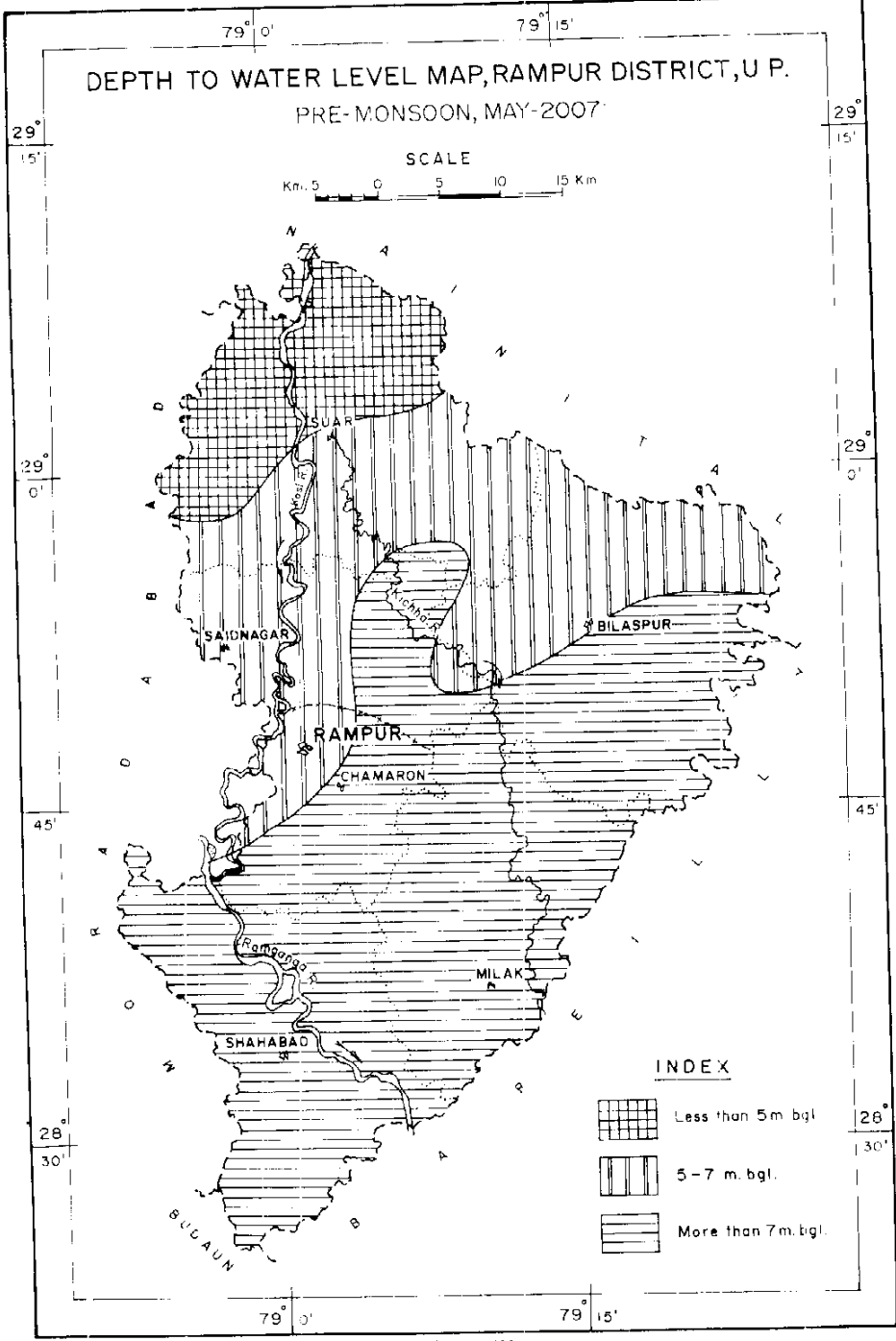
Sl. No.	Location	Premonsoon			Postmonsoon			Annual		
		Data Points	Rise (m/yr.)	Fall (m/yr.)	Data Points	Rise (m/yr.)	Fall (m/yr.)	Data Points	Rise (m/yr.)	Fall (m/yr.)
1.	Tanda Urmatnaag	9		0.1371	10		0.2680	37		0.1715
2.	Tanda	8		0.0484	8		0.2162	39		0.1662
3.	Thunapur	10	0.0377		10		0.0549	38		0.1038

LONG TERM WATER LEVEL TREND (1998-2007) IN RAMPUR DISTRICT, U.P.

S. No.	Location/ Latitude/ Longitude/ Toposheet	Type of Well	Drilled Depth/ Bedrock (mbgl)	Zones Tapped (mbgl)	Water Level (mbgl)	Yield (lpm)	Draw Down	Geology	Electrical Conductivity (micromhos/cm at 25 ⁰ C)	Chloride (mg/l)
1.	Khata	EW	450.00	157-163 176-182 210-222 228-234 286-292 298-310	-	-	-	Alluvium	-	-
2.	Raura Kalan 28 ⁰ 37'24" 79 ⁰ 37'52"	SH	450.00	257-271 273-383	-	-	-	Alluvium	808	25
3.	Bidpura	EW	706.75	272-284 281-291 296-302 305-317 323-332	2.42	3478	6.88	Alluvium	-	-
4.	Tanda	EW	325.25	114-120 175-184 206-212 239-241 306-315	6.13	2483	4.25	Alluvium	-	-
5.	Tanda	OW	325.25	298-310	-	-	-	Alluvium	-	-
6.	Bilaspur	EW	450 312	156-162 207-213 236-242 250-254 266-272	9.00	2500	-	Alluvium	-	-



C.S.W. 44 (U.S.M.) Drg. No. 1633/9 (N.C. Pandey) Drg. No. 2649/09



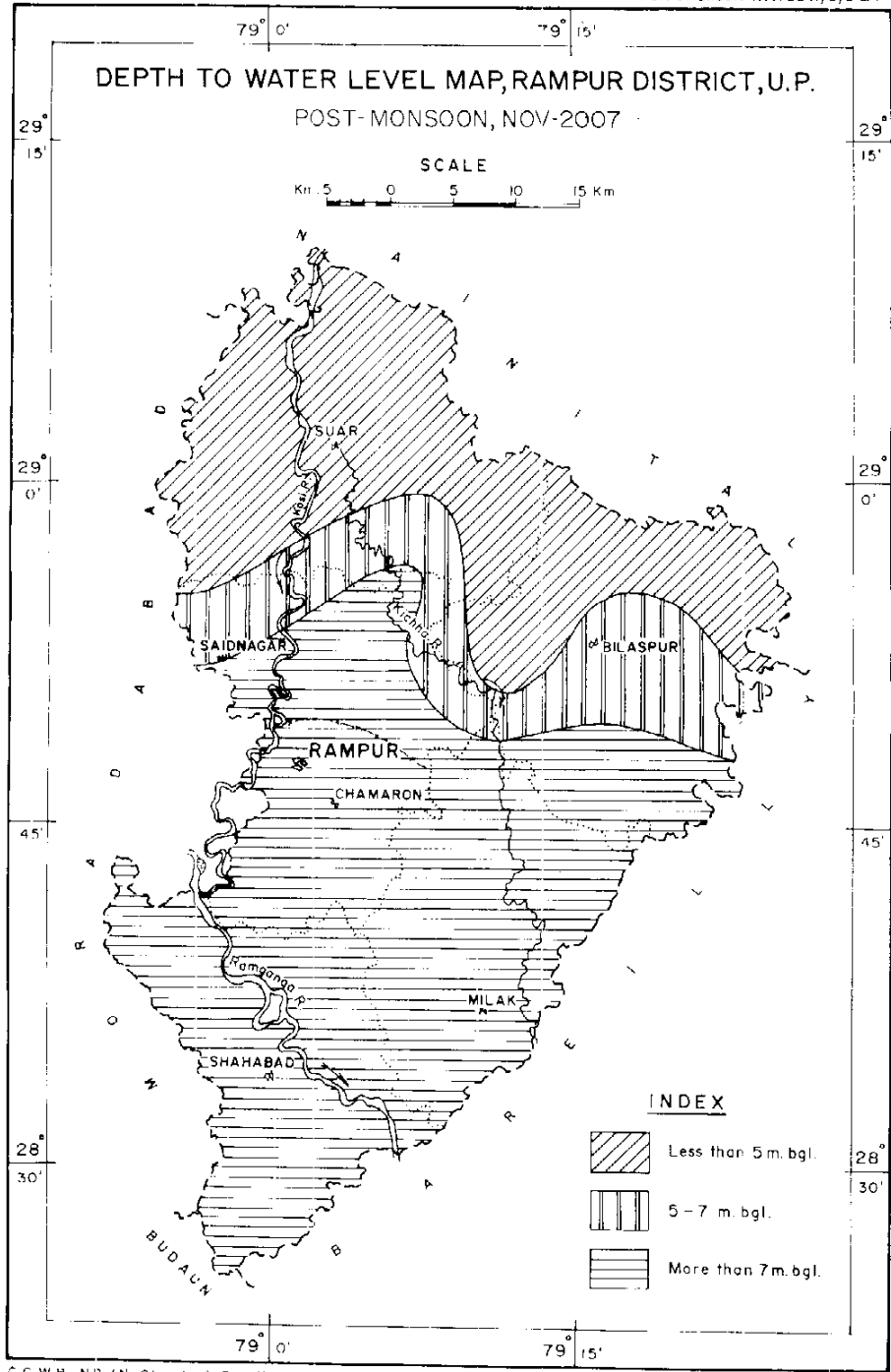
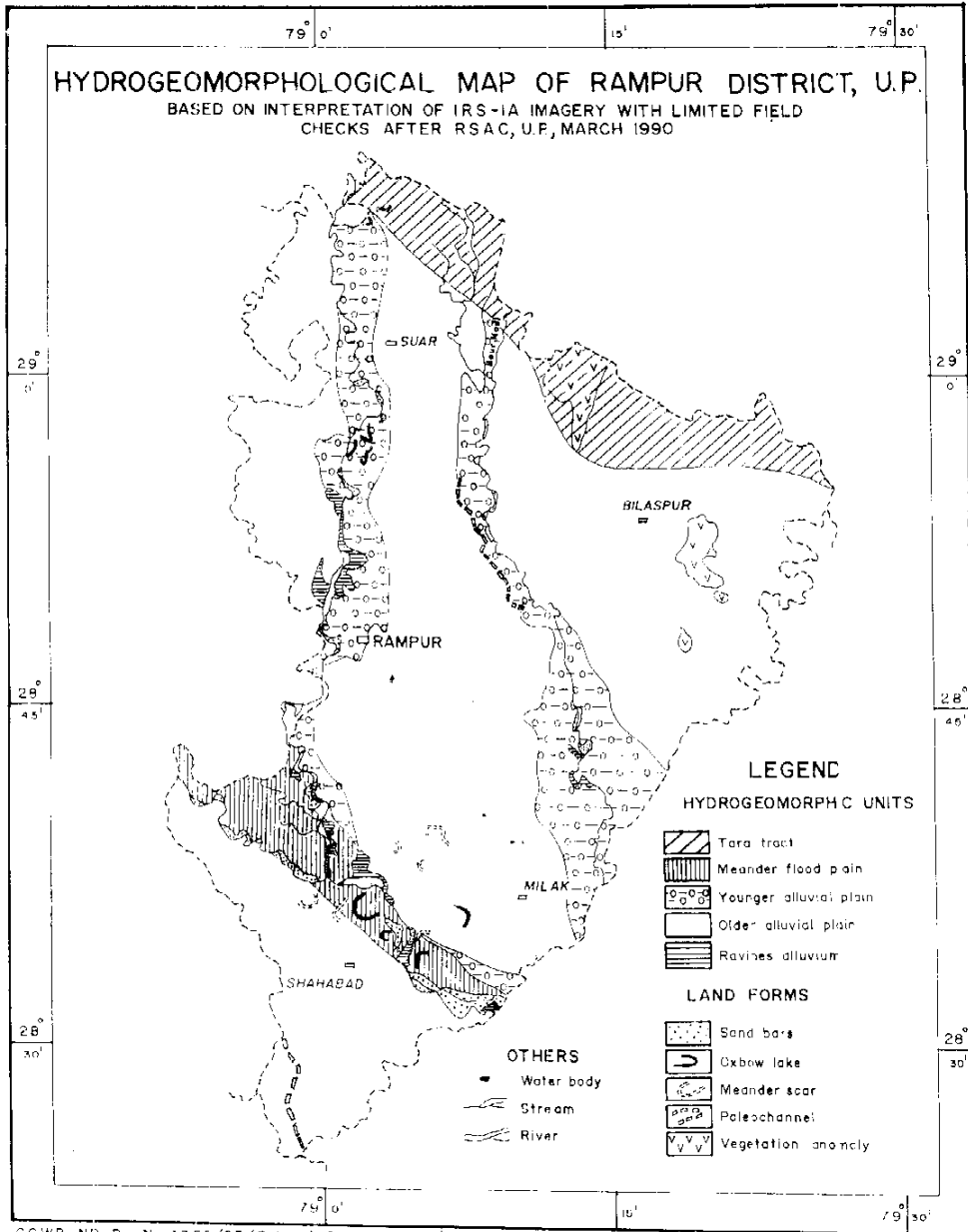


Fig.- 4



CGWB, NR, Drg No- 73/50/95 (Rakesh), Drg no.2652/2009

