

DISTRICT BROCHURE OF KANPUR NAGAR DISTRICT, U.P.

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

By

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Scientist 'B'

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DISTRICT

DISTRICT AT GLANCE

1. GENERAL INFORMATION

i. Geographical Area (Sq. Km.)	: 3155.40
ii. Administrative Divisions (as on 31.03.2009)	:
Number of Tehsil/Block	3/10
Number of Panchayat/Villages	557/1003
iii. Population (as on 2001 census)	: 41,67,999
iv. Average Annual Rainfall (mm)	: 821.90

2. GEOMORPHOLOGY

Major Physiographic Units	: Central Ganga alluvial plain
Major Drainages	: Ganga, Pandu

3. LAND USE (Sq. Km.)

a) Forest area	: 56.56
b) Net area sown	: 1856.67

4. MAJOR SOIL TYPES

: Alluvial, Sandy

5. AREA UNDER PRINCIPAL CROPS (as on 2005-2006)

: 1593.37

6. IRRIGATION BY DIFFERENT SOURCES

(Areas and Number of Structures) (Sq.Km.)

Dugwells	: 9.04
Tubewells, Borewells	: 50.25/293, 916.11/54160
Tanks/ponds	: 4.56
Canals	: 323.08/822 Km.
Other Sources	: 0.29
Net Irrigated Area	: 1303.33
Gross Irrigated Area	: 1786.74

7. NUMBER OF GROUND WATER MONITORING WELLS OF CGWB (As on 31-3-2009)

No. of Dugwells	: 11
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8. PREDOMINANT GEOLOGICAL FORMATIONS

: Sand, Silt, Clay, Kankar & Gravel

9. HYDROGEOLOGY

Major water bearing formation	: Gravel, sand and silt.
(Pre-monsoon Depth to water level during 2008)	: 2.20-27.13 mbgl
(Post-monsoon Depth to water level during Nov'2008)	: 2.08-27.13 mbgl

	Long term water level trend in 10 years (1999-2008) in m/yr :	Rise 7.0 – 43.0 cm/yr.
	Premonsoon	Fall 04.0 – 63.0 cm/yr.
	Long term water level trend in 10 years (1999-2008) in m/yr :	Rise 08.0 cm/yr.
	Postmonsoon	Fall 04.0 – 84.0 cm/yr.
10.	GROUND WATER EXPLORATION BY CGWB (As on 31-3-2007)	
	No of wells drilled (EW)	: 15
	Depth range (m)	: 377 – 508 mbgl
	Discharge (litres per second)	: 31.5 – 65.23
	Storativity	: 0.000029 – 0.00086
	Transmissivity (m ² /day)	: 357 - 6458
11.	GROUND WATER QUALITY	: Good
	Presence of Chemical constituents more than permissible limit (e.g. EC, F, As, Fe)	: Fe – 6.236 mg/l As – upto 42 ppb
12.	DYNAMIC GROUND WATER RESOURCES (2004)-in MCM	
	Annual Replenishable Ground Water Resources	: 926.61
	Gross Annual Ground Water Draft	: 623.93
	Projected Demand for Domestic Industrial Uses upto 2029	: 53.05
	Stage of Ground Water Development	: 67.33%
13.	AWARENESS AND TRAINING ACTIVITY	
	Mass Awareness Programmes organized	: One
	Date	: 2000 – 2001
	Place	: Kalyanpur Block Office
14.	EFFORTS OF ARTIFICIAL RECHARGE & RAINWATER HARVESTING	:
	Projects completed by CGWB (No & Amount spent)	: Nil
	Projects under technical guidance of CGWB (Numbers)	: 2 (BSNL building & R.B.I. Building in Mall road)
15.	GROUND WATER CONTROL AND REGULATION	:
	Number of OE Blocks	: Nil
	No of Critical Blocks	: Nil
	No of blocks notified	: Nil

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1.0 INTRODUCTION

The Kanpur Nagar district lies in middle of Uttar Pradesh State. It lies between 25°55' and 27° North latitude and 79°30' and 80°35' East longitudes in Survey of India Toposheet No. 54N and 63B. The total geographical area of the district is 3155 sq.km. with three number of Tehsil and the numbers of blocks viz. Kalyanpur, Bidhnu, Sarsaul, Bilahaur, Kakawan, Sivrajpur, Chaubepur, Patara, Bhitrgaon and Ghatampur. The major parts of the area is almost a flat plain with some minor undulations. The river Ganga and Yamuna with their tributaries form the drainage system (Dendritic type). As per census of 2001 the total population of the district is 4167499 persons having 2247216 male and 1920783 female. In year 2005-06 the Net sown area is 185667 hectare and Net Irrigated area is 130333 hectare. The area irrigated by Canal is 32308 hectare where as by ground water is 96636 hectare (74%). The total length of Canal in the district is 822 km. The total number of state tube wells and boring wells are 293 and 54160 respectively. As per (2005-06) statistical data Land Use Pattern in the district is as follows:

Table-1

LAND USE PATTERN IN KANPUR NAGAR DISTRICT (2005-06)

Sl. No.	Land Use Pattern	Area (Hectare)
1.0	Total Area	299435
2.0	Forest	5656
3.0	Agriculture Barren Land	17524
4.0	Present Fallow Land	30747
5.0	Other Fallow Land	7353
6.0	Gross Sown Area	268272
7.0	Gross Irrigated Area	178674

The water supply investigation were carried out by Geological Survey Of India in year 1971-72. The hydrogeological investigation in Kanpur metropolis were carried out by Sh. A. Subramaniam (C.G.W.B.) during F.S.P. 1976-77, 1977-78. The Reappraisal survey carried out by Sh. A.K. Srivastava and Sh. A.K. Bhargawa C.G.W.B. N.R. during F.S.P. 1986-87 and by Sh. A.V. Singh & AK. Bhargawa in year 1996-97. Besides above work exploratory tubewell and deposit tubewells were constructed by C.G.W.B. in Kanpur Nagar district.

2.0 CLIMATE & RAINFALL

The average annual rainfall in the district is 821.9 mm. The climate is sub humid and it is characterized by hot summer and general dryness except in the south west monsoon. About 90% of rainfall takes place from third week of June to September. During monsoon surplus water is available to deep percolation to ground water.

May and early part of June constitute the hottest part of the year. The mean daily maximum temperature in May is 41.7⁰C. The mean daily minimum temperature is 27.2⁰C and maximum temperature rises up to 45⁰C or over. With the onset of the monsoon in June the day temperature drops down appreciably. The January is the coldest month with mean daily maximum temperature at 22.8⁰C and mean daily minimum temperature at 8.6⁰C. The mean monthly maximum temperature is 32.2⁰C and mean monthly minimum temperature is 19.5⁰C.

During monsoon season the relative humidity is high and in summer season, humidity is less. The mean monthly morning relative humidity is 69% and mean monthly relative humidity is 50%.

The winds are generally light with some strength in force during summer and early monsoon season. The mean wind velocity is 9.6 k.m.p.h. The potential Evapotranspiration is 1660.9 mm.

3.0 GEOMORPHOLOGY & SOIL TYPES

The Kanpur Nagar district is part of Indo Gangetic Plain. The clay, silt, gravel and sands of different grades are main sedimentary constituents. The generalized geological succession is as follows:

Table-2

GEOLOGICAL SUCCESSION IN KANPUR NAGAR DISTRICT

Period	Age	Land Form (Geomorphology)	Rock Type
QUATERNARY	Upper Pleistocene to Recent	Newer Alluvium	Fine Sand and Clays
	Lower Pleistocene to Upper Pleistocene	Older Alluvium	Sand of different grades and clay mixed with Kankar
-----UNCONFORMITY-----			
Bundelkhand Granite (Archean), Vindhyan Sandstone (Proterozoic)			

The older alluvium, alluvial deposit mostly occurring in the central part were deposited during lower to Upper Pleistocene period. The newer alluvium were deposited during Upper Pleistocene to Recent period mostly occurring along the course of rivers.

The soil of the district exhibits a great variety of composition and appearance. The major part of the district consists of ordinary soils known locally as Bhur and Sand on ridges, Matiyar or clay in depressions and Domat or Loam in the Plains. The 'Reh' prevails in the clay dominant areas.

4.0 GROUND WATER SCENARIO

4.1 HYDROGEOLOGY:

The Kanpur Nagar District is part of Indo Gangetic Plain. The silt, gravel, and sands of different grades are main water bearing formations. The ground water occurs

under unconfined condition in phreatic zones and under confined condition in deeper zones. The sedimentological constitution of the subsurface granular zones shows remarkable variation in the depth and the nature of occurrence in north and southern part of the district. In southern part specially along Yamuna river, feldspar-quartz, Jasper sands and gravel (Mourum) are the main constituents of the granular zones that occurs comparatively at shallow levels i.e. 24 to 57 mbgl whereas in the northern parts along the Ganga river, these reworked sedimentary formations are existing at deeper levels i.e. 265 to 310 mbgl. The provenance of these sedimentary formations is mainly Bundelkhand Granite Complex of Archean age and Vindhyan Sandstone of Puranas. In the northern part the silt and clay sediments forming thin lensoid beds are frequently occurring in depth.

Depth to Water Level:

The prevailing hydrogeological conditions and geomorphology controls the water table configuration. The water level measured four times in a year in C.G.W.B. National Hydrograph Network Stations in Kanpur Nagar district. There are eleven hydrograph stations in Kanpur Nagar district. The premonsoon period (year 2007) depth to water level varies from 2.20 to 27.13 mbgl whereas in postmonsoon period it varies from 2.08 to 27.13 mbgl (Table-3). The depth to water level is shallow along canal command area while it is deeper along river Yamuna.

Water Level Fluctuation:

In year the water level fluctuation varies from 0.0 to 1.70 m.

Long Term Water Level Trend:

The long term water level trend for last ten years (1998-2007) shows annual declining trend in 14 numbers of hydrograph stations. It varies from 10 cm/y to 88cm/y. Only one hydrograph station Motipura showing annual rising trend (11cm/y). In pre-monsoon period three hydrograph stations shows rising trend & these are Naramau (07 cm/y), Motipura (19 cm/y) and Chubepur (43cm/y) and rest are showing declining trend which varies from 4 to 63 cm/y. In post monsoon period except Motipura all hydrograph stations are showing declining trend and it varies from 4 to 84 cm/y.

Aquifer Parameters & Specific Yields:

In the district shallow aquifer in the depth range of 20-96 mbgl have been 'tapped' or utilized through cavity and strainer wells. The specific yield of unconfined aquifer is 12 %. The deep drilling down to basement by C.G.W.B. (503 mbgl at Panki) has revealed the existence of potential granular zones in the depth range of 250-450 mbgl. The transmissivity of deeper aquifer varies between 1705 to 6000 m²/d. The storativity values varies from 0.000029 to 0.00086

Table-3

WATER LEVEL FLUCTUATION (PRE AND POST) MONSOON N.H.S./C.G.W.B. IN KANPUR NAGAR DISTRICT FOR THE YEAR 2007

Sl. No.	Well Name	Pre- Monsoon S.W.L. (mbgl)	Post-Monsoon S.W.L. (mbgl)	Fluctuation (meter)
1.	Bhithargaon	11.21	-	-
2.	Bidhnu	5.15	3.63	1.52
3.	Bithoor	11.40	10.04	1.36
4.	Chaubepur	12.30	12.10	0.20
5.	Motipura	2.20	1.70	0.50
6.	Niwada Dhamni	5.92	4.27	1.65
7.	Patara	9.65	7.95	1.70
8.	Sachendi	5.77	4.35	1.42
9.	Sakhajanwari	27.13	27.13	0.00
10.	Sarh	3.74	2.08	1.66
11.	Sheoli	5.62	5.00	0.62

4.2 GROUND WATER RESOURCES:

The block wise estimation of Ground Water Resources has been done as per GEC-1997 Methodology. As on 31.3.2004 the Net Annual Ground Water Availability of the district is 926.61 MCM. The existing Gross Ground Water Draft is 623.93 MCM. The stage of ground water development is 67.33% (Table-5). The Net Ground Water Availability for future irrigation development is 286.28 MCM. The Sivrajpur Block is in semi critical category. All other blocks are in safe category.

Table- 4

LONG TERM WATER LEVEL TREND (1998 – 2007)

State : Uttar Pradesh
District : Kanpur

SL. No.	Location	Pre-Monsoon			Post-Monsoon			Annual		
		Data Points	Rise (m/year)	Fall (m/year)	Data Points	Rise (m/year)	Fall (m/year)	Data Points	Rise (m/year)	Fall (m/year)
1.	Bithatu	9		0.3787	9		0.8897	34		0.5679
2.	Sachendi	10		0.0435	10		0.1306	38		0.1040
3.	Maharajpur 2	6		0.1222	5			20		
4.	Niwada Dhamni	10		0.0680	10		0.2481	38		0.2147
5.	Sarth	10		0.1842	10		0.0472	38		0.1067
6.	Sheoli	9		0.0737	9		0.2442	33		0.1500
7.	Narmau (New)	7	0.0713		7		0.4188	27		0.3242
8.	Samadhi Naubast	9		0.3782	9		0.5046	35		0.4892
9.	Motipura	6	0.1951		7	0.0893		26	0.1115	
10.	Kanpur	7		0.2312	7		0.6132	27		0.5223
11.	Chaubepur 1	8	0.4341		10		0.5933	34		0.3204
12.	Bithoor – Nganj	9		0.2943	10		0.2783	45		0.2205
13.	Bidhnu	10		0.2347	10		0.0972	38		0.2086
14.	Sakha Janwari	8		0.3590	9		0.7698	37		0.5962
15.	Patara	9		0.4659	10		0.6102	37		0.5829
16.	Anupur	3			4			14		
17.	Bhitargaon	9		0.6377	8		0.8440	32		0.8868

Table-5

DYNAMIC GROUND WATER RESOURCES IN KANPUR DISTRICT, U.P.

Sl. No.	Block	Annual ground water recharge (in ham)	Net ground water availability (in ham)	Existing 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 state tubewells	Number of feasible pumpsets & borings
1.	Bhitargaon	10882.69	9794.42	7402.01	2310.28	75.57	Safe	90	641
2.	Bidhnoo	9131.81	8675.22	5342.17	3093.07	61.58	Safe	120	859
3.	Bilhour	7658.33	7275.41	4510.86	2645.96	62.00	Safe	103	734
4.	Chaubepur	9738.85	8224.96	6583.46	1548.02	80.04	Safe	60	430
5.	Ghatampur	13831.78	12448.60	6248.03	6057.12	50.19	Safe	236	1682
6.	Kakawan	12658.89	12025.95	8722.31	3135.27	72.53	Safe	122	870
7.	Kalyanpur	7887.96	7099.16	4325.72	2444.42	60.93	Safe	95	679
8.	Patara	10673.93	10140.23	6650.40	3334.76	65.58	Safe	130	926
9.	Sarsaul	8659.77	7793.80	4661.13	2901.91	59.81	Safe	113	805
10.	Shivrajpur	10204.45	9184.00	7947.01	1158.18	86.53	Semi-critical	45	321
	Total	101328.46	92661.75	62393.10	28628.99	67.33		1114	7947

4.3 GROUND WATER QUALITY:

The ground water of Kanpur Nagar district is colourless, odourless and slightly alkaline in nature. The Electrical conductance ranges from 470-1560 μ /cm at 25⁰C. The Fluoride is within the permissible range from 0.47-0.96 mg/l. Phosphate is found nil in the area. It is observed that quality of water is good for drinking, domestic and all other purposes. The arsenic content has been found ranging from Nd to 42mg/l. The trace metals Zn, Mn, Ni, Pb are within the permissible limit except for copper 1249mg/l and iron 6.236 mg/l at Kanpur.

4.4 STATUS OF GROUND WATER DEVELOPMENT:

The stage of ground water development in the district is 67.33%. The maximum development is in the Sivrajpur block (86%) and minimum is in Ghatampur Block (50.19%).

In the district cavity and strainer type bore well are feasible for irrigation. The depth of borewell varies from 20m to 96 mbgl. The average depth of this structure is 32 mbgl. Due to reasonable construction and maintenance cost, easy feasibility and private ownership these structures are popular in the area for irrigation. Along the course of Yamuna river in southern most part of the district comparatively deeper strainer well of 90 to 96 mbgl tapping mostly medium sand and 'Mouram' are also common. These have discharge of 1075 to 1500 lpm. In the rest part of the district shallow cavity type bore well of 20 to 53 mbgl are common in which fine to medium sand is tapped. The discharge is up to 600 lpm.

The depth of state irrigation tube well varies between 150 to 250 mbgl. The discharge is up to 2500 lpm. There are 54160 borewell and 293 state tubewell in the district. The irrigation by ground water is 96636 hectare. The irrigation by borewells and state tubewells are 91611 hectare and 5026 hectare respectively. The maximum number of state tubewells are in Ghatampur block (173 No.).

The C.G.W.B. has constructed deep exploratory tubewells down to 500 meter in the district for irrigation and drinking purpose. In these deep tubewells suitable granular zones are tapped between 250-400 mbgl with the yield from 2500-3900 lpm.

At present 74% of irrigation is through ground water. The net availability of ground water for future development is 28628 hectare meter. If 50 cm column water required for crop an additional 57,256 hectare can be irrigated by utilizing

(developing) above resources. As per land use pattern (2005-06) Net sown area is 185667 hectare and Net irrigated area is 130333 hectare. Hence 55,334 hectare area is without irrigation facility. This can be fulfilled by utilizing net ground water available for future development.

5.0 GROUND WATER MANAGEMENT STRATEGY

5.1 GROUND WATER DEVELOPMENT:

The stage of ground water development in the district is 67.33 %. The Net ground water availability for future irrigation development is 28628.99 ham (Table-5). There is good scope for ground water development in the district. For future ground water development for irrigation net available resource may be distributed 50% for state tubewell and 50% for borewells (Down to 100 mbgl). As per these norms 1114 numbers of state tubewells and 7947 borewells are feasible in the district. The cavity type bore wells are feasible in the area having thick confining layer of clay and kankar on top of shallow sand aquifer. Along the course of Yamuna river in southern part of the district comparatively deeper strainer wells 90-96 meter mbgl tapping coarse sand and Mouram by 1.5 mm slot size may yield 1000 to 15000 lpm. The well design of the state tubewells is 12"/8" or 12"/6". The slot size of 1.25 to 1.50mm is suitable for tapping granular zones.

5.2 WATER CONSERVATION & ARTIFICIAL RECHARGE:

As per NHS data of C.G.W.B. for last 10 years (1998-2007) shows declining trend of water level. Only one well at Motipura shows rising trend. The annual decline in water level varies from 10 to 88 cm/year. Only one block Sivrajpur is in Semi critical Category. All other blocks are in safe category. There is need for water conservation structure in rural area and Artificial Recharge in urban area. In the city water level varies from 10 to 32.0 mbgl and stress is in first aquifer (Submersible pumps and shallow tube wells). Hence to arrest the decline in water level Artificial Recharge adopting rooftop rain water harvesting structure needed in the city. In rural area parts of Sarsul, Bhitargaon and Ghatampur blocks depth to water level is more than 10 mbgl and NHS are showing declining trend for last 10 years. Hence water

conservation i.e. ponds, check dams, may be constructed for arresting decline in water level. About 10 numbers of rooftop rain water harvesting scheme are implemented in guidance of C.G.W.B. in Kanpur Cant area. One rooftop rain water harvesting scheme each in B.S.N.L. building and Reserve Bank of India Building in Mall road in the city implemented under the guidance of C.G.W.B.

6.0 GROUND WATER RELATED ISSUES AND PROBLEMS

6.1 WATER LEVEL DECLINE:

The data of National Hydrograph Stations of Kanpur Nagar district shows decline in water level trend for last 10 years (1998-2007) period. In pre-monsoon period decline in water level varies from 4 to 63 cm/year. This decline in water level is due to stress in shallow aquifer. In the city water level has gone down to 36.0 mbgl. The depth to water level at Nirala Nagar, Fazalganj, Juhi depot, Kidwai Nagar, Babupurwa, Rawatpur and Defense Colony are more than 20.0 mbgl

6.2 DRILLING PROBLEMS:

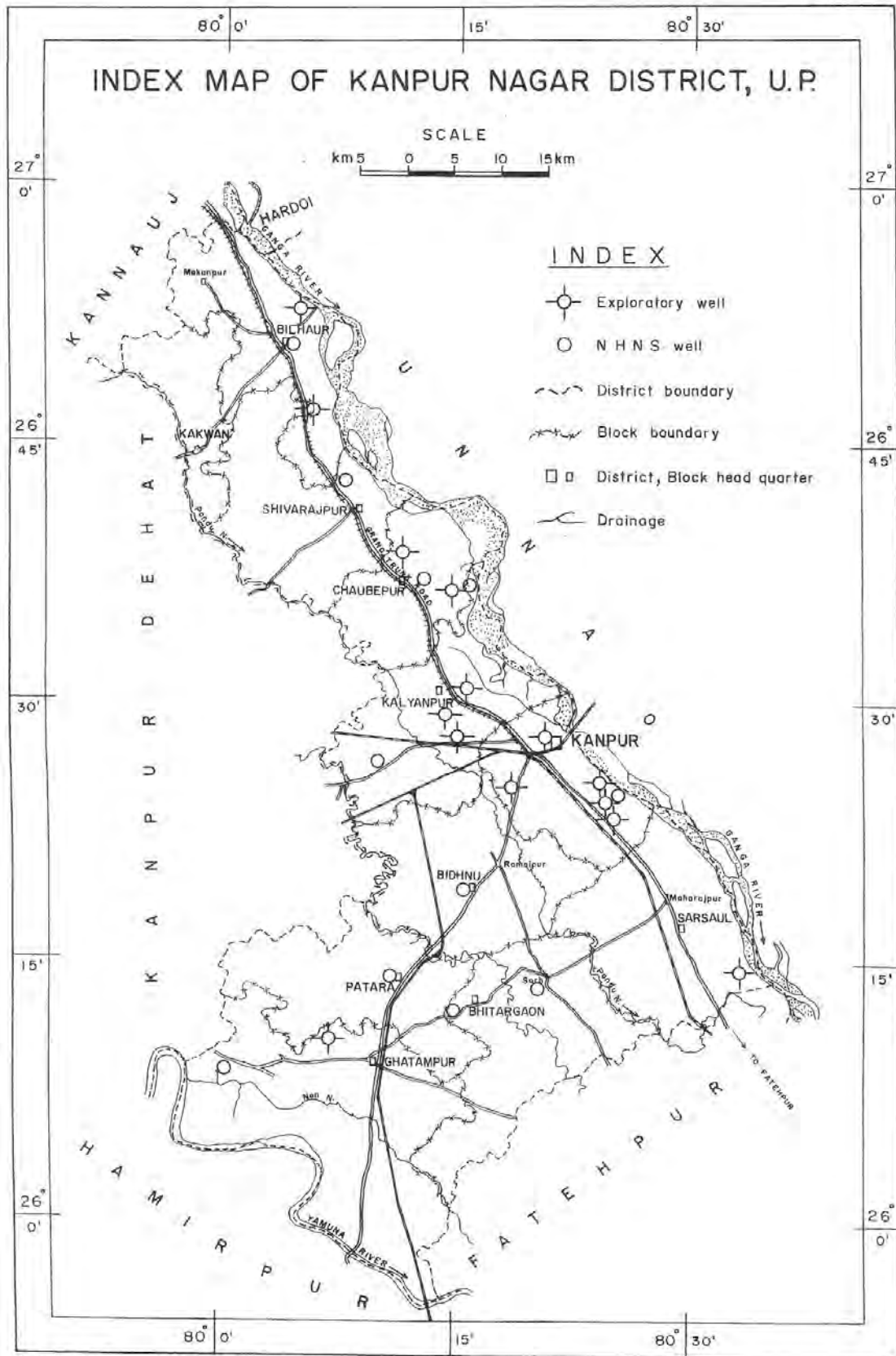
For constructing deep tube well in the district Electrical Logging should be done to delineate the saline zone (IInd Aquifer is Brakish). The deep tubewell constructed by tapping granular zone in IIIrd aquifer (250 mbgl) and cement sealing the above confining layer. The cement Sealing needs technical expertise for constructing deep tubewells. At Domanpur in Sarsaul block deep borewell of 440 m was abandoned due to poor quality after zone testing.

7.0 AWARENESS & TRAINING ACTIVITY

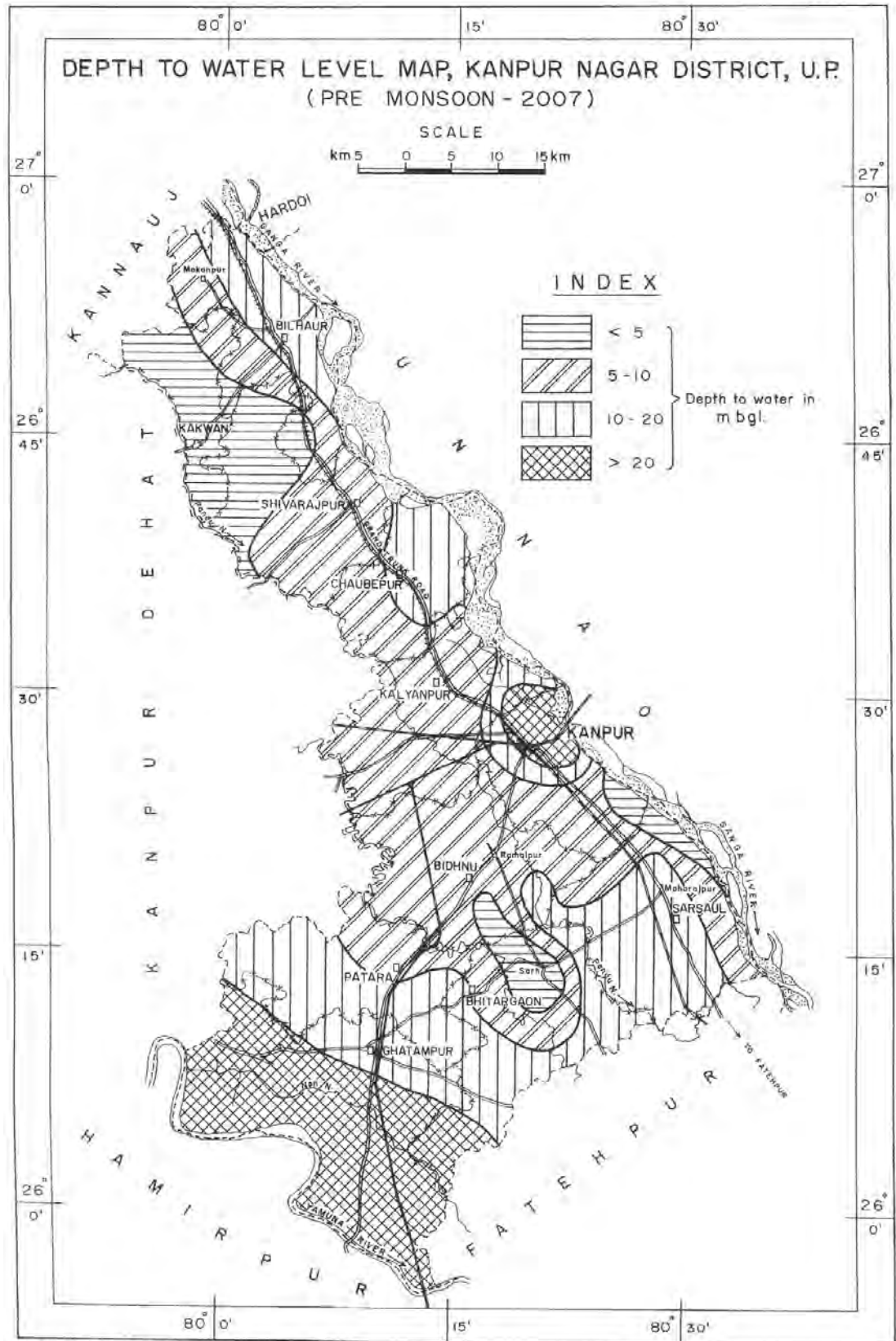
One Mass Awareness Programme for water conservation was conducted at Kalyanpur block in the district in year 200-01. About 400 persons have attended this programme.

8.0 RECOMMENDATIONS

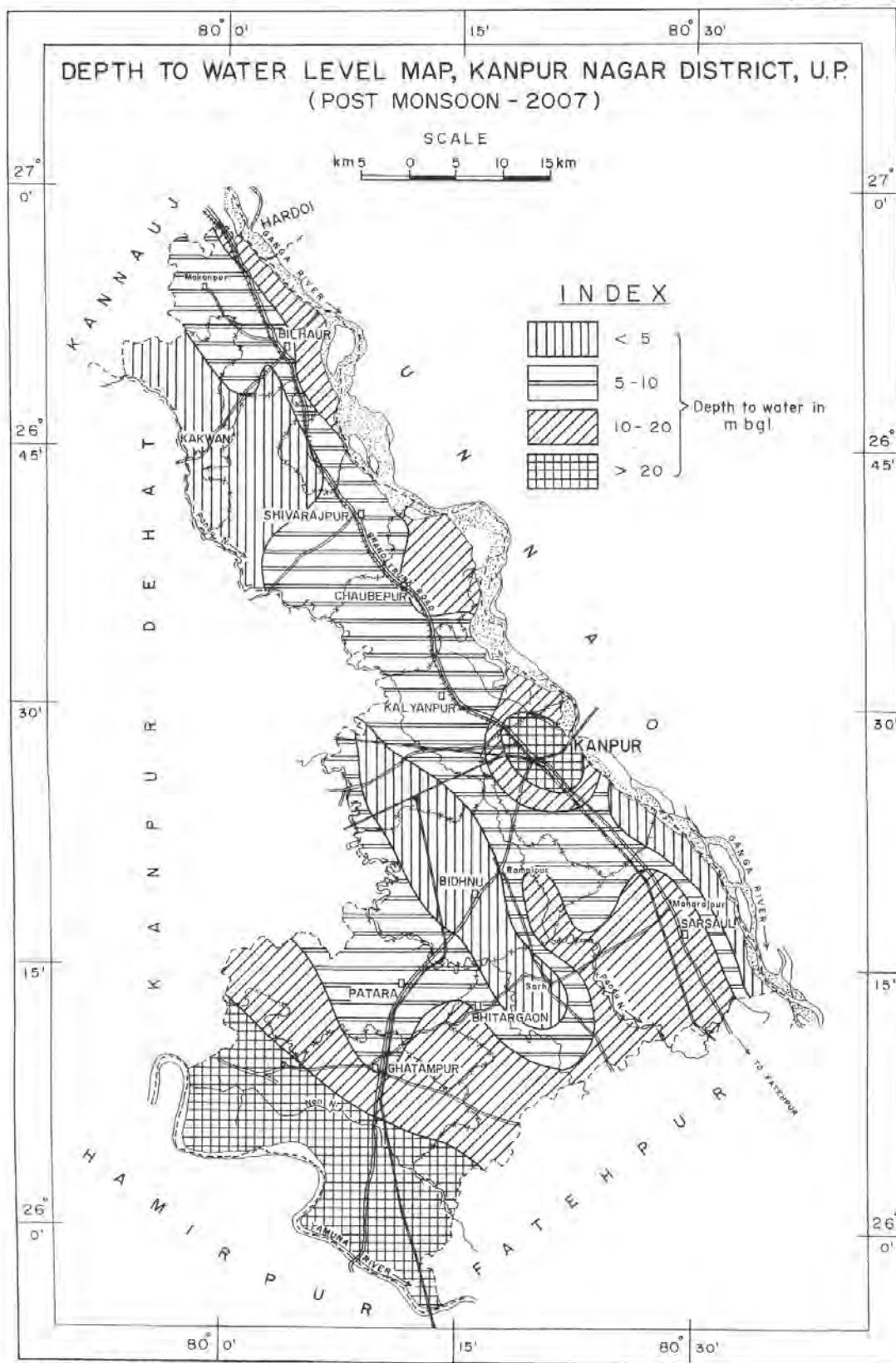
- (i) In Kanpur Nagar district maximum number of National Hydrograph Stations are showing declining trend of water level. Except Sivrajpur block all blocks are in safe category. To arrest declining water level trend, water conservation structures should be constructed in rural areas and rooftop rain water harvesting should be adopted in urban area.
- (ii) In canal command area where water level is below 5.0 mbgl more shallow tubewells should be constructed. Conjunctive use of surface and ground water has to be adopted for future ground water management.
- (iii) In the Kanpur City area only deep tubewells tapping granular zones between 250 to 400 mbgl should be constructed for pipe water supply scheme.
- (iv) The stage of ground water development is 67.33% (31.3.2004). The net ground water availability for future development is 28628 ham. Hence there is good scope for ground water development in the district. By utilizing this resource additional 1114 state tubewells and 7947 borewells can be constructed in the district (Table-7).

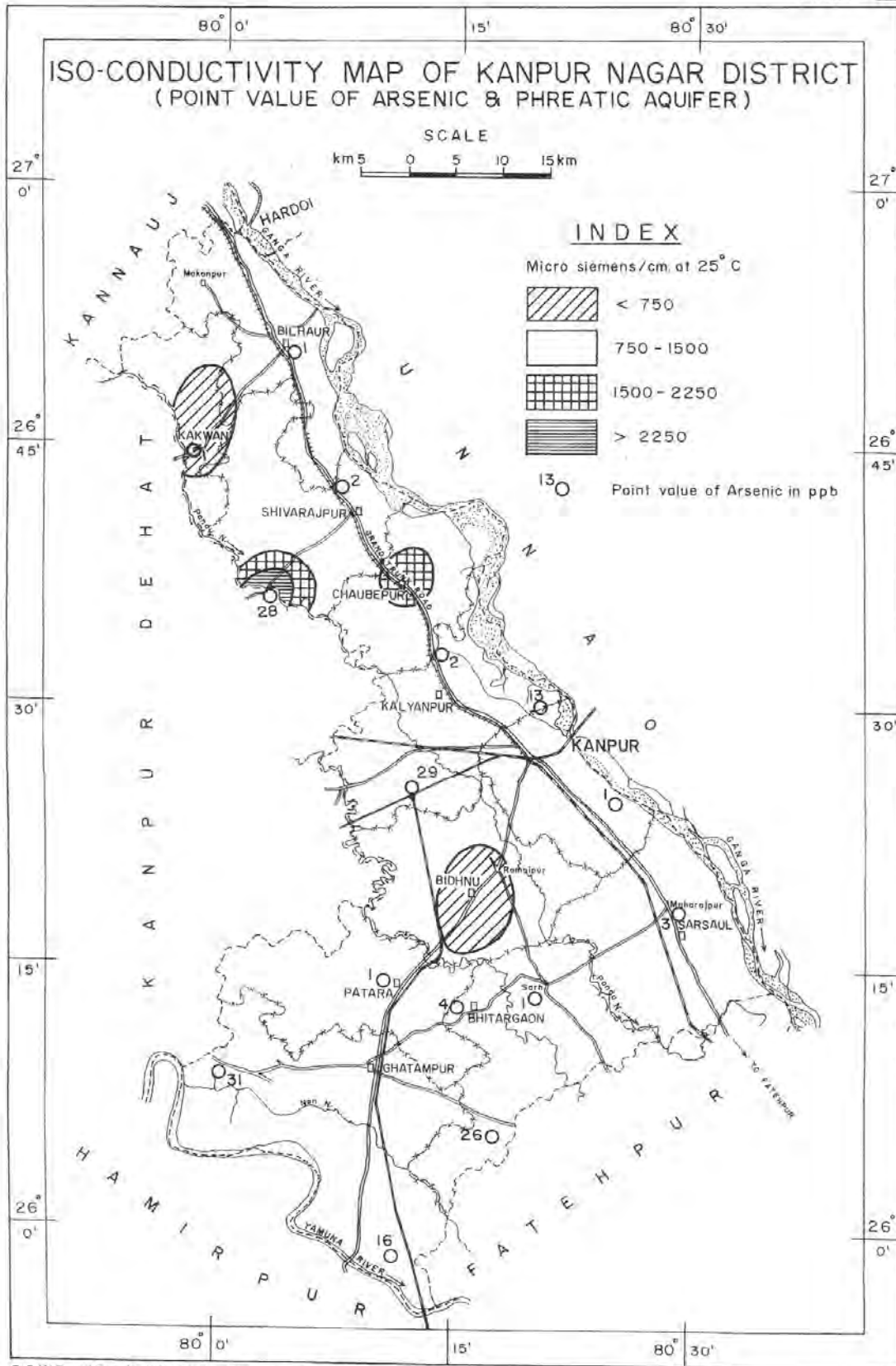


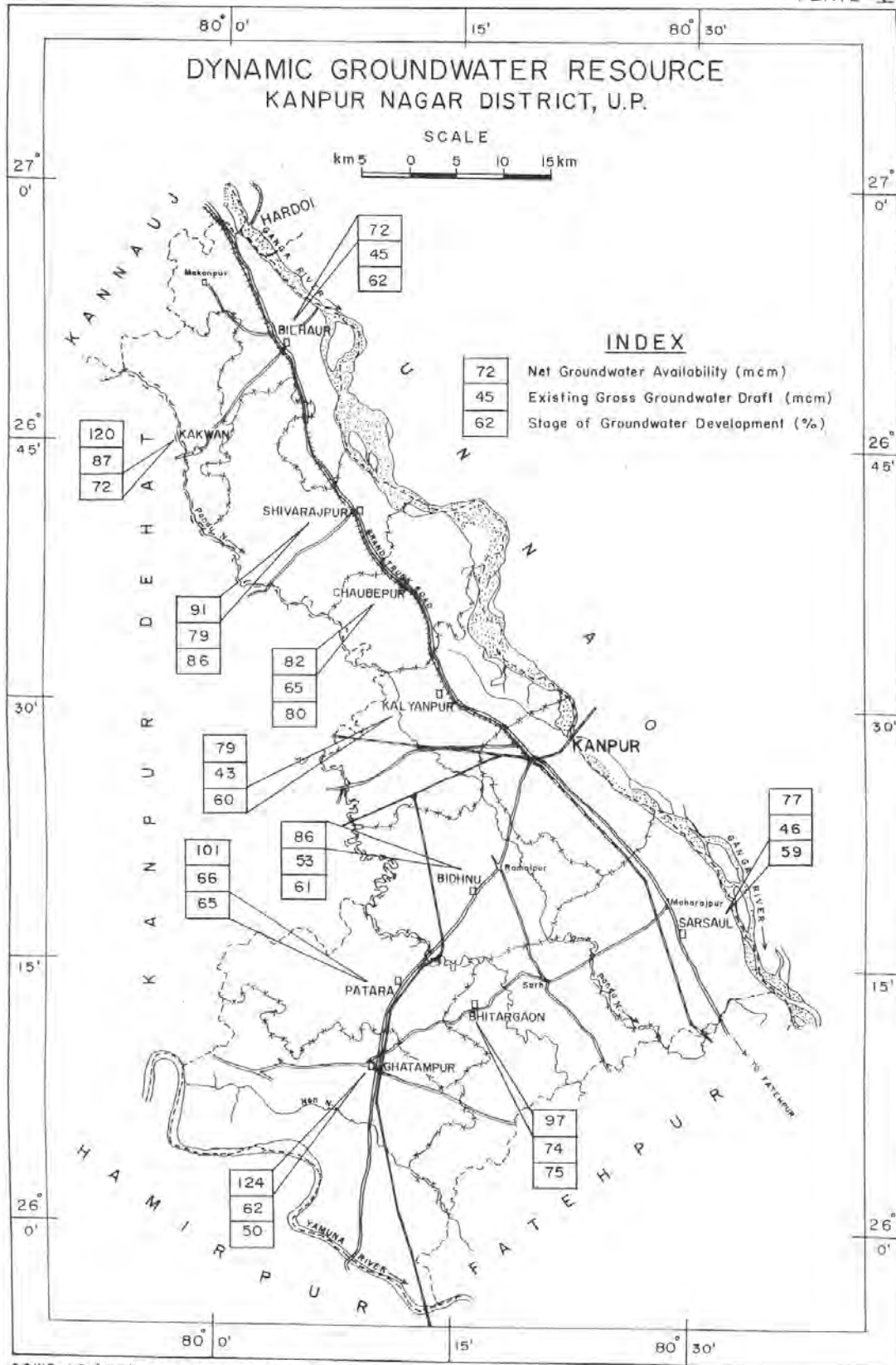
C.G.W.B., N.R., (RAKESH), Drg. No. 4024/10



C G W B, NR, (RAKESH), Drg. No 4025/10







CGWB, NR (N.Chandra) Drg. No. 4028/10