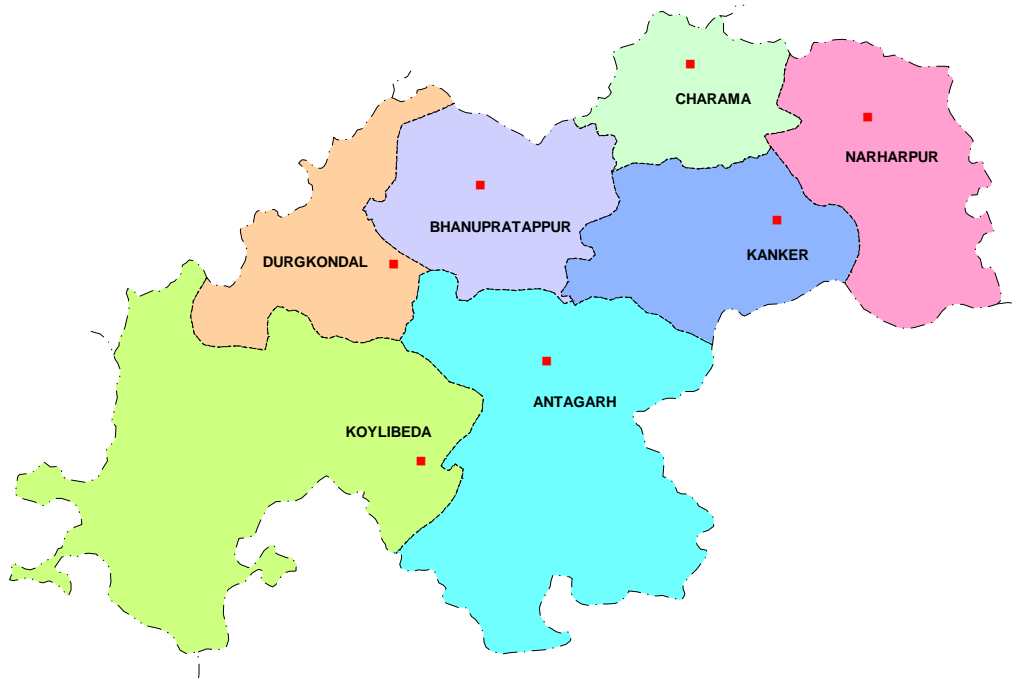




**GOVT. OF INDIA  
MINISTRY OF WATER RESOURCES  
CENTRAL GROUND WATER BOARD**

**GROUND WATER BROCHURE KANKER DISTRICT  
CHHATTISGARH  
2012-13**



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# GROUND WATER BROCHURE OF KANKER DISTRICT

## DISTRICT AT A GLANCE

### I. General

1. Location	: Located in the south-western corner of the State.
Long (East)	: 80°24''06' to 81°49''00'
Lat (North)	: 19°41''41' to 20°33''20'
2. Geographical area	: 6432.68 sq.km.
3. Community Development blocks	: 7 no.s
4. Villages	: 1003 no.s
5. Population	: 7,48,593 (As per Census 2011)
6. Average annual rainfall(Last five years i.e. 2007-2012)	: 1090 mm
7. Major physiographic unit	: Chhattisgarh Plain & Bastar Plateau
8. River Basins and major drainage	: <b>Mahanadi Basin(covers 35% area)</b> Major rivers and streams: (Duth, hatkal Turi,Kukari etc.) <b>Godavari Basin(covers 65% area)</b> Major rivers and streams: (Kotri, Jemri, Karakasa, Bharke etc)
8. Forest area	: Nearly 44% of geographical area

### II. Major Soils

1. Alfisols	: Red loamy/sandy
2. Ultisols	: Yellow and Red brown

### III. Principal crops (2011)

Crop seasons	: Two (Kharif and Rabi)
1. Rice	: 173596 ha
2. Pulses	: 19081 ha
3. Jowar & Maize	: 9551 ha
4. Wheat	: 832 ha

### IV. Irrigation (2011)

1. Net sown area	:211135 ha
2. Gross irrigated area	:26850 ha
a) By dug wells	:4481 no.s (706 ha)
b) By tube wells	:5119 no.s (6515 ha)
c) By tanks/ponds	:649 no.s (3693 ha)
d) By canals	:17 no.s (7039 ha)
e) By other sources	:8897 ha

### V. Geology

:Bengpal and Dongargarh Group (Granite gneisses, Rhyolite, basalt, BHQ, Acid & Basic Intrusives )

## **VI. Hydrogeology**

Water bearing formations

:Major formations are weathered & fractured Granite gneisses

## **VII. Ground water monitoring (by CGWB)**

1. No. of monitoring stations

:22 no.s

a) Dug wells

:19 no.s

b) Piezometers

:03 no.s

2. Water levels

a) Pre-monsoon water level (2012)

:3.46 to 16.23 mbgl(average-4 to 9 mbgl)

b) Post-monsoon water level (2012)

: 1.83 to 9.15 mbgl(average- 3 to 6 mbgl)

c) Water level fluctuation

: 0.32 to 14.19 m (average- 2 to 6 m)

d) Water level trend (2002-2012)

:On average no significant rise and fall

## **VIII. Ground water exploration (by CGWB)**

1. Total no. of wells drilled

:82 no.s

a) Exploratory wells

:63 no.s

b) Observation wells

:13 no.s

c) Piezometers

:6 no.s

2. Depth range

:60 to 202 mbgl

3. Discharge

:0.4 to 23lps

4. Transmissivity

:14 to 194 m<sup>2</sup>/day

## **IX. Ground water quality**

:Fit for all purposes

## **X. Ground water**

### **resources(AsonMarch2009)**

1. Annual available resources

:87764.34 ham

2. Ground water draft

:17349.74 ham

3. Stage of ground water development

:20.81%

## **XI. Awareness and Training activity**

:Training programme at District headquarters in the year 2008.

## **XII. Artificial recharge and rain water harvesting**

1. Projects by CGWB

:Nil

2. Projects under technical guidance

:Nil

## **XIII. Ground water control and regulation**

:Nil (No critical/ notified/Over exploited areas)

## **XIV. Major ground water problems and issues**

:Nil

# Ground Water Brochure of Kanker district, Chhattisgarh

By

M.M. Sonkusare, Scientist 'C'

## 1. General

The Kanker district covers an area of 6432.68 sq. km. It consists of 1003 no of villages. For administrative convenience these villages are grouped into 7 no of development blocks. Kanker is the district headquarters. The block head quarters are Kanker, Charama, Narharpur, Bhanupratappur, Koylibeda, Durgkondal and Antagarh. The district is known for its forest produce. **Fig.1** shows the location of the area along with the drainage, block head quarters, location of NHS and location of exploratory wells drilled in the district.

Nearly 75 % of the area is drained by Kotri River, which is tributary to Godavari River. The tributaries for Kotri River are waler, Jemri, Karakassa, Bharke, Belengar, Mendaki, Dondri and Khandi. The remaining 25% of the area is drained by Mahanadi River in the east with the tributaries of Duth, Hatkal, Turi, Kukari, Nani, Jura and Baroda.

The normal annual rainfall for the district is 1090 mm. The annual temperature varies from 10°C in winter to 42°C in summer. The relative humidity varies from 87% in rainy season to 32% during winter.

Physiographically, the district can be divided into two regions, namely the Chhattisgarh plains and the Bastar plateau. The maximum altitude is 917 m amsl at Matla reserve forest area near Temargaon Pahar ranges and the minimum is 300 m amsl on the western parts of the district. The average elevation is around 343.84 m amsl. The general slope is towards north in the northwest part of the district and is towards south in the remaining part.

The soils in the district are having wide variations. In all two types of soils are existing in the district and are mostly insitu in nature. Most of the area is covered by Red loamy/sandy Alfisols & Yellow /Red Brown Ultisols.

## 2. Geology and Hydrogeology

Geologically the district is covered by metasediments and crystallines of Precambrian constituting Bengpal, Bailadila, Nandgaon, and Abujhamar group of rocks. The formations include Gneisses, Granites, Banded-Heamatite-Quartzite, Rhyolite, Basalt, acid and basic intrusives. The ground water mainly occurs in phreatic (water table) conditions and at places under semi-confined conditions. Weathered formation thickness varies from 10 to 30 m. In granites, the weathered formation and the fractures in hard rock constitute the aquifers. Invariable the fractures are limited to a depth of 80m. The hydrogeological map prepared for the district is presented at the end of text as **Fig .5** .In all 22 no of network observation stations (NHS) were established in the district to monitor water levels 4 times a year and water quality once in a year.

The pre-monsoon ground water level in the district (**Fig. 2**) shows that it varies from 3.46 to 16.23 mbgl and the post-monsoon water level ( **Fig.3**)varies from 1.83 to 9.15 mbgl. The water level fluctuation varies from 0.32 to 14.19 m m. The water level trend (for 10 years) indicates a rising trend in 7 no of stations and a falling trend in 10 no of stations for pre-monsoon period. The post -monsoon water level trend indicates a

Fig. - 1

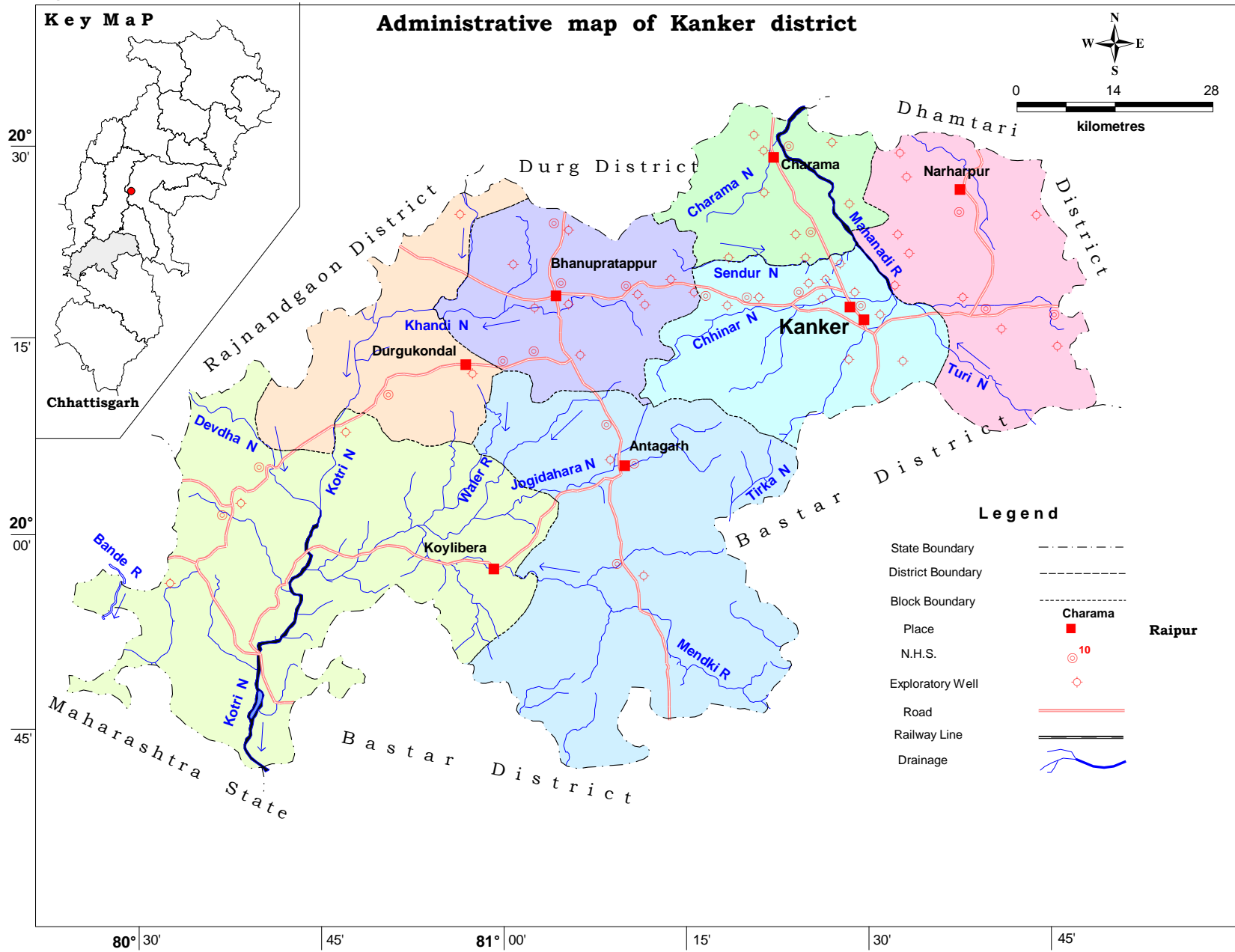


Fig. - 2

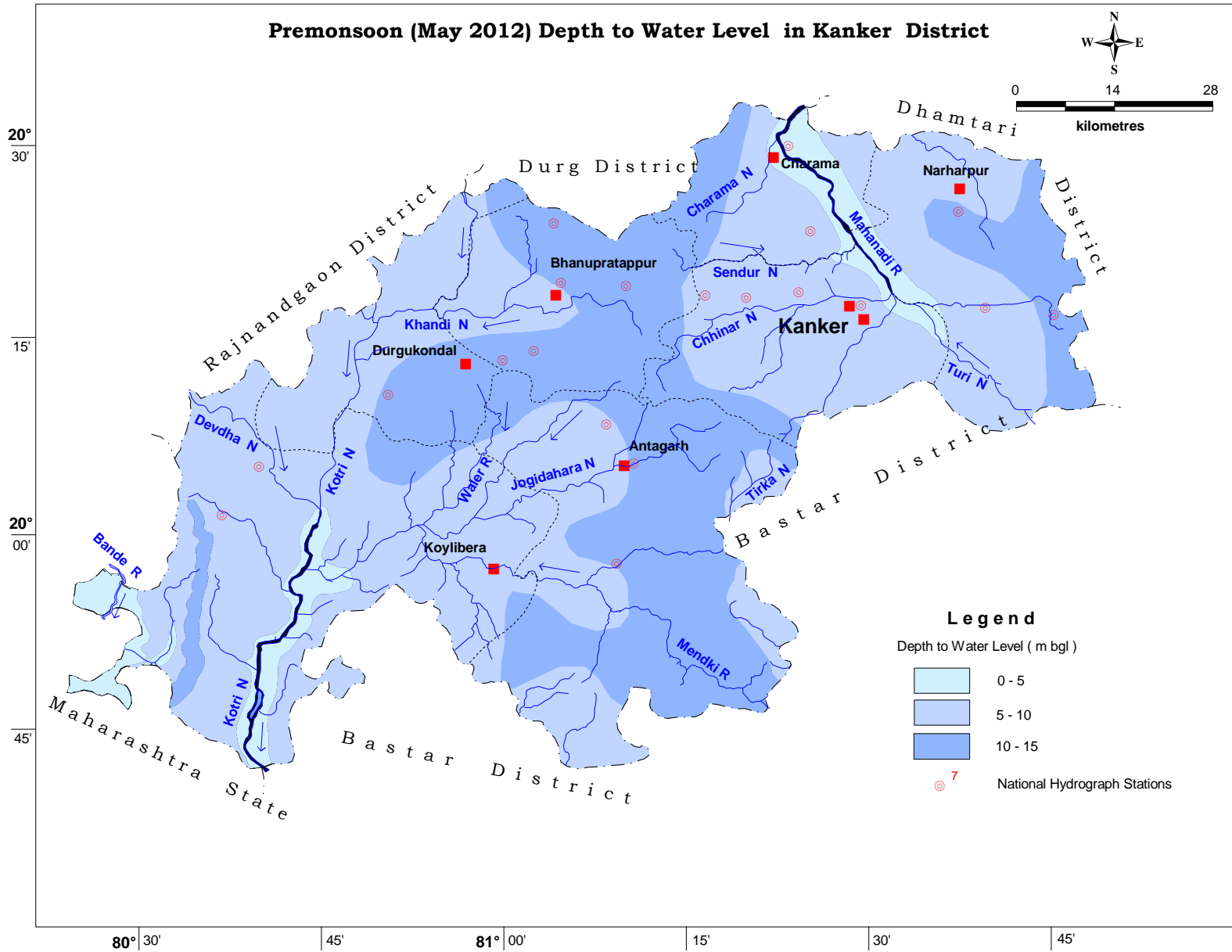
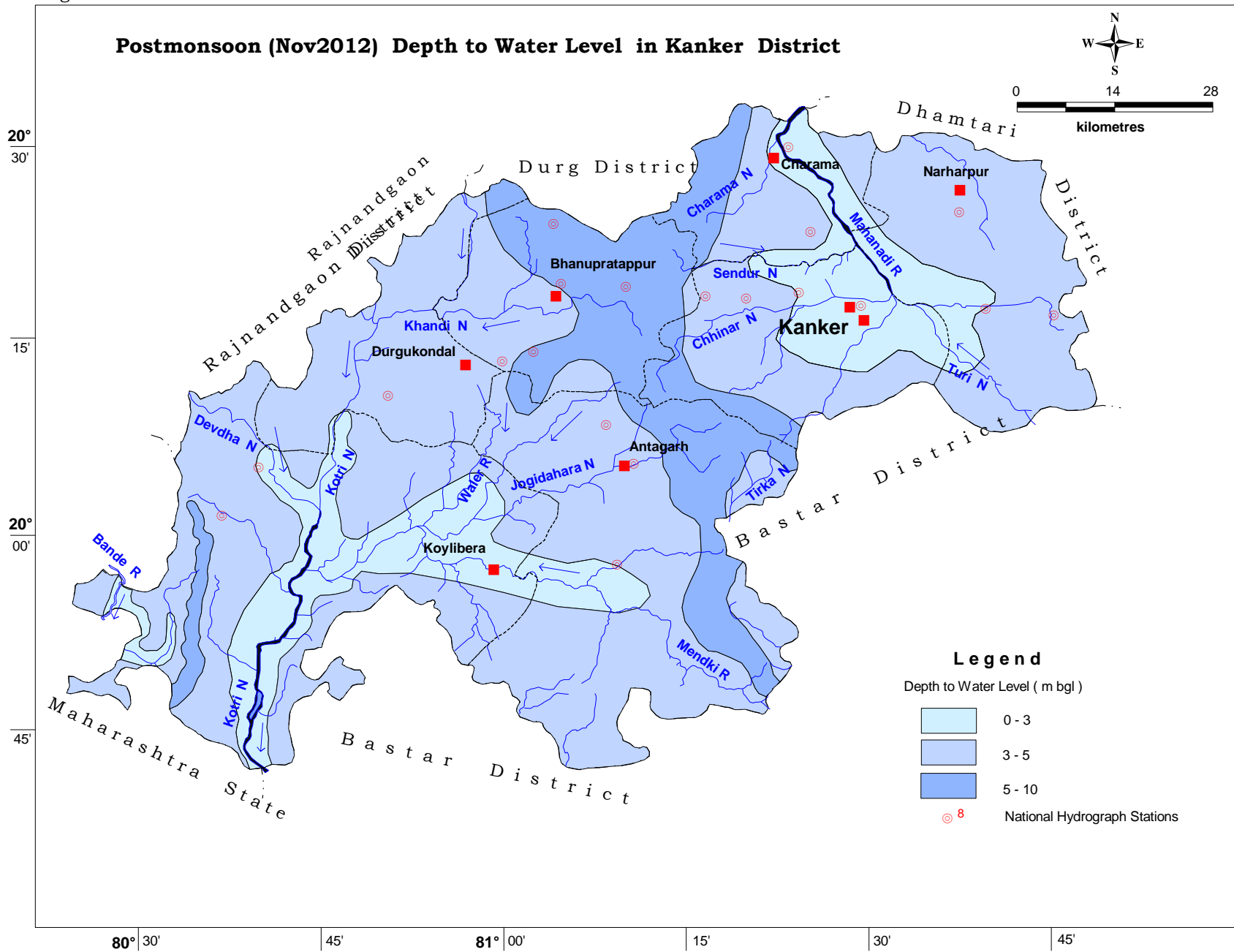


Fig. - 3



raising trend in 8 no of stations and a falling trend in 11 no of stations. The discharge in granites varies from 1 to 23 lps. Nearly 21% of the exploratory wells drilled by the department yielded less than 1 lps. About 65 % wells recorded yield in the range of 1 to 5 lps and in the remaining 14% it was more than 5 lps. The Transmissivity value for granites varies from 14 to 194 m<sup>2</sup>/day.

### 3. Ground water resource (As on March 2009)

The ground water resources for Kanker district has been estimated based on the GEC.1997 methodology. The estimates indicate that the annual replenishable ground water resource for the district is 87764.34 Ham. The net annual ground water availability is 83376.11 Ham. The gross annual draft has been estimated as 17349.74 Ham and out of which, the draft for irrigation is 15797.06 Ham and for domestic & industrial water supply purpose is 1552.68. The ground water resources for Kanker district is given below and presented in fig 4

Ground water resources for Kanker district								
Command / Non Command	Total Annual Recharge in Ham	Net Ground Water Availability in Ham	Existing Gross Ground Water Draft for Irrigation in Ham	Existing Gross GW Draft for Domestic & Industrial Water Supply in Ham	Existing Gross Ground Water Draft for All Uses in Ham	Allocation For Domestic & Industrial Water Supply in Ham	Net Ground Water Availability for Future Irrigation Development in Ham	Stage of Ground Water Development in %
Antagarh								
Command	253.63	240.95	69.06	1.89	70.95	2.5	169.39	29.44
Non Command	12046.34	11444.02	779.5	161.08	940.58	212.62	10451.9	8.22
Block Total	12299.97	11684.97	848.56	162.97	1011.53	215.12	10621.29	8.66
Bhanupratappur								
Command	139.86	132.87	52	2.83	54.83	3.74	77.13	41.27
Non Command	9327.74	8861.35	1473.2	198.47	1671.67	261.96	7126.19	18.86
Block Total	9467.6	8994.22	1525.2	201.3	1726.5	265.7	7203.32	19.2
Charama								
Command	311.86	296.27	243.4	7.44	250.84	9.82	43.05	84.67
Non Command	8845.52	8403.24	4421.8	233.42	4655.22	308.1	3673.34	55.4
Block Total	9157.38	8699.51	4665.2	240.86	4906.06	317.92	3716.39	56.39
Durgkondal								
Command	232.61	220.98	171.2	2.67	173.87	3.53	46.25	78.68
Non Command	10874.39	10330.67	411.56	135.57	547.13	178.95	9740.16	5.3
Block Total	11107	10551.65	582.76	138.24	721	182.48	9786.41	6.83
Kanker								
Command	195.1	185.34	153.8	3.77	157.57	4.98	26.56	85.01
Non Command	9326.11	8859.8	3584.16	203.98	3788.14	269.24	5006.4	42.76
Block Total	9521.21	9045.14	3737.96	207.75	3945.71	274.22	5032.96	43.62
Koilibeda								
Command	1452	1379.4	97.46	21.86	119.32	28.85	1253.09	8.65
Non Command	23895.74	22700.95	1579.16	330.69	1909.85	436.48	20685.31	8.41
Block Total	25347.74	24080.35	1676.62	352.55	2029.17	465.33	21938.4	8.43
Narharpur								
Command	274.83	261.09	220.2	5.32	225.52	7.01	33.88	86.38
Non Command	10588.61	10059.18	2540.56	243.69	2784.25	321.65	7196.97	27.68
Block Total	10863.44	10320.27	2760.76	249.01	3009.77	328.66	7230.85	29.16
<b>DISTRICT TOTAL</b>	<b>87764.34</b>	<b>83376.11</b>	<b>15797.06</b>	<b>1552.68</b>	<b>17349.74</b>	<b>2049.43</b>	<b>65529.62</b>	<b>20.81</b>



#### 4. Ground water development

The ground water development estimated for Kanker block is 43.62%, for Charama block is 56.39%, for Narharpur block is 29.16%, for Bhanupratappur block is 19.20%, for Koylibeda block is 8.43%, for Durgkondal blocks is 6.83% and for Antagarh block is 8.66%. The overall stage of ground water development for the district is 20.81%. **Fig.4** shows the stage of ground water development in the district and **Fig.5** shows the yield potential and suitable abstraction structures for the area .

The dug well depth varies from 6 to 15 m and the dia varies from 2.4 to 3.1 m. The bore wells drilled in the area are 60 to 90m deep with dia varying from 0.1 to 0.15 m. Diesel or electric operated pumps of 0.25 to 1HP or traditional teda is used to lift the water from dug wells for the irrigation purposes. The electrical pump or rope and bucket is used to lift the water for domestic purpose. Submersible electrical pumps of 3 to 5 HP are used for irrigation purpose in case of bore wells in the area. The bore wells in granitic terrain can irrigate an area of 0.5 to 1.5 ha paddy crop. The ground water is the main sources of drinking water in the district covering 1003 no of villages.

In all 5119 no of bore wells and 4481 no of dug wells are existing in the district. Together they irrigate around 7221 ha. The contribution of ground water for irrigation comes to nearly 48% in the district. The use of ground water in non-command area is maximum.

#### 5. Ground water quality

The water samples collected from NHS stations during the month of May (pre-monsoon) were analysed to determine the quality of ground water in the district. The EC and pH values were measured at the site during the Reappraisal Hydrogeological Surveys in the year 2011.

The major ions as per BIS standard indicates that ground water in the district is suitable for all purposes.

The plot of Piper tri linear diagram and US salinity diagram indicates that the ground water in the district is suitable for irrigation purpose. The EC values are comparatively less in the southern part of the district. The EC values particularly in granitic terrain ranges between 36 to 324  $\mu\text{s}/\text{cm}$  at 25°C and the pH values are showing values more than 7. The overall composition of ground water indicates that it is moderately alkaline and predominantly  $\text{CaHCO}_3$  type (Calcium bicarbonate type).

#### 6. Ground water management strategy

There exists a wide scope for ground water development in the district. The available ground water resources for the district are of the order of 83376.11 Ham and the ground water draft is 17349.74 Ham. The stage of ground water development is only 20.81%.

It is estimated that with the available ground water resources a total of 41688 no.s of bore wells can be constructed in the district. By adopting suitable developmental strategies, the less developed blocks of Narharpur, Bhanupratappur, Koylibeda, Durgkondal and Antagarh can be further developed by way of increased irrigation.

Fig. No.- 4

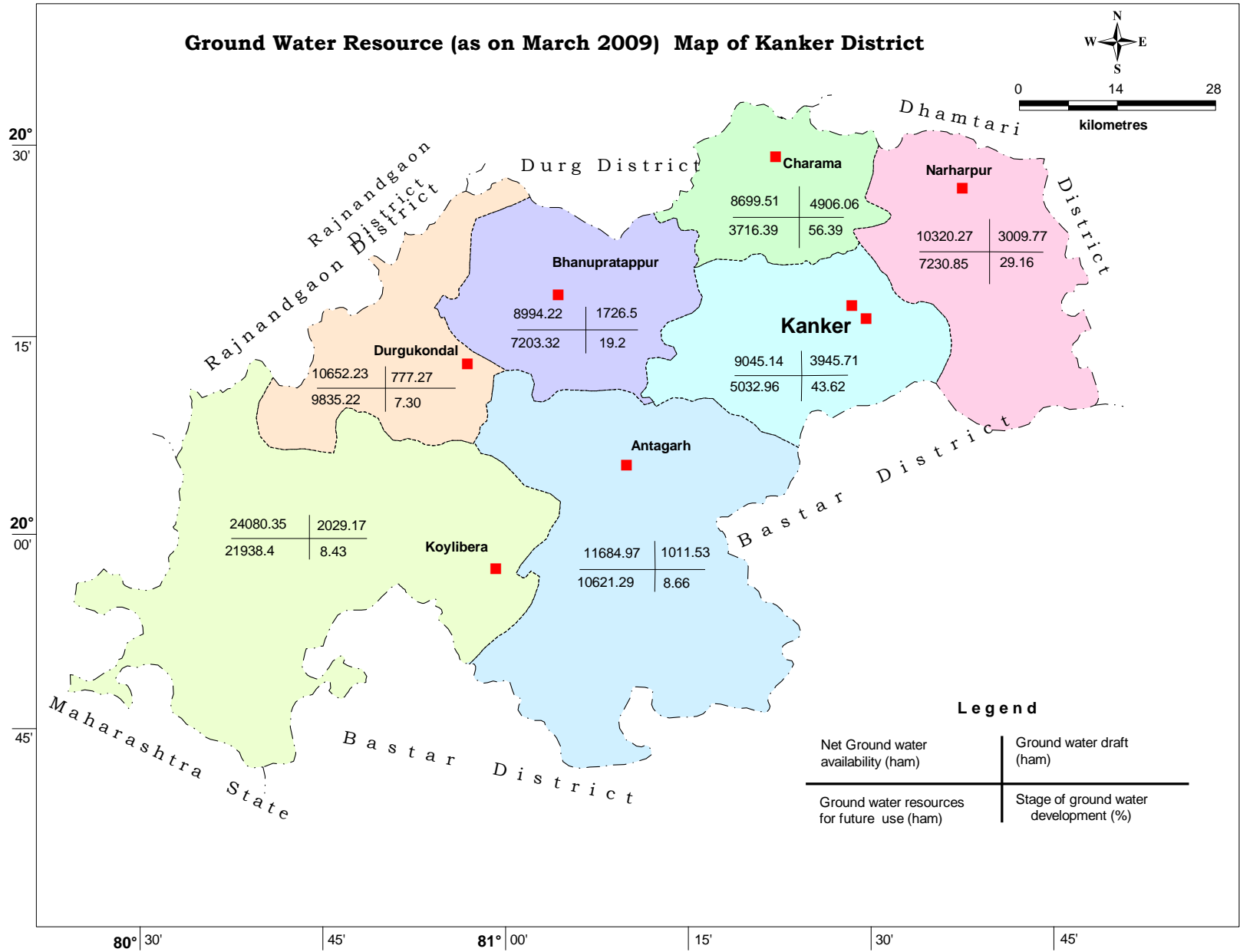
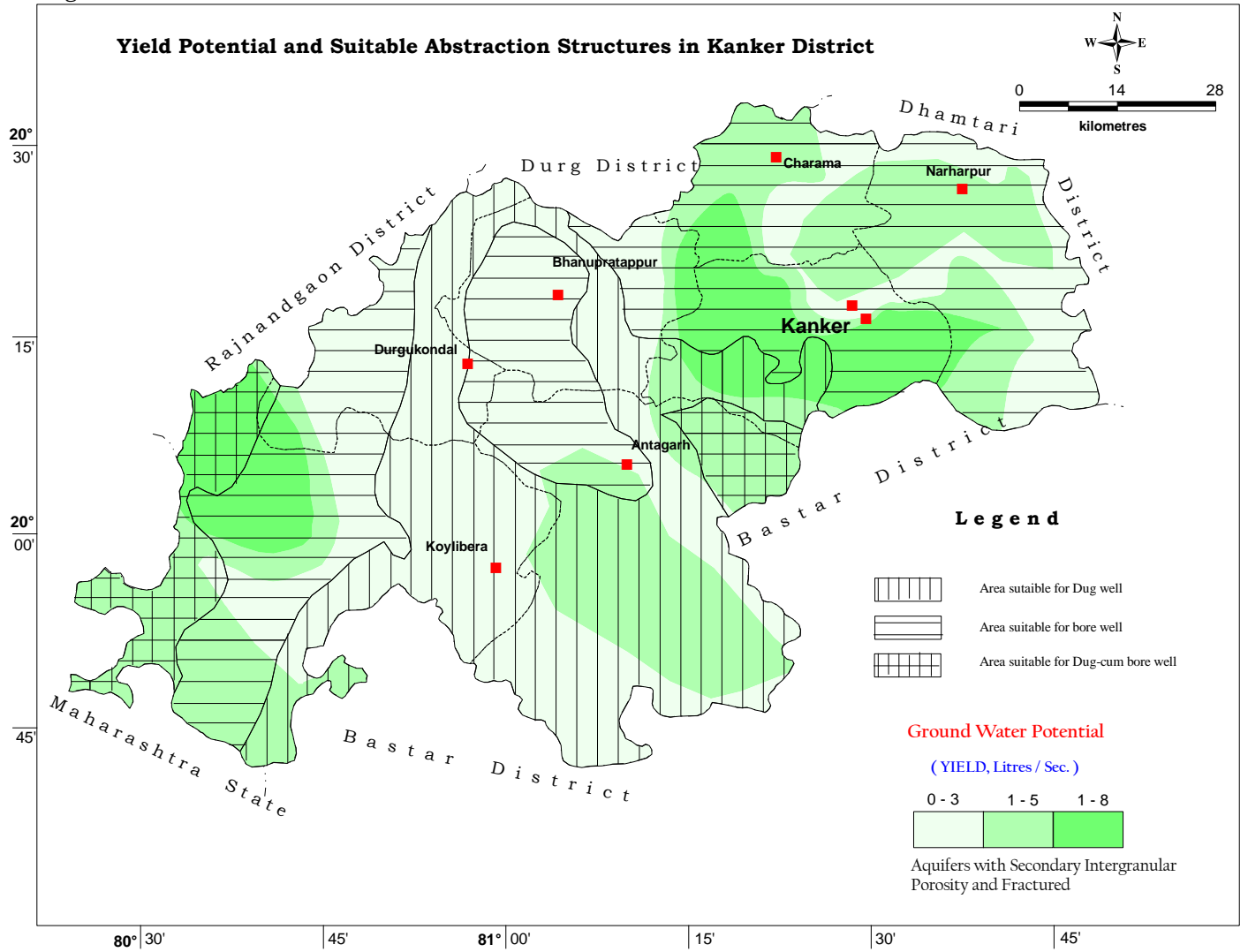


Fig. - 6



## **7. Water conservation and Artificial Recharge**

The average annual rainfall for the district is 1090mm. There exist a huge surplus non-committed run off in the district. Rain water harvesting and artificial recharge structures at suitable locations can be constructed to improve the storage capacity of the surface and subsurface reservoirs. **Fig 6** is presented to show the area suitable for artificial recharge and future ground water development.

## **8. Awareness and Training activity**

So far one no. of Training programme on ground water conservation and artificial recharge in the year 2008 were conducted by the department at Kanker. Representatives from PHED, State Ground Water Survey Department, Forest department, NGO.s, Farmers and Ground Water Professionals were awared during these programmes.

### **Acknowledgement**

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Fig. - 5

# Hydrogeological map of Kanker District

