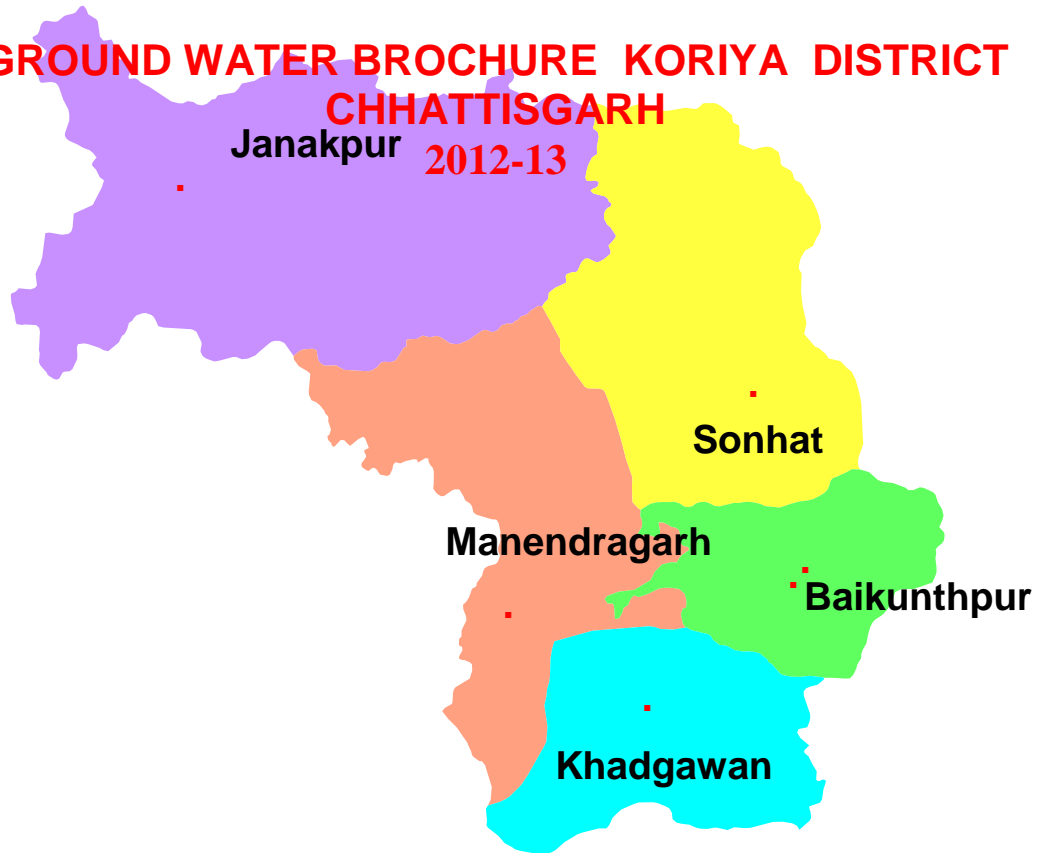




**GOVT. OF INDIA
MINISTRY OF WATER RESOURCES
CENTRAL GROUND WATER BOARD**

**GROUND WATER BROCHURE KORIYA DISTRICT
CHHATTISGARH
Janakpur 2012-13**



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GROUND WATER BROCHURE OF KORIYA DISTRICT

DISTRICT AT A GLANCE

I. General

1. Location : Located in the extreme north-western corner of the State.
- Long (East) : 81°34'45" to 82°45'30'
- Lat (North) : 22°56'45" to 23°55'30'
2. Geographical area : 5977.70 sq.km.
3. Community Development blocks : 5 no.s
4. Villages : 650 no.s
5. Population : 6,59,039 (As per Census 2011)
6. Average annual rainfall(Last five years i.e. 2007-2012) : 1130 mm
7. Major physiographic unit : Northern Hilly Region
8. River Basins and major drainage : **Ganga Basin(covers 60% area)**
Major rivers and streams:
(Banas, Gopad, Singhore, Gaini etc.)
Mahanadi Basin(covers 40% area)
Major rivers and streams:
(Hasdeo, Gej, Neor, Junka, Soi etc)
8. Forest area : Nearly 75% of geographical area

II. Major Soils

1. Alfisols : Red gravelly/sandy
2. Inceptisols : Shallow black
3. Ultisols : Red and yellow, lateritic

III. Principal crops (2011)

- Crop seasons : Two (Kharif and Rabi)
1. Rice : 67867 ha
2. Pulses : 11674 ha
3. Jowar & Maize : 8780 ha
4. Wheat : 3583 ha

IV. Irrigation (2011)

1. Net sown area :101615 ha
2. Gross irrigated area :8341 ha
- a) By dug wells :5747 no.s (894 ha)
- b) By tube wells :586 no.s (367 ha)
- c) By tanks/ponds :929 no.s (178 ha)
- d) By canals :77 no.s (4529 ha)
- e) By other sources :2278 ha

V. Geology

:*Gondwana Supergroup (Sandstone, Shale, clay, siltstone, coal seam) Chhota Nagpur Complex (Granite gneiss, Quartzite & Calc-Silicaterocks) Deccan*

Trap (Dykes, Sills & Basalt flows)

VI. Hydrogeology

Water bearing formations

:Major formations are porous & fractured Sandstones, Granite gneisses, vesicular Basalts etc.

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)

:0.4 to 11.74 mbgl(average-4 to 9 mbgl)

b) Post-monsoon water level (2012)

:1.4 to 6.4 mbgl(average- 3 to 6 mbgl)

c) Water level fluctuation

: 1.2 to 8.4 m (average- 2 to 4 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

:18 no.s

a) Exploratory wells

:9 no.s

b) Observation wells

:4 no.s

c) Piezometers

:5 no.s

2. Depth range

:50 to 397 mbgl

3. Discharge

:0.14 to 4.21 lps

4. Transmissivity

:11.3 to 36.8 m²/day

5. Storativity

:0.00078 to 0.0017

IX. Ground water quality

:Fit for all purposes

X. Ground water

resources(AsonMarch2009)

1. Annual available resources

:44583.07 ham

2. Ground water draft

:9769.57 ham

3. Stage of ground water development

:23.07%

XI. Awareness and Training activity

:Mass awareness at District headquar ters Baikunthpur in the year 2006-07 and 2007-08.

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 Koriya district, Chhattisgarh

By

M.M. Sonkusare, Scientist 'C'

1. General

The Koriya district covers an area of 5977.70 sq.km. It consists of 650 no. of villages. For administrative convenience these villages are grouped into 5 no. of community development blocks. Baikunthpur is the districts headquarters. The block headquarters are Janakpur, Sonhat, Manendragarh, Khadgaon and Baikunthpur. Nearly 75% of the total geographical area of the district is covered by forest. The district is known for its forest product and coal mining. **Fig 1** shows the location of the area along with drainage, block headquarters, Network Hydrograph Stations and location of exploratory wells established and drilled by Central Ground Water Board in the district respectively.

The district can be broadly divided into 2 major river basins; Ganga basin and Mahanadi basin. The Ganga basin covers 60% of the area however the remaining area is drained by the Mahanadi basin. The Banas, Singhore, Gaini, Gopad, etc. are the major tributaries to Ganga river. The Hasdeo, Neor, Soi, Gej, Haldhali, Jhunka, etc. are the major tributaries to the Mahanadi river. The drainage pattern in the district is dendritic to sub-dendritic and the drainage density is high in central and southern parts.

The average annual rainfall for the district is 1130 mm. The annual temperature varies from 10°C in winter to 40°C in summer. The relative humidity varies from 75% in rainy season to 30-40% during winter.

Physiographically, the district is a part of Northern Hills and characterized by undulating topography with high hills, dissected plateaus, steep slopes and scarps. The Basaltic terrain is characterized by highly undulating topography with steep hills and plateau tops. The plateaus and ridges in the area are of 600 m amsl. The maximum elevation observed for hilly areas is 1025 m amsl and is at the central part of the district namely the Devgarh peak. The lowest elevation is 380 m amsl and is along the Banas river, which is on the northwestern part of the district.

The soils in the district are having wide variations. In all three types of soils are existing in the district and are mostly insitu in nature. Most of the area is covered by Red gravely/sandy Alfisols. It occurs over the Suprabarakars (Mahadeva/ Suprapanchet/ Parsora formation) in the area. The Shallow black Inceptisols are present over the Panchet and the Barakar formations. The Red and yellow Ultisols rich in iron oxide occur on the Upper Pali and the Mahadeva/ Suprapanchet/ Parsora formations.

2. Geology and Hydrogeology

Geologically the district mainly covers formations ranging in age from Archaean to Cretaceous in age. Apart from these the Recent Alluvium and Pliocene Laterites occur in isolated patches in non mapable form. The Chhota Nagpur Gneissic Complex of Archaean to Proterozoic age covers the southern part of the district. . The Chhota Nagpur Gneissic Complex mainly consists of Quartzite, Mica Schist, Amphibolite, Schist, Granite gneiss, Biotite gneiss and Calc Silicate. Gondwana Supergroup of rocks including both upper and lower Gondwana sequence covers the northern part of the

Fig. - 1

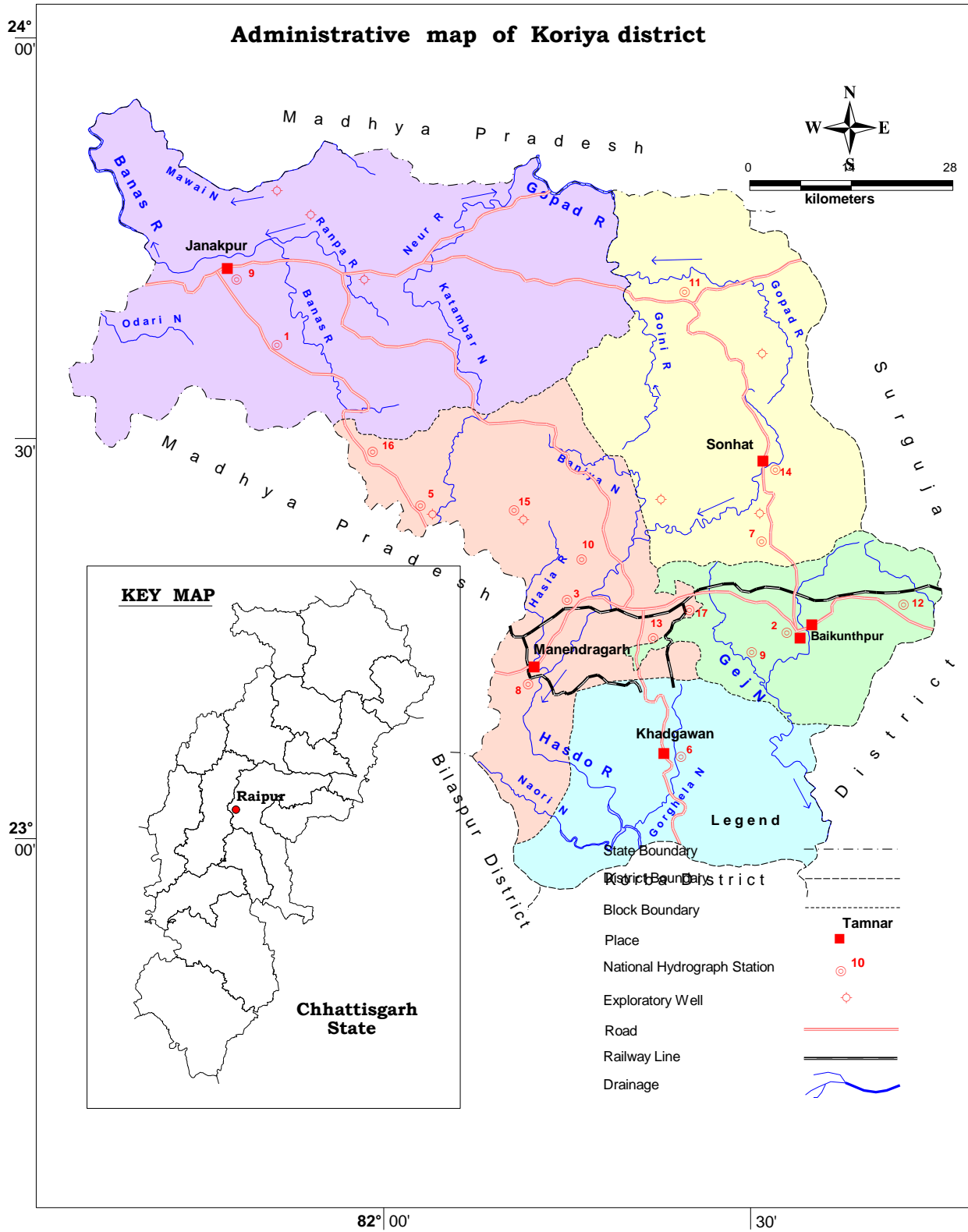


Fig. - 2

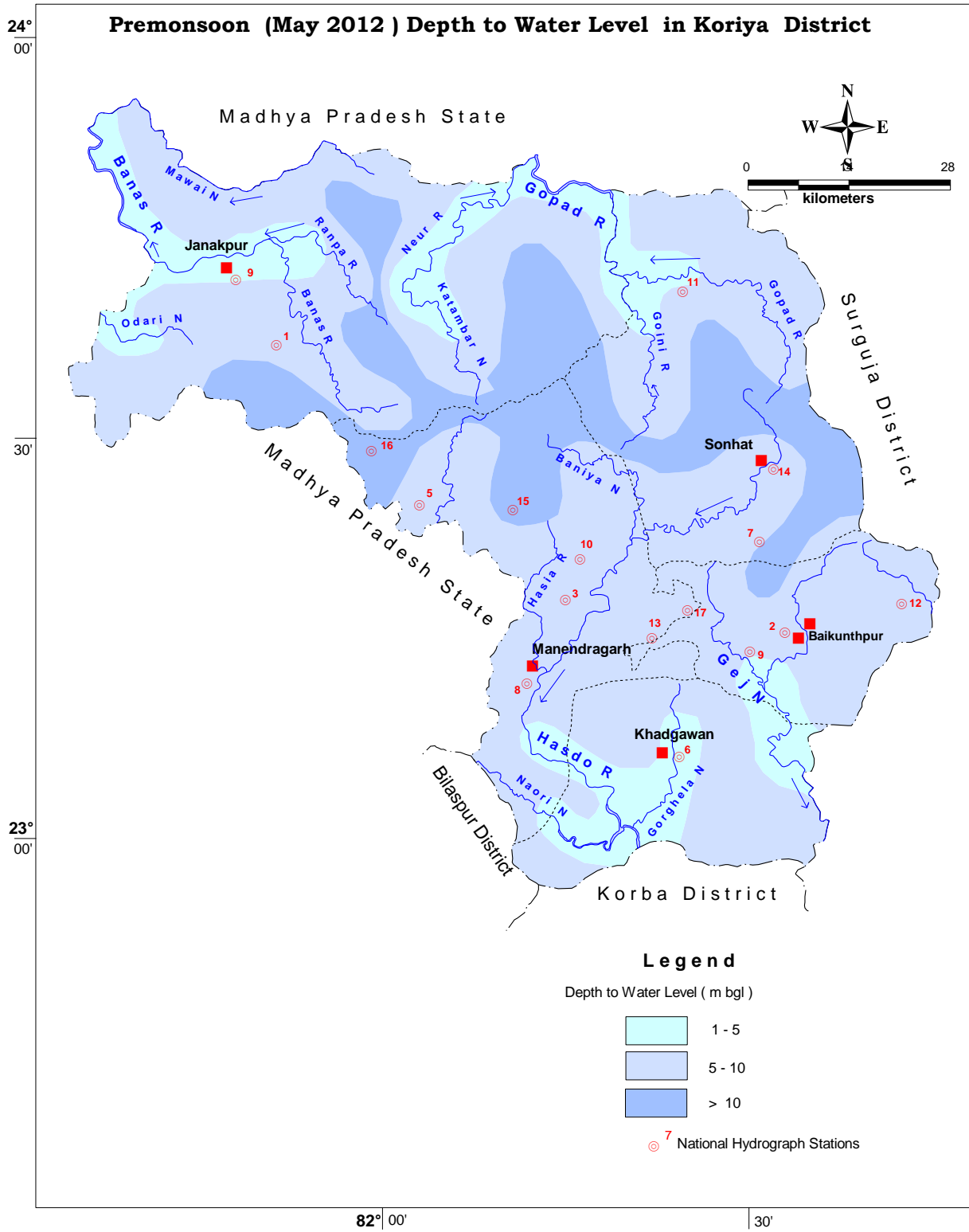
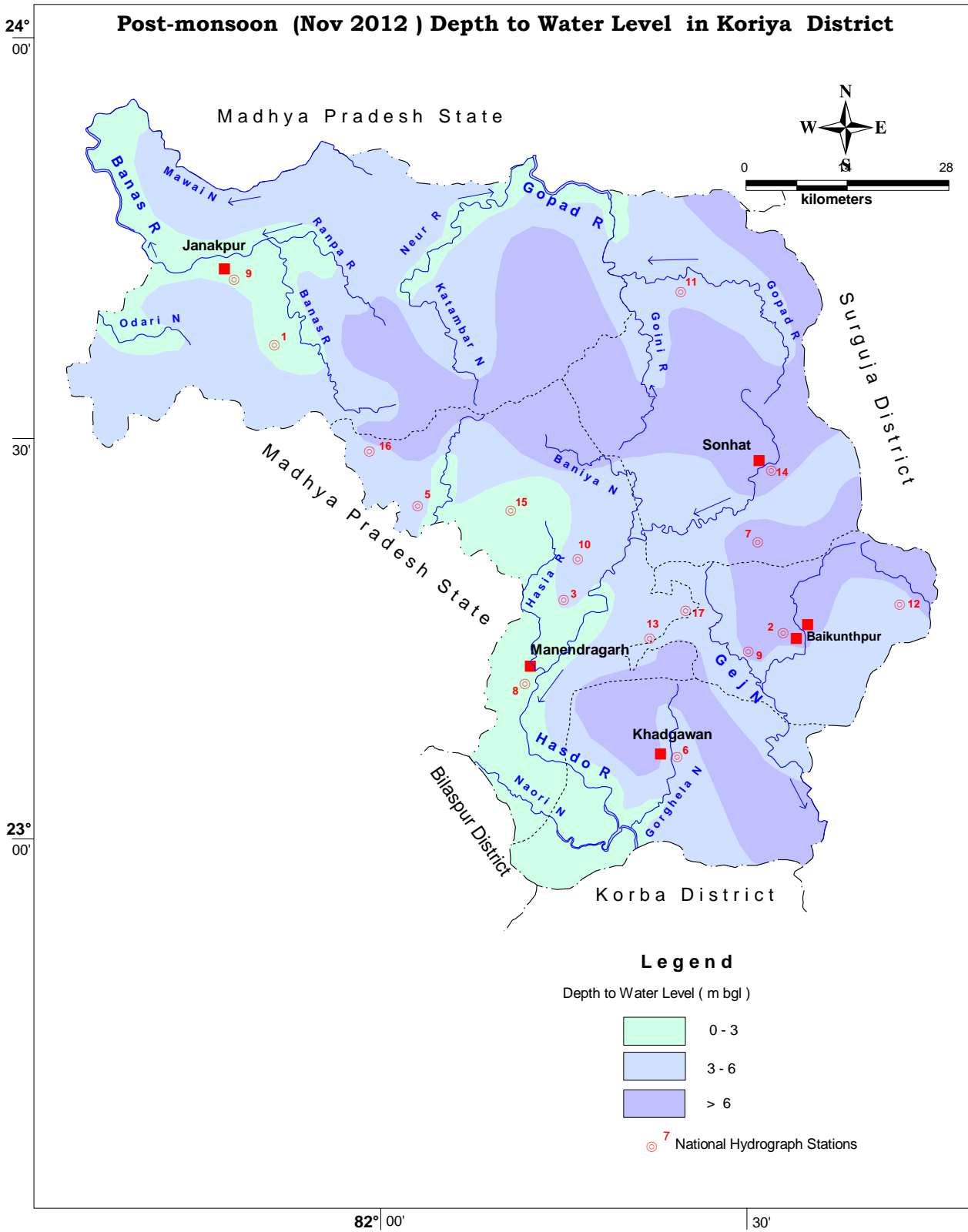


Fig. - 3



district. The Gondwana Supergroup includes Talchir, Barakar, Barren Measure, Upper and Middle Pali, Raniganj, Undifferentiated Coal measures, Panchet, Mahadeva/Supra Panchet/Parsora (Suprabarakar) Formations. The Gondwana Supergroup of rocks mainly consists of sandstone, shale, clay, siltstone and coal seams. The Deccan traps of Cretaceous to Palaeogene age occur on the northwestern part of the district. The Dolerite and Gabbro occurs as dykes trending E-W and NNE-SSW directions in Gondwana formations.

The ground water in these formations occurs under water table conditions in the porous media and under confined to semi-confined conditions in the fractured part of the rock. In Chhota Nagpur Gneissic Complex, the weathered thickness varies from negligible to 15m with average thickness around 10 to 12 m. The weathered and fractured part constitutes the aquifers. In Gondwana formations, the porous, permeable and fractured part constitutes the aquifers. The ground water movement is controlled by the intergranular pore spaces, joints and fractures. At places auto-flow conditions are also encountered in this formation. The depth range of the aquifer zones tapped in Gondwana formation was from 30 to 233 m and in a well the no. of zones encountered varies from 2 to 8 in number. In Deccan Traps, the weathered thickness varies from negligible to 25 m with an average around 12 to 15m. The weathered and the vesicular part of the formation constitute the aquifers. The hydrogeological map prepared for the district is presented in **Fig 5**.

In all there are 22 no. of observation wells (i.e. National Hydrograph Network Stations); out of which 19 no.s are dug wells and 3 no.s are piezometers were established in the district to monitor the water levels four times a year and water quality once a year.

The pre-monsoon ground water level in the district (**Fig 2**) varies from 0.4 to 11.74 mbgl with an average around 4 to 9 mbgl and the post-monsoon water level (**Fig 3**) varies from 1.4 to 6.4 mbgl with an average around 3 to 6 mbgl. The water level fluctuation varies from 1.2 to 8.4 with an average around 2 to 4 m. The water level trend (for last 10 years) for pre-monsoon and post-monsoon period on an average indicates no significant rise or fall.

The discharge in Gondwana formation varies from 0.45 to 4.21 lps in the wells drilled by the CGWB. The transmissivity of this formation is varying from 11 to 36.8 m²/day and the specific capacity ranges between 2 and 10.95 lpm/m of draw down and storativity ranges from 0.00078 to 0.0017. The data of other agencies indicate that the general yield in Archaens and Deccan Trap varies from 1 to 3 lps; however these formations are not explored by way of drilling in the district by CGWB.

3. Ground water resource (As on March 2009)

The ground water resources for Koriya district has been estimated based on the GEC.1997 methodology. The estimates indicate that the annual replenishable ground water resource for the district is 44583.07 Ham. The net annual ground water availability is 42353.92 Ham. The gross annual draft has been estimated as 9769.57 Ham and out of which, the draft for irrigation is 8412.31 Ham and for domestic & industrial water supply purpose is 1357.26. The ground water resources for Koriya district is given in table below and in fig 4

The ground water resources for Koriya district								
Assessment Unit / Block /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 Ground Water 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 %
Baikunthpur								
Command	1913.14	1817.48	122.80032	94.91	217.71032	73.31	1621.3697	11.98
Non Command	4478.62	4254.69	2257.91	332.24	2590.15	355.08	1641.7	60.88
Block Total	6391.76	6072.17	2380.7103	427.15	2807.8603	428.39	3263.0697	46.24
Bharatpur								
Command	1209.19	1148.73	140	11.7	151.7	15.06	993.67	13.21
Non Command	21707.41	20622.04	1895	355.66	2250.66	457.84	18269.2	10.91
Block Total	22916.6	21770.77	2035	367.36	2402.36	472.9	19262.87	11.03
Khadgaon								
Command	208.39	197.97	45	4.16	49.16	5.35	147.62	24.83
Non Command	7122.23	6766.12	1218.9	211.25	1430.15	271.95	5275.27	21.14
Block Total	7330.62	6964.09	1263.9	215.41	1479.31	277.3	5422.89	21.24
Manendragarh								
Command	639.25	607.29	77.8	21.35	99.15	27.48	502.01	16.33
Non Command	3638.78	3456.84	1918	228.92	2146.92	211.99	1326.85	62.11
Block Total	4278.03	4064.13	1995.8	250.27	2246.07	239.47	1828.86	55.27
Sonhat								
Command	513.83	488.14	51.5	11.48	62.98	14.78	421.86	12.9
Non Command	3152.23	2994.62	685.4	85.59	770.99	110.18	2199.04	25.75
Block Total	3666.06	3482.76	736.9	97.07	833.97	124.96	2620.9	23.95
DISTRICT TOTAL	44583.07	42353.92	8412.3103	1357.26	9769.5703	1543.02	32398.59	23.07

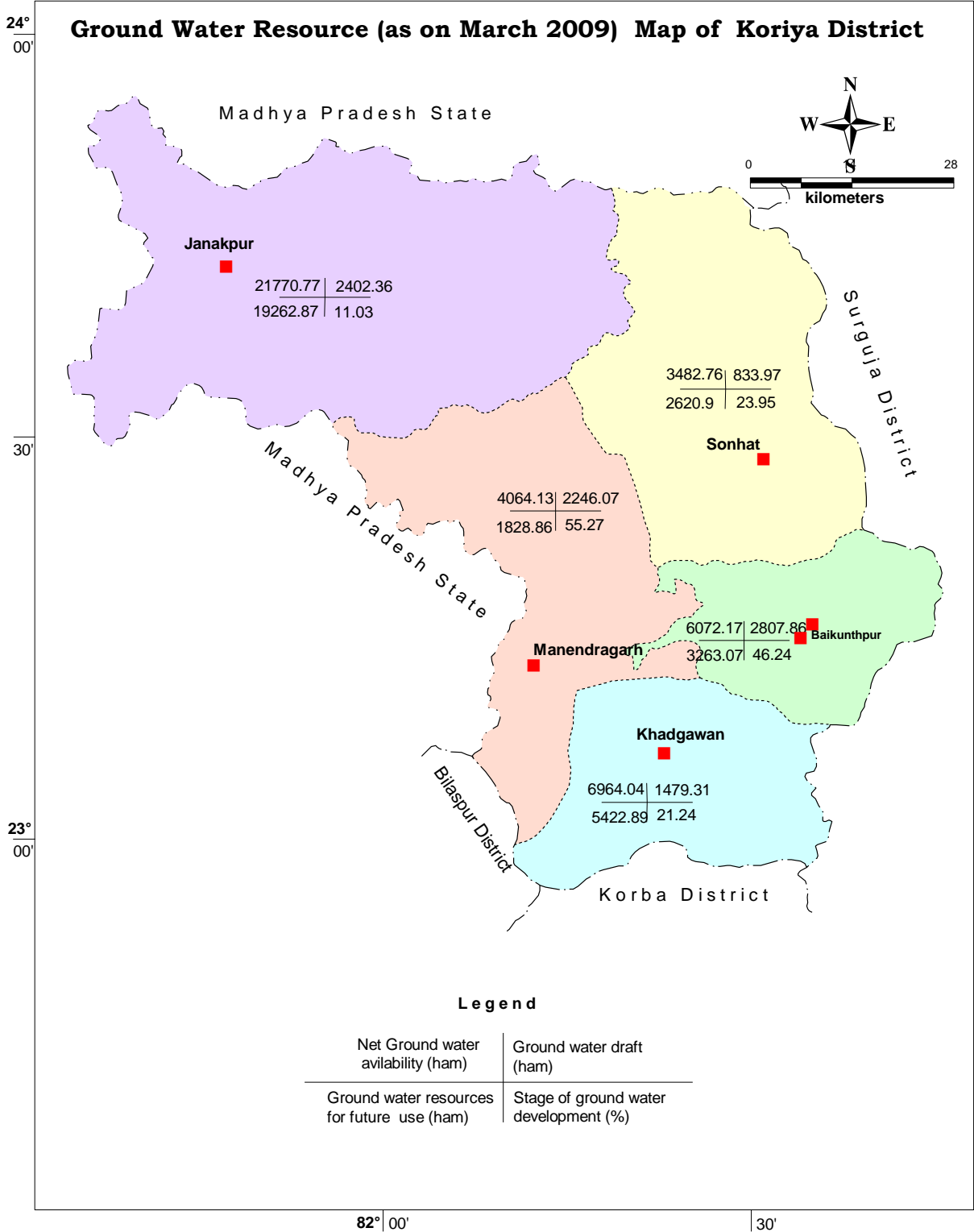
4. Ground water development

The ground water development in the district is being done by dug wells and bore wells. The dug well depth varies from 5 to 14 m and the diameter varies from 1 to 4 m.

The bore wells drilled in the area are 60 to 75m deep with diameter of 100 to 150 mm. Diesel or electric operated pumps of 0.25 to 1 HP or traditional teda is used to lift the water from dug wells for irrigation purposes. The electric pump or rope and bucket are 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 the area can irrigate an area of 0.5 to 1.5 ha for paddy.

Ground water is the main source of drinking in the district covering 650 no. of villages. In all 586 no. of tube wells and 5747 no. of dug wells exist in the district (2011). Together they irrigate around 1211 ha. The contribution of ground water for irrigation comes to nearly 14.51% in the district. The use of ground water in non-command area is maximum.

Fig. No.- 4



The stage of ground water development estimated for Janakpur block is 11.03%, for Sonhat block is 23.95%, for Manendragarh block is 55.27%, for Khadgaon block is 21.24% and for Baikunthpur block is 46.24%. The overall stage of development in the district is 23.07%. The district as well as all the blocks fall within the Safe category. The block wise stage of ground water development in the district is depicted in **Fig 4**. The yield potential and the recommended suitable abstraction structures for the area are shown in **Fig 6**.

5. Ground water quality

The water samples collected from NHNS during the month of May.2009 (Pre-monsoon) were analyzed to determine the quality of ground water in the district. The analysis shows that the concentrations of the major ions are within limit as per BIS Standards and the ground water in the district is suitable for all puposes.

The plot of Piper Trilinear Diagram and US Salinity Diagram indicates that the ground water in the district is suitable for drinking, irrigation and all other purposes. The EC values ranges between 63 to 770 micro siemens/cm at 25°C (Fig 5) and the pH values ranges between 7.7 to 8.2. The overall composition of ground water indicates that it is moderately alkaline and predominantly CaHCO₃ type (calcium bicarbonate).

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 order of 32398.59 Ham and the ground water draft is 9769.57 Ham. The stage of ground water development is only 23.07%. It is estimated that with the available ground water resources a total of 16199 no.s of bore wells can be constructed in the district. By adapting suitable developmental strategies, the less developed blocks like Janakpur, Sonhat, and khadgaon can be further developed by way of increased irrigation. The northwestern part of Janakpur block, northern and southern part of Sonhat block and northern part of Manendragarh block can be developed by constructing deep tube wells of average depth around 250m.

7. Water conservation and Artificial Recharge

The average annual rainfall for the district is 1130 mm. 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 two no.s of Mass awareness programmes on ground water conservation and artificial recharge in the year 2006-07 and 2007-08 were conducted by the department at Baikunthpur. 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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MAHESH M. SONKUSARE
Scientist 'C'

Hydrogeological Map of the Koriya District

