

GEOMORPHOLOGY

DISTRICT—SIROHI

Landform Units	Symbol	Lithology / Material / Description	Occurrence in district	Land use/Land cover
Fluvial Origin Alluvial Plain	AP	Mainly undulating land scape formed due to fluvial activity, consists of gravels, sand, silt and clay. Terrain mainly undulating, produced by extensive deposition of alluvium by river system.	Along river west Banas, Kapalganga, Krishnawati, Khari, Jawai.	Marginal double crop, single crop (Rabi / Kharif).
Valley Fill	VF	Formed by fluvial activity, usually at lower topographic locations, comprising of boulders, cobbles, pebbles gravels, sand, silt and clay. The unit has consolidated sediment deposits.	Along river Banas and Krishnawati.	Marginal double crop, single crop (Rabi).
Ravine	RV	Small, narrow, deep, depression, smaller than gorges, larger than gulley, usually carved by running water.	Western margin of district.	Marginal Kharif crop, open scrub.
Denudational Origin Pediment	P	Broad gently sloping rock flooring, erosional surface of low relief between hill and plain, comprised of varied lithology, criss crossed by fractures & faults.	Scattered in entire district, main concentration in west.	Single crop (Kharif), open scrub fallow.
Burried Pediment	BP	Pediment covered essentially with relatively thicker alluvial, colluvial or weathered materials.	Scattered in entire district, mainly concentrated in south west and north.	Marginal double crop, single crop (Kharif), fallow, open scrub.
Hill Structural Hill	SH	Linear to arcuate hills showing definite trend-lines with varying lithology associated with folding, faulting etc.	Along western margin of district.	Forest, mining, open scrub.

72°30'

73°00'

GEOMORPHOLOGY

SIROHI DISTRICT

Scale 0 5 10 15 20 km.

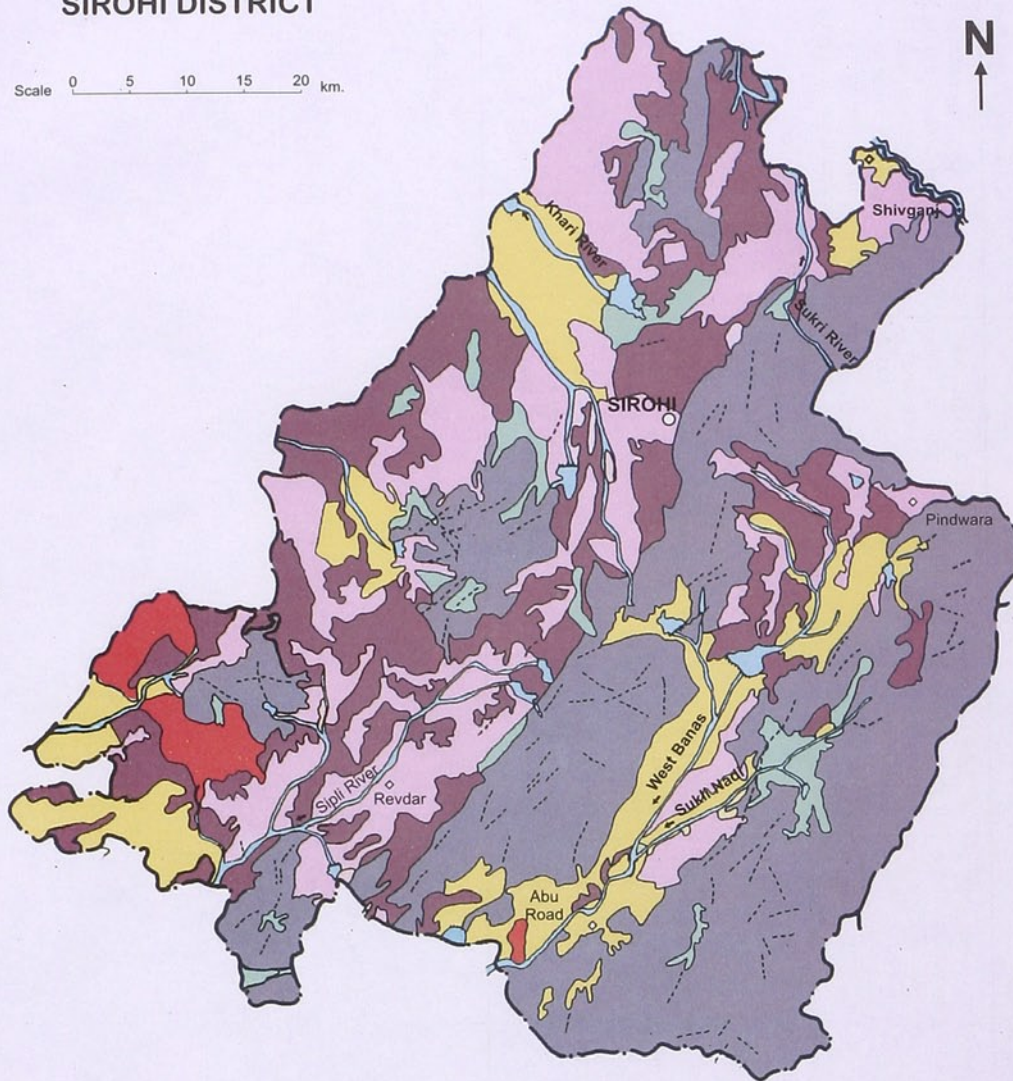


25° 00'

25° 00'


24° 30'

24° 30'



LEGEND

Lineament

 - FAULTS/FRACTURES/JOINTS OF VARYING LENGTH AND BREADTH

Water Bodies


 - RIVER/STREAMS/RESERVOIR




- STRUCTURAL/LINEAR/DENUDATIONAL

Landform Units :


Fluvial Origin :


 Alluvial Plain

 Valley Fill

 Ravine

Denudational Origin :

 Pediment

 Buried Pediment

72°30'

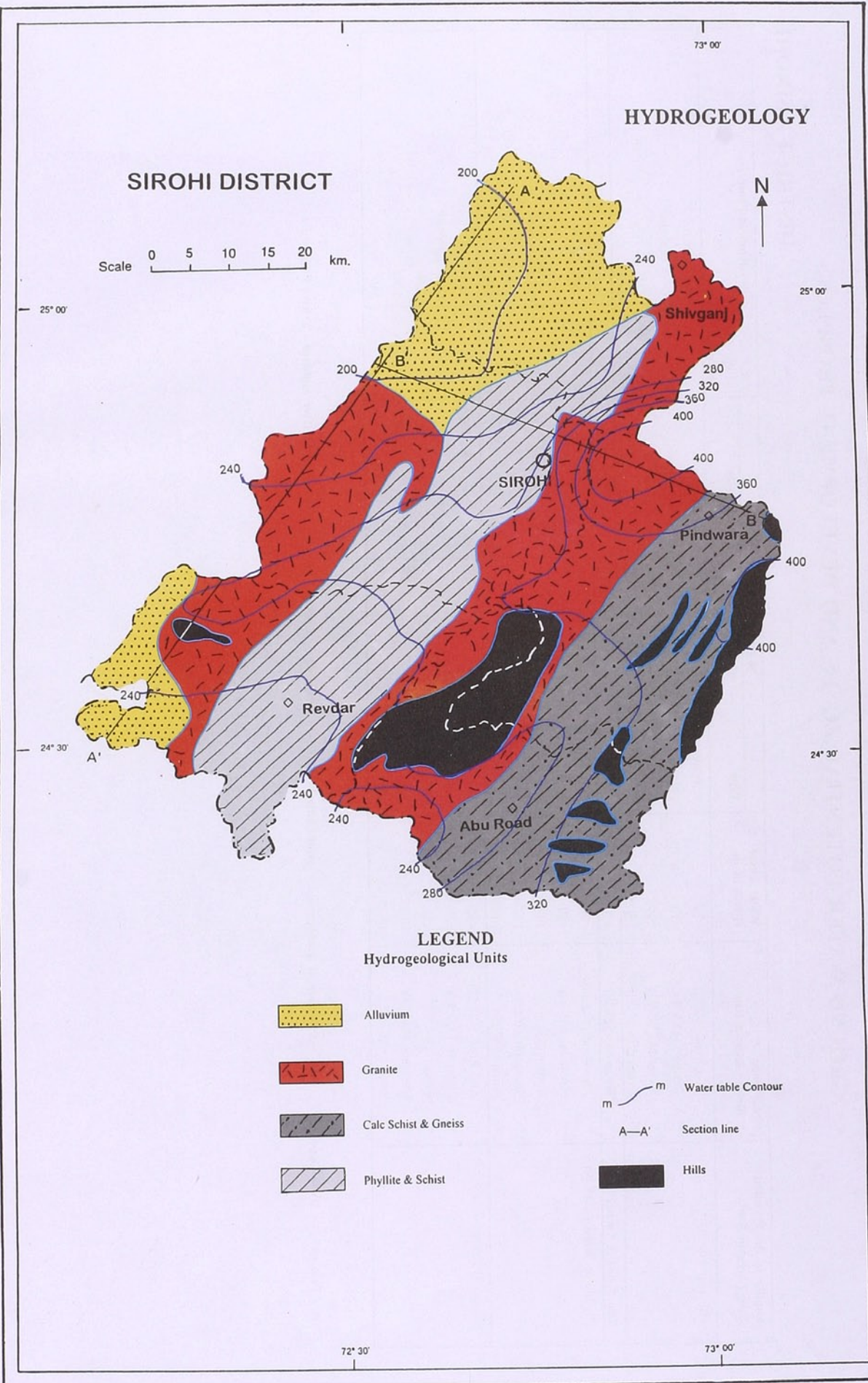
73°00'

HYDROGEOLOGY

DISTRICT—SIROHI

Hydrogeological units	Description of the unit/Geological section	Occurrence	Ground Water flow
Alluvium (Quaternary)	It comprises unconsolidated to semi consolidated sand, gravel, pebbles, boulders and at places clay in varying proportion. These are fluvial deosits and their thickness in major part of the area varies between 10 to 15 m.	The litho unit occurs in major part of Shivganj block. It also spreads in peripheral part of adjoining Sirohi block. Western most area in Reodar block and a localised pocket in Abu Road block have been located with alluvial aquifer.	General direction of ground water flow north of Sirohi has been inferred toward SE to NW. In other parts of the district, it is N to S whereas in southern portion it is from NE to SW. Hydraulic gradient is more steep in hilly terrain, in other parts of the area it has been computed as 4.0 m/km.
Granite (Post Delhi Intrusives)	It is the main intrusive rock of Delhi super group. Granite is light grey to pink colour, medium to coarse grained, and characteristically have porphyritic texture. The litho unit is sparsely jointed and exhibit weathering upto depth of about 40 m.	The litho unit covers most extensive area in Sirohi block and also extends in parts of other adjoining blocks.	
Calc schist & Gneiss (Delhi super group)	These litho units mainly comprise arenaceous sediments. Quartzites, biolite schist, calc gneiss and limestone are different litho units, which show gradation from one to other unit.	These litho assemblages occur in south eastern area between Pindwara and Abu Road and occupies extensive area in these blocks.	
Phyllite & Schist (Aravalli super group)	These litho units include argillaceous meta sediments and generally susceptible to erosion and weathering.	The litho assemblages cover major part of Reodar block and extend north eastward in Shivganj block where occupy small area. Part of Sirohi and Aburoad blocks also have been reported with these rock units.	

For cross section(s) please see page no. 550

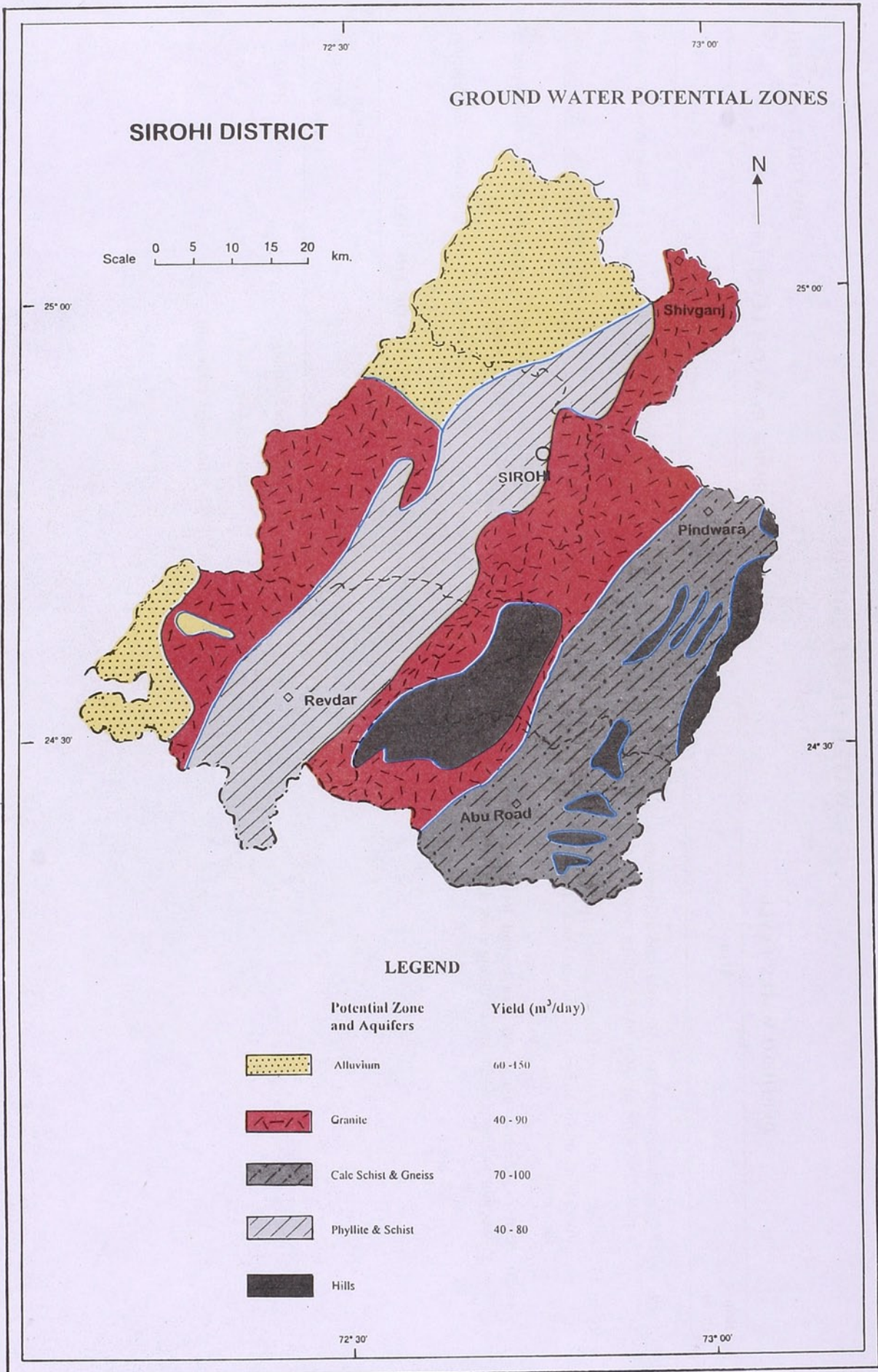


GROUND WATER POTENTIAL ZONES AND DEVELOPMENT PROSPECTS

DISTRICT - SIROHI

Aquifer in the Potential Zone (Area in Km ²)	Occurrence * Block (Area in Km ²)	Water Level (1997) in m.	Well Parameters			E.C. X10 ³ siem/cm	Development Prospects
			Type	Proposed depth in m	Discharge in m ³ /day		
Alluvium (981.83)	* Abu Road (60.50)	<20	TW/DW	70-80/25-40	120	<2	Semi Critical
	* Revdar (185.93)	<20	TW/DW	60-80/25-40	150	<2	Over exploited
	* Sheoganj (526.03)	<35	TW	50-70	150	<2,2-4	Safe
	* Sirohi (209.37)	15-25	TW/DW	70-80/30-35	150	<2,2-4	Safe
Calc Schist & Gneiss (525.38)	* Pindwara (525.38)	<20	TW/DW	70-80/20-35	120	<2,2-4	Safe
	* Abu Road (142.34)	<20	TW/DW	60-80/25-40	80	<2	Safe
	* Pindwara (525.38)	<20	TW/DW	70-80/25-40	120	<2,2-4	Safe
	* Revdar (553.00)	10-30	TW/DW	60-80/25-40	90	<2	Semi Critical
	* Sheoganj (60.15)	15-30	TW/DW	60-80/25-40	90	<2,2-4	Safe
	* Sirohi (262.53)	10-25	TW/DW	70-80/25-40	90	<2,2-4	Safe
Granite (1550.50)	* Abu Road (128.22)	<15	DW	15-30	90	<2	Safe
	* Pindwara (357.52)	<20	DW	25-40	90	<2,2-4	Over exploited
	* Revdar (246.87)	<25	DW	30-40	90	<2	Safe
	* Sheoganj (186.71)	10-25	DW	25-40	90	<2,2-4	Safe
	* Sirohi (631.18)	10-20	DW	25-40	90	<2,2-4	Safe

TW - Tube wells DW - Dug wells Safe - <65% stage of development Semi Critical - 65-85% development Critical - 85-100% development Over exploited - >100% development



WATER LEVEL TRENDS

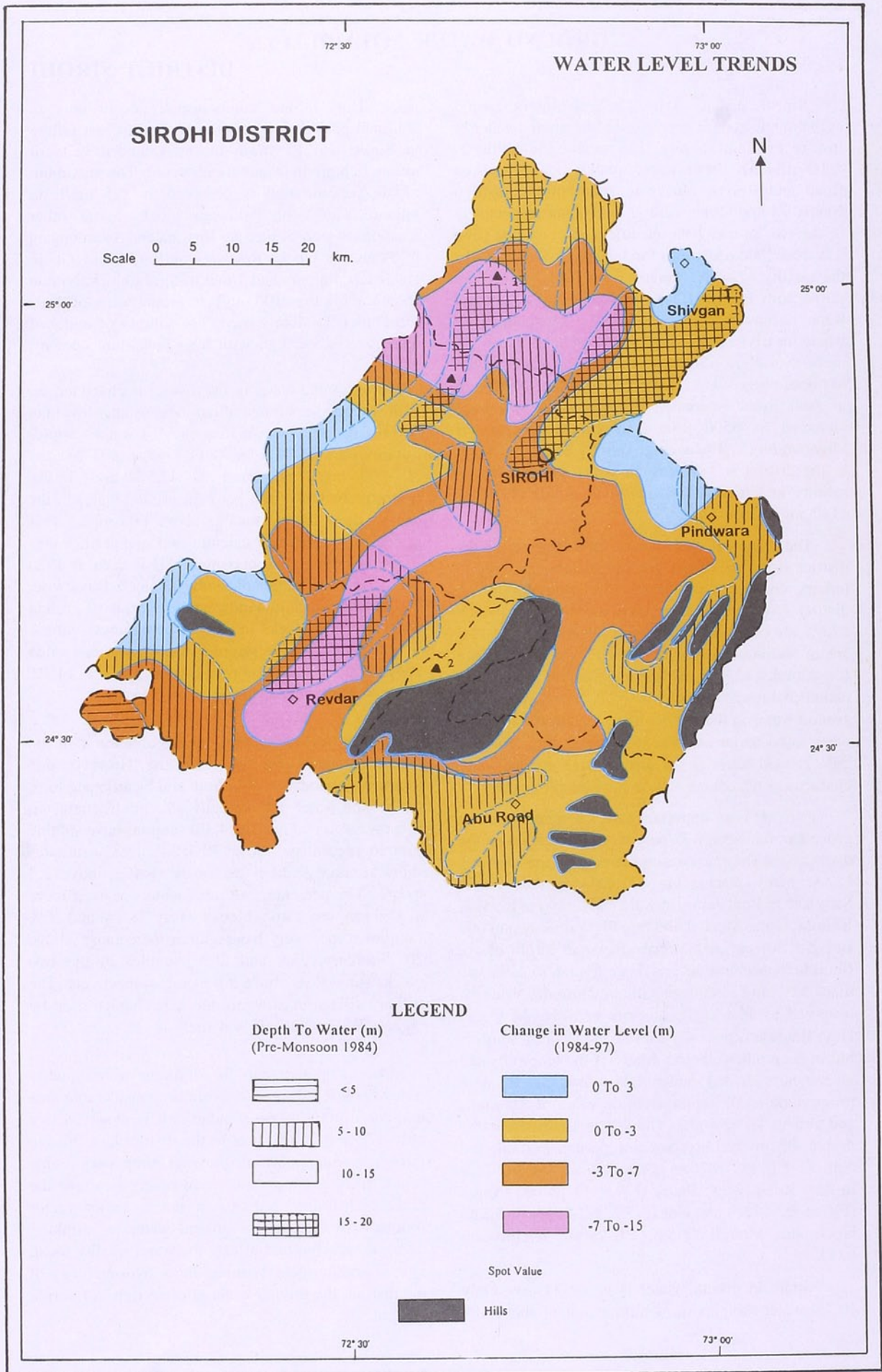
DISTRICT : SIROHI

CHANGE IN WATER LEVEL (1984-1997)

Range in m	Area	Range in m	Area
< 10	Revdar block, area around Abu road, east of Pindwara west of Sirohi and a pocket west of Shivganj have shallow water level less than 10 m.	0 to 3	Small pockets situated along northeastern and western peripheral region exhibit rise in water level less than 3 m.
10 to 15	Major part of the district leaving aside Revdar block area around Abu Road, north of Sirohi, east of Pindwara, has depth to water level between the range.	0 to -3	Peripheral region leaving aside south western area, show marginal depletion in water level less than 3 m.
15 to 20	Part of Shivganj block and area around Revdar extending northeast direction has deep water level ranging from 15 to 20.	-3 to -7	Major part of the district leaving aside peripheral region, exhibit depletion in water level between the range.
		-7 to -15	Area north of Sirohi and between Revdar and Sirohi show steep depletion in water level ranging upto 15 m.

DETAILS OF THE SPOT

Spot code	Village (Block)	Change in water level in m (1984-97)
1.	Bhootgaon (Sirohi)	(-) 17.92
2.	Delwara (Abu Road)	(-) 9.60
3.	Kailasnagar (Shivganj)	(-) 10.53



GROUND WATER POTABILITY

DISTRICT SIROHI

Sirohi district lying in sub humid-humid agroclimatic zone is characterised by ground water of low to medium salinity (Electrical Conductivity < 4000 $\mu\text{S}/\text{cm}$). Fresh water quality occurs in Abu Road and Revdar blocks in south of the district. Nearly 74 and 88 per cent ground water respectively in the two blocks have electrical conductivity (EC) less than 2000 $\mu\text{S}/\text{cm}$. In Pindwara and Sirohi blocks the quality of water ranges from fresh to medium saline with EC less than 4000 $\mu\text{S}/\text{cm}$. The ground water is, however, more inferior in Shivganj block where nearly 24 per cent water samples have EC more than 4000 $\mu\text{S}/\text{cm}$. The minimum value of EC has been observed as 380 $\mu\text{S}/\text{cm}$ in village Achalgarh in Abu Road whereas maximum value has been observed as 8500 $\mu\text{S}/\text{cm}$ in village Khejana of Shivganj block. The average salinity of ground water in the district is 1875 $\mu\text{S}/\text{cm}$ which corresponds to salinity in terms of total dissolved solids (TDS) as 1140 mg/L.

The chemical character of ground water in the district also varies from primary bicarbonate type to tertiary chloride type. Nearly 42% samples in the district have bicarbonate type water out of which 27.6% are of mixed cation bicarbonate type and 11.6 are of sodium-bicarbonate type of water. Only in a few samples (2.8%) calcium-magnesium dominating cation character has been observed. Nearly 30 percent ground water in the district have secondary character wherein no major anion is seen dominating. The rest 29% ground water in the district have tertiary water character with chloride as major anionic species.

Fluoride is an important toxic element present in ground water. Nearly 33 percent water samples of the district have fluoride concentration more than 1.5 mg/L. At many places, viz., Anthala in Abu Road; Sangwan in Pindwara; Jirawal and Nimbaj in Revdar; Bithura, Gola, Mochal and Sugarliya in Shivganj and Belagiri, Mirpur and Mahabatnagar in Sirohi block, fluoride concentration has been found to be more than 5.0 mg/L. The maximum fluoride value is observed as 11.6 mg/L at Gola in Shivganj block. High fluoride is not only confined to shallow aquifers but in deep tubewells too. Many of the tubewells and piezometers drilled under agriculture development programme (ADP) show fluoride value of 3.0 mg/L and above. These waters show high fluoride content despite of low salinity. Some important example are Amla (F-6.0; EC-1870) and Amthala (F-4.4; EC 710) in Abu Road block; Padiv (F-4.8; EC-2700), Anger (F-6.0; EC-2120) and Gol (F-5.2; EC-2600) in Sirohi block and Mongli (F-5.6; EC-2900) in Shivganj block.

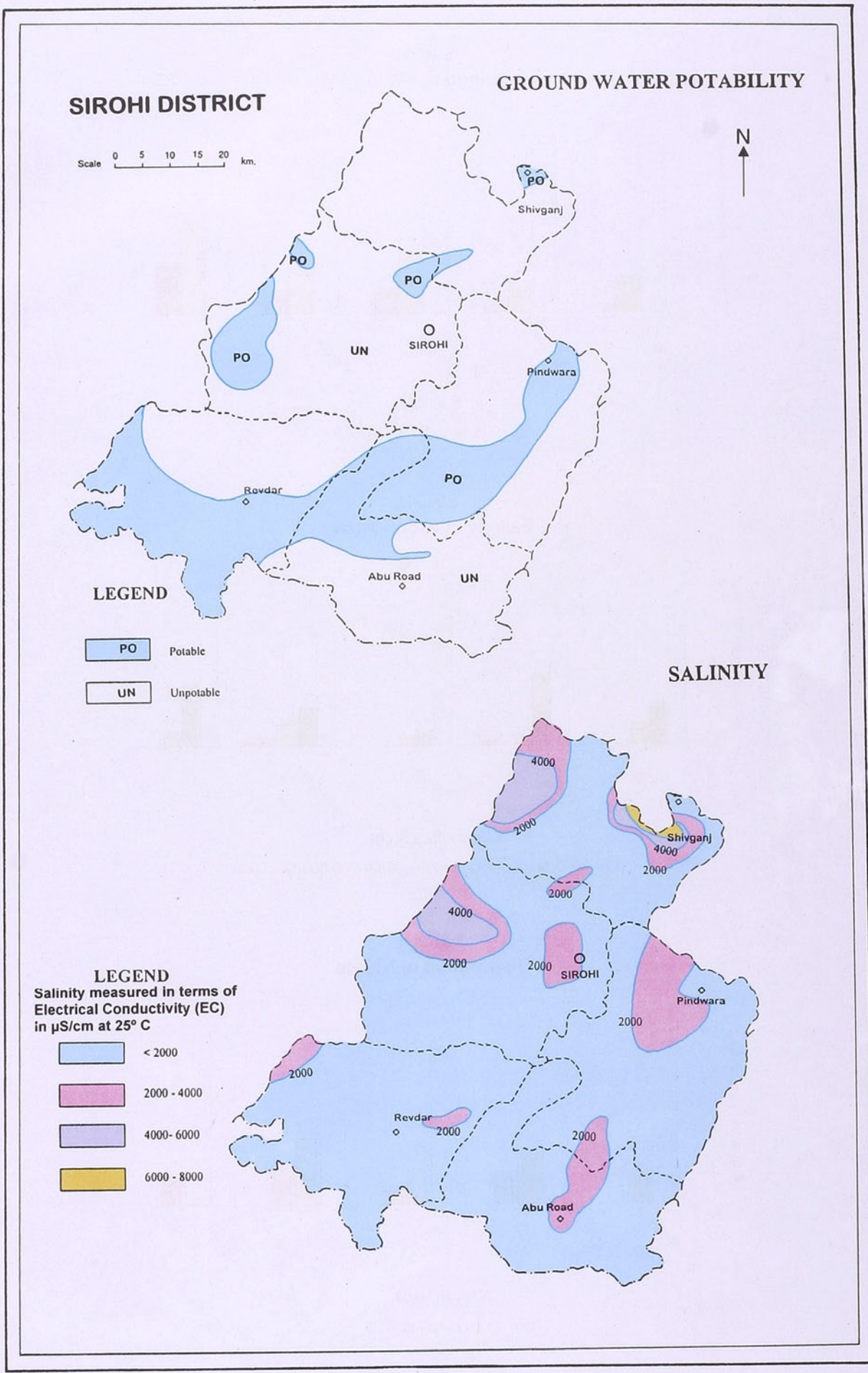
Nitrate in ground water is generally low. Only 10.7% water samples show nitrate content above 100

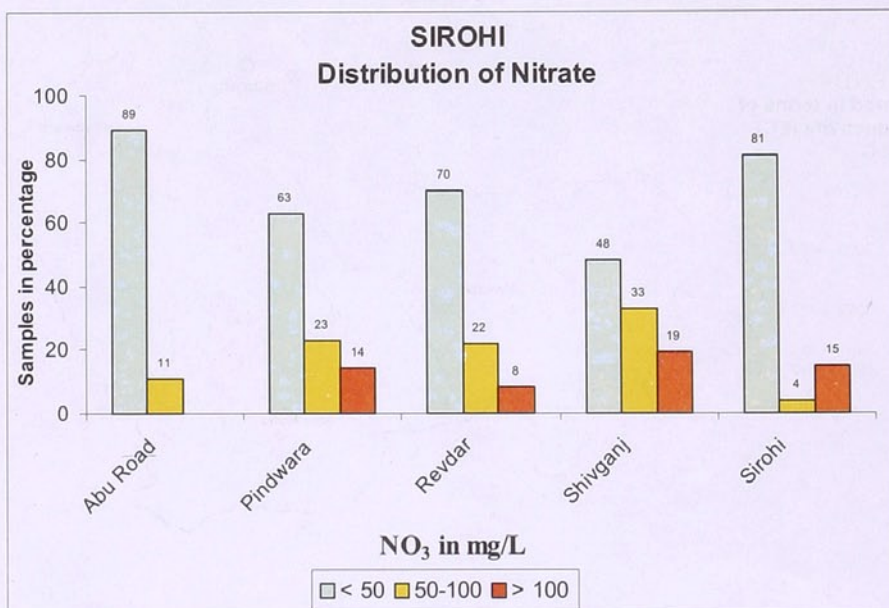
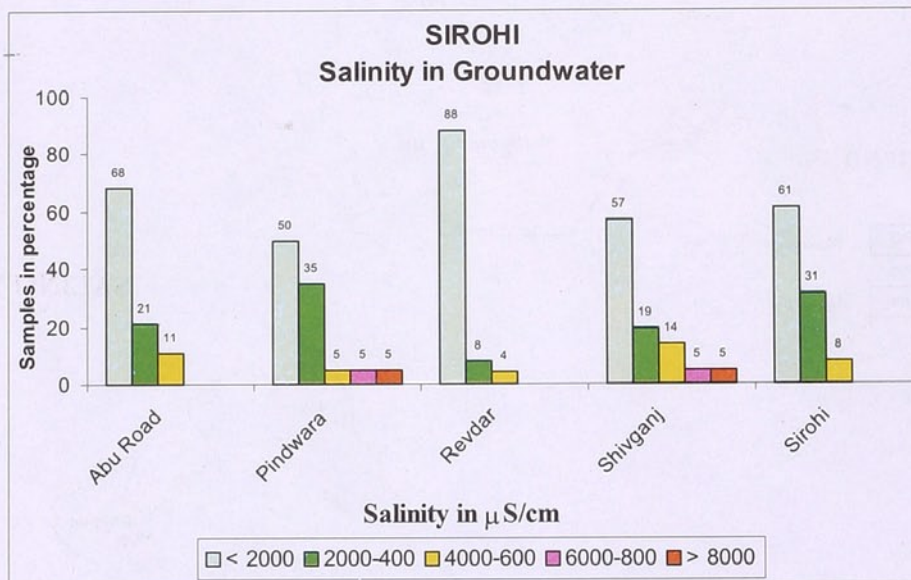
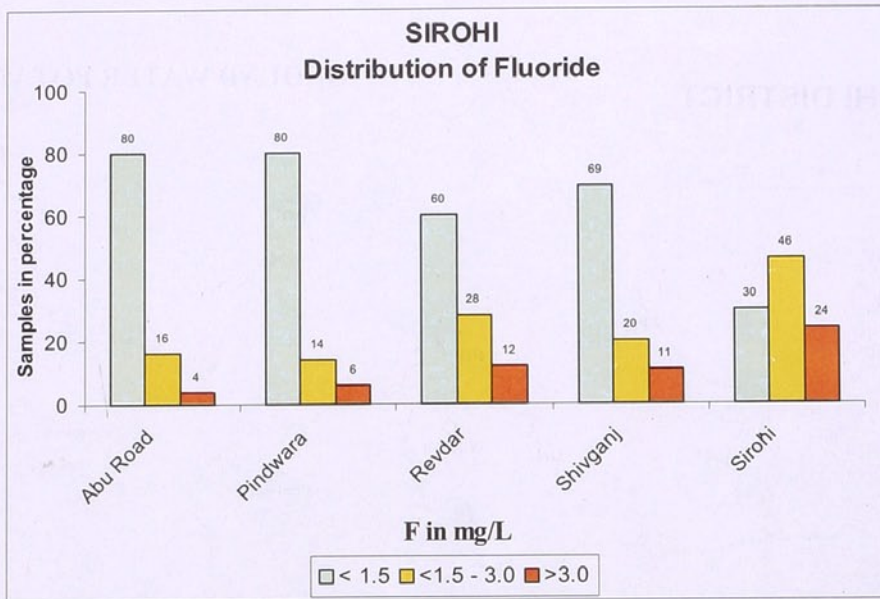
mg/L. High nitrate waters usually occur only in confined pockets but in some portion in east falling in Sirohi and Pindwara blocks extended belts of nitrate rich groundwater are observed. The maximum nitrate concentration is observed as 395 mg/L in village Nandia of Pindwara block. Some other locations of significance are Birwara and Swaroopganj in Pindwara block; Revdar and Sorda and Goeli, Kalandari, Rajpura and Tawri in Sirohi block. Nitrate content more than 100 mg/L in groundwater of these locations is randomly seen. The salinity of many of these waters are high with high potassium content.

The ground water in the district is characterised by low to medium range of hardness usually less than 600 mg/L. The per cent frequency of water samples falling in the total hardness (TH) range of 0-300 and 301-600 mg/L is found as 42.5% and 46.9% respectively. Only 10.6 per cent ground water in the district show hardness value above 600 mg/L. This is due to low ratio of calcium and magnesium ions in ground water. The maximum TH is seen as 1920 mg/L in village Warain of Pindwara block. Blockwise, the ground water in Pindwara is inferior to ground water in other blocks in respect of hardness values. In this block 18.2% samples show hardness value above 600 mg/L as compared to only 5.2 to 14.3% of such waters occurring in other blocks.

Owing to low salinity, the ground water in the district is suitable for agriculture use. However, due to relative abundance of sodium and bicarbonate ions, the ground water is marginally alkaline in character. It is observed that nearly 14.3% samples have soluble sodium percentage above 70 while 18.8% samples show residual sodium carbonate (RSC) above 2.0 meq/L. The percentage of such waters is even more in Shivganj and Sirohi blocks where 38.1% and 20% samples respectively have sodium percentage above 70. Similarly, 28.6 and 20% samples in the two blocks show RSC above 2.0 meq/L respectively. The Bithura village in Shivganj block is characterised by highest RSC value of 14.4 me/L.

An integrated map for drinking water quality based upon ICMR standards shows considerable area non-conforming to the standards. It is observed that only 37.8% ground water in the district have all the three constituents within the maximum permissible limits. In rest, one or more constituent is above the prescribed limits. Salinity is not a major factor problem for rejection of ground water for drinking use, but high fluoride affects the water quality most. Due to granite rocks forming major hydrogeology of the district, the ground water is often rich in fluoride content.

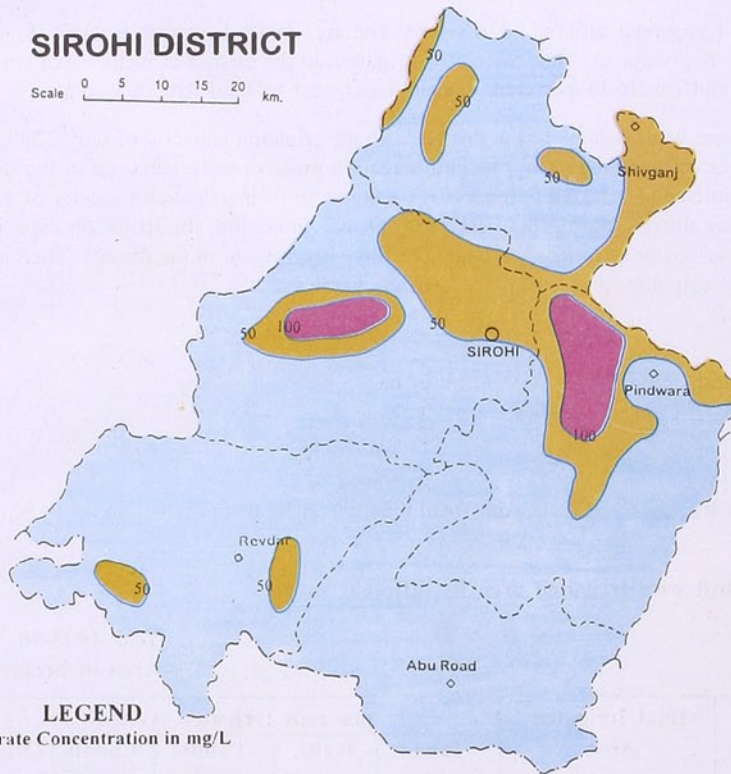




NITRATE DISTRIBUTION

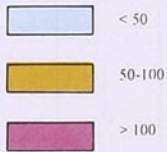
SIROHI DISTRICT

Scale 0 5 10 15 20 km.



LEGEND

Nitrate Concentration in mg/L



FLUORIDE DISTRIBUTION

LEGEND

Fluoride Concentration in mg/L

