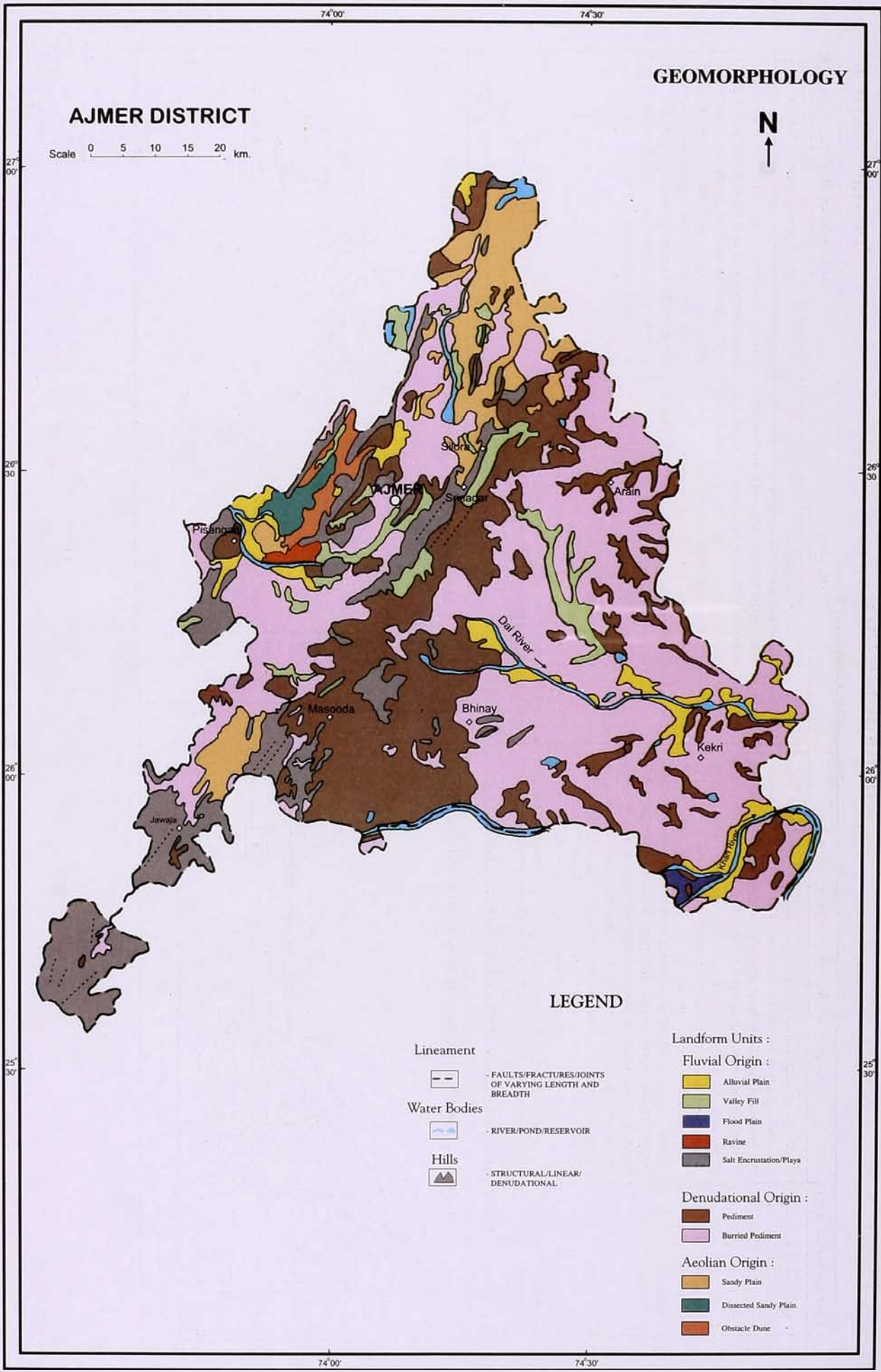


## GEOMORPHOLOGY

### DISTRICT—AJMER

Landform Units	Symbol	Lithology / Material / Description	Occurrence in district	Land use/Land cover
<b>Fluvial Origin</b> Alluvial Plain	AP	Mainly undulating land scape formed due to fluvial activity, consisting of gravels, sand, silt and clay.	Along rivers Dai, Khari, Sagarmati.	Marginal double crop, single crop (Rabi / Kharif), fallow.
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.	Scattered in central part i.e. south of Ajmer city, south of Kishangarh town & near Kharwa village.	Marginal double crop, single crop (Rabi), open scrub.
Salt Encrustation/ Playa	SE/PL	Topographical depressions comprising of clay, silt, sand and soluble salts, usually undrained and devoid of vegetation.	Northern most tip.	Salt lake, salt waste.
Flood Plain	FP	The surface or strip of relatively smooth land adjacent to a river channel formed by river and covered with water when river over flows its bank. Normally subject to periodic flooding.	Along Khari river in south east.	Single crop (Rabi), open scrub.
Ravine	RV	Small, narrow, deep, depression, smaller than gorges, larger than gully, usually carved by running water.	Negligible in wind ward side of hills in north.	Open scrub.
<b>Denudational Origin</b> Pediment	P	Broad gently sloping rock flooring, erosional surface of low relief between hill and plain, comprises of varied lithology, criss crossed by fractures & faults.	Mainly concentrated at margin of hills.	Marginal double crop, single crop (Kharif), fallow, open scrub.
Burried Pediment	BP	Pediment covered essentially with relatively thicker alluvial, colluvial or weathered materials.	Scattered in entire district main concentration in east, south east and western part.	Double crop, single crop (Kharif), fallow, open scrub.
<b>Eolian Origin</b> Sandy Plain	SP	Formed of aeolian activity, wind blown sand with gentle sloping to undulating plain, comprising of coarse sand, fine sand, silt & clay.	Surrounding Beawar town, Kishanganj, Mandanganj town and extending toward north east direction.	Marginal double crop, single crop (Kharif), open scrub, fallow.
Dissected Sandy Plain	DSP	Sandy plain highly dissected by stream & drainage.	South west of Pushkar.	Single crop (Kharif), fallow, open scrub.
Obstacle Dune	OD	Formed on windward/leeward sides of obstacle like isolated hills or continuous chain of hill, due to obstruction in path of sand laden wind; badly dissected, well cemented and vegetated.	South west and north east of Pushkar.	Open scrub.
<b>Hills</b> Linear Ridge	LR	Long narrow low-lying ridge usually barren, having high run off may form over varying lithology with controlled strike.	Negligible in west and nothern part.	Barren.
Denudational Hill	DH	Steep sided, relict hills undergone denudation, comprising of varying lithology with joints, fractures and lineaments.	Scattered in central and south west.	Open scrub.
Structural Hill	SH	Linear to arcuate hills showing definite trend-lines with varying lithology associated with folding, faulting etc.	Divides the district into two halves south west and north east.	Forest, open scrub.



**AJMER DISTRICT**

Scale 0 5 10 15 20 km.

**GEOMORPHOLOGY**



**LEGEND**

- Lineament**  
 - FAULTS/FRACTURES/JOINTS OF VARYING LENGTH AND BREADTH
- Water Bodies**  
 - RIVER/POND/RESERVOIR
- Hills**  
 - STRUCTURAL/LINEAR/DENUDATIONAL

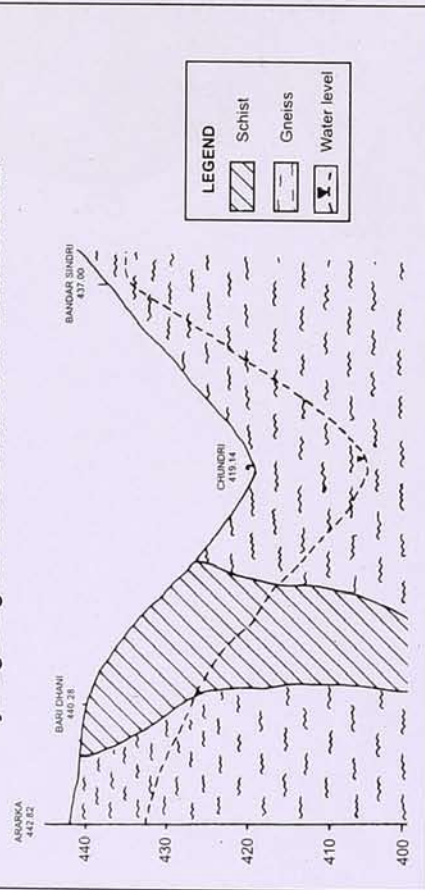
- Landform Units :**
- Fluvial Origin :**
- Alluvial Plain
  - Valley Fill
  - Flood Plain
  - Ravine
  - Salt Encrustation/Playa
- Denudational Origin :**
- Pediment
  - Buried Pediment
- Aeolian Origin :**
- Sandy Plain
  - Dissected Sandy Plain
  - Obstacle Dune

# HYDROGEOLOGY

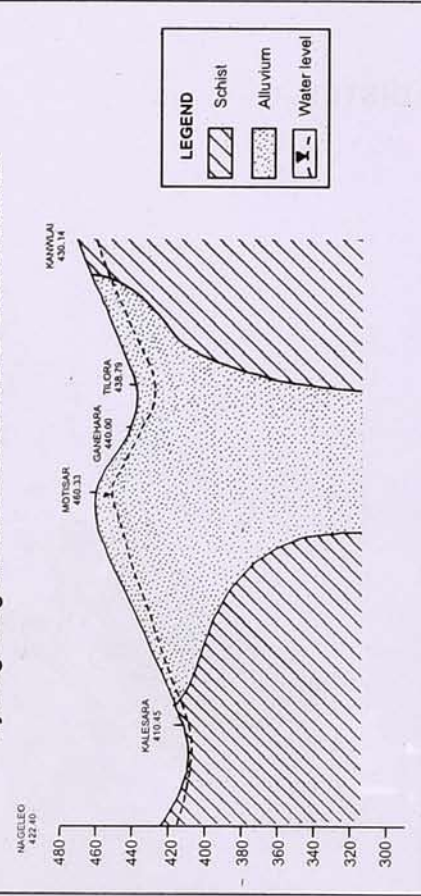
## DISTRICT—AJMER

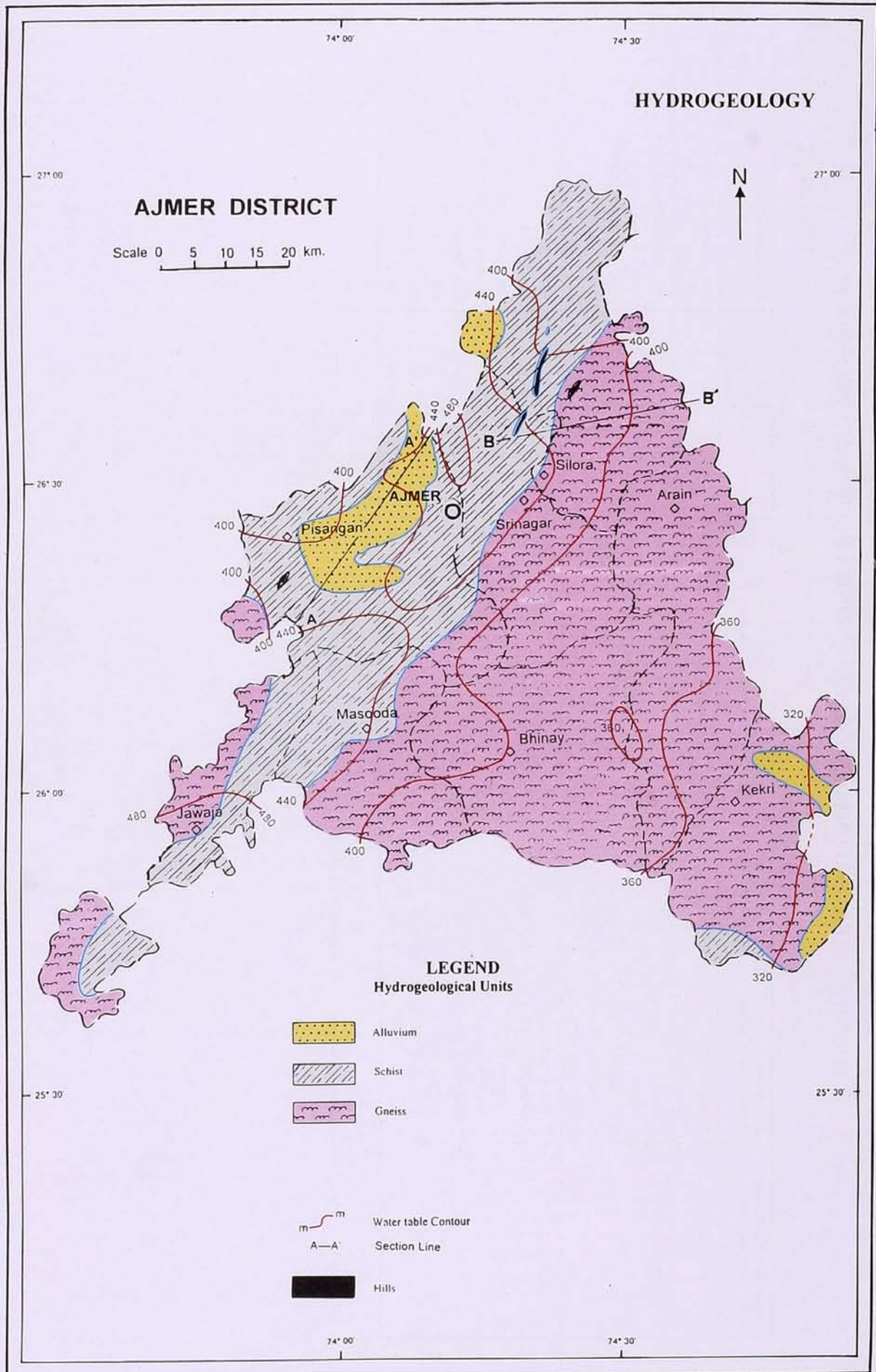
Hydrogeological units	Description of the unit/Geological section	Occurrence	Ground Water flow
Alluvium (Quaternary)	It comprises unconsolidated to semi consolidated sand with silt, clay and kankar in variable proportions. Thickness of alluvium in Masooda and Kekri block is generally less than 10 m while in Pisangan block it is between 25 to 30 m.	The formation occupies small area in Masooda and Srinagar blocks while quite a large area in Kekri and Pisangan blocks. Alluvium in Masooda and Kekri blocks occurs along river courses.	General direction of ground water flow varies from place to place. In eastern half of the area, it is inferred from NW-SE or W to E. Area around Ajmer has N to S flow. In other part there is wide variation. Hydraulic gradients in Arain & Kekri blocks located in central part are 2.27 and 1.68 m/km. It is generally steep in western part and worked out around Ajmer as 2.8 m/km.
Calc-schist (Delhi and Bhilwara Super Groups)	Delhi Super Group of rocks are represented by Kumbhalgarh, Ajabgarh and Alwar groups and mainly includes calc-schist, calc-gneiss, garnet-biotite schist, quartzite and mica schist. Bhilwara Super Group comprises Sawar group and Mangalwar complex and represented by dolomitic marble, garnetiferous mica schist and migmatites etc.	The litho unit occupies western part of the district in Jawaja, Pisangan, Silora and Srinagar blocks.	
Granite, Gneiss (Bhilwara Super Group)	The Bhilwara Super Group represented by Sadmata complex includes paragneiss migmatites and pyroxene granulite.	The lithological assemblages cover major part of the area in Kekri, Bhinay, Arain, Silora and Srinagar blocks.	

Hydrogeological Cross Section A-A' District AJMER



Hydrogeological Cross Section B-B' District AJMER





## GROUND WATER POTENTIAL ZONES AND DEVELOPMENT PROSPECTS

DISTRICT - AJMER

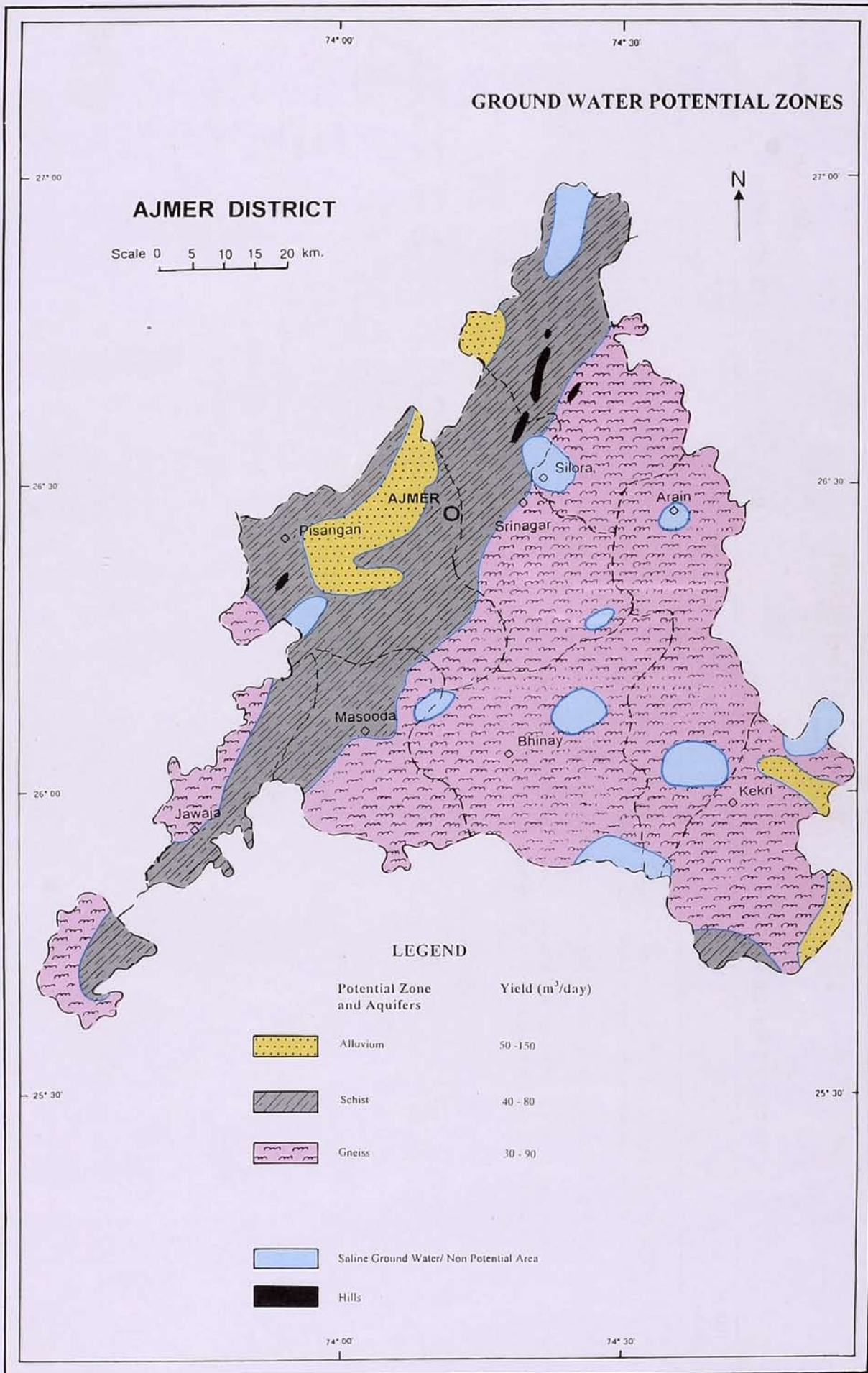
Aquifer in the Potential Zone (Area in Km <sup>2</sup> )	Occurrence * Block (Area in Km <sup>2</sup> )	Water Level (1997) in m.	Type	Well Parameters		Discharge in m <sup>3</sup> /day	E.C. X10 <sup>-4</sup> stem/cm	Development Prospects
				Proposed depth in m				
Alluvium (332.49)	* Kekri (91.87)	<15	DW	25-30		33-50	<4	Over exploited
	* Pisangan (240.62)	<20	DW	25-30		33-50	<4	Critical
Cale-Schist (2002.57)	* Jawaja (307.56)	<15	DW	25-30		30-45	<4	Over exploited/Semi Critical
	* Masooda (183.44)	<15	DW	25-30		30-45	<4,4-8	Semi Critical
	* Pisangan (682.14)	<20	DW	25-30		30-45	<4	Over exploited/Semi Critical
	* Kishangarh (Silora) (566.74)	<30	DW	25-30		30-45	<4,4-8	Safe
	* Sri Nagar (262.69)	<25	DW	25-30		25-45	<4,4-8	Over exploited
	* Arain (1064.01)	<15	DW	25-30		30-50	<4,4-8	Safe
Granite gneiss (5121.70)	* Bhinay (1150.82)	<15	DW	25-30		30-50	<4	Semi Critical
	* Jawaja (176.77)	<20	DW	25-30		30-40	<4	Critical/Over exploited
	* Kekri (797.80)	<10	DW	25-30		33-45	<4,4-8	Safe/Semi Critical
	* Masooda (633.56)	<20	DW	25-30		30-40	<4,4-8	Semi Critical
	* Pisangan (185.29)	<15	DW	25-30		30-40	<4	Safe
	* Kishangarh (Silora) (446.14)	<30	DW	25-30		30-40	<4,4-8	Safe
	* Sri Nagar (677.31)	<20	DW	25-30		30-45	<4,4-8	Safe

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






# GROUND WATER POTENTIAL ZONES

## AJMER DISTRICT

Scale 0 5 10 15 20 km.



### LEGEND

Potential Zone and Aquifers	Yield ( $m^3/day$ )
 Alluvium	50 - 150
 Schist	40 - 80
 Gneiss	30 - 90
 Saline Ground Water/ Non Potential Area	
 Hills	



Alluvium

50 - 150



Schist

40 - 80



Gneiss

30 - 90



Saline Ground Water/ Non Potential Area



Hills

## WATER LEVEL TRENDS

DISTRICT : AJMER

### CHANGE IN WATER LEVEL (1984-1997)

Range in m	Area	Range in m	Area
< 5	Small pockets located in southern part of the district, south of Srinagar and northern peripheral area have shallow water level less than 5 m.	2 to 4	Small pockets around Arain, Bhinay, southern and western peripheral area exhibit rise in water level between the range.
5 to 10	Major part of the district, leaving aside some pockets, be in this range.	0 to 2	Area between Arain and Kekri extending westward upto Bhinay and Pisangan and pockets located in southern periphery show rise in water level less than 2 m.
> 10	Small pockets between Pisangan and Masooda, southern peripheral area and north of Silora and Srinagar have deep water level ranging more than 10 m.	0 to -2	Central part, excluding area around Bhinay and peripheral region, exhibit depletion in water level less than 2 m.
		-2 to -4	Northern part comprising part of Silora, Srinagar and Pisangan blocks and pockets in southern periphery show depletion in water level in the range.

### DETAILS OF THE SPOT

Spot code	Village (Block)	Change in water level in m (1984-97)
1.	Salemabad (Silora)	(-) 13.40
2.	Sokliya (Bhinay)	(-) 14.50





## GROUND WATER POTABILITY

### DISTRICT AJMER

The ground water is fresh to saline with an average electrical conductivity (EC) of 3863  $\mu\text{S}/\text{cm}$ . In Bhinay, Jawaja and Pisangan blocks ground water is comparatively less mineralised (EC < 3000  $\mu\text{S}/\text{cm}$ ) but in Arain, Kekri, Masooda, Srinagar and Silora blocks nearly 55% of well waters are moderately saline to saline having EC above 3000  $\mu\text{S}/\text{cm}$ .

Ground water occurring in alluvium and calc-schist is less mineralised, and have low fluoride and nitrate contents. Wells tapping gneiss, schist and calc-gneiss comparatively yield more mineralised water. The nitrate and fluoride contents of these wells are also higher.

The fresh bicarbonate type waters are having low dissolved solids and low content of chloride. 28% waters have shown bicarbonate type of character with either sodium (17.3%) or calcium + magnesium (10.4%) as dominant cation. These waters occur mainly in the alluvial and calc-schist aquifers of Pisangan, Jawaja and Bhinay blocks of the district. Water occurring near foothill zones and river banks has mostly  $\text{Ca-HCO}_3$  and  $\text{Ca} + \text{Mg-HCO}_3$  type of character with an average EC value around 1000  $\mu\text{S}/\text{cm}$  while that of  $\text{Na-HCO}_3$  type has an average EC value around 2000  $\mu\text{S}/\text{cm}$ .

24% well waters show the mix type of chemical character. The Sodium mix type of water is observed in 18.9% cases whereas  $\text{Ca} + \text{Mg}$  mix type in 4.8% well waters.

The chloride type of waters (48.6%) are mostly associated with sodium as dominant cation (43.8%). The remaining 4.8% cases in which dominant cations are  $\text{Ca} + \text{Mg}$  generally occur in discharge zone.

Salinity of ground water varies considerably from village to village in the district due to semi arid climate, hilly terrain and weathered water bearing formations.

The analyses indicate that the lowest EC of 280  $\mu\text{S}/\text{cm}$  is observed in ground water at village Motisar block Pisangan and highest value of 19200  $\mu\text{S}/\text{cm}$  at village Almas block Arain. In 45% of analyses, conductivity values are below 2000  $\mu\text{S}/\text{cm}$  while 22.5% and 14.1% analyses fall in the ranges of 2000-4000 and 4000-6000  $\mu\text{S}/\text{cm}$  respectively. Rest 4.8% and 13.6% analyses are having EC values between 6000-8000 and above 8000  $\mu\text{S}/\text{cm}$  respectively. Salinity map shows that fresh to slightly saline ground water (EC below 4000  $\mu\text{S}/\text{cm}$ ) occurs in northern, north-eastern, central, south eastern, western, southern and south-western parts of the district. High salinity ground water (EC > 8000  $\mu\text{S}/\text{cm}$ ) also occurs in northern, south-eastern, western and north-eastern parts of the district covering parts of Silora, Masooda, Bhinay, Kekri and Pisangan blocks.

The average EC of the district is 3863  $\mu\text{S}/\text{cm}$  whereas lowest average observed in block Jawaja (2267  $\mu\text{S}/\text{cm}$ ). The average EC of different blocks i.e. Arain, Bhinay, Kekri, Masooda, Pisangan, Silora and Srinagar are 4865, 2804, 4931, 4741, 3326, 3933 and 4053  $\mu\text{S}/\text{cm}$  respectively.

Fluoride content in ground water of the district

varies from 0.32 mg/L (Bada Kheda, block Jawaja) to 17.4 mg/L (Bharai block Kekri) with an average of 2.52 mg/L. The fluoride content of less than 1.5 mg/L is observed in 40.2% of waters and 1.5 to 3.0 mg/L in 32.5% of waters while 27.3% waters have shown the range above 3.0 mg/L of fluoride.

On going through fluoride distribution map, it is seen that the fluoride values above 1.5 mg/L are observed in major parts of Silora, Bhinay, Masooda and Kekri blocks.

The average nitrate content in the district is 78.4 mg/L with lowest of 3 mg/L at Mehrun Kallan and Nad in Kekri and Pisangan blocks respectively whereas highest of 730 mg/L at Kirap block Masooda. 18% well waters have shown nitrate concentration less than 20 mg/L whereas 39.4% waters are covered in the range of 20-50 mg/L of  $\text{NO}_3$ . The well waters in the range of 51-100 mg/L and above 100 mg/L are observed in 20.9% and 22.1% well waters respectively.

No homogeneous pattern of distribution of nitrate has been observed in the district. However, some localised patches of high nitrate content in ground water are observed in Silora, Srinagar, Kekri and Arain blocks. Analyses have indicated that waters with high concentration of nitrate, also contain high potassium content. It is attributed to leaching of residual nitrogenous fertiliser or pollution of ground water by other sources.

The average TH observed in ground water of the district is 596 mg/L with the lowest of 30 mg/L at Ajesar, block Srinagar and highest of 2863 mg/L at Daulatpura block Masuda. 42.2% well waters show TH within the limit of 300 mg/L and well waters of 25.3% are covered in the range of 300-600 mg/L. The TH above 600 mg/L is observed in 32.5% of well waters. The percentage of such water is even more in Arain, Kekri, Masooda and Srinagar blocks.

High salinity and alkalinity in ground water of considerable part of the district renders it unsuitable for irrigation. The water of 14.1% of wells in salinity range of 4000-6000  $\mu\text{S}/\text{cm}$  can be utilised for growing salt tolerant crops on the sandy loam soil of the district. 18.5% of well water has EC more than 6000  $\mu\text{S}/\text{cm}$ . Sodium percentage above 70 (36.4%) and RSC more than 2.0 meq/L (27.3%) in well waters may create alkalinity hazard to the soil in the district. Use of gypsum to overcome hazardous effect of sodic water is therefore suggested for optimum utilization of such waters.

An integrated map for drinking water quality based on ICMR standards show most of the area non-confirming to the standards for one or more constituents amongst salinity, nitrate and fluoride. Ground water at these places needs quality management to render it safe for drinking. Chloride and sulphate are also additive factors affecting water quality but their high concentration is mostly associated with salinity. The salinity and fluoride are the major cause for making water unsuitable for drinking in the district.

# AJMER DISTRICT

Scale 0 5 10 15 20 km.

## GROUND WATER POTABILITY



### LEGEND

- PO Potable
- UN Unpotable

- SPOT VALUES**
- ▲ Nitrate above 100 mg/L
  - ▲ Fluoride above 1.5 mg/L

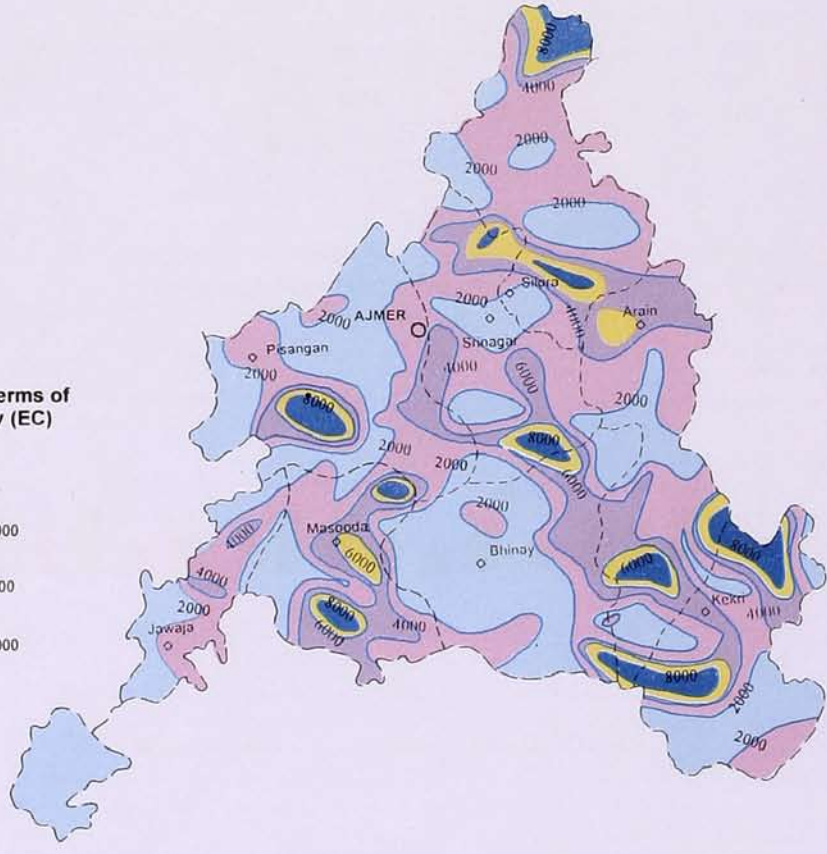


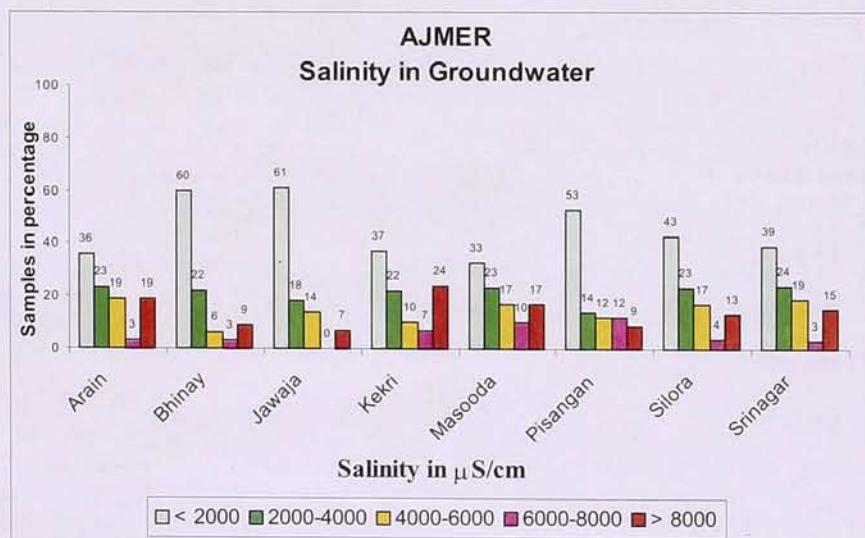
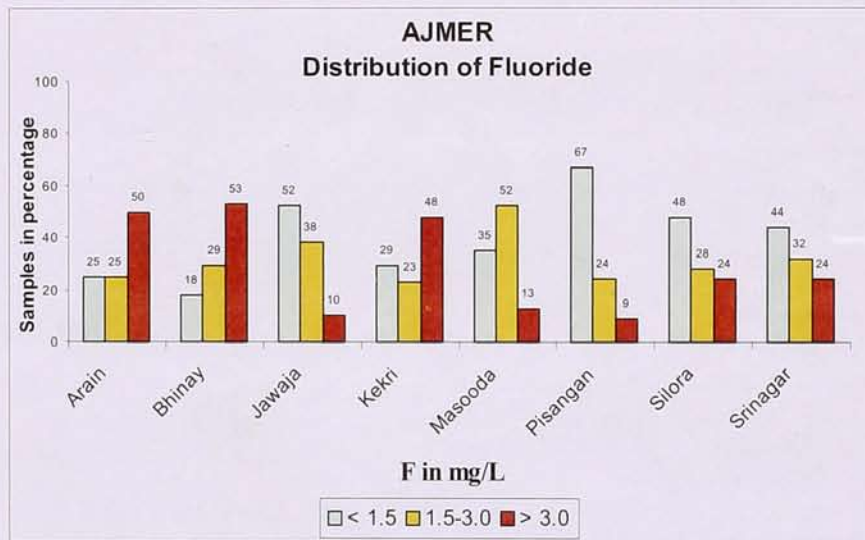
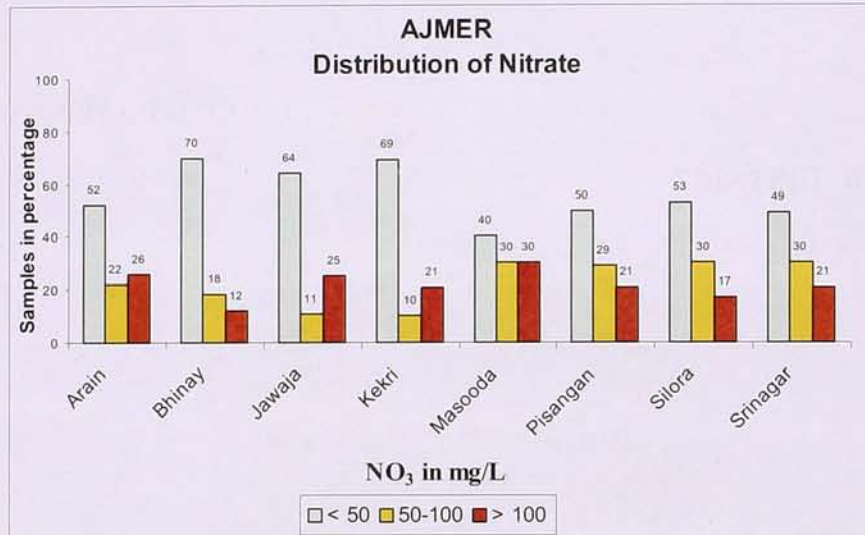
## SALINITY

### LEGEND

Salinity measured in terms of Electrical Conductivity (EC) in  $\mu\text{S/cm}$  at 25° C

- < 2000
- 2000 - 4000
- 4000 - 6000
- 6000 - 8000
- > 8000





# AJMER DISTRICT

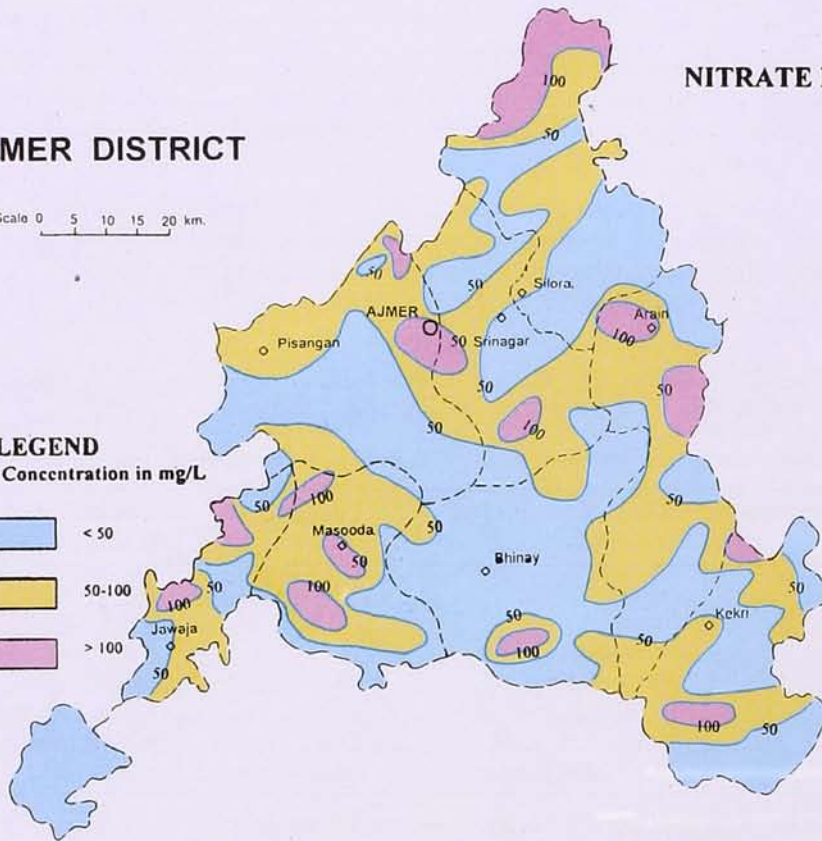
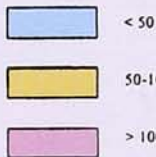
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## NITRATE DISTRIBUTION



### LEGEND

Nitrate Concentration in mg/L



## FLUORIDE DISTRIBUTION

### LEGEND

Fluoride Concentration in mg/L

