

## GEOMORPHOLOGY

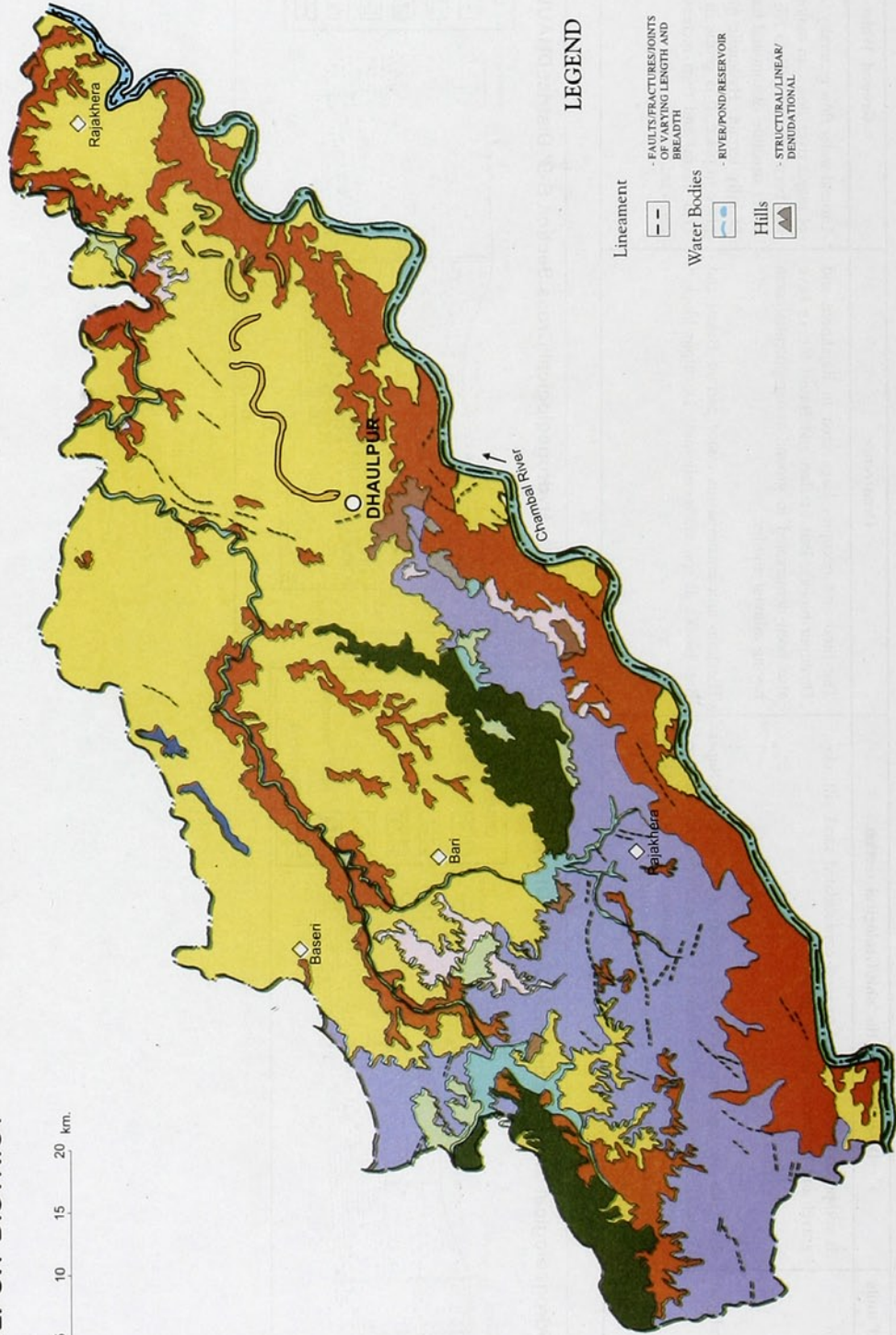
### DISTRICT—DHAULPUR

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. Terrain mainly undulating, produced by extensive deposition of alluvium by river system.	Upper half of district.	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.	West of Parvati Dam.	Marginal double crop, single crop (Rabi / Kharif).
Palaeochannel	PC	Mainly buried or abandoned stream/river courses, comprising of coarse textured material of variable sizes.	North of Dhaulpur town.	Double crop, single crop (Rabi).
Flood Plain	FP	The surface on strip of relatively smooth land adjacent to a river channel formed by river and covered with when river over flows its bank. Normally subject to periodic flooding.	North west of Sepau village.	Double crop, single crop (Rabi).
Ravine	RV	Small, narrow, deep, depression, smaller than gorges, larger than gulleys, usually carved by running water.	Along rivers Chambal, Parvati and Gambhir.	Single crop, open scrub.
<b>Denudational Origin</b> 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.	South and west of Dhaulpur town.	Marginal double crop, single crop (Kharif), open scrub.
Burried Pediment	BP	Pediment covered essentially with relatively thicker alluvial, colluvial or weathered materials.	South of Ramsagar dam and around Barapubatala village.	Single crop (Rabi / Kharif), open scrub, fallow.
<b>Structural Origin</b> Plateau	PT	Formed over varying lithology with extensive, flat, landscapes, bordered by escarpment on all sides. Essentially formed over horizontally layered rocky marked by extensive flat top and steep slopes. It may be criss crossed by lineament.	In central south of Umaid Sagar.	Land with or without scrub.
Dissected Plateau	DP	Plateau, criss-crossed by fractures forming deep valleys.	South west of district, upper stream of Parvati dam & south of Ramsagararh.	Open scrub.
<b>Hills</b> Structural Hill	SH	Linear to arcuate hills showing definite trend-lines with varying lithology associated with folding, faulting etc.	South west of Dhaulpur town.	Open scrub.

# GEOMORPHOLOGY



## DHAULPUR DISTRICT



### LEGEND

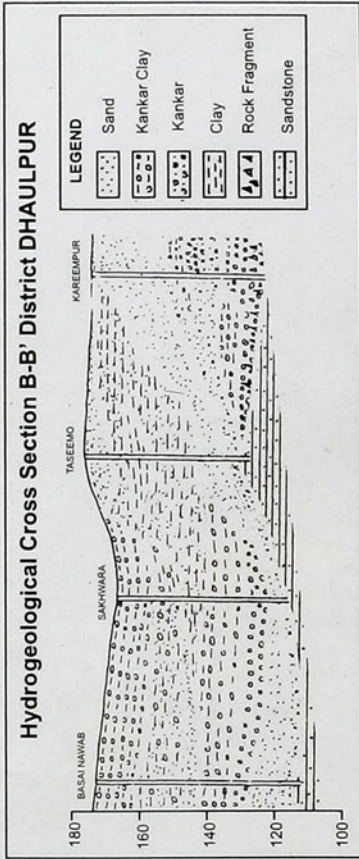
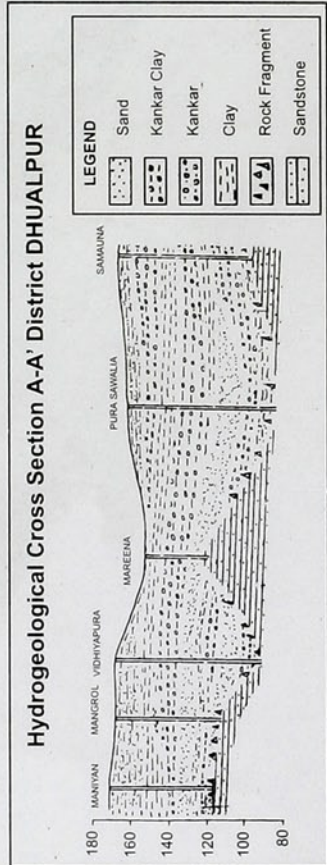
- Lineament**
    - FAULTS/FRACTURES/JOINTS OF VARYING LENGTH AND BREADTH
  - Water Bodies**
    - RIVER/POND/RESERVOIR
  - Hills**
    - STRUCTURAL/LINEAR/DENUDATIONAL
- Landform Units :**
- Fluvial Origin :**
    - Alluvial Plain
    - Valley Fill
    - Pulsechannel
    - Flood Plain
    - Ravine
  - Denudational Origin :**
    - Pediment
    - Buried Pediment
  - Structural Origin**
    - Plateau
    - Dissected Plateau



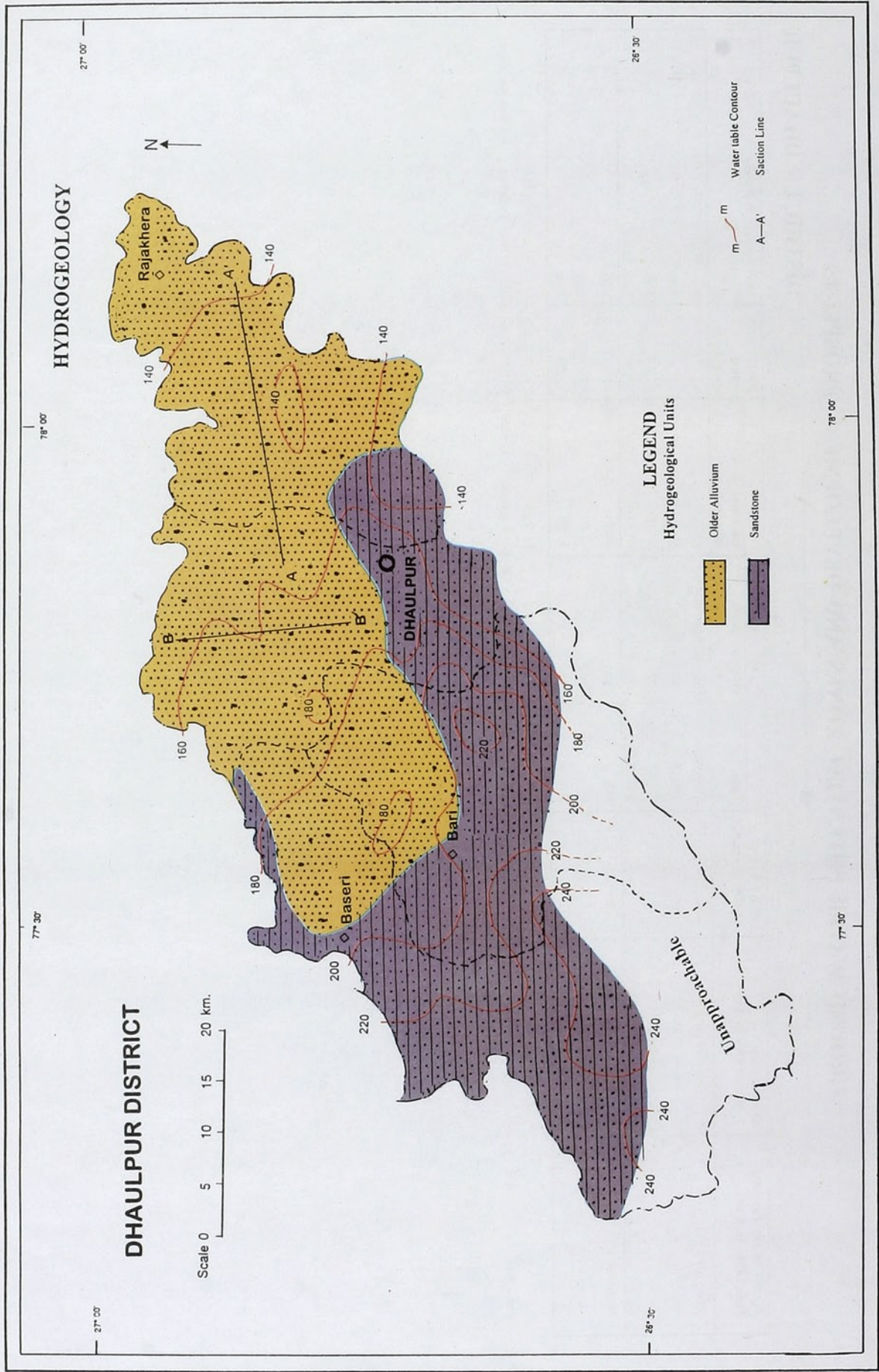
# HYDROGEOLOGY

## DISTRICT—DHAULPUR

Hydrogeological units	Description of the unit/Geological section	Occurrence	Ground Water flow
Older Alluvium (Quaternary)	It comprises unconsolidated to semi consolidated sand, silt, clay, gravel and kanker in varying proportions.	The litho unit occupies large area in Rajakhhera and Dhaulpur blocks. Part of Bari and Baseri blocks have also been demarcated in ground water potential area having alluvial aquifer.	Ground water flow generally follows the direction of major river flows. In major part of the area it has been inferred SW to NE. Localised ground water structure like mound has also been noticed in hilly terrain. Hydraulic gradient varies from place to place. It is gentle in north western part (1.6 m/km) and then increases gradually south eastward.
Sandstone (Vindhyan Super Group)	The litho unit represents youngest member of the Vindhyan Super Group. It is fine to medium grained and characteristically have red colour with white specks. Sandstone is generally consolidated but at places semi consolidated and porous in nature. Thickness of the litho unit varies from 50 to 75 m.	The litho unit encompasses major part of Baseri and Bari blocks. It spreads in adjoining Dhaulpur block.	







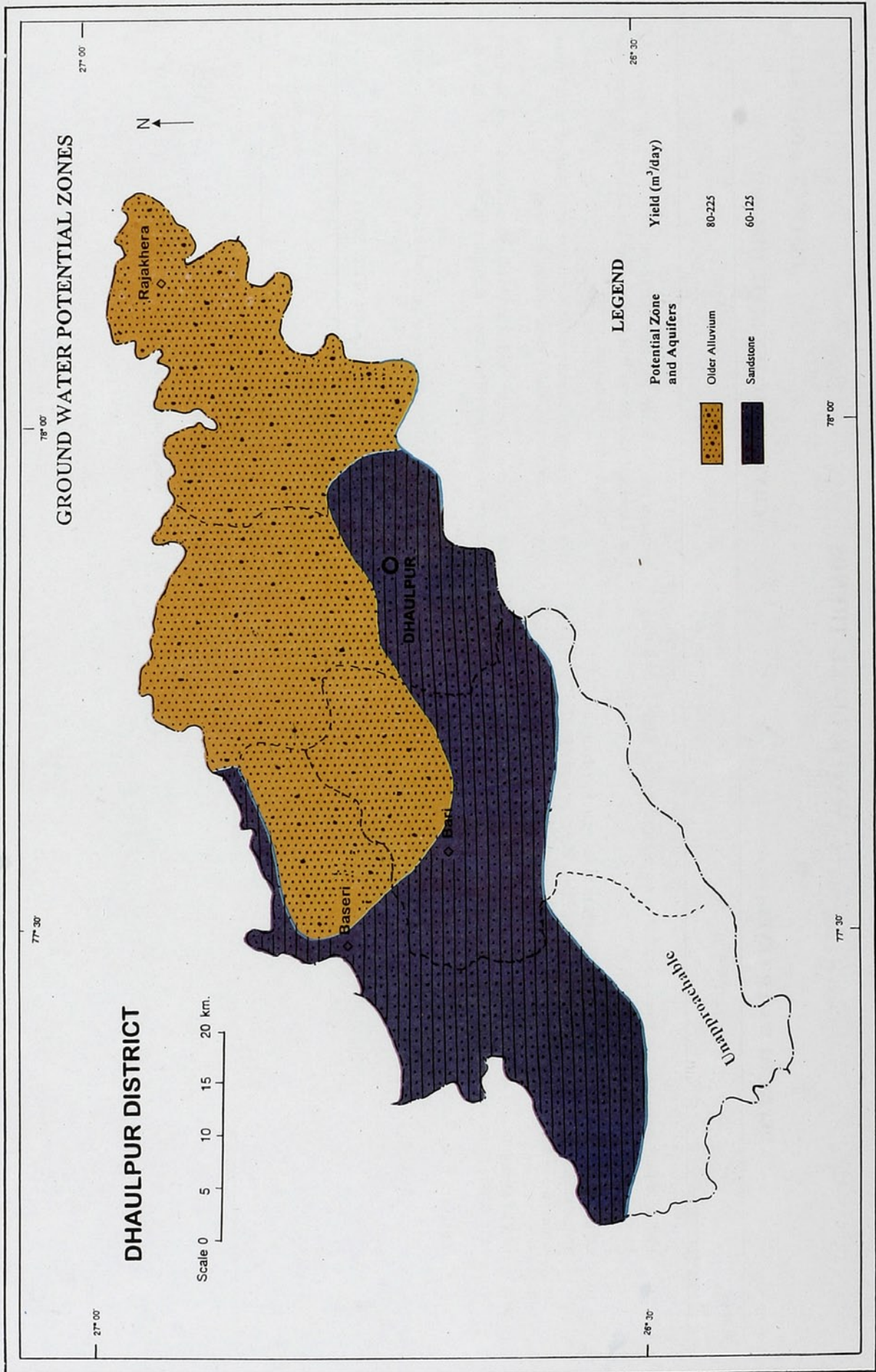
## GROUND WATER POTENTIAL ZONES AND DEVELOPMENT PROSPECTS

### DISTRICT - DHAULPUR

Aquifer in the Potential Zone (Area in Km <sup>2</sup> )	Occurrence * Block (Area in Km <sup>2</sup> )	Water Level (1997) in m.	Well Parameters		E.C. X10 <sup>-6</sup> siem/cm	Development Prospects
			Type	Proposed depth in m		
Older Alluvium (1429.98)	* Bari (198.92)	<25	TW/DCB	100-180/40-60	<2	Safe
	* Baseri (200.02)	<10	TW/DCB	100-180/30-50	<2	Safe
	* Dhaulpur (472.15)	<15	TW/DCB	100-180/30-50	<2,2-4	Safe
	* Rajakhera (558.89)	<40	TW/DCB	100-180/50-70	<2,2-4	Semi Critical
Sandstone (801.37)	* Bari (314.50)	<10	DW	20-35	<2	Safe
	* Baseri (358.59)	<15	DW	20-35	<2	Safe
	* Dhaulpur (128.28)	<35	DW	40-60	<2,2-4	Safe

TW - Tube wells    DCB - Dug cum borewells    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 : DHAULPUR

### DEPTH TO WATER LEVEL

Range in m	Area
< 5	Part of Baseri and Dhaulpur blocks situated north west of Parvati river have shallow water level less than 5 m.
5 to 10	Major part of the district, leaving aside Rajakhera block, part of Dhaulpur and southern peripheral area of Baseri and Bari have depth to water level within the range.
10 to 15	Part of Dhaulpur and southern peripheral area of Baseri and Bari blocks have depth to water level within the range.
> 15	Rajakhera block has deep water level ranging more than 15 m.

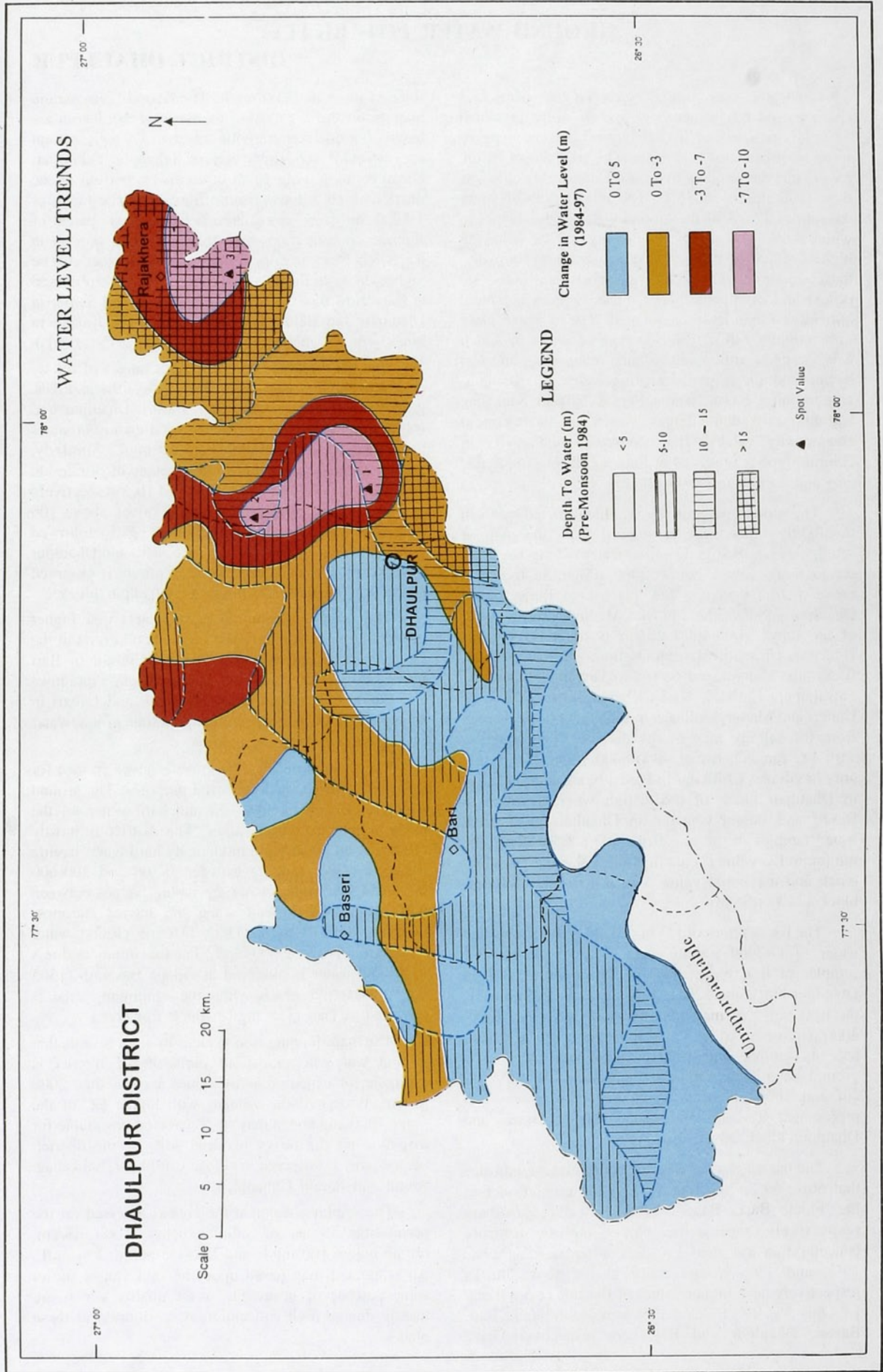
### CHANGE IN WATER LEVEL (1984-1997)

Range in m	Area
0 to 5	Southern part of Baseri and Bari blocks exhibit rise in water level upto 5 m. Localised pockets north of Parvati river situated in these blocks also show marginal rise within the range.
0 to -3	Area along Parvati river and part of Rajakhera and Dhaulpur blocks show marginal depletion in water level within the range.
-3 to -7	Area including Dhaulpur and Rajakhera and a pocket along northern boundary in Dhaulpur block show depletion in water level within the range.
-7 to -10	Area around Dhaulpur and Rajakhera exhibit steep depletion in water level within the range.

### DETAILS OF THE SPOT

Spot code	Village (Block)	Change in water level in m (1984-97)
1.	Bhainsakh (Rajakhera)	(-) 16.00
2.	Mangrol (Rajakhera)	(-) 12.20
3.	Rancharpura (Rajakhera)	(-) 17.80







## GROUND WATER POTABILITY

### DISTRICT DHAULPUR

76.4 per cent ground water of the district is characterised by bicarbonate type of water in which 52% is characterised as calcium-magnesium type of water whereas 24.4% is sodium bicarbonate in nature having electrical conductivity (EC) values generally less than 1000  $\mu\text{S}/\text{cm}$  at 25°C. The mixed type of water constitutes 12.6% of the ground water in the district in which 8.6% is of sodium dominating and 4% is having higher values of calcium and magnesium. Normally, these samples are having EC values between 1000-3000  $\mu\text{S}/\text{cm}$  and even more. Thus, these samples are more mineralised than fresh bicarbonate type of water. Only 11% samples fall in chloride type of water in which 6.3% samples are having calcium-magnesium and rest having sodium as predominating cation. In Khanpur, Umreh, Jarga, Basai, Hanota, Purani Chhaoni, Sankabag and Singwatikallan villages, waters are having more conductivity values. The maximum conductivity in chloride type is observed at Purani Chhaoni (6800  $\mu\text{S}/\text{cm}$ ) and Sankabag (4900  $\mu\text{S}/\text{cm}$ ).

The ground water is mostly characterised by fresh to slightly saline type as viewed from the map of salinity. Fresh to slightly saline water having electrical conductivity values below 2000  $\mu\text{S}/\text{cm}$  is found in entire district except a few patches in Bari, Baseri, Dhaulpur and Rajakhera blocks. Medium salinity water of the range 2000-4000  $\mu\text{S}/\text{cm}$  is found in villages Dhurwas, Umreh in Bari block, Baseri in Baseri block, Baserinib, Manpur and Saipur in Dhaulpur block and Sawaliapur, Hatwari, Karka-Khera, Singhawalikallan, Unheri and Mangrol villages in Rajakhera block as seen from the salinity map of the district. Water samples with EC range between 4000-6000  $\mu\text{S}/\text{cm}$  are found only in villages Chilikhur in Baseri block and Suakabag in Dhaulpur block of the district whereas Angai in Baseri and Purani Chhaoni in Dhaulpur block have water samples in the range of 6000-8000  $\mu\text{S}/\text{cm}$ . The minimum EC value occurs in Nibbi village of Dhaulpur block and maximum value is seen at Angai of Baseri block (7400  $\mu\text{S}/\text{cm}$ ).

The bar diagram of EC of ground water shows that water of 0-2000  $\mu\text{S}/\text{cm}$  range is available in 93% samples of Bari block, 88% in Baseri block, 88% in Dhaulpur block and 52% in Rajakhera block. Similarly, the next range of medium salinity of water i.e. 2000-4000 is represented by 7% in Bari block, 3% in Baseri, 6% in Dhaulpur and 18% in Rajakhera block. The ground water of high to very high salinity i.e. 4000  $\mu\text{S}/\text{cm}$  and above is occurring in very few places and represented 9% and 6% respectively in Baseri and Dhaulpur block of the district.

The bar diagram of fluoride concentration indicates that 50%, 69%, 75% and 45% of the groundwater in the block Bari, Baseri, Dhaulpur and Rajakhera respectively represents waters having fluoride concentration less than 1.5 mg/L whereas 45%, 27%, 19%, and 43% ground water in the above blocks respectively have higher values of fluoride (1.5-3.0 mg/L). Only 5%, 4%, 6% and 11% samples in blocks Bari, Baseri, Dhaulpur and Rajakhera respectively have

fluoride more than 3.0 mg/L. The fluoride distribution map shows that the most of the water of the district are having fluoride concentration less than 1.5 mg/L except area around Baseri, Kotra, Jitpura, Salampur, Takimpur, Sapan forming a big patch in northwest portion of the district which is having more fluoride in the range of 1.5-3.0 or even more. Similarly, another patch of fluoride concentration more than 1.5 mg/L is seen in Rajakhera block in northeastern part of the district. The higher values of fluoride concentration are also observed at Barauli in Baseri block, Malani pawar and Saipur in Dhaulpur and Bajna, Dan and Faraspur in Rajakhera block with the maximum at Bajna village (5.2 mg/L).

The bar diagram shows different ranges of nitrate concentration in ground water. 56%, 78%, 79% and 83% ground water in the block Bari, Baseri, Dhaulpur and Rajakhera respectively represents good quality of water having nitrate concentration upto 50 mg/L. Similarly, the bar diagram also shows other ranges of nitrate i.e. 50-100 mg/L as 19%, 15%, 15% and 10% respectively in above blocks. The higher nitrate values above 100 mg/L are mostly found in Bari block (25%) followed by Baseri and Rajakhera blocks (7% each) and Dhaulpur block (6%). The maximum value of nitrate is observed at Purani Chhaoni (300 mg/L) of Dhaulpur block.

The nitrate distribution map depicts that higher concentration of nitrate (>100 mg/L) is observed in the villages Jamalpura, Khanpur, Tantri, Umrain in Bari blocks; Angri and Baseri in Baseri block, Pipraunwa and Purani Chhaoni in Dhaulpur block and Lubari in Rajakhera block. However, the high nitrate groundwater occurs only in scattered patches.

The total hardness (TH) in water gives an idea for its use in domestic and industrial purposes. The ground water is categorised into soft and hard water on the basis of total hardness values. The district is mostly characterised by soft and moderately hard water having hardness values ranging between 0-300 and 300-600 mg/L. 34.7% ground water are having values between 0-300 and 54% ground water are having hardness between 300-600 mg/L. Only 11% of ground water have hardness above 600 mg/L. The maximum hardness in ground water is observed at village Basainib (1305 mg/L) Dhaulpur block while the minimum value is observed at Dan (115 mg/L) block Rajakhera.

The map showing isoconductivity lines reveals that ground water in almost all parts of the district is available for irrigation as its values are less than 2000  $\mu\text{S}/\text{cm}$ . Waters of the villages with higher EC of the range 4000 and above may be considered unsuitable for irrigation on the heavy textured soils of the district. Such quality is observed in village Chillikhur, Sankabag, Angai and Purani Chhaoni.

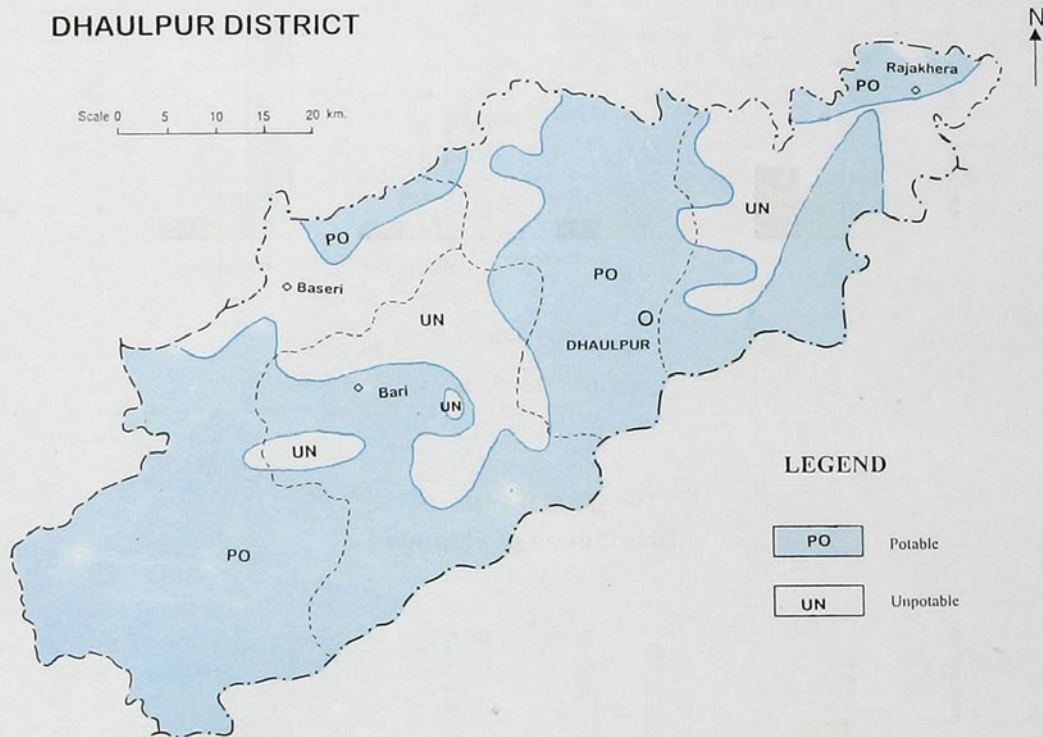
The drinking water in the area is assessed on the permissible values of salinity below 4000  $\mu\text{S}/\text{cm}$ , nitrate below 100 mg/L and fluoride below 1.5 mg/L. An integrated map based upon the said values shows some patches of unsuitable water quality which are mostly due to high concentration of fluoride at these places.



# GROUND WATER POTABILITY

## DHAULPUR DISTRICT

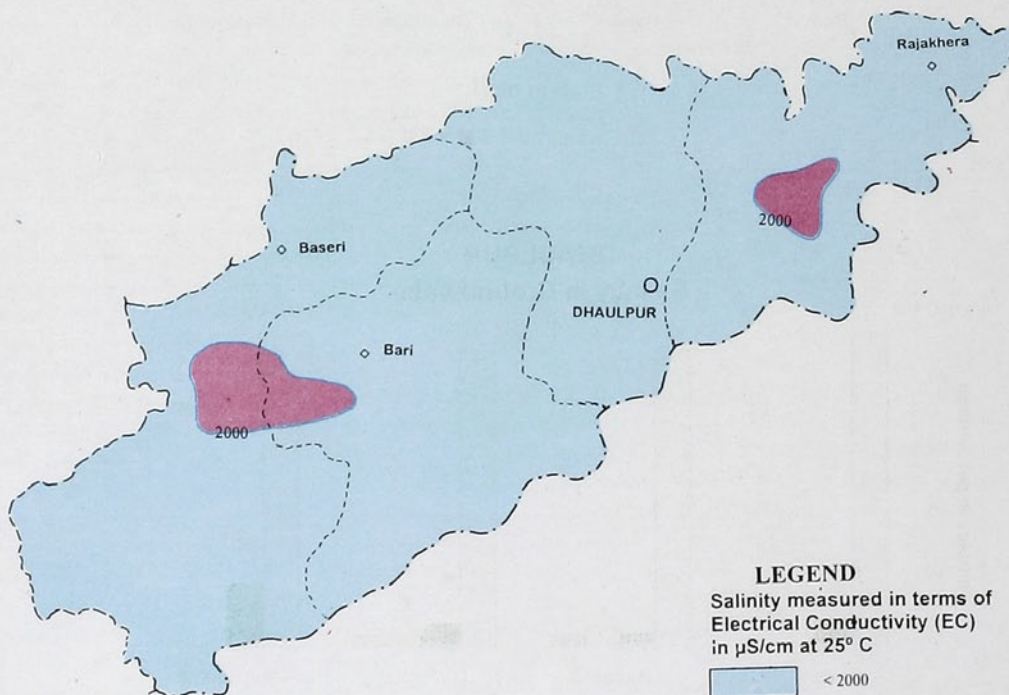
Scale 0 5 10 15 20 km.



### LEGEND

- PO Potable
- UN Unpotable

## SALINITY

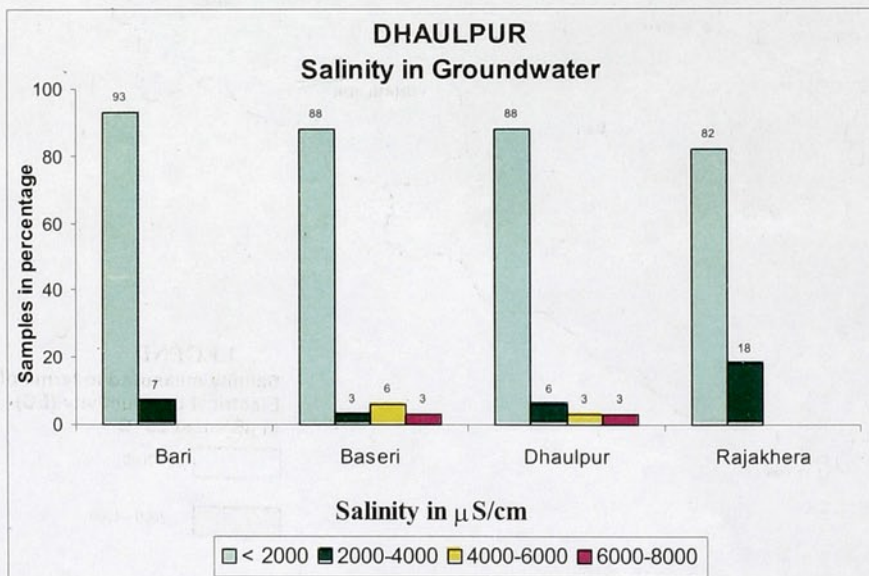
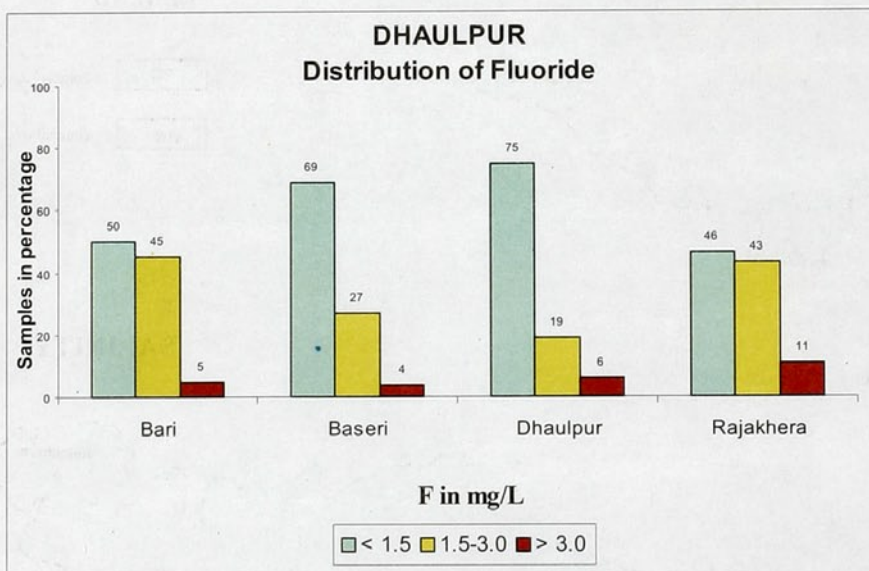
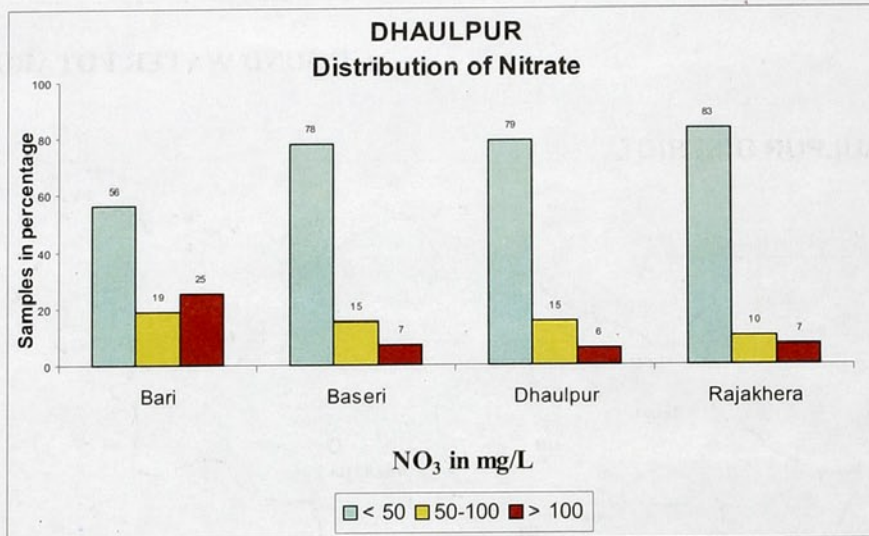


### LEGEND

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

- < 2000
- 2000 - 4000

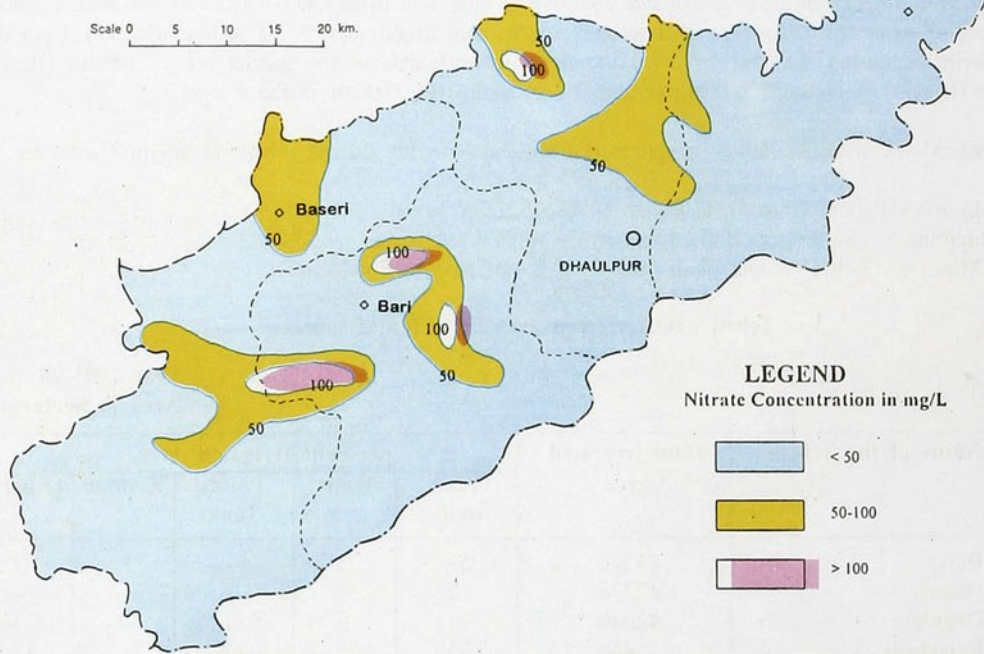




# NITRATE DISTRIBUTION

## DHAULPUR DISTRICT

Scale 0 5 10 15 20 km.



# FLUORIDE DISTRIBUTION

