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# Hydrogeological Atlas of Rajasthan Pratapgarh District

Dhariawa

Chhoti Sad

Pratapgarh

Arnod

Peepal khoont

2013





# Hydrogeological Atlas of Rajasthan

# **Pratapgarh District**

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#### Location:

Pratapgarh district is located in the southern part of Rajasthan. It is bounded in the northwest by Chittaurgarh district, in the west by Udaipur and Dungarpur districts, southwest by Banswara district, in the east and southeast by state of Madhya Pradesh. It stretches between 23° 31' 49.84" to 24° 30' 16.57" north latitude and 74° 13' 19.93" to 74° 58' 59.58" east longitude covering area of 4,400.7 sq km. The district is systematically drained by three prominent rivers and major part of the district in the centre and west is part of 'Mahi River Basin' whereas the north-south extending strip in the eastern border is part of 'Chambal River Basin' and the small part in the north is part of 'Banas River Basin'. Most of the district is hilly/rocky of which about 34% is prominently hilly.

#### Administrative Set-up:

Pratapgarh district is administratively divided into five blocks. The following table summarizes the basic statistics of the district at block level.

| C No   | Block Nomo   | Population             | Area    | % of District | Total Number of    |
|--------|--------------|------------------------|---------|---------------|--------------------|
| 5. NO. | BIOCK Mame   | (Based on 2001 census) | (sq km) | Area          | Towns and Villages |
| 1      | Arnod        | 1,19,837               | 694.5   | 15.8          | 179                |
| 2      | Chhoti Sadri | 1,16,676               | 704.8   | 16.0          | 152                |
| 3      | Dhariawad    | 1,52,615               | 891.6   | 20.3          | 162                |
| 4      | Peepalkhoont | 80,988                 | 545.4   | 12.4          | 94                 |
| 5      | Pratapgarh   | 2,36,651               | 1,564.3 | 35.5          | 359                |
|        | Total        | 7,06,767               | 4,400.7 | 100.0         | 946                |

Pratapgarh district has 946 towns and villages, of which five are block headquarters as well.

#### Climate:

The climate of Pratapgarh district is more similar to Madhya Pradesh than to typically arid Rajasthan. The district witnesses three distinct seasons viz, winters, summer and monsoon. In winter season, extending between November to February, average temperature is 18 °C whereas in summer months of March to June, the average temperature is 31 °C. Summers are dry and hot with temperatures soaring to 45 °C in the months of June. Monsoon months between July and Sept-Oct are wet and humid as the district receives fairly good rainfall. The average total annual rainfall is 896.2 mm.















Southwestern part of the district has some undulating plains but most of the remaining areas of the district are hilly terrain. The general slope of the terrain is from east and northeast towards southwest. However, the whole of north-south trending strip in the eastern part of the district that is part of Chambal river basin has west to east slope and the small part in the north which is part of Banas basin has northerly slope. The topographic elevation shows wide variation ranging from the lowest of 161.9 m above mean sea level in Dhariawad block in the western part of the district to the highest of 576.5 m above mean sea level In Pratapgarh in eastern part of the district.

| S. No. | Block Name   | Min. Elevation<br>(m amsl) | Max. Elevation<br>(m amsl) |
|--------|--------------|----------------------------|----------------------------|
| 1      | Arnod        | 348.4                      | 576.4                      |
| 2      | Chhoti Sadri | 386.8                      | 576.1                      |
| 3      | Dhariawad    | 161.9                      | 495.2                      |
| 4      | Peepalkhoont | 187.4                      | 529.8                      |
| 5      | Pratapgarh   | 204.9                      | 576.5                      |

#### Table: Block wise minimum and maximum elevation

#### RAINFALL

The district receives a good rainfall. The general distribution of rainfall across the district can be visualized from isohyets presented in the Plate – III, where it can be seen that most of the district received rainfall in the range of 600-900mm in year 2010. Theannual average rainfall was 717.5 mm based on the data of available blocks. Highest annual rainfall was observed in Pratapgarh block (1002 mm) whereas lowest was in Peepalkhoont block (563.2 mm). The highest average annual rainfall noticed in Pratapgarh block (844.5 mm).

#### Table: Block wise annual rainfall statistics (derived from year 2010 meteorological station data)

| Block Name   | Minimum Annual<br>Rainfall (mm) | Maximum Annual<br>Rainfall (mm) | Average Annual<br>Rainfall (mm) |
|--------------|---------------------------------|---------------------------------|---------------------------------|
| Arnod        | 581.2                           | 821.7                           | 669.3                           |
| Chhoti Sadri | 615.7                           | 948.7                           | 794.5                           |
| Dhariawad    | 605.8                           | 753                             | 660.7                           |
| Peepalkhoont | 563.2                           | 702.4                           | 618.5                           |
| Pratapgarh   | 660.9                           | 1,002.00                        | 844.5                           |















The district exposes rocks belonging to Bhilwara, Aravalli and Vindhyan Super Groups. Deccan trapsoccupysignificant area of the district in the central, eastern and southern parts. The Bhilwara Super Group is divided into Ranthambhor, Hindoli Groups and Mangalwar complex which consist Shale, slates, phyllites, limestone, dolomitic marble, migmatites, feldspathic mica schist and amphibolites. It is exposed in northwestern, western and southwestern parts of the district. The Aravalli Super Group is divided into Udaipur and Debari Group which consists of the rock formation such as Phyllite, mica schist, quartzite, dolomite and migmatites. The Vindhyan Super Group is divided in Khorip, Lasrawan, Sand and Satola Groups with Shale, Conglomerate, Limestone, sandstone and siltstone formations. Vindhyan Super Group is exposed mainly in northern part of the district and some exposure in southeastern parts in Chhotisadri block and also partly in Dhariawad, Pratapgarh and Arnod blocks.

| Age/Super Group | Group                   | Formation  |  |  |  |  |  |
|-----------------|-------------------------|--|--|--|--|--|--|
| Cretaceous      |                         | Deccan Traps   |  |  |  |  |  |
|                 | Khorip                  | Shales, Sand-Stone, Conglomerate, Porceltanite   |  |  |  |  |  |
| ) (in allowers  | Lasrawan                |  |  |  |  |  |  |
| vindnyan        | Sand                    | Limestone, Shale, Sandstone, Siltstone   |  |  |  |  |  |
|                 | Satola                  |  |  |  |  |  |  |
|                 | X                       | XXXUnconformityXXXX  |  |  |  |  |  |
| Udaipur         |                         | Phyllite, mica schists, meta siltstone, quartzite, Dolomite, gneisses and migmatites.                |  |  |  |  |  |
| Aravalli        | Debari                  | Meta-arkose, quartzite, phyllite, dolomitic marble and dolomite.                                     |  |  |  |  |  |
|                 | X                       | XXXUnconformityXXXX  |  |  |  |  |  |
|                 | Ranthambhor             | Shale and slates   |  |  |  |  |  |
|                 |                         | Dolerite sills & dykes   |  |  |  |  |  |
| Bhilwara        | Hindoli                 | Shale, Slates, Phyllites, Metagreywackes, Limestone, Dolomitic marble                                |  |  |  |  |  |
|                 | Mangalwar Complex       | Migmatites, gniess, Feldspathic mica schist, Garnet-mica schist, impure Marble and Para-amphibolite. |  |  |  |  |  |
|                 | Berach Granite & Gneiss |  |  |  |  |  |  |

# GEOMORPHOLOGY

#### Table: Geomorphologic units, their description and distribution

| Origin              | Landform Unit                                     | Description   |
|---------------------|---|---|
|                     | Buried Pediment                                   | Pediment covers essentially with relatively thicker alluvial, colluvial or weathered materials.   |
|                     | Intermontane Valley                               | Depression between mountains, generally broad & linear, filled with colluvial deposits.   |
| Denudational        | Pediment  | Broad gently sloping rock flooring, erosional surface of low relief between hill and plain, comprised of varied lithology, criss-crossed by fractures and faults.   |
|                     | Pediment Zone                                     | Formed by coalescence of several alluvial fans by stream covering large area at foot hills, with gentle slope in humid to sub humid region.   |
| Fluxial Valley Fill |   | Formed by fluvial activity, usually at lower topographic locations, comprising of boulders, cobbles, pebbles, gravels, sand,  |
| FIUVIAI             | valley Fill                                       | silt and clay. The unit has consolidated sediment deposits.   |
|                     | Dissected Plateau                                 | Plateau, criss-crossed by fractures forming deep valleys.   |
| Structural          | Plateau   | Formed over varying lithology with extensive, flat, landscapes, bordered by escarpment on all sides. Essentially formed horizontally layered rocky marked by extensive flat top and steep slopes. It may be criss crossed by lineament.   |
| Hills               | Denudational,<br>Structural Hill,<br>Linear Ridge | Steep sided, relict hills undergone denudation, comprising of varying lithology with joints, fractures and lineaments.<br>Linear to arcuate hills showing definite trend-lines with varying lithology associated with folding, faulting etc.<br>Long narrow low-lying ridge usually barren, having high run off may form over varying lithology with controlled strike. |















Though the district is predominantly hilly with hills occupying about 34% of the district area, aquifers have formed in weathered, fractured and jointed hardrocks which contain good quality and quantity of water. Basalts occupy about 41% of area and occupy areas in the central, eastern and southeastern part of the district. Next most widespread aquifer is formed in BGC with 15.3% areal coverage. Shales and schist also form minor aquifers in northern part of the district.

| Aquifer in<br>Potential Zone | Area<br>(sq km) | % age of<br>district | Description of the unit/Occurrence   |
|------------------------------|-----------------|----------------------|--|
| Schist                       | 109.7           | 2.5                  | Medium to fine grained compact rock. The litho units are soft, friable and have closely spaced cleavage. |
| Shale                        | 315.7           | 7.2                  | Grey, light green and purple in colour and mostly splintery in nature.                                   |
| Basalt                       | 1824.3          | 41.4                 | Dark grey, olive green and green colour, compact, vesicular, amygdaloidal and weathered.                 |
| BGC                          | 674.4           | 15.3                 | Grey to dark coloured, medium to coarse grained rocks.   |
| Hills                        | 1477.1          | 33.6                 |  |
| Total                        | 4,401.2         | 100.0                |  |

#### Table: aquifer potential zones their area and their description

## STAGE OF GROUND WATER DEVELOPMENT

Ground water resource assessment studies have revealed that in all the blocks of the Pratapgarh district as significant development of ground water has taken place. Peepalkhoont is the only block where ground water can still be developed as it falls in 'Safe' category. All the remaining blocks are either in 'Over Exploited' or in 'Critical' category implying that the ground water resources have nearly been exhausted and no more development be resorted to in those blocks to prevent further depletion.

| Categorization on the basis of stage of development of ground water | Block Name                      |
|---|---------------------------------|
| Safe  | Peepalkhoont                    |
| Critical  | Dhariawad                       |
| Over Exploited  | Arnod, Pratapgarh, Chhoti Sadri |

Basis for categorization: Ground water development <= 70% - Safe, <=100% - Critical and >100% - Over-Exploited.













# LOCATION OF EXPLORATORY AND GROUND WATER MONITORING WELLS

# Pratapgarh district has a fairly well distributed network of exploratory wells (23) and ground water monitoring stations (123) in the district owned by RGWD (21 and 107 respectively) and CGWB (2 and 23 respectively). The exploratory wells have formed the basis for delineation of subsurface aquifer distribution scenario in three dimensions. Benchmarking and optimization studies suggest that both the ground water level and quality monitoring network need to be strengthened by adding 55 additional wells to water level monitoring network and just 7 wells to water quality network for optimization of the network.

| Block Name   | Explo | oratory V | Vells | Gro<br>Monit | ound Water<br>oring Sta | ter<br>ations | Recommended additional wells for optimization of monitoring network |               |  |  |
|--------------|-------|-----------|-------|--------------|-------------------------|---------------|---|---------------|--|--|
|              | CGWB  | RGWD      | Total | CGWB         | RGWD                    | Total         | Water Level   | Water Quality |  |  |
| Arnod        | -     | 2         | 2     | 3            | 22                      | 25            | 22  | 0             |  |  |
| Chhoti Sadri | -     | 3         | 3     | 1            | 26                      | 27            | 0   | 7             |  |  |
| Dhariawad    | 1     | 3         | 4     | 4            | 18                      | 22            | 0   | 0             |  |  |
| Peepalkhoont | 1     | 10        | 11    | 3            | 15                      | 18            | 5   | 0             |  |  |
| Pratapgarh   | -     | 3         | 3     | 5            | 26                      | 31            | 28  | 0             |  |  |
| Total        | 2     | 21        | 23    | 16           | 107                     | 123           | 55  | 7             |  |  |

#### Table: Block wise count of wells (existing and recommended)

## **DEPTH TO WATER LEVEL (PRE MONSOON – 2010)**

In spite of being a predominantly hard rock area, the district shows very limited variation in depth to ground water levels i.e., from less than 10m bgl to around 30m bgl. Western sides of the district are marked with moderately deeper water level in between 10-20m bgl whereas the eastern parts of the districts observed with water level more than 20m bgl. A small patch of quite shallow water level (10mbgl) has observed in the eastern part of Pratapgarh block.

| Depth to water level |   | Block wise area coverage (sq km) * |       |       |            |         |  |  |  |  |
|----------------------|---|------------------------------------|-------|-------|------------|---------|--|--|--|--|
| (m bgl)              | Arnod Chhoti Sadri Dhariawad Peepalkhoont |                                    |       |       | Pratapgarh | (sq km) |  |  |  |  |
| < 10                 | 24.4                                      | -                                  | -     | -     | 4.7        | 29.1    |  |  |  |  |
| 10-20                | 389.4                                     | 502                                | 38.7  | 0.7   | 518.7      | 1,449.5 |  |  |  |  |
| > 20                 | 133.5                                     | 60.3                               | 405.4 | 428.4 | 417.9      | 1,445.5 |  |  |  |  |
| Total                | 547.3                                     | 562.3                              | 444.1 | 429.1 | 941.3      | 2,924.1 |  |  |  |  |

\* The area covered in the derived maps is less than the total district area since the hills have been excluded from interpolation/contouring.















# WATER TABLE ELEVATION (PRE MONSOON - 2010)

# DISTRICT – PRATAPGARH

The flow directions inferred from water table contour map bring out that the drainage divide between Chambal basin and Mahi basin roughly coincides with regional ground water flow divide as well. The flow to the west of this drainage divide (i.e., within Mahi basin) is from east to west and in the Chambal basin part the flow of ground water is from west to east. In the northern part, the flow of ground water is in northerly direction, again relating well with Mahi-Banas drainage divide. Highest water table elevation reaching to >520m amsl is seen in central part of the district in Arnod and Pratapgarh blocks whereas, minimum elevation is very low (<180m amsl) in the Dhariawad block in western part of the district.

| Block Name   | Block wise area coverage (sq km) within water table elevation range (m amsl) |         |         |         |         |         |         |         |         |         |         |         | <b>Total Area</b> |         |         |      |         |
|--------------|--|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|-------------------|---------|---------|------|---------|
| DIOCK Marine | <180   | 180-200 | 200-220 | 220-240 | 240-260 | 260-280 | 280-300 | 300-320 | 320-340 | 340-360 | 360-380 | 380-400 | 400-440           | 440-480 | 480-520 | >520 | (sq km) |
| Arnod        | -  | -       | -       | -       | -       | -       | -       | -       | -       | -       | 3.0     | 10.1    | 29.1              | 121.7   | 324.7   | 58.7 | 547.3   |
| Chhoti Sadri | -  | -       | -       | -       | -       | -       | -       | -       | -       | -       | -       | 3.6     | 61.6              | 423.0   | 74.1    | -    | 562.3   |
| Dhariawad    | -  | 47.3    | 172.5   | 155.5   | 49.0    | 15.0    | 4.3     | 0.5     | -       | -       | -       | -       | -                 | -       | -       | -    | 444.1   |
| Peepalkhoont | -  | -       | 3.2     | 9.0     | 73.2    | 50.4    | 51.8    | 52.2    | 44.7    | 57.9    | 31.8    | 20.0    | 28.9              | 6.0     | -       | -    | 429.1   |
| Pratapgarh   | -  | -       | -       | -       | 12.0    | 5.6     | 1.3     | 5.0     | 5.2     | 12.8    | 34.9    | 56.7    | 115.0             | 367.7   | 325.1   | -    | 941.3   |
| Total        | -  | 47.3    | 175.7   | 164.5   | 134.2   | 71.0    | 57.4    | 57.7    | 49.9    | 70.7    | 69.7    | 90.4    | 234.6             | 918.4   | 723.9   | 58.7 | 2,924.1 |

#### Table: Block wise area covered in each water table elevation range

### WATER LEVEL FLUCTUATION (PRE TO POST MONSOON 2010)

A 2m contour interval adopted to visualize the ground water level fluctuation reveals a localized fall of more than 2 min Chhoti Sadri area to rise of more than 8m also in Chhoti Sadri area itself as seen in Plate – XI. The –ve fluctuation areas (indicated by pink and red regions) are the areas where overexploitation is taking place, however these are small isolated pockets only. Most part of the district has shown a general to significant rise in ground water level in the post monsoon season with respect to pre monsoon season as general fluctuation range varies from 0m to 6m.

| Water level fluctuation |       | Block wise area coverage (sq km) |           |              |            |         |  |  |  |  |  |
|-------------------------|-------|----------------------------------|-----------|--------------|------------|---------|--|--|--|--|--|
| range (m)               | Arnod | Chhoti Sadri                     | Dhariawad | Peepalkhoont | Pratapgarh | (sq km) |  |  |  |  |  |
| < -2                    | -     | 3.4                              | -         | -            | -          | 3.4     |  |  |  |  |  |
| -2 to 0                 | -     | 42.9                             | 22.7      | -            | 1.9        | 67.5    |  |  |  |  |  |
| 0 to 2                  | 128.0 | 98.9                             | 209.0     | 188.2        | 313.6      | 937.7   |  |  |  |  |  |
| 2 to 4                  | 261.6 | 209.5                            | 192.5     | 240.8        | 291.4      | 1,195.8 |  |  |  |  |  |
| 4 to 6                  | 154.6 | 141.9                            | 19.9      | 0.1          | 243.3      | 559.8   |  |  |  |  |  |
| 6 to 8                  | 3.1   | 65.3                             | -         | -            | 91.1       | 159.5   |  |  |  |  |  |
| > 8                     | -     | 0.4                              | -         | -            | -          | 0.4     |  |  |  |  |  |
| Total                   | 547.3 | 562.3                            | 444.1     | 429.1        | 941.3      | 2,924.1 |  |  |  |  |  |

#### Table: Block wise area covered in each water fluctuation zone















# **GROUND WATER ELECTRICAL CONDUCTIVITY DISTRIBUTION**

**DISTRICT – PRATAPGARH** 

The Electrical conductivity (at 25°C) distribution map is presented in Plate – XII. The areas with low EC values in ground water (<2000  $\mu$ S/cm) are shown in yellow color and occupies almost 99% of the district area indicating that, by and large the ground water in this region is suitable for domestic purpose. The areas with moderately high EC values (2000 - 4000  $\mu$ S/cm) are shown in green color and occupy just 1% of the district area, occurring as small isolated patches in southern part of district.

| <b>Electrical Conductivity Ranges</b> |       | Block wise area coverage (sq km) |       |              |       |           |       |              |       |       |         |  |  |
|---------------------------------------|-------|----------------------------------|-------|--------------|-------|-----------|-------|--------------|-------|-------|---------|--|--|
| (μS/cm at 25°C)                       | Arnod |                                  | Chhot | Chhoti Sadri |       | Dhariawad |       | Peepalkhoont |       | pgarh | (ca km) |  |  |
| (Ave. of years 2005-09)               | Area  | %age                             | Area  | %age         | Area  | %age      | Area  | %age         | Area  | %age  | (sq km) |  |  |
| < 2000                                | 525.3 | 96.0                             | 562.3 | 100.0        | 444.1 | 100.0     | 429.1 | 100.0        | 941.3 | 100.0 | 2,902.1 |  |  |
| 2000-4000                             | 22.0  | 4.0                              | -     | -            | -     | -         | -     | -            | -     | -     | 26.0    |  |  |
| >4000                                 | -     | -                                | -     | -            | -     | -         | -     | -            | -     | -     | -       |  |  |
| Total                                 | 547.3 | 100.0                            | 562.3 | 100.0        | 444.1 | 100.0     | 429.1 | 100.0        | 941.3 | 100.0 | 2,924.1 |  |  |

#### Table: Block wise area of Electrical conductivity distribution

#### **GROUND WATER CHLORIDE DISTRIBUTION**

The yellow colored regions in Plate – XIII are such areas where chloride concentration is low (<250 mg/l) that occupy approximately 83% of the district area and the ground water in this region is suitable for domestic purpose. The areas with moderately high chloride concentration (250-1000mg/l) are shown in green color and occupy approximately 17% of the district area, largely in the eastern part of Pratapgarh district. No area has shown presence of high chloride concentration in ground water.

| <b>Chloride Concentration</b> |       | Block wise area coverage (sq km) |       |         |       |       |        |        |       |       |         |
|-------------------------------|-------|----------------------------------|-------|---------|-------|-------|--------|--------|-------|-------|---------|
| Range (mg/l)                  | Arı   | nod                              | Chhot | i Sadri | Dhari | awad  | Peepal | khoont | Prata | pgarh |         |
| (Ave. of years 2005-09)       | Area  | %age                             | Area  | %age    | Area  | %age  | Area   | %age   | Area  | %age  | (sq km) |
| < 250                         | 283.0 | 52.0                             | 560.5 | 100.0   | 444.1 | 100.0 | 428.3  | 100.0  | 719.1 | 76.0  | 2,435.0 |
| 250-1000                      | 264.3 | 48.0                             | 1.8   | -       | -     | -     | 0.8    | -      | 222.2 | 24.0  | 489.1   |
| > 1000                        | -     | -                                | -     | -       | -     | -     | -      | -      | -     | -     | -       |
| Total                         | 547.3 | 100.0                            | 562.3 | 100.0   | 444.1 | 100.0 | 429.1  | 100.0  | 941.3 | 100.0 | 2,924.1 |

#### Table: Block wise area of Chloride distribution















# GROUND WATER FLUORIDE DISTRIBUTION

**DISTRICT – PRATAPGARH** 

The Fluoride concentration map is presented in Plate – XIV. The areas with low concentration (i.e.,>1.5 mg/l) are shown in yellow color and such areas are seen to occupy almost 99% of the district area which hasground water suitable for domestic purpose. The areas with moderately high concentration (1.5-3.0 mg/l) in green color patches and high Fluoride concentration (>3.0 mg/l) in red color patches together occupy less than 1% of the district area as small isolated pockets adjacent to hills in central and northern parts of the district.

| Fluoride concentration  |       | Block wise area coverage (sq km) |              |       |           |       |              |       |            |       |         |  |  |
|-------------------------|-------|----------------------------------|--------------|-------|-----------|-------|--------------|-------|------------|-------|---------|--|--|
| Range(mg/l)             | Arnod |                                  | Chhoti Sadri |       | Dhariawad |       | Peepalkhoont |       | Pratapgarh |       | (ca km) |  |  |
| (Ave. of years 2005-09) | Area  | %age                             | Area         | %age  | Area      | %age  | Area         | %age  | Area       | %age  |         |  |  |
| < 1.5                   | 547.3 | 100.0                            | 559.1        | 99.4  | 444.1     | 100.0 | 413.4        | 96.3  | 938.4      | 99.7  | 2,902.3 |  |  |
| 1.5-3.0                 | -     | -                                | 3.2          | 0.6   | -         | -     | 15.4         | 3.6   | 2.9        | 0.3   | 21.5    |  |  |
| > 3.0                   | -     | -                                | -            | -     | -         | -     | 0.3          | 0.1   | -          | -     | 0.3     |  |  |
| Total                   | 547.3 | 100.0                            | 562.3        | 100.0 | 444.1     | 100.0 | 429.1        | 100.0 | 941.3      | 100.0 | 2,924.1 |  |  |

#### Table: Block wise area of Fluoride distribution

#### **GROUND WATER NITRATE DISTRIBUTION**

High nitrate concentration in ground water renders it unsuitable for agriculture purposes. Plate – XV shows distribution of Nitrate in ground water. Low nitrate concentration (<50 mg/l) is shown in yellow color and occupies approximately 48% of the district area which is suitable for agriculture purpose. The areas with moderately high nitrate concentration (50-100 mg/l) are shown in green color and occupy approximately 46% of the district area, largely northern part of the district. Remaining part of the district area is covered with high nitrate concentration (>100 mg/l) which is shown in red colored patches, which is not suitable for agriculture purpose however, such patches are either within hilly tract or adjacent o hills which may not be agricultural/crop field.

| Nitrate concentration   |       | Block wise area coverage (sq km) |       |         |              |       |              |       |            | Total Area |            |
|-------------------------|-------|----------------------------------|-------|---------|--------------|-------|--------------|-------|------------|------------|------------|
| Range(mg/l)             | Arr   | nod                              | Chhot | i Sadri | ri Dhariawad |       | Peepalkhoont |       | Pratapgarh |            | lotal Area |
| (Ave. of years 2005-09) | Area  | %age                             | Area  | %age    | Area         | %age  | Area         | %age  | Area       | %age       | (sq km)    |
| < 50                    | 238.8 | 43.6                             | 180.8 | 32.2    | 205.2        | 46.4  | 391.2        | 91.1  | 396.0      | 42.0       | 1,412.0    |
| 50-100                  | 297.4 | 54.4                             | 280.0 | 49.8    | 238.9        | 53.6  | 36.3         | 8.5   | 488.2      | 51.9       | 1,340.8    |
| >100                    | 11.1  | 2.0                              | 101.5 | 18.0    | -            | -     | 1.6          | 0.4   | 57.1       | 6.1        | 171.3      |
| Total                   | 547.3 | 100.0                            | 562.3 | 100.0   | 444.1        | 100.0 | 429.1        | 100.0 | 941.3      | 100.0      | 2,924.1    |

#### Table: Block wise area of Nitrate distribution







PLATE - XV

75°11'24"

75°00'00"

DESH

4.5 0.0 4.5 9.0 13.5 18.0 22.5

75°11'19"

75°00'00"















From hydrogeological perspective, the beginning of massive bedrock has been considered for defining top of bedrock surface. There are either no alluvial covers over the bedrock or are very thin to be important from hydrogeological view point. Depth to bedrock map of Pratapgarh district (Plate – XVI) thus reveals wide variation of more than 20m below ground level reaching in areas adjacent to hills, to a maximum depth of more than 80m in the western part of the district. The major rocks types occurring in the district are Phyllites, Shale, Basalt and BGC. The bedrock occurs at shallow depths (less than 20m bgl) in and around Arnod, Chhoti Sadri and Pratapgarh blocks i.e., almost entire eastern part of the district. As we move to western periphery of the district, the depth of bedrock increases to a maximum of about 80m bgl. The depth of bedrock found more than 80 m bgl in Peepalkhoont block.

| Donth to hadrock |       |       | В     |              | Total Area |           |       |              |       |       |           |
|------------------|-------|-------|-------|--------------|------------|-----------|-------|--------------|-------|-------|-----------|
| (m hal)          | Arr   | Arnod |       | Chhoti Sadri |            | Dhariawad |       | Peepalkhoont |       | pgarh |           |
| (III DEI)        | Area  | %age  | Area  | %age         | Area       | %age      | Area  | %age         | Area  | %age  | (sq kiii) |
| < 20             | 29.3  | 5.3   | 122.3 | 22.0         | -          | -         | -     | -            | 131.7 | 14.0  | 283.3     |
| 20-40            | 477.7 | 87.4  | 389.1 | 69.0         | -          | -         | 55.2  | 12.8         | 729.4 | 77.5  | 1,651.4   |
| 40-60            | 38.7  | 7.0   | 50.9  | 9.0          | 331.1      | 74.5      | 302.2 | 70.4         | 76.1  | 8.5   | 799.0     |
| 60-80            | 1.6   | 0.3   | -     | -            | 113.0      | 25.5      | 64.1  | 15.0         | 4.1   | -     | 182.8     |
| > 80             | -     | -     | -     | -            | -          | -         | 7.6   | 1.8          | -     | -     | 7.6       |
| Total            | 547.3 | 100.0 | 562.3 | 100.0        | 444.1      | 100.0     | 429.1 | 100.0        | 941.3 | 100.0 | 2,924.1   |

#### **UNCONFINED AQUIFER**

#### Unconfined aquifer hardrock areas

Aquifers in the district are predominantly formed in weathered, fractured and jointed rock formations occurring at shallower depths and these constitute good unconfined aquifers. The thickness of aquifers thus formed varies from less than 10m to around 50m. Isolated parts have very thick zones especially in Peepalkhoont and Pratapgarh where the thickness of aquifer in unconfined condition is seen to be more than 40m. Rest of the blocks have moderate to low thickness of aquifers in hardrock reaching to a maximum of 20m to 30m.

| Unconfined aquifer |       | Block v      | vise Area cov | erage (sq km) |            | <b>Total Area</b> |
|--------------------|-------|--------------|---------------|---------------|------------|-------------------|
| Thickness (m)      | Arnod | Chhoti Sadri | Dhariawad     | Peepalkhoont  | Pratapgarh | (sq km)           |
| < 10               | 381.9 | 496.2        | 0.4           | 211.5         | 529.6      | 1,619.6           |
| 10-20              | 165.1 | 66.1         | 93.2          | 184.2         | 196.6      | 705.2             |
| 20-30              | -     | -            | 289.1         | 32.1          | 174.2      | 495.4             |
| 30-40              | 0.3   | -            | 61.4          | 1.2           | 38.9       | 101.8             |
| > 40               | -     | -            | -             | 0.1           | 2.0        | 2.1               |
| Total              | 547.3 | 562.3        | 444.1         | 429.1         | 941.3      | 2,924.1           |







PLATE - XVII

75°14'42"

24°32'1











# **Glossary of terms**

| 1         AQUIFER         A saturated geological formation which has good perneability to<br>supply sufficient quantity of water to a Tube well, well or spring.           2         ARID CLIMATE         Climate characterized by high evaporation and low precipitation.           3         ARTIFICIAL RECHARGE         Addition of water to a groundwater reservoir by man-made activity<br>The sum total of all atmospheric or meteorological influences           4         CLIMATE         principally temperature, moisture, wind, pressure and evaporation<br>of a region.           5         CONFINED AQUIFER         A water bearing strata having confined impermeable overburden. In<br>this aquifer, water level represents the piezometric head.           6         CONTAMINATION         Introduction of undesirable substance, normally not found in water,<br>which renders the water unfit for its intended use.           7         DRAWDOWN         The drawdown is the depth by which water level is lowered.           8         FRESH WATER         Water suitable for drinking purpose.           9         GROUND WATER         A hydro-geologic unit containing one large aquifer or several<br>connected and interrelated aquifers.           11         RECHARGE         The water which does not produce sufficient foam with soap.           14         HYDRAULC         A constant that serves as a measure of permeability of porous<br>conduct sufficient foal multi sola an indicator<br>of acidity (pH < 7) or alkalinity (PH > 7).           14         HYDRAULC   | S. No. | Technical Terms     | Definition   |
|---|--------|---------------------|--|
| ACCONTEN         supply sufficient quantity of water to a Tube well, well or spring.           2         ARID CLIMATE         Climate characterized by high evaporation and low precipitation.           3         ARTIFICIAL RECHARGE         Addition of water to a groundwater reservoir by man-made activity.           4         CLIMATE         The sum total of all atmospheric or meteorological influences principally temperature, moisture, wind, pressure and evaporation of a region.           5         CONFINED AQUIFER         A water bearing strata having confined impermeable overburden. In this aquifer, water level represents the piezometric head.           6         CONTAMINATION         A water bearing strata having confined impermeable overburden. In this aquifer, water level represents the piezometric head.           7         DRAWDOWN         The drawdown is the depth by which water level is lowered.           8         FRESH WATER         Water found below the land surface.           10         GROUND WATER         A hydro-geologic unit containing one large aquifer or several connected and interrelated aquifers.           11         GROUNDWATER         The water which does not produce sufficient foam with soap.           14         HYDRAULC         A constant that serves as a measure of permeability of porous medium.           13         HYDRAULC         A constant that serves as a measure of permeability of porous medium.           14         HYDRAULC <t< td=""><td>1</td><td></td><td>A saturated geological formation which has good permeability to</td></t<>      | 1      |                     | A saturated geological formation which has good permeability to      |
| 2       ARID CLIMATE       Climate characterized by high evaporation and low precipitation.         3       ARTIFICIAL RECHARGE       Addition of water to a groundwater reservoir by man-made activity         4       CLIMATE       The sum total of all atmospheric or meteorological influences principally temperature, moisture, wind, pressure and evaporation of a region.         5       CONFINED AQUIFER       A water bearing strata having confined impermeable overburden. In this aquifer, water level represents the piezometric head.         6       CONTAMINATION       Introduction of undesirable substance, normally not found in water, which renders the water unfit for its intended use.         7       DRAWDOWN       The drawdown is the depth by which water level is lowered.         8       FRESH WATER       Water sound bow the land surface.         9       GROUND WATER BASIN       A hydro-geologic unit containing one large aquifer or several connected and interrelated aquifers.         11       RECHARGE       The water which does not produce sufficient foam with soap.         12       HARD WATER       The water which does not produce sufficient foam with soap.         13       CONDUCTIVITY       medium.         14       HYDROGELOGY       The science related with the ground water.         15       HUMID CLIMATE       The area having high moisture content.         16       ISOHYET       A line of equal amoun   | 1      | AQUILER             | supply sufficient quantity of water to a Tube well, well or spring.  |
| 3       ARTIFICIAL RECHARGE       Addition of water to a groundwater reservoir by man-made activity         4       CLIMATE       The sum total of all atmospheric or meteorological influences principally temperature, moisture, wind, pressure and evaporation of a region.         5       CONFINED AQUIFER       A water bearing strata having confined impermeable overburden. In this aquifer, water level represents the piezometric head.         6       CONTAMINATION       Introduction of undesirable substance, normally not found in water, which renders the water unfit for its intended use.         7       DRAWDOWN       The drawdown is the depth by which water level is lowered.         8       FRESH WATER       Water suitable for drinking purpose.         9       GROUND WATER       A hydro-geologic unit containing one large aquifer or several connected and interrelated aquifers.         11       GROUNDWATER       The natural infiltration of surface water into the ground.         12       HARD WATER       The science related with the ground water.         13       HYDRAULC       A constant that serves as a measure of permeability of porous consult of rainfall.         14       HYDROGEOLOGY       The science related with the ground water.         15       HUMID CLIMATE       The area having high moisture content.         16       ISOHYET       A line of equal amount of rainfall.         17       METEOROLOGY  | 2      | ARID CLIMATE        | Climate characterized by high evaporation and low precipitation.     |
| 4         CLIMATE         The sum total of all atmospheric or meteorological influences<br>principally temperature, moisture, wind, pressure and evaporation<br>of a region.           5         CONFINED AQUIFER         A water bearing strata having confined impermeable overburden. In<br>this aquifer, water level represents the piezometric head.           6         CONTAMINATION         Introduction of undesirable substance, normally not found in water,<br>which renders the water unfit for its intended use.           7         DRAWDOWN         The drawdown is the depth by which water level is lowered.           8         FRESH WATER         Water soutable for drinking purpose.           9         GROUND WATER         A hydro-geologic unit containing one large aquifer or several<br>connected and interrelated aquifers.           11         RECHARGE         The natural infiltration of surface water into the ground.<br>RECHARGE           12         HARD WATER         The water which does not produce sufficient foam with soap.           13         CONDUCTIVITY         A constant that serves as a measure of permeability of porous<br>CONDUCTIVITY           14         HYDROGEOLOGY         The science related with the ground water.           15         HUMID CLIMATE         The area having high moisture content.           16         ISOHYET         A line of equal amount of rainfall.           17         METEOROLOGY         Science of the atmosphere. <t< td=""><td>3</td><td>ARTIFICIAL RECHARGE</td><td>Addition of water to a groundwater reservoir by man-made activity</td></t<> | 3      | ARTIFICIAL RECHARGE | Addition of water to a groundwater reservoir by man-made activity    |
| 4         CLIMATE         principally temperature, moisture, wind, pressure and evaporation of a region.           5         CONFINED AQUIFER         A water bearing strata having confined impermeable overburden. In this aquifer, water level represents the piezometric head.           6         CONTAMINATION         Introduction of undesirable substance, normally not found in water, which renders the water unfit for its intended use.           7         DRAWDOWN         The drawdown is the depth by which water level is lowered.           8         FRESH WATER         Water solutable for drinking purpose.           9         GROUND WATER         Water found below the land surface.           10         GROUNDWATER         The natural infiltration of surface water into the ground.           11         RECHARGE         The natural infiltration of surface water into the ground.           12         HARD WATER         The water which does not produce sufficient foam with soap.           13         CONDUCTIVITY         medium.           14         HYDRAULIC         A constant that serves as a measure of permeability of porous medium.           15         HUMID CLIMATE         The area having high moisture content.           16         ISOHYET         A line of equal amount of rainfall.           17         METEOROLOGY         Science of the atmosphere.           18         PERCOLATIO  |        |                     | The sum total of all atmospheric or meteorological influences        |
| of a region.           5         CONFINED AQUIFER         A water bearing strat having confined impermeable overburden. In<br>this aquifer, water level represents the piezometric head.           6         CONTAMINATION         Introduction of undesirable substance, normally not found in water,<br>which renders the water unfit for its intended use.           7         DRAWDOWN         The drawdown is the depth by which water level is lowered.           8         FRESH WATER         Water suitable for drinking purpose.           9         GROUND WATER         A hydro-geologic unit containing one large aquifer or several<br>connected and interrelated aquifers.           11         GROUNDWATER         The natural infiltration of surface water into the ground.           12         HARD WATER         The water which does not produce sufficient foam with soap.           13         HYDRAULC         A constant that serves as a measure of permeability of porous<br>medium.           14         HYDROEGELOGY         The area having high moisture content.           16         ISOMYET         A line of equal amount of rainfall.           17         METEOROLOGY         Science of the atmosphere.           18         PERCOLATION         It is fow through a porous substance.           19         PERMEABILITY         The property or capacity of a soil or rock for transmitting water.           20         pH  | 4      | CLIMATE             | principally temperature, moisture, wind, pressure and evaporation    |
| 5       CONFINED AQUIFER       A water bearing strata having confined impermeable overburden. In this aquifer, water level represents the piezometric head.         6       CONTAMINATION       Introduction of undesirable substance, normally not found in water, which renders the water unfit for its intended use.         7       DRAWDOWN       The drawdown is the depth by which water level is lowered.         8       FRESH WATER       Water suitable for drinking purpose.         9       GROUND WATER       Water found below the land surface.         10       GROUNDWATER BASIN       A hydro-geologic unit containing one large aquifer or several connected and interrelated aquifers.         11       RECHARGE       The natural infiltration of surface water into the ground.         12       HARD WATER       The water which does not produce sufficient foam with soap.         13       HYDRAULIC       A constant that serves as a measure of permeability of porous medium.         14       HYDROGEOLOGY       The science related with the ground water.         15       HUMID CLIMATE       The area having high moisture content.         16       ISOHYET       A line of equal amount of rainfall.         17       METEOROLOGY       Science of the atmosphere.         18       PERCOLATION       It is flow through a porous substance.         19       PERCOLATION       It is a natural  |        |                     | of a region.   |
| 3       CONTINED ACONER       this aquifer, water level represents the piezometric head.         6       CONTAMINATION       Introduction of undesirable substance, normally not found in water, which renders the water unift for its intended use.         7       DRAWDOWN       The drawdown is the depth by which water level is lowered.         8       FRESH WATER       Water suitable for drinking purpose.         9       GROUND WATER       Water found below the land surface.         10       GROUNDWATER       A hydro-geologic unit containing one large aquifer or several connected and interrelated aquifers.         11       GROUNDWATER       The natural infiltration of surface water into the ground.         12       HARD WATER       The water which does not produce sufficient foam with soap.         13       HYDRAULIC       A constant that serves as a measure of permeability of porous CONDUCTIVITY         14       HYDROGEOLOGY       The science related with the ground water.         15       HUMID CLIMATE       The area having high moisture content.         16       ISOHYET       A line of equal amount of rainfall.         17       METEOROLOGY       Science of the atmosphere.         18       PERCOLATION       It is flow through a porous substance.         19       PERMEABILITY       The property or capacity of a soil or ock for transmitting water.  | 5      |                     | A water bearing strata having confined impermeable overburden. In    |
| 6       CONTAMINATION       Introduction of undesirable substance, normally not found in water, which renders the water unfit for its intended use.         7       DRAWDOWN       The drawdown is the depth by which water level is lowered.         8       FRESH WATER       Water suitable for drinking purpose.         9       GROUND WATER       Water found below the land surface.         10       GROUNDWATER BASIN       A hydro-geologic unit containing one large aquifer or several connected and interrelated aquifers.         11       GROUNDWATER       The natural infiltration of surface water into the ground.         8       FRESH WATER       The water which does not produce sufficient foam with soap.         12       HARD WATER       The water any high moisture content.         13       HYDRAULIC       A constant that serves as a measure of permeability of porous CONDUCTIVITY medium.         14       HYDROGEOLOGY       The science related with the ground water.         15       HUMID CLIMATE       The area having high moisture content.         16       ISOHYET       A line of equal amount of rainfall.         17       METEOROLOGY       Science of the atmosphere.         18       PERCOLATION       It is flow through a porous substance.         19       PERMEABILITY       The property or capacity of a soil or rock for transmitting water.   | 5      |                     | this aquifer, water level represents the piezometric head.           |
| 0       CONTINUENTIAL       which renders the water unfit for its intended use.         7       DRAWDOWN       The drawdown is the depth by which water level is lowered.         8       FRESH WATER       Water suitable for drinking purpose.         9       GROUND WATER       Water found below the land surface.         10       GROUND WATER BASIN       A hydro-geologic unit containing one large aquifer or several connected and interrelated aquifers.         11       RCHARGE       The natural infiltration of surface water into the ground.         12       HARD WATER       The water which does not produce sufficient foam with soap.         13       HYDRAULIC       A constant that serves as a measure of permeability of porous         14       HYDROGEOLOGY       The science related with the ground water.         15       HUMID CLIMATE       The area having high moisture content.         16       ISOHYET       A line of equal amount of rainfall.         17       METEOROLOGY       Science of the atmosphere.         18       PEROLATION       It is flow through a porous substance.         19       PERMEABILITY       The property or capacity of a soil or rock for transmitting water.         22       RECHARGE       It is a natural or artificial process by which water is added from outside to the aquifer.         23       SAFE YIELD <td>6</td> <td>CONTAMINATION</td> <td>Introduction of undesirable substance, normally not found in water,</td>   | 6      | CONTAMINATION       | Introduction of undesirable substance, normally not found in water,  |
| 7       DRAWDOWN       The drawdown is the depth by which water level is lowered.         8       FRESH WATER       Water suitable for drinking purpose.         9       GROUND WATER       Water found below the land surface.         10       GROUNDWATER BASIN       A hydro-geologic unit containing one large aquifer or several connected and interrelated aquifers.         11       GROUNDWATER RAGE       The natural infiltration of surface water into the ground.         12       HARD WATER       The water which does not produce sufficient foam with soap.         13       HYDRAULIC       A constant that serves as a measure of permeability of porous conductivity medium.         14       HYDROGEOLOGY       The science related with the ground water.         15       HUMID CLIMATE       The area having high moisture content.         16       ISOHYET       A line of equal amount of rainfall.         17       METEOROLOGY       Science of the atmosphere.         18       PERCOLATION       It is flow through a porous substance.         19       PERMEABILITY       The property or capacity of a soil or rock for transmitting water.         20       pH       Value of hydrogen-ion concentration in water. Used as an indicator of acidity (pH < 7) or alkalinity (pH > 7).         21       PIEZOMETRIC HEAD       Elevation to which water will rise in a piezometers.   | 0      | CONTAMINATION       | which renders the water unfit for its intended use.                  |
| 8       FRESH WATER       Water suitable for drinking purpose.         9       GROUND WATER       Water found below the land surface.         10       GROUND WATER BASIN       A hydro-geologic unit containing one large aquifer or several connected and interrelated aquifers.         11       GROUNDWATER RECHARGE       The natural infiltration of surface water into the ground.         12       HARD WATER       The water which does not produce sufficient foam with soap.         13       HYDRAULC       A constant that serves as a measure of permeability of porous medium.         14       HYDROGEOLOGY       The science related with the ground water.         15       HUMID CLIMATE       The area having high moisture content.         16       ISOHYET       A line of equal amount of rainfall.         17       METEOROLOGY       Science of the atmosphere.         18       PERCOLATION       It is flow through a porous substance.         19       PERMEABILITY       The property or capacity of a soil or rock for transmitting water.         20       pH       Value of hydrogen-ion concentration in water. Used as an indicator of acidity (pH < 7) or alkalinity (pH > 7).         21       PIEZOMETRIC HEAD       Elevation to which water will rise in a piezometers.         22       RECHARGE       It is a natural or artificial process by which water is added from outside to the aq   | 7      | DRAWDOWN            | The drawdown is the depth by which water level is lowered.           |
| 9       GROUND WATER       Water found below the land surface.         10       GROUND WATER BASIN       A hydro-geologic unit containing one large aquifer or several connected and interrelated aquifers.         11       GROUNDWATER RECHARGE       The natural infiltration of surface water into the ground.         12       HARD WATER       The water which does not produce sufficient foam with soap.         13       HYDRAULIC       A constant that serves as a measure of permeability of porous medium.         14       HYDROGEOLOGY       The science related with the ground water.         15       HUMID CLIMATE       The area having high moisture content.         16       ISOHYET       A line of equal amount of rainfall.         17       METEOROLOGY       Science of the atmosphere.         18       PERCOLATION       It is flow through a porous substance.         19       PERMEABILITY       The property or capacity of a soil or rock for transmitting water.         20       pH       Value of hydrogen-ion concentration in water. Used as an indicator of acidity (pH < 7) or alkalinity (pH > 7).         21       PIEZOMETRIC HEAD       Elevation to which water will rise in a piezometers.         22       RECHARGE       It is a natural or artificial process by which water is added from outside to the aquifer.         23       SAFE YIELD       Amount of water which can be  | 8      | FRESH WATER         | Water suitable for drinking purpose.                                 |
| 10GROUND WATER BASINA hydro-geologic unit containing one large aquifer or several<br>connected and interrelated aquifers.11GROUNDWATER<br>RECHARGEThe natural infiltration of surface water into the ground.12HARD WATERThe water which does not produce sufficient foam with soap.13HYDRAULIC<br>CONDUCTIVITYA constant that serves as a measure of permeability of porous<br>medium.14HYDROGEOLOGYThe science related with the ground water.15HUMID CLIMATEThe area having high moisture content.16ISOHYETA line of equal amount of rainfall.17METEOROLOGYScience of the atmosphere.18PERCOLATIONIt is flow through a porous substance.19PHValue of hydrogen-ion concentration in water. Used as an indicator<br>of acidity (pH < 7) or alkalinity (pH > 7).21PIEZOMETRIC HEADElevation to which water will rise in a piezometers.22RECHARGEIt is a natural or artificial process by which water is added from<br>outside to the aquifer.23SAFE YIELDAmount of water which can be extracted from groundwater without<br>producing undesirable effect.24SALINITYConcentration of dissolved salts.25SEMI-CONFINED<br>AQUIFERAquifer overlain and/or underlain by a relatively thin semi-pervious<br>layer.26SEMI-CONFINED<br>AQUIFERAquifer overlain and/or underlain by a relatively thin semi-pervious<br>layer.27SPECIFIC YIELDQuantity of water which is released by a formation after its<br>complete saturation.28TOTAL DISSOLVED<br>SOLIDS <td>9</td> <td>GROUND WATER</td> <td>Water found below the land surface.</td>   | 9      | GROUND WATER        | Water found below the land surface.                                  |
| 10       Connected and interrelated aquifers.         11       GROUNDWATER<br>RECHARGE       The natural infiltration of surface water into the ground.         12       HARD WATER       The water which does not produce sufficient foam with soap.         13       HYDRAULIC<br>CONDUCTIVITY       A constant that serves as a measure of permeability of porous<br>medium.         14       HYDRAGEOLOGY       The science related with the ground water.         15       HUMID CLIMATE       The area having high moisture content.         16       ISOHYET       A line of equal amount of rainfall.         17       METEOROLOGY       Science of the atmosphere.         19       PERCOLATION       It is flow through a porous substance.         19       PERMEABILITY       The property or capacity of a soil or rock for transmitting water.         20       pH       Value of hydrogen-ion concentration in water. Used as an indicator<br>of acidity (pH < 7) or alkalinity (pH > 7).         21       PIEZOMETRIC HEAD       Elevation to which water will rise in a piezometers.         22       RECHARGE       It is a natural or artificial process by which water is added from<br>outside to the aquifer.         23       SAFE YIELD       Amount of water which can be extracted from groundwater without<br>producing undesirable effect.         24       SALINITY       Concentration of dissolved salts.  | 10     | GROUND WATER BASIN  | A hydro-geologic unit containing one large aquifer or several        |
| 11GROUNDWATER<br>RECHARGEThe natural infiltration of surface water into the ground.12HARD WATERThe water which does not produce sufficient foam with soap.13HYDRAULIC<br>CONDUCTIVITYA constant that serves as a measure of permeability of porous<br>medium.14HYDROGEOLOGYThe science related with the ground water.15HUMID CLIMATEThe area having high moisture content.16ISOHYETA line of equal amount of rainfall.17METEOROLOGYScience of the atmosphere.18PERCOLATIONIt is flow through a porous substance.19PERMEABILITYThe property or capacity of a soil or rock for transmitting water.20pHValue of hydrogen-ion concentration in water. Used as an indicator<br>of acidity (pH < 7) or alkalinity (pH > 7).21PIEZOMETRIC HEADElevation to which water will rise in a piezometers.22RECHARGEIt is a natural or artificial process by which water is added from<br>outside to the aquifer.23SAFE YIELDAmount of water which can be extracted from groundwater without<br>producing undesirable effect.24SALINITYConcentration of dissolved salts.25SEMI-ARIDAn area is considered semiarid having annual rainfall between 10-20<br>inches.26SEMI-CONFINED<br>AQUIFERAquifer overlain and/or underlain by a relatively thin semi-pervious<br>layer.27SPECIFIC YIELDQuantity of water which is released by a formation after its<br>complete saturation.28TOTAL DISSOLVED<br>SOLIDSTotal weight of dissolved mineral constituents in wa   | 10     | GROOND WATER BASIN  | connected and interrelated aquifers.                                 |
| 11RECHARGE12HARD WATERThe water which does not produce sufficient foam with soap.13HYDRAULIC<br>CONDUCTIVITYA constant that serves as a measure of permeability of porous<br>medium.14HYDROGEOLOGYThe science related with the ground water.15HUMID CLIMATEThe area having high moisture content.16ISOHYETA line of equal amount of rainfall.17METEOROLOGYScience of the atmosphere.18PERCOLATIONIt is flow through a porous substance.19PERMEABILITYThe property or capacity of a soil or rock for transmitting water.20pHValue of hydrogen-ion concentration in water. Used as an indicator<br>of acidity (pH < 7) or alkalinity (pH > 7).21PIEZOMETRIC HEADElevation to which water will rise in a piezometers.22RECHARGEIt is a natural or artificial process by which water is added from<br>  | 11     | GROUNDWATER         | The natural infiltration of surface water into the ground.           |
| 12HARD WATERThe water which does not produce sufficient foam with soap.13HYDRAULIC<br>CONDUCTIVITYA constant that serves as a measure of permeability of porous<br>medium.14HYDROGEOLOGYThe science related with the ground water.15HUMID CLIMATEThe area having high moisture content.16ISOHYETA line of equal amount of rainfall.17METEOROLOGYScience of the atmosphere.18PERCOLATIONIt is flow through a porous substance.19PERMEABILITYThe property or capacity of a soil or rock for transmitting water.20pHValue of hydrogen-ion concentration in water. Used as an indicator<br>of acidity (pH < 7) or alkalinity (pH > 7).21PIEZOMETRIC HEADElevation to which water will rise in a piezometers.22RECHARGEIt is a natural or artificial process by which water is added from<br>outside to the aquifer.23SAFE YIELDAmount of water which can be extracted from groundwater without<br>producing undesirable effect.24SALINITYConcentration of dissolved salts.25SEMI-ARIDAn area is considered semiarid having annual rainfall between 10-20<br>inches.26SEMI-CONFINED<br>AQUIFERAquifer overlain and/or underlain by a relatively thin semi-pervious<br>layer.27SPECIFIC YIELDQuantity of water which is released by a formation after its<br>complete saturation.28TOTAL DISSOLVED<br>SOLIDSTotal weight of dissolved mineral constituents in water per unit<br>volume (or weight) of water in the sample.  | 11     | RECHARGE            |  |
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| 22       RECHARGE       outside to the aquifer.         23       SAFE YIELD       Amount of water which can be extracted from groundwater without producing undesirable effect.         24       SALINITY       Concentration of dissolved salts.         25       SEMI-ARID       An area is considered semiarid having annual rainfall between 10-20 inches.         26       SEMI-CONFINED AQUIFER       Aquifer overlain and/or underlain by a relatively thin semi-pervious layer.         27       SPECIFIC YIELD       Quantity of water which is released by a formation after its complete saturation.         28       TOTAL DISSOLVED SOLIDS       Total weight of dissolved mineral constituents in water per unit volume (or weight) of water in the sample.   | 22     | DECHARCE            | It is a natural or artificial process by which water is added from   |
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| 24     SALINITY     Concentration of dissolved salts.       25     SEMI-ARID     An area is considered semiarid having annual rainfall between 10-20 inches.       26     SEMI-CONFINED AQUIFER     Aquifer overlain and/or underlain by a relatively thin semi-pervious layer.       27     SPECIFIC YIELD     Quantity of water which is released by a formation after its complete saturation.       28     TOTAL DISSOLVED SOLIDS     Total weight of dissolved mineral constituents in water per unit volume (or weight) of water in the sample.   | 23     | SAFE TIELD          | producing undesirable effect.  |
| 25       SEMI-ARID       An area is considered semiarid having annual rainfall between 10-20 inches.         26       SEMI-CONFINED AQUIFER       Aquifer overlain and/or underlain by a relatively thin semi-pervious layer.         27       SPECIFIC YIELD       Quantity of water which is released by a formation after its complete saturation.         28       TOTAL DISSOLVED SOLIDS       Total weight of dissolved mineral constituents in water per unit volume (or weight) of water in the sample.   | 24     | SALINITY            | Concentration of dissolved salts.                                    |
| 25     SEMI-ARID     inches.       26     SEMI-CONFINED<br>AQUIFER     Aquifer overlain and/or underlain by a relatively thin semi-pervious<br>layer.       27     SPECIFIC YIELD     Quantity of water which is released by a formation after its<br>complete saturation.       28     TOTAL DISSOLVED<br>SOLIDS     Total weight of dissolved mineral constituents in water per unit<br>volume (or weight) of water in the sample.  | 25     |                     | An area is considered semiarid having annual rainfall between 10-20  |
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| Zo         AQUIFER         layer.           27         SPECIFIC YIELD         Quantity of water which is released by a formation after its complete saturation.           28         TOTAL DISSOLVED SOLIDS         Total weight of dissolved mineral constituents in water per unit volume (or weight) of water in the sample.   | 20     | SEMI-CONFINED       | Aquifer overlain and/or underlain by a relatively thin semi-pervious |
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| 27         SPECIFIC TIELD         complete saturation.           28         TOTAL DISSOLVED<br>SOLIDS         Total weight of dissolved mineral constituents in water per unit<br>volume (or weight) of water in the sample.  | 27     |                     | Quantity of water which is released by a formation after its         |
| 28         TOTAL DISSOLVED<br>SOLIDS         Total weight of dissolved mineral constituents in water per unit<br>volume (or weight) of water in the sample.   | 27     | SPECIFIC YIELD      | complete saturation.   |
| <sup>28</sup> SOLIDS volume (or weight) of water in the sample.   | 20     | TOTAL DISSOLVED     | Total weight of dissolved mineral constituents in water per unit     |
|   | 28     | SOLIDS              | volume (or weight) of water in the sample.                           |



Wind-blown sand deposits

(Contd...)



S. No.

STATION

EOLIAN DEPOSITS







A A A KAR AR AR AR AR AR

| S No | Myths   | Facts   |
|------|---|---|
| 1    | What is Ground Water  | Water which occurs below the land in geological   |
|      | an underground lake   | formations/rocks is Ground water  |
|      | <ul> <li>a net work of underground rivers</li> </ul>                                    |   |
|      | <ul> <li>a bowl filled with water</li> </ul>  |   |
| 2    | Ground Water occurs everywhere beneath the Land Surface                                 | Not really, it depends on the nature of rock formation  |
| 3    | There is a relationship between ground water<br>and surface water                       | Not all the places. Near streams/rivers there is relation   |
| 4    | Groundwater is not renewable resource   | It is renewable source and every year it is being recharged<br>through rain/applied irrigation etc  |
| 5    | Ground water is unlimited and deeper you drill more discharge                           | It is limited to annual recharge from rain/applied irrigation.<br>The discharge may not increase if you go deeper   |
| 6    | Ground Water moves rapidly  | The movement of ground water is very slow   |
| 7    | Ground water pumped from wells is thousands of years old                                | Generally the ground water being tapped through wells is a few years old  |
| 8    | If water taste good—it is safe to drink   | It may have other chemicals e.g. fluoride, nitrates etc which are harmful   |
| 9    | Water from free flowing tube wells is very<br>pure                                      | This water can also be contaminated so test before use  |
| 10   | If I recharge my TW/DW/HP it will not benefit<br>me                                     | It will also benefit you and also adjoing wells   |
| 11   | There is no static ground water resources in Rajasthan                                  | Rajasthan is also having Static GW resources, and being<br>tapped in most of areas as GW annual withdrawal is more<br>than annual recharge  |
| 12   | I cannot meet annual cooking and drinking<br>water requirement by rain water harvesting | The water requirement for drinking and cooking is only 8<br>lit/day. You can harvest this water for family of 5 persons<br>from roof top or paved area of 75 Sq m to meet annual<br>requirement |
| 13   | You can increase ground water recharge  | This can be done by harvesting the rain water and storing<br>in sub surface reservoir (GW) by constructing the recharge<br>structures   |
| 14   | You cannot use abandoned TW/HP/DW for<br>ground water recharge                          | These should be used as recharge structures as harvested<br>rain water is directly put into GW reservoir  |
| 15   | Putting waste near HP/TW will not cause any problem                                     | Such actions will pollute wells and water   |

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