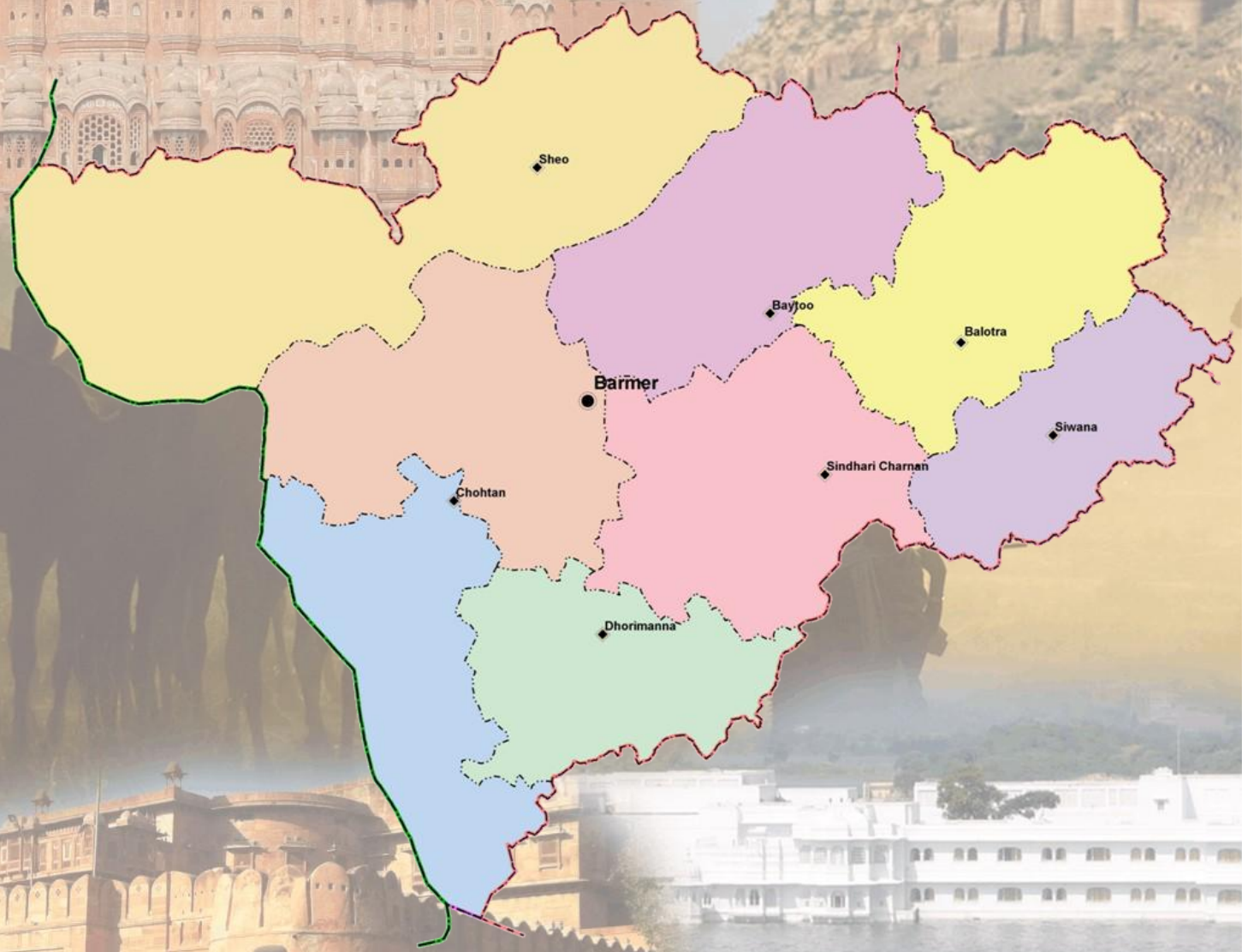
Ground Water Department,
Rajasthan

Hydrogeological Atlas of Rajasthan
Barmer District

European Union
State Partnership Programme

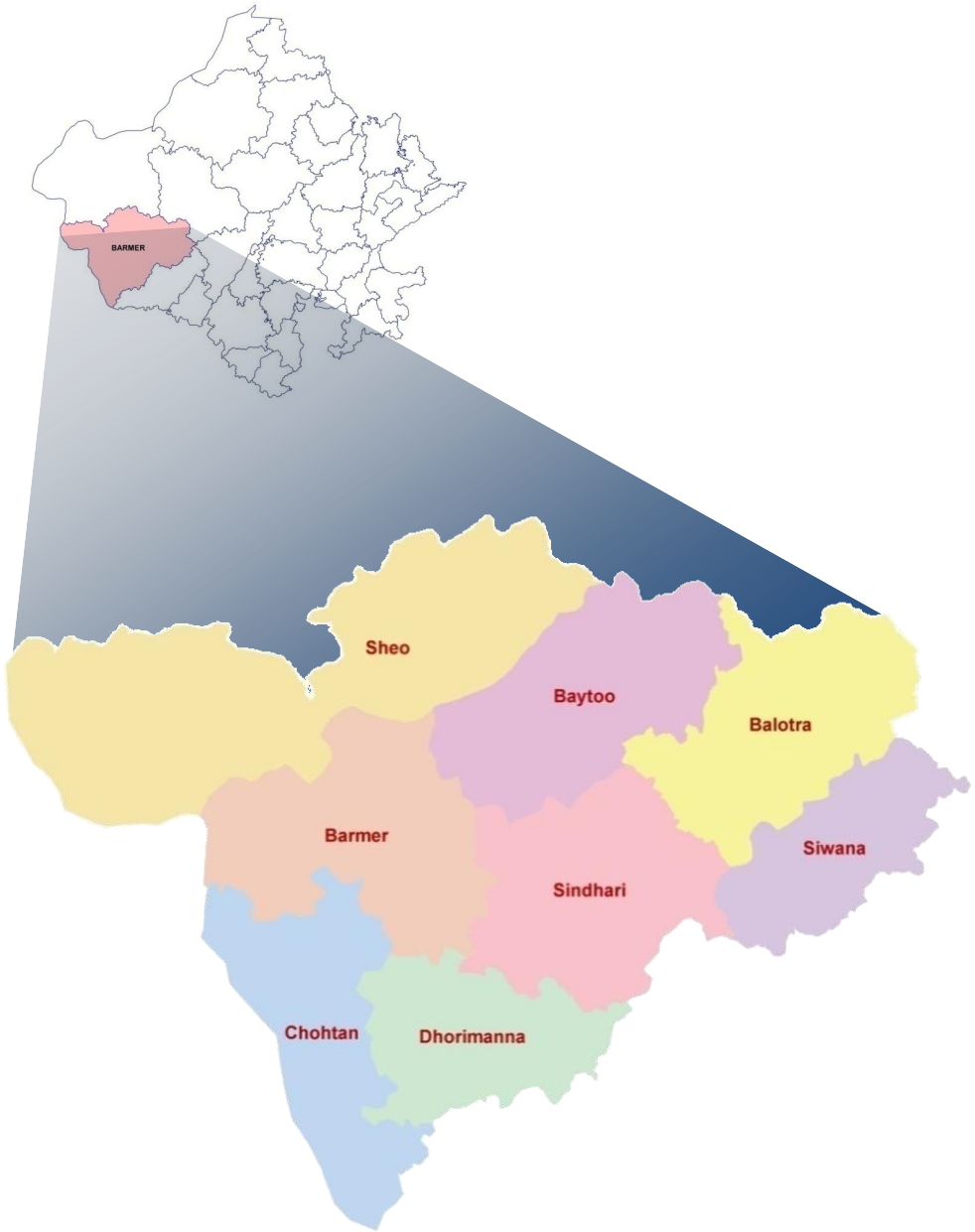


2013

ROLTA
Rolta India Limited

Hydrogeological Atlas of Rajasthan

Barmer District



Contents:

2013

ADMINISTRATIVE SETUP

DISTRICT – BARMER

Location:

Barmer district is located in the southwestern part of Rajasthan. It is bounded in the North by Jaisalmer district, in the northeast by Jodhpur district, southeast by Jalor district and Pakistan in the West. It stretches between 24^{o} 37' 08.51" to 26^{o} 32' 27.50" North latitude and 70^{o} 04' 02.48'' to 72^{o} 52' 10.89'' East longitude covering an approximate area of 28,551 sq kms. The southeastern part of the district is drained by Luni River but significant part of the district does not have a systematic drainage system and is part of Outside basin.

Administrative Set-up:

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

S. No.	Block Name	Population (Based on 2001 census)	Area (sq km)	% of District Area	Total Number of Towns and Villages
1	Balotra	3,27,409	3,371.2	11.8	234
2	Barmer	3,21,666	3,690.9	12.9	310
3	Baytoo	2,10,345	3,513.6	12.3	323
4	Chohtan	2,25,754	3,068.1	10.7	189
5	Dhorimanna	2,50,929	2,456.9	8.6	261
6	Sheo	1,78,539	6,825.0	24.0	251
7	Sindhari	2,36,545	3,463.9	12.1	259
8	Siwana	2,13,648	2,161.3	7.6	116
Total		**19,64,835**	**28,550.9**	**100.0**	**1,943**

Barmer district has 1,943 towns and villages of which eight are block headquarters as well.

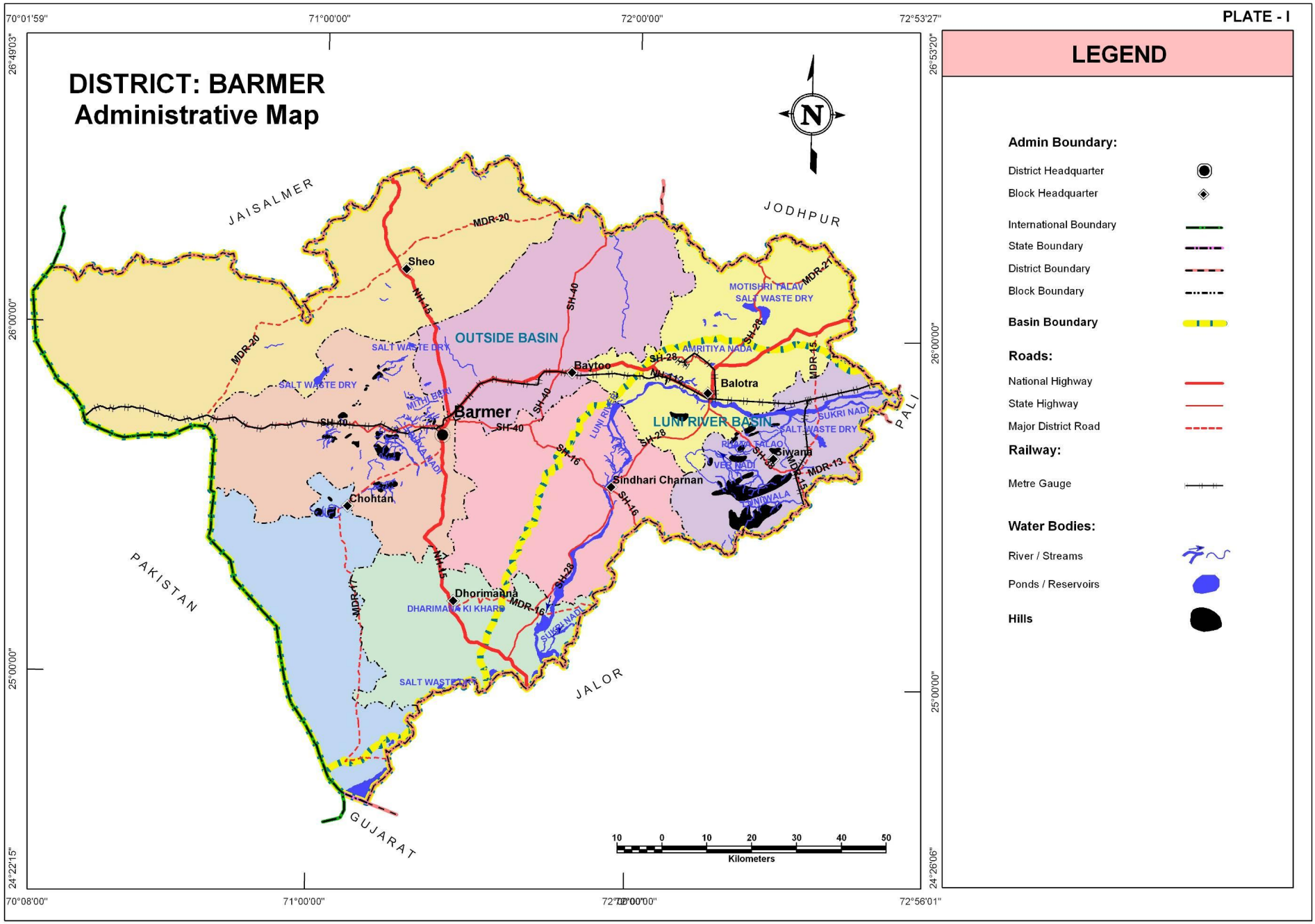
Climate:

The district is part of arid climatic region. Rainfall in the district is very low as the mean annual rainfall is only 307.7 mm. Almost 90% of the total annual rainfall is received during the southwest monsoon, which enters the district in the first week of July and withdraws by the mid of September. As the district lies in the desert area, extreme of heat in summer and cold in winter is experienced in the district. Both day and night temperature increases gradually and reaches their maximum values in May and June. The temperature varies from 48^{o}C in summer to 2^{o}C in winter. Atmosphere is generally dry except during the monsoon period.

Ground Water Department,
Rajasthan

European Union
State Partnership Programme

PLATE - I



LEGEND

Admin Boundary:

- District Headquarter
- Block Headquarter
- International Boundary
- State Boundary
- District Boundary
- Block Boundary
- **Basin Boundary**

Roads:

- National Highway
- State Highway
- Major District Road

Railway:

- Metre Gauge

Water Bodies:

- River / Streams
- Ponds / Reservoirs
- **Hills**

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TOPOGRAPHY

DISTRICT – BARMER

Most part of the district comes under the Great Indian Desert. In the eastern part of the district and to the west of Barmer city, exposures of hill ranges are seen is trending east –west direction. The district is actually a vast sandy tract. The only major drainage course in the area is Luni River, which flows from Balotra and Sindhari Charnan block towards Jalor district. Salt lakes are found in the northeast and northwest parts of the district. The general topographic elevation in the district is between 125 m to 250 m above mean sea level. Elevation ranges from a minimum of 0.00 m above mean sea level in Chohtan block in the southwest part of the district to maximum of 931.8 m above mean sea level In Siwana block in eastern part of the district which is part of Aravalli range.

Table: Block wise minimum and maximum elevation

S. No.	Block Name	Minimum Elevation (m amsl)	Maximum Elevation (m amsl)
1	Balotra	84.5	371.4
2	Barmer	83.6	612.8
3	Baytoo	110.3	257.8
4	Chohtan	0.0	616.5
5	Dhorimanna	22.2	257.3
6	Sheo	42.0	369.9
7	Sindhari	42.8	269.9
8	Siwana	103.8	931.8

RAINFALL

Rainfall in this district is scanty. The general distribution of rainfall across the district can be visualized from isohyets presented in the Plate III where most of the district received rainfall in the range of 400 – 500mm in year 2010. There is variation in rainfall pattern in the district, start from high rainfall from southern and southeastern part and gradually decreases towards northwest. The total annual average rainfall was 528.0 mm based on the data of available blocks for the year 2010. Chohtan block receives maximum rainfall (722.0 mm) whereas minimum was in Sheo block (359.5 mm). Maximum average annual rainfall recorded in Chohtan block about 637.0 mm.

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

Block Name	Minimum Annual Rainfall (mm)	Maximum Annual Rainfall (mm)	Average Annual Rainfall (mm)
Balotra	435.6	612.1	500.3
Barmer	426.2	571.6	484.7
Baytoo	420.2	474.8	437.4
Chohtan	521.3	786.8	637.0
Dhorimanna	528.8	742.6	632.0
Sheo	359.5	478.3	421.1
Sindhari	429.1	626.9	498.0
Siwana	509.7	721.3	613.3

PLATE - II

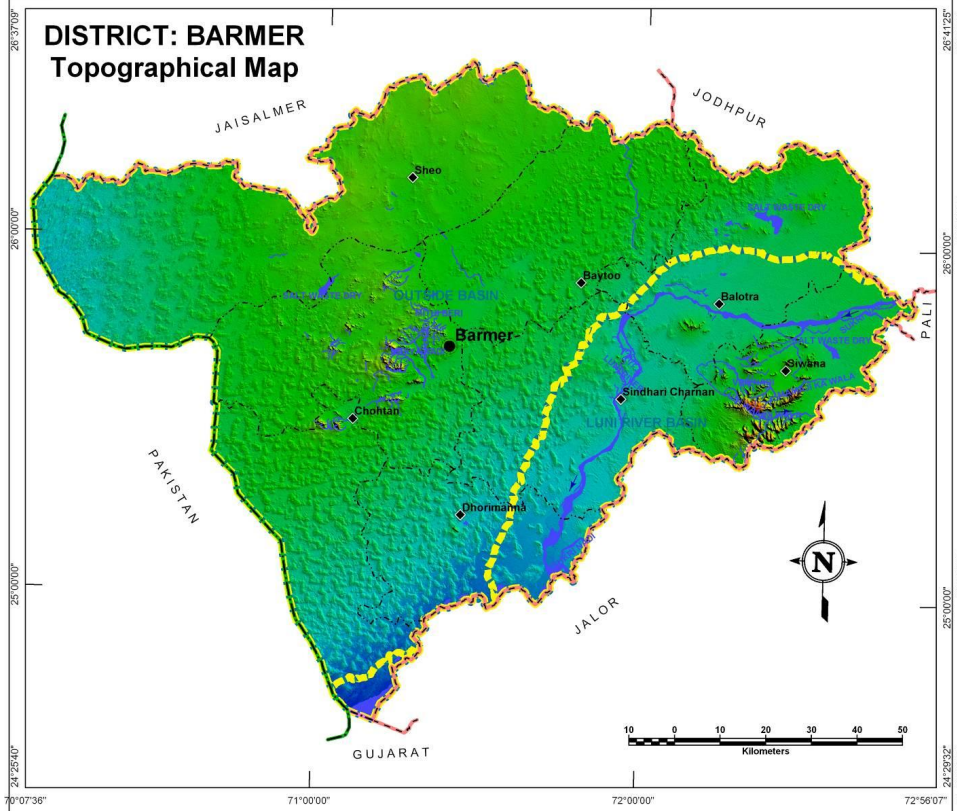
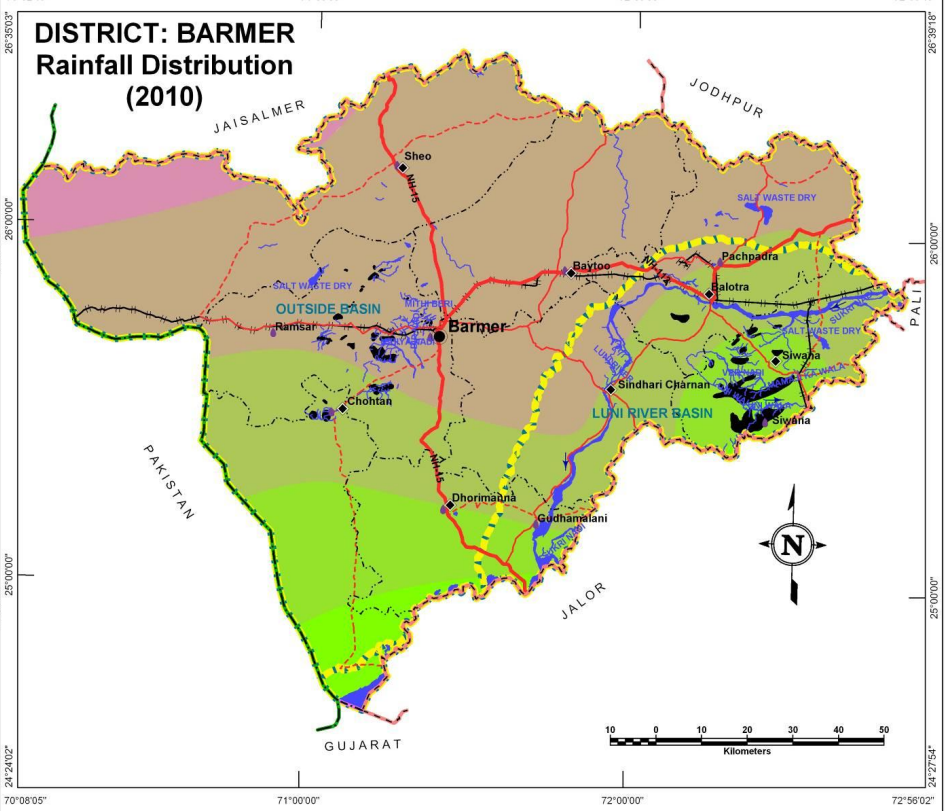


PLATE - III



LEGEND

Admin Boundary:

- District Headquarter
- Block Headquarter
- International Boundary
- State Boundary
- District Boundary
- Block Boundary

Basin Boundary

Water Bodies:

- River / Streams
- Ponds / Reservoirs

Elevation (m amsl):

929 875 750 625 500 375 250 125 0

Source : SRTM DEM

LEGEND

Admin Boundary:

- District Headquarter
- Block Headquarter
- Raingauge Stations
- International Boundary
- State Boundary
- District Boundary
- Block Boundary

Basin Boundary

Roads:

- National Highway
- State Highway
- Major District Road

Water Bodies:

- River / Streams
- Ponds / Reservoirs

Hills

Isohyets (mm):

- 300-400
- 400-500
- 500-600
- 600-700
- 700-800

GEOLOGY

DISTRICT – BARMER

Most part of the district is covered by desert sand and sand dunes. The rock formation occupies the area in patches. The Malani igneous suits of rocks are most extensive & are oldest in the area, consist of volcanic rocks, rhyolites granites & associated intrusive like basic dykes aplites & quartz veins. Besides these igneous rocks other rocks exposed in the area are sandstone belonging to Lathi, Fatehgarh & Mandai formation, Akli & Kapurdi formations constituted by bentonite.

Super Group	Group	Formation
	Recent to Sub-recent	Sand, Sandy soil, Kankar vast gypsum & Selenite deposite
	Lower to middle Eocene	Kapurdi formation
	Paleocene	Mandhi formation & Akli formation
--X--------X--------X--------X---Unconformity---X--------X--------X-------X--		
Deccan Traps	Cretaceous	Fateh garh formation
	Jurassic	Lathi formation
--X--------X--------X--------X---Unconformity---X--------X--------X-------X--		
Post-Delhi	Proterozoic	Malani igneoues rock

GEOMORPHOLOGY

Table: Geomorphologic units, their description and distribution

Origin	Landform Unit	Description
Aeolian	Dune Complex	An undulating plain composed of number of sand dunes of cressent shape.
	Dune Valley Complex	Cluster of dunes and interdunal spaces with undulating topography formed due to wind-blown activity, comprising of unconsolidated sand and silt.
	Eolian Plain	Formed by aeolian activity, with sand dunes of varying height, size, slope. Long stretches of sand sheet. Gently sloping flat to undulating plain, comprised of fine to medium grained sand and silt. Also scattered xerophytic vegetation.
	Interdunal Depression	Slightly depressed area in between the dunal complex showing moisture and fine sediments.
	Interdunal Flat	Flat, narrow land between dunes.
	Obstacle Dune	Formed on windward/leeward sides of obstacle like isolated hills or continuous chain of hills, dune to obstruction in path of sand laden winds. Badly dissected well cemented and vegetated.
	Sandy Plain	Formed of aeolian activity, wind-blown sand with gentle sloping to undulating plain, comprising of coarse sand, fine sand, silt and clay.
Denudational	Burried Pediment	Pediment covers essentially with relatively thicker alluvial, colluvial or weathered materials.
	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.
Fluvial	Alluvial Plain	Mainly undulating landscape formed due to fluvial activity, comprising of gravels, sand, silt and clay. Terrain mainly undulating, produced by extensive deposition of alluvium.
	Paleochannel	Mainly buried on abandoned stream/river courses, comprising of coarse textured material of variable sizes.
	Salt Encrustation/Playa	Topographical depression comprising of clay, silt, sand and soluble salts, usually undrained and devoid of vegetation.
Hills	Denudational, Structural Hill, Linear Ridge	Steep sided, relict hills undergone denudation, comprising of varying lithology with joints, fractures and lineaments. Linear to arcuate hills showing definite trend-lines with varying lithology associated with folding, faulting etc. Long narrow low-lying ridge usually barren, having high run off may form over varying lithology with controlled strike.

PLATE - IV

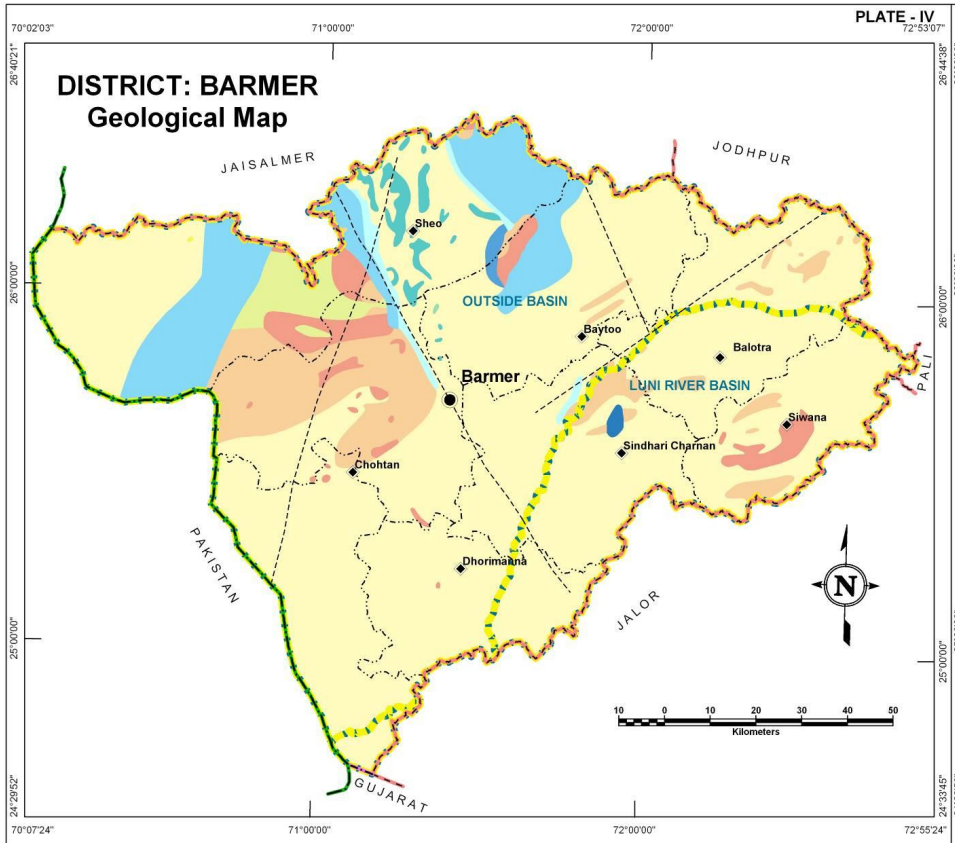
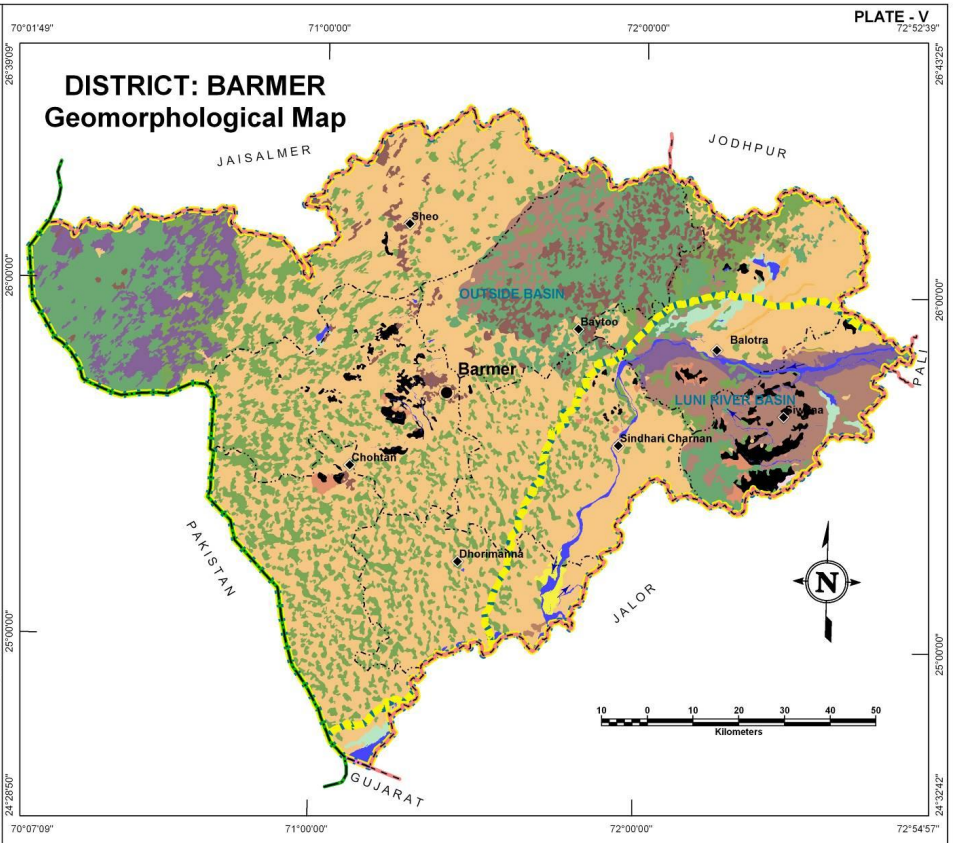


PLATE - V



LEGEND

Admin Boundary:
- District Headquarter
- Block Headquarter
- International Boundary
- State Boundary
- District Boundary
- Block Boundary
- **Basin Boundary**

Structural Features:
- Lineament

Geology:
- Alluvium and wind blown sand
- Shumar Formation
- Kapurdi Formation
- Mandai Formation
- Akli Formation
- Fatehgarh Formation
- Lathi Formation
- Jodhpur Group
- Birmania Formation
- Sarnu-Dandali Complex
- Malani Plutonic
- Volcanic Suite
- Erinpura Granite & Gneiss

Source: District Resource Map of Rajasthan - GSI

LEGEND

Admin Boundary:
- District Headquarter
- Block Headquarter
- International Boundary
- State Boundary
- District Boundary
- Block Boundary
- **Basin Boundary**

Water Bodies:
- River/Ponds/Reservoirs

Structural Features:
- Fault/Fractures/Lineament

Hills:
- Structural/Denudational/Linear Ridge

Landform Units:

Fluvial Origin:
- Alluvial Plain
- Palaeochannel
- Salt Encrustation/Playa

Denudational Origin:
- Pediment
- Burried Pediment

Aeolian Origin:
- Sandy Plain
- Eolian Plain
- Dune Complex
- Dune Valley Complex
- Interdunal Depression
- Interdunal Flat
- Obstacle Dune

Source: Ground Water Atlas of Rajasthan - SRSAC & GWD, Rajasthan

AQUIFERS

DISTRICT – BARMER

While the surface is mostly covered by wind-blown sand, the aquifers at deeper levels are mainly formed in alluvium, Sandstone and Rhyolites. Weathered and fractured parts of the massive rocks contribute to aquifer formation whereas the sandy, gravelly and other granular parts of alluvium constitute aquifers. Younger and older alluviums together contribute to about 54% of the aquifers in the district. Tertiary sandstone through its primary and secondary porosity forms about 23% of aquifers while Rhyolite adds up to another 12% of aquifer area. In the rest of the area aquifers are formed in granite or sandstones.

Table: aquifer potential zones their area and their description

Aquifer in Potential Zone	Area (sq km)	% age of district	Description of the unit/Occurrence
Younger Alluvium	2,522.6	8.8	It is largely constituted of Aeolian and Fluvial sand, silt, clay, gravel and pebbles in varying proportions.
Older Alluvium	12,832.0	44.9	This litho unit comprises of mixture of heterogeneous fine to medium grained sand, silt and kankar.
Tertiary Sandstone	6,521.6	22.8	Medium to coarse grained, consolidated to semi consolidated sandstone.
Sandstone	2,248.1	7.9	Fine to medium grained, red colour and compact and at places.
Rhyolite	3,304.4	11.6	Rhyolite is porphyritic and has phenocryst of quartz and feldspar.
Granite	850.6	3.0	Light gey to pink colour, medium to coarse grained, and characteristically have porphyritic texture.
Hills	271.8	1.0	-
Total	**28,551.1**	**100.0**	

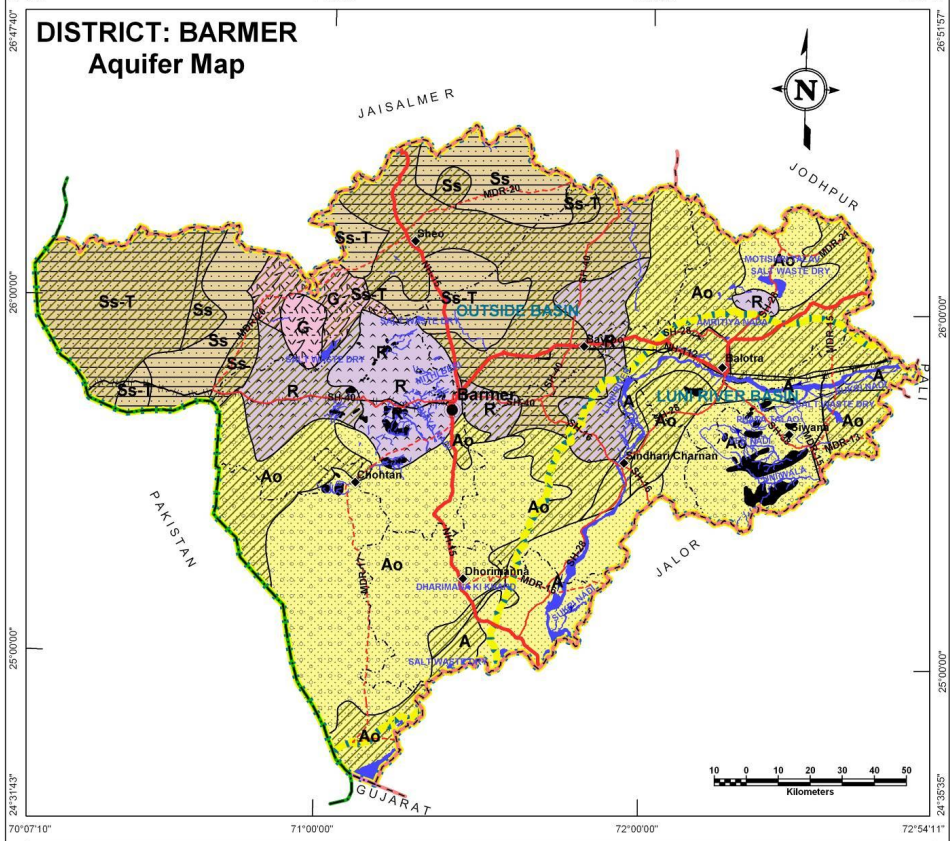
STAGE OF GROUND WATER DEVELOPMENT

In spite of scanty rainfall in the district, still the Barmer block does not seem to have resorted to over exploitation as it falls under 'safe' category from ground water development perspective. Two districts fall under 'Critical' category, three under 'Over exploited' category. The only block that falls under 'Notified' category is the Baytoo block. Overall the ground water in the northern part of the district is under more stressed as compared to other parts.

Categorization on the basis of stage of development of ground water	Block Name
Safe	Barmer
Critical	Sindhari, Chohtan
Over Exploited	Sheo, Dhorimanna, Siwana, Balotra
Notified	Baytoo

Basis for categorization: Groundwater development <= 70% - Safe; <=100% - Critical and >100% - Over-Exploited. In Notified blocks development of GW is not permitted any more.

PLATE - VI



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- Block Boundary
- **Basin Boundary**

Roads:
- National Highway
- State Highway
- Major District Road

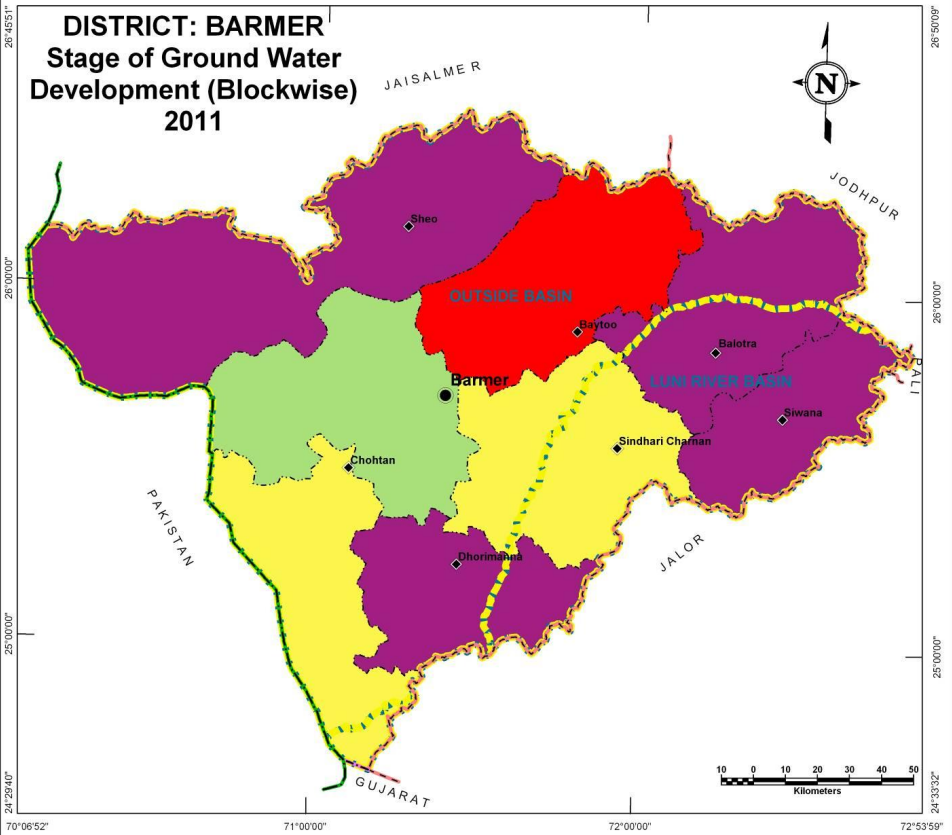
Railway:
- Metre Gauge

Water Bodies:
- River / Streams
- Ponds / Reservoirs
- **Hills**
- **Saline Area**

Aquifer:
- Younger Alluvium
- Older Alluvium
- Tertiary Sandstone
- Sandstone
- Rhyolite
- Granite

Source: Ground Water Potential Zone Map - GWD, Rajasthan

PLATE - VII



LEGEND

Admin Boundary:
- District Headquarter
- Block Headquarter
- International Boundary
- State Boundary
- District Boundary
- Block Boundary
- **Basin Boundary**

Stage of Ground Water Development:
- Safe
- Critical
- Over-Exploited
- Notified

Source: Ground Water Department, Rajasthan

LOCATION OF EXPLORATORY AND GROUND WATER MONITORING WELLS DISTRICT – BARMER

The Barmer district has a well distributed network of large number of exploratory wells (188) and groundwater monitoring stations (377) in the basin owned by RGWD (147 and 280 respectively) and CGWB (41 and 97 respectively). The exploratory wells have formed the basis for delineation of subsurface aquifer distribution scenario in three dimensions. Benchmarking and optimization studies suggest that ground water level monitoring should be strengthened by adding 11 additional wells in three blocks and 74 additional wells to effectively monitor the water quality.

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

Block Name	Exploratory Wells			Ground Water Monitoring Stations			Recommended additional wells for optimization of monitoring network	
	CGWB	RGWD	Total	CGWB	RGWD	Total	Water Level	Water Quality
Balotra	6	19	**25**	8	44	**52**	-	3
Barmer	7	16	**23**	16	37	**53**	1	11
Baytoo	6	15	**21**	12	23	**35**	-	-
Chohtan	1	19	**20**	17	34	**51**	-	8
Dhorimanna	3	12	**15**	11	26	**37**	-	-
Sheo	13	44	**57**	18	54	**72**	10	6
Sindhari	2	9	**11**	11	25	**36**	-	4
Siwana	3	13	**16**	4	37	**41**	-	42
Total	**41**	**147**	**188**	**97**	**280**	**377**	**11**	**74**

DEPTH TO WATER LEVEL (PRE MONSOON – 2010)

Depth to water level shows large variation ranging from less than 10m below ground level to about 110m below ground level. Most of the alluvial part of Luni Basin and adjoining parts falling within Balotra, Siwana, Sinndhari and parts of Dhorimanna blocks the ground water occurs at shallow depths ranging from less than 10 – 70m. There are also shallow water pockets less than 10m bgl occurs in isolated patches mainly in Baytoo, Chohtan and Dhorimanna blocks. In general, in the north and south west parts the ground water occurs at deeper levels i.e., beyond 50m and reaching even upto 110m in major part of Barmer, Baytoo and Sheo blocks.

Depth to water level (m bgl)	Block wise area coverage (sq km) *								Total Area (sq km)
	Balotra	Barmer	Baytoo	Chohtan	Dhorimanna	Sheo	Sindhari	Siwana	
<10	8.8	4.0	88.3	555.0	358.0	25.3	-	-	**1,039.4**
10-20	569.8	878.8	641.6	245.1	748.5	495.7	350.4	116.7	**4,046.6**
20-30	1,718.6	417.7	816.1	203.1	205.4	720.8	1,429.3	563.6	**6,074.6**
30-40	776.8	343.1	680.9	193.2	216.3	642.8	790.1	195.5	**3,838.7**
40-50	166.9	473.7	635.3	340.8	429.3	632.3	609.8	90.6	**3,378.7**
50-60	96.7	352.0	295.1	294.7	354.4	738.1	237.7	195.7	**2,564.4**
60-70	21.5	516.1	186.3	772.4	145.0	918.5	46.6	517.9	**3,124.3**
70-80	2.4	455.3	100.1	451.0	-	918.3	-	222.2	**2,149.3**
80-90	-	161.2	51.5	-	-	1,068.0	-	73.4	**1,354.1**
90-100	-	25.3	17.8	-	-	625.1	-	-	**668.2**
>100	-	-	0.7	-	-	40.3	-	-	**41.0**
Total	**3,361.5**	**3,627.2**	**3,513.7**	**3,055.3**	**2,456.9**	**6,825.2**	**3,463.9**	**1,975.6**	**28,279.3**

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

PLATE - VIII

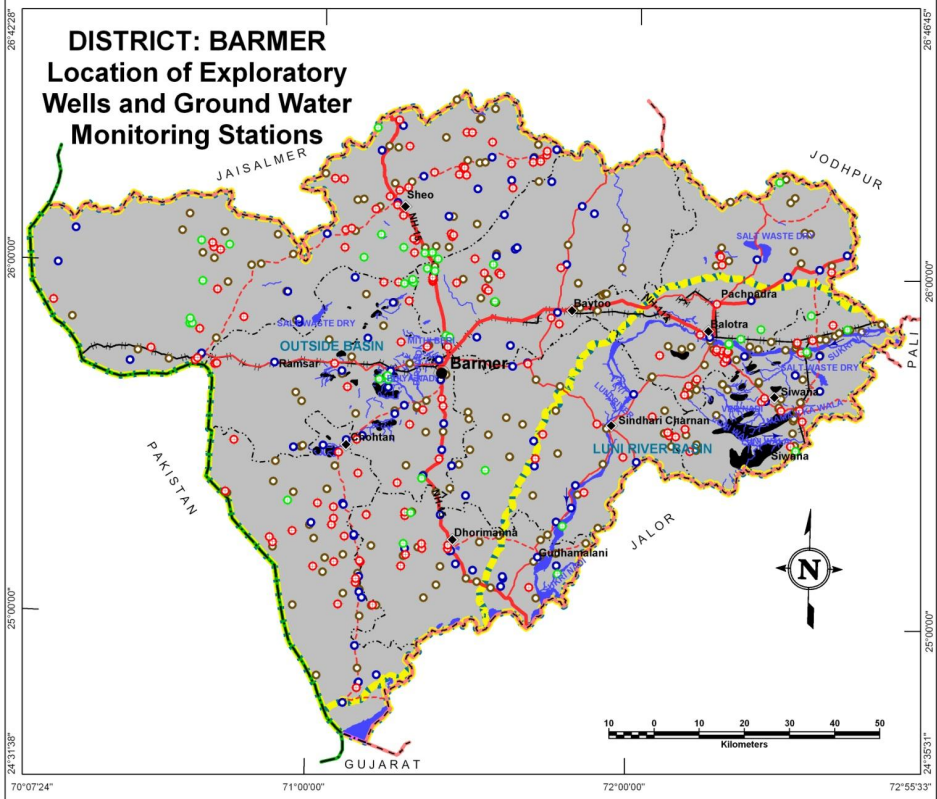
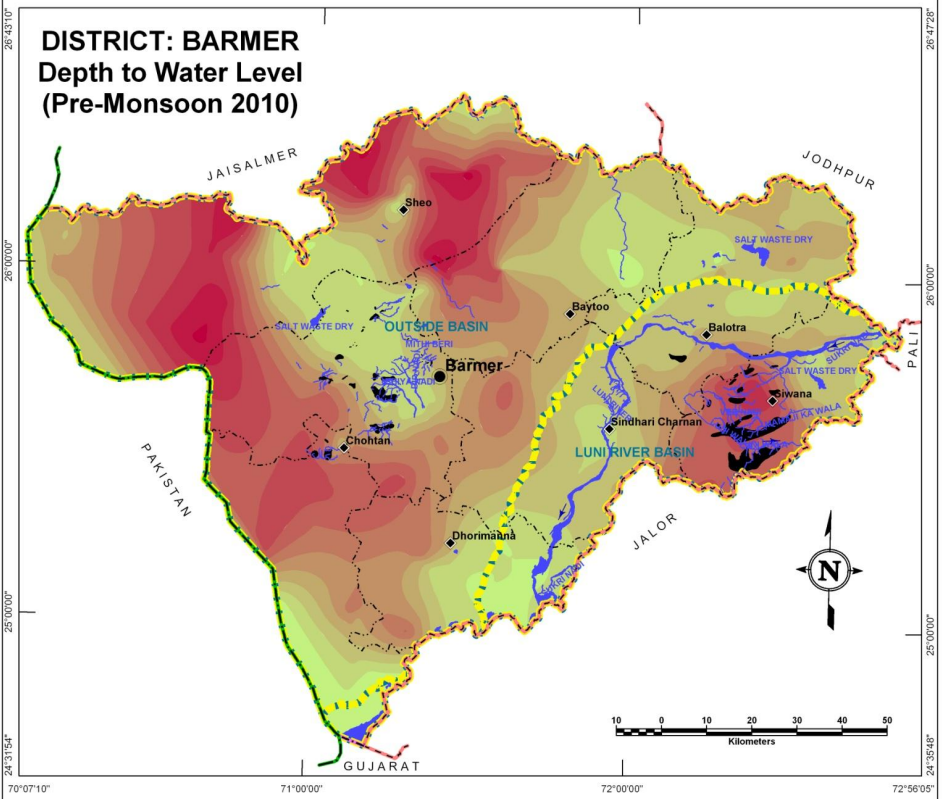


PLATE - IX



LEGEND

Admin Boundary:
- District Headquarter
- Block Headquarter
- International Boundary
- State Boundary
- District Boundary
- Block Boundary
- **Basin Boundary**

Roads:
- National Highway
- State Highway
- Major District Road

Railway
- Metre Gauge

Water Bodies:
- River / Streams
- Ponds / Reservoirs
- **Hills**

Exploratory Wells:
- CGWB
- RGWD

Ground Water Monitoring Stations:
- CGWB
- RGWD

LEGEND

Admin Boundary:
- District Headquarter
- Block Headquarter
- International Boundary
- State Boundary
- District Boundary
- Block Boundary
- **Basin Boundary**

Water Bodies:
- River / Streams
- Ponds / Reservoirs
- **Hills**

Depth to Water Level(m bgl):
- < 10
- 10 - 20
- 20 - 30
- 30 - 40
- 40 - 50
- 50 - 60
- 60 - 70
- 70 - 80
- 80 - 90
- 90 - 100
- > 100

WATER TABLE ELEVATION (PRE MONSOON – 2010) DISTRICT – BARMER

General flow direction of groundwater is shown in water table map (Plate – X).is from north to south and southwest within major part of the district. Water table elevation shows large variation across the district from less than 20m amsl to >280m amsl. The high water table in the centre of the basin, gradually lowers towards west and southeast reaching a minimum elevation (<20m amsl) in the Sheo in north and Dhorimanna and Chohtan blocks in S-SE parts of the district.

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

Block Name	Block wise area coverage (sq km) per water table elevation (m amsl) range															Total Area (sq km)
	< 20	20 – 40	40 – 60	60 – 80	80 – 100	100 – 120	120 – 140	140 – 160	160 – 180	180 – 200	200 – 220	220 – 240	240 – 260	260 – 280	> 280	
Balotra	-	-	-	164.1	356.7	1,293.6	988.7	303.1	194.6	60.7	-	-	-	-	-	**3,361.5**
Barmer	-	-	63.5	399.7	621.9	659.9	410.3	262.5	308.6	264.7	465.6	170.5	-	-	-	**3,627.2**
Baytoo	-	-	-	-	1.2	933.6	873.1	795.3	660.4	240.1	10.0	-	-	-	-	**3,513.7**
Chohtan	314.8	716.7	394.2	391.7	709.1	520.5	8.3	-	-	-	-	-	-	-	-	**3,055.3**
Dhorimanna	15.4	1,298.7	1,047.9	94.9	-	-	-	-	-	-	-	-	-	-	-	**2,456.9**
Sheo	58.4	396.5	478.1	784.1	484.0	451.6	424.1	575.8	1,299.0	914.1	599.0	257.5	78.3	13.8	10.9	**6,825.2**
Sindhari	-	8.5	1,053.8	1,027.2	717.4	555.3	66.5	35.2	-	-	-	-	-	-	-	**3,463.9**
Siwana	-	-	-	522.4	301.1	393.7	691.5	66.9	-	-	-	-	-	-	-	**1,975.6**
Total	**388.6**	**2,420.4**	**3,037.5**	**3,384.1**	**3,191.4**	**4,808.2**	**3,462.5**	**2,038.8**	**2,462.6**	**1,479.6**	**1,074.6**	**428.0**	**78.3**	**13.8**	**10.9**	**28,279.3**

WATER LEVEL FLUCTUATION (PRE TO POST MONSOON 2010)

Water table fluctuation map prepared at 2m contour interval has been prepared (Plate – XI) to visualize ground water flow. A fall of 4 m in water table is seen in areas while a rise by 14m is also revealed in other areas. The –ve fluctuation areas (indicated by pink and red regions) are the areas where overexploitation is taking place and even after monsoon recharge water level has not risen and has actually gone down with respect to pre-monsoon levels. Such large ground water depletion areas are located at around Barmer and in the northern and western part of Sheo block. Rest of the district has shown a general rise of upto 4m and occasionally reaching more than 14m as noticed in the eastern part of Siwana block.

Table: Block wise area covered in each water fluctuation zone

Water level fluctuation range (m)	Block wise area coverage (sq km)								Total Area (sq km)
	Balotra	Barmer	Baytoo	Chohtan	Dhorimanna	Sheo	Sindhari	Siwana	
<-4	-	27.9	-	-	-	3.6	-	-	**31.5**
-4 – -2	-	49.5	25.4	-	-	125.0	38.8	-	**238.7**
-2 – 0	14.5	255.7	565.5	858.6	59.0	2,999.6	479.8	72.9	**5,305.6**
0 – 2	1,316.7	1,843.9	2,288.0	2,118.2	2,258.8	2,488.1	1,981.8	762.9	**15,058.4**
2 – 4	1,266.8	741.0	628.6	49.9	139.1	945.1	947.5	436.8	**5,154.8**
4 – 6	621.3	544.7	6.2	27.1	-	175.6	16.0	367.5	**1,758.4**
6 – 8	96.9	130.6	-	1.5	-	65.6	-	166.0	**460.6**
8 – 10	30.3	21.6	-	-	-	20.2	-	81.4	**153.5**
10 – 12	13.4	8.8	-	-	-	2.4	-	45.2	**69.8**
12 – 14	1.6	3.5	-	-	-	-	-	30.8	**35.9**
>14	-	-	-	-	-	-	-	12.1	**12.1**
Total	**3,361.5**	**3,627.2**	**3,513.7**	**3,055.3**	**2,456.9**	**6,825.2**	**3,463.9**	**1,975.6**	**28,279.3**

PLATE - X

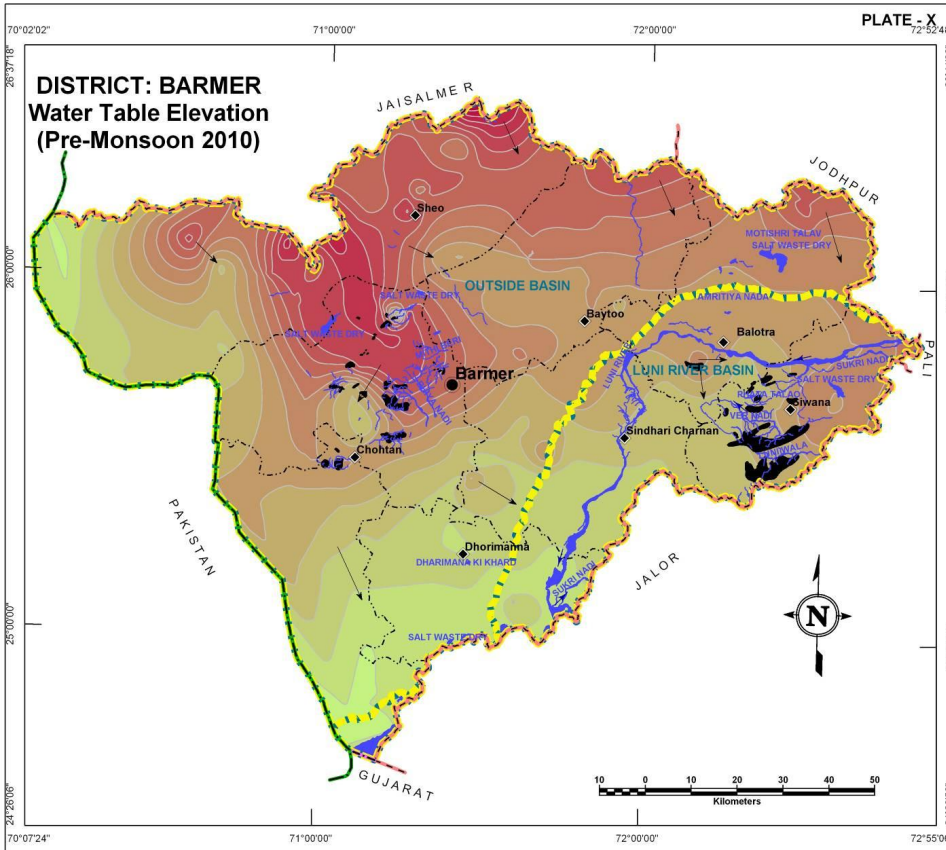
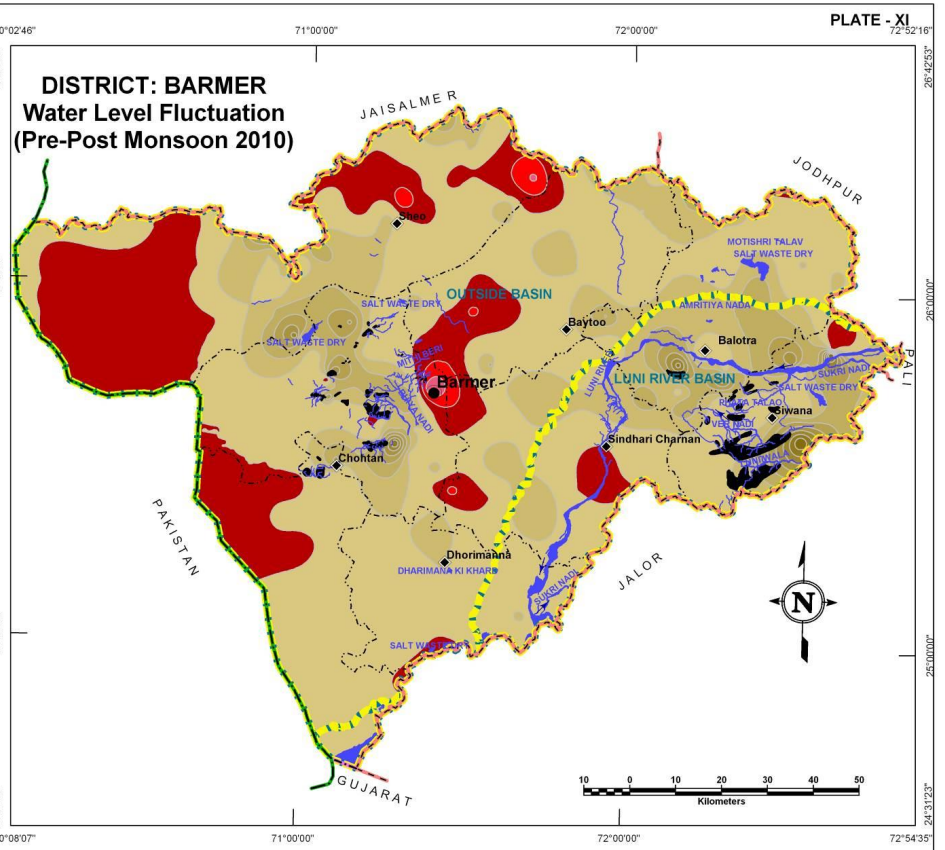


PLATE - XI



LEGEND

Admin Boundary:

- District Headquarter
- Block Headquarter
- International Boundary
- State Boundary
- District Boundary
- Block Boundary

Basin Boundary

Water Bodies:

- River / Streams
- Ponds / Reservoirs

Hills

Water Table Elevation

Water Table Elevation(m amsl):

< 20	160 - 180
20 - 40	180 - 200
40 - 60	200 - 220
60 - 80	220 - 240
80 - 100	240 - 260
100 - 120	260 - 280
120 - 140	>280
140 - 160	

LEGEND

Admin Boundary:

- District Headquarter
- Block Headquarter
- International Boundary
- State Boundary
- District Boundary
- Block Boundary

Basin Boundary

Water Bodies:

- River / Streams
- Ponds / Reservoirs

Hills

Water Level Fluctuation(m):

- <-4
- -4 to -2
- -2 to 0
- 0 to 2
- 2 to 4
- 4 to 6
- 6 to 8
- 8 to 10
- 10 to 12
- 12 to 14
- >14

GROUND WATER ELECTRICAL CONDUCTIVITY DISTRIBUTION DISTRICT – BARMER

The Electrical conductivity (at 25°C) distribution map is presented in plate XII. The areas with high EC values in ground water (<4000 µS/cm) are shown in red color and occupies approximately 61% of the district area which is not suitable for domestic purpose. The areas with moderately high EC Values (2000-4000 µS/cm) are shown in green color and occupy approximately 35% of the district area. Remaining small portion of the district area approximately 4% falls under low EC values (>2000 µS/cm) area which is shown in yellow color, largely eastern part of SindhariCharnan where ground water is suitable for domestic purpose.

Table: Block wise area of Electrical conductivity distribution

Electrical Conductivity Ranges (µS/cm at 25°C) (Ave. of years 2005-09)	Block wise area coverage (sq km)																Total Area (sq km)
	Balotra		Barmer		Baytoo		Chohtan		Dhorimanna		Sheo		Sindhari		Siwana		
	Area	%age	Area	%age	Area	%age	Area	%age	Area	%age	Area	%age	Area	%age	Area	%age	
< 2000	89.2	2.7	110.8	3.1	4.6	0.1	92.1	3.0	5.1	0.2	225.9	3.3	2.0	0.1	692.3	35.0	**1,222.0**
2000-4000	535.4	15.9	1,266.6	34.9	779.2	22.2	1,885.4	61.7	848.1	34.5	3,676.5	53.9	167.7	4.8	620.1	31.4	**9,779.0**
>4000	2,736.9	81.4	2,249.8	62.0	2,729.9	77.7	1,077.8	35.3	1,603.7	65.3	2,922.8	42.8	3,294.2	95.1	663.2	33.6	**17,278.3**
Total	**3,361.5**	**100.0**	**3,627.2**	**100.0**	**3,513.7**	**100.0**	**3,055.3**	**100.0**	**2,456.9**	**100.0**	**6,825.2**	**100.0**	**3,463.9**	**100.0**	**1,975.6**	**100.0**	**28,279.3**

GROUND WATER CHLORIDE DISTRIBUTION

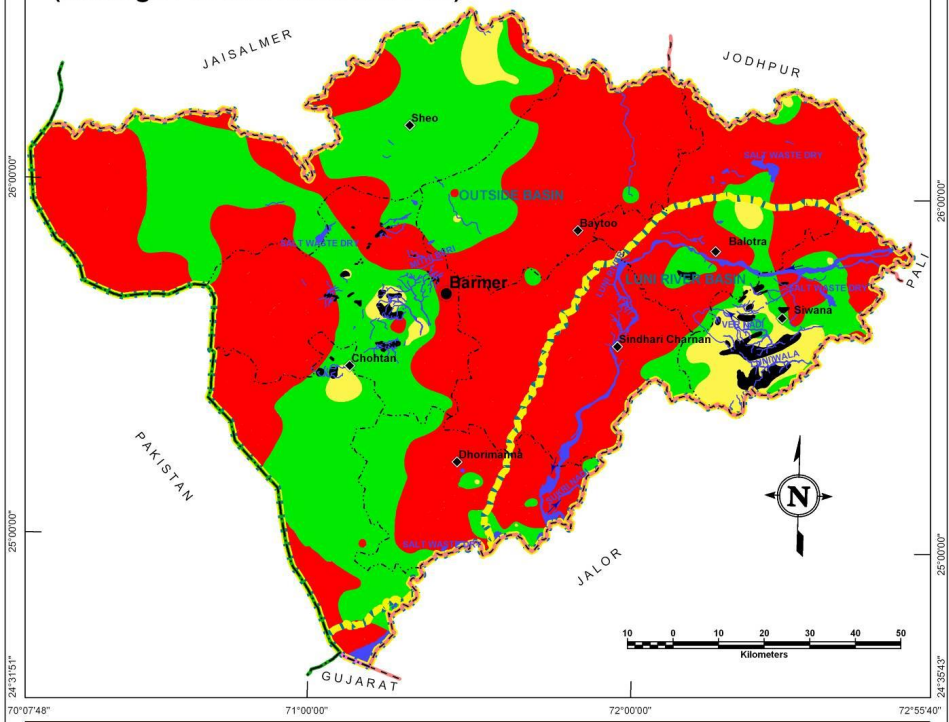
High chloride concentration in ground water also renders it unsuitable for domestic and other purposes. The red colored regions in plate XIII are such areas where chloride concentration is high (<1000 mg/l) occupies approximately 57% of the district area and is not suitable for domestic purpose. The areas with moderately high chloride concentration (250-1000 mg/l) are shown in green color and occupy approximately 42% of the district. That leaves only 1% of the district where low chloride concentration (>250 mg/l) is found in ground water therefore leaving most part of the district unsuitable for domestic purpose.

Table: Block wise area of Chloride distribution

Chloride Concentration Range (mg/l) (Ave. of years 2005-09)	Block wise area coverage (sq km)																Total Area (sq km)
	Balotra		Barmer		Baytoo		Chohtan		Dhorimanna		Sheo		Sindhari		Siwana		
	Area	%age	Area	%age	Area	%age	Area	%age	Area	%age	Area	%age	Area	%age	Area	%age	
<250	1.5	-	40.1	1.0	-	-	10.6	-	0.3	-	52.3	1.0	-	-	224.1	11.0	**328.9**
250-1000	575.0	17.0	1,657.1	46.0	1,242.3	35.0	1,920.0	63.0	929.8	38.0	4,325.2	63.0	239.2	7.0	1,080.0	55.0	**11,968.6**
>1000	2,785.0	83.0	1,930.0	53.0	2,271.4	65.0	1,124.7	37.0	1,526.8	62.0	2,447.7	36.0	3,224.7	93.0	671.5	34.0	**15,981.8**
Total	**3,361.5**	**100.0**	**3,627.2**	**100.0**	**3,513.7**	**100.0**	**3,055.3**	**100.0**	**2,456.9**	**100.0**	**6,825.2**	**100.0**	**3,463.9**	**100.0**	**1,975.6**	**100.0**	**28,279.3**

PLATE - XII

DISTRICT: BARMER
Electrical Conductivity Distribution
(Average Pre-Monsoon 2005-09)



LEGEND

Admin Boundary:

- District Headquarter
- Block Headquarter
- International Boundary
- State Boundary
- District Boundary
- Block Boundary

Basin Boundary

Water Bodies:

- River / Streams
- Ponds / Reservoirs

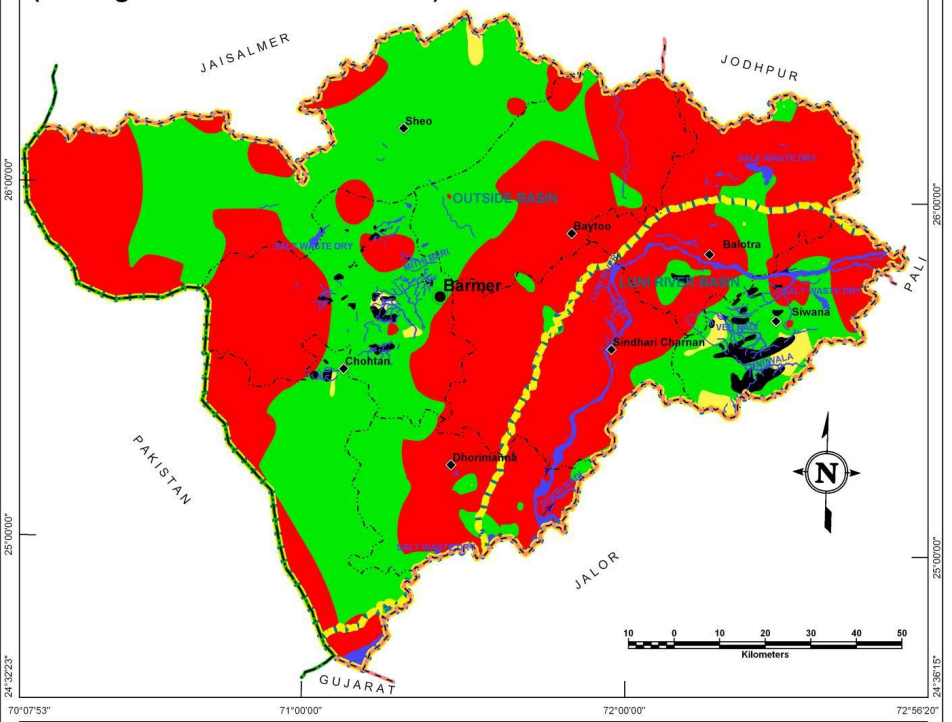
Hills

Electrical Conductivity (µS/cm at 25°C):

- < 2000
- 2000-4000
- >4000

PLATE - XIII

DISTRICT: BARMER
Chloride Distribution
(Average Pre-Monsoon 2005-09)



LEGEND

Admin Boundary:

- District Headquarter
- Block Headquarter
- International Boundary
- State Boundary
- District Boundary
- Block Boundary

Basin Boundary

Water Bodies:

- River / Streams
- Ponds / Reservoirs

Hills

Chloride Concentration (mg/l):

- < 250
- 250 - 1000
- > 1000

GROUND WATER FLUORIDE DISTRIBUTION DISTRICT – BARMER

The Fluoride concentration map is presented in Plate XIV.The areas with moderately high concentration (1.5–3.0 mg/l; green colour) occupy almost half(52%) of the district area and the about 11% of the district has high Fluoride concentration (>3.0 mg/l) which is shown in red color. The ground water in these areas which together account for about 63%, is not suitable for domestic purpose. The areas with low fluoride concentration (i.e.,>1.5 mg/l) occupy 37%of the district area which is suitable for domestic purpose. The high fluoride areas surround Barmer region.

Table: Block wise area of Fluoride distribution

Fluoride concentration Range (mg/l) (Ave. of years 2005-09)	Block wise area coverage (sq km)																Total Area (sq km)
	Balotra		Barmer		Baytoo		Chohtan		Dhorimanna		Sheo		Sindhari		Siwana		
	Area	%age	Area	%age	Area	%age	Area	%age	Area	%age	Area	%age	Area	%age	Area	%age	
<1.5	1,850.3	55.1	2,633.1	72.6	842.2	24.0	1,210.0	39.6	792.9	32.3	747.1	11.0	733.7	21.2	1,732.6	87.7	**10,541.9**
1.5-3.0	1,241.8	36.9	987.0	27.2	1,473.0	41.9	1,281.4	41.9	1,245.2	50.6	5,691.5	83.3	2,440.3	70.4	241.9	12.2	**14,602.1**
>3.0	269.4	8.0	7.1	0.2	1,198.5	34.1	563.9	18.5	418.8	17.1	386.6	5.7	289.9	8.4	1.1	0.1	**3,135.3**
Total	**3,361.5**	**100.0**	**3,627.2**	**100.0**	**3,513.7**	**100.0**	**3,055.3**	**100.0**	**2,456.9**	**100.0**	**6,825.2**	**100.0**	**3,463.9**	**100.0**	**1,975.6**	**100.0**	**28,279.3**

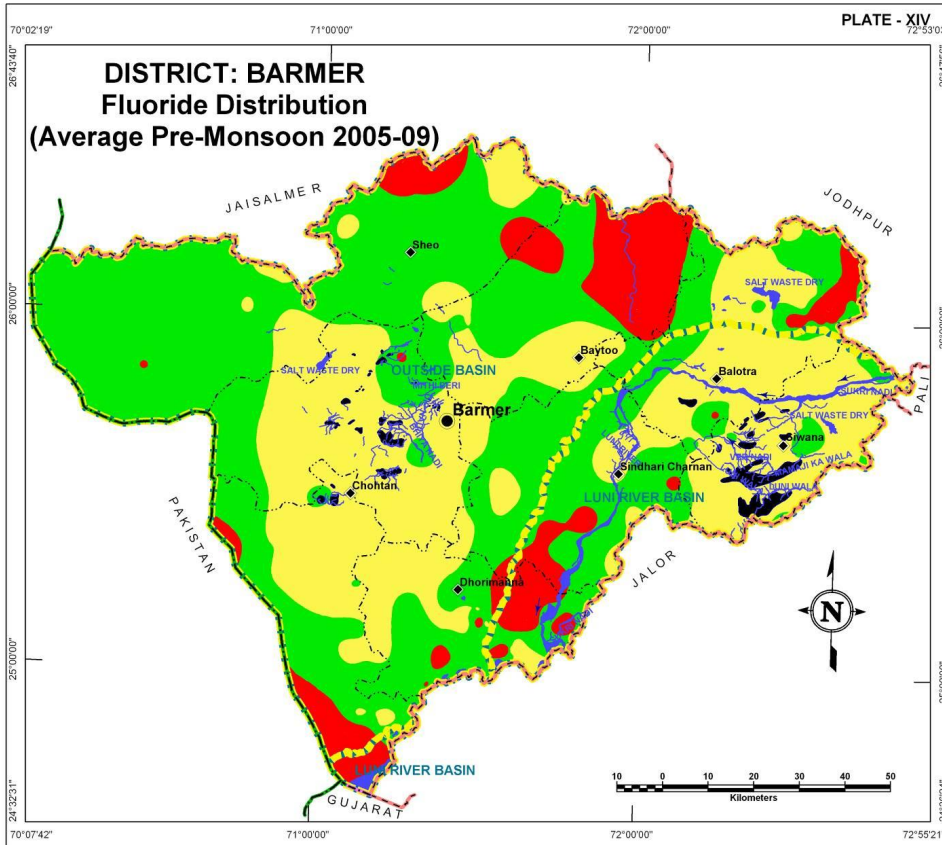
GROUND WATER NITRATE DISTRIBUTION

High nitrate concentration in ground water renders it unsuitable for agriculture purposes. Plate XV shows distribution of Nitrate in groundwater. High nitrate concentration (>100 mg/l) is shown in red color and occupies approximately 66% of the district area which is not suitable for agriculture purpose. The areas with moderately high nitrate concentration (50-100 mg/l) are shown in green color and occupy approximately 17% of the district area, largely northern and northwestern part of the district. Remaining part of the district area approximately 18% is covered with low nitrate concentration (<50 mg/l) which is shown in yellow colored patches where the ground water is suitable for agriculture purpose. Perusal of the map reveals that low Nitrate areas are mostly found in desert areas in the west and northern part. Therefore, by and large, the whole district has poor potential for ground water based agriculture.

Table: Block wise area of Nitrate distribution

Nitrate concentration range (mg/l) (Ave. of years 2005-09)	Block wise area coverage (sq km)																Total Area (sq km)
	Balotra		Barmer		Baytoo		Chohtan		Dhorimanna		Sheo		Sindhari		Siwana		
	Area	%age	Area	%age	Area	%age	Area	%age	Area	%age	Area	%age	Area	%age	Area	%age	
<50	261.3	7.8	41.6	1.2	602.8	17.2	0.5	-	21.1	0.9	3,715.2	54.5	22.3	0.6	311.0	15.7	**4,975.8**
50-100	516.4	15.4	516.7	14.2	419.8	12.0	282.8	9.3	169.1	6.9	1,292.8	18.9	337.5	9.7	1,149.8	58.2	**4,684.9**
>100	2,583.8	76.8	3,068.9	84.6	2,491.1	70.8	2,772.0	90.7	2,266.7	92.2	1,817.2	26.6	3,104.1	89.7	514.8	26.1	**18,618.6**
Total	**3,361.5**	**100.0**	**3,627.2**	**100.0**	**3,513.7**	**100.0**	**3,055.3**	**100.0**	**2,456.9**	**100.0**	**6,825.2**	**100.0**	**3,463.9**	**100.0**	**1,975.6**	**100.0**	**28,279.3**

PLATE - XIV



LEGEND

Admin Boundary:

- District Headquarter
- Block Headquarter
- International Boundary
- State Boundary
- District Boundary
- Block Boundary

Basin Boundary

Water Bodies:

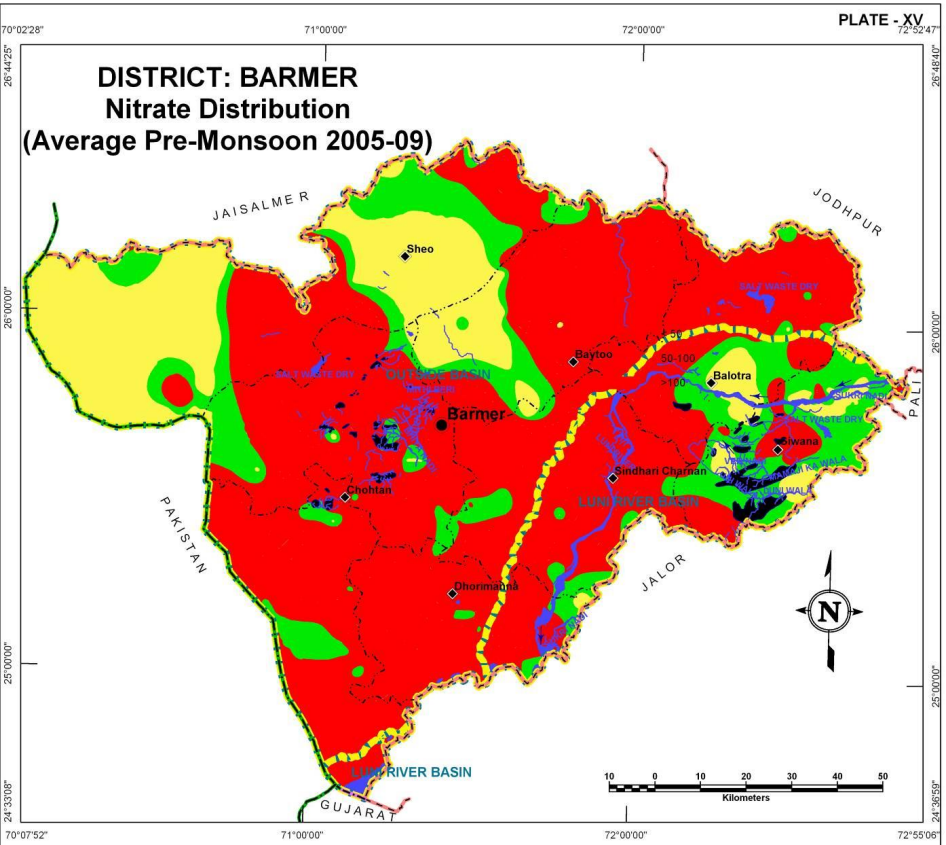
- River / Streams
- Ponds / Reservoirs

Hills

Fluoride Concentration (mg/l):

- < 1.5
- 1.5-3.0
- >3.0

PLATE - XV



LEGEND

Admin Boundary:

- District Headquarter
- Block Headquarter
- International Boundary
- State Boundary
- District Boundary
- Block Boundary

Basin Boundary

Water Bodies:

- River / Streams
- Ponds / Reservoirs

Hills

Nitrate Concentration (mg/l):

- < 50
- 50-100
- >100

DEPTH TO BEDROCK

DISTRICT – BARMER

From hydrogeological perspective, the beginning of massive bedrock has been considered for defining top of bedrock surface. The major rocks types occurring in the district are Sandstone, Rhyolite and Granite. These rocks are overlain by alluvial deposits of sand, clay, silt and admixture of these in different proportions and thicknesses. The map (Plate – XVII) reveals that the bedrock is encountered at shallow depths in eastern parts whereas towards further west in the district, bedrock becomes deeper until it reaches a depth of more than 240m bgl. The deeper depth bedrock has encountered in Sheo block (more than 280m bgl) whereas depth of bed rock more than 240m bgl has reported in the eastern part of Barmer block, northern part of Dhorimanna block and western part of Sheo block.

Depth to bedrock (m bgl)	Block wise area coverage (sq km)																Total Area (sq km)
	Balotra		Barmer		Baytoo		Chohtan		Dhorimanna		Sheo		Sindhari		Siwana		
	Area	%age	Area	%age	Area	%age	Area	%age	Area	%age	Area	%age	Area	%age	Area	%age	
<40	561.6	17.0	14.8	-	-	-	-	-	-	-	3.6	-	-	-	44.6	2.0	**624.6**
40 – 60	2,353.3	70.0	145.8	4.0	221.3	6.3	-	-	-	-	12.0	-	6.2	-	1,739.4	88.0	**4,478.0**
60 – 80	281.6	8.0	705.4	19.0	508.4	14.5	43.0	1.4	115.6	5.0	57.7	1.0	303.1	9.0	191.6	10.0	**2,206.4**
80 – 100	139.6	4.0	688.1	19.0	515.2	14.7	229.9	7.5	315.4	13.0	362.3	5.0	928.3	27.0	-	-	**3,178.8**
100 – 120	25.4	1.0	833.8	23.0	798.4	22.6	541.4	17.7	1,090.0	43.0	834.6	12.0	2,159.4	62.0	-	-	**6,283.0**
120 – 140	-	-	650.0	18.0	720.3	20.5	1,506.5	49.4	653.0	27.0	901.1	13.0	60.3	2.0	-	-	**4,491.2**
140 – 160	-	-	324.7	9.0	634.2	18.1	363.4	11.9	94.4	4.0	508.6	7.0	6.6	-	-	-	**1,931.9**
160 – 180	-	-	131.9	4.0	90.8	2.6	217.7	7.1	68.6	3.0	711.1	10.0	-	-	-	-	**1,220.1**
180 – 200	-	-	67.2	2.0	25.1	0.7	137.2	4.5	45.1	2.0	1,541.2	24.0	-	-	-	-	**1,815.8**
200 – 220	-	-	34.6	1.0	-	-	16.2	0.5	30.6	1.0	1,285.9	19.0	-	-	-	-	**1,367.3**
220 – 240	-	-	21.3	1.0	-	-	-	-	22.9	1.0	484.1	7.0	-	-	-	-	**528.3**
240 – 260	-	-	6.3	-	-	-	-	-	17.5	1.0	72.0	1.0	-	-	-	-	**95.8**
260 – 280	-	-	1.9	-	-	-	-	-	3.8	-	36.8	1.0	-	-	-	-	**42.5**
>280	-	-	1.4	-	-	-	-	-	-	-	14.2	-	-	-	-	-	**15.6**
Total	**3,361.5**	**100.0**	**3,627.2**	**100.0**	**3,513.7**	**100.0**	**3,055.3**	**100.0**	**2,456.9**	**100.0**	**6,825.2**	**100.0**	**3,463.9**	**100.0**	**1,975.6**	**100.0**	**28,279.3**

UNCONFINED AQUIFER

Most part of the district has thick cover of eolian sand but aquifers are formed in both alluvium and hardrock. The southeastern half of the district has alluvial aquifers whereas the northwestern half has aquifers formed in hardrock formations. The alluvial aquifers attain a thickness of more than 110mas seen near the eastern border of Dhorimanna block but the general depth of this aquifer is less than 30m in rest of the area. Weathered, fractured and jointed rock formations within hard rocks at shallower depths constitute good unconfined aquifers. Such zone ranges in thickness from less than 10 meter to around 70 meter throughout the western and northwestern part of the Barmer district. The thickest zone of weathered/fractured hardrock thickness is observed in the Barmer block (>60m). In general thickness of aquifer in hardrock area in the district is less than 30m.

Alluvial areas

Unconfined aquifer Thickness (m)	Block wise Area coverage (sq km)								Total Area (sq km)
	Balotra	Barmer	Baytoo	Chohtan	Dhorimanna	Sheo	Sindhari	Siwana	
< 10	2,330.5	1,365.1	609.8	724.8	429.7	-	1,126.7	1,698.3	**8,284.9**
10-20	789.2	109.2	-	711.2	658.1	-	607.3	222.8	**3,097.8**
20-30	76.6	23.3	-	383.6	664.7	-	460.1	37.7	**1,646.0**
30-40	-	-	-	999.9	321.5	-	191.1	14.8	**1,527.3**
40-50	-	-	-	235.5	127.5	-	78.1	-	**441.1**
50-60	-	-	-	-	105.1	-	54.6	-	**159.7**
60-70	-	-	-	-	64.4	-	17.7	-	**82.1**
70-80	-	-	-	-	38.3	-	11.4	-	**49.7**
80-90	-	-	-	-	25.4	-	7.2	-	**32.6**
90-100	-	-	-	-	18.3	-	4.3	-	**22.6**
100-110	-	-	-	-	3.6	-	1.7	-	**5.3**
> 110	-	-	-	-	0.3	-	0.6	-	**0.9**
Total	**3,196.3**	**1,497.6**	**609.8**	**3,055.0**	**2,456.9**	**-**	**2,560.8**	**1,973.6**	**15,350.0**

Hardrock areas

Unconfined aquifer Thickness (m)	Block wise Area coverage (sq km)								Total Area (sq km)
	Balotra	Barmer	Baytoo	Chohtan	Dhorimanna	Sheo	Sindhari	Siwana	
< 10	76.7	422.3	1,428.00	-	-	314.2	844.1	-	**3,085.3**
10-20	88.5	1,164.30	1,334.90	-	-	3,823.80	59	2	**6,472.5**
20-30	-	310.7	141	-	-	2,587.90	-	-	**3,039.6**
30-40	-	142.6	-	0.1	-	99.3	-	-	**242.0**
40-50	-	62.7	-	0.2	-	-	-	-	**62.9**
50-60	-	23.3	-	-	-	-	-	-	**23.3**
> 60	-	3.7	-	-	-	-	-	-	**3.7**
Total	**165.2**	**2,129.6**	**2,903.9**	**0.3**	**-**	**6,825.2**	**903.1**	**2.0**	**12,929.3**

PLATE - XVI

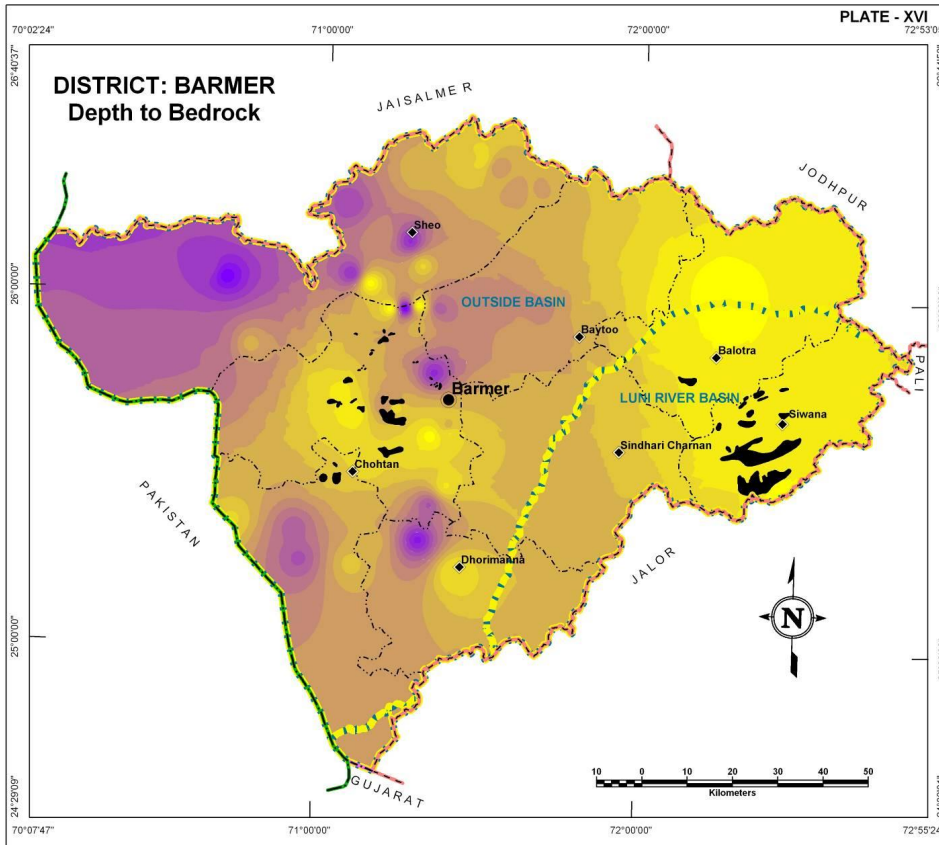
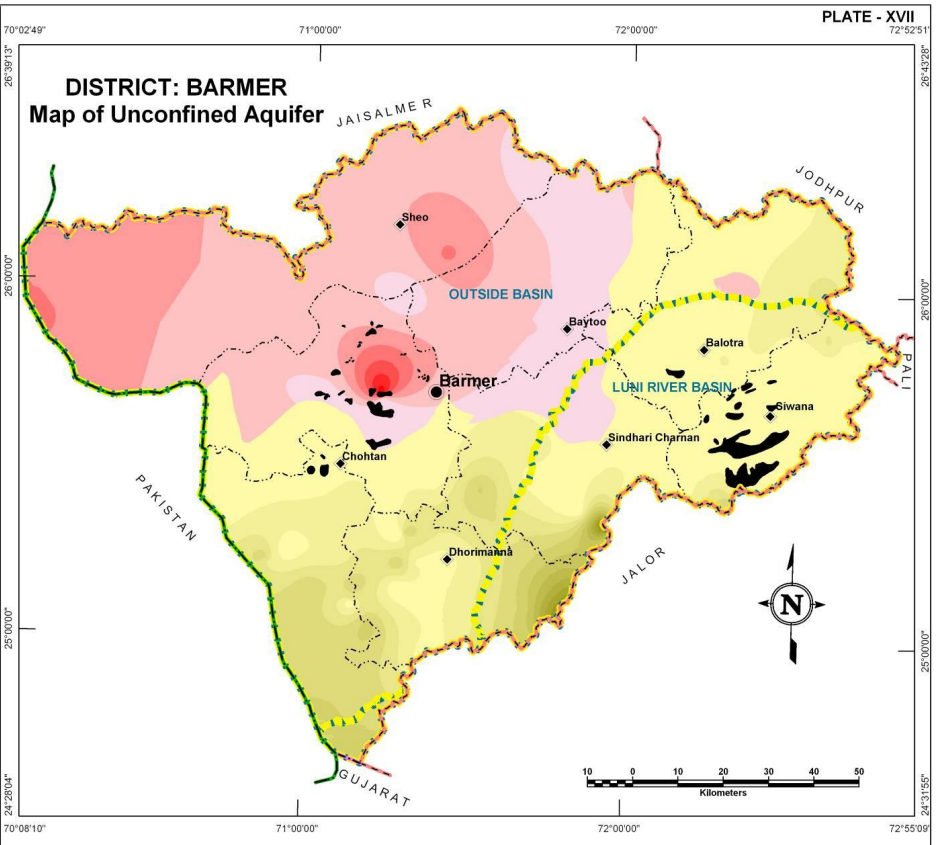


PLATE - XVII



LEGEND

Admin Boundary:

- District Headquarter
- Block Headquarter
- International Boundary
- State Boundary
- District Boundary
- Block Boundary
- Basin Boundary
- Hills

Depth to Bedrock (mg/l):

<40	160-180
40-60	180-200
60-80	200-220
80-100	220-240
100-120	240-260
120-140	260-280
140-160	>280

LEGEND

Admin Boundary:

- District Headquarter
- Block Headquarter
- International Boundary
- State Boundary
- District Boundary
- Block Boundary
- Basin Boundary
- Hills

Aquifer Thickness:

Alluvial Area:	Weathered & Fractured Zone in Hardrock Area
< 10	< 10
10-20	10-20
20-30	20-30
30-40	30-40
40-50	40-50
50-60	50-60
60-70	> 60
70-80	
80-90	
90-100	
100-110	
> 110	

Glossary of terms

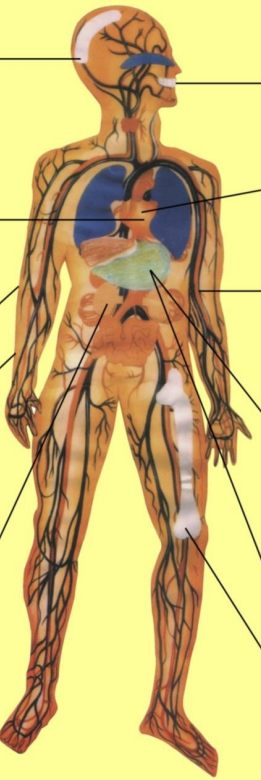
S. No.	Technical Terms	Definition
1	AQUIFER	A saturated geological formation which has good permeability to supply sufficient quantity of water to a Tube well, well or spring.
2	ARID CLIMATE	Climate characterized by high evaporation and low precipitation.
3	ARTIFICIAL RECHARGE	Addition of water to a 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	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	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 CONDUCTIVITY	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 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.
29	TRANSMISSIBILITY	It is defined as the rate of flow through an aquifer of unit width and total saturation depth under unit hydraulic gradient. It is equal to product of full saturation depth of aquifer and its coefficient of permeability.
30	UNCONFINED AQUIFER	A water bearing formation having permeable overburden. The water table forms the upper boundary of the aquifer.
31	UNSATURATED ZONE	The zone below the land surface in which pore space contains both water and air.
32	WATER CONSERVATION	Optimal use and proper storage of water.
33	WATER RESOURCES	Availability of surface and ground water.
34	WATER RESOURCES MANAGEMENT	Planned development, distribution and use of water resources.
35	WATER TABLE	Water table is the upper surface of the zone of saturation at atmospheric pressure.
36	ZONE OF SATURATION	The ground in which all pores are completely filled with water.
37	ELECTRICAL CONDUCTIVITY	Flow of free ions in the water at 25C mu/cm.
38	CROSS SECTION	A Vertical Projection showing sub-surface formations encountered in a specific plane.
39	3-D PICTURE	A structure showing all three dimensions i.e. length, width and depth.
40	GWD	Ground Water Department
41	CGWB	Central Ground Water Board
42	CGWA	Central Ground Water Authority
43	SWRPD	State Water Resources Planning Department
44	EU-SPP	European Union State Partnership Programme
45	TOPOGRAPHY	Details of drainage lines and physical features of land surface on a map.
46	GEOLOGY	The science related with the Earth.
47	GEOMORPHOLOGY	The description and interpretation of land forms.
48	PRE MONSOON SURVEY	Monitoring of Ground Water level from the selected DKW/Piezometer before Monsoon (carried out between 15th May to 15th June)
49	POST-MONSOON SURVEY	Monitoring of Ground Water level from the selected DKW/Piezometer after Monsoon (carried out between 15th October to 15th November)
50	PIEZOMETER	A non-pumping small diameter bore hole used for monitoring of static water level.
51	GROUND WATER FLUCTUATION	Change in static water level below ground level.
52	WATER TABLE	The static water level found in unconfined aquifer.
53	DEPTH OF BED ROCK	Hard & compact rock encountered below land Surface.
54	G.W. MONITORING STATION	Dug wells selected on grid basis for monitoring of state water level.
55	EOLIAN DEPOSITS	Wind-blown sand deposits

(Contd…)

Ground Water Department,
Rajasthan

European Union
State Partnership Programme

भूजल में घुले मुख्य तत्वों की अधिकता का मानव शरीर पर दुष्प्रभाव



- बोरोन-स्नायु तन्त्र पर प्रभाव
- क्लोराइड-सोडियम के साथ मिलकर उच्च रक्त चाप
- कैल्शियम-जोड़ों में कड़ापन
- आर्सेनिक-त्वचा रोग, कैंसर
- लेड-बच्चों के शारीरिक व मानसिक विकास में बाधा वयस्कों में गुर्दे के रोग
- फ्लोराइड - दंत क्षरण
- सोडियम-हृदय, गुर्दा व रक्त परिसंचरण रोगों से ग्रसित लोगों को हानिकारक
- नाइट्रेट-नवजात शिशुओं में ब्लू बेबी बीमारी (मेथमोग्लोबिनिमिया)
- सल्फेट-अधिकता में मैग्नेशियम के साथ मिलकर दस्तावर
- आयरन-आयरन जीवाणु से आमाशय संबंधी रोग
- फ्लोराइड-जोड़ों में अकड़न, हड्डियों में मुड़ाव

केन्द्रीय भूमि जल बोर्ड,
पश्चिमी क्षेत्र, जयपुर
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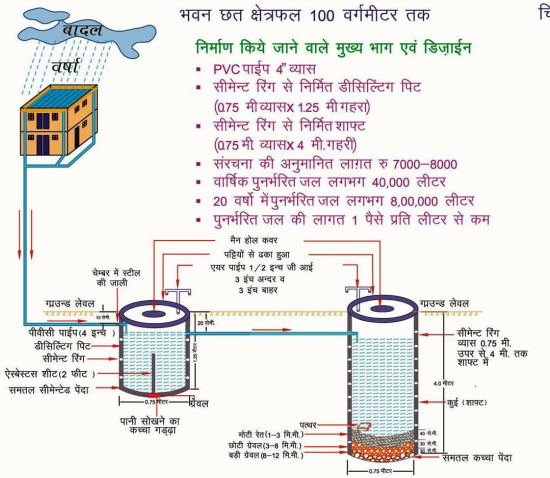
भूजल अमूल्य है इसे प्रदूषित न करें।

चित्र–1

भवन छत क्षेत्रफल 100 वर्गमीटर तक

निर्माण किये जाने वाले मुख्य भाग एवं डिज़ाईन

- PVC पाईप 4" व्यास
- सीमेन्ट रिंग से निर्मित डीसिल्टिंग पिट (0.75 मी.व्यास x 1.25 मी.गहरा)
- सीमेन्ट रिंग से निर्मित शाफ्ट (0.75 मी.व्यास x 4 मी.गहरी)
- संरचना की अनुमानित लाग़त रु 7000–8000
- वार्षिक पुनर्भरित जल लगभग 40,000 लीटर
- 20 वर्षो में पुनर्भरित जल लगभग 8,00,000 लीटर
- पुनर्भरित जल की लागत 1 पैसे प्रति लीटर से कम

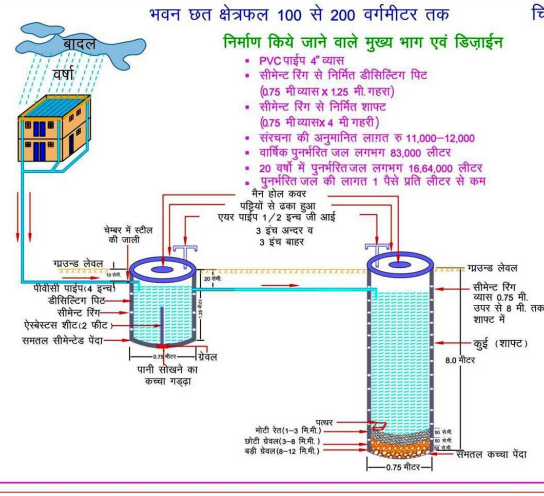


चित्र–2

भवन छत क्षेत्रफल 100 से 200 वर्गमीटर तक

निर्माण किये जाने वाले मुख्य भाग एवं डिज़ाईन

- PVC पाईप 4" व्यास
- सीमेन्ट रिंग से निर्मित डीसिल्टिंग पिट (0.75 मी.व्यास x 1.25 मी. गहरा)
- सीमेन्ट रिंग से निर्मित शाफ्ट (0.75 मी.व्यास x 4 मी गहरी)
- संरचना की अनुमानित लाग़त रु 11,000–12,000
- वार्षिक पुनर्भरित जल लगभग 83,000 लीटर
- 20 वर्षो में पुनर्भरित जल लगभग 16,64,000 लीटर
- पुनर्भरित जल की लागत 1 पैसे प्रति लीटर से कम

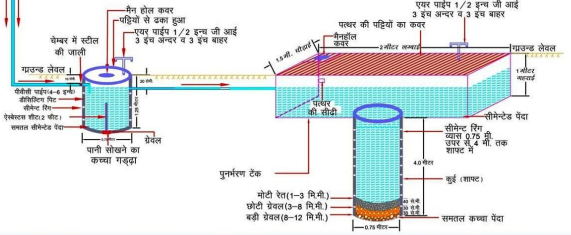


चित्र–3

भवन छत क्षेत्रफल 200 से 300 वर्गमीटर तक

निर्माण किये जाने वाले मुख्य भाग एवं डिज़ाईन

- PVC पाईप 4"– 6" व्यास
- सीमेन्ट रिंग से निर्मित डीसिल्टिंग पिट (0.75 मी.व्यास x 1.25 मी.गहरा)
- रीचार्ज टेंक 1.5 मी.चौड़ा x 2 मी.लम्बा x 1 मी.गहरा
- सीमेन्ट रिंग से निर्मित शाफ्ट (0.75 मी.व्यास x 4 मी.गहरी)
- संरचना की अनुमानित लाग़त रु 15,000–16,000
- वार्षिक पुनर्भरित जल लगभग 1,25,000 लीटर
- 20 वर्षो में पुनर्भरित जल लगभग 25,00,000 लीटर
- पुनर्भरित जल की लागत 1 पैसे प्रति लीटर से कम

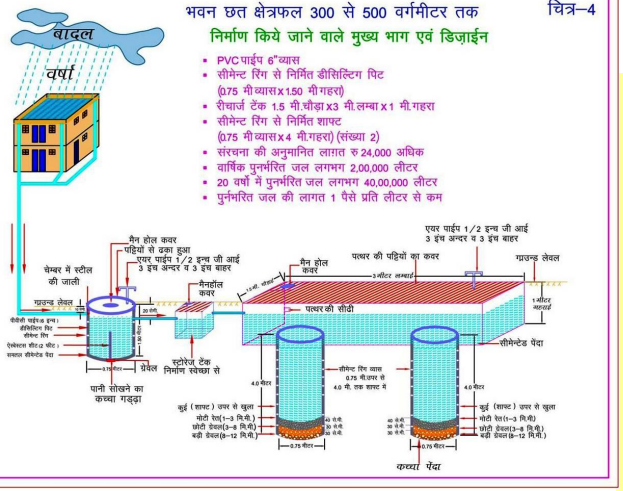


चित्र–4

भवन छत क्षेत्रफल 300 से 500 वर्गमीटर तक

निर्माण किये जाने वाले मुख्य भाग एवं डिज़ाईन

- PVC पाईप 6" व्यास
- सीमेन्ट रिंग से निर्मित डीसिल्टिंग पिट (0.75 मी.व्यास x 1.50 मी.गहरा)
- रीचार्ज टेंक 1.5 मी.चौड़ा x 3 मी.लम्बा x 1 मी.गहरा
- सीमेन्ट रिंग से निर्मित शाफ्ट (0.75 मी.व्यास x 4 मी.गहरा) (संख्या 2)
- संरचना की अनुमानित लाग़त रु 24,000 अधिक
- वार्षिक पुनर्भरित जल लगभग 2,00,000 लीटर
- 20 वर्षो में पुनर्भरित जल लगभग 40,00,000 लीटर
- पुनर्भरित जल की लागत 1 पैसे प्रति लीटर से कम



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Myths and Facts about Ground Water

S No	Myths	Facts
1	What is Ground Water • an underground lake • a net work of underground rivers • a bowl filled with water	Water which occurs below the land in geological formations/rocks is Ground water
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 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 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. 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 pure	This water can also be contaminated so test before use
10	If I recharge my TW/DW/HP it will not benefit 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 tapped in most of areas as GW annual withdrawal is more than annual recharge
12	I cannot meet annual cooking and drinking water requirement by rain water harvesting	The water requirement for drinking and cooking is only 8 lit/day. You can harvest this water for family of 5 persons from roof top or paved area of 75 Sq m to meet annual requirement
13	You can increase ground water recharge	This can be done by harvesting the rain water and storing in sub surface reservoir (GW) by constructing the recharge structures
14	You cannot use abandoned TW/HP/DW for ground water recharge	These should be used as recharge structures as harvested 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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