केंद्रीय भूमि जल बोर्ड

जल संसाधन, नदी विकास और गंगा संरक्षण मंत्रालय

भारत सरकार

Central Ground Water Board

Ministry of Water Resources, River Development and Ganga Rejuvenation

Government of India

Report

on

AQUIFER MAPPING AND GROUND WATER MANAGEMENT

Dausa District, Rajasthan

पश्चिमी क्षेत्र जयपुर

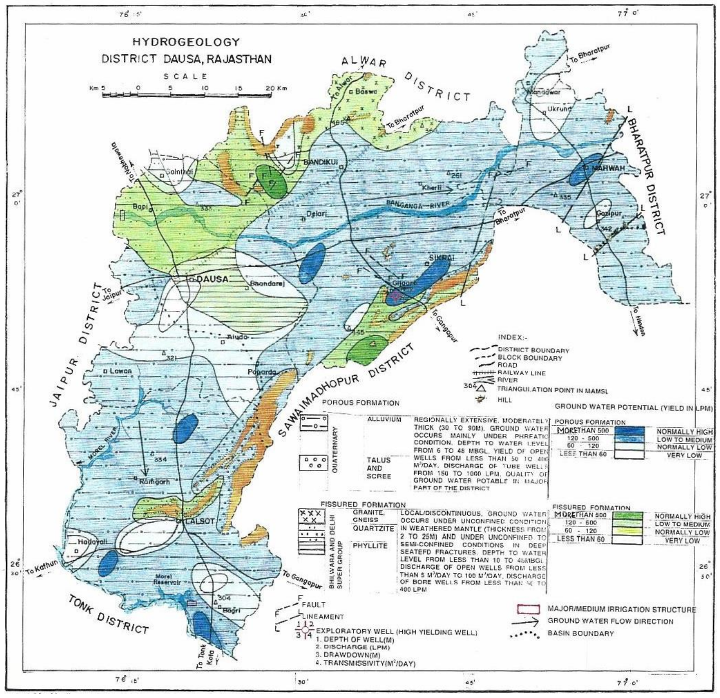
Western Region, Jaipur

Government Of India

Ministry of Water Resources, River Development & Ganga Rejuvenation,

Central Ground Water Board (WR)

Western Region Jaipur



Report on National Aquifer Mapping & Management Plan

(Based on Selected Available Data)

Dausa District, Rajasthan

By

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July 2017

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Report On National Aquifer Mapping and Management Alwar District, Rajasthan

1. Introduction

1.1 Objectives

Various developmental activities over the years have adversely affected the groundwater regime in the state. There is a need for scientific planning in development of groundwater under different hydrogeological situation and to evolve effective management practices with involvement of community for better ground water governance. In view of emergent challenges in the ground water sector in the state there is an urgent need for comprehensive and realistic information pertaining to various aspects of groundwater resource available in different hydrogeological setting through a process of systematic data collection, compilation, data generation, analysis and synthesis. Hence, aquifer mapping of the study area is the need of the hour.

1.2 Scope of the study

Aquifer mapping can be understood as a scientific process wherein a combination of geological, Geophysical, hydrological and chemical fields and laboratory analyses are applied to characterized the quantity, quality, and sustainability of ground water in aquifers. Aquifer mapping is expected to improve our understanding of the geological framework of aquifer, their hydrologic characteristics, water level in aquifer and how they changes over time and space and the occurrence of natural and anthropogenic contaminants that affect the portability of groundwater. Results of these studies will contribute significantly to resource management tools such as long term aquifer monitoring network and conceptual and quantitative regional groundwater flow models to be used by planners, policy makers and other stake holders. Aquifer mapping at appropriate scale can help to prepare, implement, and monitor the efficacy of various management interventions aimed at long term sustainability of our precious groundwater recourses, which in turn will help to achieve drinking water scarcity, improved irrigation facilities and sustainability of water resource in the state.

1.3 Approach & Methodology

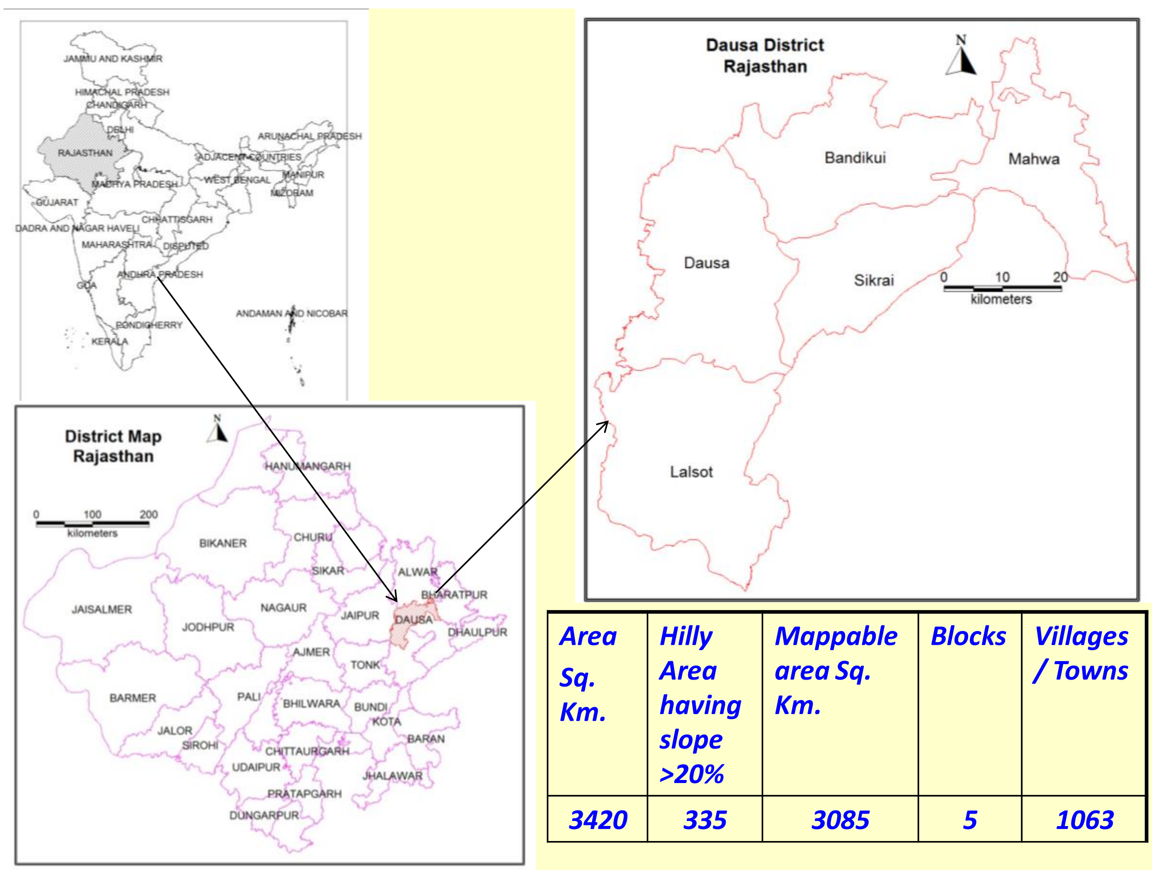
As mentioned above, aquifer mapping is an attempt to integrate the geological, Geophysical, hydrological and chemical field and laboratory analyses are applied to characterize the quality, quantity and sustainability of groundwater in aquifer. Under the National aquifer Programme, it is proposed to generate Aquifer maps on 1:50000 scale, which basically aims at characterizing the aquifer geometry, behavior of groundwater levels and status of groundwater development in various aquifer system to facilitate planning of their suitable management. The major activities involved in this process include compilation of existing data, identification of data gaps, generation of data for feeling data gaps and preparation of different aquifer layers. The flow chart is as follow

1.4 Area Details

Dausa district is located in the eastern part of Rajasthan state and lies between 26°22'40" & 27o14'00" north latitudes and 76°08'30" & 77°02'15" east longitudes. It covers 3420.17sq.km of geographical area (figure1). The administrative set up of the district is given below in table 1.

Table 1. Administrative set up of the district

Sr.no	Sub-division	Tehsil	Block	Area (sq.km.)
1	Lalsot	Lalsot	Lalsot	871.24
2	Dausa	Dausa	Dausa	943.76
3	Bandikui	Baswa	Bandikui	632.64
4	Sikrai	Sikrai	Sikrai	502.23
5	Mahuwa	Mahuwa	Mahuwa	470.00



Area Sq. Km.	Hilly Area having slope >20%	Mappable area Sq. Km.	Blocks	Villages / Towns
3420	335	3085	5	1063

Figure 1: Index Map

The population of district is 16,37,226 based on census, 2011 including 8,59,821 (52.51%) males and 7,77,405 (47.48%) females. The density of population is 476 persons/sq.km.

Dausa district is covered under mainly banganga basin, (forming 62.89% part in upper northern part of district), morel basin (34.27% part occupying southern part of district) and very small part by ghambhir basin (encompassing 2.84% part in south of mahuwa). Surface water divide runs from south of bhandana to paparda in the southern part of dausa block and separates the district into two river basins viz. Banganga and morel river basins (figure 2).

The area is drained by banganga and morel rivers, which are nonperennial in nature and flow during monsoon period only. The drainage is dendritic type. The drainage density ranges from 0.50 to 0.70 km/km2 (karanth, 1980).

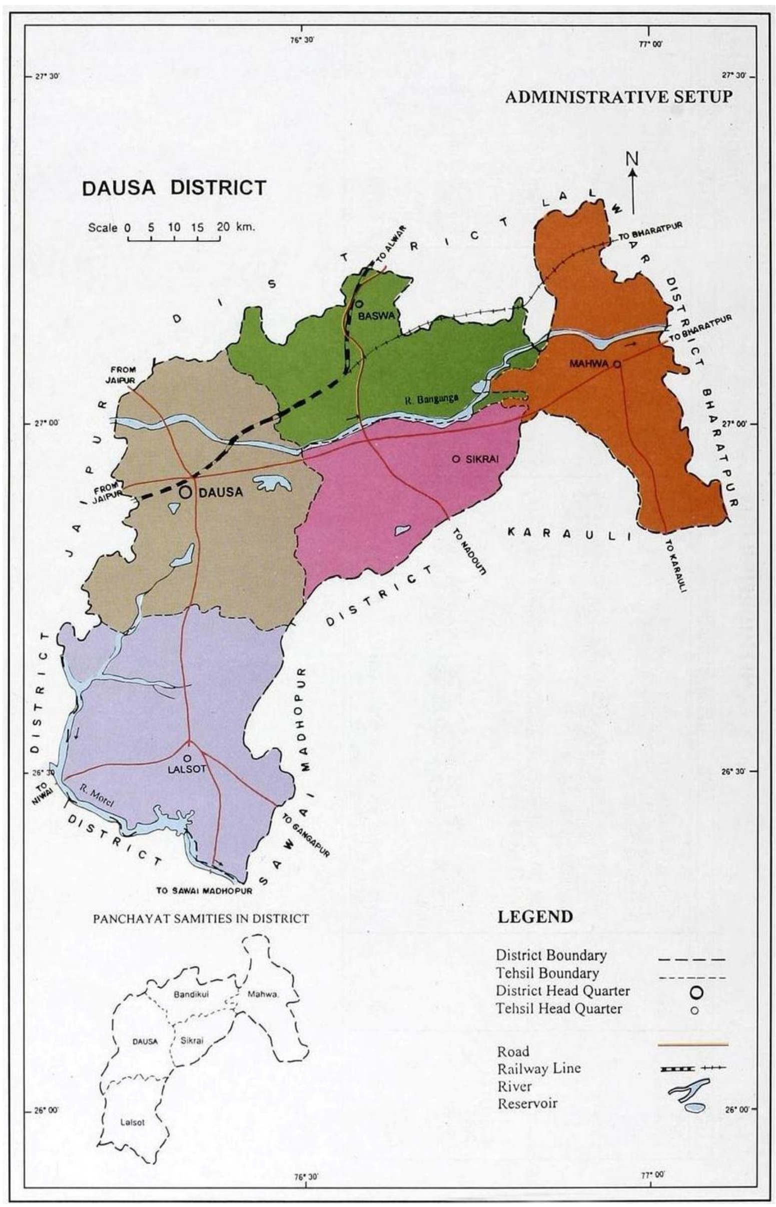


Figure 2: Administrative set up of Area

1.5 Data availability and Adequacy

Exercise on Groundwater availability, groundwater monitoring (water level and chemical quality) and exploration had been carried out by CGWB and state Ground water Department. 31 No. of NHS had been monitored by CGWB,WR,Jaipur . 11 No. of EW have been constructed and 43 VES have been conducted by CGWB.

1.6 Data Adequacy

The data collected from State GWD and CGWB WR Jaipur have been compiled and analysed. It has been observed that validation and georeferncing of the location coordinates, lithologs and hydrogeological data is needed and State GWD data lacks in aquifer parameters. Geophysical data collected needs georeferncing of the hydrogeological interpretations. It has been observed that available data are limited largely to State highways and main roads only. Hence, to get a clear 3D hydrogeological geometry of the aquifer system and its behaviour, there is need to generate data by Groundwater Exploration and to establish more numbers of monitoring stations for better understanding of the groundwater regime behavior in terms of both quantity and quality.

1.7 Data Gap Analysis

Based on the data collected from State GW agencies like GWD, PHED, Water Resources and CGWB regarding groundwater monitoring, exploration, surface water and agriculture, the gaps were identified after plotting on 1:50000 map. Based on this map the gaps were identified for data to be generated like bed rock configuration, Saline/ Fresh water interface, aquifer continuity and quality of groundwater in an area. Dausa District further needs data to be generated in the gaps. The details of data gap for monitoring, VES and exploration is given in appendix-IA,IB & 2A,2B.

1.8 Rainfall & Climate

The climate of the district can be classified as semi-arid. It is charaterised by very hot summers and very cold winters with fairly good rainfall during southwest monsoon period. In May and June, the maximum temperature may sometimes go up to 48°C. The potential evapotranspiration rates are quite high, especially during May and June. Various climatological parameters viz. normal rainfall, potential evapo-transpiration, maximum & minimum mean temperature, relative humidity and wind speed are presented in Table 2 and depicted in Figure 3.

The mean annual rainfall of the district based on 37 years data (1977-2013) works out to be 658.08mm. The coefficient of variation is moderate at 34.1% indicating that the rainfall is slightly unreliable and droughts occur in continuous spells of few years. The district experienced very poor rainfall continuously for a period of six years i.e. from 1986 to 1991. The area again experienced drought conditions from 1999 to 2002. The year 2002 was the worst year with rainfall being 53.2% less than mean annual rainfall. The period between 1992 and 1998 was exceptionally good with rainfall in excess of mean rainfall for 7 consecutive years. The rainfall in the year 1995 was 91.5% more than mean annual rainfall.

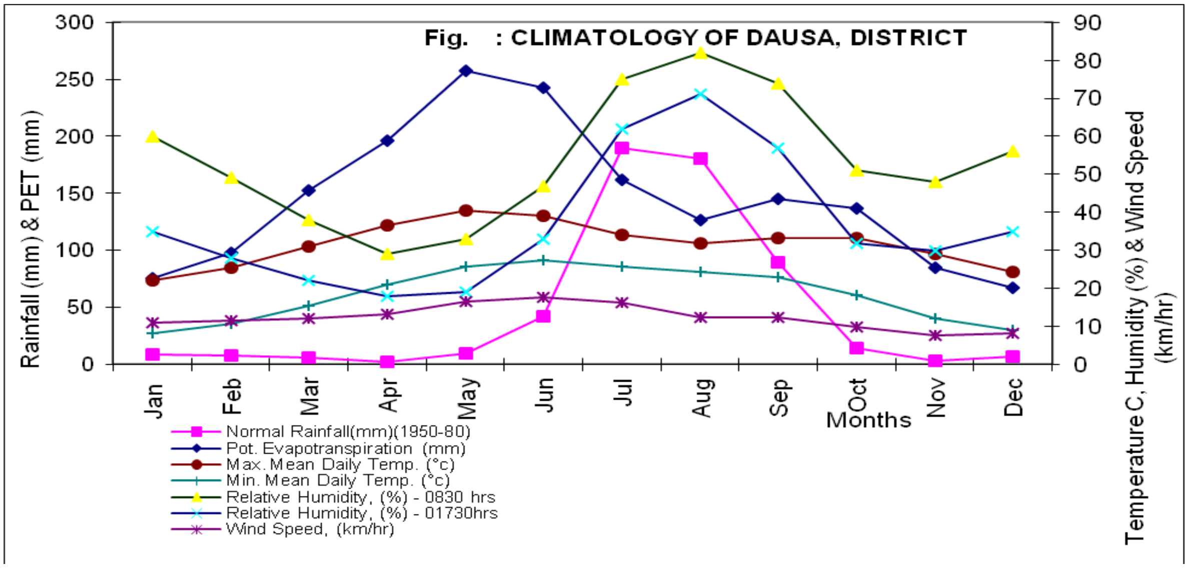


Figure 3: Climatology Data, Dausa district

Table 2: Annual Rainfall, Standard Deviation & Coeff. of Variation of annual rainfall, Dausa district (1997-2014)

YEAR	Dausa	Baswa	Lalsot	Mahua	Sikrai	Average
1977	1025.4	812.5	1207.0	590.8	1093.6	945.9
1978	800.3	727.6	752.0	831.0	1429.6	908.1
1979	495.4	468.6	409.0	172.0	557.8	420.6
1980	773.4	548.1	595.0	478.0	642.0	607.3
1981	1287.2	521.0	1057.5	522.0	21.0	681.7
1982	640.6	413.3	508.6	561.0	213.4	467.4
1983	1353.2	913.5	806.0	1060.0	209.0	868.3
1984	776.0	490.6	456.0	738.0	268.0	545.7
1985	854.6	862.2	554.0	803.6	825.0	779.9
1986	492.2	331.0	383.0	464.5	413.0	416.7
1987	270.2	391.2	389.8	458.9	314.4	364.9
1988	456.6	466.2	417.0	567.5	373.0	456.1
1989	439.6	463.6	508.0	336.0	551.0	459.6
1990	500.6	641.0	594.0	456.0	1002.0	638.7
1991	700.0	422.0	660.1	358.0	622.0	552.4

YEAR	**Dausa**	**Baswa**	**Lalsot**	**Mahua**	**Sikrai**	**Average**
1992	955.0	688.0	675.2	713.0	986.0	803.4
1993	665.0	850.0	678.0	652.0	716.0	712.2
1994	661.0	684.2	767.0	503.0	900.0	703.0
1995	1021.0	1098.0	863.0	1608.0	1652.0	1248.4
1996	708.0	1133.0	742.0	1607.0	1109.0	1059.8
1997	631.5	709.0	974.0	709.6	632.0	731.2
1998	762.0	862.0	1047.0	1059.0	820.0	910.0
1999	464.0	538.0	523.0	574.0	580.0	535.8
2000	488.0	536.0	349.0	465.0	394.0	446.4
2001	505.5	495.0	614.5	617.0	689.0	584.2
2002	300.0	252.0	275.0	176.0	521.0	304.8
2003	660.0	777.0	941.0	722.0	856.0	791.2
2004	573.0	523.0	627.0	490.0	358.0	514.2
2005	698.0	638.0	489.0	965.0	508.0	659.6
2006	373.0	425.0	412.0	479.0	505.0	438.8
2007	562.0	479.0	612.0	718.0	401.5	554.5
2008	810.0	931.0	783.0	802.0	979.0	861.0
2009	379.0	455.0	470.0	419.0	400.0	424.6
2010	718.0	650.0	1045.0	541.0	660.0	722.8
2011	919.0	820.0	1189.0	546.0	583.0	811.4
2012	668.0	845.0	1092.0	865.0	910.0	876
2013	955.0	746.0	864.0	948.0	915.0	885.6
2014	488.0	555.0	1031.0	756.0	598.0	685.6
Mean	688.7	634.1	705.5	662.1	680.4	674.2
STD(mm)	252.7	204.7	242.2	293.4	321.0	205.1
CV(%)	36.7	32.3	34.3	44.3	47.2	30.4

(Source: Revenue Department, Ajmer)

1.9 Geomorphology And Soil Types

The district forms part of East Rajasthan upland. It consists of fairly open undulating plain with hillocks in the southeastern border and in the northern part (Figure 4). The altitude of relief ranges from 280 to 334 m amsl in the northern part of the district with west to east slope and from 250 to 273 m amsl in the southern part with northwest to south east slope. The only hill forming part of Aravalli hill system in the area is the Lalsot -Toda Bhim having a relative height of over 200 m. The various geomorphological units developed by ways of different origin are furnished below in Table 3.

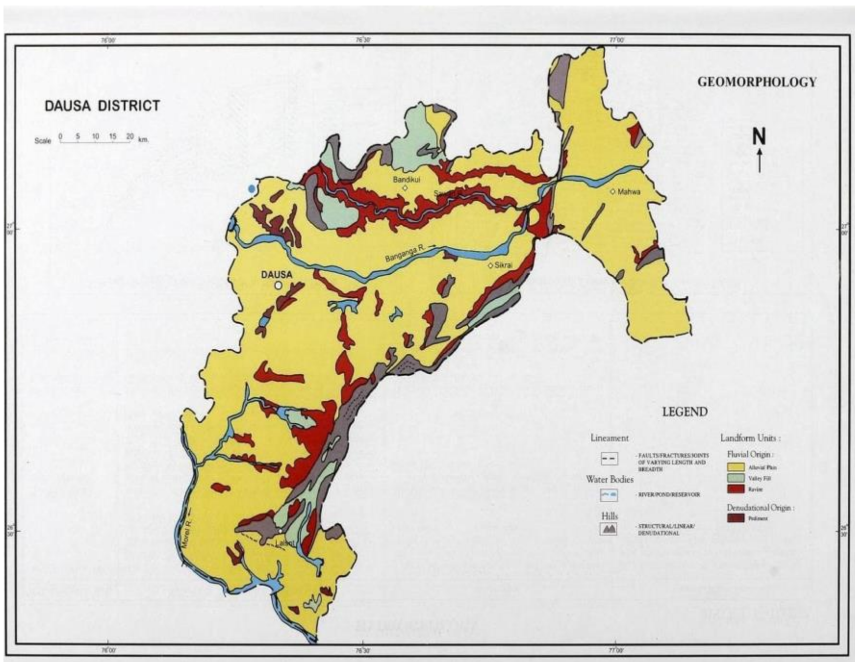


Figure 4: Geomorphological Map of Dausa District

Table 3: Geomorphological Units

	Origin		Land Form Unit	Occurrence
i	Structural	i	Ridges and Valleys	Confined to hilly terrain mostly lies on the south eastern margin of the district and scattered isolatedly in northern part
ii	Fluvial	i	Alluvial Plain	Major portion of the district is characterized by undulating plains which are big & large monotonous land scape with fairly thick alluvial cover
		ii	Bad Lands (Ravines)	Occur in the form of longitudinal track in the northern part of the district and in isolated pockets in the east of Dausa.
iii	Aeolian	i	Zones of Barchan dunes	Northern part of district in west of Bandikui

	Origin		Land Form Unit	Occurrence
		ii	Zones of obstacle dunes	All along west of hill ranges trending in NE -SW direction in the southeastern border of the district.
		iii	Sand Sheet	Southern part of the district.
iv	Denudational	i	Plantation of surfaces on proterozoic rocks	On the proterozoic rocks between Lalsot and Paparda
		ii	Piedmont zones	In foothills at two places i.e. east of Lalsot and between Kalakhoh and Denda along the extreme south east periphery of district.

The area has two types of soils viz. old alluvium and lithosols and regosols of hills. Old alluvium soil occupies major part of the area and found in plains. They are calcareous semi-consolidated to unconsolidated brown soils, loamy sand to sandy loam in texture. These are well drained. Lithosols and regosols of hills is present in north western part and in south eastern border and found on Bhilwara's, Delhi's meta sediments and in isolated hills. These soils are shallow with gravel very near the surface, light textured, fairly drained, reddish brown to greyish brown in colour. Cultivation is restricted because of a limited root zone.

2.0 Aquifer System

2.1 Hydrogeology

Quaternary alluvium is the principal water bearing formation occupies more than 3/4th part of the district. Talus & scree deposits and hard rocks of Bhilwara and Delhi Super Group rest in small part (forming 15.35% of district) forming minor aquifers in the district (Figure 5). The Principal aquifer map of Dausa district is given in Figure 6.

Alluvium (composed of sand, clay, kankar and gravel) forms the principal and potential aquifer in the area. Ground water Occurs under unconfined to confined conditions in the primary porosity i.e. pore spaces. Exploratory borehole data has revealed the presence of aquifer system down to the depth of 90 m reaching maximum in the Mahuwa block.

Talus and scree deposits form minor aquifer occuring on the flanks of almost all the hills. Lithologically, these are composed of rock fragments. Topographically, these are situated in such a position that they receive all the run-off from the hills/hill ranges located nearby. Width of talus and scree deposits along the foothills varies from a few metres to over 500 m. It is more where hill ranges are tectonically affected and disrupted by faulting. Ground water occurs under unconfined to semi-confined conditions. They form locally very potential aquifer along foothills in the area towards north east of Lalsot along Lalsot-Todabhim fault zone. Thickness of talus and scree deposits goes up to 50 m of which the aquifer comprises 28 to 50 m.

Quartzite, phyllite/shale, gneisses of Bhilwara Super Group form the minor aquifers and occupy the north western part and south eastern border of the district. Ground water occurs under unconfined condition to semi-confined conditions in the weathered mantle (ranging in thickness from 2 to 25 m) and deep-seated secondary porosity i.e. fractures, joints, contacts etc. of hard formation.

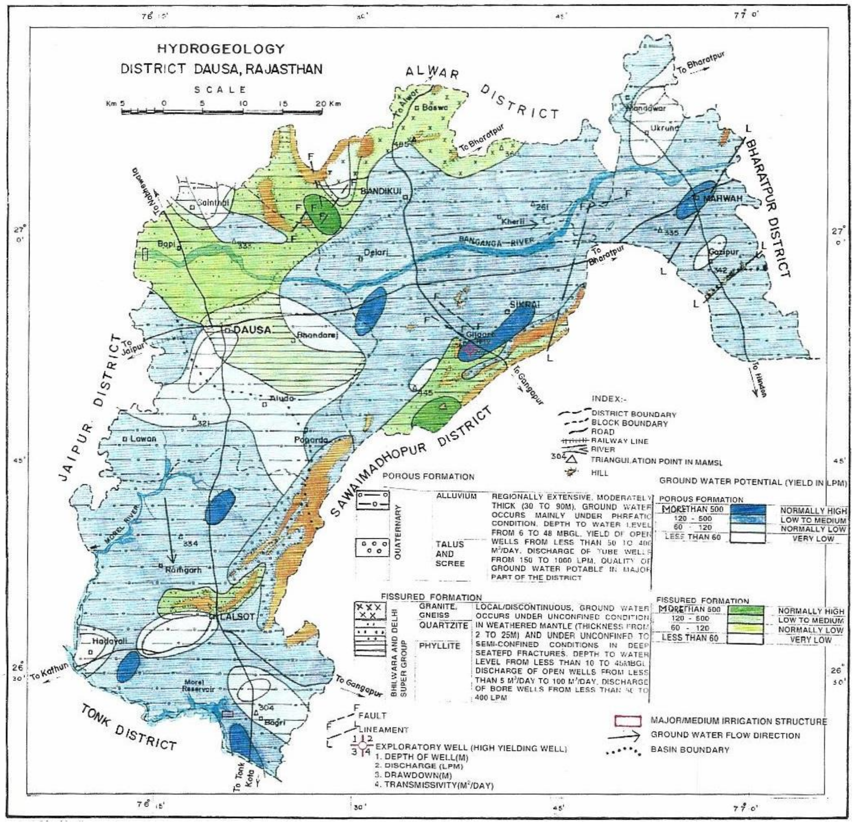


Figure 5: Hydrogeology Map of Dausa District

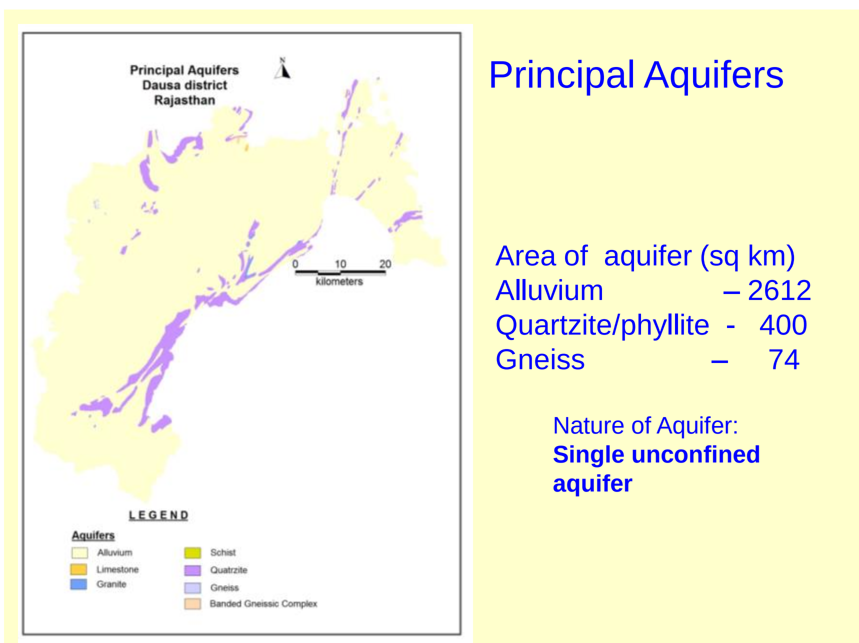


Figure 6: Principal aquifer map of Dausa District

The total number of hydrograph stations in the district is 31 including 6-dug wells and 25 peizometers. Depth to water level varies from 7.17 m to 53.33 m during pre-monsoon, 2013 (Figure 7) and 3.86 m to 59.67 m during post-monsoon, 2015 (Figure 8). Deeper water level i.e. more than 30 m has been observed in area around Bandikui, Baswa (Bandikui block), Mandawar (Mahuwa block) and Lalsot (Lalsot block). Out of total stations monitored, about 28% of stations exhibit water level between 10 and 30 m, 52% stations have more than 30 m water level and less than 10 m water level is constituted by only 20% of stations. Amplitude of negative fluctuation ranges from less than 1 m to 2m. Positive fluctuation has been observed in major areas covering major part of Mahuwa block and areas around Dausa & west of Dausa, Baswa, southeast part of lalsot block and at local pockets.

The Study of long-term water level trend for the last ten years (premonsoon, 2004 -2013) reveals that all the hydrograph stations exhibit declining trend ranging from 0.05 to 2.86m/year.

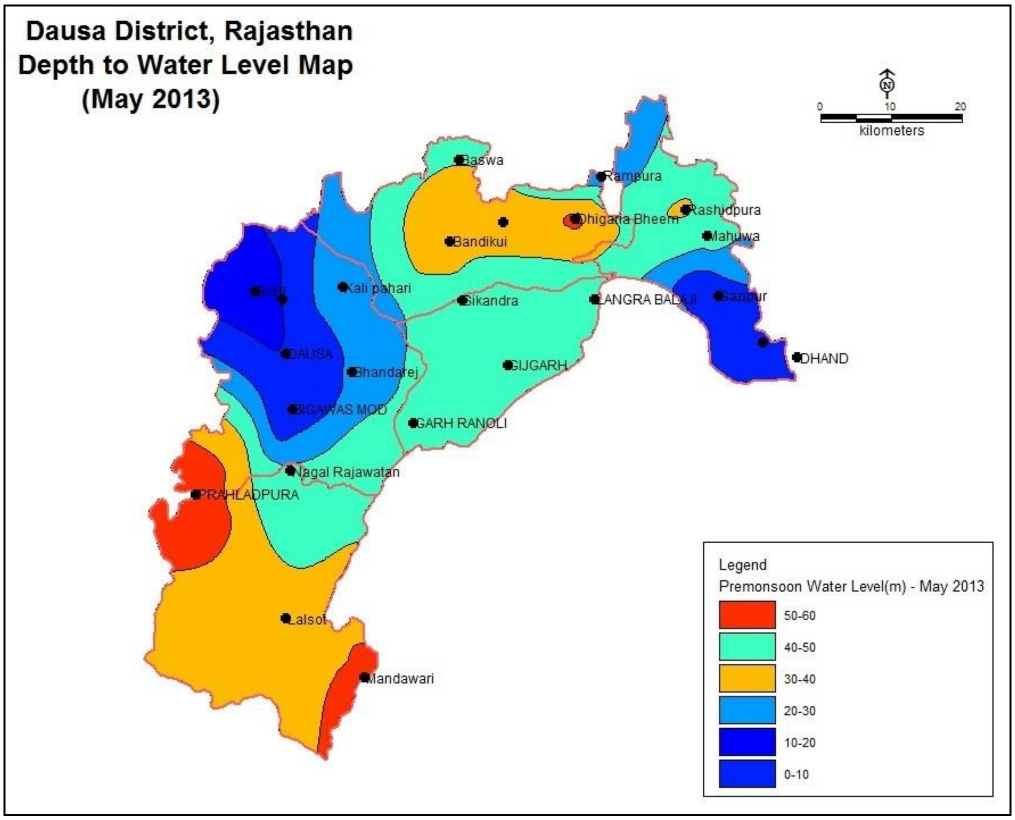


Figure 7: Pre-Monsoon depth to water level map of Dausa district

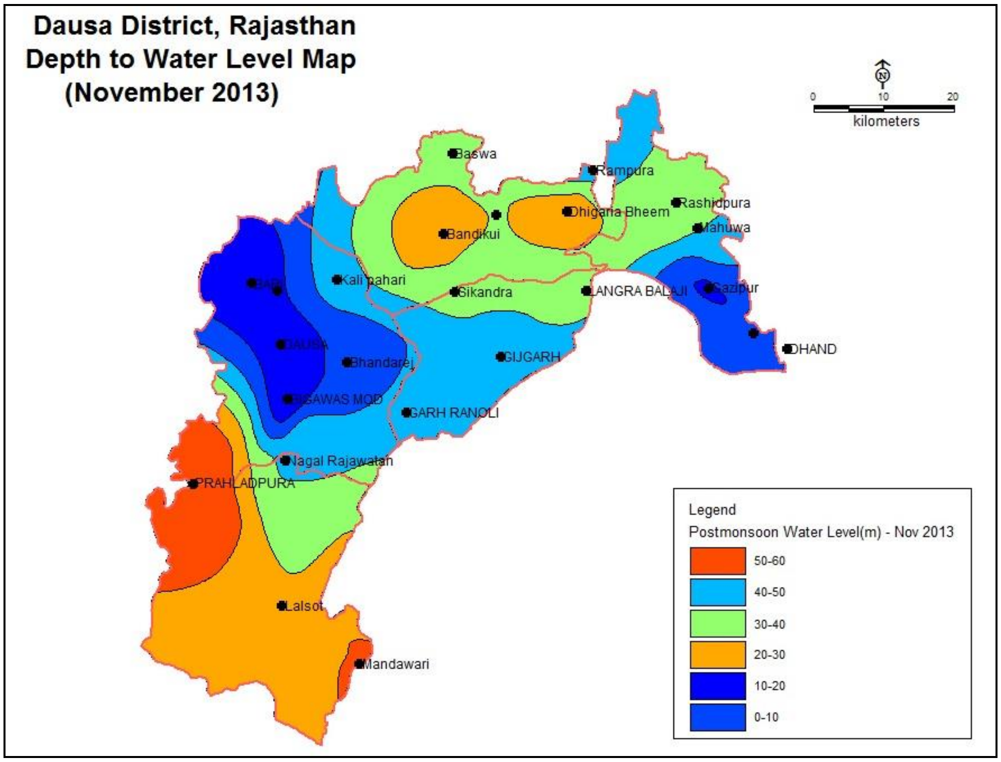


Figure 8: Post-Monsoon depth to water level map of Dausa district

The yield of open wells tapping alluvial formation and talus and scree deposits varies from less than 30 to 400 m3/day depending upon the locations. The specific capacity of wells based on Slitcher's formula ranges from 0.0031 to 0.0443 m3/m/m and optimum yield lies between 2 and 80 Ipm. The yield of open wells in hard rocks ranges from less than 5 to 100 m3/day averaging to about 30 m3/day. The specific capacity of wells ranges from 0.0205 to 0.0086 m3/m/m and optimum yield is about 36 Ipm. The status of boreholes (as on 31.03.2014) drilled by CGWB is presented below in Table 4.

Table 4: Status of CGWB boreholes

Type of wells	Formation		Total
	Alluvium	Hard rock	
Exploratory well (EW)	25	13	38
Observation well (OW)	3	1	4
Slim hole (SH)	3	-	3
Piezometer (PZ)	16	3	19

Exploratory borehole data drilled in alluvial formation has indicated that depth of drilling ranges from 28.59 to 86.16 m and depth of wells constructed varies from 18.98 to 85.11 m. The discharge of wells varies from 60 to 1000 Ipm having 2 to 28 m of drawdown. The transmissivity value of aquifer varies from 1.22 to 1688 m2/day and storativity from 5.5x10-4 to 3.7x10-3. The specific yield of alluvium ranges from 0.08% to 0.12%.

In hard rock, the depth of bore wells drilled varies from 74 and 203.7 m having discharge from less than 50 to 400 Ipm with moderate drawdown. The formations encountered are granite, gneiss of Bhilwara Super Group and quartzite, slate, phyllite of Delhi Super Group. The discharge of exploratory wells are statistically analysed and furnished below.

Total No. Of Wells Analysed	**Range of discharge in lpm**							
	<60		**60-120**		**120-500**		**>500**	
	No.	%	No.	%	No.	%	No.	%
61	15	24	4	6	27	46	15	24

The decadal fluctuation (May 2005-2014) & 2015 of Dausa district is presented in Figure 9.

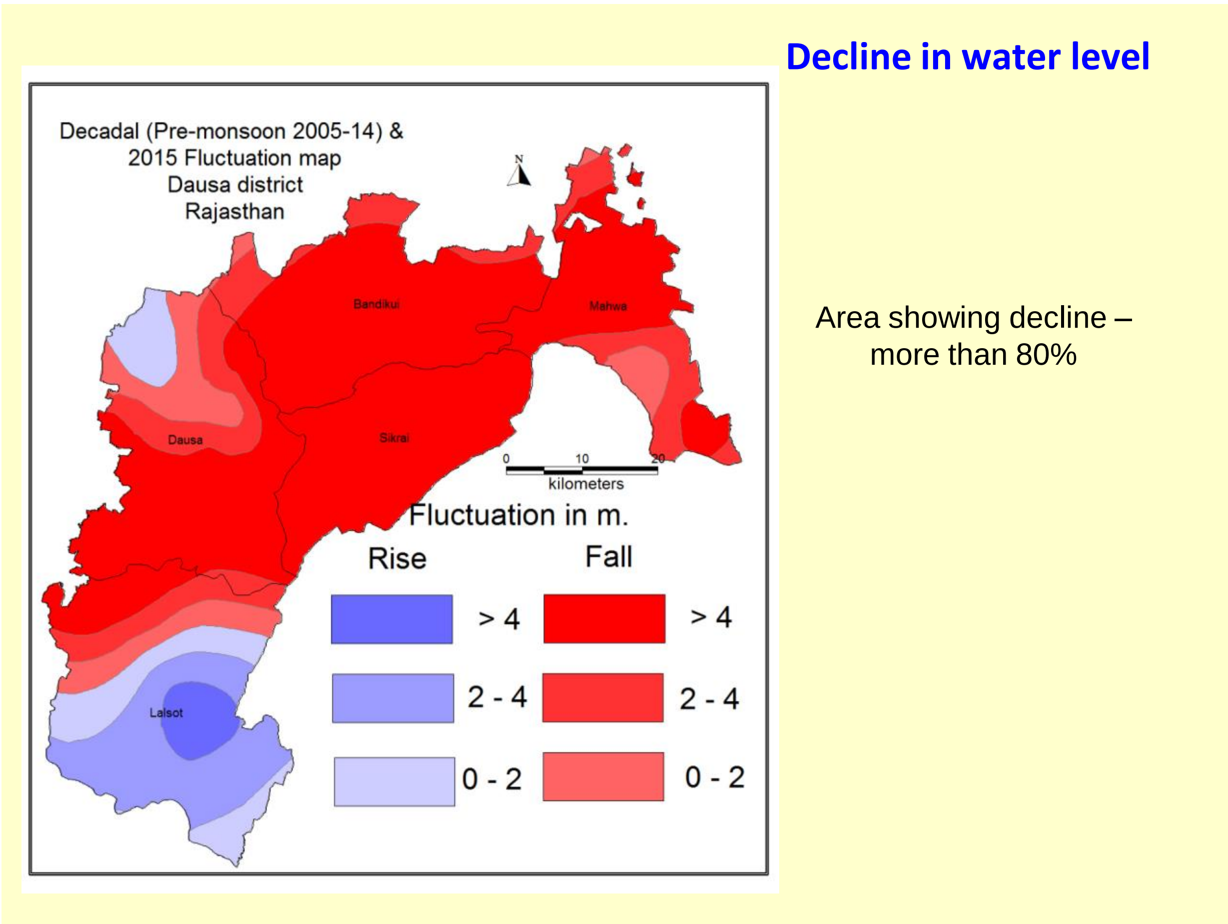


Figure: 9. Decadal fluctuation Map

The hydrographs of selected monitoring stations are shown in Figure 10.

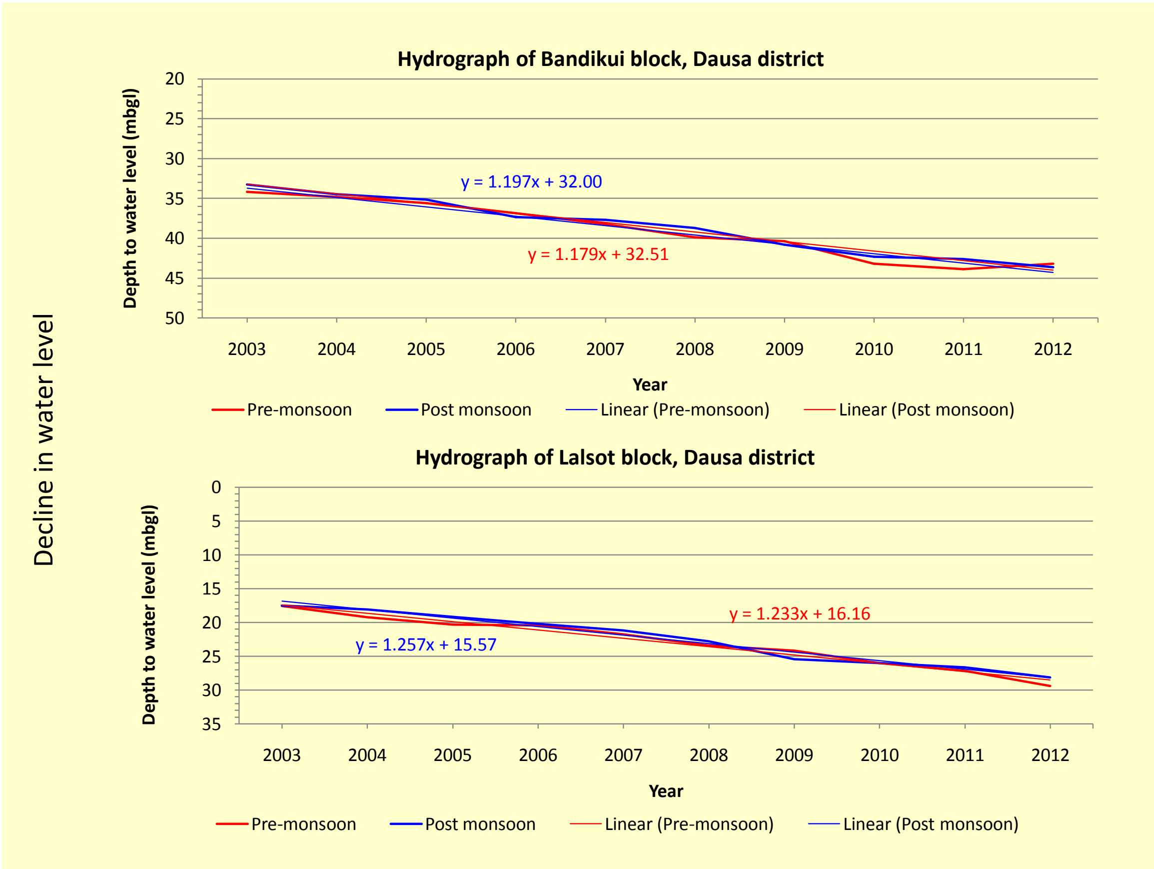


Figure: 10. Hydrograph of Bandikui & Lalsot blocks, District dausa

The map showing aquifer geometry & characterization Dausa district is presented in Figure 11.

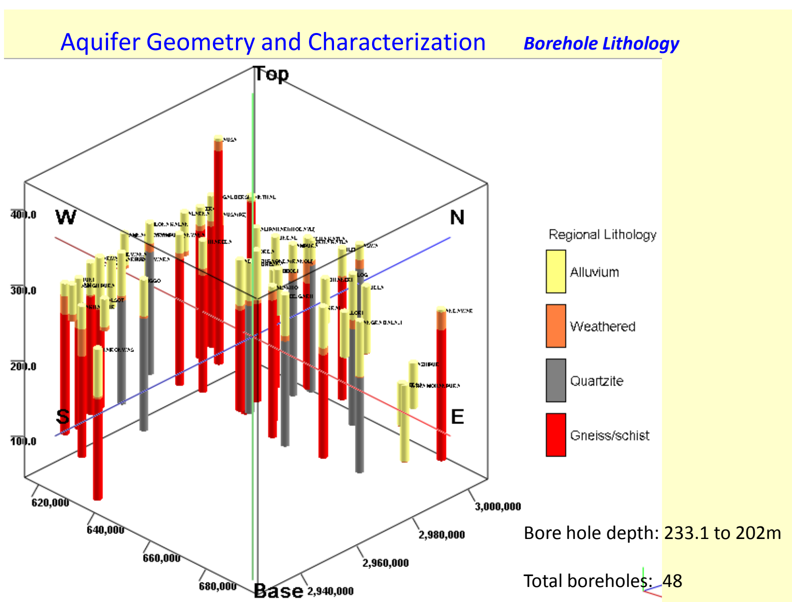


Figure 11: Map showing aquifer geometry & characterization Dausa district

The map showing the Regional lithology of Dausa district has been shown in Figure 12.

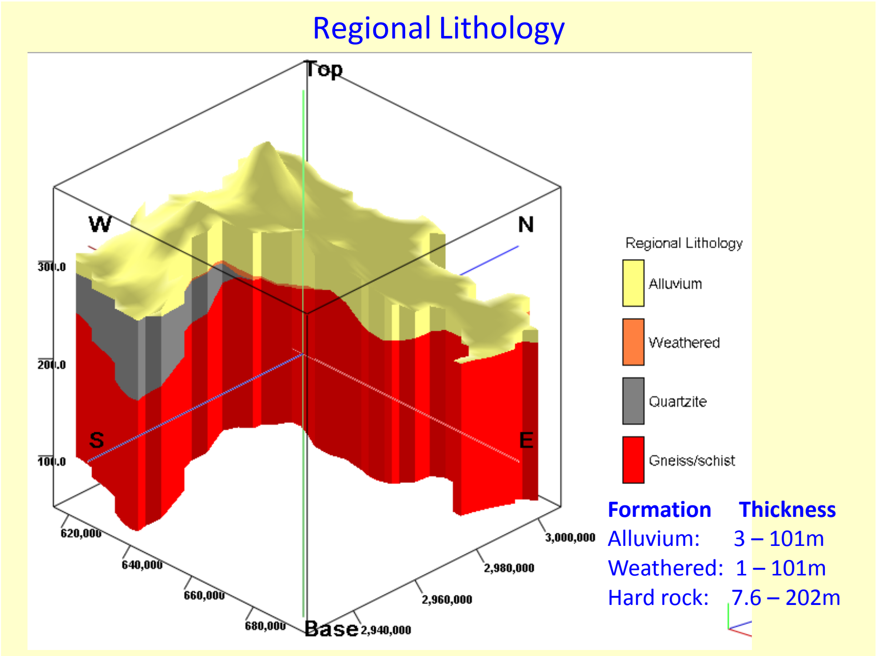


Figure 12: Map showing regional lithology, Dausa district

Based on the data, the 3 D aquifer disposition modal has been prepared in presented in Figure 13.

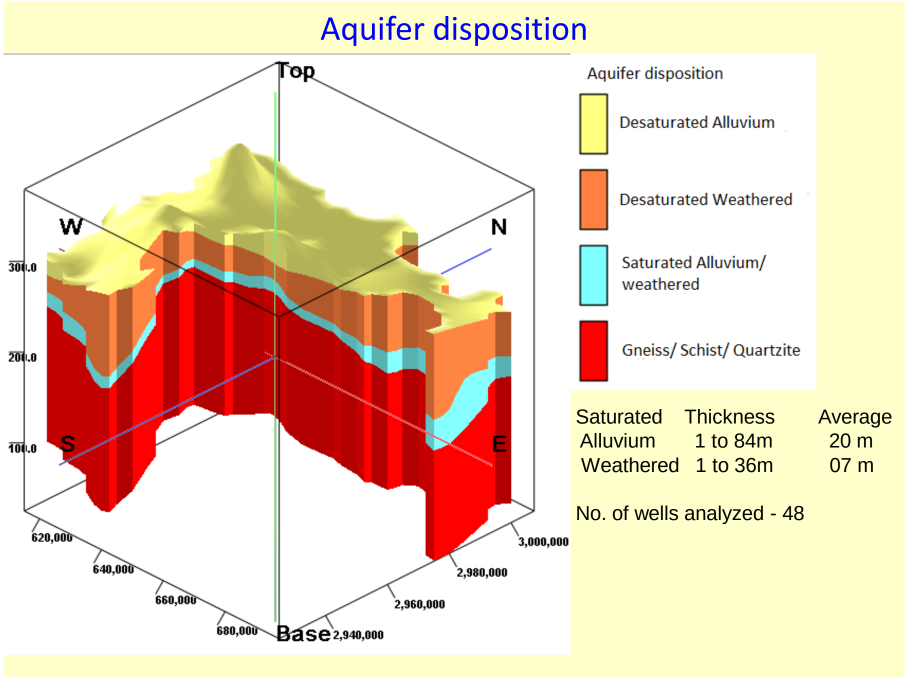


Figure 13: Map showing aquifer disposition, Dausa district

The following hydrogeological sections showing aquifer disposition, have been prepared (Figure 15) and their alignment is depicted in Figure 14.

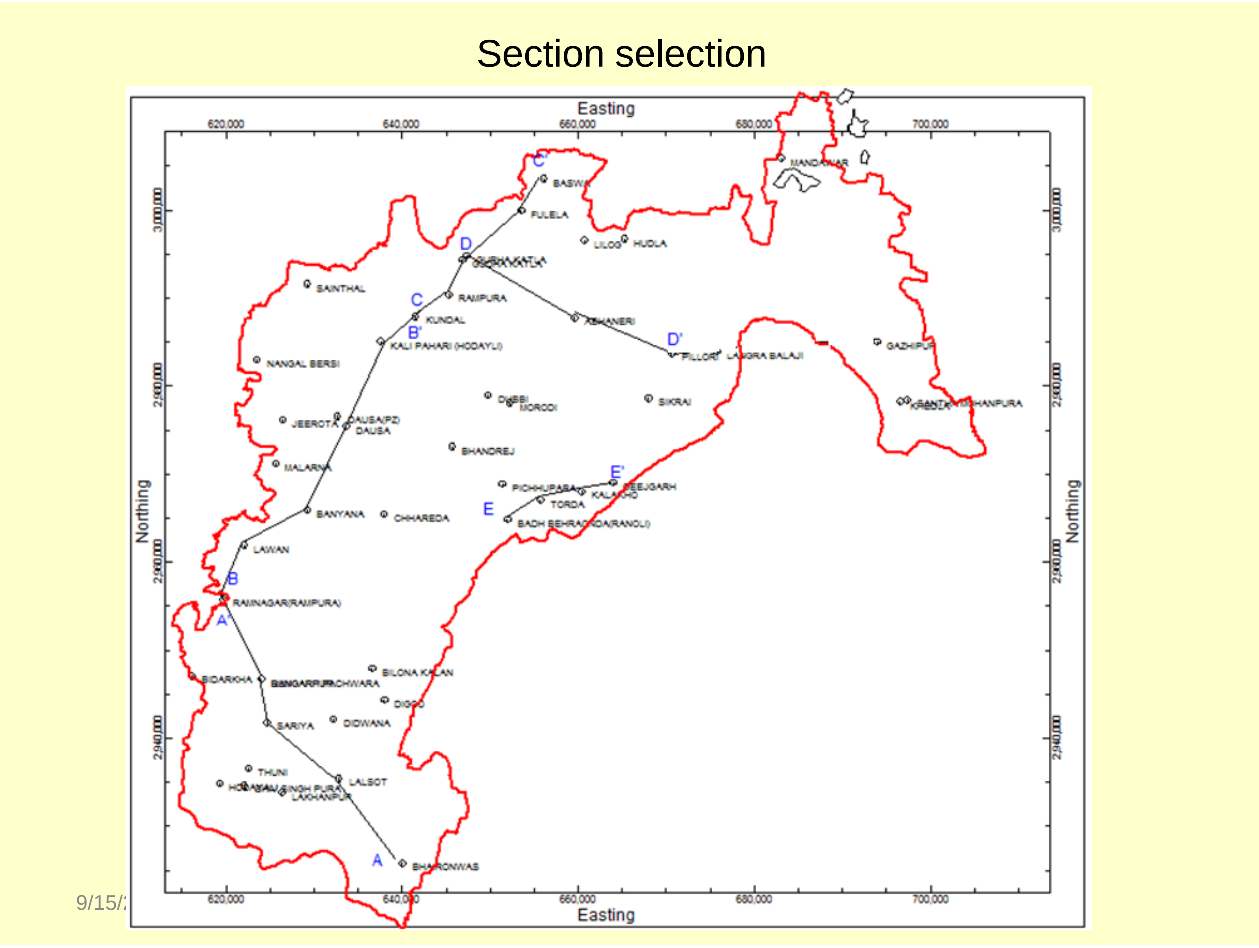


Figure 14: Map showing different cross sections, Dausa district

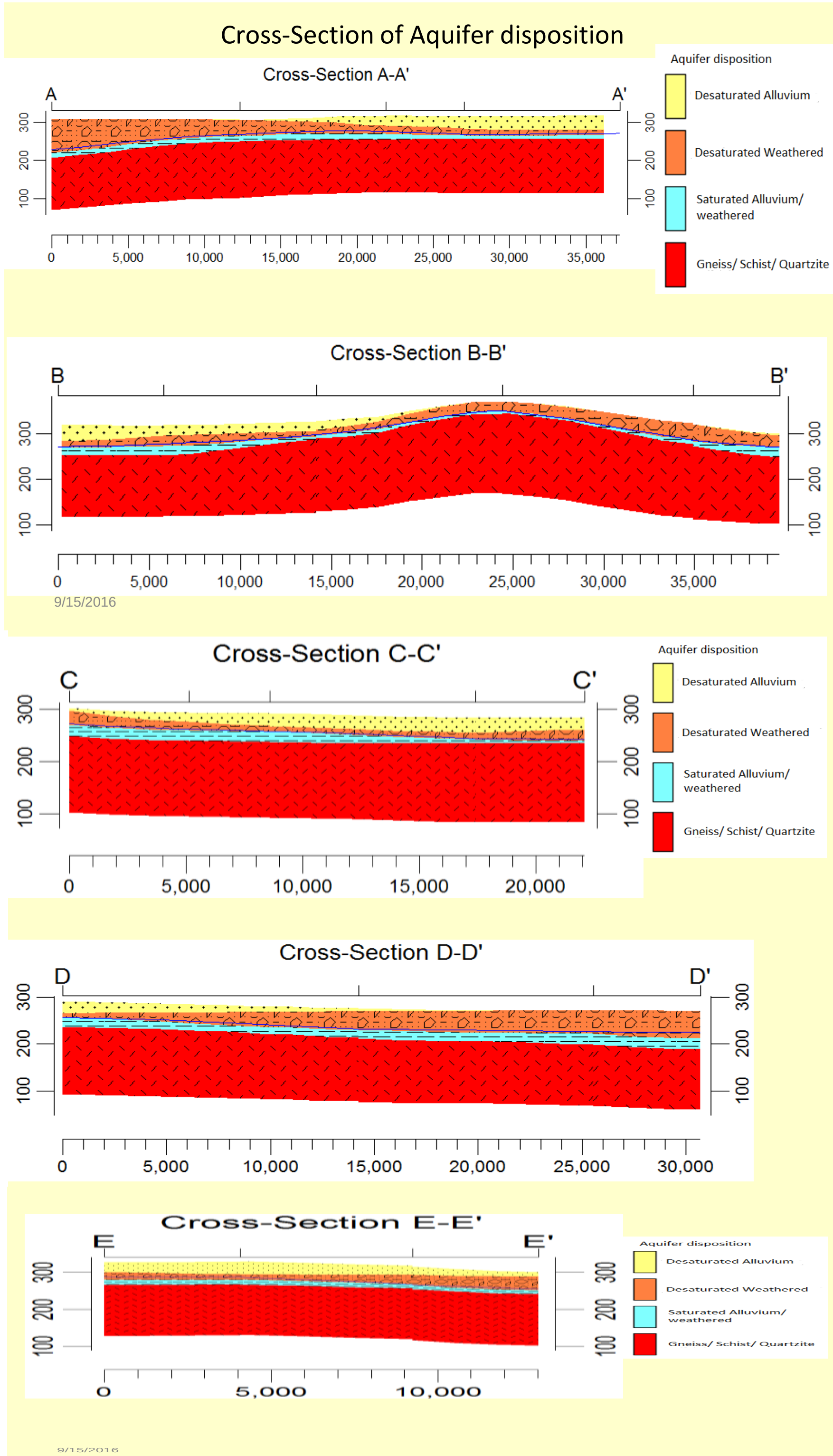


Figure 15: Map showing different cross sections A-A',B-B',C-C',D-D', & E-E' aquifer disposition

The water table elevation map of Dausa district as per pre monsoon 2015 data is shown in Figure 16.

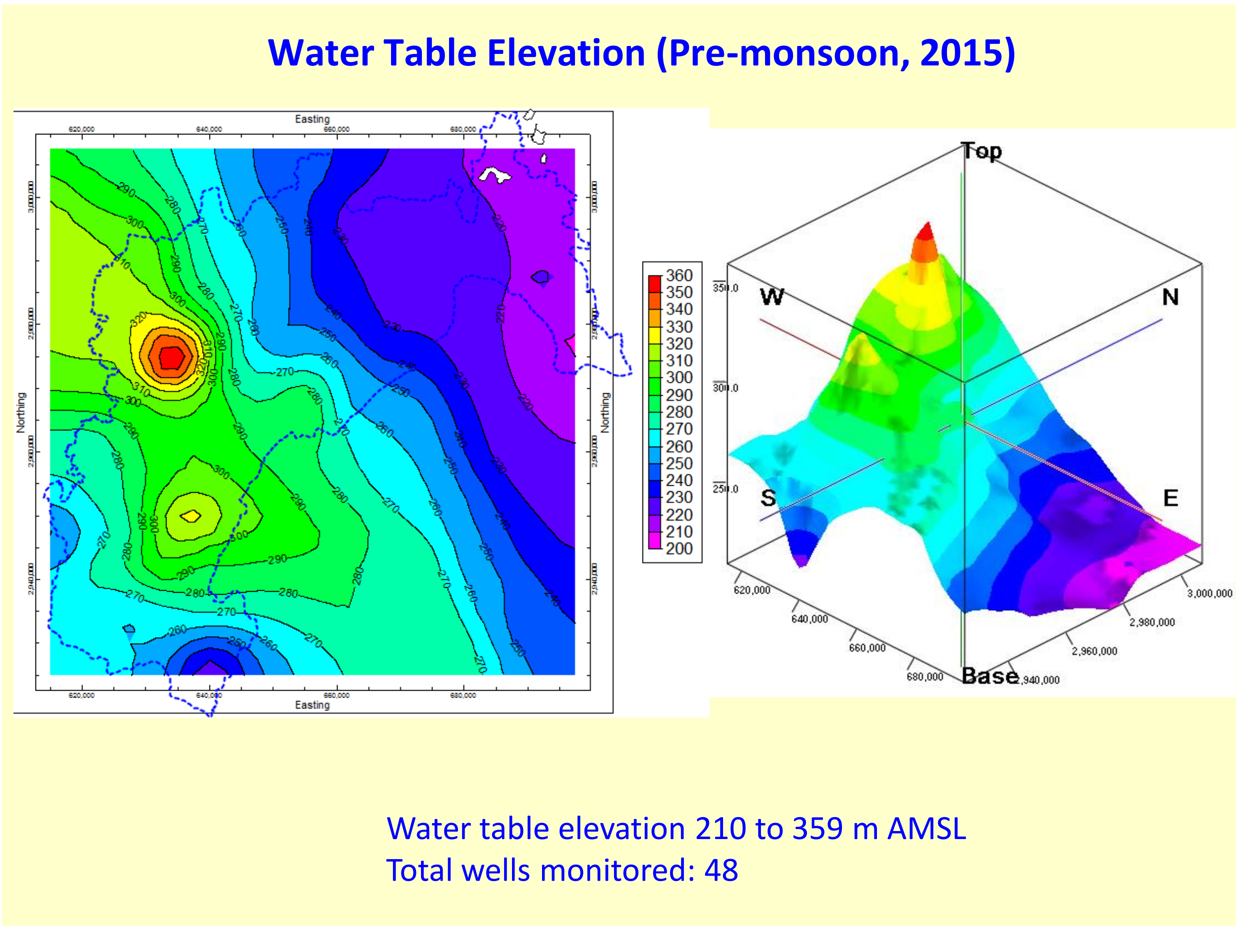


Figure 16: Water Table Elevation Map (May, 2015)

2.2 Ground Water Quality

The ground water is moderately alkaline type having pH value more than 7 and is potable in major part of the district. The electrical conductivity in general rests between 500 to 5000 µS/cm at 25°C in major part of the area (Figure 17), however it ranges from 550 (minimum at garh ranoli in sikrai block and kali pahari in dausa block) to 4790 µS/cm at 25°C (maximum at Bapi in Dausa block). Out of total stations, 69% of stations have electrical conductivity within 3000 µS/cm at 25°C. EC value between 2000 and 3000 is constituted by 25% of the samples and 31.25% of stations rests beyond 3000 µS/cm at 25°C occupying which covers the central part of Dausa block, west of Mahuwa, west of Sikrai and south west of Lalsot. Nitrate concentration falls within permissible limit i.e.45 ppm in greater part of the area constituted by 81.25% of stations (Figure 18).

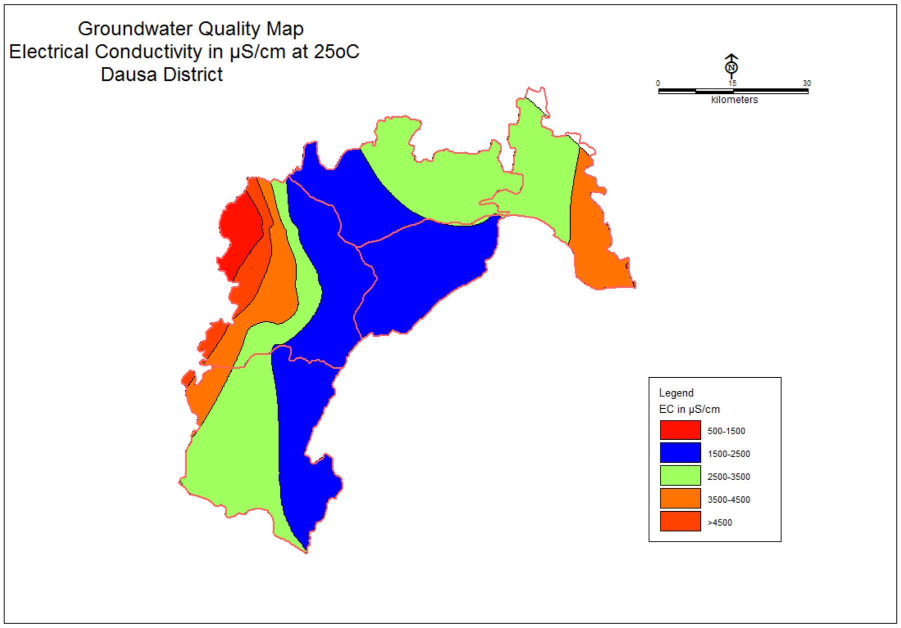


Figure 17: EC Map of Dausa District

Fluoride content ranges from traces to a maximum of 3.60 mg/I Out of total stations, 31.25% of stations represent fluoride concentration more than permissible limit i.e.1.5 mg/I (Figure 19). Iron concentration ranges from nil (at bapi and bhandarej in dausa block) to a maximum of 5.80 mg/I (at baswa in bandikui block). Out of total stations, 50% of stations have iron content beyond permissible limit i.e 0.3 mg/I of drinking water standard.

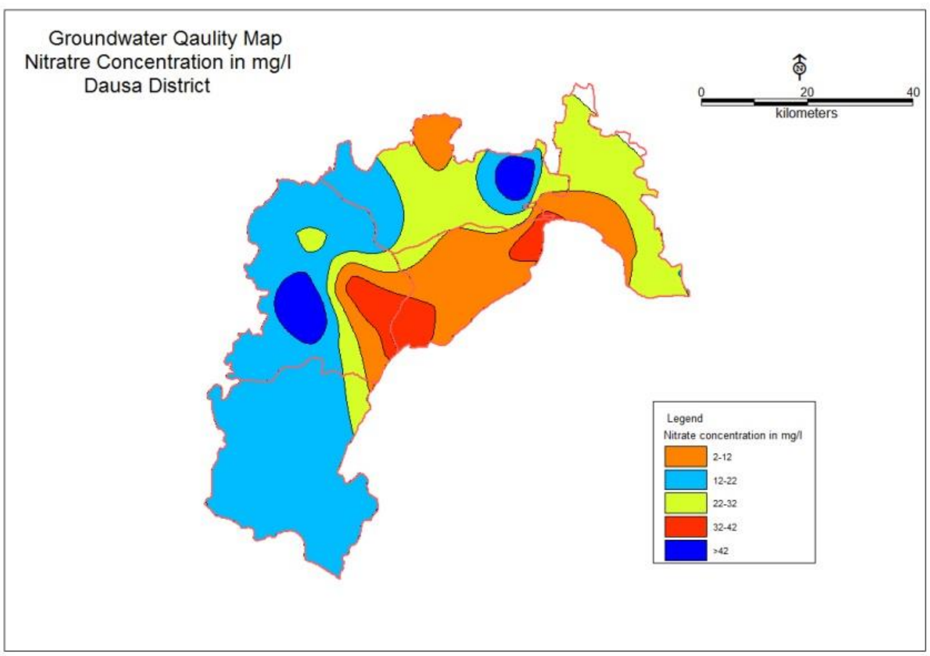


Figure 18: Nitrate map of Dausa District

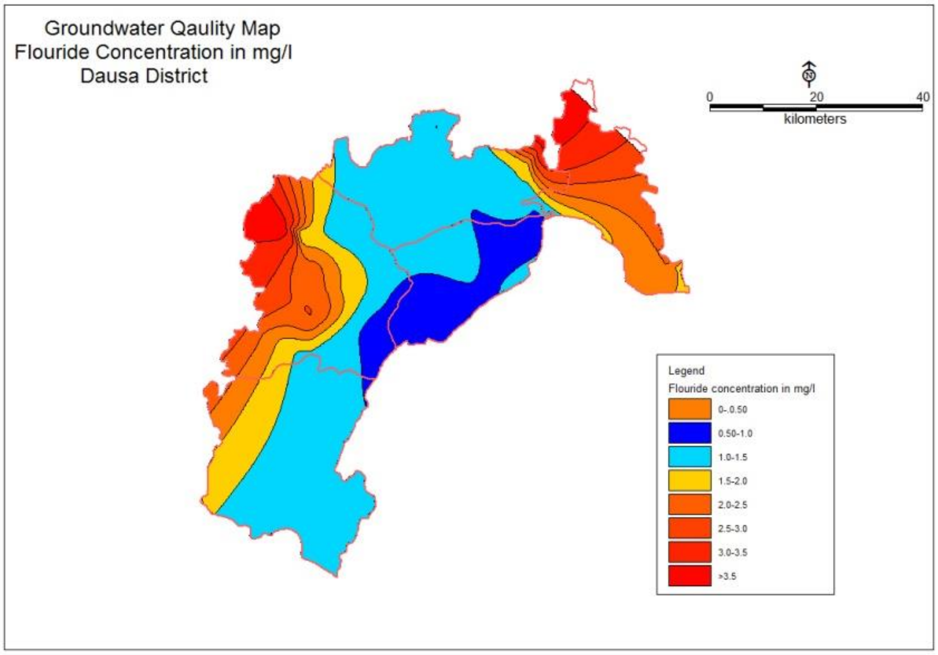


Figure 19: Fluoride map of Dausa District

3. Ground Water Resources

Based on Ground Water Estimation Committee (1997), dynamic groundwater resources of Rajasthan as on 31.03.2013 have been reassessed jointly by Central Ground Water Board and Ground Water Department, Govt. of Rajasthan. Block and zone wise details of resources are given in Table 5. The figure showing Showing net GW availability Vs ground water draft, dist. Dausa is shown in Figure 20.

Table 5: Ground Water Resources as on 31.03.2017

Status of Ground Water resources – Dausa district

Block	***Ground Water Availability (MCM)***	***Irrigation Draft (MCM)***	***Domestic/ Industrial Draft (MCM)***	***Gross Draft (MCM)***	***Stage (%)***
Bandikui	34.8283	72.3347	4.0693	76.4040	219.37
Dausa	68.3923	70.6314	9.2990	79.9304	116.87
Lalsot	60.6702	121.3560	3.2861	124.6421	205.44
Mahua	34.1292	46.6905	4.6144	51.3049	150.33
Sikrai	56.3159	79.2168	4.2734	83.4902	148.25
Total	254.3359	390.2294	25.5422	415.7716	163.47

All the blocks are over exploited.

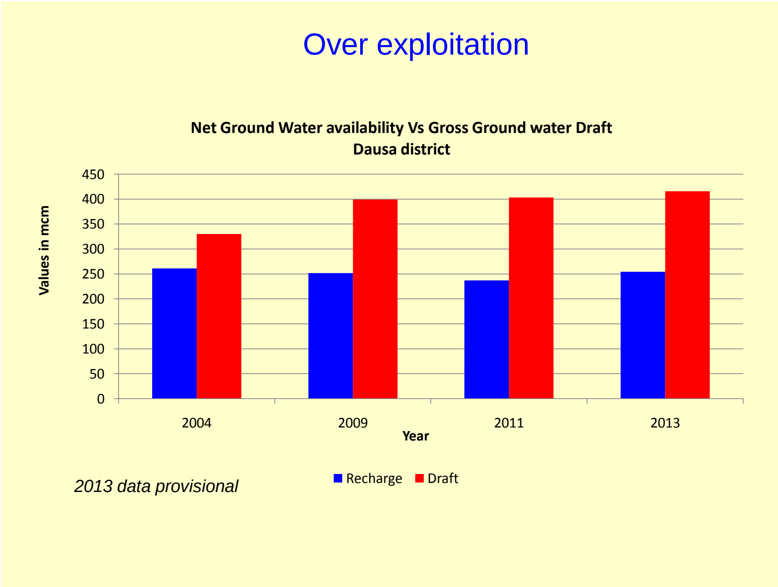


Figure 20: Showing net GW availability Vs ground water draft, dist. Dausa

4. Major ground water related issues

The following ground water related issues have been emerged:

a. Over exploitation

b. Decline in ground water level

c. Deep water levels

d. Ground water quality - Salinity

e. Over exploitation

f. Decline in water levels.

5. Management Strategies

All the blocks are over exploited, thereby, leaving no/limited scope of further ground water development for various consumptions and area is devoid of sustained surface water bodies.In order to manage the ground water resources and to control further decline in water levels, a management plan has been proposed. In order to manage the ground water resources and to control further decline in water levels, a management plan has been proposed. The management plan comprises two components- supply side management and demand side management. Since there is very little surplus surface water available in this district, very little intervention in the form of supply side management could be proposed.

5.1 Supply Side Management

The supply side management of ground water resources can be done through the artificial recharge of surplus runoff available within river sub basins and micro watersheds. Also it is necessary to understand the unsaturated aquifer volume available for recharge. The unsaturated volume of aquifer for the Dausa district is computed based on following; the area feasible for recharge, unsaturated depth below 5 m bgl and the specific yield of the aquifer.

5.1.1 Artificial recharge to ground water through interventions of various structures

The following parameters are inevitable for planning of artificial recharge to ground water.

- Availability of sufficient storage space to accommodate recharged water
- Availability of surplus water to recharge
- Feasibility of sub-surface geological formations

The details of feasible recharge structures to recharge the surplus water in respective blocks of Dausa district are given in Table 6.

Table 6: Block-wise details of feasible recharge structures, Dausa District

Supply Side Management

Block	Zone AREA (sq. km.)	surplus available in the Zone (in Mm3)	Surplus available ins zone as per the water level	No. of RS 0.03 MCM/RS	No of RS possible in block (as per water bodies)	Remaining Surplus water for Recharge and Conservation	No. of PT (Rounded off to nearest integer)	No. of PT possible in block
Bandikui	0	0		0	0	0	0	0
Dausa	306.65	1.7071	1.7071	57	57	0	0	0
Lalsot	873.97	4.8654	4.8654	162	138	0.7254	4	4
Mahua	0	0	0	0	0	0	0	0
Sikrai	0	0	0	0	0	0	0	0
Total	1180.62	6.57	6.57	219	195	0.73	4	4

Summary of recharge structures and percolation tanks and their cost component is as below:

Information	Figure
Surplus available	6.57 MCM
Number of recharge shafts (in existing village ponds)	195
No. of percolation tanks	4
Net ground water recharge	4.60 MCM
Total cost of proposed interventions	Rs 11.35 crore

5.2 Demand side Management

Though not much augmentation can be done through supply side management due to less availability of surplus water, applying the techniques of demand side management can save large amount of water. Demand side management has been proposed through two interventions – changing the more water intensive wheat crop to gram (chick pea) and use of sprinkler irrigation in the areas where rabi crop is being irrigated through ground water and

5.2.1 Change in cropping pattern

In view of the alarming decline of water level, drastic reduction in saturated thickness of aquifer and resulting of depletion of aquifer, there is need to bring paradigm change/shift in cropping pattern in the area. It is proposed to grow low water requirement crop like gram in the instead of wheat. Growing of gram will save the water to the tune of about 51 mcm per annum @ 0.1m (Table 7).

Table 7: Block-wise water saving through change in cropping pattern and irrigation practice

Block	Irrigated Area (ha) proposed for irrigation through sprinkler	Total cost (Rs in cr)	Water Saving by sprinkler in mcm @0.08 m	Water Saving by change in cropping pattern in mcm @0.1 m	Total water saving (mcm)
Bandikui	25234	63.09	10.09	7.87	17.97
Dausa	34838	87.10	13.94	11.24	25.18
Lalsot	51246	128.12	20.50	14.34	34.84
Mahua	33652	84.13	13.46	8.67	22.13
Sikrai	27194	67.99	10.88	9.03	19.90
Total	172164	430	69	51	120

Change in crop from wheat to gram will not affect farmers economy and sustainable ground water supply will be maintained.

Change in cropping pattern (Wheat to Gram)							
Irrigated Area (ha)	**Irrigated Area (ha) under wheat proposed for Gram cultivation**	**Production of wheat (ton)/ha**	**Production of gram (ton)/ha**	**Unit cost (Rs) of wheat /ton**	**Unit cost (Rs) of gram /ton**	**Market value (Rs) of wheat (ton)/ha**	**Market value (Rs) of gram (ton)/ha**
172164	86082	5	1.5	16000	53000	80000	79500

Enhancement of ground water resources through artificial recharge, improved irrigation practices and change in cropping pattern is abridged below as under.

- **Sprinkler**
  - Area proposed for irrigation by sprinkler – 860.82 sq km (50%)
  - Net Water saving - 69 MCM (20% of crop water requirement)
  - Total cost for sprinklers – Rs 430crore @Rs 50,000 per hectare

- **Change in cropping pattern**
  - From wheat to gram in 511.54sq km irrigated area
  - Net water saving - 51 MCM
- **Total water saving : 120 MCM**
- **Total Cost / Outlay: Rs. 430Crores**

Block wise details of ground water recharged and saved along with expected improvement in stage of ground water development is given in Table 8. The perusal of data indicate that saving of ground water through projects may lead to decrease in the net ground water draft and may reduce the stage of ground water development from 134.19 % to 117.00% after interventions.

Table 8: Summary of expected benefit of management strategies, Dausa district

Expected Benefits or Outcome

Block	Net G.W. Availability (mcm)	Additional Recharge from RWH & conservation (mcm)	Total Net G.W. Availability after intervention (mcm)	Existing G.W Draft for all purpose (mcm)	Saving of Ground water through projects (mcm)	Net GW draft after interventions (mcm)	Present stage of G.W. development (%)	Projected stage of G.W. Dev. (in %)
Bandikui	34.8283	0.00	34.83	76.40	17.97	58.44	158.55	167.78
Dausa	68.3923	1.19	69.59	79.93	25.18	54.76	111.08	78.69
Lalsot	60.6702	3.41	64.08	124.64	34.84	89.80	130.82	140.15
Mahua	34.1292	0.00	34.13	51.30	22.13	29.17	158.06	85.47
Sikrai	56.3159	0.00	56.32	83.49	19.90	63.59	112.43	112.91
Total	254.3359	4.60	258.94	415.77	120.02	295.75	134.19	117.00

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