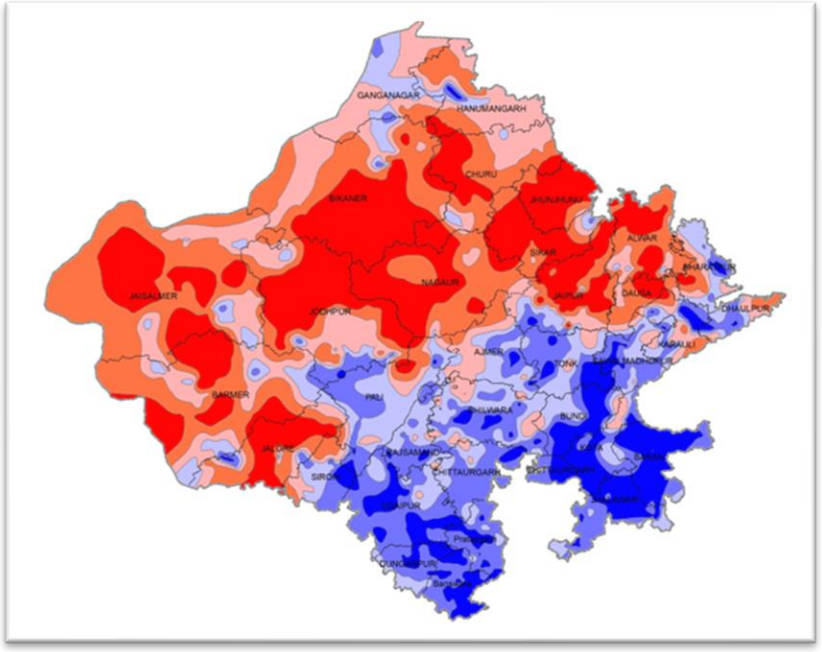


GROUND WATER LEVEL BULLETIN

AUGUST 2024

RAJASTHAN

ABSTRACT

Ground water level Scenario during August-2024 highlighting the findings, status of ground water level and its seasonal, annual and decadal comparison.

CGWB,WESTERN REGION, JAIPUR

1.0 INTRODUCTION

Groundwater bulletin is prepared by CGWB depicting changes in groundwater regime of the country through different seasons. It is an effort to obtain information on groundwater levels through representative monitoring wells. The important attributes of groundwater regime monitoring are groundwater level.

The natural conditions affecting the groundwater regime involve climatic parameters like rainfall, evapotranspiration etc., whereas anthropogenic influences include pumpage from the aquifer, recharge due to irrigation systems and other practices like waste disposal etc.

Groundwater levels are being measured by Central Ground Water Board four times a year during January, March/April/May, August and November. The regime monitoring started in the year 1969 by Central Groundwater Board. A network of 25437 observation wells called **National Hydrograph Network Stations (NHNS)**, as on 30.04.2023, located all over the country is being monitored.

2.0 STUDY AREA

The State of Rajasthan comprising of 33 districts has a geographical area of 3,42,239 square kilometers (sq km) and is the largest State in the country. Administrative division map of Rajasthan is shown in Figure-1. It is situated between north latitudes 23°03' and 30°12' and east longitudes 69°30' and 78°17'. The ground water monitoring is being carried out through a network of observation wells- the National Hydrograph Network Stations (NHS).

Physiographically the state is divided into four major units, i.e., Aravalli hill ranges, Eastern plains, Western Sandy Plain and Sand Dunes & Vindhyan Scarpland and Deccan Lava Plateau.The Aravalli Hill Ranges from the main water divide in Rajasthan.

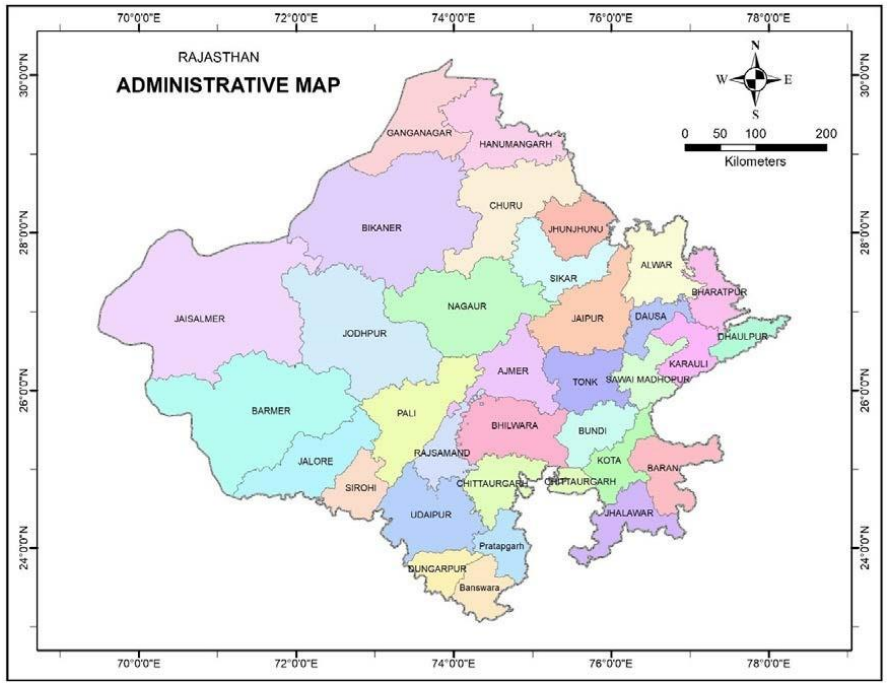


Figure-1: Map showing administrative divisions of Rajasthan

Luni is the only river west of Aravallis. In the remaining area of western Rajasthan comprising about 60% of the geographical area of the state, the drainage is internal, and the streams are lost in the desert sands after flowing for a short distance from the point of origin. In the east of Aravalli ranges, the main rivers are Chambal, Banganga, Banas, Sahibi, Kantli, Banas and Mahi.Diverse rock types ranging from the oldest Archaean Metamorphics to Sub-Recent to Recent alluvium and wind-blown sand are exposed in Rajasthan. However, in a major portion of the area, particularly in Western Rajasthan, the older rocks lie concealed below a cover of alluvium and blown sand and underlain by hard rock (nearly 40%) consisting of the Archaeans

crystalline (Bhilwara Super Group), Proterozoic rocks comprising Aravalli and Delhi Super Groups, Erinpura Granite, Malani volcanics and plutonic suite of rocks and their equivalents, Marwars, Vindhyans and Deccan Traps. The soft rocks include the alluvium and the blown sand, which occupy the major portion in the remaining part of the State.

3.0 GROUND WATER LEVEL MONITORING

The National Hydrograph Network Stations set-up is a system of spatially distributed observation points at which periodic monitoring of ground water and regime behavior viz. recording of water levels and temperature and collection of ground water samples for water (chemical) quality analysis are done. The main objectives of monitoring of water levels and water quality are to observe the rise and fall of ground water levels and to study changes in quality of water in space and time consequent to changes in the inputs and outputs. Database on ground water levels and quality created through this effort forms an important tool in the evaluation of optimum development and decision making on the various aspects of water resources management. Presently 1266 NHS comprises of 709 dug well and 557 piezometers in the state are being monitored.

The district-wise breakup of the water level monitoring stations is given in Table-1.

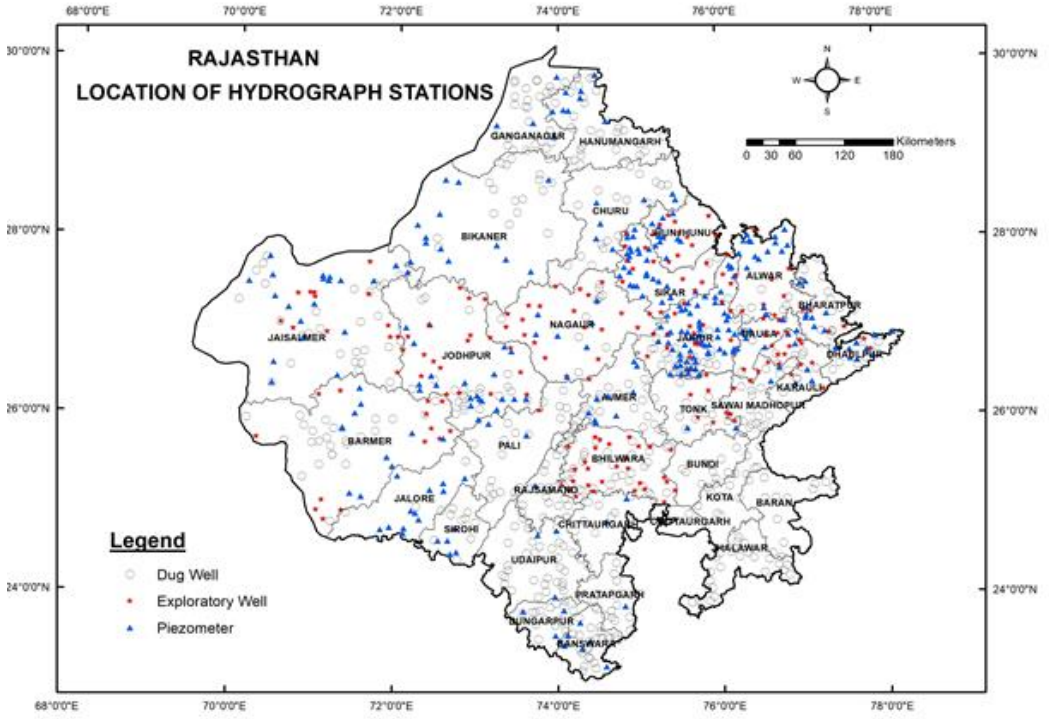


Figure- 2: Map showing locations of monitoring wells (NHNS) in Rajasthan State

Table-1: District-wise distribution of water level monitoring stations

Sl. No.	District	Geographical area (sq km)	Total Number of NHS			Number of NHS monitored		
			Dug Well	Piezometer	Total	Dug Well	Piezometer	Total
1	Ajmer	8481	27	20	47	25	5	30
2	Alwar	8380	11	39	50	10	29	39
3	Banswara	4536	28	20	48	28	6	34
4	Baran	6955	18	1	19	14	1	15
5	Barmer	28387	31	56	87	25	27	52
6	Bharatpur	5100	17	22	39	13	14	27
7	Bhilwara	10455	36	33	69	33	22	55
8	Bikaner	27244	20	36	56	16	26	42
9	Bundi	5550	13	9	22	10	4	14
10	Chittaurgarh	7880	16	2	18	9	2	11
11	Churu	16830	19	11	30	18	10	28
12	Dausa	3470	6	28	34	5	16	21
13	Dhaulpur	3000	9	14	23	8	10	18
14	Dungarpur	3770	16	14	30	16	11	27
15	Ganganagar	10978	31	6	37	31	5	36
16	Hanumangarh	9656	29	24	53	26	20	46
17	Jaipur	11066	30	125	155	27	65	92
18	Jaisalmer	38401	35	49	84	30	39	69
19	Jalore	10640	7	17	24	5	15	20
20	Jhalawar	6219	27	2	29	21	0	21
21	Jhunjhunu	5928	0	30	30	0	25	25
22	Jodhpur	22850	26	98	124	19	59	78
23	Karauli	5016	14	26	40	12	24	36
24	Kota	5481	16	5	21	12	3	15
25	Nagaur	17718	13	39	52	9	26	35
26	Pali	12387	22	13	35	15	7	22
27	Pratapgarh	4360	20	2	22	18	1	19
28	Rajsamand	4768	26	4	30	21	3	24
29	Sawai Madhopur	5043	17	11	28	15	8	23
30	Sikar	7732	2	53	55	2	43	45
31	Sirohi	5136	11	7	18	9	5	14
32	Tonk	7194	16	22	38	15	11	26
33	Udaipur	11761	38	4	42	28	1	29
	Total	3,42,239	647	842	1489	545	543	1088

4.0 RAIN FALL

Rajasthan receives much lower rainfall compared to the other parts of the country. Out of the total rainfall, a sizable portion is in the beginning of the rainy season which is mainly used for building the soil moisture and is also lost to evaporation because of the arid conditions. The amount infiltrating through the soil mass to contribute to ground water storage is of the order of 5% to 7% in areas underlain by hard rocks and 10% to 15% in alluvial areas.

The normal annual rainfall of Rajasthan is 549 mm. However, during the period from 2014-23, highest average annual rainfall of the State occurred in the year 2019 and lowest inthe year 2017. The average annual rainfall (2023) is 20.9% more than the normal annual rainfall. The average annual rainfall of the State during the period 2023 works out to be 695.0 mm.

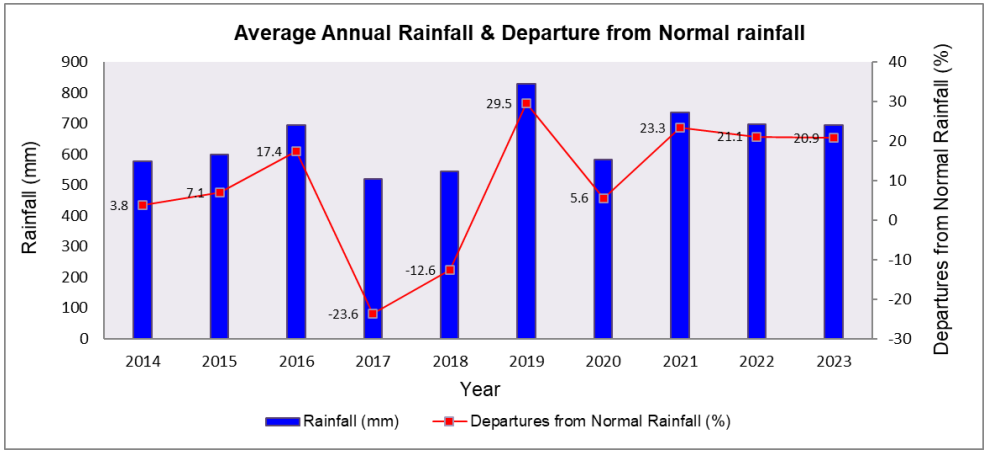


Figure-3: Average annual rainfall and departure from normal rainfall

5.0 GROUND WATER LEVEL SCENARIO (AUGUST 2024)

Depth To Water Level (August 2024)

Total 1088 stations were analyzed for August, 2024. Depth to water level varies from 0.05 mbgl (Shapura, Bhilwara district) to 144.2 mbgl (Phalodi, Jodhpur district).Water level more than 40 mbgl was monitored at 23.35 % stations and spread from north west to western and upper central parts covering mostly Jhunjhunu, Sikar, Jalore, Nagaur, Jodhpur,Jaipur,Dausa,Jalore,Alwar, Jaisalmer,Barmer, Bikaner, Churu, Bharatpur, Karauli,Hanumangarh, Sawai Madhopur districts.

Depth to water level between 20 to 40 mbgl was recorded in 15.81% monitoring stations, stretching from north east to western part and upper central part of the State, covering major parts of Hanumangarh,Churu, Jaisalmer, Alwar,Bikaner, Daulpur, Barmer,Jalore, Sikar, Karauli,Dausa, Jodhpur, Jhunjunu,Jaipur, Chittogarh,Pali, Baratpur districts.Depth to water level between 10 & 20 mbgl was recorded in 14.34% stations falling mostly in Hanumangarh,Gangangar, Chittorgarh, Bikaner, Sirohi, Barmer, Bharatpur,Churu, Jalore, Kota, Karauli,Alwar, Daulpur, Jodhpur, Dungargarh, Rajsamand,Jaisalmer, Tonk,Nagaur, Udaipur, Dausa and at isolated locations.

Depth to water level ranging from 5 to 10 mbgl was recorded at 11.86% stations in falling in south & south eastern part of the state and spread in large patches in Sirohi, Ganganagar,Dausa, Pali,Bharatpur, Karauli, Dungarpur,Bhilwara, Udaipur, Ajmer, Tonk,Jhalawar, Kota, Sawai Madhopur, Rajsamand, Jaisalmer, Dhaulpur,Churu, Pratapgarh, Bikaner, Banswara,Barmer, Jodhpur districts.

Water level ranging between 2 & 5 mbgl was observed at 14.61% stations spread over south, south east part of State falling in Udaipur, Baran, Jhalawar, Pali, Saawai Madhopur, Bhilwara, Dungarpur, Ajmer, Rajsamand, Banswara, Tonk, Dhaulpur,Pratapgarh, Bharatpur, Karauli,Jalore, Sirohi, Bundi, Ganganagar districts.Shallow water level i.e. less than 2 mbgl have been observed at 20.04% stations and falling in Bundi, Pratapgarh, Banswara, Baran,Kota, Tonk, Rajsamand,Chittorgarh, Bhilwara,Ajmer, Jhalawar,Sawai Madhopur, Dungarpur, Jaipur, Pali , Udaipur,Dhaulpur, Karauli, Bharatpur, Ganganagar districts.

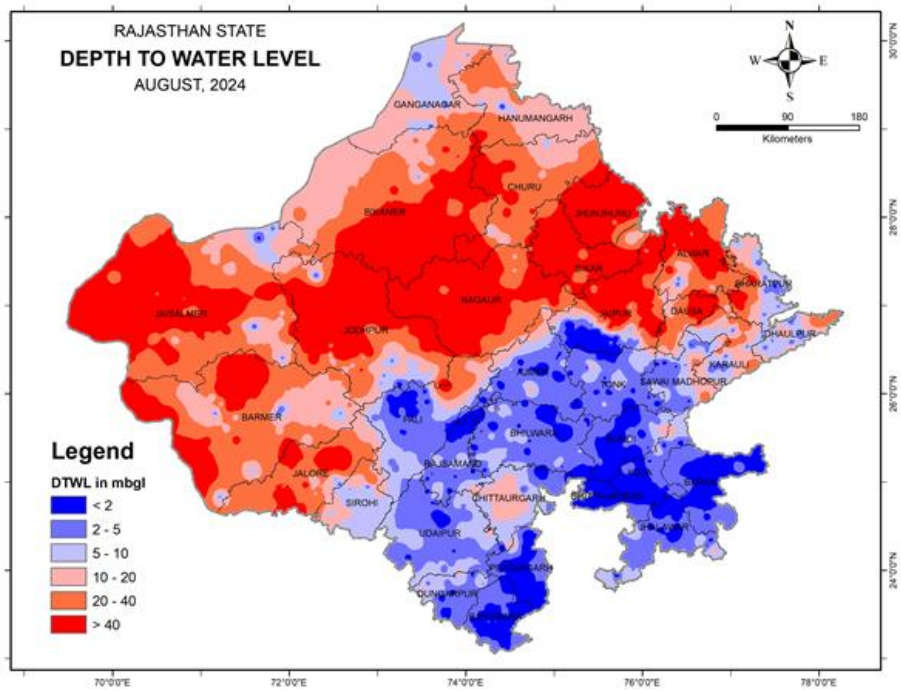
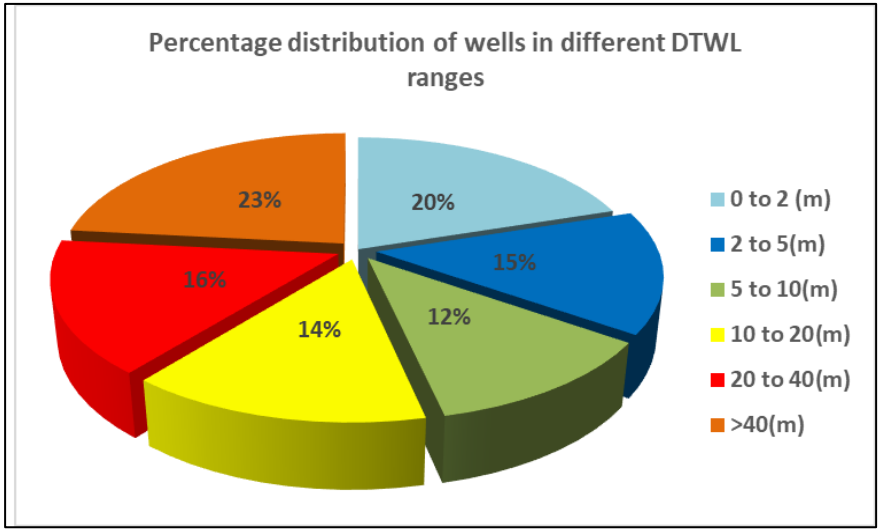


Fig4: Depth to Water level map of August 2024



Water Level Fluctuation - August, 2023 to August, 2024

Total number of wells analysed are 860. A perusal of map (Fig-3) of annual water level fluctuation from August 2023 to August 2024 reveals that 26.74% stations shown rise, 73.25% decline & 0.01% stations shows no change in water level. Area of rise in water spreads from south east to south-central, north western, western and west central parts of the State. Minimum & maximum rise was recorded 0.01 m in Birmi observation well, Jhunjunu district and 30.01 m Gadali, Jhunjunu district.

Rise in Water Levels:

Rise in water level < 2m in 17.4% stations was observed falling mostly in Jhunjunu, Sirohi,Nagaur,Sikar,Alwar, Dungarpur,Dausa, Udaipur,Daulpur, Jaipur,Karauli,Jalore, Bharatpur,Rajsamand, Bikaner, Barmer and Banswara districts and few isolated patches .

Water level rise between 2 & 4m was shown by 3.8% stations mostly falling in Sirohi,Udaipur,Barmer,Nagaur,Bharatpur,Jaisalmer,Jalore,Bhilwara ,Ajmer, Jhunjunu, Jaipur, Karauli,Alwar,Banswara,Hanumangarh,Sikar and Jodhpur districts.Rise of more than 4m has been recorded at 5.5 % stations falling mostly in Chittorgarh, Jodhpur, Dausa, Daulpur, Udaipur, Sikar, Nagaur ,Rajsamand, Jhunjunu, Barmer, Sirohi, Jalore, Pali ,Jaisalmer ,Ajmer,Alwar, Bikaner and Jaipur districts.

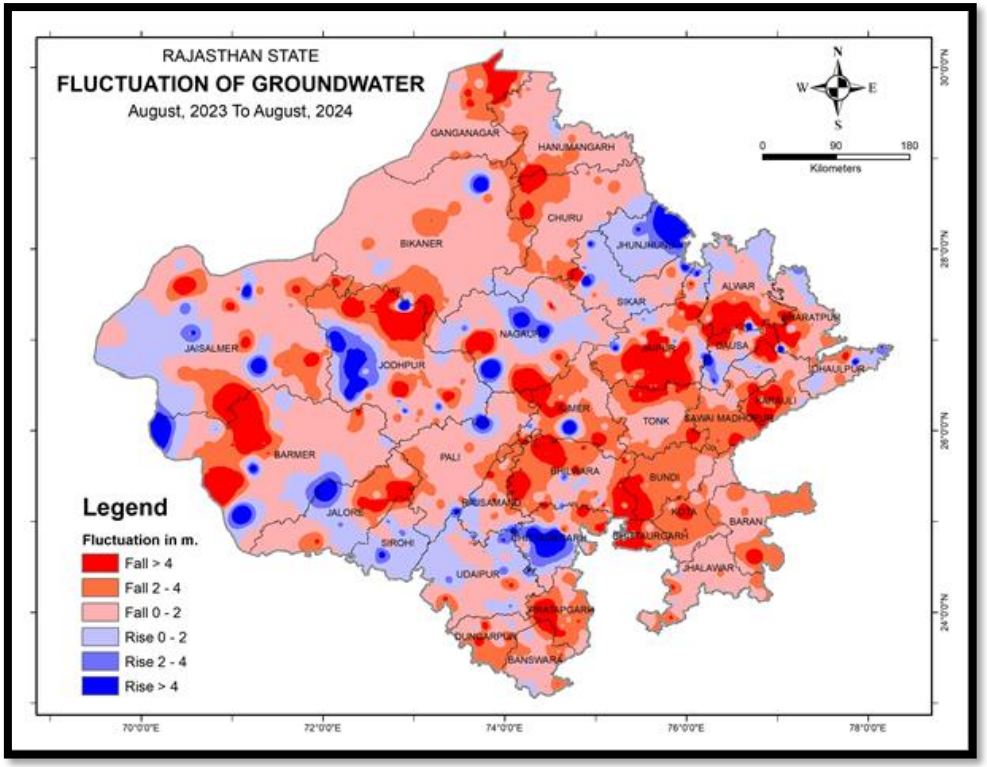


Fig4: Water level Fluctuation map August 2023- August 2024

Decline in Water Levels:

About 73.25% stations scattered in all the districts, mostly in north-eastern, south, south weastern, north& north central parts, shows decline in water level during this period. Minimum & maximum decline was recorded at 0.02 m in Gantiyali,Jaisalmer District and Ladpura of Jodhpur and 28.9 m Paparbar, Bhilwara district.Decline in water level <2m was recorded in 37.0% stations falling mostly Hanumangarh, Bikaner, Jhalawar, Kota, Ganganagar, Banswara, Pali, Churu, Tonk,Baran,Rajsamand, Bharatpur, Pratapgarh,Sawai Madhopur, Jaisalmer, Bundi,Sikar, Karauli, Ajmer and at isolated locations in all other districts.

Decline in water level between 2 & 4m was recorded at 17.8% stations at Bundi,Baran,Tonk,Churu,Sawai Madhopur,Daulpur, Dungarpur,Hanumangarh, Jaisalmer,Pratapgarh, Jaipur, Rajsamand, Bhilwara, Chittorgarh, AAjmer, Pali, Jodhpur, Kota, Banswara districts.

Water level decline >4m was exhibited by 18.5% stations Jaipur, Bhilwara, Pratapgarh, Dausa, Chittorgarh, Ajmer, Barmer, Kota, Jalore, Karauli, Sawai Madhopur, Bharatpur, Alwar, Jodhpur, Ganganagar, Jaisalmer, Dungarpur, Jhalawar ,Nagaur , Dhaulpur, Banswara, Pali, Udaipur and Bundi districts.

Water Level Fluctuation – May 2024 to August, 2024

Total number of wells analyzed are 894. A perusal of map (Fig-5) of annual water level fluctuation from May 2024 to August 2024 reveals that 80.87% stations shown rise, 18.57% decline & 0.56% stations shows no change in water level. Area of rise in water spreads from south east to south-central, north western, western and west central parts of the State. Minimum & maximum rise was recorded 0.03 m in Sanawara observation well, Barmer district and 43.02 m Bastawa Matha, Jodhpur district.

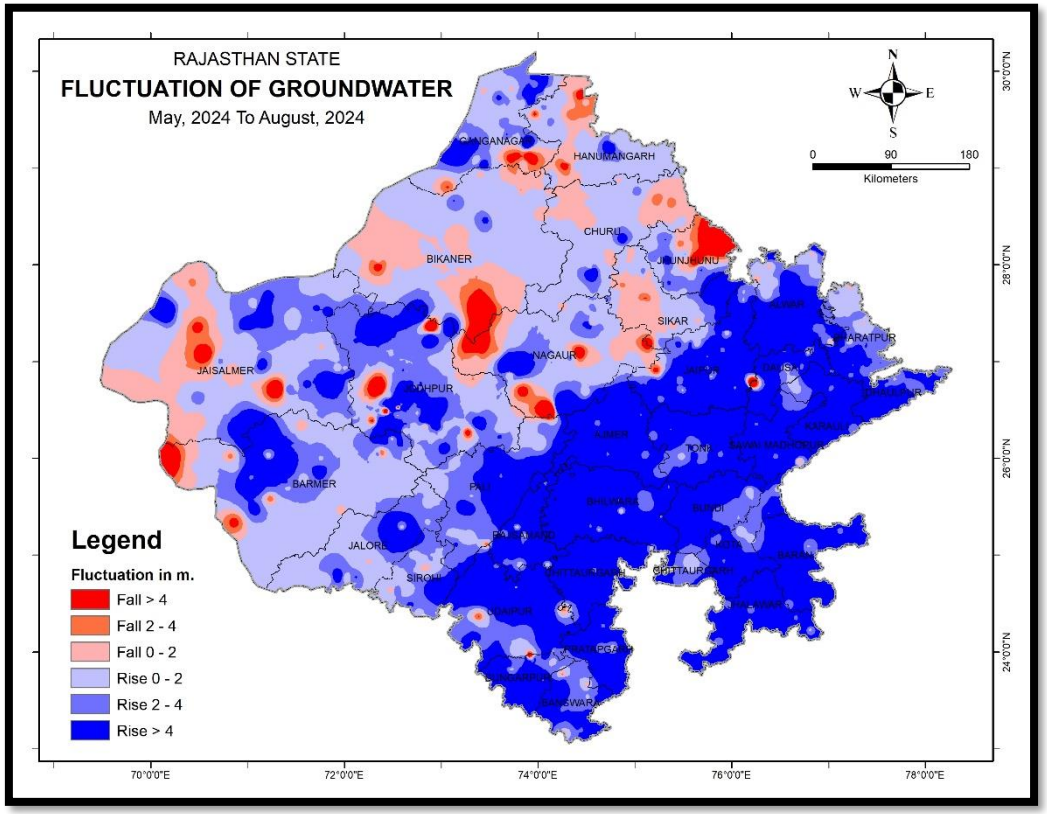


Fig5: Water level Fluctuation map May 2024 - August 2024

Rise in Water Levels:

Rise in water level < 2m in 23.8% stations was observed falling mostly in Hanumangarh, Jalore, Bikaner, Pali, Barmer, Jaisalmer, Churu, Jodhpur, Bundi, Nagaur, Sikar, Kota, Bharatpur, Chittorgarh, Jhunjunu, Baran, Ganganagar and Udaipur and as patched in all other districts .Water level rise between 2 & 4m was shown by 15.9% stations mostly falling in Banswara, Bundi, Kota, Sirohi, Karauli,Jhalawar, Pali, Jodhpur, Bharatpur, Tonk, Jhunjunu, Ajmer, Dungarpur, Jaipur, Baran, Sawai Madhopur, Udaipur, Nagaur, Jaisalmer, Rajsamand, Pratapgarh, Udaipur, Dausa, Jodhpur and Barmer districts .Rise of more than 4m has been recorded at 41.2 % stations mainly along the south eastern ,eastern and western part of the State namely Pratapgarh, Bhilwara, Ajmer, Sawai Madhopur, Dungarpur, Chittorgarh, Rajsamand, Dausa, Tonk,Baran ,Karauli, Udaipur, Daulpur, Alwar, Jaipur, Banswara, Kota, Bundi, Bharatpur, Jodhpur, Ganganagar, Jhunjunu ,Barmer, Sirohi , Jaisalmer, Jalore and Pali districts.

Decline in Water Levels:

About 18.57% stations scattered in western ,north& north central parts, shows decline in water level during this period. Minimum & maximum decline was recorded at 0.01 m in Siroha, Bharatpur district and 28.6 m Gadhali,Jhunjunu district. Decline in water level <2m was recorded in 12.6% stations falling mostly in Ganganagar, Sikar, Sirohi, Churu, Bikaner, Alwar,Nagaur, Hanumangarh, Jalore, Jaisalmer, Bharatpur, Jhunjunu, Barmer,Jodhpur, Rajsamand, Dungarpur, Banswara districts.

Decline in water level between 2 & 4m was recorded at 1.9 % stations at Churu, Nagaur, Jhunjunu, Sawai Mahopur,Sikar, Barmer, Udaipur, Bikaner, Alwar, Banswara, Jaisalmer and Jodhpur districts.

Water level decline >4m was exhibited by 4% stations and distributed along Nagaur, Ganganagar, Jhunjunu, Hanumangarh, Jodhpur, Jaisalmer, Barmer, Bikaner, Dausa, Pali,Sikar,Dungarpur,Udaipur and Jaipur districts.

Decadal Variation - Decadal average Fluctuation of August (2014-2023) to August, 2024

Total number of wells analysed are 944. Comparison of water level for August 2024 with that of mean August (2014-2023) (Fig-6) infer that water level in 38.65% stations show rise wheras 61.25% shows decline in water level. Rise is mostly in south to south-central, north eastern, western and west central parts of the State. Minimum & maximum rise was recorded at 0.01m (Banthoni, Baran District and 30.01 m (Gadali,Jhunjunu district).

Rise in Water Levels:

Rise in water level <2m in 18.8% stations was observed falling mostly in Jhalawar,Jhunjunu,Churu,Ganganagar,Sirohi,Nagaur, Udaipur, Kota, Sikar, Bundi, Dausa, Bikaner, Hanumangarh, Dungarpur, Barmer, Baran, Pali, Jaisalmer, Karauli, Banswara, Jodhpur, Alwar and Bhilwara and at isolated locations in all the remaining districts .Rise in water level between 2 & 4m was shown by 7.4% stations falling mostly in Hanumangarh, Jalore, Chittorgarh, Kota,Sikar, Dungarpur, Churu, Jhalawar, Udaipur, Jhunjunu, Bharatpur, Ganganagar and Alwar districts and in isolated patched in all other districts.Rise in water level more than 4 m has been recorded at 12.5% stations falling mostly in Jhunjunu, Jodhpur, Alwar, Chittorgarh,Sikar, Dausa, Jalore, Jaipur, Daulpur, Nagaur, Barmer and Sirohi districts.

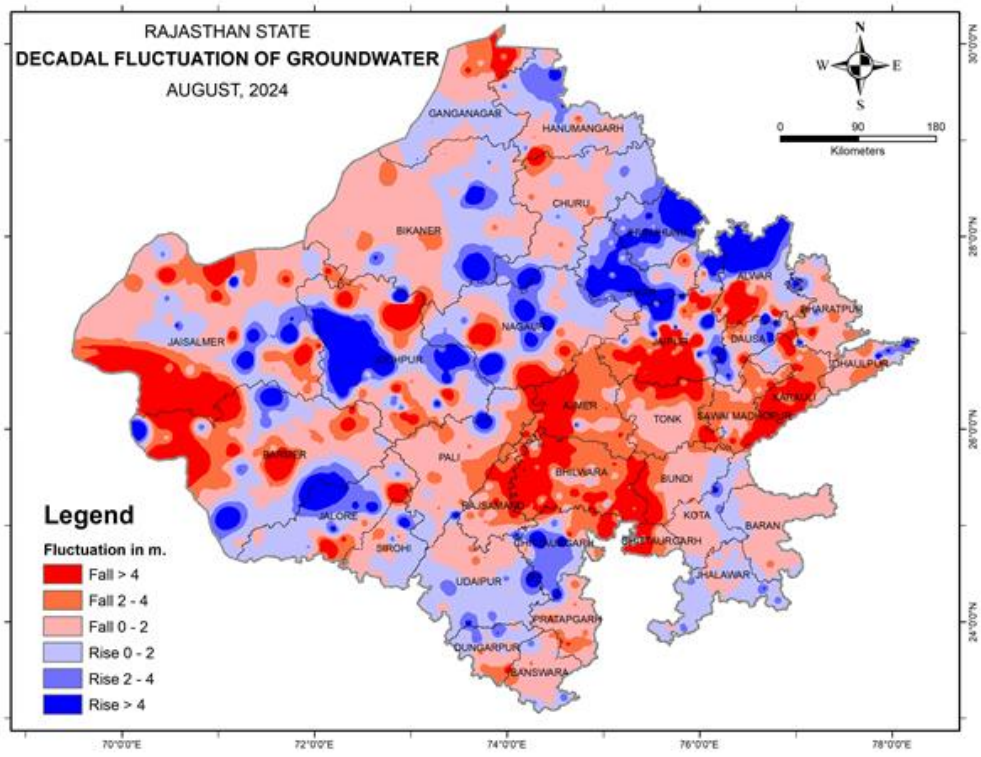


Fig 6: Decadal average fluctuation of August (2014-2023) to August 2024

Decline in Water Levels:

About 61.25% stations, scattered mostly in eastern, south east, north western & central parts, shows decline in water level. Minimum & maximum decline was recorded at 0.01m (Padampura, Ganganagar District and Kharana,Jaipur district) and 30.42 m (Rawastar1,Barmer district) respectively. Decline in water level <2m was recorded in 27.8% stations falling mostly in Baran, Banswara, Tonk, Bundi,Pratapgarh, Bharatpur, Udaipur, Ganganagr, Pali, Bikaner,Hanumangarh, Dhaulpur, Jhalawar, Churu,Karauli, Sawai Madhopur, Barmer ,Rajsamand districts and at isolated locations in all the remaining districtsWater level decline between 2 & 4m was recorded at 15.4% stations scattered in Rajsamand, Pali, Pratapgarh, Sawai Madhopur,Dhaulpur, Ajmer, Kota, Bikaner, Sirohi,Jaisalmer, Dungarpur, Bhilwara, Nagaur, Dausa, Karauli, Bharatpur, Tonk ,Churu, Jodhpur, Banswara, Barmer, Jalore,Udaipur and Bundi districts.

Water level decline >4m was shown by 18.1% stations mostly in Bhilwara, Jaipur, Ajmer, Karauli,Alwar, Sawai Madhopur, Jaisalmer, Jodhpur, Daulpur, Chittorgarh,Rajsamand,Tonk,Jalore, Dausa,Barmer, Bharatpur , Ganganagar, Pratapgarh,Nagaur,Sirohi, Hanumangarh,Dungarpur and Sikar districts.