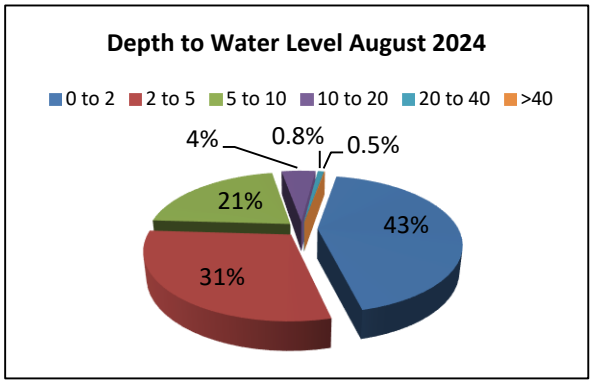

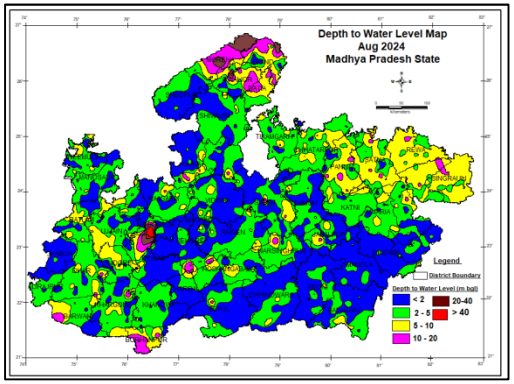

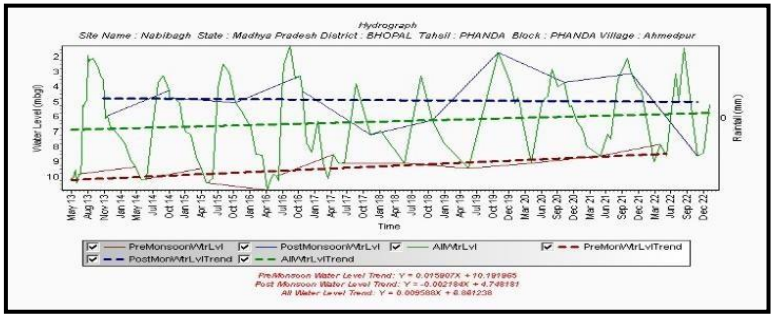

GROUND WATER LEVEL BULLETIN
AUGUST 2024
MADHYA PRADESH

ABSTRACT

Ground Water Level Scenario during August 2024 highlighting the findings, status of ground water level in different aquifers and its seasonal, annual and decadal comparison.

CGWB, NORTH CENTRAL REGION, BHOPAL, MADHYA PRADESH

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, evapo-transpiration etc., whereas anthropogenic influences include pumpage from the aquifer, recharge due to irrigation systemsand 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 Ground Water Board. A network of **1867** observation wells called **National Hydrograph Network Stations (NHNS)**, as on 25.09.2024, located all over the country is being monitored.

2.0 STUDY AREA

Madhya Pradesh is located in the central part of India and is a land-locked state, bordered on the west by Gujarat, on the northwest by Rajasthan, on the northeast by Uttar Pradesh, on the east by Chhattisgarh and on the south by Maharashtra State. It has a geographical area of 3,08,252 km^2 and is situated between north latitudes 21˚ 04' and 26˚ 54' and east longitudes 74° 00' and 82° 50'. There are 52 districts, 313 community development blocks and 4 urban areas in Madhya Pradesh.

The population of state as per census 2011 is 7, 25, 97, 565with a population density of 236 persons per km^2 area. Out of total population, 75% lives in the villages and their main occupation is agriculture. The important urban areas in the state are Bhopal, Indore, Jabalpur, Ujjain and Gwalior. Dhupgarh in Pachmarhi is the highest point in the state. Madhya Pradesh comprises several linguistically and culturally distinct regions, of which the major regions are

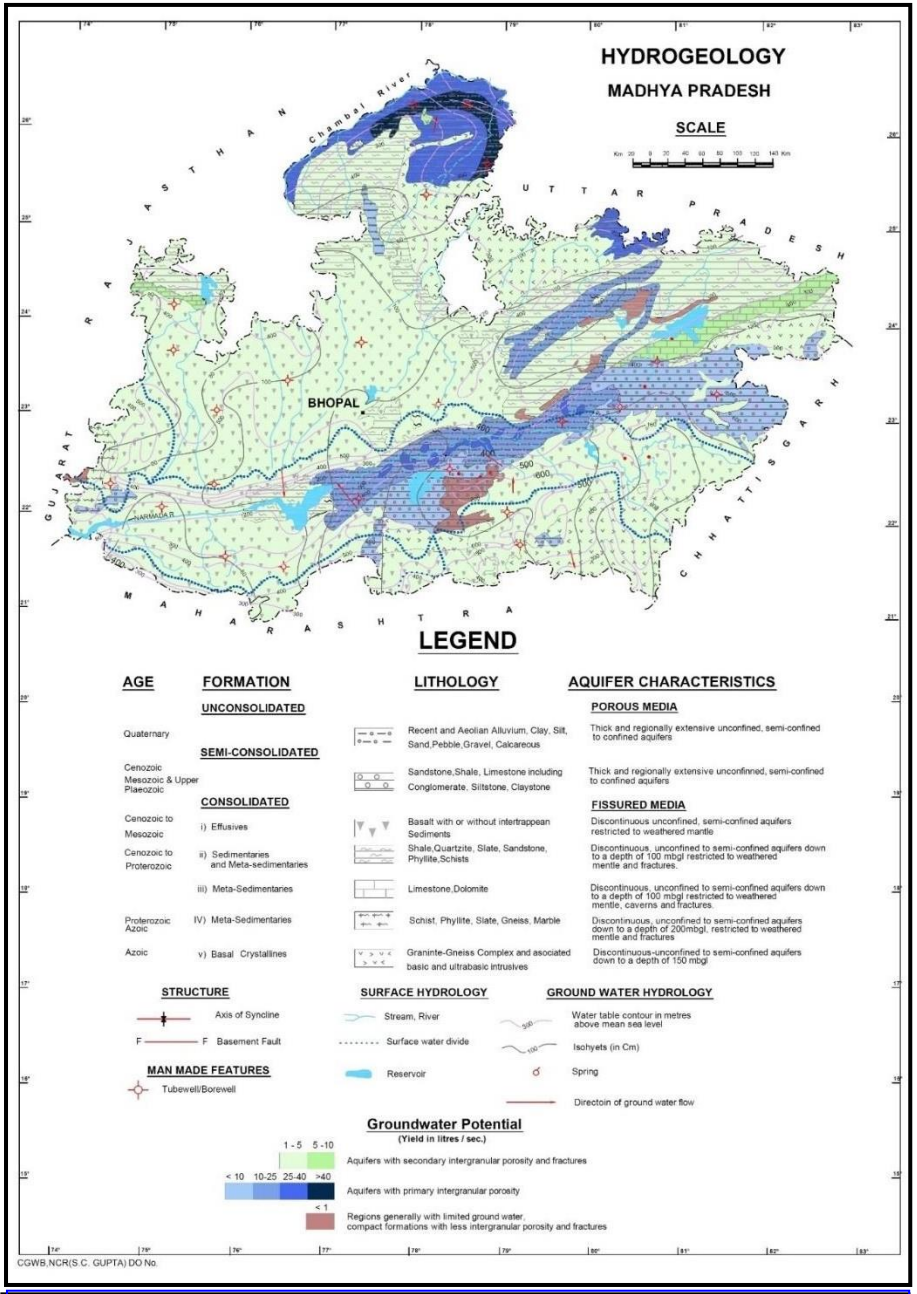

Figure-1: Map showing major aquifers and Hydrogeology of Madhya Pradesh

Malwa Plateau Region which is located in the northwest of the state and north of the Vindhya Range, with its distinct language and culture. Indore is the major city of the region, while Ujjain is a town of historical importance. Bhopal, the capital city lies on the extension of Malwa Region and on the edge of Bundelkhand Region. **Nimar Region** is located in the western portion of the Narmada River valley, lying south of the Vindhyas in the southwest portion of the state. Khandwa, Khargone, Burhanpur and Barwani are the major district of the Nimar Region. **Bundelkhand** is a region of rolling hills and fertile valleys in the northern part of the state, which slopes down toward the Indo-Gangetic plain to the north. This region encompasses Gwalior, Sagar, Damoh, Panna, Chhatarpur and Tikamgarh Districts. **Chambal region** is located in the north-western parts of the stateThis region is comprised of Sheopur, Morena and Bhind Districts. **Baghelkhand** is a hilly region in the northeast parts of the state, which includes the eastern end of the Vindhya Range. Satna, Rewa and Sidhi Districts lie in this region. **Mahakoshal (Mahakaushal)** is the southeastern portion of the state, which includes the eastern end of the Narmada River valley and the Eastern Satpuras. Jabalpur is the most important city in the region. Katni and Jabalpur Districts lie in this region and **Central Vindhyan and Satpura Region** is occupying most parts of the central Narmada River valley. Hoshangabad, Harda and Narsimhapur Districts lies in this region.

3.0 GROUND WATER LEVEL MONITORING

The North Central Region office of CGWB, based at Bhopal, monitors the ground water wells spread all over the state. As on January 2024, **1867** monitoring wells are located in 51 districts of Madhya Pradesh including dug wells **(1392),** Observatory Wells & piezometers **(475).** Water samples are collected from these wells during May to identify groundwater quality issues in each area. District-wise distribution of Ground Water Monitoring Wells in Madhya Pradesh during August 2024 is given in table 1. The locations of these monitoring wells are shown in **Figure 2**.

All monitoring wells are monitored four times in a given hydrological year in the months of May (pre monsoon) (20th to 30th day), August (20th to 30th day), November (post monsoon) (1st to 10th day) and January (1st to 10th day). The long-term data generated during these monitoring seasons are important for computation, comparison and analysis of ground water utilization and its availability. The district-wise breakup is given in Table 1.

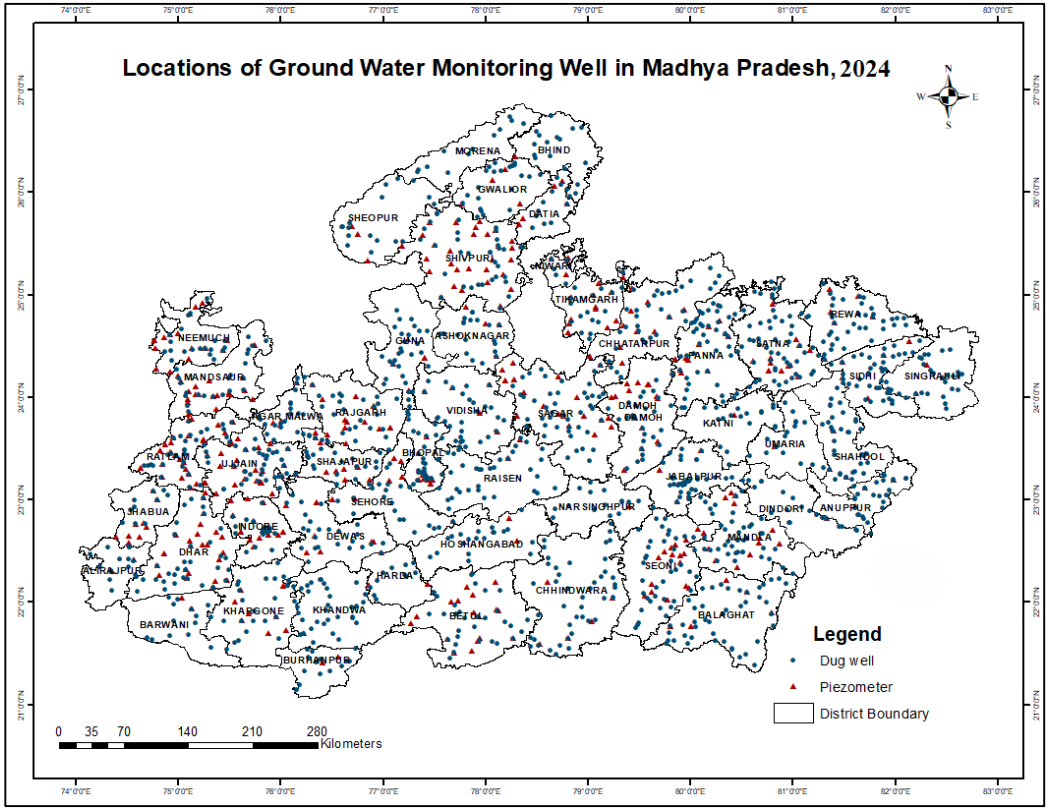

Figure- 2: Map showing locations of monitoring wells (NHNS) in Madhya Pradesh

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

Sl.No.	Name of District	Number of GW Monitoring stations (August 2024)		
		DW	OW/PZ	Total
1	AGAR-MALWA	21	3	24
2	ALIRAJPUR	14	2	16
3	ANUPPUR	24	4	28
4	ASHOKNAGAR	22	5	27
5	BALAGHAT	43	5	48
6	BARWANI	13	2	15
7	BETUL	34	18	52
8	BHIND	17	1	18
9	BHOPAL	30	13	43
10	BURHANPUR	14	2	16
11	CHHATARPUR	34	16	50
12	CHINDWARA	42	7	49
13	DAMOH	27	17	44
14	DATIA	11	5	16
15	DEWAS	26	10	36
16	DHAR	32	29	61
17	DINDORI	20	1	21
18	GUNA	30	4	34
19	GWALIOR	24	4	28
20	HARDA	13	2	15
21	INDORE	24	18	42
22	JABALPUR	36	4	40
23	JHABUA	10	9	19
24	KATNI	16	1	17
25	KHANDWA	34	1	35
26	KHARGONE	22	9	31
27	MANDLA	39	13	52
28	MANDSAUR	21	22	43
29	MORENA	10	0	10
30	NARMADAPURAM	19	0	19
31	NARSINGHPUR	14	1	15
32	NEEMUCH	20	14	34
33	PANNA	44	13	57
34	RAISEN	34	3	37
35	RAJGARH	26	17	43

Sl.No.	Name of District	Number of GW Monitoring stations (August 2024)		
		DW	OW/PZ	Total
36	RATLAM	29	29	58
37	REWA	43	6	49
38	SAGAR	49	19	68
39	SATNA	54	15	69
40	SEHORE	26	8	34
41	SEONI	41	12	53
42	SHAHDOL	39	3	42
43	SHAJAPUR	24	10	34
44	SHEOPUR	17	3	20
45	SHIVPURI	36	32	68
46	SIDHI	38	6	44
47	SINGRAULI	30	3	33
48	TIKAMGARH	21	19	40
49	UJJAIN	36	29	65
50	UMARIA	17	1	18
51	VIDISHA	32	5	37
	Total	**1392**	**475**	**1867**

4.0 RAIN FALL

The rainfall data is collected from the India Meteorological Department on a daily basis and on a monthly basis too. Rainfall data for the Years 2022 and 2023, the percentage departure of rainfall from the Year 2022 and the percentage departure of rainfall from normal given in table 2. On the basis of the data of table 2, a rainfall map is prepared and given in the figure 3. Madhya Pradesh state received normal rainfall in 2023 as compared to 2022. In 2023 19 % less rainfall is seen as compared to 2022. In the year 2023 highest rainfall (1314.4 mm) observed in Narmadapuram District and lowest rainfall (587 mm) in Ashoknagar District. Highest percentage rainfall departure from Year 2022 is observed in Alirajpur District (57%) and lowest in Guna District (-57%).

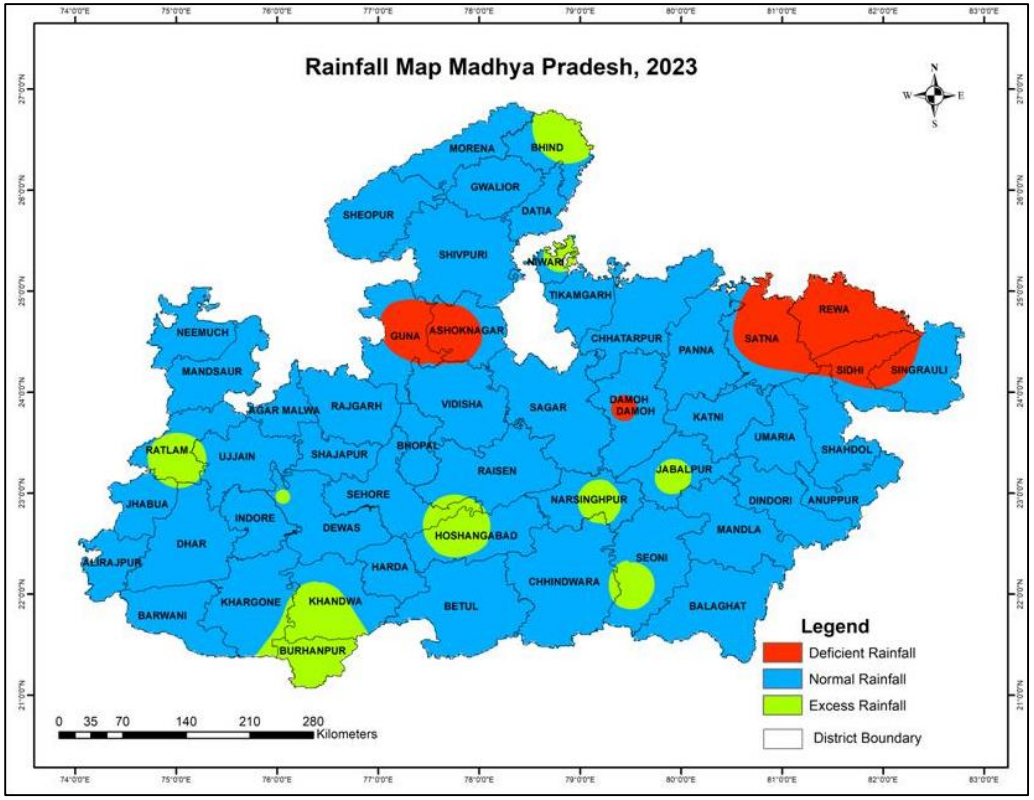

Figure- 3: Rainfall Map of Madhya Pradesh, 2023

Table 2: District-wise distribution of water level monitoring stations

S.N.	NAME	RAINFALL_2023	RAINFALL_2022	NORMAL RAINFALL	% RAINFALL 2023 DEPARTURE FROM NORMAL	% RAINFALL DEPARTURE FROM 2022	Status 2023
1	ANUPPUR	1155.8	1222.8	997.5	16	-5	Normal
2	BALAGHAT	1207.8	1508.5	1239.4	-3	-20	Normal
3	CHHATARPUR	770.4	912.9	941.4	-18	-16	Normal
4	CHINDWARA	1183.8	1578	1000.8	18	-25	Normal
5	DAMOH	827.3	1039.3	1088.9	-24	-20	Deficit
6	DINDORI	1177.8	1125.5	1183.2	0	5	Normal
7	JABALPUR	1094	1149.8	1130.1	-3	-5	Normal
8	KATNI	1012.7	895.5	941.5	8	13	Normal
9	MANDLA	1178.7	1401.2	1197.1	-2	-16	Normal
10	NARSINGPUR	1314.4	1272.3	1051.8	25	3	Excess
11	NIWARI	1021	1050.3	775.6	32	-3	Excess
12	PANNA	980.4	1045	1086.9	-10	-6	Normal
13	REWA	698.9	744.9	986.7	-29	-6	Deficit
14	SAGAR	1006.8	1310.2	1068.5	-6	-23	Normal
15	SATNA	600	807.8	949.3	-37	-26	Deficit
16	SEONI	1282.5	1432.4	1018.1	26	-10	Excess
17	SHAHDOL	961	1018.2	992.8	-3	-6	Normal
18	SIDHI	715.4	811.1	1047.8	-32	-12	Deficit
19	SINGRAULI	722.9	805.1	876.1	-17	-10	Normal
20	TIKAMGARH	908.7	857.9	911.8	0	6	Normal
21	UMARIA	963.7	1056.2	1075.6	-10	-9	Normal
22	AGAR-MALWA	889.8	1392.9	899.3	-1	-36	Normal
23	ALIRAJPUR	987.9	628	871.8	13	57	Normal
24	ASHOKNAGAR	587	1215.4	856.2	-31	-52	Deficit
25	BARWANI	721.1	748.2	669.4	8	-4	Normal
26	BETUL	1095.6	1589.3	1038.1	6	-31	Normal
28	BHOPAL	785.5	1750.9	956.2	-18	-55	Normal
29	BURHANPUR	1084.5	1128.8	737.3	47	-4	Excess
30	DATIA	679.7	645	745.4	-9	5	Normal

S.N.	NAME	RAINFALL_2023	RAINFALL_2022	NORMAL RAINFALL	% RAINFALL 2023 DEPARTURE FROM NORMAL	% RAINFALL DEPARTURE FROM 2022	Status 2023
31	DEWAS	1111.7	1345.8	904.7	23	-17	Excess
32	DHAR	922.3	756.4	818.8	13	22	Normal
33	GUNA	693.5	1628.4	940.9	-26	-57	Deficit
34	GWALIOR	604.7	705.7	721.5	-16	-14	Normal
35	HARDA	1177.4	1396.4	1078.8	9	-16	Normal
36	INDORE	1283.3	1044.4	868.1	48	23	Excess
37	JHABUA	1123.2	723.2	884.2	27	55	Excess
38	KHANDWA	914	1022.6	789.1	16	-11	Normal
39	KHARGONE	918.3	791.8	719.3	28	16	Excess
40	MANDSAUR	702.2	1021.3	825.3	-15	-31	Normal
41	MORENA	640.2	670.5	644.3	-1	-5	Normal
42	NARMADAPURAM	1131.7	1787.6	1259.1	-10	-37	Normal
43	NEEMUCH	735.4	1106.7	776.9	-5	-34	Normal
44	RAISEN	1129.5	1597.8	1084.6	4	-29	Normal
45	RAJGARH	768.8	1727.3	893	-14	-55	Normal
46	RATLAM	1243	1154.8	914.5	36	8	Excess
47	SEHORE	1045.7	1545.6	1070.3	-2	-32	Normal
48	SHAJAPUR	738.6	1287.4	905.9	-18	-43	Normal
49	SHEOPUR	677.5	1028.8	666.4	2	-34	Normal
50	SHIVPURI	750.9	996.3	787.3	-5	-25	Normal
51	UJJAIN	965.3	1087.2	884.4	9	-11	Normal
52	VIDISHA	899.4	1540.1	1023.3	-12	-42	Normal
	MADHYA PRADESH	945.5	1169.1	949.5	0	-19	Normal

5.0 GROUND WATER LEVEL SCENARIO (AUGUST 2024)

5.1 SHALLOW AQUIFER (UNCONFINED)

5.1.1 DEPTH TO WATER LEVEL

Depth to Water Level in Unconfined Aquifer (August 2024)

The depth to water level of 1518 wells is used for the analysis. Analysis of depth to water level data of 1518 wells shows water levels vary between 0 m bgl (Agar Malwa, Anuppur, Betul, Bhopal, Dewas, Dhar, Guna, Hoshangabad, Indore, Jhabua, Mandla, Raisen, Shahdol, Umaria districts) to 54.97 m bgl (Gwalior district). Water level of less than 2 m bgl is recorded in 43% of wells, between 2 to5 m bgl in 31% of wells, between 5 to 10 m bgl in 21% of wells, between 10 to 20 m bgl in 4 % of wells, between 20-40 m bgl in 0.8% of wells and water level more than 40 mbgl is observed in 0.5% of wells.

Shallow water level of less than 2 m bgl as isolated patches in parts of Dindori, Chhindwara, Damoh, Balaghat, Mandla, Anuppur, Seoni, Betul, Harda, Dewas, Sehore, Raisen, Vidisha, Guna, Jhabua, Alirajpur, Sheopur, Shivpuri districts covering only an area of 43% of the State. Water level of 2 to 5 m bgl is observed in parts of Umaria, Katni, Chhatarpur, Panna, Tikamgarh, Sheopur, Shivpuri, Vidisha, Rajgarh, Narsinghpur, Hoshangabad, Raisen, Damoh, Alirajpur, Dhar, Barwani, Khandwa, Khargone, Ujjain, Neemuch, Mandsaur districts covering an area of 31% of the state. 21% area of the state is covered by depth to water level of 5 to 10 m bgl is observed in Rewa, Singrauli, Sidhi, Satna, Panna, Bhind, Datia, Ujjain, Dhar, Barwani, Chhatarpur districts. Water level of 10 to 20 m bgl is covered in 4% of the state area. Water levels of 20 to 40 m bgl cover 0.8% area of the State covering mainly Bhind, Morena, Shajapur districts. Water levels greater than 40 m bgl cover 0.5% of the state and is mainly covering Shajapur district.

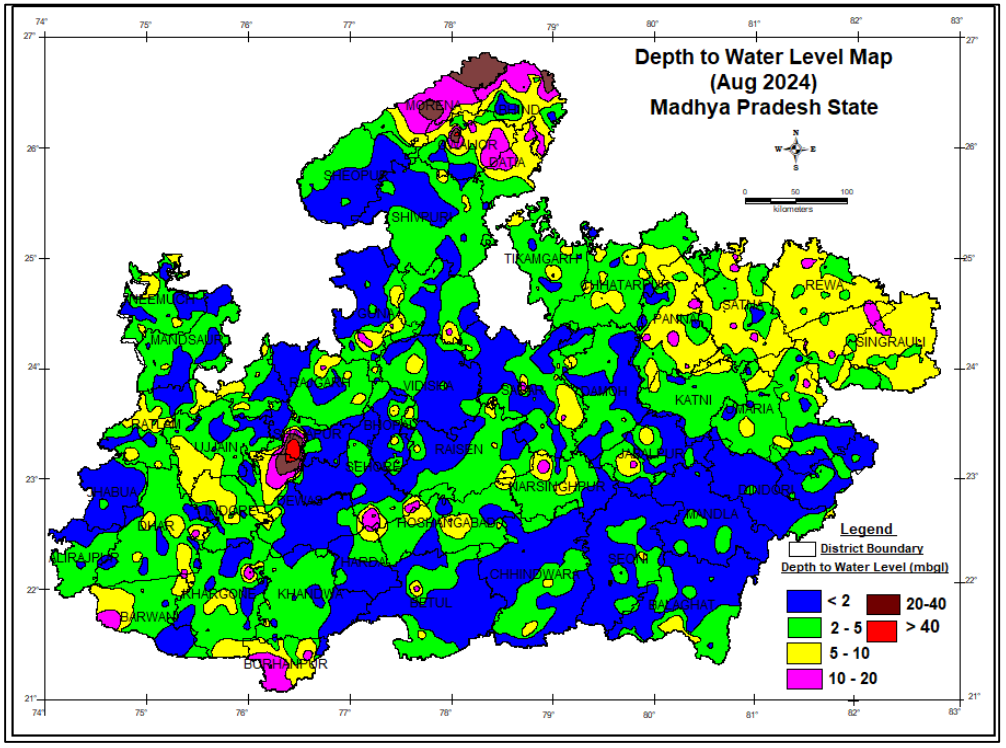

Figure-4: Depth to water level of unconfined aquifer during August 2024.

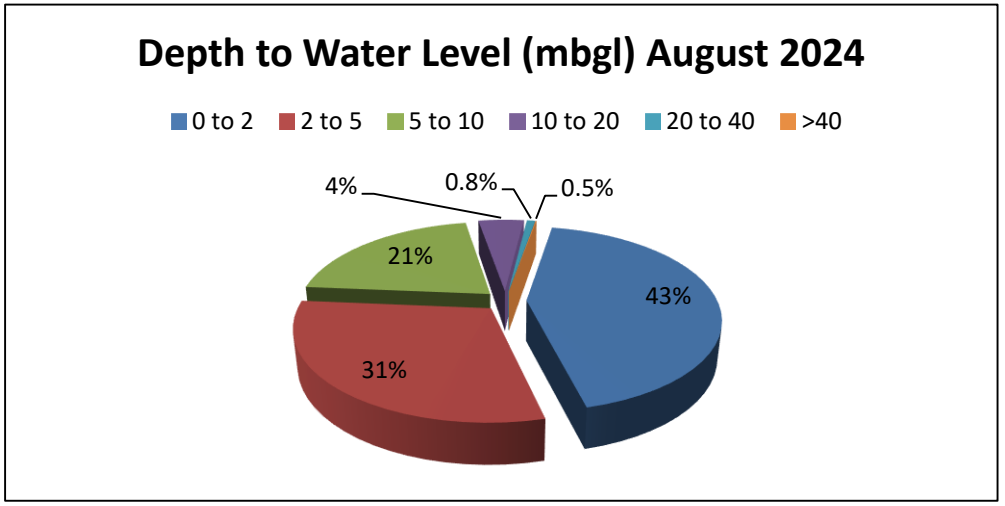

Figure-5: Percentage of wells in different water level ranges in unconfined aquifer.

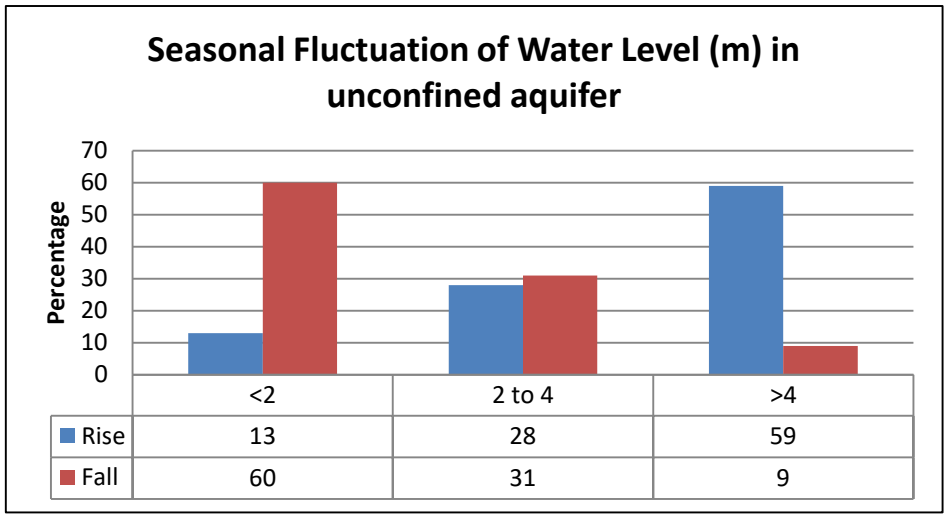

Figure-6: Percentage of wells showing rise and fall in WL in unconfined aquifer (May 2024 to August 2024)

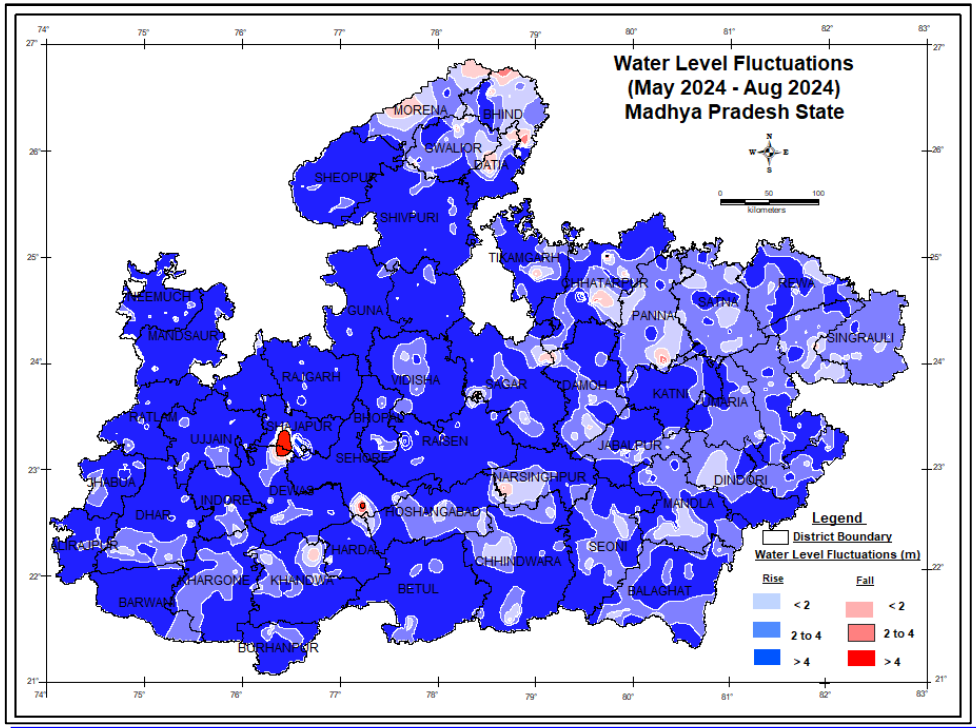

Figure-7: Seasonal water level fluctuation in unconfined Aquifer (May 2024 to August 2024)

5.1.2 SEASONAL FLUCTUATION IN WATER LEVEL

Seasonal Fluctuation of Water Level in Unconfined Aquifer (May 2024 to August 2024)

Rise in Water Levels:

Out of 1410 wells, water level rise of less than 2 m is recorded in 13% wells, 2 to 4 m in 28% wells and more than 4 m in 59% of the wells. Water level rise of less than 2 m is seen in Dindori, Panna, Mandla, Damoh, Chhatarpur, Morena, Bhind, Gwalior, Datia districts. Water level rise of 2 to 4 m is observed in districts mainly Singrauli, Rewa, Satna, Panna, Umaria, Jabalpur, Dindori, MandlaKhargone, Khandwa, Gwalior, Seoni, Balaghat, Narsinghpur, Hoshangabad. Rise of more than 4 m is observed in parts of all districts.

Fall in Water Levels:

Out of 42 wells that have registered fall in water levels, 60% have recorded less than 2 m while 31% in the range of 2 to 4 m and remaining 9% wells registered water level fall of more than 4 m. Fall of less than 2 m is mainly observed in Bhind, Morena, Datia, Gwalior districts. Fall of 2 to 4 m is observed mainly in Bhind, Panna, Sehore districts. Water level fall of more than 4 m is observed in Shajapur, Dewas districts.

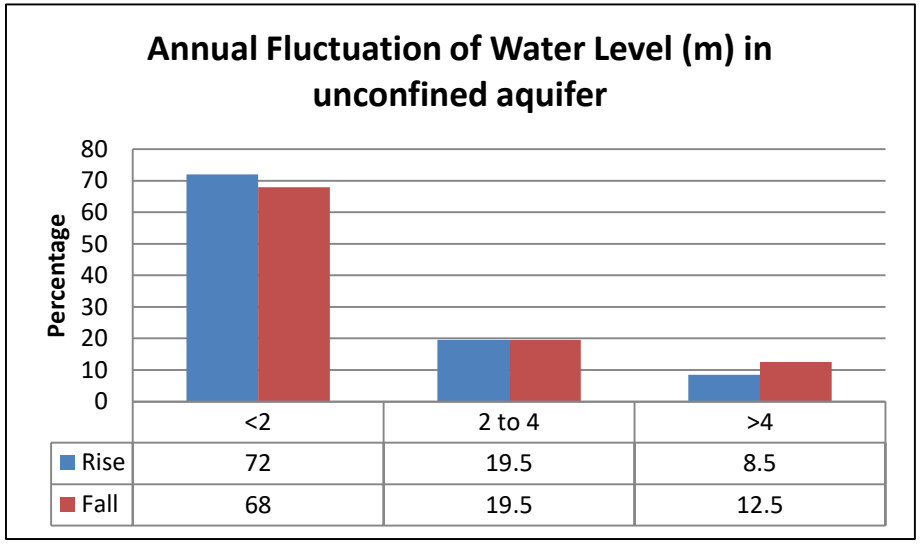

Figure-8: Percentage of wells showing rise and fall in WL in unconfined aquifer (August 2023 – August 2024)

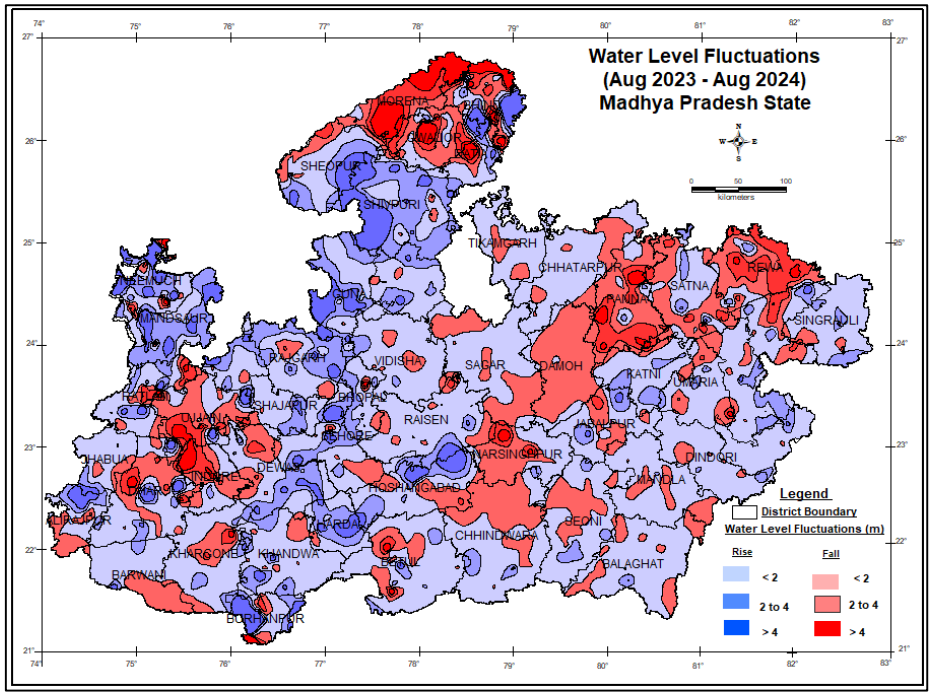

Figure-9: Annual water level fluctuation in unconfined aquifer (August 2023 – August 2024)

5.1.3 ANNUAL FLUCTUATION IN WATER LEVEL

Annual Fluctuation of Water Level in Unconfined Aquifer (August 2023 to August 2024)

Rise in Water Levels:

Out of 833 wells, water level rise of less than 2 m is recorded in 70% wells, 2 to 4 m in 17% wells and more than 4 m in 13% of the wells. Water level rise of less than 2 m is seen in Singrauli, Rewa, Umaria, Katni, Jabalpur, Dindori, Narsinghpur, Hoshangabad, Betul, Harda, Khandwa, Burhanpur, Khargone, Barwani, Dhar, Alirajpur, Jhabua, Ratlam, Neemuch, Mandsaur, Vidisha districts. Water level rise of 2 to 4 m is observed mainly in districts such as Shivpuri, Sheopur, Raisen, Harda, dewas, Rajgarh, Guna, Alirajpur, Burhanpur, Neemuch, Mandsaur. Rise of more than 4 m is significantly observed in Sheopur, Shivpuri, Bhind, Burhanpur, Hoshangabad, Neemuch, Mandsaur districts.

Fall in Water Levels:

Out of 443 wells that have observed fall in water levels, 69% have recorded less than 2 m bgland 19% in the range of 2 to 4 m and remaining 12% wells observed water level fall of more than 4 m. Fall of less than 2 m is mainly observed in parts of Sheopur, Bhind, Morena, Gwalior, Rewa, Satna, Panna, Damoh, Narsinghpur, Chhindwara, Seoni, balaghat, Ujjain, Dhar, Indore, Dewas, Barwani, Alirajpur districts. Fall of 2 to 4 m is observed mainly in Rewa, Sidhi, Bhind, Morena, Gwalior, Panna, Ujjain, Indore regions. Fall of beyond 4 m is observed as as isolated patches in Rewa, Panna, Bhind, Morena, Gwalior, Ujjain, Indore, Narsinghpur districts.

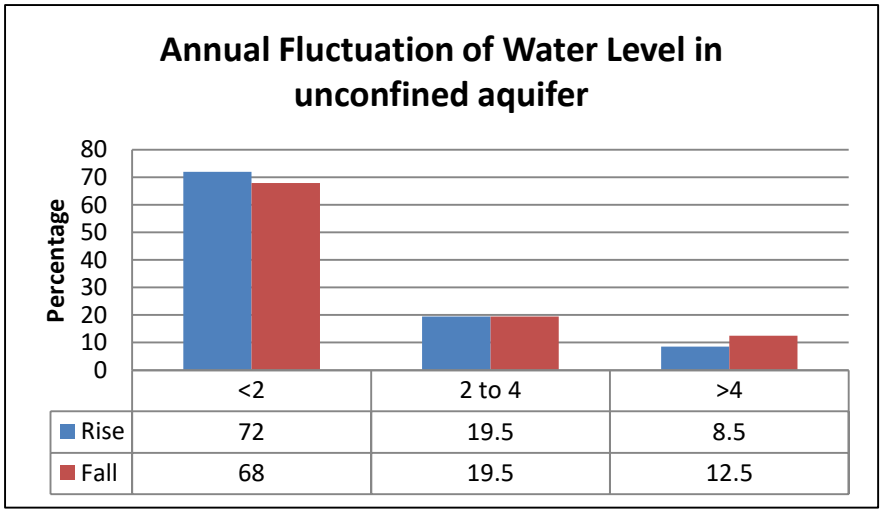

Figure-10: Percentage of wells showing rise and fall in WL in unconfined aquifer (August 2022 to August 2024) (in m)

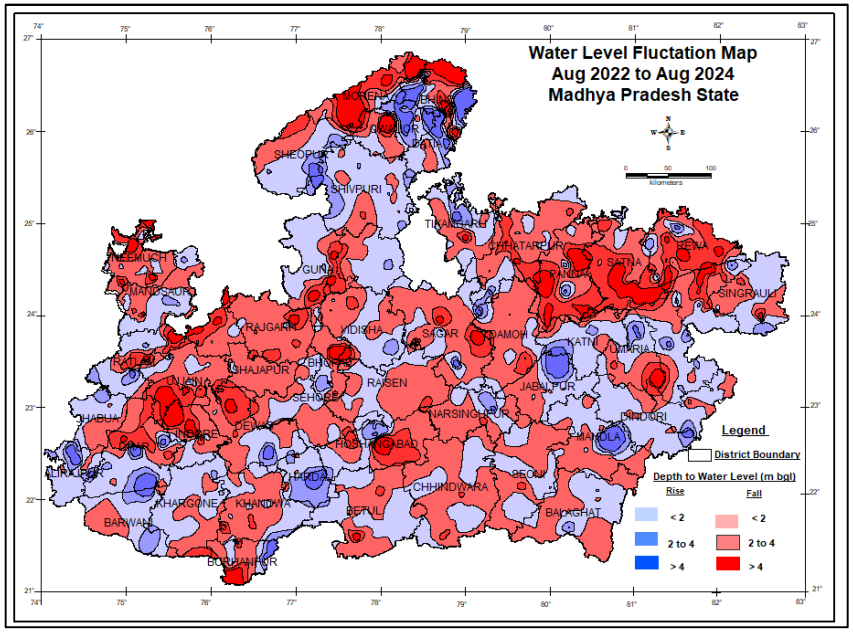

Figure-11: Water Level Fluctuation Map (August 2022 to August 2024)

Annual Fluctuation of Water Level in Unconfined Aquifer (August 2022 to August 2024)

Rise in Water Levels

Out of 477 wells showing rise in water level, water level rise of less than 2 m is recorded in 78% wells, 2 to 4 m in 17% wells and more than 4 m in 5% of the wells. Water level rise of less than 2 m is seen in Singrauli, Sidhi, Dindori, Umaria, Katni, Jabalpur, Anuppur, Shivpuri, Sheopur, Guna, Ashoknagar, Vidisha, Raisen, Sehore, Bhopal, Harda, Betul, Khargone, Barwani, Dhar, Jhabua, Ratlam, Mandsaur districts. Water level rise of 2 to 4 m is observed mainly in districts such as Gwalior, Datia, Jabalpur, Mandla, Harda, Dhar, Sheopur, Shivpuri. Rise of more than 4 m is significantly observed in Datia, Gwalior, Bhind districts.

Fall in Water Levels

Out of 589 wells that have registered fall in water levels, 65% have recorded less than 2 m while 20% in the range of 2 to 4 m and remaining 15% wells registered water level fall of more than 4 m. Fall of less than 2 m is mainly observed in all over the state mainly in parts of Singrauli, Rewa, Satna, Shahdol, Sidhi, Raisen, Vidisha, Balaghat, Dindori, Anuppur, Batul, Shajapur, Rajgarh, Ratlam, Neemuch, MandsaurSheopur districts. Fall of 2 to 4 m is observed mainly in Rewa, Satna, Chhatarpur, Ujjain, Burhanpur, Hoshangabad, Bhind, Morena, Neemuch, Ujjain, Indore, Dhar districts. Fall of beyond 4 m is observed as as isolated patches in Morena, Gwalior, Sheopur, Satna, Umaria, Ujjain, Indore, Hoshangabad, Neemuch, Burhanpur districts.

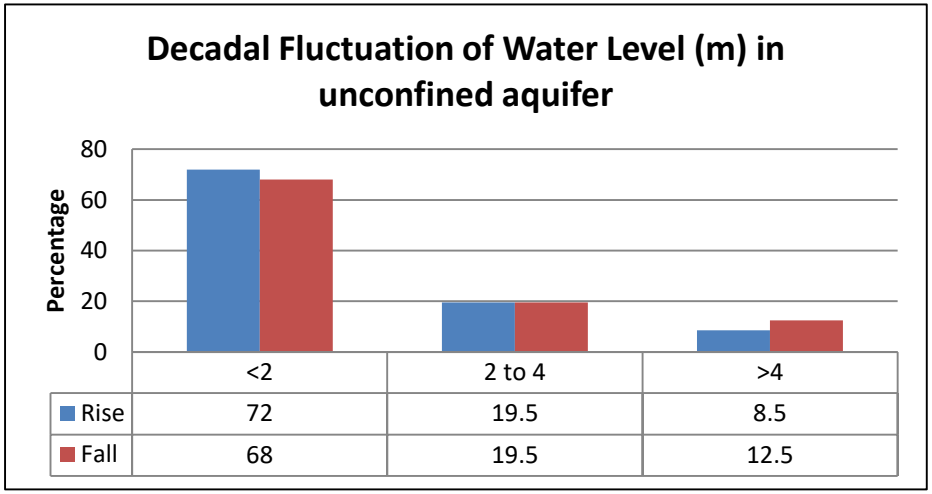

Figure-12: Percentage of wells showing rise and fall in WL in unconfined Aquifer (Decadal Mean August (2014-2023) to August 2024)

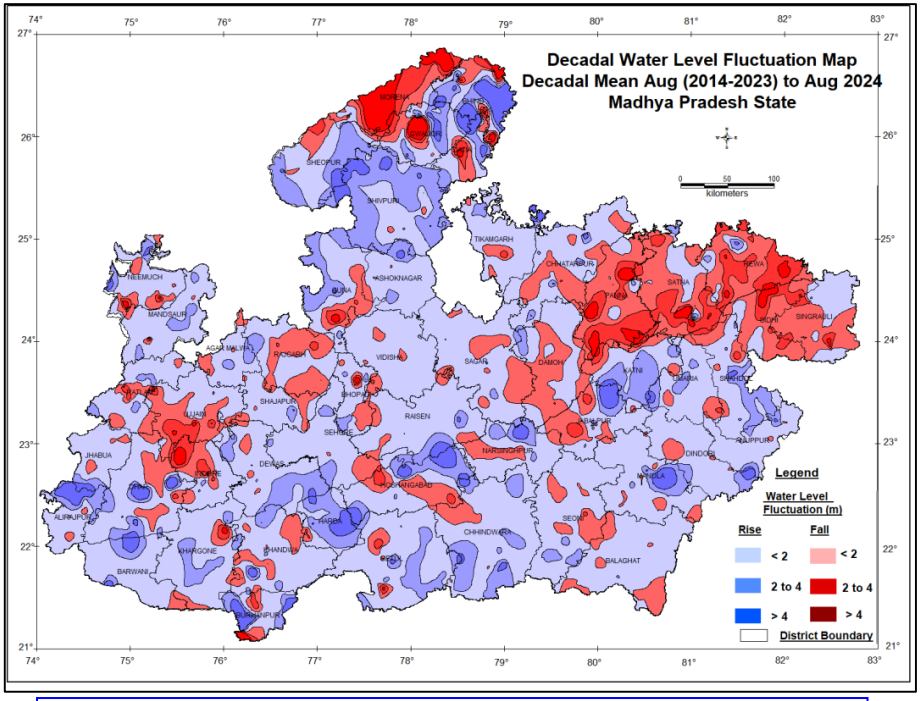

Figure-13: Annual water level fluctuation in unconfined Aquifer(Decadal Mean August (2014-2023) to August 2024)

5.1.4 DECADAL FLUCTUATION IN WATER LEVEL

Decadal Fluctuation of Water Level in Unconfined Aquifer (Decadal Mean August (2014-2023) to August 2024)

Rise in Water Levels:

Out of 884 wells that have register rise in water level, water level rise of less than 2 m is recorded in 72% wells, 2 to 4 m in 19.5% wells and more than 4 m in 8.5% of the wells. Water level rise of less than 2 m is seen in all the districts, significantly in Vidisha, Raisen, Sagar, Chhindwara, Barwani districst in more than 72% of the wells. Water level rise of 2 to 4 m is observed mainly in Katni, Mandla, Shahdol, Shivpuri, Sheopur, Hoshangabad, Raisen, Alirajpur, Dewas, Khandwa District in 19.5% of wells and rise of more than 4 m is significantly observed in Bhind, Shivpuri, Alirajpur in 8.5% of wells.

Fall in Water Levels:

Out of the 429 wells that have registered fall in water level, 68% have recorded fall of less than 2 m while 19.5% in the range of 2 to 4 m and remaining 12.5% wells registered water level fall of more than 4 m. Fall of less than 2 m is observed in parts of Singrauli, Rewa, Sidhi, Satna, PannaHoshangabad Chhindwara, Ujjain, Indore districts. Fall of 2 to 4 m, recorded in Rewa, Panna, Satna, Ujjain districts. Fall beyond 4 m is recorded mainly in Morena, Gwalior, Sidhi, Indore districts.

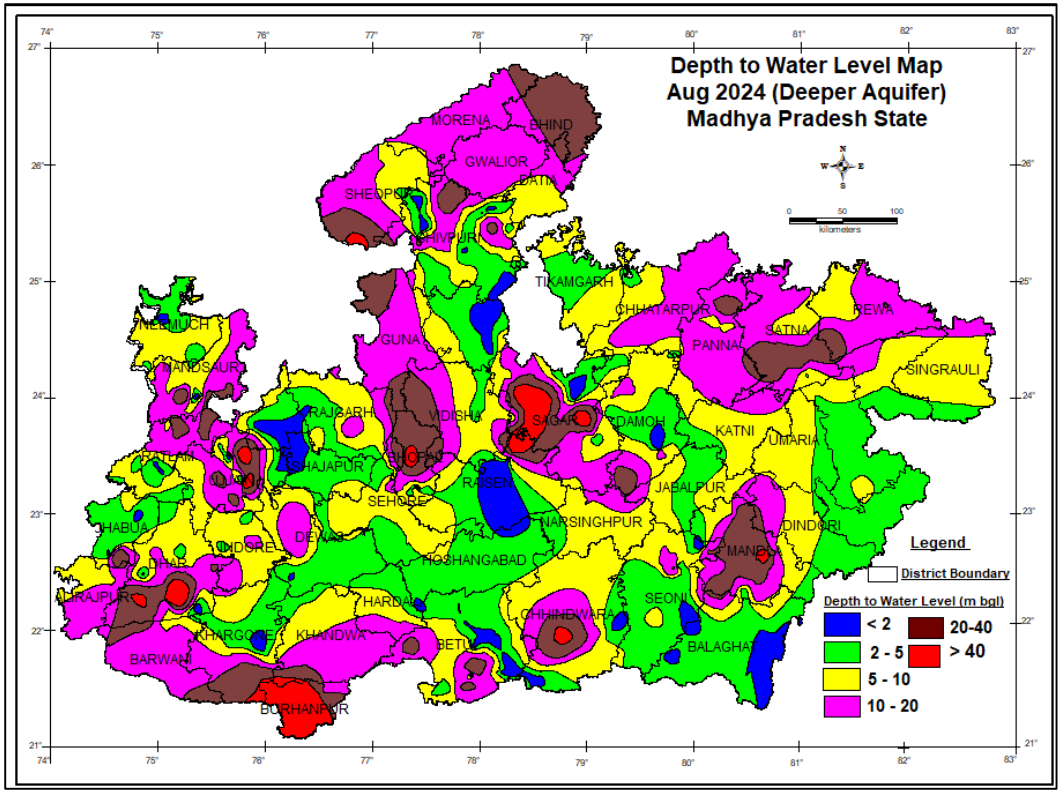

Figure-14: Depth to Water Level Map Confined / semi-confined Aquifer, August 2024

5.2 DEEPER AQUIFER (CONFINED/ SEMI-CONFINED)

5.2.1 DEPTH TO PIEZOMETRIC LEVEL

Analysis of piezometric level data of 310 wells shows piezometric levels vary between 0 m bgl (Damoh, Betul districts) to 99.75 m bgl (Dhar district). Piezometric level between 0 to 2 m bgl in 17% of wells, between 2 to 5 m bgl in 24% of wells, between 5 to 10 m bgl in 28% of wells, between 10 to 20 m bgl in 14% of wells, between 20 to 40 m bgl in 12% of wells and piezometric level more than 40 m bgl is registered in 5 % of wells.

17% area of the state is covered by depth to piezometric level of 0 to 2 m bgl in Balaghat, Seoni, Raisen, Shajapur, Ashoknagar, Shivpuri districts. Piezometric level of 2 to 5 m bgl is covered in 24% of the state area and observed in Shahdol, Dindori, Balaghat, Seoni, Hoshangabad, Khargone, Dewas, Damoh, Tikamgarh, Shajapur, Rajgarh districts. Piezometric levels of 5 to 10 m mainly observed in Singrauli, Rewa, Satna, Umaria, Katni, Indore, Neemuch, Mandsaur, Harda, Khandwa, Sheopur, Narsinghpur, Chhindwara, Sehore districts. Piezometric levels of 10 to 20 m mainly observed in Morena, Gwalior, Sheopur, Guna, Vidisha, Panna, Chhatarpur, Rewa, Satna, Barwani, Khandea districts. Piezometric levels of 20 to 40 m mainly observed in Satna, Mandla, Chhindwara, Bhopal, Vidisha, Bhind, Sheopur, Khargone, Dhar districts. Deeper water level of greater than 40 m bgl is found mainly in Burhanpur, Chhindwara, Sagar districts.