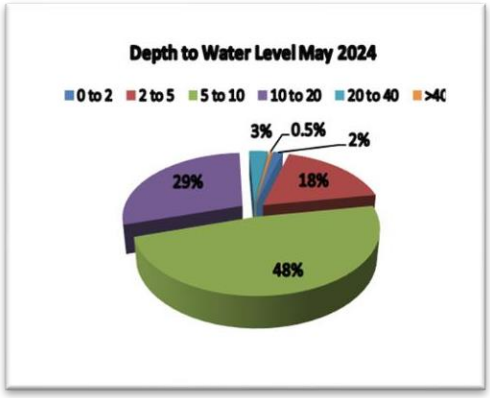
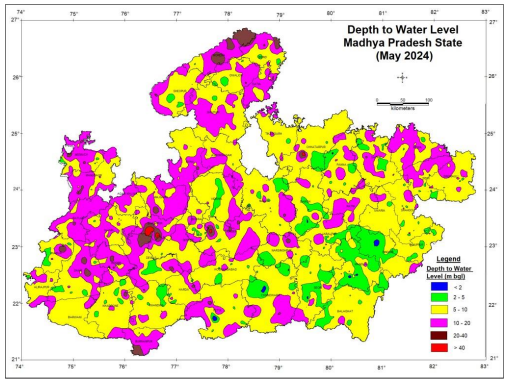
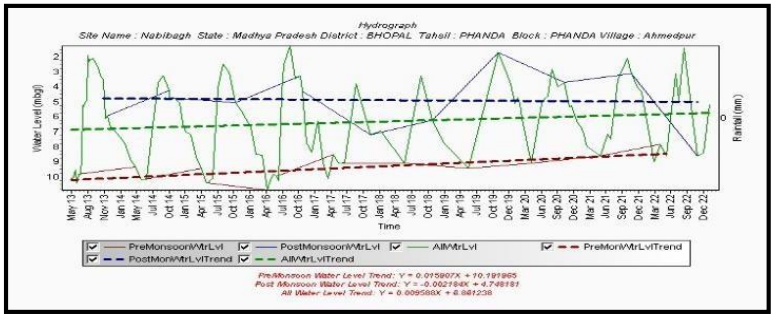






GROUND WATER LEVEL BULLETIN
MAY 2024
MADHYA PRADESH

ABSTRACT

Ground water level Scenario during May-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 State. 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 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 Ground Water Board. A network of 1871 observation wells called **National Hydrograph Network Stations (NHNS)**, as on 30.04.2024, located all over Madhya Pradesh 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, 317 blocks and 4 Urban Areas in Madhya Pradesh. The population of state as per census 2011 is 7, 25, 97, 565 with 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 and Gwalior. Dhupgarh in Pachmarhi is the highest point in the state. Madhya Pradesh comprises several linguistically and culturally distinct regions.

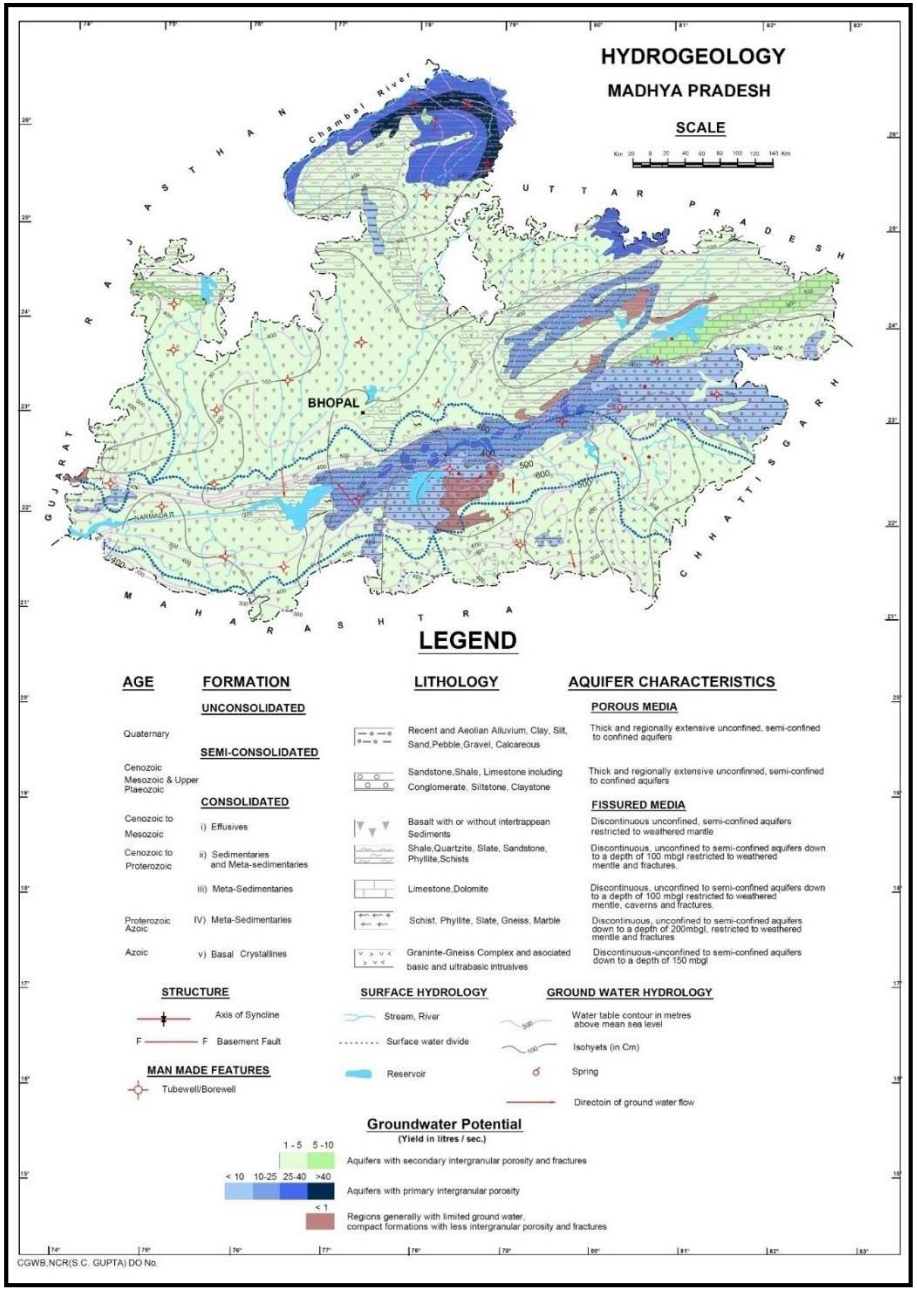


Figure-1: Map showing major aquifers and Hydrogeology of Madhya Pradesh

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 state. This region is comprised of Sheopur, Morena and Bhind Districts. **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

As of March 2024, the North Central Region office of CGWB, situated in Bhopal, oversees a network of 1874 monitoring wells distributed across 52 districts of Madhya Pradesh. These wells include 1386 dug wells, as well as observatory wells and piezometers (485). 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 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 August (20th to 30th), November (post monsoon) (1st to 10th day), January (1st to 10th day) andMay (pre monsoon) (20th to 30th 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.

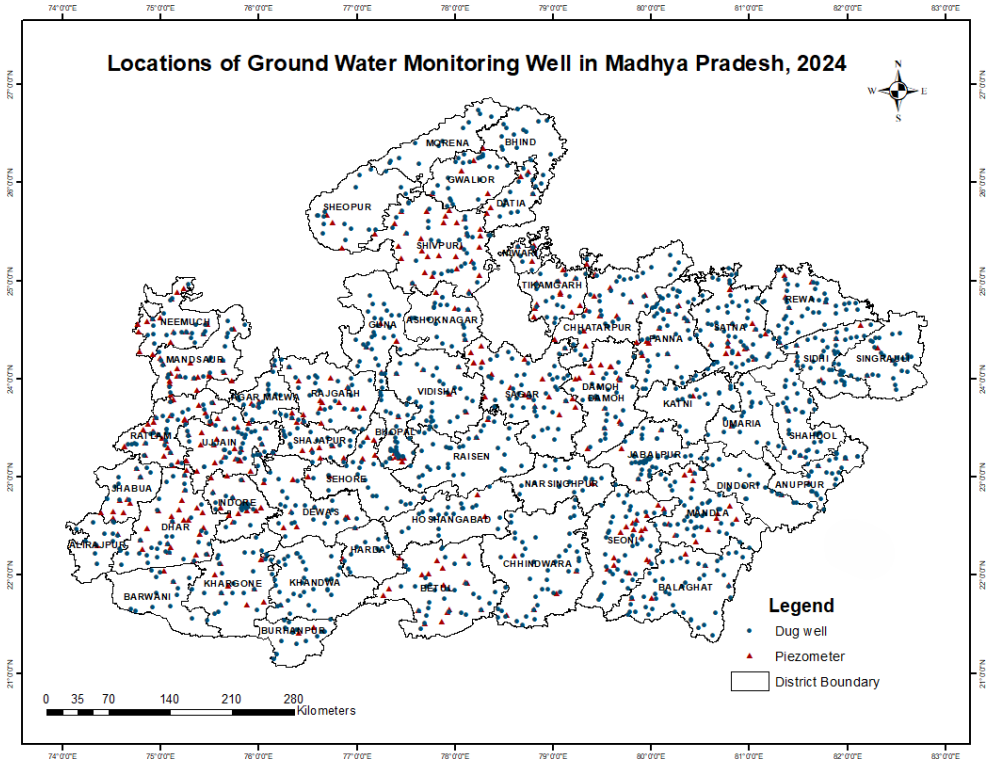


Figure- 2: Map showing locations of monitoring wells (NHNS) in MadhyaPradesh

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

S.No.	Name of District	Number of GW Monitoring stations (May 2024)		
		DW	OW/PZ	Total
1	AGAR-MALWA	20	3	23
2	ALIRAJPUR	14	2	15
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	44	7	51
13	DAMOH	27	17	44
14	DATIA	11	5	16
15	DEWAS	26	10	36
16	DHAR	32	29	61
17	DINDORI	22	1	23
18	GUNA	31	4	35
19	GWALIOR	25	4	29
20	HARDA	13	2	15
21	INDORE	24	19	43
22	JABALPUR	37	5	42
23	JHABUA	11	9	20
24	KATNI	16	1	17
25	KHANDWA	35	1	36
26	KHARGONE	23	9	32
27	MANDLA	43	10	53
28	MANDSAUR	21	22	43
29	MORENA	11	0	11
30	NARMADAPURAM	21	0	21
31	NARSINGHPUR	14	1	15
32	NEEMUCH	20	14	34

33	**PANNA**	**44**	**13**	**57**
34	**RAISEN**	**35**	**3**	**38**
35	**RAJGARH**	**27**	**16**	**43**
36	**RATLAM**	**30**	**29**	**59**
37	**REWA**	**43**	**6**	**49**
38	**SAGAR**	**49**	**19**	**68**
39	**SATNA**	**54**	**15**	**69**
40	**SEHORE**	**22**	**8**	**30**
41	**SEONI**	**43**	**12**	**55**
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	**1409**	**473**	**1882**

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 2023 and 2022, 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 1, a rainfall map is prepared and given in the figure 3. Madhya Pradesh state received normal rainfall in 2023 as compared to 2022, 19 % less rainfall is seen. 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%).

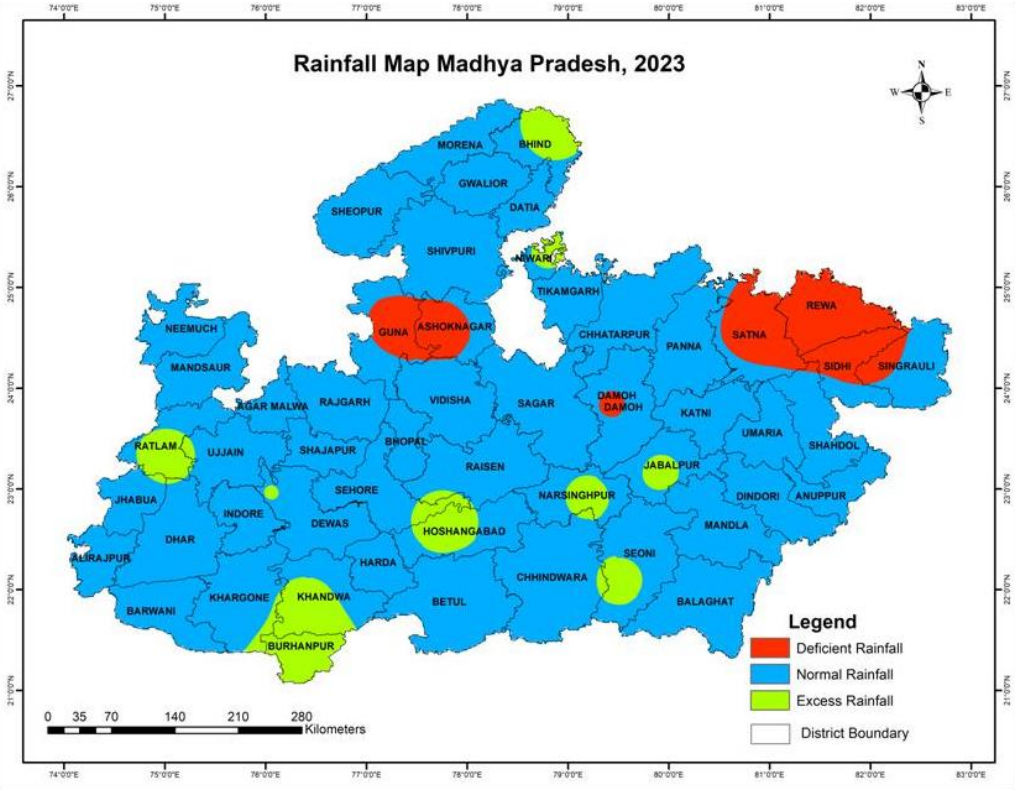


Figure- 3: Rainfall Map of Madhya Pradesh, 2023

Table-2: District wise variability of rainfall in Madhya Pradesh (2023)

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	NARSINGHPUR	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
27	BHIND	869.1	743.8	612.5	42	17	Excess
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
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
53	MADHYA PRADESH	945.5	1169.1	949.5	0	-19	Normal

5.0 GROUND WATER LEVEL SCENARIO (MAY 2024)

5.1 SHALLOW AQUIFER (UNCONFINED)

5.1.1 DEPTH TO WATER LEVEL

Depth To Water Level in Unconfined Aquifer (May 2024)

The depth to water level of 1503 wells is used for the analysis. Analysis of depth to water level data of 1503 wells shows water levels vary between 1.2 m bgl (Bhopal district) to 49.43 m bgl (Indore district). Water level of less than 2 m bgl is recorded in 1.56% of wells, between 2 to 5 m bgl in 17.94% of wells, between 5 to 10 m bgl in 48% of wells, between 10 to 20 m bgl in 29 % of wells, between 20-40 m bgl in 3% 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 Umaria, Mandla, Chhindwara, Betul, Panna districts covering only an area of 1.56% of the Madhya Pradesh. Water level of 2 to 5 m bgl is observed in parts of Rewa, Sidhi, Shadol, Annupur, Dindori, Balaghat, Seoni, Jabalpur, Chhatarpur, Damoh, Chhindwara, Narsinghpur, Vidisha, Khandwa, Dewas, Jhabua, Dhar districts covering an area of 17.94% ofthe State. 48% area of the State is covered by depth to water level of 5 to 10 m bgl is observed throughout the state with significant area in Barwani, Chhatarpur, Damoh, Sagar, Balaghat, Umaria, Shadol, Hoshangabad Districts. Water level of 10 to 20 m bgl is covered in 29% of the State area. Water levels in the range of 20 to 40 m covers 3% area of the State covering mainly Chhatarpur, Raisen, Shajapur, Morena, Bhind, Burhanpur, Jhabua, Dhar, Neemuch, Mandsaur districts. Water levels greater than 40 m cover 0.5% of the State and is mainly covering Shajapur District.

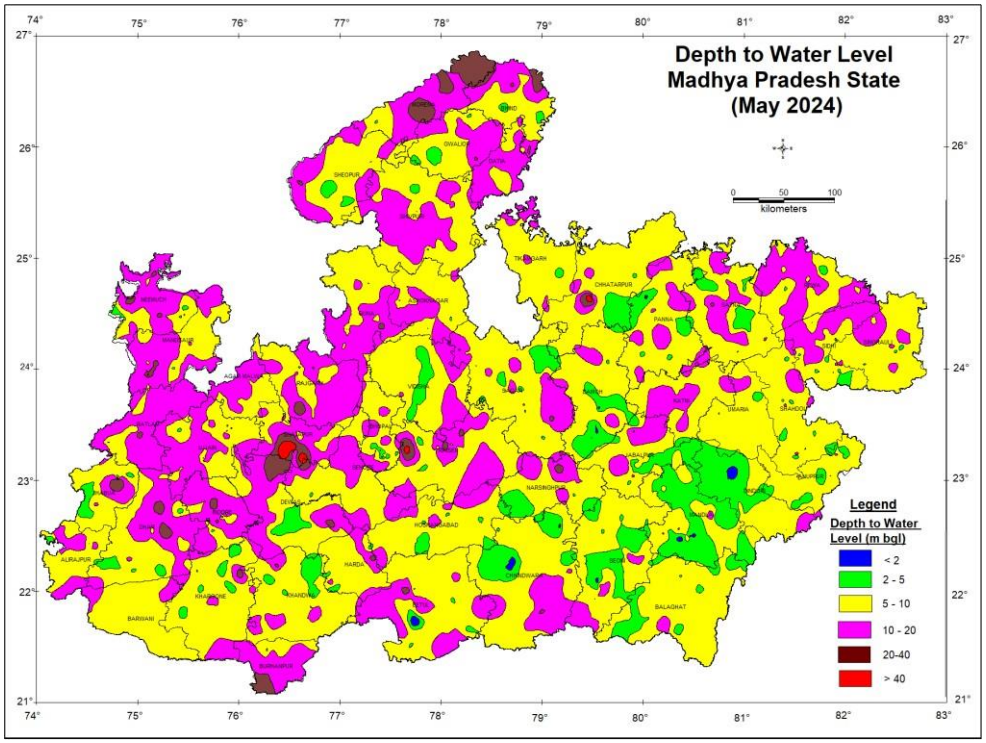


Figure-4: Depth to water level of unconfined aquifer during November 2023.

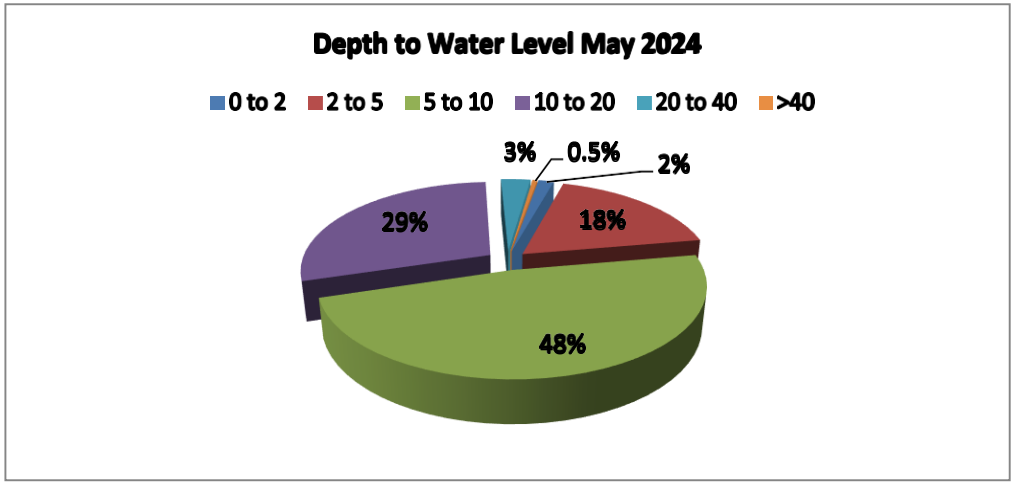


Figure-5: Percentage of wells in different water level ranges in unconfined aquifer.

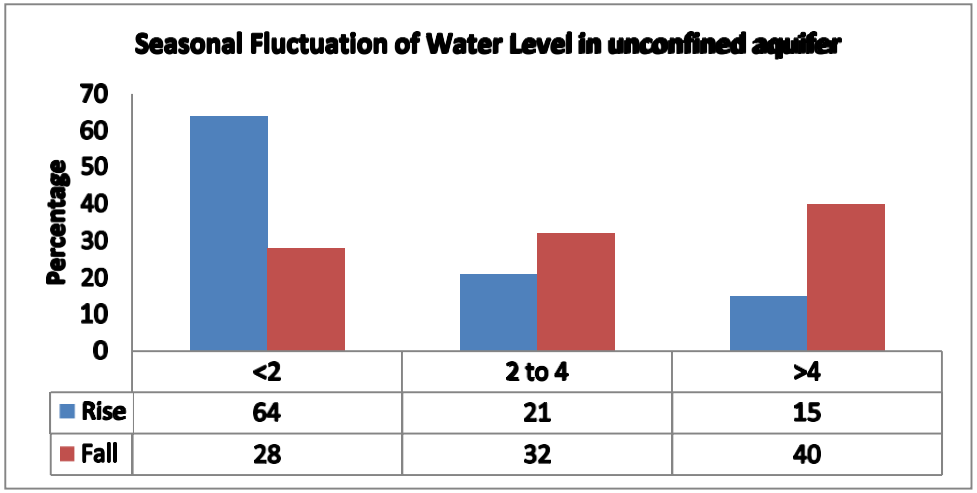


Figure-6: Percentage of wells showing rise and fall in WL in unconfined aquifer (May 2023 to November 2023)

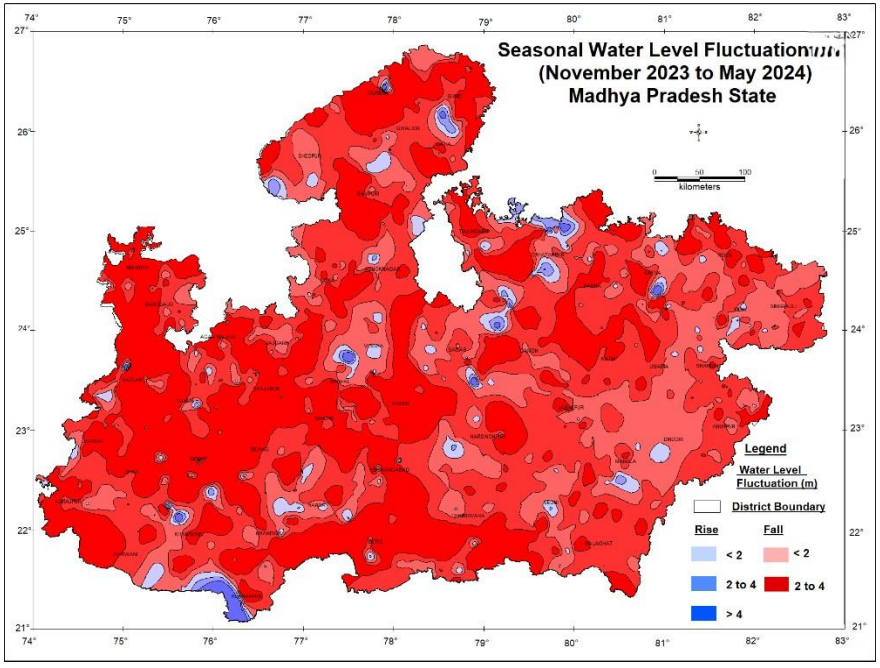


Figure-7: Seasonal water level fluctuation in unconfined Aquifer(May 2023 to November 2023)

5.1.2 SEASONAL FLUCTUATION IN WATER LEVEL

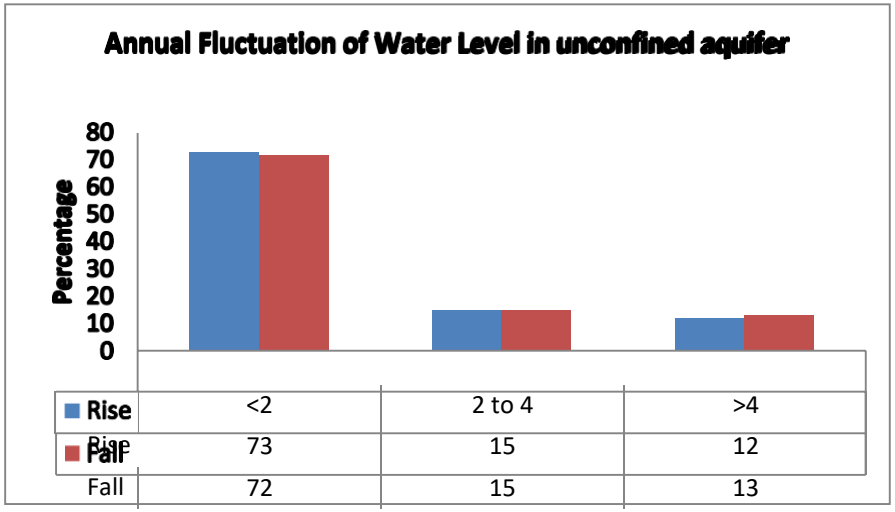
Seasonal Fluctuation of Water Level in Unconfined Aquifer (November 2023 to May 2024)

Rise in Water Levels:

Out of 120 wells, water level rise of less than 2 m is recorded in 64% wells, 2 to 4 m in 21% wells and more than 4 m in 15% of the wells. Water level rise of less than 2 m is seen in Sidhi, Rewa, Satna, Dindori, Mandla, Seoni, Narsinghpur, Chhatarpur, Tikamgarh, Sagar, Datia, Morena, Shivpuri, Vidisha, Burhanpur, Barwani, Ratlam districts. Water level rise of 2 to 4 m is observed mainly in districts such as Satna, Chhatarpur, Mandla, Visisha, Khargone, Sheopur. Rise of more than 4 m is significantly observed in Satna, Chhatarpur, Sagar, Damoh, Tikamgarh, Vidisha, Khargone, Datia, Sheopur, Burhanpur districts.

Fall in Water Levels:

Among the 1187 wells experiencing a decline in water levels, 28% showed decreases of less than 2 meters, 32% exhibited declines ranging from 2 to 4 meters, and the remaining 40% recorded reductions exceeding 4 meters in water levels. Fall of less than 2 m is mainly observed in parts of Singrauli, Rewa, Sidhi, Dindori, Annupur, Seoni, Chindwara, Damoh, Chhatarpur, Sagar, Vidisha, Ashoknagar, Sheopur, Shivpuri, Rajgarh, Ujjain, Khargone, Harda, Alirajpur districts. Fall of 2 to 4 m is observed mainly in Mandsaur, Ratlam, Alirajpur,Barwani, Khandwa, Khargone, Betul, Narsinghpur, Vidisha, Sagar, Umaria, Katni, Tikamgarh, Chhatarpur, Gwalior, Balaghat, Annupur, Dindori Districts. Water level fall of more than 4 m is observed in Singrauli, Rewa, Satna, Panna, Chhatarpur, Tikamgarh, Sagar, Damoh, Raisen, Betul, Sehore, Shajapur, Indore, Narsinghpur, Jabalpur, Dewas, Dhar, Mandsaur, Neemuch, Jhabua, Alirajpur, Shivpuri, Morena, Bhind, Datia Districts.



	<2	2 to 4	>4
Rise	73	15	12
Fall	72	15	13

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

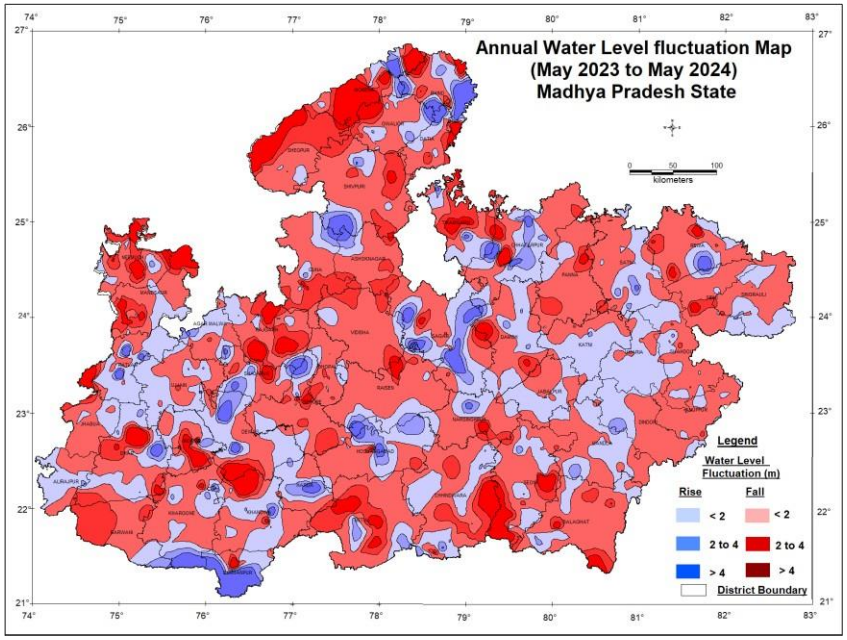


Figure-9: Annual water level fluctuation in unconfined aquifer (November 2023 to November 2023)

5.1.3 ANNUAL FLUCTUATION IN WATER LEVEL

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

Rise in Water Levels:

Out of 392 wells, water level rise of less than 2 m is recorded in 73% wells, 2 to 4 m in 15% wells and more than 4 m in 12% of the wells. Water level rise of less than 2 m is seen in Singrauli, Rewa, Satna, Shadol, Umaria, Katni, Dindori, Mandla, Jabalpur, Balaghat, Chindwara, Damoh, Sagar, Chhatarpur, Tikamgarh, Gwalior, Guna, Hoshangabad, Khandwa, Harda, Ujjain, Agar Malwa, Alirajpur, Indore, Jhabua, Dhar, Shajapur, Dewas districts. Water level rise of 2 to 4 m is observed mainly in districts such as Rewa, Sagar, Hoshangabad, Harda, Burhanpur, Khargone, Dewas, Shivpuri, Bhind. Rise of more than 4 m is significantly observed in Shivpuri, Bhind, Dewas, Burhanpur, Harda, Hoshangabad, Sagar, Chhatarpur, Rewa districts.

Fall in Water Levels:

Among the 661 wells experiencing a decline in water levels, 72% showed decline of less than 2 meters, 15% exhibited declines ranging from 2 to 4 meters, and the remaining 13% recorded Water Level decline of more than 4 meters in water levels. Fall of less than 2 m is mainly observed in parts of Singrauli, Rewa, Balaghat, Shadol, Seoni, Mandla, Jabalpur, Panna, Satna, Chhatarpur, Tikamgarh, Damoh, Narsinghpur, Chhindwara, Betul, Hoshangabad, Khargone, Barwani, Jhabua, Dhar, Ujjain, Neemuch, Mandsaur, Guna, Ashoknagar, Shivpuri, Sheopur, Gwalior, Bhind districts. Fall of 2 to 4 m is observed mainly in Rewa, Sidhi, Sagar, Seoni, Chhindwara, Betul, Khandwa,Dewas, Dhar, Shivpuri, Guna, Vidisha regions. Fall of beyond 4 m is observed as isolated patches in Rewa, Shadol, Seoni, Chhindwara, Betul, Khandwa, Dewas, Raisen, Guna, Neemuch, Mandsaur, Dhar, Sheopur, Shivpuri, Bhind, Morena, Tikamgarh, Chhatarpur, Sagar, Damoh districts.

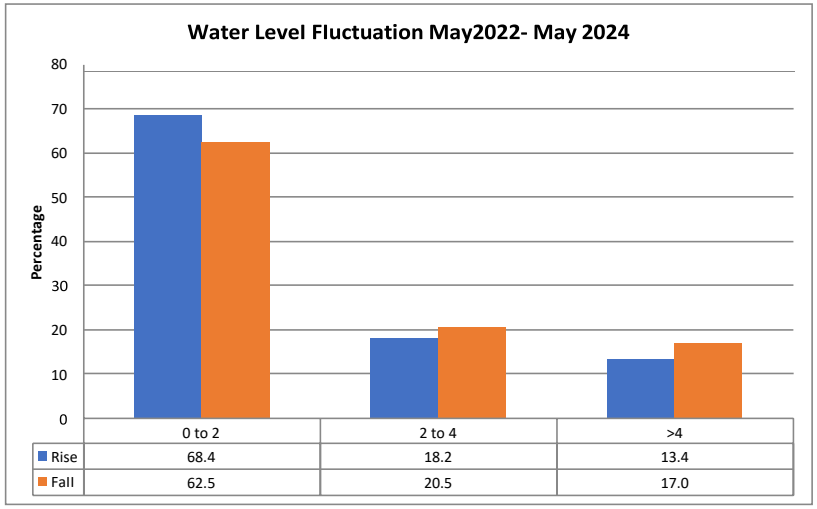


Figure-10: Percentage of wells showing rise and fall in WL in unconfined aquifer(November 2022 to November 2024)

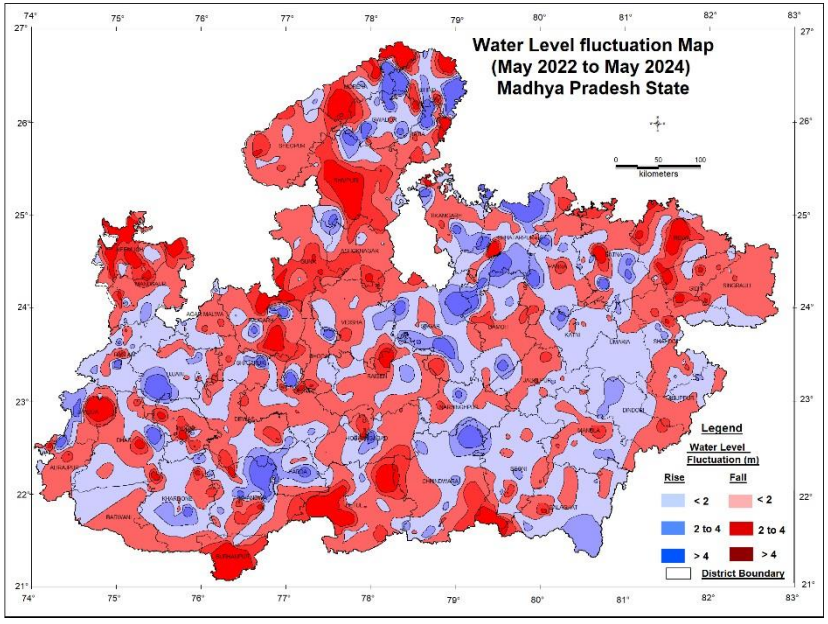


Figure-11: Water Level Fluctuation Map (May 2022 to May 2024)

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

Rise in Water Levels

Among the 500 wells experiencing an increase in water levels, 68% showed rises of less than 2 meters, 18% exhibited increases ranging from 2 to 4 meters, and 13% recorded rises exceeding 4 meters in water levels. A rise in water levels of less than 2 meters has been observed across all districts, notably in Anuppur, Bhopal, Burhanpur, Chhindwara, Indore, Jabalpur, Katni, Khandwa, Ratlam, Seoni, and Betul districts. Water level rise of 2 to 4 m is observed mainly in districts such as, Shahdol, Ujjain and Chhindwara districts. Rise of more than 4 m is significantly observed in Datia, Bhind, Chattarpur, Gwalior and Harda districts.

Fall in Water Levels

Among the 522 wells experiencing a decline in water levels, 62% showed Water level decline of less than 2 meters, 20% exhibited declines ranging from 2 to 4 meters, and the remaining 17% recorded Water Level decline of more than 4 meters in water levels. Fall of less than 2 meters are predominantly observed statewide, particularly in areas encompassing Singrauli, Dindori, Mandla, Rewa, Dewas, Bhopal, Raisen, Sehore, Sheopur, and Shivpuri districts. Fall of 2 to 4 m is observed mainly in Guna, Morena, Shivpuri, Jhabua, Betul, Hosangabad, Rewa and Neemuch region. Fall of beyond 4 m is observed as isolated patches in Neemuch, Jhabua, Burhanpur, Betul, Seoni, Rewa, Shivpuri, Morena, bhind, Indore, Dhar, Chhindwara, and Jabalpur etc.

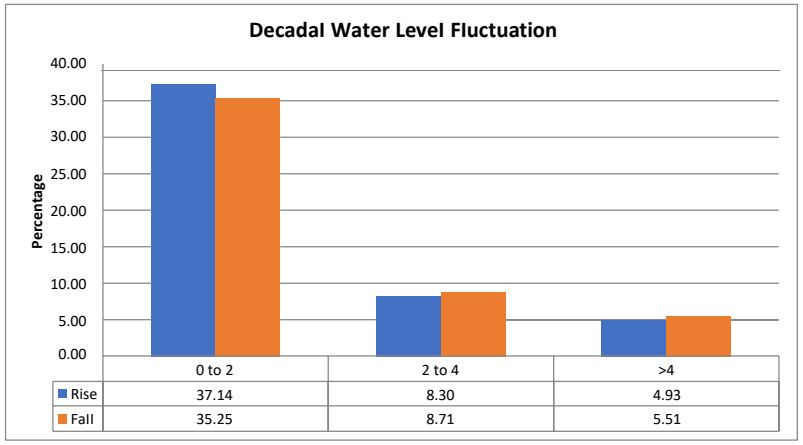


Figure-12: Percentage of wells showing rise and fall in WL in unconfined Aquifer(Decadal Mean May (2014-2023) to May 2024)

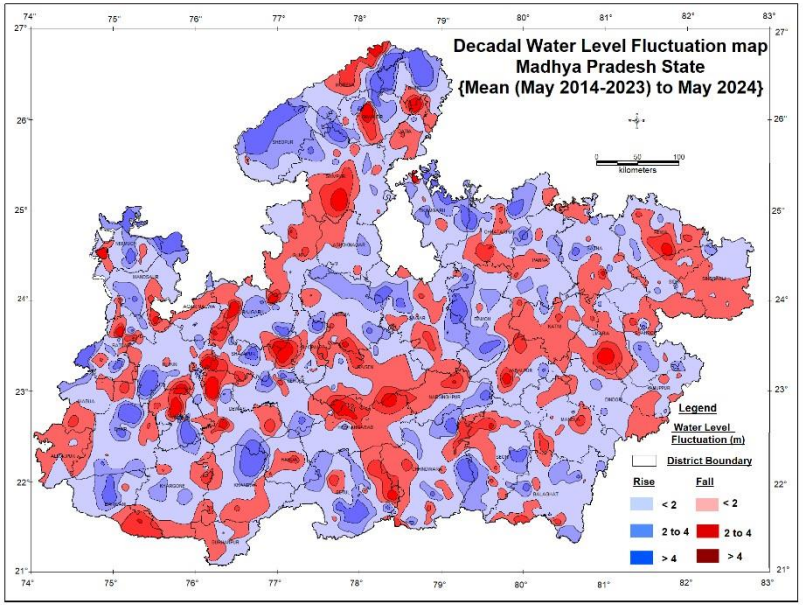


Figure-13: Annual water level fluctuation in unconfined Aquifer (Decadal Mean May (2014-2023) to May 2024)

5.1.4 DECADAL FLUCTUATION IN WATER LEVEL

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

Rise in Water Levels:

Out of 613 wells that have experienced a rise in water level, water level rise of less than 2 m is recorded in 74% wells, 2 to 4 m in 16% wells and more than 4 m in 10% of the wells. Water level rise of less than 2 m is seen in all the districts, significantly in Hosangabad, Indore and Seoni district in more than 9% of the wells. Water level rise of 2 to 4 m is observed mainly in Ujjain, Hosangabad, Shahdol, Rewa and Raisen District and rise of more than 4 m is significantly observed in Tikamgarh, Gwalior, Chhindwara and Datia. Harda district have maximum wells showing water level rise in this decade followed by Agar Malwa and Ujjain.

Fall in Water Levels:

Out of the 602 wells that have experienced fall in water level, 71% have recorded fall of less than 2 m while 18% in the range of 2 to 4 m and remaining 11 % wells experienced a water level fall of more than 4 m. Fall of less than 2 m is observed in all districts mainly in parts of Khandwa, Bhopal, Anuppur, Khargone and Tikamgarh District. Fall of 2 to 4 m, recorded in Hosangabad, Shahdol, Chattarpur, Ujjain, Ashoknagar and Shajapur districts. Fall beyond 4 m is recorded mainly in Indore, Hosangabad, Seoni, Rewa, andGwalior Districts. Maximum wells in Sidhi and Barwani districts are showing water level decline.

5.2 DEEPER AQUIFER (CONFINED/ SEMI-CONFINED)

5.2.1 DEPTH TO PIEZOMETRIC LEVEL

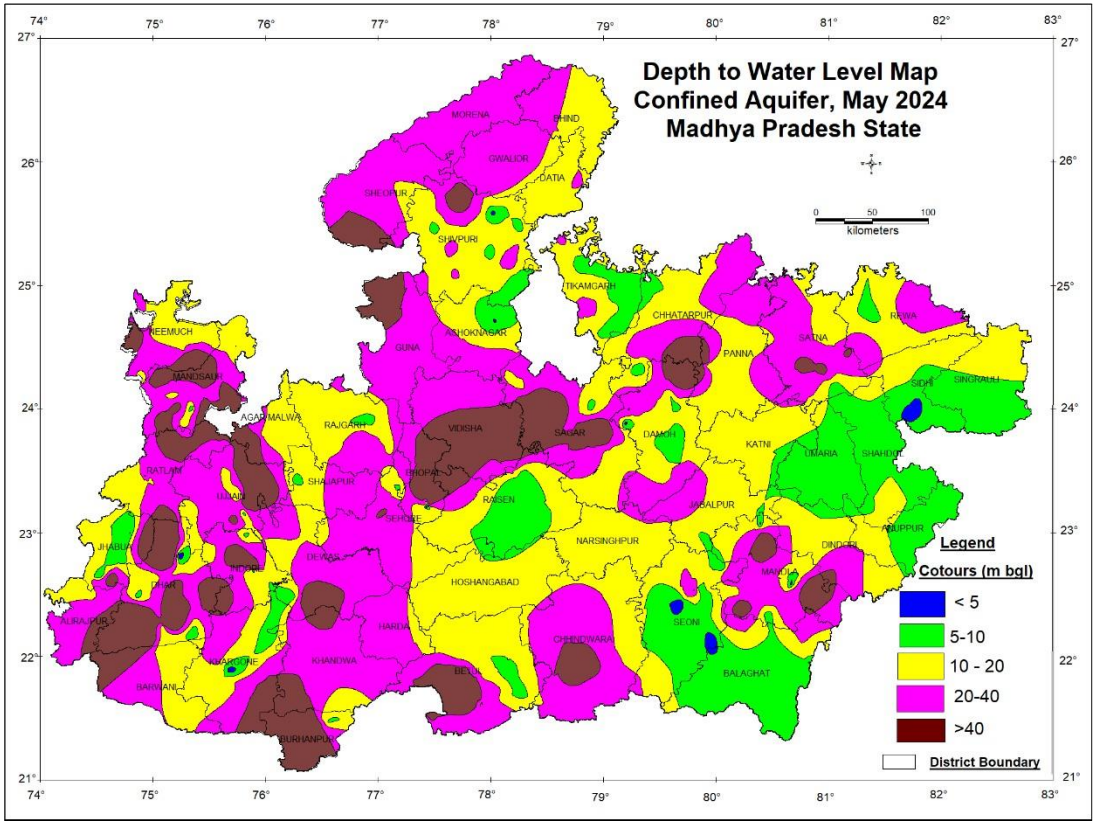


Figure-14: Depth to Water Level Map Confined Aquifer, May 2024

Analysis of piezometric level data of 300 wells shows piezometric levels vary between 2.03 mbgl (Bhopal) to 199 mbgl (Dhar district). Piezometric level between 2 to 5 m bgl in 4% of wells, between 5 to 10 m bgl in 30% of wells, between 10 to 20 m bgl in 32% of wells, between 20-40 m bgl in 25% of wells and piezometric level more than 40 m bgl is observed in 18 % of wells. Shallow piezometric level of 2 to 5 mbgl is found mainly in Western and South western districts like Seoni, Balaghat, Sidhi, Mandla, Damoh. The Shallow water level in deeper aquifer is also observed in Jhabua, Dhar and Khargone in North-eastern districts and in Bhopal and Ashoknagar districts.

30 % area of the State is covered by depth to piezometric level of 5 to 10 m bgl with zones in all the part of the State mainly in North-western districts like Singrauli, Sidhi, Shahdol, Umaria and Anuppur. 5-10 mbgl Water Level is also found in Raisen, Balaghat, Seoni, Jhabua, Ashoknagar and Tikamgarh districts. Piezometric level of 10 to 20 m bgl is covered in 60% of the State area and observed in Maximum district. It is mainly observed in Katni, Hosangabad, Narsinghpur, Betul, and Neemuch district. Deeper piezometric levels of 20-40 m mainly observed in Central, Western and South-Western Districts like Morena, Sheopur, Guna, Shajapur, Dewas, Khandwa, Harda, Ratlam and Chhindwara district. Deeper Waterlevel of more than 40 m bgl is found in Central and Western regions covering districts of Vidisha, Sagar, Bhopal, Burhanpur, Dhar, Ujjain, Ratlam, Mandsaur, Sheopur, Betul and Chhindwara Districts.