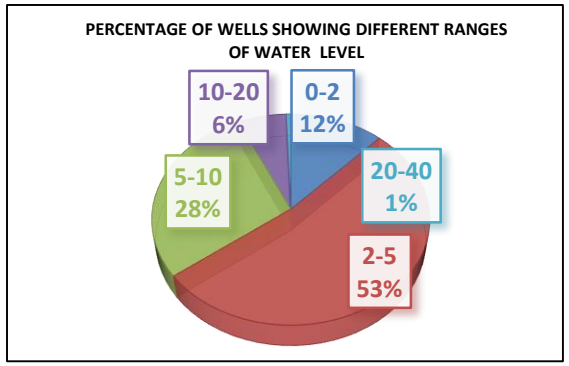

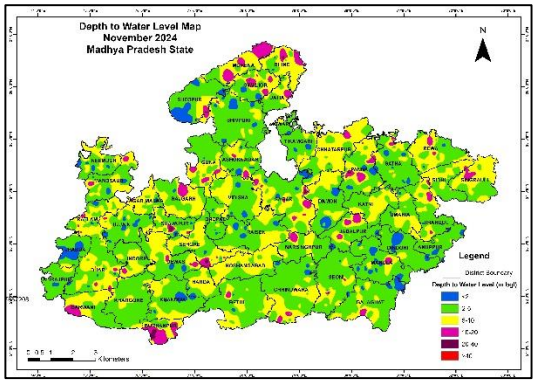

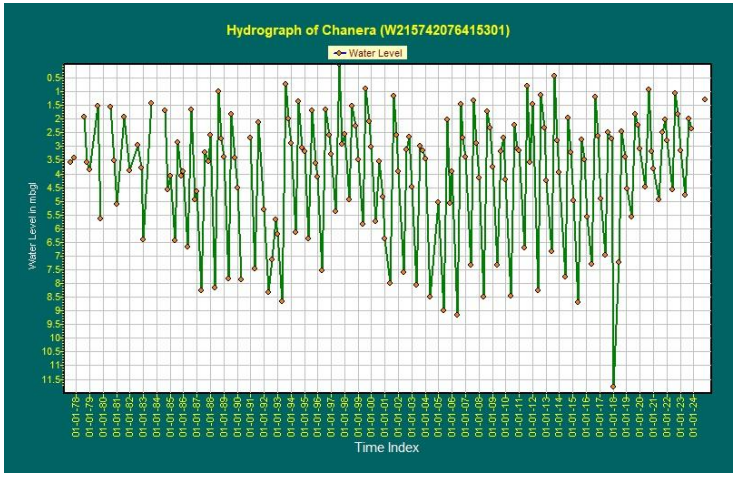

GROUND WATER LEVEL BULLETIN
NOVEMBER 2024
MADHYA PRADESH

ABSTRACT

Ground Water Level Scenario during November 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 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 Ground Water Board. A network of **1861** observation wells called **National Hydrograph Network Stations (NHNS)**, 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 55 districts, 313 community development blocks and 4 urban areas in Madhya Pradesh.

The population of state as per census 2011 is 7, 25, 97, 565 a population density of 236 persons per km^2 area. Out of total population, 75% lives in the villages and their main occupation are 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, of which the major regions are

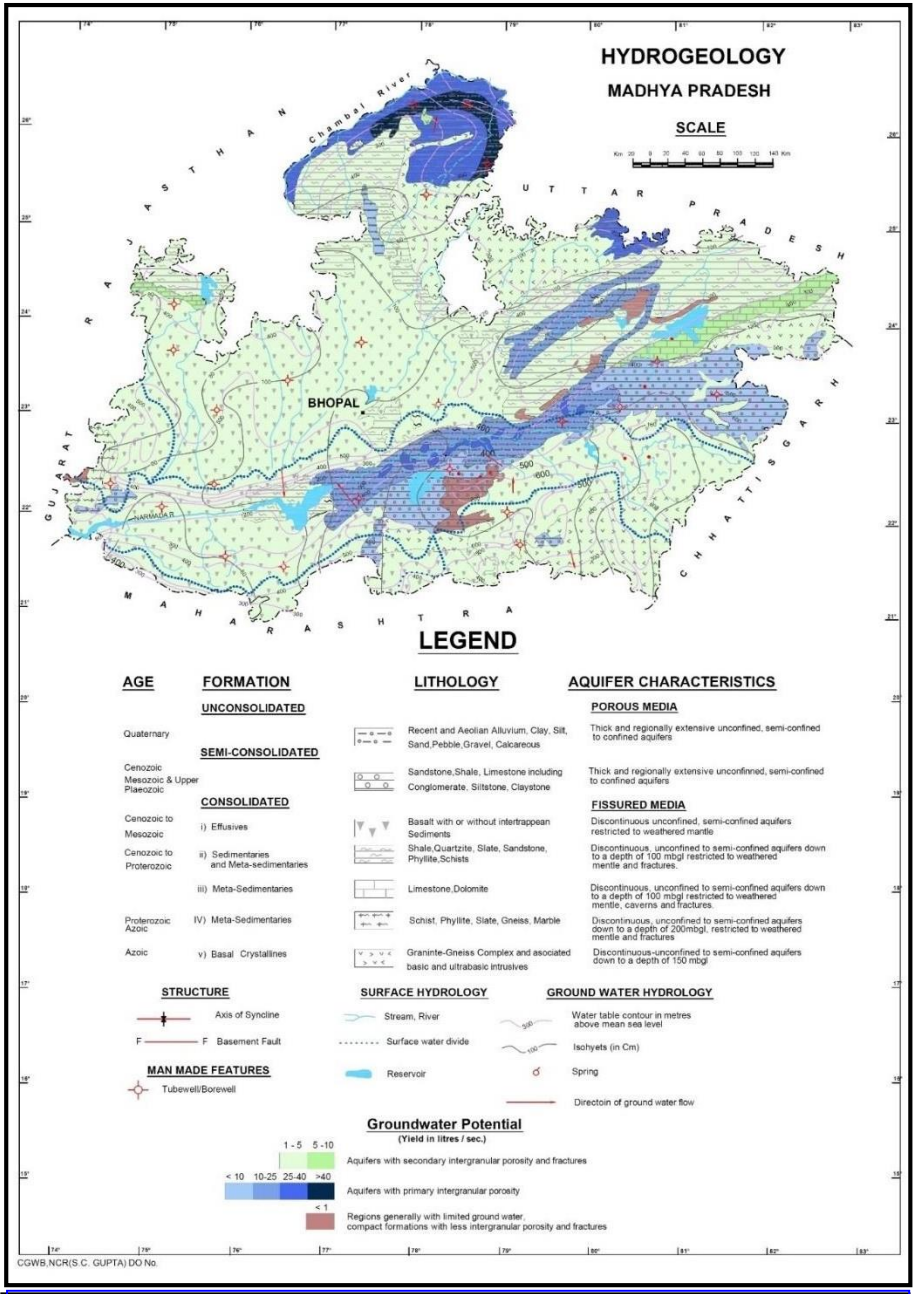

Figure-1: Map showing major aquifers and Hydrogeology of Madhya Pradesh

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 state. This 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 November 2024, **1861** monitoring wells are located in 55 districts of Madhya Pradesh including dug wells **(1385),** Observatory Wells & piezometers **(476).** Water samples are collected from these wells during November to identify groundwater quality issues ineach area. District-wise distribution of Ground Water Monitoring Wells in Madhya Pradesh during November 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.

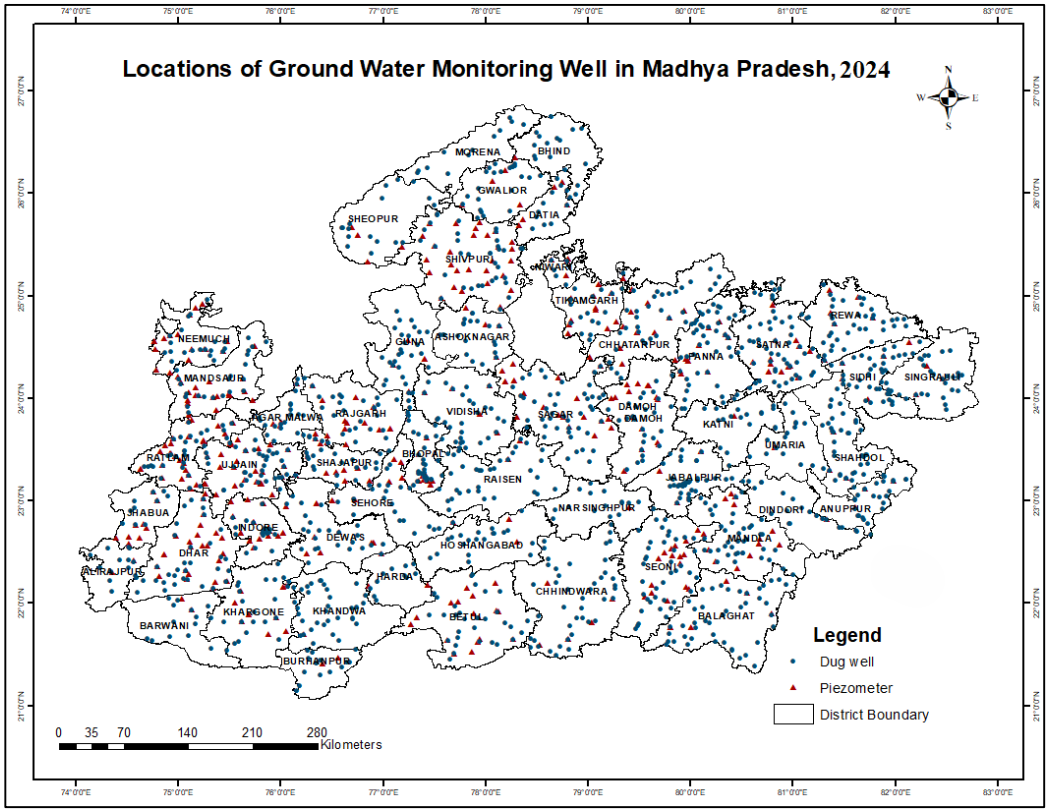

Figure- 2: Map showing locations of monitoring wells (NHNS) in Madhya Pradesh

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

District	Number of GW Monitoring stations (Nov 2024)		
	DW	PZ	Total
Agar-Malwa	20	3	23
Alirajpur	14	2	16
Anuppur	24	4	28
Ashoknagar	21	5	26
Balaghat	43	5	48
Barwani	13	2	15
Betul	34	18	52
Bhind	17	1	18
Bhopal	30	13	43
Burhanpur	14	2	16
Chhatarpur	33	16	49
Chhindwara	32	4	36
Damoh	27	17	44
Datia	11	5	16
Dewas	26	10	36
Dhar	32	29	61
Dindori	19	1	20
Guna	31	4	35
Gwalior	25	4	29
Harda	13	2	15
Indore	23	19	42
Jabalpur	36	5	41
Jhabua	10	9	19
Katni	16	1	17
Khandwa (East Nimar)	34	1	35
Khargone (West Nimar)	23	9	32
Maihar	20	9	29

Mandla	39	13	52
Mandsaur	20	22	42
Mauganj	15	1	16
Morena	10	0	10
Narmadapuram	17	0	17
Narsimhapur	15	1	16
Neemuch	20	14	34
Niwari	5	5	10
Pandhurna	10	3	13
Panna	44	13	57
Raisen	34	3	37
Rajgarh	27	16	43
Ratlam	29	29	58
Rewa	28	5	33
Sagar	49	19	68
Satna	34	6	40
Sehore	25	8	33
Seoni	42	12	54
Shahdol	37	3	40
Shajapur	23	10	33
Sheopur	17	3	20
Shivpuri	36	32	68
Sidhi	38	6	44
Singrauli	30	3	33
Tikamgarh	16	14	30
Ujjain	36	29	65
Umaria	16	1	17
Vidisha	32	5	37
Grand Total	**1385**	**476**	**1861**

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, 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 table1, 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%).

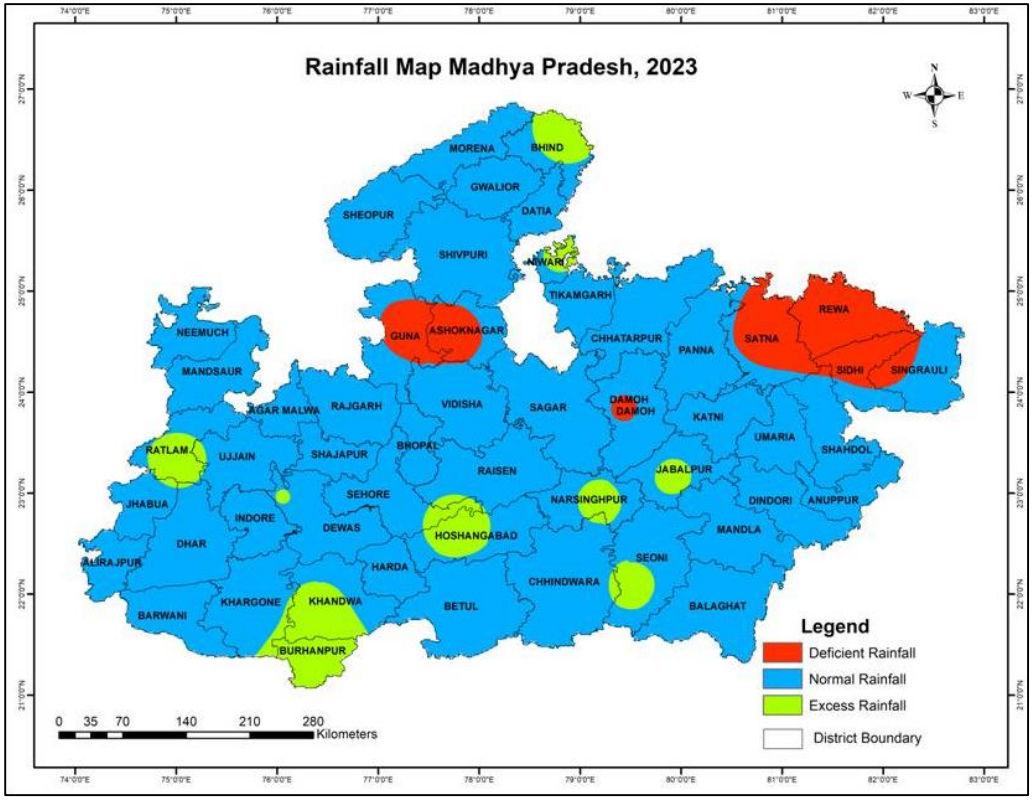

Figure- 3: Rainfall Map of Madhya Pradesh, 2023

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	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

S.N.	NAME	RAINFALL_2023	RAINFALL_2022	NORMAL RAINFALL	% RAINFALL 2023 DEPARTURE FROM NORMAL	% RAINFALL DEPARTURE FROM 2022	Status 2023
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
	MADHYA PRADESH	945.5	1169.1	949.5	0	-19	Normal

5.0 GROUND WATER LEVEL SCENARIO (NOVEMBER 2024)

5.1 SHALLOW AQUIFER (UNCONFINED)

5.1.1 DEPTH TO WATER LEVEL

Depth To Water Level in Unconfined Aquifer (November 2024)

The depth to water level of 1482 wells is used for the analysis. Analysis of depth to water level data shows water levels vary between 0.1 m bgl in Sajapur District to 30.63 m bgl in Panna District. Water level of less than 2 m bgl is recorded in 12% of wells, between 2 to 5 m bgl in 52.6% of wells, between 5 to 10 m bgl in 28.6% of wells,between 10 to 20 m bgl in 6.2 % of wells, between 20-40 m bgl in 0.6% of wells.

Shallow water level of less than 2 m bgl as isolated patches in parts of Jhabua, Dindori, Balaghat, Sheopur, Mandla, Khandwa, Damoh, Shivpuri, Gwalior, Raisen and Satna etc. Water level of 2 to 5 m bgl is observed in More than half of the state mainly covering Northern and South-Western District namely Sheopur, Shivpuri, Guna, Vidisha, Dindori, Anuppur, Mandla, Balaghat, and Seoni. 28.5% area of the state is covered by depth to water level of 5 to 10 m bgl is observed in Chattarpur, Hosangabad, Sehore, Dhar, Rewa, Morena, Bind and Vidisha districts. Water level of 10 to 20 m bgl is covered in 6%of the State area. Water levels of 20 to 40 m bgl cover 0.6% area of the State and these deeper Water levels have been observed mainly in Burhanpur, Sehore, Sajapur, Panna, and Bhind district.

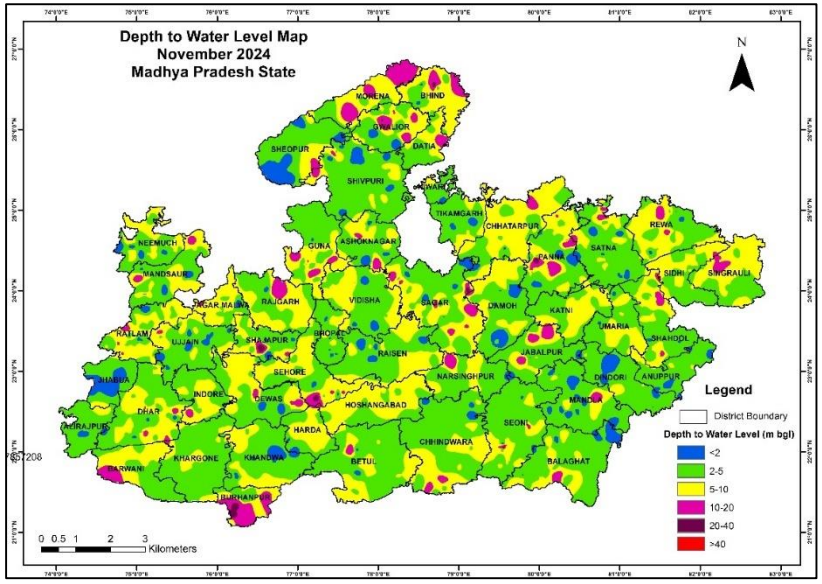

Figure-4: Depth to water level of unconfined aquifer during November 2024.

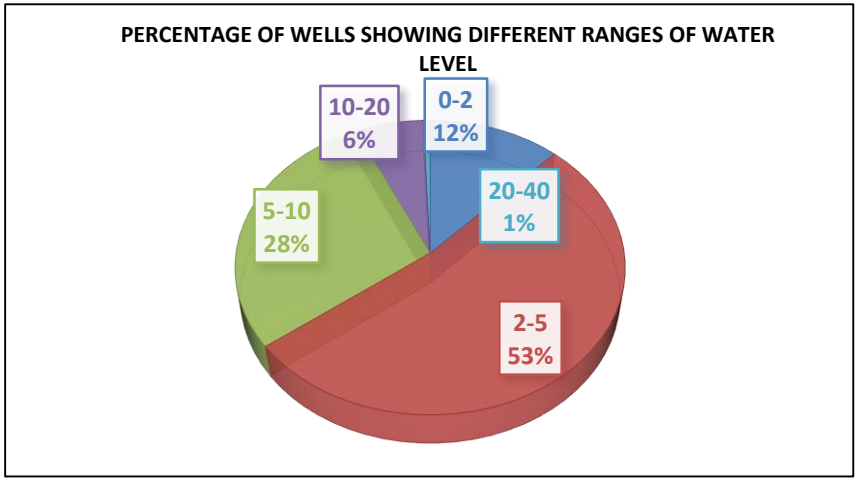

Figure-5: Pie Chart of Depth to water level of unconfined aquifer during November 2024.

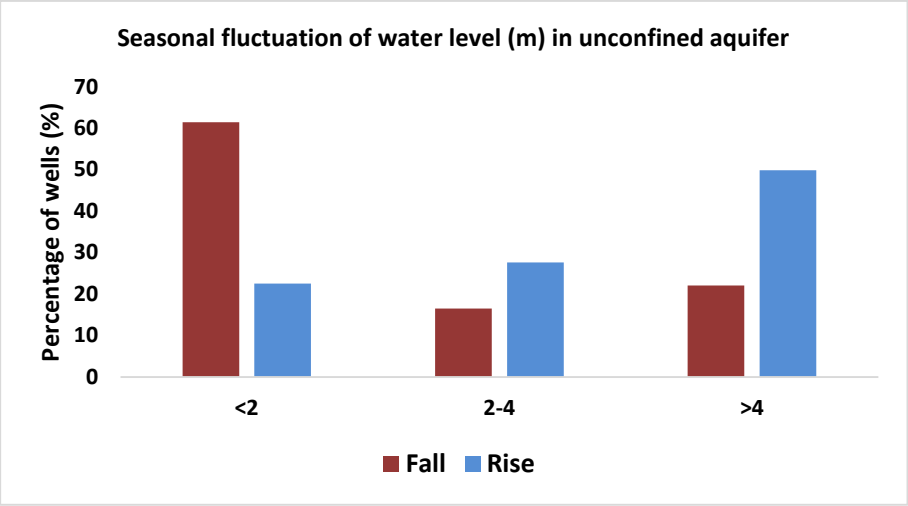

Figure-6: Percentage of wells showing rise and fall in WL in unconfined aquifer (May 2024 to Nov 2024)

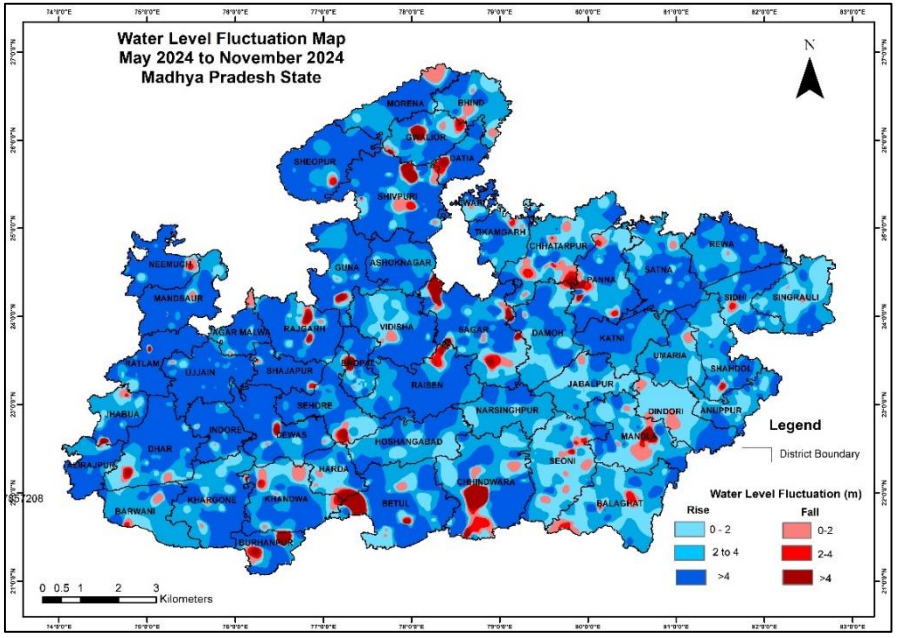

Figure-7: Seasonal water level fluctuation in unconfined Aquifer (May 2024 to November 2024)

5.1.2 SEASONAL FLUCTUATION IN WATER LEVEL (May 2024 to Nov 2024)

Rise in Water Levels:

Out of 1427 wells, water level rise of less than 2 m is recorded in 22 % wells, 2 to 4 m in 28 % wells and more than 4 m in 50% of the wells. Water level rise of less than 2 m is seen mostly in South-Western Districts like Dindori, Mandla, Seoni, Singauli, Jabalpur, Vidisha and Chattarpur etc. Water level rise of 2 to 4 m is observed in districts mainly Morena, Barwani, Singrauli, Rewa, Ashoknagar, Guna, Chhindwara, Narsinghpur, Hosangabad, Satna and Rewa. Rise of more than 4 m is observed in parts of majorly all districts.

Fall in Water Levels:

Out of 167 wells that have registered fall in water levels, 61 % have recorded less than 2 m while 17 % in the range of 2 to 4 m and remaining 22 % wells registered water level fall of more than 4 m. Fall of less than 2 m is mainly observed in Gwalior, Chattarpur, Khandwa, Mandla, Dindori, Sehore and Bhopal districts. Fall of 2 to 4 m is observed mainly in Chhindwara, Balaghat, Datia, Neemuch, Bhopal, Shivpuri and Sagar districts. Water level fall of more than 4 m is observed in Harda, Betul, Burhanpur, Chhindwara, Mandla, Raisen, Sagar, Dhar and Panna District.

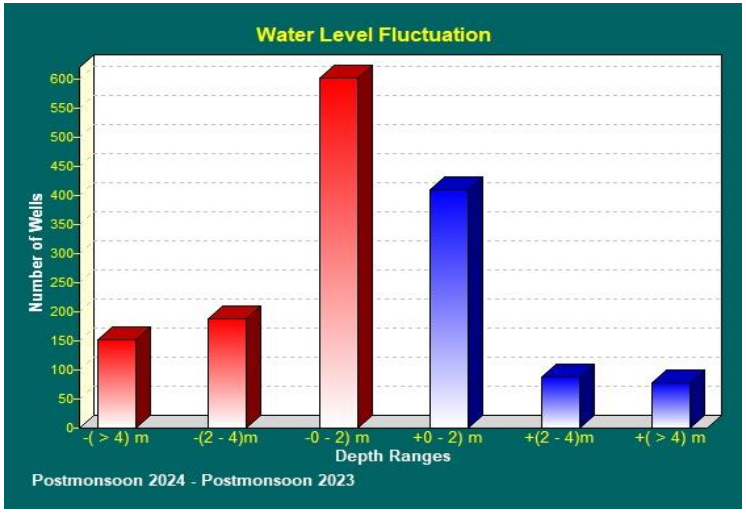

Figure-8: Number of wells showing rise and fall in WL in unconfined aquifer (November 2023 to November 2024)

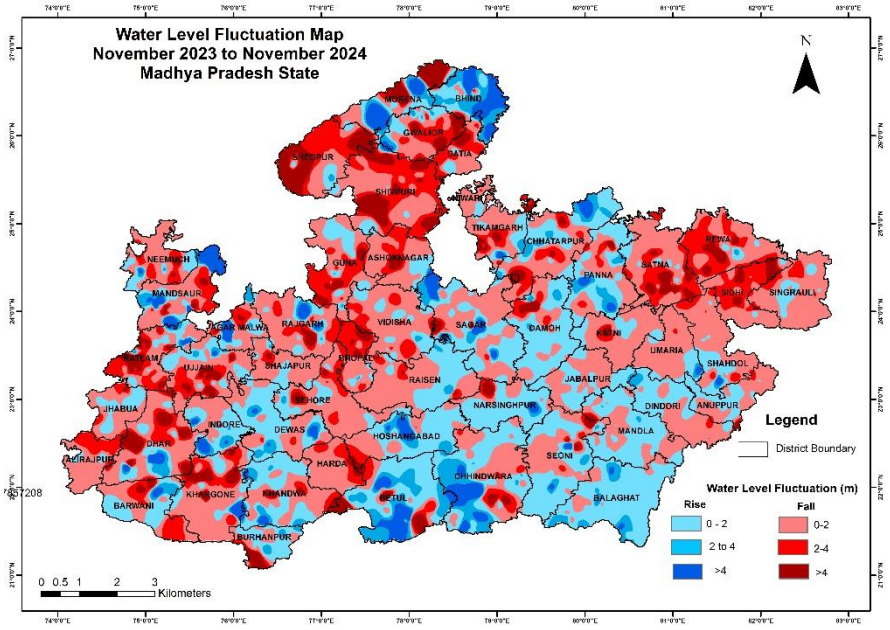

Figure-9: Annual water level fluctuation in unconfined aquifer (November 2023-November 2024)

5.1.3 ANNUAL FLUCTUATION IN WATER LEVEL

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

Rise in Water Levels:

Out of 570 wells that have observed rise in water levels, 26.8% have recorded rise of less than 2 m whereas 5.7% in the range of 2 to 4 m and remaining 5.09% wells observed water level rise of more than 4 m. Rise of less than 2 m is mainly observed in parts of Southern, South-western and south-eastern districts like Balaghat, Betul, Raisen, Hosangabad, Dewas, Indore, Damoh, Dindori, Seoni, Panna and Guna districts. Rise of 2 to 4 m is observed mainly in Chattarpur, Khargone, Neemuch, Barwani, Agar-Malwa and Rajgarh Districts. Rise of beyond 4 m is observed significantly in Chhindwara, Betul,Chattarpur, Khargone, Neemuch, Panna, Dewas, Dhar, Barwani and Rajgarh Districts.

Fall in Water Levels:

Out of 944 wells, water level fall of less than 2 m is recorded in 39.9% wells, 2 to 4 m in 12.3% wells and more than 4 m in 10% of the wells. Water level fall of less than 2 m is seen mainly in Northern and North-Western Districts mainly Sheopur, Shivpuri, Gwalior, Sidhi, Satna, Khargone, Dhar, Ujjain, and Guna districts. Water level fall of 2 to 4 m is observed mainly in districts such as Rewa, Sidhi, Khargone, Sheopur, Neemuch, Vidisha and Bhopal District. Fall of more than 4m is observed in almost all the district excepts part of South-Western Region

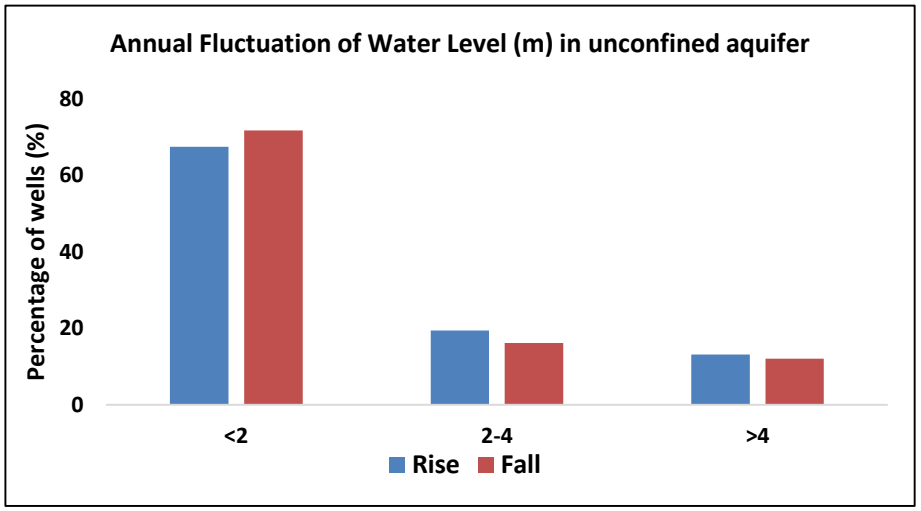

Figure-10: Percentage of wells showing rise and fall in WL in unconfined aquifer (November 2022 to November 2024)

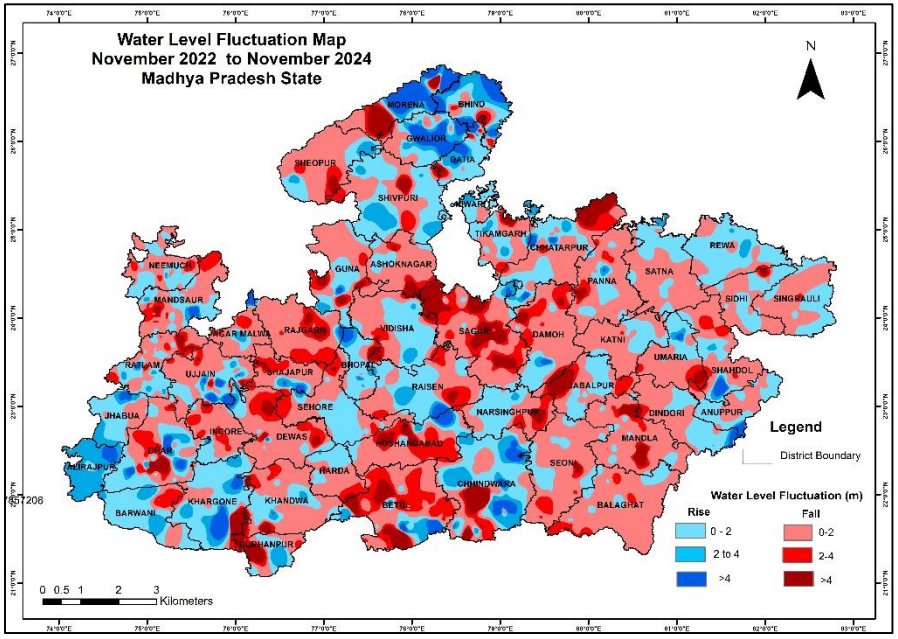

Figure-11: Water Level Fluctuation Map (Nov 2022 to Nov 2024)

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

Rise in Water Levels

Out of 479 wells showing rise in water level, water level rise of less than 2 m is recorded in 67.4% wells, 2 to 4 m in 19.4% wells and more than 4 m in 13.15% of the wells. Water levelrise of less than 2 m is seen in Morena, Gwalior, Bhind, Chhindwara, Khargone, Ujjain, Shahdol districts. Water level rise of 2 to 4 m is observed mainly in districts such as Shivpuri, Raisen, Ujjain, Alirajpur, Barwani, Khargone, Shivpuri and Ratlam Districts. Rise of more than 4 m is significantly observed Significantly in Rewa, Jhabua, Chhindwara, Khargone, Barwani, Jhabua, and Bhopal District.

Fall in Water Levels

Out of 747 wells that have registered fall in water levels, 71.7% have recorded less than 2 m while 16.1% in the range of 2 to 4 m and remaining 12.04% 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 Sheopur, Balaghat, Dindori, Satna, Damoh, Khandwa, Dewas, Ujjainb, Katni and Ashoknagar districts. Fall of 2 to 4 m is observed mainly in Chattarpur, Betul, Mandla, Sagar, Dewas, Hosangabad, Raisen and Shahdol districts. Fall of beyond 4 m is observed as as isolated patches significantly Morena, Chattarpur, Umaria, Mandla, Dewas, Burhanpur, Dhar, Betul, Sagar, Jabalpur, Narsinghpur, Rajgarh and Ashoknagar Districts.

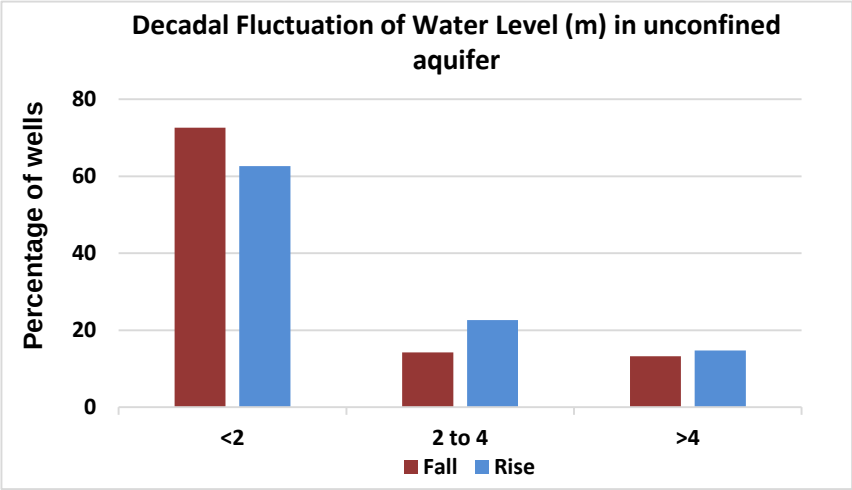

Figure-12: Percentage of wells showing rise and fall in WL in unconfined Aquifer (Decadal Mean Nov (2014-2023) to Nov 2024)

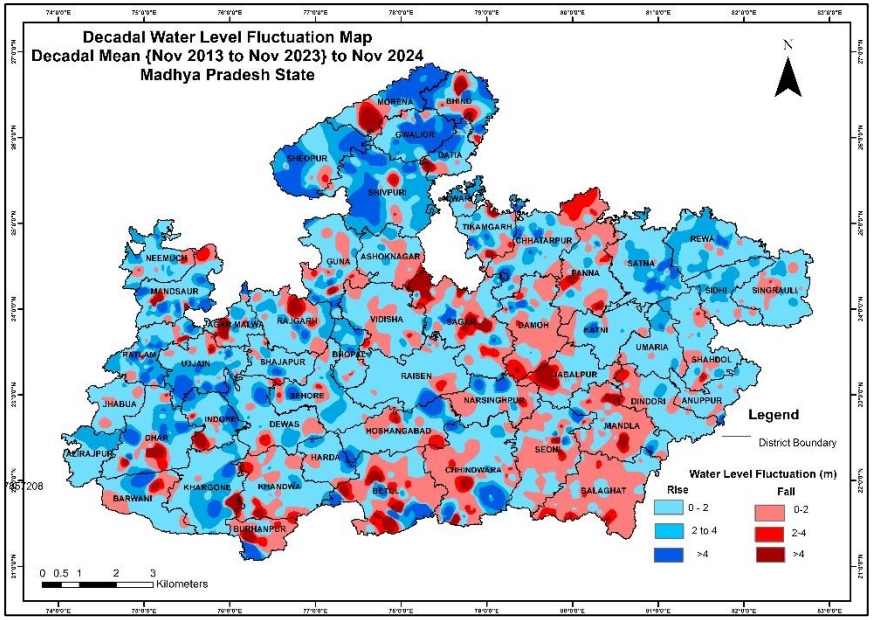

Figure-13: Annual water level fluctuation in unconfined Aquifer (Decadal Mean Nov (2014-2023) to Nov 2024)

5.1.4 DECADAL FLUCTUATION IN WATER LEVEL

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

Rise in Water Levels:

Out of the 1076 wells that have registered rise in water level, 62.7% have recorded rise of less than 2 m while 22.5% in the range of 2 to 4 m and remaining 14.8% wells registered water level rise of more than 4 m. Rise of less than 2 m is observed all over the state and significantly in parts of in Raisen, Bhopal, Sehore, Vidisha, Katni, Dindori, Anuppur, Shahdol districts. Rise of 2 to 4 m, recorded in mainly in North-eastern and Northern districts mainly in Ujjain, Indore, Khargone, Bhopal, Dhar, Alirajpur, Sheopur, Chattarpur, Satna, Rewa, Shivpuri, Khargone and Khandwa districts. Water level rise of more than 4m is observed mainly in Northern districts significantly. The districts facing rise of more than 4m are Morena, Gwalior, Sheopur, Shivpuri, Ujjain, Khargone, Chhindwara, Satna, Ujjain, Indore, Khargone, Dhar, Mandsaur, Ratlam and Dewas districts.

Fall in Water Levels:

Out of 500 wells that have register fall in water level, water level fall of less than 2 m is recorded in 72.6% wells, 2 to 4 m in 14.2% wells and more than 4 m in 13.2% of the wells. Water level fall of less than 2 m is seen in patches, significantly in Morena, Jabalpur, Betul, Agar Malwa, Dhar, Sagar, Rajgarh, Khargone and Bhind districts. Water level fall of 2to 4 m is observed mainly in Chattarpur, Betul, Mandla, Balaghat, Jabalpur and Burhanpur District. Water level fall of more than 4m is observed all over the State mainly in Balaghat, Seoni, Mandla, Damoh, Beul, Ashoknagar districts.

5.2 DEEPER AQUIFER (CONFINED/ SEMI-CONFINED)

5.2.1 DEPTH TO PIEZOMETRIC LEVEL

Analysis of piezometric level data of 308 wells shows piezometric levels vary between 0 m bgl (Ujjain District) to 70.85 m bgl (Sagar district). Piezometric level between 0 to 2 m bgl in 4.2% of wells, between 2 to 5 m bgl in 25.3% of wells, between 5 to 10 m bgl in 28.5% of wells, between 10 to 20 m bgl in 24.6% of wells, between 20 to 40 m bgl in 9.5% of wells and piezometric level more than 40 m bgl is registered in 6.6% of wells.

Water level of 0 to 2 m bgl is found in small patches in Satna, Mandla, Betul, Raisen and Dhar districts. Piezometriclevel of 2 to 5 m bgl is covered in 25% of the state area and observed mainly in Rewa, Singrauli, Sidhi, Shahdol, Ashoknagar, Hosangabad, Dhar, Tikamgarh, Balaghat and Damoh districts. Piezometric levels of 5 to 10 m mainly observed in Hosangabad, Raisen, Dewas, Satna, Khargone, Neemuch, Ratlam, Dhar and Rajgarh districts. Piezometric levels of 10 to 20 m mainly observed in Northern and South Western Districts like Morena, Bhind, Gwalior, Datia, Sheopur, Shivpuri, Chattarpur, Panna, Narsinghpur, Chhindwara, Alirajpur, Barwani, Guna and Vidisha districts. Piezometric levels of 20 to 40 m mainly observed in Sheopur, Guna, Khandwa, Burhanpur, Dhar, Rajgarh, Mandla, Dindori and Sagar districts. Deeper water level of greater than 40 m bgl is found mainly in Panna, Mandla, Dindori, Satna, Dewas, Dhar, Burhanpur and Panna District.

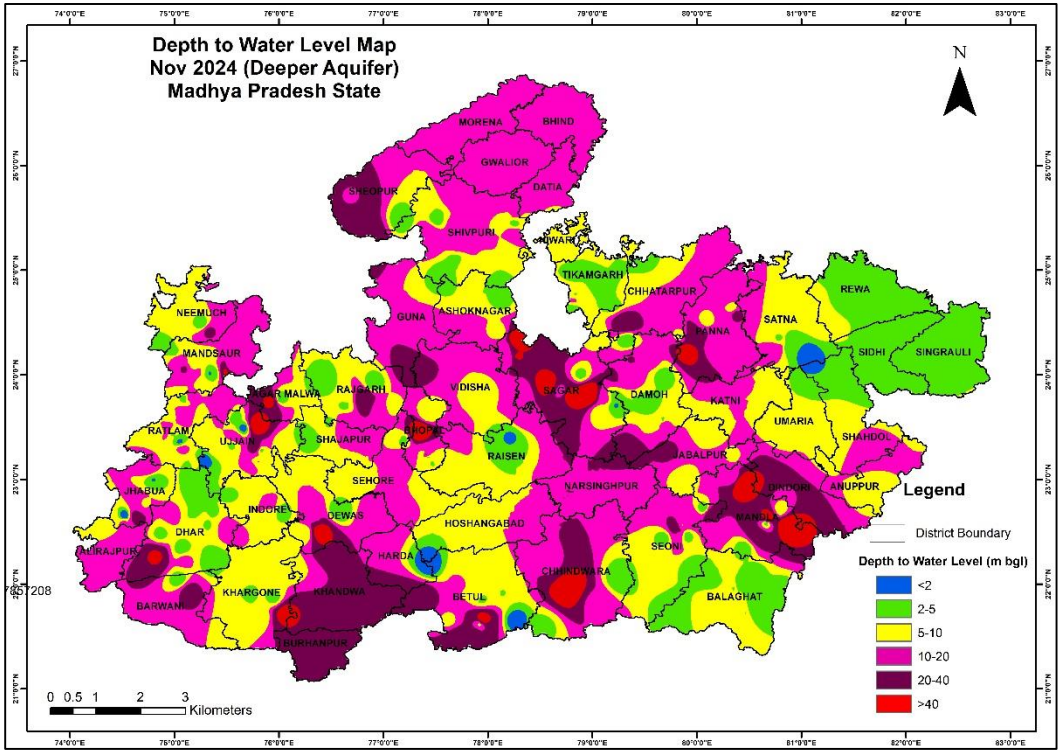

Figure-14: Depth to Water Level Map Confined / semi-confined Aquifer, Nov 2024

Prepared by:
Lata Udsaiya, Sc-C
Sumanta Kumar Mohanta, Sc-C
Vaishnavi Parihar, Sc-B
Pradip Roy, Sc-B