ABSTRACT

Ground Water Level Scenario during January-2025 highlighting the findings, status of ground water level in different aquifers and its seasonal, annual and decadal comparison.

CGWB, NORTH CENTRAL CHHATTISGARH REGION, RAIPUR

GROUND WATER LEVEL BULLETIN

January 2025

CHHATTISGARH

1.0 Introduction

Chhattisgarh, located between North Latitude 17°47’ to 24°06’ and East Longitude 80°14’ to 84°24’, is monitored for groundwater dynamics by the Central Ground Water Board's North Central Chhattisgarh Region in Raipur. Covering 1,37, 360 sq. km, the state is predominantly tribal, encompassing approximately 65.90% of its total area. Groundwater regime monitoring involves a network of observation wells and piezometers. Dug wells represent the shallow phreatic aquifer system, while piezometers gauge the shallow un-confined and deeper semi-confined aquifer systems.

This monitoring forms part of the all India Network Hydrograph Stations, overseen by various regional offices nationwide. As of January 2025, there were 1251 operational wells, comprising 1023 dug wells and 228 piezometers are monitored quarterly for groundwater levels and quality. The objective is to assess groundwater behaviour across diverse hydrogeological environments, periodically estimating groundwater resources and tracking water quality changes.

2.0 Study Area

Physiography

Chhattisgarh is geographically categorized into three distinct regions. The Bastar Plateau in the southern part of the state includes districts such as Bastar, Kondagaon, and Dantewada. Covered mostly by dense evergreen forests and hilly terrain, it features high-level plateaus, structural hills, valleys, and pediplains, with altitudes ranging from 400 to 600 meters above mean sea level (a msl).

The Chhattisgarh Plain occupies the central part and spans districts like Raipur, Bilaspur, and Durg. This region, formed on Proterozoic rocks, is characterized by a gently undulating and flat terrain, interspersed with remnants of hills and ridges. Altitudes vary from 284 meters amsl in the southeast to 750 meters amsl in the northwest.

The Northern Hilly Region covers the northern and north-central parts, encompassing districts like Raigarh and Bilaspur. It forms part of the Maikal and Hazaribagh hill ranges, featuring structural plains, pediplains, denudational plateaus, and hills. This area supports various river systems, including tributaries of the Mahanadi and Son rivers. The state's highest point, Tulisi Dongri in Dantewada district, reaches 1197 meters amsl, while its lowest point is 50 meters amsl at Konta, also in Dantewada district.

Drainage

Chhattisgarh is traversed by major rivers including the Mahanadi, and its tributaries Seonath, Hasdeo, Mand, and Arpa, impacting several districts. The Indravati River, a Godavari tributary, flows through Kanker, Bastar, and Dantewada districts.

Hydrogeological conditions

The occurrence and movement of ground water is related to the existing geology of the area. The State is underlain by various rock types belonging to different geological ages, from Azoic to Quaternary. Nearly 58 % of the State is covered by Crystalline and metamorphic rocks; around 27 % of the area is covered by Chhattisgarh Group of rocks. The semi-consolidated Gondwana Supergroup of rocks covers 13 % of the area and the remaining 2 % by Deccan trap, Lameta, Laterite and River Alluvium.

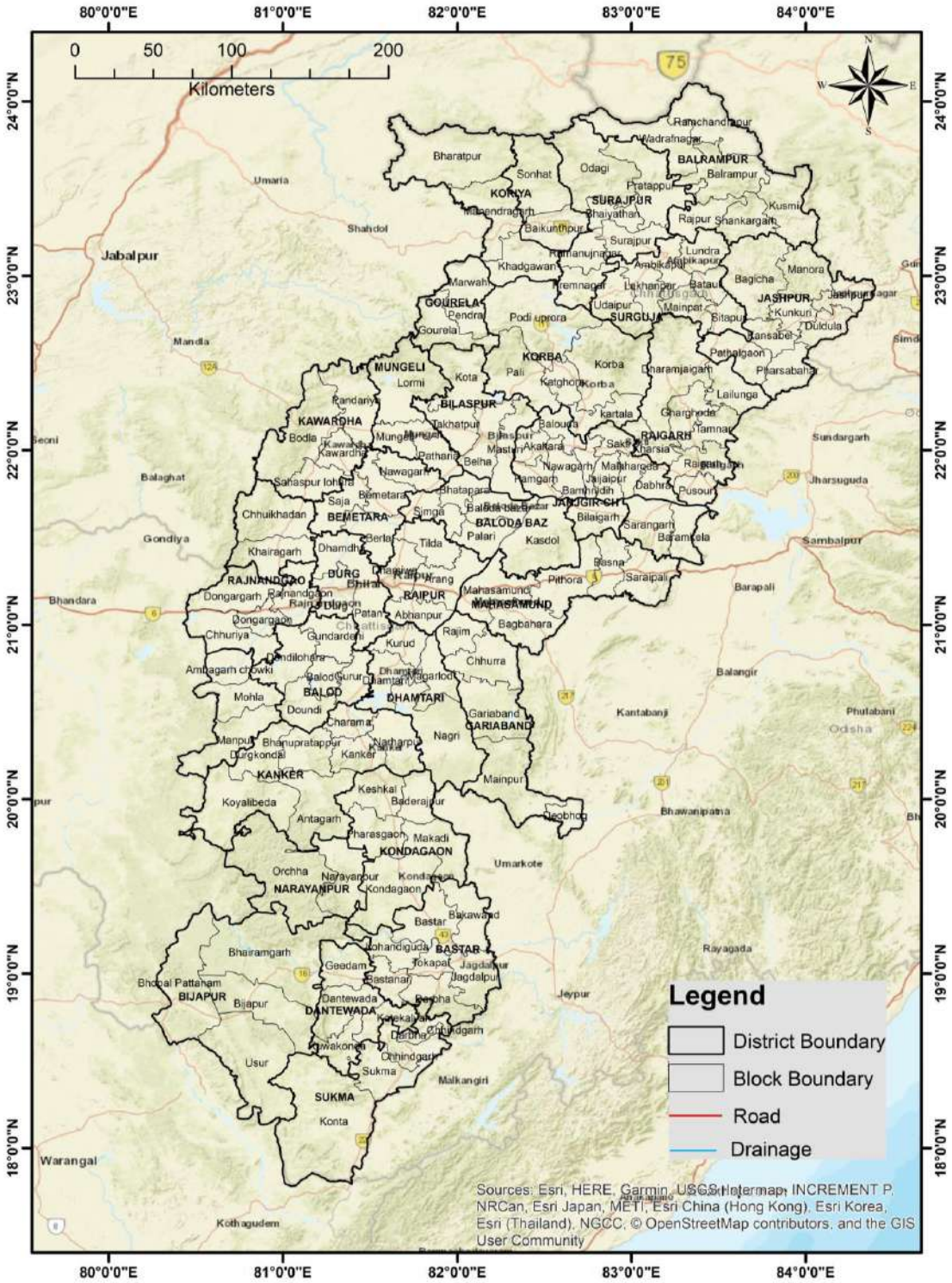

Figure-1: Map showing administrative divisions Chhattisgarh

3.0 Groundwater Level Monitoring

The Central Ground Water Board, North Central Chhattisgarh Region, conducts ongoing quarterly monitoring of groundwater regimes in Chhattisgarh state. This involves a network of monitoring stations situated across various hydrogeological and geomorphic units. **As of January 2025, there were 1251 operational wells, comprising 1023 dug wells and 228 piezometers.** The details of the wells are provided in Table 1.

Table-1: District-wise distribution of water level monitoring stations as per Jan 2025

Sl no	State	District	DW	PZ	Total
1	Chhattisgarh	Balod	47	8	55
2	Chhattisgarh	Balodabazar	32	10	42
3	Chhattisgarh	Balrampur	16	7	23
4	Chhattisgarh	Bastar	15	12	27
5	Chhattisgarh	Bemetara	43	8	51
6	Chhattisgarh	Bijapur	0	0	0
7	Chhattisgarh	Bilaspur	55	6	61
8	Chhattisgarh	Dantewada	0	0	0
9	Chhattisgarh	Dhamtari	27	8	35
10	Chhattisgarh	Durg	51	9	60
11	Chhattisgarh	Gariaband	23	2	25
12	Chhattisgarh	Janjgir	44	10	54
13	Chhattisgarh	Jashpur	82	10	92
14	Chhattisgarh	Kabirdham	10	8	18
15	Chhattisgarh	Kanker	11	1	12
16	Chhattisgarh	Kondagaon	12	1	13
17	Chhattisgarh	Korba	84	30	114
18	Chhattisgarh	Koriya	30	3	33
19	Chhattisgarh	Mahasamund	30	25	55
20	Chhattisgarh	Mungeli	30	7	37
21	Chhattisgarh	Narayanpur	0	0	0
22	Chhattisgarh	Raigarh	89	10	99
23	Chhattisgarh	Raipur	37	15	52
24	Chhattisgarh	Rajnandgaon	48	10	58
25	Chhattisgarh	Sukma	0	0	0
26	Chhattisgarh	Surajpur	61	6	70
27	Chhattisgarh	Surguja	47	5	54
28	Chhattisgarh	Gaurela-Pendra-Marwahi	28	3	31
29	Chhattisgarh	Sakti	10	5	15
30	Chhattisgarh	Khairagarh-Chhuikhadan-Gandai	9	4	13
31	Chhattisgarh	Mohla-Manpur- Ambagarh Chowki	2	1	38
32	Chhattisgarh	Sarangarh-Bilaigarh	18	1	22
33	Chhattisgarh	Manendragarh Chirimiri Bharatpur	32	3	
Total			**1023**	**228**	**1251**

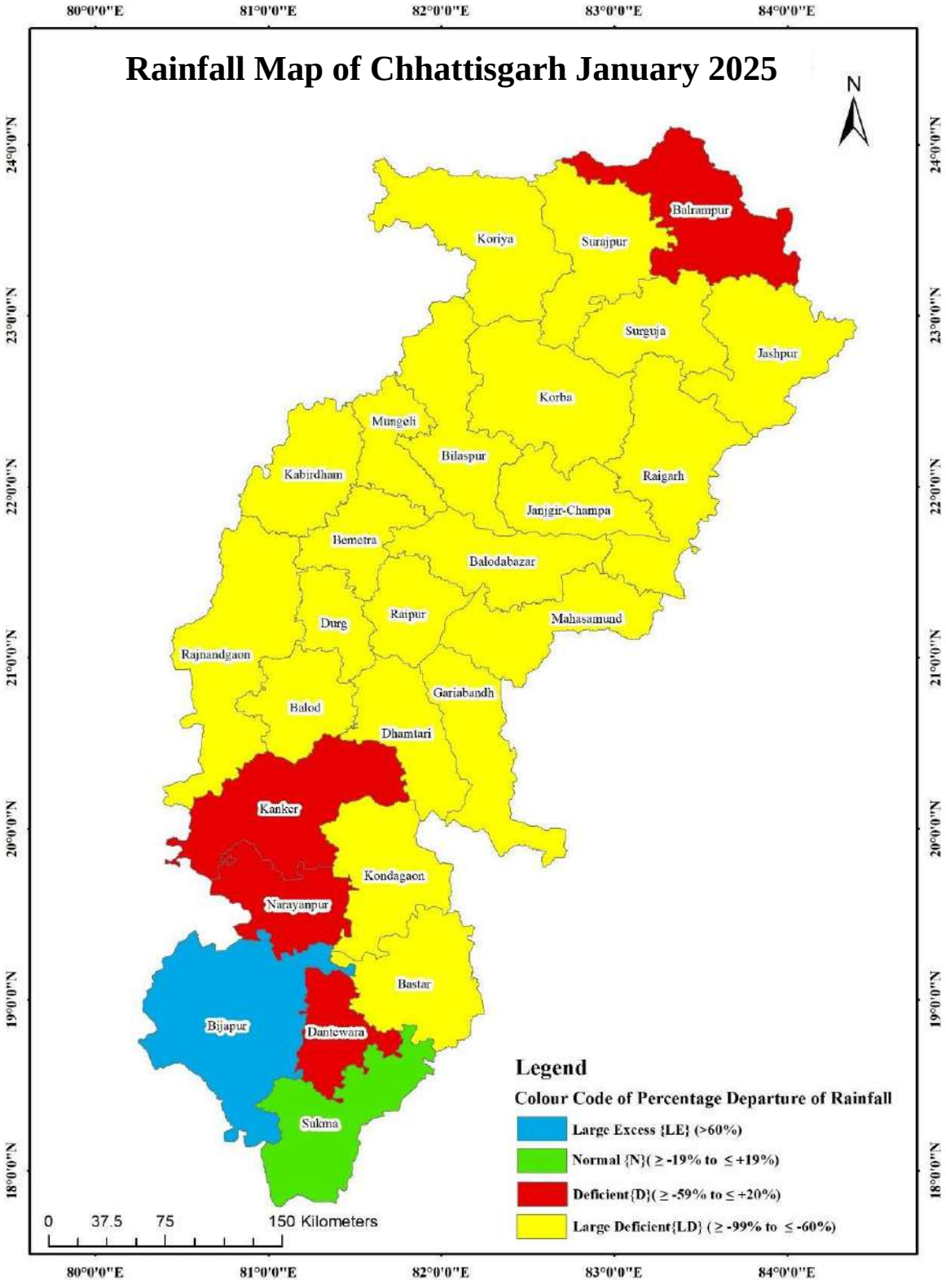

Figure : 2 Rainfall Map of Chhattisgarh (January 2025)

4.0 Rainfall

The region experiences a subtropical monsoon climate with distinct summer, monsoon, and winter seasons. The southwest monsoon prevails from June to mid-September, providing about 90% of the annual rainfall. Winter spans from October to February, while summer lasts from March to mid-June. Rainfall primarily recharges groundwater, with the Indian Meteorological Department (IMD), state departments, and agricultural universities maintaining over 200 rain gauge stations across the state. The average annual rainfall in the region is 1089.9 mm,

varying across districts from a high of 2286.5 mm in Bijapur to a low of 560 mm in Bemetara.

Table 2: District wise distribution of Rainfall with deviation given in colour code

Sl. No.	District	Percentage Departure	Category
1	Balod	-99%	Large Deficient
2	Baloda Bazar	-97%	Large Deficient
3	Balrampur	-50%	Deficient
4	Bastar	-50%	Deficient
5	Bemetara	-92%	Large Deficient
6	Bijapur	41%	Large Excess
7	Bilaspur	-85%	Large Deficient
8	Dantewada	-51%	Deficient
9	Dhamtari	-79%	Large Deficient
10	Durg	-89%	Large Deficient
11	Gariaband	-60%	Large Deficient
12	Gaurela-Pendra-Marwahi	-85%	Large Deficient
13	Janjgir-Champa	-99%	Large Deficient
14	Jashpur	-78%	Large Deficient
15	Kabirdham	-90%	Large Deficient
16	Kanker	-41%	Deficient
17	Khairagarh-Chhuikhadan-Gandai	-88%	Large Deficient
18	Kondagaon	-65%	Large Deficient
19	Korba	-82%	Large Deficient
20	Korea	-79%	Large Deficient
21	Mahasamund	-87%	Large Deficient
22	Manendragarh-Chirmiri-Bharatpur	-89%	Large Deficient
23	Mohala-Manpur-Chowki	-73%	Large Deficient
24	Mungeli	-92%	Large Deficient
25	Narayanpur	-30%	Deficient
26	Raigarh	-77%	Large Deficient
27	Raipur	-82%	Large Deficient
28	Rajnandgaon	-99%	Large Deficient
29	Sakti	-97%	Large Deficient
30	Sarangarh-Bilaigarh	-98%	Large Deficient
31	Sukma	3%	Excess
32	Surajpur	-66%	Large Deficient
33	Surguja	-81%	Large Deficient

5.0 GROUND WATER LEVEL SCENARIO(Jan 2025)

5.1.1 Depth to WaterLevel data

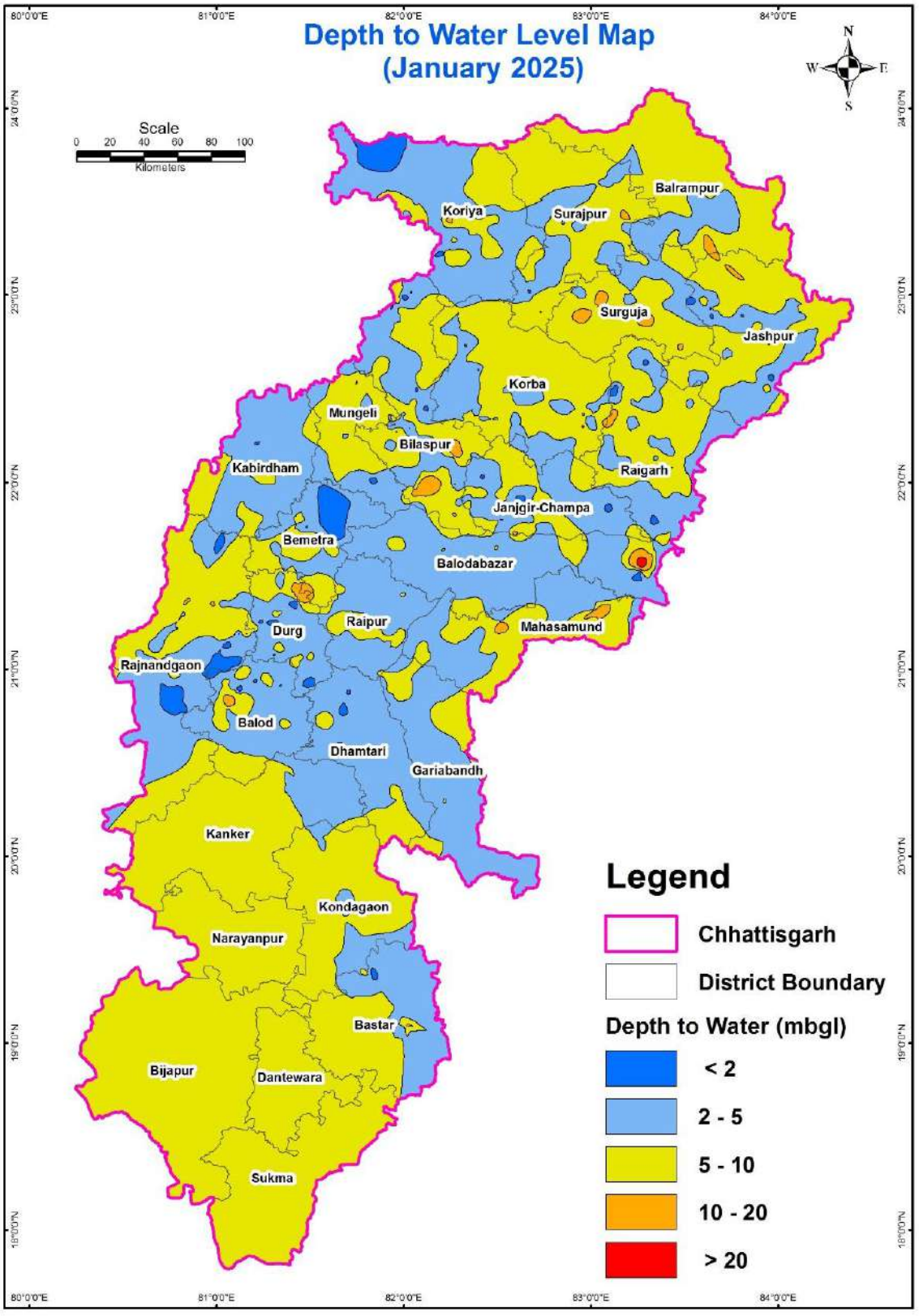

Figure: 3 Depth to water level map for Unconfined Aquifer January 2025

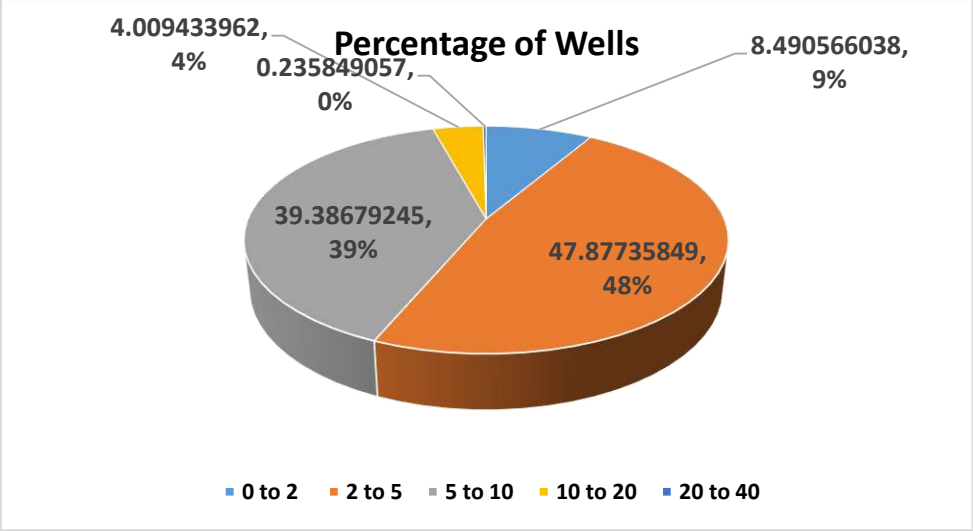

Figure 4 : Percentage of Monitoring Stations vs Ranges of rise and Fall of Water Level(Jan 2025)

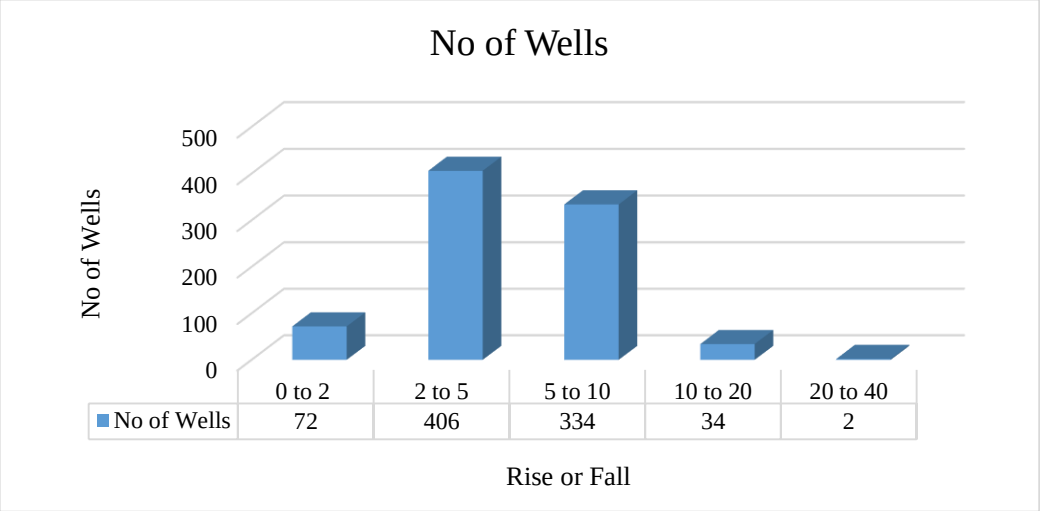

Figure 5: Nos of Monitoring Stations vs Ranges of rise and Fall of Water Level(Jan 2025)

5.1.2 Seasonal Fluctuation in Water Level

Depth To Water Level (January 2025)

Out of 848 wells, 72 wells in districts of Rajnandgaon, Durg, Bilaspur, Raigarh and few more areas are in the range of 0 to 2m. 406 wells are in the range of 2 to 5 m bgl in areas of Raipur, Surguja Rajnandgaon Bilaspur durg and Raigarh. 334 wells are in the range of 5-10 m bgl scattered in areas of Surguja, Rajnadgaon, Raipur, Koriya Korba Jashpur, Janjgir Champa Durg Bilaspur and Bastar. Only 34 wells are in the range of 10 to 20 m. Only 02 wells are greater than 2 m bgl.

May 2024 vs Jan 2025

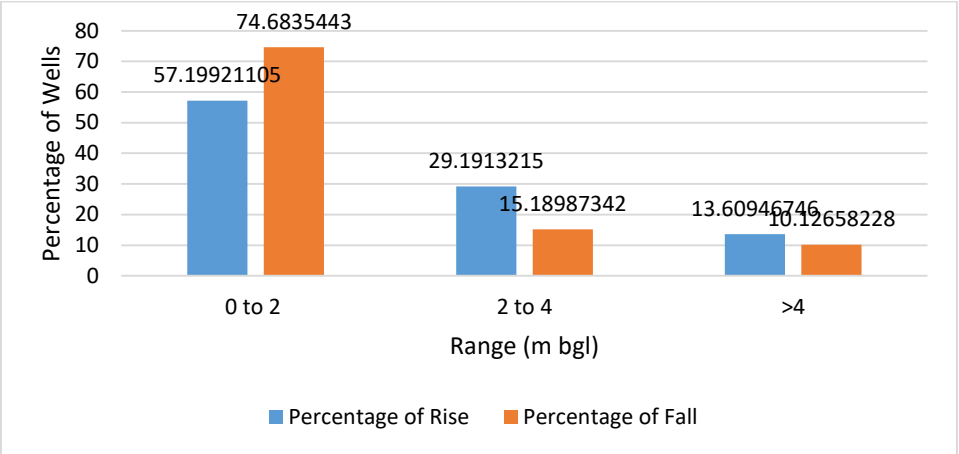

Figure 6 : Percentage of Monitoring Stations vs Ranges of rise and Fall of Water Level(May 2024 vs Jan 2025)

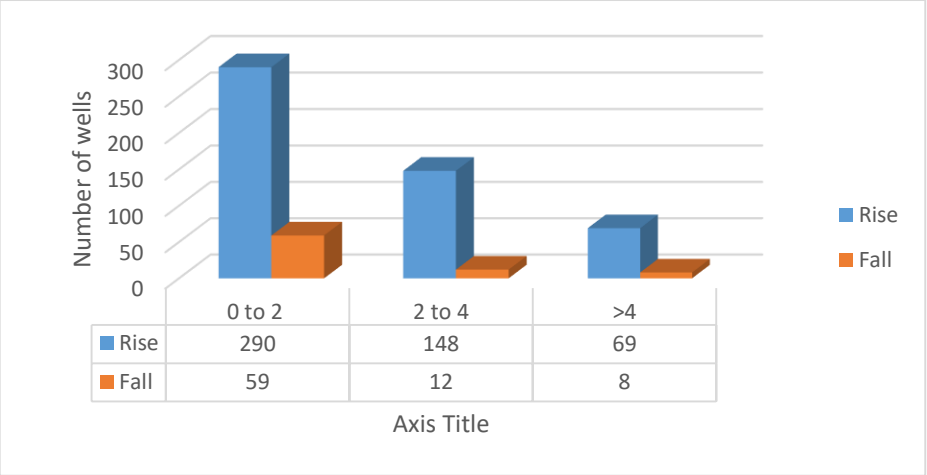

Figure 7 : Nos of Monitoring Stations vs Ranges of rise and Fall of Water Level(May 2024 vs Jan 2025)

Out of 594 wells, 507 wells are showing rise while 79 wells are showing fall.

Rise of Water Level

Out of 507 wells showing rise, 290 are in the range of 0 to 2 m bgl in areas of Bilaspur, Jashpur, Koriya, Raigarh Rajnandgaon. 148 wells are in the range of 2 to 4 m in areas of Bilaspur, Raigarh, Rajnandgaon and Surguja districts. 69 wells are showing water level more than 4 m bgl in areas of Bilaspur, Jashpur, Surguja and Rajnandgaon districts.

Fall in Water Level

Out of 79 wells showing fall in water level, 59 wells are in the fall of water level range in 0 to 2 m bgl. 12 wells are showing fall in range of 2 to 4 m bgl. Only 8 wells are in the fall greater than 4 mbgl.

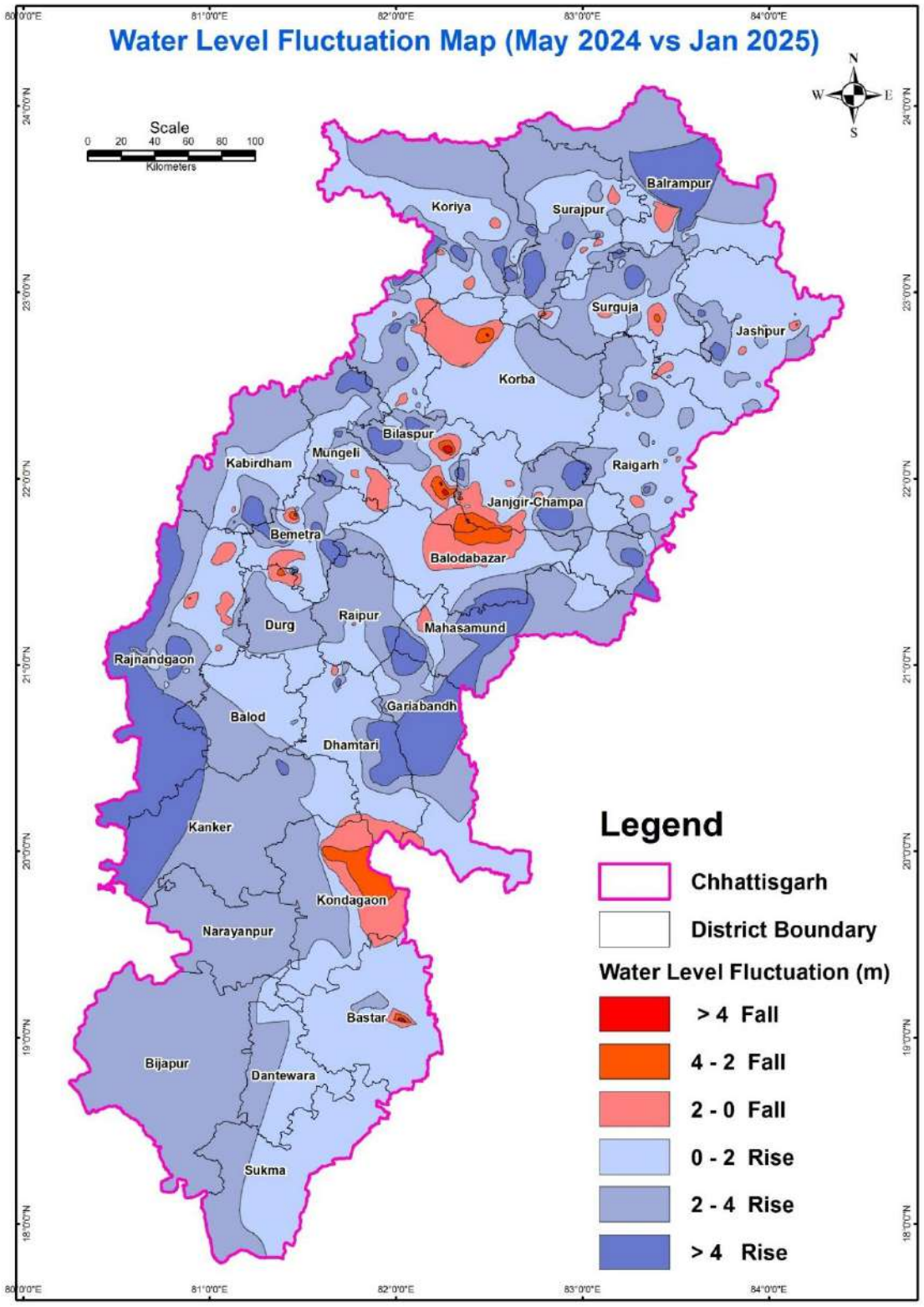

Figure: 8 Depth to water level map for Unconfined Aquifer May 2024 vs January 2025

August 2025 vs January 2025

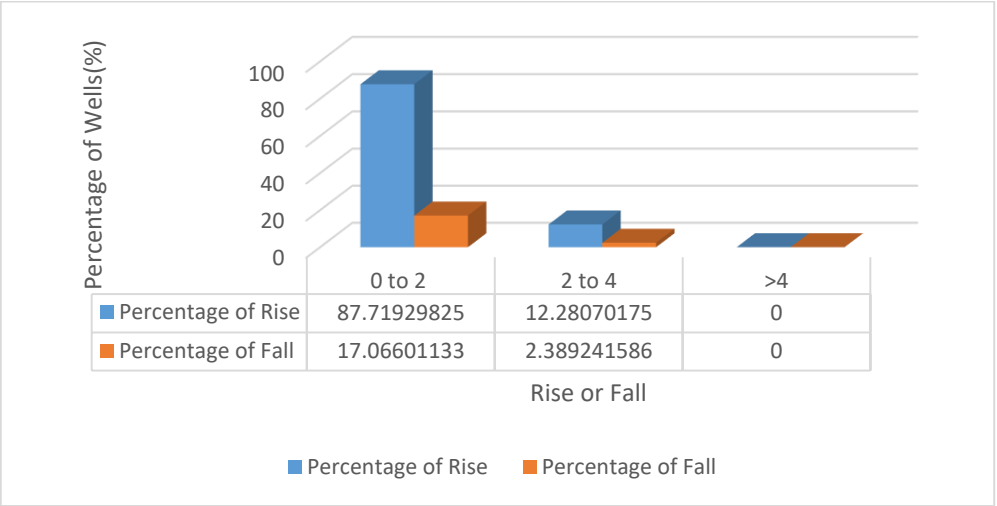

Figure 9: Percentage of Monitoring Stations vs Ranges of rise and Fall of Water Level (August 2024 vs January 2025)

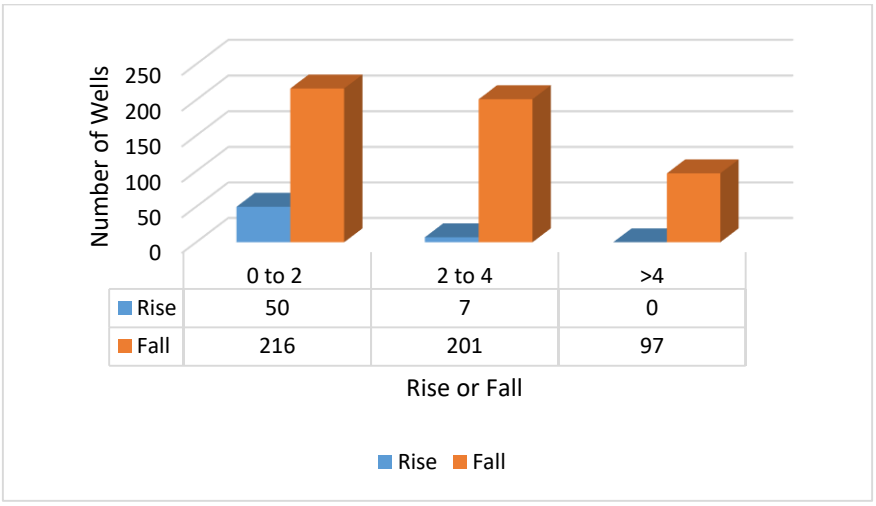

Figure 10: Nos of Monitoring Stations vs Ranges of rise and Fall of Water Level (August 2024 vs January 2025)

Out of 573 wells, only 57 wells are showing rise in water level while 514 wells are showing fall.

Rise in Water Level

50 wells distributed in districts of Bilaspur, Dhamtari, Durg, Koriya, Mahasamund, Rajnandgaon and Surguja. 148 wells distributed in areas in Kawardha, Mahasamund, Raigarh and Raipur show rise in 2 to 4 mbgl.

Fall in Water Level

216 wells show fall in districts of Bilaspur, Durg, Jashpur, Koriya Raigarh, Raipur, Rajnandgaon and Surguja in range of 0 to 2 m bgl. 201 wells in areas of Rajnandgaon, Surguja, Raigarh, Mahasamund, Koriya, Korba, Kawardha, Durg and Bilaspur are showing in range 2 to 4 mbgl. 97 wells are showing fall greater than 4 mbgl. These are distributed in areas of Surguja, Rajnandgaon, Raipur, Raigarh, Koriya, Korba, Jashpur, Durg, Bilaspur and Bastar.

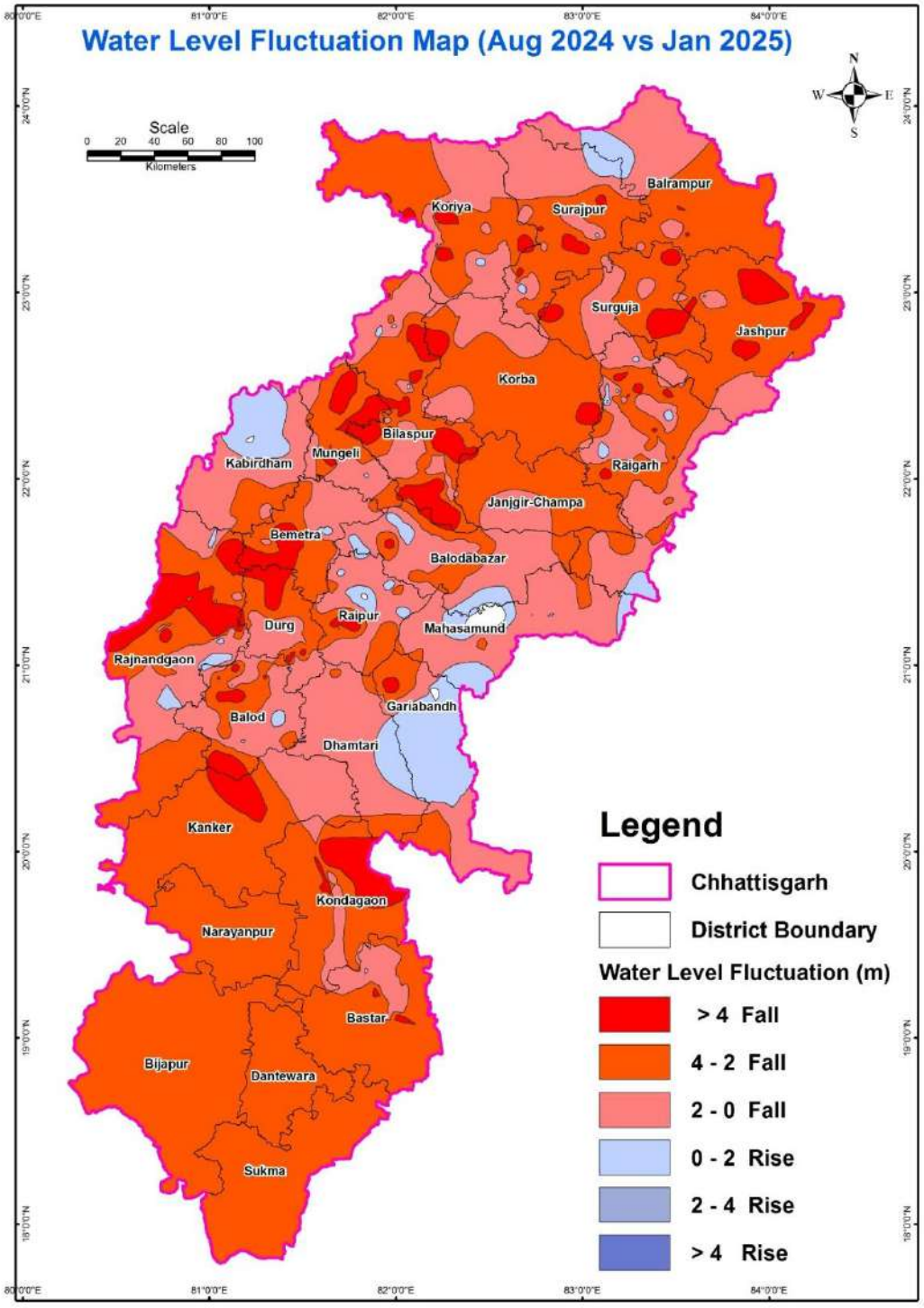

Figure : 11 Depth to water level map for Unconfined Aquifer August 2024 vs January 2025

November 2024 vs January 2025

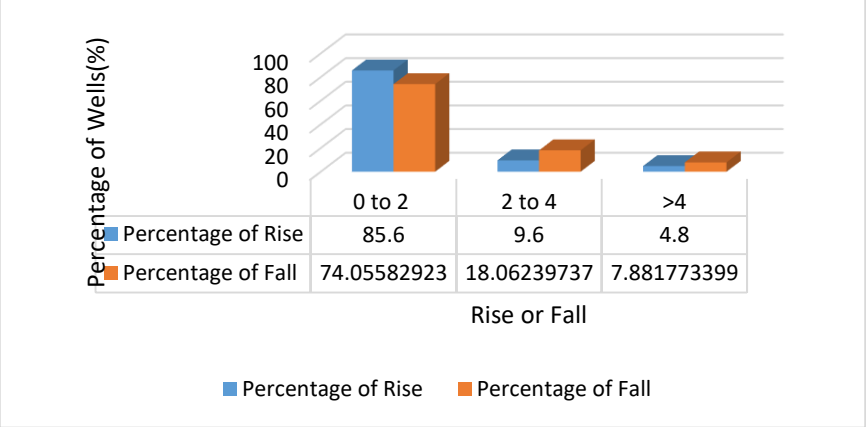

Figure: 12 Percentage of Monitoring Stations vs Ranges of rise and Fall of Water Level (November 2024 vs January 2025)

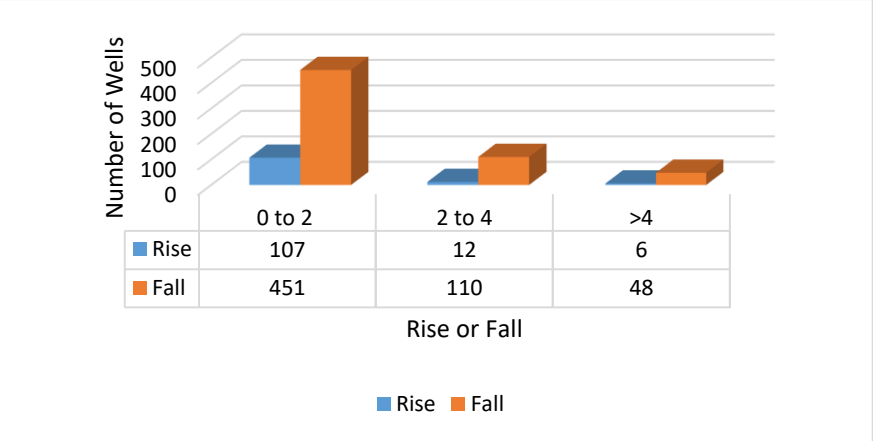

Fig: 13 Nos of Monitoring Stations vs Ranges of rise and Fall of Water Level (November 2024 vs January 2025)

Out of 740 wells, 125 wells are showing rise in hydraulic head while 609 wells are showing fall in the same.

Rise in Water Level

107 wells are showing rise in the range 0 to 2 m bgl in areas of Rajnandgaon, Surguja, Raipur, Durg, Mahasamund, Koriya and Jashpur. 12 wells are showing in the range 2 to 4 m bgl. 6 wells show rise in hydraulic head more than 4 m bgl distributed in areas of Rajnandgaon, Surguja, Koriya, Jashpur, Raipur, Balodabazar.

Fall in Water Level

451 wells show fall in hydraulic head in areas of Rajnadgaon, Surguja, Raigarh, Jashpur, Koriya, Bilaspur, Raipur and Balodabazar in 0 to 2 m bgl. 110 wells showing fall in 2 to 4 mbgl are distributed in areas of Rajnandgaon, Surguja, Raipur, Durg, Mahasamund, Bilaspur, Durg, Koriya Raipur, and Jashpur. 48 wells showing fall more than

4 m bgl are in areas of Kanker, Narayanpur, Bemetara, Bilaspur, Rajnandgaon, Mahasamund, Surguja, Surajpur, Jaspur, Koriya, Balrampur.

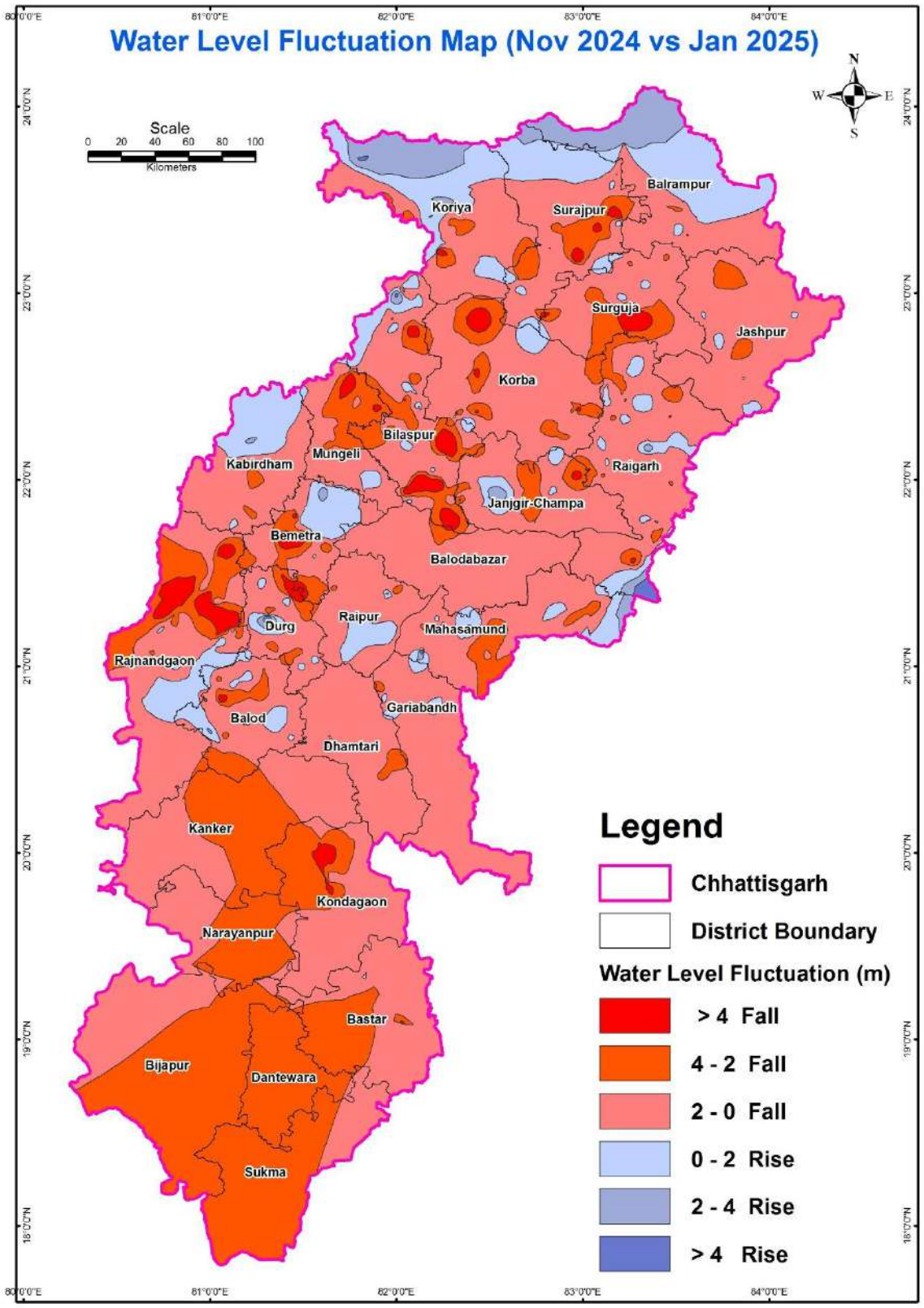

Figure: 14 Depth to water level map for Unconfined Aquifer November 2024 vs January 2025

5.1.3 Annual Fluctuation in Water Level

January 2024 vs January 2025

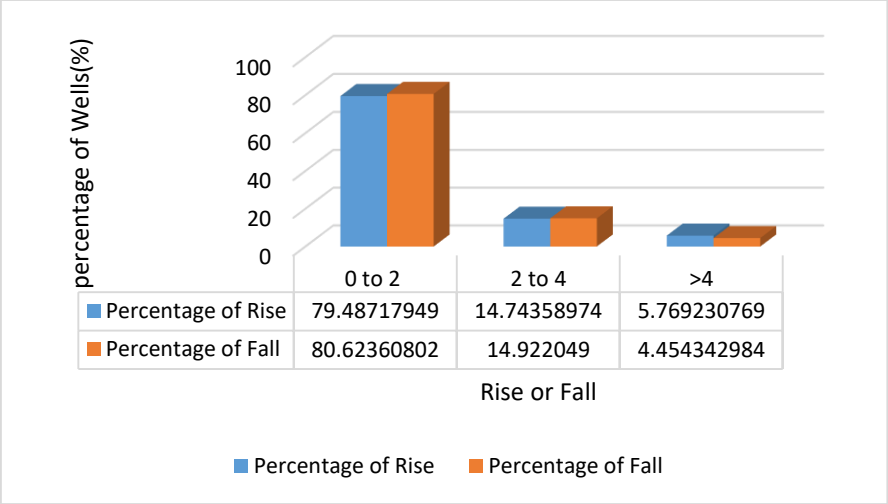

Figure 15: Percentage of Monitoring Stations vs Ranges of rise and Fall of Water Level (January 2024 vs January 2025)

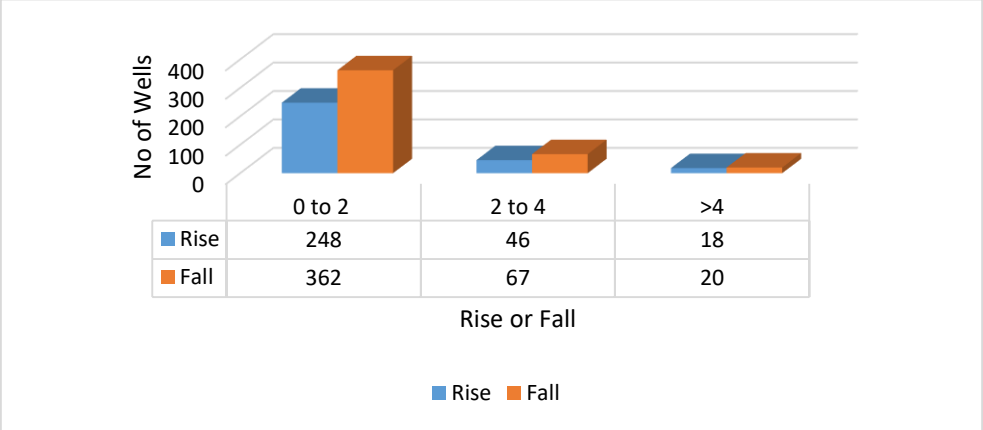

Figure 16 : Nos of Monitoring Stations vs Ranges of rise and Fall of Water Level (January 2024 vs January 2025)

Out of 779 wells, 312 wells are showing rising trend while 449 wells are showing falling trend.

Rise in Water Level

These 248 wells out of 312 shows rise of 0 to 2 m bgl in areas of Surguja, Rajnandgaon, Raipur, Raigarh, Mahasamund, Koriya Korba, Kawardha, Janjgir Champa. 146 wells showing rising trend of 2 to 4 mbgl in all the districts except Korba, Kanker, Kawardha, Bastar. 18 wells show rising trend of more than 4 m bgl in areas of Koriya, Mahasamund, Raigarh, Raipur, Durg, Bilaspur Rajnandgaon, Surguja.

Fall in Water Level

362 out of 449 shows fall of water level in range of 0 to 2 m bgl in areas of Koriya, Mahasamund, Raigarh, Raipur, Durg, Bilaspur Rajnandgaon, Surguja, Jashpur, Bilaspur, Janjgir Champa. 67 wells show fall in water level in range

of 2 to 4 m bgl in areas of Surguja, Rajnandgaon, Raigarh, Jaspur, Bastar, Bilaspur. 20 wells show fall over 4 mbgl in areas of Surguja, Rajnandgaon, Raipur, Korba, Koriya, Dhamtari, Bilaspur, Janjgir Champa.

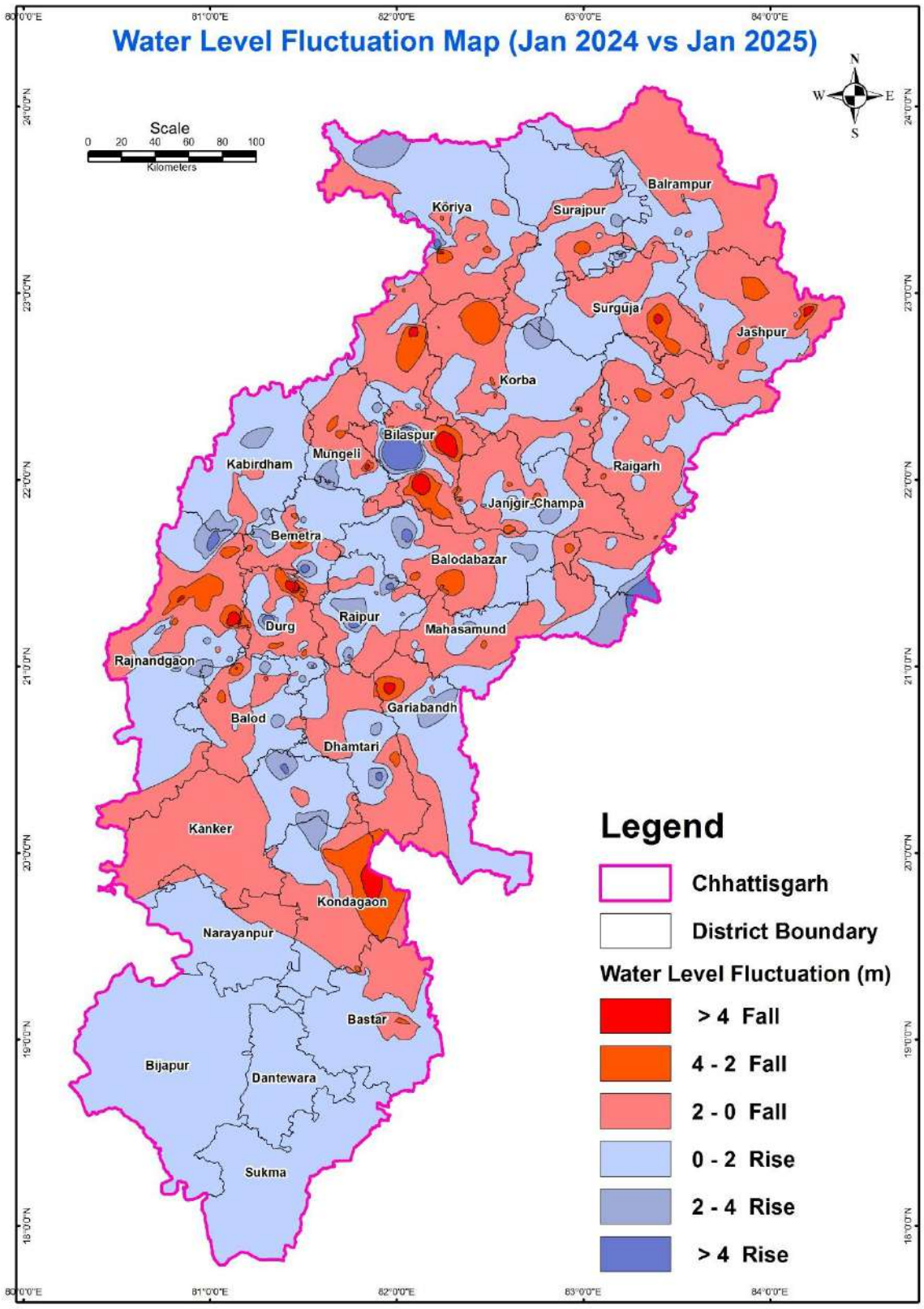

Figure 17: Water Level Fluctuation Map for Unconfined Aquifer January 2024 vs January 2025

January 2023 vs January 2025

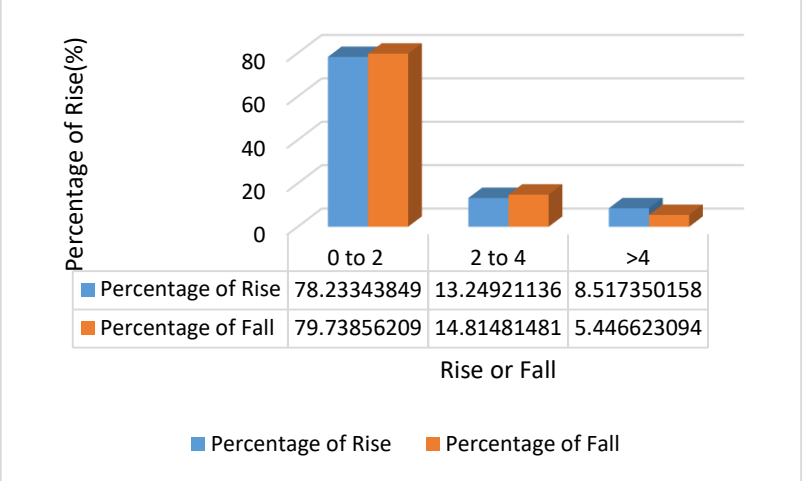

Figure 18: Percentage of Monitoring Stations vs Ranges of rise and Fall of Water Level (January 2023 vs January 2025)

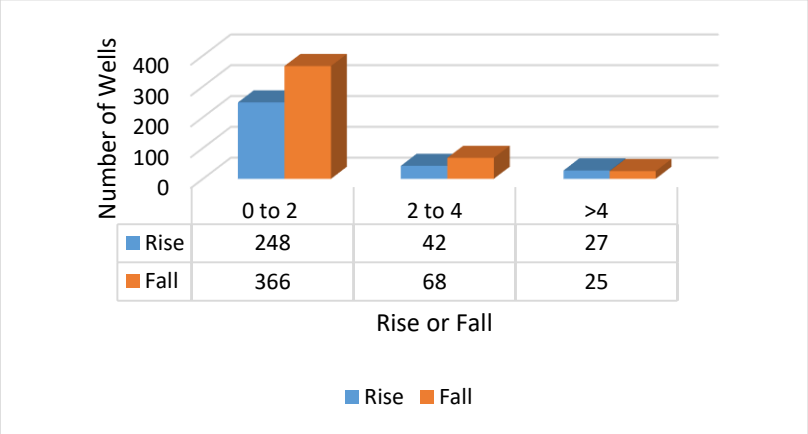

Figure 19: Nos of Monitoring Stations vs Ranges of rise and Fall of Water Level (January 2023 vs January 2025)

Out of 791 wells in total, 317 shows rise in hydraulic head while 459 wells fall in hydraulic head.

Rise in Water Level

Out of 317, 248 shows rise in water level in range of 0 to 2 m bgl in areas of Surguja, Raipur, Raigarh, Mahasamund, Koriya Korba, Kawardha, Janjgir Champa, Durg, Bilaspur Rajnandgaon, Surguja, Jashpur, Bastar Kanker Kawardha. 42 wells showing rise in water level are in the range of 2 to 4 mbgl in areas of Koriya Korba, Kawardha, Janjgir Champa, Durg, Surguja and Rajnandgaon. 27 wells in areas of Surguja, Rajnandgaon, Raipur, Mahasamund, Koriya Korba, Kawardha, Janjgir Champa, Durg, Bilaspur Rajnandgaon, Surguja, Janjgir Champa, Kawardha show rise over 4 mbgl.

Fall in Water Level

Out of 459 wells showing fall in water level, 366 are in areas of Rajnandgaon, Raipur, Raigarh, Janjgir Champa, Durg, Bilaspur, Bastar Kanker Kawardha and Jaspur. 68 wells are showing fall of 2 to 4 m bgl while 25 wells are showing fall over 4 m bgl.

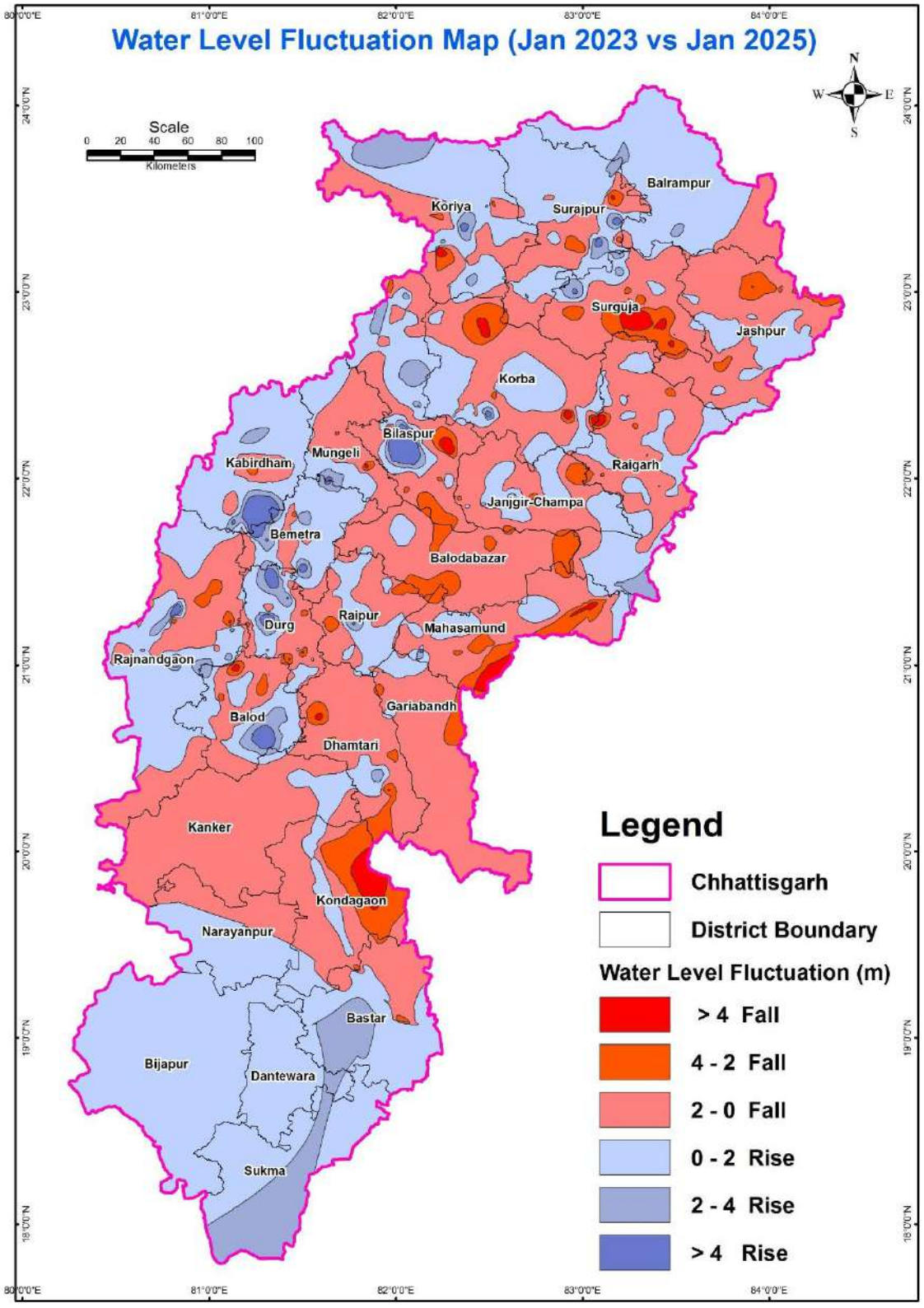

Figure 20: Water Level Fluctuation Map for Unconfined Aquifer January 2023 vs January 2025

5.1.4 Decadal Fluctuation in Water Level

Mean of January (January 2015 to January 2024) Vs January 2025

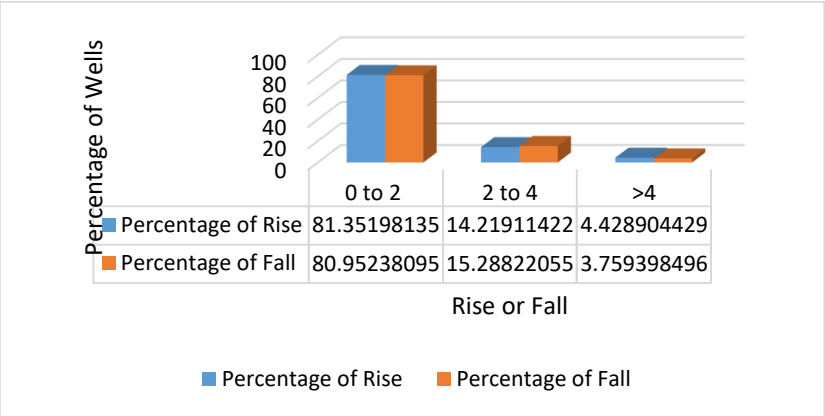

Figure 21: Percentage of Monitoring Stations vs Ranges of rise and Fall of Water Level (January 2015 to January 2024) Vs January 2025

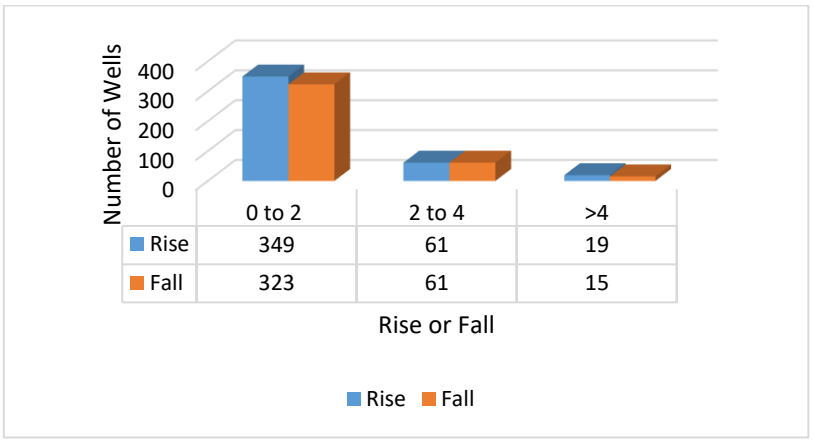

Figure 22: Nos of Monitoring Stations vs Ranges of rise and Fall of Water Level (January 2015 to January 2024) Vs January 2025

Out of 828 total wells 429 are showing rise in water level while 399 are showing fall in water level.

Rise in Water Level

349 out of 429 showing rise are in areas of Bastar, Bilaspur, Dhamtari, Durg, Janjgir – Champa, Jashpur, Kanker, Kawardha, Korba, Koriya, Mahasamund, Raigarh, Raipur, Rajnandgaon and Surguja. In 0 to 2 mbgl. 61 wells in areas of Bilaspur, Dhamtari, Durg, Janjgir – Champa, Kawardha, Korba, Koriya, Mahasamund, Raigarh, Raipur, Rajnandgaon and Surguja in 2 to 4 m bgl. 19 wells in areas of Raipur, Rajnandgaon, Surguja, Korba, Jashpur Bilaspur are showing rise over 4 m bgl.

Fall in Water Level

Out of 399 wells, 323 wells are showing fall in range of 0 to 2 mbgl in areas of Bastar, Bilaspur, Dhamtari, Durg, Janjgir – Champa, Jashpur, Kanker, Kawardha, Korba, Koriya, Mahasamund, Raigarh, Raipur, Rajnandgaon and Surguja. 61 wells in range of 2 to 4 m bgl fluctuation of water level is found in all districts except Kanker and Kawardha. 15 wells in areas of Surguja, Rajnandgaon, Korba, Koriya, Bastar, Bilaspur and Durg shows fall more than 4 m bgl.

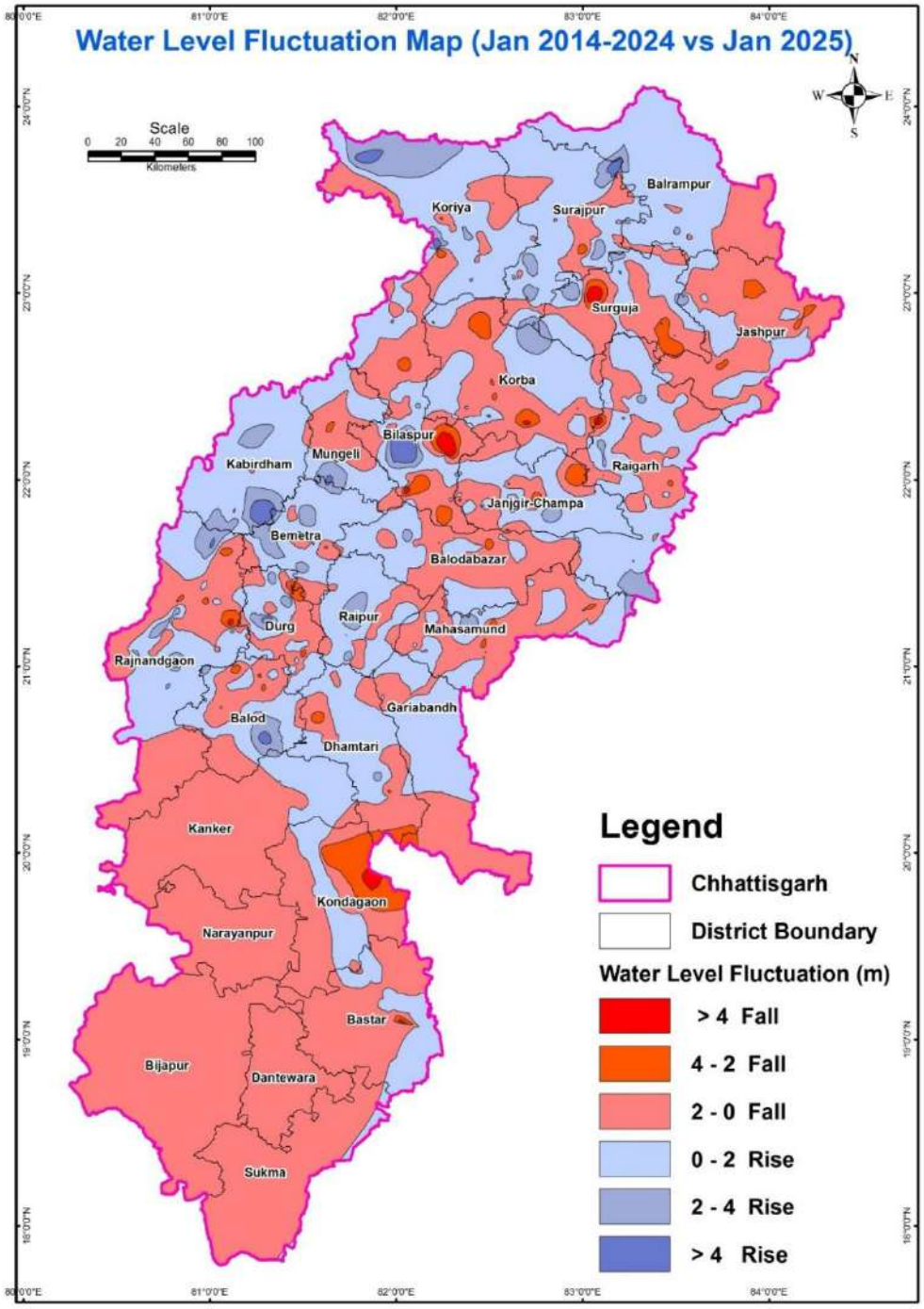

Figure 23: Decadal Water Level Map for Unconfined Aquifer January (2015-2024) vs January 2025

5.2 Confined Semiconfined AquiferDeeper Aquifer

5.2.1 Depth to Water Level in Peizometric Level

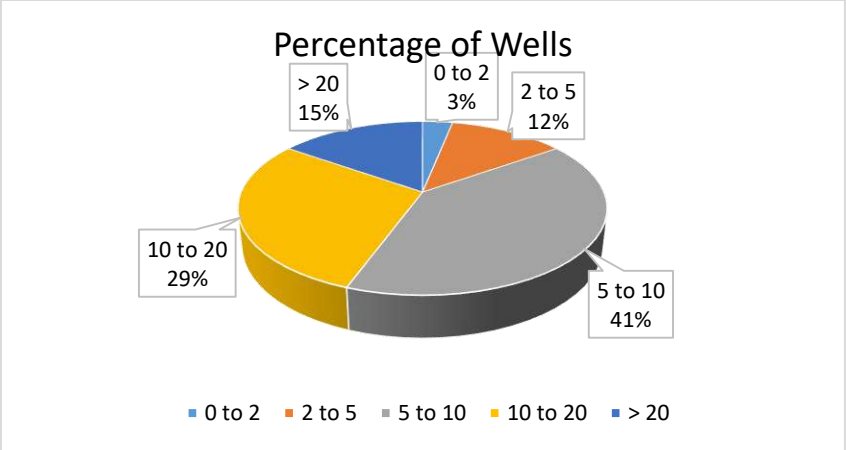

Figure 24: Percentage of Monitoring Stations vs Water Level Peizometer (January 2025)

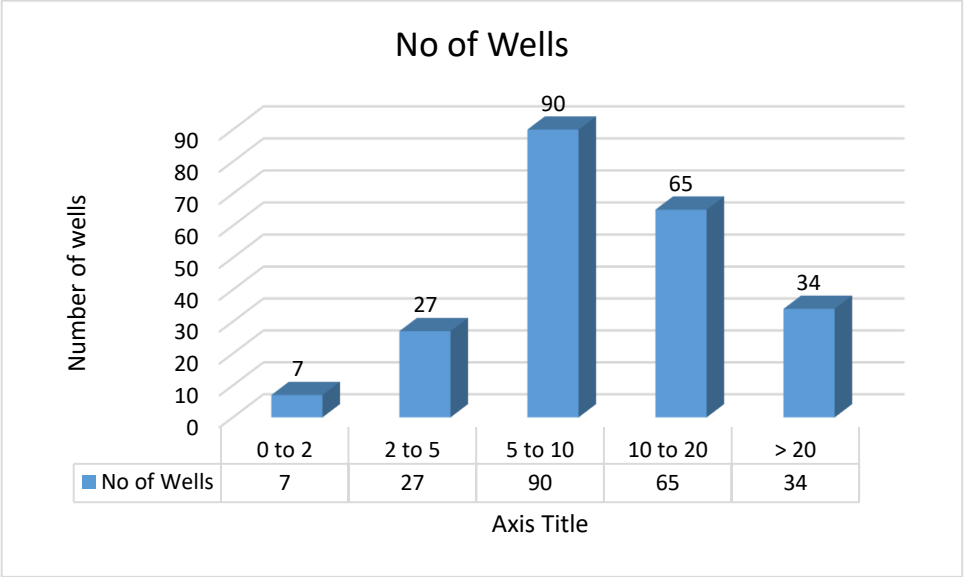

Figure 25: Nos of Monitoring Stations vs Ranges of rise and Fall of Water Level Peizometer (January 2025)

5.2.2 Seasonal Fluctuation in Peizometric Level (January 2025 Fractured Aquifer)

Out of 223 Peizomters/Exploratory Wells /Observation wells, only 7 wells show water level in the range of 0 to 7 m bgl. While 27 wells shows water level in the range of 2 to 5 mbgl. 90 wells are Gariyaband, Durg Raipur, Balodabazar, Janjgir Champa, Korba, Surajpur, Jashpur. 65 wells are in the range of 10 to 20 m bgl in Bijapur, Dantewada,Dhamatai, Balod, Rajnandgaon Koriya, Surguja, Balrampur and Jashpur. Only 34 wells have water level more than 20 m bgl in areas of Bastar, Bemetara, Mahasamund and Raigarh.

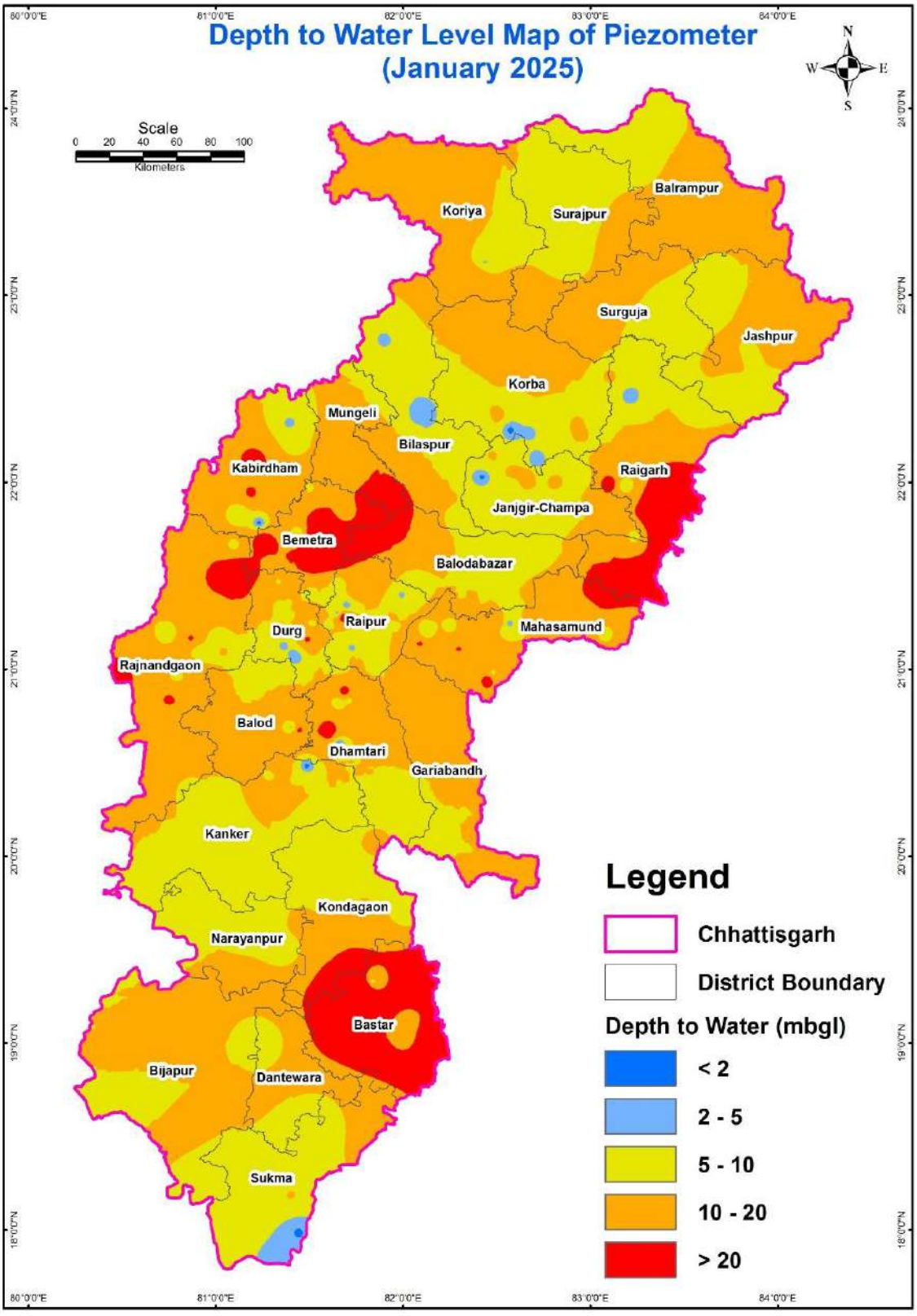

Figure 26: Depth to water level map for Deeper Aquifer January 2025

5.2.3 Annual Fluctuation In Peizometric Level

Deeper Aquifer (Piezometer) January 2024 vs January 2025

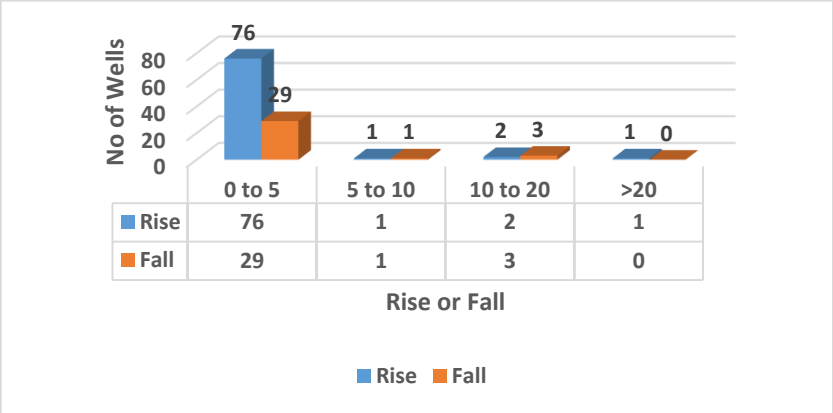

Figure: 27 Nos of Monitoring Stations vs Ranges of rise and Fall of Water Level (January 2024 vs January 2025)

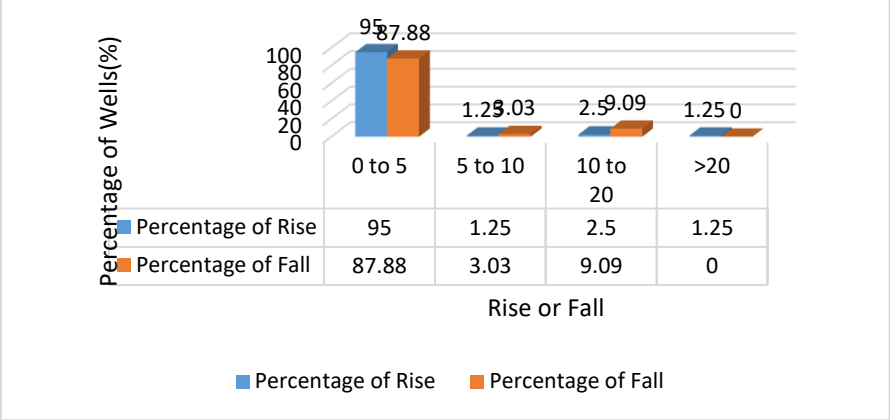

Figure 28: Percentage of Monitoring Stations vs Water Level (January 2024 vs January 2025)

Out of 113 wells, 33 wells are showing rise in ground water level while 80 wells are showing fall in water level.

Fall in Water Level

76 wells show fall in water level in range of 0 to 5 m bgl in areas of Raigarh, Bilaspur, Kondagaon Dhamtari, Raipur, Mungeli, Bhilai, Kanker, Bastar, Gurur, Janjgir Champa, Durg, Mahasamund, Korba. Only one well shows water level fall in range of 5 to 10 mbgl is in Narayanpur. Only three wells in areas of Kharsia and Tanakhar shows fall in water level between 10 to 20 m bgl. Only one well in area of Basanpalli shows fall of more than 20 m bgl.

Rise in Water Level

29 wells are showing Rise in ground water level in range between 0 to 5 m bgl. In areas of Raipur, Bilaspur, Jashpur, Raigarh, Gurur, Surajpur, Balrampur, Dhamtari, Mahasamund, Sakti. Only one well in Dharsiwa shows fall in range of 5 to 10 m bgl. Only two wells in areas of Dasrangpur and Kasdol shows water level range in range of 10 to 20 mbgl.

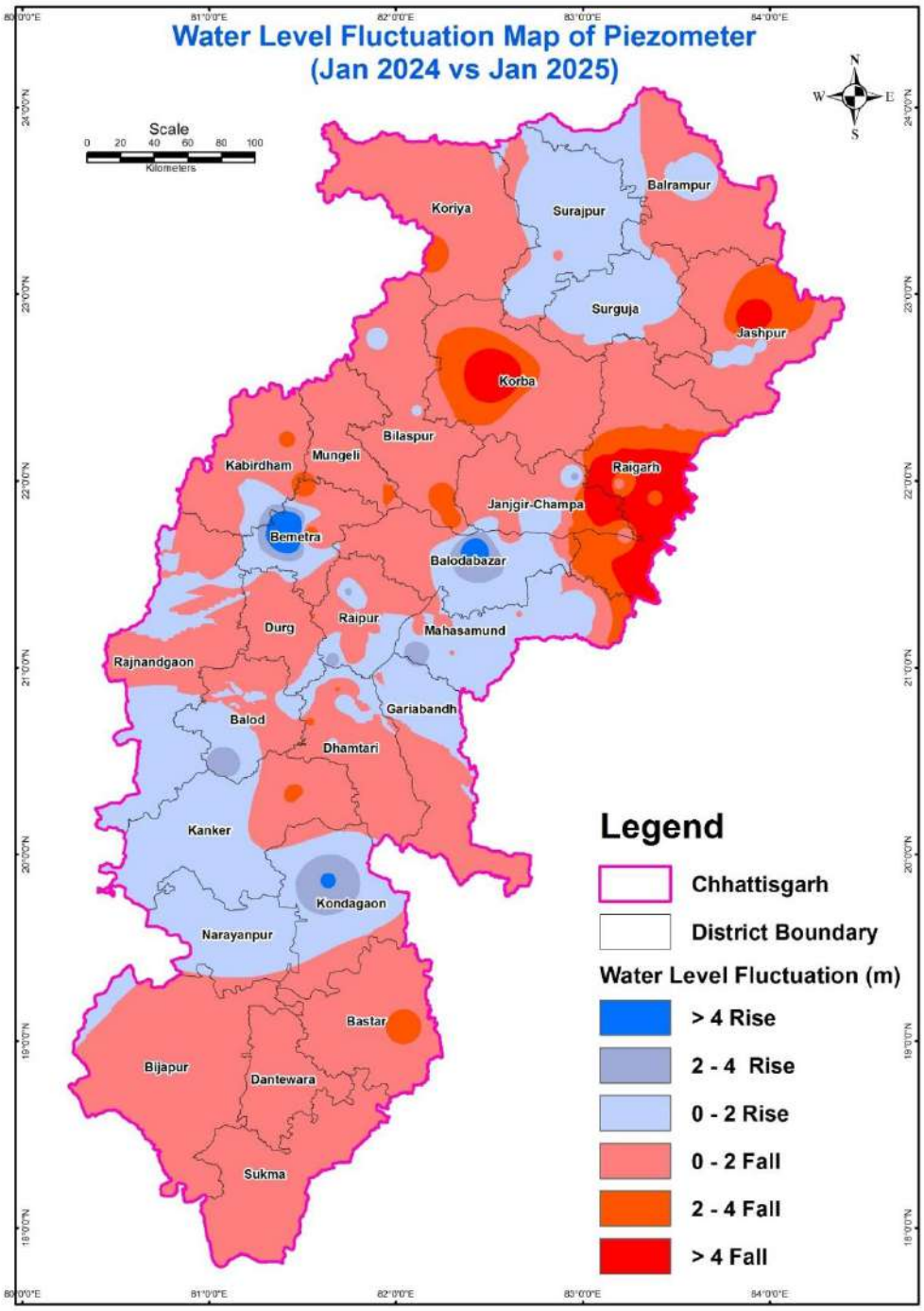

Figure 29 : Water Level Fluctuation Map for Deeper Aquifer January 2024 vs January 2025

6.0 Summary

This is to sum up that as per the analysis of the data of January 2025 monitoring with seasonal, annual and decadal fluctuation it can be drawn that many wells distributed all over the state of Chhattisgarh is showing a fall in ground water level. Although few areas shows rise in water level but such areas are limited.

7.0 Recommendations

Groundwater Level and Recommendations

The key observations and recommendations are outlined below:

1. Areas with Shallow Water Level (< 2 mbgl):

Districts like Bastar, Raigarh, Dhamtari and Kanker and isloated patches distributed in various other district.

Recommendations:

- Excess of watering the crop in root zone must be avoided to prevent further rise in the water table and water logging.
- Use of drip and sprinkler irrigation can help in efficient use of water.
- Crop Rotation Techniques can be taken up. Rice and Sugarcane cultivation requires huge quantity of water which can be replaced by some less water-intensive crops.

2. Areas with Moderate Water Level (2 to 5 mbgl):

Around 60-65 % of wells across all districts in state of Chhattisgarh are in this range.

Recommendations:

- Install rainwater harvesting systems in residential, industrial, and agricultural areas.
- Construct recharge wells and percolation tanks to boost groundwater levels.
- Build check dams to slow runoff and enhance infiltration.
- Promote drip and sprinkler irrigation to conserve water in agriculture.
- Encourage crop diversification with less water-intensive crops like millets instead of paddy and sugarcane.

3. Areas with Deep Water Level (5 to 10 mbgl):

Areas of Raigarh, Rajnadgaon, some parts of Mahasamund, Manendragarh and Bastar.

Recommendations:

- Regulate groundwater extraction to prevent depletion.
- Build artificial recharge structures and install rainwater harvesting systems.
- Promote crop diversification with less water-intensive crops to maintain groundwater balance.

Implementing these recommendations will enhance groundwater availability and ensure long-term water security.