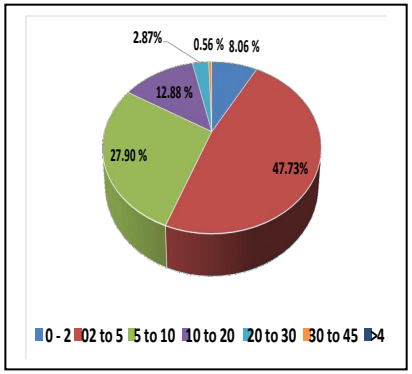

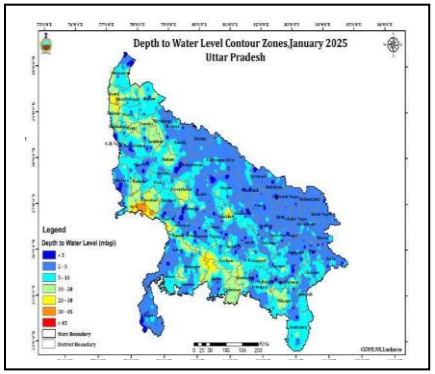

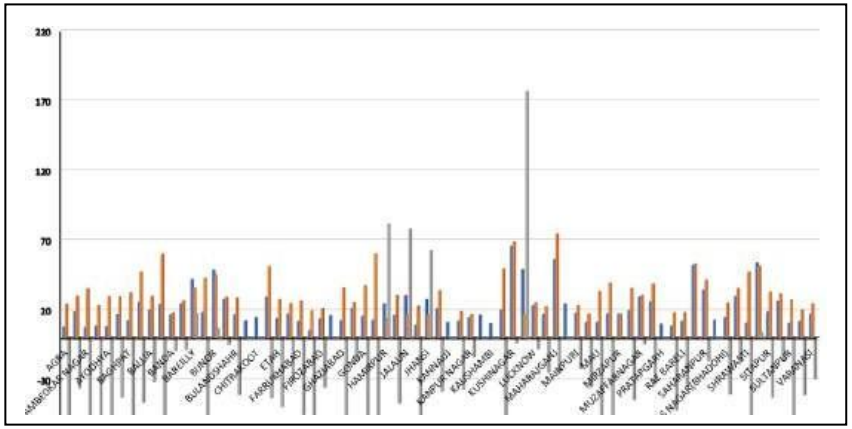

GROUND WATER LEVEL BULLETIN
UTTAR PRADESH
JANUARY 2025

ABSTRACT

Ground water level Scenario during January – 2025 highlighting the finding, status of ground water level in different aquifer and its seasonal, annual and decadal comparison.

CGWB, NORTHERN REGION LUCKNOW

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 in volve climatic parameters like rainfall, vapor transpiration etc. whereas anthropogenic in fluences include pumpage from the aquifer, recharge due to irrigation systems and other practices like waste disposal etc.

Groundwater levels are being measured by Central Ground Water Board four times a year during January, March, April, May, August and November. The regime monitoring started in the year 1969 by Central Groundwater Board. A network of 1464 observation wells called National Hydrograph Network Stations (NHNS), as on 31.01.2025, located all over the State is being monitored.

2.0 STUDYAREA

The State of Uttar Pradesh forms a part of vast Gangetic Alluvial Plain covering an area of 2,40,928 Sq. Km. and lies between North latitude $23^0$52'12" & $30^0$24'30" and East longitude $77^0$05'38" & $84^0$38'30". It is bounded by Uttarakhand on the NW, Nepal on the NE, Bihar on the East, Madhya Pradesh in the South, and Haryana, Delhi & Rajasthan in the West as shown in figure 1.

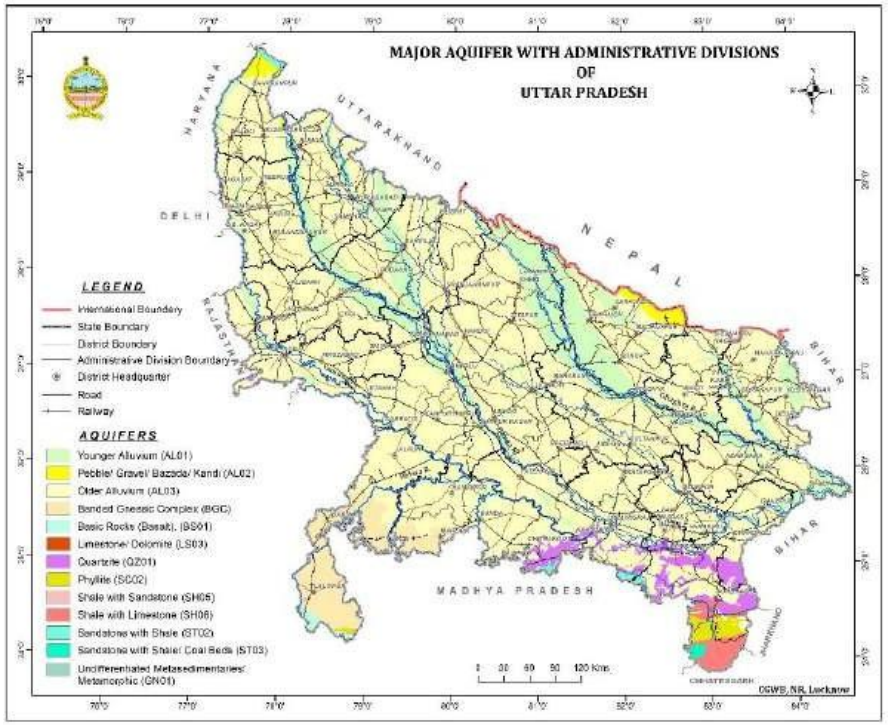

Figure-1: Map showing major aquifers and administrative divisions of UP

The state is covered with rich fertile soil and underlain by a large thickness of alluvium making it one of the richest grounds water repositories of the world. Ground water is a major source of fresh water on earth. It is the most dependable source of water, comparatively free

from the vagaries of nature, easily accessible, available at the point of use and economical. Hence it is being developed indiscriminately and the ground water reservoir is stressed. The State being the most populous in the country, with a population density of 829 persons per sq. km and a high rate of population growth (20%), its demand for water is soaring. Also due to industrialization, urbanization and modern farming practices, its quality is also at stake.

demand for water is soaring. Also due to industrialization, urbanization and modern farming practices its quality is also at stake.

The food production in Uttar Pradesh is commensurate with the self-sufficiency of the country. One of the major contributors for this sufficiency is irrigation. To meet this high irrigational requirement, water resources are being increasingly developed. Ground water contributes to about 71 % of the irrigation needs of the State. The indiscriminate development of ground water has resulted in depletion of groundwater storage and lowering of water level in certain areas on one hand. On other side the surface water development in shallow water level has resulted in water logging and soil salinization. The geology and structure of the formations existing in an area control by occurrence and movement of ground water. The geomorphic conditions also have a great impact on ground water scenario. The larger part of the State is under lain by fluvial sediments laid down in the fore deep between Plateau region in south and Himalayas in north during the Quaternary period by the Indus-Ganga system of drainage over the Precambrian topography existing during geological past. These deposits owe their origin to riverine activity. The southern part of the State has entirely different geological conditions being underlain by Precambrian formations under a thin alluvial cover. Broadly, the State can be divided into two hydrogeological units.

1. Unconsolidated zone.
2. Consolidated, hard rock zone.

The hydrogeological conditions of the above two units widely differ and are discussed subsequently in brief.

Unconsolidated Zone:

This unit covers nearly 85% of the State area. The unconsolidated formations comprising the area have been deposited through mighty rivers originating from the great Himalayan Mountains. These sediments are an admixture of pebble, gravel, sand, silt, clay and kankar. The sediments are generally coarser in the north and gradually become finer southeast ward along downstream of the drainage which is a typical feature of fluvial deposits. This zone consists of mainly two parts, the Terai and the Alluvial Plain. However, the foot hill zone is very small part of Bhaber belt and lies in the northern parts of Bijnore and Saharanpur districts. The Terai is a narrow-disconnected belt along the northwestern fringe of the State. The Alluvial Plain occupies the area

south of Terai and can further be divided into two sub units - Younger Alluvium and Older Alluvium.

The younger alluvium occurs mostly along the present-day flood plain area. The continuous shifting of the drainage network with time caused reworking of their earlier deposits giving rise to the younger alluvium. The older alluvium occupying comparatively high area covers major part of the Plain. A typical characteristic of older alluvium is formation of kankar within itself due to leaching of calcium carbonate under favourable climatic conditions. The kankar occasionally forms pans restricting downward movement of water.

The thickness of alluvial sediments is variable and generally goes up-to 500m. below which occur the semi-consolidated Upper Siwalik formations. The Shallower basement occurs in isolated areas which are known as “Basement highs." This unconsolidated zone is porous and permeable with primary intergranular porosity and has good ground water potential. The sub- surface correlation of formations in the state has shown presence of several aquifers down to a depth of 750 m below the ground. These aquifers mainly encountered in Central Ganga Plain have been grouped on the basis of lithological characters as well as based on interpretation of electrical logs of Boreholes drilled and are as follows:

1. First aquifer 0.0 – 150.00 mbgl
2. Second aquifer 160.00 – 210.00 mbgl
3. Third aquifer 250.00 – 360.00 mbgl
4. Forth deep aquifer 380.00 – 600.00 mbgl

The upper part of the first aquifer down to 50 mbgl is the main source of drinking water through hand pumps and dug wells and is unconfined in nature. The first aquifer as a whole which is under unconfined to semi-confined conditions, it is the most potential aquifer group which is the main source of groundwater in the State extensively exploited through private as well as Government tube wells to meet the drinking water and irrigation needs. The deeper aquifers are confined in nature being exploited to a very limited extent. The yield of the second aquifer is limited while the third aquifer is potential. The shallow and phreatic aquifers are under heavy stress.

Consolidated Zone:

The Bundelkhand Vindhyan plateau region is underlain by a variety of Precambrian formations, mostly granite and granite gneisses, Vindhyan sandstone, limestone & shale, under a thin alluvial cover or without alluvial cover. As such these formations are hard and compact and devoid of any primary porosity. The ground water in these formations occurs in the secondary porosity of these formations. The secondary porosity has developed due to cracks and fractures which are open at the surface and tighten at depth. The ground water occurs under unconfined or water level conditions in these formations.

The alluvial sediments of moderate depth along the river course sand in valleys form potential ground water repositories. The weathered mantle over the entire until so forms potential aquifers. These aquifers are being monitored mostly through open wells over the area.

3.0 GROUNDWATER LEVEL MONITORING

Central Ground Water Board, Northern Region, is monitoring changes in groundwater regime in Uttar Pradesh State on quarterly basis continuously. This is facilitated by a network of monitoring stations in the State located in diverse hydrogeological and geomorphic units. The number of operational wells till January 2025 was 1464 which include 1006 dug wells and 458 piezometers shown in **figure** 2. The district-wise breakup of the water level monitoring stations is given in **Table-1**.

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

S. No.	District	Number of Water Level Monitoring Stations		
		January, 2025		
		DW	PZ	Total
1	Aligarh	9	4	13
2	Hathras	5	4	9
3	Mathura	17	3	20
4	Bulandshahar	2	14	16
5	Gautam Budha Nagar	0	8	8
6	Etah	2	4	6
7	Farukkhabad	1	4	5
8	Mainpuri	4	5	9
9	Agra	6	11	17
10	Firozabad	0	6	6
11	Kasganj	4	11	15
12	Auraiya	9	2	11
13	Etawah	11	2	13
14	Kanpur Dehat	12	1	13
15	Kanpur Nagar	16	1	17
16	Kannauj	11	2	13
17	Barabanki	37	4	41
18	Lucknow	9	15	24
19	Unnao	24	5	29
20	Sitapur	27	6	33
21	Raebareily	30	5	35
22	Sultanpur	33	6	39
23	Ayodhya	13	5	18
24	Ambedkar Nagar	9	16	25
25	Amethi	36	2	38
26	Bahraich	20	15	35
27	Shrawasti	13	6	19
28	Gonda	25	4	29

S. No.	District	Number of Water Level Monitoring Stations		
		January, 2025		
		DW	PZ	Total
29	Balrampur	17	9	26
30	Siddharth Nagar	14	10	24
31	Basti	14	3	17
32	Sant Kabir Nagar	10	1	11
33	Maharajganj	13	1	14
34	Deoria	28	1	29
35	Kushinagar	28	0	28
36	Gorakhpur	15	16	31
37	Jhansi	20	2	22
38	Lalitpur	19	4	23
39	Jalaun	32	5	37
40	Bareily	11	4	15
41	Pilibhit	8	3	11
42	Shahajahanpur	3	0	3
43	Budaun	0	10	10
44	Hardoi	16	7	23
45	Lakhimpur Kheri	26	5	31
46	Bijnor	6	14	20
47	Amroha	0	9	9
48	Moradabad	5	6	11
49	Rampur	4	6	10
50	Sambhal	0	11	11

S. No.	District	Number of Water Level Monitoring Stations		
		January, 2025		
		DW	PZ	Total
51	Ghaziabad	0	3	3
52	Saharanpur	7	11	18
53	Muzaffarnagar	2	10	12
54	Meerut	1	12	13
55	Baghpat	2	9	11
56	Hapur	0	4	4
57	Shamli	0	4	4
58	Ballia	21	2	23
59	Azamgarh	22	10	32
60	Mau	13	3	16
61	Ghazipur	22	11	33
62	Banda	10	18	28
63	Hamirpur	12	11	23
64	Mahoba	10	6	16
65	Chitrakoot	10	14	24
66	Fatehpur	13	14	27
67	Pratapgarh	29	2	31
68	Prayagraj	38	0	38
69	Kaushambi	10	2	12
70	Jaunpur	30	8	38
71	Varanasi	11	2	13
72	Chandauli	15	4	19

S. No.	District	Number of Water Level Monitoring Stations		
		January, 2025		
		DW	PZ	Total
73	Sonbhadra	22	0	22
74	Bhadohi	7	0	7
75	Mirzapur	25	0	25
Grand Total		**1006**	**458**	**1464**

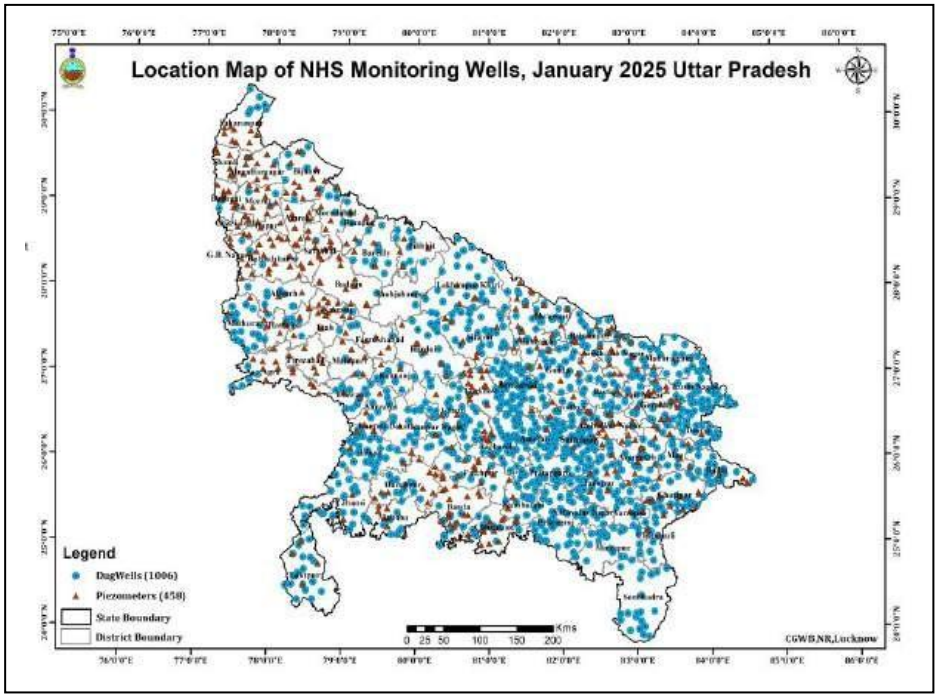

Figure-2: Map showing locations of monitoring wells (NHNS) in Uttar Pradesh

4.0 RAINFALL

The district wise monthly grided rainfall data collected from Indian Meteorological Department; India WRIS were used to analyzed the rainfall pattern (As per latest rainfall data available). Figure-3 shows actual Rainfall of the district during the period of June-August, 2024. Table-2 gives the district wise normal rainfall and actual rainfall June-August, 2023-2024 with the departure from normal rainfall.

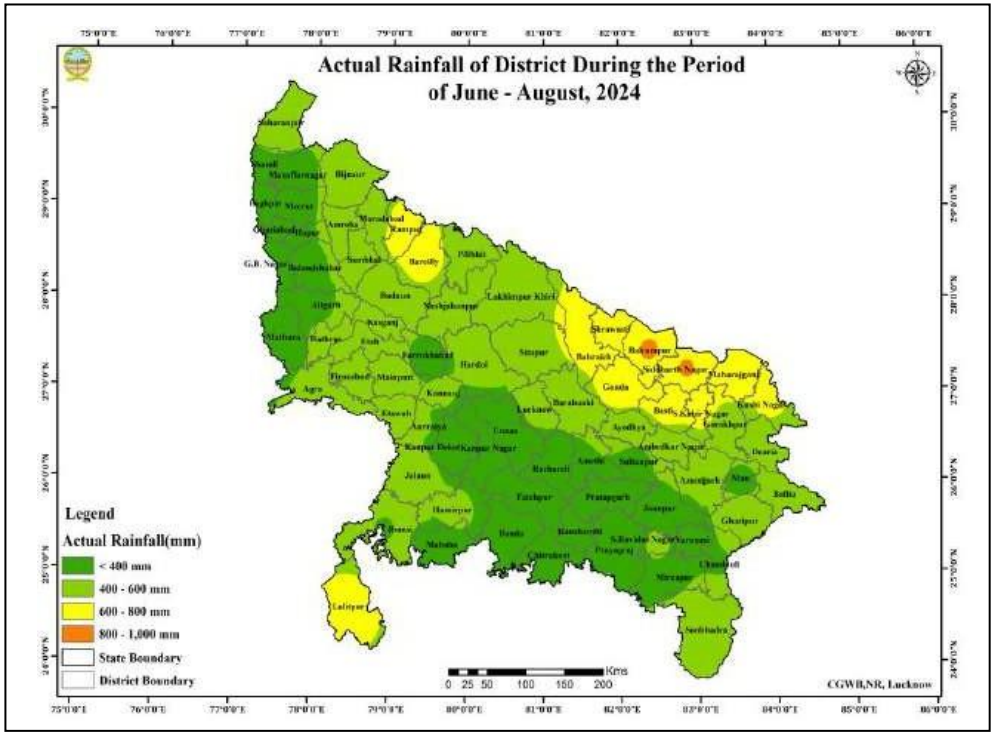

Figure-3: Actual Rainfall of the district during the period of June-August, 2024

Table-2: District wise variability of rainfall (June to August 2024) in Uttar Pradesh (2024)

S.No	District	Total Normal Rainfall (mm) 2024	Total Actual Rainfall (mm), 2023	Deviation%	Total Actual Rainfall (mm), 2024	Deviation%	% Deviation 2024 to 2023
1	Agra	556.8	433.12	-22.21	422.06	-24.20	-2.62
2	Aligarh	485.7	514.59	5.95	360.25	-25.83	-42.84
3	Ambedkar nagar	698	433.2	-37.94	416.69	-40.30	-3.96
4	Auraiya	569.8	424.39	-25.52	407.14	-28.55	-4.24
5	Ayodhya	680.7	461.15	-32.25	445.51	-34.55	-3.51
6	Azamgarh	725.7	375.47	-48.26	398.38	-45.10	5.75
7	Baghpat	451.5	621.31	37.61	265.39	-41.22	-134.11
8	Bahraich	768.4	639.47	-16.78	756.72	-1.52	15.49
9	Ballia	714.1	437.3	-38.76	399.91	-44.00	-9.35
10	Balrampur	868.3	621.96	-28.37	824.04	-5.10	24.52
11	Banda	709.9	428.79	-39.60	392.52	-44.71	-9.24
12	Bara banki	707.1	630.49	-10.83	477.38	-32.49	-32.07
13	Bareilly	735.4	497.2	-32.39	681.19	-7.37	27.01
14	Basti	770.7	506.85	-34.24	696.46	-9.63	27.22
15	Bijnor	762.2	1027.12	34.76	472.49	-38.01	-117.38
16	Budaun	613.8	647.23	5.45	480.08	-21.79	-34.82
17	Bulandshahr	531.7	512.58	-3.60	393.42	-26.01	-30.29
18	Chandauli		376.6		393.11		4.20

S.No	District	Total Normal Rainfall (mm) 2024	Total Actual Rainfall (mm), 2023	Deviation%	Total Actual Rainfall (mm), 2024	Deviation%	% Deviation 2024 to 2023
19	Chitrakoot		411.22		372.42		-10.42
20	Deoria	768.3	430.25	-44.00	443.08	-42.33	2.90
21	Etah	522	703.93	34.85	529.91	1.52	-32.84
22	Etawah	597.6	465.06	-22.18	410.52	-31.31	-13.29
23	Farrukhabad	631.5	448.14	-29.04	319.45	-49.41	-40.28
24	Fatehpur	670.2	253.65	-62.15	176.47	-73.67	-43.74
25	Firozabad	546.7	678.78	24.16	494.46	-9.56	-37.28
26	Gautam buddha Nagar		306.55		244.64		-25.31
27	Ghaziabad	500.1	370.94	-25.83	251.3	-49.75	-47.61
28	Ghazipur	713.5	420.9	-41.01	486.92	-31.76	13.56
29	Gonda	790.3	582.33	-26.32	790.7	0.05	26.35
30	Gorakhpur	847.1	473.73	-44.08	548.66	-35.23	13.66
31	Hamirpur	597.1	605.18	1.35	466.02	-21.95	-29.86
32	Hardoi	632.4	487.78	-22.87	427.46	-32.41	-14.11
33	Jalaun	627.3	471.85	-24.78	510.95	-18.55	7.65
34	Jaunpur	684.1	382.98	-44.02	375.15	-45.16	-2.09
35	Jhansi	675.7	537.09	-20.51	392.88	-41.86	-36.71
36	Amroha	657.2	696.51	5.98	498.97	-24.08	-39.59

S.No	District	Total Normal Rainfall (mm) 2024	Total Actual Rainfall (mm), 2023	Deviation%	Total Actual Rainfall (mm), 2024	Deviation%	% Deviation 2024 to 2023
37	Kannauj		572.69		419.94		-36.37
38	Kanpur dehat	576.5	330.46	-42.68	254.37	-55.88	-29.91
39	Kanpur nagar	583.6	400.99	-31.29	292.91	-49.81	-36.90
40	Kasganj		643.14		493.44		-30.34
41	Kaushambi		330.02		307.65		-7.27
42	Kheri	761.2	629.57	-17.29	648.1	-14.86	2.86
43	Kushinagar	900.2	487.9	-45.80	460.69	-48.82	-5.91
44	Lalitpur	780.7	642.15	-17.75	739.46	-5.28	13.16
45	Lucknow	636.7	780.11	22.52	471.55	-25.94	-65.44
46	Mahamaya nagar (Hathras)	509	581.88	14.32	467.57	-8.14	-24.45
47	Maharajganj	983.4	590.59	-39.94	682.87	-30.56	13.51
48	Mahoba		542.27		331.21		-63.72
49	Mainpuri	530.3	627.33	18.30	426.26	-19.62	-47.17
50	Mathura	434.2	355.04	-18.23	285.54	-34.24	-24.34
51	Mau	766.4	412.61	-46.16	336.29	-56.12	-22.69
52	Meerut	613.2	796.7	29.92	383.34	-37.49	-107.83
53	Mirzapur	647.3	358.1	-44.68	374.61	-42.13	4.41

S.No	District	Total Normal Rainfall (mm) 2024	Total Actual Rainfall (mm), 2023	Deviation%	Total Actual Rainfall (mm), 2024	Deviation%	% Deviation 2024 to 2023
54	Moradabad	689.2	631.57	-8.36	519.25	-24.66	-21.63
55	Muzaffarnagar	569	704.3	23.78	360.76	-36.60	-95.23
56	Pilibhit	784.6	561.09	-28.49	560.51	-28.56	-0.10
57	Pratapgarh		324.01		343.02		5.54
58	Prayagraj	652.3	291.62	-55.29	328.83	-49.59	11.32
59	Rae bareli	649.4	376.29	-42.06	208.83	-67.84	-80.19
60	Rampur	810.7	772.28	-4.74	724.94	-10.58	-6.53
61	Saharanpur	630.9	1032.54	63.66	503.36	-20.22	-105.13
62	Sant kabir nagar		687.07		668.65		-2.75
63	Bhadohi	687.3	350.67	-48.98	423.68	-38.36	17.23
64	Shahjahanpur	693.4	491.51	-29.12	499.07	-28.03	1.51
65	Shrawasti	768.4	575.78	-25.07	733.2	-4.58	21.47
66	Siddharth nagar	859.4	650.72	-24.28	826.25	-3.86	21.24
67	Sitapur	655.8	478.64	-27.01	499.23	-23.87	4.12
68	Sonbhadra	748.2	516.18	-31.01	596.49	-20.28	13.46
69	Sultanpur	703.8	385.12	-45.28	321.52	-54.32	-19.78
70	Unnao	629	375.06	-40.37	282.78	-55.04	-32.63
71	Varanasi	636.9	357.1	-43.93	345.73	-45.72	-3.29
	Average	**672.61**	**520.55**	**-19.56**	**458.37**	**-30.92**	**-19.28**

The Average normal and normal rainfall in (mm) for the month from June 2024 to August 2024 comes to be 672.61 and 458.37 respectively. From the Map of deviation % in rainfall from normal June 2024 to August 2024, it is inferred that most of the regions in the UP fall in the category of normal to deficit as shown in figure-4. This shows that most of the region of UP receives the moderate to heavy rainfall. Average % deviation in august 2024 w.r.t. august 2023 is -19.28%. There is no drastic change in the rainfall pattern in august 2024 as compared to previous year.

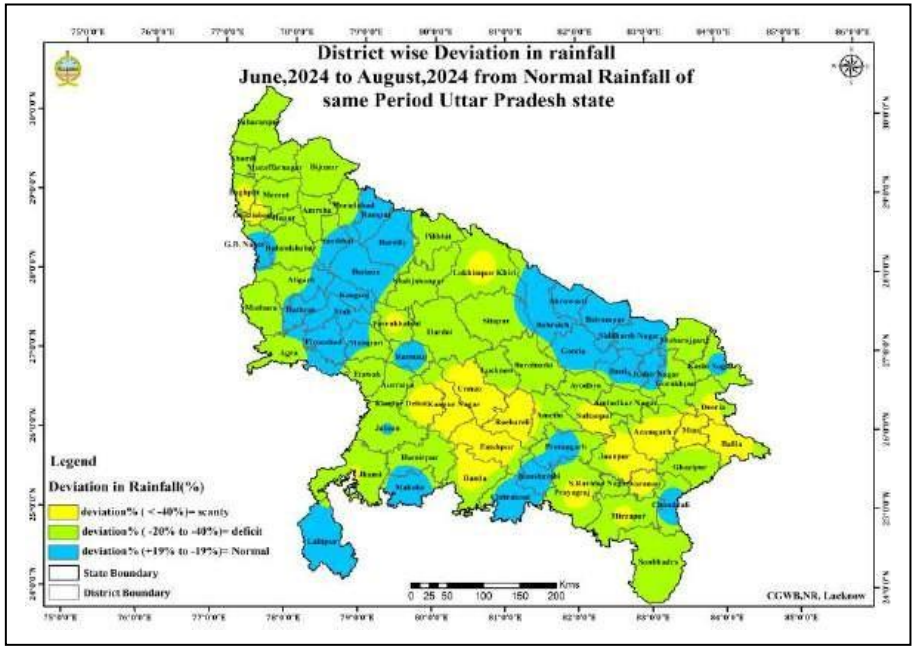

Figure-4: District wise deviation % in Rainfall during the period of June-August,2024

5.0 GROUNDWATER LEVEL SCENARIO (JANUARY 2025)

5.1. SHALLOW AQUIFER (UNCONFINED)

5.1.1. DEPTH TO WATER LEVEL

Depth To Water Level in Unconfined Aquifer (January 2025)

The depth to water level of 1079 wells is used for the analysis. It shows that water level varies between 0.17 mbgl (Banda district) to 44.17 mbgl (Agra). Water level of less than 2 mbgl is recorded in 87 wells (8.06%), between 2 to 5 mbgl in 515 wells (47.73%), between 5 to 10 mbgl in 301 wells (27.9%), between 10 to 20 mbgl in 139 wells (12.88%), between 20-30 mbgl in 31 wells (2.87%) and water level between 30-45 mbgl is registered in 6 wells (0.56%). Map showing depth to Water level of unconfined aquifers is shown in Figure – 5 and percentage of wells of different water level ranges for unconfined aquifers is shown in Figure No. 6. Shallow water level of less than 2 mbgl is seen in isolated patches in parts of Saharanpur, Bijnore, Moradabad, Rampur, Bareilly, Shrawasti, Balrampur, Siddharth nagar, Basti, Sant Kabir nagar, Deoria, Mau, Azamgarh, Ambedkar nagar, Barabanki, Banda, Mahoba, Jhansi, Lalitpur, Jalaun, Kanpur Nagar, Kanpur Dehat, Aurraiya, Etawah, Aligarh, Budaun, Mathura, Bulandshahr, Gautam Budh Nagar and Meerut districts of UP. Water level of 2 to 5 mbgl is majorly observed in Terai region of UP namely Moradabad, Rampur, Bareilly, Pilibhit, Shahjahanpur, Lakhimpur Kheri, Hardoi, Sitapur, Shrawasti, Bahraich, Balrampur, Gonda, Siddharth Nagar, Maharajganj, Basti, Sant Kabir Nagar, Gorakhpur, Azamgarh, Maharajganj, Kushinagar, Deoria, Mau, Mainpuri, Chanduali, Ballia, also in Bundelkhand region of UP namely Sonbhadra, Mahoba, Banda, Jalaun, Lalitpur, Jhansi and central part of UP such as Amethi, Barabanki, Unnao, Hardoi, Kanpur nagar, Kanpur Dehat, Rai barelli, Ayodhaya, and isolated patches are seen in Ghazipur, Mirzapur, Jaunpur, Sultanpur, Kannauj, Etawah, Sambhal , Budaun, Meerut and Bijnore districts of Uttar Pradesh .

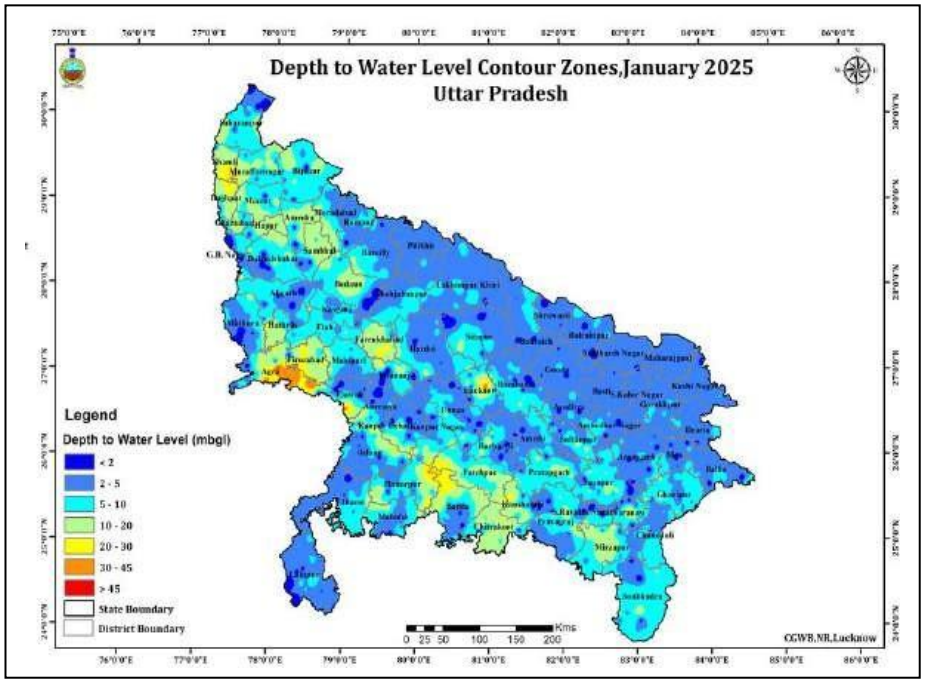

Figure-5: Depth to water level of Unconfined Aquifer during January2025

Depth to water level of 5 to 10 mbgl which is observed in the parts of Saharanpur, Bijnore, Muzaffarnagar, Moradabad, Amroha, Rampur, Bareilly, Budaun, Shahjahanpur, Lakhimpur Kheri, Hardoi, Sitapur, Lucknow, Unnao, Barabanki, Raebareli, Amethi, Ayodhya, Pratapgarh, Sultanpur, Ambedkar Nagar, Prayagraj, Jaunpur, Azamgarh, Mau, Ballia, Ghazipur, Sonbhadra, Jhansi, Fatehpur, Mirzapur, Banda, Mahoba, Hamirpur, Jhansi, Kanpur Nagar, Kanpur Dehat, Jalaun, Aurraiya, Kannauj, Etawah, Mainpuri, Kasganj, Etah, Aligarh, Hathras and Mathura districts of UP.

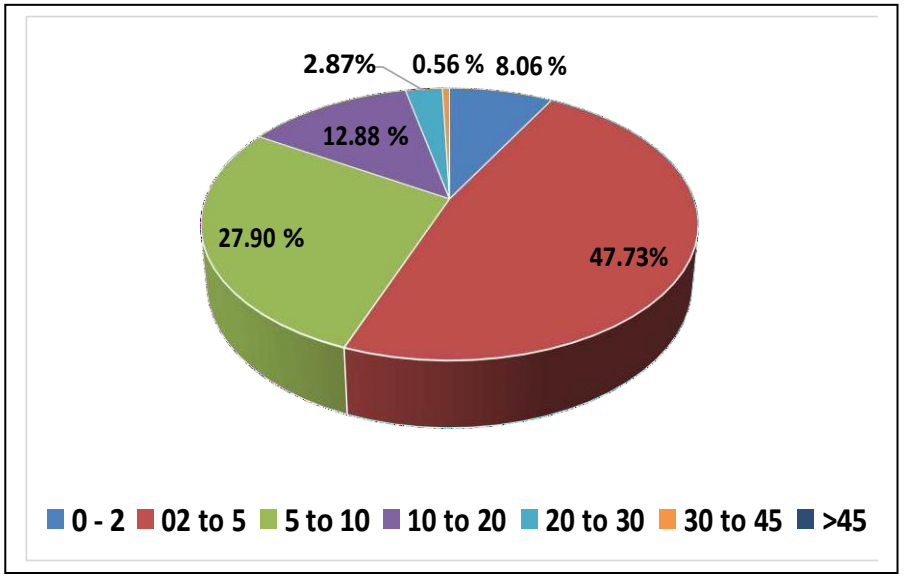

Figure-6 Percentage of wells in different water level ranges in Unconfined Aquifer

Water level of 10 to 20 mbgl are observed majorly in Middle Gangetic plains parts namely Saharanpur, Shamli, Baghpat, Ghaziabad, Muzaffarnagar, Bijnor, Meerut, Hapur, Amroha, Sambhal, Bulandshahr, Budaun, Farrukhabad, Kannauj, Hathras, Agra, Firozabad, Etawah, Kanpur Dehat , Kanpur Nagar, Jalaun, Hamirpur, Banda, Sitapur, Fatehpur, Raebareli, Lucknow, Unnao and also in Hamirpur, Jhansi,

Kaushambi, Chitrakoot, Pratapgarh and Mirzapur districts of U.P. Deeper water levels of more than 20 mbgl is observed in the parts of Baghpat, Shamli, Agra, Firozabad, Farrukabad, Etawah, Jalaun, Kasganj, Kannauj, Lucknow, Banda, Varanasi, Hamirpur and Fatehpur districts.

5.1.2 SEASONAL FLUCTUATION IN WATER LEVEL

Seasonal Fluctuation of Water Level in Unconfined Aquifer (May 2024 to January 2025)

Rise in Water Levels:

Out of 758 wells, water level rise of less than 2m is recorded in 496 wells (65.44%), 2 to 4m in 171 wells (22.56%) and more than 4m in 32 wells (4.22%) as shown in Fig-7. Water level rise of less than 2m are mostly observed in all parts of the state and rise in 2 – 4m is mostly observed in Bundelkhand region of UP and along with, it is also noticed in Kanpur Nagar, Kanpur Dehat, Aurraiya, Etawah, Mainpuri, Firozabad, Hathras, Mathura, Bijnore, Amroha, Moradabad, Meerut, Rai Bareilly, Amethi, Azamgarh, Ghazipur, Varanasi, Lalitpur and Sonbhadra districts of UP. Rise of more than 4m is significantly observed in isolated patches of Agra, Mathura, Hathras, Bijnor, Chitrakoot, Prayagraj, Mirzapur Kaushambhi, Fatehpur districts of UP.

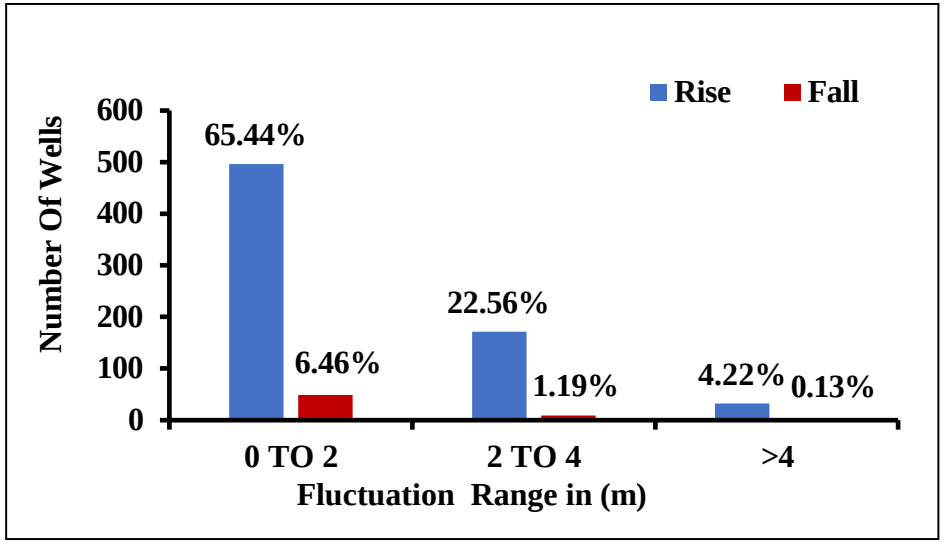

Figure-7: Percentage of wells showing rise and fall in WL in Unconfined Aquifer (May 2024 w.r.t. January 2025)

Fall in Water Levels:

Out of 758 wells that have registered fall in water levels, 49 wells (6.46%) have recorded less than 2m while 9 wells (1.19%) in the range of 2 to 4m and remaining 1 well (0.13%) registered water level fall of more than 4m. Fall of less than 2m is mainly observed in isolated parts of Chitrakoot, Banda, Mirzapur, Sonbhadra, Ghazipur, Bahraich, Gonda and Basti. Fall of 2-4m is noticed in Chitrakoot, Banda, Sonbhadra, Ghazipur, Bahraich. Fall greater than 4m is significantly observed in isolated patches of Sonbhadra and Chitrakoot districts of UP. Map showing seasonal water level fluctuation (May 2024 to January 2025) is shown in Fig.8

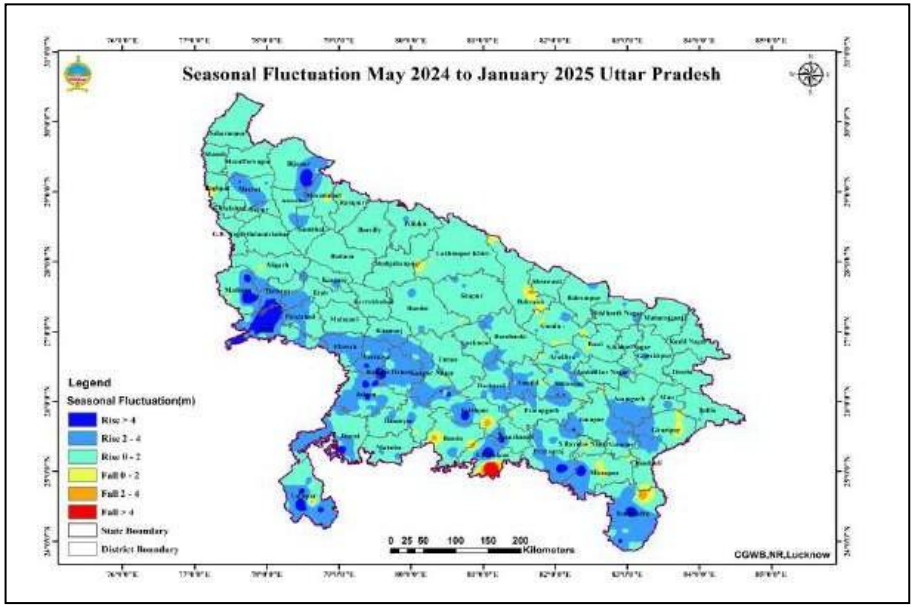

Figure-8: Seasonal water level fluctuation in unconfined Aquifer (May 2024 to January 2025)

Seasonal Fluctuation of Water Level in Unconfined Aquifer (August 2024 to January 2025)

Rise in Water Levels:

Out of 929 wells, water level rise of less than 2m is recorded in 202 wells (21.74%), 2 to 4m in 21 wells (2.26%) and more than 4m in 6 wells (0.65%) as shown in Fig-9. Water level rise of less than 2m are mostly observed in all parts of the Western UP. And isolated patches of Kannauj, Rai barely, Amethi, Sultanpur, Jaunpur, Prayagraj, Varanasi, and rise in 2 – 4m is mostly observed in Baghpat, Meerut, Sambhal, Amroha, Mathura, Kannauj, Etawah, Prayagraj, and rise of more than 4m is significantly observed in isolated patches of Meerut, Hapur, Ghaziabad, Mathura, Etawah, Kannauj, Hamirpur, Prayagraj and Varanasi districts of UP.

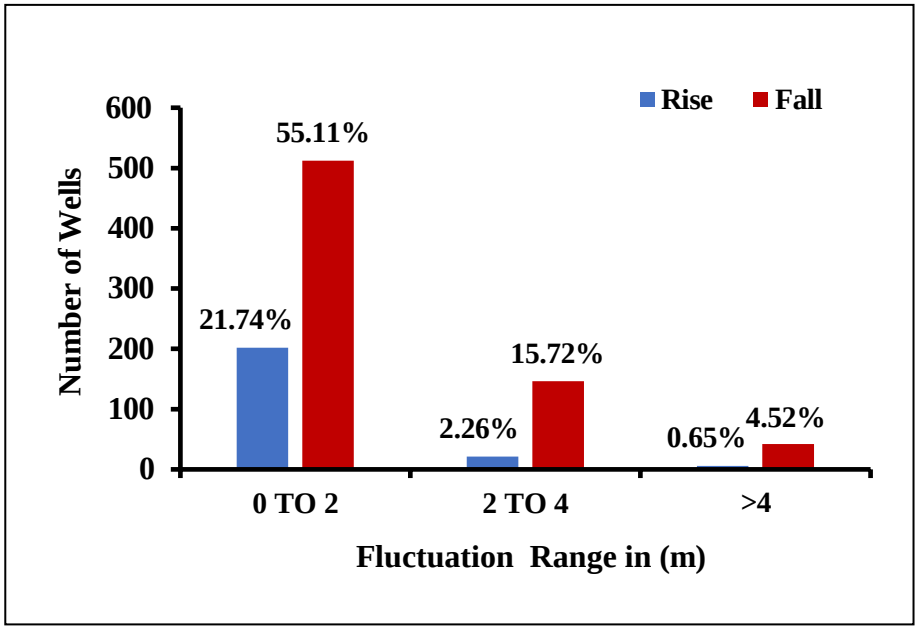

Figure-9: Percentage of wells showing rise and fall in WL in Unconfined Aquifer (August 2024 w.r.t. January 2025)

Fall in Water Levels:

Out of 929 wells that have registered fall in water levels, 512 wells (55.1%) have recorded less than 2m while 146 wells (15.72%) in the range of 2 to 4m and remaining 42 wells (4.5%) registered water level fall of more than 4m. Fall of less than 2m is mainly observed in Terai region, Bundelkhand region and Eastern Part of UP along with Bijnore, Muzzafarnagar, Moradabad, Saharanpur, Agra, Mathura, Firozabad. Fall of 2-4m is noticed in Bundelkhand region, Prayagraj, Mirzapur, Sonbhadra, Chanduali, Gazipur. Isolated patches of Mau, Varanasi, Bahraich, Shravasti, Hardoi, Sahajahanpur and Pilibhit. Fall greater than 4m is significantly observed in isolated patches of Banda, Lalitpur, Sonbhadra, Mirzapur, Ghazipur, Prayagraj and Chitrakoot. Map showing seasonal water level fluctuation (August 2024 to January 2025) is shown in Fig.10

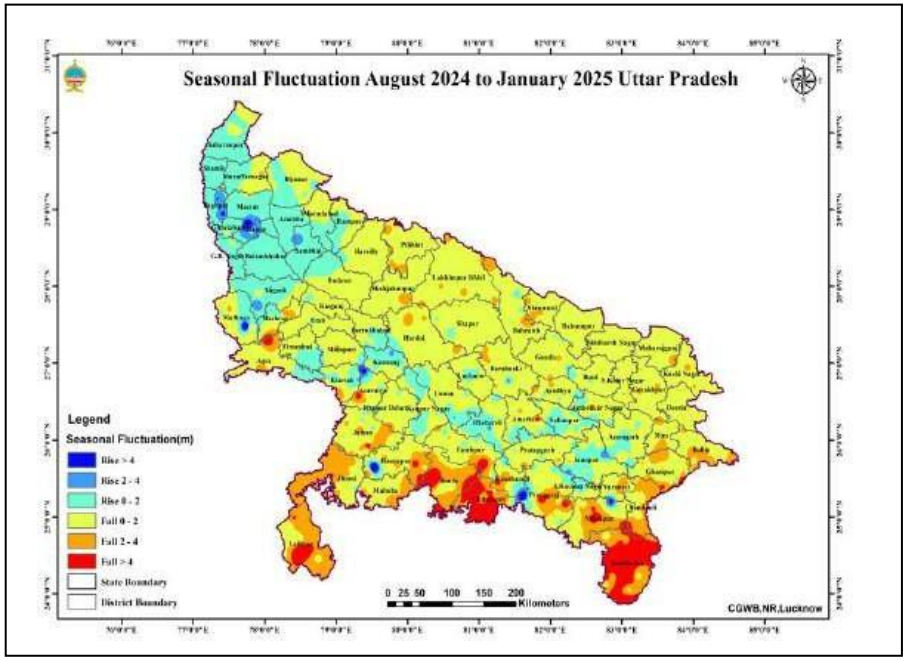

Figure-10: Seasonal water level fluctuation in Unconfined Aquifer (August 2024 to January 2025)

Seasonal Fluctuation of Water Level in Unconfined Aquifer (November 2024 to January 2025)

Rise in Water Levels:

Out of 1018 wells, water level rise of less than 2m is recorded in 188 wells (18.47%), 2 to 4m in 10 wells (0.98%) and more than 4m in 7 wells (0.69%) as shown in Fig-11. Water level rise of less than 2m are mostly observed in Western part UP. and isolated patches of Ayodhaya, Ambedkar nagar, Basti, Jaunpur, Varanasi, Chandauli, Mau, Ghazipur, Ballia, and rise in 2 – 4m is mostly observed in isolated patches of Hapur,

Meerut, Ghaziabad, Mathura, Etah, Kasganj, Farrukhabad, Varanasi, Chandauli, Ambedkar nagar and Ayodhaya. and Rise of more than 4m is significantly observed in isolated patches of Hapur, Meerut, Ghaziabad, Mathura, Etah, Kasganj, Farrukhabad, Varanasi, Chandauli, Ambedkar nagar , Chitrakoot and Ayodhaya districts of UP.

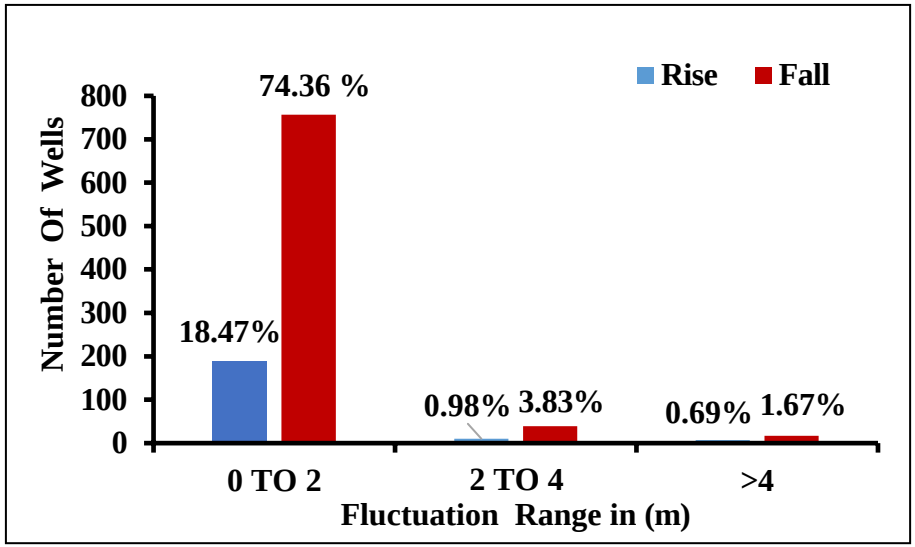

Figure-11: Percentage of wells showing rise and fall in WL in Unconfined Aquifer (November 2024 w.r.t. January 2025)

Fall in Water Levels:

Out of 1018 wells that have registered fall in water levels, 757 wells (74.36%) have recorded less than 2m while 39 wells (3.83%) in the range of 2 to 4m and remaining 17wells (1.67%) registered water level fall of more than 4m. Fall of less than 2m is observed in all regions of UP. Fall of 2-4m is noticed in Fatehpur, Banda, Kaushambi, Chitrakoot, Prayagraj, Sonbhadra, Mirzapur, Chandauli, Ghazipur, Jaunpur, Sultanpur, Amethi, Unnao, Lucknow, Muzzafarnagar and Jalaun. Fall greater than 4m is significantly observed in isolated patches of Chitakoot, Pragayraj, Mirzapur, Sonbhadra, Jaunpur, Sultanpur, Amethi, Unnao, Jalaun and Lucknow. Map showing seasonal water level fluctuation (November 2024 to January 2025) is shown in Fig.12

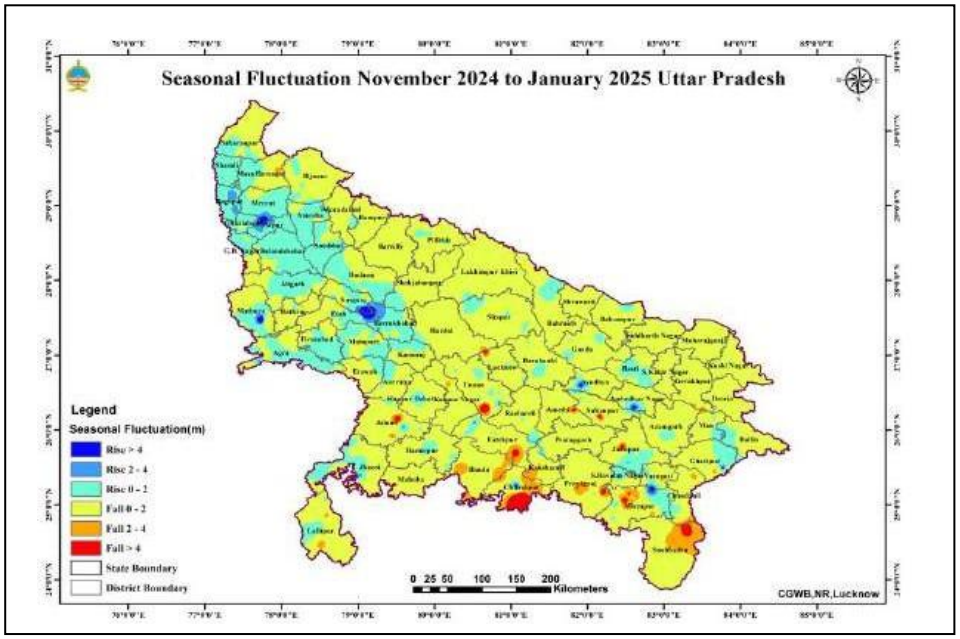

Figure-12: Seasonal water level fluctuation in Unconfined Aquifer (November 2024 to January 2025)

5.1.3 ANNUAL FLUCTUATION IN WATER LEVEL

Annual Fluctuation of Water Level in Unconfined Aquifer (January 2024 to January 2025)

Rise in Water Levels: Out of 855 wells analyzed, it is observed that, the rise in water level of less than 2m is recorded in 407 wells (47.60%), 2 to 4 in 26 wells (3.04%) and more than 4 m in 9 wells (1.05%). Water level rise of less than 2m is seen in Terai Regions, Middle Gangetic Plains, Bundelkhand region and Eastren parts of UP along with Meerut, Gonda, Ambedkar nagar, Unnao, Rai barelli, Amethi, Sultanpur, Kanpur nagar, Kanpur Dehat, Sonbhadra and Varanasi districts. Water level rise of 2 to 4 m is observed mainly in, Agra, Mathura, Hathars, Etah, Jalaun, Hamirpur, Fatehpur, Amethi, Mahoba and Sonbhadra districts. Rise of more than 4m is significantly observed in Agra, Etah, Hamirpur, Fatehpur, Amethi and Sonbhadra districts.

Fall in Water Levels: Out of 855 wells analyzed, 389 wells(45.50%) of the area shows fall in water levels and recorded water level of less than 2m fall, while 19 wells (2.22%) are in the range of 2 to 4m and remaining 5 wells (0.58%) shows fall of more than 4m. Fall of less than 2m is mainly observed in Terai Region and Central part of UP along with Mathura, Hamirpur, Fatehpur, Banda, Kaushambi, Prayagraj, Mirzapur, Sonbhadra, Pratapgarh, Chanduali, Varanasi, Ghazipur, Ballia, Deoria, Kushinagar, Ambedkar Nagar and Jaunpur, districts in UP.

Fall of 2 to 4 m is observed mainly in isolated patches of Saharanpur, Muzaffarnagar, Sitapur, Fatehpur, Banda, Lucknow, Rai bareilly Bahraich Prayagraj, Chaundali, Mirzapur, Sonbhadra and Ghazipur districts. Fall of more than 4m is observed in isolated patches of Sant Prayagraj, Band, Fatehpur, Ghazipur and Sitapur districts.

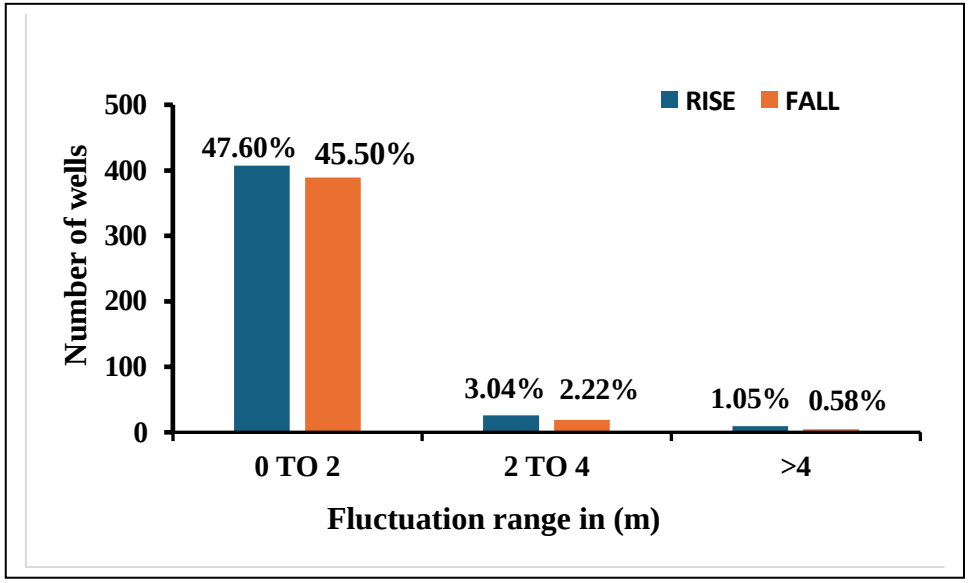

Figure-13: Percentage of wells showing rise and fall in WL in Unconfined Aquifer (January 2024 w.r.t. January 2025)

Percentage of wells showing rise and fall in WL for unconfined aquifer (January 2024 to January 2025) in Figure–13 and annual water level fluctuation in unconfined aquifer (January 2024 -2025) is shown in Figure- 14.

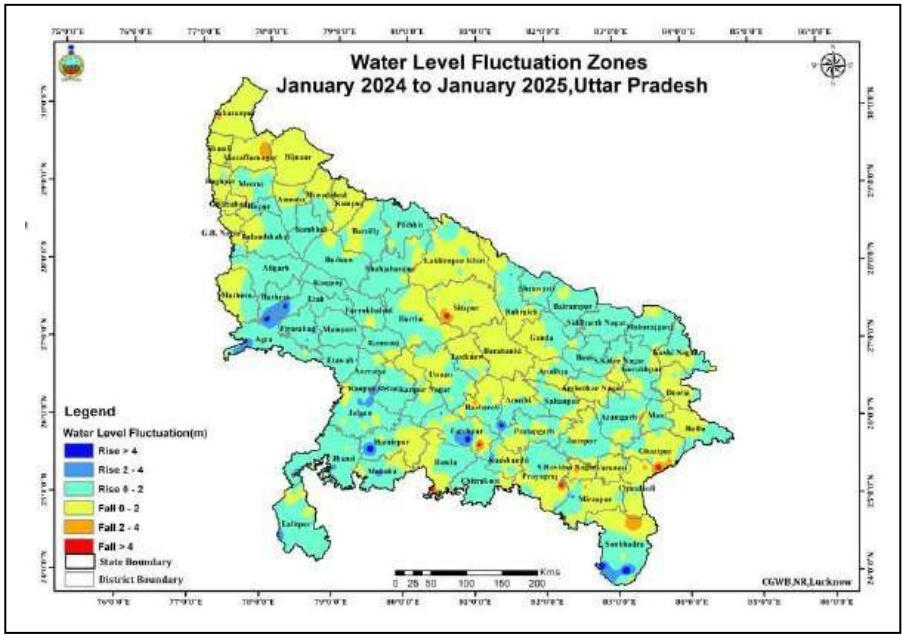

Figure-14: Annual water level fluctuation in Unconfined Aquifer (January 2024 to January 2025)

Annual Fluctuation of Water Level in Unconfined Aquifer (January 2023 to January 2025)

Rise in Water Levels: Out of 683 wells analyzed, it is observed that, the rise in water level of less than 2m is recorded in 205 wells (30.01%) , 2 to 4 in 24 wells (3.51%) and more than 4 m in 8 wells (1.17%). Water level rise of less than 2m is seen in Northern western part and Bundelkhand region of UP along with Sultanpur, Rai barelliy, Fatehpur, Banda, Azamgarh, Gazipur, Ballia, Chandauli, Sonbhadra, Shrawasti, Balrampur, Basti and Siddharath Nagar districts. Water level rise of 2 to 4 m is observed mainly in, Agra, Mathura, Hathars, Ferozabad, Etah, Ghaziabad, Meerut, Hapur, Sultanpur, Fatehpur, Sonbhadra, and Lalitpur districts. Rise of more than 4m is significantly observed in Ghaziabad, Meerut, Hapur, Mathura, Agra, Etah, Sonbhadra, Fatehpur and Ambedkar nagar districts.

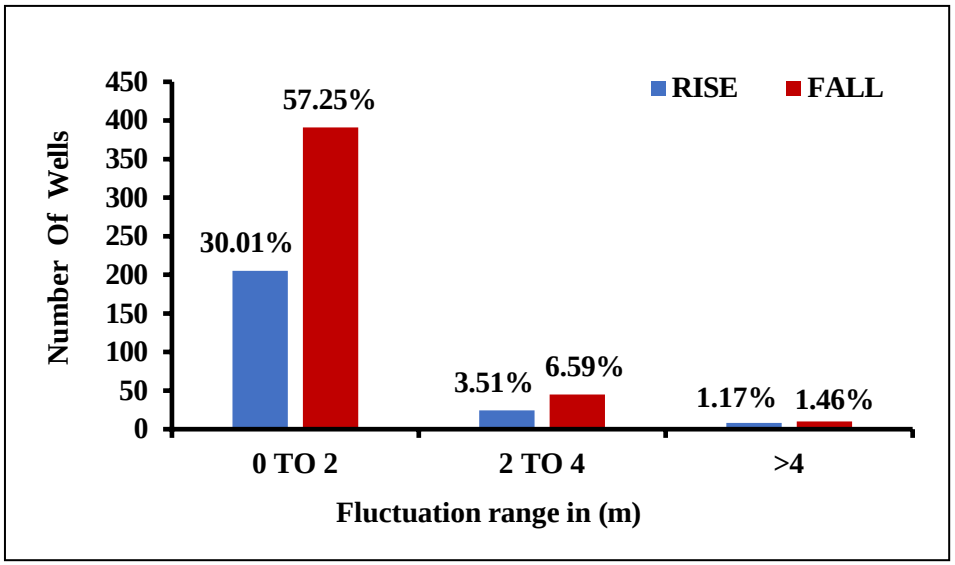

Figure-15: Percentage of wells showing rise and fall in WL in Unconfined Aquifer (January 2023 w.r.t. January 2025)

Fall in Water Levels: Out of 683 wells analyzed, 391 wells(57.25%) of the area shows fall in water levels and recorded water level of less than 2m fall, while 45 wells (6.6%) are in the range of 2 to 4m and remaining 10 wells (1.46%) shows fall of more than 4m. Fall of less than 2m is mainly observed in South-East and Eastren part of UP along with Saharanpur, Muzzafarnagar, Shamli, Baghpat, Ghaziabad, Mathura districts in UP. Fall of 2 to 4 m is observed mainly in isolated patches of Shamli, Muzzafarnagar, Kannauj, Kaushambi, Chitrakoot, Pratapgarh, Jaunpur, Mirzapur, Sant Ravidas nagar, Mau, Ballia, Ghazipur, Azamgarh Jhansi, Mahoba and Gorakhpur districts. Fall of more than 4m is observed in isolated patches of Shamli, Kannauj, Chitrakoot, Fatehpur, Kaushambi, Mirzapur, Jhansi, Mahoba, Jalaun, Unnao and Kanpur Nagar districts of UP

Percentage of wells showing rise and fall in WL for unconfined aquifer (January 2023 to January 2025) in Figure–15 and annual water level fluctuation in unconfined aquifer (January 2023 -2025) is shown in Figure- 16.

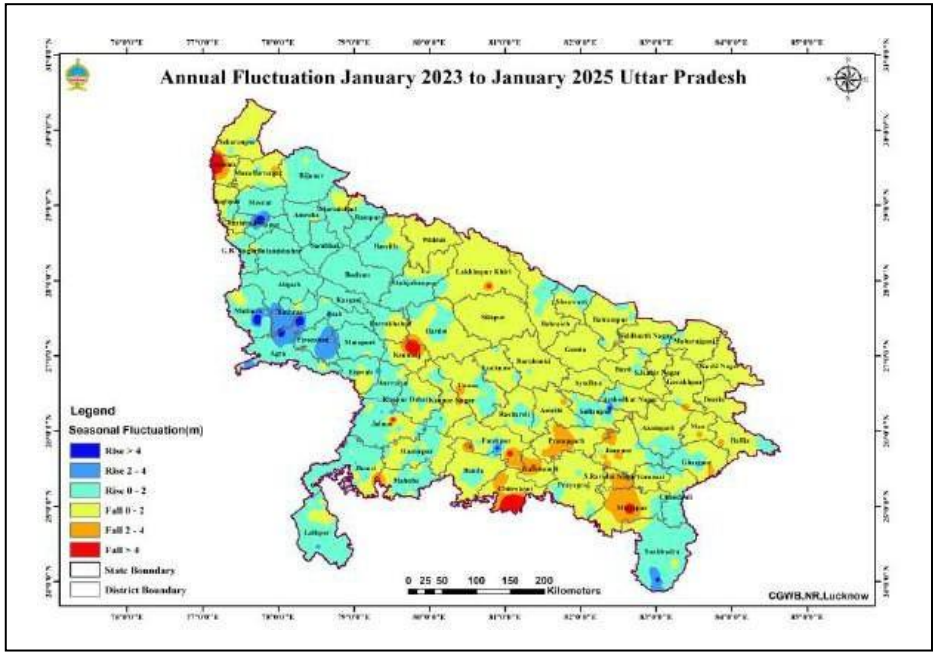

Figure-16: Annual water level fluctuation in Unconfined Aquifer (January 2023 to January 2025)

5.1.4 Decadal Fluctuation of Water Level in Unconfined Aquifer (Decadal Mean January (2015-2024) to January 2025)

Rise in Water Levels:

Out of 499 analyzed wells, the rise in water level of less than 2m is recorded in 234wells (46.89%), 2 to 4 m in 25 wells (5.01 %) and more than 4m in 7 wells (1.40%). Water level rise of less than 2m is seen in nearly all districts of UP such as Saharanpur, Shamli, Bijnore, Moradabad, Aligarh, Agra, Mathura, Bagpat, Meerut, Aligarh, Mainpuri, Firozabad, Kanpur Dehat, Kanpur Nagar, Jalaun, Hamirpur, Bareilly, Pilibhit, Shahjahanpur, Rampur, Etawah, Jhansi, Lalitpur, Mahoba, Azamgarh, Banda, Basti, Siddharth Nagar, Balrampur, Sitapur, Unnao, Hardoi, Shravasti, Sultanpur, Gorakhpur, Bahraich, Gonda, Sonbhadra, Chitrakoot, Fatehpur, Prayagraj, Jaunpur, Mau and Varanasi regions. Water level rise of 2 to 4 m is observed mainly in isolated patches of Hathras, Etah, Agra, Firozabad, Aurraiya, Jalaun, Jhansi, Hamirpur, Lalitpur, Mahoba, Fatehpur, Jaunpur, Sultanpur, Sonbhadra and Varanasi districts and rise of more than 4m is significantly observed in Agra, Hathras, Etah, Jalaun, Hamirpur and Fatehpur districts of UP.

Fall in Water Levels:

Out of the 499 analyzed wells, 200 wells (40.08%) of the area shows, fall in water levels of less than 2m while 30 wells (6.01%) in the range of 2 to 4m and remaining 3 wells (0.6%) registered water level fall of more than 4m. Fall of less than 2 m is observed in major parts in Eastren parts of Uttar Pradesh such as Maharajganj, Ballia, Deoria, Kushinagar, Gorakhpur, Azamgarh, Mau, Gazipur, Chaundali, Mirzapur, Prayagraj, Jaunpur, Pratapgarh and Ambedkar nagar districts.

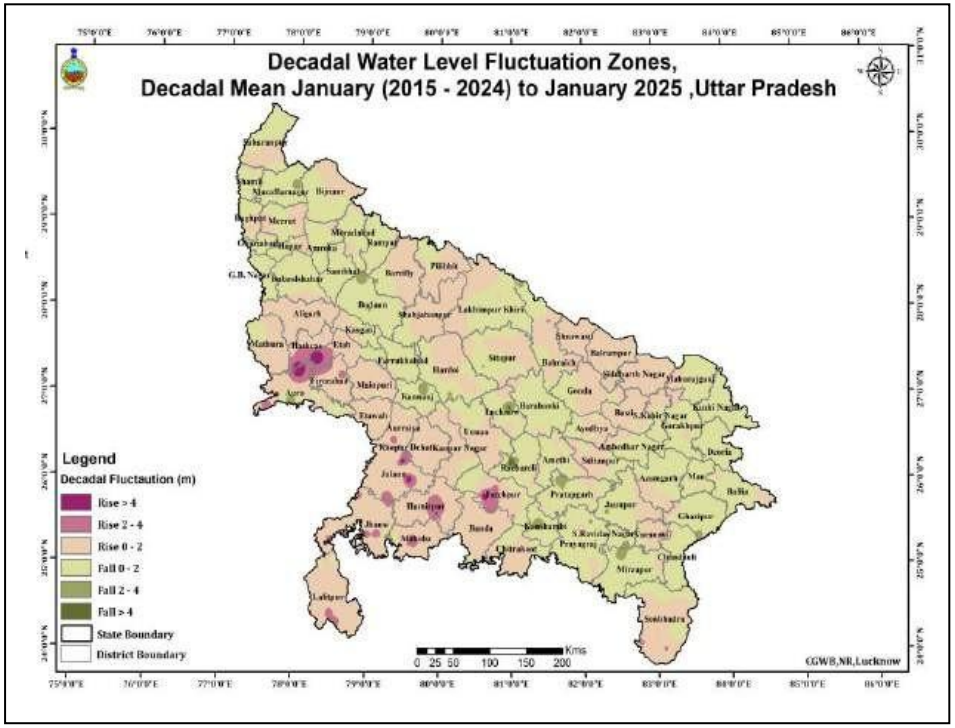

Figure-17: Decadal Water level Contour Zones, Decadal Mean January (2015-2024) w.r.t. January2025)

Central parts of Uttar Pradesh such as Hardoi, Kannauj, Kasganj, Farrukhabad, Sitapur, Lakhimpur Kheri, Lucknow, Bahraich, Barabanki, Rai Bareilly, Amethi, Unnao and Gonda districts and Western parts of UP namely Saharanpur, Baghpat, Meerut Amroha, Bulandshahr, Aligarh, Budaun, Ghaziabad, Shamli, Sambhal, Bijnore, Muzaffarnagar, Hapur and Rampur districts. Fall of 2 to 4m is observed in isolated patches of Agra, Muzaffarnagar, Budaun, Kannauj, Lucknow, Rai bareilly, Pratapgarh, Kaushambi, Sant Ravidas nagar, Mirzapur and Ghazipur districts. Fall more than 4m is observed in isolated patches of Lucknow, and Raibareilly districts of UP. Decadal Water level fluctuation form (January 2015- 2024) with respect to January 2025 is shown in the Figure–17 and percentage of wells showing rise and fall in WL for Unconfined Aquifer (Decadal fluctuation January (2015-2024) w.r.t. January 2025) is shown in Figure-18.

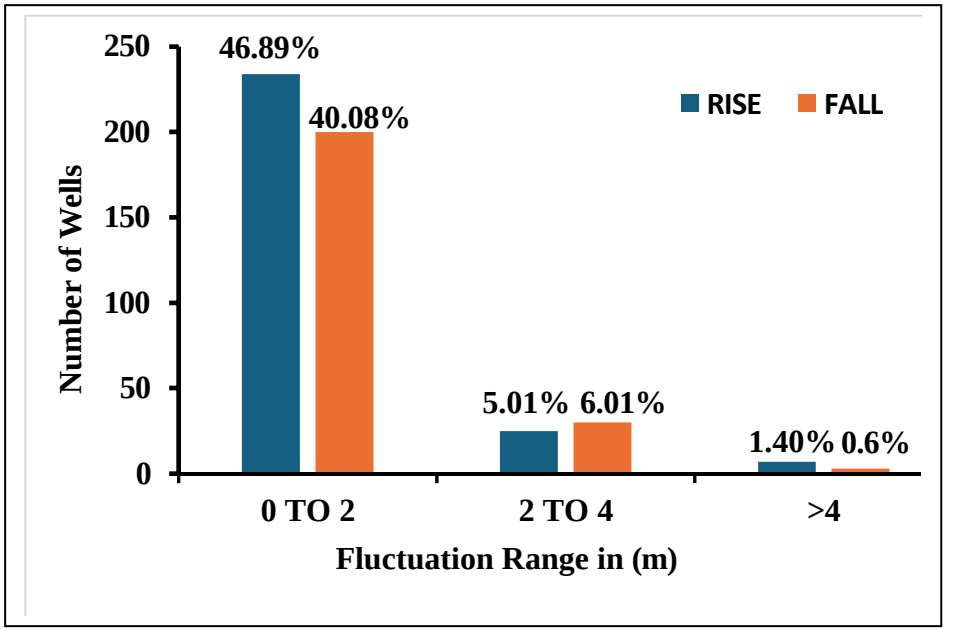

Figure-18: Percentage of wells showing rise and fall in WL in Unconfined Aquifer (Decadal Fluctuation January (2015-2024) w.r.t. January2025)

5.2 DEEPER AQUIFER (CONFINED/SEMI-CONFINED)

5.2.1 DEPTH TO PIEZOMETRIC LEVEL

Depth To Piezometric Level in Confined/Semi-Confined Aquifer (January 2025)

Analysis of piezometric level of 216 wells shows piezometric head vary between 0.37 mbgl (Mau) to 49.61 mbgl (Agra district). Piezometric level of less than 2 mbgl is recorded in 14 wells, between 2 to 5 mbgl in

63 wells, between 5 to 10 mbgl in 59 wells, between 10 to 20 mbgl in 55 wells, between 20-30 mbgl in 19 wells, greater than 30 mbgl in 6 wells. Percentage of wells of different Piezometric level ranges for Confined Aquifer is shown in Figure-19. Shallow piezometric level of less than 2 mbgl is noticed in Bahraich, Banda, Hamirpur, Azamgarh, Gorakhpur, Ayodhaya, Shrawasti, Siddharath nagar, Mau and Mahoba districts comprising 6.48% area of State. Piezometric level of 2 to 5 mbgl mainly observed in parts of Bijnore, Budaun, Bulandshahr, Etah, Fatehpur, Ambedkar nagar, Gonda, Azamgarh, Bahraich, Balrampur, Banda, Gorakhpur, Hathras, Mau, Lalitpur, Jhansi, Jaunpur, Lakhimpur Kheri, Siddharathnagar, Unnao, Shravasti, Rampur and Sambhal districts of the State which constitute 29.17% area of UP.

Piezometric Level of 5 to 10 mbgl observed in significant area of Ambedkar Nagar, Azamgarh, Ayodhaya, Baghpat, Ballia, Bahraich, Bijnore, Bulandshahr, Budaun, Lakhimpur Kheri, Meerut, Mahoba, Hapur, Hathras, Muzaffarnagar, Rampur, Saharanpur, Sitapur, Chandauli, Gorakhpur, Chitrakoot, Fatehpur, Shravasti, Ghazipur and Unnao districts, occupies 27.31% area of the state Piezometric level of 10 to 20 mbgl is observed mostly in Saharanpur, Balrampur, Chitrakoot, Fatehpur, Shamli, Bahraich, Baghpat, Banda, Bijnore, Meerut, Ghazipur, Jalaun, Jaunpur, Moradabad, Mahoba, Pratapgarh, Gautam Budh Nagar, Bulandshahr, Sambhal, Varanasi and Budaun districts which covers 25.46% area of whole UP.

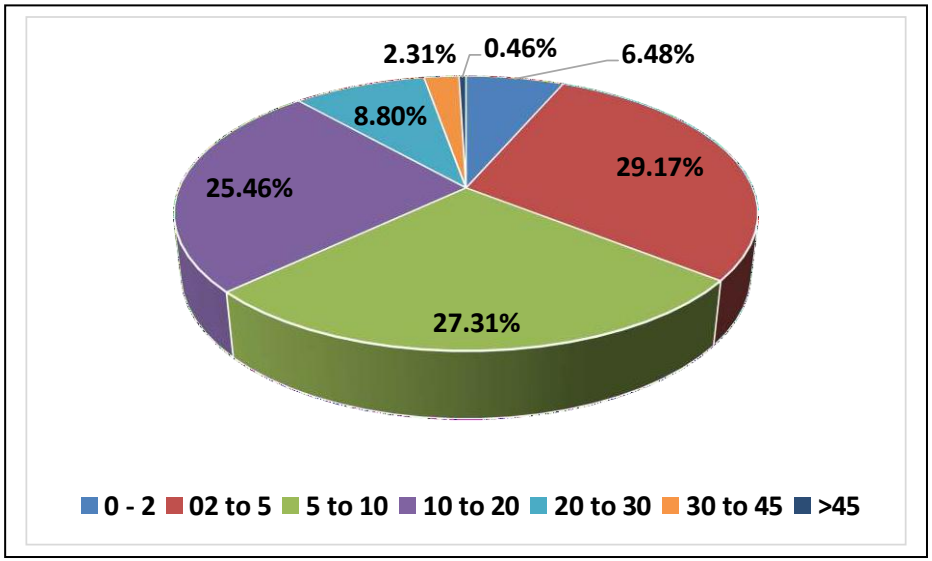

Figure-19: Percentage of wells in different Piezometric Level ranges in Confined Aquifer

The piezometric level of 20-30 mbgl is observed in Baghpat, Banda, Bijnore, Budaun, Fatehpur, Hamirpur, Hathras, Kaushambi, Muzaffarnagar, Varanasi, Sambhal and Shamli districts comprising 8.8% of area and piezometric level of greater than 30 mbgl constitutes nearly 3% area mainly in Agra, Hamirpur and Mathura district of UP.

5.2.2 SEASONAL FLUCTUATION IN PIEZOMETRIC LEVEL

Seasonal Fluctuation of Piezometric Level in Confined/ Semi-Confined Aquifer (May 2024 to January 2025)

Rise in Piezometric Level:

Out of 164 wells, rise in piezometric level of less than 2m is recorded in 105 wells (64%), 2 to 4m in 24 wells (14.63%) and more than 4m in 9 wells (5.5%). Percentage wise distribution of wells is shown in Figure-20. Rise in Piezometric level of less than 2m is seen in Ambedkar Nagar, Ayodhaya, Azamgarh, Baghpat, Bahraich, Ballia, Balrampur, Banda, Bijnore, Budaun, Bulandshahr, Chitrakoot, Fatehpur, Gorakhpur, Gonda, Hathras, Jaunpur, Jhansi, Mahoba, Mau, Meerut, Rampur, Saharanpur, Sambhal, Shravasti, Siddharath nagar, Unnao and Varanasi districts. Rise in Piezometric level of 2 to 4m is observed mainly in districts such as, Agra, Azamgarh, Balrampur Banda, Chandauli, Chitrakoot, Fatehpur, Gorakhpur, Mahoba, Meerut, Muzzafarnagar, Rampur, Saharanpur and Sambhal districts. Rise of more than 4m is significantly observed in Banda, Baghpat, Bijnore, Chanduali, Fatehpur and Mau districts of UP

Fall in Piezometric Level:

Out of 164 analyzed wells, fall in piezometric level of less than 2m is recorded in 20 wells (12.20%) while 2 wells (1.22%) are in the range of 2 to 4m and fall greater than 4m recorded in 4 wells (2.44%). Fall of less than 2m is mainly observed in parts of Agra, Baghpat, Fatehpur, Azamgarh, Banda, Bulandshahr, Ghazipur, Jaunpur, Muzzafarnagar, Saharanpur and Chitrakoot districts. Fall of 2 to 4m is observed mainly in Hamirpur and Banda region. Fall greater than 4m is observed in Balrampur, Chitrakoot, Fatehpur and Hamirpur districts.

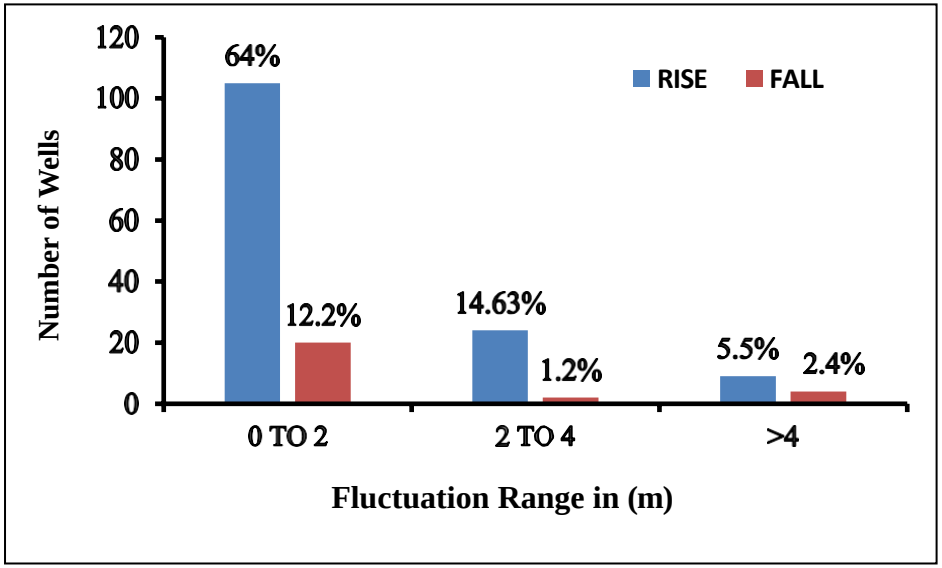

Figure-20: Percentage of wells showing rise and fall in Piezometric Level in Confined Aquifer (May 2024 w.r.t. January 2025)

Seasonal Fluctuation of Piezometric Level in Confined/ Semi-Confined Aquifer (August 2024 to January 2025)

Rise in Piezometric Level:

Out of 166 wells, rise in piezometric level of less than 2m is recorded in 53 wells (32%), 2 to 4m in 7 wells (4.22%) and more than 4m in 5 wells (3%). Percentage wise distribution of wells is shown in Figure-21. Rise in Piezometric level of less than 2m is seen in Ambedkar Nagar, Ayodhaya, Azamgarh, Baghpat, Bahraich, Balrampur, Bijnore, Badaun, Bulandshahr, Fatehpur, Ghazipur, Gorakhpur, Hathras, Jaunpur, Mahoba, Meerut, Muzzafarnagar, Pratapgarh, Rampur, Saharanpur, Sambhal, Siddharath nagar and Unnao districts. Rise in Piezometric level of 2 to 4m is observed mainly in districts such as, Ambedkar Nagar, Fatehpur, Jaunpur, Muzzafarnagar, and Sambhal districts. Rise of more than 4m is significantly observed in Fatehpur, Hamirpur, Jaunpur and Moradabad districts of UP

Fall in Piezometric Level:

Out of 166 analyzed wells, fall in piezometric level of less than 2m is recorded in 63 wells (38%) while 28 wells (16.87%) are in the range of 2 to 4m and fall greater than 4m recorded in 10 wells (6%). Fall of less than 2m is mainly observed in parts of Agra, Ambedkar nagar, Fatehpur, Azamgarh, Baghpat, Bahraich, Ballia, Balrampur, Banda, Bijnor, Bulandshahr, Fatehpur, Gonda, Ghazipur, Jaunpur, Meerut, Mau, Muzzafarnagar, Rampur, Shravasti, Siddharath Nagar and Sitapur districts. Fall of 2 to 4m is observed mainly in Agra, Bahraich, Banda, Chitrakoot, Fatehpur, Gazipur, Gorakhpur, Hamirpur, Mahoba, Meerut and Saharanpur region. Fall greater than 4m is observed in Agra, Banda, Chitrakoot and Jalaun districts.

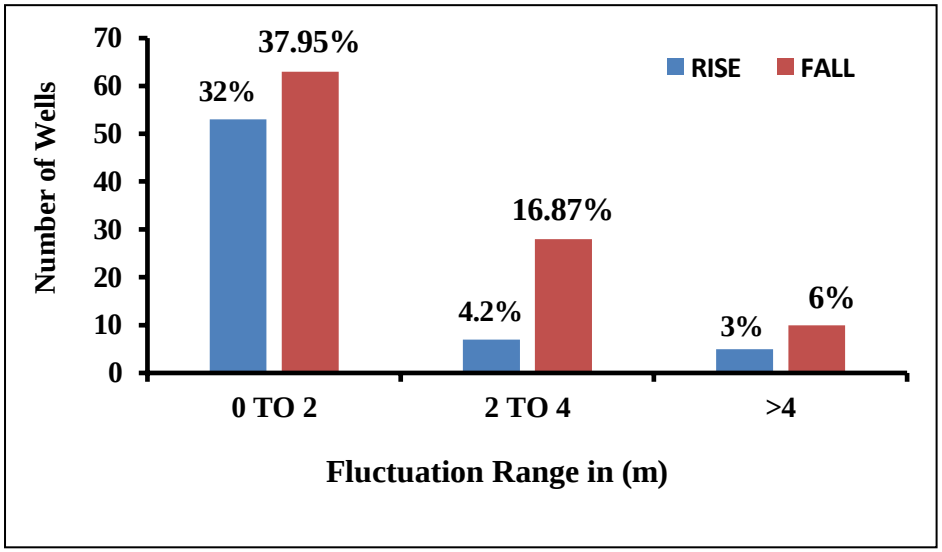

Figure-21: Percentage of wells showing rise and fall in Piezometric Level in Confined Aquifer (August 2024 w.r.t. January 2025)

Seasonal Fluctuation of Piezometric Level in Confined/ Semi-Confined Aquifer (November 2024 to January 2025)

Rise in Piezometric Level:

Out of 175 wells, rise in piezometric level of less than 2m is recorded in 40 wells (22.86%), 2 to 4m in 4 wells (2.29%) and more than 4m in 3 wells (1.71%). Percentage wise distribution of wells is shown in Figure-22. Rise in Piezometric level of less than 2m is seen in Agra, Ambedkar Nagar, Ayodhaya, Baghpat, Bahraich, Banda, Bijnore, Badaun, Bulandshahr, Chitrakoot, Fatehpur, Gautam Buddha nagar, Hathras, Jaunpur, Kausambi, Meerut, Moradabad, Muzzafarnagar, Pratapgarh, Rampur, Saharanpur, Sambhal, and Unnao districts. Rise in Piezometric level of 2 to 4m is observed mainly in districts such as Banda, Meerut and Muzzafarnagar districts. Rise of more than 4m is significantly observed in Azamgarh, Baghpat and Fatehpur districts of UP

Fall in Piezometric Level:

Out of 175 analyzed wells, fall in piezometric level of less than 2m is recorded in 112 wells (64%) while 11 wells (6.29%) are in the range of 2 to 4m and fall greater than 4m recorded in 5 wells (2.86%). Fall of less than 2m is mainly observed in parts of Ambedkar nagar, Ayodhaya, Azamgarh, Baghpat, Bahraich, Balrampur, Banda, Bijnor, Badaun, Bulandshahr, Chaundauli, Chitrakoot, Fatehpur, Gonda, Gorakhpur, Ghazipur, Hapur, Jalaun, Jaunpur, Mahoba, Meerut, Mau, Muzzafarnagar, Pratapgarh, Rampur, Sambhal, Saharanpur, Shravasti, Siddharath Nagar, Unnao, Varanasi and Sitapur districts. Fall of 2 to 4m is observed mainly in Bahraich, Banda, Bulandshahr, Chitrakoot, Gorakhpur, Mahoba, Rampur, Saharanpur region. Fall greater than 4m is observed in Banda, Chitrakoot, Hamirpur and Jhansi districts.

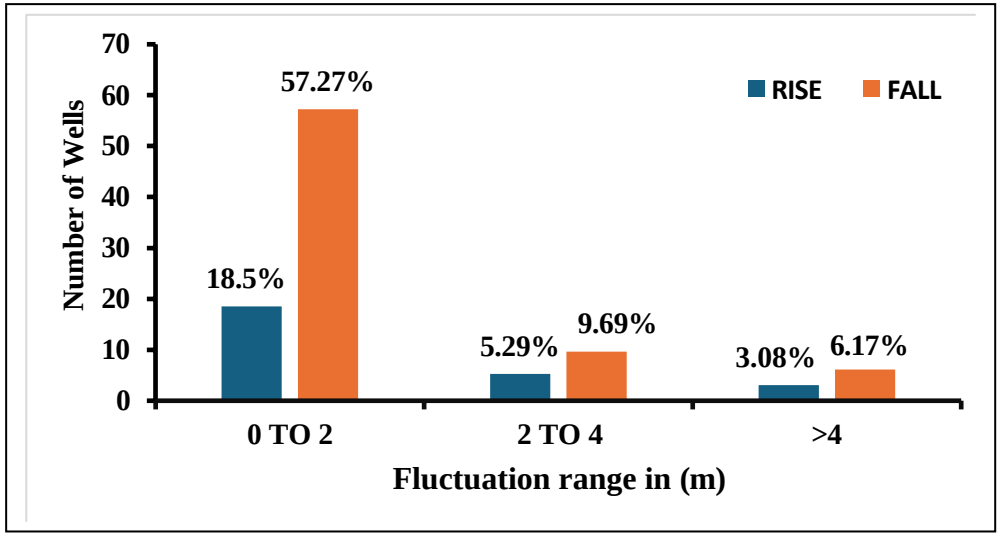

Figure-22: Percentage of wells showing rise and fall in Piezometric Level in Confined Aquifer (November 2024 w.r.t. January 2025)

5.2.3 ANNUAL FLUCTUATION IN PIEZOMETRIC LEVEL

Annual Fluctuation of Piezometric Level in Confined / Semi-confined Aquifer (January 2024 to January 2025)

Rise in Piezometric level: Out of 88 wells, the rise of less than 2m piezometric level is recorded in 31 wells (35.23%), between 2m–4m in 5 wells (5.68%). Piezometric level rise of less than 2m is seen in the districts of Banda, Chitrakoot, Azamgarh, Fatehpur, Gorakhpur, Gonda, Siddharathnagar, Balrampur, Meerut, Rampur and Sambhal districts. Rise in piezometric level from 2 – 4m is seen significantly in Chitrakoot, Banda, Fatehpur and Baghpat district.

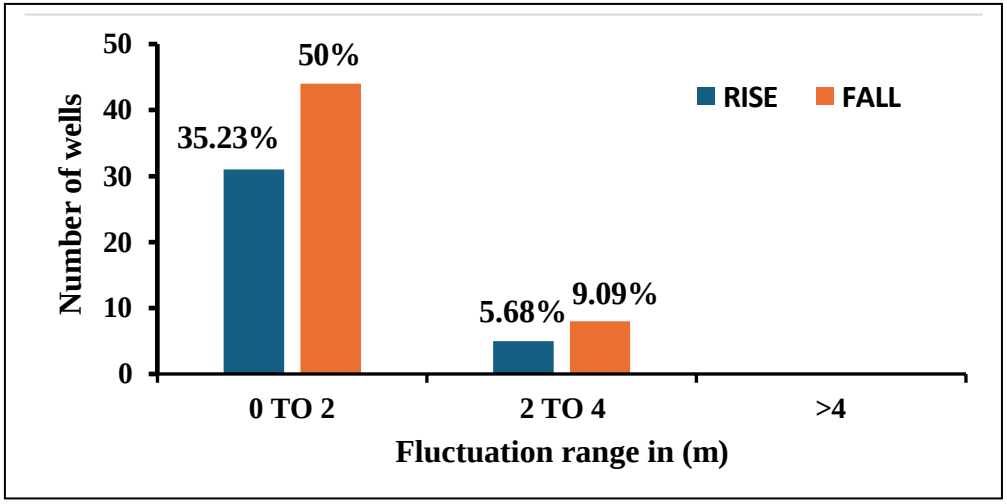

Figure-23: Percentage of wells showing rise and fall in Piezometric Level in Confined Aquifer (January 2024 to January 2025)

Fall in Piezometric Level: Out of 88 analyzed wells 44 wells (50%) shows fall in piezometric level of less than 2m while 8 wells (9.09%) registered piezometric level fall between 2m-4m. Fall of less than 2m is mainly observed in parts of Baghpat, Bahraich, Banda, Chitrakoot, Mahoba, Fatehpur, Unnao, Azamgarh, Ayodhaya, Gorakhpur, Sitapur, Moradabad, Siddharathnagar, Lakhimpur Kheri, Rampur and Meerut districts. Piezometric level fall of 2 – 4m in parts of Banda, Hamirpur, Chitrakoot and Mahoba districts. Percentage of wells showing rise and fall in Piezometric Level of Confined Aquifer (January 2024 to January 2025) is shown in the Figure –23.

Annual Fluctuation of Piezometric Level in Confined / Semi-confined Aquifer (January 2023 to January 2025)

Rise in piezometric level:

Out of 73 wells, the rise of less than 2m piezometric level is recorded in 11 wells (15.07%), between 2m–4m in 5 wells (6.85%) and greater than 4m in 1 well (1.37%). Piezometric level rise of less than 2m is seen in the districts of Banda, Chitrakoot, Azamgarh, Meerut, Mahoba and Sambhal districts. Rise in piezometric level from 2 – 4m is seen significantly in Chitrakoot, Banda, Fatehpur and Jaunpur and Sambhal district. Rise in piezometric level greater than 4m is seen in Baghpat district

Fall in Piezometric Level: Out of 73 analyzed wells 50 wells (68.5%) shows fall in piezometric level of less than 2m while 4 wells (5.48%) shows fall in piezometric level between 2m to 4m and fall greater than 4m is seen in 2 wells (2.74%). Piezometric level fall of less than 2m is seen in the districts of Banda, Chitrakoot, Azamgarh, Baghpat, Bahraich, Meerut, Mahoba, Fatehpur, Gonda, Gorakhpur, Lakhimpur Kheri, Mau, Rampur and Siddharath Nagar districts. Fall in piezometric level from 2 – 4m is seen in Azamgarh, Chitrakoot, Jalaun and Mahoba district. Rise in piezometric level greater than 4m is seen in Fatehpur and Mahoba district. Percentage of wells showing rise and fall in Piezometric Level of Confined Aquifer (January 2023 to January 2025) is shown in the Figure –24.

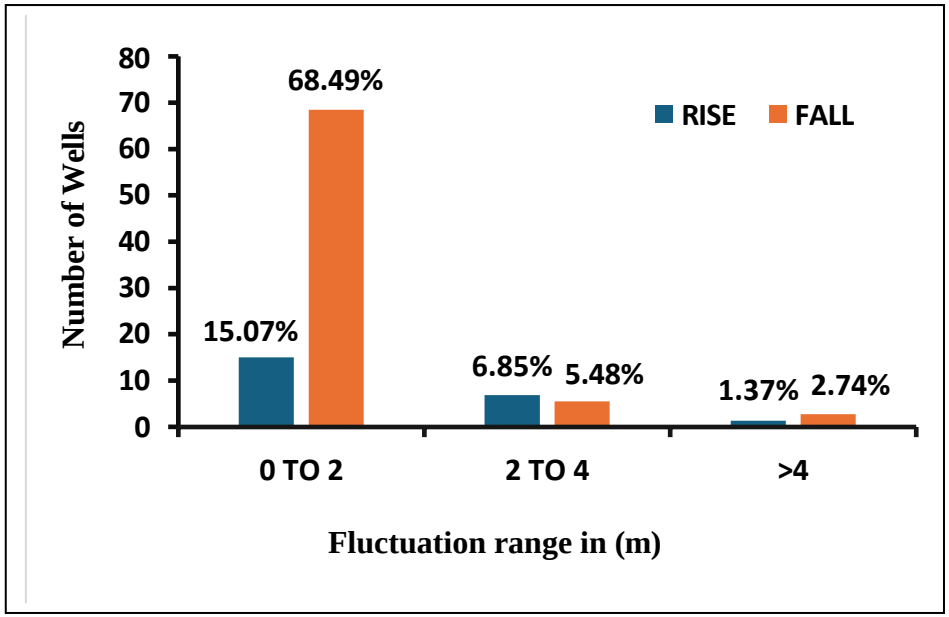

Figure-24: Percentage of wells showing rise and fall in Piezometric Level in Confined Aquifer (January 2023 to January 2025)

5.2.4 DECADAL FLUCTUATION IN PIEZOMETRIC LEVEL

Decadal Fluctuation of Piezometric Level in Confined/Semi-confined Aquifer (Decadal Mean January (2015-2024) to January 2025)

Rise in Piezometric Level:

Out of 4 wells analysed, 2 wells have registered rise in piezometric level, in range of less than 2m in Rampur and Gautam Buddha nagar districts of UP.

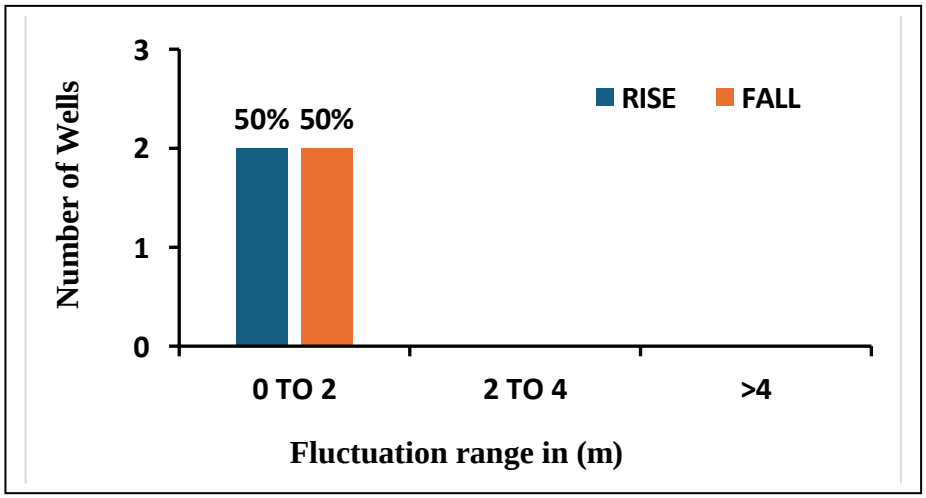

Figure-25: Percentage of wells showing rise and fall in Piezometric Level in Confined/Semi- Confined Aquifer (Decadal Mean January (2015-2024 to January 2025).

Fall in piezometric level:

Out of 4 wells analyzed, 2 wells have registered fall in piezometric level, in range of less than 2m in Meerut and Bulandshahr districts of UP.

Percentage of wells showing rise and fall in Piezometric Level in Confined/Semi- confined Aquifer (Decadal Mean January (2015-2024 to January 2025) is shown in Figure – 25.

6.0 SUMMARY

As a component of the National Ground Water Monitoring Programme, the CGWB, NR, Lucknow conducts monitoring of the ground water conditions on a quarterly basis: in January, pre-monsoon May, August, and post-monsoon November. Additionally, a yearly assessment of ground water quality is performed in May and November. As of January 31, 2024, the Northern Region-Central Ground Water Board supervises 1006 dug wells and 458 piezometers. This comprehensive effort aims to portray the variations in the states ground water conditions across different aquifers. In January 2025, around 82% of the state's area exhibited a depth to water level within 10 meters below ground level for unconfined aquifers and around 62% for confined. Deeper water levels of more than 20m covers nearly 3% area of the State comprising mainly of Baghpat, Shamli, Banda, Agra, Firozabad, Farrukhabad, Lucknow, Hamirpur and Fatehpur districts.

The ground water level in Uttar Pradesh during January, 2025 has been significantly influenced by rainfall patterns. Rainfall data from period June-August, 2024 (As per latest data available) witnessed a departure of 30.92% from the normal, classifying most of the region in the category of normal rainfall. This has result in rise in the water level in

many districts of UP. Districts of UP like Bareilly, Balrampur, Siddharath nagar, Basti, Gonda, Bahraich, Shrawasti, Maharajganj, Lalitpur and Kushi nagar receives actual rainfall greater than 600mm. Seasonal fluctuation comparison with May-2024 to January-2025 has shown rise in about 90% area of the state in unconfined and 84% area in confined aquifer. This comparison with August-2024 to January-2025 has shown rise in about 25% area in Unconfined and 39% area in Confined Aquifer. Same comparison with November-2024 to January-2025 has shown rise in about 20% area of the State in Unconfined and 26% in Confined Aquifer. Annual fluctuation comparison with January-2024 to January-2025 has shown rise in about 51% area of the state in Unconfined and 40% area in Confined Aquifer. Annual fluctuation comparison with January-2023 to January-2025 has shown rise in about 34% area in Unconfined and 22% area in Confined Aquifer. Around 53% of the area experienced rise of water level in decadal mean water level fluctuation of January (2015-2024) with respect to January,2025 in Unconfined Aquifer whereas in Confined Aquifer 50% of monitoring stations have experienced rise in decadal mean water level of January, 2015-2024, with respect to January,2025, The monsoon in 2024 witnessed significant fluctuations in rainfall pattern across the State. The evident rise in annual ground water level during January 2025 in Uttar Pradesh can be attributed to a substantial rainfall in this period.

7.0 Recommendation

- 45.5% of the well are showing fall in Groundwater in comparison with previous year mainly in Saharanpur, Muzaffarnagar, Sitapur, Fatehpur, Banda, Lucknow, Raibareilly, Prayagraj, Chaundali, Mirzapur, Sonbhadra and Ghazipur and isolated patches of Sant Prayagraj, Banda, Fatehpur, Ghazipur and Sitapur districts.
- State Government are suggested to adopt more water conservation measure to augment Groundwater water in the area. Rain water harvesting and artificial recharge techniques, depending on the feasibility of Artificial Recharge Structure, may be introduced at a larger scale to minimize the problem of declining water level and depletion of GW resource.
- Demand side measure such as sprinkler, drip irrigation and Enhancement in cultivation of low water requiring crops and a small modification of the prevailing cropping pattern is recommendable as per its suitability for the area, needs to be promoted in the district like Saharanpur, Muzaffarnagar, Sitapur, Fatehpur, Banda, Lucknow, Rai Bareilly, Prayagraj, Chaundali, Mirzapur, Sonbhadra and Ghazipur and isolated patches of Sant Prayagraj, Band, Fatehpur, Ghazipur and Sitapur districts.

- Areas with deeper Groundwater levels showing declining trend in last ten year such as parts of Ghaziabad, Meerut, Agra, Shamli, Muzaffar Nagar, Bulandshahar, Sambhal, Chitrakoot etc. need Overall increase in cultivation area of mustard, vegetables and wheat may be recommended as an alternative option as these crops are suitable for the local climate and soil type and need a lesser irrigation water column in the range of 0.40 to 0.45 m.