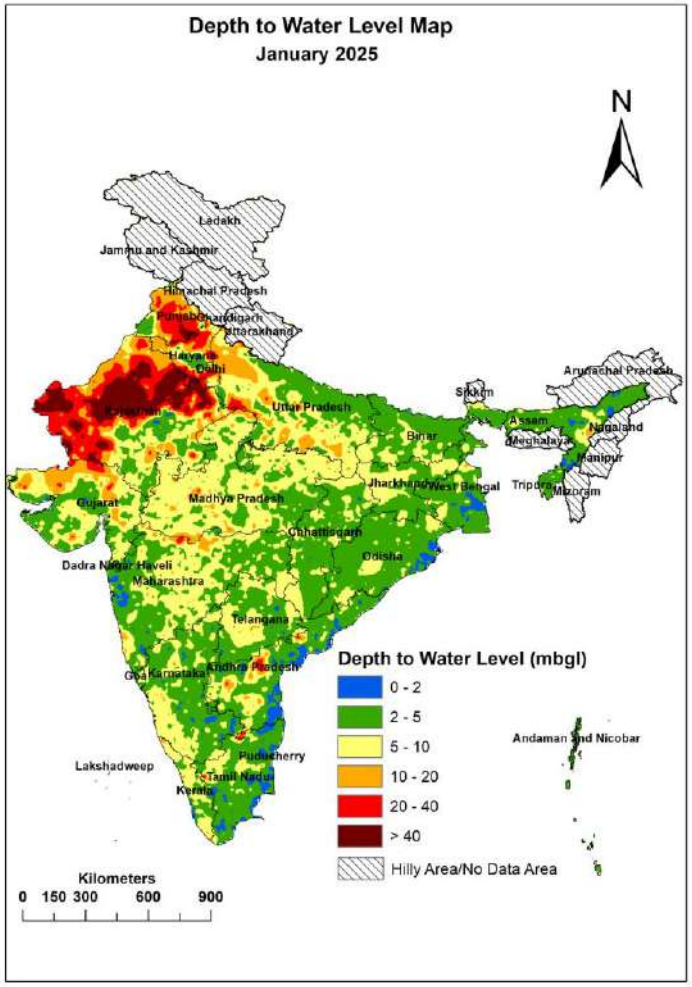

GROUND WATER LEVEL BULLETIN

January 2025

ABSTRACT

Groundwater level scenario during January 2025 highlighting the findings, status of ground water level in different aquifers and its seasonal, annual and decadal comparison.

National Data Centre
Central Ground Water Board, Faridabad

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, evapotranspiration 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 Groundwater Board. Currently, a network of 27163 observation wells called National Hydrograph Network Stations (NHNS) located all over the country is being monitored.

2.0 HYDROGEOLOGICAL SETUP OF COUNTRY

India's hydrogeological setup is characterized by diverse aquifer systems across its varied geography. The Indo-Gangetic Plain features extensive, productive alluvial aquifers, while Peninsular India has less permeable hard rock aquifers in the Deccan Plateau and sedimentary basins. Arid regions like Rajasthan and Gujarat experience scanty rainfall and feature less productive, shallow aquifers. The hydrogeological map of India is depicted in Figure -1 and the geographical distribution of hydrogeological units along with their Groundwater potential is given in Table 1.

Table1. Aquifer System in the Country

System	Coverage	Groundwater potential
Unconsolidated formations - alluvial	Indo-Gangetic, Brahmaputra plains	Highly productive system down to 600 m depth.
	Coastal Areas	Reasonably extensive aquifers but risk of saline water intrusion
	Arid areas	Scanty rainfall. Salinity hazards. Groundwater availability at great depths.
Consolidated/semi-consolidated formations - sedimentary, basalts & crystalline rocks	Peninsular Areas	Groundwater available in fractures and in weathered zones with varying yield at shallower depths (20-40 m) in some areas and deeper depths (100-200 m) in other areas.
Hilly	Hilly states	Low storage capacity due to quick runoff

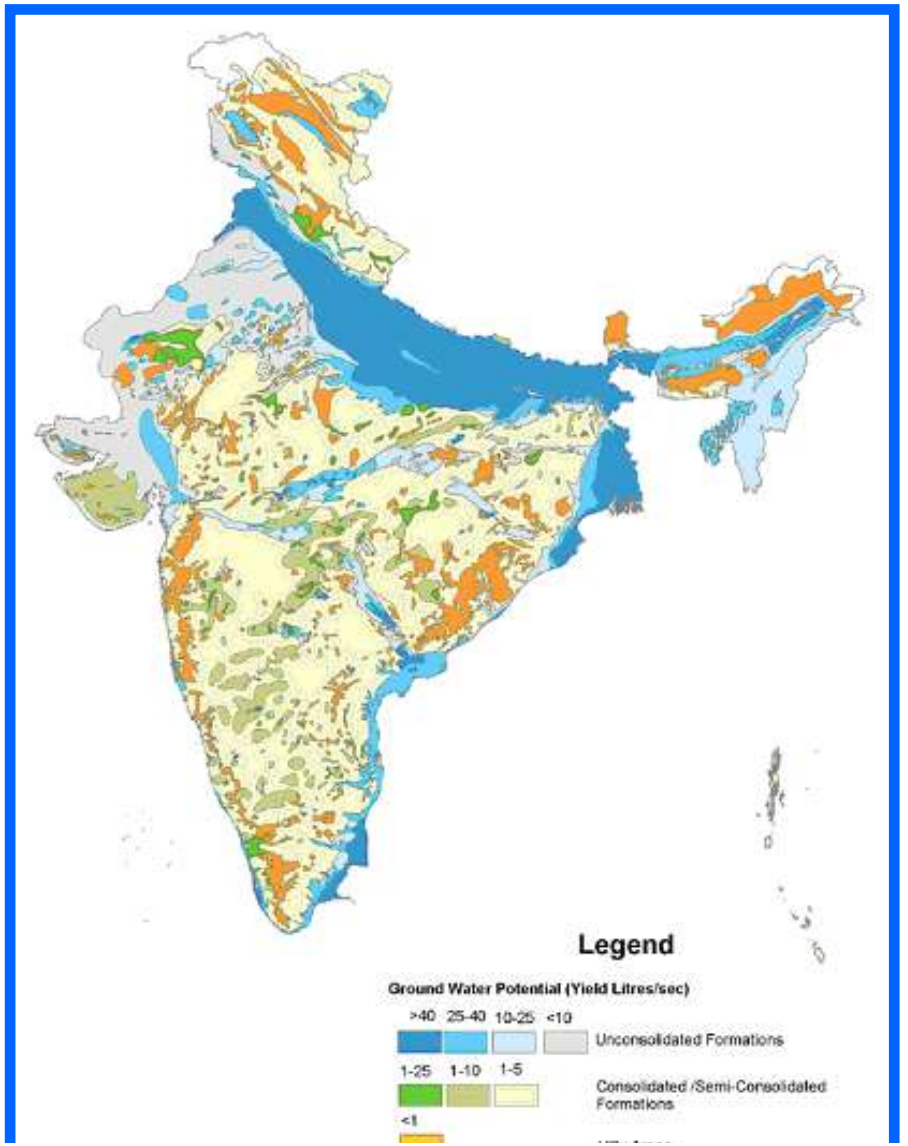

Figure 1: Map showing major aquifers and geomorphic divisions

3.0 GROUND WATER LEVEL MONITORING

Central Ground Water Board is monitoring changes in groundwater regime in the country on quarterly basis continuously. This is facilitated by a network of monitoring stations in the country located in diverse hydrogeological and geomorphic units. The number of operational stations as in March 2024 was 27163 which include 16516 dug wells, 9552 piezometers, 913 Handpumps and 182 Springs.

The state-wise breakup of the water level monitoring stations is given in Table 2.

Table 2. state-wise water level monitoring stations

State/UT	Dug Well	Piezometer	Hand pump	Spring	Total
Andhra Pradesh	676	797	0	0	**1473**
Arunachal Pradesh	26	6	0	0	**32**
Assam	355	80	8	0	**443**
Bihar	796	120	0	0	**916**
Chhattisgarh	1044	269	5	0	**1318**
Goa	83	52	0	0	**135**
Gujarat	789	504	0	0	**1293**
Haryana	478	819	0	0	**1297**
Himachal Pradesh	138	55	0	24	**217**
Jharkhand	460	122	0	0	**582**
Karnataka	1360	931	0	0	**2291**
Kerala	1330	296	0	24	**1650**
Madhya Pradesh	1386	485	0	0	**1871**
Maharashtra	1779	296	0	0	**2075**
Manipur	4	0	0	2	**6**
Meghalaya	67	13	0	19	**99**
Mizoram	3	0	0	0	**3**
Nagaland	99	1	0	28	**128**
Odisha	1507	277	0	0	**1784**
Punjab	175	995	0	0	**1170**
Rajasthan	642	660	0	0	**1302**
Sikkim	0	4	0	0	**4**
Tamil Nadu	743	694	0	0	**1437**
Telangana	273	1008	0	0	**1281**
Tripura	97	18	0	0	**115**
Uttar Pradesh	978	486	0	0	**1464**
Uttarakhand	39	12	149	79	**279**
West Bengal	695	286	751	0	**1732**
Andaman & Nicobar	111	2	0	0	**113**
Chandigarh	1	22	0	0	**23**
DD and DNH	38	5	0	0	**43**
Delhi	22	113	0	0	**135**
Jammu and Kashmir	313	106	0	6	**425**
Puducherry	9	18	0	0	**27**
Total	**16516**	**9552**	**913**	**182**	**27163**

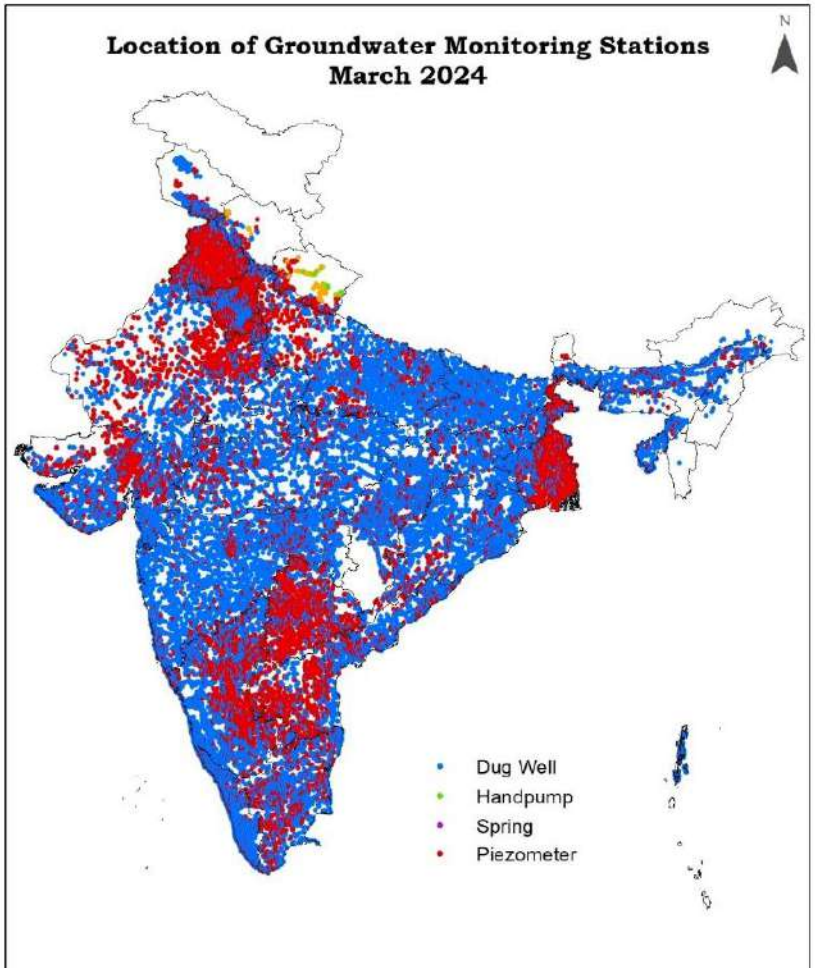

Figure 2: Location of groundwater monitoring stations

4.0 RAINFALL

The state-wise rainfall data was collected from the India Meteorological Department (IMD) to analyze the rainfall patterns during the monsoon period. Table 3 presents the normal rainfall and actual rainfall for each state during the Southwest Monsoon of 2023 and 2024, along with the departures from normal rainfall. It also indicates the percentage increase in monsoon rainfall in 2024 compared to 2023.

Observations show that in 2024, the SW Monsoon rainfall had a 7.6% departure from the normal rainfall. Additionally, during the SW Monsoon of 2024, a 14.0% increase in rainfall was recorded compared to the Southwest Monsoon of 2023.

Table 3. State-wise rainfall (mm) during SW Monsoon 2023 and 2024.

State/UTs	Normal Rainfall	Actual Rainfall 2023	% Deviation	Actual Rainfall 2024	% Deviation	% Deviation 2024 to 2023
Andhra Pradesh	521.6	485.9	-6.8	662.9	27.1	36.4
Arunachal Pradesh	1675.1	1466.3	-12.5	1200	-28.4	-18.2
Assam	1479.1	1176.9	-20.4	1202.3	-18.7	2.2
Bihar	992.2	760.6	-23.3	798.7	-19.5	5.0
Chhattisgarh	1132.2	1061.3	-6.3	1231.7	8.8	16.1
Delhi	544.3	542.2	-0.4	658.3	20.9	21.4
DNH & DD	2206.5	2476.5	12.2	2885.2	30.8	16.5
Goa	3007.7	3367.8	12.0	4400.5	46.3	30.7
Gujarat	711.9	841.7	18.2	1055.4	48.3	25.4
Haryana	426	419.7	-1.5	408.7	-4.1	-2.6
Himachal Pradesh	734.4	876.4	19.3	594.7	-19.0	-32.1
Jammu & Kashmir	549.1	574.2	4.6	408.5	-25.6	-28.9
Jharkhand	1022.9	755.7	-26.1	1011.6	-1.1	33.9
Karnataka	831.8	681.1	-18.1	927.3	11.5	36.1
Kerala	2018.6	1327.4	-34.2	1748.2	-13.4	31.7
Ladakh	22.3	45.2	102.7	26	16.6	-42.5
Madhya Pradesh	949.5	947.3	-0.2	1121.2	18.1	18.4
Maharashtra	994.5	965.7	-2.9	1252.1	25.9	29.7
Manipur	1038.8	565.1	-45.6	714.3	-31.2	26.4
Meghalaya	2695.3	2272.3	-15.7	2430.2	-9.8	6.9
Mizoram	1626.1	1470	-9.6	1349.2	-17.0	-8.2
Nagaland	1038.8	934.9	-10.0	701.3	-32.5	-25.0
Odisha	1150.2	1115.4	-3.0	1091.9	-5.1	-2.1
Puducherry	418	462.4	10.6	497	18.9	7.5
Punjab	439.8	417.5	-5.1	314.8	-28.4	-24.6
Rajasthan	435.6	499.7	14.7	678.4	55.7	35.8
Sikkim	1672.9	1753.6	4.8	2040.8	22.0	16.4
Tamil Nadu	328.4	353.9	7.8	389	18.5	9.9
Telangana	734.8	846.8	15.2	948.3	29.1	12.0
Tripura	1391.1	1221.9	-12.2	1578.4	13.5	29.2
Uttar Pradesh	746.2	620.9	-16.8	744.9	-0.2	20.0
Uttarakhand	1162.7	1210.8	4.1	1273.4	9.5	5.2
West Bengal	1344.2	1202.4	-10.5	1391	3.5	15.7
Total	**868.6**	**820**	**-5.6**	**934.8**	**7.6**	**14.0**

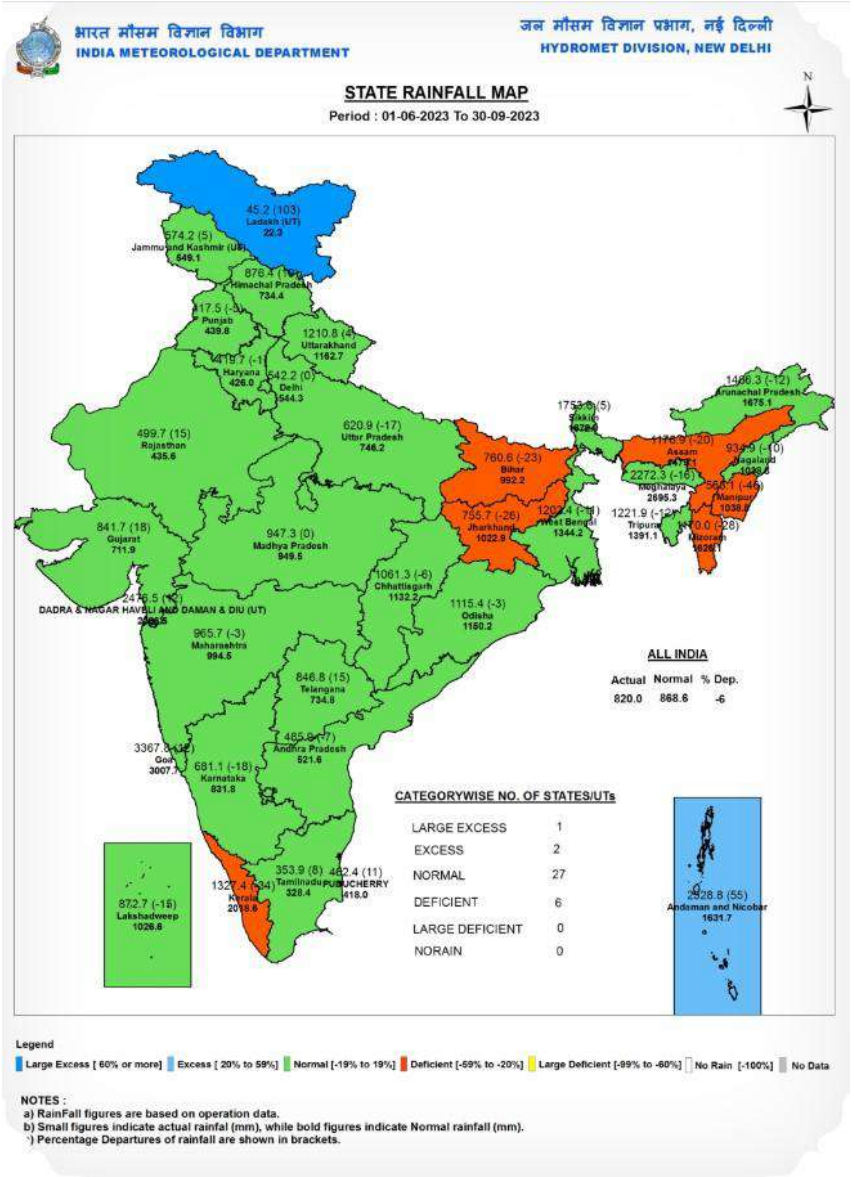

Figure 3: State-wise rainfall pattern during monsoon period 2023

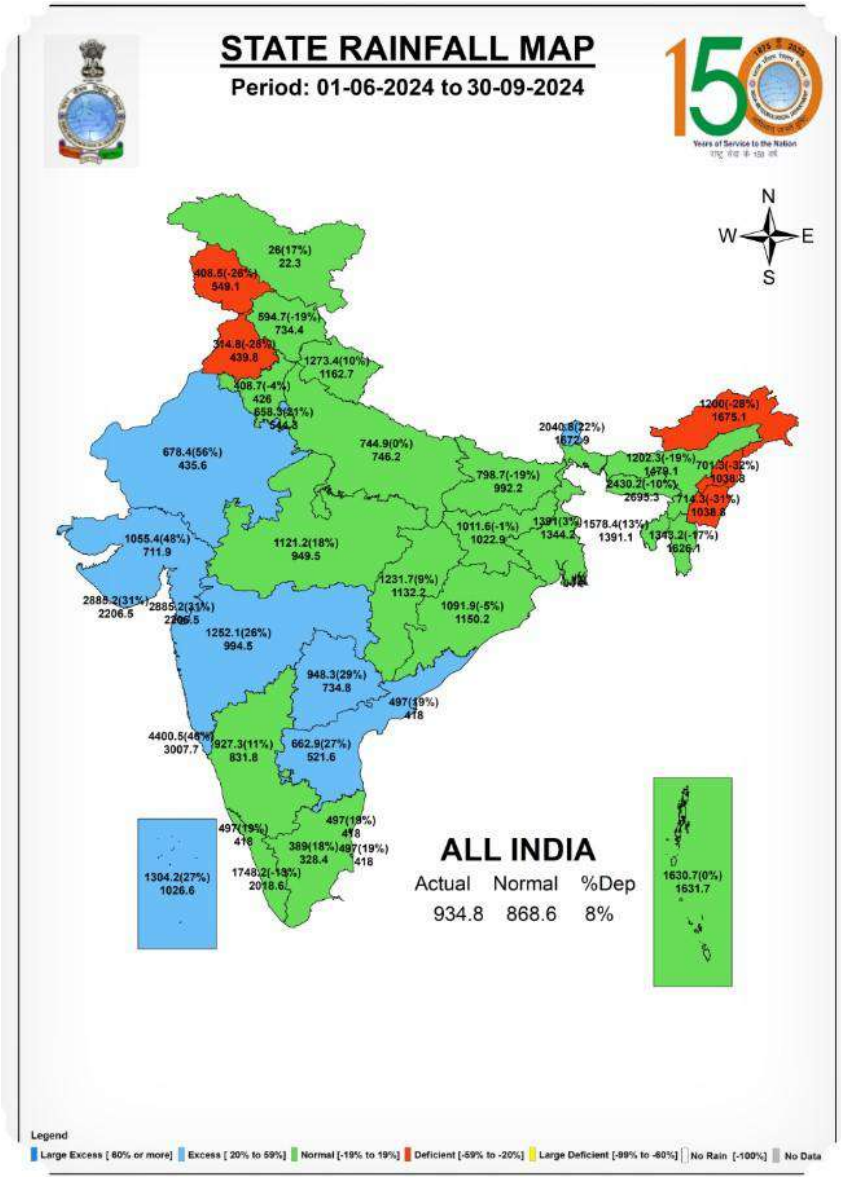

Figure 4: State-wise rainfall pattern during monsoon period 2024

5.0 GROUND WATER 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 groundwater level data for January 2025 indicates that out of the total 16755 wells analysed, 15.4% wells are showing water level less than 2 m bgl (meter below ground level), 41.5% wells are showing water level in the depth range of 2 to 5 m bgl, 29.4% wells are showing water level in the depth range of 5 to10 m bgl, 8.5% wells are showing water level in the depth range of 10 to 20 m bgl, 3.0% wells are showing water level in the depth range of 20 to 40 m bgl and the remaining 2.2% wells are showing water level more than 40 m bgl. (Fig-5)

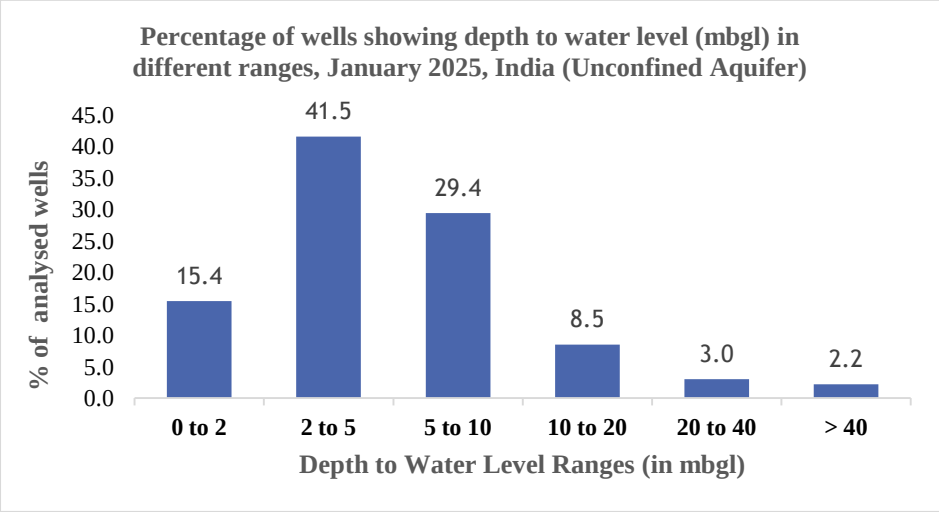

Figure 5**:** Number of wells showing depth to water level (mbgl) in different ranges, January 2025 in unconfined aquifers, India

Groundwater level data of January 2025 for the country reveals that the general depth to water level of the country ranges from 0-10 m bgl. A very shallow water level of less than 10 m bgl is observed in almost all states in patches. In major parts of north-western and western states, especially in the states of Chandigarh, Haryana, Punjab and Rajasthan, depth to water level is generally deeper and ranges from about 20 to more than 40 m bgl. (Fig 6)

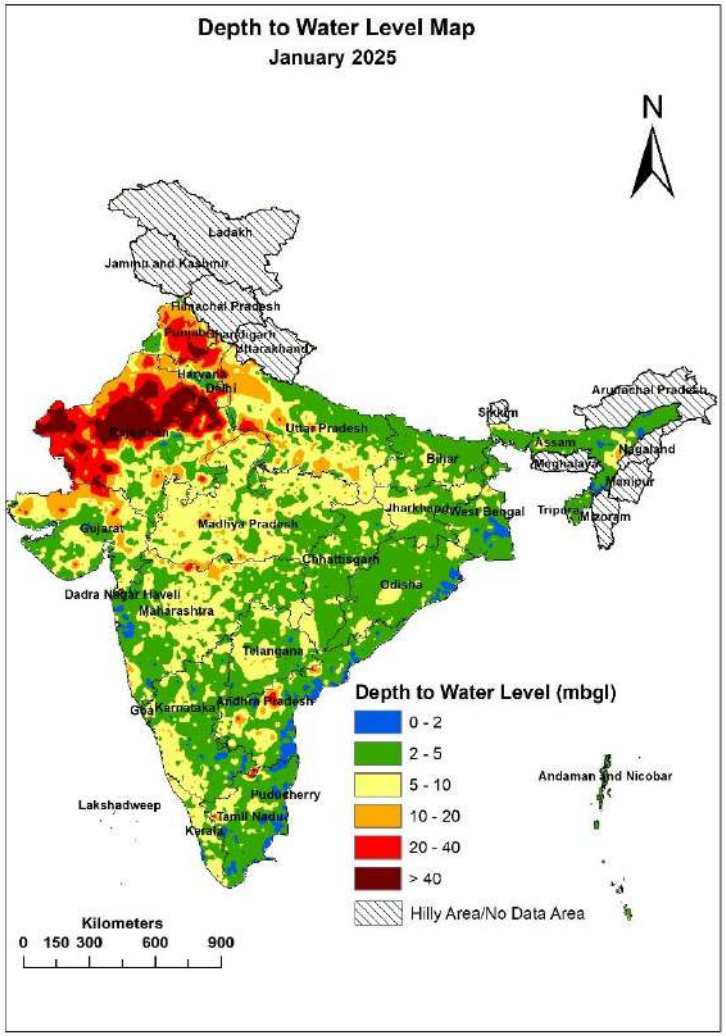

Figure 6: Depth to water level of unconfined aquifer during January 2025

5.1.2 ANNUAL FLUCTUATION IN WATER LEVEL

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

The groundwater level fluctuation analysis done in 14929 wells. The water level fluctuation of January 2024 compared to January 2025 shows that, 8820 (59.1%) are showing rise and 5993 (40.2%) are showing fall in water level. The remaining 116 (0.7%) stations analysed do not show any change in water level. (Fig. 7)

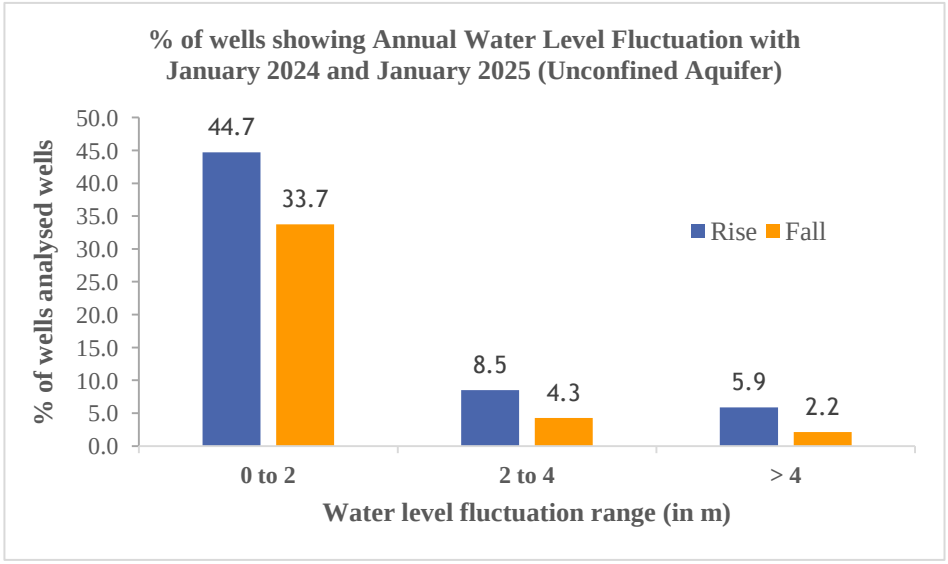

Fig. 7: Annual Water Level Fluctuation & Frequency Distribution of Different Ranges from January 2024 to January 2025 in unconfined aquifer, India

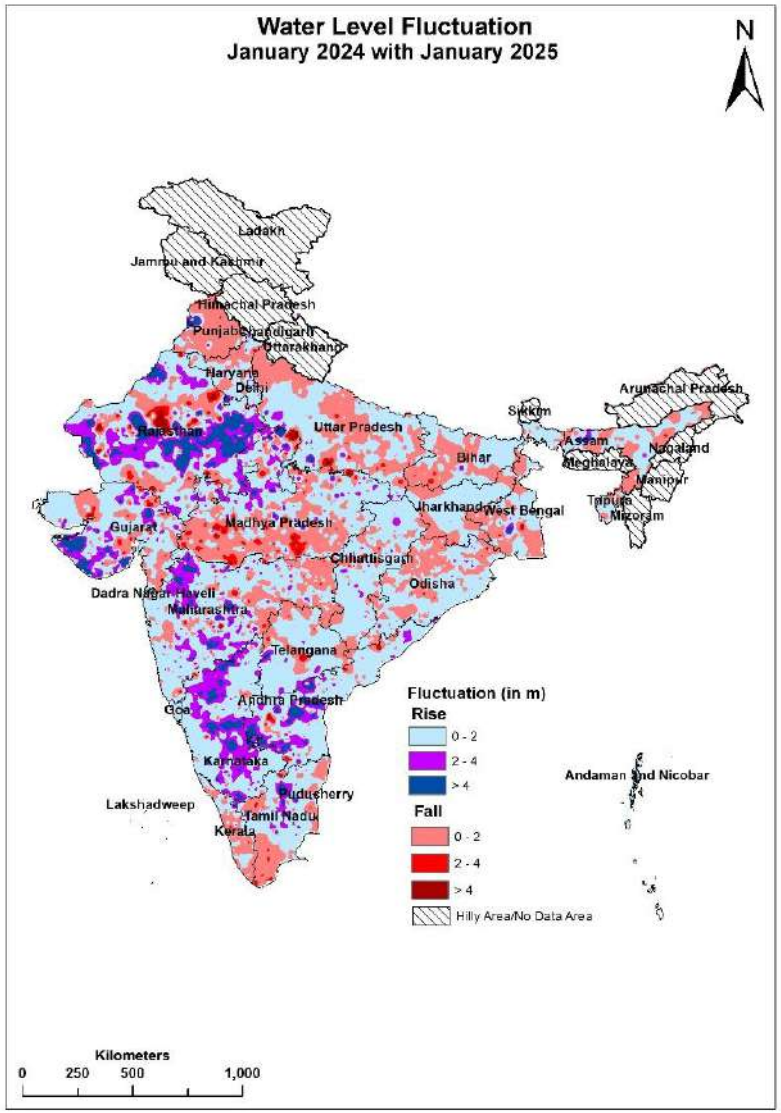

Figure 8: Annual water level fluctuation in unconfined aquifer (January 2024 to January 2025)

Rise in Water Levels:
About 44.7% wells are showing rise in the water level in the range of less than 2 m. About 8.5% wells are showing rise in water level in 2 to 4 m range and 5.9% wells showing rise in water level more than 4 m range. Rise in water level is prominently observed in patches in the states of Andhra Pradesh, Goa, Karnataka, Rajasthan, Jharkhand, Delhi, Telangana, Maharashtra, Chandigarh, Chhattisgarh, Gujarat, Uttarakhand, Odisha, Tamil Nadu and Uttar Pradesh.

Fall in Water Levels:
About, 33.7% wells are showing decline in water level in less than 2 m range. About 4.3% wells are showing decline in water level in 2 to 4 m range and 2.2% wells are showing decline in water level more than 4 m range. Fluctuation is mainly in the range of 0 to 2 m. A comparison of depth to water level of January 2024 to January 2025 also reveals that fall in the water level is prominently observed in parts of the states such as Puducherry, Punjab, Jammu and Kashmir, Arunachal Pradesh, Nagaland, Himachal Pradesh, Meghalaya, Tripura, Kerala, Haryana and West Bengal. (Fig. 8).

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

The groundwater level fluctuation analysis done in 13816 wells. The water level fluctuation of January 2023 compared to January 2025 shows that, 8142 (58.9) are showing a rise and 5566 (40.3%) are showing fall in water level. The remaining 108 (0.8%) stations analysed do not show any change in water level. (Fig.9)

Rise in Water Levels:
About 46.3% wells are showing rise in the water level in the range of less than 2 m. About 7.5% wells are showing rise in water level in 2 to 4 m range and 5.1% wells showing rise in water level more than 4 m range. Fluctuation is mainly in the range of 0 to 2 m. A rise in water level is observed in the scattered pattern in parts of the states of Chandigarh, Puducherry, Goa, Karnataka, Tamil Nadu, Meghalaya, Jharkhand, Kerala, Gujarat, Tripura, Chhattisgarh and Arunachal Pradesh.

Fall in Water Levels:
About, 40.3% of the total analysed wells are showing a declining water level, out of which, 32.3% wells are showing decline in water level in less than 2 m range. About 5.5% wells are showing decline in water level in 2 to 4 m range and 2.5% wells are showing decline in water level more than 4 m range. Fluctuation is mainly in the range of 0 to 2 m. A comparison of depth to water level of January 2023 to January 2025 also reveals that fall in water level is observed in the parts of states of Andhra Pradesh, Haryana, Nagaland, Bihar, Jammu and Kashmir, Uttar Pradesh, Punjab and Telangana. (Fig.10)

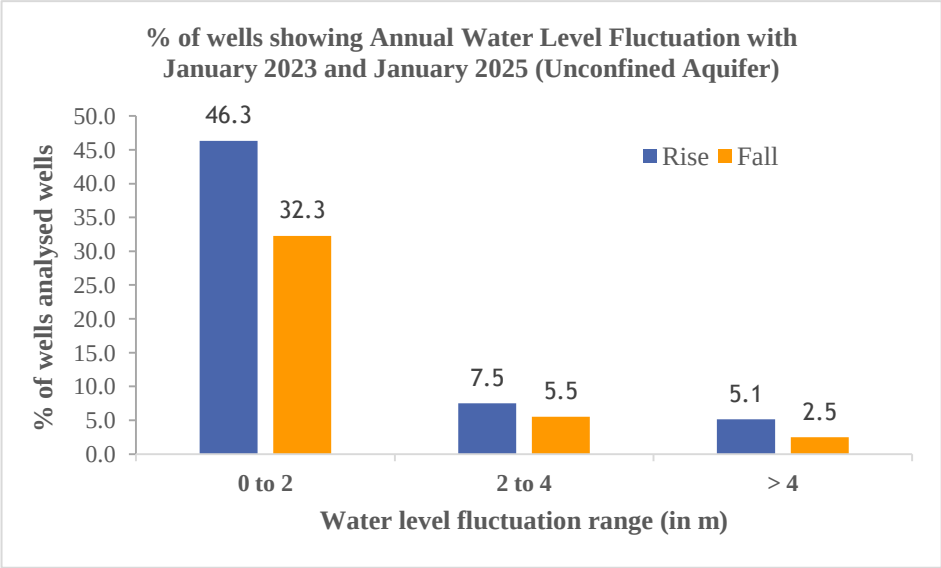

Figure 9: Annual Water Level Fluctuation & Frequency Distribution of Different Ranges from January 2023 to January 2025 in unconfined aquifer, India

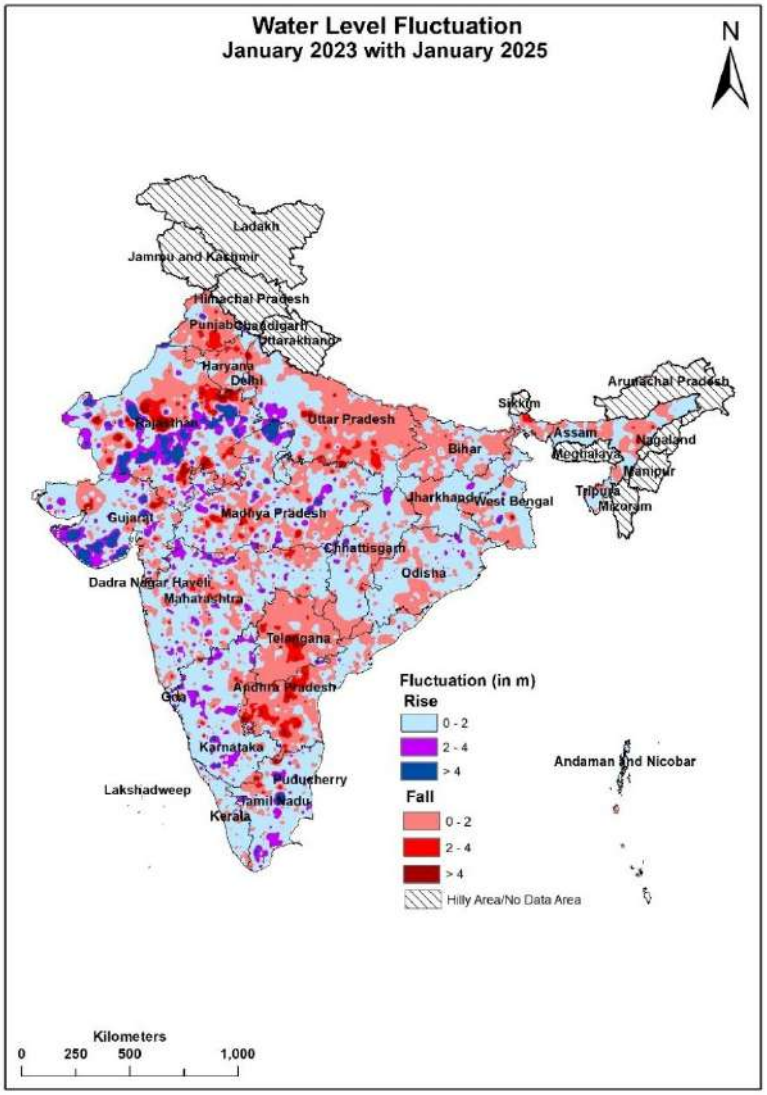

Figure 10: Annual water level fluctuation in unconfined aquifer (January 2023 to January 2025)

5.1.3 SEASONAL FLUCTUATION IN WATER LEVEL

Seasonal Fluctuation of Water Level in Unconfined Aquifer (Pre-monsoon 2024 to January 2025)

The groundwater level fluctuation analysis done in 14623 wells. A comparison of depth to water level of January 2025 with Pre-monsoon 2024 indicates that, 12334 (84.3%) are showing rise and 2257 (15.4%) are showing fall in water level. Remaining 32 (0.3%) stations analyzed do not show any change in water level. (Fig.11)

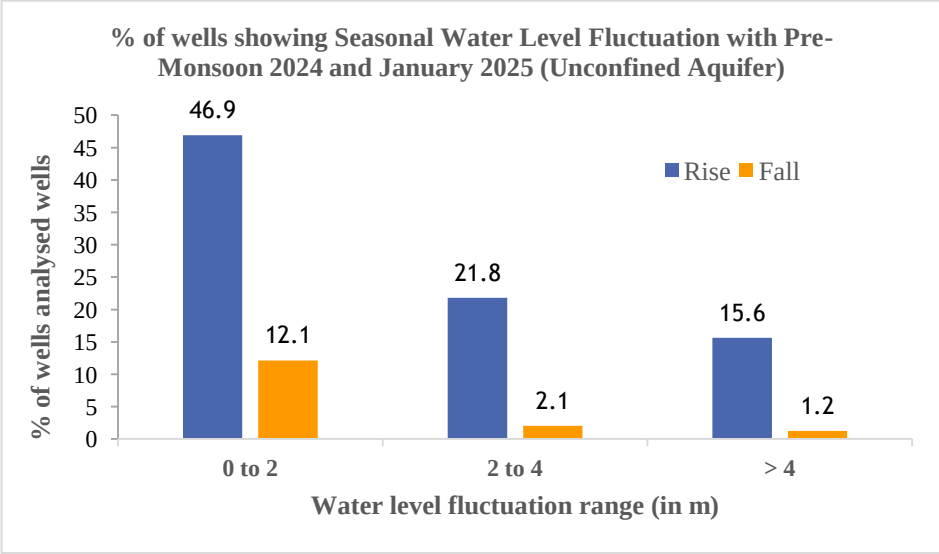

Figure 11: Seasonal Water Level Fluctuation with Pre-monsoon 2024 and January 2025 in an unconfined aquifer, India

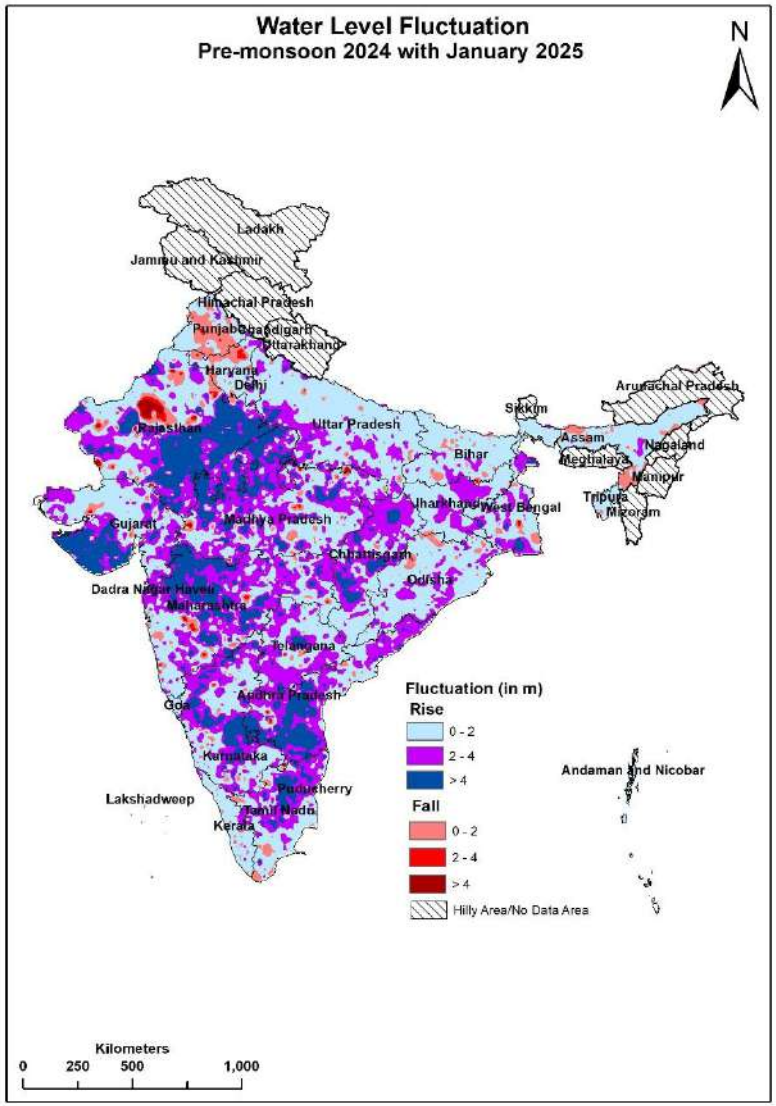

Figure 12: Seasonal Water Level Fluctuation with Pre-monsoon 2024 and January 2025 in an unconfined aquifer, India

Rise in Water Levels:

About 46.9% wells are showing rise of water level less than 2 m. About 21.9% wells are showing rise in water level in the range of 2 to 4 m and about 15.6% wells are showing rise in water level in the range of more than 4 m. Rise in water level is prominently observed in all the states except Nagaland.

Fall in Water Levels:

About 12.1% wells are showing decline in water in the range of 0 to 2 m. 2.1% wells are showing decline in water level in 2 to 4 m range and the remaining 1.2% are in the range of more than 4 m. Fall is mostly in the range of 0 to 2 m observed in patches in a few states like Punjab, Haryana and Rajasthan (Fig. 12).

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

The groundwater level fluctuation analysis done in 15306 wells. A comparison of depth to water level of January 2025 with August 2024 indicates that, 3822 (25.0%) are showing rise and 11433 (74.8%) are showing fall in water level. The remaining 51 (0.2%) stations analysed do not show any change in water level. (Fig. 13).

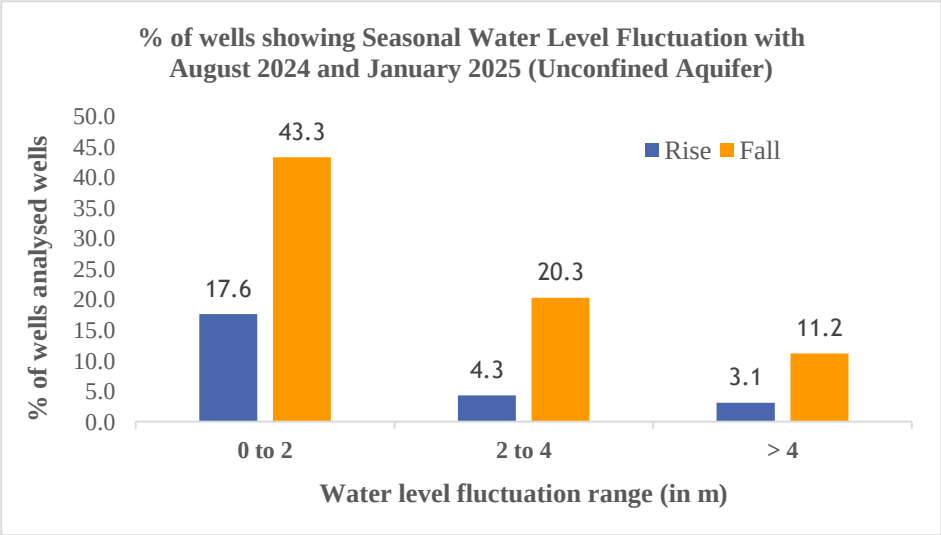

Figure 13: Seasonal Water Level Fluctuation with August 2024 and January 2025 in an unconfined aquifer, India

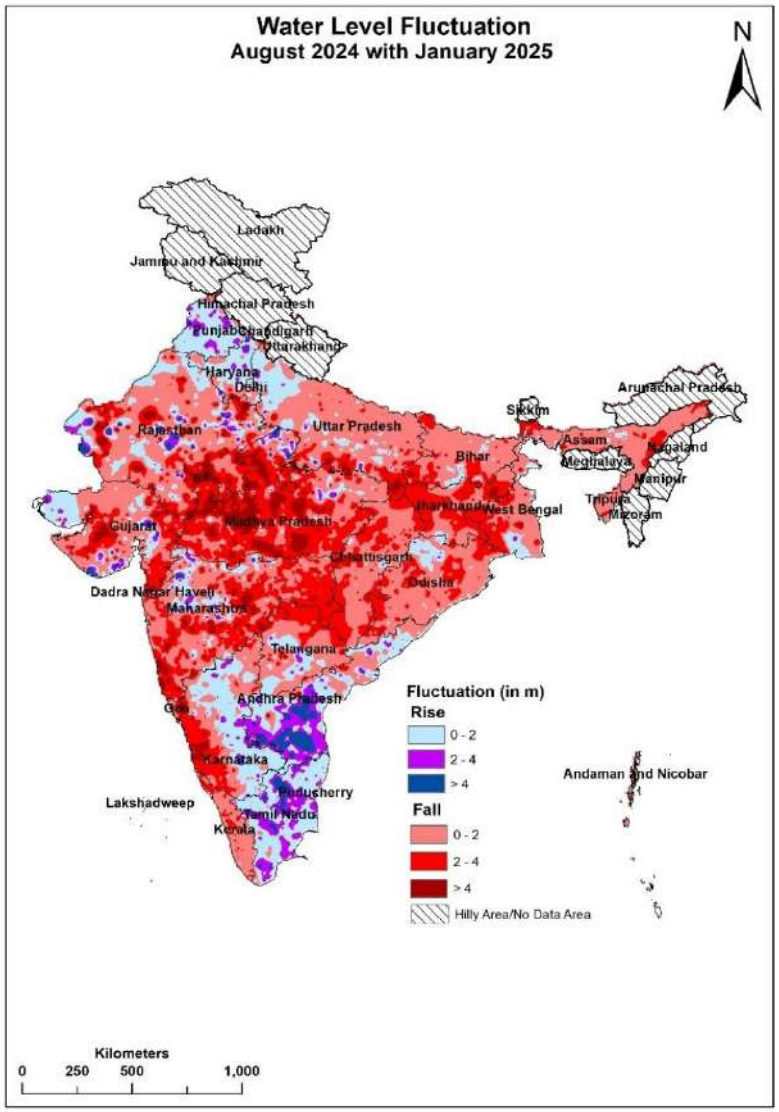

Figure 14: Seasonal Water Level Fluctuation with August 2024 and January 2025 in an unconfined aquifer, India

Rise in Water Levels:

About 17.6% wells are showing rise of water level less than 2 m. About 4.3% wells are showing rise in water level in the range of 2 to 4 m and about 3.1% wells are showing rise in water level in the range of more than 4 m. Rise in water level is prominently observed in all the parts of the states Andhra Pradesh, Chandigarh, Delhi, Haryana Tamil Nadu, Puducherry and Punjab.

Fall in Water Levels:

About 43.3% wells are showing decline in water in the range of 0 to 2 m. 20.3% wells are showing decline in water level in 2 to 4 m range and the remaining 11.2% are in the range of more than 4 m. Fall is mostly in the range of 0 to 2 m. The fall is significantly observed in all states except Andhra Pradesh, Chandigarh, Delhi, Haryana Tamil Nadu, Puducherry and Punjab (Fig. 14).

Seasonal Fluctuation of Water Level in Unconfined Aquifer (Post-monsoon to January 2025)

The groundwater level fluctuation analysis done in 15470 wells. A comparison of depth to water level of January 2025 with Post-monsoon 2024 indicates that, 3641 (23.5%) are showing rise and 11704 (75.6%) are showing fall in water level. The remaining 125 (0.9%) stations analysed do not show any change in water level. (Fig. 15).

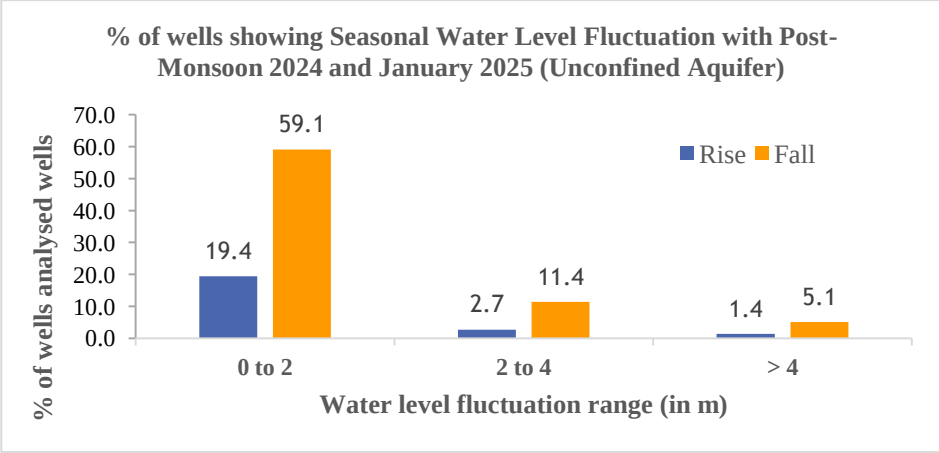

Figure 15: Seasonal Water Level Fluctuation with Post-monsoon 2024 and January 2025 in an unconfined aquifer, India

Rise in Water Levels:
About 19.4% wells are showing rise of water level less than 2 m. About 2.7% wells are showing rise in water level in the range of 2 to 4 m and about 1.4% wells are showing rise in water level in the range of more than 4 m. Rise in water level is prominently observed in parts of states like Chandigarh, Delhi, Haryana, Punjab and Tamil Nadu.

Fall in Water Levels:
About 59.1% wells are showing decline in water in the range of 0 to 2 m. 11.4% wells are showing decline in water level in 2 to 4 m range and the remaining 5.1% are in the range of more than 4 m. Fall is mostly in the range of 0 to 2 m. The fall is significantly observed in all states except Chandigarh, Delhi, Haryana, Punjab and Tamil Nadu. (Fig. 16)

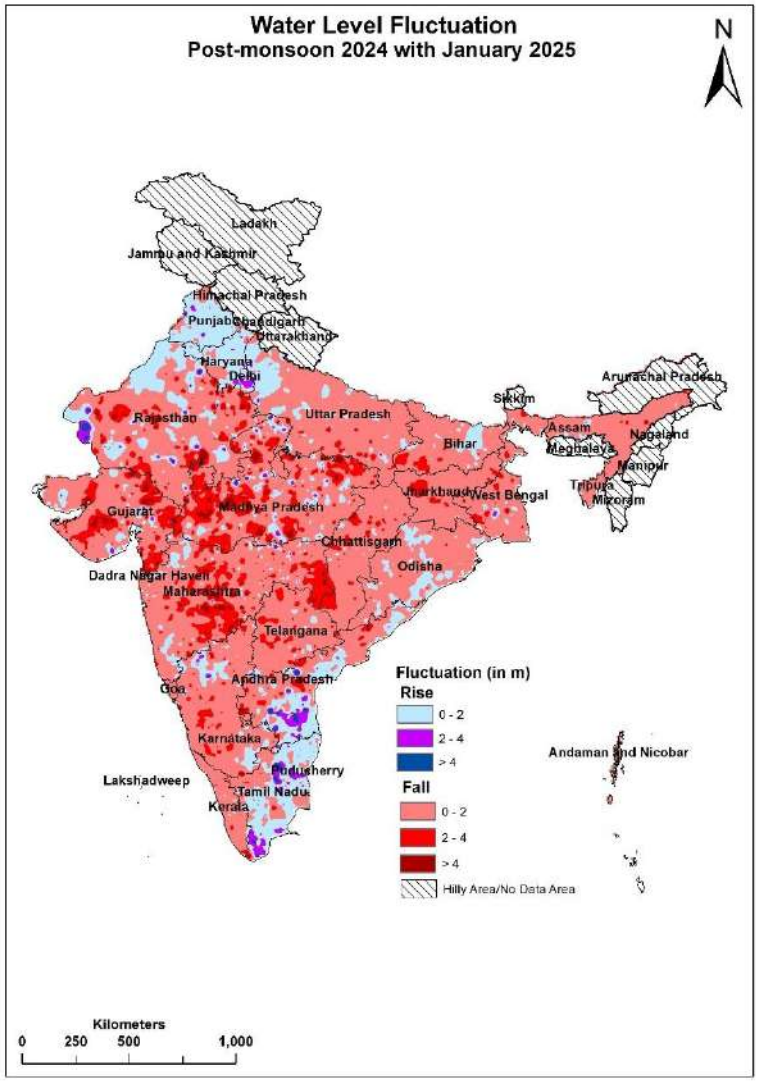

Figure 16: Seasonal Water Level Fluctuation with Post-monsoon 2024 and January 2025 in an unconfined aquifer, India

5.1.4 DECADAL FLUCTUATION IN WATER LEVEL

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

The groundwater level fluctuation analysis done in 13101 wells. A comparison of depth to water level of January 2025 with decadal mean of January (2015-2024) indicate that, 8697 (66.4%) are showing rise and 4350 (33.2%) are showing fall in water level. The remaining 54 (0.4%) stations analysed do not show any change in water level. (Fig. 17)

Rise in Water Levels:

About 49.8% wells are showing rise of water level less than 2 m. About 10.5% wells are showing rise in water level in the range of 2 to 4 m and about 6.1% wells are showing rise in water level in the range of more than 4 m. Rise in water level is prominently observed in all states except Himachal Pradesh, Bihar, Jammu and Kashmir, Nagaland and Punjab.

Fall in Water Levels:

About 27.6% wells are showing decline in water in the range of 0 to 2 m. 3.7% wells are showing decline in water level in 2 to 4 m range and the remaining 1.9% are in the range of more than 4 m. Fall is mostly in the range of 0 to 2 m observed in patches in states like Himachal Pradesh, Bihar, Jammu and Kashmir, Nagaland and Punjab. (Fig. 18)

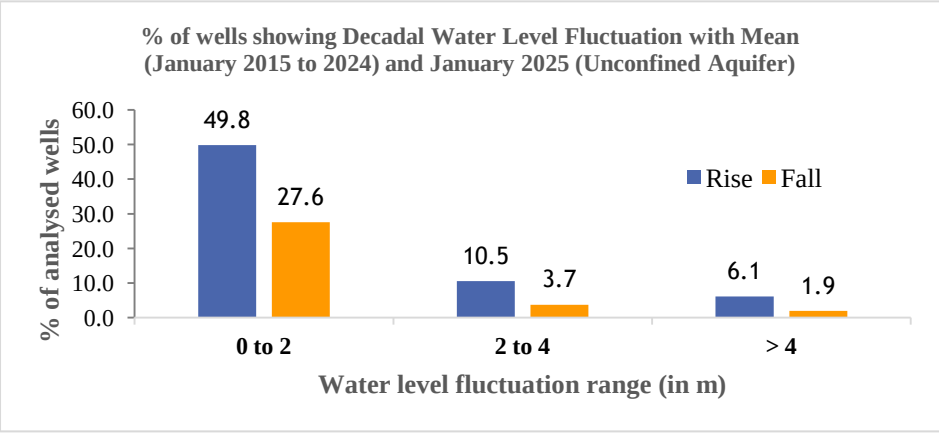

Figure 17: Decadal Water Level Fluctuation with a mean (January 2015 to 2024) and January 2025 in unconfined aquifer, India

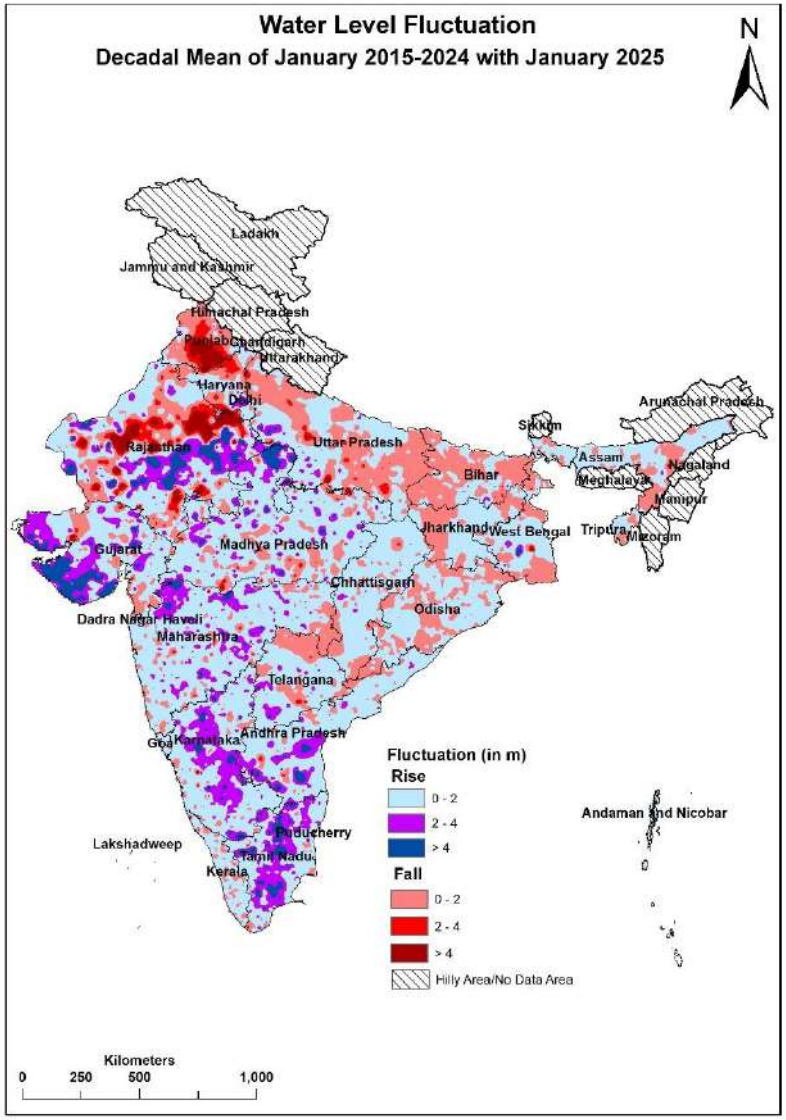

Figure 18: Decadal Water Level Fluctuation with mean (January 2015 to 2024) and January 2025 in unconfined aquifer, India.

5.2 DEEPER AQUIFER (CONFINED/ SEMI-CONFINED)

5.2.1 DEPTH TO PIEZOMETRIC LEVEL/ HEAD

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

The piezometric water level of confined aquifers for January 2025 indicates that out of the total 5312 wells analysed. It is observed from the analysis that the piezometric water level of 7.0% wells are less than 2 m bgl, 23.4% wells are in the depth range of 2 to 5 m bgl, 27.4% wells are in the depth range of 5 to 10 m bgl, 24.1% wells in the depth range of 10 to 20 m bgl, 11.7% wells are in the depth range of 20 to 40 m bgl and the remaining 6.3% wells have more than 40 m bgl. (Fig. 15). Thus, the country's typical range of piezometric water levels is less than 20 meters. From the analysis of the data, it's also revealed that deeper piezometric level of more than 20 m is prominently observed in Chandigarh, Gujarat, Haryana and Punjab. (Fig. 19)

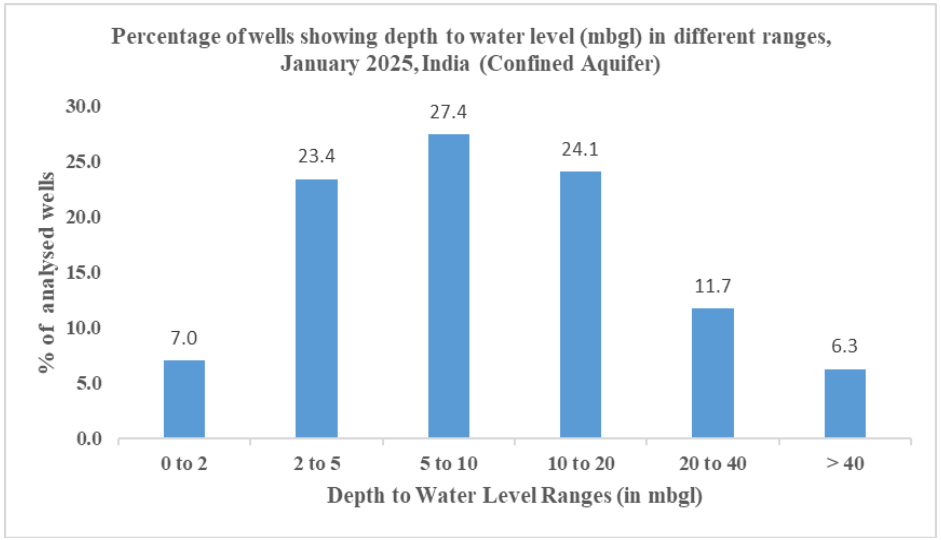

Figure 19: Number of wells showing depth to piezometric water level (mbgl) in different ranges January 2025 in confined aquifers, India

5.2.2 ANNUAL FLUCTUATION IN PIEZOMETRIC HEAD

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

A comparison of depth to piezometric water level of January 2025 with January 2024 reveals that out of a total of 4074 wells analysed, 2378 (58.4%) of wells are showing rise in piezometric water level, among which 34.2% wells are showing rise of less than 2 m. About 10.4% wells are showing rise in water level in the range of 2 to 4 m and 13.8% wells are showing rise in the range of more than 4 m. Among the 1673 (41.1%) wells showing decline in water level, 26.7% wells are showing decline in piezometric level in the range of 0 to 2 m. 6.3% wells are showing decline in piezometric water level in 2 to 4 m range and remaining 8.0% are in the range of more than 4 m. 23 wells are showing no change in their piezometric head. (Fig. 20).

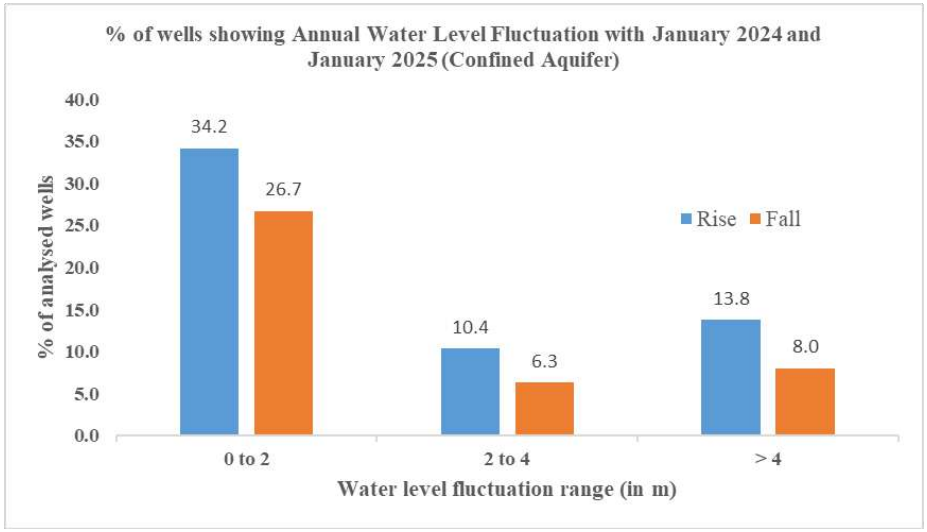

Figure 20: Annual Piezometric Water Level Fluctuation & Frequency Distribution of Different Ranges of January 2025 wrt January 2024 in confined aquifer, India

Rise in piezometric water level in the majority of wells observed in Andhra Pradesh, Chandigarh, Delhi, Goa, Gujarat, Haryana, Karnataka, Madhya Pradesh, Maharashtra, Telangana, Tripura and West Bengal. Similarly fall in the significant number of wells is observed in states like Bihar and Punjab.

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

A comparison of depth to piezometric water level of January 2025 with January 2023 reveals that out of a total of 3610 wells analysed, 1747 (48.4%) of wells are showing rise in piezometric water level, among which 45.0% wells are showing rise of less than 2 m. About 6.1% wells are showing rise in water level in the range of 2 to 4 m and 6.6% wells are showing rise in the range of more than 4 m. Among the 1849 (51.2%) wells showing decline in water level, 27.1% wells are showing decline in piezometric level in the range of 0 to 2 m. 6.3% wells are showing decline in piezometric water level in 2 to 4 m range and remaining 8.6% are in the range of more than 4 m. 14 wells are showing no change in their piezometric head. Rise in piezometric water level is observed in states likeAssam, Delhi, Goa, Gujarat, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Tamil Nadu, Tripura and West Bengal (Fig. 21).

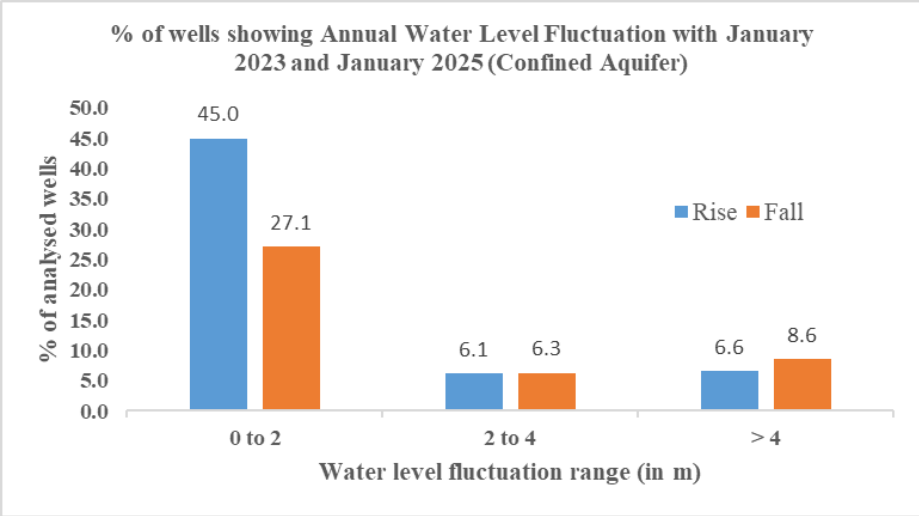

Figure 21: Annual Piezometric Water Level Fluctuation & Frequency Distribution of Different Ranges of January 2025 wrt January 2024 in confined aquifer, India

5.2.3 SEASONAL FLUCTUATION IN PIEZOMETRIC HEAD

Seasonal Fluctuation of Piezometric Water Level in Confined Aquifer (Pre-monsoon 2024 to January 2025)

A comparison of depth to piezometric water level of Pre-monsoon 2024 with January 2025 reveals that out of a total of 4397 wells analysed, 3647 (83.0%) of wells are showing rise in piezometric water level, among which 32.5% wells are showing rise of less than 2 m. About 20.0% wells are showing rise in water level in the range of 2 to 4 m and 30.5% wells are showing rise in the range of more than 4 m. Among the 742 (17.0%) wells showing decline in water level, 9.5% wells are showing decline in piezometric level in the range of 0 to 2 m. 2.6% wells are showing decline in piezometric water level in 2 to 4 m range and remaining 4.7% are in the range of more than 4 m. 8 wells are showing no change in their piezometric head. (Fig. 22).

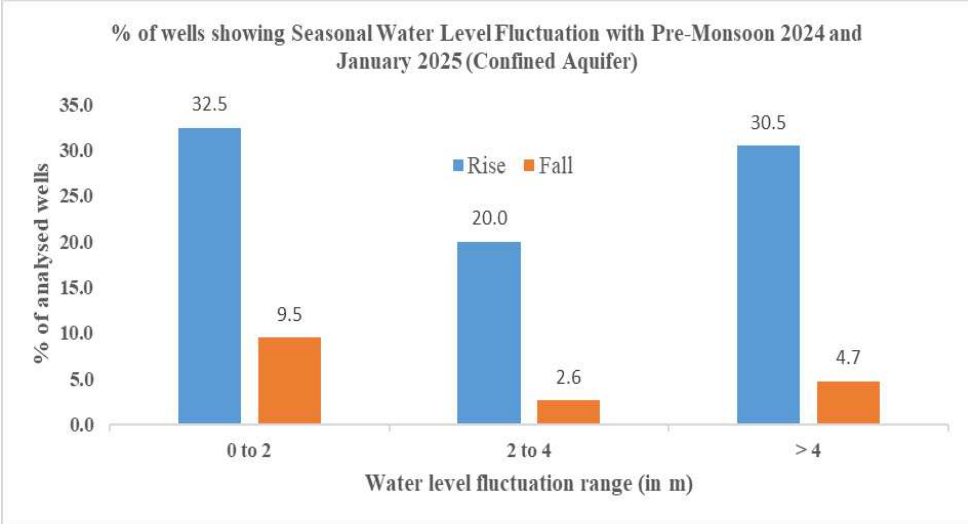

Figure 22: Seasonal Piezometric Water Level Fluctuation with Pre-monsoon 2024 and January 2025 in an confined aquifer, India

Rise in piezometric water level in the majority of wells observed in almost all states except Chandigarh.

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

A comparison of depth to piezometric water level of August 2024 with January 2025 reveals that out of a total of 4467 wells analysed, 2222 (49.7%) of wells are showing rise in piezometric water level, among which 23.6% wells are showing rise of less than 2 m. About 10.7% wells are showing rise in water level in the range of 2 to 4 m and 15.5% wells are showing rise in the range of more than 4 m. Among the 2237 (50.1%) wells showing decline in water level, 24.1% wells are showing decline in piezometric level in the range of 0 to 2 m. 12.0% wells are showing decline in piezometric water level in 2 to 4 m range and the remaining 13.9% are in the range of more than 4 m. 8 wells are showing no change in their piezometric head. (Fig. 23).

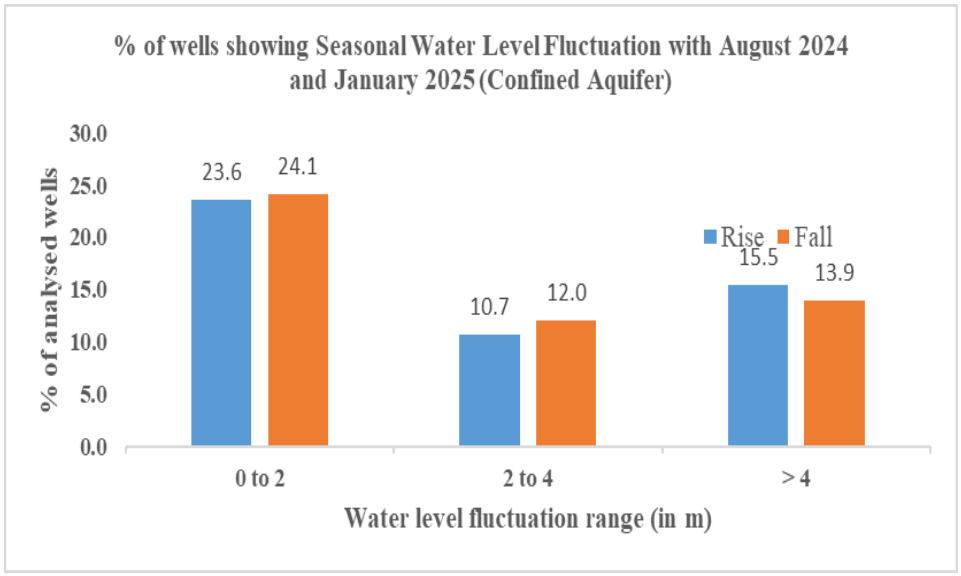

Figure 23: Annual Piezometric Water Level Fluctuation & Frequency Distribution of Different Ranges from August 2024 to January 2025 in confined aquifer, India

Rise in piezometric water level in the majority of wells observed in states like Andhra Pradesh, Chandigarh, Delhi, Haryana, Karnataka, Punjab, Tamil Nadu and Telangana.

Seasonal Fluctuation of Piezometric Water Level in Confined Aquifer (Post-monsoon 2024 to January 2025)

A comparison of depth to piezometric water level of post-monsoon 2024 with January 2025 reveals that out of a total of 4756 wells analysed, 1483 (31.18%) of wells are showing rise in piezometric water level, among which 20.1% wells are showing rise of less than 2 m. About 5.1% wells are showing rise in water level in the range of 2 to 4 m and 6.0% wells are showing rise in the range of more than 4 m. Among the 3234 (68.0%) wells showing decline in water level, 42.4% wells are showing decline in piezometric level in the range of 0 to 2 m. 11.7% wells are showing decline in piezometric water level in 2 to 4 m range and the remaining 13.9% are in the range of more than 4 m. 39 wells are showing no change in their piezometric head. (Fig. 24).

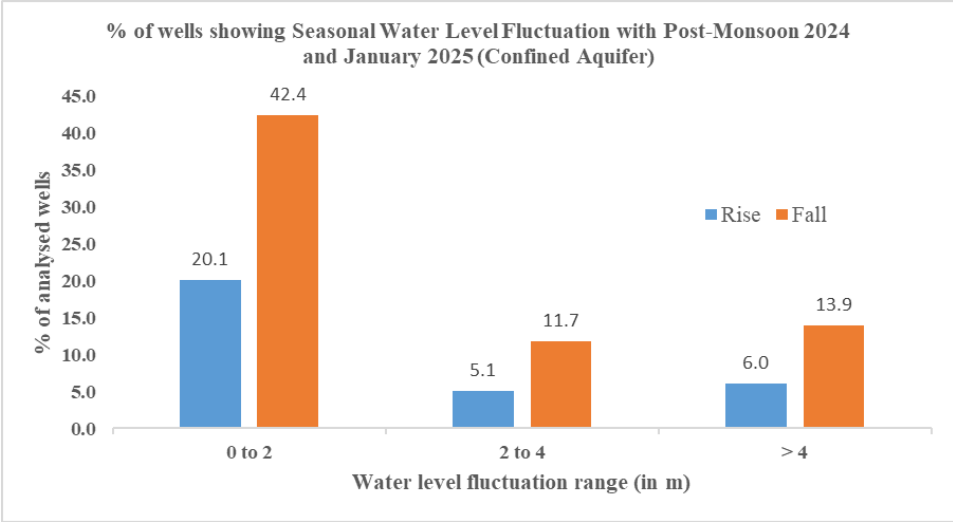

Figure 24: Annual Piezometric Water Level Fluctuation & Frequency Distribution of Different Ranges from August 2024 to January 2025 in confined aquifer, India

Rise in piezometric water level in the majority of wells observed states like Chandigarh, Punjab, Tamil Nadu and Uttrakhand.

5.2.4 DECADAL FLUCTUATION IN PIEZOMETRIC HEAD

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

A comparison of depth to piezometric water level of January 2025 with decadal mean of January (2015-2024) indicates that, out of total 1790 wells analysed, 1032 (57.7%) of wells are showing rise in piezometric head, among which 28.6% wells are showing rise of less than 2 m. About 11.3% wells are showing rise in piezometric head in the range of 2 to 4 m and 17.7 % wells are showing rise in the range of more than 4 m. Among the 752 (42.0%) wells showing decline in piezometric head, 20.7% wells are showing decline in piezometric head in the range of 0 to 2 m. 8.6 wells are showing decline in piezometric head in 2 to 4 m range and the remaining 12.7% are in the range of more than 4 m. (Fig. 25).

Rise in piezometric head in majority of wells observed in all states except Bihar, Chandigarh, Goa, Haryana, Punjab, and West Bengal.

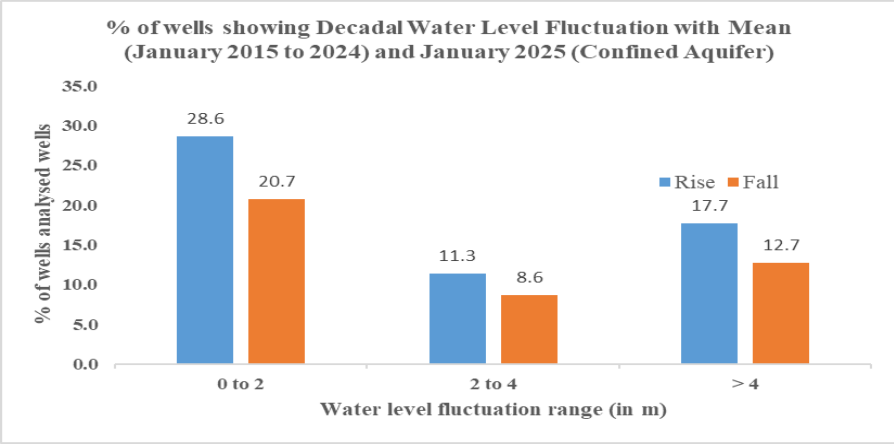

Figure 25: Decadal Piezometric Water Level Fluctuation with mean (January 2015 to 2024) and January 2025 in confined aquifer, India

6.0 SUMMARY

As a component of the National Ground Water Monitoring Programme, the CGWB conducts monitoring of the groundwater conditions on a quarterly basis: in January, pre-monsoon May, post-monsoon August, and November. As of March 2024, the Central Ground Water Board supervises total 27163 monitoring stations. This comprehensive effort aims to portray the variations in the country's ground water conditions across different aquifers.

In January 2025, around 86% of the country's monitoring stations exhibited a depth to water level within 10 meters below ground level. Deeper water levels of more than 20 m are observed in around 5 % of stations of the country covering mainly the western states, especially Western Rajasthan, Punjab, Haryana and Chandigarh.

The deeper groundwater level in the states like Western Rajasthan, Punjab, Haryana and Chandigarh during January 2025 has been significantly influenced by the deficient rainfall compared to other parts of country during the monsoon period.

Annual water level comparison with the previous year January 2024 to January 2025 has shown that about 59% of total analyzed stations of the country experienced rise in annual water level fluctuation because of the higher rainfall in 2024 compared to 2023.

About 67% of analyzed stations of the shallow aquifer experienced a rise of water level in decadal mean water level fluctuation of 2015-2024 with respect to January 2025, whereas about 58% of analyzed stations in the deeper aquifers experienced rise in the decadal mean piezometric level of 2015-2024 with respect to January 2025.

Rain water is the primary source for recharging the aquifers. The rainfall pattern witnessed significant fall in seasonal groundwater levels from Post-monsoon 2024 to January 2025 in the country.

7.0 RECOMMENDATIONS

1. **Deeper Ground Water level in January 2025 (Area suitable for AR & RWH)**
   The ground water level in the country is deeper in the north western and southern parts covering the states of Punjab, Haryana, Rajasthan , Delhi and Tamil Nadu. Deeper water level and annual decline in water level during post-monsoon indicates poor recharge condition due to insufficient rainfall or higher groundwater pumping resulting in insignificant replenishment of the aquifers due to the monsoon raifall. Such areas are suitable for Rain Water Harvesting and Artificial recharge. Depending on the area and feasibility, the structures suitable for RWH or AR can be planned with state-specific focus.

2. Comparison of January 2025 water level with that of November 2024 shows that, there is fall in water level in 59% of the wells which indicates rapid decline in water level throughout the country due to utilization of ground water. To get rid of water scarcity in the subsequent period, conjunctive use of surface and ground water and wide scale utilization of micro-irrigation practices have to be promoted wherever ground water is being used for irrigation.

3. **Recommendations on Management of depletion in Ground Water Levels**
   Based on the nature of aquifer, ground water levels and recharge/discharge characteristics and demand/ supply scenario the ground water management aspects are to be planned. The following practices can be taken into consideration for ground water management planning.

   - **Focus on Western States with Deeper Water levels:** In Rajasthan, Punjab, Haryana, and Chandigarh, it is essential to harvest monsoon rainwater and utilize it for artificial recharge. Regular maintenance of recharge structures is recommended to maintain efficiency.
   - **Master Plan for Site Selection:** The MASTER PLAN FOR ARTIFICIAL RECHARGE TO GROUND WATER IN INDIA-2020 should be referenced to identify optimal sites for artificial recharge structures.
   - **Urban Recharge:** In urban areas with reduced natural recharge, rooftop rainwater harvesting structures would be effective for groundwater recharge and storage.
   - **Point Recharge Structures:** These are recommended for recharging deeper aquifers effectively through recharge tubewell/borewells.

4. **Efficient Water Use Practices**

   - **Micro-Irrigation:** Promote efficient micro-irrigation practices, especially for water-intensive crops such as paddy and sugarcane.
   - **Crop Diversification:** Encourage farmers to shift from water-intensive crops to less water-demanding varieties suitable for local climatic conditions.
   - **Water-Efficient Fixtures:** Advocate for the adoption of water-efficient fixtures and low-flow plumbing systems in residential and commercial buildings. Technologies include low-flow faucets, aerators, showerheads, and toilets.

5. **Community-Based Water Management**

   - **Water Budgeting:** Implement water budgeting by Village Panchayats to promote responsible water usage.
   - **Participatory Groundwater Management:** Foster community involvement in groundwater management at the grassroots level to create a sense of ownership and accountability.

6. **Re-Use of Treated Water**
   - **Treated Sewage Water:** Encourage the reuse of treated sewage water after secondary or tertiary treatment for groundwater recharge, ensuring compliance with water quality standards.

7. **Reviving Traditional Water Bodies**
   - **Restoration Projects:** Restore traditional water bodies such as ponds, lakes, and historical water harvesting structures to support natural recharge processes.

8. **Policy and Incentives**
   - **Incentives for Conservation:** Provide financial incentives to industries and farmers adopting water-saving technologies and sustainable water management practices.
   - **Regulatory Measures:** Enforce groundwater extraction regulations, especially in over-exploited regions, to prevent unsustainable depletion.

Central Ground Water Board
Ministry of Jal Shakti
Department of Water Resources,
River Development and Ganga Rejuvenation
Government of India