सत्यमेव जयते
Goverment Of India

भारत सरकार
Government of India
जल शक्ति मंत्रालय
Ministry of Jal Shakti
जल संसाधन, नदी विकास और गंगा संरक्षण विभाग
Department of Water Resources
River Development and Ganga Rejuvenation
केंद्रीय भूमि जल बोर्ड
Central Ground Water Board

भूजल स्तर बुलेटिन, उत्तराखंड राज्य

जनवरी 2025

Groundwater Level Bulletin, Uttarakhand State

January 2025

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 pumping 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. A network of 359 observation wells called **National Hydrograph Network Stations (NHNS)**, as on 30.05.2024, located all over the state is being monitored.

2.0 STUDY AREA

Uttarakhand State has a very diverse hydrogeological set-up. However, this hilly state can broadly be classified into two hydrogeological regimes namely Gangetic Alluvial Plain and Himalayan Mountain Belt. As per 2024 Groundwater resource assessment, Total Annual Ground Water Recharge of the State has been assessed as 2.14 bcm and Annual Extractable Ground Water Resource is 1.964 bcm. The Total Current Annual Ground Water extraction is 1.05 bcm and Stage of Ground Water extraction is 53.54 %.

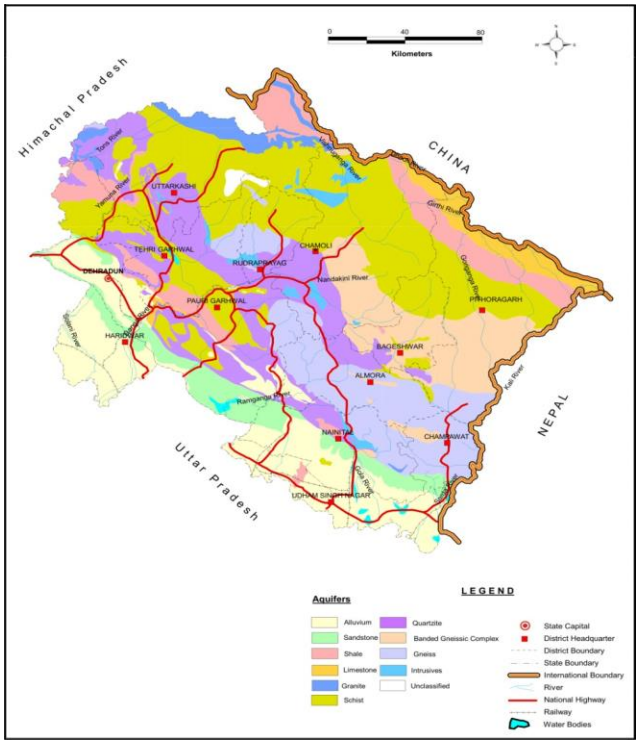

Fig.1 : Map showing disposition of principal aquifers of Uttarakhand State

The hydrogeology of Uttarakhand is related to geology and physiography. Variable hydrogeological conditions exist in the state due to a wide variation in the geology and land forms. The regional hydrogeological setup can be described on the basis of five hydrogeological units from north to south. (i) Himalayan Region, (ii) Sub-Himalayan Region, (iii) Bhabhar Zone, (iv) Tarai Zone and (v) Central Ganga Plain. The Disposition of Principle Aquifer system of Uttarakhand State is given in the Fig. (1).

3.0 GROUND WATER LEVEL MONITORING

Central Ground Water Board, Uttaranchal Region, is monitoring changes in groundwater regime in Uttarakhand 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 May 2025 was 359 which include 40 dug wells, 194 Handpumps, 109 Springs, 4 deep aquifer tube wells and 12 piezometers.

Table 1: district-wise number of monitoring stations

District	Number of Stations				
	DW	PZ	HP	Spring	TW
Dehradun	16	3	35	4	2
Haridwar	13	1	29	0	1
US Nagar	7	8	39	0	0
Pauri Garhwal	0	0	13	7	0
Tehri Garhwal	0	0	12	8	0
Nainital	3	0	14	7	1
Almora	0	0	11	27	0
Pithoragarh	0	0	7	9	0
Bageshwar	0	0	5	10	0
Chamoli	0	0	8	16	0
Rudraprayag	0	0	2	8	0
Champawat	1	0	9	6	0
Uttarkashi	0	0	10	7	0

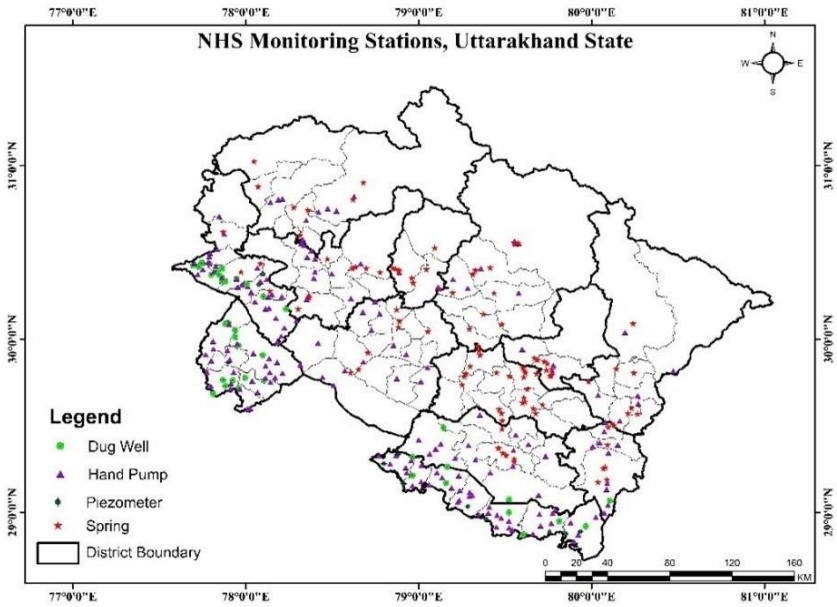

Fig.2: NHS monitoring stations of Uttarakhand State, as on January,2025

4.0 RAINFALL

The normal annual rainfall varies from 1182 mm in Haridwar district to 1927.30 mm in Pithoragarh district. The average annual rainfall varies from 1067.70 mm at Joshimath (Chamoli district) to 1927.30 mm at Munsyari (Pithoragarh district). Most of the rainfall occurs as monsoon rainfall during the months of July and August. The Isohyetal Map of Uttarakhand prepared using mean normal rainfall is given in **Fig. 2**. The map reveals that intensity of rainfall increases from SW to NW in a broadly linear pattern with high rainfall prevailing in both the eastern and the western parts of the state.

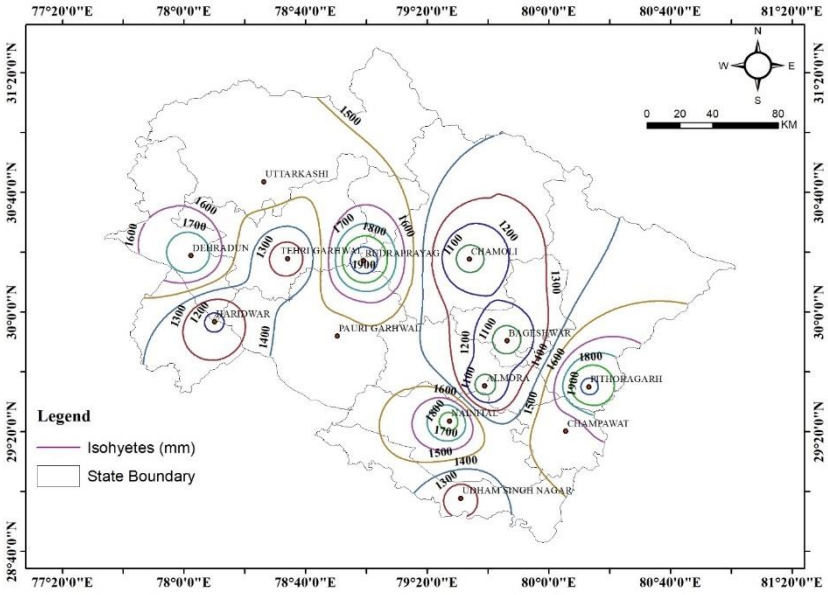

Fig.3: Mean Isohyetal Map of Uttarakhand State

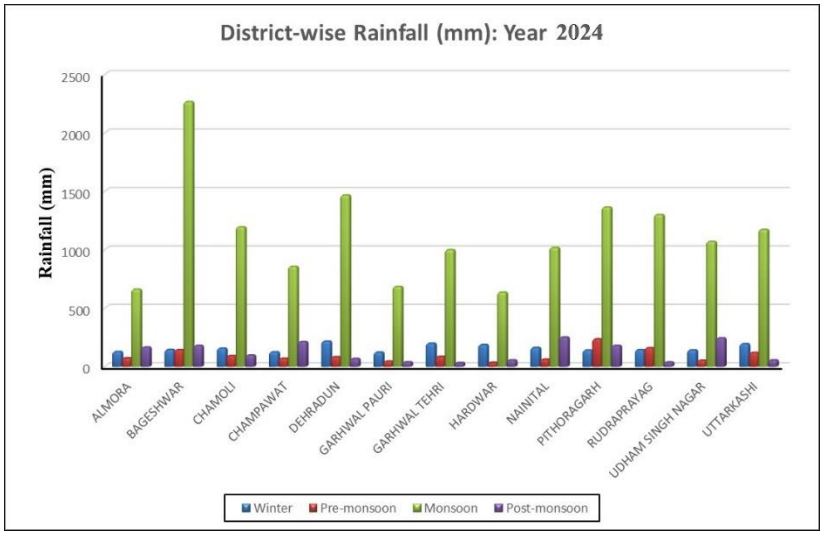

Fig.4: District-wise Actual Rainfall (mm) (Source: IMD)

5.0 GROUND WATER LEVEL SCENARIO

5.1 UNCONFINED AQUIFER

5.1.1 Depth to Water level (Jan 2025)

The depth to water level of 225 wells is used for the analysis. Analysis of depth to water level data of 225 wells shows water levels vary between 0.52 m bgl (Joshimath) to 92.63 m bgl (Pauri Garhwal district). Water level of less than 5 m bgl is recorded in 28.44 % of wells, between 5 to 10 m bgl in 21.33% of wells,between 10 to 15 m bgl in 14.22% of wells, between 15 to 30 m bgl in 19.56 % of wells, between 30-50 m bgl in 8.89% of wells and water level more than 50 mbgl is registered in 7.56% of wells.

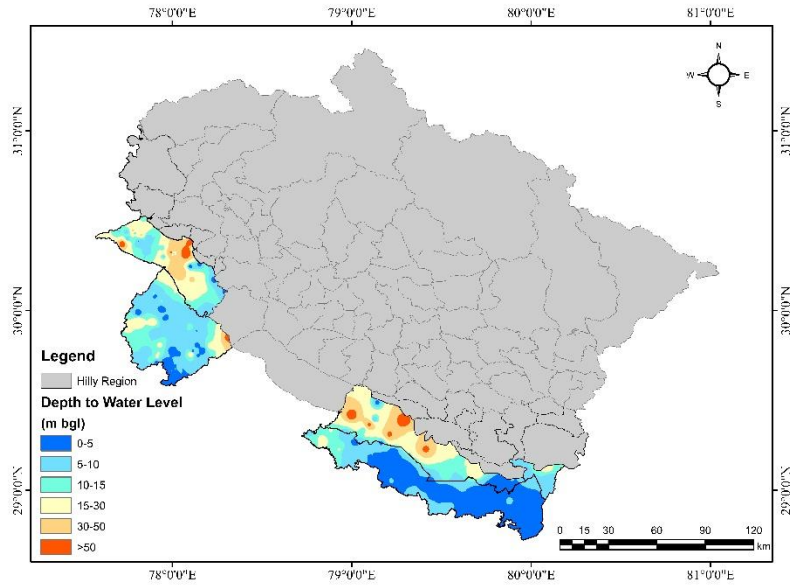

Fig.5: Depth to Water level Map (Jan 2025), Uttarakhand State

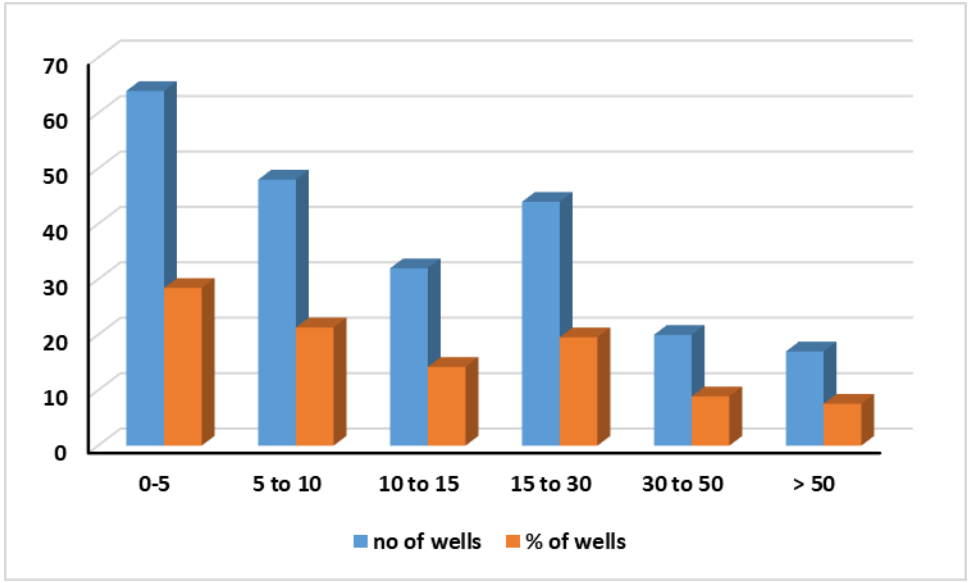

Fig.6: Percentage of wells in different water level range

5.1.2 Seasonal Fluctuation in Water Level

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

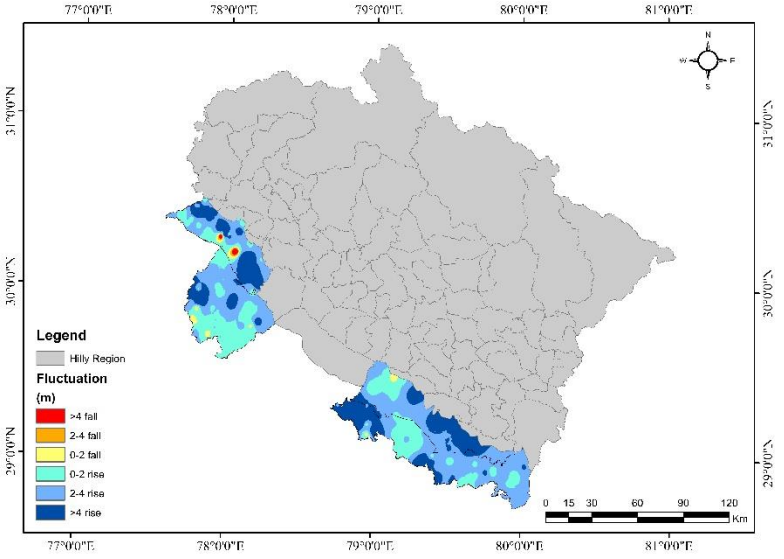

Fig. 7: Seasonal Fluctuation in water level (May 2024 Vs Jan 2025)

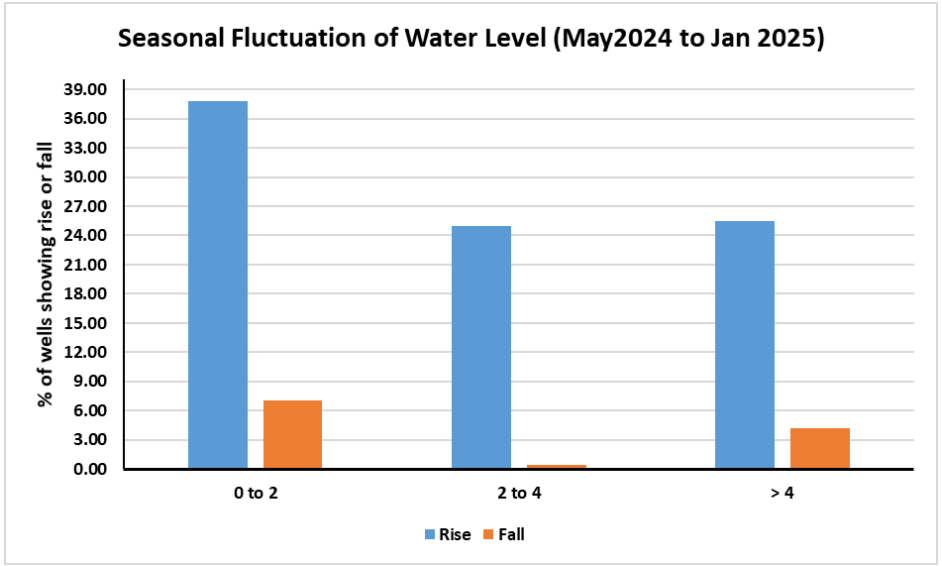

Fig. 8: Percentage of wells showing different fluctuation range from May 2024 to Jan 2025

Rise in Water level:

Out of 212 wells, 187 wells (88% of total wells) are showing rise in water level in Jan 2025 when compared with pre-monsoon 2024 water level data. Out of 212 wells, 37.74 % of the wells showing rise in the range of 0-2 m, 25 % of wells ahowing rise in the range of 2-4 m while, 54 wells (25.47% of the total) showing rise greater than 4 m.

Fall in Water level:

Out of 212 wells, 25 wells (22% of total wells) are showing fall in water level in January 2025 when compared with pre-monsoon 2024 water level data. Out of 212 wells, 7.08 % of the wells showing fall in the range of 0-2 m, 0.47 % of wells showing fall in the range of 2-4 m while, only 09 wells (4.25% of the total) showing fall greater than 4 m.

Seasonal Fluctuation of Water Level in Unconfined Aquifer (Aug 2024 to Jan 2025)

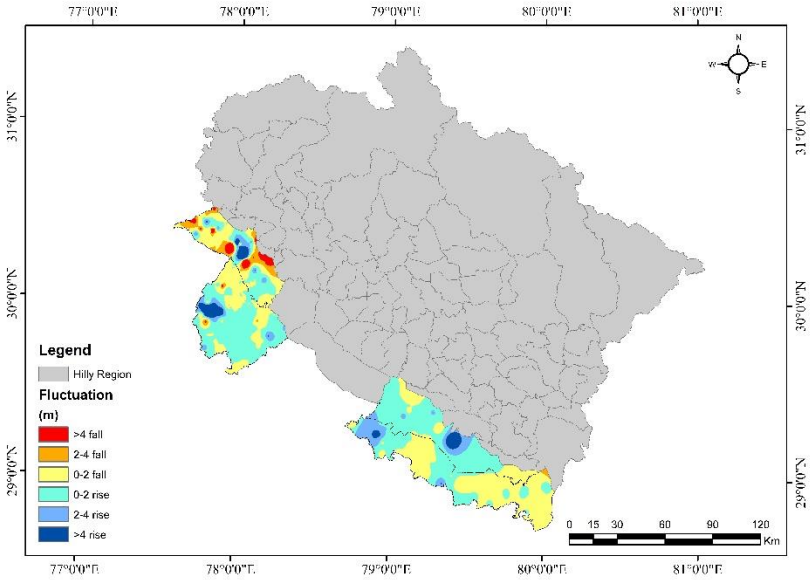

Fig. 9: Fluctuation in water level (Aug 2024 Vs Jan 2025)

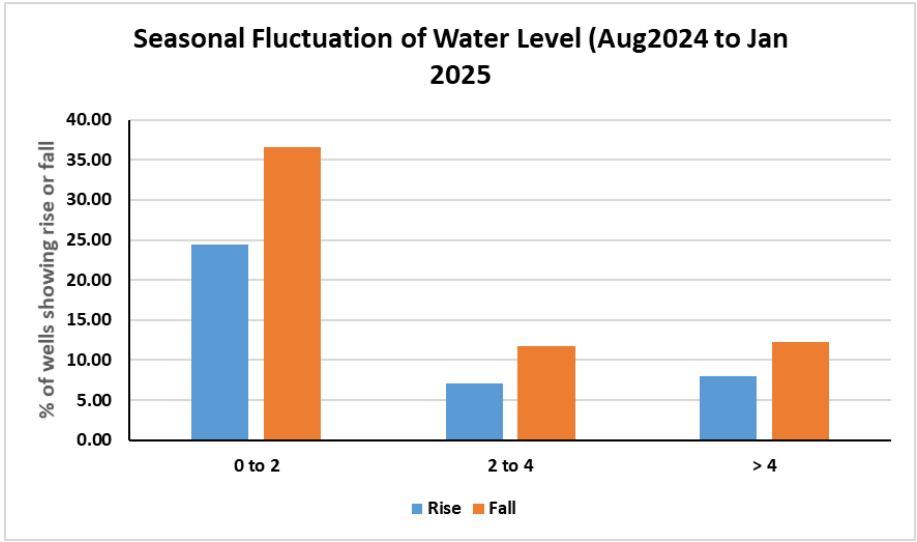

Fig. 10: Percentage of wells showing different fluctuation range from Aug 2024 to Jan 2025

Rise in Water level:

Out of 213 wells, 84 wells (39.43% of total wells) are showing rise in water level in Jan 2025 when compared with August 2024 water level data. Out of 213 wells, 24.41 % of the wells showing rise in the range of 0-2 m, 7.04 % of wells ahowing rise in the range of 2-4 m while, only 17 wells (7.98% of the total) showing rise greater than 4 m.

Fall in Water level:

Out of 213 wells, 129 wells (60.57% of total wells) are showing fall in water level in January 2025 when compared with August 2024 water level data. Out of 213 wells, 36.62 % of the wells showing fall in the range of 0-2 m, 11.74 % of wells showing fall in the range of 2-4 m while, only 04 wells (12.21% of the total) showing fall greater than 4 m.

Seasonal Fluctuation of Water Level in Unconfined Aquifer (Nov 2024 to Jan 2025)

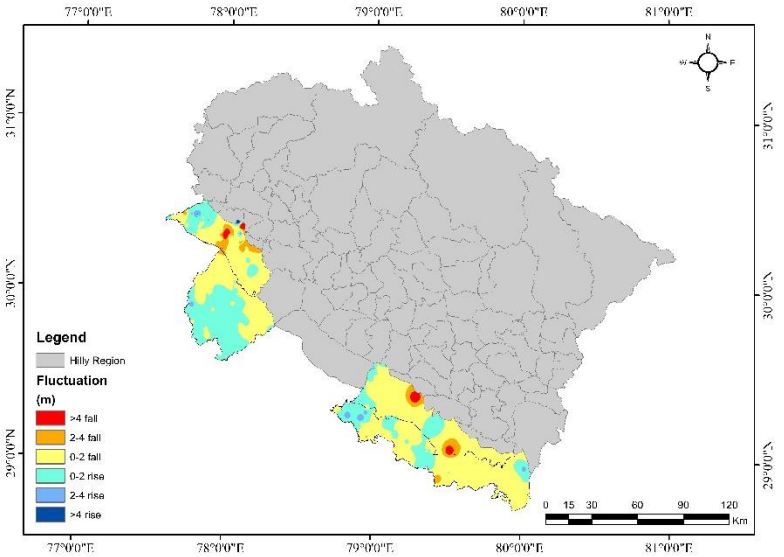

Fig. 11: Fluctuation in water level (Nov 2024 Vs Jan 2025)

Rise in Water level:

Out of 214 wells, 62 wells (28.97% of total wells) are showing rise in water level in Jan 2025 when compared November 2024 water level data. Out of 214 wells, 21.96 % of the wells showing rise in the range of 0-2 m, 4.67 % of wells ahowing rise in the range of 2-4 m while, only 05 wells (2.34% of the total) showing rise greater than 4 m.

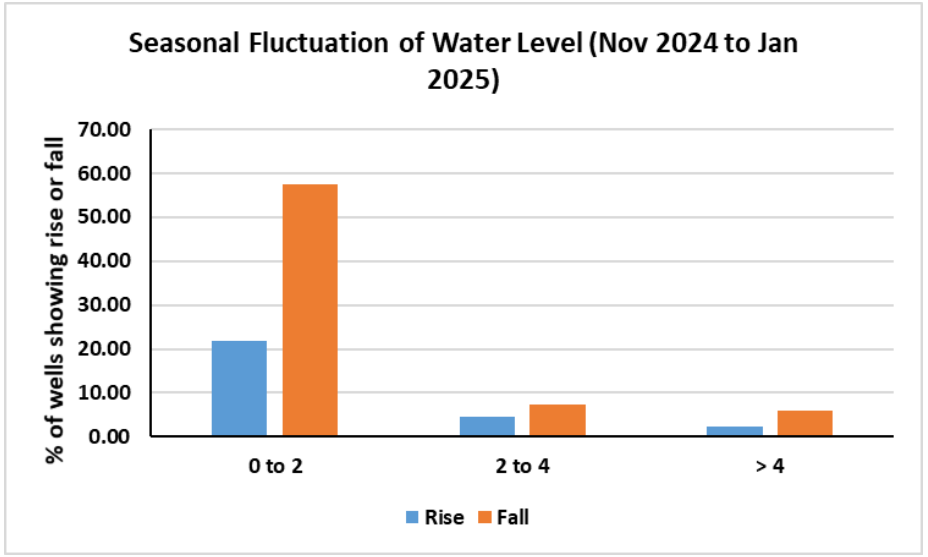

Fig. 12: Percentage of wells showing different fluctuation range from Nov 2024 to Jan 2025

Fall in Water level:

Out of 214 wells, 152 wells (71.02% of total wells) are showing fall in water level in January 2025 when compared with November 2024 water level data. Out of 214 wells, 57.48 % of the wells showing fall in the range of 0-2 m, 7.48 % of wells showing fall in the range of 2-4 m while, only 13 wells (6.07% of the total) showing fall greater than 4 m.

5.1.3 Annual Fluctuation in Water Level

Annual Fluctuation of Water Level (January 2023 to January 2025)

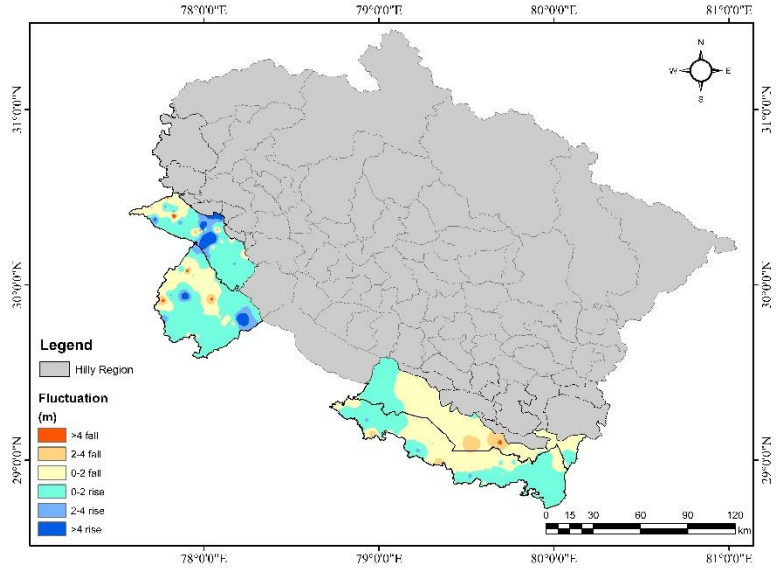

Fig. 13: Fluctuation in water level (Jan 2023 Vs Jan 2025)

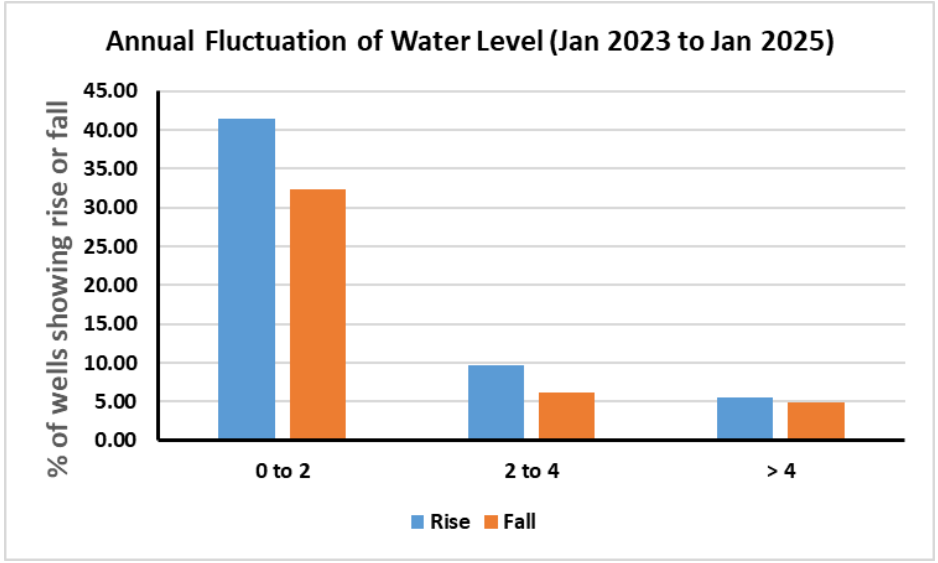

Fig. 14: Percentage of wells showing different fluctuation range Jan 2023 to Jan 2025

Rise in Water level:

Out of 145 wells, 82 wells (56.55% of total wells) are showing rise in water level in Jan 2025 when compared with January 2023 water level data. Out of 145 wells, 41.38 % of the wells showing rise in the range of 0-2 m, 9.66 % of wells ahowing rise in the range of 2-4 m while, only 08 wells (5.52% of the total) showing rise greater than 4 m.

Fall in Water level:

Out of 145 wells, 63 wells (43.44% of total wells) are showing fall in water level in January 2025 when compared with January 2023 water level data. Out of 145 wells, 32.41 % of the wells showing fall in the range of 0-2 m, 6.21 % of wells showing fall in the range of 2-4 m while, only 07 wells (4.83% of the total) showing fall greater than 4 m.

Annual Fluctuation of Water Level (January 2024 to January 2025)

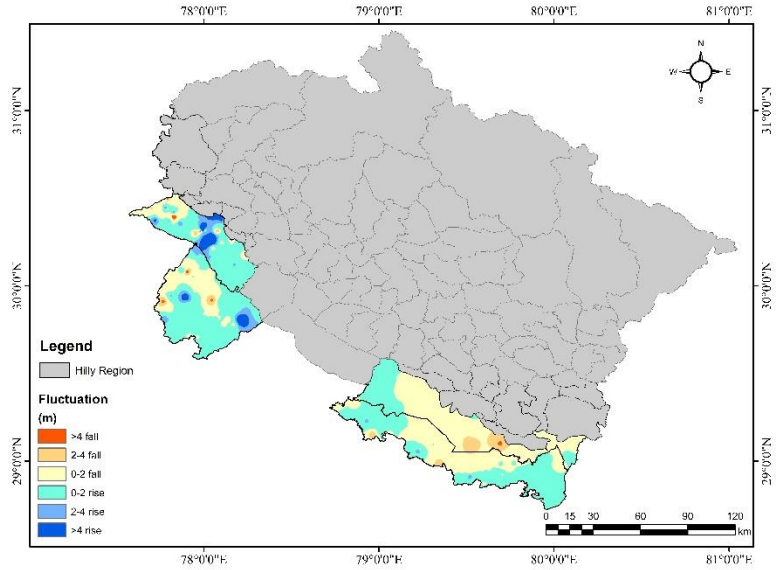

Fig. 15: Fluctuation in water level (Jan 2024 Vs Jan 2025)

Rise in Water level:

Out of 145 wells, 78 wells (53.79% of total wells) are showing rise in water level in Jan 2025 when compared with January 2024 water level data. Out of 145 wells, 42.07 % of the wells showing rise in the range of 0-2 m, 6.90 % of wells ahowing rise in the range of 2-4 m while, only 07 wells (4.83% of the total) showing rise greater than 4 m.

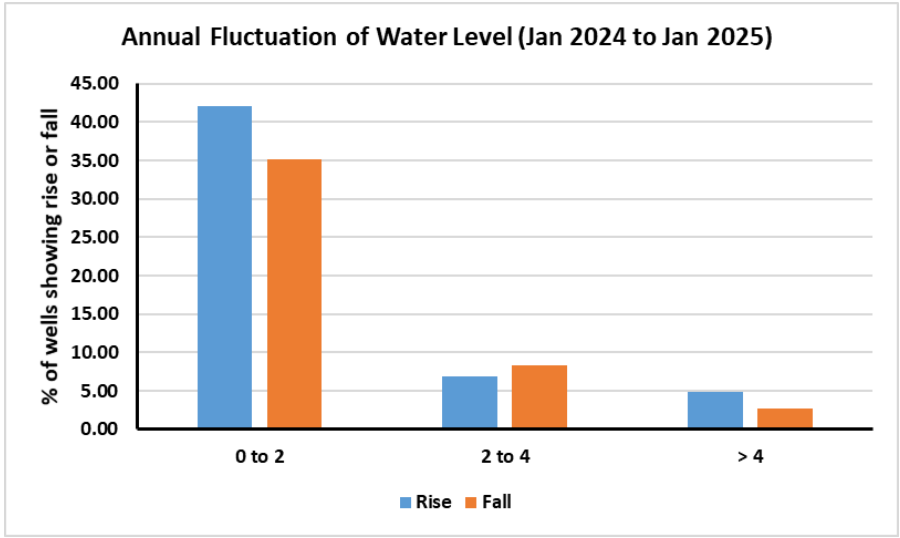

Fig. 16: Percentage of wells showing different fluctuation range Jan 2024 to Jan 2025

Fall in Water level:

Out of 145 wells, 67 wells (46.21% of total wells) are showing fall in water level in January 2025 when compared with January 2024 water level data. Out of 145 wells, 35.17 % of the wells showing fall in the range of 0-2 m, 8.82 % of wells showing fall in the range of 2-4 m while, only 04 wells (2.76% of the total) showing fall greater than 4 m.

5.2 Decadal Fluctuation in Water level (Jan 2015 to Jan 2024 Vs Jan 2025)

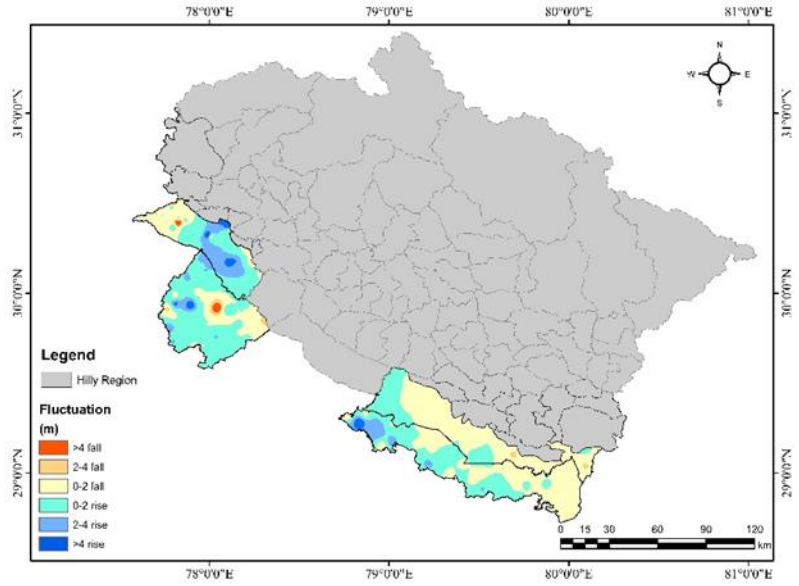

Fig. 17: Decadal Fluctuation in water level (Jan 2015 to Jan 2024 Vs Jan 2025)

Rise in Water level:

Out of 141 wells, 76 wells (~53% of total wells) are showing rise in water level in January 2025 when compared with last 10 years (2015-2024) January water level data. Out of 141 wells, 38.30 % of the wells showing rise in the range of 0-2 m, 9.93 % of wells showing rise in the range of 2-4 m while, only 08 wells (5.67% of the total) showing rise greater than 4 m.

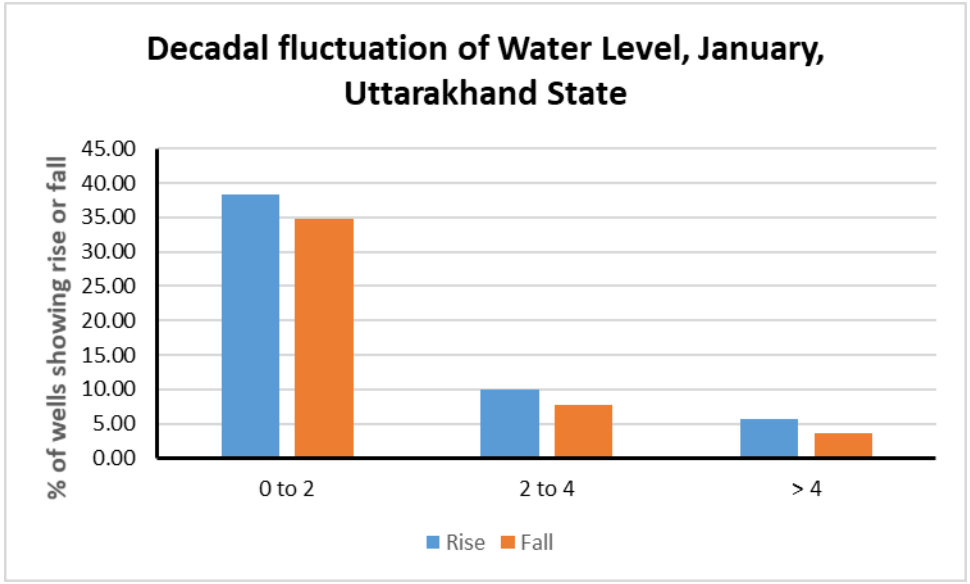

Fig. 18: Percentage of wells showing different decadal fluctuation range

Fall in Water level:

Out of 141 wells, 65 wells (47% of total wells) are showing fall in water level in January 2025 when compared with last last 10 years (2015-2024) January water level data. Out of 141 wells, 34.75 % of the wells showing fall in the range of 0-2 m, 7.80 % of wells showing fall in the range of 2-4 m, while 03 wells (3.55% of the total) showing fall greater than 4 m.

5.3 Measurement of Spring discharge in the Hilly Regions

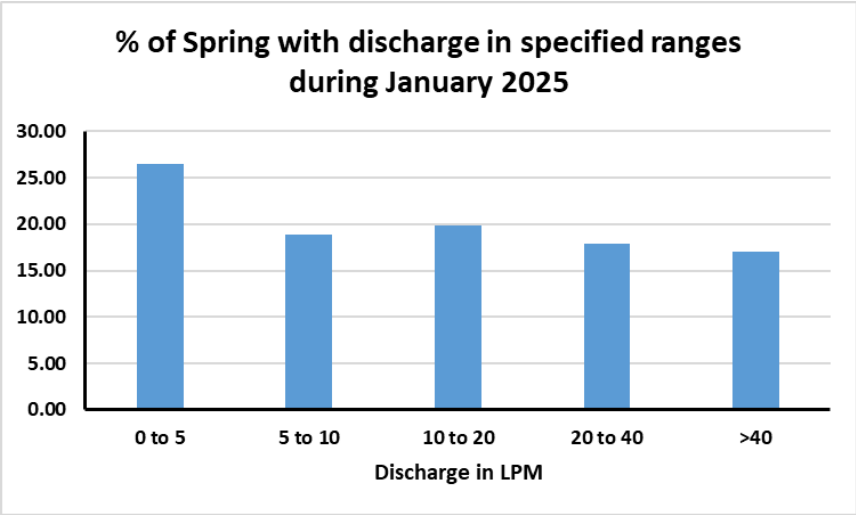

Fig.19: Percentage of Spring with discharge (in lpm) in specified range, Uttarakhand State

Total 106 numbers of Springs were measured for their discharge (in lpm) in Uttarakhand State in the month of January 2025. Out of 106 numbers of measured springs, 26.42% (28 numbers out of 106) were showing discharge in the range of 0-5 lpm, 18.87% (20 springs) were showing discharge in the range of 5-10 lpm, 19.81% (21 springs) were showing discharges in the range of 10-20 lpm, 17.92% (19 springs) were showing discharge in the range of 20-40 lpm and 18 springs out of 106 (i.e. 16.98% of the total) were showing discharge more than 40 lpm. Minimum discharge of 0.92 lpm was observed in the Soda Sarauli Spring of Dehradun district while Maximum discharge of 534 lpm was observed in the Askote spring of Pithoragarh district during the January 2025.

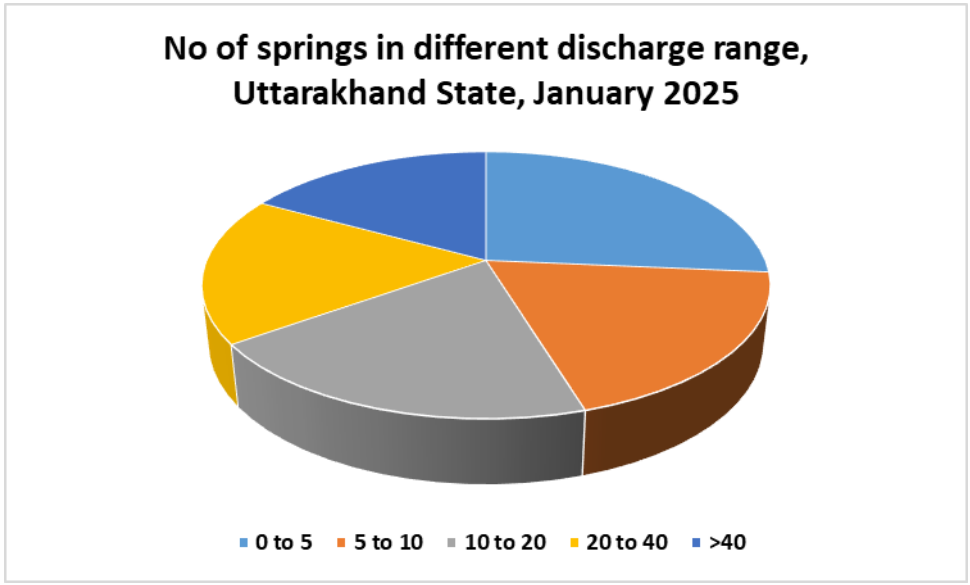

Fig.20: Number of Spring with discharge (in lpm) in specified range, Uttarakhand State

56% of the springs were showing decline in discharge during January 2025 when compared with January 2024. Minimum decline in discharge is 0.41 lpm and maximum decline in discharge is observed as 62.3 lpm. 44% of the total springs were showing rise in the discharge during January 2025 when compared with January 2024. Minimum increase in the discharge is observed as 0.06 lpm and maximum discharge is observed as 60.21 lpm.

6. SUMMARY

As a component of the National Ground Water Monitoring Programme, the CGWB, UR, Dehradun conducts monitoring of the ground water conditions on a quarterly basis: in January, pre-monsoon May, monsoon August, and post-monsoon November. Additionally, a yearly assessment of ground water quality is performed in May. As of January 31, 2025, the Uttaranchal Region of the Central Ground Water Board supervises 35 dug wells, 196 Handpump, 111 Springs and 12 piezometers. This comprehensive effort aims to portray the variations in the state's ground water conditions across different aquifers.

In January 2025, Water level of less than 5 m bgl is recorded in 28.44 % of wells, between 5 to 10 m bgl in 21.33% of wells, between 10 to 15 m bgl in 14.22% of wells, between 15 to 30 m bgl in 19.56 % of wells, between 30-50 m bgl in 8.89% of wells and water level more than 50 m bgl is registered in 7.56% of wells.

Out of 212 wells, 187 wells (88% of total wells) are showing rise in water level in Jan 2025 when compared with pre-monsoon 2024 water level data. Out of 212 wells, 25 wells (22% of total wells) are showing fall in water level in January 2025 when compared with pre-monsoon 2024 water level data.

Out of 213 wells, 84 wells (39.43% of total wells) are showing rise in water level in Jan 2025 when compared with August 2024 water level data. Out of 213 wells, 129 wells (60.57% of total wells) are showing fall in water level in January 2025 when compared with August 2024 water level data.

Out of 214 wells, 62 wells (28.97% of total wells) are showing rise in water level in Jan 2025 when compared November 2024 water level data. Out of 214 wells, 152 wells (71.02% of total wells) are showing fall in water level in January 2025 when compared with November 2024 water level data.

Out of 145 wells, 82 wells (56.55% of total wells) are showing rise in water level in Jan 2025 when compared with January 2023 water level data. Out of 145 wells, 63 wells (43.44% of total wells) are showing fall in water level in January 2025 when compared with January 2023 water level data.

Out of 145 wells, 78 wells (53.79% of total wells) are showing rise in water level in Jan 2025 when compared with January 2024 water level data. Out of 145 wells, 67 wells (46.21% of total wells) are showing fall in water level in January 2025 when compared with January 2024 water level data.

Out of 141 wells, 76 wells (~53% of total wells) are showing rise in water level in January 2025 when compared with last 10 years (2015-2024) January water level data. Out of 141 wells, 65 wells (47% of total wells) are showing fall in water level in January 2025 when compared with last last 10 years (2015-2024) January water level data.

7. RECOMMENDATIONS

The areas where depth to water level is more than 10 m during the post-monsoon season and showing decadal decline in the water level, interventions for the artificial recharge and water conservation should be taken up. In the hilly areas where the spring discharge is low and declining, spring rejuvenation and spring shed management should be taken up as the springs are the lifeline for the Himalayan regions.