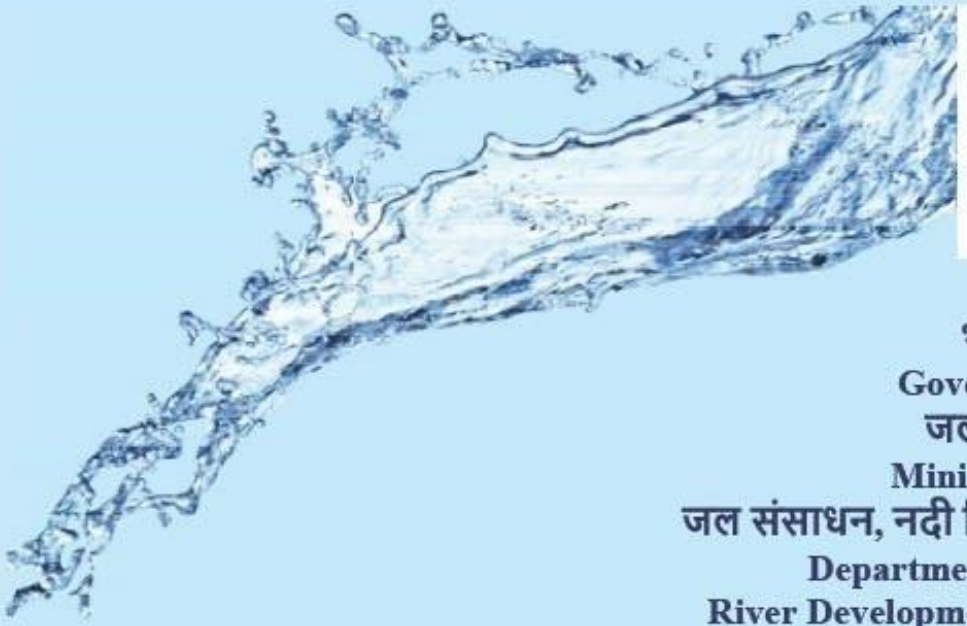


सत्यमेव जयते
Goverment Of India

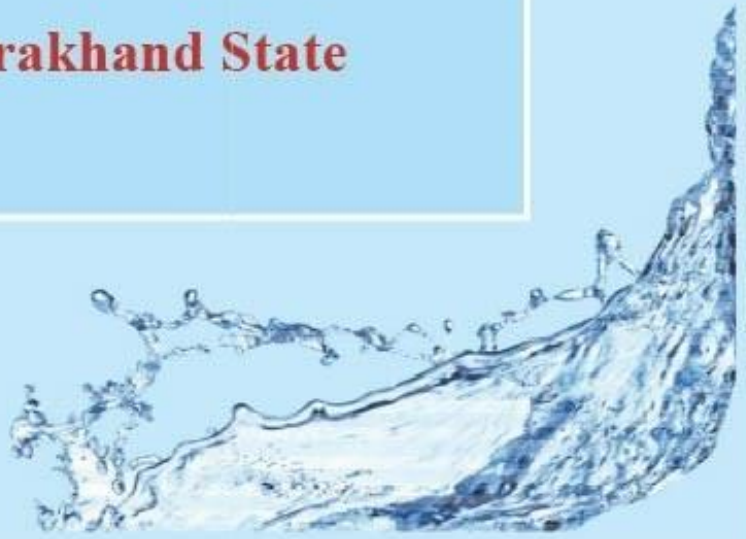
भारत सरकार
Government of India
जल शक्ति मंत्रालय
Ministry of Jal Shakti
जल संसाधन, नदी विकास और गंगा संरक्षण विभाग
Department of Water Resources
River Development and Ganga Rejuvenation
केंद्रीय भूमि जल बोर्ड
Central Ground Water Board

भूजल स्तर बुलेटिन, उत्तराखंड राज्य

मई 2025

Groundwater Level Bulletin, Uttarakhand State

May 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 30.05.2025, 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 %.

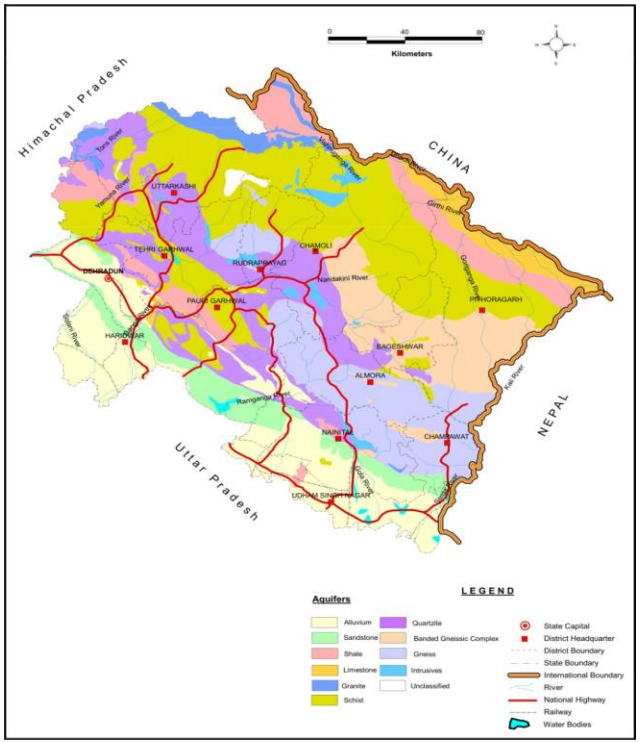


Fig.1 : Map showing disposition of principal aquifers of Uttarakhand State

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

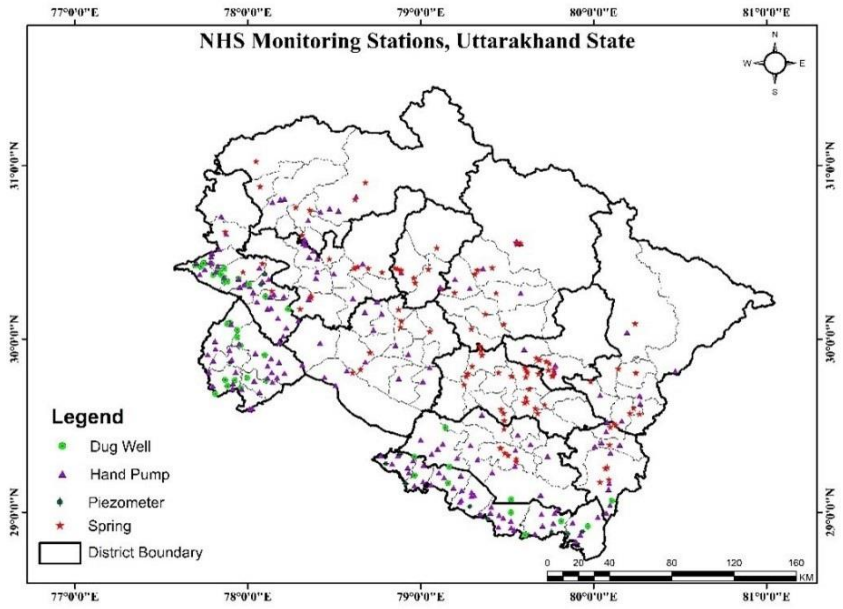


Fig.2: NHS monitoring stations of Uttarakhand State, as on May,2025

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. 3**. 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.

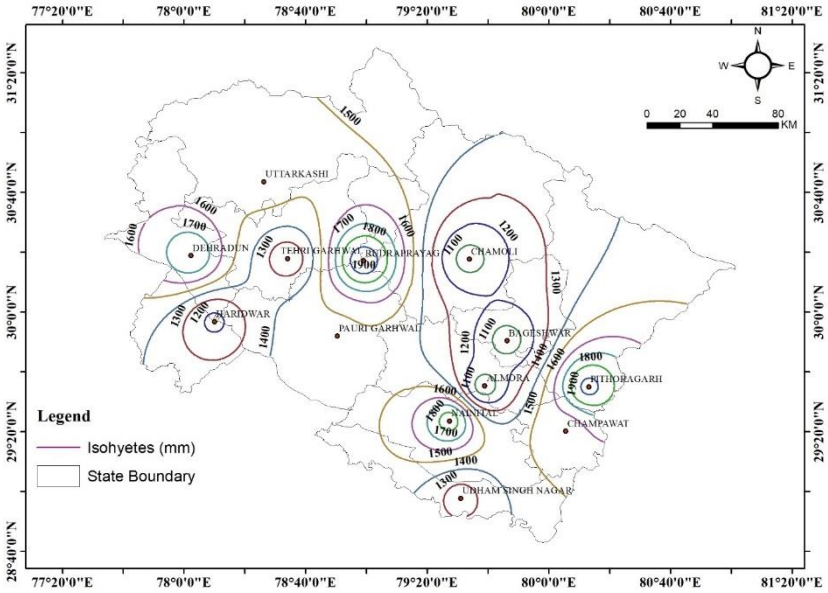


Fig.3: Mean Isohyetal Map of Uttarakhand State

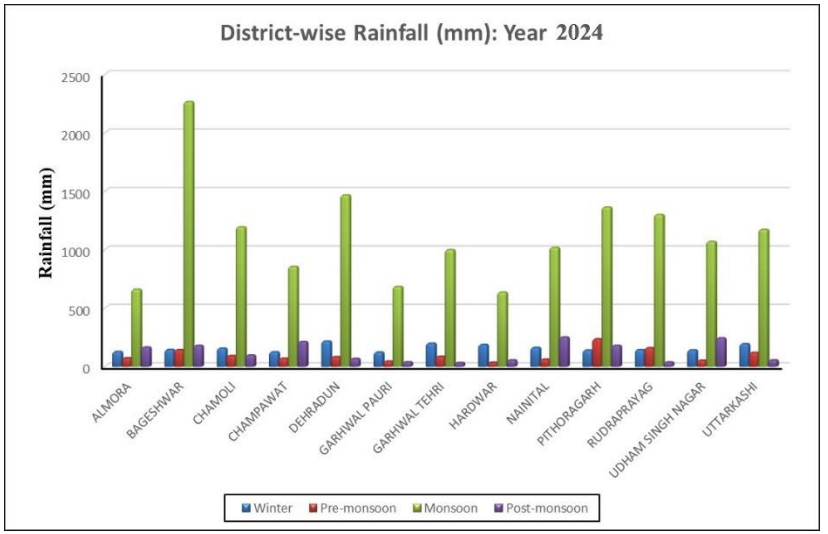


Fig.4: District-wise Actual Rainfall (mm) (Source: IMD)

5.0 GROUND WATER LEVEL SCENARIO

5.1 UNCONFINED AQUIFER

5.1.1 Depth to Water level (May 2025)

The depth to water level of 224 wells is used for the analysis. Analysis of depth to water level data of 224 wells shows water levels vary between 0.23 m bgl (Kopa Signal, Udham Singh Nagar District) to 94.54 m bgl (Pauri Garhwal district). Water level of less than 5 m bgl is recorded in 18.3 % of wells, between 5 to 10 m bgl in 23.21% of wells,between 10 to 15 m bgl in 17.41% of wells, between 15 to 30 m bgl in 23.21 % of wells, between 30-50 m bgl in 11.16% of wells and water level more than 50 mbgl is registered in 6.7% of wells.

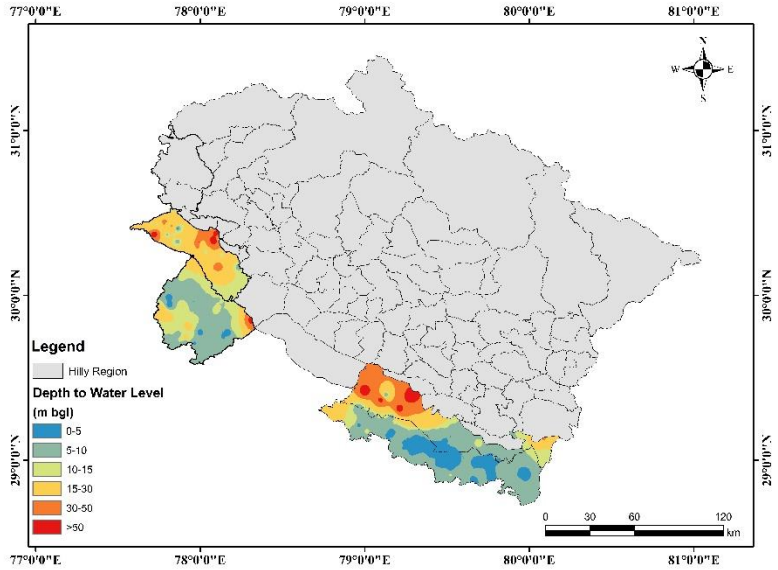


Fig.5: Depth to Water level Map (May 2025), Uttarakhand State

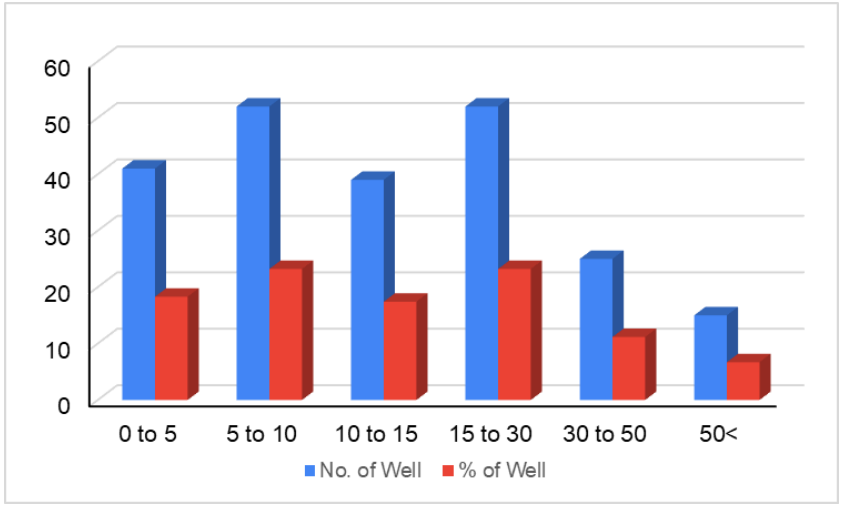


Fig.6: Percentage of wells in different water level range

5.1.2 Annual Fluctuation in Water Level

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

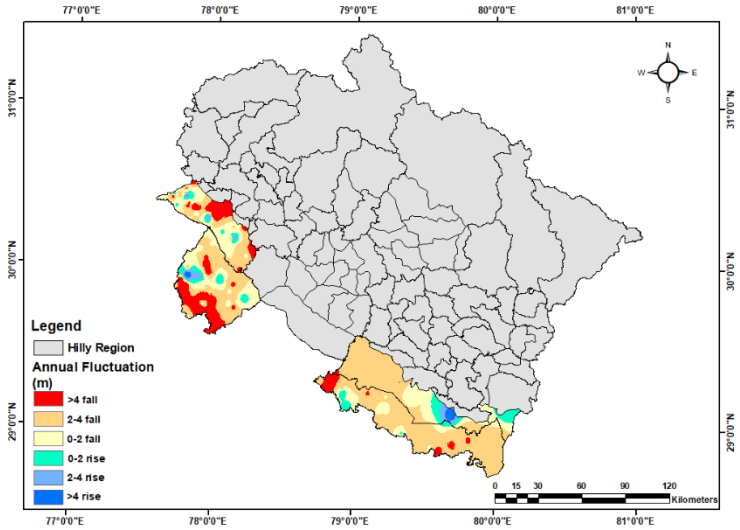


Fig. 7: Fluctuation in water level (May 2023 Vs May 2025)

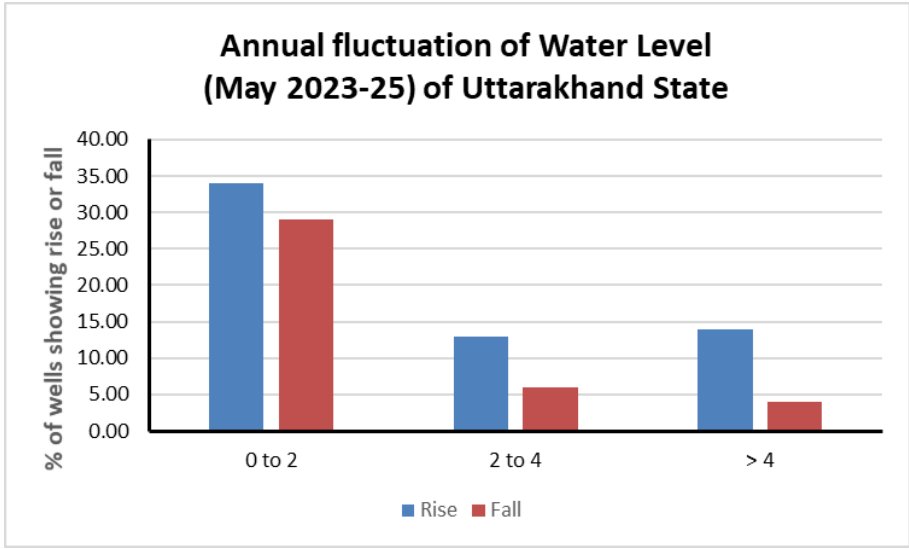


Fig. 8: Percentage of wells showing different fluctuation range May 2023 to May 2025

Rise in Water level:

Out of 154 wells, 97 wells (61% of total wells) are showing rise in water level in May 2025 when compared with May 2023 water level data. Out of 97 wells, 34 % of the wells showing rise in the range of 0-2 m, 13 % of wells showing rise in the range of 2-4 m while, only 23 wells (14% of the total) showing rise greater than 4 m.

Fall in Water level:

Out of 154 wells, 57 wells (39% of total wells) are showing fall in water level in May 2025 when compared with May 2023 water level data. Out of 57 wells, 29 % of the wells showing fall in the range of 0-2 m, 6 % of wells showing fall in the range of 2-4 m while, only 04 wells (4% of the total) showing fall greater than 4 m.

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

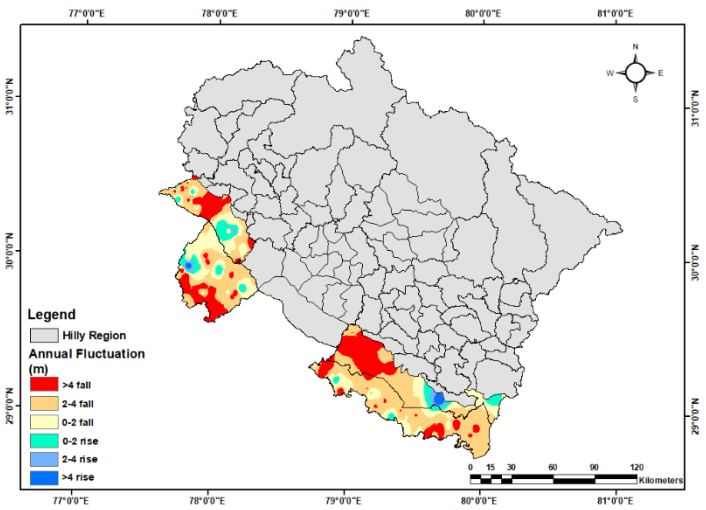


Fig. 9: Fluctuation in water level (Jan 2024 Vs Jan 2025)

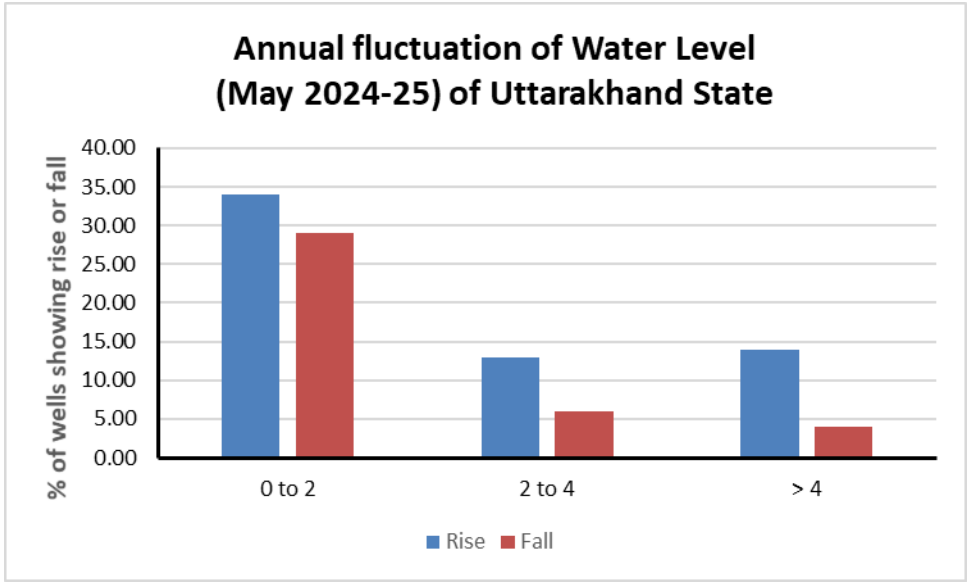


Fig. 10: Percentage of wells showing different fluctuation range Jan 2024 to Jan 2025

Rise in Water level:

Out of 204 wells, 128 wells (62% of total wells) are showing rise in water level in May 2025 when compared with May 2024 water level data. Out of 128 wells, 34 % of the wells showing rise in the range of 0-2 m, 15 % of wells showing rise in the range of 2-4 m while, only 27 wells (13% of the total) showing rise greater than 4 m.

Fall in Water level:

Out of 204 wells, 76 wells (38% of total wells) are showing fall in water level in May 2025 when compared with May 2024 water level data. Out of 76 wells, 27 % of the wells showing fall in the range of 0-2 m, 6 % of wells showing fall in the range of 2-4 m while, only 09 wells (5% of the total) showing fall greater than 4 m.

5.1 Decadal Fluctuation in Water level (May 2015 to May 2024 Vs May 2025)

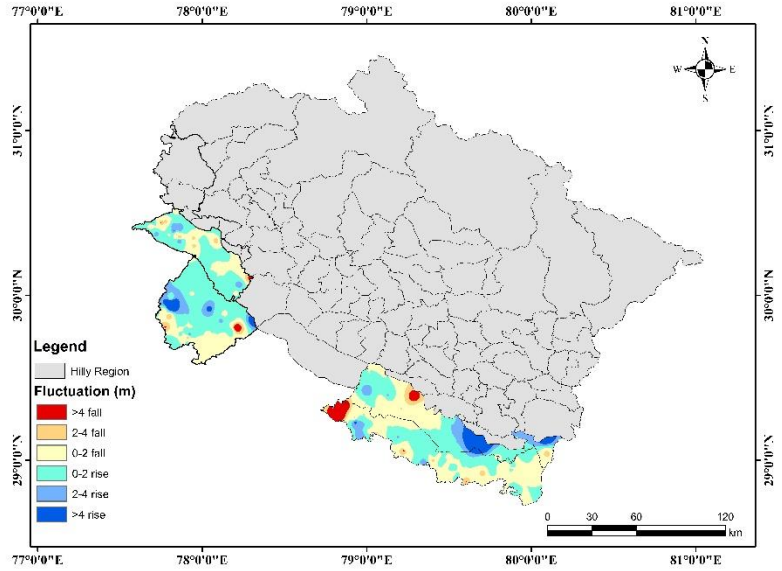


Fig. 11: Decadal Fluctuation in water level (May 2015 to May 2024 Vs May 2025)

Rise in Water level:

Out of 131 wells, 66 wells (~50.38% of total wells) are showing rise in water level in May 2025 when compared with last 10 years (2015-2024) May water level data. Out of 131 wells, 30.53 % of the wells showing rise in the range of 0-2 m, 12.21 % of wells showing rise in the range of 2-4 m while, only 10 wells (7.63% of the total) showing rise greater than 4 m.

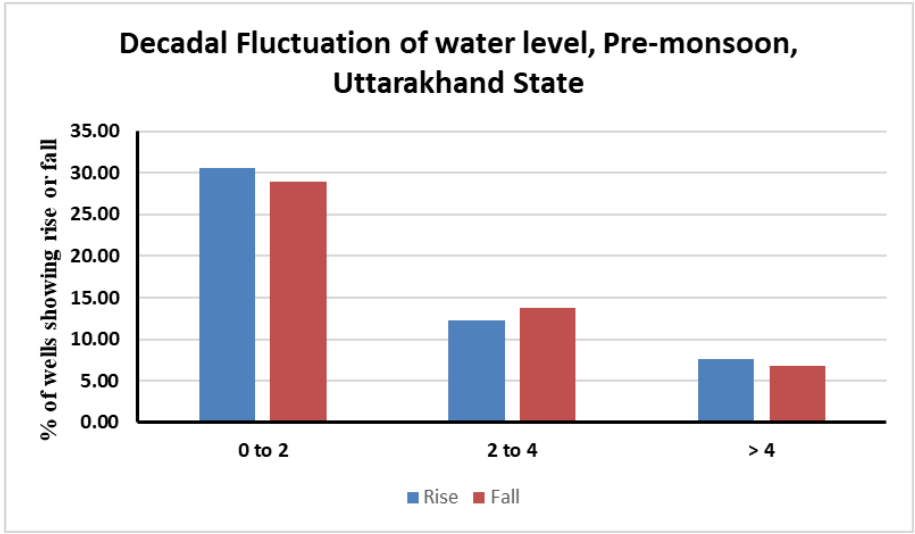


Fig. 12: Percentage of wells showing different decadal fluctuation range

Fall in Water level:

Out of 131 wells, 65 wells (49.62% of total wells) are showing fall in water level in May 2025 when compared with last last 10 years (2015-2024) May water level data. Out of 131 wells, 29.01 % of the wells showing fall in the range of 0-2 m, 13.74 % of wells showing fall in the range of 2-4 m, while 09 wells (6.87% of the total) showing fall greater than 4 m.

5.2 Measurement of Spring discharge in the Hilly Regions

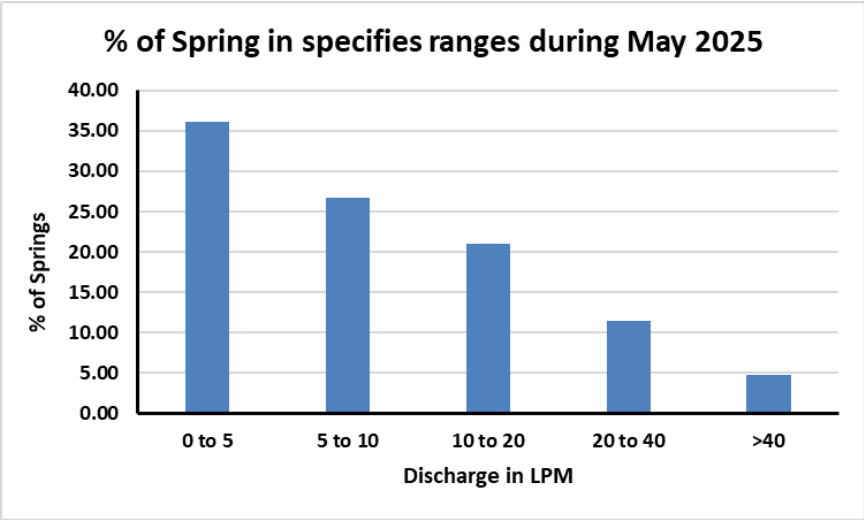


Fig.13: Percentage of Spring with discharge (in lpm) in specified range, Uttarakhand State

Total 105 numbers of Springs were measured for their discharge (in lpm) in Uttarakhand State in the month of May 2025. Out of 105 numbers of measured springs, 36.19% (38 numbers out of 105) were showing discharge in the range of 0-5 lpm, 26.67% (28 springs) were showing discharge in the range of 5-10 lpm, 22.95% (22 springs) were showing discharges in the range of 10-20 lpm, 11.43% (12 springs) were showing discharge in the range of 20-40 lpm and 5 springs out of 105 (i.e. 4.76% of the total) were showing discharge more than 40 lpm. Minimum discharge of 0.65 lpm was observed in the Lodh Spring of Almora district while Maximum discharge of 243.7 lpm was observed in the Gangnani spring of Uttarkashi district during the May 2025.

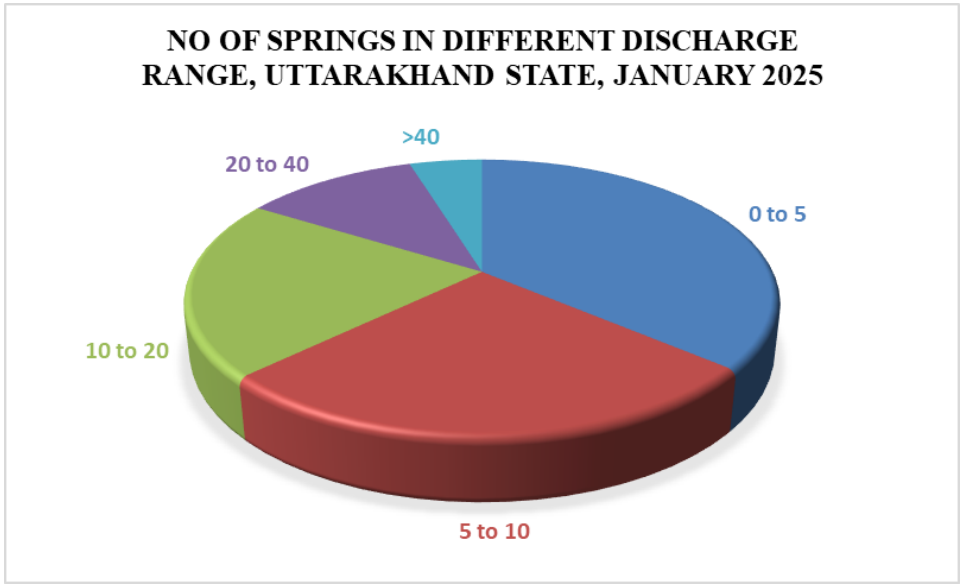


Fig.14: Number of Spring with discharge (in lpm) in specified range, Uttarakhand State

39.60% of the springs were showing decline in discharge during May 2025 when compared with May 2024. Minimum decline in discharge is 0.15 lpm and maximum decline in discharge is observed as 141 lpm. 60.4% of the total springs were showing rise in the discharge during May 2025 when compared with May 2024. Minimum increase in the discharge is observed as 0.04 lpm and maximum discharge is observed as 202.2 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 May 2025, analysis of depth to water level data of 224 wells shows water levels vary between 0.23 m bgl (Kopa Signal, Udham Singh Nagar District) to 94.54 m bgl (Pauri Garhwal district). Water level of less than 5 m bgl is recorded in 18.3 % of wells, between 5 to 10 m bgl in 23.21% of wells,between 10 to 15 m bgl in 17.41% of wells, between 15 to 30 m bgl in 23.21 % of wells, between 30-50 m bgl in 11.16% of wells and water level more than 50 mbgl is registered in 6.7% of wells.

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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.