GROUND WATER LEVEL BULLETIN

JANUARY – 2025

JAMMU & KASHMIR

CENTRAL GROUND WATER BOARD

NORTH WESTERN HIMALAYAN REGION

Jammu

ABSTRACT

Ground water level Scenario during January-2025 highlighting the findings, status of ground water level in different aquifers and its seasonal, annual and decadal comparison. The present report discusses the regional behaviour of groundwater water levels in the phreatic aquifers of the Jammu outer plains of the Jammu region. In Jammu outer plains, the depth to water level varied from 0.35 m bgl to 35.56 m bgl. The seasonal fluctuation of water levels of January 2025 vs May 2024 shows a rise in 19 wells and a fall in 163 wells, whereas w.r.t August 2024 shows a rise in 145 wells and a fall in 39 wells with no change in 1 well and w.r.t November 2024, shows a rise in 42 wells and a fall in 135 wells with no change in 2 wells. The annual fluctuation of water levels of January 2025 vs January 2024 shows a rise in 50 wells and a fall in 136 wells, whereas w.r.t January 2023 shows a rise in 80 wells and a fall in 104 wells with no change in 5 wells. The decadal fluctuation of water levels of January 2025 shows a rise in 56 wells and a fall in 128 wells (especially in the Kandi areas of Outer plains), with no change in 5 wells.

CGWB, NORTH WESTERN HIMALAYAN REHION, JAMMU

1. 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 attribute 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.

The Central Groundwater Board, North Western Himalayan Region is monitoring water levels in observation wells in Jammu and Kashmir State four times a year viz. May (between 20th and 31st), August (between 20th and 31st), November (1st and 10th), and January (1st and 10th). The total number of active groundwater monitoring wells is 402 (Dug Wells 315 and Piezometers 87) as of January 2024 which are located in alluvial areas of Jammu, Kathua, Samba, Rajouri, Reasi, Udhampur, Srinagar, Baramulla, Anantnag, Kupwara and Pulwama Districts. Most monitoring stations fall in valley areas of these districts. For a better understanding of the spatiotemporal behaviour of groundwater, the groundwater level contour maps were generated using IDW Interpolation methods in the GIS platform. Furthermore, the groundwater level categorization and data analysis were done using using Microsoft Excel. The present report discusses the regional behaviour of water levels in phreatic aquifers for the period January 2025 which will enable user agencies to plan development strategies.

2. STUDY AREA

Jammu and Kashmir is the northernmost Union Territory of India after Ladakh. It lies within latitudes of 32°17’ and 36°08’ N and longitudes of 73°23’ and 76°47' E. The UT has a total geographical area of 42,241 sq. km and has an international border with Pakistan in the west. The States of Punjab and Himachal Pradesh form its southern border and the UT of Ladakh forms the northern and northeastern border. Jammu & Kashmir is divided into two administrative divisions’ viz. Kashmir Division and Jammu Division. There is a total of 20 districts in J&K UT. The administrative map of the state is shown in Figure 1.

Major parts of the J&K represent high and rugged mountainous terrain. The geography of the J&K is highly varied with the highest mountain ranges in the world, extensive plateau, enormous valleys, deep gorges, and large canyons in the Middle and Higher Himalayan Regions. The UT can be divided into six distinct physiographic units Sirowal, Kandi, Shiwaliks, Kashmir Valley, Hilly Mountains, and Trans-Himalayan zone. Geological formations ranging in age from pre-Cambrian to Recent. These formations can broadly be classified into three categories viz – Hard or consolidated- rocks comprising granites, slates, quartzite, Panjal traps, limestone, etc. Semi-consolidated rocks comprising claystone, siltstone, sandstone, etc. Unconsolidated formations from Quaternary to Recent age are comprised of Clay, Silt, Sand, Gravel, pebbles, boulders, etc.

The entire UT of Jammu and Kashmir falls in the Indus River Basin Major sub-basins of the Indus System in J&K are the Jhelum Sub-basin, the Chenab Sub-basin, and the Ravi Sub-basin. The UT of J&K has great diversity in its temperature and

precipitation. Excepting the plain, south of the Siwaliks of the Jammu Division, the climate over the greater parts of the state resembles that of the mountainous and continental parts of the temperate latitudes.

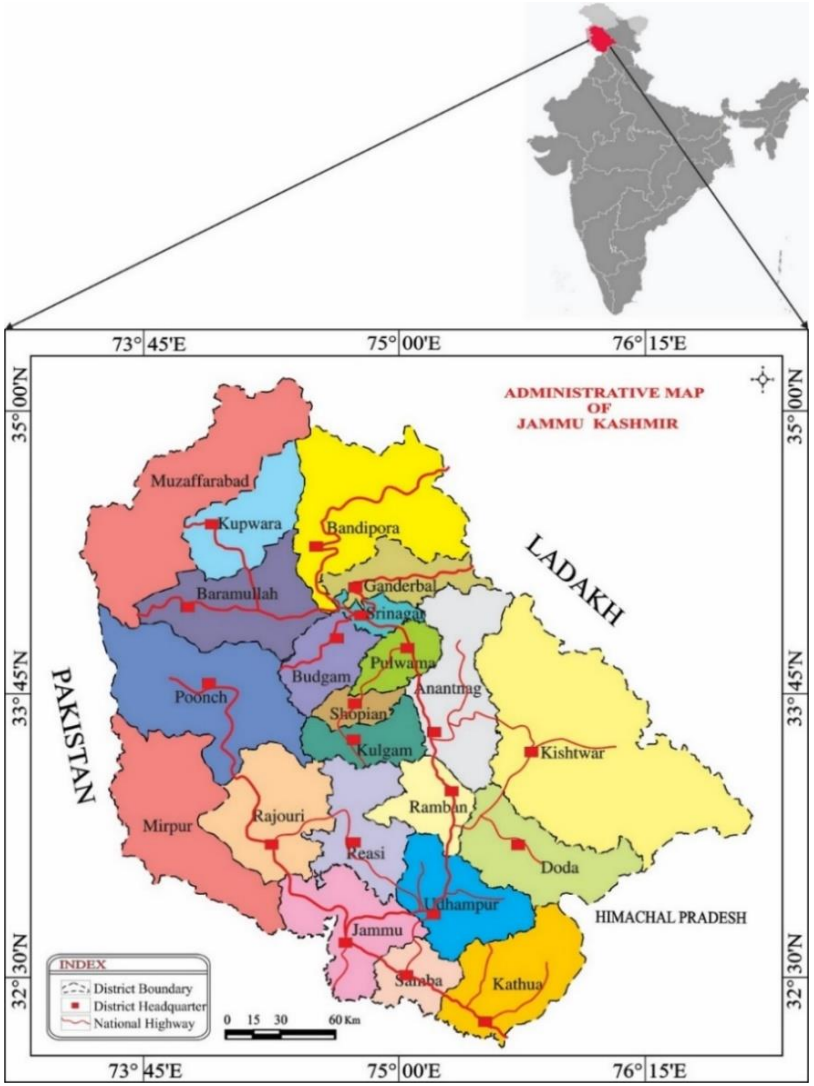

Figure. 1 Administrative Map of J&K

3. GROUND WATER LEVEL MONITORING

In Jammu & Kashmir, at present, 402 Hydrograph Network Stations are being monitored during pre-monsoon and post-monsoon periods. 315 NHS exist in the Jammu Region and 87 stations in the Kashmir Region. To date, no monitoring stations have been established in the Ladakh Region. District-wise number of hydrograph network stations as of January 2025 is shown in table 1 and their locations are shown in Figure 2.

Table 1. District-wise break-up of active Ground Water Monitoring Wells (DUG WELLS) in J&K (as on 31 March 2024)

Sl. No.	REGION	DISTRICT	Total No of Monitoring wells	Number of Active Ground Water Monitoring Wells Jan-24
1	KASHMIR REGION	ANANTNAG	0	Monitoring not carried out due to snowfall
2		BARAMULLA	23	
3		KUPWARA	48	
4		PULWAMA	2	
5		SRINAGAR	1	
6		BANDIPORA	5	
7		BUDGAM	0	
8		GANDERBAL	0	
9		KULGAM	0	
10		SHOPIAN	0	
	Total		**79**	**0**
11	JAMMU REGION	JAMMU	88	87
12		KATHUA	42	34
13		RAJAURI	38	37
14		REASI	8	8
15		SAMBA	38	35
16		UDHAMPUR	22	22
17		DODA	0	Hilly Areas
18		KISHTWAR	0	
19		RAMBAN	0	
20		POONCH	0	
	Total		**236**	**223**
	TOTAL J&K		**315**	**223**

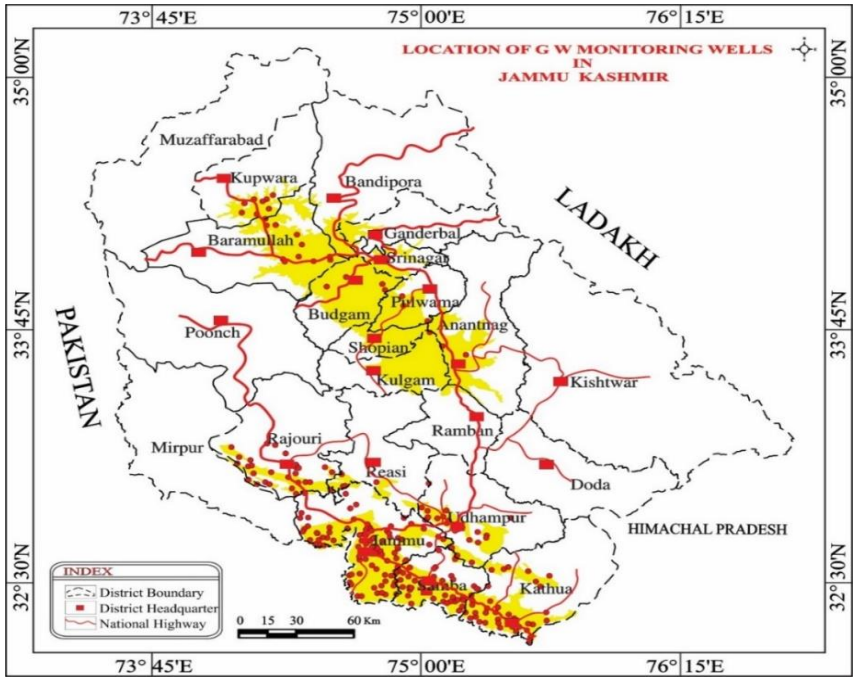

Figure 2. Location Map of Groundwater monitoring wells in Alluvial Aquifers in J&K

4. RAINFALL

The State of Jammu and Kashmir has great diversity in its temperature and precipitation. Excepting the plain, south of the Siwaliks of the Jammu Division, the climate over the greater parts of the state resembles that of the mountainous and continental parts of the temperate latitudes.

4.1. The climate of the Jammu Division

The climate of the Jammu division is sub-humid to sub-tropical. It is divisible into two parts namely (i) the plain region, lying to the south of the Siwaliks, and (ii) the mountainous region, stretching over the Middle and the Greater Himalayas in the districts of Doda, Rajouri, Poonch, and Udhampur. The climate of the plain region and Middle Himalayas including the Pir Panjal is characterized by a rhythm of seasons which is caused by the reversal of winds in the form of southwest and north-east monsoons. The reversal of pressure takes place regularly twice a year. This region has a sub-tropical climate with a hot and dry climate in summer and a cold climate in winter. It lies in the northern hemisphere above the tropic of Cancer. The Minimum and Maximum temperature of the district varies between 4°C to 47°C and the monsoon starts from the beginning of July to the first week of September. From October to June the precipitation and temperature patterns resemble closely the valley temperature zones. However, the summer rainfall and temperature resemble the precipitation pattern in the sub-tropical zone. The region receives an average annual precipitation of 1070 mm mainly in the form of rainfall. Snowfall occurs in high mountainous parts of the Jammu region due to the southwest monsoon from July to September and contributes about 80% of the total rainfall. The temperature in plain areas of the Jammu region goes up to 45ºC during summer and drops to as low as 3º C during the winter season.

4.2. The climate of the Kashmir Division

The weather and climate of the Kashmir Division are intrinsically linked with the weather mechanism of the subcontinent in general. The location of the Kashmir Valley at a high altitude (about 1600m AMSL) in the north-western corner of the subcontinent, surrounded by high mountains on all sides, gives it a unique geographical character with distinctive climatic characteristics. It experiences Temperate-cum-Mediterranean type

of climate. The average annual precipitation is 660 mm. In winter, rainfall occurs from the western disturbances (temperate cyclones). These disturbances have their origin in the Mediterranean Sea. The rainfall generated by these cyclones is fairly widespread locally known as *Alamgir*. About 65% of the precipitation occurs in the form of snow during the winter season, i.e. December to February. March and April are the months of rainfall. May to September are relatively dry months. The mercury drops between -8ºC and 12ºC during winter and attains a moderate temperature of around 35ºC during summer.

5. GROUND WATER LEVEL SCENARIO

5.1. UNCONFINED AQUIFER

5.1.1. DEPTH TO WATER LEVEL

Depth To Water Level in Unconfined Aquifer (January 2025)

The water level data in respect of 265 wells for January 2025 were analysed in J&K out of which 190 fall in Jammu region and 75 in Kashmir valley. In Jammu's outer plains, the depth to water level varied from 0.35 m bgl (Khanpur Nagrota in Jammu District) to 35.56 m bgl (Taryai in Jammu district).

DTWL in Jammu Region: Out of 190 wells, 36 wells (18.94%) have recorded a water level of less than 2.0 m bgl. About 96 (50.52%) of the total wells analyzed have shown depth to water level in the range of 2-5 m bgl. Whereas 38 wells (20%) have shown water levels in the range of 5-10 m bgl. 12 (6.31%) wells have registered deeper water levels, in the range of 10-20 m bgl. 8 wells (4.21%) have shown water levels below 20 mbgl.

Valley areas of Jammu, Samba and Kathua districts below the contact of Kandi Sirowal show water levels between 2-5 m bgl except few patches that show water levels between 0-2m bgl. In the Sirowal area of Outer Plains, most of the water levels have been recorded between 2 - 5 m bgl except a few small patches that show water levels from 0 to 2 m bgl. In the Kandi Belt, the water levels are deeper ranging between 5-20 m bgl and a few patches of northwestern Jammu, having water levels more than 10 m bgl. The northwestern and northern parts of the Jammu district show water levels > 20 mbgl (Figure 3).

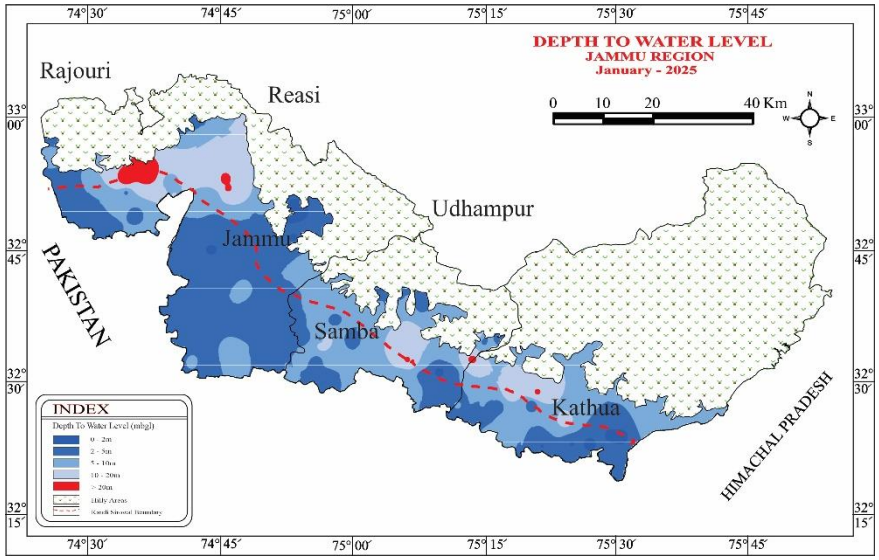

Figure 3 DTWL January 2025 Jammu Region

5.1.2. SEASONAL FLUCTUATION OF WATER LEVELS

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

The water level data with respect to 184 National Hydrograph Stations was analyzed in the Jammu Region. Majority of the wells have shown a rise. A total of 39 wells have shown a decline and 145 wells have shown a rise in water levels in the range of 0-2 m, 2-4 m, and >4 m. The minimum rise of 0.01 m at Leherian in Jammu District to a maximum rise of 9.54 m is shown at Chapki Kalan in Kathua district. Whereas a minimum decline of 0.01 m is recorded at Pansar in Kathua district to a maximum of 6.13 m at Nilcha in Samba district

Rise in water Levels:

Rise is shown by 121 wells (65.76%) in the range of 0-2 m. 18 wells (9.78%) have registered a rise from 2-4 m bgl and 5 well (2.71%) are showing a rise of >4 m.

Fall in Water Levels:

36 wells (19.56%) have shown a fall in the range of 0-2 m, 121 wells (1.08%) have shown a fall between 2-4 m, and 2 wells (1.08%) have shown fall of >4 m.

In the Jammu Region, a rise in the range of 0–4 m has been observed in all the areas. The majority of the areas have shown rise in water levels and decline is shown in few patches. The decline is observed in north western and southern areas of Samba district (Figure 4).

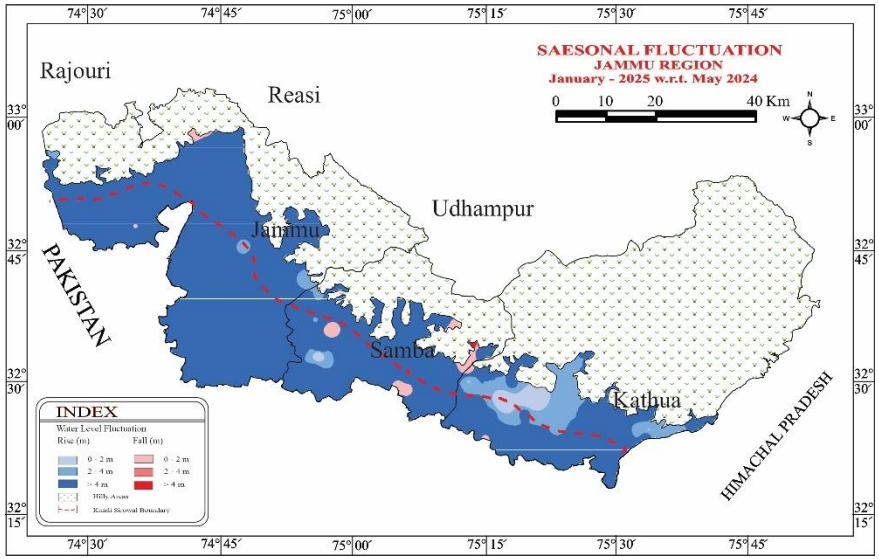

Figure 4. Seasonal Fluctuation May 2024 vs January 2025

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

The water level data with respect to 183 National Hydrograph Stations was analyzed in the Jammu Region. Majority of the wells have shown a rise. A total of 163 wells have shown a decline and 19 wells have shown a rise in water levels in the range of 0-2 m, 2-4 m, and >4 m and 1 well with no change. The minimum rise of 0.03 m at Miran Sahib in Jammu District to a maximum rise of 3.13 m is shown at Sanoora in Samba district. Whereas a minimum decline of 0.05 m is recorded at Khanpur Nagrota in Jammu district to a maximum of 3.06 m at Akhnoor Batera in Jammu district

Rise in water Levels:

Rise is shown by 17 wells (9.28%) in the range of 0-2 m. 2 wells (9.72%) have registered a rise from 2-4 m bgl and 0 well (0%) are showing a rise of >4 m.

Fall in Water Levels:

108 wells (59.01%) have shown a fall in the range of 0-2 m, 45 wells (24.59%) have shown a fall between 2-4 m, and 10 wells (5.46%) have shown fall of >4 m.

In the Jammu Region, a decline in the range of 0–2 m has been observed in all the areas, and decline >4m is also observed in Jammu and Kathua areas. Rise is shown in Central areas of Samba district, (Figure 5).

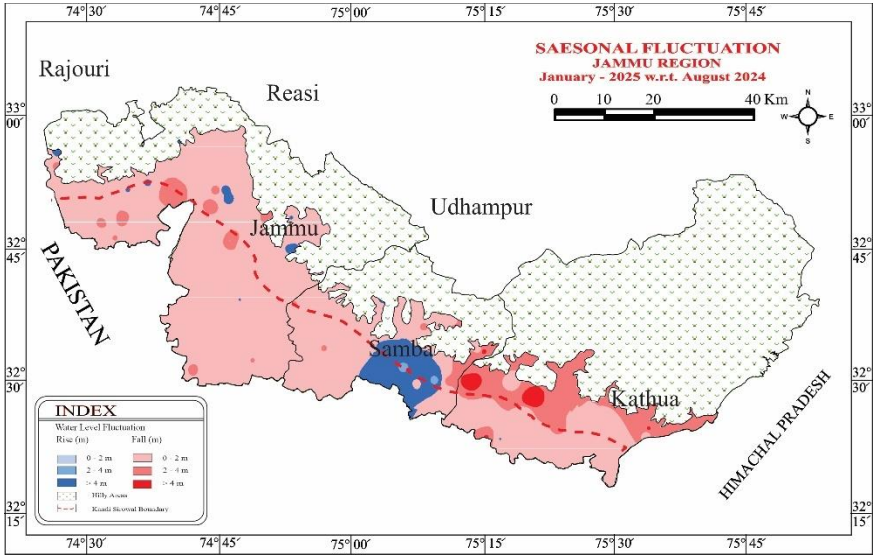

Figure 5. Seasonal Fluctuation August 2024 vs January 2025

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

The water level data with respect to 179 National Hydrograph Stations was analyzed in the Jammu Region. Majority of the wells have shown a rise. A total of 42 wells have shown a rise and 135 wells have shown a fall in water levels in the range of 0-2 m, 2-4 m, and >4 m, and no change in fluctuation is shown by 2 wells. The minimum rise of 0.01 m at Nagri in Kathua District to a maximum rise of 6.67 m is shown at Bhagwanachak in Jammu district. Whereas a minimum decline of 0.02 m is recorded at Lakhri in Kathua district to a maximum of 9.37 m at Arnia in Jammu district

Rise in water Levels:

Rise is shown by 39 wells (21.7%) in the range of 0-2 m. 2 wells (1.11%) have registered a rise from 2-4 m bgl and 1 well (0.55%) are showing a rise of >4 m.

Fall in Water Levels:

118 wells (65.92%) have shown a fall in the range of 0-2 m, 11 wells (6.14%) have shown a fall between 2-4 m, and 6 wells (3.35%) have shown fall of >4 m.

In the Jammu Region, a decline in the range of 0–2 m has been observed in majority of the areas, with few areas having >4m decline especially southern Jammu and northern Kathua district. Rise is shown in few areas of all districts mostly in Northern, north-western Jammu, southern Samba and few patches in Kathua districts, (Figure 6).

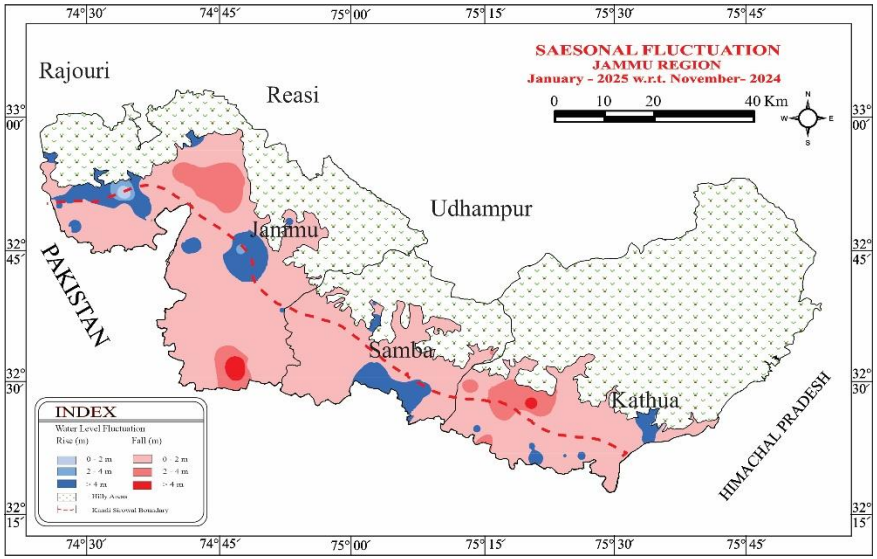

Figure 6. Seasonal Fluctuation November 2024 vs January 2025

5.1.3. ANNUAL FLUCTUATION OF WATER LEVEL

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

The water level data with respect to 186 National Hydrograph Stations was analyzed in the Jammu Region. Majority of the wells have shown a fall. A total of 136 wells have shown a decline and 50 wells have shown a rise in water levels in the range of 0-2 m, 2-4 m, and >4 m. The minimum rise of 0.01 m at Pansar in Kathua District to a maximum rise of 3.59 m is shown at Gagrote in Rajouri district. Whereas a minimum decline of 0.01 m is recorded at Gho Manahasan in Jammu district to a maximum decline of 2.91 m at Bhamla in Reasi district

Rise in water Levels: Rise is shown by 43 wells (23.11%) in the range of 0-2 m. 7 wells (3.76%) have registered a rise from 2-4 m bgl and 0 wells (0%) are showing a rise of >4 m.

Fall in Water Levels: Among 136 wells showing a fall, 128 wells (68.81%) have shown a fall in the range of 0-2 m, 8 wells (4.30%) have shown a fall between 2-4 m, and 0 wells (0%) have shown fall of >4 m.

In the Jammu Region, majority of the area is showing decline in the range of 0–4 m. rise is also observed in few portions of each district. The effect of the groundwater withdrawal is shown in all districts (Figure 7).

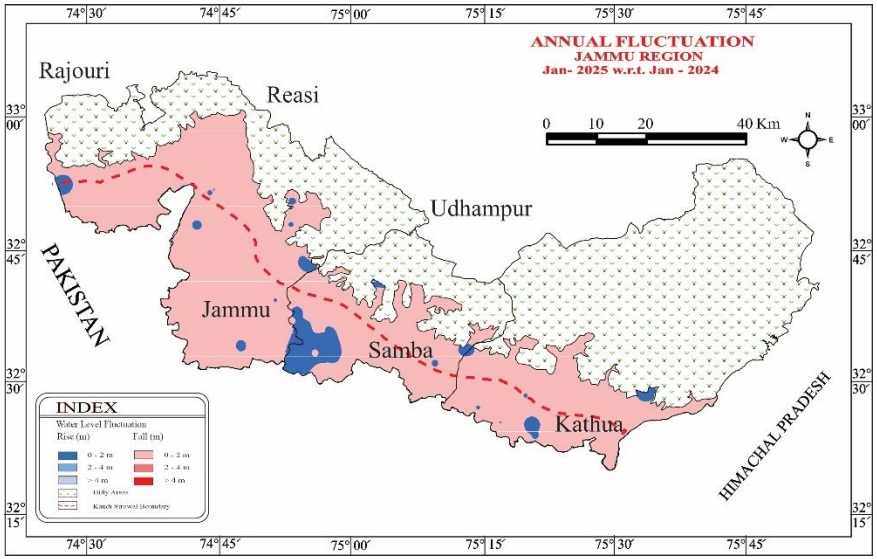

Figure 7. Annual Fluctuation January 2025 vs January 2024

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

The water level data with respect to 189 National Hydrograph Stations was analyzed in the Jammu Region. Majority of the wells have shown a fall. A total of 104 wells have shown a decline and 80 wells have shown a rise in water levels where as 5 wells have shown no change. The minimum rise of 0.03 m at Marh in Jammu District to a maximum rise of 8.22 m is shown at Nagrota Uttarbani in Samba district. Whereas a minimum decline of 0.01 m is recorded at Mahal Shah Kalandrian in Samba district to a maximum decline of 4.52 m at Battal Baliyan in Udhampur district

Rise in water Levels: Rise is shown by 72 wells (38.09%) in the range of 0-2 m. 6 wells (3.17%) have registered a rise from 2-4 m bgl and 2 wells (1.05%) are showing a rise of >4 m.

Fall in Water Levels: Among 80 wells showing a fall, 96 wells (50.79%) have shown a fall in the range of 0-2 m, 6 wells (3.17%) have shown a fall between 2-4 m, and 0 wells (0%) have shown fall of >4 m.

In the Jammu Region, rise and decline is shown equally in all the districts. Rise is mostly found in northern to south eastern Jammu district, north to south-western, and eastern Samba district and southern parts of Kathua district. The effect of the groundwater withdrawal is shown in all districts (Figure 8).

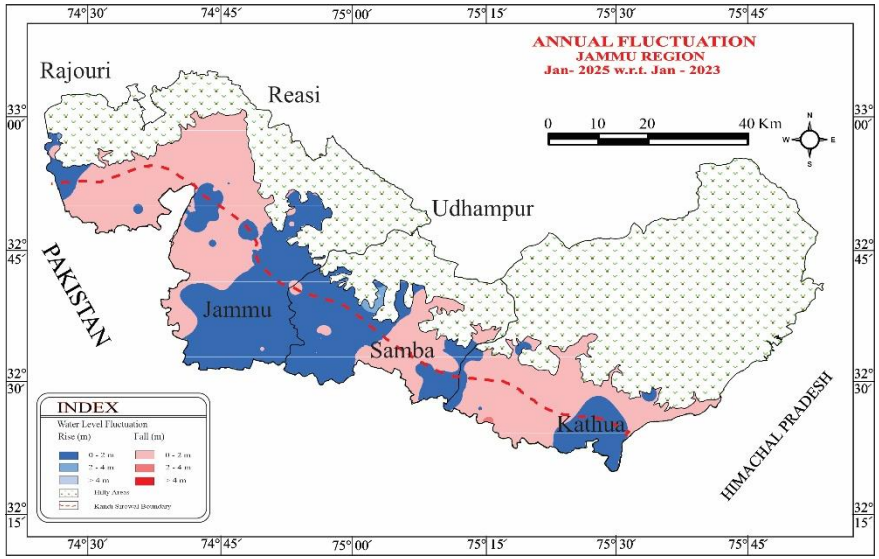

Figure 8. Annual Fluctuation January 2025 vs January 2023

5.1.4. DECADAL FLUCTUATION OF WATER LEVEL

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

The water level fluctuation for January 2025 Vs. (Mean of January 2015 – January 2024 has been worked out in respect of 189 observation wells. It is observed that a total of 56 wells have shown a rise and 128 wells have shown a decline in water level (especially in Kandi areas of Outer plains) and 5 wells have shown no change. The minimum rise of 0.01 m at Gho Brahmna Samba district to a maximum rise of 3.34 m in Mothian Kalan Samba district, whereas, a minimum decline of 0.03 m in Sumah in Jammu district to a maximum of 5.78m at Battal Ballian in Udhampur district is recorded.

Rise in water Levels:

Rise is shown by 53 wells (28.04%) in the range of 0-2 m. 3 wells (1.58%) have registered a rise from 2-4 m bgl and 0 wells (0%) are showing a rise of >4 m.

Fall in Water Levels:

Among 128 wells showing a fall, 112 wells (59.25%) have shown a fall in water level in the range of 0-2 m, 15 wells (7.93%) have shown a fall between 2-4 m, and 1 well (0.52%) have shown fall of >4 m.

Jammu Region the decline in the range of 0–2 m has been observed in major portions of each district. Significant portions of all the districts have shown a decline above 2m in water levels. Northeastern Jammu and central portions of Samba district shows water level rise. (Figure 9).

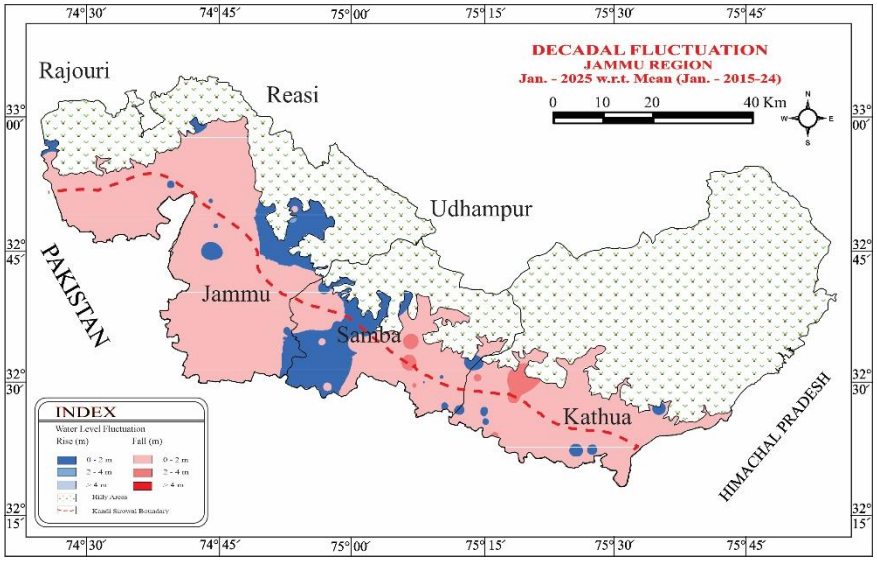

Figure 9. Decadal Fluctuation January 2025

5.2. CONFINED/SEMICONFINED AQUIFER

5.2.1 DEPTH TO PIEZOMETRIC LEVEL

Due to non-availability of sufficient wells in confined aquifer the analysis could not be performed.

6. SUMMARY

As part of the National Ground Water Monitoring Programme, the CGWB, NWHR, Jammu monitors groundwater conditions quarterly: in January and May (pre-monsoon) and in August and November (post-monsoon). In this area, the water supply is mainly dependent on groundwater either from the springs or shallow/ or deep aquifer systems. The groundwater also forms the main source of the surface water bodies through base flow. The groundwater level maps showed that the water levels in the Kandi formation are deeper than areas in the Sirowal formation and are significantly controlled by the monsoons. In general, the groundwater levels in Jammu Region are shallow in November. However, in the Kashmir region, August has having deepest water levels as compared to May and November due to non-monsoon rainfall, glacier melt and paddy cultivation. In certain places, particularly in urban and industrial areas, the groundwater levels are showing a declining trend in response to over-exploitation.

In Jammu outer plains, the depth to water level varied from 0.35 m bgl to 35.56 m bgl. The seasonal fluctuation of water levels of January 2025 w.r.t. November 2024 in the Jammu Region shows a rise in 42 wells and a fall in 135 wells with no change in 2 wells. The minimum rise of 0.01 m to a maximum rise of 6.67 m with minimum decline of 0.02 m to a maximum decline of 9.37 m is recorded. Similarly, the seasonal fluctuation of water levels of

January 2025 w.r.t. August 2024 shows a rise in 163 wells and a fall in 19 wells with no change in 1 well. The minimum rise of 0.03 m to a maximum rise of 3.13 m with minimum decline of 0.05 m to a maximum decline of 3.06 m is recorded. Whereas, the seasonal fluctuation of water levels of January 2025 w.r.t. May 2024 shows a rise in 39 wells and a fall in 145 wells. The minimum rise of 0.01 m to a maximum rise of 9.54 m with minimum decline of 0.01 m to a maximum decline of 6.13 m is recorded.

The annual fluctuation of water levels of January 2025 w.r.t. January 2024 in the Jammu Region shows a rise in 50 wells and a fall in 136 wells. A minimum rise of 0.01 m to a maximum rise of 3.59 m whereas, a minimum decline of 0.01 m to a maximum of 2.91 m is recorded. Similarly, the annual fluctuation of water levels of January 2025 w.r.t. January 2023 in the Jammu Region shows a rise in 80 wells and a fall in 104 wells with no change in 5 wells. A minimum rise of 0.03 m to a maximum rise of 8.22 m whereas, a minimum decline of 0.01 m to a maximum of 4.52 m is recorded.

The decadal fluctuation of water levels of January 2025 in the Jammu region shows a rise in 56 wells and a fall in 128 wells (especially in the Kandi areas of Outer plains), with no change in 5 wells. The minimum rise of 0.01 m to a maximum rise of 3.34m, whereas, a minimum decline of 0.03 m to a maximum of 5.78 m is observed.

7. RECOMMENDATIONS

Development of Deeper Aquifers: Deeper aquifers in both Jammu and Kashmir can be developed to meet water supply demands. Micro-level planning, based on aquifer geometry, parameters, and water resources data, is necessary for sustainable development.

Tube Well Construction Guidelines: Tube wells should be designed to tap only iron-free aquifers, avoiding iron-rich zones through cement sealing and selective gravel packing.

Climate Change & Spring Water Conservation: Climate change significantly threatens water resources, especially in hilly regions where springs are drying up. A systematic inventory of springs, along with the adoption of snow water harvesting and other sustainable groundwater development techniques, is required.

Well Head Protection & Sewage Management: Groundwater-based water supplies in Jammu and Srinagar require well head protection to prevent bacterial contamination (e.g., coliform, E. coli). The lack of proper sewage and sanitation across the UT is a major cause of water contamination and needs immediate action. Proper sewage treatment and drainage systems must be implemented, especially in waterlogged areas, to prevent groundwater pollution.

Groundwater Quality & Protection: Groundwater in Jammu and Kashmir UT is generally fresh and potable. As the primary water source—including springs, shallow, and deep groundwater—it also sustains surface water bodies through base flow during dry periods. Protection measures are essential to prevent contamination.

Iron & Gas Contamination in Kashmir Valley: Groundwater from deeper aquifers in Kashmir contains iron and marshy gases, requiring proper treatment before supply. Identifying iron-free aquifers through advanced scientific and geophysical exploration will help mitigate this issue.

Industrial & Urban Water Quality Monitoring: Rapid urbanization and industrialization necessitate strict water quality monitoring. State authorities should establish monitoring networks in industrial areas like Bari-Brahmana, Gangyal, and Kashmir Valley, particularly along drains carrying industrial effluents.