



GROUND WATER LEVEL BULLETIN

AUGUST-2024

JAMMU & KASHMIR



CENTRAL GROUND WATER BOARD
NORTH WESTERN HIMALAYAN REGION
Jammu

ABSTRACT

The present report discusses the regional behaviour of groundwater water levels in the phreatic aquifers of the Kashmir valley and outer plains of the Jammu region. 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 August. 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 Kashmir Region, the depth to water level varied from 0.6 m bgl to 6.80 m bgl. In Jammu's outer plains, the depth to water level varied from 0.03 m bgl to 35.72 m bgl. The annual fluctuation of water levels of August 2024 in the Jammu Region shows a rise in 111 wells and a fall in 110 wells. A minimum rise of 0.01 m to a maximum rise of 20.75 m whereas, a minimum decline of 0.01 m to a maximum of 5.6 m is recorded. The decadal fluctuation of water levels of August 2024 in the Jammu region shows a rise in 123 wells and a fall in 93 wells (especially in the Kandi areas of Outer plains). The minimum rise of 0.02 m to a maximum rise of 2.97m, whereas, a minimum decline of 0.01 m to a maximum of 6.35m is observed.

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 425 (Dug Wells 338 and Piezometers 91) 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 Microsoft Excel. The present report discusses the regional behaviour of water levels in phreatic aquifers for the period August 2024 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.

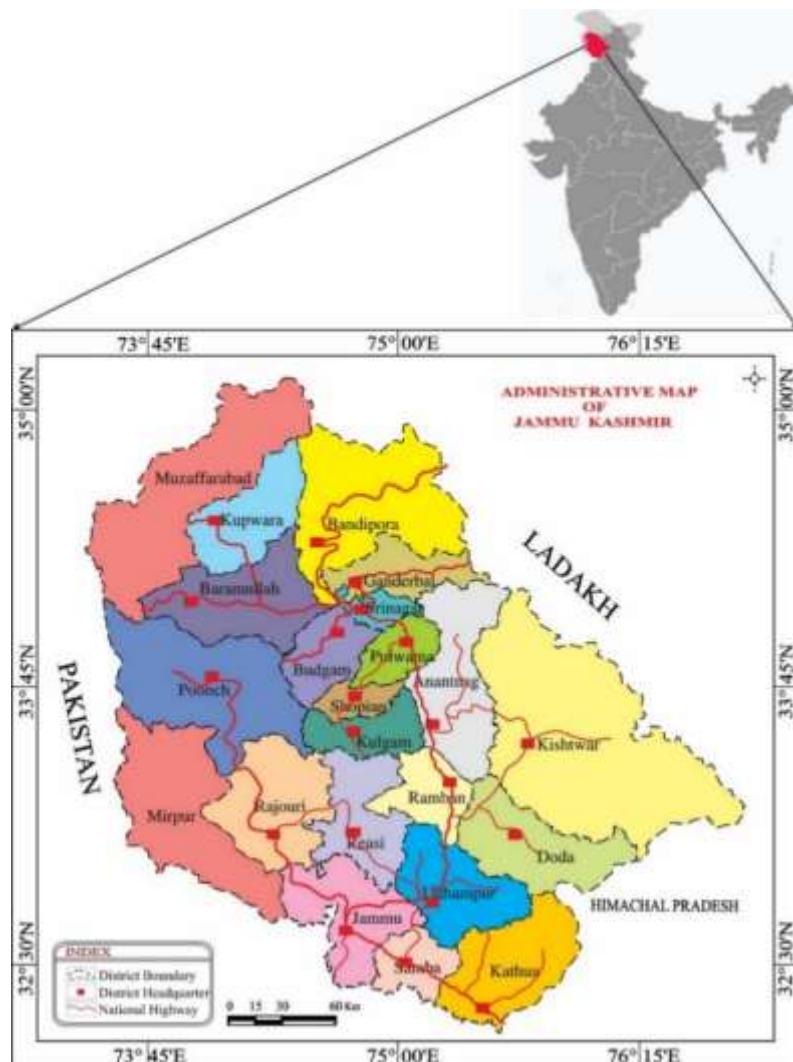


Figure. 1 Administrative Map of J&K

3. GROUND WATER LEVEL MONITORING

In Jammu & Kashmir, at present, 425 Hydrograph Network Stations are being monitored during pre-monsoon and post-monsoon periods. 241 NHS exist in the Jammu Region and 95 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 August 2024 is shown in table 1 and their locations are shown in Figure 2.

Sl. No.	Region	District	Total No of Monitoring wells	Number of Active Ground Water Monitoring Wells
1	Kashmir Region	Anantnag	0	0
2		Baramulla	23	23
3		Kupwara	48	47
4		Pulwama	2	2
5		Srinagar	1	1
6		Bandipora	5	5
7		Budgam	0	0
8		Ganderbal	0	0
9		Kulgam	0	0
10		Shopian	0	0
	Total		79	78
11	Jammu Region	Jammu	88	82
12		Kathua	42	41
13		Rajouri	38	36
14		Reasi	8	8
15		Samba	38	36
16		Udhampur	22	22
17		Doda	0	0
18		Kishtwar	0	0
19		Ramban	0	0
20		Poonch	0	0
	Total		236	225
	TOTAL J&K		315	303

Table 1B. District-wise break-up of active Ground Water Monitoring Wells (PIEZOMETERS) in J&K (August 2024)				
Sl. No.	Region	District	Total No of Monitoring wells	Number of Active Ground Water Monitoring Wells
1	Kashmir Region	Anantnag	0	0
2		Baramulla	0	0
3		Kupwara	0	0
4		Pulwama	0	0
5		Srinagar	2	2
6		Bandipora	0	0
7		Budgam	0	0
8		Ganderbal	1	1
9		Kulgam	0	0
10		Shopian	0	0
	Total		3	3
11	Jammu Region	Jammu	22	22
12		Kathua	22	18
13		Rajouri	6	6
14		Reasi	8	6
15		Samba	7	6
16		Udhampur	13	12
17		Doda	0	0
18		Kishtwar	0	0
19		Ramban	0	0
20		POONCH	5	5
	Total		83	75
	TOTAL J&K		86	78

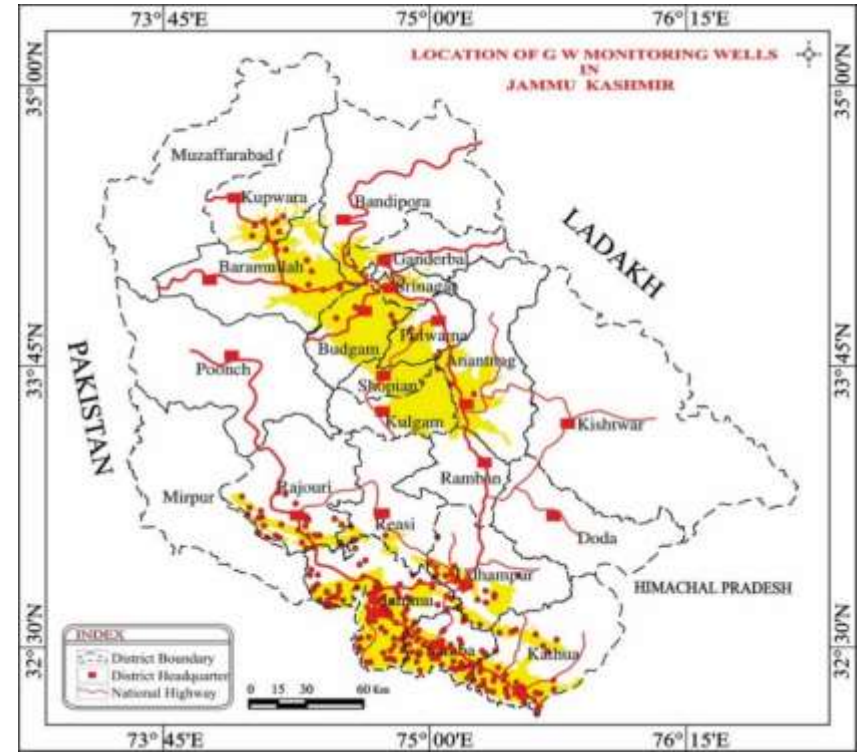


Figure 2. Location Map of Groundwater monitoring wells in Alluvial Aquifers in J&K

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 45°C during summer and drops to as low as 3° 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 -8°C and 12°C during winter and attains a moderate temperature of around 35°C during summer.

5. GROUND WATER LEVEL SCENARIO (AUGUST 2024)

5.1. SHALLOW AQUIFER (UNCONFINED)

5.1.1. DEPTH TO WATER LEVEL

Depth To Water Level in Unconfined Aquifer (August 2024)

The water level data in respect of 300 wells for August 2024 were analysed in J&K out of which 225 fall in Jammu region and 75 in Kashmir valley. In Kashmir Region, the depth to water level varied from 0.6 m bgl (Kunel in Kupwara District) to 6.80 m bgl (Zamzampora Sheeri in Baramulla district). In Jammu's outer plains, the depth to water level varied from 0.03 m bgl (Kothian in Kathua District) to 35.72 m bgl (Taryai in Jammu district).

DTWL in Kashmir Region: 16 wells (21.3%) have recorded a water level of less than 2.0 m bgl. About 47 (62.7%) of the total wells analyzed have shown depth to water level in the range of 2-5 m bgl. Whereas 11 wells (14.7%) have shown water levels in the range of 5-10 m bgl. 1 (1.3%) wells have registered deeper water levels, in the range of 10-20 m bgl. None of the wells has shown water levels below 20 mbgl.

DTWL in Jammu Region: 103 wells (45.8%) have recorded a water level of less than 2.0 m bgl. About 80 (35.6%) of the total wells analyzed have shown depth to water level in the range of 2-5 m bgl. Whereas 21 wells (9.3%) have shown water levels in the range of 5-10 m bgl. 12 (5.3%) wells have registered deeper water levels, in the range of 10-20 m bgl. 9 wells (4%) 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 & above 5 m bgl. In the Kandi Belt, the water levels are deeper ranging between 5-20 m bgl and a few patches of northern and northwestern Jammu, central parts of Kathua having water levels more than 10 m bgl. The northwestern and northern parts of the Jammu district and central parts of the Samba district show water levels > 20 mbgl (Figure 3).

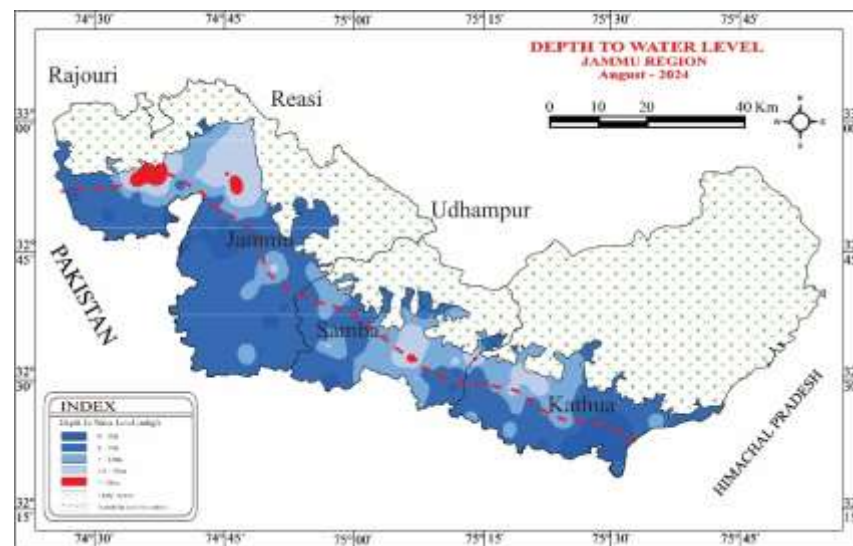


Figure 3 DTWL August 2024 Jammu Region

5.1.2. ANNUAL FLUCTUATION OF WATER LEVEL

August 2024 with respect to August 2023

The water level data with respect to 221 National Hydrograph Stations for August 2024 was analyzed in the Jammu Region. Wells have shown a fall as well as a rise in equal proportion. A total of 111 wells have shown a rise and 110 wells have shown a fall in water levels in the range of 0-2 m, 2-4 m, and >4 m. The minimum rise of 0.01 m at Garan Jagir Reasi District and Uttarbani in Samba District to a maximum rise of 20.75 m is shown at Dhanu Kanal Udhampur district. Whereas a minimum decline of 0.01 m is recorded at Pansar Kathua district to a maximum of 5.6 m at Bhagwal in Kathua district

Rise in water Levels:

Rise is shown by 103 wells (46.6%) in the range of 0-2 m. 6 wells (2.7%) have registered a rise from 2-4 m bgl and 2 wells (0.9%) are showing a rise of >4 m.

Fall in Water Levels:

Among 110 wells showing a fall, 102 wells (46.2%) have shown a fall in the range of 0-2 m, 7 wells (3.2%) have shown a fall between 2-4 m, and 1 well (0.5%) have shown fall of >4 m.

In the Jammu Region, a decline in the range of 0–2 m has been observed in major portions of each district with few exceptions in all the districts. North and northwestern areas of Jammu district, western Samba, and southeastern parts of Kathua district show a rise of >2 m in major portions, Decline is shown in the central, eastern, and northern parts of Jammu district, whole Samba district, and northern parts of Kathua district (Figure 4).

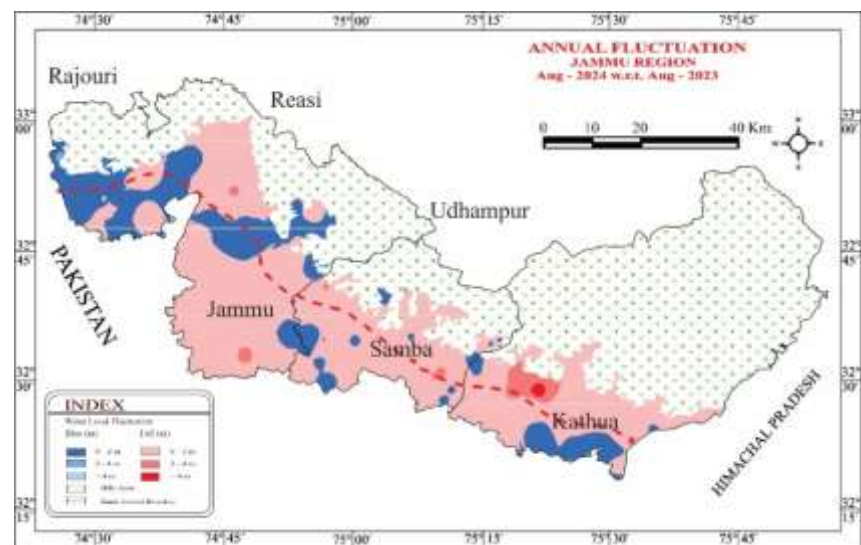


Figure 4. Annual Fluctuation August 2024 Jammu Region

5.1.3. DECADAL FLUCTUATION OF WATER LEVEL

August 2024 with respect to the mean of August 2014 – August 2023

The water level fluctuation for August 2024 Vs. (Mean of August 2014 – August 2023 has been worked out in respect of 216 observation wells. It is observed that a total of 123 wells have shown a rise and 93 wells have shown a decline in water level (especially in Kandi areas of Outer plains). The minimum rise of 0.02 m at Lalyal Jammu district to a maximum rise of 2.97m in Kalal Rajouri district, whereas, a minimum decline of 0.01 m in Thandapani Rajouri district to a maximum of 6.35m at Bhagwal Kathua district is recorded.

Rise in water Levels:

Rise is shown by 119 wells (55.1%) in the range of 0-2 m. 4 wells (1.9%) 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 93 wells showing a fall, 81 wells (37.5%) have shown a fall in water level in the range of 0-2 m, 9 wells (4.2%) have shown a fall between 2-4 m, and 3 wells (1.4%) have shown fall of >4 m.

Jammu Region is showing a decline as well as a rise in water levels in all districts equally. 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 rise in water levels. North and northwestern areas of Jammu district, northern and eastern Samba, and north and northeastern parts of Kathua district show a decline of >2 m in major portions, Rise is shown in the central,

eastern, and southern parts of Jammu district, southwestern Samba district, and southeastern parts of Kathua district (Figure 5)

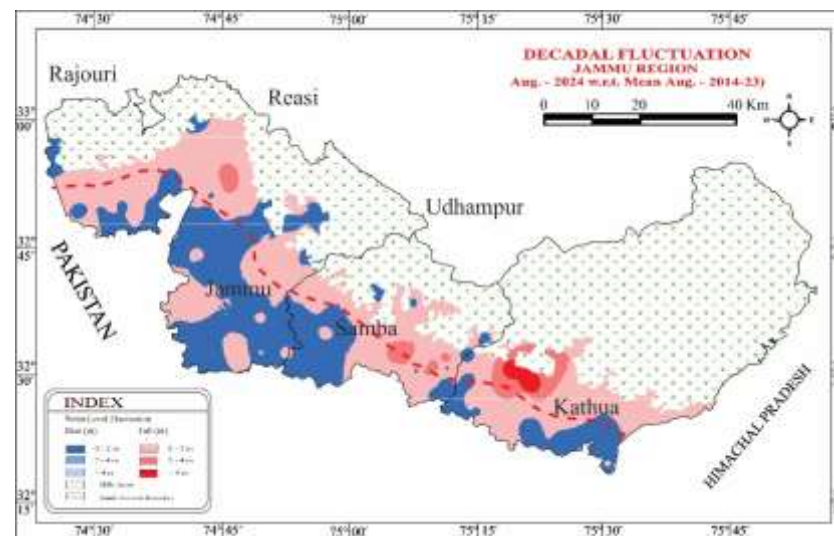


Figure 5. Decadal Fluctuation August 2024 Jammu Region