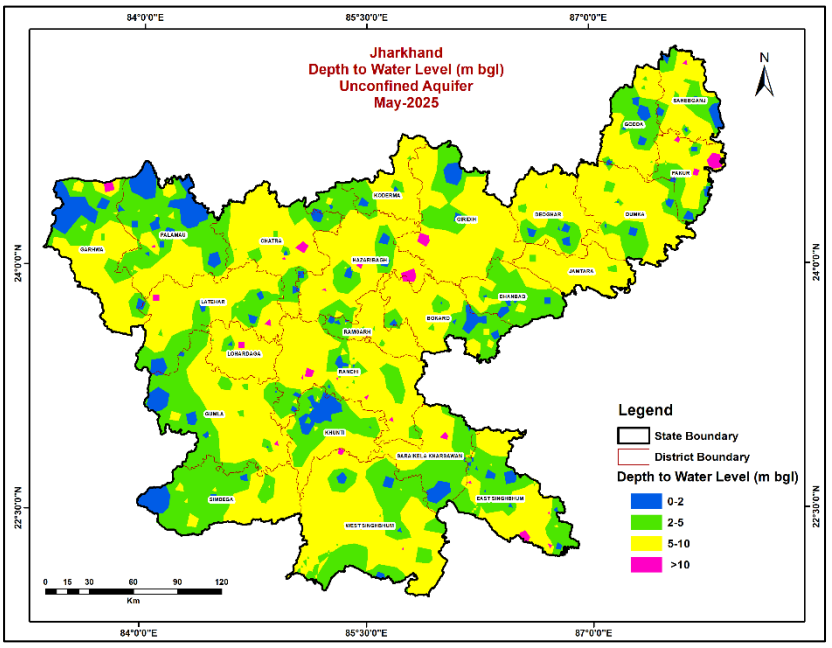
GOVERNMENT OF INDIA
MINISTRY OF JAL SHAKTI
DEPARTMENT OF WATER RESOURCES, RD & GR
CENTRAL GROUND WATER BOARD

REPORT ON GROUND WATER LEVEL BULLETIN IN JHARKHAND STATE (MAY 2025)



CENTRAL GROUND WATER BOARD
SUO, RANCHI
JUNE 2025

GROUND WATER LEVEL BULLETIN

May 2025

JHARKHAND

1.0 INTRODUCTION

The Groundwater Bulletin is prepared by the Central Ground Water Board (CGWB) to depict changes in the groundwater regime across the country during different seasons. This effort aims to gather information on groundwater levels through a network of representative monitoring wells. Key attributes of groundwater regime monitoring include groundwater levels.

Natural conditions that affect the groundwater regime include climatic factors such as rainfall and evapotranspiration. In contrast, anthropogenic influences involve activities like aquifer pumpage, recharge from irrigation systems, and practices such as waste disposal. The Central Ground Water Board measures groundwater levels four times a year: in January, March/April/May, August, and November. Groundwater regime monitoring has been conducted since 1969, and as of April 30, 2024, a network of 25437 observation wells, known as National Hydrograph Network Stations (NHNS), is being monitored throughout the country.

2.0 STUDY AREA

Jharkhand, a state created on November 15, 2000, consists of districts located on the Chotanagpur Plateau, which was part of the erstwhile Bihar. This date also commemorates the birthday of the legendary tribal freedom fighter, Birsa Munda. Currently, Jharkhand is comprised of 24 districts and 264 administrative blocks. The capital of the state is Ranchi. The state covers an area of 79714 square kilometers and is situated between latitudes 21º 55' 00" and 25º 15' 00", and longitudes 83º 15' 00" and 87º 55' 00". Jharkhand is bordered by Bihar to the north and West Bengal to the east. To the west and south, it is bounded by the states of Chhattisgarh and Odisha, respectively. ***(Figure.1).***

According to the 2011 census, the state's population is 3.30 crore (33 million). The population density is 414 people per square kilometer. The urban population consists of approximately 7.912 million, while the rural population is about 25.05 million. Tribals make up about 28% of the total population. The state is moderately urbanized, with Ranchi serving as its capital city. Approximately 24% of the total population lives in urban areas.

Important urban centers in the state include Jamshedpur, Dhanbad, Hazaribagh, Daltonganj, Dumka, and Deoghar.

***Figure 1*: Administrative Map of Jharkhand**

3.0 GROUND WATER LEVEL MONITORING

The Central Ground Water Board, State Unit Office Ranchi, is continuously monitoring changes in the groundwater regime in Jharkhand on a quarterly basis. This monitoring is supported by a network of stations located across various hydrogeological and geomorphic units in the state. As of May 2025, there were 709 operational wells, comprising 562 dug wells and 147 piezometers. In May 2025, a total of 534 wells were monitored (534 dug wells and 136 piezometers), of which 34 wells were dry. Additionally, 39 wells (28 dug wells and 11 piezometers) could not be monitored due to reasons such as inaccessibility, being filled up, the installation of pump units, damaged roads, locked gates, and other factors. The district- wise breakup of the water level monitoring stations is given in ***Table-1.***

Table-1: District-wise distribution of water level monitoring stations of Jharkhand as on May 2025.

S.No.	Districts	DW	PZ	Total
1	Bokaro	21	2	23
2	Chatra	22	4	26
3	Deoghar	16	6	22
4	Dhanbad	25	4	29
5	Dumka	22	7	29
6	E. Singhbhum	38	3	41
7	Garhwa	27	8	35
8	Giridih	22	4	26
9	Godda	24	3	27
10	Gumla	23	3	26
11	Hazaribagh	32	12	44
12	Jamtara	16	5	21
13	Khunti	16	6	22
14	Koderma	11	6	17
15	Latehar	18	6	24
16	Lohardaga	16	2	18
17	Pakur	16	4	20
18	Palamu	30	15	45
19	Ramgarh	20	6	26
20	Ranchi	59	24	83
21	Sahibganj	26	3	29
22	Saraikela	16	1	17
23	Simdega	20	7	27
24	W Singhbhum	26	6	32
Total		**562**	**147**	**709**

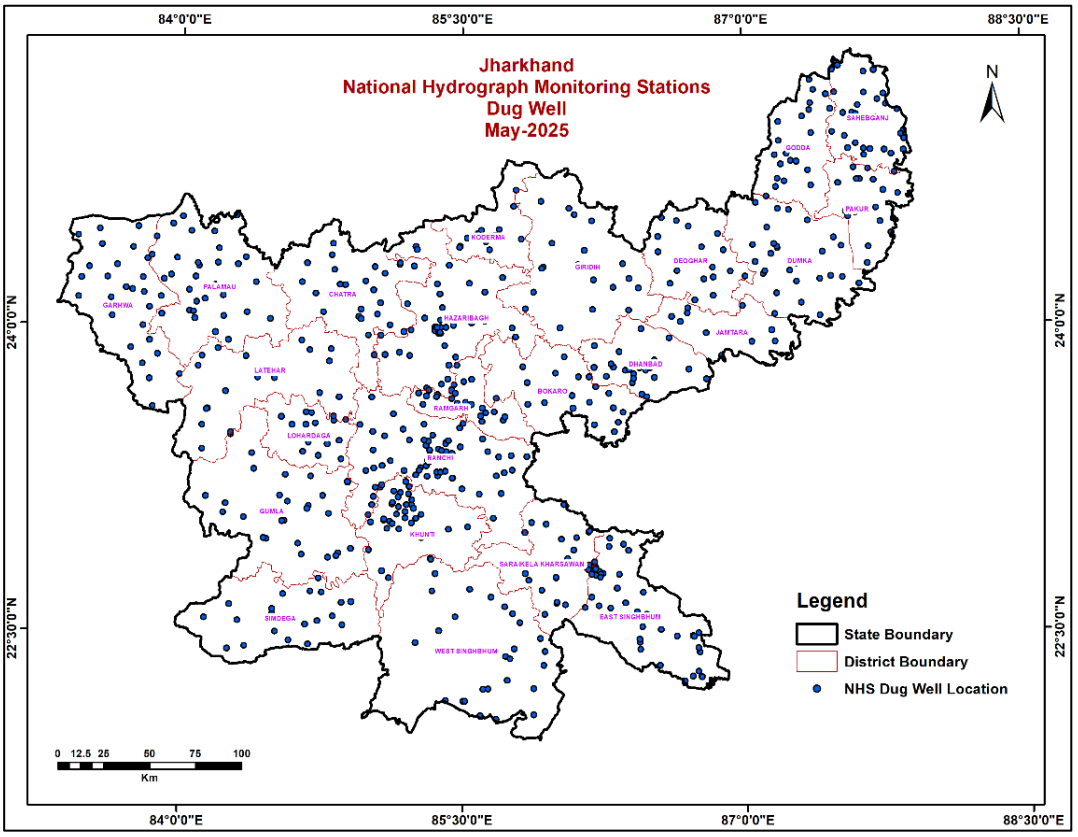


***Figure-2*: Location Map National Hydrograph Monitoring Stations (Dug Well) of of Jharkhand**

4.0 RAINFALL

The amount and distribution of rainfall significantly impact the state's economy, as agricultural activities primarily rely on rainfall. Additionally, rainfall serves as the main source for groundwater recharge throughout the state. The average annual rainfall for the state is 1,301 mm, with district-level variations ranging from 1,528 mm in Pakur to 1,084.1 mm in Godda. The distribution of normal annual rainfall by district is presented in Table 2.

An analysis of isohyets depicting mean annual rainfall shows that most areas of the state receive between 1,200 and 1,400 mm of rain each year. The majority of this annual precipitation comes from the southwestern monsoon, which typically begins in the second week of June. This monsoon rainfall accounts for approximately 83% of the state's total annual rainfall. The percentage of monsoon rainfall by district varies, ranging from 79.13% in Dumka to as high as 87.98% in Chatra. The Annual Normal Rainfall (in cm) for Jharkhand State is illustrated in Figure 3.

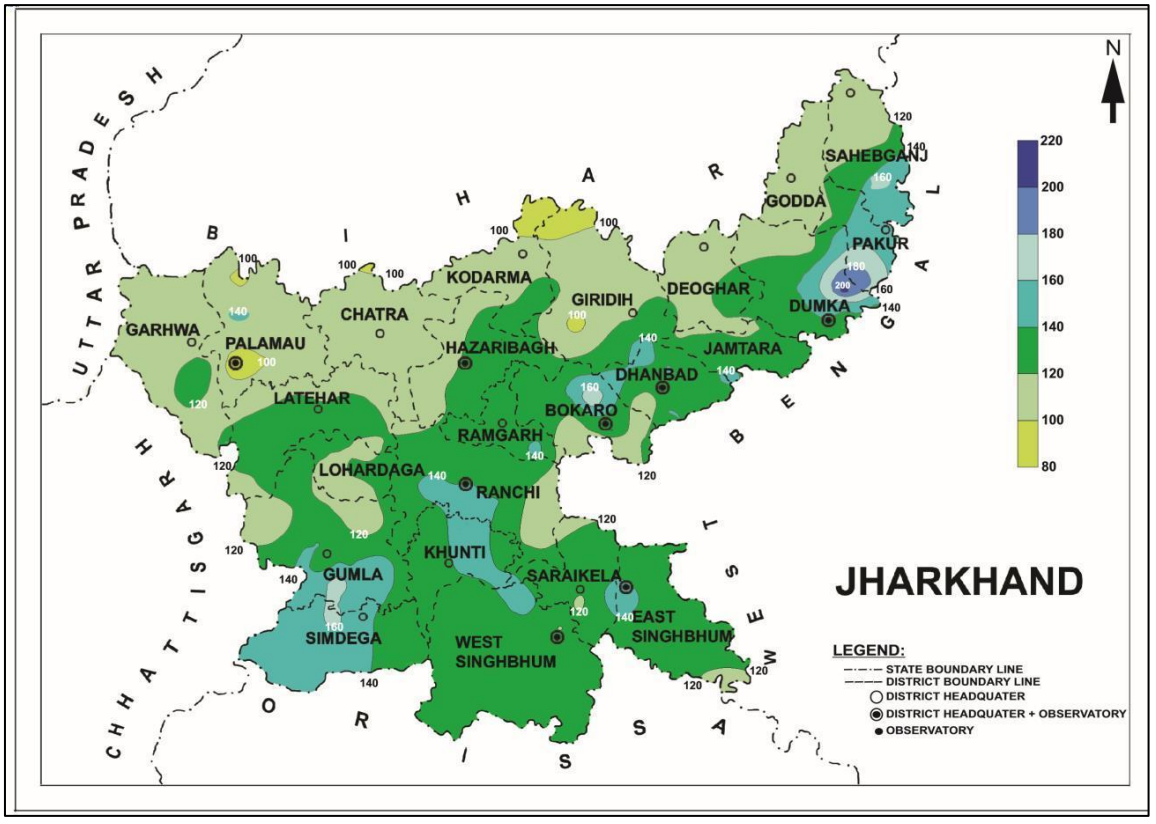


Figure-3: **Annual Normal Rainfall (cm) of Jharkhand State**

***Table-2*: District-wise Normal Rainfall of Jharkhand State**

Sl. No.	Name of the Districts	Normal Annual Rainfall (mm)	Normal Monsoon Rainfall (mm)
1.	Bokaro	1259.6	1040.2
2.	Chatra	1206.3	1061.3
3.	Deoghar	1220.7	993.3
4.	Dhanbad	1295.6	1074.7
5.	Dumka	1422.5	1125.6
6.	East Singhbhum	1403.4	1136.4
7.	Garhwa	1210.3	1047.7
8.	Giridih	1215.6	1024.2
9.	Godda	1084.1	883.6
10.	Gumla	1460.9	1208.5
11.	Hazaribagh	1251.2	1040.5
12.	Jamtara	1447.4	1182.5
13.	Khunti	1323.2	1086.4
14.	Koderma	1115.9	940.7
15.	Latehar	1237.2	1061.3
16.	Lohardaga	1194.3	985.3
17.	Pakur	1528.0	1215.3
18.	Palamau	1169.4	1014.5
19.	Ramgarh	1251.2	1040.5
20.	Ranchi	1323.2	1086.4
21.	Sahebganj	1410.6	1153.9
22.	Saraikela	1307.6	1068.7
23.	Simdega	1506.5	1317.0
24.	West Singhbhum	1351.6	

5.0 GROUND WATER LEVEL SCENARIO

5.1 UNCONFINED AQUIFER

5.1.1 Depth to Water Level May 2025

Depth to Water Level in Unconfined Aquifer (May 2025)

The analysis was conducted on the depth to water level data from 509 wells. The findings indicate that the water levels vary between 0.46 meters (in Gumla district) and 12.06 meters below ground level (bgl) (in East Singhbhum district). The map of depth to water level as of May 2025 (Figure 4) shows that areas with a depth to water level between 0-2 meters are limited, primarily found in parts of Khunti, Saraikela Kharsawan, Garhwa, Palamu, Gumla, Giridh, Bokaro, Deoghar, and patches within Godda district.

In contrast, 32% of the area is observed to have a depth to water level ranging from 2-5 meters, which includes parts of Dhanbad, Khunti, East and West Singhbhum, Palamu, Saraikela Kharsawan, Simdega, and smaller areas in Gumla and Godda districts.

Additionally, 62% of the state demonstrates a depth to water level in the range of 5-10 meters, covering regions in Hazaribagh, Chatra, Laterhar, Lohardaga, Deoghar, Jamatra, Dumka, Gumla, Garhwa, Ranchi, Bokaro, and Giridh districts (Figure 5).

Finally, areas with water levels between 10-20 meters below ground are found in small regions of Pakur, Chatra, Hazaribagh, and Garhwa districts. The deeper water levels may be attributed to temporal heavy ground water withdrawal and the pumping effect near the observation wells.

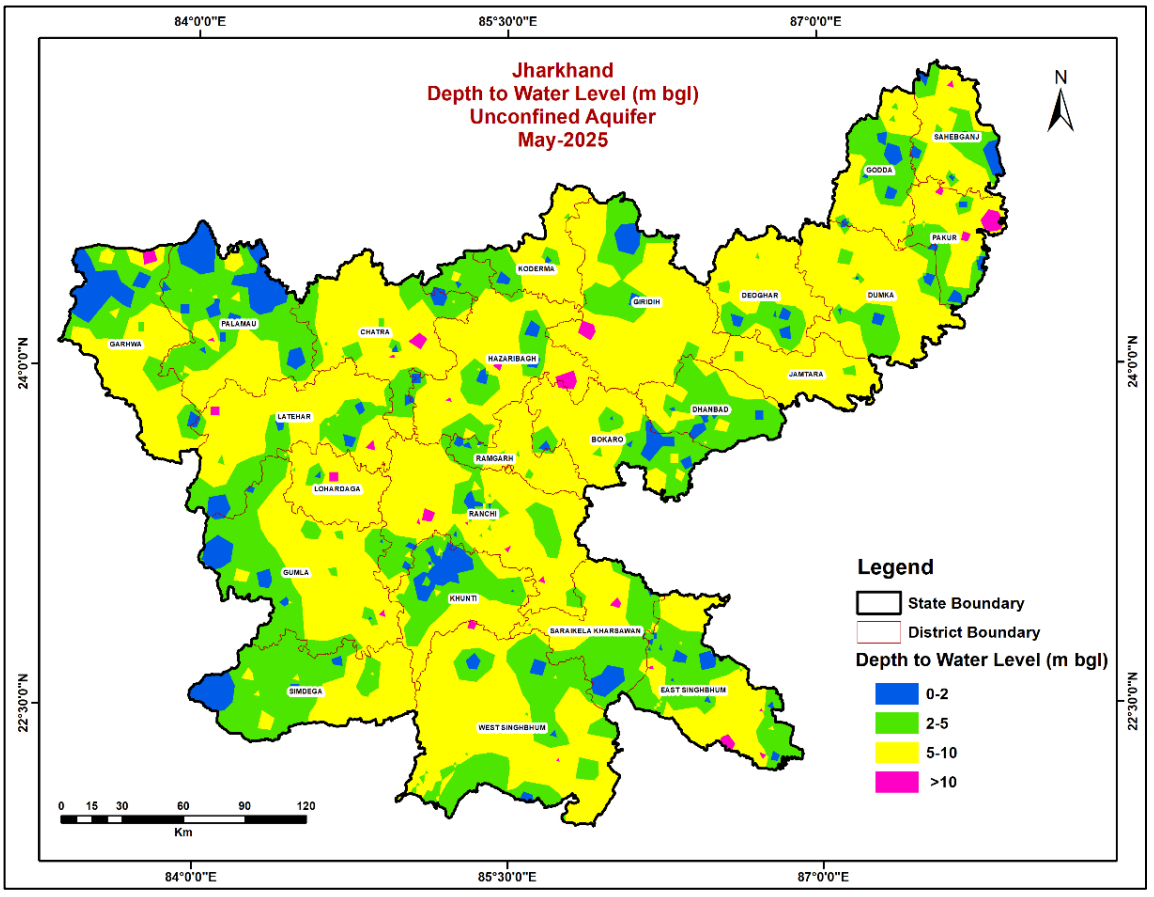


***Figure: 4*- Depth to water level map of Jharkhand (May-2025)**

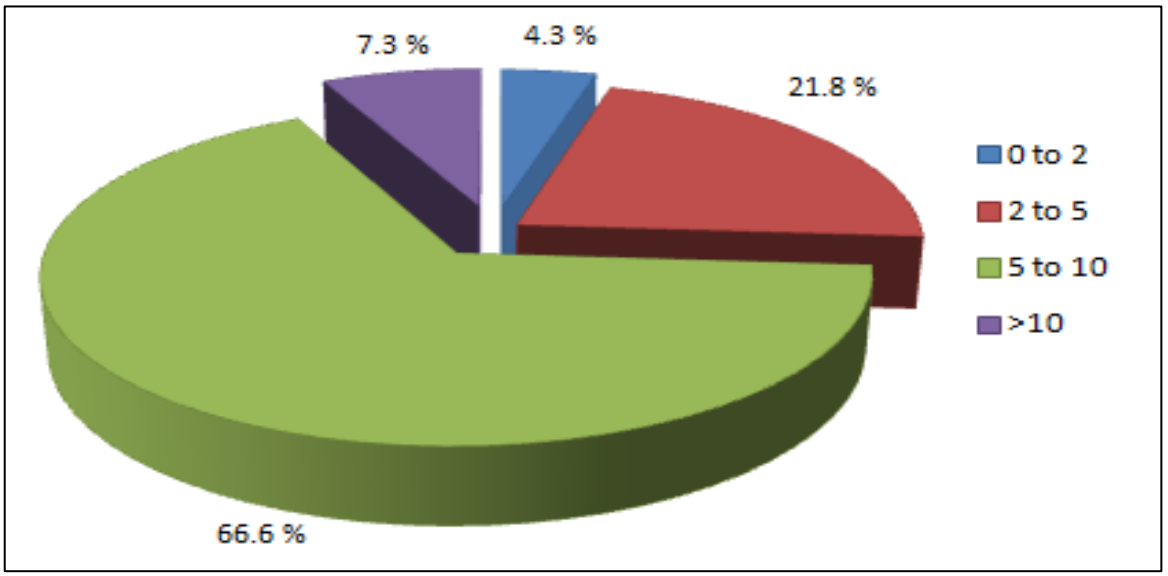


***Figure: 5*- percentage of wells in different water level ranges in unconfined aquifer**

5.1.2 SEASONAL FLUCTUATION IN WATER LEVEL

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

In Jharkhand state, 89% of the area shows a decline in water level, while 11% indicates rise when comparing the water levels from May 2025 to January 2025. ***(Figure-6).***

Fall in Water Levels:

Water level declines have been observed across almost all areas of the state, with the exception of some regions in the northeastern and southeastern parts. According to data from NHS wells, 54.4% have shown a water level decrease within the range of 0-2 meters, affecting 52% of the total area of the state. This includes the majority of districts such as Gumla, Simdega, Godda, Giridih, Deoghar, Dumka, Dhanbad, Garhwa, Hazaribagh, Sahebganj, and Bokaro.

In addition, water levels have fallen within the range of 2-4 meters in 21.8% of NHS wells, primarily in the western part of the state, which covers 23% of the total area. This trend is notably evident in districts such as Giridih, Bokaro, Ramgarh, and parts of West Singhbhum, Latehar, Garhwa, Jamtara, Dhanbad, Chatra, and Pakur.

Finally, a significant drop in water levels exceeding 4 meters has been recorded in only 4% of NHS wells, covering about 14% of the state's area. This severe decline is mainly concentrated in the Palamu, Lohardaga, and West Singhbhum districts, with additional some parts of Ranchi, Chatra, East Singhbhum, Jamtara, and Giridih district. ***(Figure-7).***

Rise in Water Levels:

Only 10% of the total area of the state has experienced rise in water levels. Among the monitored National Hydrogeological Survey (NHS) wells, only 15.6% have shown a rise of 0 to 2 meters, 2.9% have recorded a rise of 2 to 4 meters, and 1.2% have observed a rise of more than 4 meters. The rise of 0 to 2 meters has been noted in the districts of Koderma, Pakur, Sahibganj, East Singhbhum, West Singhbhum, Saraikela, and other smaller regions within the state. A rise in the range of 2 to 4 meters has been observed in parts of East Singhbhum, Sahibganj, and Dumka districts. A rise of more than 4 meters has been recorded in a small area of East Singhbhum district.

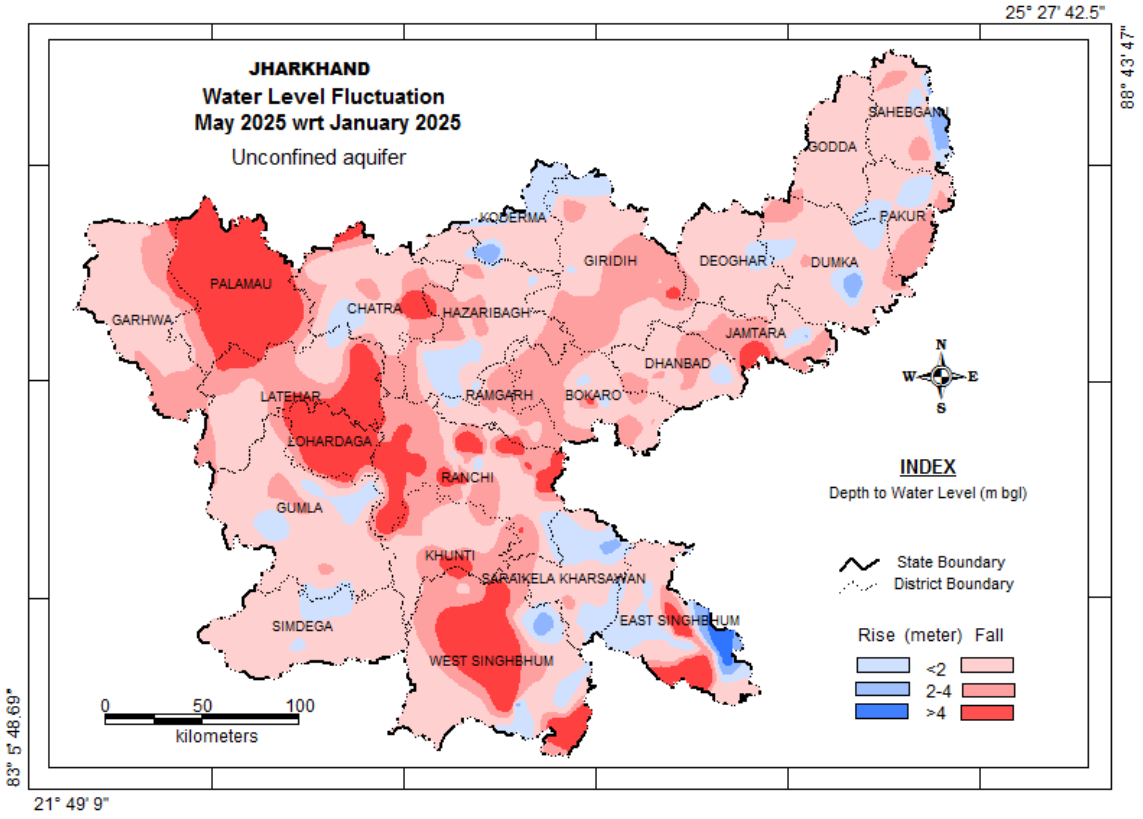


Figure 6: Water level fluctuation in unconfined Aquifer (May 2025 to January 2025)

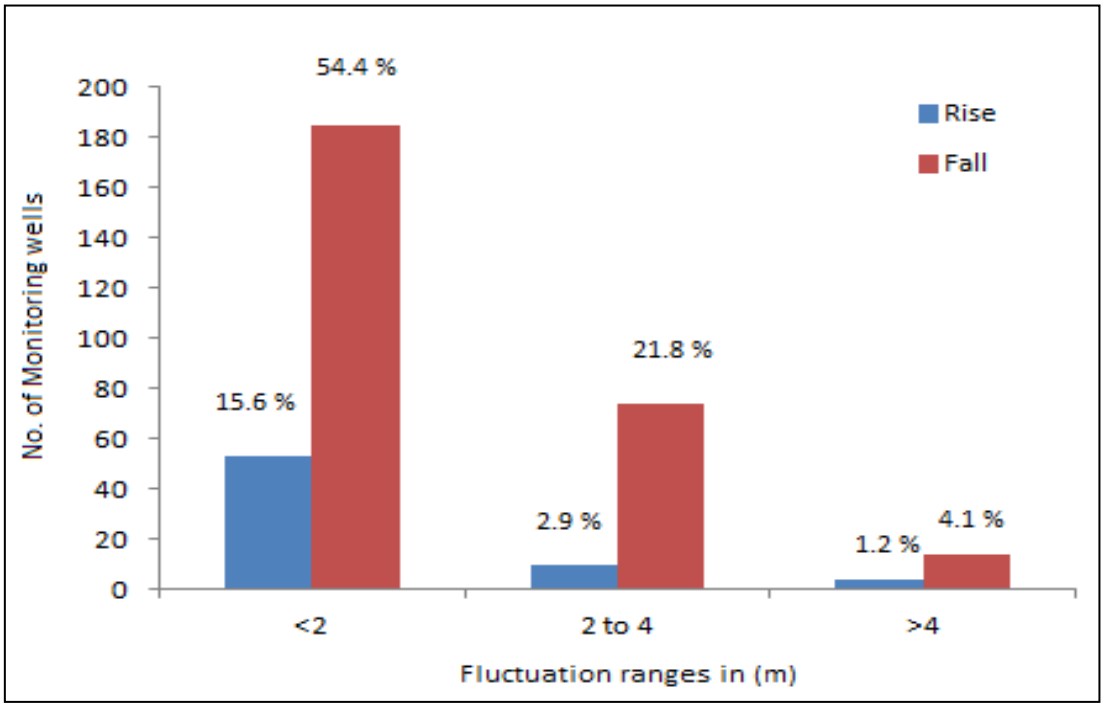


Figure 7: Percentage of wells showing rise and fall in water level in unconfined aquifer (May 2025 to January 2025)

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

There has been a water level decline observed in almost the entire state (99.69% of the total area) when comparing the water levels of May 2025 to those of August 2024. ***(Figure-8)***

Fall in Water Levels

Water level declines within the range of 0 to 2 meters have been observed in 19.8% of NHS wells, covering 5.65% of the area in parts of Deoghar, Dhanbad, Bokaro, East Singhbhum, and West Singhbhum districts, as well as some smaller regions of the state.

In contrast, 35.2% of NHS wells show water level declines ranging from 2 to 4 meters. These declines primarily recorded in the northeastern parts of the state, including significant areas of Sahibganj, Godda, Dumka, Deoghar, Giridih, Dhanbad, Bokaro, Chatra, Palamu, Gumla, and both East and West Singhbhum districts, covering a total of 50.14% of the area. (Figure 9.)

Finally, a decline of over 4 meters in water levels has been observed in 42.2% of NHS wells, predominantly in major portions of Hazaribagh, Giridih, Ramgarh, Pakur, Latehar, Ranchi, Gumla, and Simdega districts. Additional areas include parts of Palamu, Garhwa, East Singhbhum, West Singhbhum, Bokaro, Khunti, Jamtara, Koderma, and other smaller patches of the state, covering a total area of 43.9%.

Rise in Water Levels:

NHS wells have shown a rise in water levels within the ranges of 0 to 2 m(2%), 2 to 4 m (0.3%), and greater than 4 m(0.3%). This accounts for 0.39% of the total area of the state, which includes small patches in the Chatra, Deoghar, and East Singhbhum districts.

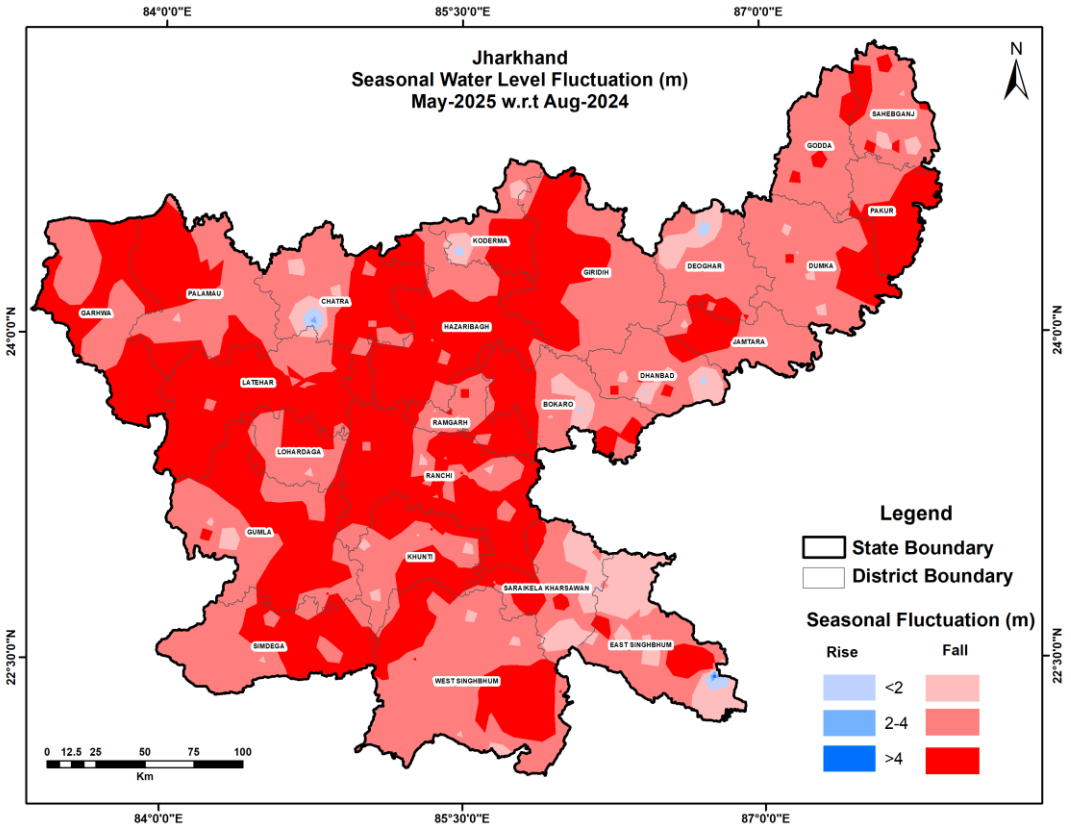


Figure8: Water level fluctuation in unconfined Aquifer (May2025 to August2024)

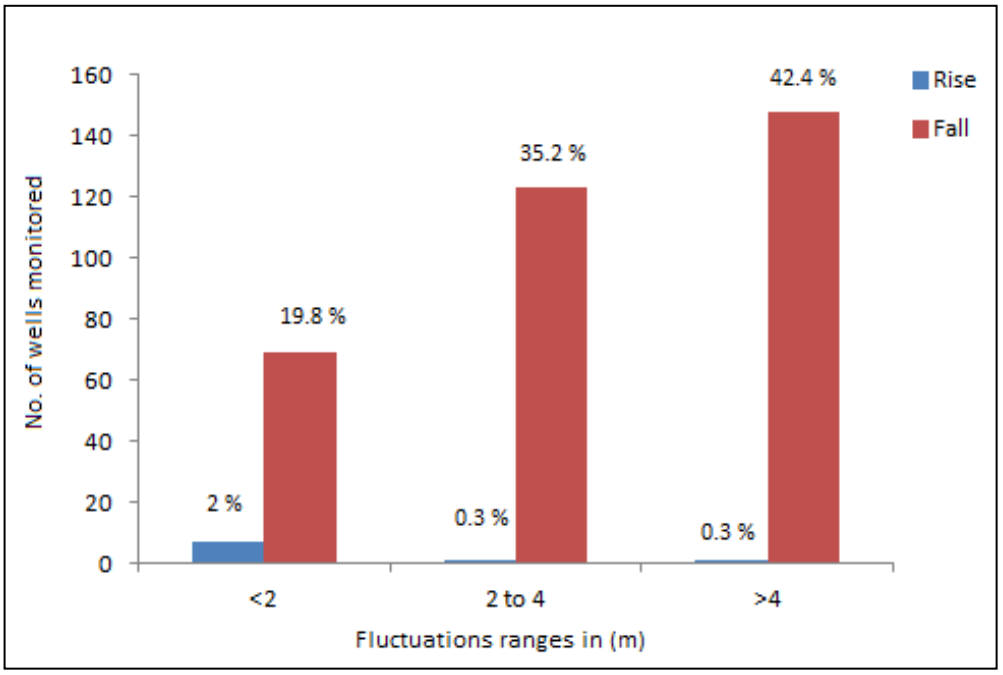


Figure 9: Percentage of wells showing rise and fall in water level in unconfined aquifer (May 2025 to August 2024)

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

99% of the state's area shows a water level decline when compared from May 2025 to the depth of water levels in November 2024. ***(Figure-10)***

Fall in Water Levels

Water level declines within the range of 0 to 2 meters have been observed in 27.68% of the National Hydrogeological Survey (NHS) wells. This range covers small areas in the districts of Deoghar, Dhanbad, Bokaro, East Singhbhum, West Singhbhum, Saraikela Kharsawan, Chatra, Palamu, and Garhwa, as well as some smaller patches that collectively cover 19% of the state.

Furthermore, 40.2% of NHS wells indicate a water level decline within the range of 2 to 4 meters. This decline is evident in nearly the entire state, with the exception of parts of East Singhbhum, West Singhbhum, Dumka, Sahebganj, Godda, Garhwa, Palamu, Ranchi, Hazaribagh, Latehar, and Chatra districts, along with some smaller areas, accounting for around 67% of the state. ***(Figure-11)***

Additionally, a water level decline of more than 4 meters has been observed in 25.7% of NHS wells, affecting around 13% area of the state. This significant decline is particularly noticeable in major parts of Hazaribagh, Latehar, and Ranchi districts, as well as portions of Giridih, Jamtara, East Singhbhum, West Singhbhum, Khunti, Gumla, Chatra, and Palamu districts, alongside some other areas of the state.

Rise in Water Levels:

Only 5.77% of NHS wells have shown a rise in water levels within the range of 0 to 2 meters, and 0.7% have shown a rise of more than 4 meters. This represents a very small area covering only Chatra, Dumka, Kodrema, East Singhbhum, and West Singhbhum districts, accounting for just 1% of the total area. Additionally, there are no wells that have recorded a rise in water levels within the range of 2 to 4 meters.

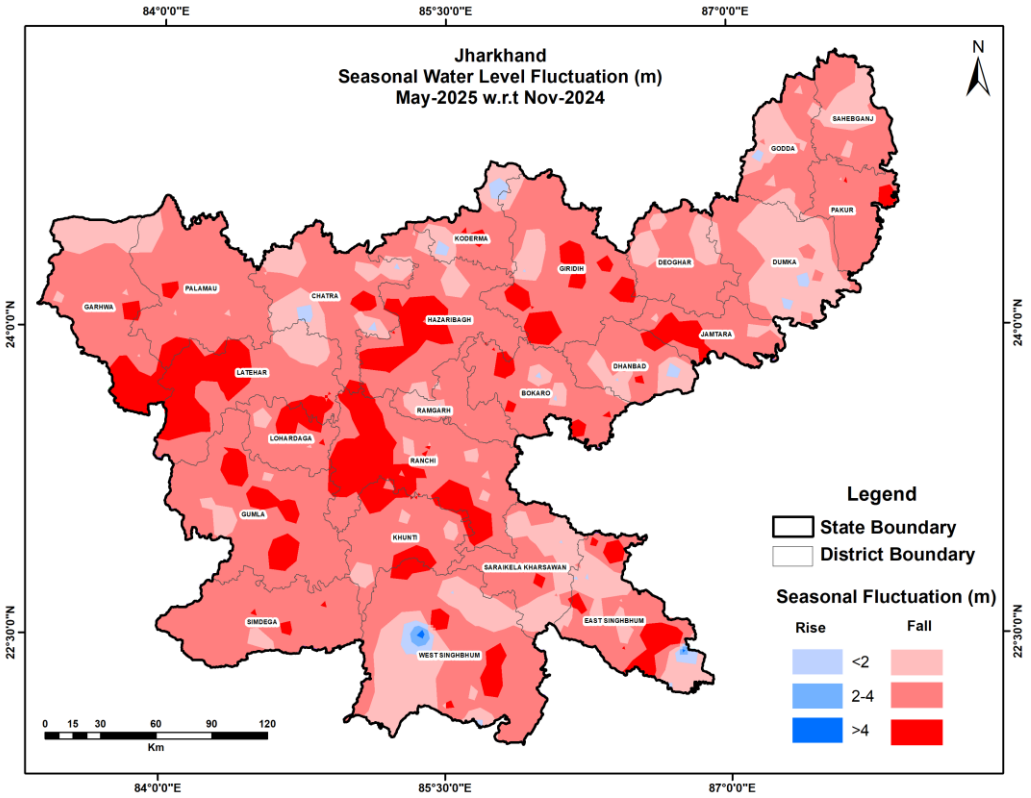


Figure 10: Water level fluctuation in unconfined Aquifer (May 2025 to Nov 2024)

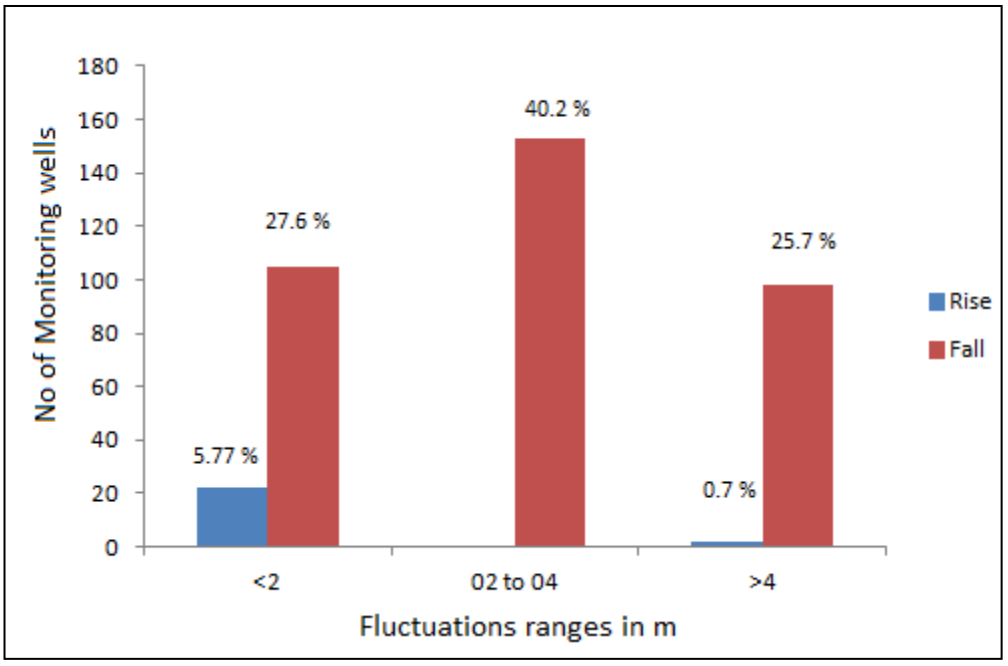


Figure 11: Percentage of wells showing rise and fall in water level in unconfined aquifer (May 2025 to November 2024)

5.1.3 ANNUAL FLUCTUATION IN WATER LEVEL

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

Out of 362 wells analyzed for annual fluctuations in water levels, a rise in water level was observed in 236 wells, a fall was noted in 120 wells, and no change was recorded in 6 wells.

Rise in Water Levels:

Water level rise within the range of 0 to 2 meters has been observed in 56.9% of NHS wells, covering 56% of the area in the districts of Giridih, Koderma, Deoghar, Dhanbad, Bokaro, Dumka, Khunti, East Singhbhum, Latehar, Palamu, Ranchi, Garhwa, and parts of West Singhbhum, Simdega, Chatra, Jamtara, Lohardaga, Godda, Gumla, Pakur, Sahebganj, Ramgarh, and Saraikela. A water level rise in the range of 2 to 4 meters has been recorded in 7.7% of NHS wells, covering 5% of the area in parts of Hazaribagh, East Singhbhum, Latehar, Palamu, and Garhwa districts. Additionally, a water level rise of more than 4 meters has been observed in 2.2% of NHS wells, which represents a very small part of the Hazaribagh, East Singhbhum, Latehar, and Palamu districts, covering only 1% of the state's total area. (***Figure 12),*** (***Figure 13)***

Fall in Water Levels:

A water level decline of between 0 and 2 metres has been observed in 28.4% of NHS wells, which covers 33% of the state's total area. This decline includes major parts of the Gumla, Simdega, West Singhbhum, and Ramgarh districts. Additionally, a decline of 2 to 4 metres has been recorded in small regions of the Pakur, Sahebganj, Jamtara, Chatra, Gumla, Saraikela, Simdega, and West Singhbhum districts, covering 4% of the area. Furthermore, only 1.2% of NHS wells have shown a decrease of more than 4 metres, which has occurred in parts of the Saraikela, Jamtara, and Pakur districts, accounting for 1% of the state area. (***Figure 12),*** (***Figure 13)***

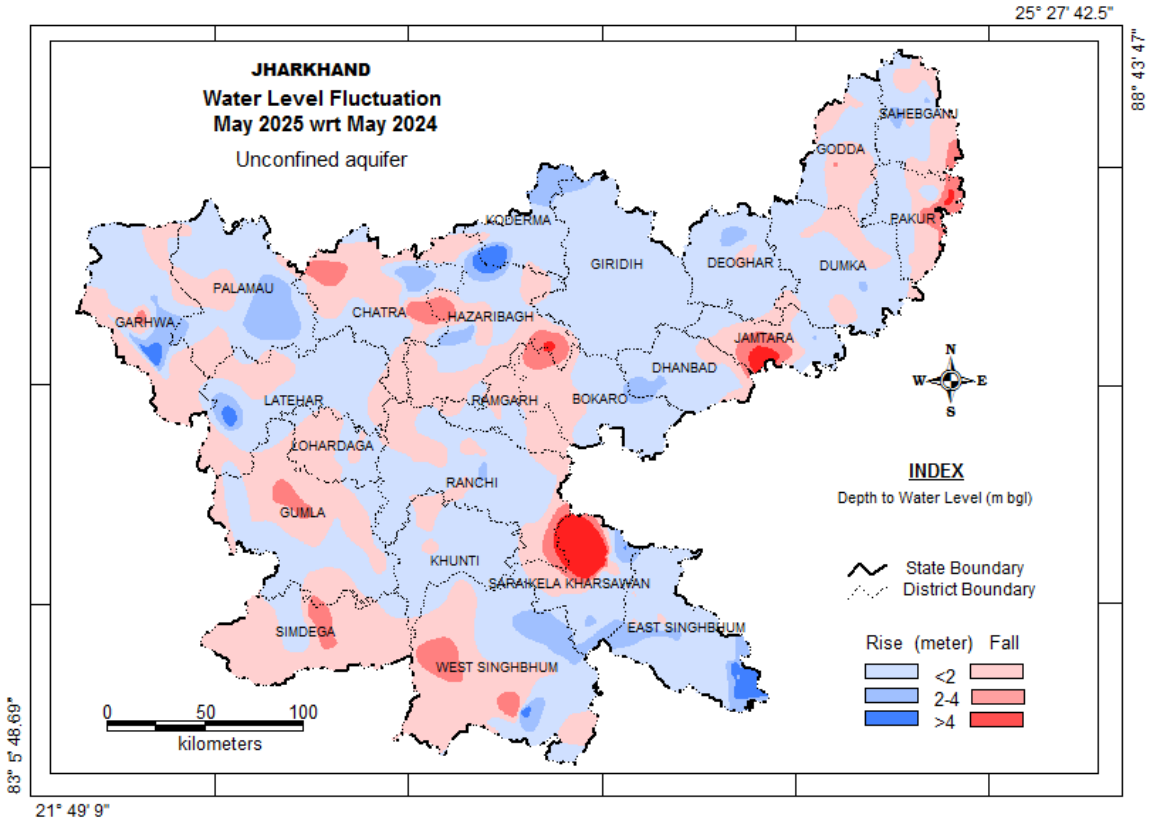


Figure 12: Annual water level fluctuation in unconfined aquifer (May 2025 to May 2024)

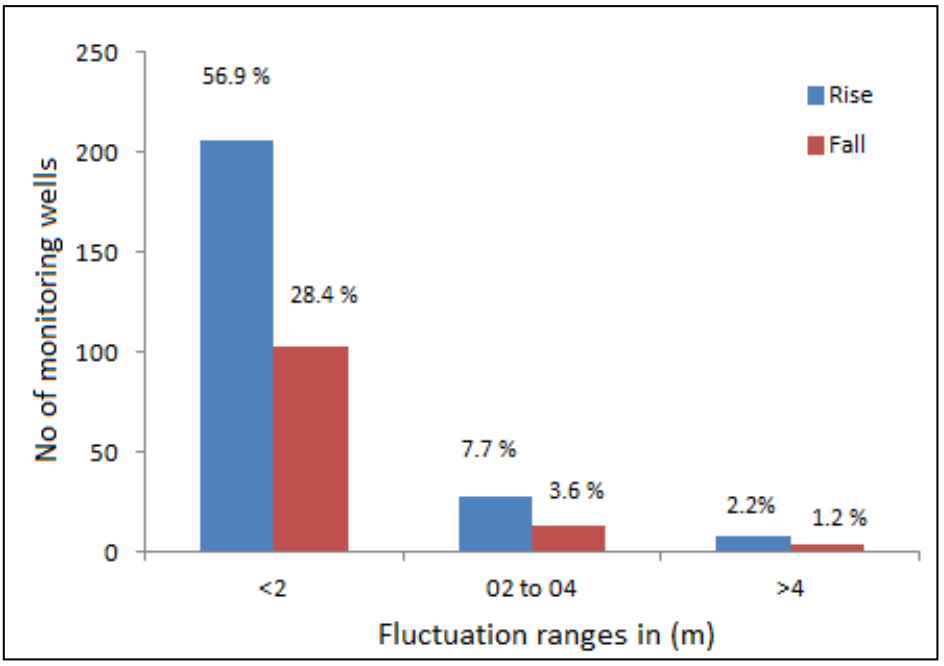


Figure 13: Percentage of wells showing rise and fall in water level in unconfined aquifer (May 2025 to May 2024)

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

Out of 317 wells analyzed for annual fluctuations in water levels, of May 2025 with respect to May 2023, a rise in water level was observed in 210 wells, a fall was noted in 107 wells.

Rise in Water Levels:

Water level rise within the range of 0 to 2 meters has been observed in 48.5% of NHS wells, covering 56% of the area in the districts Godda, Dumka, Giridih, Dhanabd, Bokaro, Ranchi, Saraikela, E Singhbhum, W Singhbhum, Khunti, Simdega, Gumla, Latehar, Hazaribagh, Koderma, Palamu and Garhwa district. This increase may be attributed to the frequent rainfall experienced in May 2025. A water level rise in the range of 2 to 4 meters has been recorded in 13.24% of NHS wells, covering 11% of the area in parts of Hazaribagh, Chatra, Garhwa, Khunti, E Singhbhum and W Singhbhum and some other parts of the state. Minor part of Garhwa, Khunti, E Singhbhum W SInghbhum and Hazaribagh district covering only 2% of area of the state shows water level rise more than 4 m. this range of water level recorded in 4.4% of wells. (***Figure 13),*** (***Figure 14)***

Fall in Water Levels:

A water level decline of between 0 and 2 metres has been observed in 26.8% of NHS wells, which covers 26% of the state's total area. This decline includes major parts of the Chatra, Palamu, Hazaribagh, Bokaro, Sahebganj, w Sinfhbhum, Simdega and some other parts of the state. Additionally, a decline of 2 to 4 metres has been recorded in small regions of the Pakur, Pakur, Jamtara and Chatra districts, covering 3% of the area. Furthermore, only 2.5% of NHS wells have shown a decrease of more than 4 meters, which has occurred in parts of the Pakur, Dhanbad, Jamtara, Bokaro and Chatra districts, accounting for 2% of the state area. (***Figure 13),*** (***Figure 14)***

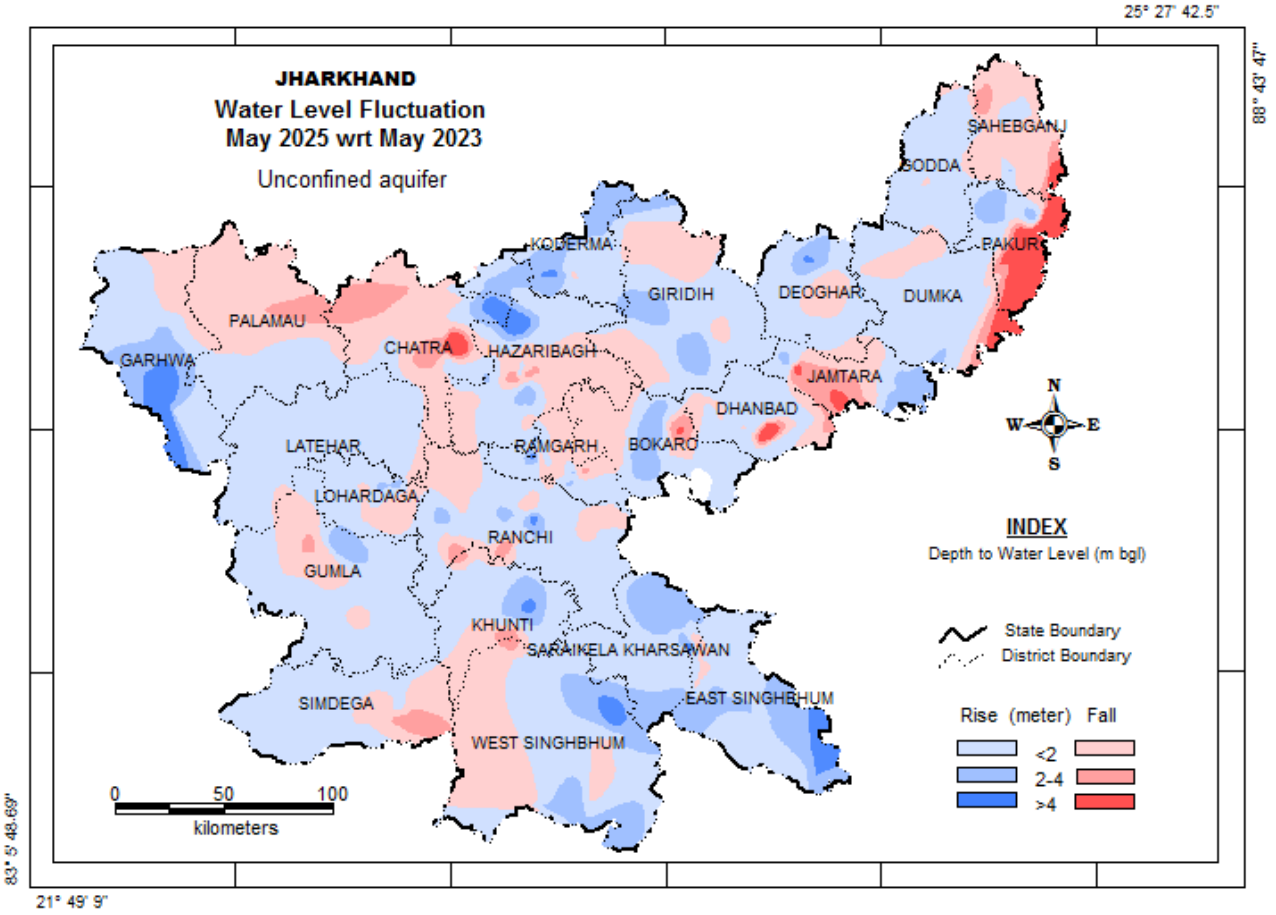


Figure 13: Annual water level fluctuation in unconfined aquifer (May 2025 to May 2023)

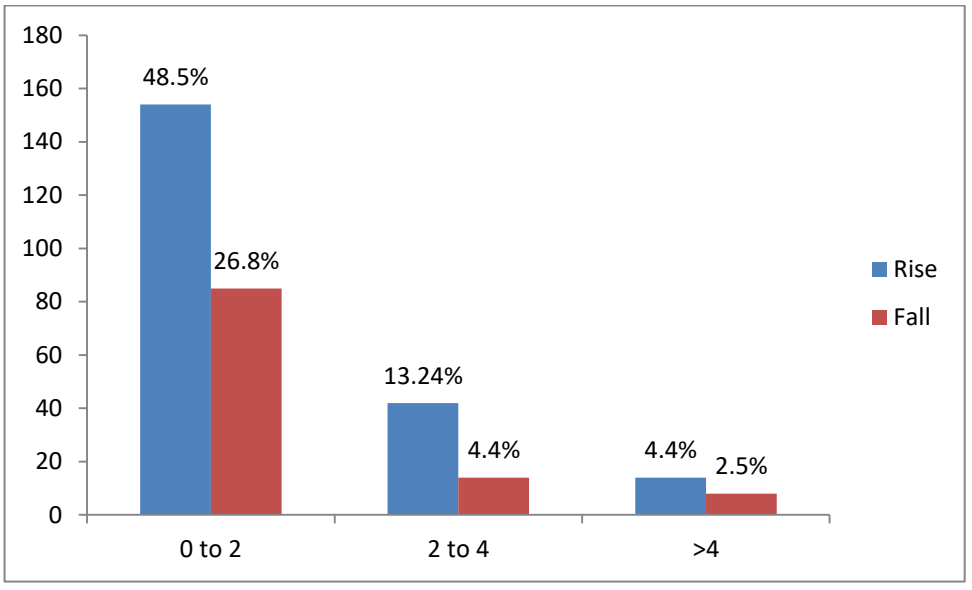


Figure 14: Percentage of wells showing rise and fall in water level in unconfined aquifer (May 2025 to May 2023)

5.1.4 DECADAL FLUCTUATION IN WATER LEVEL

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

In Jharkhand, 59% of the total area has experienced a rise in water level, while 41% has seen a decline when compared to May 2025 with the decadal mean from May 2015 to May 2024.

Rise in Water Levels:

Water level rise between 0 and 2 meters have been observed in 46.8% of NHS wells, which encompass major parts of Deoghar, Giridih, Dhanbad, Bokaro, Koderma, East Singhbhum, Latehar, Palamu, Simdega, and certain areas in Dumka, Godda, Pakur, Ranchi, Khunti, Hazaribagh, Koderma, and Gumla districts. This represents about 51% of the total area of the state. Additionally, rises in water level ranging from 2 to 4 meters have been recorded in 9.1% of NHS wells, while an increase of more than 4 meters has been noted in 2.7% of these wells. A 2 to 4 meter rise has been observed in 7% of the area, particularly in parts of Giridih, Koderma, Hazaribagh, East Singhbhum, West Singhbhum, Saraikela Kharsawan, Chatra, Palamu, Garhwa, and Khunti districts, along with other regions of the state. Areas where water levels have risen by more than 4 meters are limited to small sections of Pakur and Chatra districts, covering only 1% of the total area of the state.(***Figure 15),*** (***Figure 16)***

Fall in Water Levels:

Water level decline within the range of 0-2 meters have been observed in 34% of NHS wells. This primarily covers the middle and north eastern parts of the state, impacting major areas in the Dumka, Ranchi, Ramgarh, and Chatra districts, as well as parts of Garhwa, Palamu, and Gumla districts. Together, these areas account for 37% of the total state area. A decline of water levels between 2 to 4 meters has been noted in 6.4% of NHS wells, covering only 4% of the total area of the state. This includes regions in Saraikela Kharsawan, West Singhbhum, Bokaro, Chatra, Gumla, Hazaribagh, and Pakur districts, along with some smaller areas. Finally, a decline of over 4 meters in water levels has been observed in just 1% of NHS wells, limited to very small portions of Pakur and Chatra districts.(***Figure 15),*** (***Figure 16)***

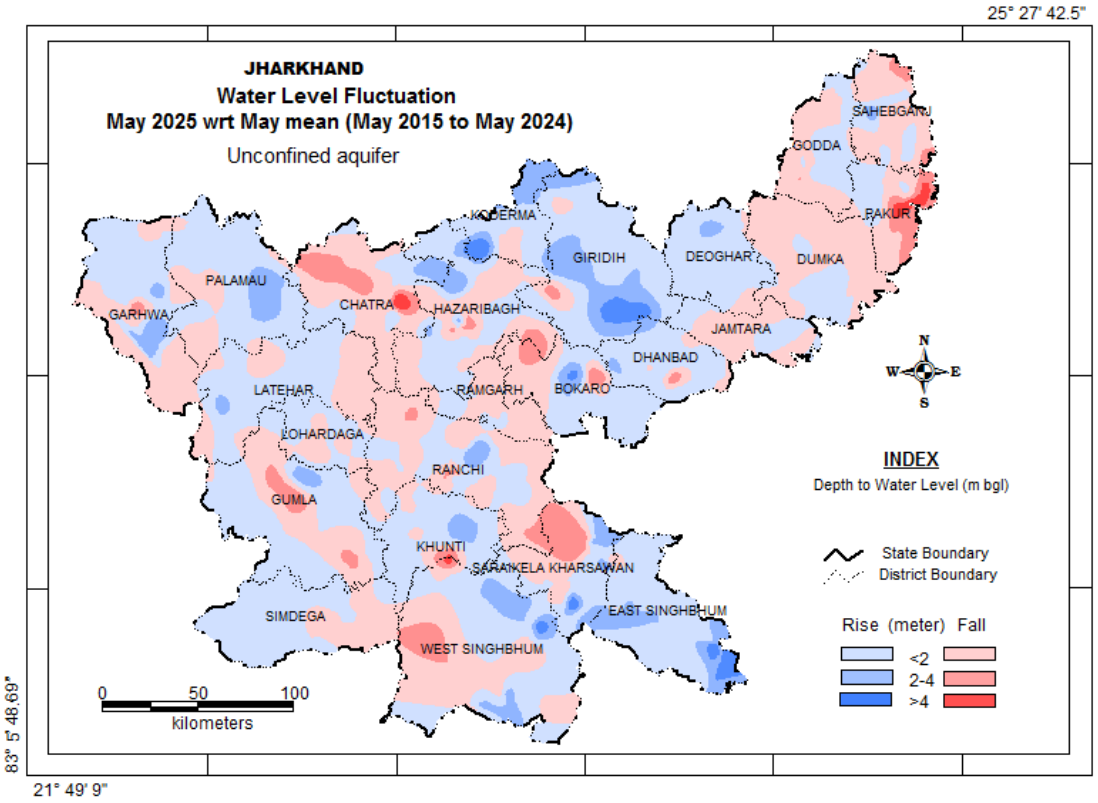


Figure 15: Decadal water level fluctuation in unconfined Aquifer (May 2025 to Decadal Mean May (2015-2024)

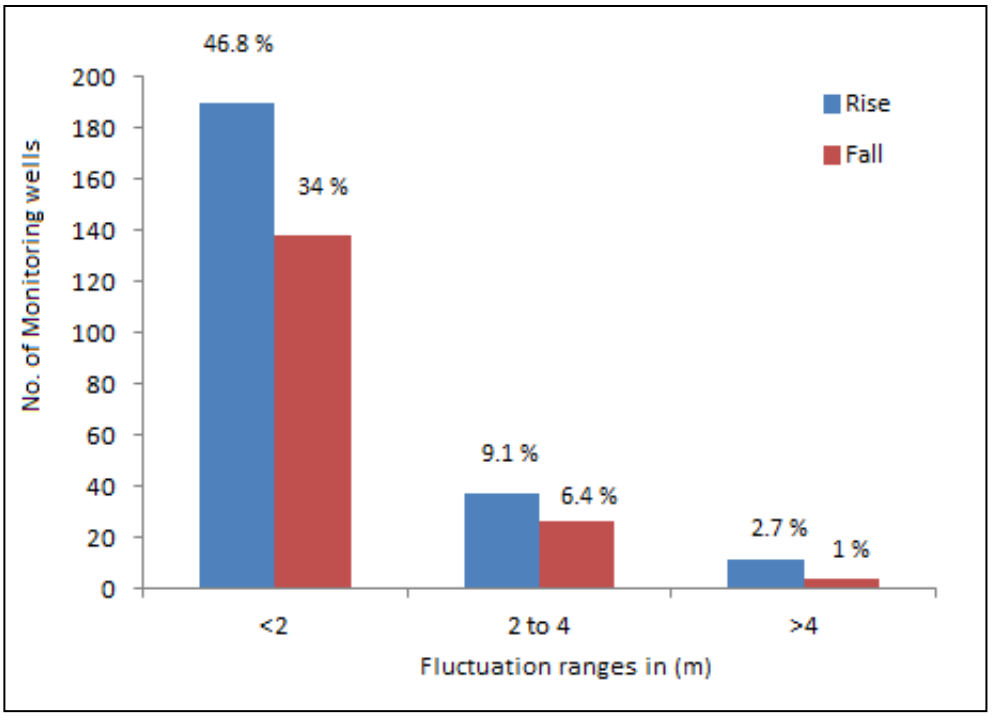


Figure 16: Percentage of wells showing rise and fall in water level in unconfined aquifer (May 2025 wrt mean May (2015 -2024))

6.0 SUMMARY

As part of the National Ground Water Monitoring Programme, the Central Ground Water Board, State Unit Office, Ranchi conduct quarterly monitoring for studying the groundwater conditions in Jharkhand. This monitoring takes place in January(recession period of WL), pre-monsoon in May, for monsoon period in August, and post-monsoon in November.

The groundwater regime monitoring for May 2025, which included 509 National Hydrograph Stations (NHS) across Jharkhand, revealed that 66% of the NHS wells in unconfined aquifers recorded water levels between 5 to 10 meters below ground level (bgl). This range covers a significant portion of the state, with exceptions in some areas in the west, south, and other locations. Additionally, 21.8% of the NHS wells showed water levels between 2 to 5 meters bgl, while 7.3% recorded levels greater than 10 meters, and 4.3% had levels between 0 to 2 meters bgl. Shallower water levels were observed in parts of Simdega, Gumla, Garhwa, Palamu, East Singhbhum, West Singhbhum, Dhanbad, and some other areas. In contrast, deeper water levels were found in the middle and northeastern parts of the state.

In May 2025, an analysis of seasonal fluctuations revealed that 80.3%, 93.53%, and 97.4% of total NHS wells experienced a decline in water levels when compared to January 2025, November 2024, and August 2024, respectively. This trend indicates a recession period following the monsoon season, affecting a significant portion of the state. In contrast, only a small percentage of NHS wells—19.7%, 6.47%, and 2.6% when compared to January 2025, November 2024, and August 2024, respectively—showed an increase in water levels, attributed to early monsoon and other factors.

The annual fluctuation data indicates that 65% of the NHS wells show a rise in water levels, covering 62% of the total area of the state. In contrast, 33% of the NHS wells exhibit a decrease in water levels, while the remaining wells show no change. The decrease in water levels affects 38% of the total area.

Regarding decadal fluctuations, 59% of the total area indicates a rise in water levels, while 41% reflects a decline. The majority of the areas reporting an increase in water levels ranging from 0 to 2 meters.

The observed rise in water levels, both annually and over the past decade, suggests that a substantial amount of rainfall throughout the year has recharged the unconfined aquifer across the entire state of Jharkhand.

7.0 RECOMMENDATIONS

All the analytical data and maps indicate that although water levels are declining compared to previous seasons (January 2025, November 2024 and August 2024), they are increasing compared to the previous year and over the past decade during the pre-monsoon season major part of Jharkhand state. In regions where water levels have risen, proper water conservation plans should be developed in consultation with line departments. Meanwhile, in areas where water levels are deeper and showing a declining trend as on May 2025, appropriate local recharge structures should be constructed to store water during the monsoon season. It is also essential to promote the responsible use of groundwater.

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