GROUND WATER LEVEL BULLETIN
MAY 2024
JHARKHAND

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 pumpage 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. The regime monitoring started in the year 1969 by Central Groundwater Board. A network of 25437 observation wells called National Hydrograph Network Stations (NHNS), as on 30.04.2024, located all over the country is being monitored.

2.0 STUDY AREA

Jharkhand state, was created on 15th November, 2000, consists of districts falling on Chotanagpur Plateau of erstwhile Bihar on the birthday of legendary tribal freedom fighter Birsa Munda. Presently it consists of 24 districts and 260 administrative blocks. The capital of the state is Ranchi. The state spreads over 79714 sq km, between Latitude 21º 55' 00" and 25º 15' 00" and Longitude 83º 15' 00"and 87º 55' 00". The state is bounded by Bihar in the north and by West Bengal in the east. The other two sides, west and south, are bounded by Chhattisgarh and Orissa states respectively (Fig.1).

The population of the state as per 2011 census is 03.30 crore. The population density is 414 person/km2. The urban population is 7.912 million and the rural

population is 25.05 million. The tribal population constitutes about 28% of total population. The state is moderately urbanized with Ranchi as its capital city. Nearly 24% of total population of the state lives in urban areas. Important urban centers are in the state are Jamshedpur, Dhanbad, Hazaribagh, Daltonganj, Dumka and Deoghar.

Fig 1: Administrative Map of Jharkhand

3.0 GROUND WATER LEVEL MONITORING

Central Ground Water Board, State Unit Office Ranchi, is monitoring changes in groundwater regime in Jharkhand 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 March 2024 was 582 which include 460 dug wells and 122 piezometers (Fig 2). In May 2024, 562 wells monitored (458 DW, 104 Pz, out of which 49 wells were dry), while 25 wells (9 dug wells and 16 piezometers) could not be monitored due to various reasons like inaccessibility, filled up, installation of pump units, road damaged, gate locked, etc. . The district-wise breakup of the waterlevel monitoring stations is given in **Table-1**.

Table-1: District-wise distribution of water level monitoring stations of Jharkhand

SR. No.	District	Number of Water Level Monitoring Stations				
		2022	2023	2024		
		Total	Total	DW	PZ	Total
1	Bokaro			16	1	17
2	Chatra			17	4	21
3	Deoghar			11	5	16
4	Dhanbad			20	4	24
5	Dumka			17	7	24
6	E. Singhbhum			36	3	39
7	Garhwa			23	8	31
8	Giridih			18	4	22
9	Godda			19	3	22
10	Gumla			17	3	20
11	Hazaribagh			28	10	38
12	Jamtara			11	5	16
13	Khunti			14	6	20
14	Koderma			7	6	13
15	Latehar			12	6	18
16	Lohardaga			12	2	14
17	Pakur			11	4	15
18	Palamu			25	7	32
19	Ramgarh			17	6	23
20	Ranchi			56	12	68
21	Sahibganj			21	3	24
22	Saraikela			14	1	15
23	Simdega			14	7	21
24	W Singhbhum			24	5	29
	Total			**460**	**122**	**582**

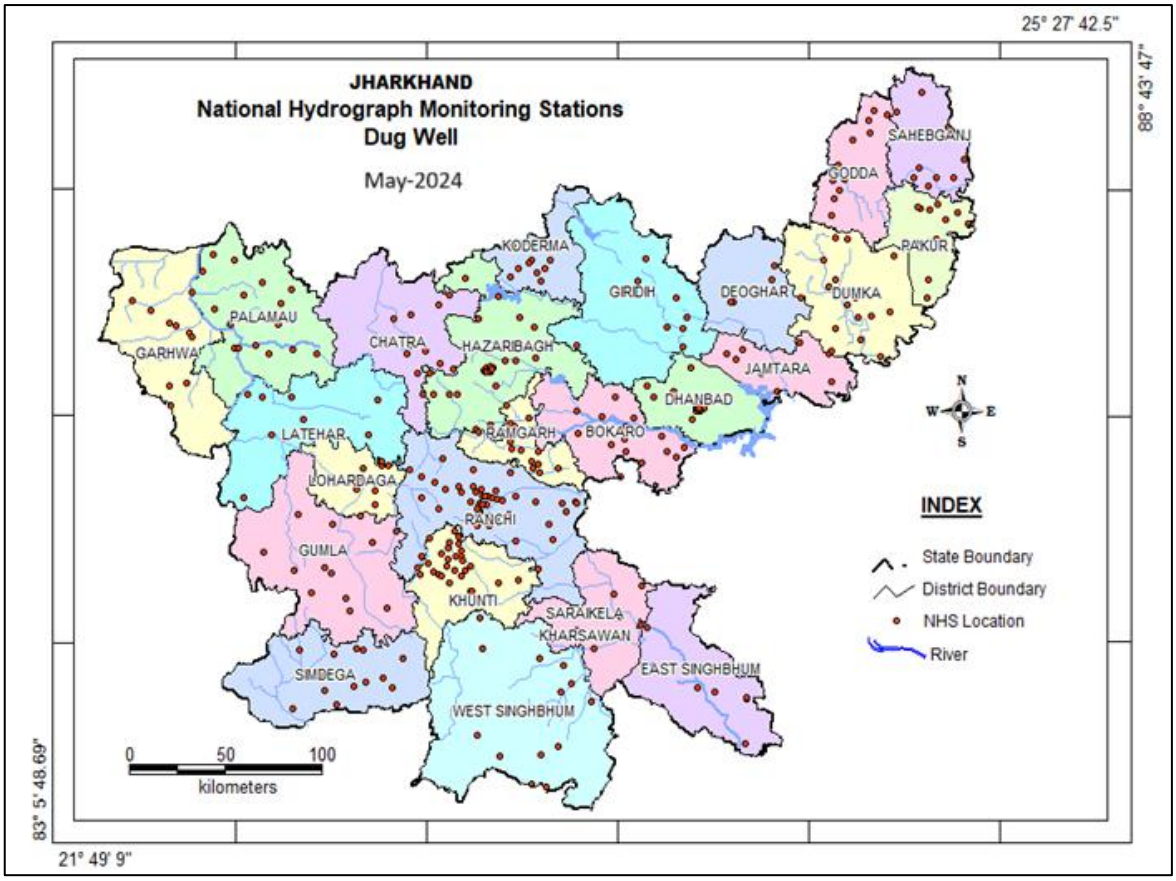

Figure-2: Map showing location of National Hydrograph Monitoring Stations of Jharkhand

5.0 GROUND WATER LEVEL SCENARIO (MAY 2024)

5.1 SHALLOW AQUIFER (UNCONFINED)

5.1.1 DEPTH TO WATER LEVEL

Depth To Water Level in Unconfined Aquifer (May 2024)

The depth to water level of 424 wells is used for the analysis. Analysis of depth to water level data of 424 wells shows water levels vary between 0.82 m bgl (Kasir, Gumla district) to 16.1 m bgl (Chakulia, E Singhbhum district). Water level of less than 2 m bgl is recorded in 2.1 % of wells, between 2 to 5 m bgl in 17% of wells, between 5 to 10 m bgl in 66.7% of wells, between 10 to 20 m bgl in 14.2 % of wells.

Shallow water level of less than 2 m bgl is found in Chatra, Gumla, Dhanbad, Purba Singbhum, Saraikela, east Singhbhum districts covering 2.1% of state . Water level of

2 to 5 m bgl is observed Bokaro, Chatra, Dhanbad, Dumka, E Singhbhum, Garhwa, Godda, Gumla, Hazaribagh, Jamtara, Khunti, Pakur, Palamu, Ramgarh, Ranchi, Sahebganj, Saraikela, Simdega, W Singhbhum districts covering an area of 17% of state. Depth to water level of 5 to 10 m bgl is observed throughout the state covering an area of 66.7% of State with significant area in Ranchi. Water level of 10 to 20 m bgl is covered in 14.2% of the State area.

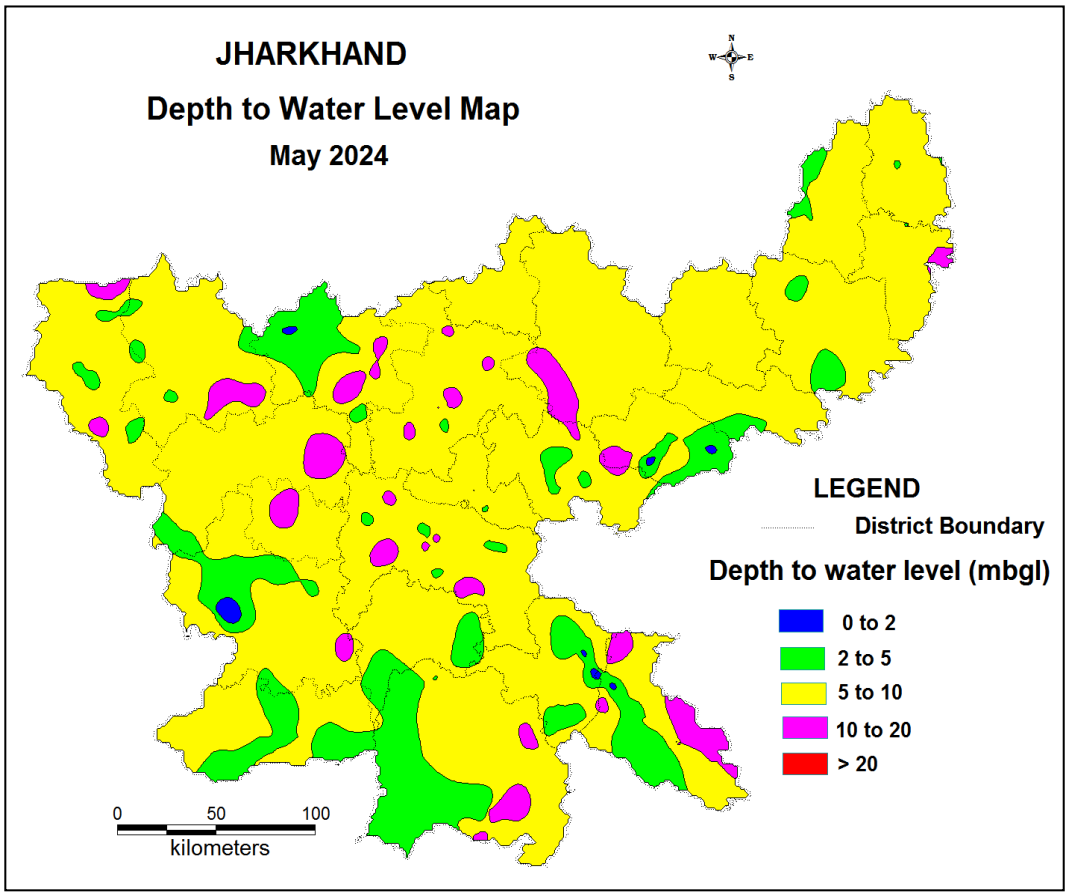

Figure-3: Pre-monsoon (May-2024) Depth to water level map of Jharkhand

5.1.2 SEASONAL FLUCTUATION IN WATER LEVEL

Seasonal Fluctuation of Water Level in Unconfined Aquifer (May 2024 to November 2023)

350 wells used for analysis for seasonal fluctuation (May 2024 to November 2024 in unconfined aquifer. 24 wells found to be rising and 326 wells falling.

Rise in Water Levels:

water level rise of less than 2 m is recorded in 50% of wells, 2 to 5 m in 12.5% wells, 5 to 10 m in 12.5% wells and more than 10 m in 25% of wells Water level rise of less than 2 m is seen significantly in Dhanbad, Bokaro, Pakur, Ramgarh, Dumka, Lohardaga, Sahibganj, Purba Singbhum districts. Water level rise of 2 to 5 m is observed mainly in Jamtara, Chatra and Hazaribag districts. Rise of 5 to 10 m and more than 10 m is significantly observed in koderma and Jamtara districts.

Fall in Water Levels:

Out of 326 wells that have registered fall in water levels, 27.3% have recorded less than 2 m while 57.67% in the range of 2 to 5 m and remaining 15.03% wells registered water level fall of more than 5 m. Fall of less than 2 m and 2 to 5m and more than 5m is mainly observed in all 24 districts of the state .

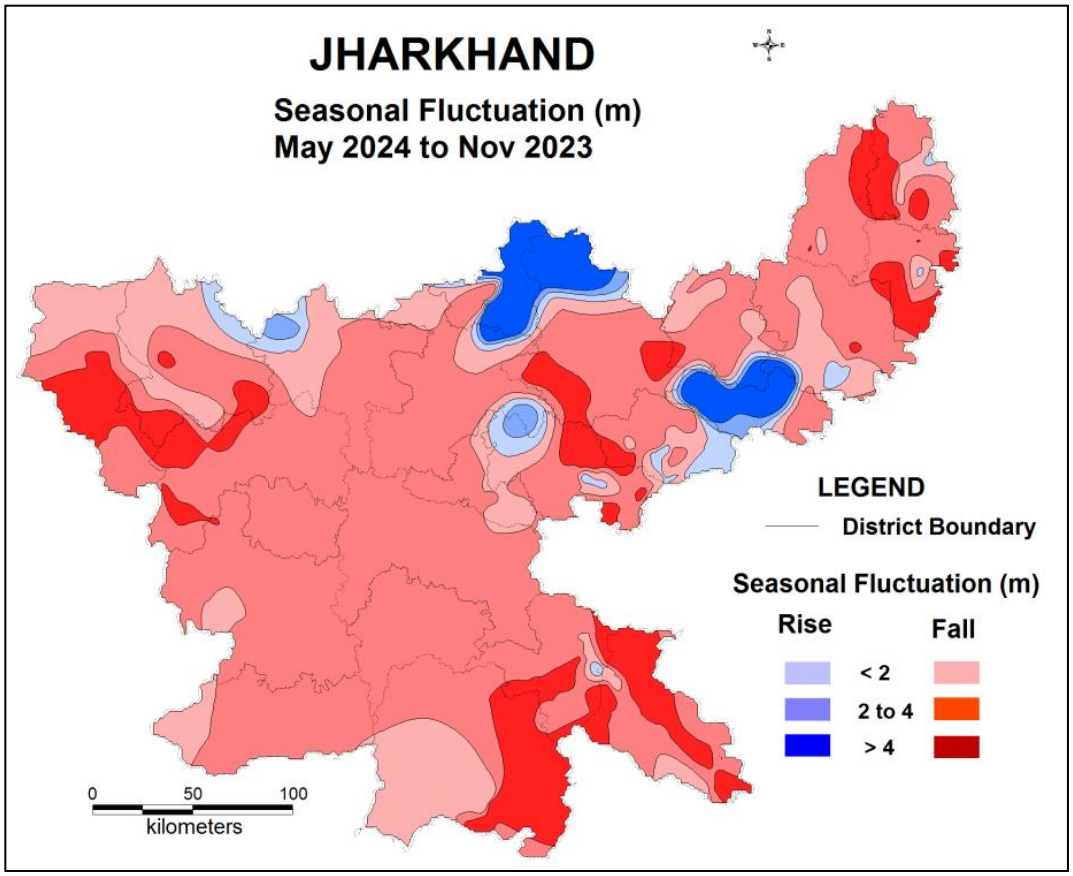

Figure 4: Seasonal water level fluctuation in unconfined Aquifer (May 2024 to November 2023)

5.1.3 ANNUAL FLUCTUATION IN WATER LEVEL

Annual Fluctuation of Water Level in Unconfined Aquifer (May 2024 to May 2023)

321 wells used for analysis for annual fluctuation (May 2024 to May 2023 in unconfined aquifer. 170 wells found to be rising and 148 wells falling and 3 wells is showing no change in water level.

Rise in Water Levels:

Out of 170 wells, water level rise of less than 2 m is recorded in 83% wells, 2 to 4 m in 13% wells and more than 4 m in 4% of the wells. Water level rise of less than 2 m is seen in all the districts. Water level rise of 2 to 4 m is observed mainly in districts such as, Chatra, Giridih, Godda, Gumla, Hazaribag, Jamtara, Khunti, Latehar, Lohardaga, Pakur, Purba Singbhum, Ramgarh, Ranchi, Saraikela, Simdega districts. Rise of more than 4 m is significantly observed in Gumla, Hazaribag, Pakur, Palamau, Paschim Singbhum, Purba , Singbhum, Saraikela districts.

Fall in Water Levels:

Out of 148 wells that have registered fall in water levels, 76% have recorded less than 2 m while 18% in the range of 2 to 4 m and remaining 6% wells registered water level fall of more than 4 m. Fall of less than 2 m is observed in all districts of Jharkhand. Fall of 2 to 4 m is observed mainly in Dhanbad, Chatra, Dumka, Giridih, Gumla, Hazaribag, Khunti, Pakur, Palamau, Paschim Singbhum, Purba Singbhum, Ranchi, Sahibganj districts. Fall of beyond 4 m is observed in Dhanbad, Pakur, Simdega, Sahibganj, Chatra, Bokaro, Jamtara districts.

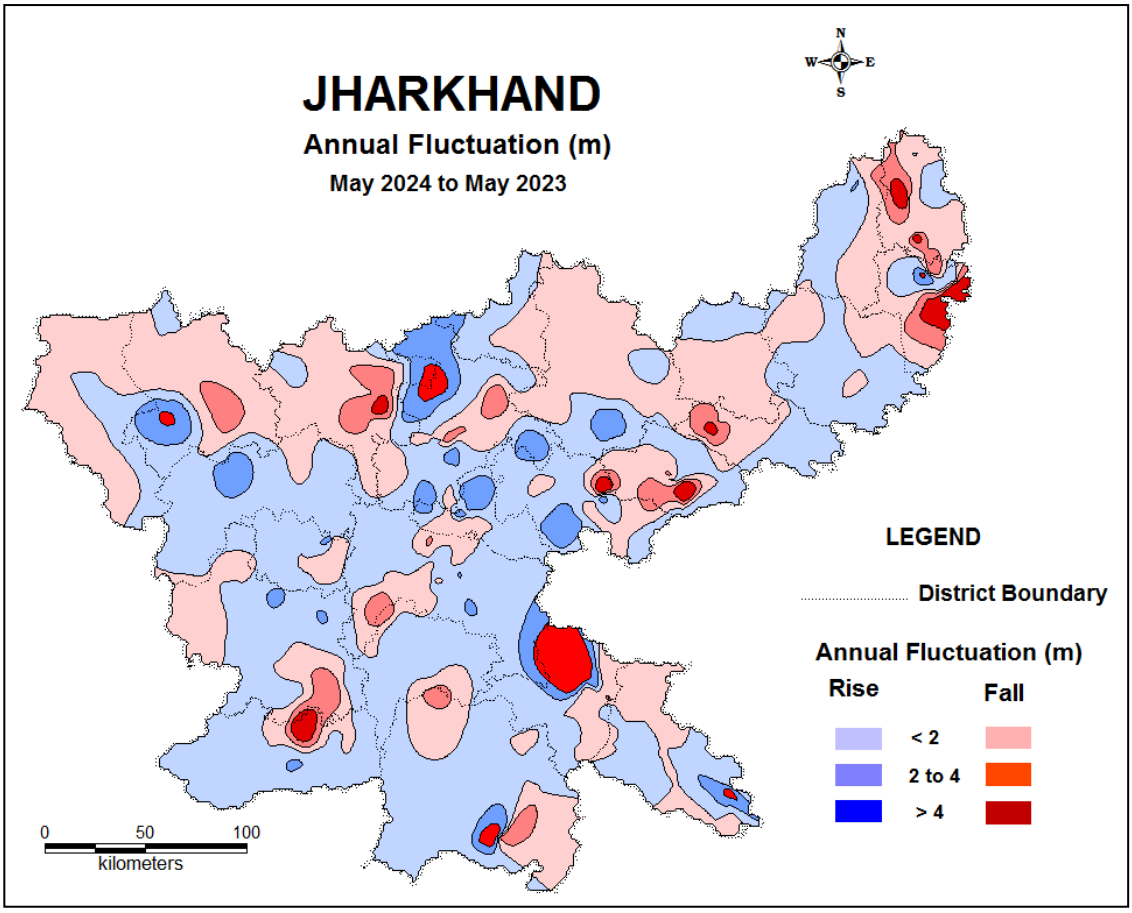

Figure 5 : Annual water level fluctuation in unconfined aquifer (May 2024 to May 2023)

5.1.4 DECADAL FLUCTUATION IN WATER LEVEL

Decadal Fluctuation of Water Level in Unconfined Aquifer(Decadal Mean May (2014-2023) to May 2024)

Rise in Water Levels:

Out of 87 wells, water level rise of less than 2 m is recorded in 84% wells, 2 to 4 m in 11% wells and more than 4 m in 5% of the wells. Water level rise of less than 2 m is seen in almost all the districts. Water level rise of 2 to 4 m is observed mainly in Hazaribag, Bokaro, Dhanbad, Giridih, Khunti, Paschim Singbhum, Simdega districts and rise of more than 4 m is significantly observed in Gumla, Chatra, Giridih, Saraikela districts.

Fall in Water Levels:

Out of the 117 wells that have registered fall in water levels, 82% have recorded less than 2 m while 16% in the range of 2 to 4 m and remaining 2% wells registered water level fall of more than 4 m. Fall of less than 2 m is observed in almost all districts of the state. Fall of 2 to 4 m, recorded in Hazaribag, Bokaro,

Chatra, Devghar, Dumka, Giridih, Jamtara, Palamau, Paschim Singbhum, Sahibgani, Saraikela districts. Fall beyond 4 mis recorded mainly in Bokaro and Hazaribag districts.

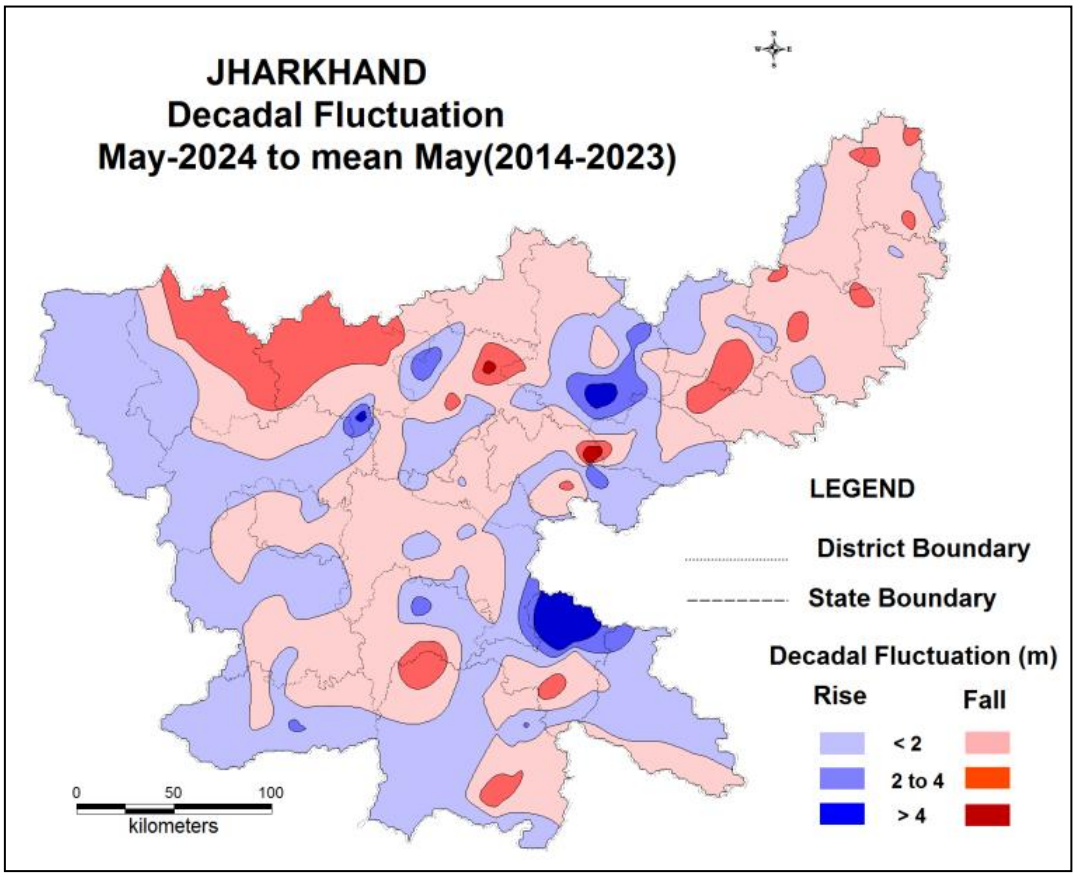

Figure 6: Decadal water level fluctuation in unconfined Aquifer (May 2024 to Decadal Mean May (2014-2023))

5.2 DEEPER AQUIFER (CONFINED/ SEMI-CONFINED)

5.2.1 DEPTH TO PIEZOMETRIC LEVEL

Depth To Piezometric Head in Confined/Semi-Confined Aquifer(May 2024)

Analysis of piezometric level data of 64 wells shows piezometric levels vary between 2.85 m.bgl (Chapri, purba singhbhum district) to 31.9m bgl (Manjhladih, Pakurdistrict). No Piezometric level of less than 2 m bgl is recorded, 5% of wells shows piezometric level between 2 to 5 m bgl, between 5 to 10 m bgl in 53% of wells, between 10 to 20 m bgl in 34% of wells and piezometric level between 20-40 m bgl is recorded in 8% of wells.

There is no water level recorded in less than 2 mbgl in confined/semi confined aquifer. Piezometric level of 2 to 5 m, bgl mainly observed in Purba Singhbhum,

Devghar, Sahibganj districts. Piezometric level of 5 to 10 m bgl is recorded in Chatra, Devghar, Giridih, Jamtara, Pakur, Purba Singhbhum, Dhanbad, Dumka, Gharwa, Godda, Gumla, Hazaribag, Khunti, Koderma, Latehar, Lohardaga, Palamu, Paschim Singhbhum, Ramgarh, Ranchi, Sahibganj, Saraikela, Simdega, districts. Piezometric level of 10 to 20 m bgl is recorded in Chatra, Devghar, Giridih, Pakur, Dhanbad, Dumka, Gharwa, Godda, Koderma, Latehar, Palamu, Ramgarh, Ranchi, Sahibganj, Simdega, districts. Deeper piezometric levels of more than 20 m mainly observed in Dumka, Pakur, Latehar districts.

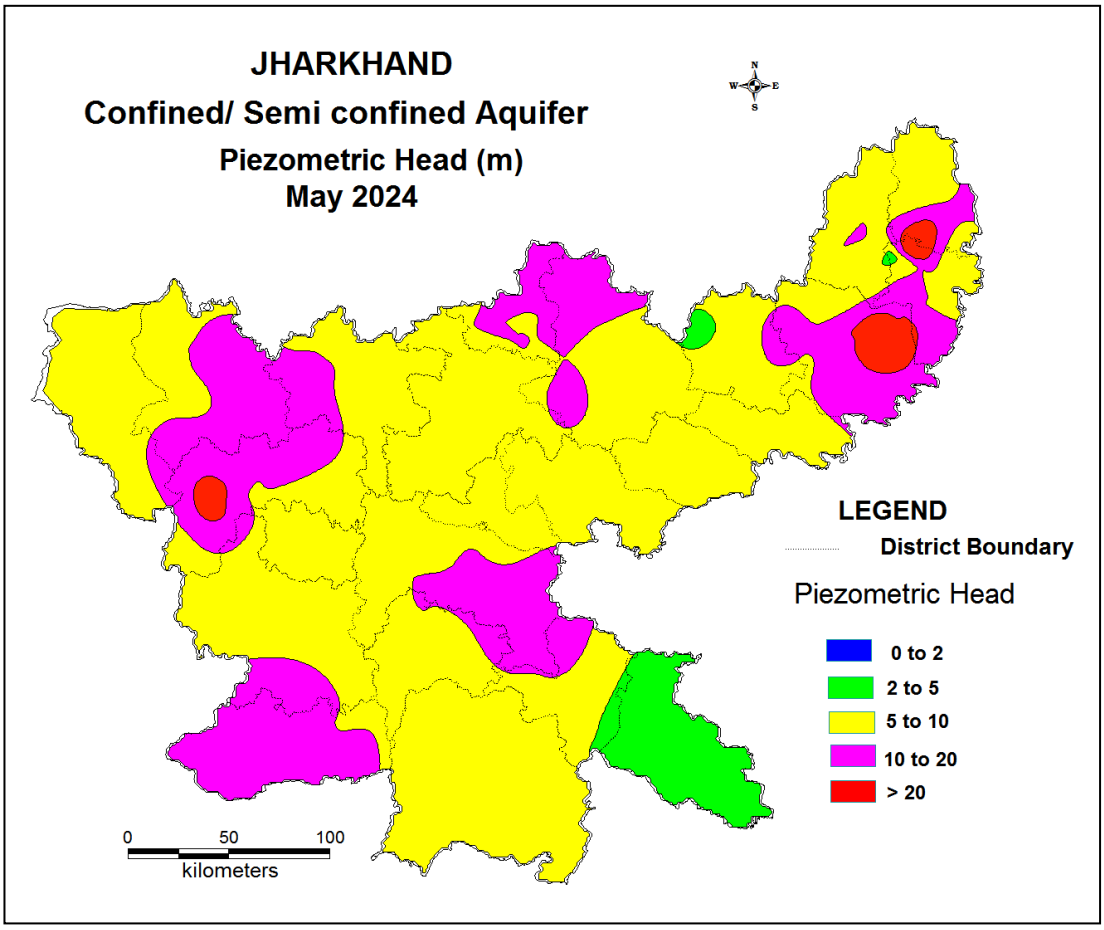

Figure-7: Piezometric head (May-2024) of confined/semi confined aquifer of Jharkhand

5.2.2 SEASONAL FLUCTUATION IN PIEZOMETRIC LEVEL

Seasonal Fluctuation of Piezometric Level in Confined/ Semi-Confined Aquifer (May 2024 to November 2023)

64 wells used for analysis for seasonal fluctuation (May 2024 to November 2023 in confined/semi confined aquifer. 7 wells found to be rising and 57 wells falling.

Rise in Piezometric Levels:

Out of 7 wells that have registered rise, piezometric level of less than 2 m is recorded in 71% wells, there is no well recorded in 2 to 4 m and 29% of the wells is being recorded in more than 4 m . Piezometric level rise of less than 2 m is seen in Pakur, Ramgarh, Dumka, Hazaribag districts. Piezometric level rise of more than 4 m is significantly observed in Simdega and Giridih districts.

Fall in Piezometric Levels:

Out of 57 wells that have registered fall in piezometric levels, 37% have recorded less than 2 m while 40% in the range of 2 to 4 m and remaining 23% wells registered piezometric level fall of more than 4 m. Fall of less than 2 m is mainly observed in Chatra Devghar, Jamtara, Pakur, Dhanbad, Dumka, Khunti, Purba Singhbhum, Koderma, Latehar, Palamu, Ramgarh, Ranchi, Sahibganj districts.

Fall of 2 to 4 m is observed mainly in Devghar Dumka, Dhanbad, Giridih, Godda, Gumla, Khunti, Paschim Singhbhum, Garhwa, Ranchi, Latehar, Simdega, Kodarma, Lohardaga,Palamu, Sahibganj districts.

Fall of beyond 4 m is observed in Dumka, Dhanbad, Pakur, Giridih, Purba Singhbhum, Garhwa, Saraikela, Ranchi, Latehar, Simdega.

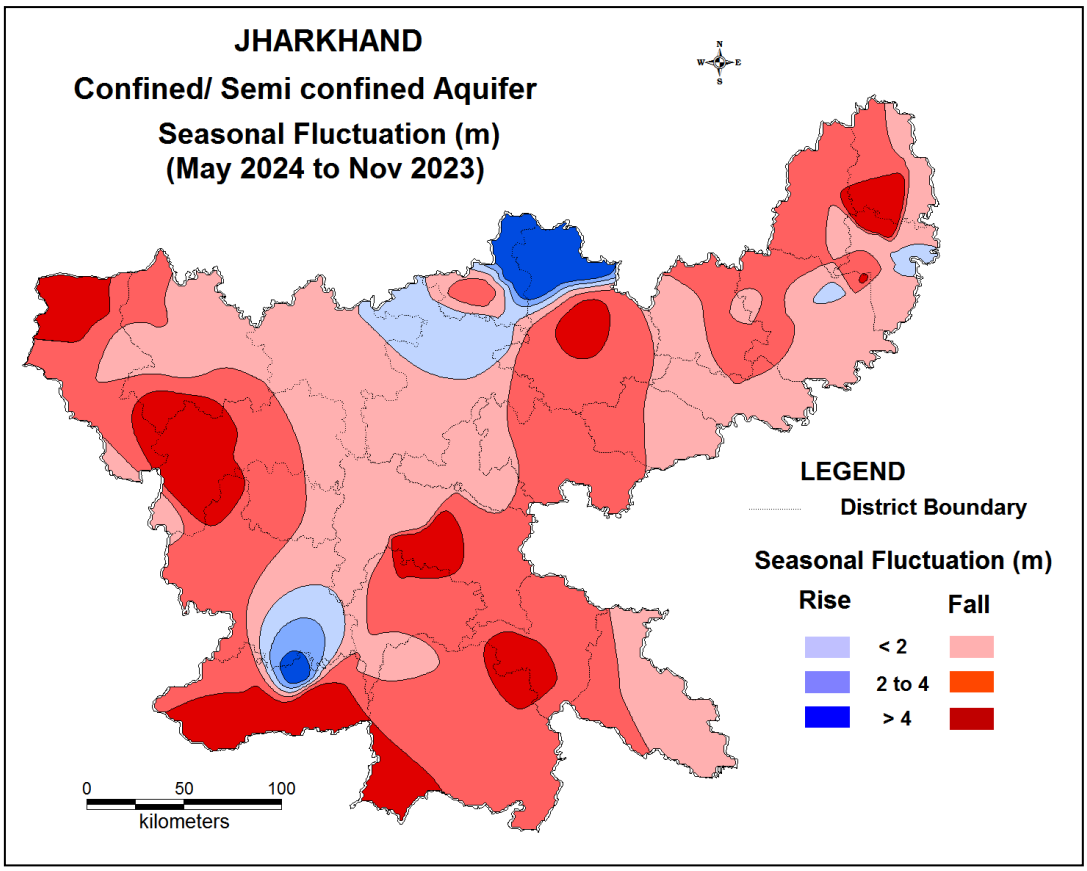

Figure 8: Seasonal water level fluctuation in confined/semi-confined Aquifer (May 2024 to Nov 2023)

5.2.3 ANNUAL FLUCTUATION IN PIEZOMETRIC LEVEL

Annual Fluctuation of Piezometric Level in Confined /Semi- confined Aquifer (May 2023 to May 2024)

85 wells used for analysis for annual fluctuation (May 2024 to May 2023 in confined/semi confined aquifer. 38 wells found to be rising and 47 wells falling.

Rise in piezometric levels:

Out of 38 wells, piezometric level rise of less than 2 m is recorded in 79% wells, 2 to 4 m in 5% wells and more than 4 m in 16% of the wells. Piezometric level rise of less than 2 m is seen in almost all the districts. Piezometric level rise of 2 to 4 m is observed mainly in Latehar, Sahebganj districts . Rise of more than 4 m is significantly observed in Pakur, Hazaribag, Latehar, Ramgarh, Simdega districts.

Fall in Piezometric Levels:

Out of 47 wells that have registered fall in piezometric levels, 68% have recorded less than 2 m while 21% in the range of 2 to 4 m and remaining 11% wells registered piezometric level fall of more than 4 m. Fall of less than 2 m is mainly observed in Chatra Devghar, Giridih, Jamtara, Pakur, Dhanbad, Dumka, Khunti, Purba Singhbhum, Koderma, Latehar, Palamu, Ranchi, Simdega, Hazaribag, Gumla, Garhwa, districts.

Fall of 2 to 4 m is observed mainly in Chatra, Jamtara, Dumka, Garhwa, Ranchi, Palamu, Paschim Singhbhum districts.

Fall of beyond 4 m is observed in Dumka, Giridih, Purba Singhbhum, Ranchi.

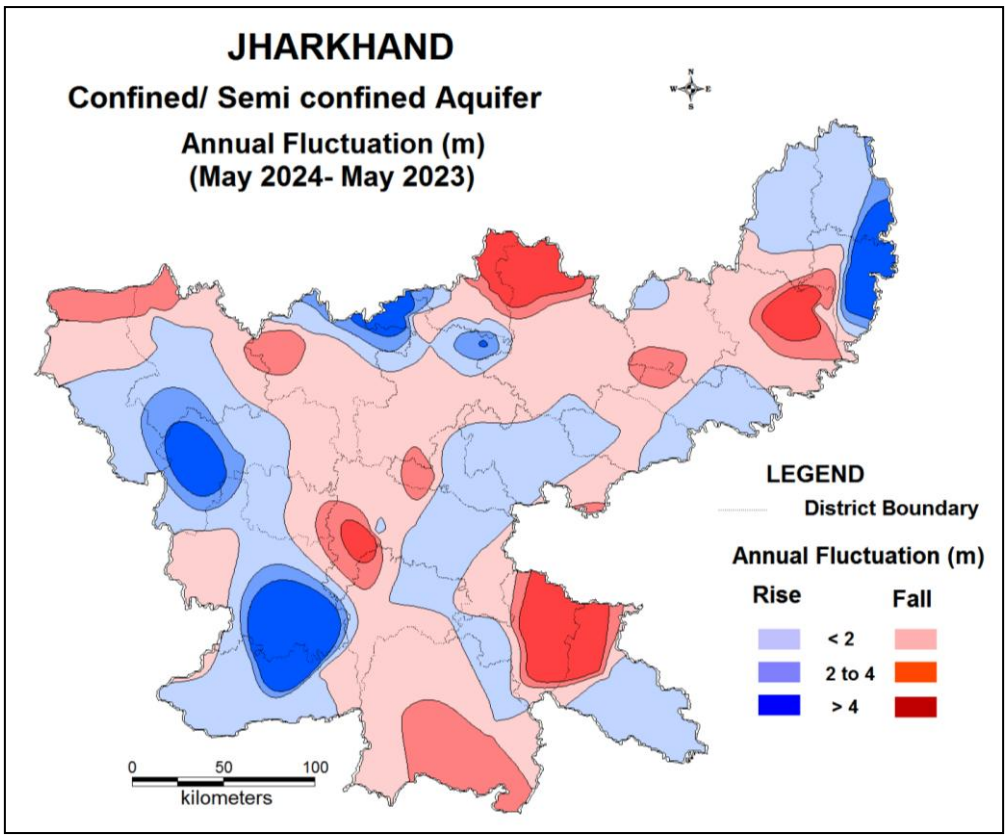

Figure 9: Annuall water level fluctuation in confined/semi-confined Aquifer (May 2024 to May 2023)

6.0 SUMMARY

As a component of the National Ground Water Monitoring Programme, the CGWB, SUO Ranchi conducts monitoring of the ground water conditions on a

quarterly basis: in January, pre-monsoon May, post- monsoon August, and November. As of May 30, 2024, the CGWB SUO Ranchi supervises 460 dug wells and 122 piezometers. This comprehensive effort aims to portray the variations in the state's ground water conditions across different aquifers.

In May 2024, around 85.8% of the well exhibited a depth to water level within 10 meters below ground level in unconfined aquifer. Deeper water levels of more than 10 m cover 14.2% area of the State covering mainly Hazaribagh, Bokaro, Koderma, Godda, East Singhbhum and Jamtara districts. In case of Piezometric water level 58% of the well exhibited a depth to water level within 10 meters below ground level. Deeper water levels in between 10 to 20m covers 34% of area and more than 20 m cover 8% area of the State covering mainly Latehar, Ranchi, Chatra, Koderma, Dumka, Palamu, Simdega, Ramgarh, Giridih, Deogarh, Pakur, East Singhbhum and Jamtara districts

Annual water level comparison with previous year May 2023 to May2024 has shown that about 53% well experienced rise in annual water level fluctuation because of the excess rainfall in 2023 monsoon. 46% of the well experienced fall of water level and 1% with no change. In decadal mean water level fluctuation of 2014-2023 with respect to May 2024, 57% of the well experienced fall and 43% shows rise of water level.