GROUND WATER LEVEL BULLETIN

NOVEMBER 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/km^2. 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 yearly on quarterly basis. 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 November 2024, 525 wells monitored (428 DW, 97 Pz, out of which 5 wells were dry), while some wells 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 water level monitoring stations is given in **Table-1**.

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

Sl.No	District	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**

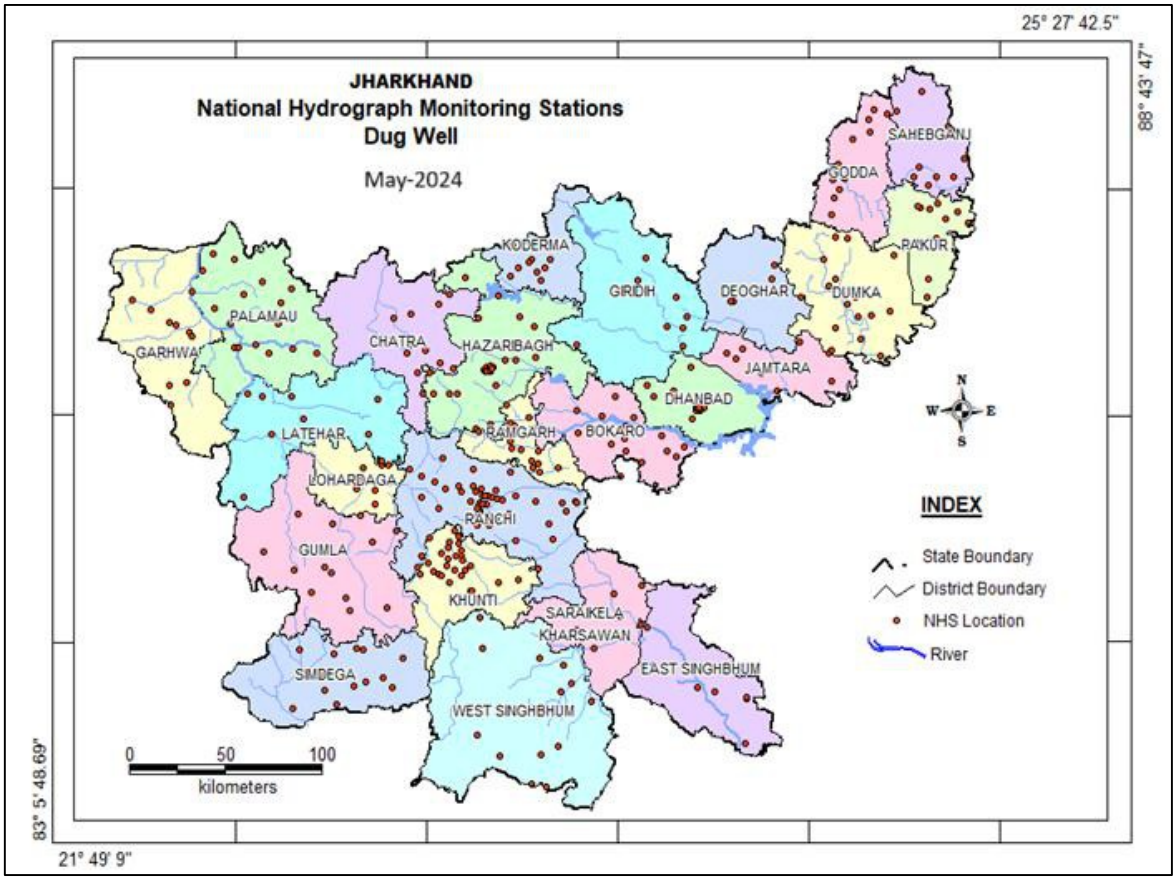

Figure-2: Map showing location of National Hydrograph Monitoring Stations of Jharkhand

5.0 GROUND WATER LEVEL SCENARIO (NOVEMBER 2024)

5.1 SHALLOW AQUIFER (UNCONFINED AQUIFER)

5.1.1 DEPTH TO WATER LEVEL

Depth To Water Level in Unconfined Aquifer (November 2024)

The depth to water level of 407 wells is used for the analysis. Analysis of depth to water level data of 407 wells shows water levels vary between 0.25 m (Gumla) to 11.20 m bgl (W Singhbhum). Water level of less than 2 m bgl is recorded in 13.8 % of wells, between 2 to 5 m bgl in 64.1% of wells, between 5 to 10 m bgl in 21.1% of wells, between 10 to 20 m bgl in only 1% of wells.

Shallow water level of less than 2 m bgl is found in Chatra, Deoghar, Garhwa, Palamu, Giridih, Hazaribagh, Latehar, Bokaro, Dhanbad, Khunti, Simdega, West Singhbhum,

Saraikela Kharsawan, Gumla, Ranchi, East Singhbum districts of state. Water level of 2 to 5 m bgl is observed throughout the state covering all districts of the state. Depth to water level of 5 to 10 m bgl is observed in most of the state covering all districts except khunti. Water level of 10 to 20 m bgl is covered maximum in Bokaro, Garhwa, West Singhbhum, Chatra district of the State.

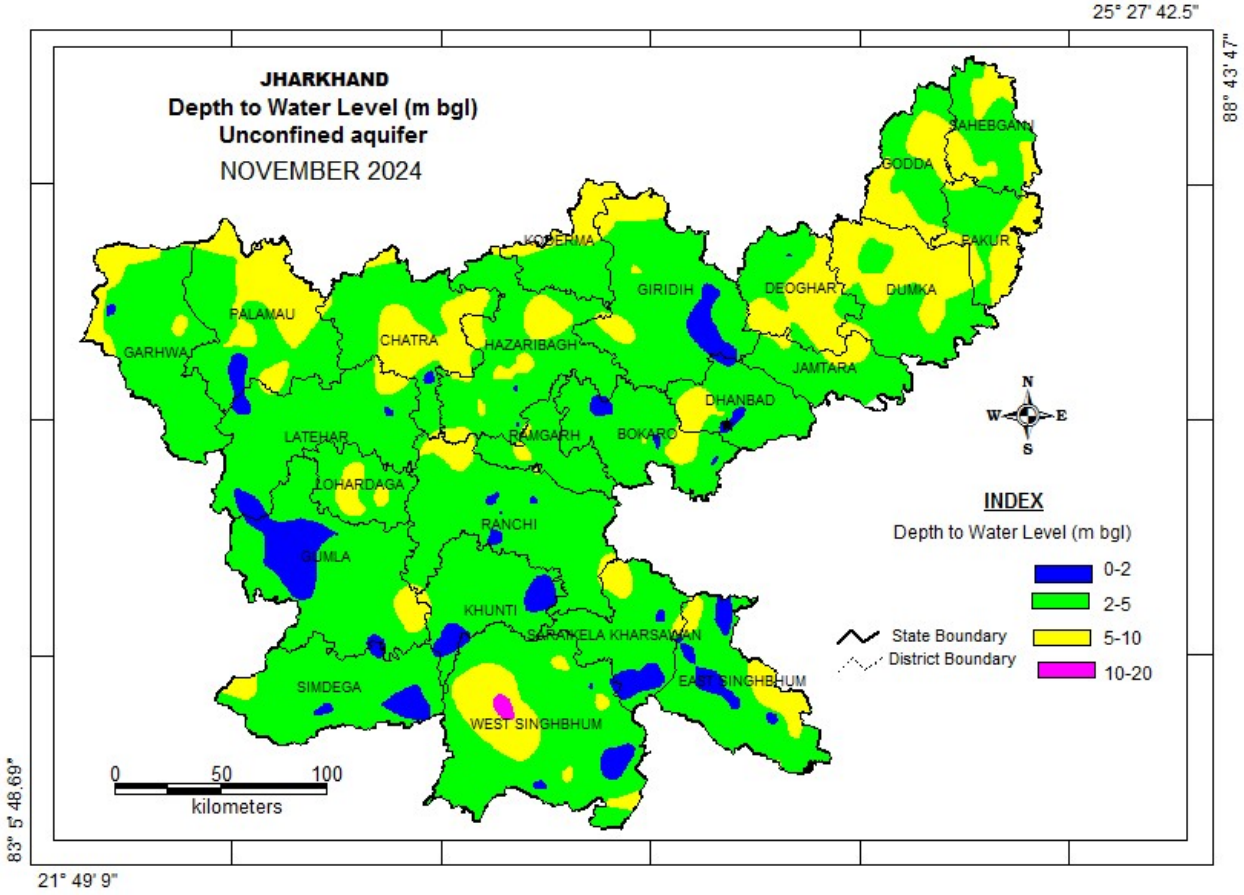

Figure 3-Post monsoon (November-2024) Depth to water level map of Jharkhand

5.1.2 SEASONAL FLUCTUATION IN WATER LEVEL

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

366 wells has been analysed for seasonal fluctuation (May 2024 to November 2024) in unconfined aquifer. Water level in 350 wells are recorded in rising and 16 wells in falling category.

Rise in Water Levels

Water level rise of less than 2 m is recorded in 23% of wells, 2 to 4 m in 38.1% wells, more than 4 m in 34.8% of wells. Water level rise of less than 2 m is observed throughout the district in E Singhbhum, Hazaribagh, Gumla, Palamu, Bokaro, Ranchi, Saraikela, Kodema, Simdega, Chatra, Dhanbad, Lohardaga, Sahebganj, Dumka, Giridih, Pakur, Latehar, W Singhbhum, Ranchi, Godda, Deoghar, Khunti districts.Water level rise of 2 to 4 m is observed throughout the districts. Rise of more than 4 m is recorded in all the districts of the state.

Fall in Water Levels:

16 nos. of wells have recoreded fall, water level fall of less than 2 m is recorded in 3.6% of wells, and is mainly observed in Khunti, Latehar W Singhbhum, Dumka, Dhanbad, Jamtara, Chatra, Palamu, Dhanbad districts. Fall of 2 to 4 m of water level is observed in 2 nos of well situated in Palamu and Chatra district. Only 1 well in Lohardaga district shows water level fall >4m.

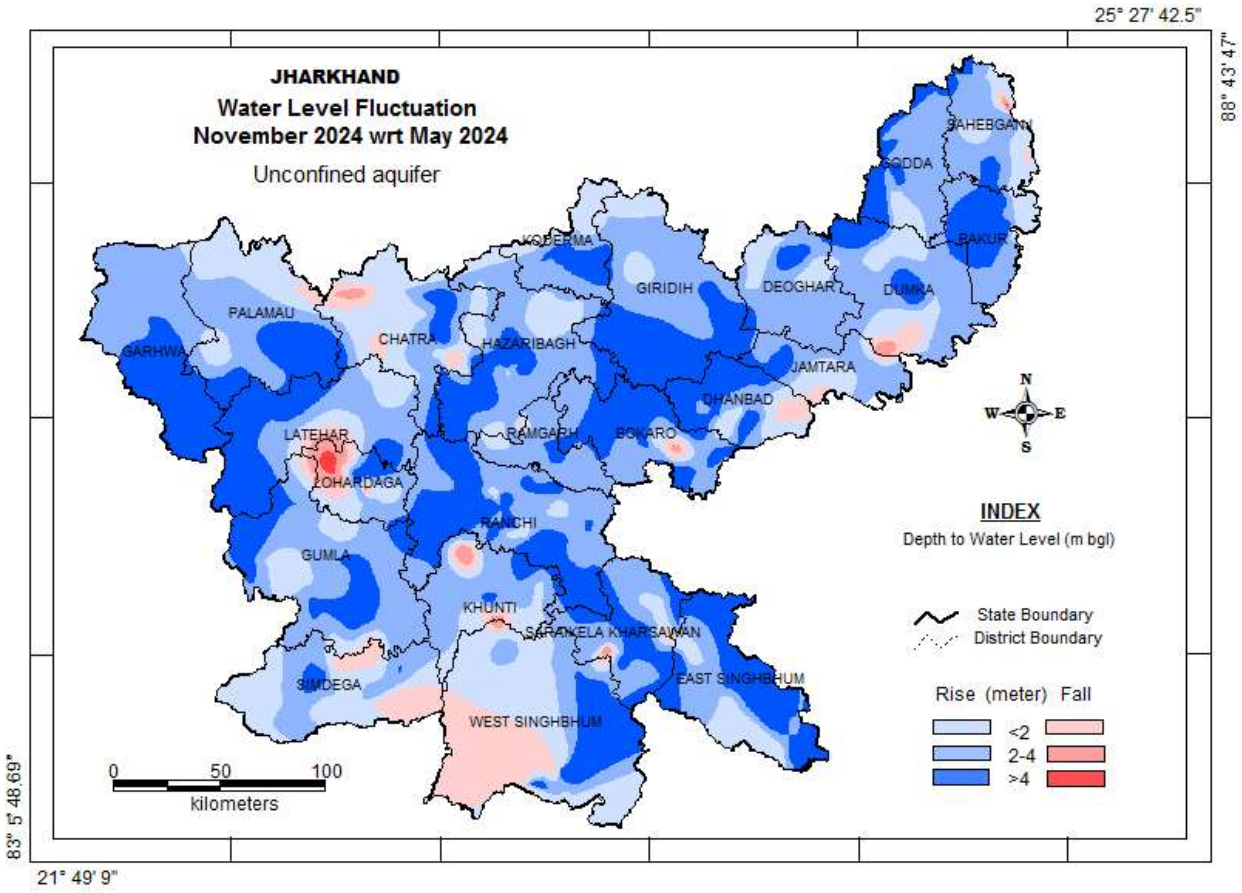

Figure 4: Seasonal water level fluctuation in unconfined Aquifer (May 2024 to November 2024)

5.1.3 ANNUAL FLUCTUATION IN WATER LEVEL

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

344 analysed wells are used for annual fluctuation (November 2024 to November 2023) in unconfined aquifer, out of which 206 wells found to be rising and 138 wells in falling category.

Rise in Water Levels:

In 206 wells, water level rise of less than 2 m is recorded in 45.1% wells, 2 to 4 m in 10.8% wells and more than 4 m in 4.1% of the wells. Water level rise of less than 2 m is seen in almost entire state. Water level rise of 2 to 4 m is observed mainly in districts such as Bokaro, Chatra, Dhanbad, E Singhbhum, Garhwa, Giridih, Godda, Gumla, Hazaribagh, Kodema, Latehar, Lohardaga, Pakur, Palamu, Ramgarh, Ranchi, Sahebganj districts. Rise of more than 4 m is significantly observed in Chatra, Deoghar, Dhanbad, Dumka,

Godda, Hazaribagh, Jamtara, Latehar, Pakur, Ramgarh, Sahebganj, Simdega, W Singhbhum districts.

Fall in Water Levels:

138 nos of well recorded fall in water levels. 36.9% have recorded less than 2 m while 2.9% in the range of 2 to 4 m and only 1 well situated in Chatra district shows 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 Dumka, Pakur, Godda, E Singhbhum, Chatra, Hazaribagh, Sahebganj, Dumka, Simdega districts. Fall of beyond 4 m is observed only in 1 well of Chatra district.

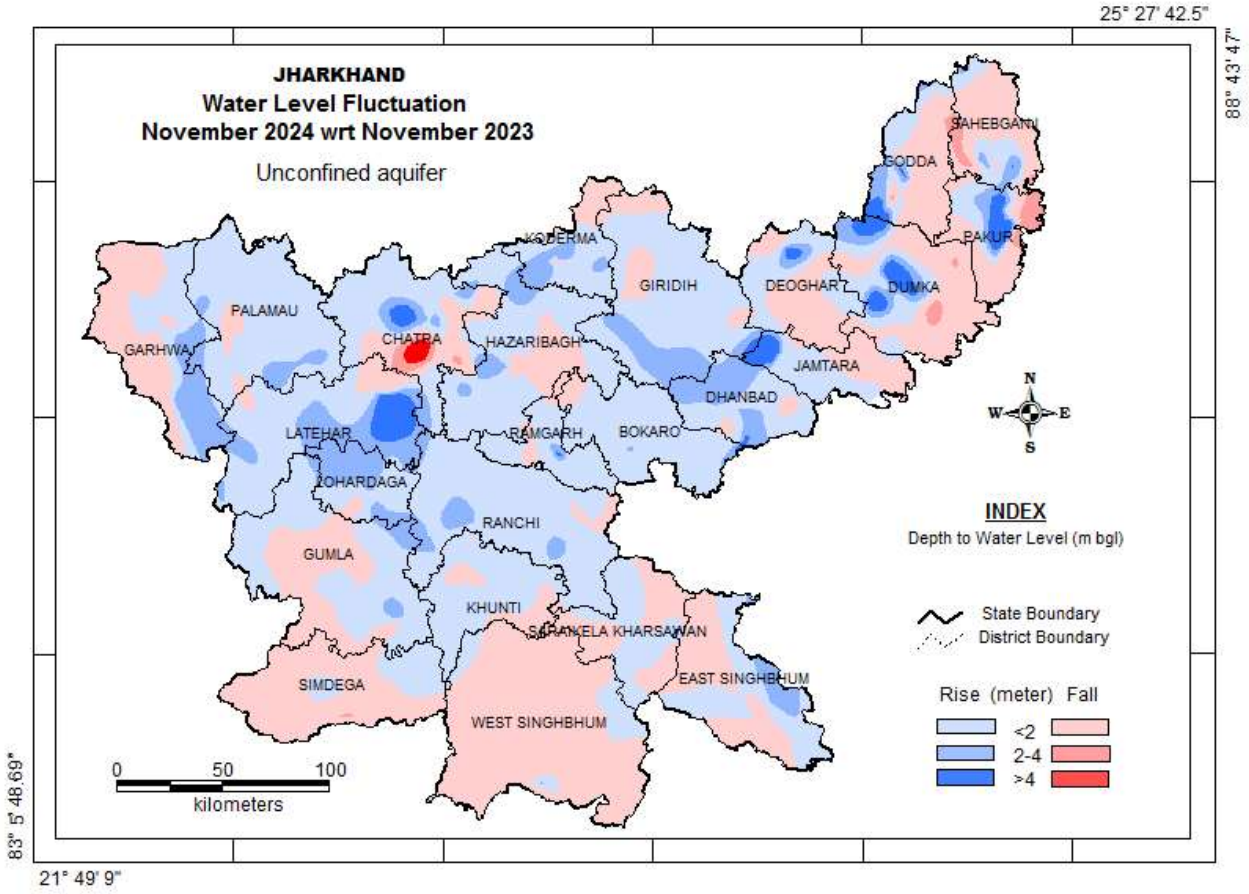

Figure 5 : Annual water level fluctuation in unconfined aquifer (November 2023 to November 2024)

5.1.4 DECADAL FLUCTUATION IN WATER LEVEL

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

241 wells used for analysis for decadal fluctuation. Decadal mean November (2014 to 2023) to November 2024 in unconfined aquifer. Out of 241 wells, 155 wells found to be rising and 86 wells found to be falling.

Rise in Water Levels:

Total 155 wells shows water level rise. Water level rise of less than 2 m is recorded in 51.5% wells, 2 to 4 m in 11.6% wells and more than 4 m in only 3 wells situated in Hazaribagh, Koderma and Latehar district. Water level rise of less than 2 m is seen in Bokaro, Deoghar, Dhanbad, Dumka, E Singhbhum, Garhwa, Giridih, Godda, Gumla, Hazaribagh, Jamtara, Kodema, Latehar, Lohardaga, Palamu, Ramgarh, Ranchi, Sahebganj, Saraikela, Simdega, W Singhbhum districts. Water level rise of 2 to 4 m is observed mainly in E Singhbhum, Garhwa, Giridih, Gumla, Hazaribagh, Jamtara, Kodema, Lohardaga, Pakur, Ranchi districts and rise of more than 4 m is significantly observed in Hazaribagh, Koderma and Latehar districts.

Fall in Water Levels:

Total 86 wells shows fall in water levels. 31.9% have recorded less than 2 m while 3.7% in the range of 2 to 4 m and no wells have been recorded water level fall of more than 4 m. Fall of less than 2 m is observed in Lohardaga, Sahebganj, Godda, Hazaribagh, Chatra, Dumka, Giridih, W Singhbhum, Pakur, Latehar, Gumla, Deoghar, Ramgarh, Palamu, Bokaro, Simdega, E Singhbhum, Simdega, Saraikela, Dhanbad, Jamtara, Garhwa districts. Fall of 2 to 4 m, recorded in Ramgarh, Pakur Lohardaga, Dumka, Dumka, Giridih, Sahebganj, Godda districts.

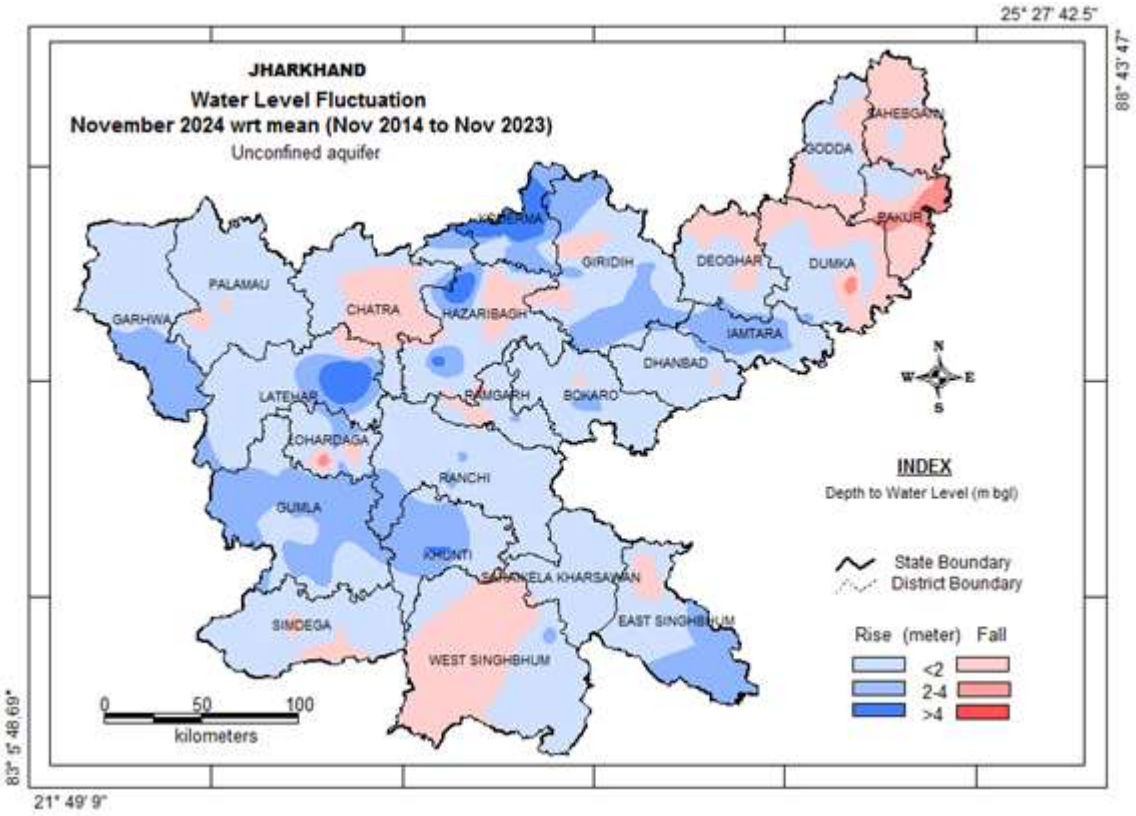

Figure 6: Decadal water level fluctuation in unconfined Aquifer (November 2024 to Decadal Mean November (2014-2023))

5.2 DEEPER AQUIFER (CONFINED/ SEMI-CONFINED)

5.2.1 DEPTH TO PIEZOMETRIC LEVEL

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

Analysis of piezometric level data of 84 wells shows piezometric levels vary between 0.43 m.bgl (Hazaribagh district) to 26.44m bgl (Dumachir, Pakur district). 3.6% of Piezometric level of less than 2 m bgl is recorded in East Singhbhum, Hazaribagh, Gumla, 40.5% of wells shows piezometric level between 2 to 5 m bgl, between 5 to 10 m bgl in 36.9% of wells, 10 to 20 m is observed in 11.9% of wells. 7.1% wells shows water level >20m.

The water level recorded in less than 2 mbgl in confined/semi confined aquifer in East Singhbhum, Hazaribagh, Gumla districts. Piezometric level of 2 to 5 m, bgl mainly observed in Chatra, Deoghar, Dhanbad, Dumka, East Singhbhum, Garhwa, Giridih, Hazaribagh, Jamtara, Khunti, Koderma, Lohardaga, Palamu, Ramgarh, Ranchi, Sahebganj, Saraikela-Kharsawan, Simdega, W Singhbhum districts. Piezometric level of 5 to 10 m bgl is recorded in Deoghar, Ranchi, Simdega, Hazaribagh, Latehar, Koderma, Garhwa, W Singhbhum, Ramgarh, Palamu, Giridih, Khunti, Dhanbad, Chatra districts. Piezometric level more than 10m bgl is recorded in Pakur, Khunti, Ranchi, Jamtara, Ramgarh, Garhwa, Chatra, East Singhbhum, Deoghar, Dumka, Bokaro, Giridih districts.

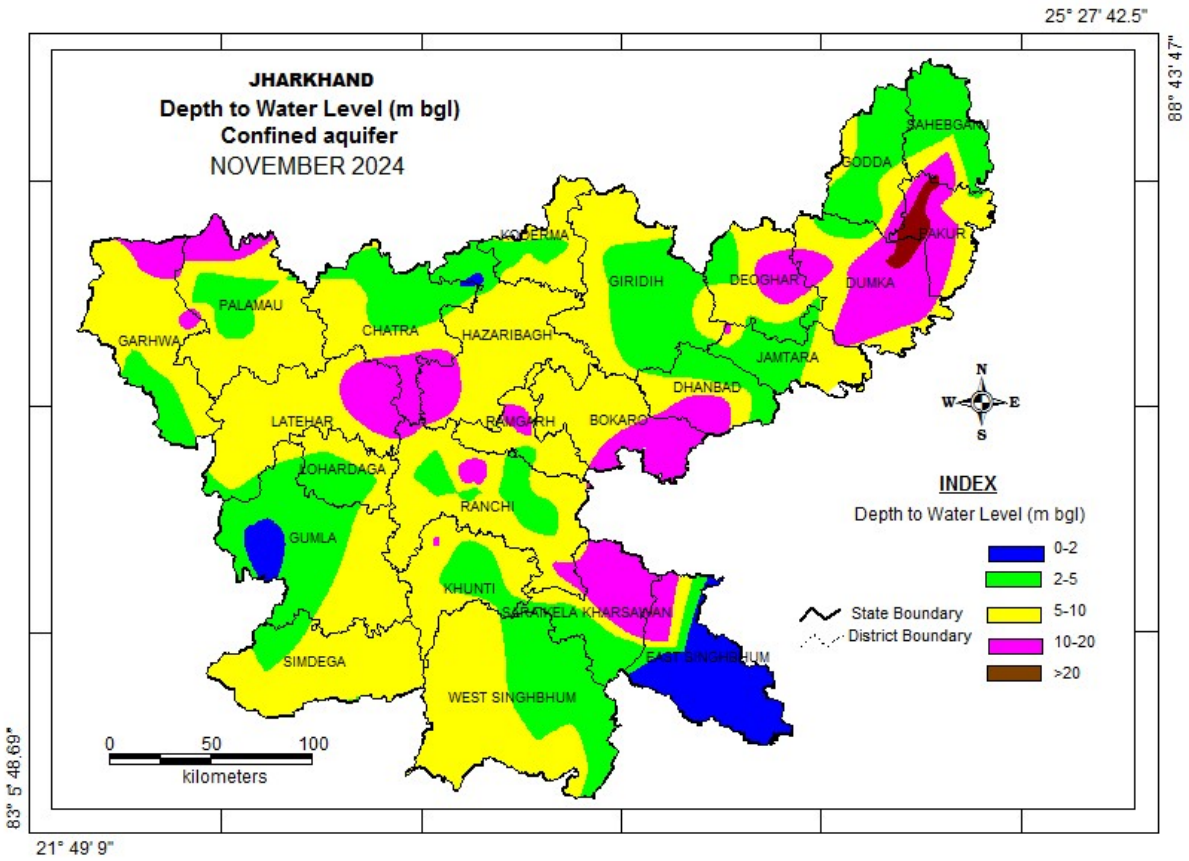

Figure-7: Piezometric head (November-2024) of confined/semi confined aquifer of Jharkhand.

5.2.2 SEASONAL FLUCTUATION IN PIEZOMETRIC LEVEL

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

Total 74 analysed wells used for seasonal fluctuation (May 2024 to November 2024 in confined/semi confined aquifer. 71 wells found to be rising and 3 wells falling.

Rise in Piezometric Levels:

Out of 71 wells that have registered rise, piezometric level of less than 2 m is recorded in 23% wells, 35.1% well recorded in 2 to 4 m and 36.5% of the wells is being recorded in more than 4 m. Piezometric level rise of less than 2 m is seen in Sahebganj, Hazaribagh, Garhwa, Latehar, Pakur, Khunti, Lohardaga, W Singhbhum, Ranchi and Simdega district. Piezometric level rise of 2 m to 4m is seen in Garhwa, East Singhbhum, Palamu, Jamtara, Simdega, Hazaribagh, Chatra, Ramgarh, Koderma, Ranchi, Khunti, W Singhbhum, Gumla districts. Piezometric level rise of more than 4 m is significantly observed in Chatra, Garhwa, Simdega, Saraikela-Kharsawan, Ranchi, Dhanbad, East Singhbhum, Jamtara, Giridih, Koderma, Latehar, Ramgarh, Khunti, Pakur districts.

Fall in Piezometric Levels:

Out of 74 wells, only 3 wells situated in Pakur, and Hazaribagh districts shows fall in piezometric levels.

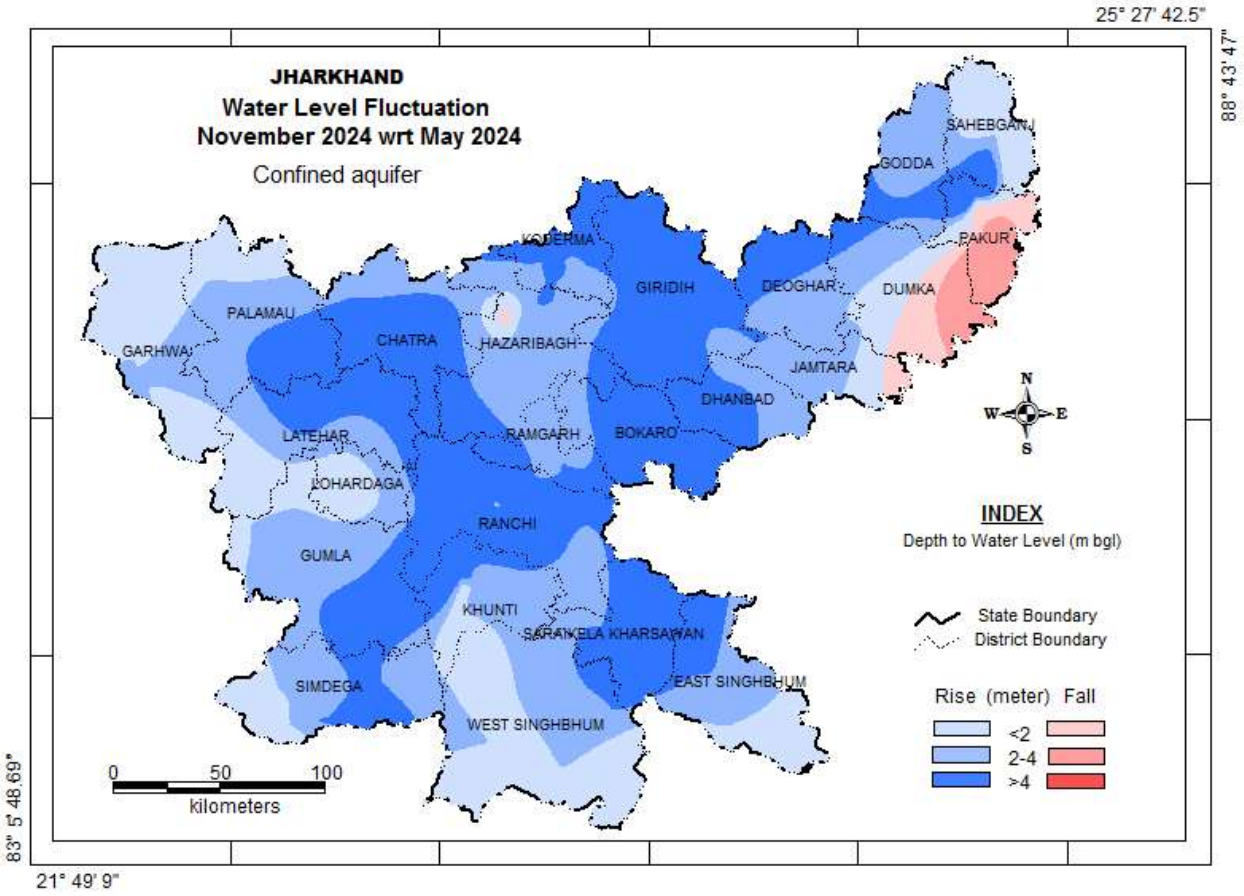

Figure 8: Seasonal water level fluctuation in confined/semi-confined Aquifer (May 2024 to November 2024)

5.2.3 ANNUAL FLUCTUATION IN PIEZOMETRIC LEVEL

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

Total 70 analysed wells are used for annual fluctuation (November 2024 to November 2023 in confined/semi confined aquifer. Out of 70 wells, 42 wells found to be rising and 28 wells falling.

Rise in piezometric levels:

Total 42 wells shows rise in piezometric level. Less than 2 m rise is recorded in 40% wells, 2 to 4 m in 14.3% wells and more than 4 m in only 5.7% of the wells. Piezometric level rise of less than 2 m is seen in Deoghar, Gumla, Garhwa, East Singhbhum, Giridih, Ranchi, Khunti, Dhanbad, Chatra, Ramgarh, Dumka, Hazaribagh districts. Piezometric level rise of 2 to 4 m is observed mainly in Latehar, Bokaro, Palamu, Chatra, Ranchi districts. Rise of more than 4 m is significantly observed in Chatra, Dumka, Ramgarh, Simdega, Giridih districts.

Fall in Piezometric Levels:

Total 28 wells that have recorded fall in piezometric levels, 31.4% have recorded less than 2 m while 4.3% in the range of 2 to 4 m and remaining 4.3% wells registered piezometric level fall of more than 4 m. Fall of less than 2 m is mainly observed in Simdega, Garhwa, Lohardaga, East Singhbhum, Deoghar, Saraikela-Kharsawan, Pakur, Khunti, Sahebganj, Hazaribagh, Latehar, ,Dumka, Palamu districts. Fall of 2 to 4 m is observed mainly in Chatra, Pakur, Garhwa, districts while fall of beyond 4 m is observed mainly in Pakur district.

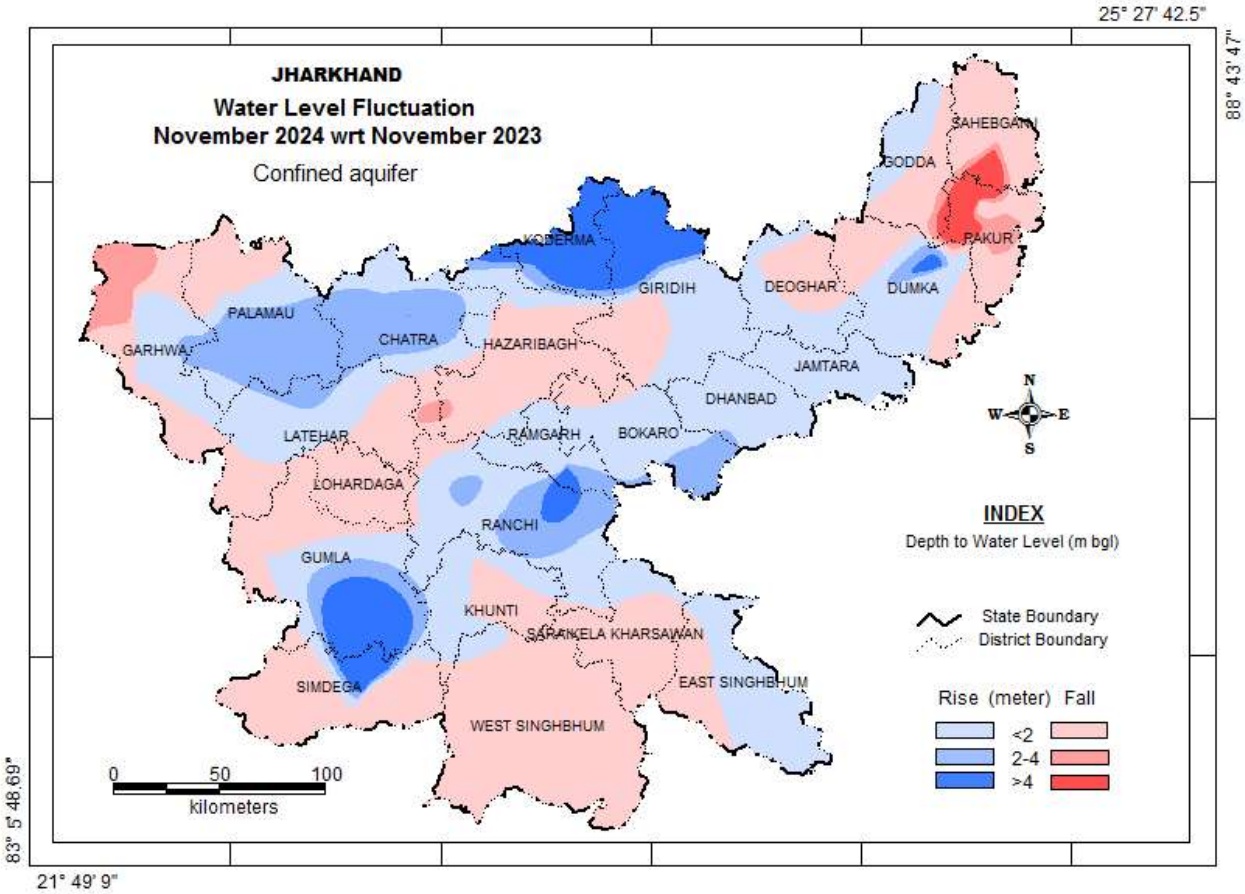

Figure 9: Annual water level fluctuation in confined/semi-confined Aquifer (November 2024 to November 2023)

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 November 2024, around 99% of thede`1qw well exhibited a depth to water level within 10 meters below ground level in unconfined aquifer. In case of Piezometric water level 80% of the well exhibited a depth to water level within 10 meters below ground level.

In unconfined aquifer, annual water level comparison with previous year November 2023 to November 2024 has shown that about 61% well experienced rise in annual water level fluctuation because of rainfall in 2023 monsoon. 38% of the well experienced fall of water level. In decadal mean water level fluctuation of 2014-2023 with respect to November 2024, 60% of the well experienced rise and 40% shows fall of water level.