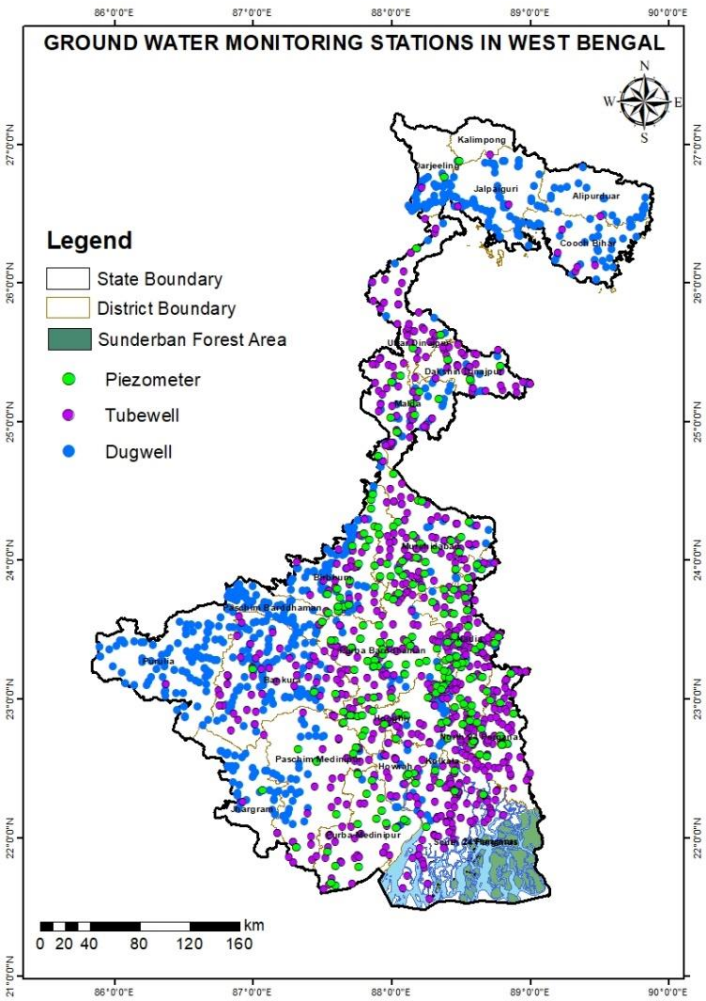

GROUND WATER LEVEL BULLETIN

November 2024

WEST BENGAL

ABSTRACT

Present Bulletin prepared on ground water scenario of West Bengal highlighting the findings, status of ground water level in different aquifers and its seasonal, annual and decadal fluctuation during November -2024.

CGWB, Eastern Region Kolkata

1.0 INTRODUCTION

Groundwater bulletin is prepared by Central Ground Water Board (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.

In West Bengal, ground water monitoring was started since 1976 when most of the ground water structures were mainly dug wells and the development of the ground water resource was very limited. It is only after 1985 when actual ground water development started in irrigational sector and took its full swing from 90s. Accordingly, Ground Water Monitoring Stations (GWMS) for monitoring of water level data were also changed in different periods. However, from late 90s, these old wells are being replaced by well-defined piezometers in phased manner with an expectation that in near future, this effort will provide better result.

Groundwater levels are being measured by CGWB, ER four times a year in West Bengal viz., in the months of April (Pre-monsoon) (20^{th} to 30^{th}), August (Mid-monsoon) (20^{th} to 30^{th}), November (Post-monsoon) (1^{st} to 10^{th}) and January (1^{st} to 10^{th}) ; 2 times (during pre and postmonsoon) in Andaman and every month in Sikkim (through Participatory monitoring since June,2024).

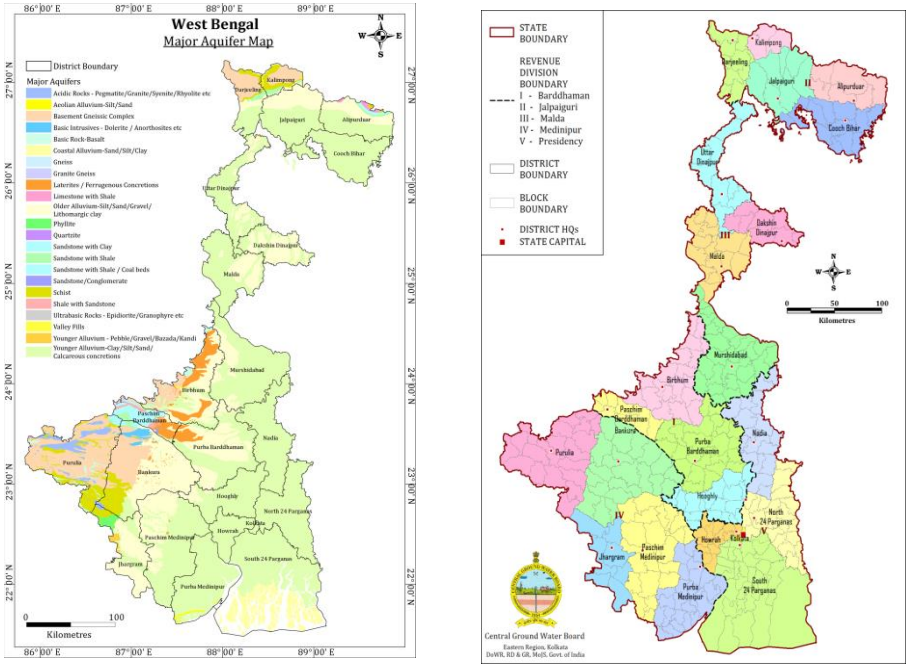

Figure-1: Map showing major aquifers and administrative divisions of West Bengal

2.0 STUDY AREA

The Eastern Region of Central Ground Water Board has jurisdiction over the State of West Bengal having an area of 88752 km^2, Andaman & Nicobar Islands (UT) having an area of 8,249 sq. km. (Andaman-6408 sq. km., Nicobar-1841 sq. km.) and Sikkim (7096 sq.km.).

The State of West Bengal is divided into 5 Divisions (Barddhaman, Jalpaiguri, Malda, Medinipur & Presidency) incorporating 23 Districts, which are further subdivided into 66 Sub-Divisions; 344 Community Development Blocks; 3,347 Gram Panchayats; 40,218 Villages (37,469 Inhabited villages with 2,03,80,118 Households); 924 Census Towns (127 Municipal & 785 Non-Municipal); 118 Municipalities and 7 Municipal Corporations. The state extends between N Latitudes, 21^0 31' 0", 27^0 33' 15" and E Longitudes, 85^0 45' 20", 89^0 33'0". Physiographically, the area incorporates extra – peninsular region of the north, peninsular mass of the south – west, and alluvial and deltaic plains of the south and south-east (figure-1).

Broadly, West Bengal has nine major physiographic divisions – Himalayan Zone, Sub-Himalayan Zone, Barind Uplands, Degraded Plateaus, Plateau Fringe Zones, Upper Gangetic Delta, Reclaimed Lower Gangetic Delta, Non-Reclaimed Lower Gangetic Delta and Medinipur Coastal Plains.

3.0 GROUND WATER LEVEL MONITORING

Central Ground Water Board, Eastern Region, has set up a network of 1732 monitoring wells known as National Hydrographic Network Stations (NHNS) in West Bengal which includes: Dugwells- 695, Handpumps-751 and Piezometers-286 {including 206-DWLR installed PZ}.

In the state of West Bengal during Pre-Monsoon 2024, 1594 wells were physically monitored while 206 wells are installed with DWLR (figure-2). Few 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

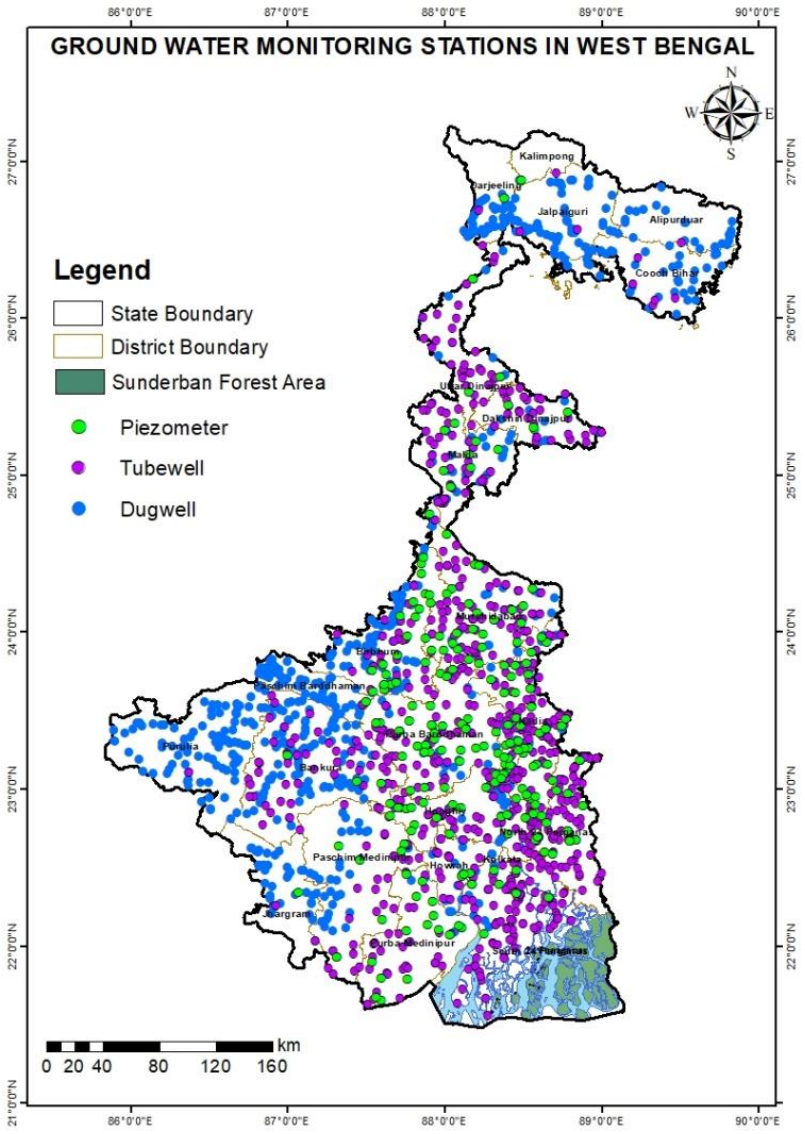

Figure- 2: Map showing locations of monitoring wells (NHNS) in West Bengal

Table-1: District-wise distribution of water level monitoring stations in West Bengal

Sl. No	Name of the District	Number of GW Monitoring Stations				
		Dug Well	Piezometer	Handpump	Spring	Total
West Bengal						
1	Alipurduar	23	0	1	0	24
2	Bankura	97	9	49	0	155
3	Birbhum	93	23	39	0	155
4	Dakshin Dinajpur	9	12	29	0	50
5	Darjeeling	40	1	2	0	43
6	Haora	18	1	15	0	34
7	Hugli	26	31	61	0	118
8	Jalpaiguri	48	0	3	0	51
9	Jhargram	30	5	5	0	40
10	Kochbehar	33	0	3	0	36
11	Kalimpong	0	0	2	0	2
12	Kolkata	4	4	12	0	20
13	Maldah	24	8	32	0	64
14	Murshidabad	18	54	72	0	144
15	Nadia	14	40	93	0	147
16	N- 24 Parganas	6	14	86	0	106
17	Paschim Barddhaman	59	9	3	0	71
18	Paschim Medinipur	32	7	31	0	70
19	Purba Barddhaman	17	21	61	0	99
20	Purba Medinipur	2	23	32	0	57
21	Purulia	89	8	0	0	97
22	S-24 Parganas	8	14	98	0	120
23	Uttar Dinajpur	5	2	22	0	29
	Total	**695**	**286**	**751**	**0**	**1732**

4.0 RAIN FALL

In 2024, as the south-west monsoon wind retreated in post-monsoon season, West Bengal experienced less rainfall in all parts of the region. In North Bengal (Darjeeling, Kalimpong, Jalpaiguri, Alipurduar, Coach Behar, Uttar and Dakshin Dinajpur) total 762 mm precipitation occurred during Oct-Nov 2024 and it is 8.4% higher than the normal rainfall over the region. However, total 669.6 mm rainfall occurred over the western part (Birbhum, Bankura, Purulia, Pachim and Purba Burdwan) of West Bengal, which is 33.75% surplus rainfall compared to normal rainfall. Southern part (Howrah, Hugly, Paschim and Purba Medinipur, Jhargram, Kolkata, North and South 24 Parganas) of state received 1967.6 mm rainfall and it is 44.7% higher than the normal rainfall. The middle part (Maldah, Mursidabad and Nadia) of the state received 362.1 mm rainfall and it is -12% lower than the normal rainfall. North 24 Paragons received the highest rainfall during Oct-Nov 2024. While, Uttar Dinajpur and Maldah received lowest rainfall during the season. The increase of rainfall over region except middle portion of the state is owing to the cyclonic effects of DANA cyclone in 4th week of October.

Table-2: District wise rainfall data from October to November 2024

District	Cumulative rainfall (mm) during Oct-Nov 2024
Cooch Behar	181.4
Darjeeling	171.2
Jalpaiguri	242.8
Malda	75.3
North Dinajpur	48.1
South Dinajpur	119.1
Bankura	205.5
Birbhum	134.7
Burdwan	199.8
East Midnapore	193
Hooghly	204.7
Howrah	253
Kolkata	288.4
Murshidabad	122.1
Nadia	165.4
North 24 Parganas	302.1
Purulia	129.6
South 24 Parganas	268.1
West Midnapore	266.6
Jhargram	192

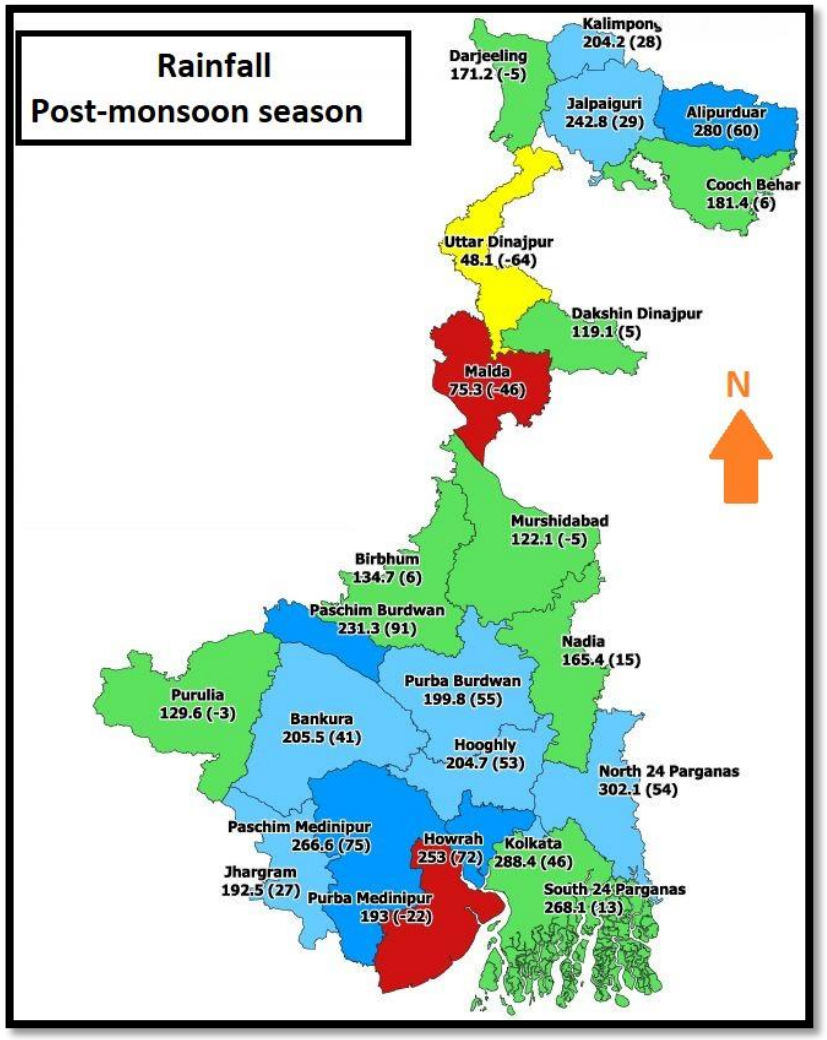

Figure-3: Rainfall distribution (in mm) and deficient rainfall (in %) over west Bengal during Oct-Nov 2024. Deficient rainfall is estimated by the comparing normal rainfall and actual rainfall. Source: IMD

5.0 GROUND WATER LEVEL SCENARIO (NOVEMBER 2024) for WEST BENGAL

5.1 SHALLOW AQUIFER (UNCONFINED)

5.1.1 DEPTH TO WATER LEVEL

Depth to Water Level in Unconfined Aquifer (November 2024)

Depth to water level during November 2024 was measured from 1689 ground water monitoring wells. A total of 721 numbers of GWMS in shallow aquifers were measured. Water level of less than 2 m bgl was recorded in 40% of wells in phreatic aquifers. Similarly in 52% of wells, water level was observed between 2-5 m bgl. 5-10 m bgl was recorded in 7% of wells and 10-20 m bgl in only 1% of wells. Only 1 well in phreatic aquifers showing water level beyond 20 m bgl *(*Figure-4 & 5).

The depth to water level map of November 2024 depicts that water level in the entire state is within the range of 0-2 and 2-5 m bgl except for few isolated patches showing water level in the range of >5 m bgl.

Deepest water level was recorded at Nungi, 20.48 m bgl in Falta block of S-24 Parganas District and shallowest water level 0.06 mbgl was found at Kulti in Barabani block Paschim Bardhaman district.

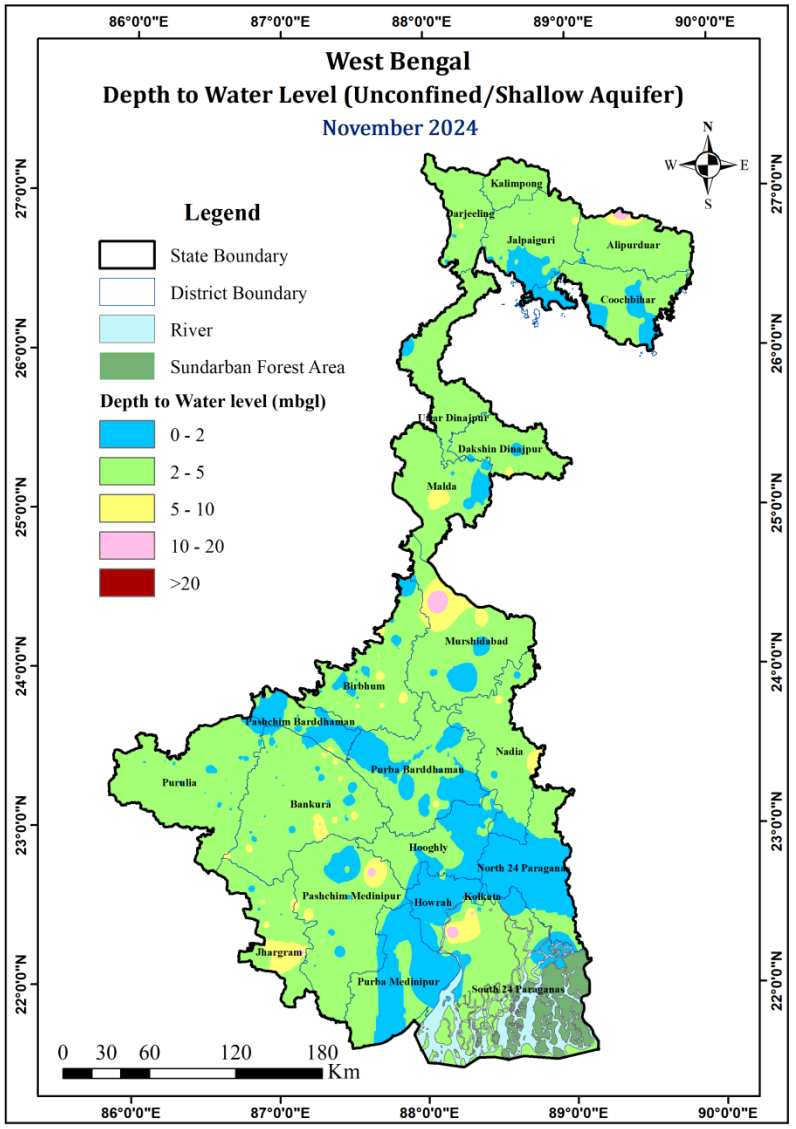

Figure-4: Depth to water level of unconfined aquifer during November 2024

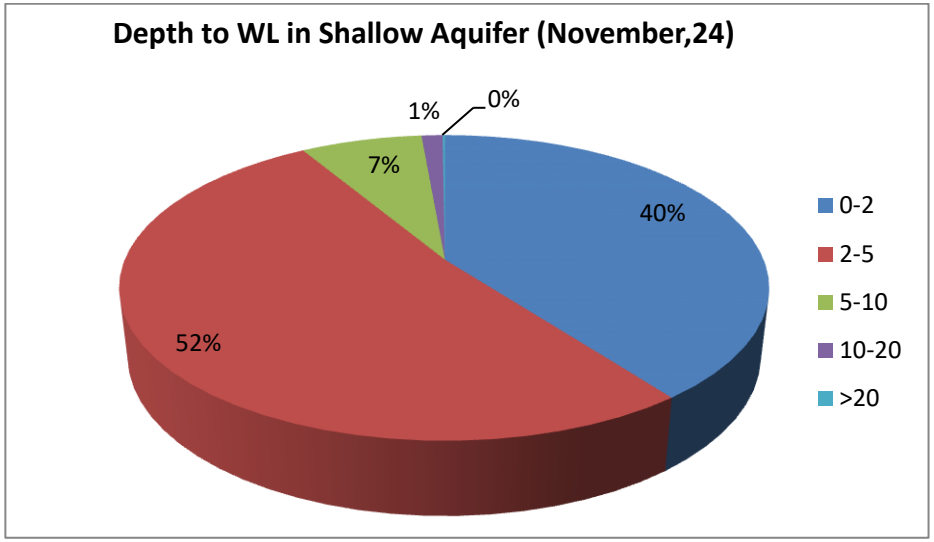

Figure-5: Percentage of wells in different water level ranges in Unconfined aquifer (November, 2024)

5.1.2 SEASONAL FLUCTUATION IN WATER LEVEL

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

In shallow aquifers out of 668 wells analyzed, 618 wells showing rise and only 50 wells shows falling water level (figure-6 &7).

In shallow aquifers in rising category 38% of wells are within the fluctuation of 0-2m, 34% are in 2-4m and 21% of wells are in the range of more than 4m. In the falling category 7% of wells are showing falling trend in 0-2m category, 3 wells are in the range of 2-4m and only 1 well are showing >4m fluctuation of water level.

The rise in water level is observed in all the districts of the State during Post-monsoon season. Fall is observed only 7% of the well in the category of 0-2 m as isolated patches observed in N-24 Parganas, Howrah, Hooghly, Jhargram, Paschim Medinipur.

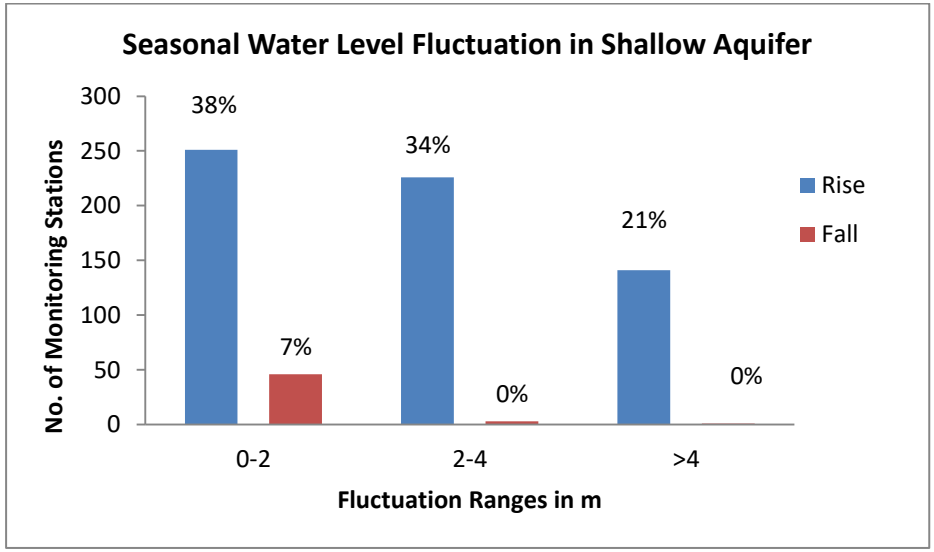

Figure-6: Percentage of wells showing rise and fall in WL in unconfined aquifer (April 2024 to November 2024)

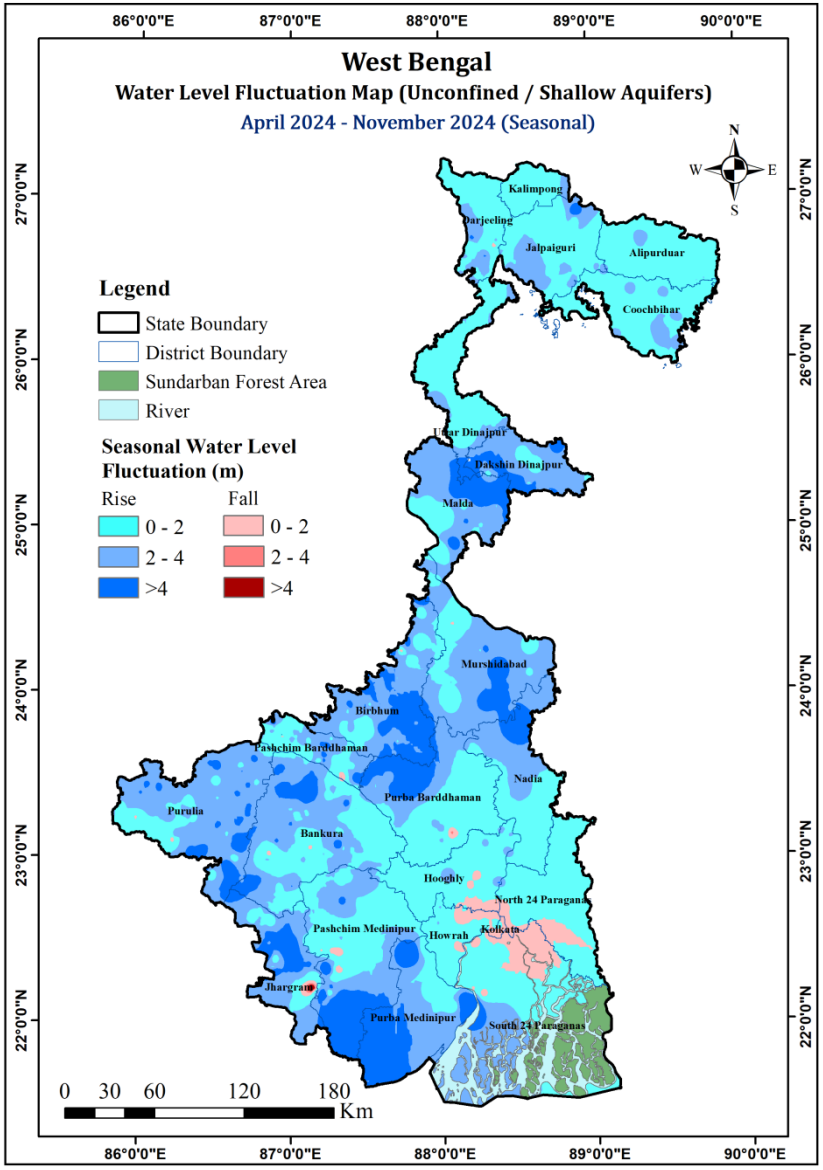

Figure-7: Seasonal water level fluctuation in unconfined aquifer (April 2024 to November 2024)

5.1.3 ANNUAL FLUCTUATION IN WATER LEVEL

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

In shallow aquifers out of 683 wells analyzed, 490 wells showing rise and 193 wells shows falling water level (figure-8 & 9).

In shallow aquifers in rising category 66% of wells are within the fluctuation of 0-2m, 5% are in 2-4m and 1% of wells are in the range of more than 4m. In the falling category 26% of wells are showing falling trend in 0-2m category, 2% of wells are in the range of 2-4m and 1% of wells are showing >4m fluctuation of water level.

The state is dominated by 0-2m fluctuation category. Rise of less than 2 m in water level is seen in all the districts of the State, significantly in N-24 Parganas, Nadia, Murshidabad, Malda, Purba Medinipur and parts of Paschim Medinipur, Coochbehar, Darjeeling, Alipurduar, S-24 Parganas districts. Fall of less than 2 m in water level is mainly observed in parts of Purba & Paschim Medinipur, Jhargram, Purulia, Birbhum, Howrah, Hooghly, Malda and Bankura districts. Fall and rise of beyond 2 m is observed as isolated patches.

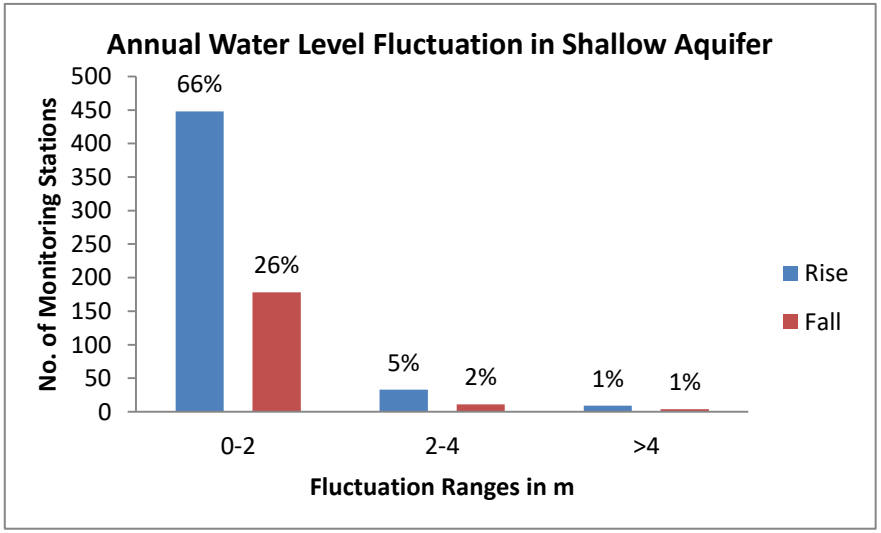

Figure-8: Percentage of wells showing rise and fall in WL in unconfined aquifer (November 2023 to November 2024)

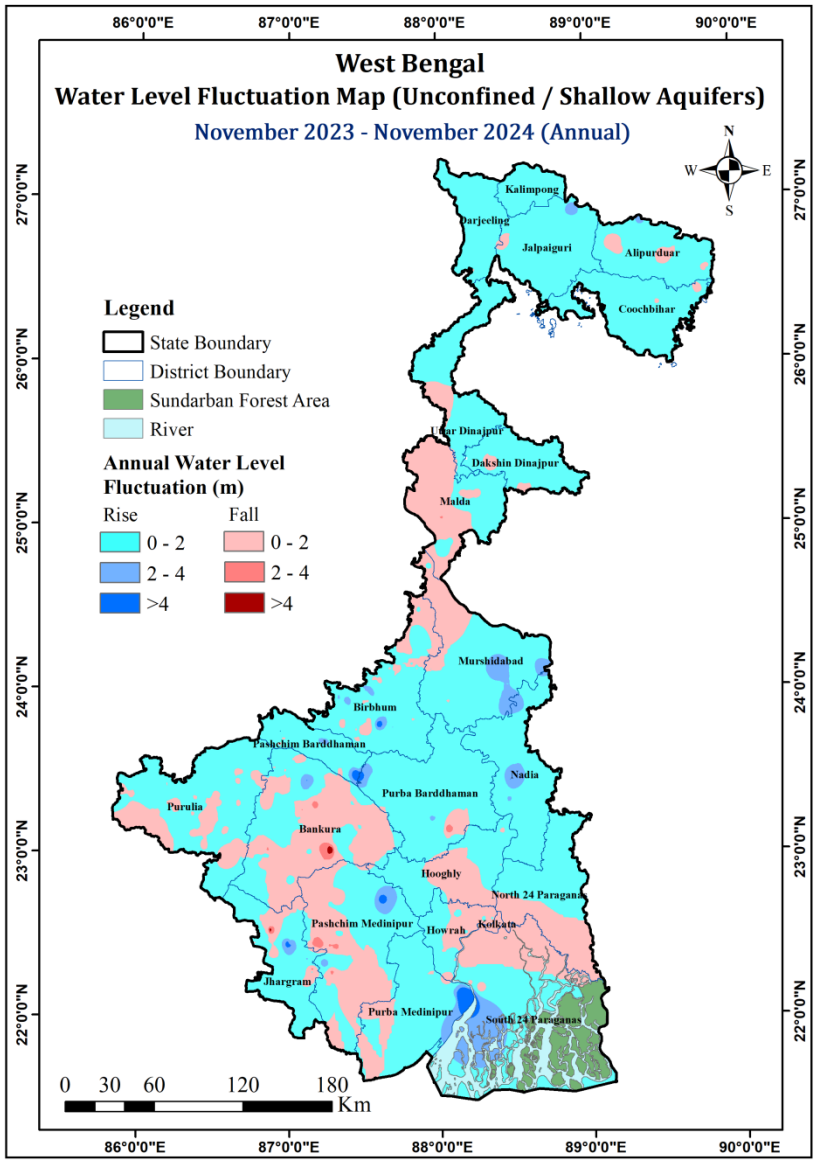

Figure-9: Annual water level fluctuation in unconfined aquifer (November 2023 to November 2024)

5.1.4 DECADAL FLUCTUATION IN WATER LEVEL

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

In shallow aquifers out of 709 wells analyzed, 548 wells showing rise and 161 wells shows falling water level (figure-10 & 11).

For shallow aquifers, in rising category 73% of wells are within the fluctuation of 0-2m, 3% are in 2-4m and 1% of wells are in the range of more than 4m. In the falling category 21% of wells are showing falling trend in 0-2m category, 1% of wells are in the range of 2-4m and 1% of wells are showing >4m fluctuation of water level. From the water level fluctuation map it can be seen water level fluctuation is mainly in the range of 0-2 m and can be observed in most of the district of the State. 2-4 m fluctuation is observed in isolated pockets.

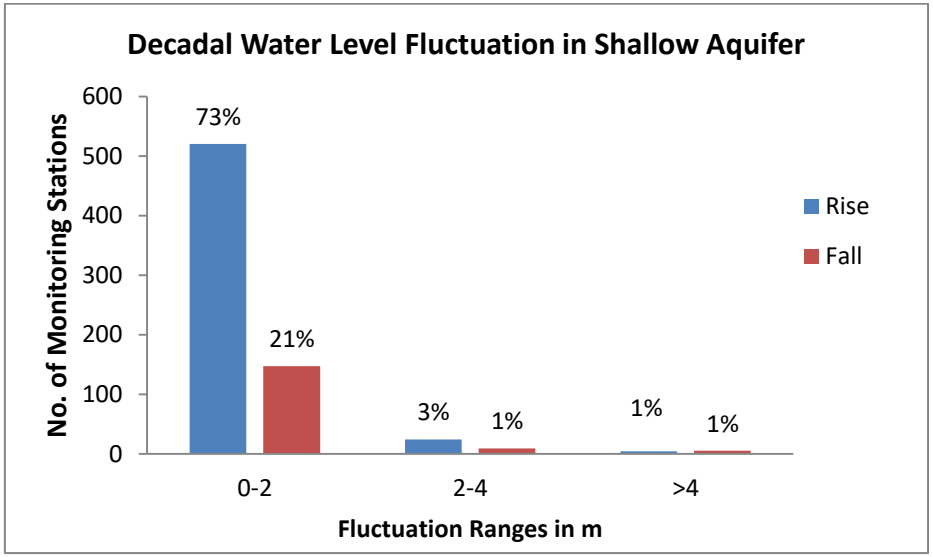

Figure-10: Percentage of wells showing rise and fall in WL in unconfined aquifer (Decadal Mean November (2014-2023) to November 2024)

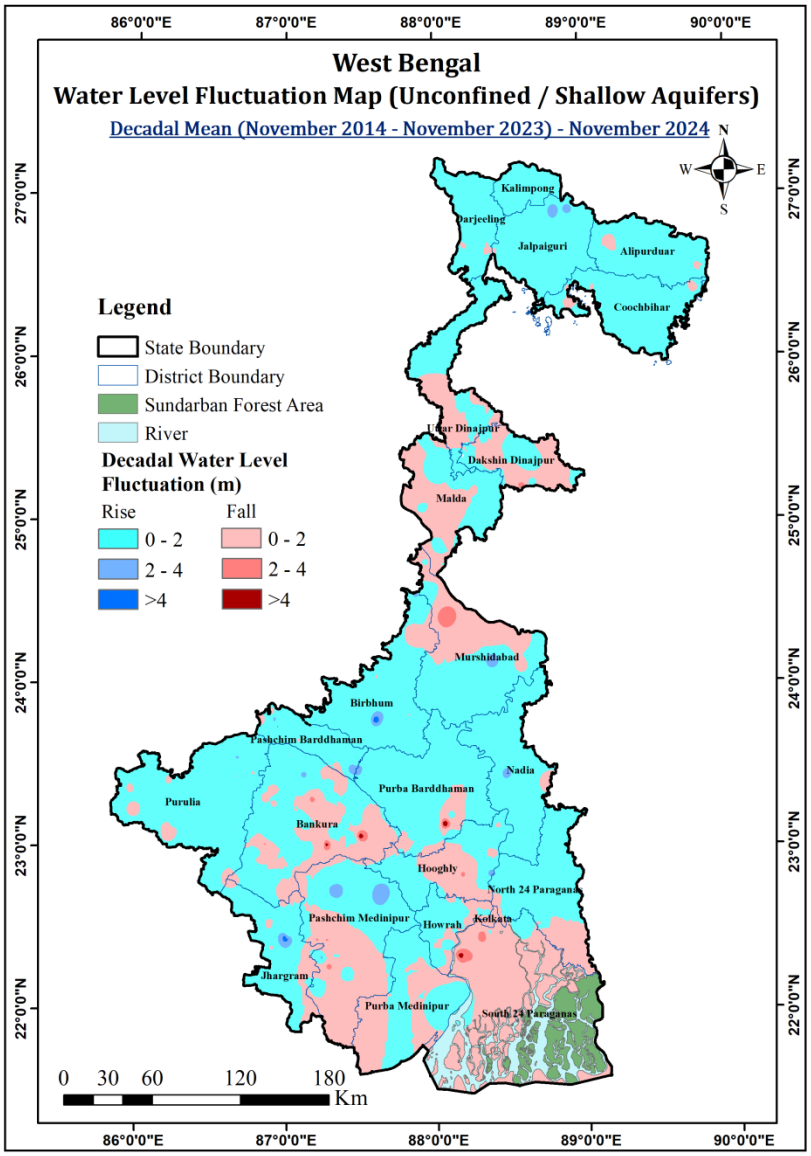

Figure-11: Decadal water level fluctuation in unconfined Aquifer(Decadal Mean November (2014-2023) to November 2024)

5.2 DEEPER AQUIFER (CONFINED/ SEMI-CONFINED)

5.2.1 DEPTH TO PIEZOMETRIC LEVEL

Depth to Piezometric Level in Confined/Semi-Confined Aquifer (November 2024)

The ground water level data November 2024 in deeper aquifers indicate that out of the total 968 wells analysed, only 4% of wells are showing water level less than 2 m bgl, 30 % wells are showing water level in the depth range of 2-5 m bgl, 24% number of wells are showing water level in the depth range of 5-10 m bgl, 33% wells are showing water level in the depth range of 10-20 m bgl and 9% wells showing water level in the depth range beyond 20m bgl. The maximum depth to water level of 35.74 m bgl is observed at Charkolgram in Nanoor block of Birbhum district and lowest water level 0.42 m bgl was found at Bhebia in Hasnabad block of N 24 Parganas District (Figure-12 & 13).

From the depth to water level map of November 2024 for deeper aquifers, the water level within 0-2 m bgl occurs as isolated patches. The water level in the range of 2-5 m bgl is in northern parts of the district covering Darjeeling, Alipurduar, Jalpaiguri and Kochbehar districts and also in Purulia, Bankura, Nadia, Murshidabad, N 24 Parganas and Dinajpur districts. Water level between 5-10 m bgl is found mostly in eastern and western part of the State in parts of Paschim Medinipur, Jhargram, Bankura, Nadia, Murshidabad N 24 Parganas and Darjeeling, Alipurduar, Jalpaigudi district in the north. In the central part of the state water level is mostly deep between 10 to 20 m bgl covering the districts of Purba Bardhaman, Hooghly, Howrah, Bhirbhum, Murshidabad, Paschim & Purba Medinipur Malda, Dakshin Dinajpur, Darjeeling and Kalimpong districts. Deepest water level >20 m bgl covered the central part of the State.

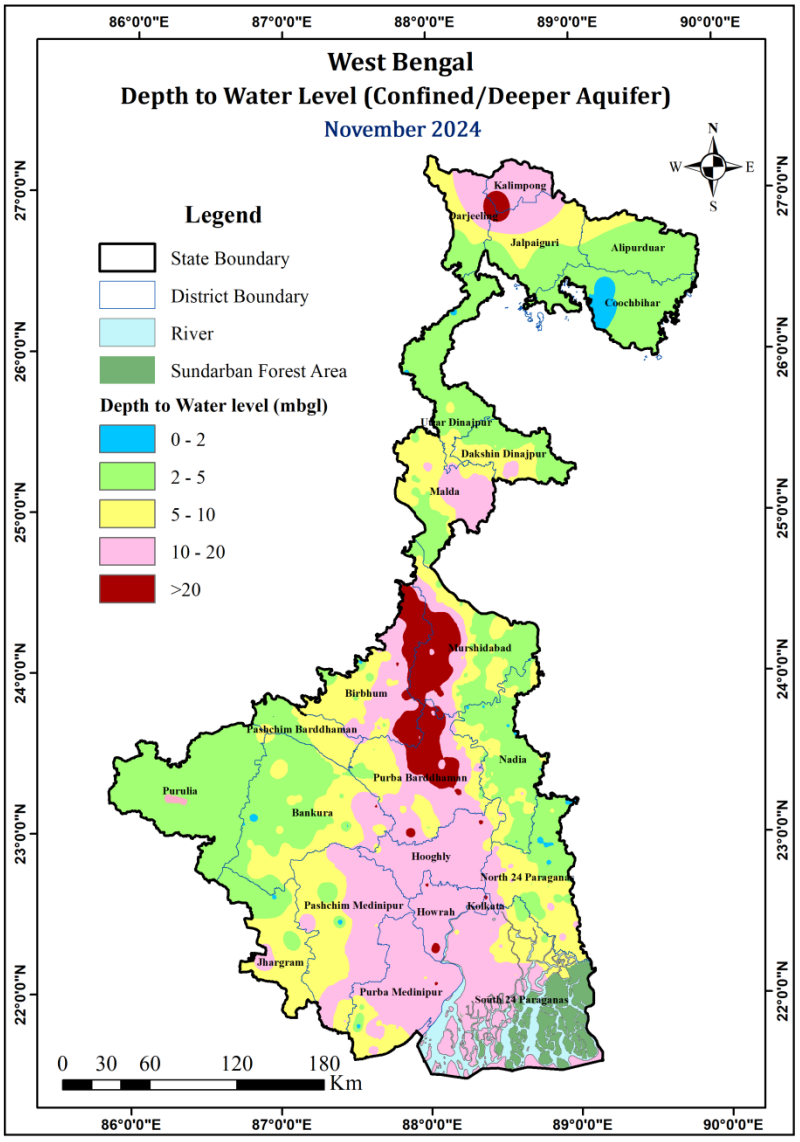

Figure-12: Depth to piezometric Level in deeper aquifer in November 2024

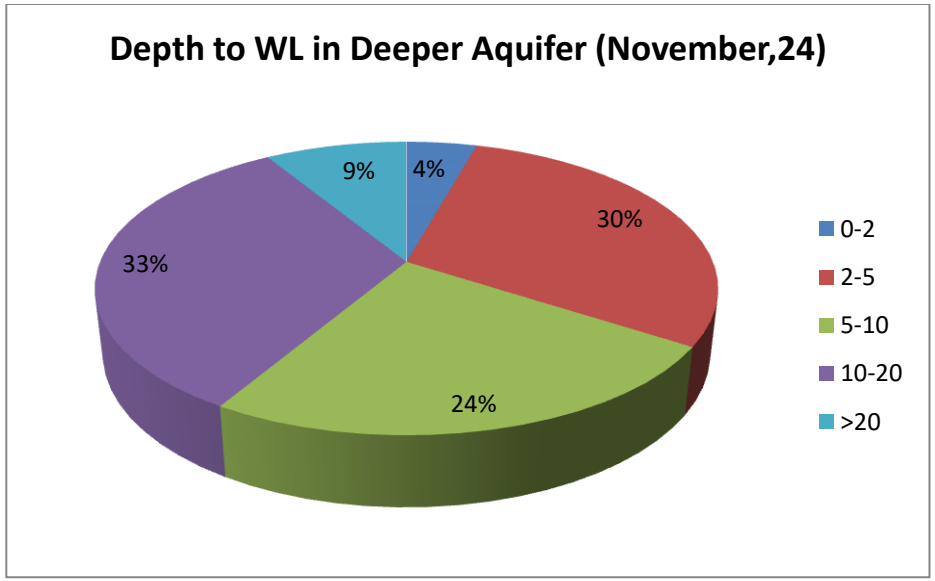

Figure-13: Percentage of wells in different piezometric levels (November 2024)

5.2.2 SEASONAL FLUCTUATION IN PIEZOMETRIC LEVEL

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

In deeper aquifers out of 852 wells analyzed, 744 wells showing rise and 108 wells shows falling water level (figure-14 &15).

In deeper aquifers in rising category 25% of wells are showing 0-2m fluctuation, 31% showing 2-4m fluctuation and 31% of wells are in the range of more than 4m. In the falling category 8% of wells are showing falling trend in 0-2m category, 3% of wells are in the range of 2-4m and 1% of wells are showing >4m fluctuation of water level.

The rise in water level is observed in all the districts of the State during Post-monsoon season. Fall is observed as isolated patches.

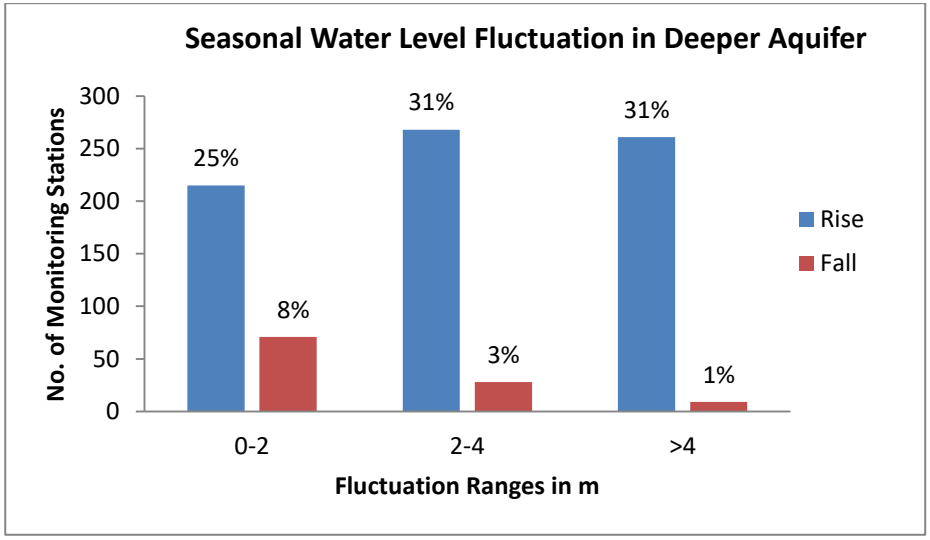

Figure-14: Percentage of wells showing rise and fall in WL in Confined aquifer/ semi-confined aquifer (April 2024 to November 2024)

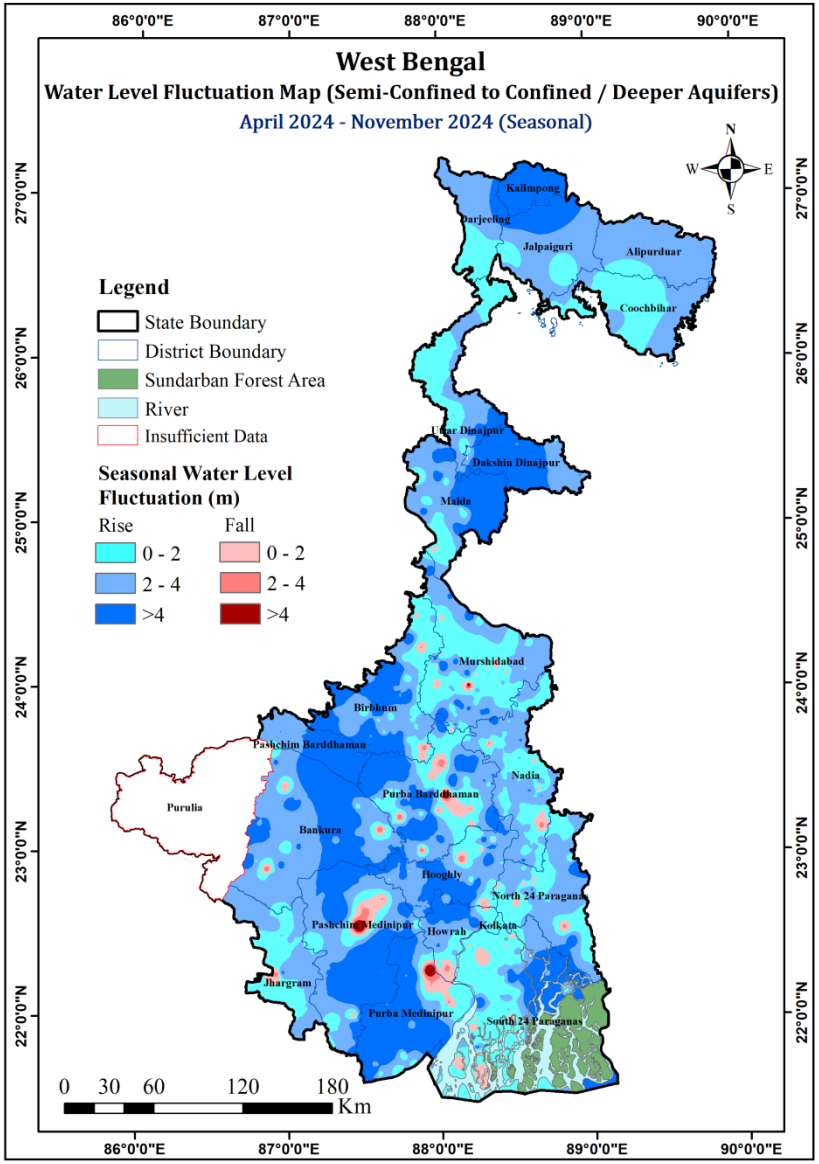

Figure-15: Seasonal water level fluctuation in in Confined aquifer/ semi-confined aquifer(April 2024 to November 2024)

5.2.3 ANNUAL FLUCTUATION IN PIEZOMETRIC LEVEL

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

In deeper aquifers out of 895 wells analyzed, 558 wells showing rise and 337 wells shows falling water level (figure-16 &17).

In deeper aquifers in rising category 42% of wells are within the fluctuation of 0-2m, 14% are in 2-4m and 6% of wells are in the range of more than 4m.

In the falling category 28% of wells are showing falling trend in 0-2m category, 5% of wells are in the range of 2-4m and 4% of wells are showing >4m fluctuation of water level.

Rise of upto 0-2 m in water level is seen in almost all the districts of the State. Rise of >2 m is observed as isolated patches.

Fall in water level is observed as isolated patches in the State.

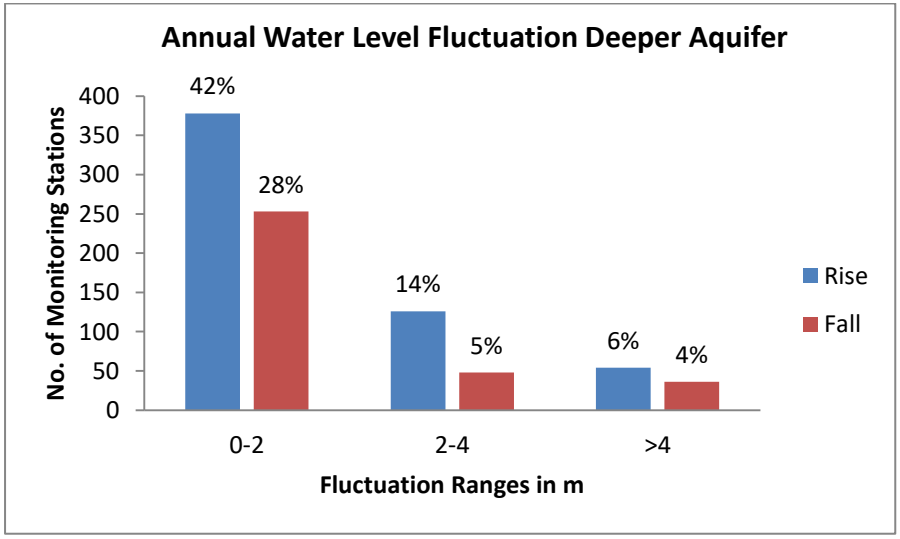

Figure-16: Percentage of wells showing rise and fall in piezometric level in confined/semi-confined aquifer (November 2023 to November 2024)

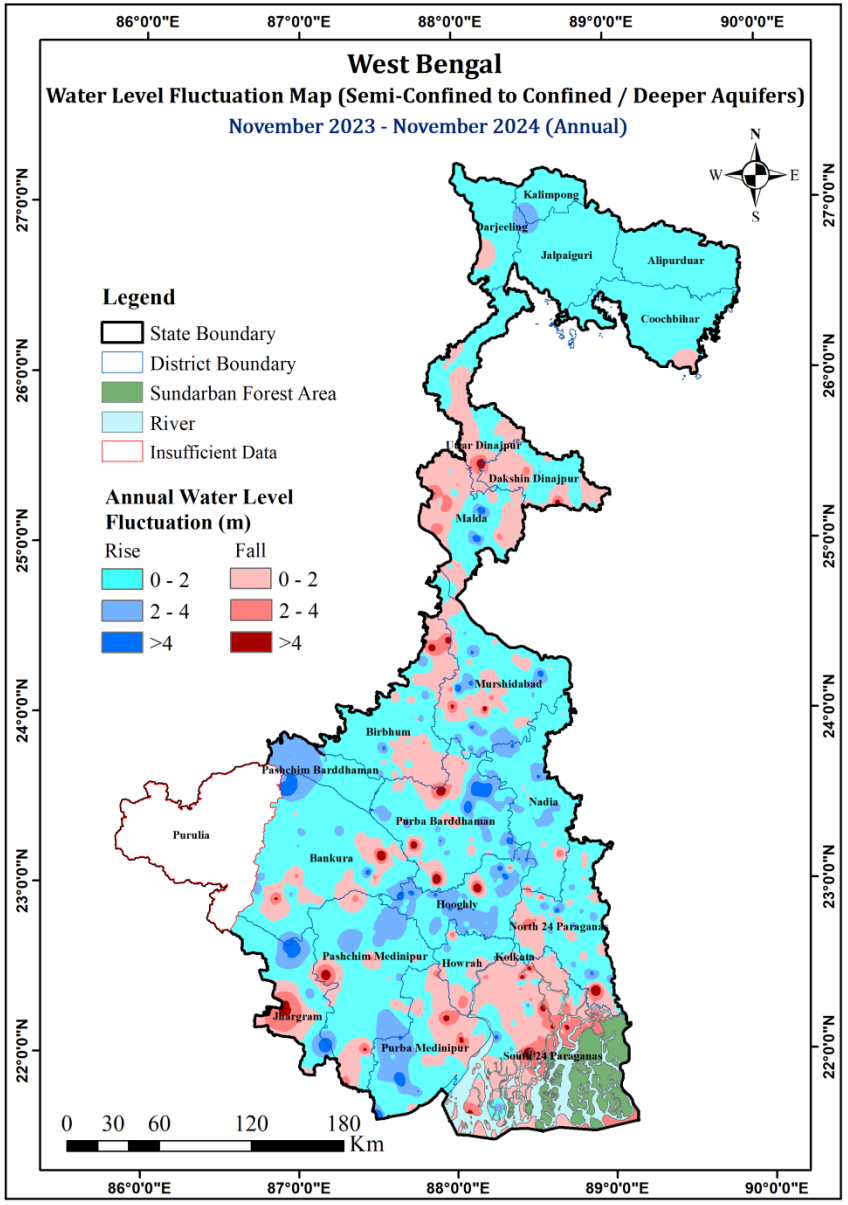

Figure-17: Annual water level fluctuation in Confined aquifer (November 2023 to November 2024)

5.2.4 DECADAL FLUCTUATION IN PIEZOMETRIC LEVEL

Decadal Fluctuation of Piezometric Level in Confined / Semi-confined Aquifer (Decadal Mean November (2014-2023) to November 2024)

In deeper aquifers out of 853 wells analyzed, 388 wells showing rise and 465 wells shows falling water level (figure-18 &19).

For deeper aquifers, in rising category 33% of wells are within the fluctuation of 0-2m, 8% are in 2-4m and 5% of wells are in the range of more than 4m. In the falling category 27% of wells are showing falling trend in 0-2m category, 15% of wells are in the range of 2-4m and 12% of wells are showing >4m fluctuation of water level. From the water level fluctuation map it can be seen water level fluctuation is mainly in the range of 0-2 m and can be observed in most of the district of the State. 2-4 m fluctuation is observed in isolated pockets. Fall of >4m is observed in Central part of the State.

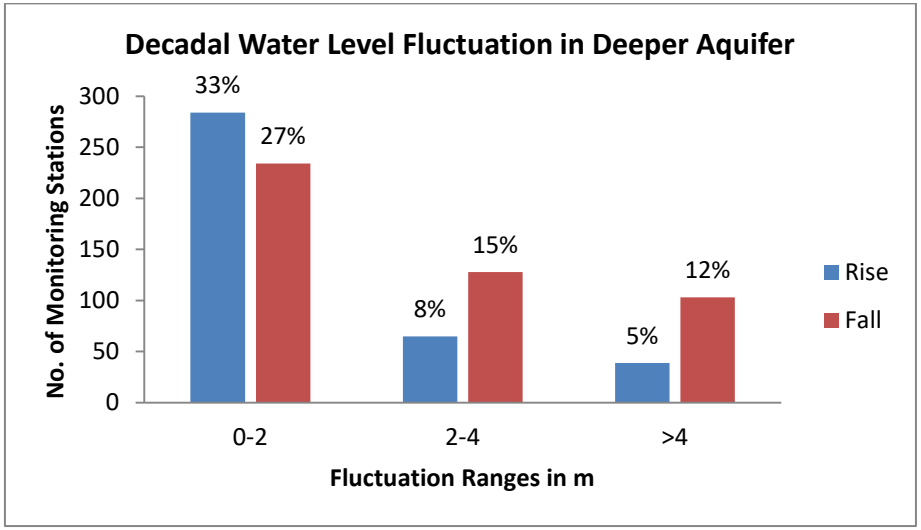

Figure-18: Percentage of wells showing rise and fall in piezometric level in confined/semi-confined Aquifer (Decadal Mean November (2014-2023) to November 2024)

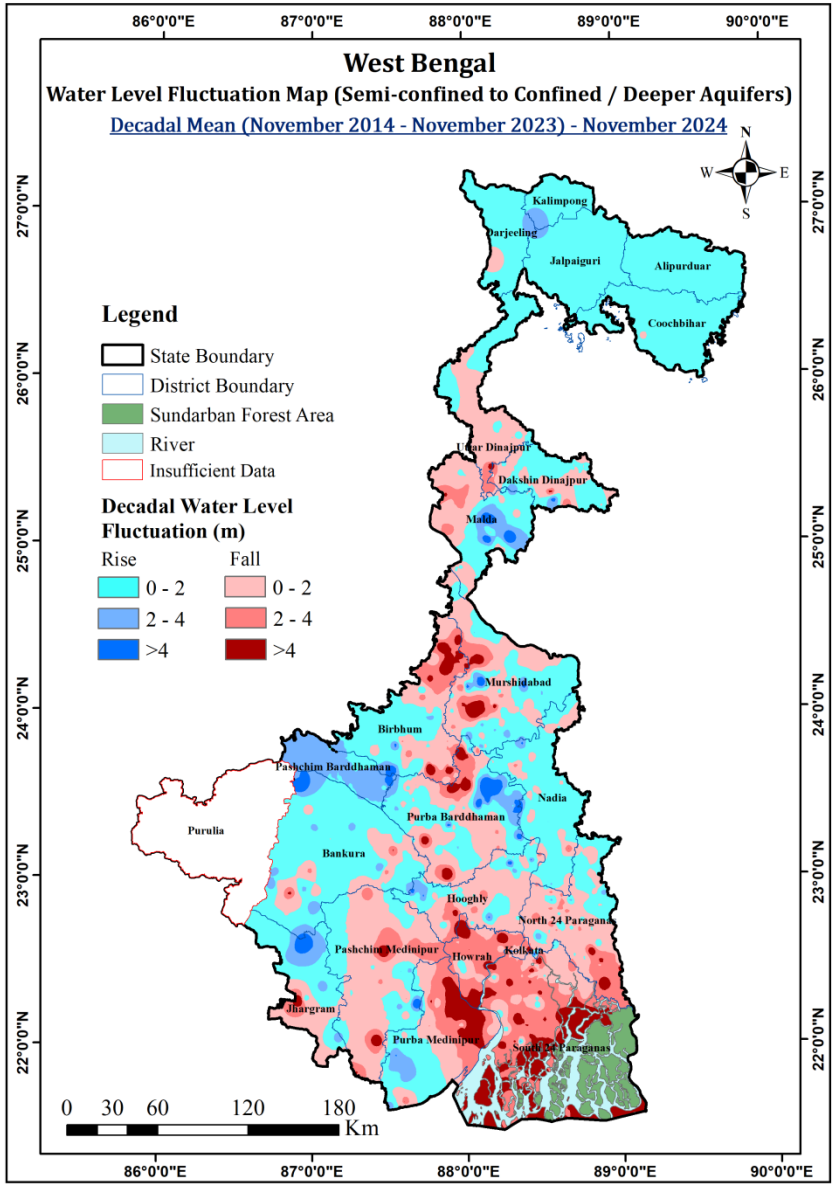

Figure-19: Decadal water level fluctuation in Confined Aquifer (Decadal Mean November (2014-2023) to November 2024)

6.0 SUMMARY

As a component of the National Ground Water Monitoring Programme, CGWB, ER, Kolkata conducts ground water monitoring on quarterly basis in West Bengal: during April (pre-monsoon), August, November (post-monsoon) and January. As on March 2024, the Eastern Region, Kolkata has 1732 GWMS in the State of West Bengal.

During November 2024, around 95% of the West Bengal's monitoring wells exhibit depth to water level within 20 meters below ground level. Deeper water levels of more than 20 m covers only 5% monitoring wells of the State.

The ground water level in West Bengal during November 2024 has been significantly influenced by rainfall from October-November 2024. This period witnessed a surplus rainfall in northern, western and southern part that has led to the rise in groundwater level of the aquifers during November 2024. Central region of West Bengal experiences significant decline as this region is considered as the rice belt of West Bengal with major irrigation draft. However, the cyclonic effects of DANA cyclone in 4th week of October leads to the increase the groundwater level of unconfined aquifer over the region.

Seasonal water level fluctuation (April 2024 to November 2024) shows that 90% rise and 10% fall in seasonal water level fluctuation which when compared to the previous year Seasonal fluctuation (April 2023 to November 2023) having 86% rise and 14% fall in water level indicating the effect of aquifer recharge during post-monsoon season in West Bengal.

Annual water level fluctuation November 2023 to November 2024 shows that 66% rise and 34% fall in annual water level fluctuation which when compared to the previous year Annual fluctuation (November 2022 to November 2023) having 52% rise and 48% fall in water level indicating the effect of ground water recharge in the State.

Similarly, Decadal fluctuation in water level of mean (2014-2023) with respect to November-2024 shows 60% of the area experienced rise and 40% fall in water level, which when compared to the previous year Decadal mean (2013-2022) to November -2023 having 37% rise and 63% fall in water level indicating significant recharge of the aquifer system in the State.

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आज़ादी का अमृत महोत्सव

CONSERVE WATER FOR FUTURE

Central Ground Water Board
Department of Water Resources, River Development &
Ganga Rejuvenation Ministry of Jal Shakti, Govt. of India
Eastern Region, 'BHUJALIKA'
Block : CP6, Sector-V, Bidhannagar,
Kolkata- 700091, West Bengal
Phone : +91 (0) 33 2367 3081
Fax : +91 (0) 33 2367 3080
Email : rder-cgwb@nic.in