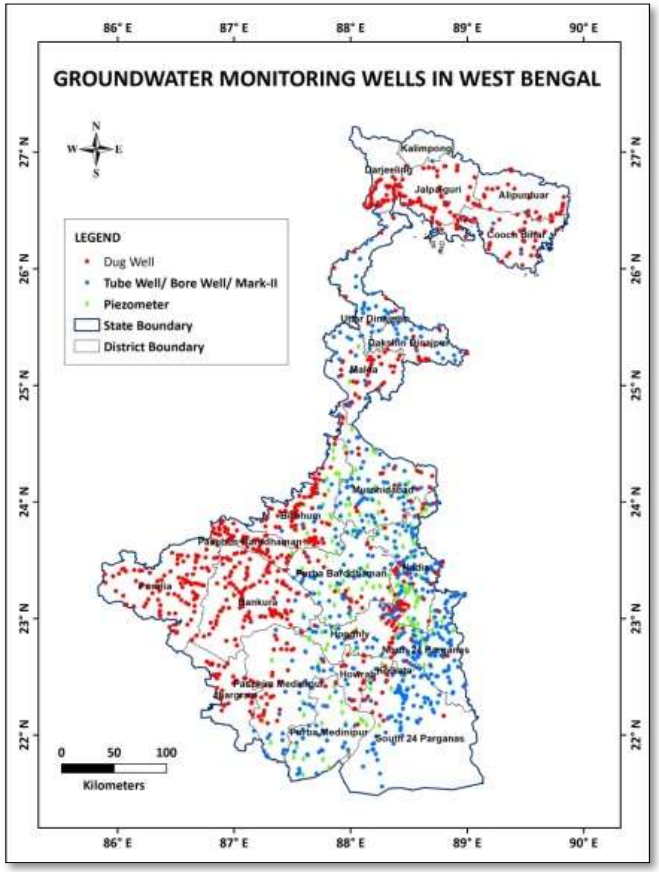


# GROUND WATER LEVEL BULLETIN

**April 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 April-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; 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 in Andaman and every month in Sikkim (through Participatory monitoring since June,2024).

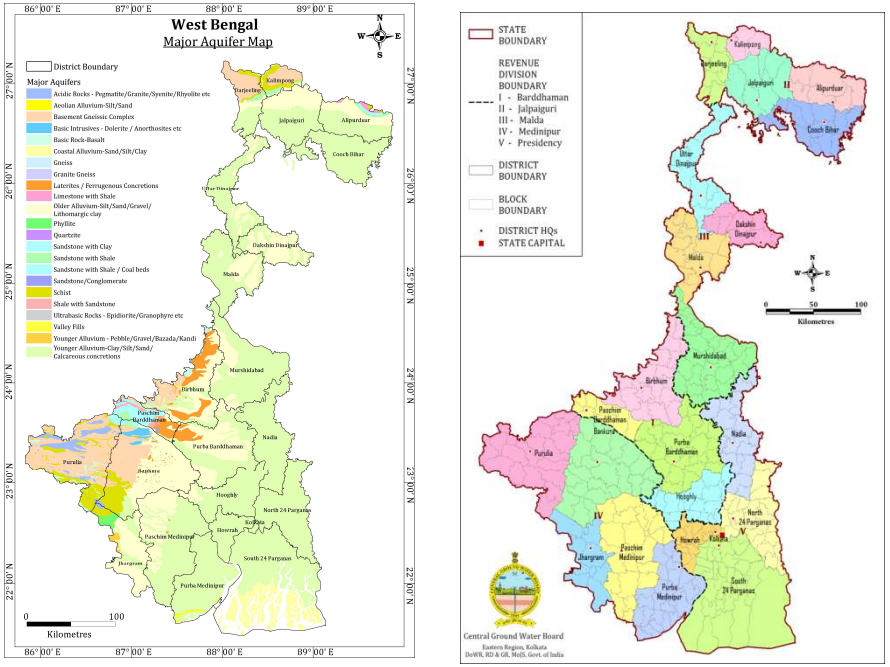


**Figure-1: Map showing major aquifers and administrative divisions of West Bengal**

## 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, 1553 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

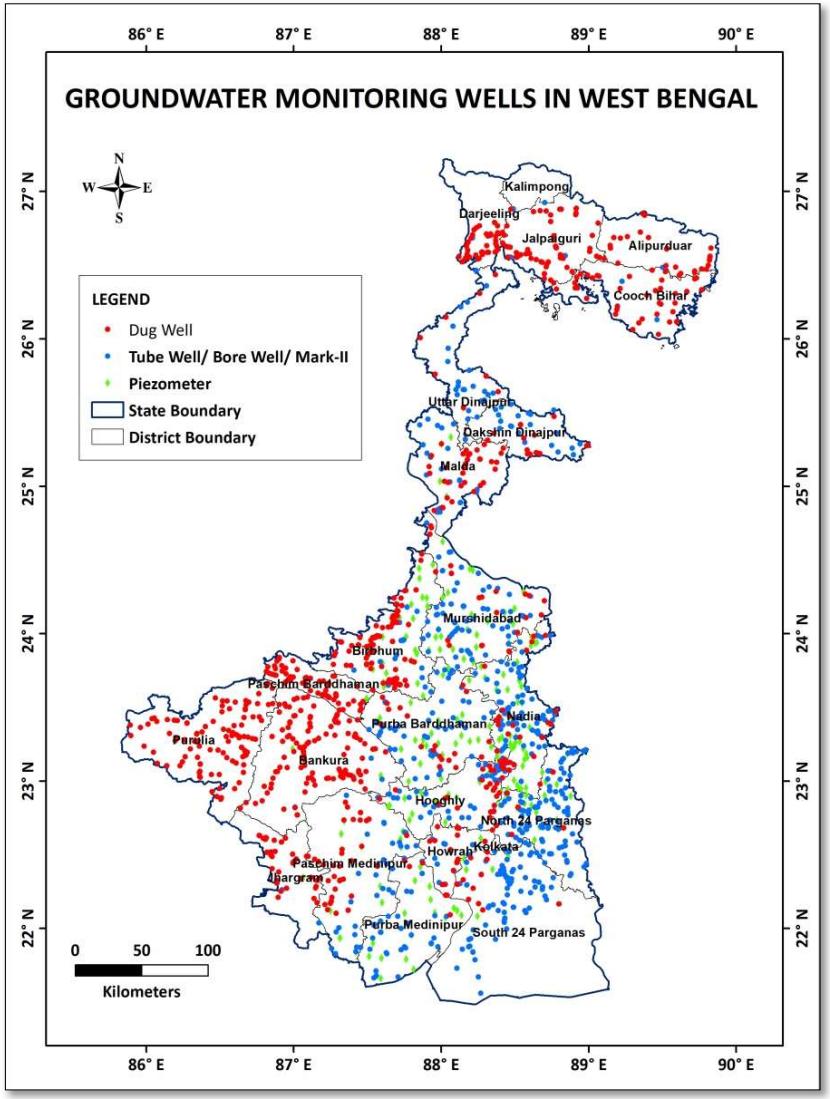


**Figure- 2: Map showing locations of monitoring wells (NHNS) in West Bengal**

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

| Sl. No | Name of the District | Number of GW Monitoring Stations (April 2024) | | | | |
|---|---|---|---|---|---|---|
| | | 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 North Bengal (Darjeeling, Kalimpong, Jalpaiguri, Alipurduar, Coach Behar, Uttar and Dakshin Dinajpur) total 12 mm and 1194 mm precipitation occurred during winter and pre-monsoon season in 2024 over the region. North Bengal used to receive pre-monsoon shower, owing to the geographical location and foothills of Himalaya. However, total 101 mm and 684 mm rainfall occurred over the western part (Birbhum, Bankura, Purulia, Pachim and Purba Burdwan) of West Bengal. Southern part (Howrah, Hugly, Pachim and Purba medinipur, Jhargram, Kolkata, North and South 24 Parganas) of state received 201 mm and 2663mm rainfall in winter and pre-monsoon. This coastal region is highly influence by the seasonal cyclonic activities. The middle part (Maldah, Mursidabad and Nadia) of the state received 73 mm and 684 mm rainfall. Kolkata, Jalpaiguri, North and South 24 parganas districts have received the highest rainfall during pre-monsoon.While, Mursidabad Purulia, West Medinipur and Maldah districts have received lowest rainfall during the pre-monsoon season (figure-3). District-wise status of rainfall is given in table-2.

**Table-2: District wise rainfall data from January to May 2024**

| District | Cumulative Rainfall (mm) | | | | |
|---|---|---|---|---|---|
| | Jan-24 | Feb-24 | Mar-24 | Apr-24 | May-24 |
| Cooch Behar | 0.1 | 0.4 | 71.0 | 6.0 | 149.0 |
| Darjeeling | 0.4 | 0.9 | 120.7 | 27.9 | 208.8 |
| Jalpaiguri | 0.1 | 0.4 | 74.2 | 39.7 | 237.0 |
| Malda | 0.0 | 11.6 | 73.0 | 0.2 | 71.9 |
| North Dinajpur | 0.0 | 6.2 | 21.9 | 0.0 | 87.2 |
| South Dinajpur | 0.0 | 4.1 | 35.7 | 0.0 | 115.1 |
| Bankura | 1.8 | 24.9 | 45.7 | 4.0 | 168.6 |
| Birbhum | 13.1 | 6.3 | 33.5 | 1.4 | 121.6 |
| Burdwan | 13.5 | 14.5 | 51.7 | 2.0 | 127.9 |
| East Midnapore | 31.8 | 7.5 | 101.2 | 2.3 | 254.3 |
| Hooghly | 16.5 | 10.3 | 57.0 | 11.2 | 227.2 |
| Howrah | 2.8 | 15.9 | 24.0 | 1.6 | 341.8 |
| Kolkata | 2.3 | 12.4 | 28.1 | 0.5 | 500.7 |
| Murshidabad | 4.0 | 1.0 | 25.0 | 0.0 | 144.0 |
| Nadia | 39.2 | 17.3 | 41.7 | 2.5 | 126.8 |
| North 24 Parganas | 10.3 | 26.0 | 37.7 | 12.9 | 308.3 |
| Purulia | 1.2 | 26.2 | 32.6 | 2.9 | 92.6 |
| South 24 Parganas | 18.6 | 15.6 | 42.4 | 7.3 | 324.7 |
| West Midnapore | 5.7 | 16.8 | 47.6 | 0.4 | 114.2 |
| Jhargram | 3.1 | 6.1 | 80.4 | 2.0 | 135.6 |

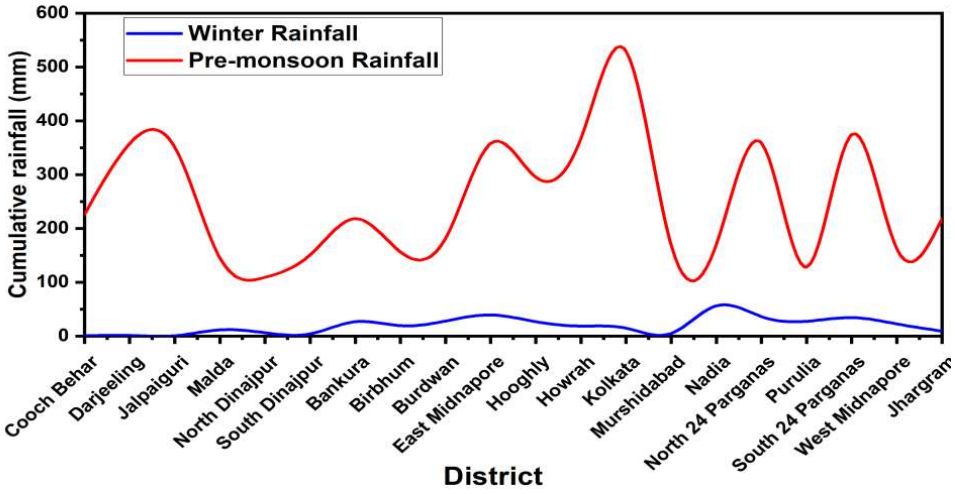


**Figure-3: Rainfall distribution (in mm) over the different districts of West Bengal during winter and pre-monsoon seasons in 2024**

# 5.0 GROUND WATER LEVEL SCENARIO (APRIL 2024) for WEST BENGAL

## 5.1 SHALLOW AQUIFER (**UNCONFINED**)

### 5.1.1 DEPTH TO WATER LEVEL

**Depth to Water Level in Unconfined Aquifer (April 2024)**

Depth to water level during April 2024 was measured manually from 1526 ground water monitoring wells. A total of 691 numbers of GWMS in shallow aquifers were measured. Water level of less than 2 m bgl was recorded in 13% of wells in phreatic aquifers. Similarly in 41% of wells, water level was observed between 2-5 m bgl. 5-10 m bgl was recorded in 41% of wells and 10-20 m bgl in only 5% of wells. Only 2 wells in phreatic aquifers showing water level beyond 20 m bgl *(Figure-4 & 5*).

The depth to water level map of April 2024 depicts that water level within the range of 0-2 m bgl falling mostly in the South-eastern part of the State. Water level within 2-5 m bgl covering most of the districts. Water level within 5-10 m bgl predominate in the western parts of the district covered by hard rock areas of Purulia, Bankura as well as the older alluvial areas covered by the districts of Jhargram, Paschim Medinipur, , Bankura and some parts of Purba and Paschim Bardhaman and Birbhum distrcits and some parts of Northern part of the State. Isolated patches at Purulia, Bankura, Jhargram, Bhirbhum, Paschim Medinipur, Dinajpur district showed water levels within the range of 10-20m bgl. Deepest water level was recorded at Saranga, 26.22 m bgl in Kalchini block of Alipurduar District and shallowest water level 0.3 mbgl was found in Budge Budge block of S-24 Parganas district.

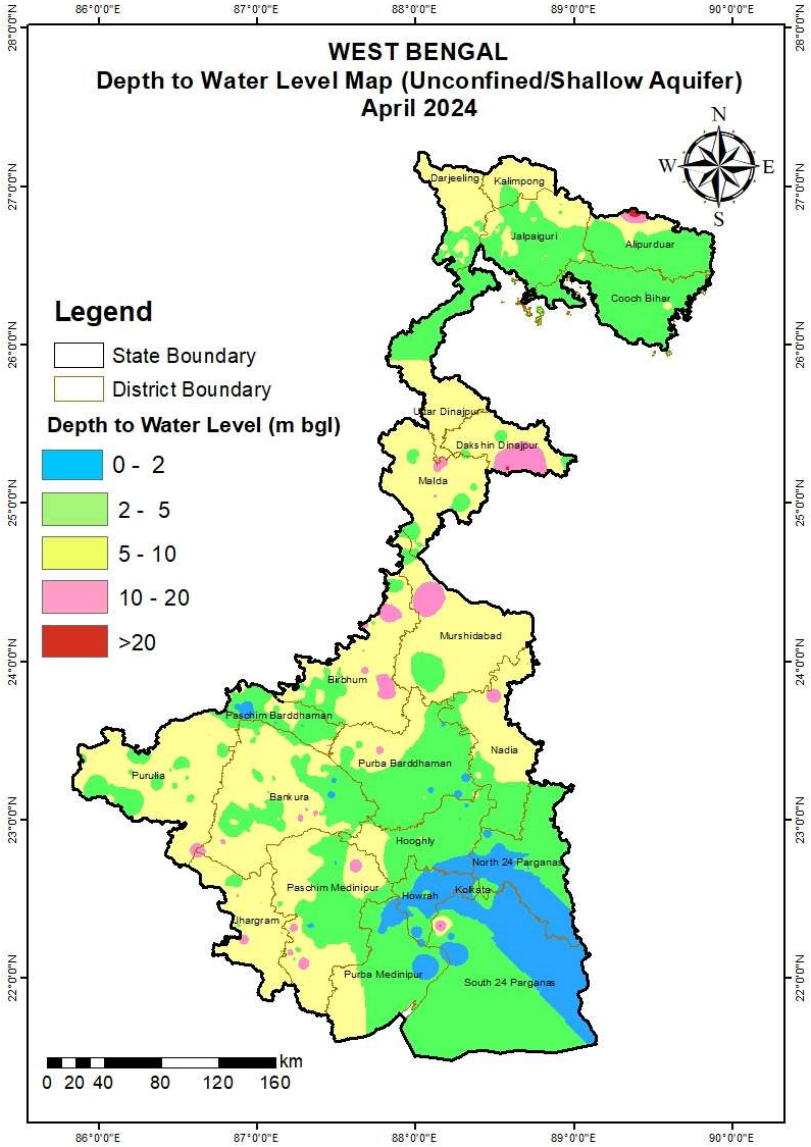


**Figure-4: Depth to water level of unconfined aquifer during April 2024**

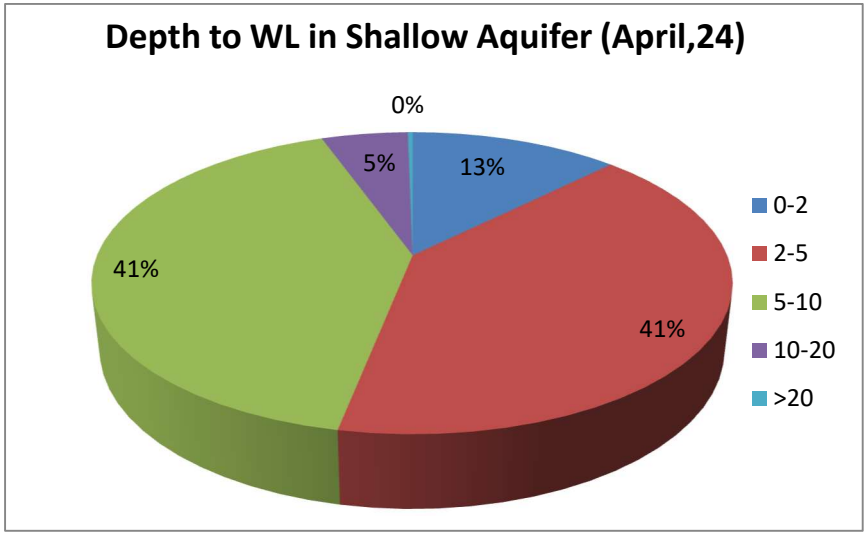


**Figure-57: Percentage of wells in different water level ranges in Unconfined aquifer**

## 5.1.2 SEASONAL FLUCTUATION IN WATER LEVEL

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

Since depth to Water Level has not been measured for any other season, hence seasonal fluctuation with respect to April-24 cannot be compared.

## 5.1.3 ANNUAL FLUCTUATION IN WATER LEVEL

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

In shallow aquifers out of 608 wells analyzed, 316 wells showing rise and 318 wells shows falling water level (figure-6 &7).

In shallow aquifers in rising category 39% of wells are within the fluctuation of 0-2m, 7% are in 2-4m and 6% of wells are in the range of more than 4m. In the falling category 41% of wells are showing falling trend in 0-2m category, 3% of wells are in the range of 2-4m and 3% of wells are showing >4m fluctuation of water level.

Rise of less than 2 m in water level is seen in all the districts, significantly in S-24 Parganas, Howrah, Hooghly, Nadia, Murshidabad, Malda and parts of S-24 Parganas, Purba & Paschim Medinipur districts.

Fall of less than 2 m in water levelis mainly observed in North Bengal districts, parts of Purba Bardhaman, Purba & Paschim Medinipur, Jhargram and Bankura districts. Fall of beyond 2 m is observed as isolated patches.

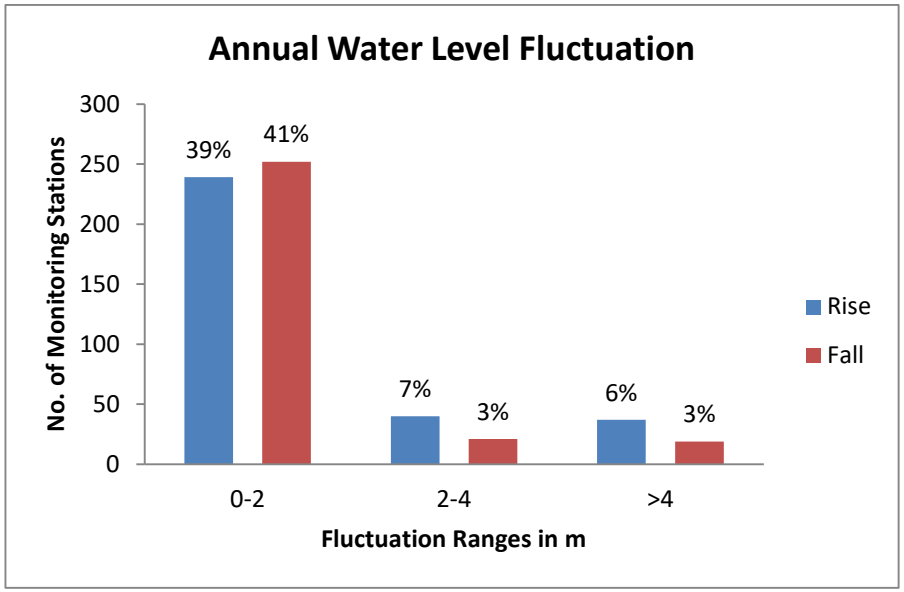


**Figure-6: Percentage of wells showing rise and fall in WL in unconfined aquifer (November 2021 to November 2023)**

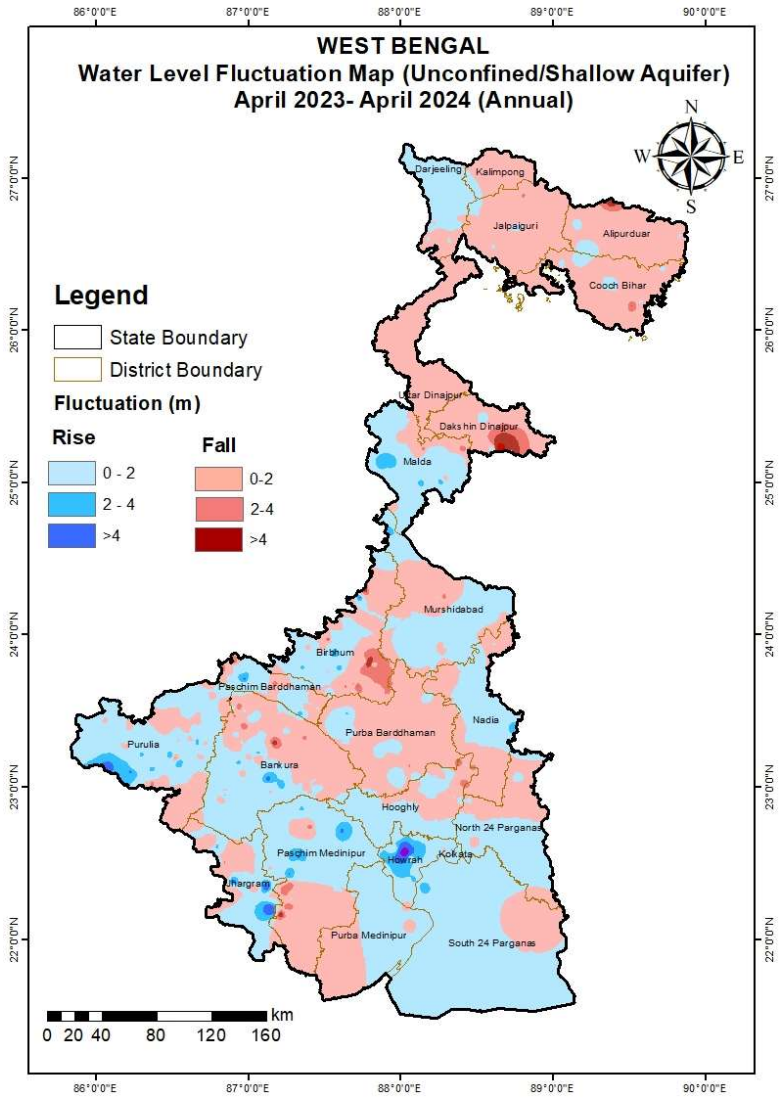


**Figure-7: Annual water level fluctuation in unconfined aquifer (April 2023 to April 2024)**

## 5.1.4 DECADAL FLUCTUATION IN WATER LEVEL

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

In shallow aquifers out of 649 wells analyzed, 234 wells showing rise and 418 wells shows falling water level (figure-8& 9).

For shallow aquifers, in rising category 30% of wells are within the fluctuation of 0-2m, 4% are in 2-4m and 2% of wells are in the range of more than 4m. In the falling category 52% of wells are showing falling trend in 0-2m category, 9% of wells are in the range of 2-4m and 3% 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.

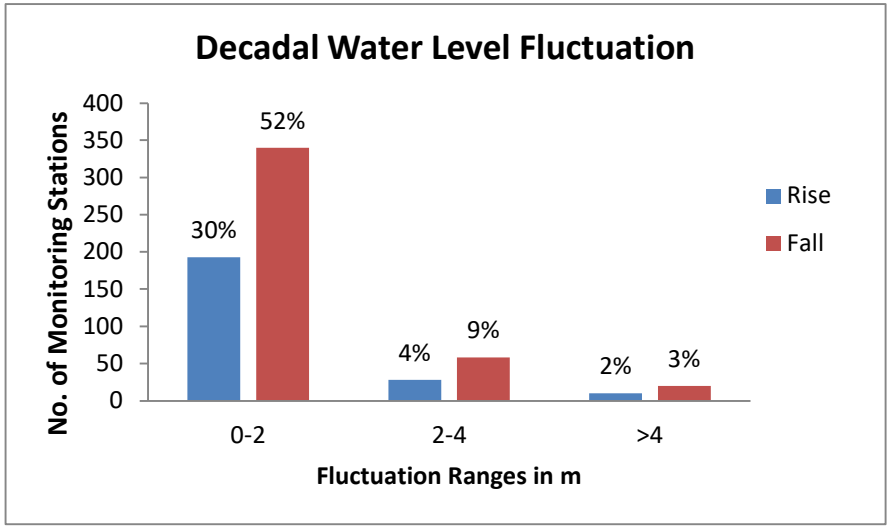


**Figure-8: Percentage of wells showing rise and fall in WL in unconfined aquifer (Decadal Mean April (2014-2023) to April 2024)**

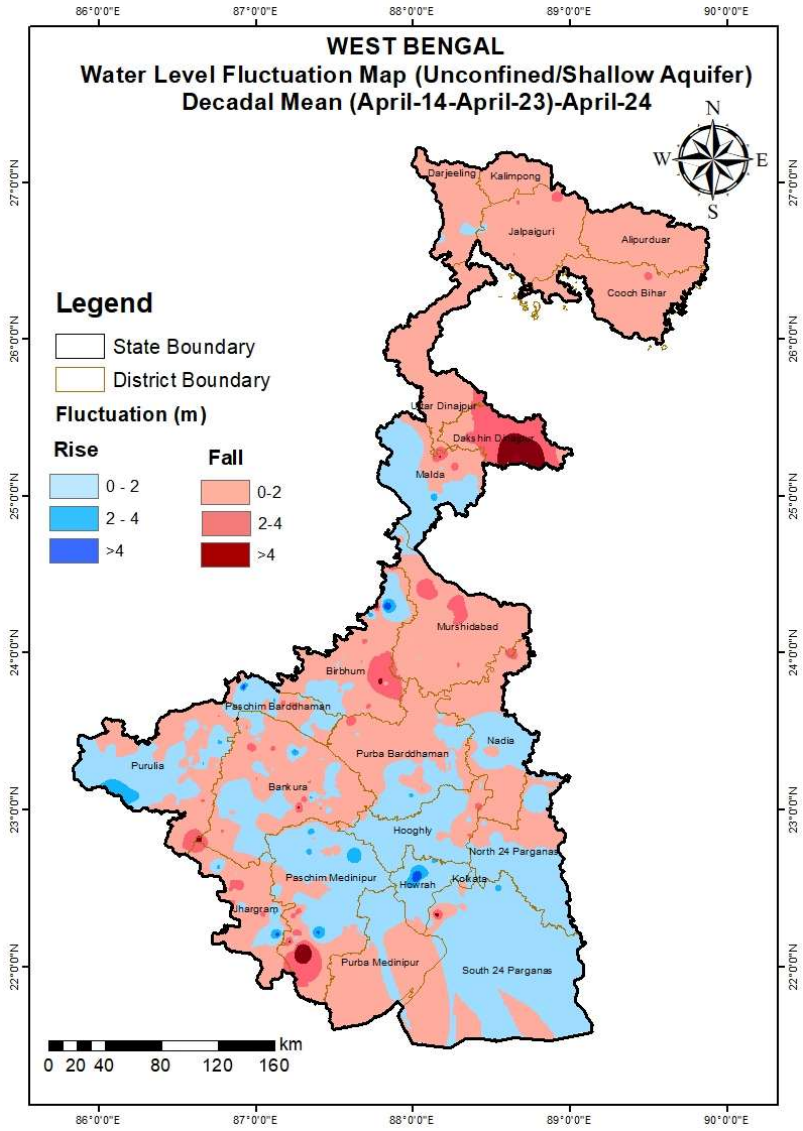


**Figure-9: Decadal water level fluctuation in unconfined Aquifer (Decadal Mean April (2014-2023) to April 2024)**

## 5.2 DEEPER AQUIFER (CONFINED/ SEMI-CONFINED)

### 5.2.1 DEPTH TO PIEZOMETRIC LEVEL

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

The ground water level data April 2024 in deeper aquifers indicate that out of the total 835 wells analysed, only 1% of wells are showing water level less than 2 m bgl, 7 % wells are showing water level in the depth range of 2-5 m bgl, 37% number of wells are showing water level in the depth range of 5-10 m bgl, 38% wells are showing water level in the depth range of 10-20 m bgl and 16% wells showing water level in the depth range beyond 20m bgl. The maximum depth to water level of 34.33 m bgl is observed at Mongpong in Kalimpong-I block of Kalimpong district and lowest water level 0.32 m bgl was found at 17 Mile TW in Kaliachak-III block of Malda District (*Figure-10 & 11*).

From the depth to water level map of April 2024 for deeper aquifers, the water level within 2-5 m bgl is in northern parts of the district covering Darjeeling, Alipurduar, Jalpaigudi and Kochbehar districts and in scattered parts in Nadia, Murshidabad, N 24 Parganas, Bankura districts. Water level between 5-10 m bgl is found mostly in eastern and western part of the State in parts of Purulia, Paschim Medinipur, Jhargram, Bankura, Nadia, Murshidabad N 24 Parganas and Darjeeling, Alipurduar, Jalpaigudi and Kochbehar district in the north. In the central part of the state water level is mostly deep beyond 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.

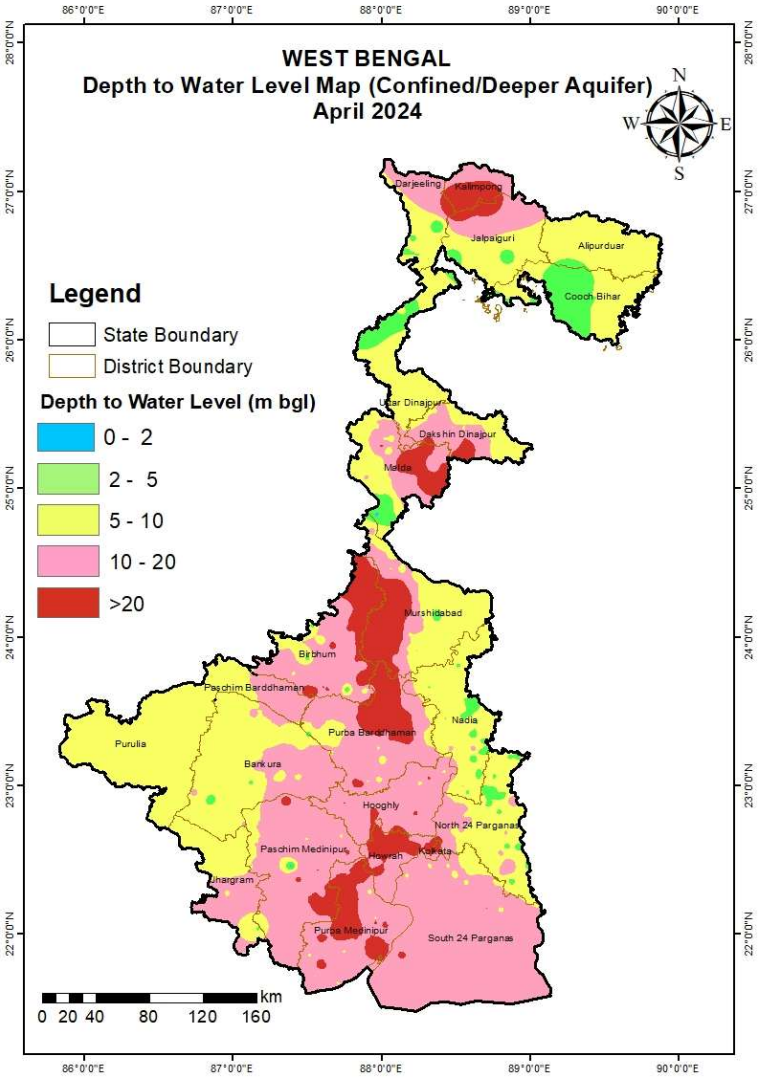


Figure-10: Depth to piezometric Level in deeper aquifer in April 2024

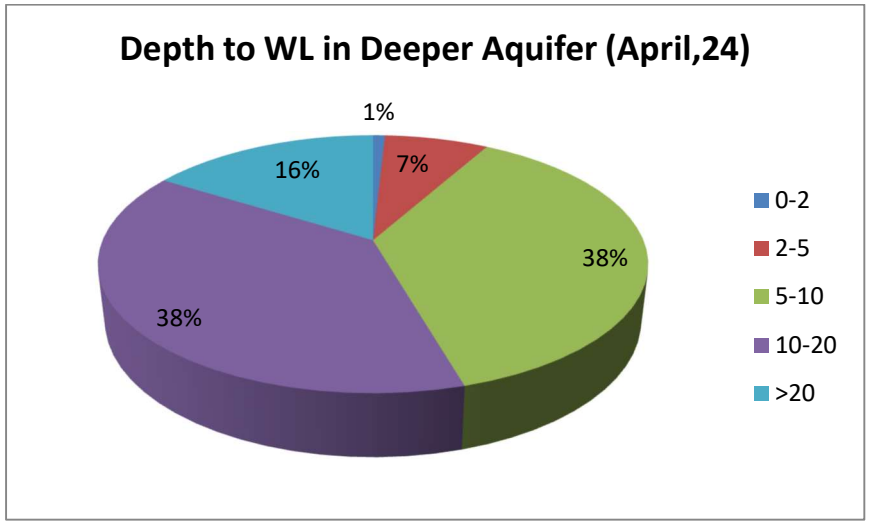


Figure-11: Percentage of wells in different piezometric levels (April 2024)

## 5.2.2 SEASONAL FLUCTUATION IN PIEZOMETRIC LEVEL

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

Since depth to Water Level has not been measured for any other season, hence seasonal fluctuation with respect to April-24 cannot be compared.

## 5.2.3 ANNUAL FLUCTUATION IN PIEZOMETRIC LEVEL

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

In deeper aquifers out of 690 wells analyzed, 306 wells showing rise and 330 wells shows falling water level (figure-12 &13).

In deeper aquifers in rising category 29% of wells are within the fluctuation of 0-2m, 7% are in 2-4m and 8% of wells are in the range of more than 4m. In the falling category 34% of wells are showing falling trend in 0-2m category, 9% of wells are in the range of 2-4m and 13% of wells are showing >4m fluctuation of water level.

Rise of less than 2 m in water level is seen significantly in Nadia, Purulia, and parts of Purba & Paschim Medinipur, Howrah, Hooghly, Murshidabad, Malda districts. Rise of >2 m is observed as isolated patches.

Fall of less than 2 m in water level is observed in all the districts of the State. Fall of beyond 2 m is observed as isolated patches.

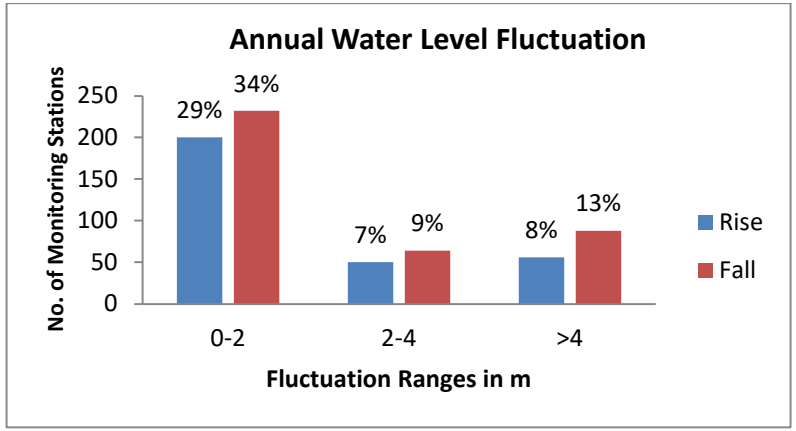


Figure-12: Percentage of wells showing rise and fall in piezometric level in confined/semi-confined aquifer (April 2023 to April 2024)

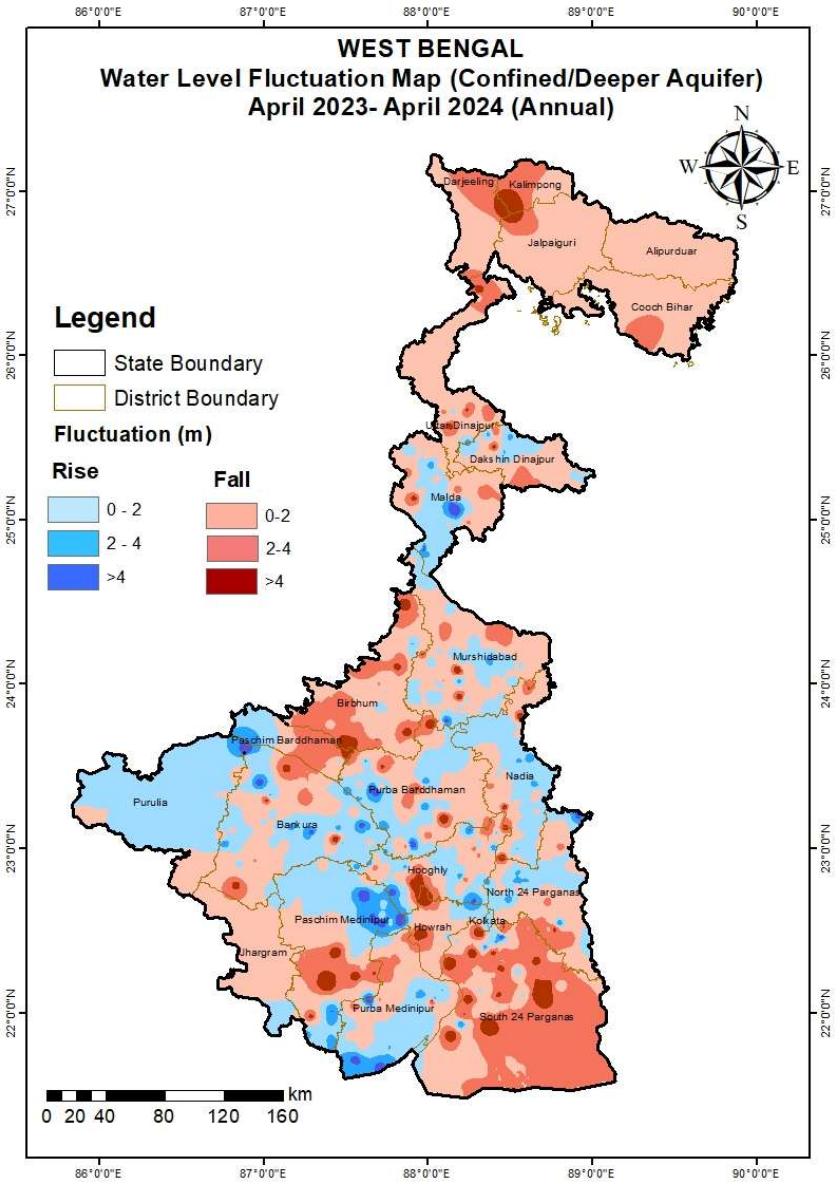


Figure-13: Annual water level fluctuation in Confined aquifer (April 2023 to April 2024)

## 5.2.4 DECADAL FLUCTUATION IN PIEZOMETRIC LEVEL

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

In deeper aquifers out of 586 wells analyzed, 131 wells showing rise and 455 wells shows falling water level (figure-14 &15).

For deeper aquifers, in rising category 15% of wells are within the fluctuation of 0-2m, 4% are in 2-4m and 4% of wells are in the range of more than 4m. In the falling category 32% of wells are showing falling trend in 0-2m category, 24% of wells are in the range of 2-4m and 21% 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.

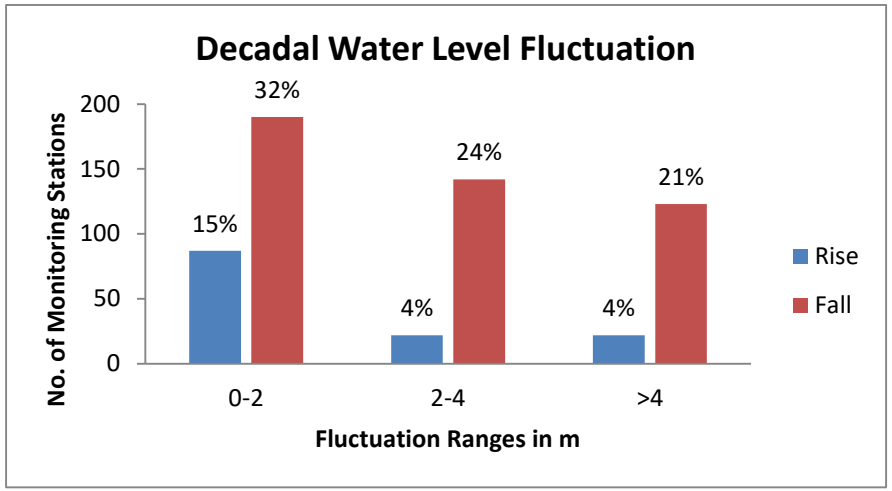


Figure-14: Percentage of wells showing rise and fall in piezometric level in confined/semi-confined Aquifer (Decadal Mean April (2014-2023) to April 2024)

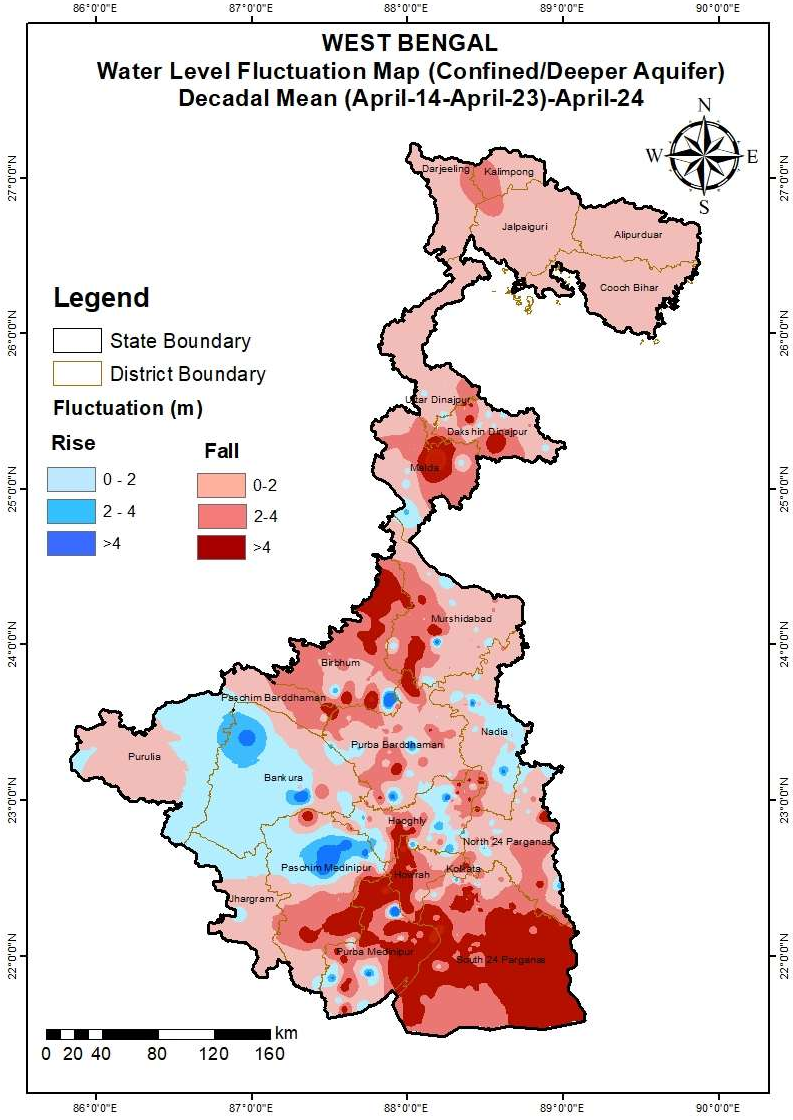


Figure-15: Decadal water level fluctuation in Confined Aquifer (Decadal Mean April (2014-2023) to April 2024)

## 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 January, April (pre-monsoon), August, and November (post- monsoon). As on March 2024, the Eastern Region, Kolkata has 1732 GWMS in the State of West Bengal.

During April 2024, around 68% of the West Bengal's monitoring wells exhibit depth to water level within 10 meters below ground level. 23 % in 10-20 m range. Deeper Deeper water levels of more than 20 m cover 9 % area of the State. The ground water level in West Bengal during April 2024 has been significantly influenced by rainfall from January 2024 to May 2024. This period witnessed a deficient rainfall that has led to the decline of groundwater level in deeper aquifers during April 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, shallow water level in unconfined aquifer can be attributed to the cyclonic effects Remal cyclone in coastal areas with heavy rainfall over short periods, which lead to less recharge to deeper aquifers owing high run-off.

Annual water level fluctuation April 2023 to April 2024 shows that 52% fall and 48% rise in annual water level fluctuation which when compared to the previous year Annual fluctuation (April 2022 to April 2023) having 75% fall and 25 % rise in water level indicating the effect of ground water recharge in West Bengal.

Similarly, Decadal fluctuation in water level of mean (2014-2023) with respect to April-2024 shows 71% of the area experienced fall and 29% rise in water level, which when compared to the previous year Decadal mean (2013-2022) to April-2023 having 70% fall and 30% rise in water level indicating that the trend is maintained in long-term water level fluctuation for West Bengal.

## 7.0 RECOMMENDATION

The long-term trend of water level fluctuations in West Bengal (Decadal Mean April (2014-2023) to April 2024), with approximately 71% of the area experiencing a decline and 29% an increase in water level, underscores the need for strategic water management. To address these challenges, the following recommendations are proposed:

1. **Enhance Groundwater Recharge and Conservation**:
    - **Desiltation of Surface Water Bodies**: Regularly removal of silt from rivers, canals, and ponds will improve water percolation and storage capacity.
    - **Rejuvenate Traditional Water Storage Structures**: Revive and maintain ponds, tanks, and other traditional water bodies to enhance local water availability.
2. **Implement Artificial Recharge Structures**:
    - Construction recharge structures such as check dams, percolation tanks, and recharge wells based on detailed studies of local aquifer characteristics to augment groundwater levels.
3. **Promote Sustainable Water Use Practices**:
    - **Efficient Irrigation Techniques**: Encouragement of water-efficient irrigation methods like drip and sprinkler systems to reduce water wastage in agriculture as there is significant decline in the Central region of the State.
4. **Diversify Water Sources**:
    - Develop alternative water sources, such as rainwater harvesting and recycling of treated wastewater, to reduce dependence on groundwater.

By adopting these measures, West Bengal can work towards achieving a more balanced and sustainable water level equilibrium, mitigating the adverse effects of fluctuations on agriculture, industry, and domestic water supply.

आज़ादी का अमृत महोत्सव

**CONSERVE WATER FOR FUTURE**

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