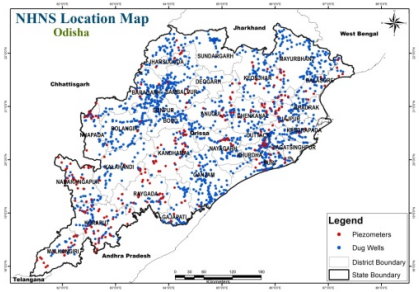


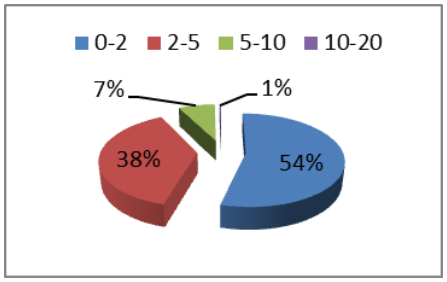


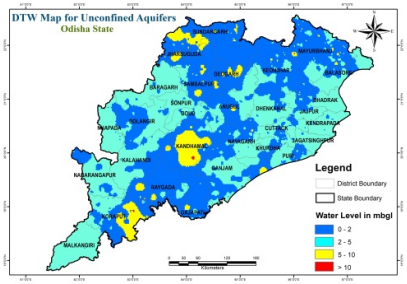


# GROUNDWATER LEVEL BULLETIN

## AUGUST 2024

## ODISHA


## ABSTRACT

Ground water level Scenario during August-2024 highlighting the findings, status of ground water level in different aquifers and its seasonal, annual and decadal comparison.



**CGWB,SOUTH EASTERNREGION,BHUBANESWAR**

## 1.0 INTRODUCTION

Ground water bulletin is prepared by GWB depicting changes in ground water regime of the state through different seasons. It is an effort to obtain information on ground water levels through representative monitoring wells. The important attributes of ground water regime monitoring are ground water level. The natural conditions affecting the groundwater regime involve climatic parameters like rainfall, evapotranspiration etc., whereasanthropogenicinfluencesincludepumpagefromtheaquifer,rechargeduetoirrigationsystemsandotherpracticeslikewastedisposaletc. GroundwaterlevelsarebeingmeasuredbyCentralGroundWaterBoard, South east Regionfourtimes a year during January, April, August and November. Anetwork of 1759 observation wells called **National Hydrograph NetworkStations (NHNS)**, as on 30.04.2024, located all over the state is beingmonitored.

## 2.0 STUDY AREA

Odisha State is the 8th largest state in India covering geographical area of 1, 55, 707 Km2. It lies between NL 17° 49’ and 22° 34’ and EL 81° 24’and 87° 29’. The State is bordered on the east by Bay of Bengal (~575 km), south by Andhra Pradesh, west by Chhattisgarh and north by Jharkhand and West Bengal states. Administratively, the state is comprises of 3 revenue divisions, 30 districts, 58 subdivisions and 314 community development blocks.The population of Odisha is 41,947,358 (census 2011) having a decadal growth rate of 13.97% and the density of population is 269 persons per sq. km. The rural population constitute about 83.32% of the total population.

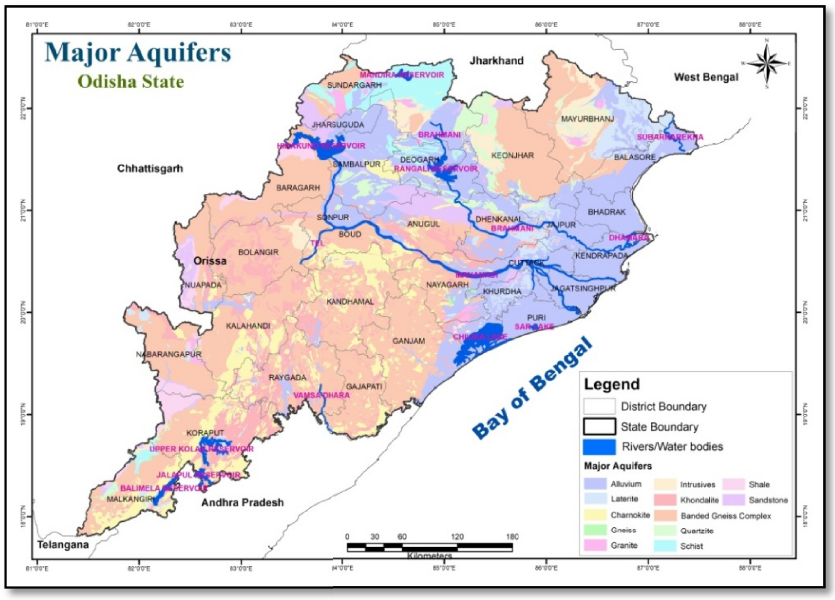


*Fig. 1. Map showing major aquifers and administrative divisions of Odisha*

Physiographically, The State presents varied and picturesque landforms. The Southern and Central parts of the State in Rayagada, Kalahandi, Kandhamal and Gajapati districts present a rugged hilly tract. Plateau occupies the Northern districts of Sundergarh, Keonjhar and Mayurbhanj and parts of Nabarangpur district in the Southwest. Undulating plains characterizes the major river valleys. A narrow coastal plain border the Bay of Bengal.

Physiographically the state can be divided into five distinct units, namely (i) Coastal plains, (ii) Northern uplands, (iii) The erosional plains of Mahanadi and other river valleys (iv) South Western hilly region and (v) Subdued plateaus.

## 3.0 GROUNDWATER LEVEL MONITORING

Central Ground Water Board, South Eastern Region, is monitoring changes in groundwater regime in Odisha 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 August 2024 is 1759 which include 1480 dug wells and 279 piezometers. Among these, 1558 wells monitored and water level recorded, while 201 wells could not be monitored due to various reasons like in accessibility issues. The district-wise breakup of the water level monitoring stations is given in **Table-1**.

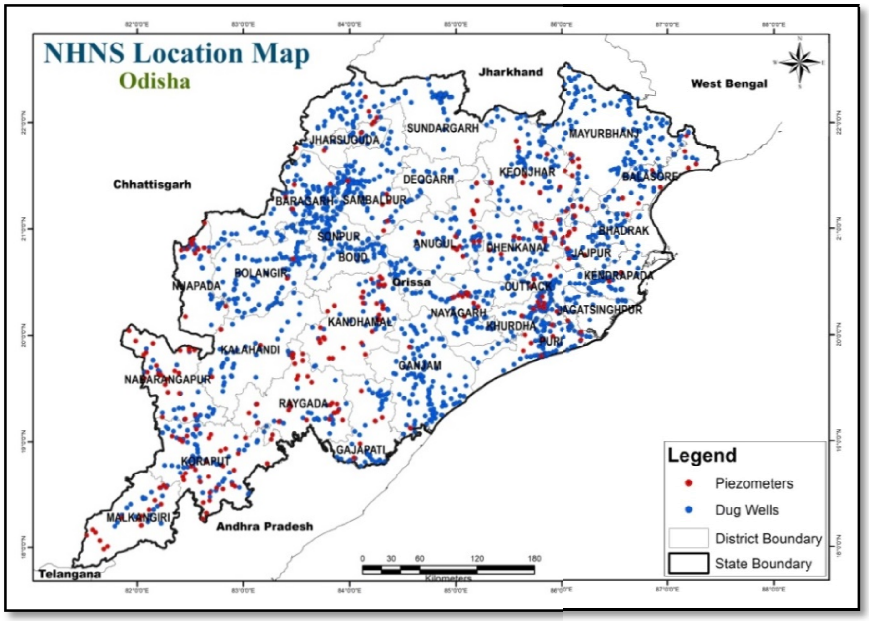


**Figure-2:Mapshowinglocationsofmonitoringwells(NHNS)inOdishastate**

Table 1District-wise distribution of water level monitoring stations

| Sl. No. | District | No. of Monitoring Stations | | |
|---|---|---|---|---|
| | | DW | BW | Total |
| 1 | ANUGUL | 48 | 13 | 61 |
| 2 | BALANGIR | 80 | 2 | 82 |
| 3 | BALESHWAR | 37 | 9 | 46 |
| 4 | BARGARH | 73 | 3 | 76 |
| 5 | BAUDH | 54 | | 54 |
| 6 | BHADRAK | 26 | | 26 |
| 7 | CUTTACK | 69 | 5 | 74 |
| 8 | DEBAGARH | 11 | | 11 |
| 9 | DHENKANAL | 41 | 6 | 47 |
| 10 | GAJAPATI | 37 | 5 | 42 |
| 11 | GANJAM | 96 | 3 | 99 |
| 12 | JAGATSINGHAPUR | 12 | | 12 |
| 13 | JAJAPUR | 38 | 14 | 52 |
| 14 | JHARSUGUDA | 19 | 4 | 23 |
| 15 | KALAHANDI | 35 | 3 | 38 |
| 16 | KANDHAMAL | 31 | 29 | 60 |
| 17 | KENDRAPARA | 26 | 3 | 29 |
| 18 | KENDUJHAR | 70 | 14 | 84 |
| 19 | KHORDHA | 72 | 8 | 79 |
| 20 | KORAPUT | 60 | 36 | 96 |
| 21 | MALKANGIRI | 20 | 17 | 37 |
| 22 | MAYURBHANJ | 110 | 9 | 119 |
| 23 | NABARANGAPUR | 27 | 25 | 52 |
| 24 | NAYAGARH | 43 | 12 | 55 |
| 25 | NUAPADA | 25 | 12 | 37 |
| 26 | PURI | 81 | 9 | 90 |
| 27 | RAYAGADA | 25 | 27 | 52 |
| 28 | SAMBALPUR | 83 | 6 | 89 |
| 29 | SONAPUR | 48 | | 48 |
| 30 | SUNDARGARH | 83 | 5 | 88 |
| Grand Total | | 1480 | 279 | 1759 |

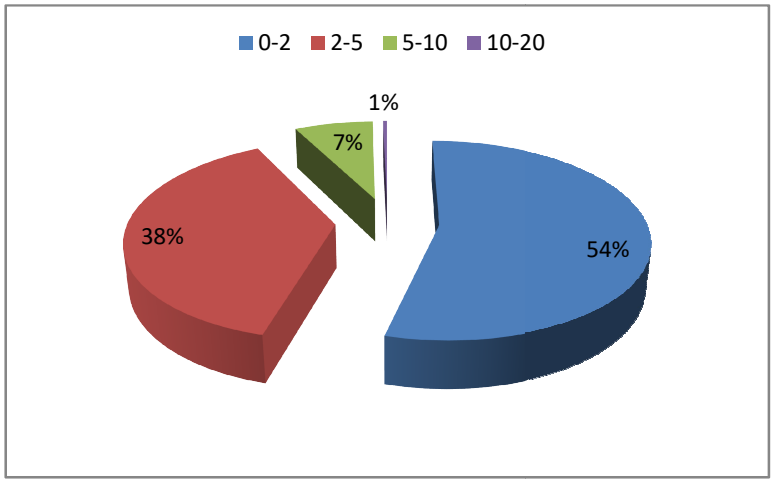


*Fig. 3. Percentage of wells in different water level ranges in unconfined aquifer.*

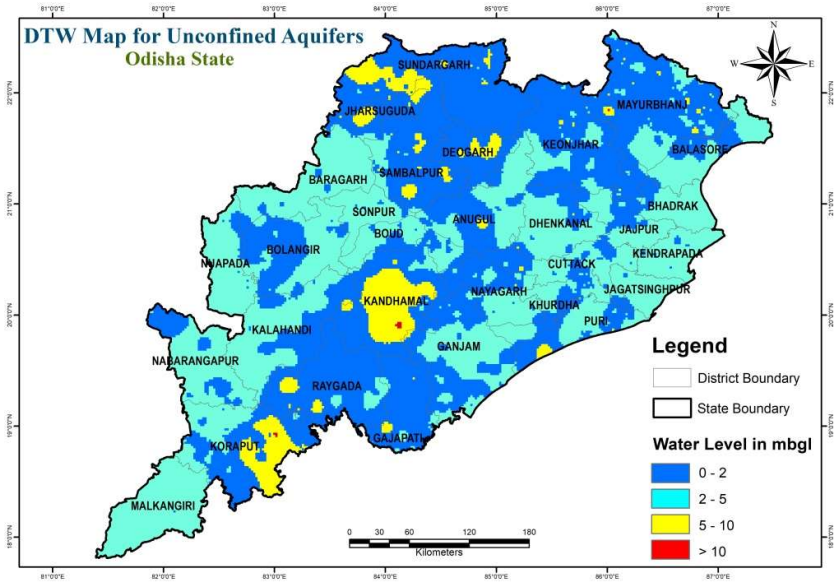


*Fig.4. Depth to water level of unconfined aquifer during August 2024.*

## 4.0 GROUND WATER LEVEL SCENARIO (AUGUST2024)

## 4.1 SHALLOW AQUIFER (UNCONFINED)

### 4.1.1 DEPTH TO WATER LEVEL

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

The depth to water level of 1371 wells is used for the analysis. Analysis of depth to water level data of 1371 wells shows water level varies between 0.01 m bgl (Sambalpur district) to 11.33 m bgl (Koraput district).

Shallow water level of less than 2 m bgl is observed in maximum number of wells in all the districts except Deogarh and Jharsuguda covering 54.19% of the NHS wells of the State. About 38.22% of the NHS wells have shown water level in this range of 2–5 mbgl. All the districts have recorded water level in this range. The districts with the maximum number of wells showing this range of water level are Jharsuguda (73.68%), Sundargarh (66.27%), Gajapti (65.71%), Deoghar (63.64%) and Kendujhar (63.64%). The major command areas of the state like Hirakud, Mahanadi, delta stage I & II, Baitarani, Salandi and Anandpur have shown water level in this range. Around 7.22% of the total NHS wells recorded water level in this range of 5-10 mbgl and present as isolated patches. Districts like Kandhamal (37.93%), Deogarh (36.36%), Jharsuguda (26.32%) and Sundargarh (24.10%) showed water level of the wells in this range.The hard rock and hilly terrains of the state has recorded water level in this range in majority of wells. Only 5 wells (0.36%) of the wells of the state fall in the range of 10-20 mbgl. It is observed in 2 wells of Kandhmal, 2 wells of Mayurbhanj and 1 well of Koraput. None of the monitored wells of August 2024 showed water level in more than 20 mbgl.

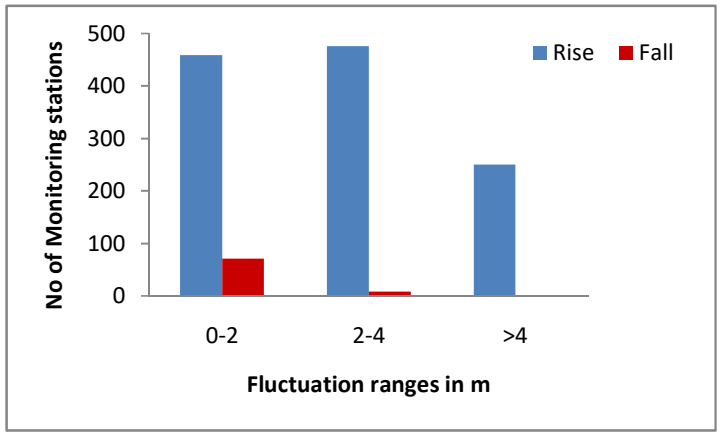


*Fig.5.Wells showing rise and fall in WL in unconfined aquifer (April 2024 to August 2024)*

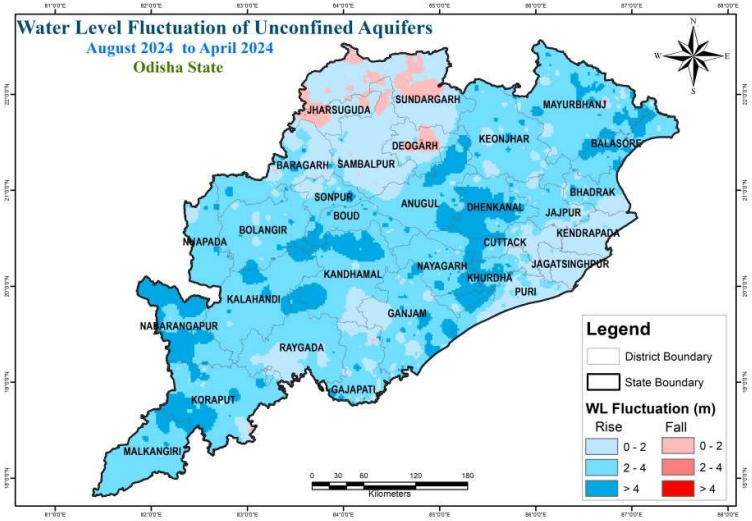


*Fig.6. Annual water level fluctuation in unconfined Aquifer (April 2024 to August 2024)*

## 4.1.2 SEASONAL FLUCTUATION IN WATER LEVEL

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

**Rise in Water Level:**

Out of 1185 wells, water level rise of less than 2 m is recorded in 38.73% wells,2 to 4 m in 40.17% wells and more than 4 m in 21.09% of the wells. Water level rise of less than 2 m is seen in all the districts significantly in Kendrapara, Jgatsinghapur, Sambalpur, Cuttack, Puri and Sundargarh districts. Water level rise in the range of 2 to 4m is observed in all districts except Sundargarh mainly in districts such as Kalahandi, Boudh, Rayagada, Balangir and Nayagarh districts. Rise of more than 4 m is significantly observed in Dhenkanal, Nabarangapur, Anugul, Baleshwar, Nuapada, Koraput, Nayagarh and Kandhamal districts.

**Fall in Water Level:**

Out of 80wells that have registered fall in water level, 88.75% have recorded less than 2 m while 10% in the range of 2 to 4 m and remaining 1.25% wells registered water level fall of more than 4m. Fall of lessthan 2m is observed as isolated patches, mainly parts of Sundargarh, Jharsuguda, Sonepur, Sambalpurand Bargarh districts. Fall of water level in the range of 2 to 4 m is observed in 8 wells in Deogarh, Jharsuguda, Sambalpur, Gajapati and Cuttack districts. Fall of beyond 4 m is observed in only one well of Mayurbhanj district.

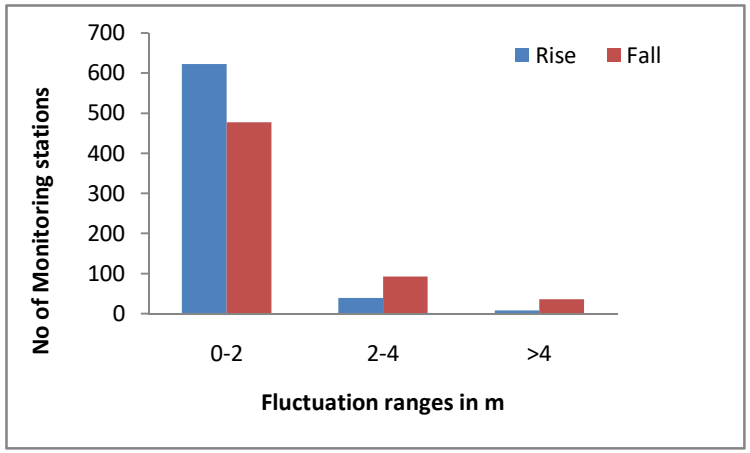


*Fig.7.Wells showing rise and fall in WL in unconfined aquifer (August 2023 to August 2024)*

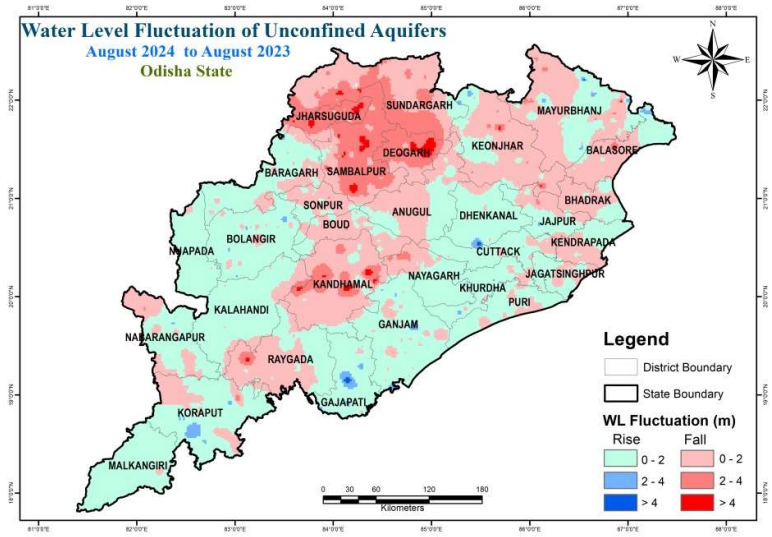


*Fig.8. Annual water level fluctuation in unconfined Aquifer (August 2023 to August 2024)*

## 4.1.3 ANNUAL FLUCTUATION IN WATER LEVEL

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

**Rise in Water Level:**

Out of 670 wells, water level rise of less than 2 m is recorded in 92.98% wells,2 to 4 m in 5.82% wells and more than 4 m in 1.19% of the wells. Water level rise of less than 2 m is seen in all the districts except Deogarh and Jharsuguda, significantly in Dhenkanal, Kalahandi, Malkangiri, Nuapada, Cuttack and Balangir districts.Water level rise in the range of 2 to 4m is observed mainly in districts such as Gajapati, Koraput, Khordha and Ganjam districts. Rise of more than 4 m is significantly observed in Baleshwar, Gajapati, Dhenkanal, Jajapur, Mayurbhanj, Koraput and Ganjam districts.

**Fall in Water Level:**

Out of 606 wells that have registered fall in water level, 78.71% have recorded less than 2 m while 15.34% in the range of 2 to 4 m and remaining 5.94% wells registered water level fall of more than 4m. Fall of water level less than 2m is observed in all districts, mainly parts of Bhadrak, Sonepur, Sundargarh, Kendrapara, Kendujhar, Boudh and Jagatsinghapur districts. Fall of water level in the range of 2 to 4 m is observed mainly in Sundargarh, Nayagarh and Baleshwar districts. Fall of beyond 4 m is observed as isolated patches in Jharsuguda, Deogarh, Kandhmal and Sambalpur districts.

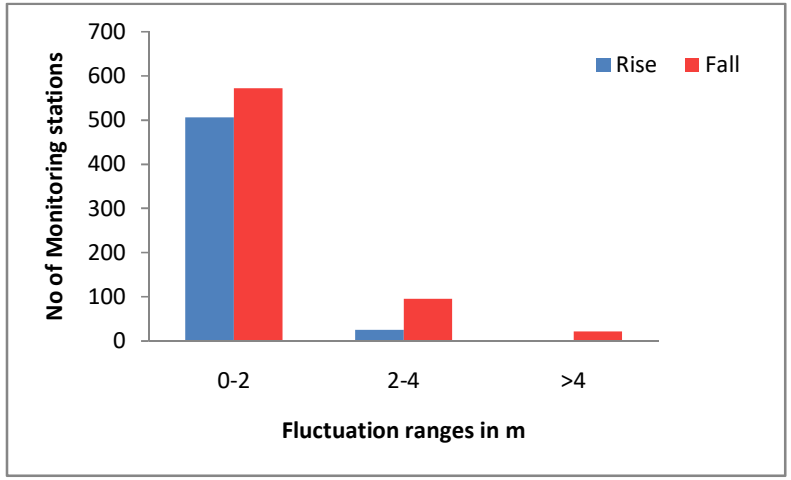


*Fig.9. Wells showing rise and fall in WL in unconfined Aquifer (Decadal Mean August (2014-2023) to August 2024*

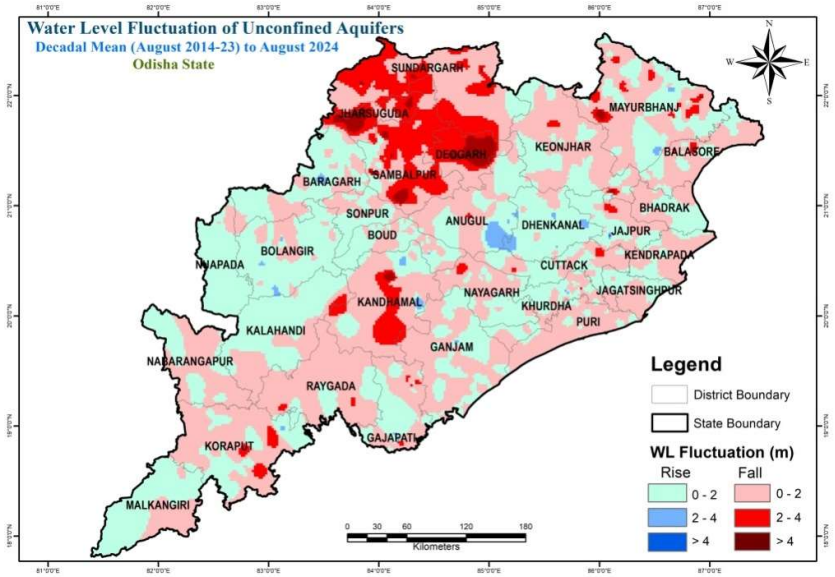


*Fig.10. Decadal water level fluctuation in unconfined Aquifer (Decadal Mean August (2014-2023) to August 2024*

## 4.1.4 DECADAL FLUCTUATION IN WATER LEVEL

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

**Rise in Water Level:**

Out of 533 wells, water level rise of less than 2 m is recorded in 94.93% wells,2 to 4 m in 4.69% wells and more than 4 m in 0.37% of the wells. Water levelrise of less than 2 m is seen in all the districts, significantly in Nuapada, Dhenkanal, Kalahandi and Balangir districts. Water level rise of 2 to 4 m is observed mainly in Anugul, Dhenkanal, Kandhamal and Gajapati districts and rise ofmore than 4 m is observed in 2 wells ofJajapur and Khordha districts.

**Fall in Water Level:**

Out of the 689 wells that have registered fall in water levels, 83.02% haverecorded less than 2 m while 13.79% in the range of 2 to 4 m and remaining 3.19% wells registered water level fall of more than 4 m. Fall of less than 2 mis observed in all districts mainly in parts of Puri, Bhadrak, Kendrapara and Nabarangpurdistricts. Fall of 2 to 4m, recorded in Sambalpur, Jharsuguda, Sundargarh and Deoghar districts. Fall beyond 4 m recordedmainly in Deogarh and Jharsuguda districts.

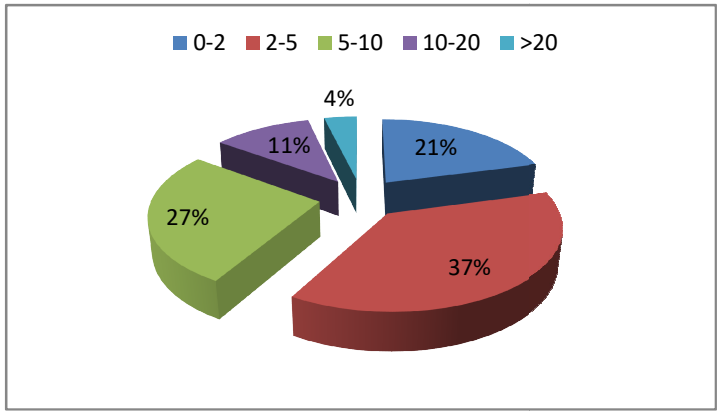


*Fig.11. Percentage of wells in different piezometric levels (August 2024)*

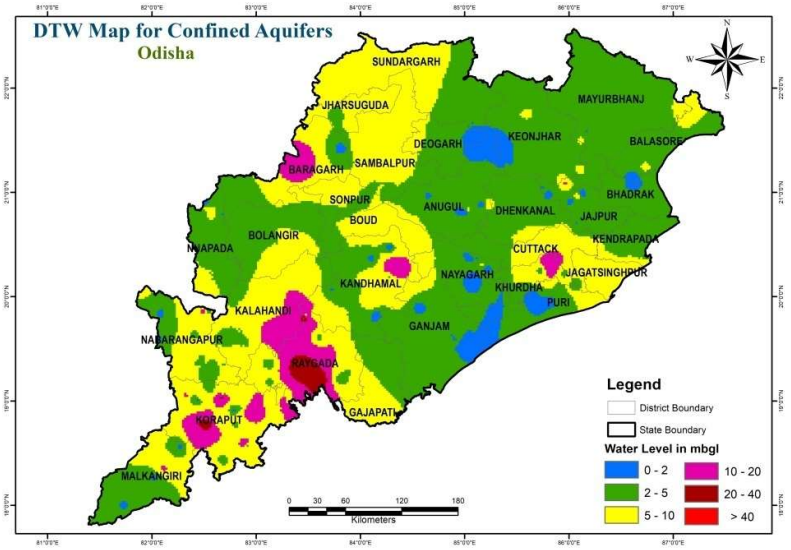


*Fig.12. Depth to piezometric Level in deeper aquifer in August 2024*

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

### 4.2.1 DEPTH TO PIEZOMETRIC LEVEL

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

Analysis of piezometric level data of 187 wells shows piezometric levels vary between 0.1mbgl (Nayagarh and Puri district) to 35.41 mbgl (Rayagada district). Piezometric level of less than 2 m bgl is recorded in 20.85% of wells, between 2 to 5 m bgl in 37.43% of wells, between 5 to 10 m bgl in 26.73% of wells, between 10 to 20 m bglin 11.23 % of wells, between 20-40 m bgl in 3.74% of wells.

Shallow piezometric level of less than 2mbgl is noticed in isolated patches mainly in Puri (75%), Nayagarh (55.56%), Anugul (50%), Bargarh (50%), Jajapur (50%) and Malkangiri (50%) districts. Piezometric level of 2 to 5mbgl mainly observed in parts of Kendujhar, Ganjam, Mayurbhanj, Kalahandi, Balangir, Gajapati and Kendrapara districts. The districts covered by depth to piezometric levelof 5 to 10 m bgl with significant area in Sundargarh, Nuapada, Sambalpur, Jharsuguda, Cuttack, Balangir, Gajapati and Baleshwar districts. Piezometric level of 10 to 20 m bgl is significantly found in Dhenkanal, Kalahandi, Kendrapara, Nabarangpur, Koraput districts. Deeper piezometric-levels of 20 to 40m mainly observed in Bargarh, Khordha, Kendrapara and Koraput districts. Deeper piezometric level of more than 40 m is observed in Kandhamal, Rayagada and Koraput districts only.

## 4.2.2 SEASONAL FLUCTUATION IN PIEZOMETRIC LEVEL

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

**Rise in piezometric level:**

Out of 177 wells, piezometric level rise of less than 2 m is recorded in 31.07% wells, 2 to 4 m in 32.77% wells and more than 4 m in 36.16% of the wells. Piezometric level rise of less than 2m is seen in most of the districts, significantly in Sambalpur, Sundargarh, Cuttack, Jharsuguda and Puri districts. Piezometric level rise of 2 to 4m is observed mainly in districts such as Balangir, Nayagarh, Ganjam, Malkangiri and Kendujhar districts. Rise of more than 4m is observed in Jajapur, Nabarangpur, Mayurbhanj, dhenkanal, Kalahandi, Anugul, Khordha, Gajapati, Baleshwar, Bargarh and Kendrapara districts.

**Fall in Piezometric Level:**

Out of 7 wells that have registered fall in piezometric levels, 71.43% have recorded less than 2 m while no well in the range of 2 to 4 m and remaining28.57% wells registered piezometric level fall of more than 4 m. Fall of lesst han 2 m is mainly observed in parts of Jharsuguda, Baleshwar, Koraput and Nabarangpur districts only. Fall beyond 4 m is observed in 2 wells of Rayagada and Kandhamal districts.

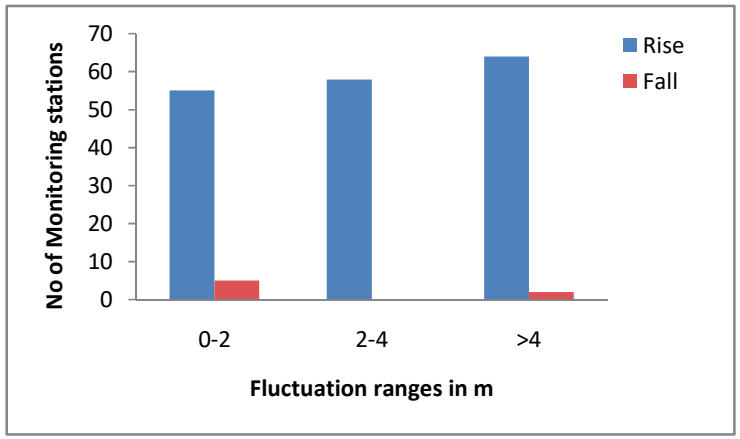


*Fig.13. Wells showing rise and fall in piezometric level in confined/ semi-confined aquifer (April 2024 to August 2024)*

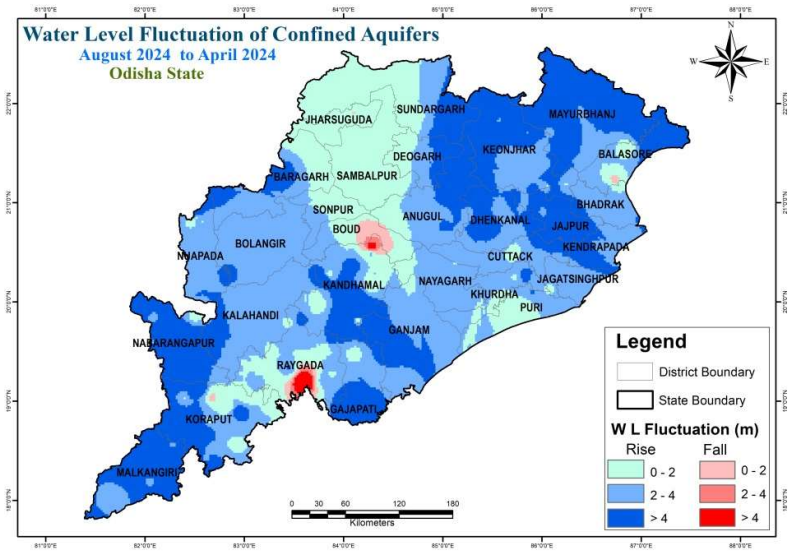


*Fig.14. Annual water level fluctuation in Confined/Semi-confined Aquifer (April 2024 to August 2024)*

## 4.2.3 ANNUAL FLUCTUATION IN PIEZOMETRIC LEVEL

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

**Rise in piezometric level:**

Out of 94 wells, piezometric level rise of less than 2 m is recorded in 74.47%wells, 2 to 4 m in 13.83% wells and more than 4 m in 11.70% of the wells. Piezometric level rise of less than 2m is seen in most of the districts, significantly in Ganjam, Kalahandi, Malkangiri and Puri districts. Piezometric level rise of 2 to 4m is observed mainly in districts such as Khordha, Nabarangpur, Gajapati, Kandhamal and Kendujhar districts. Rise of more than 4m is observed in Baleshwar, Sambalpur, Kandhamal, Koraput and Rayagada districts.

**Fall in Piezometric Level:**

Out of 70 wells that have registered fall in piezometric levels, 81.43% have recorded less than 2 m while 15.71% in the range of 2 to 4 m and remaining 2.86% wells registered piezometric level fall of more than 4 m. Fall of less than 2 m is mainly observed in parts of Jharsuguda, Cuttack, Nayagarh and Kandhamal districts. Fall of 2 to 4 m is observed mainly in Sambalpur, Balangir, Kendrapara and Kendujhar districts. Fall beyond 4 m is observed in 2 wells of Jajpur and Rayagada districts.

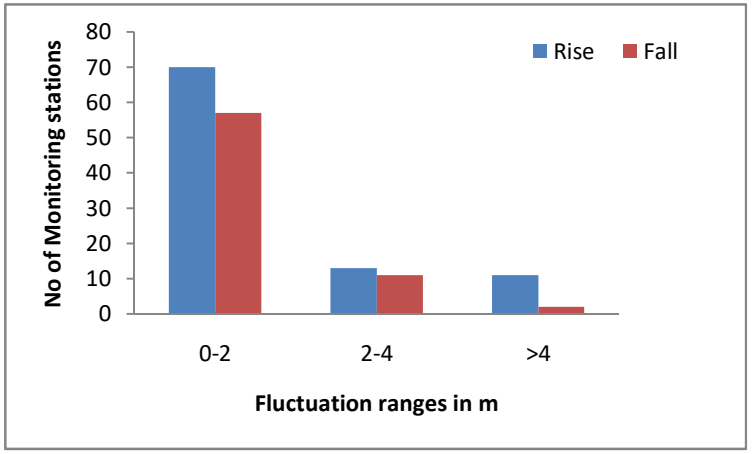


*Fig.15. Wells showing rise and fall in piezometric level in confined/ semi-confined aquifer (August 2023 to August 2024)*

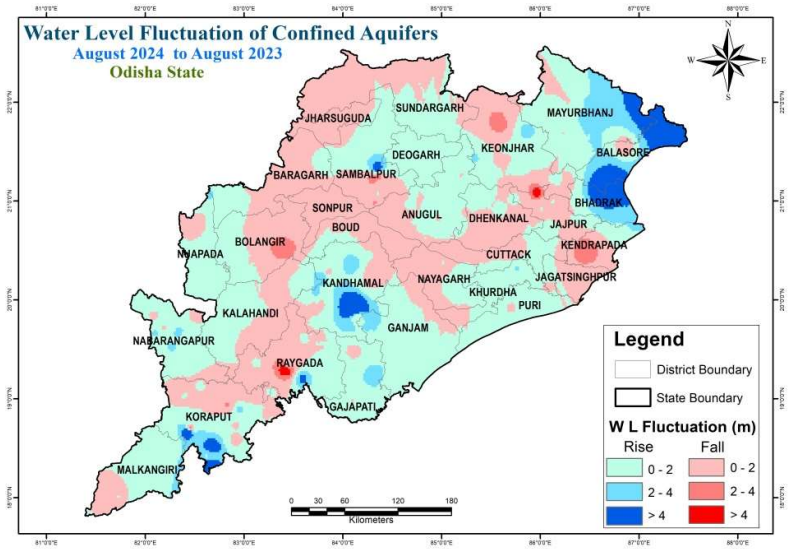


*Fig.12. Annual water level fluctuation in Confined/Semi-confined Aquifer (August 2023 to August 2024)*

## 5.0 SUMMARY

As a component of the National Ground Water Monitoring Program, the Central Ground Water Board , South Eastern Region, Bhubaneswar conducts monitoring of the ground water conditions on a quarterly basis: in January, pre-monsoon in April, August, and post-monsoon in November. Additionally, a yearly assessment of ground water quality is performed in April. As of September 30, 2024, the South Eastern Region of the Central Ground Water Board supervises 1371 dugwells and 188 piezometers. This comprehensive effort aims to portray the variations in the state's ground water conditions across different aquifers.

In August 2024, the state recorded water level in 0-5mbgl range in almost all the districts. Some wells in the hilly districts recorded water level in 5-10 mbgl range.

Seasonal water level comparison with pre monsoon period (April -2024) to August-2024 has shown that about 93.68% monitoring stations of the state experienced rise in seasonal water level fluctuation and only 6.32 % experienced fall in seasonal water level fluctuation due to monsoon rainfall.

Annual water level comparison with previous year (August -2023) to August-2024 has shown that about 52.51% monitoring stations of the state experienced rise in annual water level fluctuation and 47.49 % experienced fall in annual water level fluctuation. In general, a rise in water level has been observed in August 2024 with respect to August 2023.

Decadal mean comparison of August 2014-2023 to August 2024 has shown 43.62% of wells experienced rise in decadal mean water level fluctuation and 56.38% wells experienced fall in decadal mean water level fluctuation. In general, a fall in water level has been observed in August 2024 with respect to decadal mean (August 2014 – 2023).