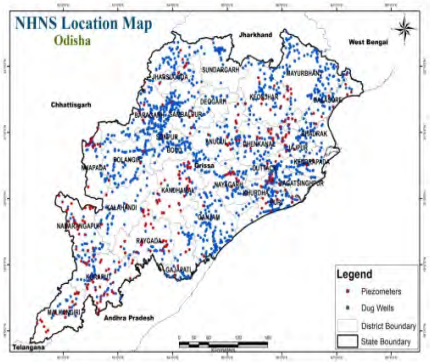

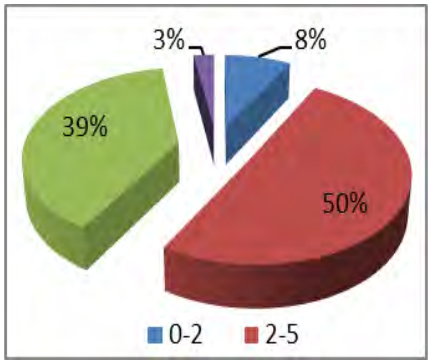

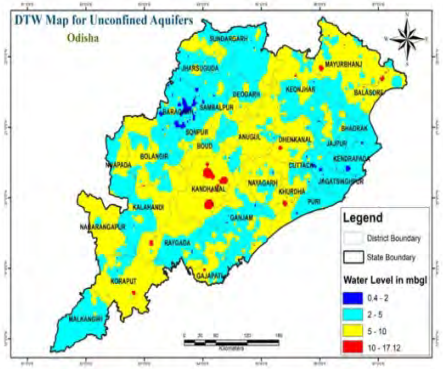

GROUND WATER LEVEL BULLETIN

APRIL 2024

ODISHA

ABSTRACT

Ground water level Scenario during April-2024 hig-hlighting the findings, status of ground water level in different aquifers and its annual and decadal compari-son.

CENTRAL GROUND WATER BOARD,

SOUTH EASTERN REGION, BHUBANESWAR

1.0 INTRODUCTION

Ground water bulletin is prepared by CGWB depicting changes in ground water 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 ground water regime monitoring is ground water level.

The natural conditions affecting the groundwater regime involve climatic parameters like rain fall, evapotranspiration etc., where as 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, April, August and November. A network of 1759 observation wells called **National Hydrograph Network Stations (NHNS)**, as on 30.04.2024, located all over the state is being monitored.

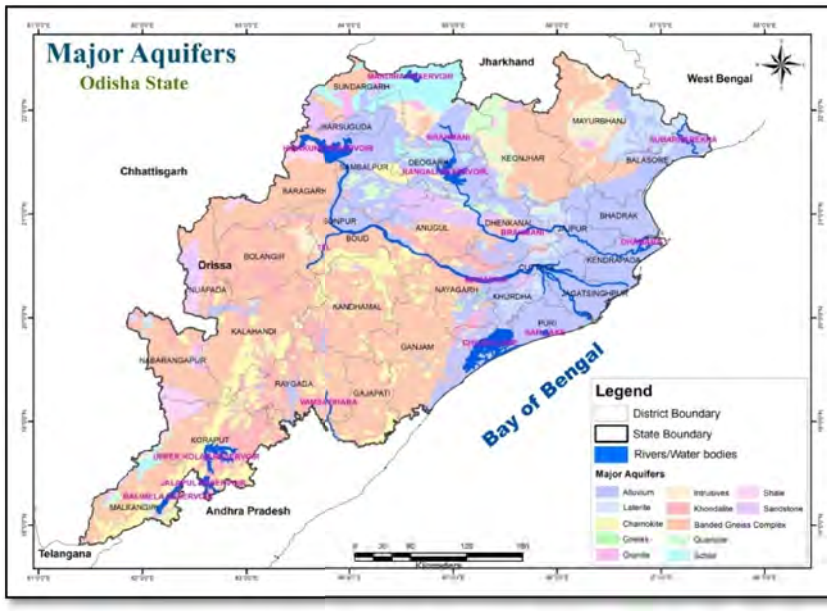

Fig. 1. Map showing major aquifers and administrative divisions of Odisha

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,’ 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. From administrative point of view, the state comprises 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.

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 borders 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 GROUND WATER 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 hydro geological and geomorphic units. The number of operational well still April 2024 is 1759 which include 1480 dug wells and 279 piezometers. Among these, 1653 wells were monitored (1589 water level recorded and 64 wells were dry),while106wells could not be monitored due to various reasons like inaccessibility, filled up, installation of pump units, road damaged, gate locked, etc. conditions. The district-wise breakup of the water level monitoring stations is given in Table-1.

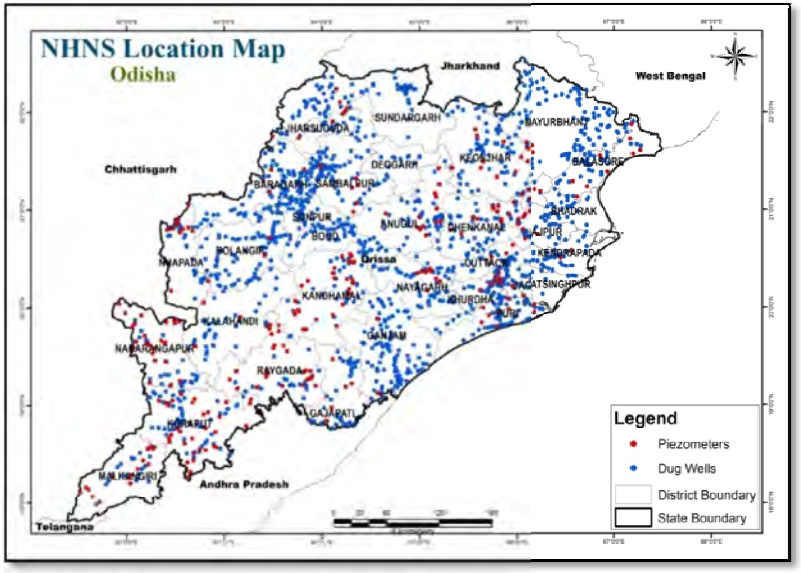

Figure-2: Map showing locations of monitoring wells (NHNS) in Odisha state

Table 1 District-wise distribution of water level monitoring stations

Sl. No.	District	No. of Monitoring Stations		
		DW	PZ	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

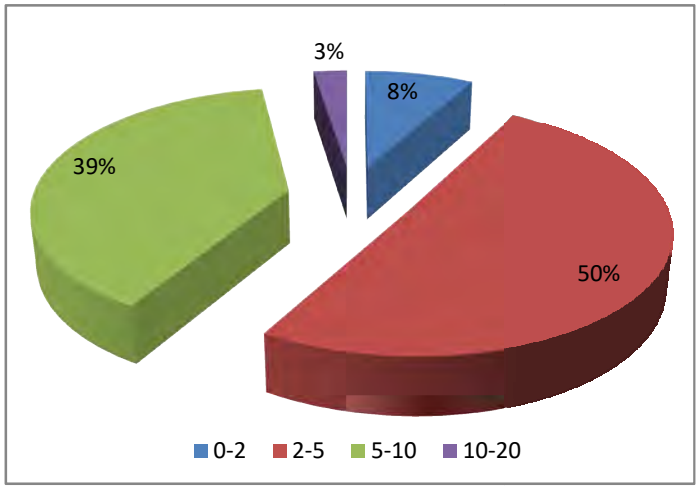

Fig. 3. Percentage of wells in different water level ranges in unconfined aquifer.

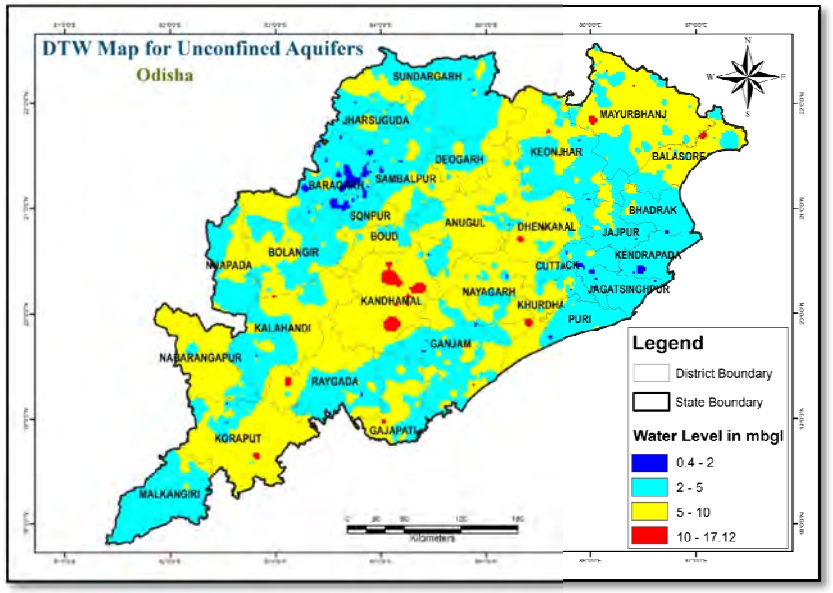

Fig.4. Depth to water level of unconfined aquifer during April 2024.

4.0 GROUND WATER LEVEL SCENARIO (APRIL 2024)

4.1 SHALLOW AQUIFER (UNCONFINED)

4.1.1 DEPTH TO WATER LEVEL

Depth to Water Level in Unconfined Aquifer (April 2024)

The depth to water level of 1361 wells is used for the analysis. Analysis of depth to water level data of 1361 wells shows water levels vary between 0.23 m bgl (Sambalpur district) to 17.38 m bgl (Mayurbhanj district).

Shallow water level of less than 2 m bgl as isolated patches in Canal command areas of Bargarh, Jagatsinghpur, Sonepur, Cuttack, Kendrapara, Sambalpur, Puri and Sundargarh districts covering only an area of 8.3% of the State. About 50.60 % 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 which have the maximum number of wells showing this range of water level i.e., Kendrapara (80.00%), Malkangiri (77.78%), Puri (73.91%), Bhadrak (69.23%), Jharsuguda (68.42%), Jajapur (67.57%), Deoghar (63.64%), Jagatsinghpur (63.64%) and Balangir (61.43%). The major command areas of the state like Hirakud, Mahanadi and delta stage I & II, Baitarani, Salandi and Anandpur have shown water level in this range. Around 39.24% of the total NHS wells recorded water level in this range of 5-10 mbgl. All the districts have recorded water level in this range except Kendrapara. The hard rock and hilly terrains of the state has recorded water level in this range in majority of wells. The maximum percentage of wells in this range is recorded in Dhenkanal (70.59%), Nabarangpur(68.18%), Koraput (65.45%), Anugul (58.14%), Kandhamal (56.67%), Nayagarh (54.76%), Mayurbhanj (52.88%) and Boudh(52.83%) district. Only 2.50% of the wells of the state fall in the range of 10-20 mbgl. It is mostly in the districts like Kandhamal (36.67%), Baleshwar (9.09%), Mayurbhanj (5.77%), Dhenkanal (5.88%). None of the monitored well in April 2024 showed water level more than 20 mbgl.

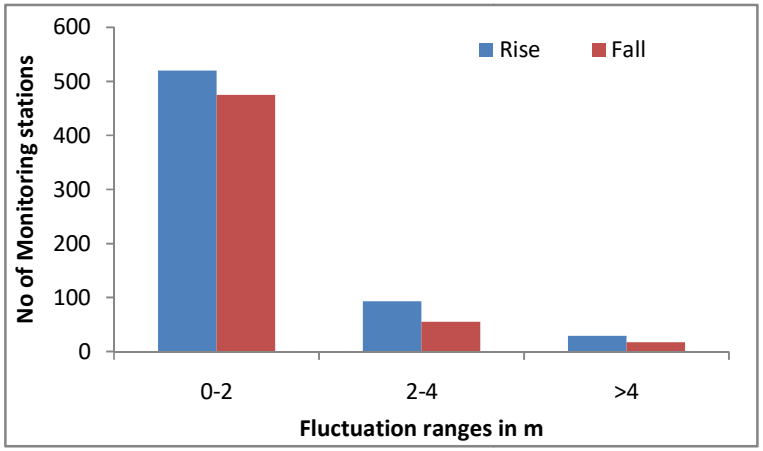

Fig.5.Wells showing rise and fall in WL in unconfined aquifer (April 2023 to April 2024)

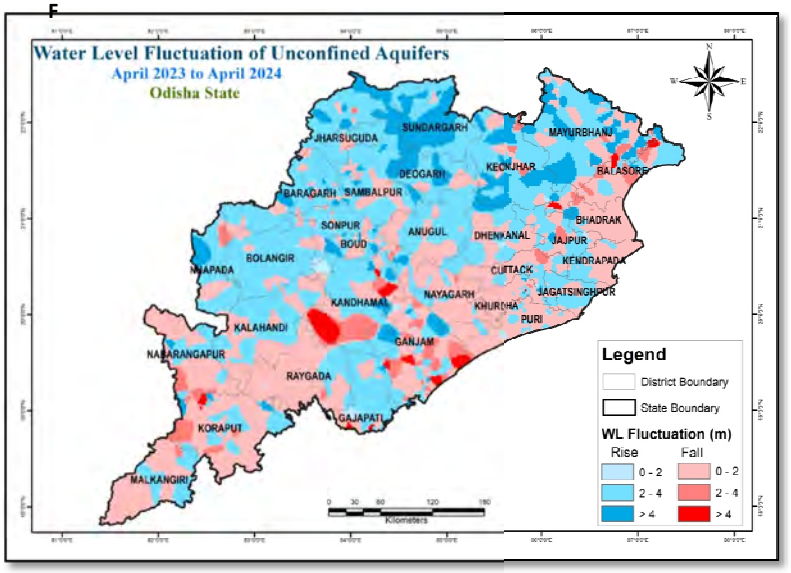

Fig.6. Annual water level fluctuation in unconfined Aquifer (April 2023 to April 2024)

4.1.2 ANNUAL FLUCTUATION IN WATER LEVEL

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

Rise in Water Levels:

Out of 642 wells, water level rise with less than 2 m is recorded in 81% wells, 2 to 4 m rise in 14.48% wells and more than 4 m rise in 4.51% of the wells. Water level rise with less than 2 m is seen in all the districts, significantly in Jharsuguda, Balangir, Anugul, Nuapada, Sonapur and Bargarh districts. Water level rise in the range of 2 to 4m is observed mainly in districts such as Debagarh, Mayurbhanj, Sundargarh, Sambalpur, Baudh and Kandhamal districts. Rise of water level more than 4 m is significantly observed in Kendujhar, Mayurbhanj, Baudh, Koraput, Bargarh, Cuttack, Khordha, Sundargarh and Ganjam districts.

Fall in Water Levels:

Out of 547 wells that have registered fall in water levels, about 86.83% have recorded less than 2 mbgl while 10.05% in the range of 2 to 4 m and remaining 3.10% wells registered water level fall more than 4 mbgl. Fall of water level less than 2 mbgl is observed in all districts, mainly parts of Nayagarh, Rayagada, Puri, Bhadrak, Nabarangpur districts. Fall of water level in the range of 2 to 4 mbgl is observed mainly in Baleshwar, Ganjam, Koraput districts. Fall of water level beyond 4 mbgl is observed as isolated patches in Kandhamal, Gajapati, Baleshwar and Ganjam districts.

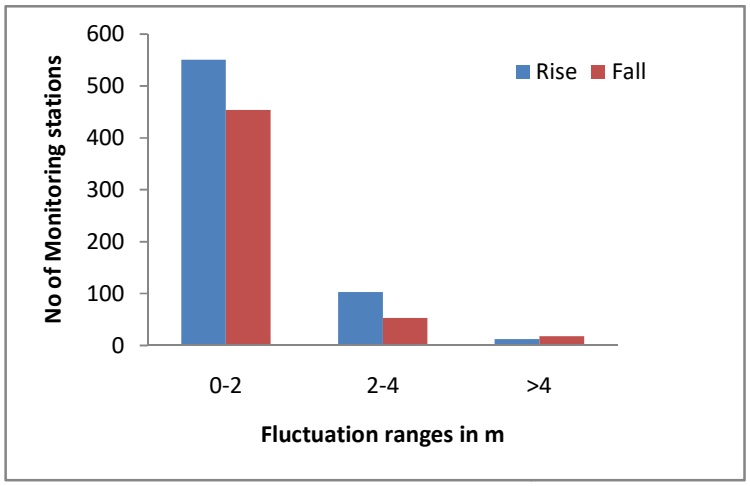

Fig.7. Wells showing rise and fall in WL in unconfined Aquifer (Decadal Mean April (2014-2023) to April 2024)

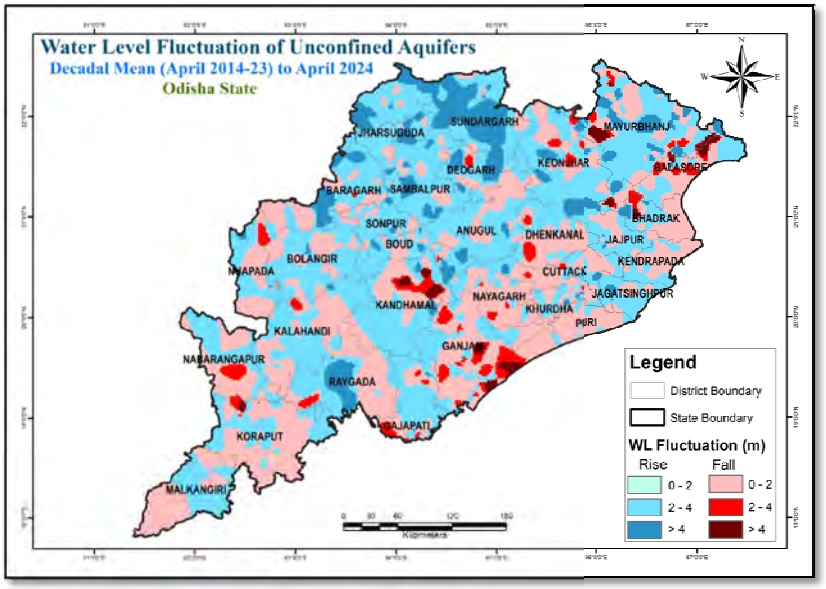

Fig.8. Decadal water level fluctuation in unconfined Aquifer (Decadal Mean April (2014-2023) to April 2024

4.1.3 DECADAL FLUCTUATION IN WATER LEVEL

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

Rise in Water Levels:

Out of 666 wells, water level rise with less than 2 mbgl is recorded in 82.73% wells, rise in the range of 2 to 4 m in 15.45% wells and more than 4 m in 1.80% of the wells. Water level rise with less than 2 mbgl is seen in all the districts, mostly in Jagatsinghapur, Sonepur and Anugl districts. Water level rise with 2 to 4 mbgl is observed mainly in Deogarh, Jharsuguda, Sundargarh, Sambalpur districts and rise more than 4 mbgl is observed in Rayagada, Mayurbhanj and Gajapati districts.

Fall in Water Levels:

Out of the 525 wells that have registered fall in water level, 86.47% have-recorded less than 2 mbgl while 10.09% in the range of 2 to 4 mbgl and remaining 3.42% wells registered water level fall more than 4 mbgl. Fall with less than 2 mbgl is observed in all districts mainly in parts of Puri, Nayagarh, Kendrapara, Dhenkanal, Rayagada and Nabarangpur districts. Fall with 2 to 4 mbgl is recorded in Gajapati, Ganjam, Baleshwar andDeogarh districts. Fall beyond 4 mbgl is recorded mainly in Baleshwar, Kandhamal, Bhadrak and Ganjam districts.

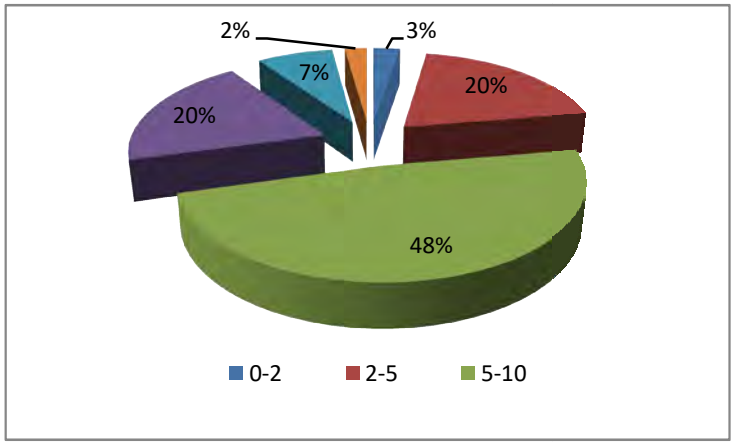

Fig.9. Percentage of wells in different piezometric levels (April 2024)

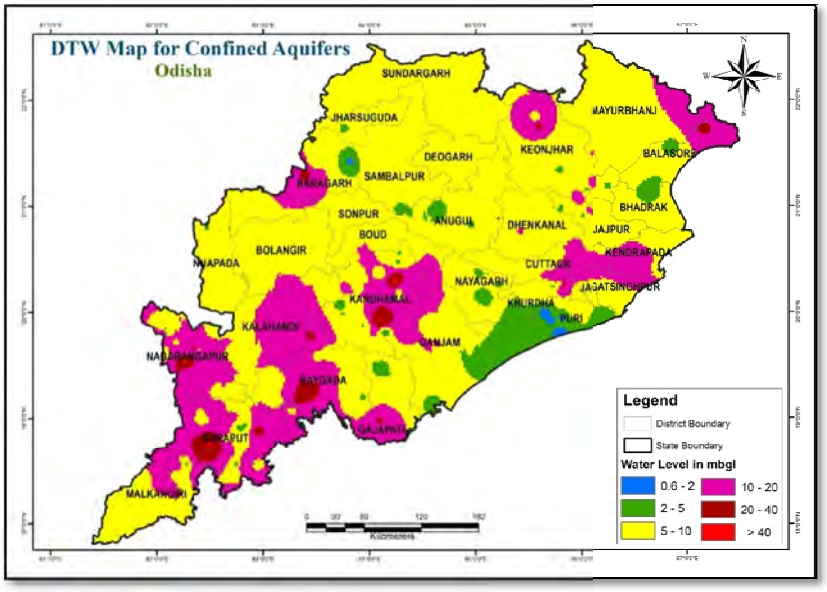

Fig.10. Depth to piezometric Level in deeper aquifer during April 2024.

4.2 DEEPER AQUIFER (CONFINED/SEMI-CONFINED)

4.2.1 DEPTH TO PIEZOMETRIC LEVEL

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

Analysis of piezometric level data of 228 wells show piezometric levels vary between 0.59 mbgl (Puri district) to 47.75 mbgl (Kandhamal district). Piezometric level of less than 2 m bgl is recorded in 2.6% of wells, between 2 to 5 m bgl in19.7% of wells, between 5 to 10 m bgl in 48.2% of wells, between 10 to 20 m bgl in 19.7 % of wells, between 20-40 m bgl in 7.5% of wells and piezometric level more than 40 mbgl is registered in 2.2% of wells.

Shallow piezometric level of less than 2 mbgl is noticed in isolated patches in Puri (57.1%), Bargarh (33.3%), Kandhamal (4.8%) district only. Piezometric level of 2 to 5 mbgl mainly observed in parts Ganjam, Nayagarh, Baleshwar, Kandhamal, Khordha, Gajapati, Jharsuguda districts. All the districts covered by depth to piezometric level of 5 to 10 m bgl with significant area in Balangir, Sundargarh, Nuapada, Sambalpur, Jharsuguda, cuttack, Mayurbhanj, Anugul 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 40mbgl mainly observed in Bargarh, Khordha, Gajapati, Rayagada districts. Deeper piezometric levels with more than 40 mbgl are observed in Kandhamal, Nabarangpur and Koraput district only.

4.2.2 ANNUAL FLUCTUATION IN PIEZOMETRIC LEVEL

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

Rise in piezometric levels:

Out of 75 wells, piezometric level rise with less than 2 m is recorded in 74.67% wells, 2 to 4 m in 14.67% wells and more than 4 m in 10.67% of the wells. Piezometric level rise with lessthan 2 mbgl is seen in most the districts,significantly in Balangir, Anugul, Bargarh, Dhenkanal, Gajapati districts. Piezometric leve lrise with 2 to 4 mbgl is observed mainly in districts such as Dhenkanal, Kendrapara, Sambalpur, Gajapati, Kendujhar districts. Water level rise with more than 4 mbgl is observed in Baleshwar, Sambalpur, Kandhamal, Nuapada and Rayagada districts.

Fall in Piezometric Levels:

Out of 120 wells that have registered fall in piezometric levels, 70% have recorded less than 2 m while 14.17% in the range of 2 to 4 mbgl and remaining 15.83% wells registered piezometric level fall with more than 4 mbgl. Fall with less than 2 mbgl is mainly observed in parts of Kalahandi, Nayagarh, Cuttack, Ganjam, Nabarangpur districts. Fall in the range of 2 to 4 mbgl is observed mainly in Khordha, Baleshwar, Nuapada, Rayagada, Kandhamal districts. Fall beyond 4 mbgl is observed as isolated patches in Kendrapara, Koraput, Gajapati, Kandhamal and Nabarangpur districts.

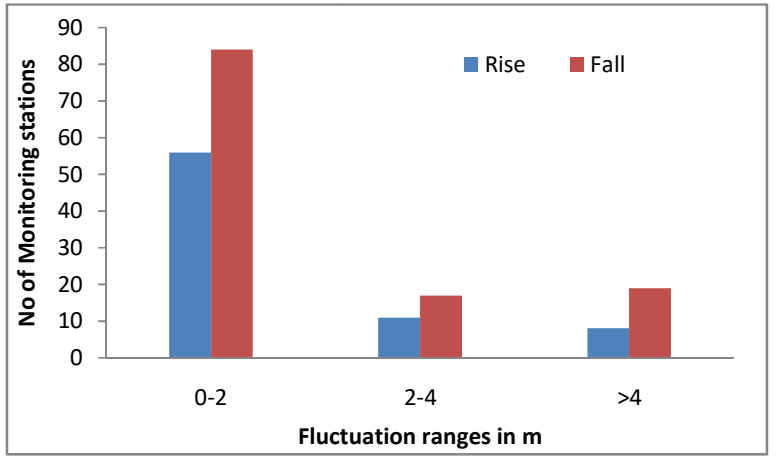

Fig.11. Wells showing rise and fall in piezometric level in confined/ semi-confined aquifer (April 2023 to April 2024)

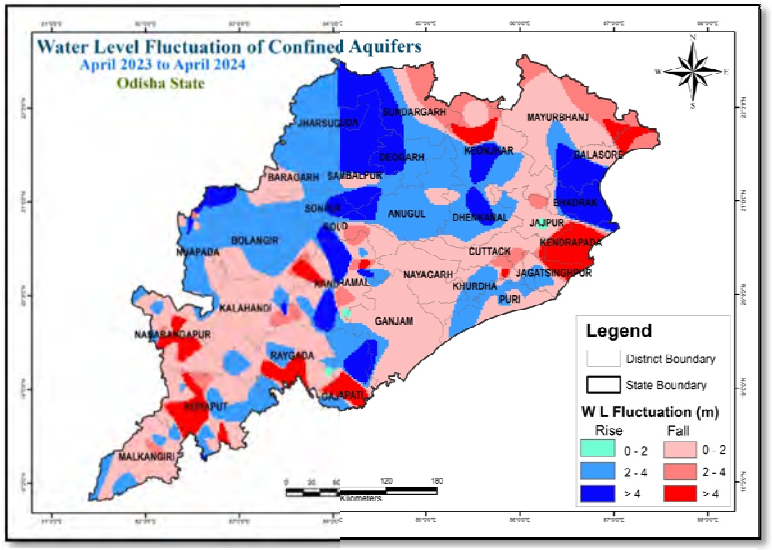

Fig.12. Annual water level fluctuation in Confined/Semi-confined Aquifer (April 2023 to April 2024)

5.0 SUMMARY

As a component of the National Ground Water Monitoring Programme, the CGWB, SER, Bhubaneswa conducts monitoring of theground water conditions on a quarterly basis: in January, pre-monsoon April, August, and post-monsoon November. Additionally, a yearly assessment of ground water quality monitoring is scheduled in April. As of June 30, 2024, theSouth Eastern Region of the Central Ground Water Board supervises 1424 dugwells and 229 piezometers. This comprehensive effort aims to portray the variations in the state's ground water conditions across different aquifers.

In April 2024, the state recorded water level in 2-10 mbgl range in almost all the districts. Some wells in the hilly districts recorded water level in 10-20 mbgl range.

Annual water level comparison with previous year (April -2023) to April-2024 has shown that about 54% monitoring stations of the state experienced rise in annual water level fluctuation and 46 % experienced fall in annual water level fluctuation. In general, a rise in water level has been observed in April 2024 with respect to April 2023.

Decadal mean comparison of April 2014-2023 to April 2024 has shown that 55.91% of the wells experienced rise in decadal mean water level fluctuation and 44.08% wells experienced a fall in decadal mean water level fluctuation. In general, a rise in water level has been observed in April 2024 with respect to decadal mean (April 2014 – 2023).