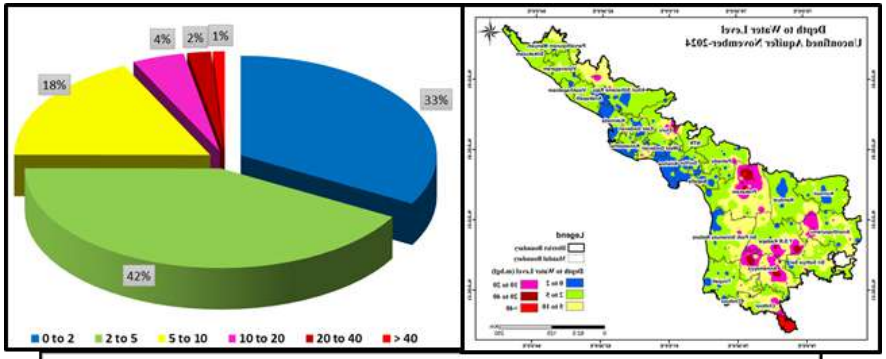

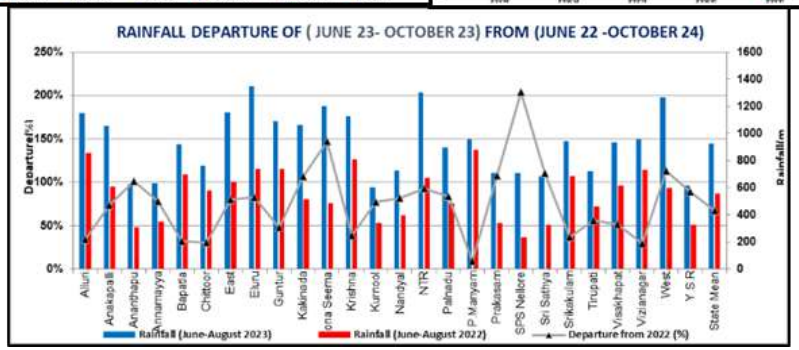

GROUND WATER LEVEL BULLETIN

JANUARY 2025

ANDHRA PRADESH

ABSTRACT

Ground water level Scenario during January-2025 highlighting the findings, status of ground water level in different aquifers and its seasonal, annual and decadal comparison.

CGWB, SOUTHERN REGION, HYDERABAD

1.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 attribute of groundwater regime monitoring is 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, 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 30.04.2023, located all over the country is being monitored.

2.0 STUDY AREA

Andhra Pradesh State is the 7th largest state in India covering geographical area of 1,62,975 Km^2. It lies between NL 12° 37' and 19° 09' and EL 76° 45' and 84° 47'. The State is bordered on the east by Bay of Bengal (coastline length ~970 km), south by Tamil Nadu and Karnataka, west by Karnataka and Telangana and north by Telangana, Chhattisgarh and Odisha states. Administratively, the stateis divided into 26 districts and governed by 668 revenue mandals with 28123 revenue villages. Total population of the state (2011 census) is ~8.45 crores (with male-female ratio of 993) of which 66.64% lives in rural area and 33.36% in urban area. The average density of population is 308 persons/km^2. The overall growth in total population during decade is ~9.2 % (2001 to 2011 census).

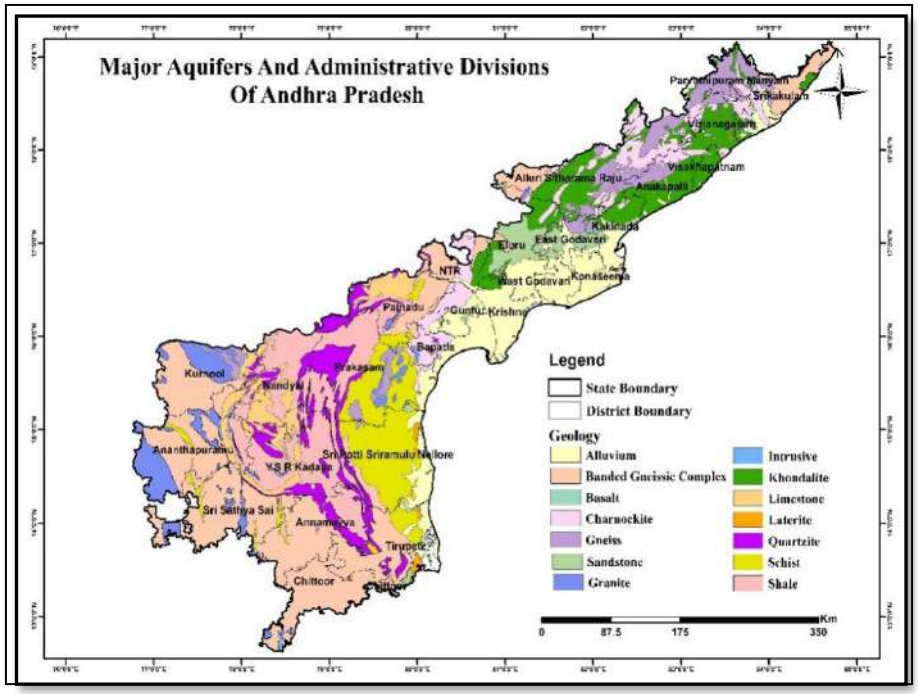

Figure-1: Map showing Major Aquifers and Administrative Divisions of Andhra Pradesh

Physiographically, Andhra Pradesh State can be divided into three distinct zones, viz., Coastal plains, Eastern Ghats and Western pediplains. The first two zones stretch from north-east to south-west in a narrow strip while 3rd zone occupy rest of the area. The elevation ranges from 0 to > 600 m above mean sea level (a.msl). Godavari and Krishna rivers and their tributaries drainthe northern and central part while Pennar river drains southern part of state before joining Bay of Bengal. There are 3 major basins and 11 medium river basins in the state.

The state is underlain by diverse rock types of different geological ages from Pre-Cambrian to Recent. 85% of the State is underlain by hard

rock formations like Archaeans, Pre-Cambrians, Cuddapahs, Kurnools and Deccan traps. The remaining 20% is underlain by soft rocks including Gondwanas, Rajahmundry sandstone and Recent Alluvium.

3.0 GROUND WATER LEVEL MONITORING

Central Ground Water Board, Southern Region, is monitoring changes in groundwater regime in Andhra Pradesh 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 January 2025 was 1473 which include 676 dug wells and 797 piezometers. In January 2025, 1382 wells monitored (1370 water level recorded and 12 wells were dry), while 64 wells (17 dug wells and 47 piezometers) could not be monitored due to various reasons like inaccessibility, filled-up, installation of pump units, road damaged, gate locked, etc. A total of 27 wells (20 dugwells and 7 piezometers) were abandoned. The number of operational wells after completion of January 2025 monitoring stands at 1446 which include 656 dug wells and 790 Bore wells. The district-wise breakup of the water level monitoring stations is given in **Table-1**.

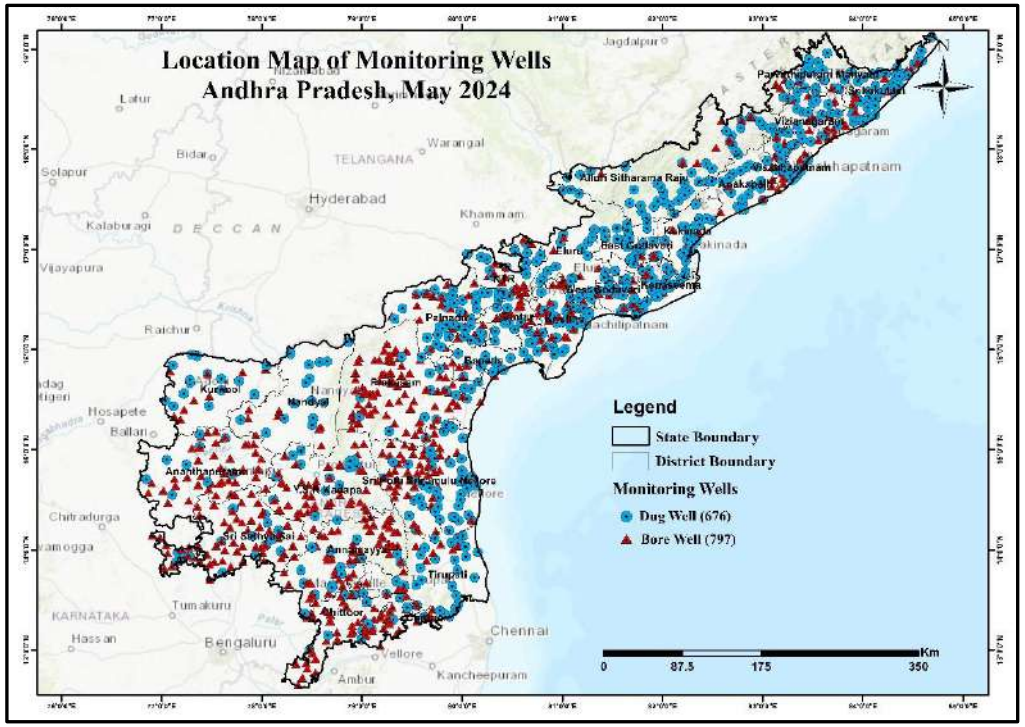

Figure- 2: Map showing locations of monitoring wells (GWMWS) in Andhra Pradesh state

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

SR. No.	District	Number of Water Level Monitoring Stations				
		2022	2023	2024		
		Total	Total	DW	PZ	Total
1	Alluri Sita Rama Raju	44	56	44	13	57
2	Anakapalli	24	23	24	4	28
3	Ananthapuramu	33	67	8	58	66
4	Annamayya	45	79	19	64	83
5	Bapatla	34	35	24	12	36
6	Chittoor	40	84	15	70	85
7	East Godavari	29	26	30	12	42
8	Eluru	35	51	21	4	25
9	Guntur	24	35	34	21	55
10	Kakinada	31	29	23	18	41
11	Konaseema	31	39	23	7	30
12	Krishna	33	81	29	56	85
13	Kurnool	28	29	17	15	32
14	Nandyal	25	24	22	5	27
15	NTR	25	29	20	19	39
16	Palnadu	55	67	46	28	74
17	Parvathipuram Manyam	32	27	22	6	28
18	Prakasam	88	116	24	98	122
19	Sirkalulam	47	51	45	66	111
20	SPS Nellore	58	128	17	74	91
21	Sri Sathya Sai	45	43	51	29	80
22	Tirupati	35	48	34	16	50
23	Visakhapatnam	14	20	16	16	32
24	Vizianagaram	47	44	31	14	45
25	West Godavari	21	33	22	14	36
26	YSR Kadapa	49	70	15	58	73
	Total	**972**	**1334**	**676**	**797**	**1473**

4.0 RAIN FALL

The rainfall data collected and compiled from weekly and monthly weather reports from Andhra Pradesh Water Resources Information and Management System (APWRIMS) were used to analyze the rainfall for the period June 2024 – Dec 2024. Table-2 gives the district-wise rainfall data for the period June-Dec 2023 & 2024, normal and the departure of June-Dec 2024 rainfall with other periods.

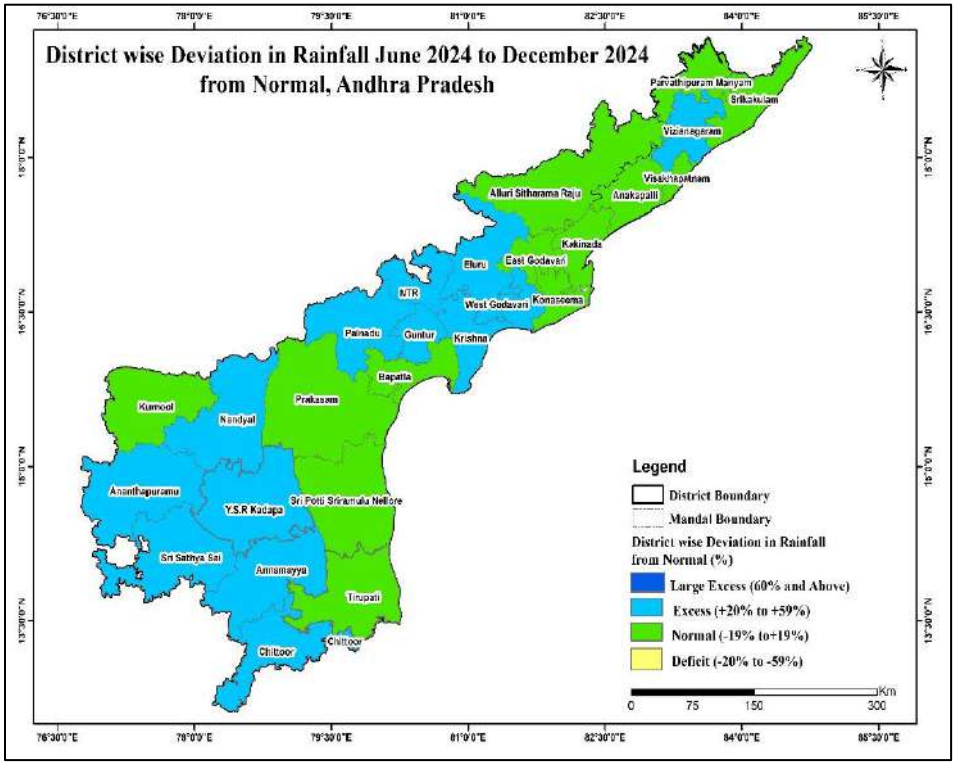

Figure-3: Rainfall deviation (June 2024 –December 2024) from normal rainfall

Table-2: District-wise variability of rainfall in Andhra Pradesh (2024)

S No	District	Rainfall (June 24-December 24)	Rainfall (June 23 to Dcecember 23)	Normal Rainfall	Departure from 2023 (%)	Departure from Normal (%)	Status
1	Alluri Sitharama Raju	1238.77	1054.52	1103.13	17%	12%	Normal
2	Anakapalli	1161.89	851.42	987.84	36%	18%	Normal
3	Ananthapuramu	677.96	340.27	459.03	99%	48%	Excess
4	Annamayya	919.2	638.21	668.1	44%	38%	Excess
5	Bapatla	976.16	1011.35	827.18	-3%	18%	Normal
6	Chittoor	1070.45	836.03	811.02	28%	32%	Excess
7	East Godavari	1192.97	904.85	1008.51	32%	18%	Normal
8	Eluru	1378.84	1015.44	949.21	36%	45%	Excess
9	Guntur	1120.53	1010.49	794.72	11%	41%	Excess
10	Kakinada	1122.33	770.2	970.67	46%	16%	Normal
11	Kona Seema	1309.49	828.26	1175.03	58%	11%	Normal
12	Krishna	1142.26	1095.04	949.05	4%	20%	Excess
13	Kurnool	621.88	375.69	544.82	66%	14%	Normal
14	Nandyal	794.86	443.46	656.16	79%	21%	Excess
15	NTR	1329.59	915.63	937.13	45%	42%	Excess
16	Palnadu	933.54	765.83	684.25	22%	36%	Excess
17	P.Manyam	1082.95	946.52	960.65	14%	13%	Normal
18	Prakasam	864.93	604.29	750.93	43%	15%	Normal
19	SPS Nellore	1080.77	755.1	963.76	43%	12%	Normal
20	Sri Sathya Sai	769.32	399.26	527.21	93%	46%	Excess
21	Srikakulam	1069.72	748.08	990.77	43%	8%	Normal
22	Tirupati	1153.87	960.51	1029.39	20%	12%	Normal
23	Visakhapatnam	1090.28	784.52	963.71	39%	13%	Normal
24	Vizianagaram	1117.55	857.78	929.02	30%	20%	Excess
25	West Godavari	1329.25	981.61	1106.92	35%	20%	Excess
26	Y.S.R	771.38	471.11	630.97	64%	22%	Excess
	State Mean	**1050.80**	**783.29**	**860.74**	**34%**	**22%**	**Excess**

5.0 GROUND WATER LEVEL SCENARIO (JANUARY2024)

5.1 SHALLOW AQUIFER (UNCONFINED)

5.1.1 DEPTH TO WATER LEVEL

Depth To Water Level in Unconfined Aquifer (January 2025)

Analysis of depth to water level data of 800 wells shows water levels vary between 0.07 m bgl (West Godavari district) to 60 m bgl (Chittoor district). Water level of less than 2 mbgl is recorded in 31% of wells, between 2 to 5 mbgl in 45% of wells, between 5 to 10 mbgl in 18% of wells, between 10 to 20 mbgl in 4% of wells, between 20-40 m bgl in 2% of wells and water level more than 40 m bgl is registered in 1% of wells. (Figure-4)

Depth to water level map of January 2025 (Figure-5) for unconfined aquifer shows that shallow water level of less than 2 m bgl as small isolated patches in parts of Kakinada, Konaseema, Anakapalli, Nandyal, Kurnool, West Godavari, SPS Nellore, Tirupati and Vizianagaram districts covering an area of 11% of state. Water level of 2 to 5 m bgl is observed mainly throughout the state in all the districts covering an area of 57% of the state. Depth to water level of 5 to 10 m bgl is observed mainly in Rayalseema area covering Kurnool, Ananthpuramu, Sri Sathya Sai, Chittoor, Prakasam, Annamayya, Palnadu Tirupati also in Alluri Sitarama Raju, Eluru and NTR districts covering 23% of the area of state. Water level of 10 to 20 m bgl is mainly observed in Rayalseema area in YSR Kadapa, Annamayya, Prakasam, Eluru, Chittoor and Ananthpuramu districts covering 6% area of state. Deeper water levels of more than 20 m occur as isolated pockets covering mainly Prakasam, YSR Kadapa, Ananthpuramu, Chittoor, Ananthapuramu and small part of NTR districts covering only 2% area of state.

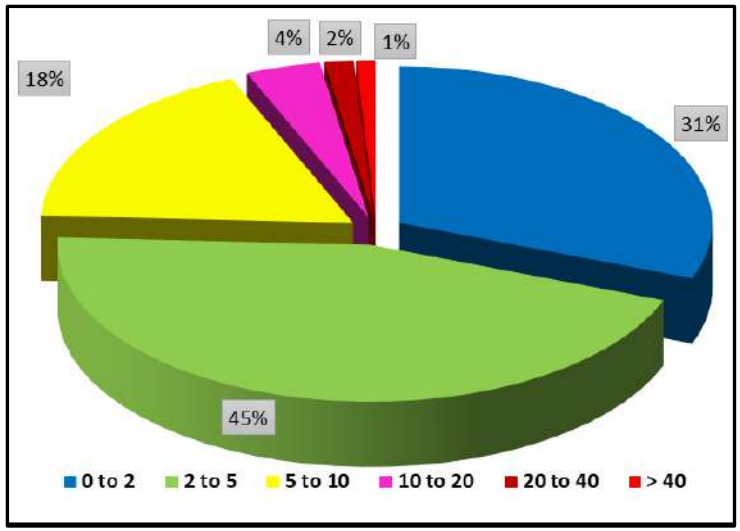

Figure-4: Percentage of wells in different water level ranges in unconfined aquifer.

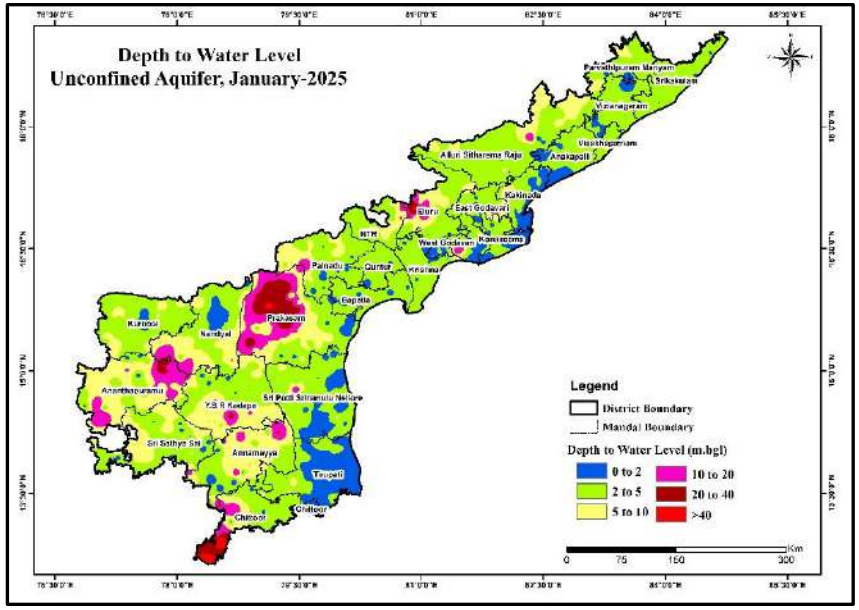

Figure-5: Depth to water level of unconfined aquifer during January 2025.

5.1.2 SEASONAL FLUCTUATION IN WATER LEVEL

Seasonal Fluctuation of Water Level in Unconfined Aquifer (May 2024 to January 2025)

Rise in Water Levels:

In the State 97% of the area (Figure-6) (699 wells) experienced rise in water levels when compared to the period May 2024. Out of 685 wells, 42% of wells have recorded rise in water level from 0 to 2 m, 33% of wells have recorded 2 to 4 m and 25 % of wells have recorded beyond 4 m. Rise in water level is observed throughout the state except in isolated patches in Ananthapuramu, Chittoor, Guntur, Eluru, NTR and Alluri Sitharama Raju districts (Figure-6).

Fall in Water Levels:

In the State about 3% of the area (Figure-7)(51 wells) experienced fall in water levels when compared to May 2024. Out of 51 wells that have registered fall in water levels, 72% of wells have recorded less than 2m fall covering and area of 2% area of state, 14% of wells recorded fall of 2 to 4m in an area 1% area, and 14% of wells recorded fall beyond 4m in 1% area of state. The fall in water level is observed only in isolated patches of the district in Ananthapuramu, Chittoor, Guntur, Eluru, NTR and Alluri Sitharama Raju districts (Figure-6).

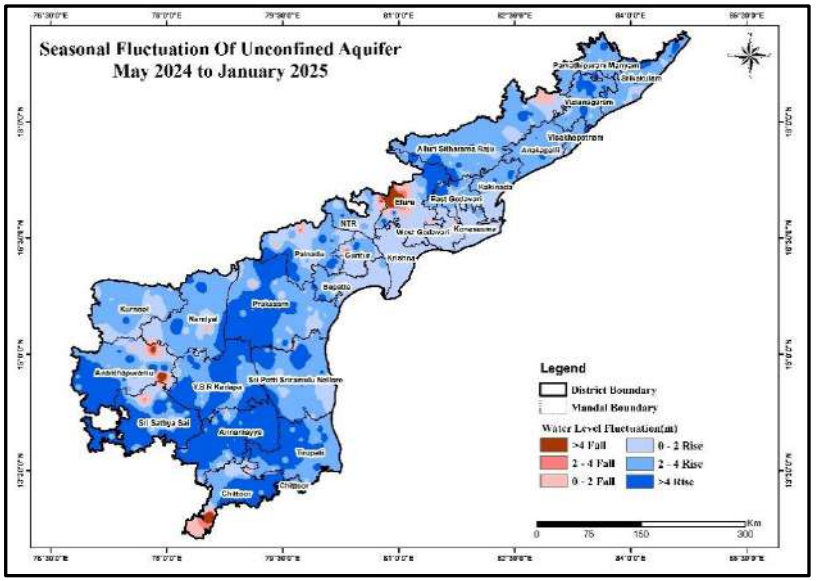

Figure-6: Percentage of wells showing seasonal rise and fall in WL in unconfined aquifer(May 2024 to January 2025)

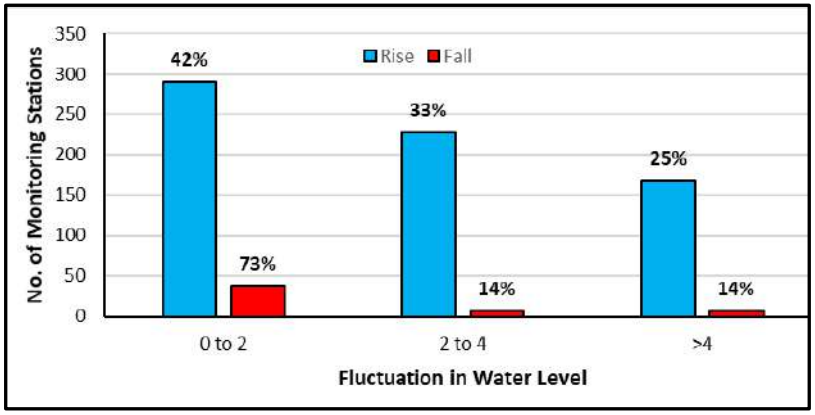

Figure-7: Seasonal water level fluctuation in unconfined Aquifer(May 2024 to January 2025)

Seasonal Fluctuation of Water Level in Unconfined Aquifer (Aug 2024 to January 2025)

Rise in Water Levels:

In the State 80% of the area (Figure-8) (535 wells) experienced rise in water levels when compared to the period Aug 2024. Out of 535 wells, 54% of wells have recorded rise in water level from 0 to 2 m, 25% of wells have recorded 2 to 4 m and 21 % of wells have recorded beyond 4 m. Rise in water level is observed throughout the state except in isolated patches in Eluru, Alluri Sitarama Raju, Nandyal and Prakasam districts (Figure-9).

Fall in Water Levels:

In the State about 20% of the area (Figure-8) (235 wells) experienced fall in water levels when compared to Aug 2024. Out of 235 wells that have registered fall in water levels, 81% of wells have recorded less than 2m fall covering and area of 17% area of state, 11% of wells recorded fall of 2 to 4m in an area 2% area, and 7% of wells recorded fall beyond 4m in 1% area of state. The fall in water level is observed only in isolated patches of the district in Nandyal, Eluru, Prakasam, Guntur, Srikakulam and Alluri Sitharama Raju districts (Figure-9).

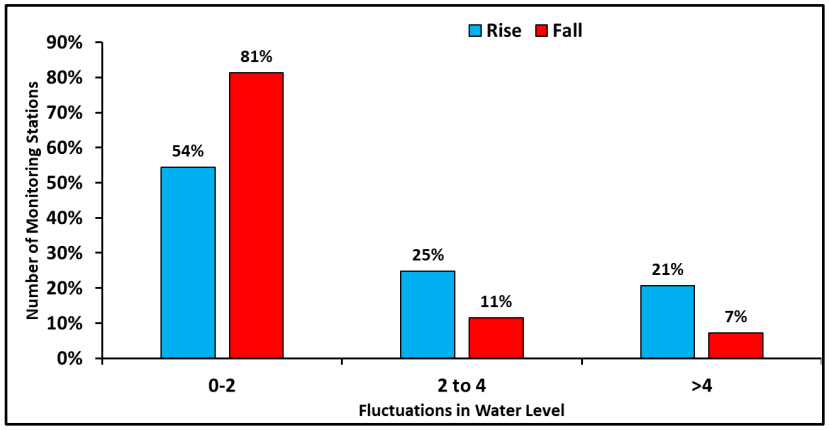

Figure-8: Percentage of wells showing seasonal rise and fall in WL in unconfined aquifer(Aug 2024 to January 2025)

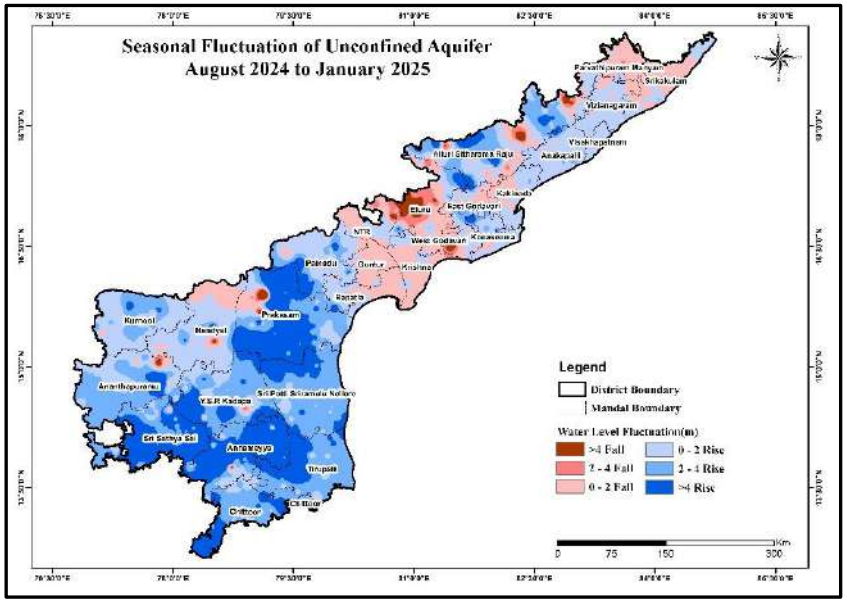

Figure-9: Seasonal water level fluctuation in unconfined Aquifer (Aug 2024 to January 2025)

Seasonal Fluctuation of Water Level in Unconfined Aquifer (November 2024 to January 2025)

Rise in Water Levels:

In the State 45% of the area (Figure-10) (357 wells) experienced rise in water levels when compared to the period Nov 2024. Out of 357 wells, 77% of wells have recorded rise in water level from 0 to 2 m, 13% of wells have recorded 2 to 4 m and 10 % of wells have recorded beyond 4 m. Rise in water level is observed throughout the state except in isolated patches in Prakasam, Nandyal, Ananthapuramu, Alluri Sitarama Raju and West Godavari (Figure-11).

Fall in Water Levels:

In the State about 55% of the area (Figure-10) (424 wells) experienced fall in water levels when compared to Nov 2024. Out of 424 wells that have registered fall in water levels, 84% of wells have recorded less than 2m fall covering and area of 46% area of state, 10% of wells recorded fall of 2 to 4m in an area 6% area, and 5% of wells recorded fall beyond 4m in 4% area of state. The fall in water level is observed only in isolated patches of the district in Prakasam, Ananthapuramu, Palnadu, Chittoor, West Godavari and Kurnool (Figure-11).

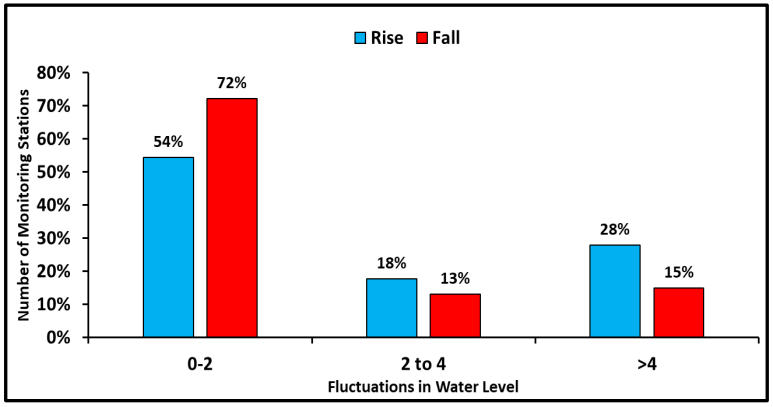

Figure-10: Percentage of wells showing seasonal rise and fall in WL in unconfined aquifer (November 2024 to January 2025)

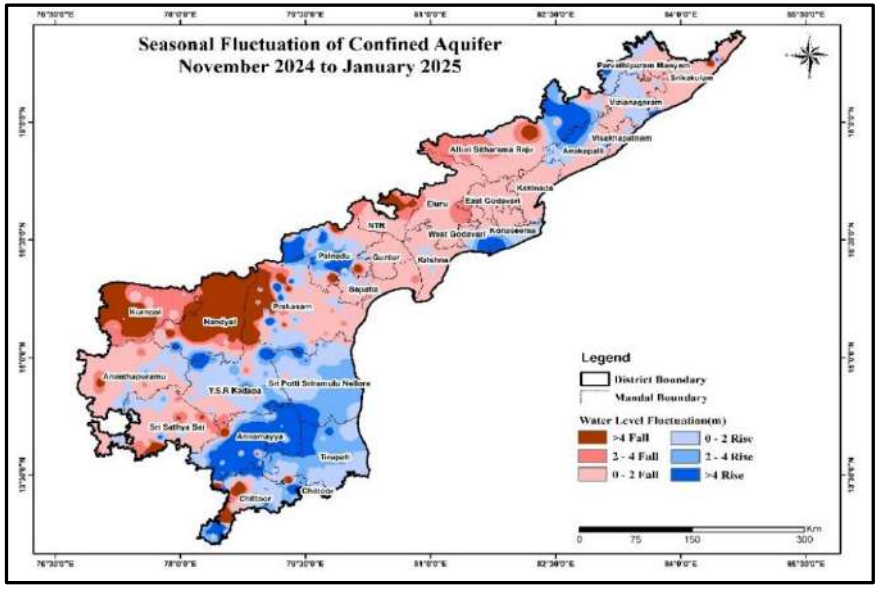

Figure-11: Seasonal water level fluctuation in unconfined Aquifer (November 2024 to January 2025)

5.1.3 ANNUAL FLUCTUATION IN WATER LEVEL

Annual Fluctuation of Water Level in Unconfined Aquifer (January 2024 to January 2025)

Rise in Water Levels:

In the State 77% of the area (Figure-13) (600 wells) experienced rise in water levels when compared to January 2024. Out of 600 wells, 16% of wells have recorded rise in water level from 2 to 4 m and is observed as patches over Vizianagram, Ankapalli, Eluru, East Godavari, Palnadu, Prakasham, SPS Nellore, Annamayya, YSR Kadapa, Sri Sathya Sai, Ananthpuramu, Kurnool and Nandyal districts covering an area of 13%. Water level rise of less than 2m is observed in 74% wells covering 57% of the area and is mainly observed throughout the state. Water level rise of more than 4m is observed in only 10% of wells covering an area of 8% and is mainly observed in Sri Sathya Sai Prakasam, Palnadu, SPS Nellore and Ananthpuramu districts (Figure-8).

Fall in Water Levels:

Out of the 198 wells that have registered fall in water levels (Figure-9), 62% have recorded less than 2 m while 20% in the range of 2 to 4 m and remaining 18% wells registered water level fall of more than 4 m. Fall of less than 2 m is observed in parts of districts of Alluri Sitharama Raju, Eluru, Krishna, Bapatla, Kurnool, Nandyal, Chittoor, YSR Kadapa, Ananthpuramu and Srikakulam districts covering area of 16%. Fall of 2 to 4 m, recorded in Alluri Sitharama Raju, Eluru, Prakasham, Nandyal, Ananthpuramu, YSR Kadapa, Annamayya and Chittoor districts covering an area of 3%. Fall beyond 4 mis recorded mainly in Ananthapuramu along with YSR Kadapa, Annamayya, Chittoor, Sri Sathya Sai, Eluru and Alluri Sitharama Raju districts covering an area of 3% of the state(Figure-13).

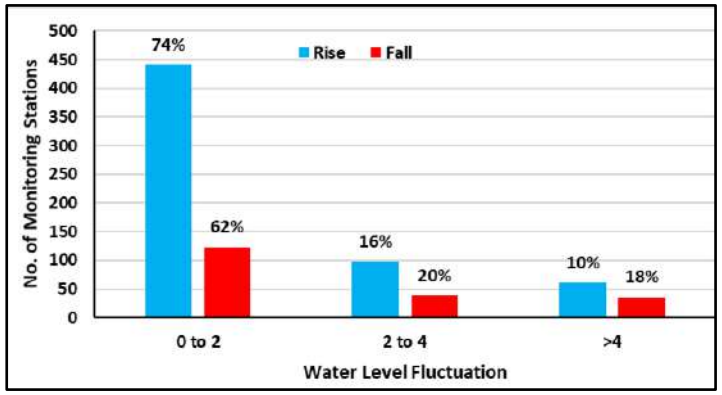

Figure-12: Percentage of wells showing annual rise and fall in WL in unconfined aquifer (January 2024 to January 2025)

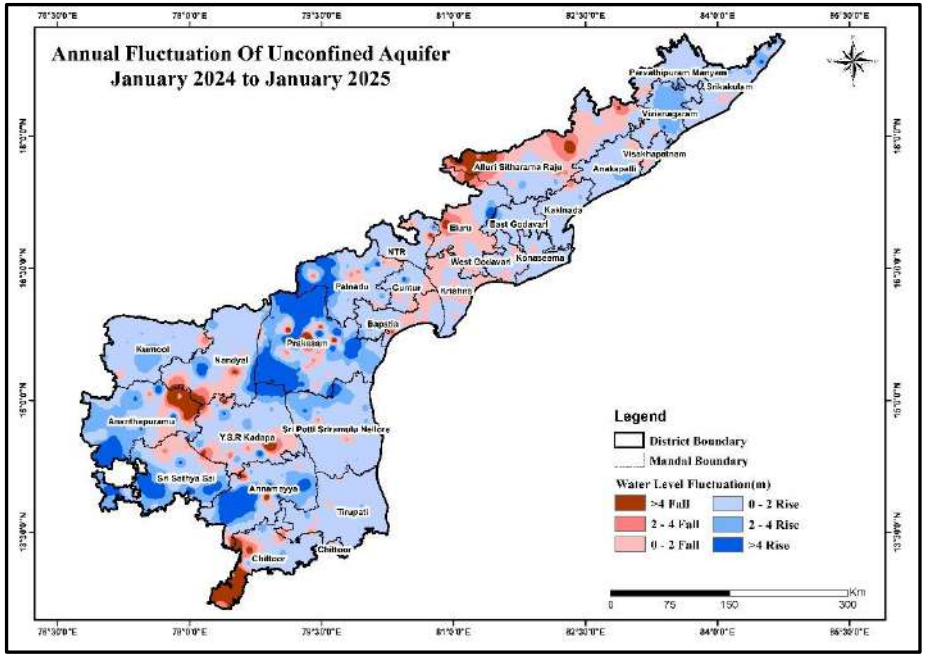

Figure-13: Annual water level fluctuation in unconfined AquiferJanuary 2024 to January 2025)

Annual Fluctuation of Water Level in Unconfined Aquifer (January 2023 to January 2025)

Rise in Water Level

In the state only 30% (282 wells) of the area rise in water levels when compared to January 2025 (Figure-14).. Out of 282 wells, 7% of wells have recorded rise in water level from 2 to 4 m and is observed as small patches over Vizianagram, Eluru, East Godavari, NTR and Sri Sathya Sai districts covering an area of 1%. Water level rise of less than 2m is observed in 90% wells covering 29% of the area and is mainly observed throughout the state and is mainly observed in Parvathipuram Manyyam, Srikakulam, Vizianagram, Vishakhapatna, Alluri Sitharama Raju, Anakapalli, Kakinada, Konaseema, East Godavari, Sri Sathya Sai Prakasam, Guntur, SPS Nellore and Tirupati districts (Figure-15).

Fall in Water Level

In the state 70% (392 wells) of the area rise in water levels when compared to January 2025 (Figure-14). Out of 392 wells, 11% of wells have recorded fall in water level from 2 to 4 m and is observed as patches over Ananthpuramu, Nandyal, Prakasham, Chittoor, Annamyya, Chittoor, Palnadu and NTR districts covering an area of 12%. Water level fall of less than 2m is observed in 79% wells covering 51% of the area and is mainly observed throughout the state. Water level fall of more than 4 m is observed in 10% of wells as patches over Ananthpuramu, Nandyal, Prakasham, Chittoor, Annamyya, Chittoor, Palnadu and NTR districts covering an area of 7%. (Figure-15).

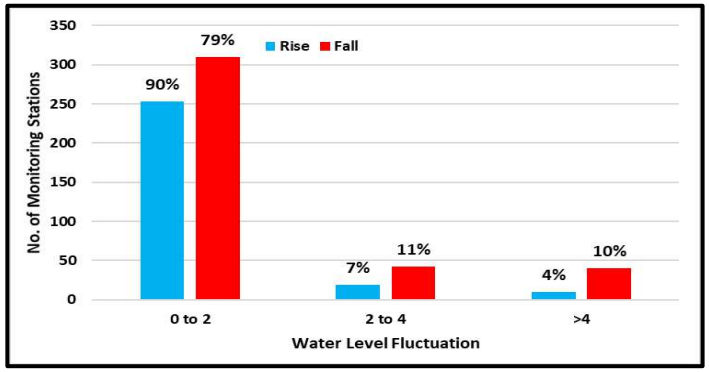

Figure-14: Percentage of wells showing annual rise and fall in WL in unconfined aquifer(January 2023 to January 2025)

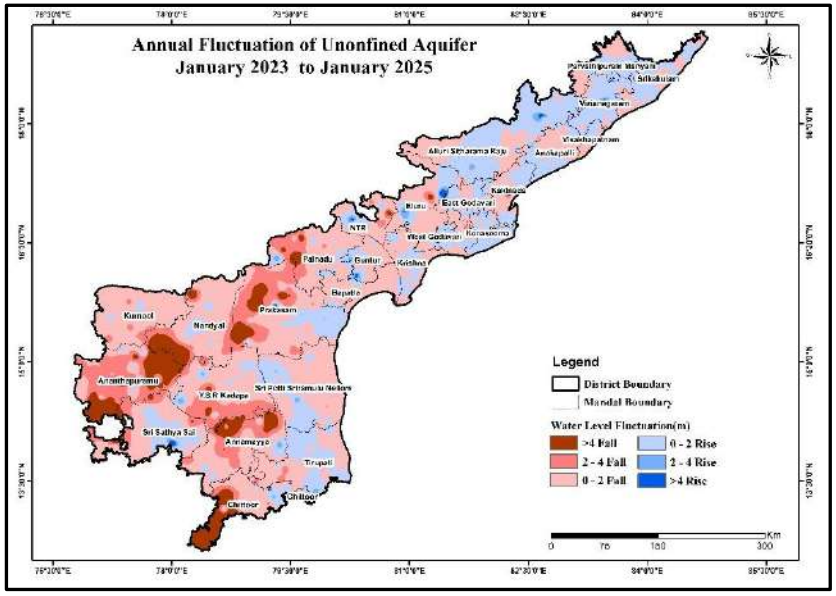

Figure-15: Annual water level fluctuation in unconfined AquiferJanuary 2023 to January 2025)

5.1.4 DECADAL FLUCTUATION IN WATER LEVEL

Decadal Fluctuation of Water Level in Unconfined Aquifer (Decadal Mean January (2015-2024) to January 2025)

Rise in Water Levels:

In the State, 73% of the area(Figure-16) (511 wells) experienced rise in water levels when compared to the January decadal mean (2015-2024). Out of 511 wells, 13% of wells have recorded rise in water level from 2 to 4 m and is observed as patches over Prakasam, Vizianagram, Nandyal, Palnadu, YSR Kadapa, Sri Sathya Sai and Annamayya districts covering insignificant areas (11%). Water level rise of less than 2m is observed in 78% wells covering 57% of the area with majorly observed over the Kurnool, Nandyal, Ananthpuramu, Sri Sathya Sai, SPS Nellore, Tirupati, Prakasam, Palnadu, Anakapalli and small isolated patches over remaining districts. Water level rise of more than 4m is observed in only 8% of wells covering an area of 5% mainly observed in Praksham, Palnadu, Sri Sathya Sai and Annamayya districts majorly (Figure-17).

Fall in Water Levels:

Out of the 279 wells that have registered fall in water levels (Figure-16), 80% have recorded less than 2 m while 10% in the range of 2 to 4 m and remaining 11% wells registered water level fall of more than 4 m. Fall of less than 2 m is observed in all districts mainly in parts of Vishakhaptnam, Anakapalli, Alluri Sitha Rama Raju, Anathpuramu, Sri Sathya Sai, Annamaya, Eluru, Nandyal, Krishna, Bapatla, Guntur, Palnadu, West Godavari and NTR districts. Fall of 2 to 4 m, recorded in Alluri Sitharam Raju, Ananthpuramu, Eluru, Chittoor, Nandyal, Annamayya and YSR Kadapa districts. Fall beyond 4 mis recorded mainly in Ananthaparamu, Alluri Sitharam Raju, Nandyal, YSR Kadapa, Chittoor and Eluru districts (Figure-17).

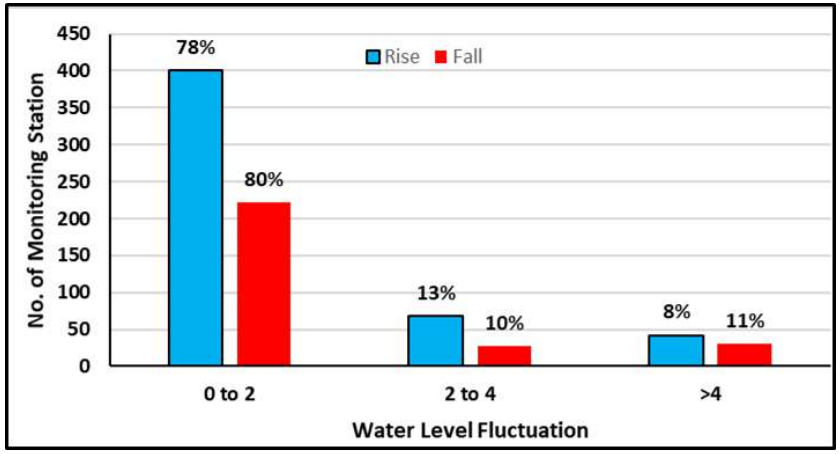

Figure-16: Percentage of wells showing decadal rise and fall in WL in unconfined Aquifer(Decadal Mean January (2015-2024) to January 2025)

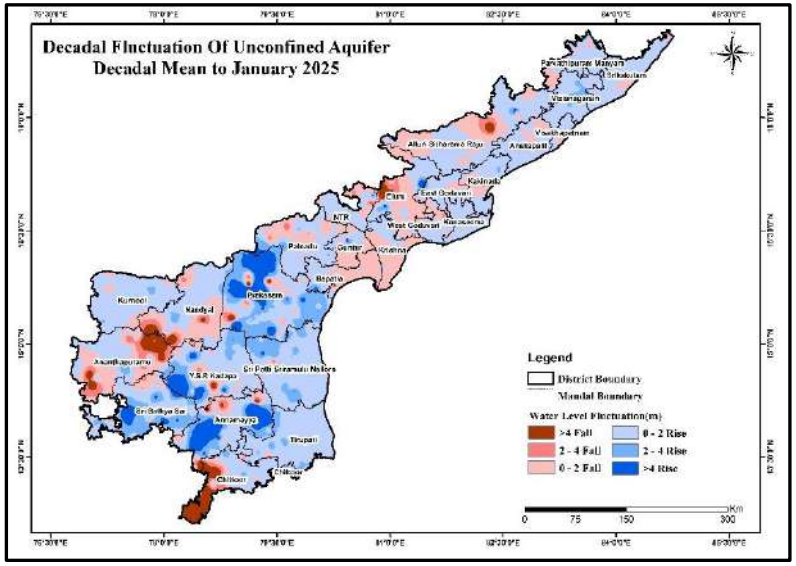

Figure-17: Decadal water level fluctuation in unconfined Aquifer (Decadal Mean January (2015-2024) to January 2025)

5.2 DEEPER AQUIFER (CONFINED/ SEMI-CONFINED)

5.2.1 DEPTH TO PIEZOMETRIC LEVEL

Depth To Piezometric Level in Confined/Semi-Confined Aquifer (Jan 2025)

Analysis of piezometric head data of 551 wells shows water levels vary between 0.15 m.bgl (Palnadu) to 72.66 bgl (Annamayya) districts. Water level of less than 2 m bgl is recorded in 10% of wells, between 2 to 5 m bgl in 26% of wells, between 5 to 10 m bgl in 31% of wells, between 10 to 20 m bgl in 23 % of wells, between 20-40 m bgl in 7% of wells and water level more than 40 m bgl is registered in 4 % of wells (Figure-18).

Piezometric head map of January 2025 (Figure-19) shows that shallow water level of less than 2 m bgl is noticed in isolated patches in Palnadu, Anakapalli, Tirupati, Ananthpuramu and YSR Kadapa districts covering an area of 1% of the State. Water level of 2 to 5 m bgl observed in Srikakulam, Vizianagaram, Anakapalli, Guntur, NTR, Palnadu, Bapatla, Prakasam, SPS Nellore, Tirupati, Sri Sathya Sai, YSR Kadapa, Chittor and Ananthpuramu districts covering an area of 21% of the State. 38 % area of the State is covered by depth to water level of 5 to 10 m bgl throughout the state with significant area in Sri Sathya Sai, Kurnool, Ananthpuramu, Chittoor, SPS Nellore, YSR Kadapa, Alluri Sitharama Raju, Palnadu, Bapatla, NTR and Guntur districts. Water level of 10 to 20 m bgl is covered in 31% of the State area and is mainly observed in Alluri Sitharama Raju, Kakinada, Konaseema, East Godavari, West Godavari, Eluru, Krishna, Prakasam, Chittoor, Sri Sathya Sai, YSR Kadapa, Nandyal, Annamayya and Kurnool districts. Deeper water levels of more than 20 m covers 8% area of the State and mainly observed in Prakasam, Nandyal, Annamaya, Chittoor, Kurnool, YSR Kadapa, Eluru, Krishna and West Godavari districts.

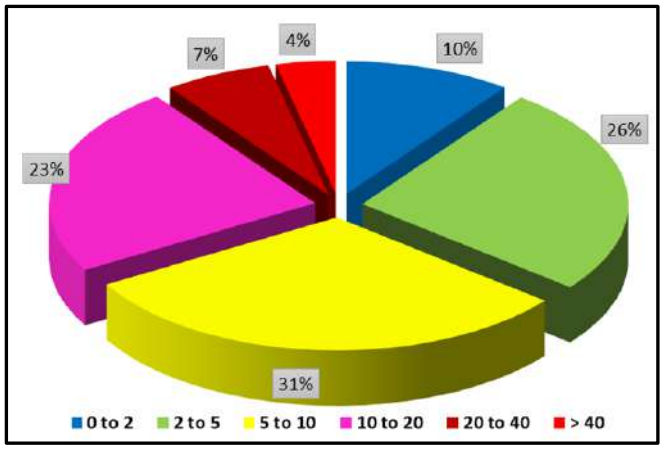

Figure-18: Percentage of wells in different piezometric levels (January 2025)

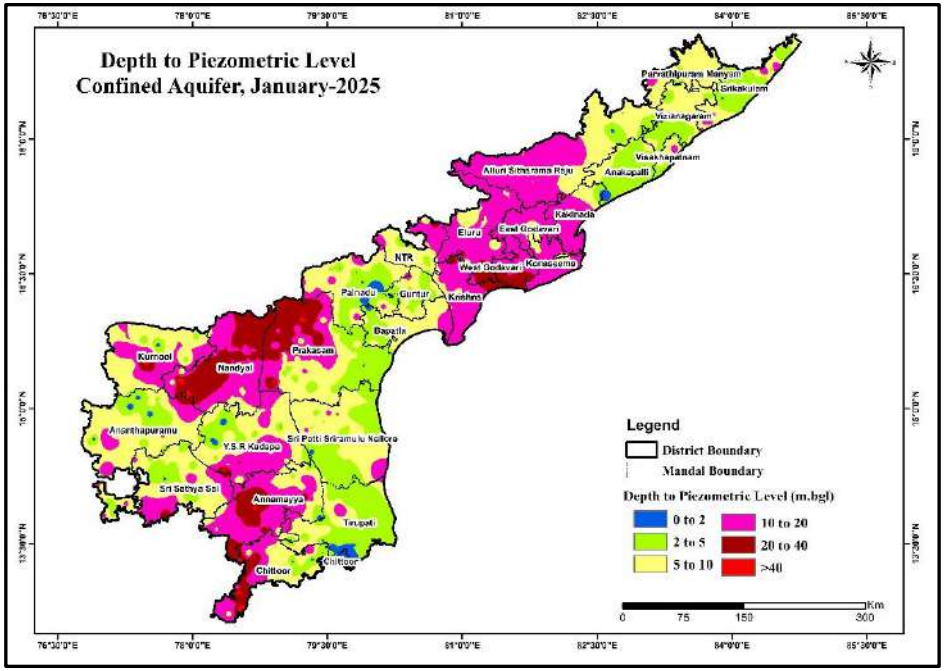

Figure-19: Depth to piezometric Level in deeper aquifer in January 2025.

5.2.2 SEASONAL FLUCTUATION IN PIEZOMETRIC LEVEL

Seasonal Fluctuation of Piezometric Level in Confined /Semi-confined Aquifer (May 2024 to January 2025)

Rise in piezometric levels:

Out of 469 wells, piezometric level rise of less than 2m is recorded in 23% wells (Figure-20) covering an area of 16%, 2 to 4m in 26% wells and more than 4 m in 51% of the wells spread over 30% and 51% of the state area respectively. Piezometric level rise of less than 2m is seen mainly in Alluri Sitharama Raju, Kakinada, Krishna, Guntur, NTR, Bapatla, Palnadu, Kurnool, SPS Nellore and Nandyal districts. Piezometric level rise of 2 to 4 m is observed mainly in Parvathipuram maniyam, Srikakulam, Vizianagaram, Vishakhapatnam, Anakapalli, Alluri Sitharama Raju, NTR, Kurnool, Ananthapuramu, Guntur, SPS Nellore and Tirupati districts. Rise of more than 4m is observed throughout the state significantly in Eluru, Alluri Sitharama Raju, Srikakulam, Nandyal, Kurnool, YSR Kadapa, Annamayya, Sri Sathya Sai, Ananthapuramu, Chittoor, Tirupati, Prakasam, Bapatla, Vishakhapatnam, Vizianagaram Anakapalli districts (Figure-21).

Fall in Piezometric Levels:

Only 49 wells have registered fall in piezometric levels, out of this 51% have recorded less than 2 m (Figure-20) covering an area of 2% while 12% in the range of 2 to 4 m and remaining 37% wells registered piezometric level fall of more than 4 m covering area 1% each respectively. Fall of less than 2 m is mainly observed as patches in Alluri Sitharama Raju, West Godavari, Palnadu, Nandyal, Kurnool, NTR Chittoor and SPS Nellore districts. Fall of 2 to 4 m is observed majorly in Kurnool, Nandyal, Palnadu, Alluri Sitharama Raju, West Godavari, NTR and Prakasam. Fall of beyond 4 m is observed as isolated patches in Alluri Sitharama Raju, NTR, West Godavari, Palnadu, Kurnool, Nandyal and Prakasam districts. (Figure-21).

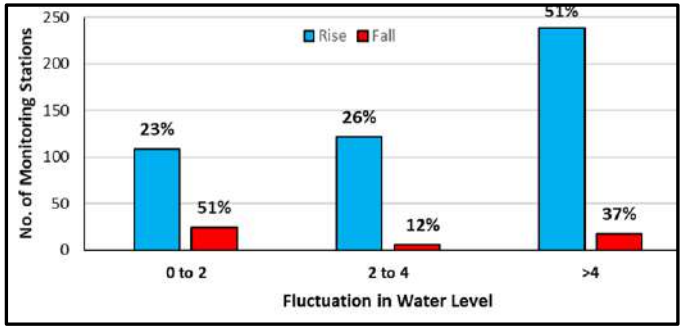

Figure-20: Percentage of wells showing seasonal rise and fall in WL in confined/semi-confined aquifer(May 2024 to January 2025)

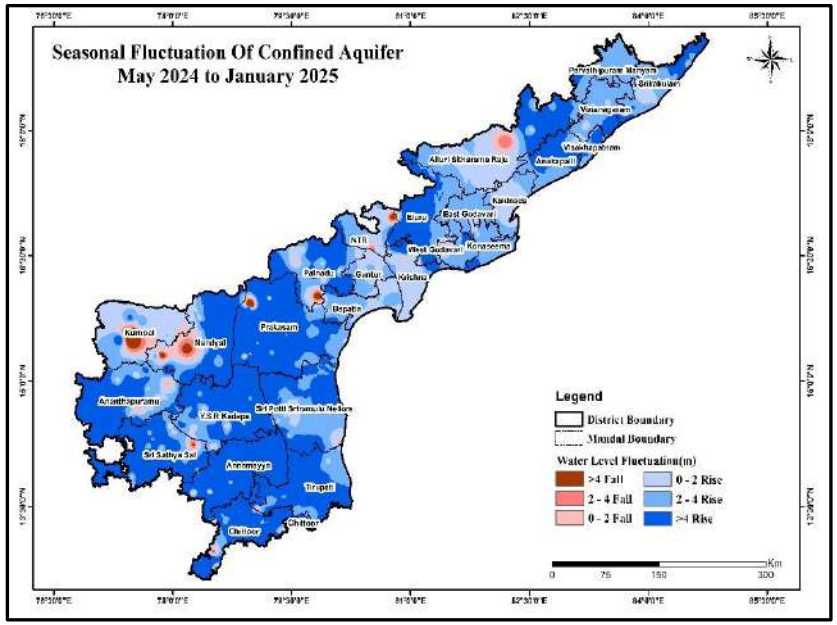

Figure-21: Seasonal water level fluctuation in confined/semi-confined Aquifer May 2024 to January 2025)

Seasonal Fluctuation of Water Level in Confined Aquifer (Aug 2024 to January 2025)

Rise in Water Levels:

In the State 70% of the area (Figure-22) (411 wells) experienced rise in water levels when compared to the period Aug 2024. Out of 441 wells, 30% of wells have recorded rise in water level from 0 to 2 m, 22% of wells have recorded 2 to 4 m and 48 % of wells have recorded beyond 4 m. Rise in water level is observed throughout the state except in isolated patches in Kurnool, Nandyal, Guntur, Eluru, NTR, Srikakulam, Kakinada and Alluri Sitharama Raju districts (Figure-23).

Fall in Water Levels:

In the State about 30% of the area (Figure-22) (120 wells) experienced fall in water levels when compared to Aug 2024. Out of 120 wells that have registered fall in water levels, 60% of wells have recorded less than 2m fall covering and area of 20% area of state, 18% of wells recorded fall of 2 to 4m in an area 6% area, and 23% of wells recorded fall beyond 4m in 4% area of state. The fall in water level is observed only in isolated patches of the district in Nandyal, Kurnool, Kakinada, Srikakulam and Alluri Sitharama Raju districts (Figure-23).

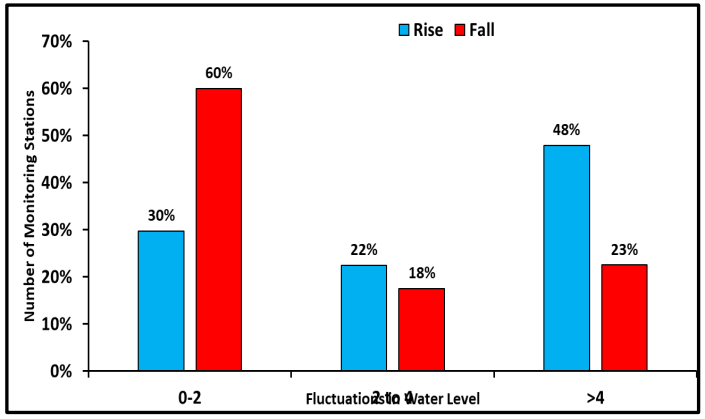

Figure-22: Seasonal water level fluctuation in confined Aquifer (Aug 2024 to January 2025)

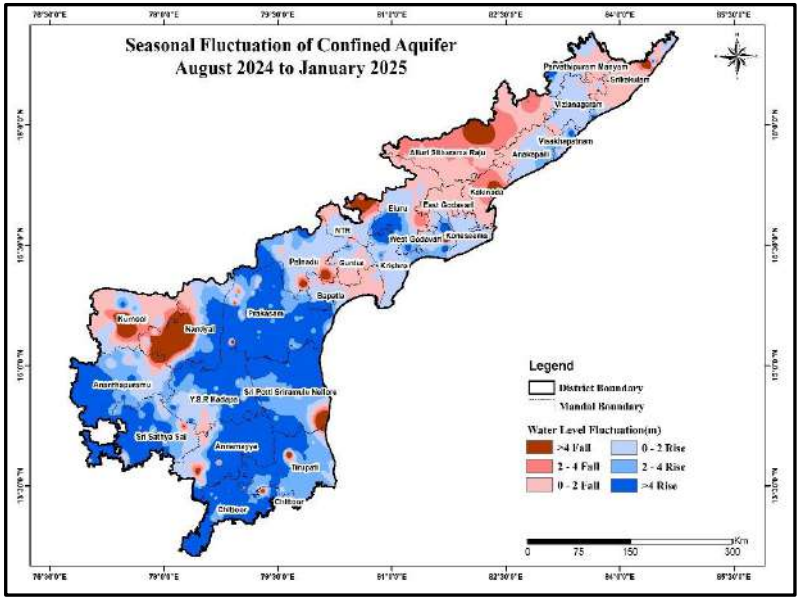

Figure-23: Percentage of wells showing seasonal rise and fall in WL in confined aquifer(Aug 2024 to January 2025)

Seasonal Fluctuation of Water Level in Confined Aquifer (November 2024 to January 2025)

Rise in Water Levels:

In the State 40% of the area (Figure-24) (226 wells) experienced rise in water levels when compared to the period Nov 2024. Out of 226 wells, 54% of wells have recorded rise in water level from 0 to 2 m, 18% of wells have recorded 2 to 4 m and 28 % of wells have recorded beyond 4 m. Rise in water level is observed throughout the state except in isolated patches in Kurnool, Praksam, Alluri Sitarama Raju, Srikakulam, Nandyal, NTR, Bapatla and CHittoor (Figure-25).

Fall in Water Levels:

In the State about 60% of the area (Figure-24)(308 wells) experienced fall in water levels when compared to Nov 2024. Out of 308 wells that have registered fall in water levels, 72% of wells have recorded less than 2m fall covering and area of 41% area of state, 13% of wells recorded fall of 2 to 4m in an area 9% area, and 15% of wells recorded fall beyond 4m in 10% area of state. The fall in water level is observed only in isolated patches of the district in Nandyal, Kurnool, Srikakulam, Alluri Sitaramaraju, Sri Satya Sai and Srikakulam (Figure-25).

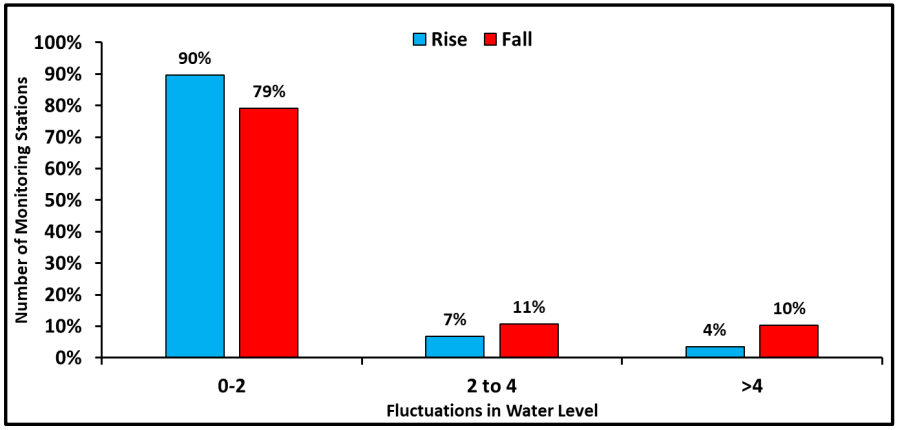

Figure-24: Annual water level fluctuation in unconfined Aquifer(Jan 2023 to January 2025)

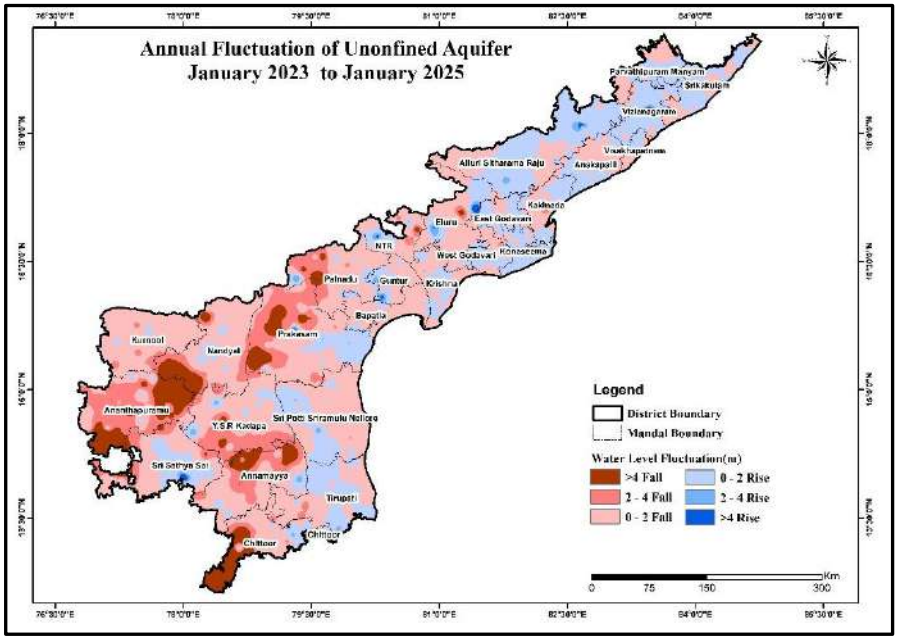

Figure-25: Percentage of wells showing annual rise and fall in WL in unconfined aquifer(Jan 2023 to January 2025)

5.2.3 ANNUAL FLUCTUATION IN PIEZOMETRIC LEVEL

Annual Fluctuation of Piezometric Level in Confined /Semi-confined Aquifer (January 2024 to January 2025)

Rise in piezometric levels:

Out of 370 wells, piezometric level rise of less than 2 m is recorded in 49% wells (Figure-26) covering 38% of the area, 2 to 4m in 23% wells and more than 4m in 28% of the wells covering 15% and 11% of the area, respectively. Rise in Piezometric level rise of less than 2m is seen in throughout the state, majorly in Alluri Sitharama Raju, Parvatthipuram Manyyam, Srikakulam, Vishakhapatnam, Vizianagram, Kakinada, Anakapalli, Konaseema, Eluru, NTR, East&West Godavari, Palnadu, SPS Nellore, Chittoor, Kurnool, Tirupati and Sri Sathya Sai districts. Piezometric level rise of 2 to 4m is observed mainly in Alluri Sitharama Raju, Eluru, Palnadu, Prakasam, Nandyal, Kurnool, Chittoor, Ananthapuramu and Sri Sathya Sai districts. Rise of more than 4m is significantly observed in Prakasam, Palnadu, Nandyal, Sri Sathya Sai, Ananthpuramu, Chittoor and Alluri Sitharama Raju districts (Figure-27).

Fall in Piezometric Levels:

Out of 180 wells that have registered fall in piezometric levels, 50% have recorded less than 2m covering (Figure-26) 25% of the area. 16% in the range of 2 to 4 m and remaining 34% wells registered piezometric level fall of more than 4 m spread over an area of 6% and 4%, respectively. Fall of less than 2m is mainly observed majorly in the Srikakulam, Parvathipuram Manyam, Viziangaram, Bapatla, West Godavari, Krishna, NTR, Ananthapuramu, YSR Kadapa, Annamayya, Tirupati, Palnadu, Alluri Sitharama Raju and NTR. Fall of 2 to 4 m is observed mainly in Parvathipuram Manyam, West Godavari, Krishna, Palnadu, NTR, Ananthapuramu, Tirupati, YSR Kadapa Annamayya and Alluri Sitha Rama Raju districts. Fall of beyond 4 m is observed over the Alluri Sitharama Raju, West Godavari, Krishna, Guntur, Palnadu, Bapatla, YSR Kadapa, Annamayya, and Chittoor districts (Figure-27).

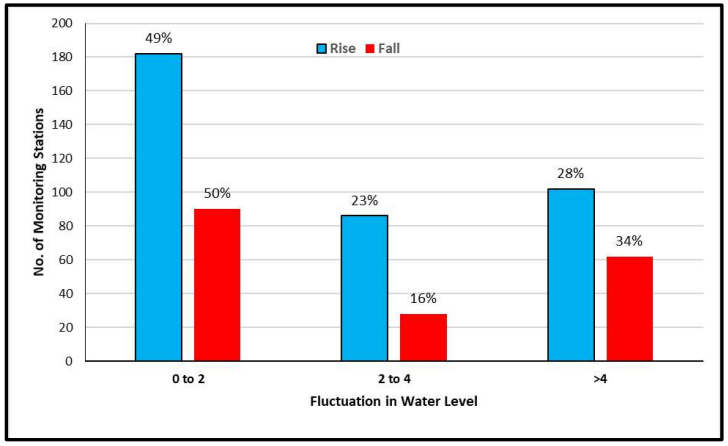

Figure-26: Percentage of wells showing annual rise and fall in WL in confined/semi-confined aquifer(January 2025 to January 2025)

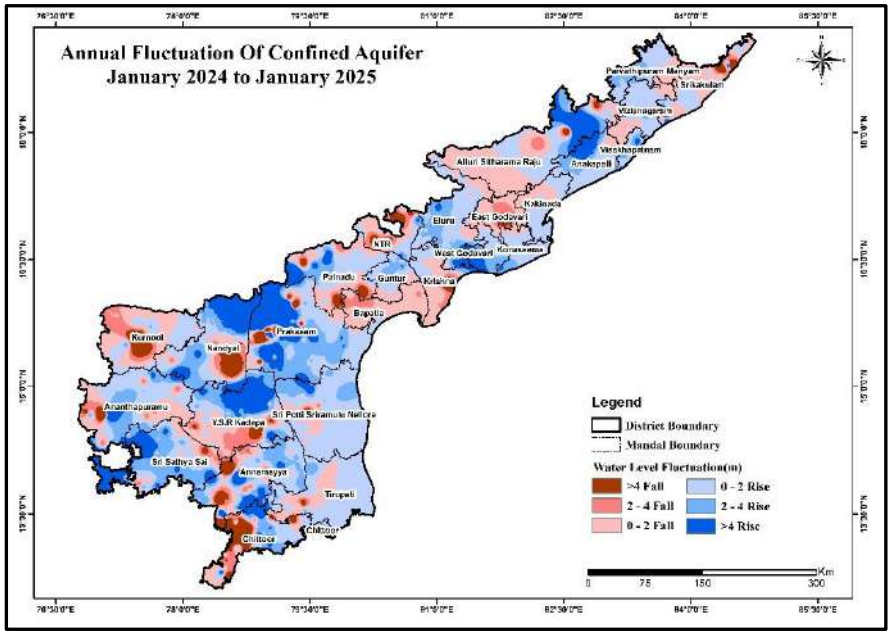

Figure-27: Annual water level fluctuation in confined/semi-confined Aquifer (January 2024 to January 2025)

Annual Fluctuation of Piezometric Level in Confined /Semi-confined Aquifer (January 2023 to January 2025)

Rise in piezometric levels:

Out of 114 wells, piezometric level rise of less than 2 m is recorded in 61% wells (Figure-28) covering 21% of the area, 2 to 4m in 18% wells and more than 4m in 20% of the wells covering 4% and 2% of the area, respectively. Rise in Piezometric level rise of less than 2m is seen in Alluri Sitharama Raju, Parvatthipuram Manyyam, Srikakulam, Vizianagram, Anakapalli, Konaseema, Eluru, NTR, East&West Godavari, Palnadu, Krishna, Prakasham, Chittoor and Tirupati districts. Piezometric level rise of 2 to 4m is observed mainly in Alluri Sitharama Raju, Palnadu, Prakasam, Krishna, East&West Godavari, Konaseema and NTR districts. Rise of more than 4m is significantly observed in Prakasam, NTR, Krishna, East&West Godavari, Konaseema and Alluri Sitharama Raju districts (Figure-29).

Fall in Piezometric Levels:

Out of 286 wells that have registered fall in piezometric levels, 51% have recorded less than 2m covering (Figure-28) 38% of the area. 16% in the range of 2 to 4 m and remaining 33% wells registered piezometric level fall of more than 4 m spread over an area of 16% and 19%, respectively. Fall of less than 2m is mainly observed throughtout the state majorly in the Rayalseema Region. Fall of 2 to 4 m is observed mainly in Rayalseema Region of Kurool, Ananthapuramu, Tirupati, YSR Kadapa, SPS Nellore, Annamayya, Kakinada, NTR, Bapatla, Guntur and Sri Sathya Sai districts. Fall of beyond 4 m is observed over the Kurnool, Nandyal, Ananthpuramu, Sri Sathya Sai, Prakasham, Palnadu, NTR, Guntur, Kakinada, YSR Kadapa, Annamayya, and Chittoor districts (Figure-29).

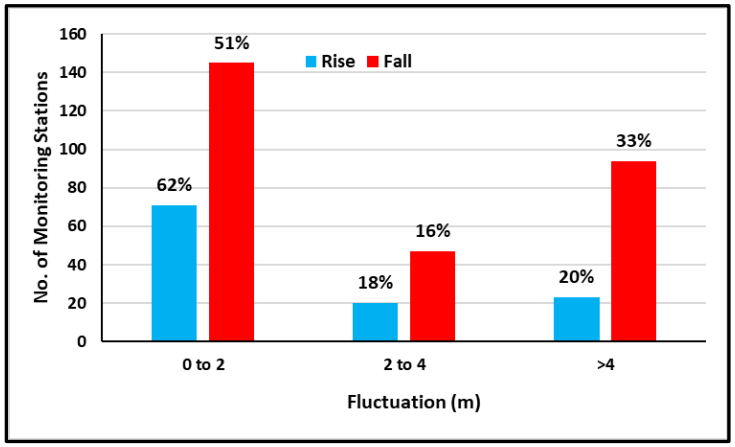

Figure-28: Percentage of wells showing annual rise and fall in WL in confined/semi-confined aquifer (January 2023 to January 2025

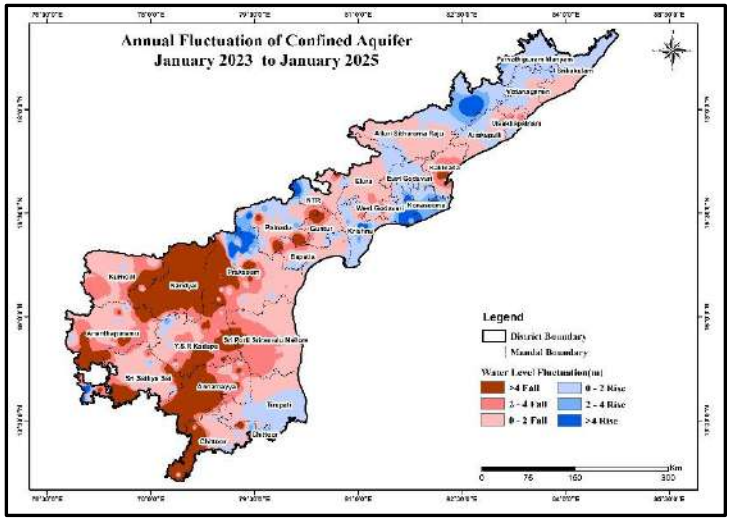

Figure-29: Annual water level fluctuation in confined/semi-confined Aquifer (January 2023 to January 2025)

5.2.4 DECADAL FLUCTUATION IN PIEZOMETRIC LEVEL

Decadal Fluctuation of Piezometric Level in Confined / Semi- confined Aquifer (Decadal Mean January(2015-2024) to January 2025)

Rise in piezometric levels:

Out of 337 wells, piezometric level rise of less than 2 m is recorded in 52% wells covering an area of 40%, 2 to 4m in 25% wells and more than 4 m in 23% of the wells are spread over 12% and 7% of the area, respectively (Fig. 18). Piezometric level rise of less than 2m is seen in major parts of State mainly in Alluri Sitharama Raju, Vizianagram, Vishakhapatnam, Konaseema, Eluru, NTR, Krishna, West Godavri, Guntur, Palnadu, Prakasam, Ananthpuramu, Sri Sathya Sai, SPS Nellore, Tirupati and Chittoor districts (Fig. 19). Piezometric level rise of 2 to 4 m is observed mainly in Alluri Sitharama Raju, Palnadu, Eluru, Prakasam, Palnadu, West Godavari, Konaseema, YSR Kadapa, SPS Nellore and Tirupati districts. Rise of more than 4m is significantly observed in Alluri Sitharama Raju, Konaseema, West Godavari, Palnadu, Prakasam, YSR Kadapa, Sri Sathya Sai, Chittor, Annamayya and SPS Nellore districts. (Figure-31).

Fall in piezometric level:

Out of 203 wells that have registered fall in piezometric levels, 47% have recorded less than 2 m covering over an area of 25% while 19% in the range of 2 to 4 m and remaining 34% wells registered piezometric level fall of more than 4 m with spread over an area of 7% and 9%, respectively. Fall of less than 2 m is mainly observed majorly in the Srikakulam, Parvathipuram Manyam, Vizianagram, Anakapalli, Kakinada, East Godavari, Krishna, Bapatla, Guntur, YSR Kadapa, Prakasam, Nandyal, Kurnool, Ananthapuramu, Sri Sathya Sai, Palnadu and Annamayya districts. Fall of 2 to 4 m is observed majorly in Alluri Sitharama Raju, Kakinada, Palnadu, Prakasam, Nandyal, Kurnool, NTR, Ananthpuramu, YSR Kadapa, Chittoor and Annamayya districts. Fall of beyond 4 m is observed majorly over Kakinada, Palnadu, Prakasam, Nandyal, Kurnool, YSR Kadapa, Chittoor, Ananthpuramu, Sri Sathya Sai and Annamayya districts (Figure-31).

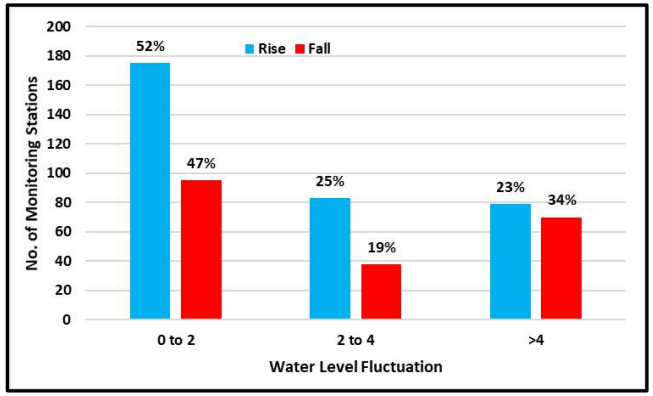

Figure-30: Percentage of wells showing decadal rise and fall in piezometric level in confined/semi-confined Aquifer (Decadal Mean January (2015-2024) to January 2025)

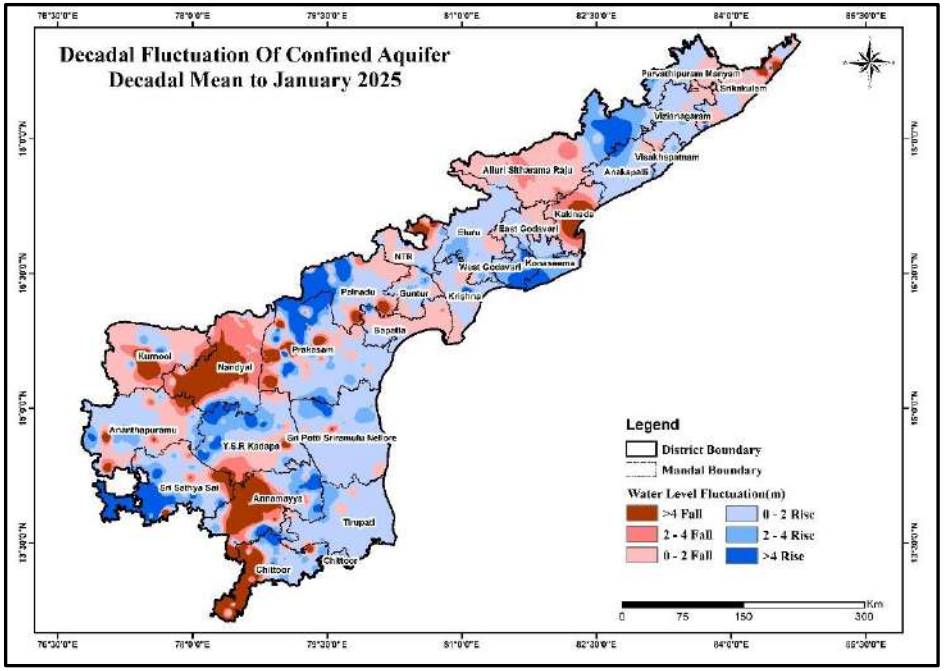

Figure-31: Decadal water level fluctuation in confined Aquifer (Decadal Mean January(2015-2024) to January 2025)

6.0 SUMMARY

As a component of the National Ground Water Monitoring Programme, the CGWB, SR, Hyderabad conducts monitoring of the ground water conditions on a quarterly basis: in January, pre-monsoon May, August, and post- monsoon November. Additionally, a yearly assessment of ground water quality is performed in May. As of January 30, 2025, the Andhra Pradesh State Unit Office of the Central Ground Water Board monitors 656 dug wells and 790 piezometers. This comprehensive effort aims to portray the variations in the state's groundwater conditions across different aquifers.

In January 2025, in unconfined aquifer around 92% of the state's area and in confined aquifer around 60% exhibited a depth to water level within 10 meters below ground level. Deeper water levels of more than 20 m covers 2% area of the State in unconfined aquifers and 8% area in confined aquifer mainly covering parts of Prakasam, YSR Kadapa, Annamayya, Chittoor, Ananthapuramu, Nandyal, West Godavari, Alluri Sitharama Raju and Eluru districts.

The groundwater level in Andhra Pradesh during January 2025 has been significantly influenced by a notable normal rainfall from June 2024 to December 2024. This period witnessed a departure of 22% from the normal and 34% when compared to June 2023 to Dcember 2023, classifying the region as experiencing large excess rainfall in comparison to June 2023 to December 2023. This significant rainfall has led to the further improvement of ground water during – January 2025.

Seasonal water level fluctuation, May-2024 to Januray-2025 in unconfined aquifer shows that about 93% of wells (685) has shown rise in water level and 7% of wells (51) showed fall in water level. For confined/semi-confined aquifer system about 90% of wells (469) shows rise in water level and 10% of wells (49) showed fall in water level. The significant rise in water levels 93% of wells in unconfined and 90% of wells in confined aquifer is influenced by the rainfall condition during June 2024 to December 2024

Annual water level fluctuation, January 2024 to January 2025 in unconfined aquifer shows that about 75% of wells (600) has shown rise in water level and 25% of wells (198) showed fall in water level. For confined/semi-confined aquifer system about 71% of wells (370) shows rise in water level and 29% of wells (180) showed fall in water level. The significant increase in water levels 75% of wells in unconfined and 71% of wells in confined aquifer might be influenced by the excess rainfall condition during June 2024 to December 2024 compared to June 2023 to December 2023.

The Decadal fluctuation (January 2015-2024 to January 2025) of ground Water Level in unconfined aquifer shows 73% of the area experienced rise in water levels when compared to the decadal January 2025 mean. Out of 790 wells, 13% of wells have recorded rise in water level from 2 to 4 m. Water level rise less than 2m is observed in 78%. Water level rise of more than 4m is observed in only 8% of wells.

The decadal fluctuation (January 2015-2024 to January 2025) in confined/semi-confined it is observed that level rise of less than 2 m is recorded in 52% wells, 2 to 4m in 25% wells and more than 4 m in 23% of the wells.

7.0 RECOMMENDATION

Recommendations:

Analysis of groundwater scenario of Andhra Pradesh reveals that the dynamics of groundwater is highly related with the variation in rainfall. Hence the following recommendations are submitted:

- To sustain Monsoon Recharge, efforts must be made to harvest rainwater through check dams, percolation tank at sites highlighted in Artificial Recharge Master Plan. And also protect and enhance natural recharge zones identified in District Recharge Plan to retain monsoon benefits.
- Promote efficient micro-irrigation techniques like drip and sprinkler irrigation to reduce groundwater extraction and encourage farmers to grow less water-intensive crops in drought-prone regions of Andhra Pradesh. Adopt crop diversification to shift from high-water-consuming crops (paddy, sugarcane) to drought-resistant crops.
- In deep water level zones (>20m), enforce strict regulations on dependency on borewell by implementing incentives for sustainable practices. In Urban areas, dependency on deeper aquifers has to curb by improving surface water supply for domestic use. Promote the reuse of treated water for non-potable purposes to lessen groundwater exploitation.
- Promote afforestation in depleted regions to improve soil moisture retention and groundwater recharge. Select native tree species with deep root systems to enhance percolation and groundwater sustainability.
- Escalate Community Awareness programs to educate farmers and industries on water-efficient practices. Establish community water conservation groups to encourage participatory groundwater management