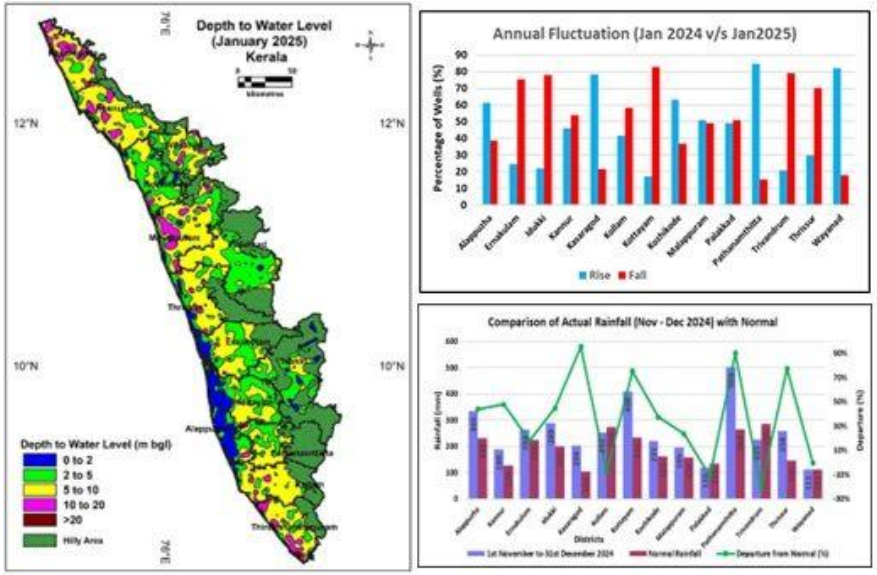


GROUNDWATER LEVEL BULLETIN

JANUARY 2025/KERALA STATE

ABSTRACT

The behavior of ground water table during January-2025 in Kerala State has been studied by monitoring Board's groundwater monitoring dug wells and purpose-built piezometers. As of January 2025, Central Ground Water Board, Kerala Region, monitors 1383 dug wells and 276 piezometers to study the ground water scenario of Kerala State. The state received an excess rainfall of 35% above normal during the period. During the period of study, the depth to water levels of phreatic aquifers of the State varies within 10 m bgl in most of the parts in the State (89% of the GWMS), while remaining 11 % of wells show depth to water level more than 10 m bgl. In confined/semi-confined aquifers, Depth to piezometric head varies from 0 to 10 m bgl in 65% of monitored piezometers and remaining 35% piezometers shows depth to piezometric head more than 10 m bgl.

1.0 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 attributes of groundwater regime monitoring are groundwater level.

The natural conditions affecting the groundwater regime involve meteorological parameters like rainfall, evapotranspiration etc., whereas anthropogenic influences include extraction 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, March/April/May, August and November. The regime monitoring started in the year 1969 by Central Ground Water Board. A network of 25437 observation wells called **National Hydrograph Network Stations (NHNS)**, as on 30.04.2024, located all over the country is being monitored.

2.0 STUDY AREA

Kerala State is a narrow stretch of land lies between North latitudes $08^0$18' and $12^0$48' and East longitudes $74^0$52' and $77^0$22' covering an area of 38863 sq.km, which is bordered by the Lakshadweep Sea on the western side and Tamil Nadu and Karnataka States on the eastern side. The length of the State from north to south is 560 km and the average width is 70 km, with a maximum of 125 km.

Due to urbanization and industrialization, the stress on groundwater has increased in the past few years, which resulted in problems like decline in water table and contamination of groundwater at many places. Change in rainfall pattern in recent years and the increased utilization of ground water put concern among the public that water may become scarce commodity in future.

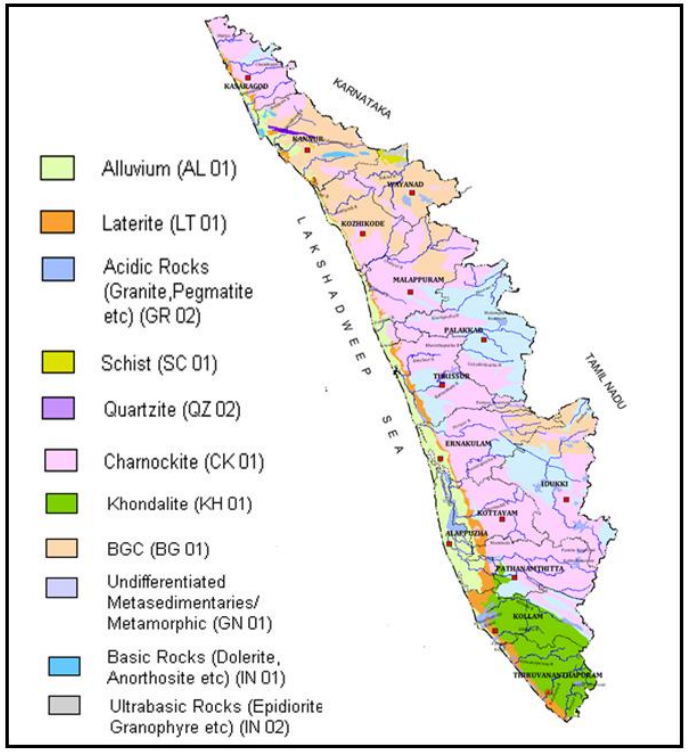


Figure-1: Map showing major aquifers and administrative divisions of Kerala

Physiographically, the State of Kerala is divided into three major units viz. the lowland, the midland and the high land. The lowlands are those areas where the elevation is less than 7.6 m above mean sea level (amsl) whereas the elevation of the midland ranges from 7.6 to 76 m amsl and that of the highland is more than 76 m amsl. Along the highlands there are two distinct plateau regions - Wayanad plateau and Munnar plateau.

Geologically 88% of the State is underlained by crystalline rocks of Archaean age, which is a part of the peninsular shield. The crystalline complex of Kerala is composed of charnockites, gneisses, schists, migmatites and rocks of the Wayanad supracrustals.

Along the western part of the State, the crystalline rocks are topped by the sedimentary formations of Palaeogene, Neogene Periods and alluvial formations of Quaternary to Recent periods. The Palaeogene and Neogene sequence has been divided into four beds viz. Alleppey, Vaikom, Quilon and Warkali, with age ranges from Eocene to Lower Miocene. Laterites of Sub-Recent age derived from the crystalline as well as sedimentary formations, and are seen all along the midlands. Along the coastal plains, the sedimentary formations and laterites are overlained by Recent Alluvium deposits.

3.0 GROUND WATER LEVEL MONITORING

In order to assess the real situation of ground water conditions, it is very essential to monitor the groundwater level and water quality over time and space. Central Ground Water Board has established 1659 Ground Water Monitoring Wells (GWMW) throughout the Kerala State for monitoring seasonal ground water level. Water level is being monitored four times a year during January, April, August and November months and water quality is being monitored from the water samples collected from optimized GWMW during April. The total number of GWMW as on 31.03.2024 is 1659. Out of these, 1383 are dug wells representing phreatic aquifers and 276 are bore wells/tube wells representing deeper aquifers of confined / semi-confined nature. These GWMW are spread over all the physiographic divisions of the State. The district-wise breakup of the water level monitoring stations is given in **Table-1**.

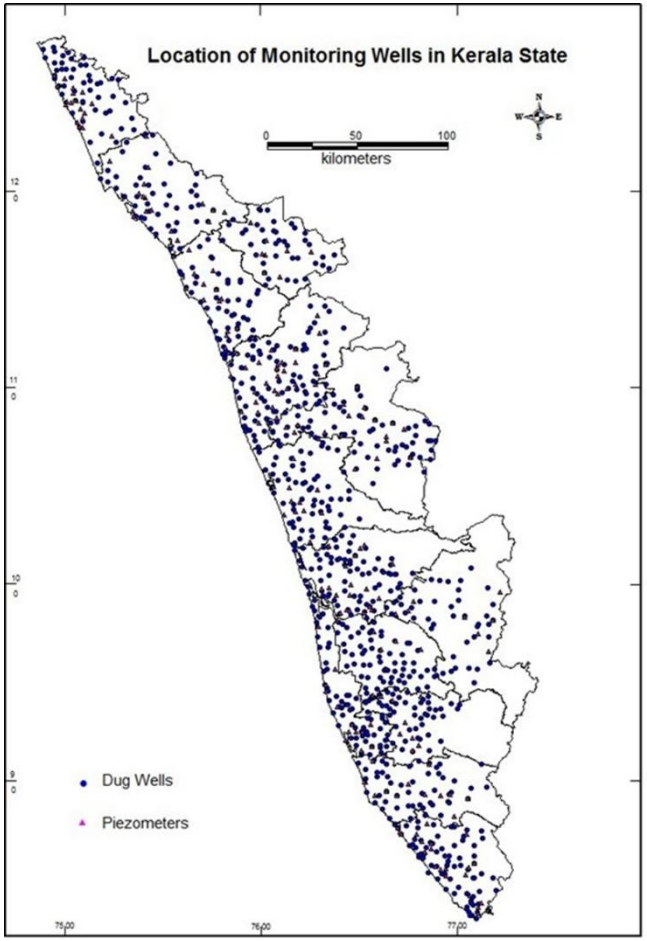


Figure- 2: Map showing locations of monitoring wells (GWMS) in Kerala state

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	Alappuzha		93	78	15	93
2	Ernakulam		143	123	20	143
3	Idukki		76	71	9	80
4	Kannur		112	99	17	116
5	Kasaragod		127	105	34	139
6	Kollam		120	114	13	127
7	Kottayam		102	97	8	105
8	Kozhikode		103	85	25	110
9	Malappuram		146	116	30	146
10	Palakkad		157	119	44	163
11	Pathanamthitta		92	84	11	95
12	Thiruvananthapuram		125	106	22	128
13	Thrissur		131	110	19	129
14	Wayanad		83	76	9	85
	Total		**1610**	**1383**	**276**	**1659**

4.0 RAINFALL

The rainfall data collected and compiled from weekly and monthly weather reports from India Meteorological Department were used to analyze the rainfall for the period November - December 2024. Table-2 gives the district-wise rainfall data for the period November - December 2023 & 2024, normal and the departure of November - December 2024 rainfall with other periods.

The state received an excess rainfall of 35% above normal during the period and departure percentage from normal varied from -21% in Thiruvananthapuram district to 95% in Kasaragod district. Kasaragod, Kottayam, Pathanamthitta and Thrissur districts received large excess rainfall during the period and Thiruvananthapuram district received deficient rainfall. The state received 18% less rainfall in 2024 compared to same period in 2023. Table-2 shows district wise distribution of rainfall in Kerala.

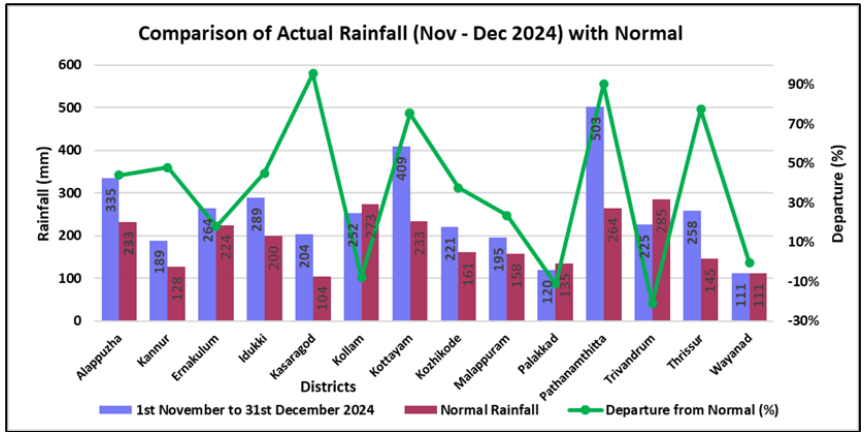


Figure-3: Rainfall deviation (November to December 2024) from normal rainfall

Table-2: District wise distribution of rainfall in Kerala

District	Rainfall (mm)		Normal Rainfall (mm)	Departure from 2023 (%)	Departure from Normal (%)	Category
	Nov to Dec 2024	Nov to Dec 2023				
Alappuzha	335.1	334.7	232.7	0%	44%	Excess
Kannur	189.0	175.2	127.7	8%	48%	Excess
Ernakulam	264.2	345.6	223.6	-24%	18%	Normal
Idukki	289.4	386.2	199.5	-25%	45%	Excess
Kasaragod	203.7	178.8	104.2	14%	95%	Large Excess
Kollam	251.9	295.5	272.8	-15%	-8%	Normal
Kottayam	408.6	427.5	233.0	-4%	75%	Large Excess
Kozhikode	221.1	243.8	160.7	-9%	38%	Excess
Malappuram	195.0	233.7	157.6	-17%	24%	Excess
Palakkad	119.7	319.7	134.7	-63%	-11%	Normal
Pathanamthitta	502.6	614.4	264.3	-18%	90%	Large Excess
Trivandrum	225.2	362.6	284.9	-38%	-21%	Deficient
Thrissur	258.0	274.9	145.4	-6%	77%	Large Excess
Wayanad	111.1	169.4	111.3	-34%	0%	Normal
State Mean	**255.3**	**311.6**	**189.5**	**-18%**	**35%**	**Excess**

Category: Large Excess (+60% or more departure from Normal), Excess (+20% to +59%), Normal (-19% to +19%), Deficient (-20% to -59%), Large Deficient (-60% to -99%).

5.0 GROUND WATER LEVEL SCENARIO (JANUARY 2025)

5.1 SHALLOW AQUIFER (UNCONFINED)

5.1.1 DEPTH TO WATER LEVEL

Depth to Water Level in Unconfined Aquifer (January 2025)

The depth to water level of 1333 wells is used for the analysis. The salient feature of the analysis is that the depth to water level over major part of the State lies within 10 m bgl in 89 % of wells analyzed, whereas, 11 % of wells show depth to water level more than 10 m bgl.

During the month of January 2025, the depth to water level of phreatic aquifer in the State varied from 0.23 in Idukki district to 44.41 mbgl in Thiruvananthapuram district. Water level greater than 10 mbgl is mainly observed in phreatic zones in part of Kasaragod, Malappuram, and Thiruvananthapuram districts. Shallow water level in the range of 0 to 2 mbgl is observed in 15% of analyzed wells and significantly in Alappuzha district and parts of Ernakulam, Idukki & Kozhikode districts. Water level in the range of 2 to 5 mbgl and 5 to 10 m bgl are observed for 31 % and 43 % of the analyzed wells respectively in the State. Water level in the range of 2 to 5 m is significantly observed in Palakkad, Kozhikode, Ernakulam, Kottayam, Idukki & Pathanamthitta districts and 5 to 10 m rage in Thiruvananthapuram, Kollam, Kasaragod, Ernakulam, Kannur & Malappuram districts. It is to be noted that major part of the State shows depth to water level in the range of 5 to 10 m bgl, during January 2025. Water level in the range of 10 to 20 mbgl is recorded for about 10 % of the analyzed wells, and mainly observed in parts of Kasaragod, Malappuram, Thiruvananthapuram, Kannur and Kollam districts. Deeper water levels more than 20 m bgl are observed in less than 1% wells and observed in small patches of Thiruvananthapuram & Kasaragod districts.

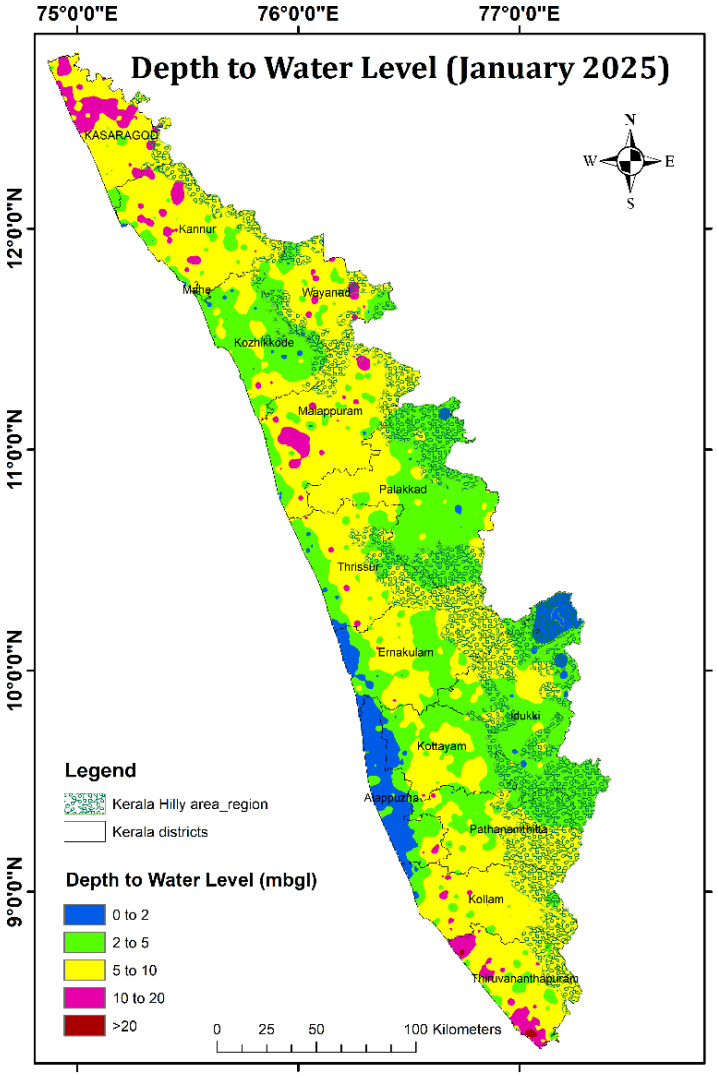


Figure-4: Depth to water Level in phreatic aquifer in Kerala during January 2025

5.1.2 SEASONAL FLUCTUATION IN WATER LEVEL

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

The analysis of data from 1255 wells shows that 83% of wells (1038 wells) recorded a rise in water level, while 17% of wells (217 wells) experienced a fall in water level. The bar diagram depicting seasonal fluctuations and the spatial distribution map are provided in Fig. 5 and 6, respectively.

Rise in Water Levels:

Out of 1038 wells, water level rise of less than 2 m is recorded in 80% wells, 2 to 4 m in 17% wells and more than 4 m in 3% of the wells. Water level rise of less than 2 m is seen in all the districts. Water level rise of 2 to 4 m is observed mainly in Kasaragod, Palakkad, Wayanad & Thiruvananthapuram districts. Rise of more than 4 m is mainly observed in isolated wells located in Kasaragod, Palakkad, Thiruvananthapuram & Kollam districts.

Fall in Water Levels:

Out of 217 wells that have registered fall in water levels, 88% have recorded less than 2 m while 7% in the range of 2 to 4 m and remaining 5% wells registered water level fall of more than 4 m. Fall of less than 2 m is observed in all the districts of the state, significantly in Ernakulam, Kottayam, Malappuram, Thiruvananthapuram and Pathanamthitta districts. Fall of 2 to 4 m is observed mainly in few wells located in Pathanamthitta, Thiruvananthapuram and Ernakulam districts. Fall of more than 4 m is observed mainly in isolated wells located in Malappuram and Thiruvananthapuram districts.

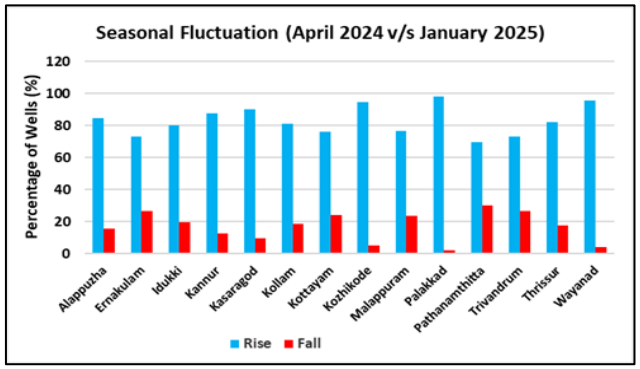
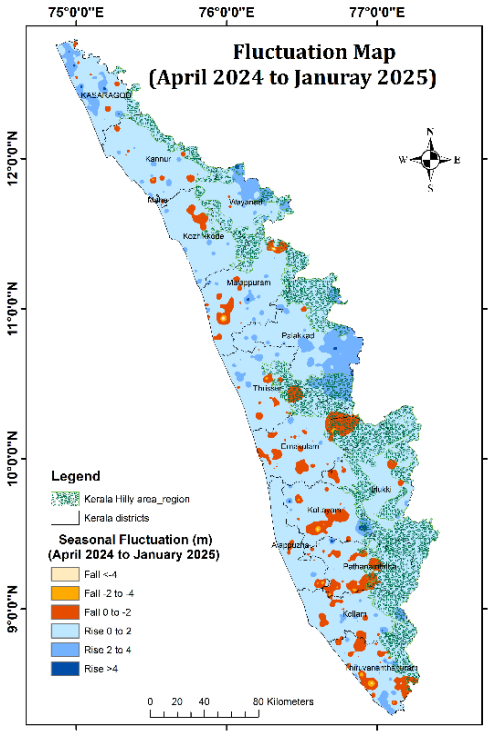


Figure-5: Percentage of wells showing rise and fall in WL in unconfined aquifer (April 2024 to January 2025)



Seasonal Fluctuation of Water Level in

Figure-6: Seasonal water level fluctuation in unconfined aquifer in Kerala (April 2024 to January 2025)

Unconfined Aquifer

(August 2024 to January 2025)

The analysis of data from 1324 wells shows that 6% of wells (81 wells) recorded a rise in water level, while 94% of wells (1243 wells) experienced a fall in water level. The bar diagram depicting annual fluctuations and the spatial distribution map are provided in Fig.7 and 8, respectively.

Rise in Water Levels:

Out of 81 wells, water level rise of less than 2 m is recorded in 86% wells,2 to 4 m in 9% wells and more than 4 m in 5% of the wells. Water level rise of less than 2 m is seen in all the districts, mainly in small parts of Thiruvananthapuram, Idukki and Kannur districts. Water level rise of 2 to 4 and more than 4 m are observed in isolated locations in the state.

Fall in Water Levels:

Out of 1243 wells that have registered fall in water levels, 68% have recorded less than 2 m while 26% in the range of 2 to 4 m and remaining 6% wells registered water level fall of more than 4 m. Fall of less than 2 m is observed significantly in all the districts of the state. Fall of 2 to 4 m is observed in all the districts of the state, mainly in Kannur, Kasargod, Ernakulam, Palakkad and Thrissur districts. Fall of beyond 4 m is observed in isolated location in the state, mainly observed in Kannur and Kasaragod districts.

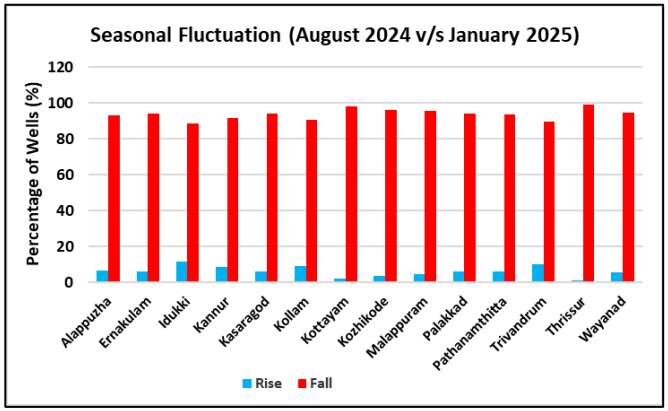


Figure-7: Percentage of wells showing rise and fall in WL in unconfined aquifer August 2024 to January 2025)

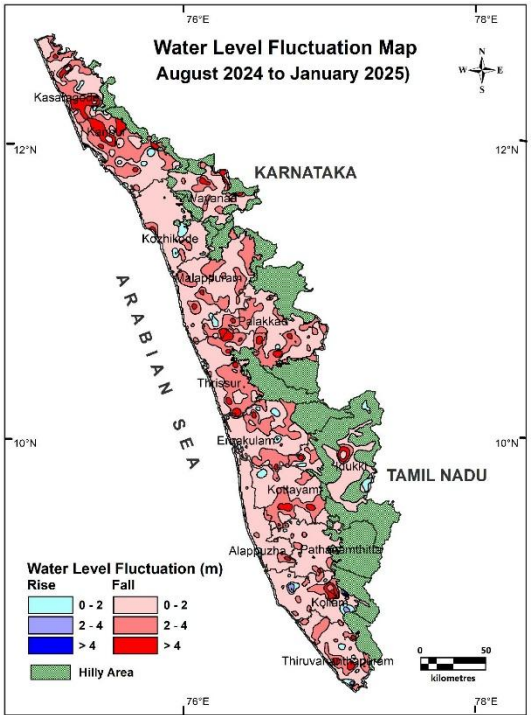


Figure-8: Seasonal water level fluctuation in unconfined aquifer in Kerala (August 2024 to January 2025)

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

The analysis of data from 1307 wells shows that 11% of wells (145 wells) recorded a rise in water level, while 89% of wells (1162 wells) experienced a fall in water level. The bar diagram depicting annual fluctuations and the spatial distribution map are provided in Fig.9 and 10, respectively.

Rise in Water Levels:

Out of 145 wells, water level rise of less than 2 m is recorded in 88% wells, 2 to 4 m in 9% wells and more than 4 m in 3% of the wells. Water level rise of less than 2 m is seen in all the districts, mainly in parts of Ernakulam, Kannur, Palakkad and Thrissur districts. Water level rise of 2 to 4 and more than 4 m are observed in isolated locations in the state.

Fall in Water Levels:

Out of 1162 wells that have registered fall in water levels, 88% have recorded less than 2 m while 10% in the range of 2 to 4 m and remaining 2% wells registered water level fall of more than 4 m. Fall of less than 2 m is significantly observed in all the districts of the state. Fall of 2 to 4 m is observed mainly in Kottayam, Thiruvananthapuram and Kollam districts. Fall of beyond 4 m is observed in isolated locations in the state, mainly in isolated locations of Thiruvananthapuram and Kottayam districts.

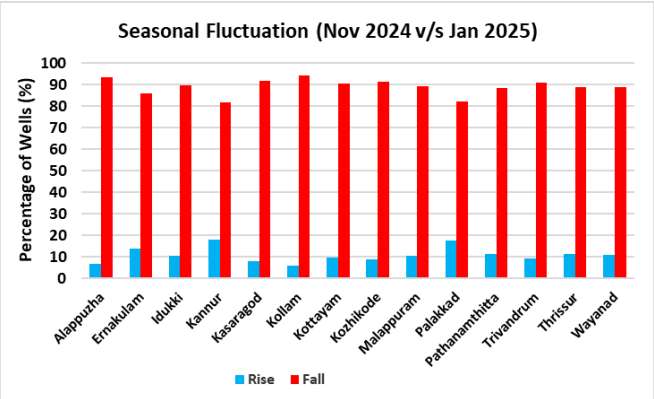


Figure-9: Percentage of wells showing rise and fall in WL in unconfined aquifer (November 2024 to January 2025)

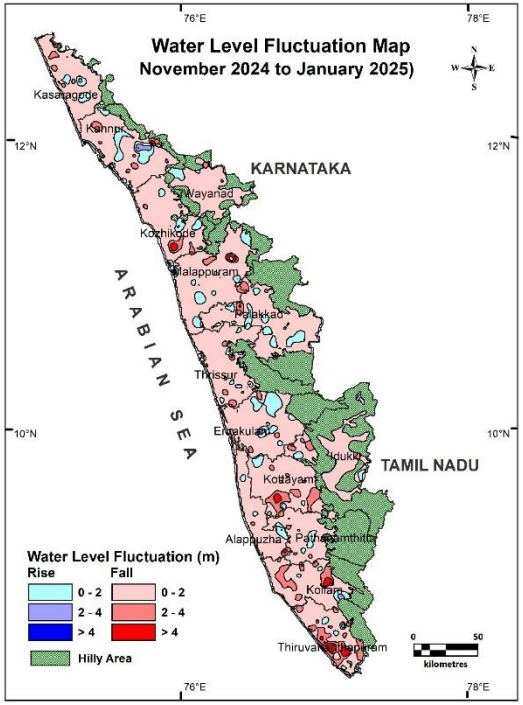


Figure-10: Seasonal water level fluctuation in unconfined aquifer in Kerala (November 2024 to January 2025)

5.1.3 ANNUAL FLUCTUATION IN WATER LEVEL

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

The analysis of data from 1308 wells shows that 72% of wells (937wells) recorded a rise in water level, while 28% of wells (371 wells) experienced a fall in water level. The bar diagram depicting annual fluctuations and the spatial distribution map are provided in Fig.11 and 12, respectively.

Rise in Water Levels:

Out of 937 wells, water level rise of less than 2 m is recorded in 88% wells, 2 to 4 m in 9% wells and more than 4 m in 3% of the wells. Water level rise of less than 2 m is seen in all the districts, significantly in Alappuzha, Ernakulam, Kollam, Kottayam, Kozhikode and Pathanamthitta districts. Water level rise of 2 to 4 m is observed in small pockets of all the districts of the state. Rise of more than 4 m is observed in isolated wells, mainly in Kasaragod district.

Fall in Water Levels:

Out of 371 wells that have recorded fall in water levels, 89% have recorded less than 2 m while 7% in the range of 2 to 4 m and remaining 4% wells registered water level fall of more than 4 m. Fall of less than 2 m is observed in all the districts of the state, significantly in Palakkad, Thrissur, Thiruvananthapuram and Kannur districts. Fall of 2 to 4 m is observed in isolated wells in the state except Alappuzha, Kottayam and Idukki districts and mainly observed in Thiruvananthapuram district. Fall of beyond 4 m is mainly observed in Kasaragod district.

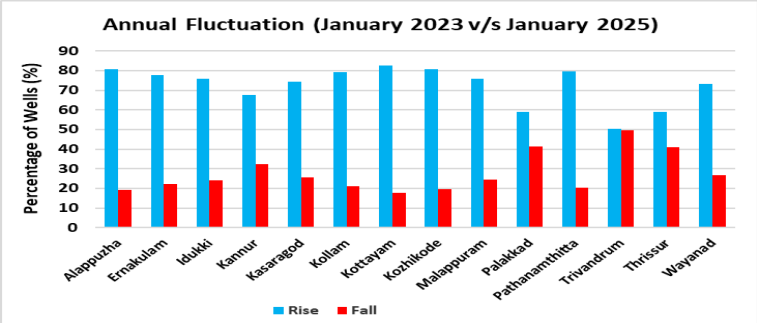


Figure-11: Percentage of wells showing rise and fall in WL in unconfined aquifer (January 2023 to January 2025)

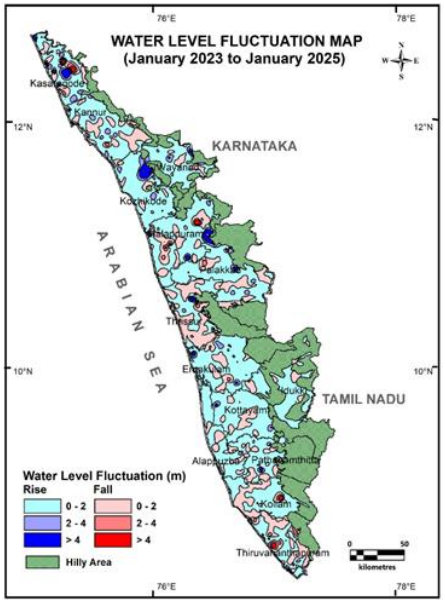


Figure-12: Annual water level fluctuation in unconfined aquifer in Kerala (January 2023 to January 2025)

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

The analysis of data from 1313 wells shows that 46% of wells (610 wells) recorded a rise in water level, while 54% of wells (703 wells) experienced a fall in water level. The bar diagram depicting annual fluctuations and the spatial distribution map are provided in Fig.13 and 14, respectively.

Rise in Water Levels:

Out of 610 wells, water level rise of less than 2 m is recorded in 91% wells, 2 to 4 m in 7% wells and more than 4 m in 2% of the wells. Water level rise of less than 2 m is seen in all the districts, significantly in Kasaragod, Pathanamthitta, Malappuram, Kozhikode, Wayanad & Alappuzha districts. Water level rise of 2 to 4 m is observed in limited number of wells in the state except Ernakulam, Idukki & Thrissur districts. Rise of more than 4 m is observed in isolated wells located mainly in Thiruvananthapuram, Malappuram & Palakkad districts.

Fall in Water Levels:

Out of 703 wells that have registered fall in water levels, 92% have recorded less than 2 m while 6% in the range of 2 to 4 m and remaining 2% wells registered water level fall of more than 4 m. Fall of less than 2 m is observed in all the districts of the state, significantly in Ernakulam, Kottayam, Thiruvananthapuram, Thrissur, Malappuram, Palakkad & Kollam districts. Fall of 2 to 4 m is observed in isolated wells located mainly in Kannur, Thiruvananthapuram, Kollam & Kottayam districts. Fall of beyond 4 m is observed in some pockets located in Thiruvananthapuram, Kollam, Wayanad & Thrissur districts.

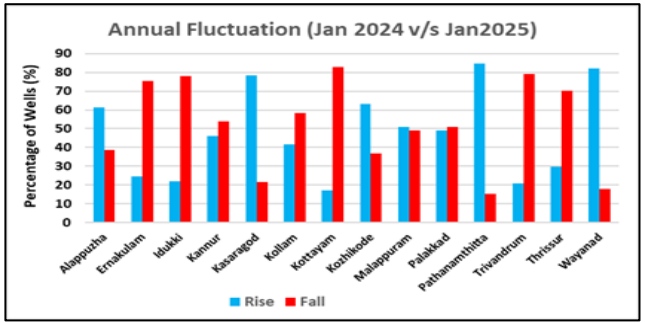


Figure-13: Percentage of wells showing rise and fall in WL in unconfined aquifer (January 2024 to January 2025)

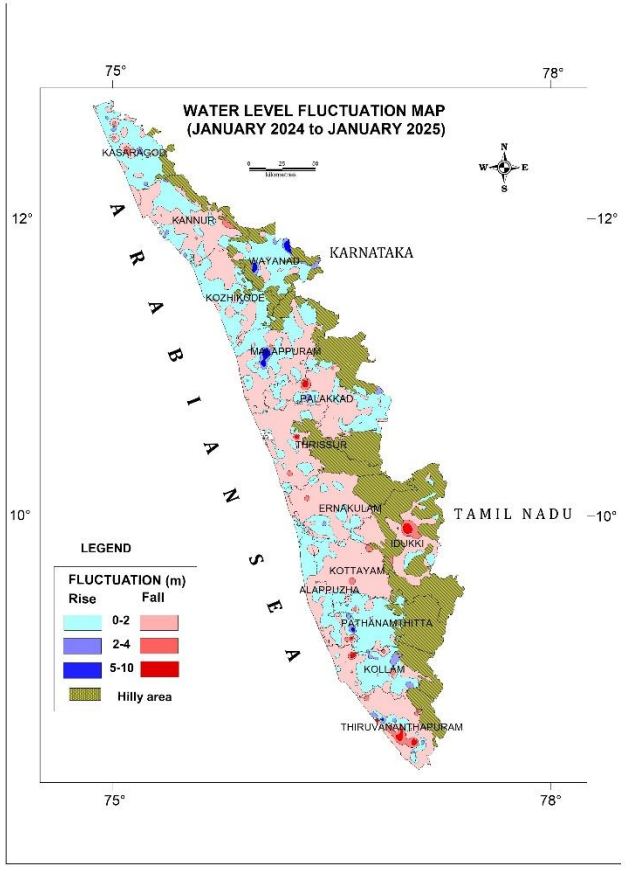


Figure-14: Annual water level fluctuation in unconfined aquifer (January 2024 to January 2025)

5.1.4 DECADAL FLUCTUATION IN WATER LEVEL

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

The analysis of data from 1205 wells shows that 69% of wells (829 wells) recorded a rise in water level, while 31% of wells (376 wells) experienced a fall in water level. The bar diagram depicting decadal fluctuations and the spatial distribution map are provided in Fig. 15 and 16, respectively.

Rise in Water Levels:

Out of 829 wells, water level rise of less than 2 m is recorded in 95% wells, 2 to 4 m in 4% wells, and more than 4 m in remaining 1% wells. Water level rise of less than 2 m is observed in all the districts of the state. Water level rise of 2 to 4 m is observed in mainly in isolated wells located in Palakkad, Thiruvananthapuram and Kasaragod districts.

Fall in Water Levels:

Out of the 376 wells that have registered fall in water levels, 96% have recorded less than 2 m while 3% in the range of 2 to 4 m and more than 4 m in remaining 1% wells. Fall of less than 2 m is observed in all districts mainly in parts of Thrissur, Thiruvananthapuram, Malappuram, Kottayam and Ernakulam districts. Fall of 2 to 4 m, recorded in Kannur, Thiruvananthapuram and Thrissur districts. Fall beyond 4 m is recorded in isolated wells located in Kannur, Malappuram, Thiruvananthapuram districts.

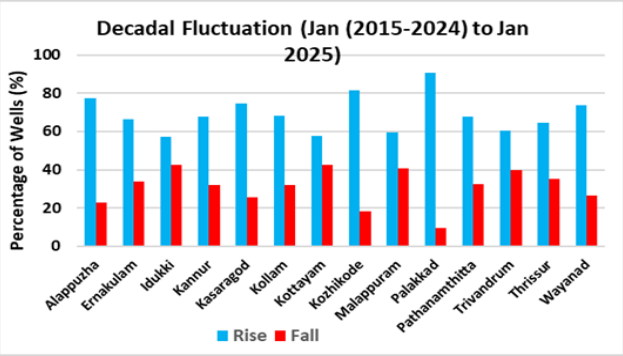


Figure-15: Percentage of wells showing rise and fall in WL in unconfined Aquifer (Decadal Mean January (2015-2024) to January 2025)

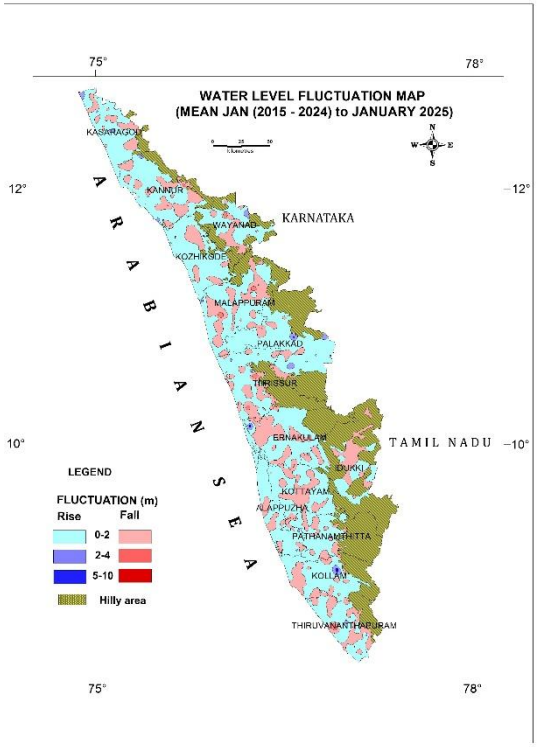


Figure-16: Water level fluctuation with respect to decadal mean January (2015-2024) to January 2025

5.2 DEEPER AQUIFER (CONFINED/ SEMI-CONFINED)

5.2.1 DEPTH TO PIEZOMETRIC LEVEL

Depth to Piezometric Level in Confined/Semi-Confined Aquifer (January 2025)

CGWB has 276 piezometers in various districts of the State which are being monitored four times a year. Out of these 50 piezometers (Tube wells) are tapping the Palaeogene-Neogene Aquifers. The depth of these piezometers ranges from 10 m to 450 m. The remaining 226 piezometers (Bore wells) are in hard rock areas and the depth of these wells' ranges from 10 m. to 300 m. About 44% of these bore wells are tapping shallow fracture zones within 30 meters depth. In the Palaeogene-Neogene aquifer system, ground water is under confined to semi-confined condition. However, in the phreatic aquifers of both Palaeogene-Neogene formations and in Quaternary-Recent alluvial formations, ground water occurs under unconfined to semi-confined condition.

The Piezometric head is analyzed for 229 wells and district-wise well frequency for different ranges of piezometric head during January 2025 has been prepared. It is observed that the depth to piezometric head ranges from 0.37 m bgl (Mannamkandam, Idukki district) to 60.46 m bgl (Villooni, Palakkad district). Depth to piezometric head varies from 0 to 10 m bgl in 65% of monitored piezometers and remaining 35% piezometers show depth to piezometric head more than 10 m bgl.

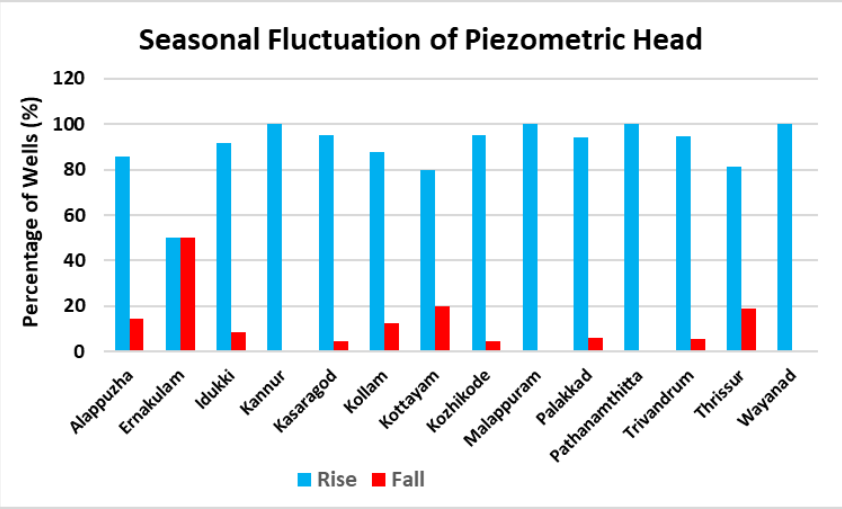


Figure-17: Percentage of wells showing rise and fall in WL in confined/semi-confined aquifer(April 2024 to January 2025)

5.2.2 SEASONAL FLUCTUATION IN PIEZOMETRIC LEVEL

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

Rise in Piezometric Levels:

Out of 199 wells analyzed, piezometric level rise of less than 2 m is recorded in 45 % wells, 2 to 4 m in 27 % wells and 19% wells registered piezometric level fall of more than 4 m. Piezometric level rise of less than 2 m is seen in all the districts, significantly in Kozhikode, Alappuzha, Palakkad & Idukki districts. Piezometric level rise of 2 to 4 m is observed mainly in Kasaragod, Palakkad and Malappuram districts. Rise of more than 4 m is observed mainly in Palakkad, Malappuram, Kasaragod and Thrissur districts.

Fall in Piezometric Levels:

Out of 199 piezometers, 6% have recorded less than 2 m while 3% in the range of 2 to 4 m. Fall of less than 2 m is mainly observed in isolated parts of Ernakulam and Thrissur districts. Fall of 2 to 4 m is observed in isolated wells of Palakkad, Alappuzha, Ernakulam & Kottayam districts.

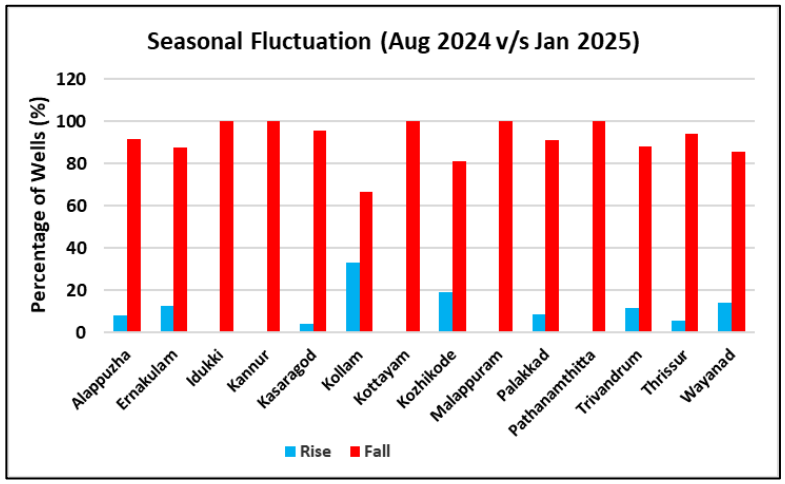


Figure-18: Percentage of wells showing rise and fall in WL in confined/semi-confined aquifer (August 2024 to January 2025).

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

Rise in Piezometric Levels:

Out of 195 wells, piezometric level rise of less than 2 m is recorded in 8 % wells and 1% wells recorded rise of water level more than 2 m. Piezometric level rise of less than 2 m is observed in isolated locations in the state, mainly in parts of Kollam and Kozhikode districts.

Fall in Piezometric Levels:

Out of 195 piezometers, 55% have recorded less than 2 m while 22% in the range of 2 to 4 m and remaining 14% wells, registered piezometric level fall of more than 4 m. Fall of less than 2 m is observed in parts of Kozhikode, Malappuram, Thiruvananthapuram and Alappuzha districts. Fall of 2 to 4 m is mainly observed in Kasaragod, Malappuram and Thrissur districts. Fall of beyond 4 m is observed in parts of Ernakulam, Kasaragod and Palakkad districts.

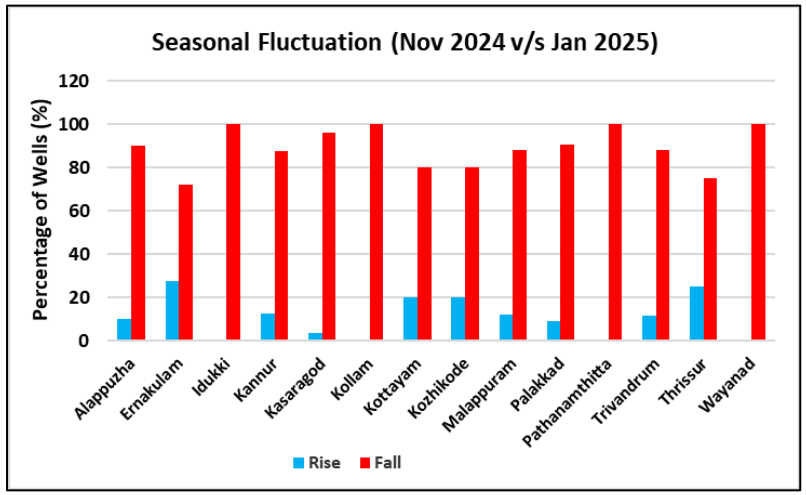


Figure-19: Percentage of wells showing rise and fall in WL in confined/semi-confined aquifer (November 2024 to January 2025).

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

Rise in Piezometric Levels:

Out of 206 wells, piezometric level rise of less than 2 m is recorded in 10% wells, 2 to 4 m in 1% wells and 1% wells registered piezometric level rise of more than 4 m. Piezometric level rise of less than 2 m is observed mainly in parts of Ernakulam, Kozhikode, Malappuram and Thrissur districts. Rise of more than 2 m observed in isolated locations in the state.

Fall in Piezometric Levels:

Out of 206 piezometers, 70% have recorded less than 2 m while 13% in the range of 2 to 4 m and remaining 5% wells, registered piezometric level fall of more than 4 m. Fall of less than 2 m is observed in all the districts of the state, mainly in Kasaragod, Kozhikode, Malappuram, Palakkad and Thiruvananthapuram districts. Fall of 2 to 4 m is observed mainly in parts of Kasaragod and Palakkad districts. Fall of beyond 4 m is observed as isolated patches Malappuram, Palakkad and Ernakulam districts.

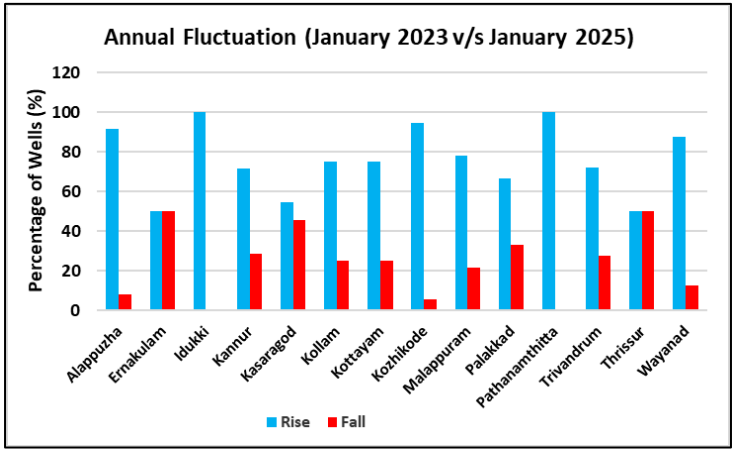


Figure-3: Percentage of wells showing rise and fall in WL in confined/semi-confined aquifer (January 2023 to January 2025).

5.2.2 ANNUAL FLUCTUATION IN PIEZOMETRIC LEVEL

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

Rise in Piezometric Levels:

Out of 193 wells, piezometric level rise of less than 2 m is recorded in 58 % wells, 2 to 4 m in 8% wells and 8% wells registered piezometric level rise of more than 4 m. Piezometric level rise of less than 2 m is seen in all the districts, significantly in Kozhikode, Alappuzha, Palakkad, Thiruvananthapuram & Malappuram districts. Rise of 2 to 4 m is observed in isolated wells located in Malappuram, Kasaragod, Palakkad, Thiruvananthapuram and Wayanad districts. Rise of more than 4 m is mainly observed in isolated wells located in Kasaragod, Palakkad and Thrissur districts.

Fall in Piezometric Levels:

Out of 193 piezometers, 17% have recorded less than 2 m while 4% in the range of 2 to 4 m and remaining 5% wells, registered piezometric level fall of more than 4 m. Fall of less than 2 m is observed mainly in parts of Kasaragod, Palakkad, Thiruvananthapuram and Thrissur districts. Fall of 2 to 4 m is observed in isolated places in Palakkad & Thrissur districts. Fall of beyond 4 m is observed as isolated patches in Ernakulam, Kasaragod and Palakkad districts.

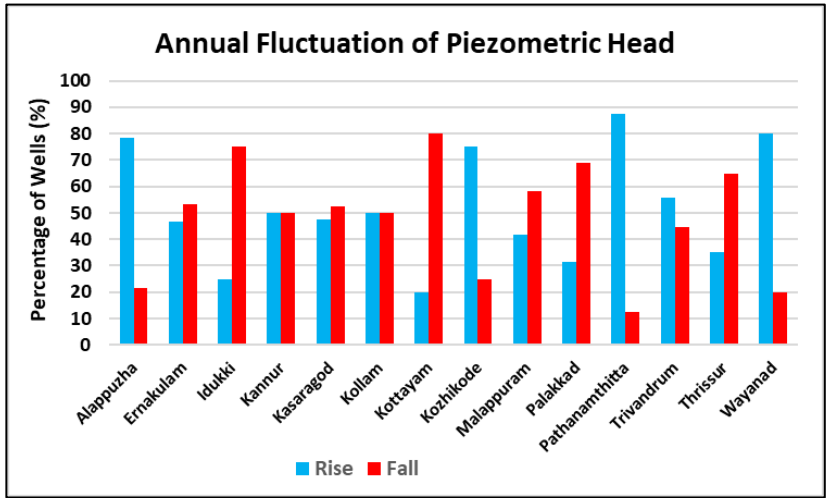


Figure-13: Percentage of wells showing rise and fall in WL in confined/semi-confined aquifer (January 2024 to January 2025).

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

Rise in Piezometric Levels:

Out of 196 wells, piezometric level rise of less than 2 m is recorded in 43 % wells, 2 to 4 m in 2% wells and 4% wells registered piezometric level rise of more than 4 m. Piezometric level rise of less than 2 m is seen in all the districts, significantly in Kozhikode, Kasaragod, Alappuzha, Palakkad & Malappuram districts. Rise of more than 4 m is mainly observed in isolated wells located in Alappuzha and Ernakulam districts.

Fall in Piezometric Levels:

Out of 196 piezometers, 38% have recorded fall of less than 2 m while 5% in the range of 2 to 4 m fall and remaining 8% wells, registered piezometric level fall of more than 4 m. Fall of less than 2 m is observed in all the districts, mainly in parts of Thiruvananthapuram, Palakkad, Malappuram and Kasaragod districts. Fall of 2 to 4 m is observed mainly in isolated places in Palakkad & Thrissur districts. Fall of beyond 4 m is observed as isolated patches in Palakkad, , Ernakulam, Thrissur & Alappuzha districts.

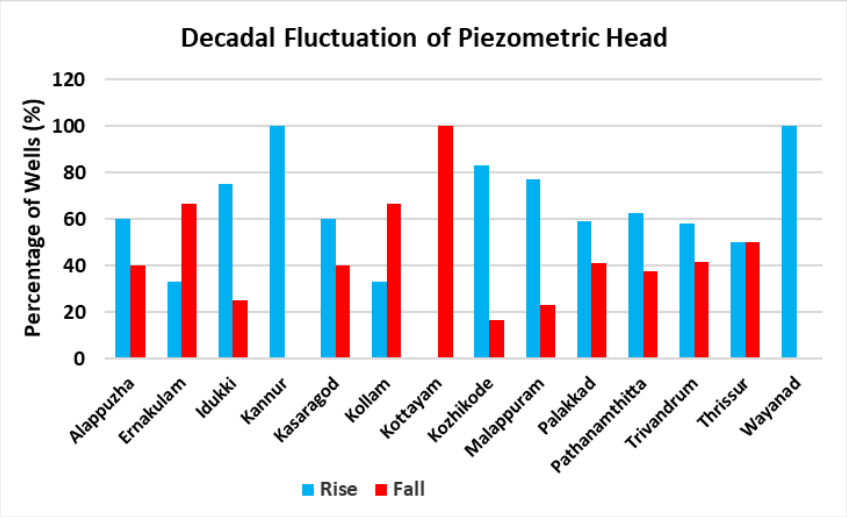


Figure-14: Percentage of wells showing rise and fall in WL in confined/semi-confined aquifer (Decadal Mean January (2015-2024) to January 2025)

5.2.3 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 138 wells analyzed, piezometric level rise of less than 2 m is recorded in 53% wells, 2 to 4 m in 5% wells and more than 4 m in 3% of the wells. Piezometric level rise of less than 2 m is observed significantly in Palakkad, Kasaragod, & Kozhikode districts. Piezometric level rise of 2 to 4 m is observed in Thiruvananthapuram & Thrissur districts.

Fall in piezometric levels:

Out of 138 wells analyzed, piezometric level rise of less than 2 m is recorded in 25% wells, 2 to 4 m in 6% wells and more than 4 m in 8% of the wells. Piezometric level fall of less than 2 m is observed mainly in Thiruvananthapuram, Kasaragod and Kollam districts. Piezometric level rise of 2 to 4 m is observed in Ernakulam, Palakkad and Thrissur districts. Rise of more than 4 m is observed in Kasaragod, Palakkad, and Thrissur districts.

6.0 SUMMARY

As a vertical of the National Ground Water Monitoring Programme, the CGWB, Kerala Region, Thiruvananthapuram carry out monitoring of the ground water conditions of the State during four times in an year: viz January, April, August, and November. Additionally, a assessment of groundwater quality is performed in April and November months. As of January, 2025, the Region monitors 1383 dug wells and 276 piezometers. This comprehensive effort aims to portray the variations in the state's ground water conditions across different aquifers.

In January 2025, out of the 1333 dug wells monitored representing unconfined aquifer, depth to water level is within 10 m bgl in most of the parts in the State with 89%, while remaining 11 % of wells show depth to water level more than 10 m bgl.

The state received an excess rainfall of 35% above normal during the period and departure percentage from normal varied from -21% in Thiruvananthapuram district to 95% in Kasaragod district. Kasaragod, Kottayam, Pathanamthitta and Thrissur districts received large excess rainfall during the period and Thiruvananthapuram district received deficient rainfall. This spatial variation in rainfall distribution is obviously reflected in groundwater scenario of the State.

Comparison of depth to water level between January 2023 and 2025 indicates that 74 % of analyzed wells shows rise in water level and 26% fall in water levels. The comparison between January decadal mean with respect to January 2025 shows that 69% of wells in rising and 31 % of wells in falling trend.

Comparison of depth to water level between January 2024 and 2025 indicates that 46 % of analyzed wells shows rise in water level and 54% fall in water levels. The comparison between January decadal mean with respect to January 2025 shows that 69% of wells in rising and 31 % of wells in falling trend.

7.0 RECOMMENDATIONS

Based on the findings, regarding the ground water conditions of Kerala State is shows declining trend. To improve the groundwater conditions of Kerala the following recommendations are made:

1. **Promotion of Water Conservation Techniques**: As the State is having variation in rainfall distribution water conservation techniques has to be adopted particularly in districts like Thiruvananthapuram, which received deficient rainfall and deeper water levels.
2. **Recharging Groundwater through Natural Methods**: Encouraging natural groundwater recharge techniques, such as improving vegetative cover and increasing the greenbelt areas, would help mitigate falling water levels.
3. **Rainfall and Groundwater Correlation Studies**: The variation in rainfall distribution significantly impacts groundwater levels. More studies should be undertaken to understand this correlation better and predict areas that might face water scarcity due to erratic rainfall patterns.
4. **Community Awareness Programs**: Public awareness campaigns focusing on the importance of maintaining groundwater levels should be conducted. Informed communities are more likely to adopt measures that protect and conserve water resources.