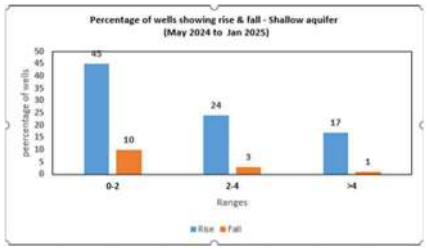
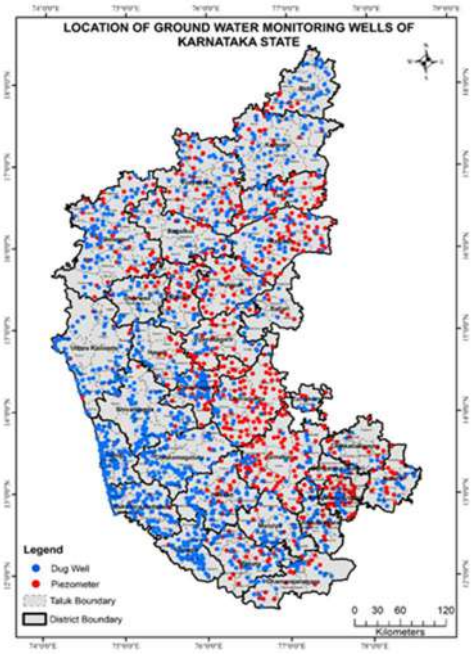
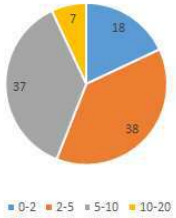
Percentage of wells in different water level ranges for shallow aquifer





Percentage of wells in different water level ranges for shallow aquifer



GROUND WATER LEVEL BULLETIN JANUARY 2025 - KARNATAKA STATE

Abstract

This Bulletin gives the overall rainfall scenario as well as 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.

In January 2025, shallow aquifer depths in Karnataka ranged from 0.06 m bgl (Uttarakannada) to 22.25 m bgl (Mysore), with 93% of wells within 10 m bgl. About 18% of wells were under 2 m bgl, while 38% and 37% ranged from 2-5 m and 5-10 m bgl, respectively. Deeper aquifers varied from 0.05 m bgl (Raichur) to 118.03 m bgl (Bangalore Urban), with 58% of wells within 10 m bgl. Depths beyond 10 m bgl were observed in 42% of wells, with 5% exceeding 40 m bgl, mostly in isolated districts. Shallow aquifers predominantly had shallow water levels, while deeper aquifers showed more variability.

From November 2024to January 2025, deeper aquifers showed a water level fall in 73% of wells, with 15% falling over 4 m, while 27% saw rise, 5% exceeding 4 m. Shallow aquifers rose in 15% of wells, with only 1% exceeding 4 m, while 85% recorded falls, 4% over 4 m.

The decadal water level fluctuation (Jan 2015- Jan2024 wrt Jan 2025) in Karnataka shows significant variations across shallow and deeper aquifers. For shallow aquifers, water levels rose in 81% of wells, with 58% experiencing a rise of 0-2 m, 17% seeing a 2-4 m rise, and 6% recording a rise of more than 4 m. Rise above 4m is observed inall districts except Bellari, Chikballapur, Dakshina Kannada, Kolar, Mandya, Shimoga, Uttara Kannada and Yadgir. However, 19% of wells showed a decline, with 16% experiencing a 0-2 m fall and smaller proportions registering larger drops. In deeper aquifers, 80% of wells reported a rise, with 35% showing a 0-2 m increase, 13% a 2-4 m rise, and 32% a rise exceeding 4 m. Meanwhile, 20% of wells exhibited falling water levels, with most declines in the 0-2 m range. These fluctuations highlight regional variations in groundwater dynamics across the state.

South Western Region, Bangalore

Contents

1.0 Introduction

Groundwater level monitoring involves measuring and tracking the depth of the water table in wells or boreholes. Ground water levels in a particular geographic location depend upon parameters like hydrogeological conditions, recharge and ground water extraction in that area. Ground water levels are measured in terms of depth below ground level. Central Ground Water Board (CGWB) is periodically monitoring the ground water levels throughout the Country on a regional scale, through a network of monitoring wells. State Governments also have their own ground water monitoring stations.

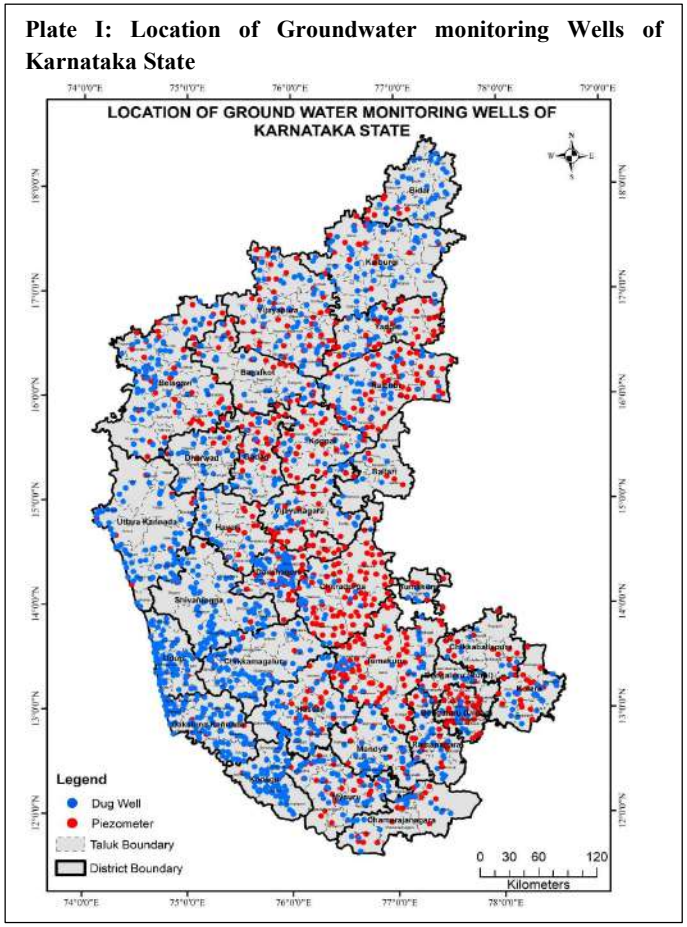
2.0 Study area:

The state of Karnataka has a geographical area of 1, 91, 761 sq. km. and is situated between N. Latitudes 11°31" and 18°45' and E. Longitudes 74°12' and 78°40'. For administrative purposes, the state is divided into 31 districts and 236 taluks. Physiographically the state is categorized into four units namely Northern plain, Southern Plain, Coastal area and Hilly region. Karnataka state is drained by the rivers Krishna, Cauvery, Godavari, West flowing minor rivers, Palar, Pennar and Ponnaiyar. The state of Karnataka is underlain by geological formations ranging in age from Archaean to Recent. Major portion of the State is covered by Peninsular Gneisses, Granites and Dharwarian Schists of Archaean age. Substantial area in the northern part of Karnataka is underlain by basalts, which form a continuation of the Deccan Traps occurring in Maharashtra. The sedimentaries comprising Bhima and Kaladgis occupy a small area in the northern districts. The recent alluvium is restricted to a narrow belt in the coastal area and along stream courses

3.0 Groundwater Level Monitoring

Monitoring of ground water levels was carried out in 2160 ground water monitoring wells in the State of Karnataka **(Plate I)** during the month of January 2025. Among the wells monitored, **1284** are dug wells and **876** are piezometers. The data indicated that the water level in the major part of the State is within the range of 0-10 m bgl .The deepest water level observed in dug wells is 22.25 m bgl. About 7% percentage of dug wells has recorded water levels deeper than 10 m bgl.

Plate I: Location of Groundwater monitoring Wells of Karnataka State



4.0 Rainfall

RAINFALL DISTRIBUTION IN KARNATAKA STATE, DURING POST MONSOON SEASON 2024

In Karnataka State, the year is generally divided into four seasons. These are: dry season (Jan-Feb), premonsoon season (Mar-May), Monsoon season (Jun-Sep) and post monsoon season (Oct-Dec). The pre monsoon season is characterised by squally weather resulting in heavy rains often accompanied by hail. The Indian summer monsoon, the harbinger of hope for the farmers, normally sets in the state by the first week of June and covers the entire state in about two weeks time. It starts withdrawing by the end of September and totally goes out of the state by the middle of October. Bulk of the annual rainfall is contributed by the summer monsoon. It is replaced by the winter monsoon, which is relatively dry. Significant rainfall occurs due to passing depressions/cyclones. The rainfall in various districts/regions/taluks has been classified as Excess (E), Normal (N) and Deficit (D) as per following criteria.

Excess : 120% of normal or more
Normal : 81% to 119% of normal
Deficit : 80% of normal or less

Based on the above classification, districts falling under the above-mentioned three of Karnataka and as well as for the State as a whole for the months October, November and December during 2024 **has been presented below.**

The rainfall data collected and compiled from Karnataka State Natural Disaster Management Cooperation (KSNDMC), GoK for the period October 2024 to December 2024. Table 4.1 gives the district-wise rainfall data for the period October to December 2023 & 2024, normal and the departure of October to December 2024 rainfall with other periods.

During the Months of October, November & December - 2024

In general the showers received during October to December are considered for the analysis. During the period (October to December 2024), the State had received an total rainfall of 238 mm, which is 28 percent more than the normal of 186 mm. Rainfall was deficit in 5 district, Large Excess inn 8 districts, Excess in 11 district and normal in 7 districts (Table 1). Map showing the district-wise rainfall distribution in Karnataka State for the period of October to December 2024 period is given as Plate II

Plate II: Rainfall Deviation (OCTOBER 2024 to DECEMBER 2024) from Normal Rainfall

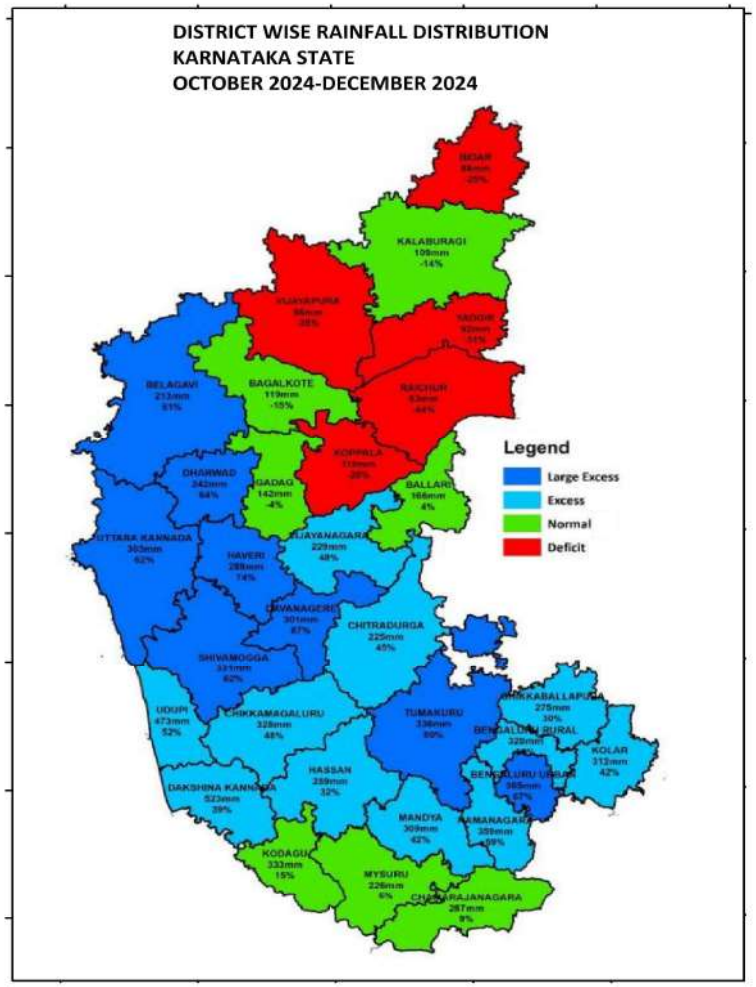


Table. 1: District-Wise Cumulative Rainfall and Percentage Departure, During the Months of October to December *2024*

Sl.No.	District	OCT-DEC 2024 Actual (mm)	OCT-DEC 2023 Actual (mm)	OCT-DEC 2024 Normal (mm)	%DEP From 2023	%DEP From Normal	Category
1	Bagalkote	119	29	141	312	-15	NORMAL
2	Ballari	166	24	159	593	4	NORMAL
3	Belagavi	213	72	133	196	61	LARGE EXCESS
4	Bengaluru Rural	320	131	213	144	50	EXCESS
5	Bengaluru Urban	365	156	219	134	67	LARGE EXCESS
6	Bidar	88	46	117	91	-25	DEFICIT
7	Chamarajanagara	287	175	263	64	9	NORMAL
8	Chikkaballapura	275	108	211	155	30	EXCESS
9	Chikkamagaluru	328	199	221	65	48	EXCESS
10	Chitradurga	225	96	155	134	45	EXCESS
11	Dakshina Kannada	523	549	376	-5	39	EXCESS
12	Davanagere	301	97	161	210	87	LARGE EXCESS
13	Dharwad	242	63	148	284	64	LARGE EXCESS
14	Gadag	142	50	147	184	-4	NORMAL
15	Hassan	289	197	220	47	32	EXCESS
16	Haveri	289	51	166	466	74	LARGE EXCESS
17	Kalaburagi	109	42	127	159	-14	NORMAL
18	Kodagu	333	259	288	28	15	NORMAL
19	Kolar	312	120	219	160	42	EXCESS
20	Koppala	119	47	149	153	-20	DEFICIT
21	Mandya	309	192	217	61	42	EXCESS
22	Mysuru	226	215	214	5	6	NORMAL
23	Raichur	83	22	146	275	-44	DEFICIT
24	Ramanagara	359	155	226	132	59	EXCESS
25	Shivamogga	331	146	205	127	62	LARGE EXCESS
26	Tumakuru	336	105	186	220	80	LARGE EXCESS
27	Udupi	473	316	312	50	52	EXCESS
28	Uttara Kannada	303	126	187	141	62	LARGE EXCESS
29	Vijayanagar	229	40	155	472	48	EXCESS
30	Vijayapura	86	36	133	139	-35	DEFICIT
31	Yadgir	92	16	134	473	-31	DEFICIT
	State	238	114	186	109	28	EXCESS

5. Ground Water Scenario

5.1Shallow aquifer (unconfined) of January-2025

5.1.1 Depth to water level Data

During January 2025 the depth to water level of shallow aquifer vary widely from 0.06 to 22.25 m bgl. Of the well analysed the salient features of the depth to water level of Shallow aquifer (Unconfined) during **January 2025** are given below.

1. A perusal of the water level data reveals that the depth to water level ranged from 0.06m bgl (Uttara Kannada district) to 27.99 bgl (Mysore district).
2. 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 93 % of wells analysed, while 7 % of wells show depth to water level more than 10 m bgl.
3. Depth to water level of less than 2 m bgl has been recorded in around 18 % of wells analysed and noted all over the districts in Karnataka state except Bangalore Rural and Bengaluru Urban districts.
4. Depth to water level in the range of 2 to 5 m bgl has been recorded in 38 % of wells analysed and noted in all the districts.
5. Depth to water level in the range of 5 to 10 m bgl has been recorded in 37% of wells analysed and noted in almost all districts except Chikkaballapura and Kolar district.
6. Depth to water level in the range of 10 to 20 m bgl has been recorded in 7% of wells analysed and observed in all districts except Bellary, Chikkaballapura, Chitradurga, Gadag, Kolar, Koppal, Mandya, Raichur, Ramanagara, Vijayanagar and Yadgir Districts.
7. Depth to water level deeper than 20 m is not observed in any of the monitored wells of CGWB.

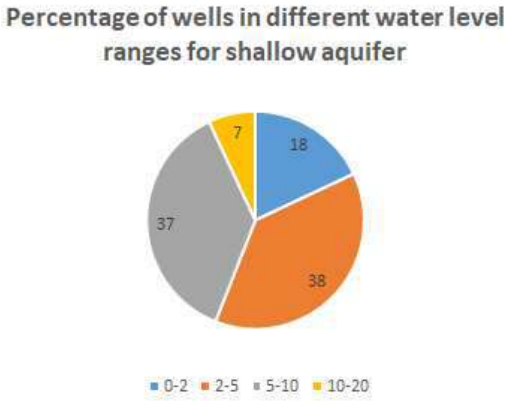
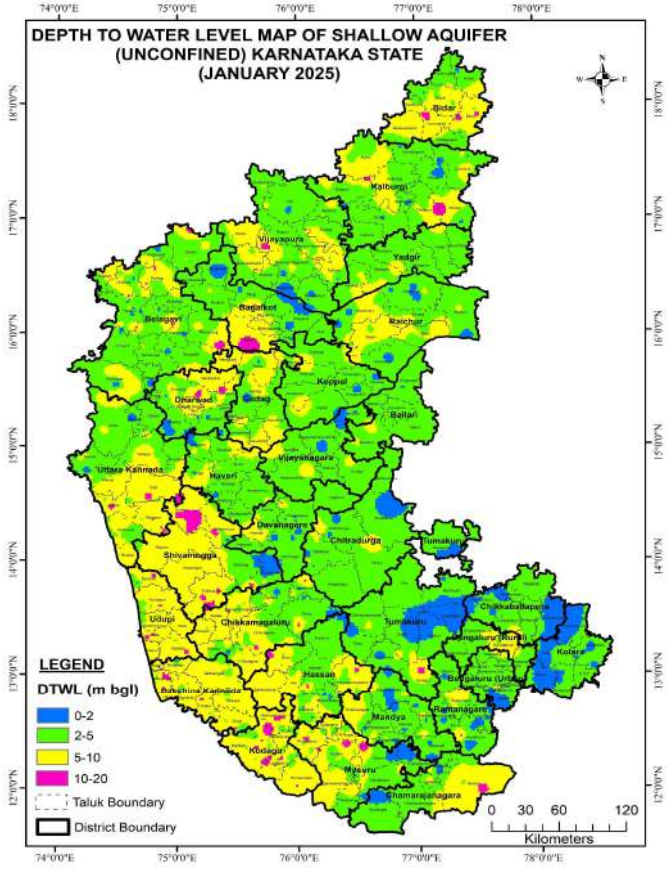


Plate- III: Depth to Water Level Map of Shallow Aquifer (Unconfined) of Karnataka State - January-2025



5.1.2 Seasonal fluctuation in Water Level

Seasonal fluctuation of water level in unconfined Aquifer
May 2024 to January 2025

A comparison of water level shows that a rise in the water level is recorded in 85% of wells analyzed while 15% recorded fall. The Map showing fluctuation in water level of Shallow aquifer (Unconfined) of May 2024 with respect to January 2025 has been given in **Plate IV**.

1. Rise in the water level in the range of 0-2 m has been observed in 45% of wells analysed and observed all over the State.
2. Rise in the water level in the range of 2-4 m has been observed in 24 % of wells analysed and observed all over the State.
3. Rise in water level more than 4m has been observed in 17% of wells analysed in all over the State except Bengaluru Rural, Bengaluru Urban, Chikkaballapura and Gadag districts.
4. The fall in water level in the range of 0-2 m has been observed in 10% of wells analysed and noted in all the districts except, Ballari, Bengaluru Rural, Chikballapur and Kolar district.
5. The fall in water level in the range of 2-4 m is observed in 3% of wells analyzed and noted in the Bengaluru Urban, Chikkamangaluru, Dakshina Kannada, Dharwad,Gadag, Kalaburagi, Kodagu, Mandya, Mysore, Raichur, shivamogga, Uttara Kannada, Vijayanagar, Vijayapura districts.
6. The fall in water level more than 4 m has been observed in 1% of wells analysed and reported in Bagalkote, Belgavi, Bidar, Chikkamagaluru, Hassan, Mysuru, Shivamogga, Udupi and Vijayapura districts.

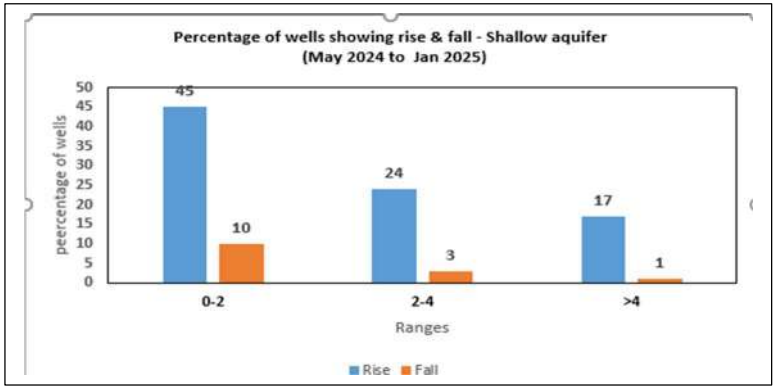
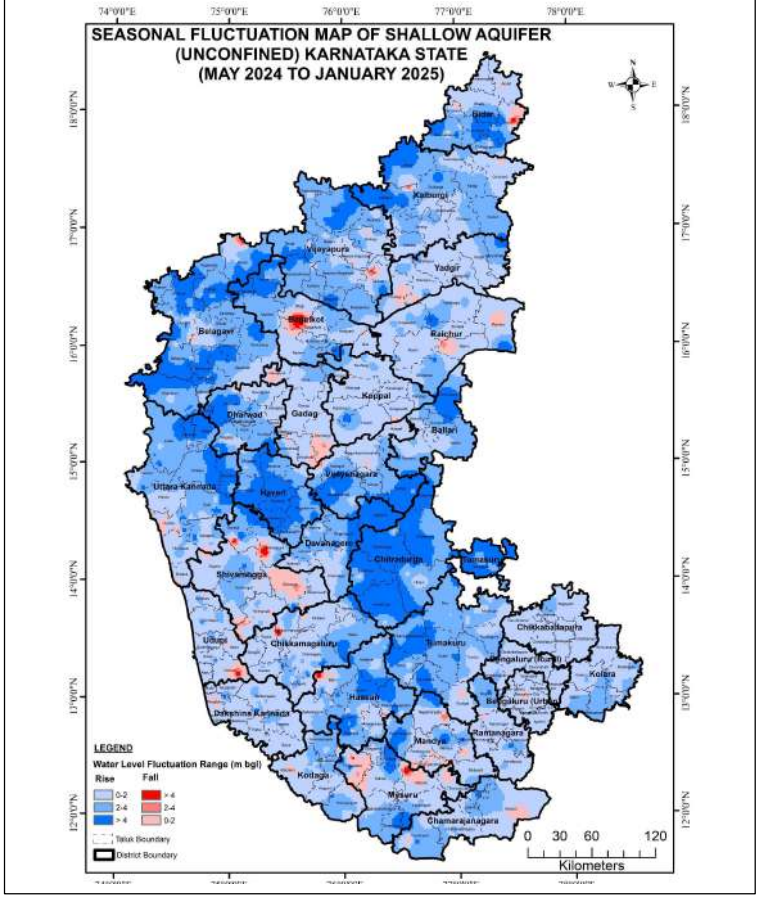


Plate IV: Seasonal Fluctuation Map of Shallow Aquifer (Unconfined) of Karnataka State - May 2024 to January 2025



Seasonal fluctuation of water level in unconfined Aquifer
August 2024 to January 2025:

A comparison of water level shows that a rise in the water level is recorded in 31% of wells analyzed while 69% recorded fall. The Map showing fluctuation in water level of Shallow aquifer (Unconfined) of August 2024 with respect to January 2025 has been given in **Plate V**.

1. Rise in the water level in the range of 0-2 m has been observed in 22% of wells analysed and observed all over the State.
2. Rise in the water level in the range of 2-4 m has been observed in 6 % of wells analysed and observed all over the State in pockets except Chikkamangalore, Chitradurga, Dakshina Kannada, Davangere, Haveri, Kodagu and Udupi districts.
3. Rise in water level more than 4m has been observed in 3% of wells and is distributed in Bellar, Belgavi, Bangalore Urban, Chamarajanagar, Chikkamangaluru, Chitradurga, Davangere, Dharwad, Haveri, Kalaburgi, Kolar, Koppal, Mandya, Tumkuru, Uttara Kannada, Vijayanagar and Vijayapura districts.
4. The fall in water level in the range of 0-2 m has been observed in 36% of wells analysed and noted in all the districts of the state.
5. The fall in water level in the range of 2-4 m is observed in 20% of wells analyzed and noted all over state except Bangalore Rural, Chikkaballapura, Chitradurga, Kolar, Koppal, Ramnagara, Tumkaru and Vijayanagar districts.
6. The fall in water level more than 4 m has been observed in 13% of wells analysed and reported in districts other than Bagalkote, Ballari, Bangalore Rural, Bangalore Urban, Chamarajanagar, Chikkaballapur, Chitradurga, Gadag, Kolar, Koppal, Mandya, Ramnagara and Tumkuru districts.

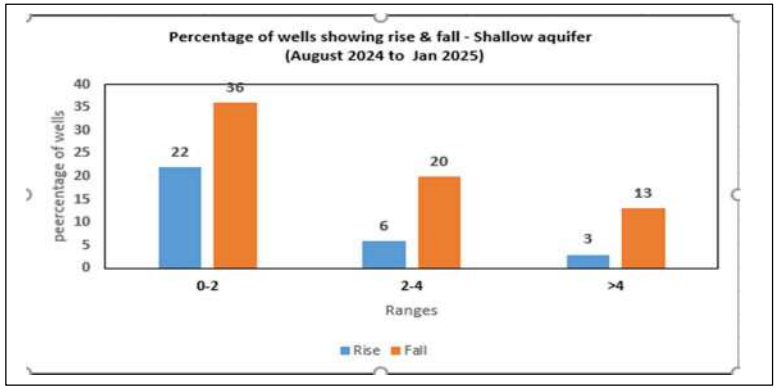
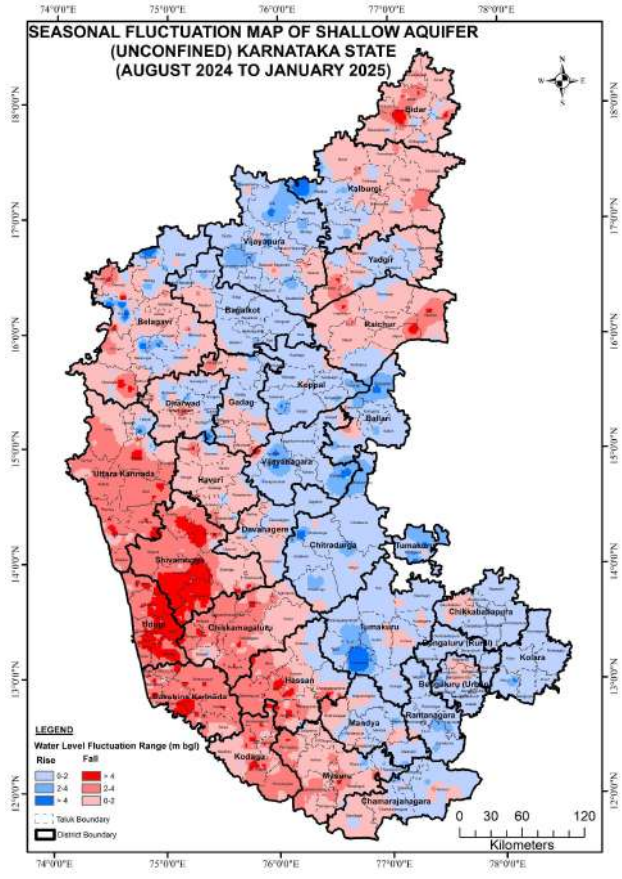


Plate V: Seasonal Fluctuation Map of Shallow Aquifer (Unconfined) of Karnataka State - August 2024 to January 2025



Seasonal fluctuation of water level in unconfined Aquifer
November 2024 to January 2025:

A comparison of water level shows that a rise in the water level is recorded in 15% of wells analyzed while 85% recorded fall. The Map showing fluctuation in water level of Shallow aquifer (Unconfined) of November 2024 with respect to January 2025 has been given in **Plate VI**.

1. Rise in the water level in the range of 0-2 m has been observed in 13% of wells analysed and observed all over the State except Ballari, Bangalore rural, Chikkaballapura and Haveri districts.
2. Rise in the water level in the range of 2-4 m has been observed in 1 % of wells analysed and observed in pockets in Bagalkote, Ballari, Bidar, Davangere, Gadag, Kodagu, Mandya, Mysuru, Ramnagara, shivamooga and Uttara Kannada districts
3. Rise in water level more than 4m has been observed in 1% of wells and is distributed in Bagalkote, Davanger, Haveri, Kolar, Mandya, Raichur, Uttara Kannada and Vijayapura districts.
4. The fall in water level in the range of 0-2 m has been observed in 67% of wells analysed and noted in all the districts of the state.
5. The fall in water level in the range of 2-4 m is observed in 14% of wells analyzed and noted all over state except Ballari, Bangalore Urban, Chamarajanagar, Chikkaballapura, Gadag and Mandya districts.
6. The fall in water level more than 4 m has been observed in 4% of wells analysed and reported in districts other than Belgavi, Bidar,Chikkamangaluru, Dakshina Kannada, Davangere, Dharwad, Hassan, Haveri, Kodagu, Kolar,Mandya, Mysuru, Shivamogga, Uttara Kannada, Vijayanagar, Vijayapura and Yadgir districts.

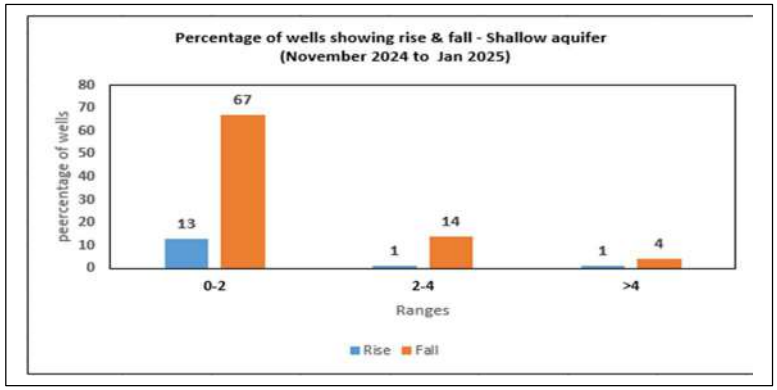
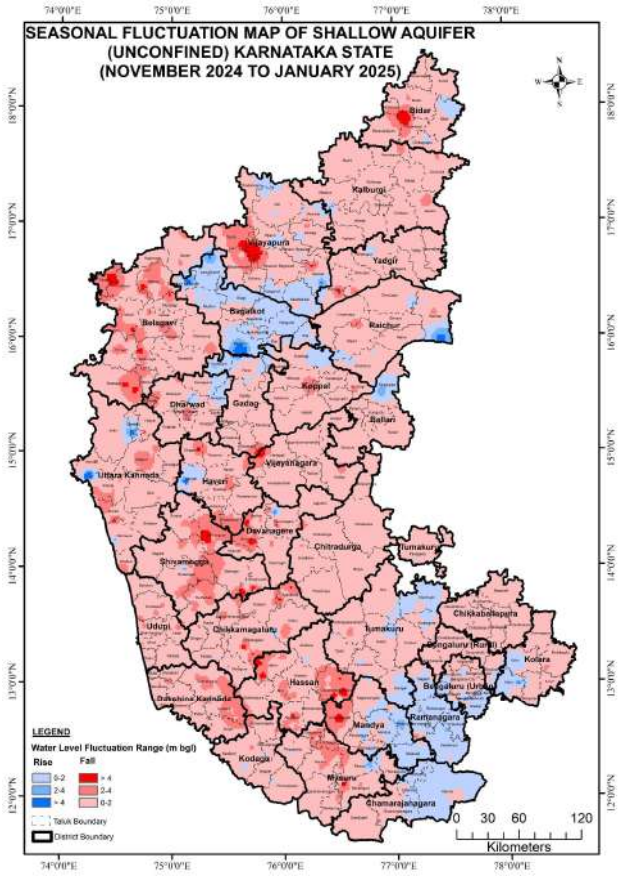


Plate VI: Seasonal Fluctuation Map of Shallow Aquifer (Unconfined) of Karnataka State - November 2024 to January 2025



5.1.3 Annual fluctuation in Water Level

Annual fluctuation of Water level in unconfined Aquifer
January 2024 – January 2025:

Comparison of water level shows that a rise in the water level is recorded in 91% of wells analysed, while 9% recorded fall. The Map showing fluctuation in water level of current monitoring period with January 2024 has been given in **Plate VII**. A perusal of the plate shows that a general rise in the range of 0 – 2 m is noticed in major part of the area.

1. Rise in the water level in the range of 0-2 m has been observed in 62% of wells analysed and observed in all over the state.
2. Rise in the water level in the range of 2-4 m has been observed in 19% of wells analysed and noted in all districts except Bangalore rural district.
3. Rise in water level more than 4m has been observed in 10% of wells analysed and noted in all districts except Ballari, Bangalore Rural, Chikkaballapura, Kolar, Koppal and Udupi districts.
4. The fall in water level in the range of 0-2 m has been observed in 7% of wells analysed and noted in all the districts except Bangalore Rural, Bangalore Urban, Chikkaballapura, Chitradurga, Haveri, Ramnagara and Vijayanagara districts
5. The fall in water level in the range of 2-4 m has been observed in 1% of wells analysed and noted in Belgavi, Bidar, Chikkamangaluru, Dakshina Kannada, Dharwad, Kodagu, Raichur and Shivamogga Districts.
6. The fall in water level more than 4 m has been observed in 1% of wells analysed and noted in Bidar, Chikkamangaluru, Dakshina Kannada, Dharwad, Hassan, Mysuru, Shivamogga, Udupi and Vijayanagar districts.

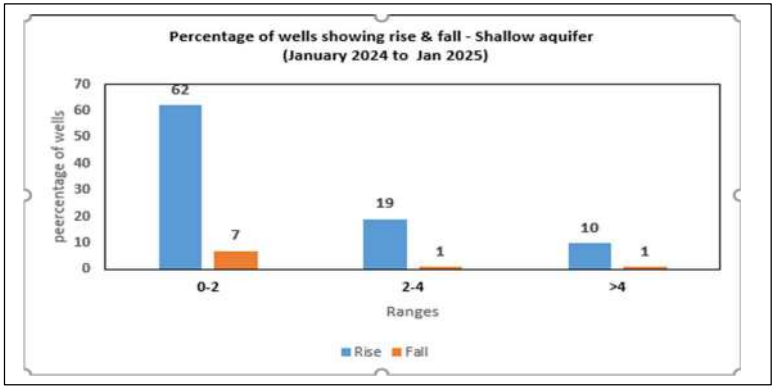
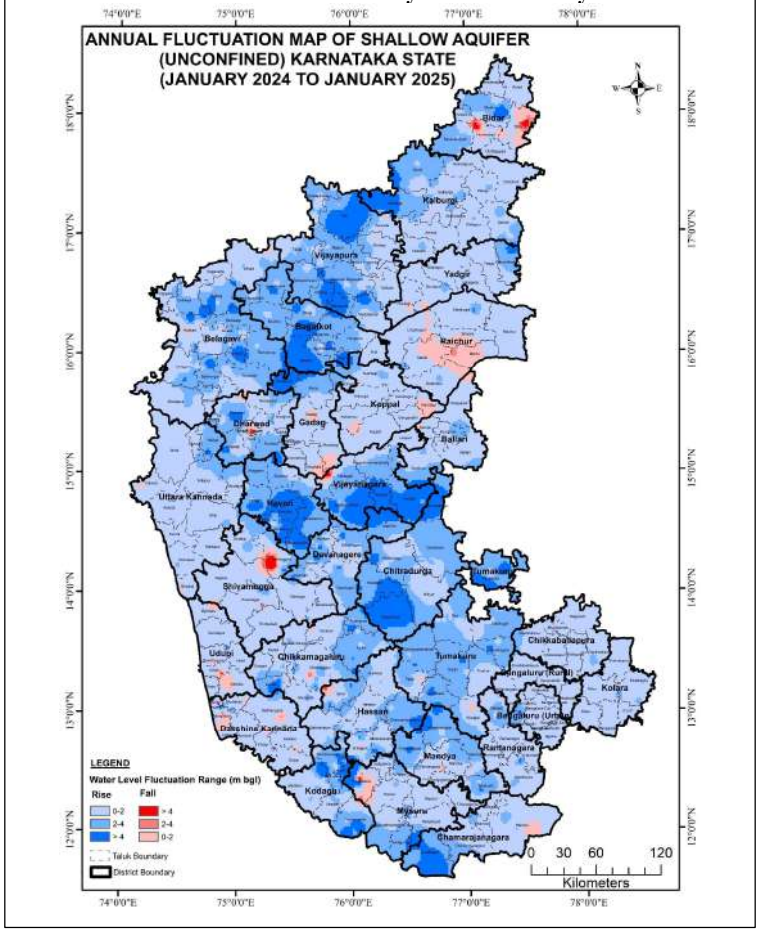


Plate VII: Annual Fluctuation Map of Shallow Aquifer (Unconfined) of Karnataka State - January 2024 to January 2025



Annual fluctuation of Water level in unconfined Aquifer
January 2023 – January 2025:

Comparison of water level shows that a rise in the water level is recorded in 83% of wells analysed, while 17% recorded fall. The Map showing fluctuation in water level of current monitoring period with January 2023 has been given in **Plate VIII**. A perusal of the plate shows that a general rise in the range of 0 – 2 m is noticed in major part of the area.

1. Rise in the water level in the range of 0-2 m has been observed in 65% of wells analysed and observed in all over the state.
2. Rise in the water level in the range of 2-4 m has been observed in 13% of wells analysed and noted in all districts except Bangalore rural, Chamarajanagar, Chikkaballapura and Kolar, district.
3. Rise in water level more than 4m has been observed in 5% of wells analysed and noted in all districts except Ballari, Bangalore Rural, Chamarajanagar, Chikkaballapura, Koppal and Ramnagara districts.
4. The fall in water level in the range of 0-2 m has been observed in 12% of wells analysed and noted in all the districts except Chikkaballapura, Haveri and Vijayanagar districts
5. The fall in water level in the range of 2-4 m has been observed in 3% of wells analysed and noted in Belgavi, Bidar, Chamarajanagar, Chitradurga, Dakshina Kannada, Dharwad, Gadag, Kodagu, Mandya, Mysuru, Raichur, Ramanagara, Tumkuru, Udupi, Uttara Kannada, Vijayapura and Yadgir Districts.
6. The fall in water level more than 4 m has been observed in 2% of wells analysed and noted in Bidar, Chamarajanagar, Chikkamangaluru, Dakshina Kannada, Dharwad, Hassan, Kodagu, Mysuru, Raichur, Shivamogga and Vijayanagar districts.

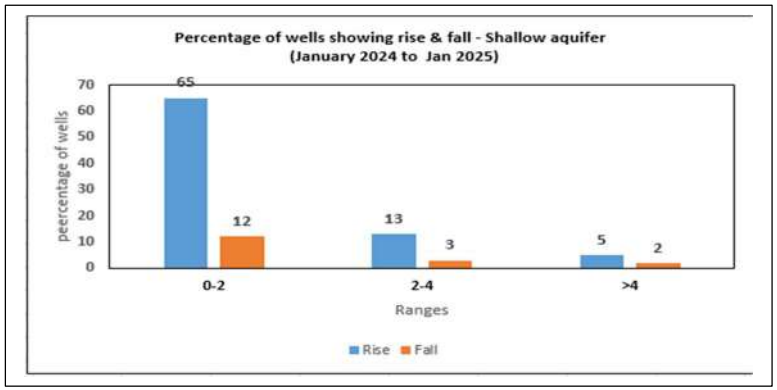
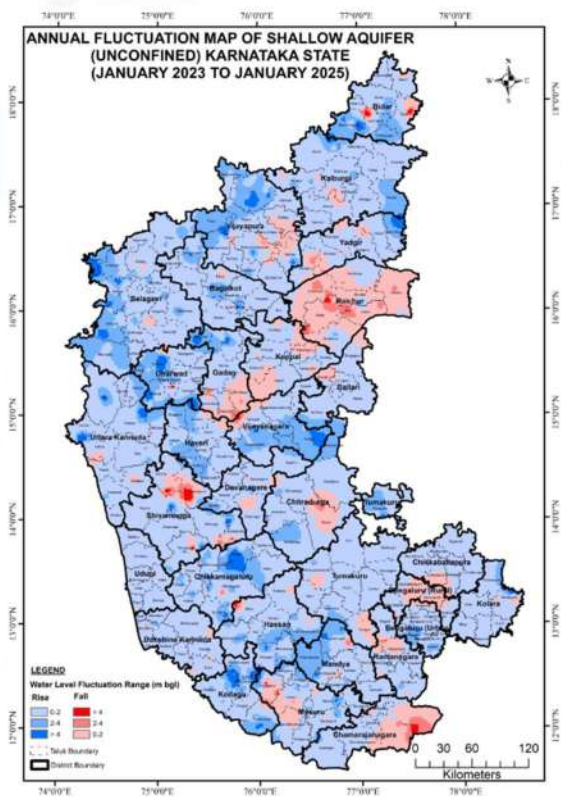


Plate VIII: Annual Fluctuation Map of Shallow Aquifer (Unconfined) of Karnataka State - January 2023 to January 2025



5.1.4. Decadal Fluctuation in water level

Decadal fluctuation of Water Level in Unconfined Aquifer

Decadal mean January (2015-2024) to January 2025 of Karnataka State:

The fluctuation in water level has been plotted in **Plate IX**. A comparison of water level shows that a rise in the water level is recorded in 81% of wells analysed, while 19% recorded fall. Salient features of the comparison of water levels are given below.

1. Rise in the water level in the range of 0-2 m has been observed in 58% of wells analysed and noted all over the State.
2. Rise in the water level more than 2-4 m has been observed in 17% of wells analysed, noted all over the State ecept in Kolar district.
3. Rise in the water level more than 4 m has been observed in 6% of wells analysed and noted in all over the State except Bellari, Chikballapur, Dakshina Kannda, Kolar, Mandya, Shimoga, Uttar Kannada and Yadgir district.
4. The fall in water level in the range of 0-2 m has been observed in 16% of wells analysed and noted in all over the state except Bangalore Rural, Chikkaballpura, Dharwad, Haveri and Kolar districts.
5. The fall in water level in the range of 2-4 m has been observed in 2% of wells analysed and noted in Belgavi, Bidar, Chikkamagaluru, Dakshina Kannada, Davangere, Dharwad, Kodagu, Mandya, Mysuru, Raichur,Shivamogga, Udupi, Uttara Kannada, Vijayapura and Yadgir districts.
6. The fall in water level more than 4 m has been observed in 1% of wells analysed and noted in Bidar, Chikkamagaluru, Hassan, Mandya, Shivamogga and Vijayanagar districts.

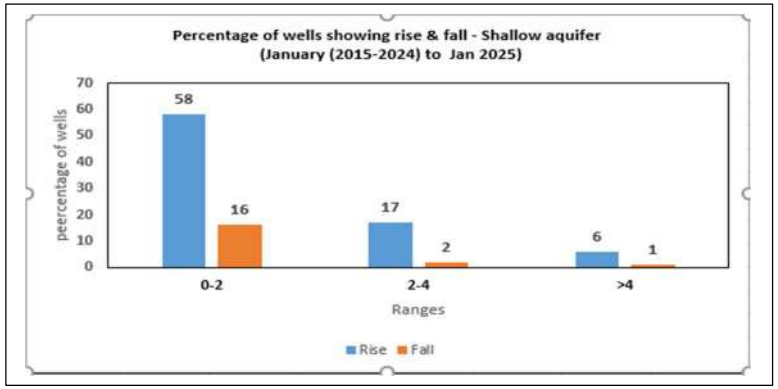
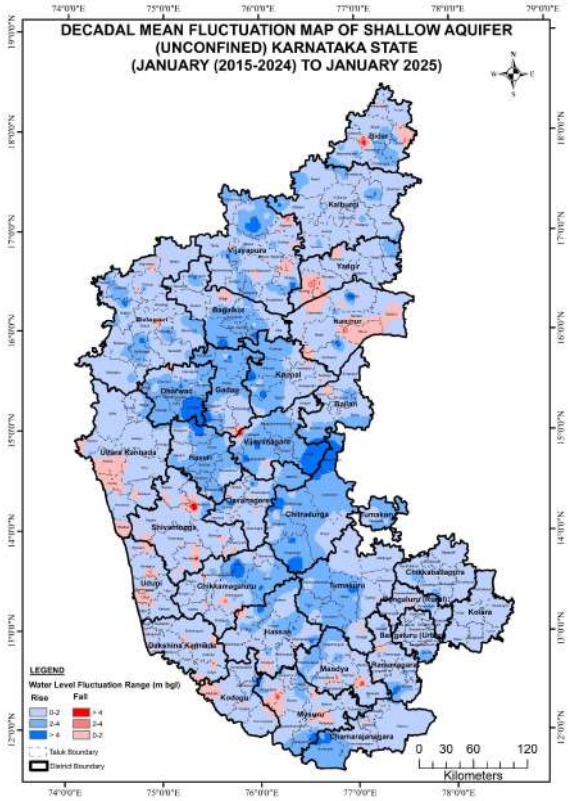


Plate IX: Decadal Fluctuation Map of Shallow Aquifer (Unconfined) of Karnataka State - January (2015-2024) to January 2025



5.2. Deeper aquifer (semi-confined/confined) of January-2025

5.2.1Depth to piezometric surface:

Depth to piezometric surface of Deeper aquifer (Semi-confined/Confined) has been recorded from piezometers spread all over the State in hard rock areas. Salient features of the depth to piezometric surface of Deeper aquifer (Semi-confined/Confined) observed from our monitoring wells during January 2025 are given below;

1. The depth to piezometric surface of Deeper aquifer (Semi-confined/Confined) ranged from 0.05 m bgl (Raichur district) to 118.03 bgl (Bangalore Urban district) in Karnataka. 58% of wells have recorded depth to piezometric surface of Deeper aquifer (Semi-confined/Confined) within 10 m bgl and 42% of wells show depth to Water level of Deeper aquifer (Semi-confined/Confined) in more than 10 m bgl.
2. Depth to piezometric surface (Semi-confined/Confined) of less than 2 m bgl has been recorded in 9% of wells analysed and this has been noted in isolated pockets in 15 districts namely Bagalkote, Bellari, Belgavi, Bangalore Urban, chitradurga,Dharwad, Kalaburgi, Koppal, Mandya, Mysore, Raichur, Tumkur, Vijayapura and Yadgir. Depth to piezometric surface in the range of 2 to 5 m bgl has been recorded in 22% of wells analysed and noted in almost all districts except Bangalore Rural, Dakshina Kannada, Kolar & Udupi districts.
3. Depth to piezometric surface in the range of 5 to 10 m bgl has been recorded in 27% of wells analysed and noted in almost all districts except Kodagu & in the range of 10 to 20 m bgl has been observed in 27% of wells analysed and reported in all districts except Chikkamagaluru& Shimoga.
4. Depth to piezometric surface (Semi-confined/Confined) in the range of 20 to 40 m bgl has been noted in 10% of wells analysed and noted in almost all districts except Bellari, Chikkamagalur, Haveri, Mandya, Shivamogga, Udupi, Uttar kannada, Yadgir districts.
5. Depth to piezometric surface (Semi-confined/Confined) in the range of more than 40 m bgl has been noted in 5% of wells analysed and is observed as isolated patch of Belgavi,Bangalore Rural, Bangalore Urban, Bidar, Chamrajnagar, Chikballapur, Chitradurga, Davanagere, Hassan, Kalaburgi, Kolar, Tumkur Vijayanagar and Vijayapura districts.

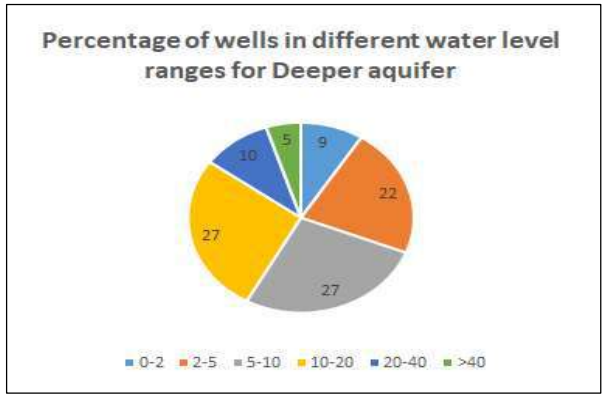
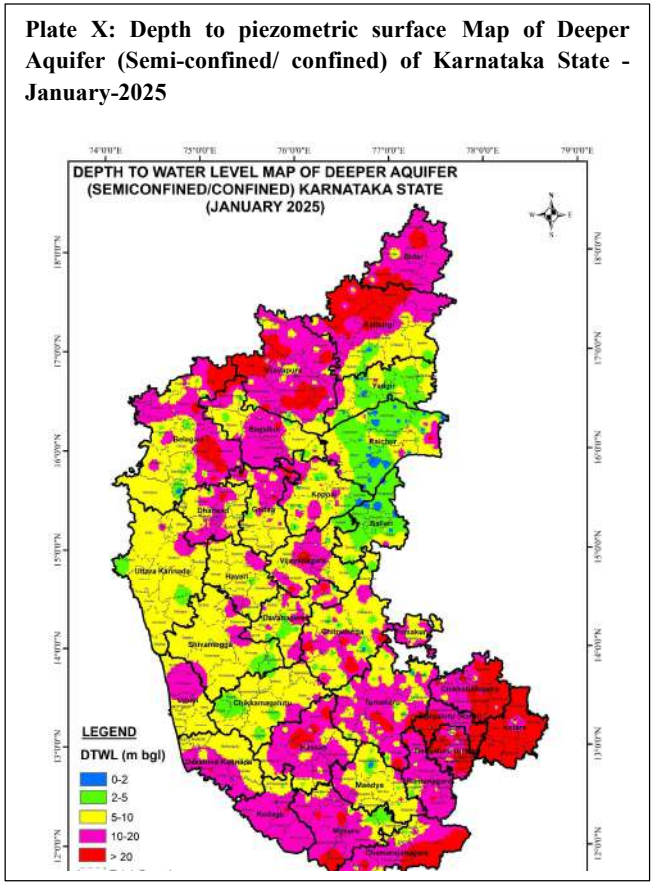


Plate X: Depth to piezometric surface Map of Deeper Aquifer (Semi-confined/ confined) of Karnataka State - January-2025



5.2.2 Seasonal Fluctuation in Piezometric Level

Seasonal Fluctuation of Piezometric level in deeper aquifer (semi-confined/confined) - May 2024 to January 2025

A comparison of piezometric level shows that a rise is recorded in 92% of wells analysed, while8% recorded fall. The Map showing fluctuation of piezometric level in Deeper aquifer (Semi-confined/Confined) of May 2024 with respect to January 2025 has been plotted in **Plate XI**. A perusal of the plate shows that a general rise in the range of >4 m is noticed in major part of the state.

1. Rise in the water level in the range of 0-2 m has been observed in 25% of wells analyzed and observed in all over the state except Chamarajanagara districts.
2. Rise in the water level in the range of 2-4 m has been observed in 18% of wells analyzed and noted in all the districts except Chikkamagaluru and Shivamogga.
3. Rise in water level more than 4m has been observed in 49% of wells analysed and noted in all the Districts except Udupi.
4. The fall in water level in the range of 0-2 m has been observed in 3% of wells analyzed and noted as pockets in 17 districts namely Bellari, Belgavi, Bangaluru Urban, Chikkaballapur, chitradurga, Davangere, Dharwad, Gadag, Hassan, Haveri, Kolar, Koppal, Mysuru,Raichur, Ramanagara, Tumakuru and Yadgir Districts.
5. The fall in water level in the range of 2-4 m has been observed in 1% of wells analysed and noted in Bangalore Rural, Bangalore Urban, Bidar, chitradurga, Raichur and Vijayapura Districts.
6. The fall in water level more than 4 m has been observed in 4 % of wells analysed and noted in Bangalore Urban, Bidar, chamarajanagar, Chikkaballapura, Davangere, Kolar, Koppal, Raichur, Ramanagara Tumakuru, Vijayanagar and Vijayapura districts.

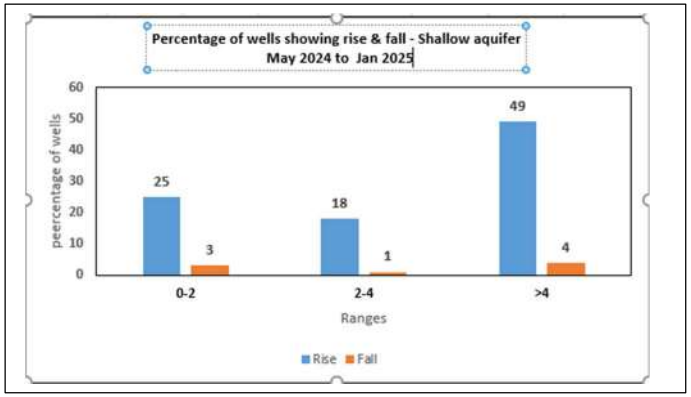
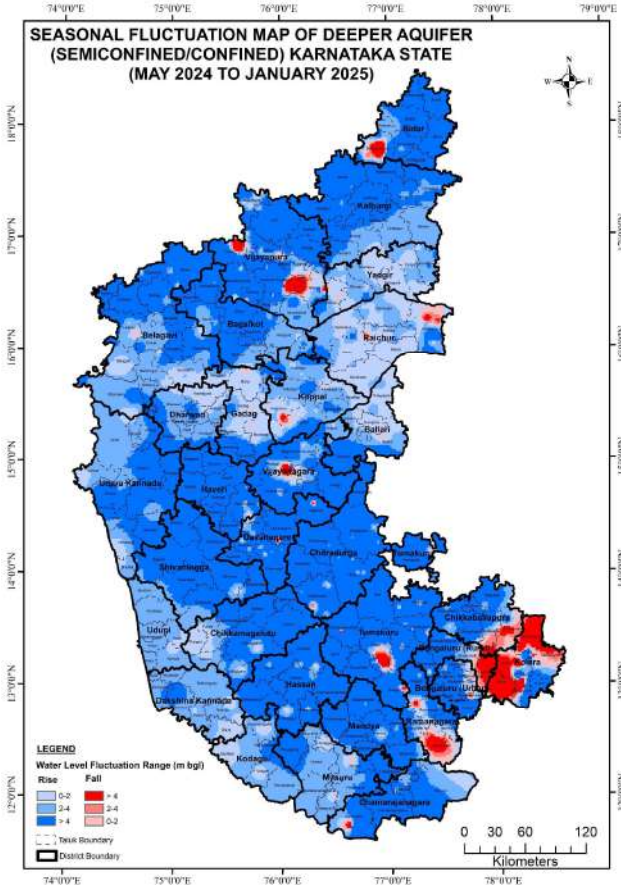


Plate XI: Seasonal Fluctuation Map of Deeper Aquifer of Karnataka State – May 2024 to January 2025



Seasonal Fluctuation of Piezometric level in deeper aquifer (semi-confined/confined) - August 2024 to January 2025

A comparison of piezometric level shows that a rise is recorded in 68% of wells analysed, while 32% recorded fall. The Map showing fluctuation of piezometric level in Deeper aquifer (Semi-confined/Confined) of August 2024 with respect to January 2025 has been plotted in **Plate XII**. A perusal of the plate shows that a general rise with in 2 m is noticed in major part of the state.

1. Rise in the water level in the range of 0-2 m has been observed in 29% of wells analyzed and observed in all over the state except Chikkamagaluru, Dakshina Kannada, Kodagu, Mysuru, shivamogga, Udupi and Uttara Kannada districts.
2. Rise in the water level in the range of 2-4 m has been observed in 14% of wells analyzed and noted in all the districts except Bidar, Chikkaballapura, Dakshina Kannda, Kodagu, Mysuru, shivamogga, Udupi and Uttara Kannada.
3. Rise in water level more than 4m has been observed in 25% of wells analysed and noted in all the Districts except Chikkamagaluru, Dakshina Kannada, Kodagu, Mysuru, shivamogga, Udupi and Uttara Kannada.
4. The fall in water level in the range of 0-2 m has been observed in16 % of wells analyzed and noted all over state except Dakshina Kannada and Ramanagara Districts.
5. The fall in water level in the range of 2-4 m has been observed in 6% of wells analysed and noted as pockets in all over state except Basgalkote, Ballari, Chamarajanagara, Chikkaballpura, Gadag, Koppal. Mandya and Ramanagara Districts.
6. The fall in water level more than 4 m has been observed in 10 % of wells analysed

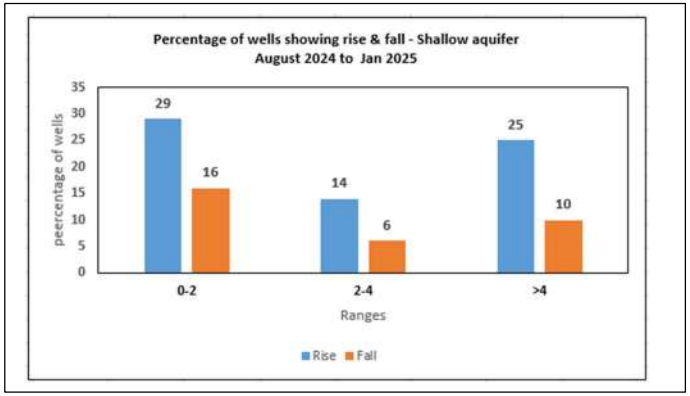
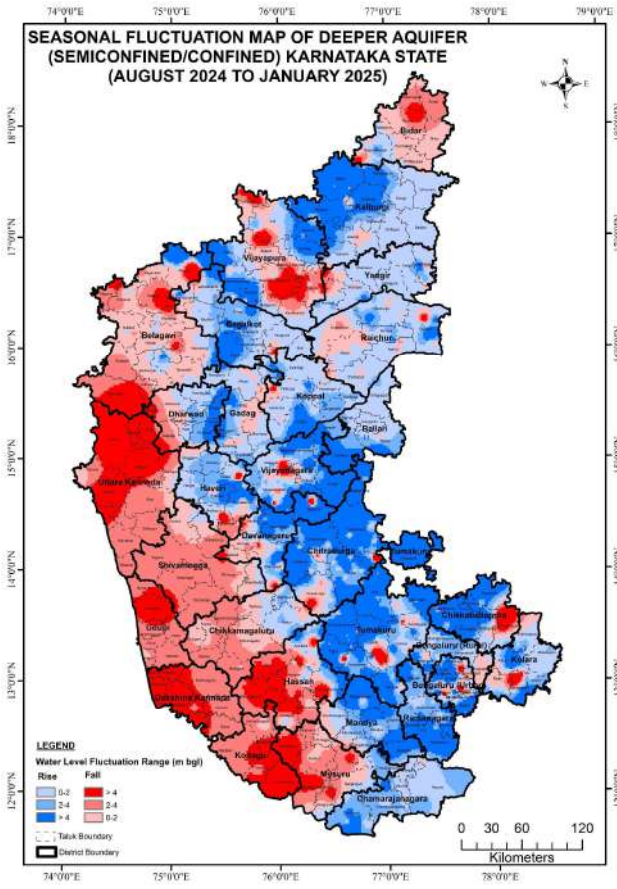


Plate XII: Seasonal Fluctuation Map of Deeper Aquifer of Karnataka State – August 2024 to January 2025



Seasonal Fluctuation of Piezometric level in deeper aquifer (semi-confined/confined) - November 2024 to January 2025

A comparison of piezometric level shows that a rise is recorded in 27% of wells analysed, while 73% recorded fall. The Map showing fluctuation of piezometric level in Deeper aquifer (Semi-confined/Confined) of November 2024 with respect to January 2025 has been plotted in **Plate XIII**. A perusal of the plate shows that a general fall with in 2 m is noticed in major part of the state.

1. Rise in the water level in the range of 0-2 m has been observed in 19% of wells analyzed and observed in all over the state except Chikkamagaluru, Dakshina Kannada, Haveri, Kodagu, Mysuru, Shivamogga, Udupi and Uttara Kannada districts.
2. Rise in the water level in the range of 2-4 m has been observed in 3% of wells analyzed and noted in Belgavi, Bangaluru Urban, Chitradurga, Dvangere, Gadag, Hassan, Kalaburgi, Kolar, Koppal, Ramanagara, Tumkaru, Vijayanagar, Vijayapura and Yadgir districts.
3. Rise in water level more than 4m has been observed in 5% of wells analysed and noted in all the Districts except Bagalkote, Bangalore Urban, Chitradurga, Davangere, JKalaburgi, Kolar, Mysuru, Raichur, Ramanagara, Tumkaru, Vijayanagar, Vijayapura and Yadgir districts.
4. The fall in water level in the range of 0-2 m has been observed in 44 % of wells analyzed and noted all over state except Bangaluru Rural Districts.
5. The fall in water level in the range of 2-4 m has been observed in 15 % of wells analysed and noted all over state except Ballari, Chikkamagaluru Ramanagara and Udupi Districts.
6. The fall in water level more than 4 m has been observed in 14 % of wells analysed and noted in all districts except Chamarajanagar, Chikkamagaluru, Dharwad, Gadag, Kodagu, Mysuru, Ramanagara, Shivamogga and Yadgir districts.

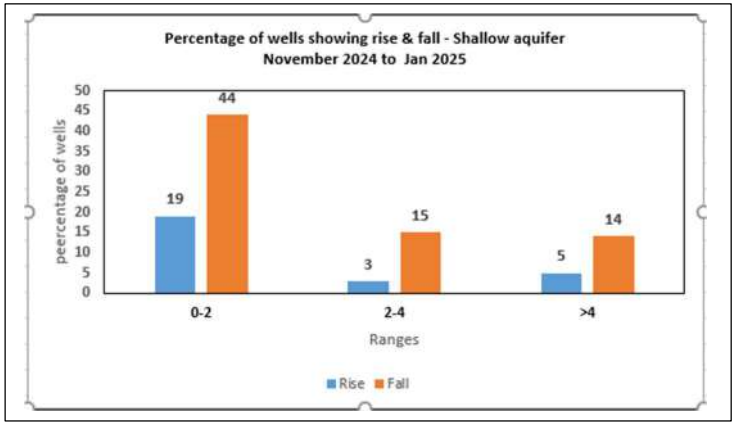
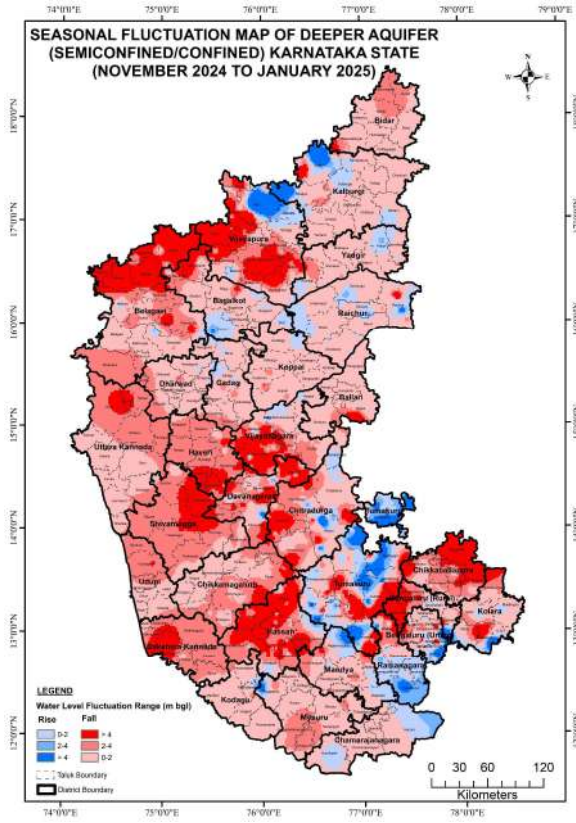


Plate XIII: Seasonal Fluctuation Map of Deeper Aquifer of Karnataka State – November 2024 to January 2025



5.2.3 Annual Fluctuation in Piezometric Level

Annual Fluctuation of Piezometric level in deeper aquifer (semi-confined/confined) - January 2024 to January 2025

A comparison of piezometric level shows that a rise is recorded in 83% of wells analysed, while 17 % recorded fall. The Map showing fluctuation of piezometric level in Deeper aquifer (Semi-confined/Confined) of January 2024 with respect to January 2025 has been plotted in **Plate XIV**. A perusal of the plate shows that a general rise is noticed in major part of the state.

1. Rise in the water level in the range of 0-2 m has been observed in 34% of wells analyzed and observed in all over the state except Haveri districts.
2. Rise in the water level in the range of 2-4 m has been observed in 16% of wells analyzed and noted in all districts except Dakshina Kannada, Dharwad, Kodagu, Ramanagara and Udupi districts.
3. Rise in water level more than 4m has been observed in 33% of wells analysed and noted in all the Districts except Bangalore Rural, Shivamogga, Udupi and Uttara Kannada districts.
4. The fall in water level in the range of 0-2 m has been observed in 8 % of wells analyzed and noted Bagalkpote, Ballari, Belgavi, Bangaluru Rural, Chamarajanagar, Chikkaballapura, Chitradurga, Gadag, Hassan, Haveri, Kalaburgi, Kolar, Koppal, Mandya, Raichur, Ramanagara, Shivamogga, Tumakuru, Udupi, Viajayanagar, Vijayapura and Yadgir districts.
5. The fall in water level in the range of 2-4 m has been observed in 3 % of wells analysed and noted in Bengaluru Rural, Bangaluru Urban, Bidar, Chikkaballapura, Hassan, Kodagu, Kolar, Koppal, Raichur, Ramanagara, Tumakuru and Yadgir districts.
6. The fall in water level more than 4 m has been observed in 6 % of wells analysed and noted in Belagavi, Bengalore Rural, Bengaluru Urban, Bidar, Chamarajanagar, Chikkaballapura, Chitradurga, Dakshina Kannada, Davanagere, Kalaburgi, Kolar, Koppal, Raichur, Ramanagara, Tumakuru, Vijayanagar and Vijayapura districts.

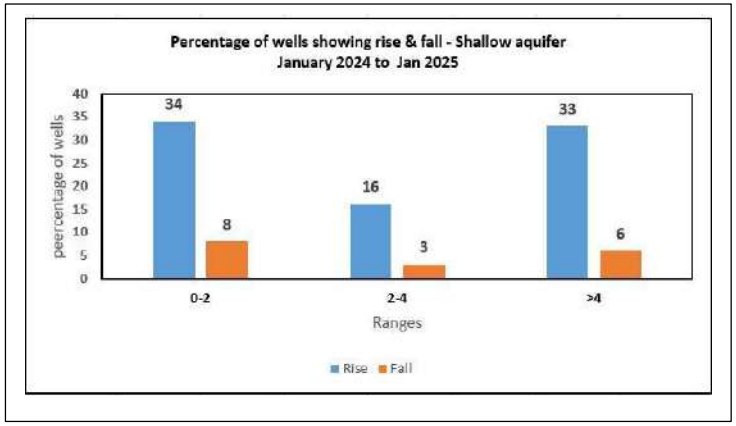
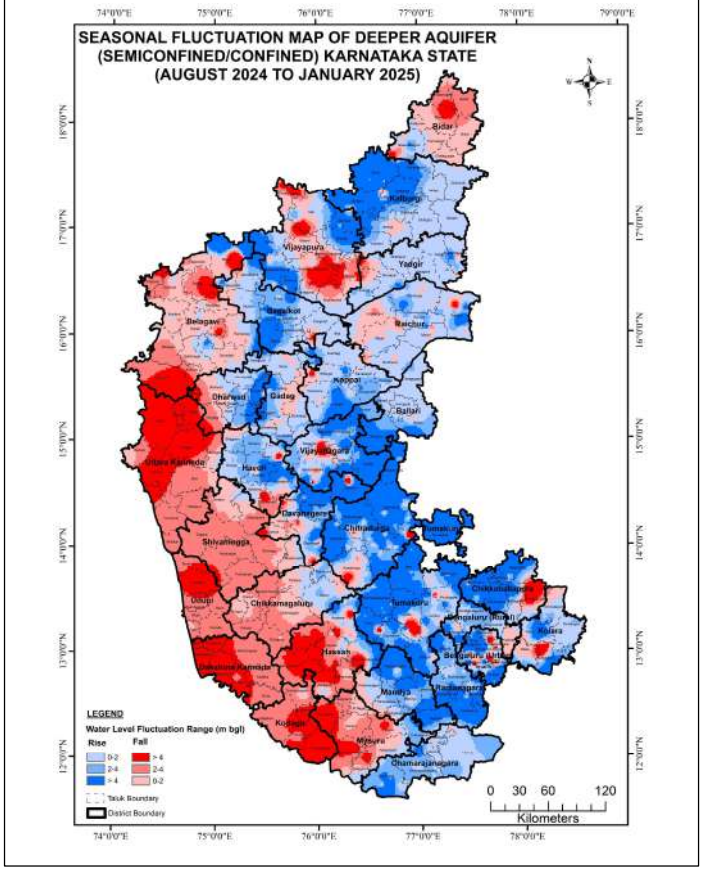


Plate XIV: Annual Fluctuation Map of Deeper Aquifer of Karnataka State – January 2024 to January 2025



Annual Fluctuation in Piezometric Level

Annual Fluctuation of Piezometric level in deeper aquifer (semi-confined/confined) - January 2023 to January 2025

A comparison of piezometric level shows that a rise is recorded in 58% of wells analysed, while 42 % recorded fall. The Map showing fluctuation of piezometric level in Deeper aquifer (Semi-confined/Confined) of January 2023 with respect to January 2025 has been plotted in **Plate XV**. A perusal of the plate shows that a general rise of 2 m is noticed in major part of the state.

1. Rise in the water level in the range of 0-2 m has been observed in 38% of wells analyzed and observed in all over the state except Bengaluru Rural and Kolar districts.
2. Rise in the water level in the range of 2-4 m has been observed in 10% of wells analyzed and noted in all districts except Ballari, Bengaluru Rural, Chamarajanagar, Chikkaballapura, Kolar, Mysuru, Ramanagara, Shivamogga, Udupi and Uttara Kannada districts.
3. Rise in water level more than 4m has been observed in 10% of wells analysed and noted in Bagalkote, Belagavi,Chikkamagaluru, Chitradurga, Dakshina Kannada, Davanagere,Hassan, Haveri, Kalaburgi, Kolar, Mandya, Mysuru, Raichur, Tumakuru, Vijayanagar, Vijayapura and Yadgir districts.
4. The fall in water level in the range of 0-2 m has been observed in 18 % of wells analyzed and noted in all districts except Bagalkote, Dharwad, Kodagu, Mandya and Uttara Kannada districts.
5. The fall in water level in the range of 2-4 m has been observed in 8 % of wells analysed and noted in all disticts except Ballari, Chikkamagaluru, Dakshina Kannada, Haveri, Kodagu, Kolar, Mysuru, Shivamogga, Udupi and Uttara Kannada districts.
6. The fall in water level more than 4 m has been observed in 16 % of wells analysed and noted in all districts except Ballari, Bidar, Chikkamagaluru, Dakshina Kannada, Dharwad, Haveri, Kodagu, Shivamogga, Udupi and Uttara Kannada districts

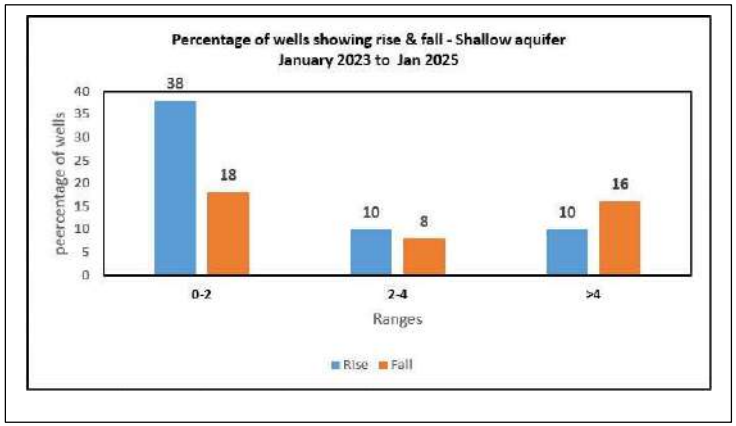
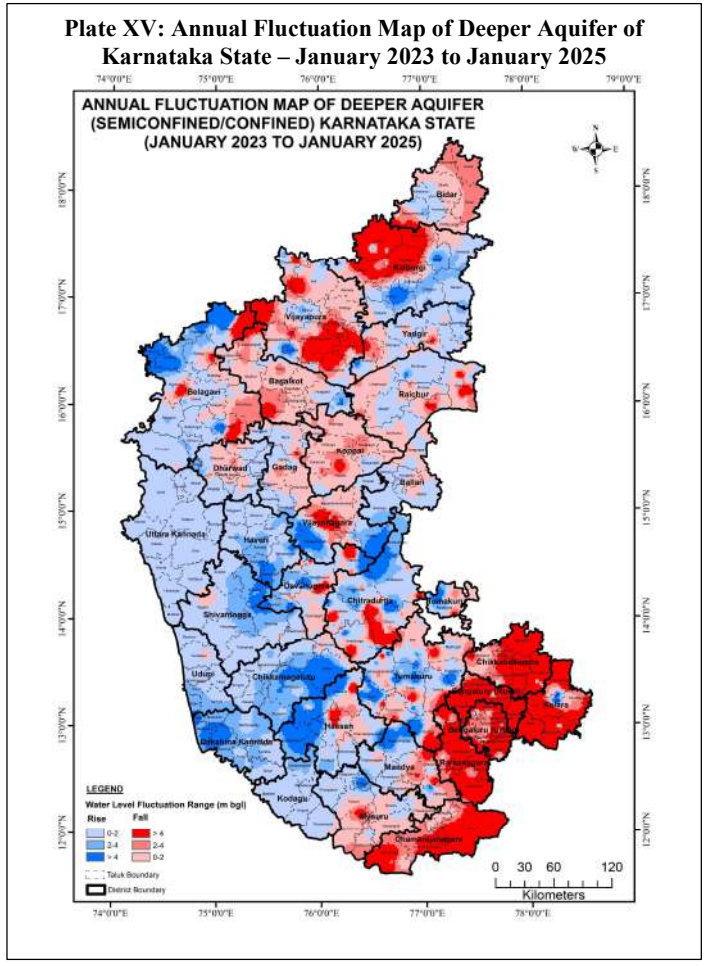


Plate XV: Annual Fluctuation Map of Deeper Aquifer of Karnataka State – January 2023 to January 2025



5.2.4 Decadal Fluctuation in Piezometric Level

Decadal Fluctuation of Piezometric level in deeper aquifer (semi-confined/confined) - January (2015-2024) to January 2025

A comparison of piezometric level shows that a rise is recorded in 80% of wells analysed, while 20% recorded fall. The Map showing fluctuation of piezometric level in Deeper aquifer (Semi-confined/Confined) of decadal mean of January (2015-2024) with respect to January 2025 has been plotted in **Plate XVI**. A perusal of the plate shows that a general rise is noticed in major part of the state.

1. Rise in the water level in the range of 0-2 m has been observed in 35% of wells analyzed and observed in all over the state except Chitradurga, Davangere,Haveri, Ramanagara, Shivamogga and Udupi districts.
2. Rise in the water level in the range of 2-4 m has been observed in 13% of wells analyzed and noted in all districts except Bagalkote, Ballari, Bidar, Dakshina Kannada, Dharwad, Gadag, Hassan, Kolar, Koppal, Raichur, Mysuru, Udupi and Viajayapura districts.
3. Rise in water level more than 4m has been observed in 32% of wells analysed and noted in Bengaluru Rural, Bengaluru Urban, Chamarajanagara, Chikkaballapura,, Chikkamagaluru, Dakshina Kannada, Davanagere, Haveri, Ramanagara, Tumakuru, Vijayanagar, Vijayapura and Yadgir districts.
4. The fall in water level in the range of 0-2 m has been observed in 16 % of wells analyzed and noted in Belagavi, Bengaluru Rural, Bengaluru Urban, Bidar, Chamarajanagara,, Chikkamagaluru, Davanagere, Hassan, Kalaburgi, Kodagu, Kolar, Koppal, Mysuru, Raichur, Ramanagara, Shivamogga, Udupi, Vijayapura and Yadgir districts.
5. The fall in water level in the range of 2-4 m has been observed in 1 % of wells analysed and noted in Bengaluru Rural and Dakshina Kannada districts.
6. The fall in water level more than 4 m has been observed in 3 % of wells analysed and noted in Bengaluru Urban and Vijayapura districts.

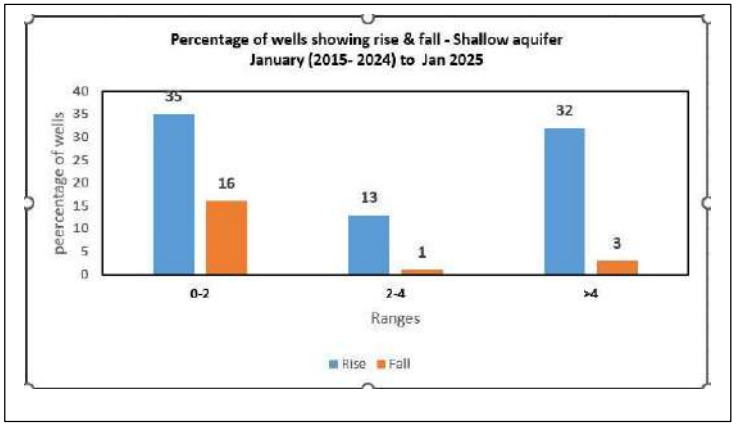
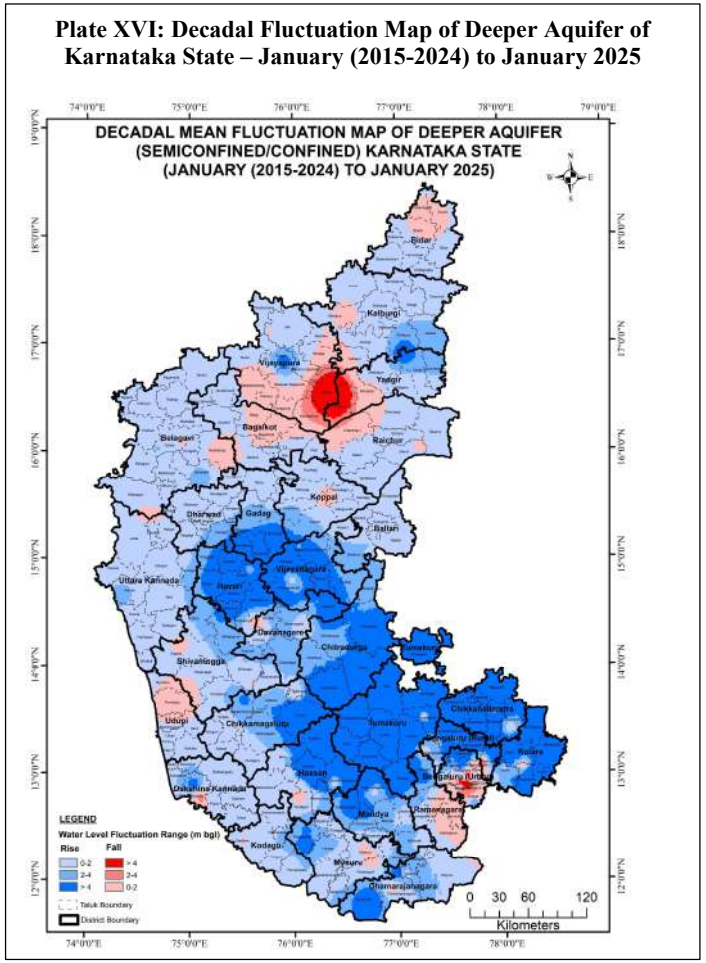


Plate XVI: Decadal Fluctuation Map of Deeper Aquifer of Karnataka State – January (2015-2024) to January 2025



6. Summary:

The behavior of ground water table during January 2025 in Karnataka State has been studied by analyzing the water level of the dug wells and bore wells. The data on water levels was analyzed in detail and salient features are as under.

2. The depth to water level of shallow aquifer over major part of the State lies within 10 m bgl in 93% of wells analysed, while 7 % of wells show depth to water level more than 10 m bgl and depth of piezometric surface of 58% of wells analysed lies with in 10 mbgl and 42% more than 10 m bgl.
3. Depth to Water level of monitoring wells during January 2025 has been compared with water level of May 2024, August 2024 and November 2024 respectively. Compared to the May water level 85% of wells analysed showed rise in water level during January. 31% of wells have recorded rise in water levels and 69% of wells recorded fall in water levels of Shallow aquifer (Unconfined) during January 2025 in comparison to August 2024 and during January 2025 only 15% of wells have recorded rise and 85 % recorded fall in water level when compared to post monsoon season 2024.
4. Annual fluctuation of wells in the shallow aquifer has also been carried out and during January 2025, 91% of wells have recorded rise in water level compared to January 2024 and 83% showed rise when compared to January 2023 water level.81 % of wells recorded rise in water level and 19% recorded fall during January 2025 in comparison to decadal mean of January .
5. Analysis of piezometric level of Deeper aquifer indicates that 92% of wells showed rise in piezometric surface compared to May 2024 where as 68 % of wells showed rise in piezometric surface while comparing with August 2024. But comparison of piezometric surface of January 2025 with post monsoon season piezometric level in analysed well recorded a fall in 73% of wells and rise only in 27% of wells analysed.
6. Annual fluctuation of wells in the deeper aquifer has also been carried out and during January 2025, 83% of wells have recorded rise in water level compared to January 2024 and 58% showed rise when compared to January 2023. 80 % of wells recorded rise in piezometric level and 20% recorded fall during January 2025 in comparison to decadal mean of January.

1. During the period (October to December 2024), the State had received an total rainfall of 238 mm, which is 28 percent more than the normal of 186 mm. Rainfall was deficit in 5 district, Large Excess inn 8 districts, Excess in 11 district and normal in 7 districts

7.0 Recommendations

- To enhance the groundwater scenario of Karnataka state utmost effort should be made to harvest the rainwater received during monsoon days and use it for artificial recharge. Periodic maintenance of the structures is also recommended to maintain the efficiency of the structure. Abandoned bore wells/dug well can be used to recharge the aquifer utilizing the surplus surface runoff available during rainy days. Master plan for artificial recharge of Karnataka and Goa as well as Naquim reports of CGWB help in selecting sites for artificial recharge structures.
- Point recharge structures are recommended to recharge deeper aquifers.
- Efficient micro irrigation practices can save upto 40% of water.
- Use of Grey water after treatment, opting for water efficient fixtures and low flow plumbing fixtures reduce the stress on groundwater. Low flow technology is