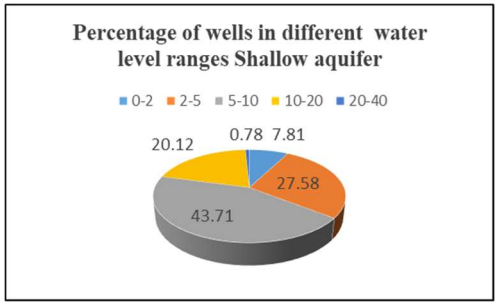
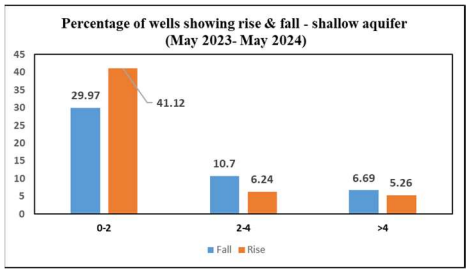
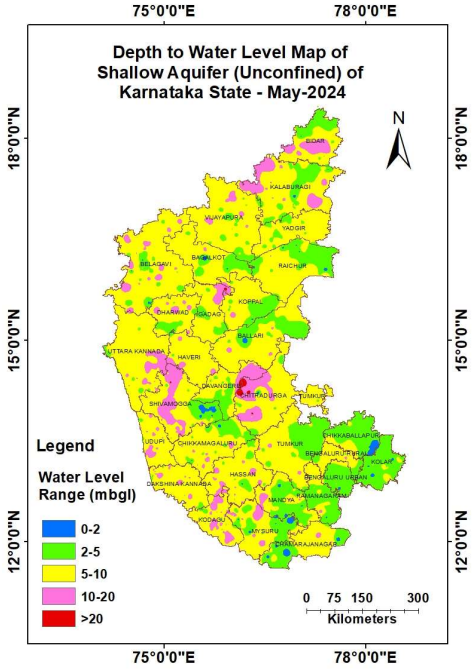






GROUND WATER LEVEL BULLETIN MAY 2024- KARNATAKA STATE

Abstract

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

South Western Region, Bangalore

Contents

1. Introduction:.....……3

2 . Rainfall distribution in karnataka state, pre-monsoon 2024 4

3. Depth to water level of shallow aquifer (unconfined) of May-2024: 6

4. Depth to water level of deeper aquifer (semi-confined/confined) of May-2024:.....7

5. Change in seasonal water level of shallow aquifer (unconfined) - January 2024-May 2024:...8

6. Change in seasonal water level of deeper aquifer (semi-confined/confined) - January 2024- May 2024:…... 9

7. Change in annual water level of shallow aquifer (unconfined) - May 2023 - May 2024:… 10

7. Change in annual water level of deeper aquifer (semi-confined/ confined) – May 2023 - May 2024:..11

9. Decadal mean water levels of deeper aquifer (semi-confined/confined) for the period – May 2014-2023 & May 2024:..12

10. Decadal mean water levels of deeper aquifer (semi-confined/confined) for the period – May 2014-2023 & May 2024:……12

11. Conclusions:.....13

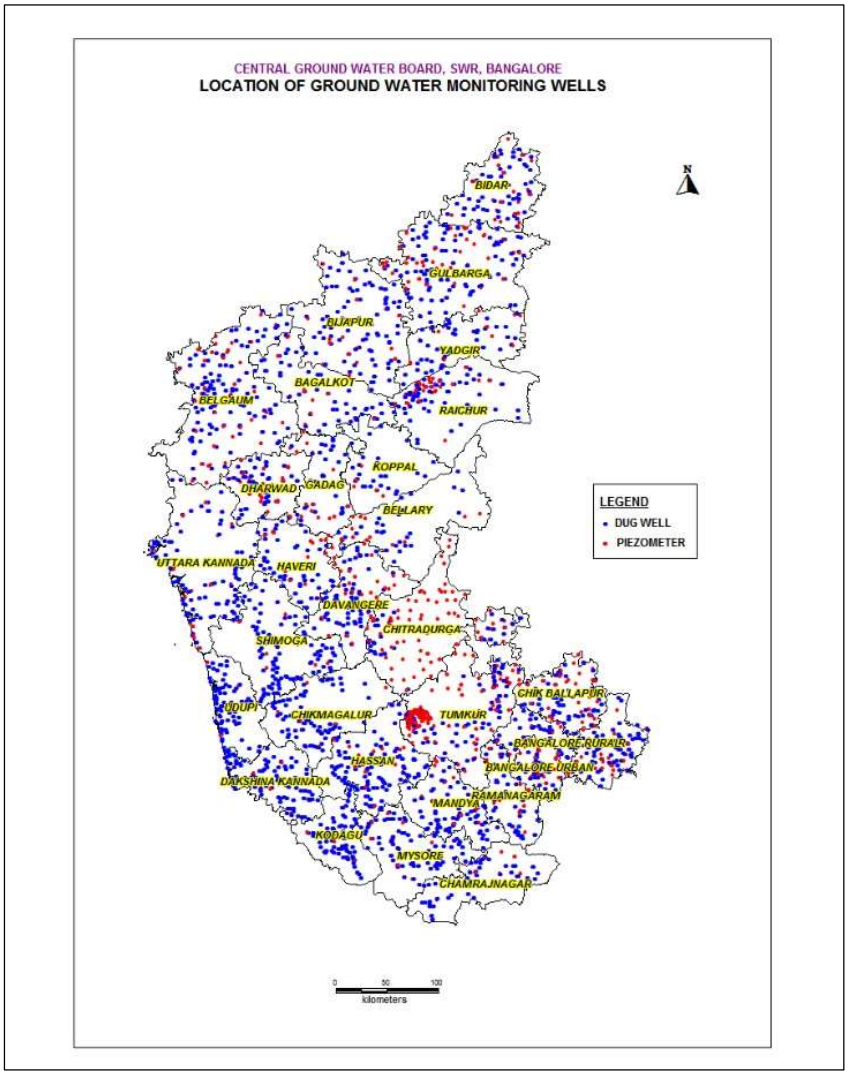
12. Summary:……...13

13. Recommendations: ……14

1. Introduction:

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 234 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

Monitoring of ground water levels was carried out at 2019 ground water monitoring wells in the State of Karnataka during the month of May 2024. Among the wells monitored, **1153** are dug wells and **866** are piezometers.. The data indicated that the water level in the major part of the State is within the range of 2-10 m bgl (5-10m: 43.7% & 2-5m : 27.5%). The deepest water level observed in dug wells is 38.85 m bgl. About 21% percentage of dugwells has recorded water levels deeper than 10 m bgl.



2. RAINFALL DISTRIBUTION IN KARNATAKA STATE, PRE-MONSOON 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

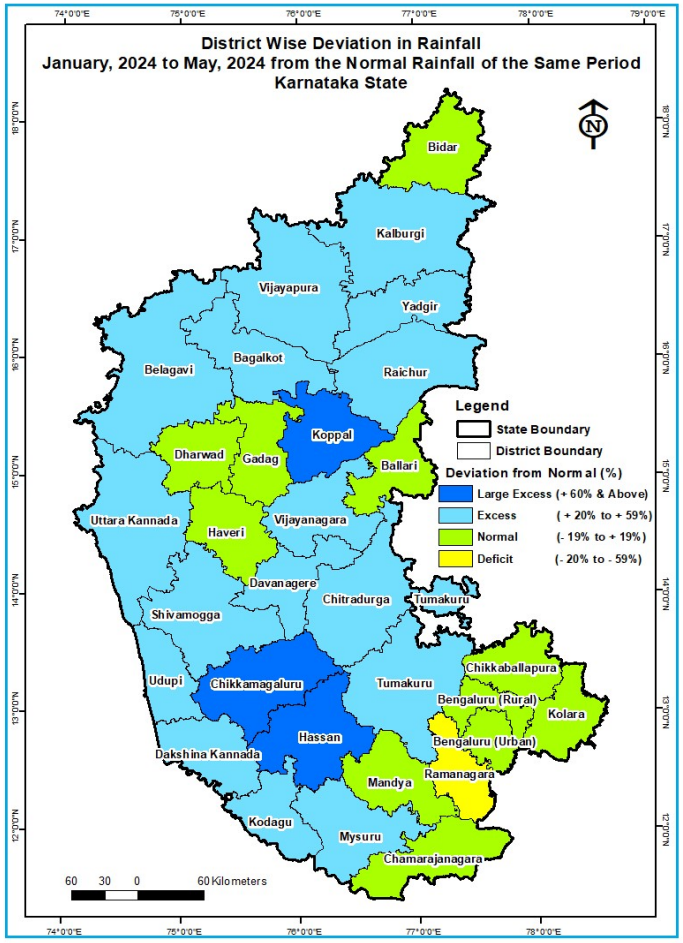
Based on the above classification, districts falling under the above-mentioned three of Karnataka and as well as for the State as a whole for premonsoon season during 2024 **has been presented below.**

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

2.1 Pre Monsoon Season -2024 (January - May)

In general, the pre-monsoon showers are received during April-May every year. For the Pre-monsoon season, the State had received an average rainfall of 165 mm, which is 27 percent more than the normal of 130 mm. Rainfall was excess in 19 district, normal in 11 districts, deficit in 1 districts (Table 4.1). Map showing the district-wise rainfall distribution in Karnataka State for the pre-monsoon 2024 period is given as Fig.1.1

Fig1.1 : Rainfall Deviation (January 2024 to May 2024) from Normal Rainfall



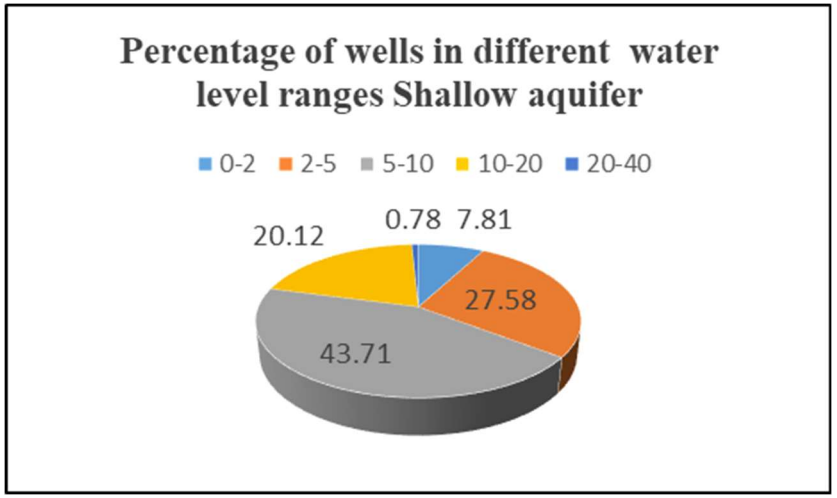
Sl.No.	District	Jan - May 2024 Actual (mm)	Jan - May 2023 Actual (mm)	Jan - May 2024 Normal (mm)	%DEP From 2023	%DEP From Normal	Category
1	Bagalkote	105	70	83	-16	26	Excess
2	Ballari	80	56	88	-37	-10	Normal
3	Belagavi	124	86	101	-15	22	Excess
4	Bengaluru Rural	147	164	155	6	-5	Normal
5	Bengaluru Urban	151	209	158	33	-4	Normal
6	Bidar	72	200	72	176	0	Normal
7	Chamarajanagara	197	224	210	7	-6	Normal
8	Chikkaballapura	100	144	112	28	-11	Normal
9	Chikkamagaluru	298	122	173	-29	73	Large Excess
10	Chitradurga	145	75	118	-37	23	Excess
11	Dakshina Kannada	396	119	241	-51	65	Large Excess
12	Davanagere	145	66	112	-41	29	Excess
13	Dharwad	125	91	126	-28	-1	Normal
14	Gadag	103	64	110	-41	-6	Normal
15	Hassan	296	177	181	-2	64	Large Excess
16	Haveri	139	83	127	-35	9	Normal
17	Kalaburagi	89	125	68	83	31	Excess
18	Kodagu	311	153	221	-31	41	Excess
19	Kolar	120	214	135	58	-11	Normal
20	Koppala	127	67	78	-15	63	Large Excess
21	Mandya	211	175	178	-2	19	Normal
22	Mysuru	255	207	207	0	24	Excess
23	Raichur	103	111	70	59	47	Excess
24	Ramanagara	144	214	186	15	-23	Deficit
25	Shivamogga	197	82	128	-36	54	Excess
26	Tumakuru	189	172	144	19	31	Excess
27	Udupi	324	53	214	-75	51	Excess
28	Uttara Kannada	147	39	120	-68	22	Excess
29	Vijayanagar	122	63	92	-31	32	Excess
30	Vijayapura	86	89	67	33	28	Excess
31	Yadgir	87	98	67	46	30	Excess
	State	165	123	130	-5	27	Excess

Table. 4.1: District-Wise Cumulative Rainfall and Percentage Departure, During Pre-Monsoon Period 2024

3. Depth to water level of shallow aquifer (unconfined) of May-2024:

During May 2024 the depth to water level of shallow aquifer vary widely from 0.1 to 38.85. Salient features of the depth to water level of Shallow aquifer (Unconfined) during **May 2024** are given below.

1. A perusal of the water level data reveals that the depth to water level ranged from 0.1m bgl (Bagalkot districts) to 38.85m bgl (Chitradurga 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 79 % of wells analysed, while 21 % 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 7.8% of wells analysed and noted all over the State except Bellary, Bangalore rural, Udupi and Uttar Kannada Districts.
4. Depth to water level in the range of 2 to 5 m bgl has been recorded in 27.58 % 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 43.71 % of wells analysed and noted in almost all districts.
6. Depth to water level in the range of 10 to 20 m bgl has been recorded in 20.12 % of wells analysed and observed in all districts except Bangalore Urban and Kolar & Chikballapura Districts.
7. Depth to water level in the range of 20 to 40 m bgl has been recorded in 0.78 % of wells analysed and observed in Chikmangalore, Chitradurga, Mysuru, Kalaburagi, Gadag, Shivamogga districts.



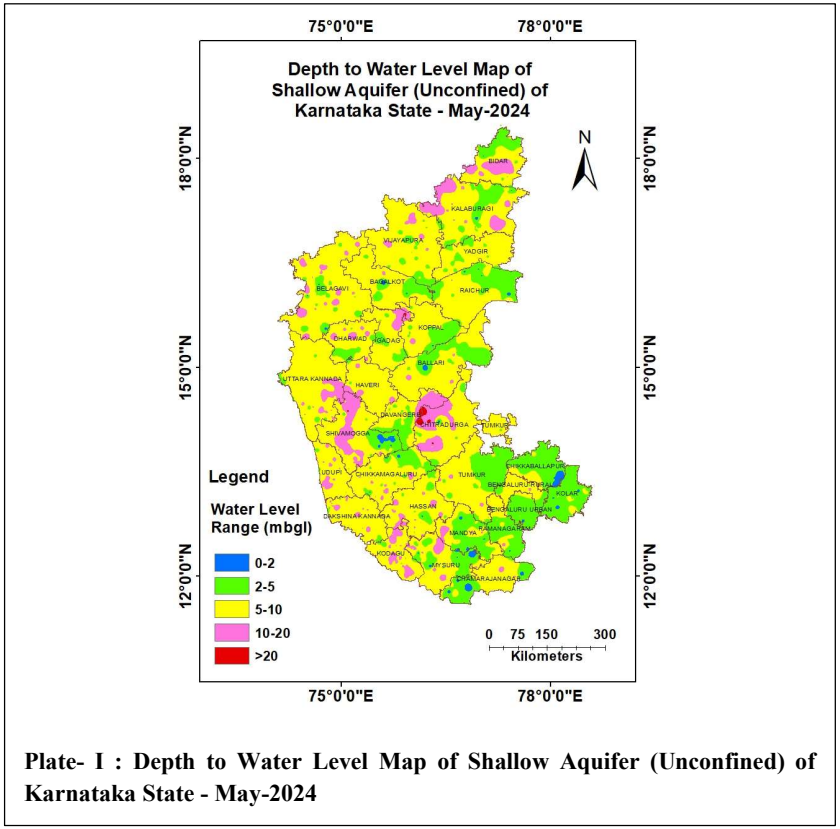
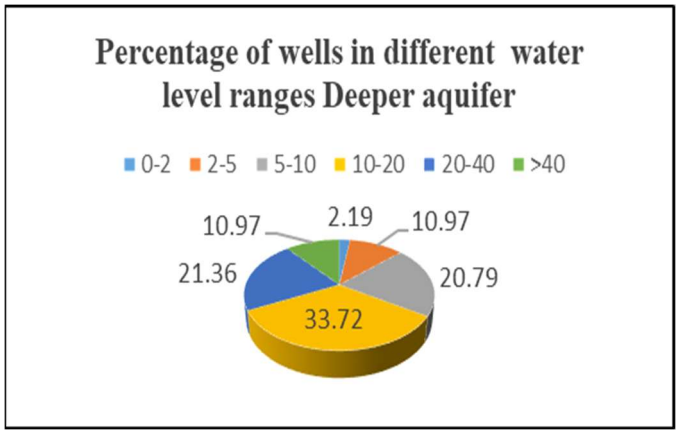


Plate- I : Depth to Water Level Map of Shallow Aquifer (Unconfined) of Karnataka State - May-2024

4. Depth to water level of deeper aquifer (semi-confined/confined) of May-2024:

Depth to Water level 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 water level of Deeper aquifer (Semi-confined/Confined) during May 2024 are given below;

1. The depth to Water level of Deeper aquifer (Semi-confined/Confined) ranged from 0.6 m bgl (Raichur district) to 139.70 m bgl (Davanagere district) in Karnataka. 32% of wells have recorded depth to Water level of Deeper aquifer (Semi-confined/Confined) within 10 m bgl and 68% of wells show depth to Water level of Deeper aquifer (Semi-confined) in more than 10 m bgl.
2. Depth to Water level of Deeper aquifer (Semi-confined/Confined) of less than 2 m bgl has been recorded in 2.19% of wells analysed and this has been noted in the districts of, Bellary, Bidar, Chitradurga, Belagavi, Raichur and Tumkur Districts and in the range of 2 to 5 m bgl has been recorded in 10.97% of wells analysed and noted in almost all districts except Bangalore Rural, Bidar, Chamrajnagara, Dakshin Kannada, Mysore and Udupi districts.
3. Depth to Water level of Deeper aquifer (Semi-confined/Confined) in the range of 5 to 10 m bgl has been recorded in 20.79% of wells analysed and noted in almost all districts except Chikmagalur, Kalaburagi, Kodagu and Shivamogga districts & in the range of 10 to 20 m bgl has been observed in 33.72% of wells analysed and reported in all districts.
4. Depth to Water level of Deeper aquifer (Semi-confined/Confined) in the range of 20 to 40 m bgl has been noted in 21.36% of wells analysed and noted in almost all districts except Chikmagalur, Kalaburagi, Raichur, Shimoga, Udupi and Uttar Kannada districts.
5. Depth to Water level of Deeper aquifer (Semi-confined/Confined) in the range of more than 40 m bgl has been noted in 10.97 % of wells analysed and is observed as isolated patch of Bagalkote, Bangalore Urban, Bangalore Rural, Belgaum, Bidar, Chamrajnagara, Chikballapura, Chitradurga, Devanagere, Hassan, Haveri, Kolar, Tumkur, Kalaburagi, Ramanagara, Mandya, Raichur, Vijayanagar and Vijayapura districts.



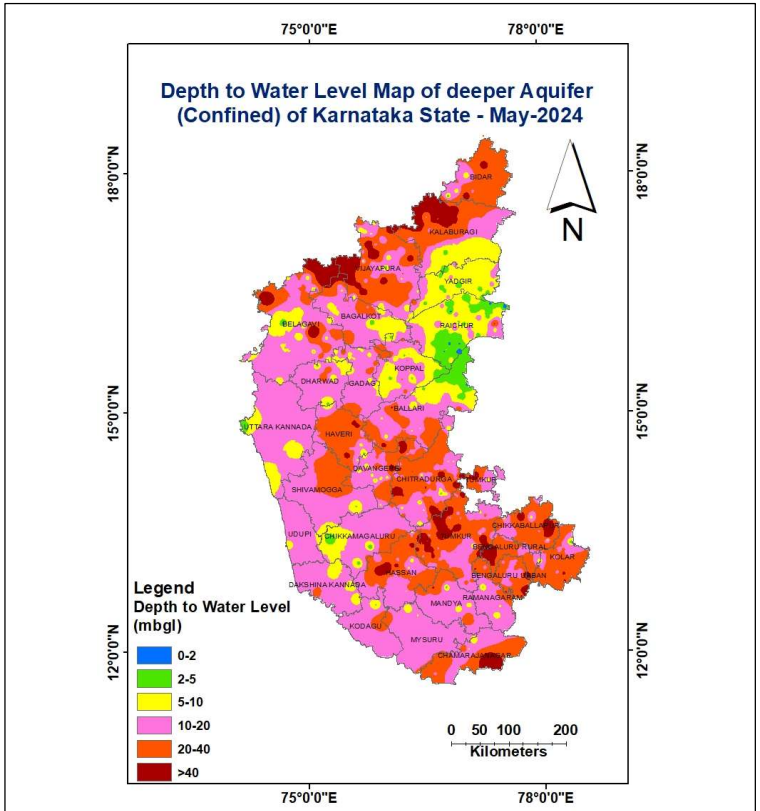
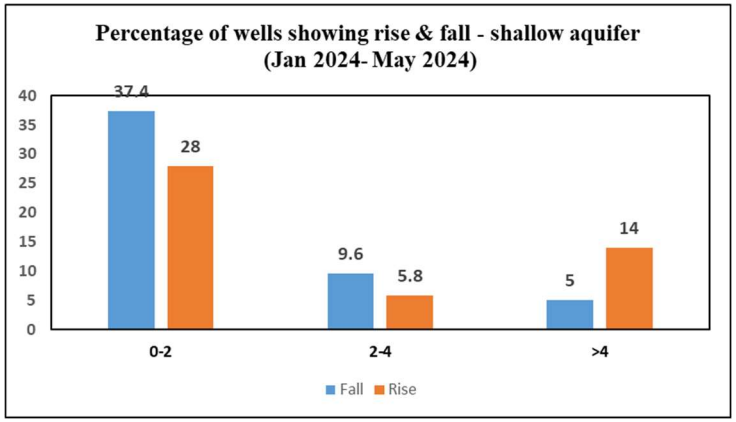


Plate II : Depth to Water Level Map of Deeper Aquifer (Semi-confined/ confined) of Karnataka State - May-2024

5. Change in seasonal water level of shallow aquifer (unconfined) - January 2024-May 2024:

A comparison of water level shows that a rise in the water level is recorded in 47.9% of wells analysed, while 52.1% recorded fall. The Map showing fluctuation in water level of Shallow aquifer (Unconfined) of May 2024 with respect to Jan 2024 has been given in **Plate III**.

1. Rise in the water level in the range of 0-2 m has been observed in 28% 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 5.8 % of wells analysed and observed in all over the State excepts Bagalkote, Ballari, Bengaluru Rural, Kolar and Raichur Districts.
3. Rise in water level more than 4m has been observed in 14% of wells analysed. and observed in all over the State excepts Bengaluru Rural & Chikkaballapura districts.
4. The fall in water level in the range of 0-2 m has been observed in 37.4% of wells analysed and reported in all the districts.
5. The fall in water level in the range of 2-4 m has been observed in 9.6 % of wells analysed and noted in all the districts except Bengaluru Urban & Vijayanagar districts.
6. The fall in water level more than 4 m has been observed in 5% of wells analysed and noted in all the districts except Bagalkote, Bengaluru Rural, Bengaluru Urban, Chikkaballapura, Gadag, Kolar, Ramanagara and Yadgir districts.



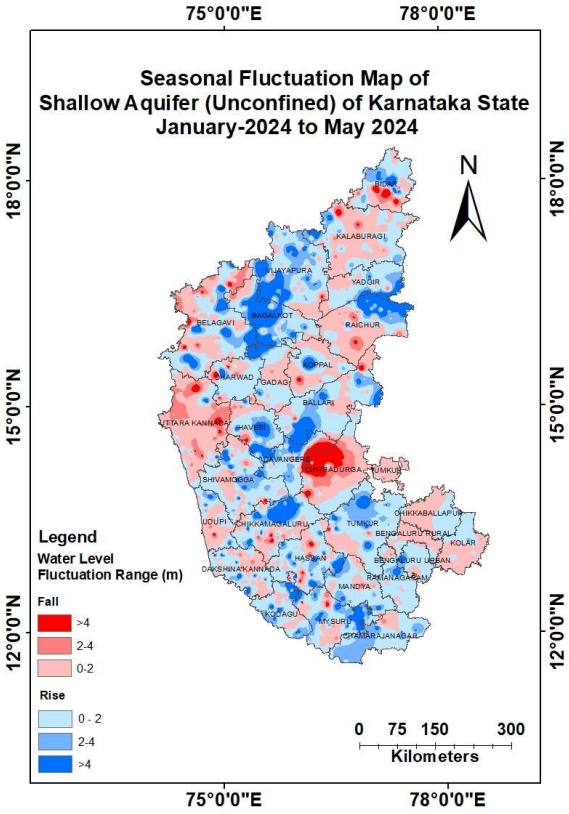
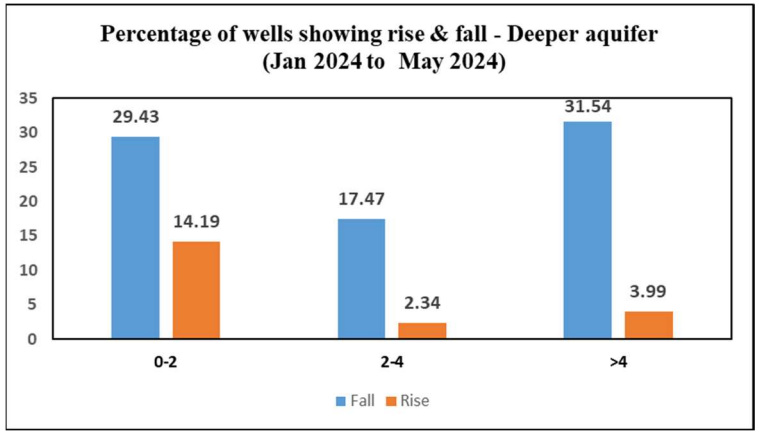


Plate III : Seasonal Fluctuation Map of Shallow Aquifer (Unconfined) of Karnataka State - January-2024 to May 2024

6. Change in seasonal water level of deeper aquifer (semi-confined/confined) - January 2024- May 2024:

A comparison of water level shows that a rise in the water level is recorded in 22.4% of wells analysed, while 77.6% recorded fall. The Map showing fluctuation in water level of Deeper aquifer (Semi-confined/Confined) of May 2024 with respect to Jan 2024 has been plotted in **Plate IV**. A perusal of the plate shows that a general fall in the range of >4 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 14.19% of wells analysed and observed in all over the District except Bengaluru Rural, Bengaluru Urban, Chamarajanagara, Dakshina Kannada, Kolar, Mandya, Shivamogga, Udupi District.
2. Rise in the water level in the range of 2-4 m has been observed in 2.34% of wells analysed and noted in Chitradurga, Davangere, Gadag, Raichur, Ramanagara, Tumakuru, Vijayapura, Yadgir Districts.
3. Rise in water level more than 4m has been observed in 3.99% of wells analysed and noted in Belagavi, Bengaluru Urban, Chamarajanagara, Chikkaballapura, Chitradurga, Gadag, Hassan, Haveri, Kolar, Mandya, Mysuru, Raichur, Ramanagara, Tumakuru, Vijayanagar, Vijayapura, Yadgir Districts.
4. The fall in water level in the range of 0-2 m has been observed in 29.43% of wells analysed and noted in all the districts except Kolar District.
5. The fall in water level in the range of 2-4 m has been observed in 17.47% of wells analysed and noted in all the districts except Ballari, Mandya, Shivamogga Districts.
6. The fall in water level more than 4 m has been observed in 31.54 % of wells analysed and noted in all the districts except Dharwad, Kodagu, Koppal, Udupi districts.



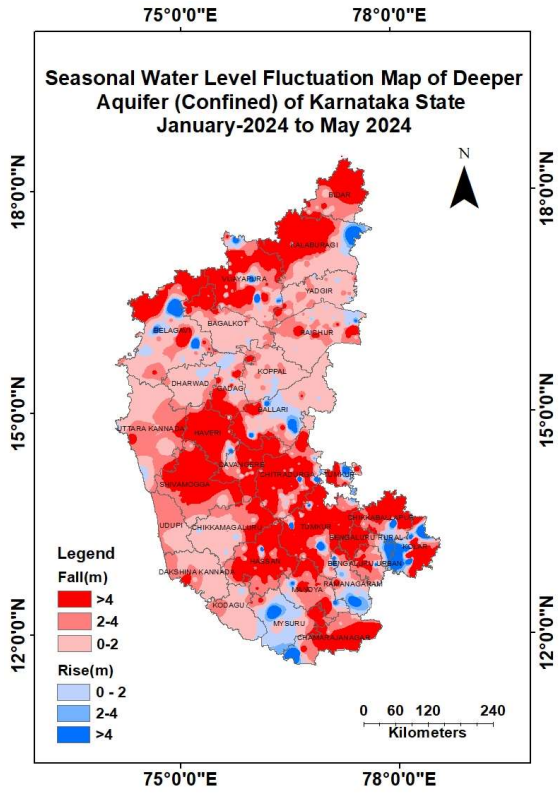
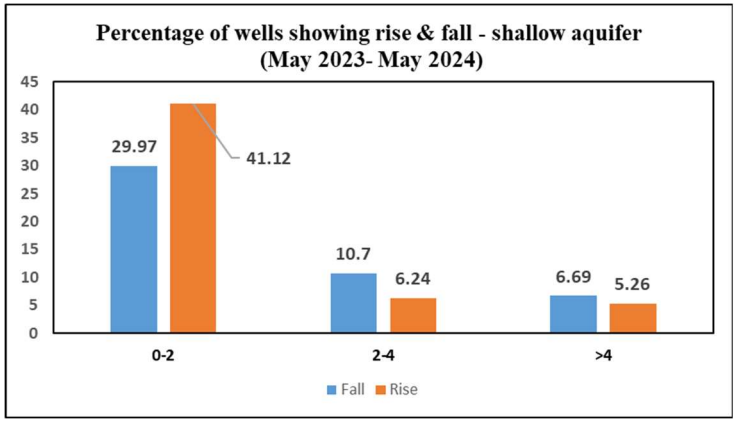


Plate IV : Seasonal Fluctuation Map of Deeper Aquifer (Semi-confined/ confined) of Karnataka State - January-2024 to May 2024

7. Change in annual water level of shallow aquifer (unconfined) - May 2023 - May 2024:

A comparison of water level shows that a rise in the water level is recorded in 52.6% of wells analysed, while 47.4% recorded fall. The Map showing fluctuation in water level of current monitoring period with May 2023 has been given in **Plate V**. 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 41.12% of wells analysed and observed in all over the District.
2. Rise in the water level in the range of 2-4 m has been observed in 6.24% of wells analysed and noted in all districts except Bagalkote, Ballari, Bengaluru Rural, Chikkaballapura, Davangere, Dharwad, Gadag, Haveri, Kolar, Koppal, Raichur, Ramanagara and Tumkur districts.
3. Rise in water level more than 4m has been observed in 5.26% of wells analysed and noted in Bagalkote, Belagavi, Bengaluru Urban, Bidar, Chamarajanagara, Chikkamagaluru, Dakshina Kannada, Dharwad, Gadag, Hassan, Haveri, Kalaburagi, Kodagu, Mandya, Mysuru, Shivamogga, Udupi, Uttara Kannada, Vijayanagar, and Vijayapura districts.
4. The fall in water level in the range of 0-2 m has been observed in 29.97% of wells analysed and noted in all the districts of state.
5. The fall in water level in the range of 2-4 m has been observed in 10.7% of wells analysed and and noted in all the districts except Bengaluru Rural and Bengaluru Urban Districts.
6. The fall in water level more than 4 m has been observed in 6.7% of wells analysed and noted in all Districts except Bengaluru Urban, Chikkaballapura, Gadag, Haveri, Ramanagara and Yadgir districts.



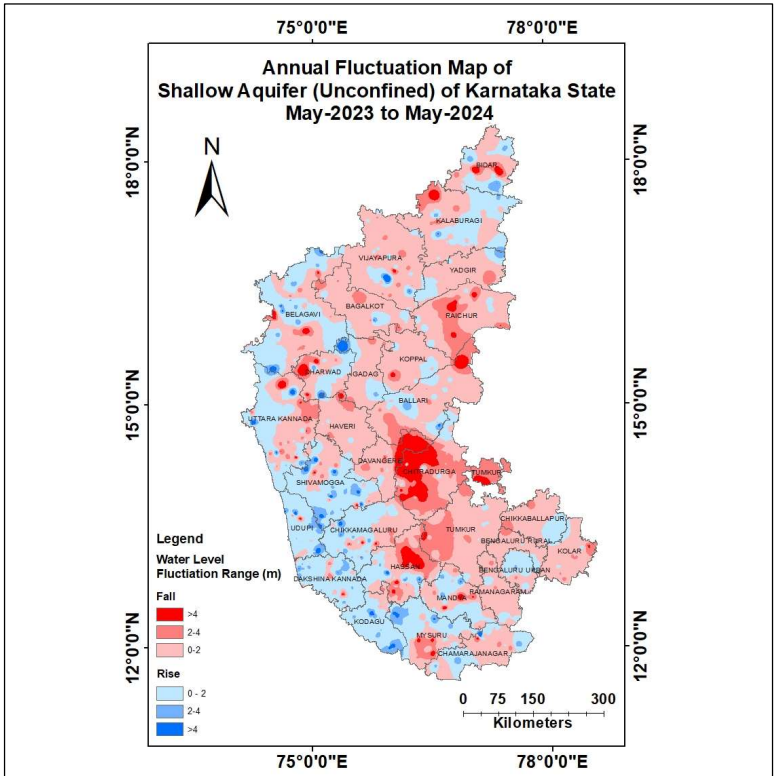
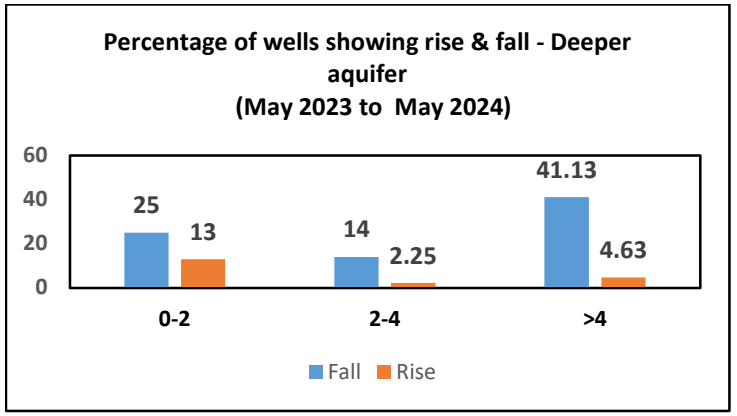


Plate V: Annual Fluctuation Map of Shallow Aquifer (Unconfined) of Karnataka State May-2023 to May-2024

8. Change in annual water level of deeper aquifer (semi-confined/ confined) – May 2023 - May 2024:

A comparison of water level shows that a rise in the water level is recorded in 20% of wells analysed, while 80% recorded fall. The fluctuation map of May 2024 with respect to May 2023 has been plotted in **Plate VI**. A perusal of the plate shows that a general fall in the range of more than 4 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 13% of wells analysed and observed in all over the District except Bidar Kodagu Raichur and Ramanagara Districts.
2. Rise in the water level in the range of 2-4 m has been observed in 2.5% of wells analysed and noted in Belagavi, Bidar, Chikkamagaluru, Chitradurga, Dakshina Kannada, Hassan, Mandya, Mysuru, Raichur, Ramanagara, Shivamogga, Tumkuru, Uttara Kannada & Vijayapura districts.
3. Rise in water level more than 4m has been observed in 4.63% of wells analysed and noted in Belagavi, Bengaluru Urban, Chikkamagaluru, Chitradurga, Gadag, Haveri, Kodagu, Kolar, Koppal, Mysuru, Raichur, Shivamogga, Vijayanagar, Vijayapura and Yadgir districts.
4. The fall in water level in the range of 0-2 m has been observed in 25% of wells analysed and reported in all the the district except Kolar district.
5. The fall in water level in the range of 2-4 m has been observed in 14% of wells analysed and and noted in all the district except Chikkamagaluru, Dakshina Kannada, Dharwad, Haveri, Kodagu and Uttara Kannada Districts.
6. The fall in water level more than 4 m has been observed in 41.13% of wells analysed and noted in all districts except Dakshina Kannada & Uttara Kannada districts.



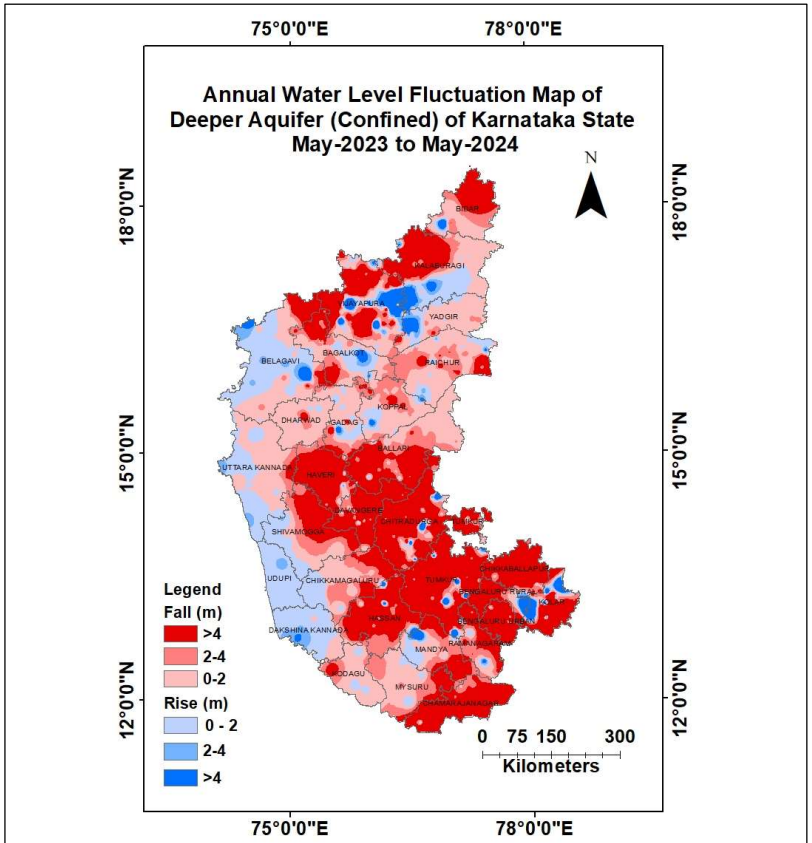


Plate VI: Annual Fluctuation Map of Deeper Aquifer (Semi-confined/confined) of Karnataka State - May-2023 to May2024

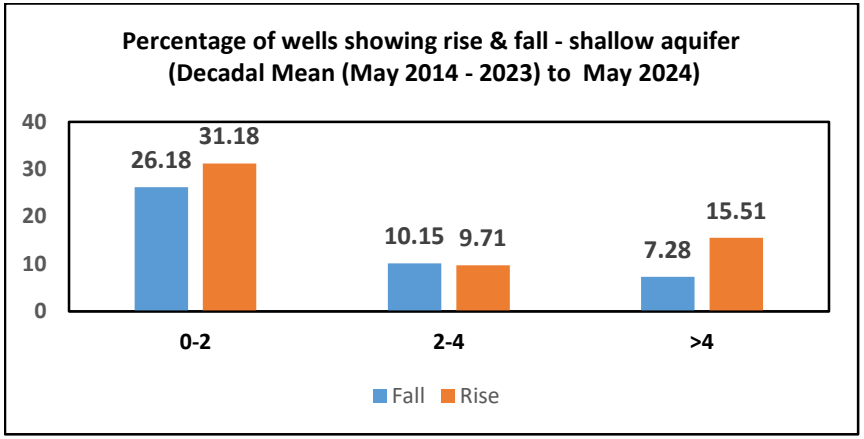
9. Decadal water level fluctuation of Shallow Aquifer (Unconfined) - Decadal mean May 2014-2023 & May 2024 of Karnataka State:

The fluctuation in water level has been plotted in **Plate VII**. A comparison of water level shows that a rise in the water level is recorded in 56.4% of wells analysed, while 43.6% 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 31.18% of wells analysed, noted all over the State.
2. Rise in the water level more than 2-4 m has been observed in 9.71% of wells analysed, noted all over the State except Kolar District.
3. Rise in the water level more than 4 m has been observed in 15.51% of wells analysed and noted in all over the State except Bangalore Rural district.
4. The fall in water level in the range of 0-2 m has been observed in 26.18% of wells analysed and noted in all over the state.
5. The fall in water level in the range of 2-4 m has been observed in 10.15% of wells analysed and noted in all over the State except Chikkaballapura & Ramanagara districts.
6. The fall in water level more than 4 m has been observed in 7.28 % of wells analysed and noted in all over the State Bengaluru Rural, Bengaluru Urban, Chikkaballapur and Koppal districts.

10. Decadal mean water levels of deeper aquifer (semi-confined/confined) for the period – May 2014-2023 & May 2024:

Due to Non-availability of Continuous 10 years data of Deeper aquifer, long-term changes in water levels between decadal mean May (2014-2023) and May 2024 of Deeper Aquifer (Semi-Confined/Confined) has not been analysed.



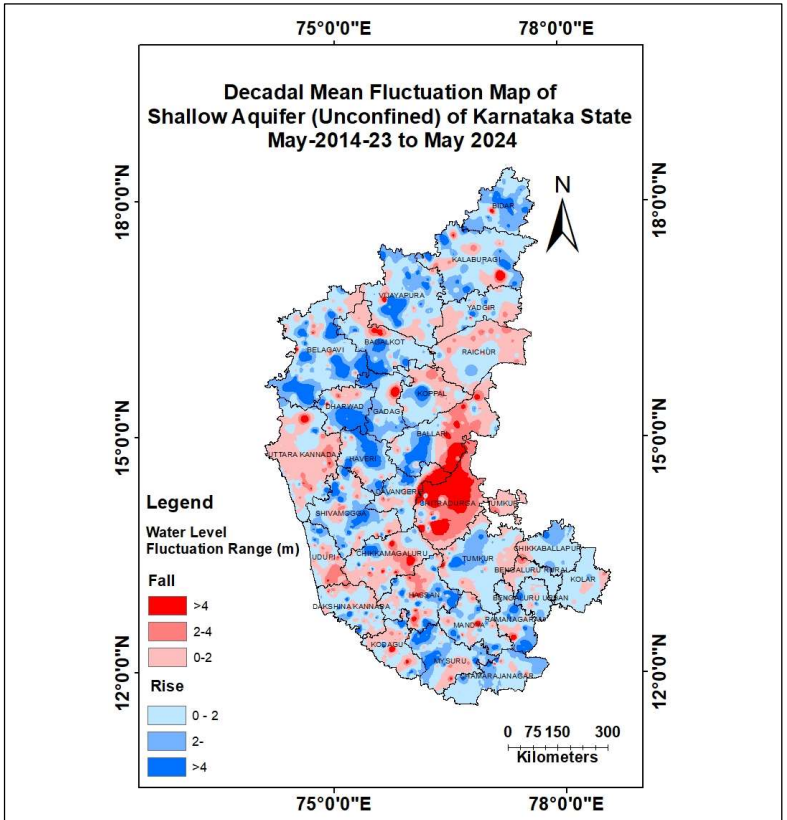


Plate VII: Decadal Mean Fluctuation Map of Shallow Aquifer (Unconfined) of Karnataka State - May-2014-23 to May 2024

11. Conclusions:

The behavior of ground water table during May 2024 in Karnataka State has been studied by analysing the water level of the dug wells and bore/tube wells. The data on water levels was analysed in detail and salient features are as under.

1. Depth to water level of Shallow aquifer (Unconfined) over major part of the State covering is within 10 m bgl in nearly 79% of wells analysed, while 21% of wells show depth to water level more than 10 m bgl.
2. In case of deeper aquifer (Semi-confined/Confined) 32% of wells have recorded depth to water level within 10 m bgl, while 33.72% of wells show depth to water level between 10 to 20 m bgl, 21.36% of bore wells show depth to water level between 20 to 40 m bgl and 10.97 % of wells have water level more than 40 m bgl.
3. Comparison of May 2024 shallow aquifer water level with Jan 2024 indicates rise in 47.9 % of the analysed wells and fall in 52.1% of wells.
4. Comparison of water level of deeper aquifer (Semi-confined/Confined) of May 2024 with Jan 2024 indicated rise in 22.4% of wells analysed and fall in 77.6% of wells analysed.
5. 52.6% of wells have recorded rise in annual fluctuation (May 2023- May 2024) and 47.4% of wells have recorded fall in water levels of Shallow aquifer (Unconfined)
6. 20% of wells have recorded rise in annual fluctuation in water levels of Deeper aquifer (Semi-confined/Confined) and 80% of wells have recorded fall in annual fluctuation in water levels during May 2023- May 2024.
7. 56.4% of wells have recorded rise in water levels and 43.6% of wells recorded fall in water levels of Shallow aquifer (Unconfined) during May 2024 in comparison to decadal mean May 2014-23 to May 2024.

12. SUMMARY

For the Pre-monsoon season, the State had received an average rainfall of 165 mm, which is 27 percent more than the normal of 130 mm. Rainfall was excess in 19 district, normal in 11 districts, deficit in 1 districts. The benefit of this excess and normal rainfall is evident in shallow aquifer. In Karnataka state 52.6% of wells indicate rise in water level during May 2024 compared to May 2023 and 56.4% of wells show rise when compared to the decadal mean water level. But the influence of rainfall is less in deeper aquifer.

13. RECOMMENDATIONS

- In order 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 normally used in faucets, aerator, shower heads and toilets.