

**GOVERNMENT OF KERALA
GROUNDWATER DEPARTMENT**

GROUNDWATER LEVEL MONITORING REPORT – SEPTEMBER 2020

Water is a replenishable natural resource which is essential for the existence of all living beings. In the past, the demand of water is mostly limited to domestic and in the agricultural sector. Due to the developments in agricultural and industrial sector the demand of water is increasing many folds since last few decades. Surface water resource alone couldn't meet the increasing demand and hence persuaded to depend on groundwater resource during the past few decades made stress on groundwater regime. In order to sustain the groundwater resources, proper groundwater management practices are needed.

Rainfall is the primary source for groundwater recharge and has a vital role in the sustainability of groundwater resource in the state. Groundwater level fluctuation results from the seasonal availability of rainfall. Kerala state experiences four distinct seasons namely winter (January-February), Pre-monsoon (March-May), Monsoon (South-West) June to September and Post-monsoon (North-East) from October to December. Average annual precipitation in the state is nearly 3000 mm. The rainfall in the State is controlled primarily by the South-West and North-East monsoons. About 90% of the rainfall occurs during six monsoon months (South-West monsoon contributes major portion of rainfall (65-70%) and about 16% from the North-East) and remaining from summer showers.

The winter rainfall (January-February) occurred in the state during 2019 is 13.1 mm, which is 46% deficient than that of the normal Rainfall (24.4 mm). The state received 169.1mm pre-monsoon rainfall during 2019, which is 55.5% deficient with that of the normal rainfall (379.70mm). During SW monsoon season 2019, the state received normal rainfall, 2309.8 mm (normal rainfall 2049.2 mm).

While the winter rainfall occurred in the state during 2020 (January - February) is 9.6mm, which is 57% deficient than that of the Normal Rainfall. But the pre-monsoon rainfall occurred in the state during 2020 is 387.5mm, which is 7% more than that of the normal rainfall in this season. During SW monsoon season 2020, the state received normal rainfall (2227.9 mm).

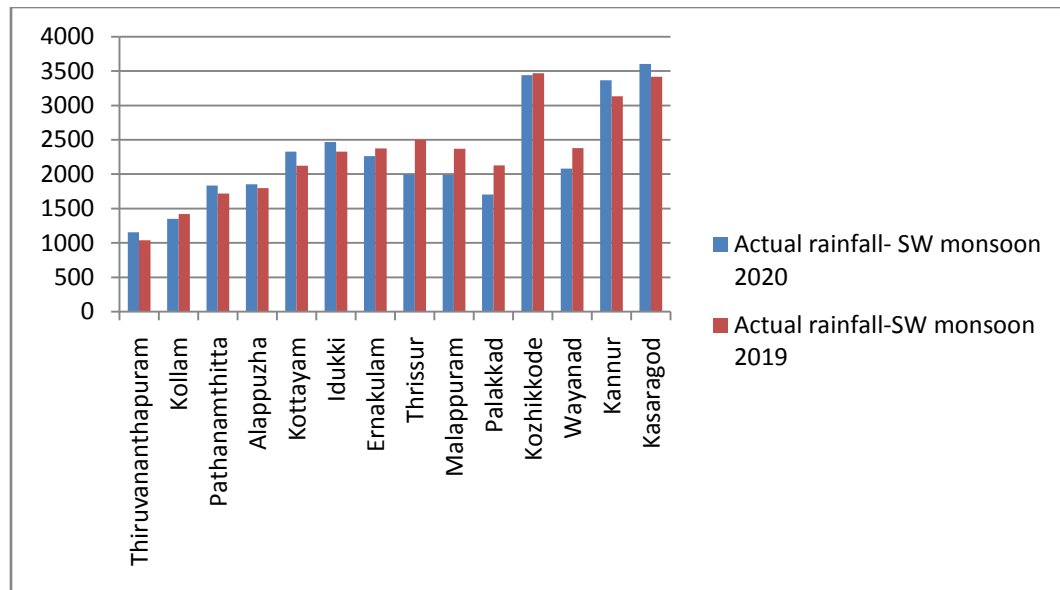


Fig:1. Comparison of actual rainfall occurred during SW monsoon 2020 wrt 2019

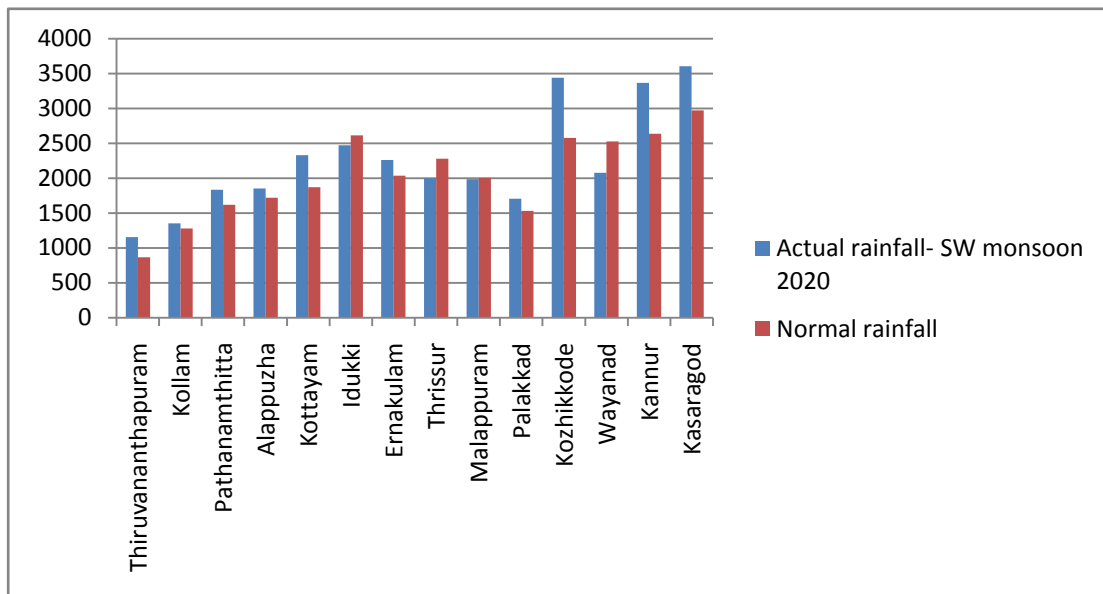


Fig:2. Comparison of actual rainfall occurred during SW monsoon 2020 wrt Normal Rainfall

Geology: Kerala, the southernmost state of Indian peninsula, is having a geographical area of 38863 km². The land area extends between latitude 8°17'30" and 12°27'40" and longitude 74°51'57" and 77°24'47". Physiographically, Kerala state is sandwiched between Western Ghats on the east and Arabian Sea on the west. Being the part of the southern Indian peninsula, the peninsular geological formations exist in the state. The major geological formations in the state

comprises crystalline rocks of Archaean Age, sedimentary rock formations of tertiary age and sub recent to recent rock formations of quaternary age.

Occurrence of Groundwater resource: Groundwater occurs under phreatic, semi-confined and confined conditions, Groundwater in unconfined aquifer is mainly utilized through tube wells in sedimentary terrain and through bore wells in hard rock areas.

Groundwater monitoring network: Short term and long term changes in the climatic conditions influence the groundwater scenario of an area. Groundwater level data are the principal information required for assessing the groundwater status and groundwater resource estimation.

Groundwater Department is maintaining a network of observation wells throughout the state representing various hydrogeological units. Observation wells includes dug wells (owned by public and private) and purpose built piezometers (bore wells and tube wells). Water level data has been collected monthly and water samples collected and analysis done periodically.

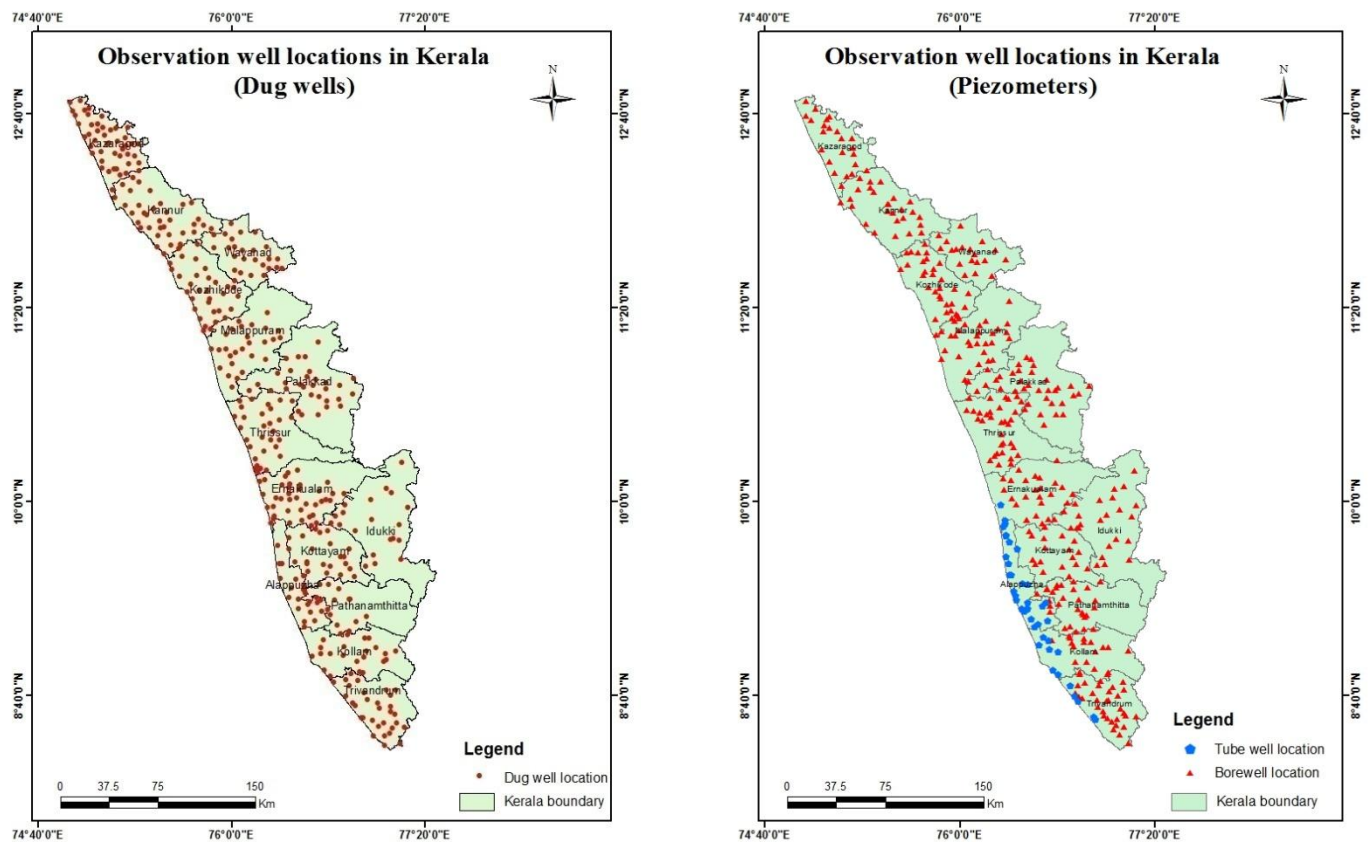


Fig:3. Location map of observation dug wells and piezometers (bore wells & tube wells)

Analysis of Groundwater level data – September 2020

During the month of September 2020, groundwater level in 364 dug wells and 373 purpose built piezometers (bore wells- 339 and tube wells – 34) has been monitored. The data collected from the observation wells during the month of September 2020 has been compared with previous year's corresponding month and also with respect to decadal mean of the corresponding month to assess the groundwater scenario in the state.

I. Depth to Groundwater level during September 2020

Dug wells- The depth to groundwater level in the observation dug wells during the month of September 2020 ranges from a minimum of -0.056 m to a maximum of 15.64mbgl. Out of 364 dug wells monitored water level in 32% of dug wells shows a depth to water level ranges from 0-2 m, 39% ranges between 2-5 m, 26% ranges between 5-10 m and 3% dug wells recorded depth to water level ranges between 10-20 mbgl. Table showing well frequency during September 2020 is appended. (Annexure-I)

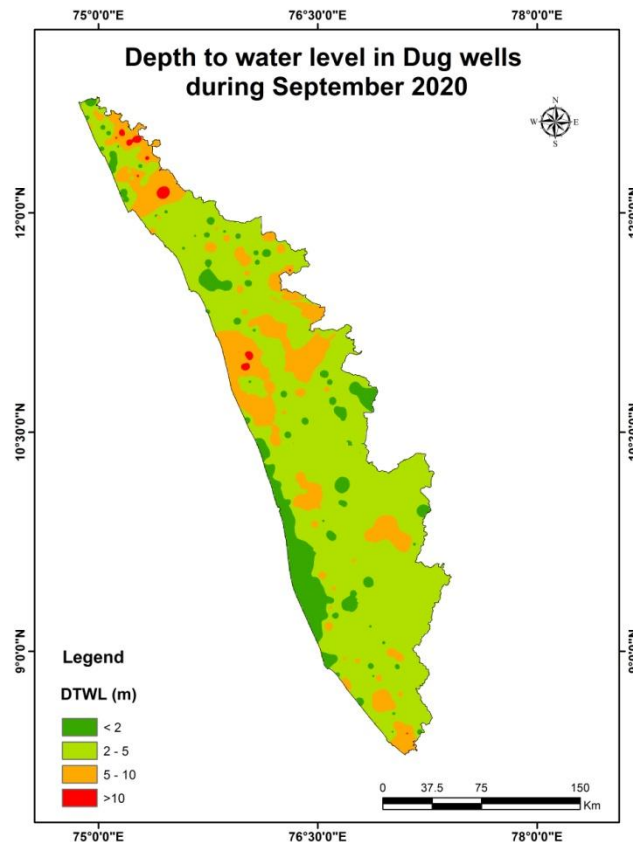


Fig:4. Depth to water level in Dug wells during September 2020

Borewells (hardrock terrain):- The depth to groundwater level in the observation bore wells during the month of September 2020 ranges from a minimum of -0.21 m to a maximum of 40.67 mbgl. Out of 339 bore wells monitored, water level in 14% of bore wells shows a depth to water level range from 0-2 m, 29 % ranges between 2-5 m, 36% ranges between 5-10 m, 17% of bore wells ranges between 10-20 m, and 4% ranges more than 20 m . Table showing well frequency during September 2020 is appended. (Annexure-I)

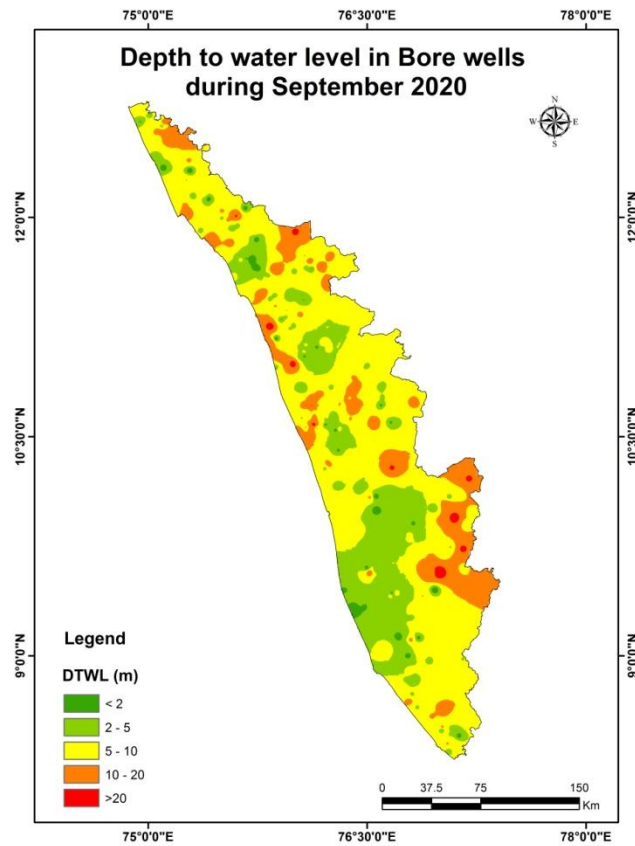


Fig:5. Depth to water level in Bore wells during September 2020

Tube wells (coastal sedimentary terrain) - The depth to groundwater level in the observation tube wells during the month of September 2020 range from a minimum of 0.18 m to a maximum of 33.77 mbgl . Out of 34 tube wells monitored in the state, water level in 32 % of tube wells shows a depth to water level range from 0-2m, 32% of tube wells ranges between 2-5 m, 27 % of tube wells ranges between 5-10 m , 3% ranges between 10-20 m and 6% ranges more than 20m. Table showing well frequency is appended.(Annexure-I)

II. Comparison of Groundwater level in September 2020 with respect to September 2019

Comparison of the groundwater level in September 2020 with respect to the corresponding month in the previous year, indicates that 62 % of observation dug wells show a fall in water level and 38 % of the wells shows no remarkable change /marginal rise in water level. Out of 62% of the dug wells shows a falling trend, 36% recorded fall in water level less than 0.5m , 23 % of dug wells show fall in the range between 0.5-1m, 16 % of dug wells show fall in the range between 1-1.5 m, 9% of dug wells show a fall in the range between 1.5 -2m, 9% dug wells show a fall in water level between 2 - 2.5m, 4% dug wells show a fall in water level between 2.5 to 3 m, 2% dug wells show a fall in water level between 3 to 3.5 m and 1% dug wells show a fall in water level more than 4 m. Table showing water level comparison of dug wells during September 2020 with respect to September 2019 is appended. (Annexure-II).

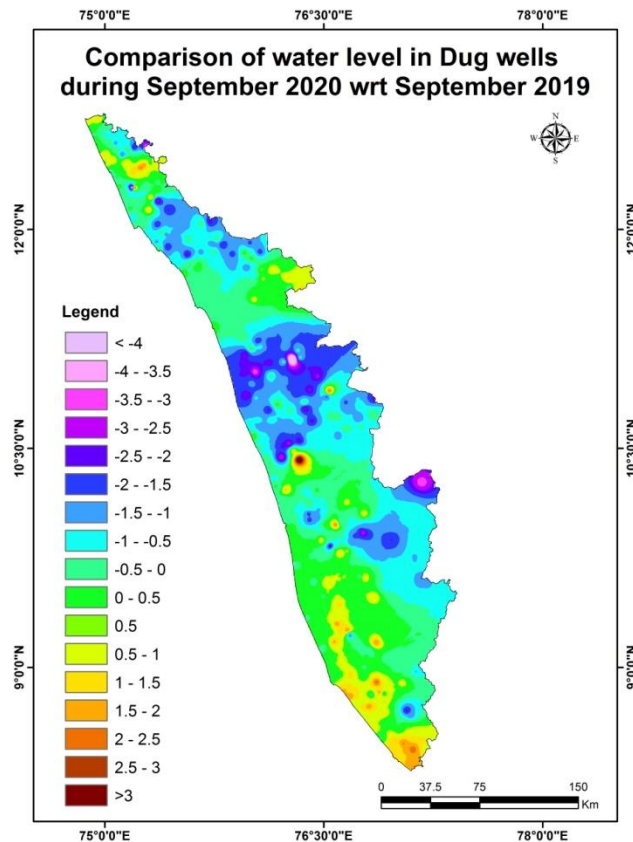


Fig:6. Comparison of water level in Dug wells during September 2020 wrt September 2019

Comparison of the water level in observation bore wells (hard rock terrain in midland and high land areas) in September 2020 with that of the previous year, it has been noticed that 68%

of bore wells show fall in water level and 32 % of the wells shows no remarkable change / marginal rise in water level. Out of 68 % of the bore wells shows a falling trend , 31 % of the bore wells recorded fall in water level less than 0.5m, 23 % show fall in the range between 0.5 - 1m, 13 % of bore wells show fall in the range between 1 - 1.5m, 10 % of bore wells show a fall in range between, 1.5-2m, 7% of bore wells show a fall in range between 2- 2.5m, 5% of bore wells show a fall in range between 2.5-3m, 5% of bore wells show a fall in range between 3.5-4m and 1% of bore wells show a fall in water level more than 4m. Table showing water level comparison of bore wells during September 2020 with respect to September 2019 is appended. (Annexure-II)

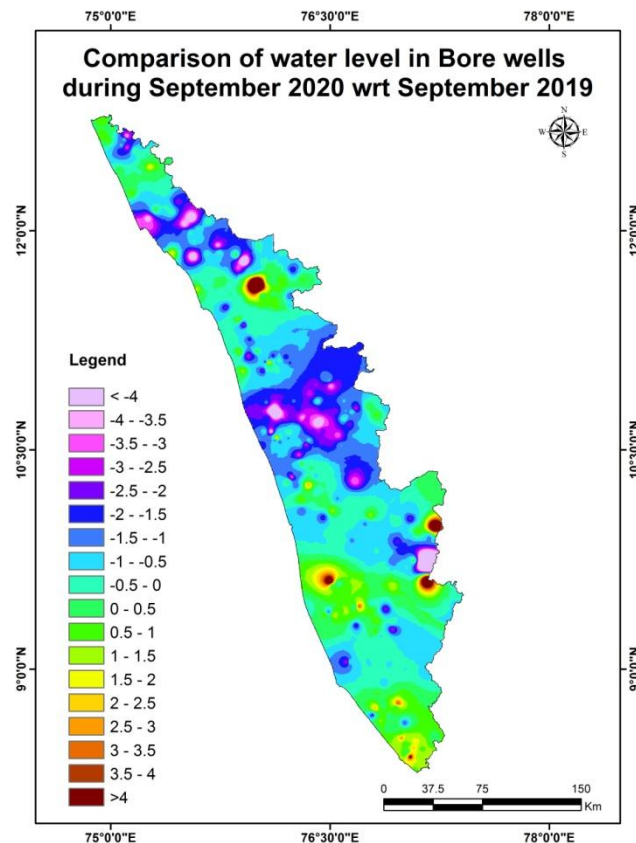


Fig:7. Comparison of water level in Bore wells during September 2020 wrt September 2019

Comparison of the water level in observation tube wells (in the coastal sedimentary areas) during September 2020 with that of the previous year reveals that 23 % of tube wells recorded a falling trend and 77 % of the wells shows no remarkable change /marginal rise of water level. Out of 23% of the tube wells showing a falling trend, 27% wells recorded fall in water level less than 0.5m, 29% wells show a fall in range between 0.5 to 1m. and 14% wells show a fall in range

between 1 to 1.5m Table showing comparison of water level during September 2020 with respect to September 2019 is appended. (Annexure-II)

III. Comparison of Groundwater level in September 2020 with respect to Decadal mean (2010- 19)

Comparison of the water level in September 2020 with respect to the decadal mean, it has been noticed that 27 % of observation dug wells recorded a fall in water level and 73% of the wells shows marginal rise /no remarkable change in water level. Out of 27% of the dugwells show a falling trend, 57% of the dug wells recorded fall in water level less than 0.5m, 29% show fall in the range between 0.5-1m, 9% of dug wells show fall in the range between 1-1.5m, 4 % of dug wells show a fall in range between 1.5-2m and 7% of dug wells show a fall in range between 2.5 - 3m. Table showing water level comparison of dug wells during September 2020 with respect to decadal mean is appended. (Annexure-III)

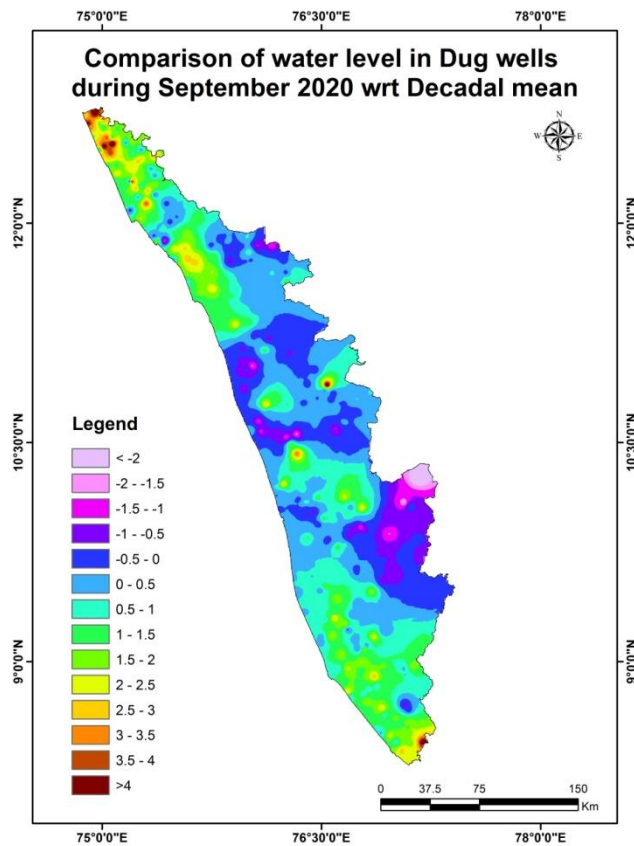


Fig:7. Comparison of water level in Dug wells during September 2020 wrt Decadal mean

Comparison of the water level in the observation bore wells during September 2020 with that of the decadal mean. It has been noticed that 44% of bore wells show fall in water level, and 56% of the wells shows marginal rise, no remarkable change in water level. Out of 44 % of the bore wells shows a falling trend , 38 % shows a fall in water level less than 0.5m, 22 % show fall in the range between 0.5 - 1m, 13% show fall in the range between 1-1.5 m, 8% of wells show a fall in range between 1.5 - 2m ,8% show a fall in range between 2-2.5 m, 2% of bore wells show a fall in range between 2.5-3 m ,3% of bore wells show a fall in range between 3-3.5m, 1% of bore wells show a fall in range between 3.5-4m and 5% of bore wells show a fall in water level more than 4 m. Table showing water level comparison of bore wells during September 2020 with respect to decadal mean is appended. (Annexure-III)

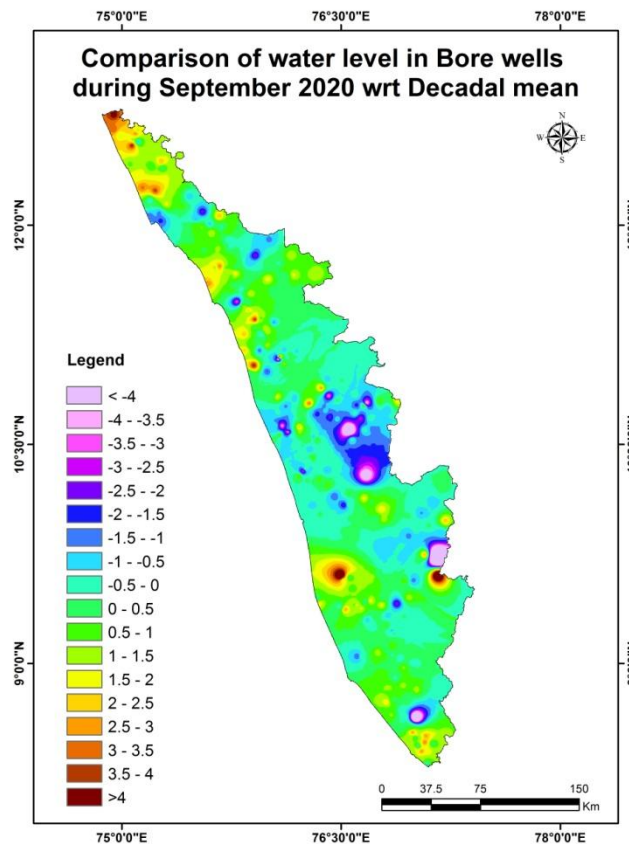


Fig:8. Comparison of water level in Bore wells during September 2020 wrt Decadal mean

Comparison of the water level in the observation tube wells during September 2020 with that of the decadal mean reveals that 21 % of tube wells recorded a falling trend and 79 % of the

tube wells show marginal rise/no remarkable change in water level. Out of 21 % of the tube wells shows a falling trend, 86% of the tube wells show fall in water level less than 0.5m and 14% of tube wells show fall in the range between 0.5 - 1m. Table showing water level comparison of tube wells during September 2020 with respect to decadal mean is appended. (Annexure-III)

Summary

Rainfall

- The state received 169.1mm pre-monsoon rainfall during 2019, which is 55.5% deficient with that of the normal rainfall (379.70mm).
- The pre-monsoon rainfall occurred in the state during 2020 is 387.5mm, which is 7% more than that of the normal rainfall in this season.
- During SW monsoon season 2020, the state received normal rainfall (2227.9 mm).

Groundwater level

- The depth to groundwater level in the observation dug wells during the month of September 2020 range from a minimum of -0.056 m to a maximum of 15.64 mbgl , in bore wells -0.21 m to a maximum of 40.67 mbgl and in the tube wells 0.18 m to a maximum of 33.77 mbgl.
- Comparison of the water level in September 2020 with respect to the previous year, reveals that 62 % of observation dug wells, 68 % of bore wells and 23% of tube wells recorded a falling trend.
- Comparison of groundwater level in September 2020 with respect to the decadal mean reveals that 27 % of observation dug wells, 44 % of bore wells and 21% of tube wells recorded a falling trend. Majority of the observation tube wells show decline in water level less than 0.5 m.
- Wells showing decline of water level more than 4 m during long term analysis will be monitored closely.
- Most of the dug wells and bore wells in the state show a decline in water level during September 2020 than that of the previous year (September 2019).

Districtwise Observation well Frequency on September 2020

Annexure I

District	Well Type	No. of WL measured	DTWL(mbgf)		Location		Depth range of wells (mts)				
			Min	Max	Min	Max	0 to 2	2 to 5	5 to 10	10 to 20	>20
Thiruvananthapuram	Dug well	23	0.55	10.35	Sarkara-Chirayinkeezhu	Perumkadavila	5	8	9	1	0
	Bore well	29	0.35	20.21	Keezharoor	Anad	3	6	14	5	1
	Tube well	4	2.88	6.45	Azhoor	Sarkara-Chirayinkeezhu	0	1	3	0	0
Kollam	Dug well	25	0.2	8.06	Yeroor	Mantrothuruth	9	9	7	0	0
	Bore well	16	0.19	9.86	Kottarakkara	Vilakudy	1	5	10	0	0
	Tube well	8	1.68	33.77	Mayanad	Mynagappally	1	1	3	1	2
Pathanamthitta	Dug well	14	0.46	5.63	Kozhancherry	Kunnamthanam	4	9	1	0	0
	Bore well	25	-0.36	13.08	Erathu	Ezhamkulam	5	7	10	3	0
Alappuzha	Dug well	19	0.056	8.37	Pazhaveedu	Kattanam	16	1	2	0	0
	Bore well	2	0.55	3.4	Venmony	Mulakkuzha	1	1	0	0	0
	Tube well	21	0.18	9.9	Thrikkunnappuzha	Mavelikkara	10	9	2	0	0
Kottayam	Dug well	12	0.12	8.24	Kumarakam	Panachikkad	4	6	2	0	0
	Bore well	24	-0.52	15.78	Erumeli North	Muttampalam	6	12	4	2	0
Idukki	Dug well	20	1.05	8.16	Udumbanchola	Kattappana	2	14	4	0	0
	Bore well	23	1.45	30.32	Udumbannoor	Peerumade	1	9	7	2	4
Ernakulam	Dug well	37	-0.07	7.82	Chellanam	Thrikkakara	13	13	11	0	0
	Bore well	20	-0.21	11.35	Assamanoor	Rayamangalam	2	11	6	1	0
	Tube well	1	9.81	9.81	Cochin	Cochin	0	0	1	0	0
Thrissur	Dug well	23	0	9.6	Valappad	Kunnamkulam	10	5	8	0	0
	Bore well	37	0.48	21.02	Madakkathara	Pariyaram	5	9	13	9	1
Malappuram	Dug well	24	0.45	12.72	Kondotty	Othukkungal	3	11	7	3	0
	Bore well	29	0.48	40.67	Wandoor	Areekode	5	10	8	3	3

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Palakkad	Dug well	31	0.19	8.45	Kalladikode	Sreekrishnapuram	7	18	6	0	0
	Bore well	33	1.12	18.95	Kuzhalmannam	Ambalapara	3	6	18	6	0
Kozhikkode	Dug well	32	0.13	9.12	Kakur	Vengery	12	12	8	0	0
	Bore well	34	-0.26	27	Ramanattukara	Nellikode	6	13	9	4	2
Wayanad	Dug well	26	0.17	11.15	Poothadi	Cheeral	8	8	9	1	0
	Bore well	19	1.4	22.02	Muttill North	Thirunelly	1	3	7	7	1
Kannur	Dug well	33	0.43	15.64	Andhur	Kooveri	10	14	8	1	0
	Bore well	27	0.44	21.91	Kooveri	Kalliad	3	5	10	8	1
Kasaragod	Dug well	45	0.02	14.77	Periya	Bandadka	13	13	13	6	0
	Bore well	21	-0.4	17.15	Beemanady	Bandadka	4	2	7	8	0

Comparison of Water level Sep 2020 with respect to Sep 2019

Annexure II

District	Well Type	No. of WL Measured	Water level	Total	0 - 0.5 m	0.5 - 1 m	1 - 1.5m	1.5 - 2 m	2 - 2.5 m	2.5 - 3 m	3 - 3.5 m	3.5 - 4 m	>4 m
					No.	No.	No.	No.	No.	No.	No.	No.	No.
Thiruvananthapuram	Dug well	23	Rise	18	5	4	4	2	3	0	0	0	0
			Fall	5	3	0	1	0	1	0	0	0	0
	Bore well	29	Rise	24	8	6	3	2	2	0	1	1	1
			Fall	5	3	0	0	2	0	0	0	0	0
	Tube well	4	Rise	2	1	0	1	0	0	0	0	0	0
			Fall	2	2	0	0	0	0	0	0	0	0
Kollam	Dug well	24	Rise	14	5	2	2	4	1	0	0	0	0
			Fall	10	8	0	1	0	0	0	0	0	1
	Bore well	14	Rise	3	1	2	0	0	0	0	0	0	0
			Fall	11	5	6	0	0	0	0	0	0	0
	Tube well	8	Rise	6	3	0	3	0	0	0	0	0	0
			Fall	2	0	1	1	0	0	0	0	0	0
Pathanamthitta	Dug well	9	Rise	4	1	1	1	1	0	0	0	0	0
			Fall	5	2	2	0	1	0	0	0	0	0
	Bore well	18	Rise	8	2	2	2	1	0	0	0	1	0
			Fall	10	4	1	1	0	2	2	0	0	0
Alappuzha	Dug well	17	Rise	13	7	2	1	1	2	0	0	0	0
			Fall	4	4	0	0	0	0	0	0	0	0
	Bore well	2	Rise	2	0	1	0	1	0	0	0	0	0
			Fall	0	0	0	0	0	0	0	0	0	0
	Tube well	18	Rise	15	12	1	0	1	1	0	0	0	0
			Fall	3	2	1	0	0	0	0	0	0	0

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Kottayam	Dug well	12	Rise	10	3	5	2	0	0	0	0	0	0
			Fall	2	2	0	0	0	0	0	0	0	0
	Bore well	23	Rise	12	3	1	5	0	0	1	0	0	2
			Fall	11	7	1	1	0	0	2	0	0	0
Idukki	Dug well	20	Rise	0	0	0	0	0	0	0	0	0	0
			Fall	20	1	8	7	1	1	1	1	0	0
	Bore well	23	Rise	6	3	1	0	0	0	0	0	0	2
			Fall	17	3	8	3	0	2	0	0	0	1
Ernakulam	Dug well	37	Rise	12	8	2	1	0	1	0	0	0	0
			Fall	25	13	6	2	3	1	0	0	0	0
	Bore well	20	Rise	5	2	0	3	0	0	0	0	0	0
			Fall	15	9	2	2	2	0	0	0	0	0
	Tube well	1	Rise	1	0	1	0	0	0	0	0	0	0
			Fall	0	0	0	0	0	0	0	0	0	0
Thrissur	Dug well	23	Rise	6	3	1	0	1	0	0	0	1	0
			Fall	17	4	6	2	0	3	1	1	0	0
	Bore well	37	Rise	5	3	1	0	0	0	1	0	0	0
			Fall	32	6	6	7	2	2	1	4	1	3
Malappuram	Dug well	24	Rise	2	2	0	0	0	0	0	0	0	0
			Fall	22	1	5	5	4	4	1	1	0	1
	Bore well	27	Rise	5	2	0	1	0	0	0	0	2	0
			Fall	22	2	5	3	8	2	1	1	0	0
Palakkad	Dug well	31	Rise	2	1	0	0	0	1	0	0	0	0
			Fall	29	7	7	6	4	2	3	0	0	0
	Bore well	33	Rise	2	1	1	0	0	0	0	0	0	0
			Fall	31	2	9	3	6	4	3	2	1	1
Kozhikkode	Dug well	17	Rise	2	2	0	0	0	0	0	0	0	0
			Fall	15	10	5	0	0	0	0	0	0	0
	Bore well	32	Rise	8	4	1	3	0	0	0	0	0	0
			Fall	24	15	5	1	0	2	1	0	0	0

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Wayanad	Dug well	26	Rise	17	8	6	3	0	0	0	0	0	0
			Fall	9	2	2	1	4	0	0	0	0	0
	Bore well	17	Rise	8	5	2	0	0	0	0	0	0	1
			Fall	9	1	3	2	1	0	0	1	0	1
Kannur	Dug well	33	Rise	7	5	0	2	0	0	0	0	0	0
			Fall	26	8	4	7	1	5	1	0	0	0
	Bore well	27	Rise	2	1	0	0	1	0	0	0	0	0
			Fall	25	9	2	4	0	2	0	2	1	5
Kasaragod	Dug well	44	Rise	23	8	7	4	2	1	0	1	0	0
			Fall	21	11	4	2	1	1	0	1	0	1
	Bore well	21	Rise	13	7	4	0	1	0	1	0	0	0
			Fall	8	2	3	0	1	0	0	1	0	1

Comparison of Water level Sep 2020 with respect to 10 yrs mean

Annexure III

District	Well Type	No. of WL Measured	Water level	Total	0 - 0.5 m	0.5 - 1 m	1 - 1.5 m	1.5 - 2 m	2 - 2.5 m	2.5 - 3 m	3 - 3.5 m	3.5 - 4 m	>4 m
					No.	No.	No.	No.	No.	No.	No.	No.	No.
Thiruvananthapuram	Dug well	23	Rise	21	1	6	3	5	4	1	0	0	1
			Fall	2	1	1	0	0	0	0	0	0	0
	Bore well	29	Rise	22	6	4	3	4	1	2	2	0	0
			Fall	7	6	0	0	0	0	0	0	0	1
	Tube well	4	Rise	3	2	0	0	0	1	0	0	0	0
			Fall	1	1	0	0	0	0	0	0	0	0
Kollam	Dug well	25	Rise	25	3	8	4	5	4	1	0	0	0
			Fall	0	0	0	0	0	0	0	0	0	0
	Bore well	16	Rise	10	2	2	6	0	0	0	0	0	0
			Fall	6	6	0	0	0	0	0	0	0	0
	Tube well	8	Rise	5	1	2	1	0	0	0	0	0	1
			Fall	3	3	0	0	0	0	0	0	0	0

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Pathanamthitta	Dug well	9	Rise	7	3	1	1	0	2	0	0	0	0
			Fall	2	2	0	0	0	0	0	0	0	0
	Bore well	18	Rise	12	5	1	2	3	0	1	0	0	0
			Fall	6	2	2	1	0	1	0	0	0	0
Alappuzha	Dug well	19	Rise	19	9	4	2	1	2	1	0	0	0
			Fall	0	0	0	0	0	0	0	0	0	0
	Bore well	2	Rise	2	1	0	0	0	0	1	0	0	0
			Fall	0	0	0	0	0	0	0	0	0	0
	Tube well	20	Rise	18	11	5	1	0	0	1	0	0	0
			Fall	2	1	1	0	0	0	0	0	0	0
Kottayam	Dug well	12	Rise	11	3	3	4	1	0	0	0	0	0
			Fall	1	0	1	0	0	0	0	0	0	0
	Bore well	23	Rise	17	6	3	4	1	1	0	1	0	1
			Fall	6	4	0	0	1	1	0	0	0	0
Idukki	Dug well	20	Rise	1	1	0	0	0	0	0	0	0	0
			Fall	19	7	8	1	2	0	1	0	0	0
	Bore well	23	Rise	9	5	0	1	0	1	1	0	0	1
			Fall	14	5	5	3	0	0	0	0	0	1
Ernakulam	Dug well	37	Rise	26	14	5	5	0	2	0	0	0	0
			Fall	11	8	3	0	0	0	0	0	0	0
	Bore well	20	Rise	13	9	2	0	2	0	0	0	0	0
			Fall	7	4	1	1	0	1	0	0	0	0
	Tube well	1	Rise	0	0	0	0	0	0	0	0	0	0
			Fall	1	1	0	0	0	0	0	0	0	0
Thrissur	Dug well	23	Rise	13	9	1	0	1	0	1	1	0	0
			Fall	10	5	1	3	1	0	0	0	0	0
	Bore well	37	Rise	10	3	4	2	0	0	1	0	0	0
			Fall	27	9	8	4	1	2	0	1	1	1

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Malappuram	Dug well	24	Rise	9	8	0	1	0	0	0	0	0	0
			Fall	15	6	8	0	1	0	0	0	0	0
	Bore well	29	Rise	13	8	1	1	1	0	0	0	0	2
			Fall	16	7	3	1	2	0	0	0	0	3
Palakkad	Dug well	31	Rise	17	11	2	2	0	0	1	0	0	1
			Fall	14	11	2	1	0	0	0	0	0	0
	Bore well	33	Rise	12	4	4	0	2	0	1	1	0	0
			Fall	21	7	6	3	1	0	1	0	1	2
Kozhikkode	Dug well	17	Rise	17	5	2	6	1	2	1	0	0	0
			Fall	0	0	0	0	0	0	0	0	0	0
	Bore well	34	Rise	29	6	8	5	3	4	1	1	0	1
			Fall	5	2	1	1	0	0	0	1	0	0
Wayanad	Dug well	26	Rise	17	9	6	1	1	0	0	0	0	0
			Fall	9	5	2	2	0	0	0	0	0	0
	Bore well	19	Rise	13	7	2	2	2	0	0	0	0	0
			Fall	6	3	1	1	0	1	0	0	0	0
Kannur	Dug well	33	Rise	24	7	2	4	3	3	4	0	1	0
			Fall	9	8	0	1	0	0	0	0	0	0
	Bore well	27	Rise	14	1	7	3	2	1	0	0	0	0
			Fall	13	4	3	3	1	1	0	0	0	1
Kasaragod	Dug well	44	Rise	43	4	4	9	5	6	6	2	2	5
			Fall	1	0	1	0	0	0	0	0	0	0
	Bore well	21	Rise	19	2	1	5	2	0	3	3	1	2
			Fall	2	1	0	1	0	0	0	0	0	0

Observation well frequency on September 2020

Abstract I

Well Type	No of WL measured	DTWL (mbgl)		Location		Depth range of wells (m)				
		min	max	min	max	0 to 2	2 to 5	5 to 10	10 to 20	>20
Dug well	364	-0.056	15.64	Pazhaveedu (Alappuzha)	Kooveri (Kannur)	116	141	95	12	0
						32%	39%	26%	3%	0%
Bore well	339	-0.21	40.67	Assamannoor (Ernakulam)	Areekode (Malappuram)	46	99	123	58	13
						14%	29%	36%	17%	4%
Tube well	34	0.18	33.77	Thrikkunnappuzha(Alappuzha)	Mynagappally (Kollam)	11	11	9	1	2
						32%	32%	27%	3%	6%

Comparison of Water level September 2020 with respect to September 2019

Abstract II

Well type	No. of WL Measured	Water level	Total	0 - 0.5 m	0.5 - 1 m	1 - 1.5 m	1.5 - 2 m	2 - 2.5 m	2.5 - 3 m	3 - 3.5 m	3.5 - 4 m	>4 m
Dug well	340	Rise	130	58	30	20	11	9	0	1	1	0
		%	38%	45%	23%	15%	8%	7%	0%	0.80%	0.80%	0%
		Fall	210	76	49	34	19	18	7	4	0	3
		%	62%	36%	23%	16%	9%	9%	4%	2%	0%	1%
Bore well	323	Rise	103	42	22	17	6	2	3	1	4	6
		%	32%	41%	21%	16%	6%	2%	3%	1%	4%	6%
		Fall	220	68	51	27	22	16	10	11	3	12
		%	68%	31%	23%	13%	10%	7%	5%	5%	1%	5%
Tube well	31	Rise	24	16	2	4	1	1	0	0	0	0
		%	77%	67%	8%	17%	4%	4%	0%	0%	0%	0%
		Fall	7	4	2	1	0	0	0	0	0	0
		%	23%	27%	29%	14%	0%	0%	0%	0%	0%	0%