GOVERNMENT OF KERALA
GROUNDWATER DEPARTMENT

GROUNDWATER LEVEL MONITORING REPORT – OCTOBER 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). During October 2019, the state received 428.1mm rainfall which is 50% excess than the normal rainfall (286.1mm).

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). And during October 2020 the state received 239.2mm rainfall which is 16% deficient than the normal rainfall.

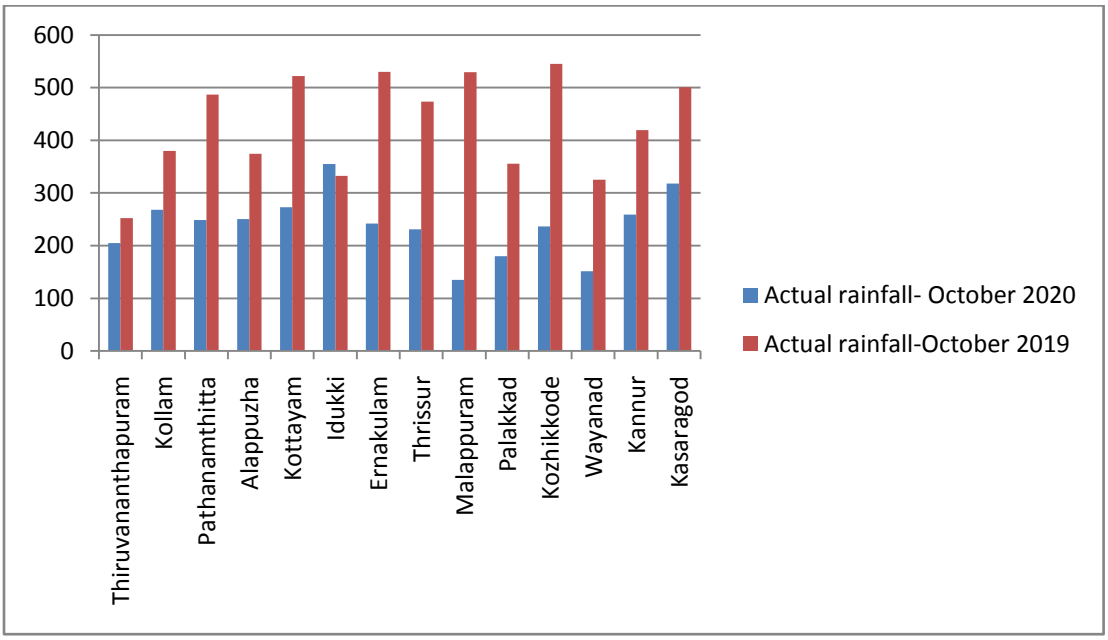


Fig:1. Comparison of actual rainfall occurred during October 2020 wrt 2019

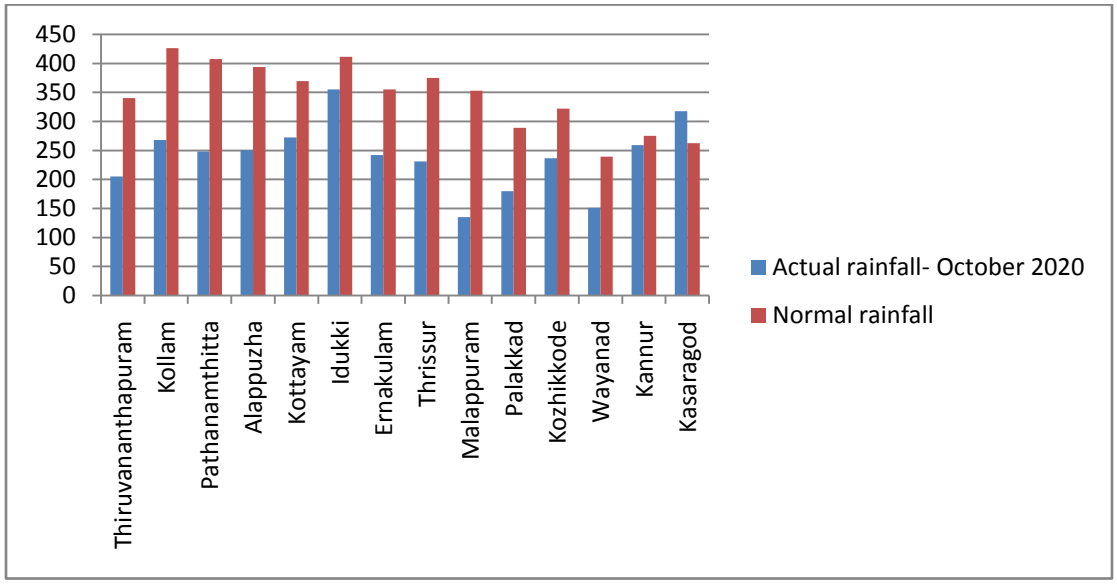


Fig:2. Comparison of actual rainfall occurred during October 2020 wrt Normal Rainfall

Geology: Kerala, the southernmost state of Indian peninsula, is having a geographical area of 38863 km^2. 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.

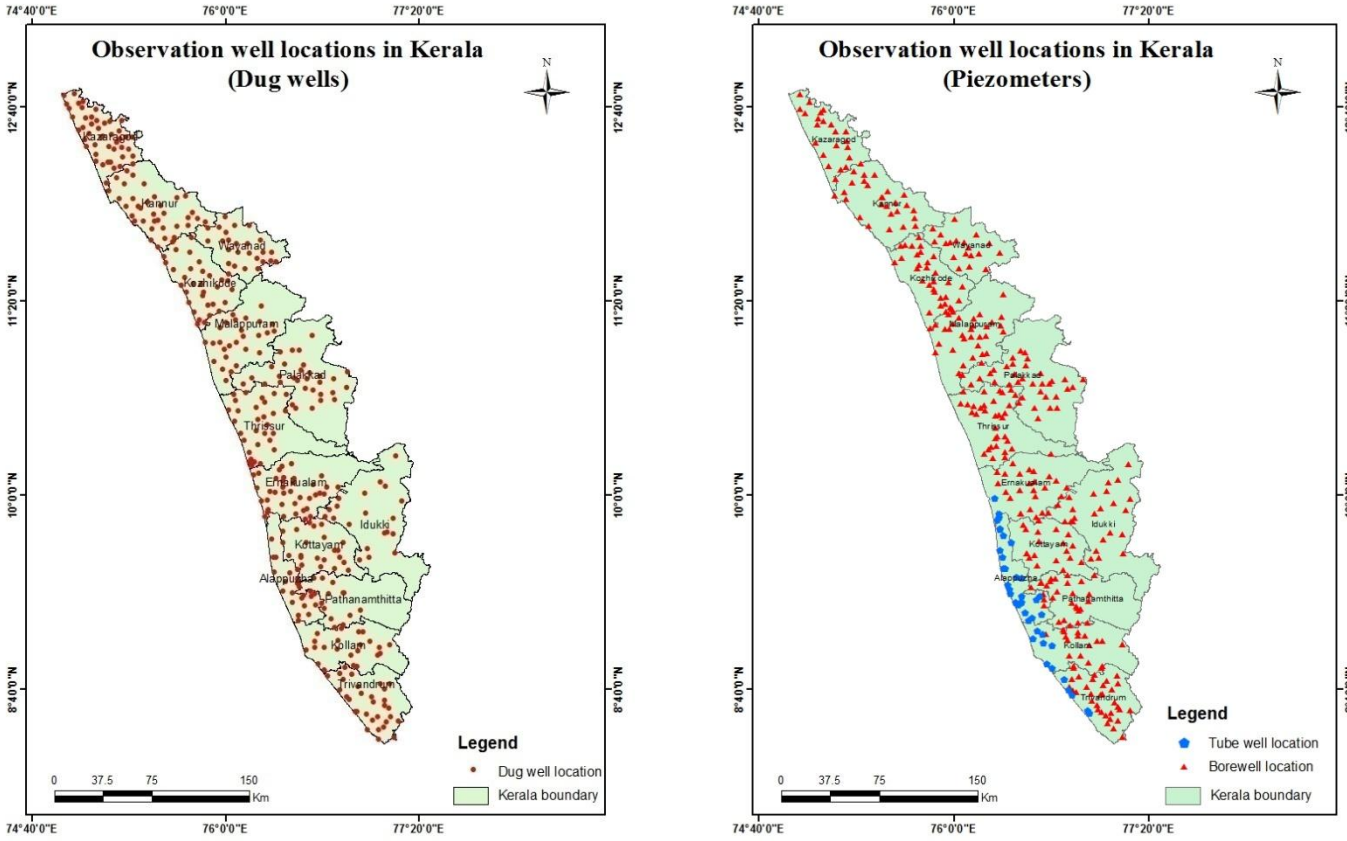


Fig:3. Location map of observation dug wells and piezometers (bore wells & tube wells)

Analysis of Groundwater level data – October 2020

During the month of October 2020, groundwater level in 381 dug wells and 375 purpose built piezometers (bore wells- 339 and tube wells – 36) has been monitored. The data collected from the observation wells during the month of October 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 October 2020

Dug wells- The depth to groundwater level in the observation dug wells during the month of October 2020 ranges from a minimum of -0.143 m to a maximum of 15.88mbgl. Out of 381 dug wells monitored water level in 26% of dug wells shows a depth to water level ranges from 0-2 m, 38% ranges between 2-5 m, 30% ranges between 5-10 m and 5% dug wells recorded depth to water level ranges between 10-20 mbgl. Table showing well frequency during October 2020 is appended. (Annexure-I)

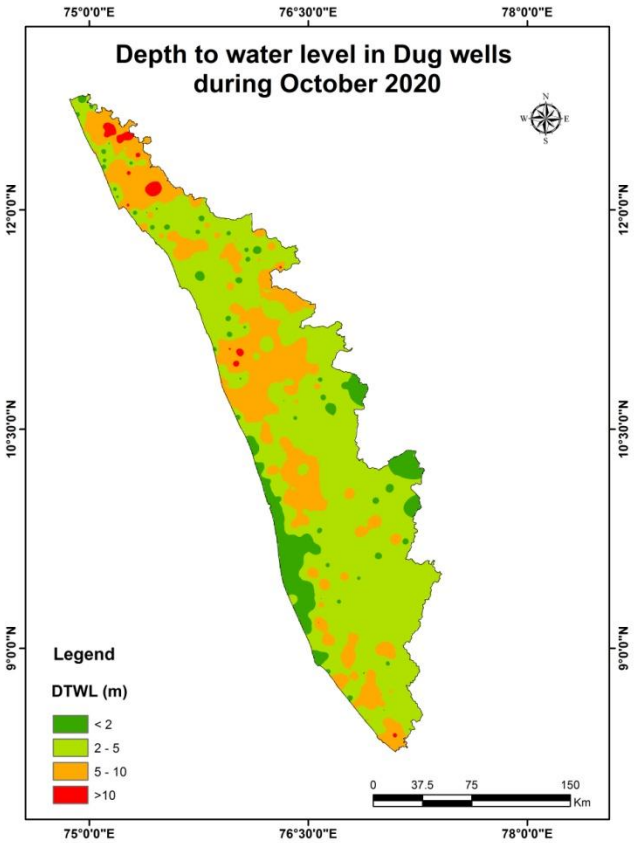
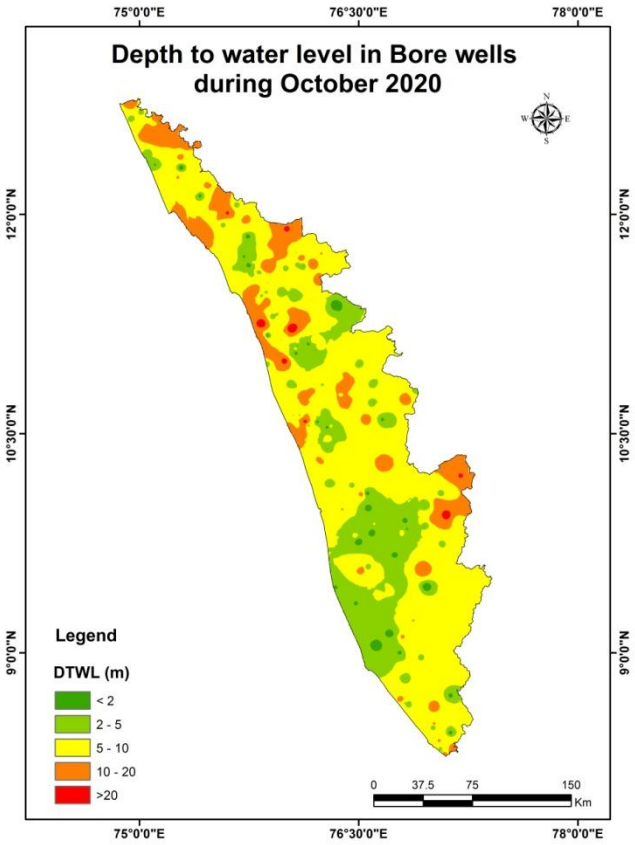


Fig:4. Depth to water level in Dug wells during October 2020

Borewells (hardrock terrain):- The depth to groundwater level in the observation bore wells during the month of October 2020 ranges from a minimum of -0.6 m to a maximum of 41.66 mbgl. Out of 339 bore wells monitored, water level in 13% of bore wells shows a depth to water level range from 0-2 m, 27 % ranges between 2-5 m, 39% ranges between 5-10 m, 19% of bore wells ranges between 10-20 m, and 3% ranges more than 20 m . Table showing well frequency during October 2020 is appended. (Annexure-I)



Fi g:5. Depth to water level in Bore wells during October 2020

Tube wells (coastal sedimentary terrain) - The depth to groundwater level in the observation tube wells during the month of October 2020 range from a minimum of 0.663 m to a maximum of 33.65 mbgl . Out of 36 tube wells monitored in the state, water level in 31 % of tube wells shows a depth to water level range from 0-2m, 31% of tube wells ranges between 2-5 m, 22 % of tube wells ranges between 5-10 m , 8% ranges between 10-20 m and 8% ranges more than 20m.Table showing well frequency is appended.(Annexure-I)

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

Comparison of the groundwater level in October 2020 with respect to the corresponding month in the previous year, indicates that 45 % of observation dug wells show a fall in water level and 55 % of the wells shows no remarkable change /marginal rise in water level. Out of 45% of the dug wells shows a falling trend, 66% recorded fall in water level less than 0.5m , 20 % of dug wells show fall in the range between 0.5-1m, 7 % of dug wells show fall in the range between 1-1.5 m, 4% of dug wells show a fall in the range between 1.5 -2m, 2% dug wells show a fall in water level between 2 - 2.5m and 0.6% dug wells show a fall in water level between 3 to 3.5 m. Table showing water level comparison of dug wells during October 2020 with respect to October 2019 is appended. (Annexure-II).

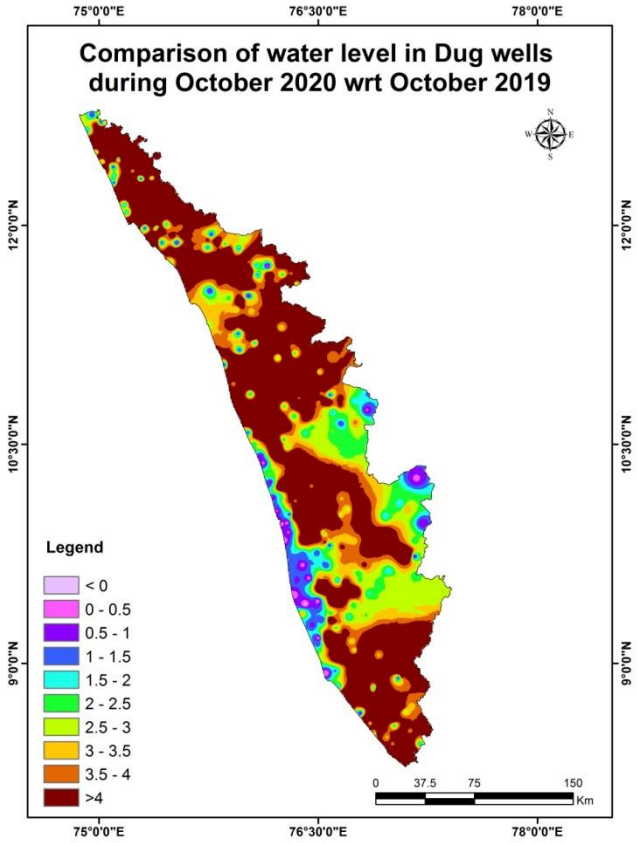


Fig:6. Comparison of water level in Dug wells during October 2020 wrt October 2019

Comparison of the water level in observation bore wells (hard rock terrain in midland and high land areas) in October 2020 with that of the previous year, it has been noticed that 44% of bore wells show fall in water level and 56 % of the wells shows no remarkable change /

marginal rise in water level. Out of 44 % of the bore wells shows a falling trend , 57 % of the bore wells recorded fall in water level less than 0.5m, 21 % show fall in the range between 0.5 - 1m, 12 % of bore wells show fall in the range between 1 - 1.5m, 3 % of bore wells show a fall in range between, 1.5-2m, 1% of bore wells show a fall in range between 2- 2.5m, 3% of bore wells show a fall in range between 2.5-3m, 0.7% of bore wells show a fall in range between 3-3.5 m, 0.7% of bore wells show a fall in range between 3.5-4m and 0.7% of bore wells show a fall in water level more than 4m. Table showing water level comparison of bore wells during October 2020 with respect to October 2019 is appended. (Annexure-II)

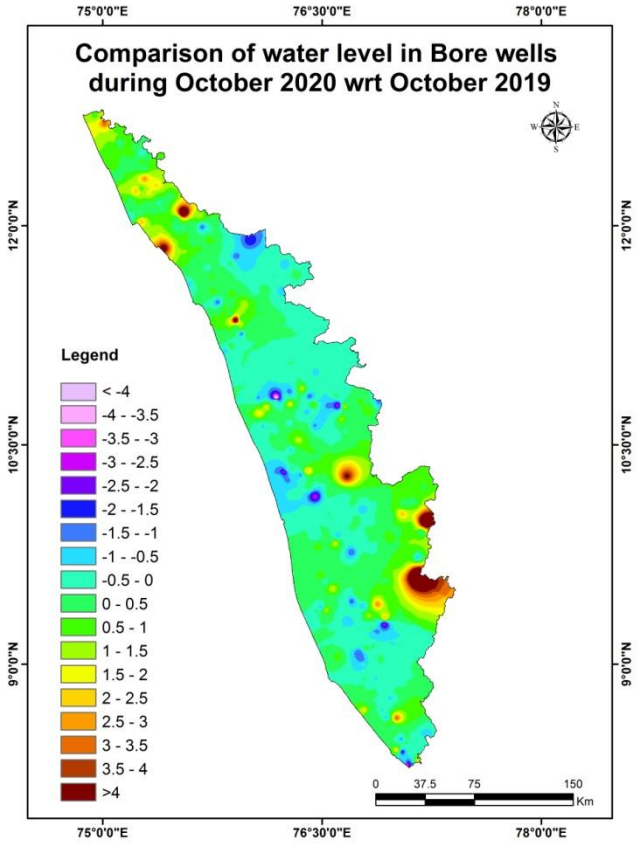


Fig:7. Comparison of water level in Bore wells during October 2020 wrt October 2019

Comparison of the water level in observation tube wells (in the coastal sedimentary areas) during October 2020 with that of the previous year reveals that 49 % of tube wells recorded a falling trend and 51 % of the wells shows no remarkable change /marginal rise of water level. Out of 49% of the tube wells showing a falling trend, 47% wells recorded fall in water level less than 0.5m, 41% wells show a fall in range between 0.5 to 1m. and 12% wells show a fall in range

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

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

Comparison of the water level in October 2020 with respect to the decadal mean, it has been noticed that 35 % of observation dug wells recorded a fall in water level and 65% of the wells shows marginal rise /no remarkable change in water level. Out of 35% of the dugwells show a falling trend, 68% of the dug wells recorded fall in water level less than 0.5m, 20% show fall in the range between 0.5-1m, 6% 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 0.7% of dug wells show a fall in range between 3 – 3.5m and 0.7% of dug wells show a fall in range between 3.5 – 4m. Table showing water level comparison of dug wells during October 2020 with respect to decadal mean is appended. (Annexure-III)

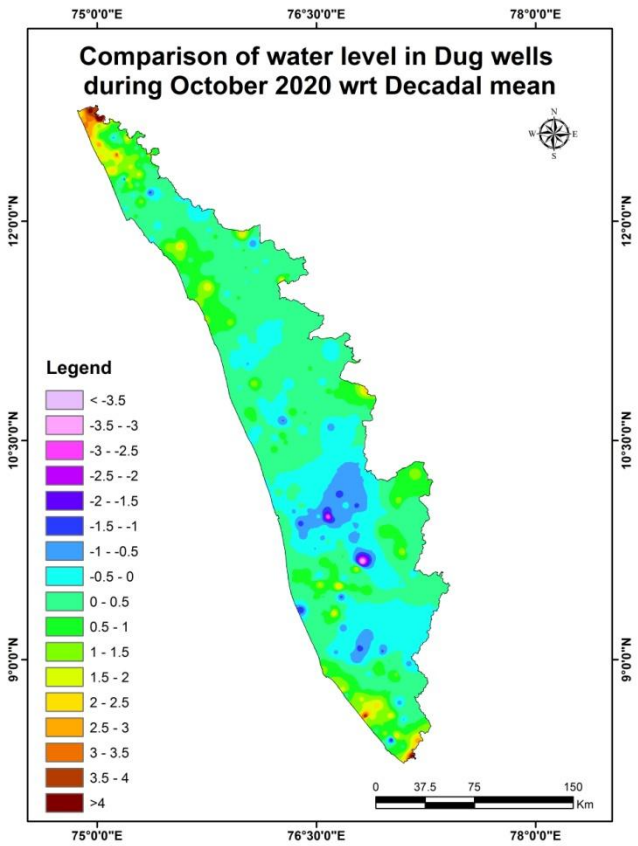


Fig:7. Comparison of water level in Dug wells during October 2020 wrt Decadal mean

Comparison of the water level in the observation bore wells during October 2020 with that of the decadal mean. It has been noticed that 39% of bore wells show fall in water level, and 61% of the wells shows marginal rise, no remarkable change in water level. Out of 39 % of the bore wells shows a falling trend , 52 % shows a fall in water level less than 0.5m, 21% show fall in the range between 0.5 - 1m, 9% show fall in the range between 1-1.5 m, 5% of wells show a fall in range between 1.5 - 2m ,2% show a fall in range between 2-2.5 m, 2% of bore wells show a fall in range between 2.5-3 m ,4% of bore wells show a fall in range between 3-3.5m, 2% of bore wells show a fall in range between 3.5-4m and 3% of bore wells show a fall in water level more than 4 m. Table showing water level comparison of bore wells during October 2020 with respect to decadal mean is appended. (Annexure-III)

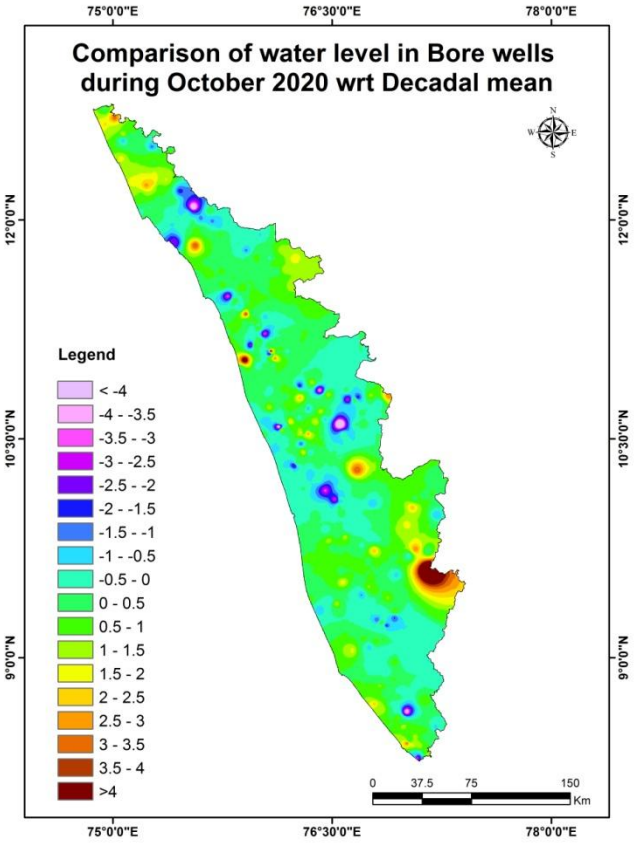


Fig:8. Comparison of water level in Bore wells during October 2020 wrt Decadal mean

Comparison of the water level in the observation tube wells during October 2020 with that of the decadal mean reveals that 34 % of tube wells recorded a falling trend and 66 % of the tube wells show marginal rise/no remarkable change in water level. Out of 34 % of the tube wells shows a falling trend, 75% of the tube wells show fall in water level less than 0.5m and 25% of tube wells show fall in the range between 0.5 - 1m. Table showing water level comparison of tube wells during October 2020 with respect to decadal mean is appended. (Annexure-III)

Summary

Rainfall

- During October 2019, the state received 428.1mm rainfall which is 50% excess than the normal rainfall (286.1mm).
- During October 2020 the state received 239.2mm rainfall which is 16% deficient than the normal rainfall.

Groundwater level

- The depth to groundwater level in the observation dug wells during the month of October 2020 range from a minimum of -0.143 m to a maximum of 15.88 mbgl , in bore wells -0.6 m to a maximum of 41.66 mbgl and in the tube wells 0.663 m to a maximum of 33.65 mbgl.
- Comparison of the water level in October 2020 with respect to the previous year, reveals that 45 % of observation dug wells, 44 % of bore wells and 49% of tube wells recorded a falling trend.
- Comparison of groundwater level in October 2020 with respect to the decadal mean reveals that 35 % of observation dug wells, 39 % of bore wells and 34% of tube wells recorded a falling trend. Majority of the observation 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 wells in the state show a decline in water level during October 2020 than that of the previous year (October 2019) due to the deficiency in rainfall.

Districtwise Observation well Frequency on October 2020 **Annexure I**

District	Well Type	No. of WL measured	DTWL(mbgl)		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	27	0.65	11.35	Sarkara-Chirayinkeezhu	Neyyattinkara	4	10	12	1	0
	Bore well	31	0.42	17.45	Peringamala (Venkolla)	Parassala	4	6	14	7	0
	Tube well	4	2.55	6.74	Azhoor	Sarkara-Chirayinkeezhu	0	2	2	0	0
Kollam	Dug well	23	-0.07	9.1	Neendakara	Mantrothuruth	6	7	10	0	0
	Bore well	16	0.55	9.63	Kottarakkara	Vilakudy	1	3	12	0	0
	Tube well	9	1.56	33.65	Mayanad	Mynagappally	1	1	2	2	3
Pathanamthitta	Dug well	14	1.39	7.77	Peringara	Kunnamthanam	4	9	1	0	0
	Bore well	25	-0.6	12.46	Erathu	Konni	3	8	12	2	0
Alappuzha	Dug well	19	-0.143	10.273	Nedumudi	Kattanam	14	3	1	1	0
	Bore well	1	1.98	1.98	Venmony	Venmony	1	0	0	0	0
	Tube well	22	0.663	17.374	Thanneermukkam	Charummoodu	10	8	3	1	0
Kottayam	Dug well	20	0.2	8.33	Kumarakam	Panachikkad	7	10	3	0	0
	Bore well	24	-0.26	16.315	Erumeli North	Muttampalam	8	9	5	2	0
Idukki	Dug well	20	0.37	7.66	Marayoor	Kattappana	6	10	4	0	0
	Bore well	22	1.26	27.17	Udumbannoor	Rajakkad	2	10	5	3	2

	Dug well	37	0	7.96	Chellanam	Thrikkakara	9	13	15	0	0
	Bore well	22	0.06	12.75	Velloorkunnam-vazhapilly	Rayamangalam	2	8	10	2	0
Ernakulam	Tube well	1	9.644	9.644	Cochin	Cochin	0	0	1	0	0
	Dug well	23	0.25	9.46	Valappad	Poyya	9	5	9	0	0
Thrissur	Bore well	37	0.044	19.087	Kolazhy	Kandanassery	5	8	18	6	0
	Dug well	27	0.86	12.42	Parappanangadi	Othukkungal	5	11	8	3	0
Malappuram	Bore well	30	0.36	41.66	Anakkayam	Areekode	5	12	7	3	3
	Dug well	31	0.4	8.48	Kozhinjampara	Sreekrishnapuram	6	16	9	0	0
Palakkad	Bore well	32	1.31	20.32	Elavancherry	Ambalapara	3	5	18	5	1
	Dug well	32	0.34	11.4	Kakur	Palayad	7	16	6	3	0
Kozhikkode	Bore well	33	0.105	28.87	Kuttiadi	Nellikode	4	11	8	8	2
	Dug well	26	0.23	11.34	Poothadi	Cheeral	6	10	9	1	0
Wayanad	Bore well	19	1.51	21.43	Muttil North	Thirunelly	1	3	7	7	1
	Dug well	36	0.15	15.88	Mangattidam	Kooveri	8	11	15	2	0
Kannur	Bore well	26	0.79	22.55	Kooveri	Kalliad	2	3	12	8	1
	Dug well	46.00	0.41	14.65	Bedadka	Bandadka	9	15	13	9	0
Kasaragod	Bore well	21	0.12	19.34	Beemanady	Bandadka	2	4	5	10	0

Comparison of Water level October 2020 with respect to October 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	25	Rise	17	9	5	1	1	1	0	0	0	0
			Fall	8	3	1	3	1	0	0	0	0	0
	Bore well	30	Rise	14	6	4	0	2	0	1	1	0	0
			Fall	16	6	6	2	0	1	0	0	1	0
	Tube well	4	Rise	3	3	0	0	0	0	0	0	0	0
			Fall	1	1	0	0	0	0	0	0	0	0
Kollam	Dug well	23	Rise	6	2	2	2	0	0	0	0	0	0
			Fall	17	10	2	1	2	2	0	0	0	0
	Bore well	14	Rise	4	4	0	0	0	0	0	0	0	0
			Fall	10	6	2	0	2	0	0	0	0	0
	Tube well	9	Rise	5	0	2	1	0	1	1	0	0	0
			Fall	4	2	1	1	0	0	0	0	0	0
Pathanamthitta	Dug well	14	Rise	2	0	2	0	0	0	0	0	0	0
			Fall	12	2	8	1	1	0	0	0	0	0
	Bore well	24	Rise	7	2	1	1	1	1	1	0	0	0
			Fall	17	10	1	3	2	0	1	0	0	0
Alappuzha	Dug well	18	Rise	6	6	0	0	0	0	0	0	0	0
			Fall	12	9	1	0	1	1	0	0	0	0
	Bore well	1	Rise	1	1	0	0	0	0	0	0	0	0
			Fall	0	0	0	0	0	0	0	0	0	0
	Tube well	21	Rise	9	7	1	1	0	0	0	0	0	0
			Fall	12	5	6	1	0	0	0	0	0	0
Kottayam	Dug well	20	Rise	14	8	3	2	0	1	0	0	0	0
			Fall	6	3	2	0	0	0	0	0	1	0
	Bore	24	Rise	18	10	4	2	2	0	0	0	0	0

	well		Fall	6	4	1	1	0	0	0	0	0	0
	Dug well	20	Rise	11	6	4	0	0	1	0	0	0	0
			Fall	9	8	1	0	0	0	0	0	0	0
	Bore well	20	Rise	13	6	4	0	0	1	0	0	0	2
Idukki			Fall	7	6	1	0	0	0	0	0	0	0
	Dug well	37	Rise	10	9	0	0	1	0	0	0	0	0
			Fall	27	17	7	2	1	0	0	0	0	0
	Bore well	21	Rise	8	8	0	0	0	0	0	0	0	0
			Fall	13	9	3	0	0	0	1	0	0	0
	Tube well	1	Rise	1	0	1	0	0	0	0	0	0	0
Ernakulam			Fall	0	0	0	0	0	0	0	0	0	0
	Dug well	23	Rise	12	8	3	0	1	0	0	0	0	0
			Fall	11	8	2	1	0	0	0	0	0	0
	Bore well	37	Rise	21	14	3	0	1	2	0	0	0	1
Thrissur			Fall	16	8	4	3	0	0	1	0	0	0
	Dug well	25	Rise	18	15	2	0	1	0	0	0	0	0
			Fall	7	6	0	1	0	0	0	0	0	0
	Bore well	29	Rise	21	10	2	2	1	1	1	0	0	4
Malappuram			Fall	8	6	1	0	0	0	1	0	0	0
	Dug well	31	Rise	13	11	1	0	1	0	0	0	0	0
			Fall	18	12	5	1	0	0	0	0	0	0
	Bore well	32	Rise	12	3	3	2	4	0	0	0	0	0
Palakkad			Fall	20	9	3	6	0	0	0	1	0	1
	Dug well	16	Rise	13	9	3	1	0	0	0	0	0	0
			Fall	3	3	0	0	0	0	0	0	0	0
	Bore well	31	Rise	23	14	6	1	1	0	0	0	0	1
Kozhikkode			Fall	8	4	2	1	1	0	0	0	0	0
	Dug well	26	Rise	7	4	1	0	1	0	0	0	1	0
Wayanad			Fall	19	15	3	0	1	0	0	0	0	0

	Bore well	19	Rise	3	3	0	0	0	0	0	0	0
			Fall	16	8	5	2	0	1	0	0	0
	Dug well	36	Rise	26	19	5	0	1	1	0	0	0
			Fall	10	9	1	0	0	0	0	0	0
	Bore well	24	Rise	18	7	4	2	1	2	0	0	2
Kannur			Fall	6	5	1	0	0	0	0	0	0
	Dug well	45	Rise	42	13	8	4	6	4	1	3	1	2
			Fall	3	2	0	1	0	0	0	0	0	0
	Bore well	21	Rise	19	4	7	4	1	1	1	1	0	0
Kasaragod			Fall	2	2	0	0	0	0	0	0	0	0

Comparison of Water level October 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.
	Dug well	27	Rise	24	8	5	3	1	3	1	1	0	2
			Fall	3	0	2	0	1	0	0	0	0	0
	Bore well	31	Rise	22	6	4	6	4	1	0	1	0	0
			Fall	9	3	4	0	0	0	0	0	1	1
	Tube well	4	Rise	4	2	1	0	1	0	0	0	0	0
Thiruvananthapuram			Fall	0	0	0	0	0	0	0	0	0	0
	Dug well	23	Rise	13	3	4	5	1	0	0	0	0	0
			Fall	10	4	3	1	2	0	0	0	0	0
	Bore well	16	Rise	3	1	2	0	0	0	0	0	0	0
			Fall	13	9	4	0	0	0	0	0	0	0
	Tube well	9	Rise	5	1	1	0	1	0	1	0	0	1
Kollam			Fall	4	2	2	0	0	0	0	0	0	0

	Dug well	12	Rise	2	2	0	0	0	0	0	0	0	0
			Fall	10	5	4	1	0	0	0	0	0	0
	Bore well	23	Rise	9	3	2	2	2	0	0	0	0	0
Pathanamthitta			Fall	14	9	1	1	3	0	0	0	0	0
	Dug well	18	Rise	17	11	4	1	0	1	0	0	0	0
			Fall	1	0	0	0	1	0	0	0	0	0
	Bore well	1	Rise	1	1	0	0	0	0	0	0	0	0
			Fall	0	0	0	0	0	0	0	0	0	0
	Tube well	21	Rise	14	10	3	0	1	0	0	0	0	0
Alappuzha			Fall	7	6	1	0	0	0	0	0	0	0
	Dug well	20	Rise	12	3	5	1	2	1	0	0	0	0
			Fall	8	5	2	0	0	0	0	0	1	0
	Bore well	24	Rise	18	6	6	2	2	2	0	0	0	0
Kottayam			Fall	6	4	1	1	0	0	0	0	0	0
	Dug well	20	Rise	8	4	1	2	1	0	0	0	0	0
			Fall	12	10	2	0	0	0	0	0	0	0
	Bore well	22	Rise	14	6	3	1	1	1	1	0	0	1
Idukki			Fall	8	7	1	0	0	0	0	0	0	0
	Dug well	37	Rise	10	9	1	0	0	0	0	0	0	0
			Fall	27	15	8	3	0	0	0	1	0	0
	Bore well	22	Rise	9	9	0	0	0	0	0	0	0	0
			Fall	13	10	0	1	0	0	0	2	0	0
	Tube well	1	Rise	0	0	0	0	0	0	0	0	0	0
Ernakulam			Fall	1	1	0	0	0	0	0	0	0	0
	Dug well	23	Rise	13	6	7	0	0	0	0	0	0	0
			Fall	10	9	0	1	0	0	0	0	0	0
	Bore well	37	Rise	23	9	3	3	4	2	1	1	0	0
Thrissur			Fall	14	6	4	2	0	1	1	0	0	0
	Dug well	27	Rise	16	13	1	2	0	0	0	0	0	0
Malappuram			Fall	11	10	1	0	0	0	0	0	0	0

	Bore well	30	Rise	20	11	5	1	0	0	0	1	0	2
			Fall	10	3	2	1	0	0	1	1	1	1
	Dug well	31	Rise	21	15	5	0	0	1	0	0	0	0
			Fall	10	9	1	0	0	0	0	0	0	0
	Bore well	32	Rise	18	10	3	3	0	1	1	0	0	0
Palakkad			Fall	14	5	4	0	2	0	0	1	1	1
	Dug well	17	Rise	15	7	3	4	1	0	0	0	0	0
			Fall	2	1	1	0	0	0	0	0	0	0
	Bore well	33	Rise	23	10	9	3	0	0	0	0	1	0
Kozhikkode			Fall	10	4	4	1	0	0	0	1	0	0
	Dug well	26	Rise	19	12	5	0	0	2	0	0	0	0
			Fall	7	6	0	1	0	0	0	0	0	0
	Bore well	19	Rise	15	7	3	4	1	0	0	0	0	0
Wayanad			Fall	4	2	1	1	0	0	0	0	0	0
	Dug well	36	Rise	24	12	8	3	0	1	0	0	0	0
			Fall	12	11	0	1	0	0	0	0	0	0
	Bore well	24	Rise	15	6	6	1	1	0	0	0	1	0
Kannur			Fall	9	4	1	1	1	1	0	0	0	1
	Dug well	45	Rise	42	10	7	8	4	5	2	2	0	4
			Fall	3	1	1	0	1	0	0	0	0	0
	Bore well	21	Rise	19	5	3	4	3	2	1	1	0	0
Kasaragod			Fall	2	0	0	2	0	0	0	0	0	0

Observation well frequency on October 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	381	-0.143	15.88	Nedumudi (Alappuzha)	Kooveri (Kannur)	100	146	115	20	0
						26%	38%	30%	5%	0%
Bore well	339	-0.6	41.66	Erathu (Pathanamthitta)	Areekode (Malappuram)	43	90	133	63	10
						13%	27%	39%	19%	3%
Tube well	36	0.663	33.65	Thanneermukkam (Alappuzha)	Mynagappally (Kollam)	11	11	8	3	3
						31%	31%	22%	8%	8%

Comparison of Water level October 2020 with respect to October 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	359	Rise	197	119	39	10	13	8	1	3	2	2
		%	55%	60%	20%	5%	7%	4%	0.50%	2%	1%	1%
		Fall	162	107	33	11	7	3	0	0	1	0
		%	45%	66%	20%	7%	4%	2%	0%	0%	0.60%	0%
Bore well	327	Rise	182	92	38	14	14	8	4	2	0	10
		%	56%	51%	21%	8%	8%	4%	2%	1%	0%	5%
		Fall	145	83	30	18	5	2	4	1	1	1
		%	44%	57%	21%	12%	3%	1%	3%	0.70%	0.70%	0.70%
Tube well	35	Rise	18	10	4	2	0	1	1	0	0	0
		%	51%	56%	22%	11%	0%	6%	6%	0%	0%	0%
		Fall	17	8	7	2	0	0	0	0	0	0
		%	49%	47%	41%	12%	0%	0%	0%	0%	0%	0%

Comparison of Water level October 2020 with respect to 10 yrs mean **Abstract III**

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	362	Rise	236	115	56	29	10	14	3	3	0	6
		%	65%	49%	24%	12%	4%	6%	1%	1%	0%	3%
		Fall	126	86	25	8	5	0	0	1	1	0
		%	35%	68%	20%	6%	4%	0%	0%	0.70%	0.70%	0%
Bore well	335	Rise	209	90	49	30	18	9	4	4	2	3
		%	61%	43%	23%	14%	9%	4%	2%	2%	0.90%	1%
		Fall	126	66	27	11	6	2	2	5	3	4
		%	39%	52%	21%	9%	5%	2%	2%	4%	2%	3%
Tube well	35	Rise	23	13	5	0	3	0	1	0	0	1
		%	66%	37%	14%	0%	9%	0%	3%	0%	0%	3%
		Fall	12	9	3	0	0	0	0	0	0	0
		%	34%	75%	25%	0%	0%	0%	0%	0%	0%	0%