

**GOVERNMENT OF KERALA  
GROUNDWATER DEPARTMENT**

**GROUNDWATER LEVEL MONITORING REPORT – DECEMBER 2020**

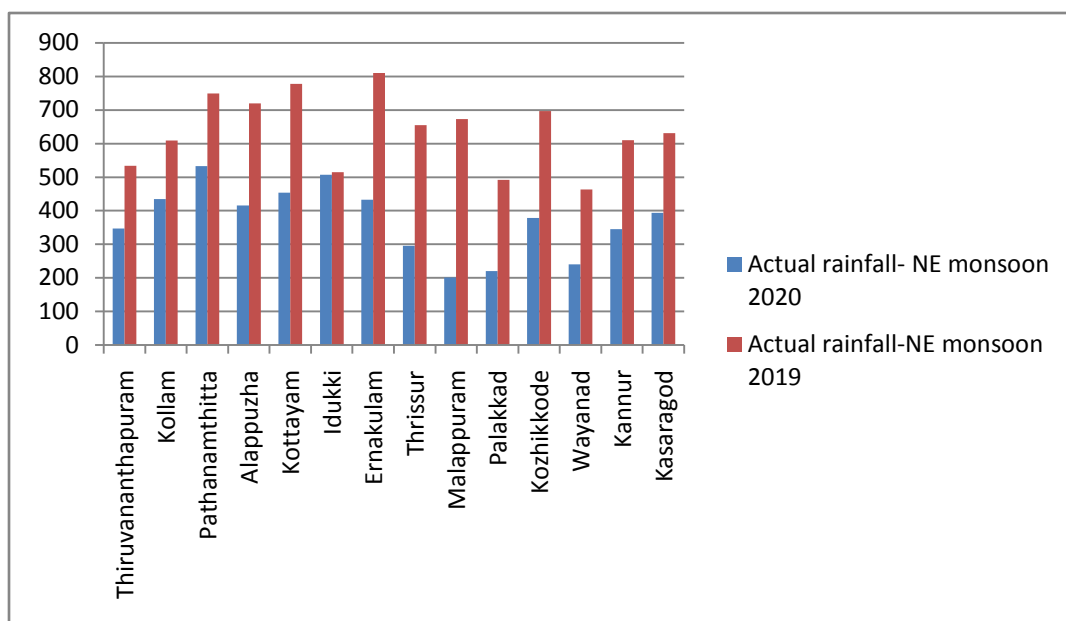
**Water** is a replenishable natural resource which is essential for the existence of all living beings. In the past, the demand of water is mostly limited to domestic and in the agricultural sector. Due to the developments in agricultural and industrial sector the demand of water is increasing many 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.

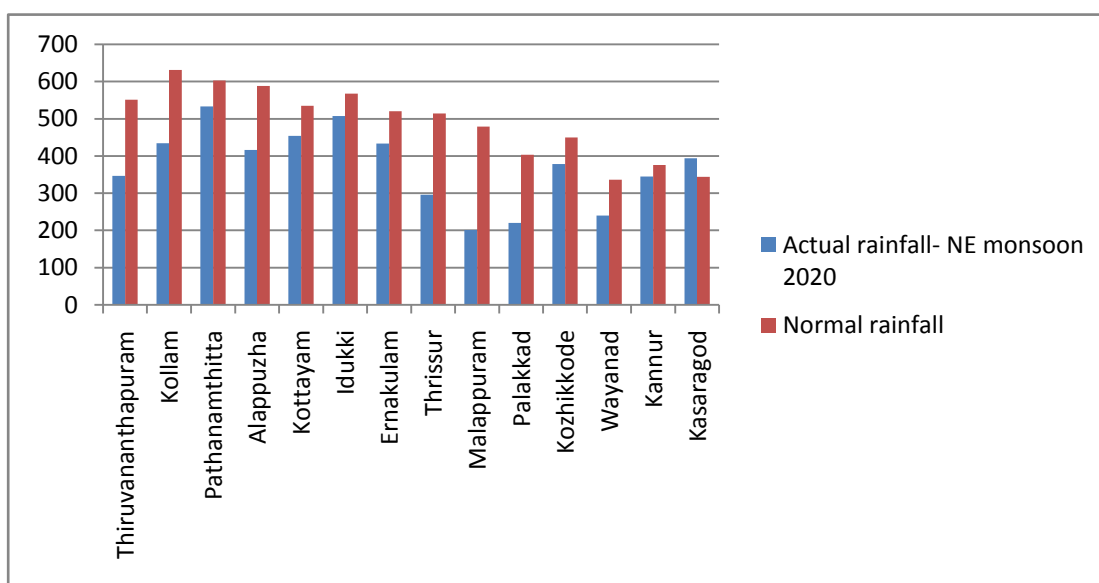
The winter rainfall (January-February) occurred in the state during 2019 is 13.1 mm, which is 46% deficient than that of the normal Rainfall (24.4 mm). The state received 169.1mm pre-monsoon rainfall during 2019, which is 55.5% deficient with that of the normal rainfall (379.70mm). During SW monsoon season 2019, the state received normal rainfall, 2309.8 mm (normal rainfall 2049.2 mm). During NE monsoon season 2019, the state received excess rainfall of 626.8 mm with a percentage departure +27 (normal rainfall 491.6 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). During NE monsoon season 2020, the state received 26% deficient rainfall than that of the normal rainfall (Actual rainfall 365.3 mm).

Most of the wells showing a declining trend during December 2020 due to the deficiency in rainfall occurred during this season than that of the previous year.



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



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

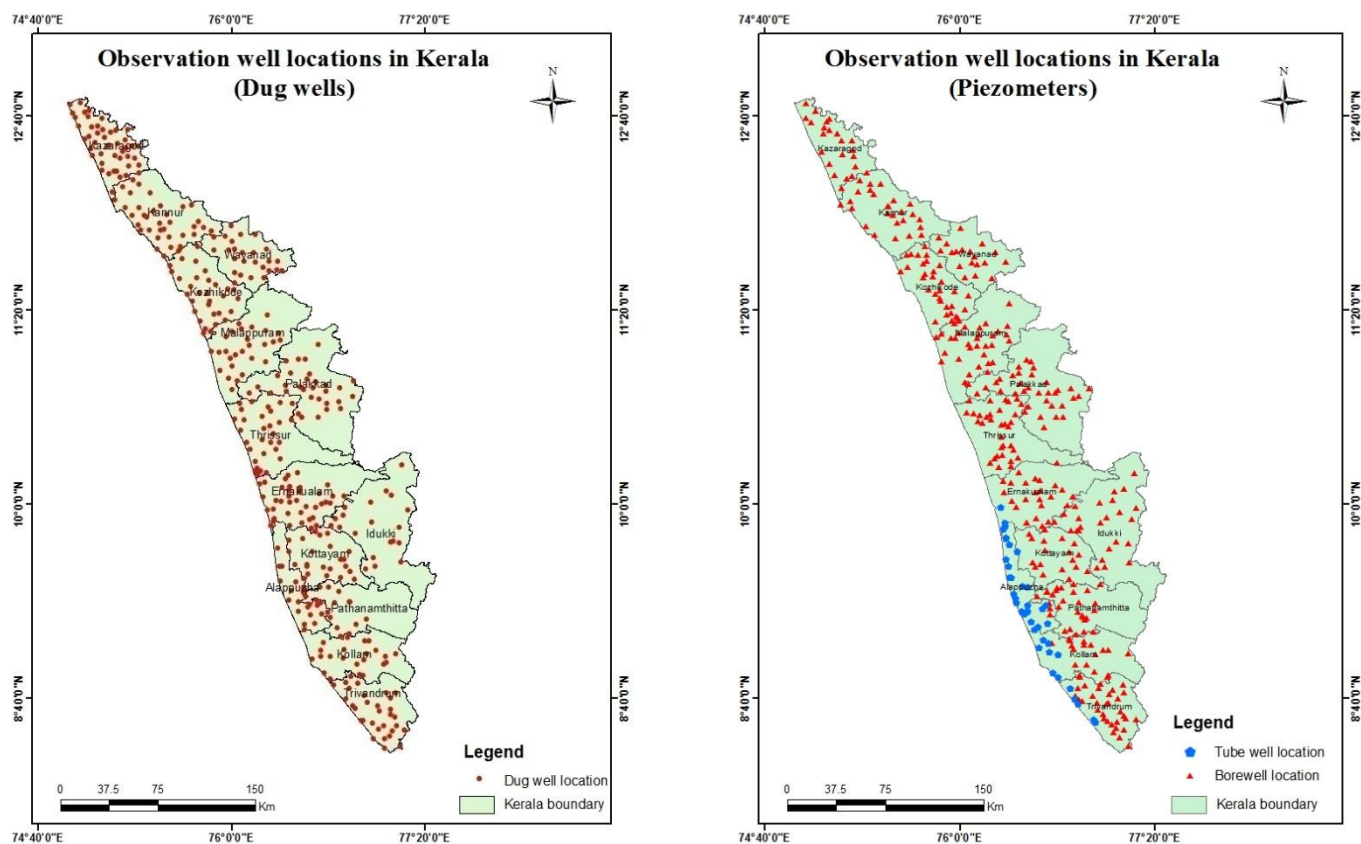
**Geology:** Kerala, the southernmost state of Indian peninsula, is having a geographical area of 38863 km<sup>2</sup>. The land area extends between latitude 8°17'30" and 12°27'40" and longitude 74°51'57" and 77°24'47". Physiographically, Kerala state is sandwiched between Western Ghats on the east 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 – December 2020

During the month of December 2020, groundwater level in 367 dug wells and 375 purpose built piezometers (bore wells- 340 and tube wells – 35) has been monitored. The data collected from the observation wells during the month of December 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 December 2020

Dug wells- The depth to groundwater level in the observation dug wells during the month of December 2020 ranges from a minimum of -0.11 m to a maximum of 17.63mbgl. Out of 367 dug wells monitored water level in 17% of dug wells shows a depth to water level ranges from 0-2 m, 35% ranges between 2-5 m, 36% ranges between 5-10 m and 12% dug wells recorded depth to water level ranges between 10-20 mbgl. Table showing well frequency during December 2020 is appended. (Annexure-I)

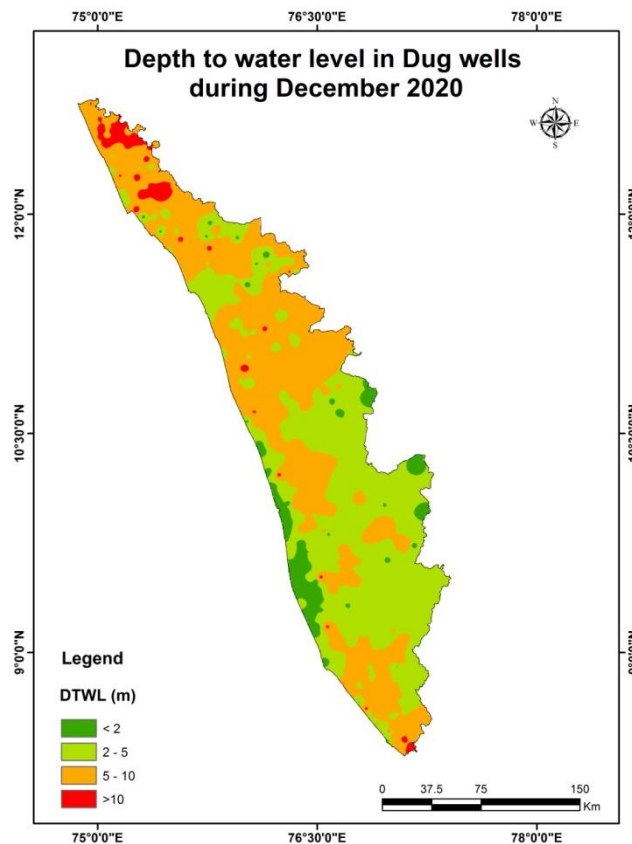
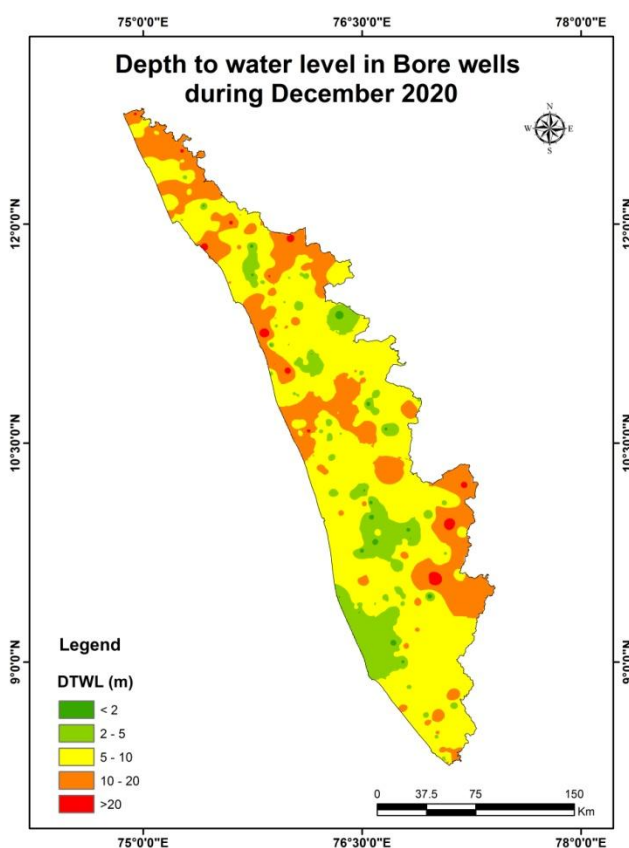


Fig:4. Depth to water level in Dug wells during December 2020

Borewells (hardrock terrain):- The depth to groundwater level in the observation bore wells

during the month of December 2020 ranges from a minimum of -0.18 m to a maximum of 41.78 mbgl. Out of 340 bore wells monitored, water level in 7% of bore wells shows a depth to water level range from 0-2 m, 22 % ranges between 2-5 m, 41% ranges between 5-10 m, 24% of bore wells ranges between 10-20 m, and 6% ranges more than 20 m . Table showing well frequency during December 2020 is appended. (Annexure-I)

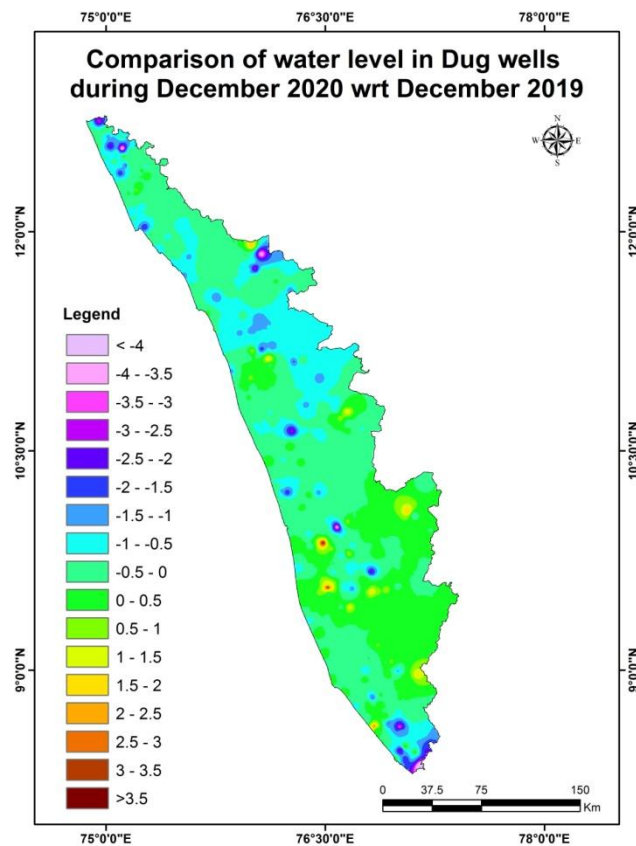


**Fig.5. Depth to water level in Bore wells during December 2020**

Tube wells (coastal sedimentary terrain) - The depth to groundwater level in the observation tube wells during the month of December 2020 range from a minimum of 0.26 m to a maximum of 33.94 mbgl . Out of 35 tube wells monitored in the state, water level in 23 % of tube wells shows a depth to water level range from 0-2m, 40% of tube wells ranges between 2-5 m, 14 % of tube wells ranges between 5-10 m , 14% ranges between 10-20 m and 9% ranges more than 20m. Table showing well frequency is appended.(Annexure-I)

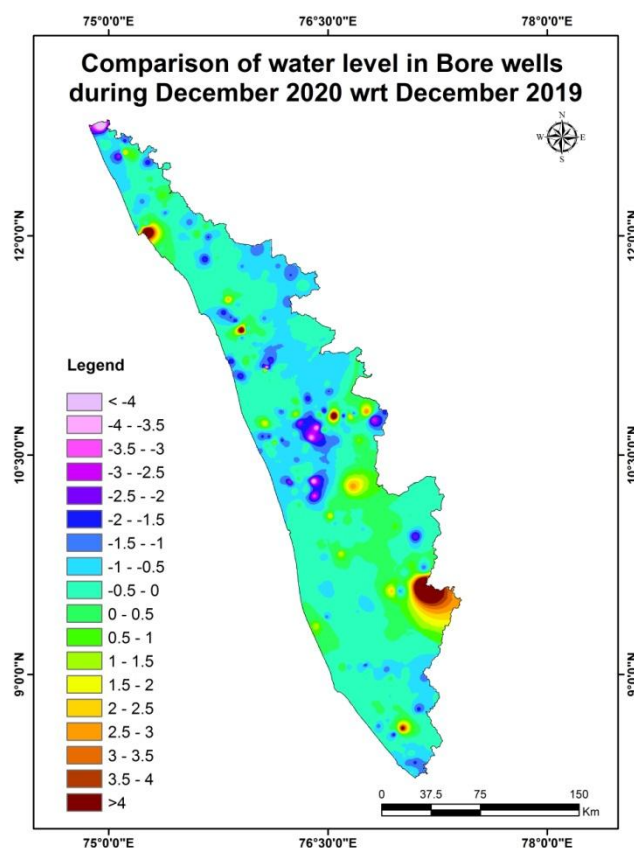
## II. Comparison of Groundwater level in December 2020 with respect to December 2019

Comparison of the groundwater level in December 2020 with respect to the corresponding month in the previous year, indicates that 73 % of observation dug wells show a fall in water level and 27 % of the wells shows no remarkable change /marginal rise in water level. Out of 73% of the dug wells shows a falling trend, 63% recorded fall in water level less than 0.5m , 22 % 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, 1% dug wells show a fall in water level between 2 - 2.5m, 2% dug wells show a fall in water level between 2.5 to 3 m, 0.07% dug wells show a fall in water level between 3 to 3.5 m, 0.03% dug wells show a fall in water level between 3.5 to 4 m and 1% dug wells show a fall in water level more than 4 m. Table showing water level comparison of dug wells during December 2020 with respect to December 2019 is appended. (Annexure-II).



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

Comparison of the water level in observation bore wells (hard rock terrain in midland and high land areas) in December 2020 with that of the previous year, it has been noticed that 76% of bore wells show fall in water level and 24 % of the wells shows no remarkable change / marginal rise in water level. Out of 76 % of the bore wells shows a falling trend , 51 % of the bore wells recorded fall in water level less than 0.5m, 20 % show fall in the range between 0.5 - 1m, 12 % of bore wells show fall in the range between 1 - 1.5m, 8 % of bore wells show a fall in range between, 1.5-2m, 5% of bore wells show a fall in range between 2- 2.5m, 2% of bore wells show a fall in range between 3-3.5 m, 0.04% of bore wells show a fall in range between 3.5-4m and 2% of bore wells show a fall in water level more than 4m. Table showing water level comparison of bore wells during December 2020 with respect to December 2019 is appended. (Annexure-II)



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

Comparison of the water level in observation tube wells (in the coastal sedimentary areas) during December 2020 with that of the previous year reveals that 48 % of tube wells recorded a falling trend and 52 % of the wells shows no remarkable change /marginal rise of water level. Out of 48% of the tube wells showing a falling trend, 75% wells recorded fall in water level less



than 0.5m, 19% wells show a fall in range between 0.5 to 1m. and 6% wells show a fall in range between 2 to 2.5m Table showing comparison of water level during December 2020 with respect to December 2019 is appended. (Annexure-II)

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

Comparison of the water level in December 2020 with respect to the decadal mean, it has been noticed that 41 % of observation dug wells recorded a fall in water level and 59% of the wells shows marginal rise /no remarkable change in water level. Out of 41% of the dugwells show a falling trend, 76% of the dug wells recorded fall in water level less than 0.5m, 12% show fall in the range between 0.5-1m, 5% of dug wells show fall in the range between 1-1.5m, 1 % of dug wells show a fall in range between 1.5-2m, 3 % of dug wells show a fall in range between 2-2.5m, 3 % of dug wells show a fall in range between 2.5- 3m , 0.07% of dug wells show a fall in range between 3.5 - 4m and 0.07% of dug wells show a fall in water level more than 4m . Table showing water level comparison of dug wells during December 2020 with respect to decadal mean is appended. (Annexure-III)

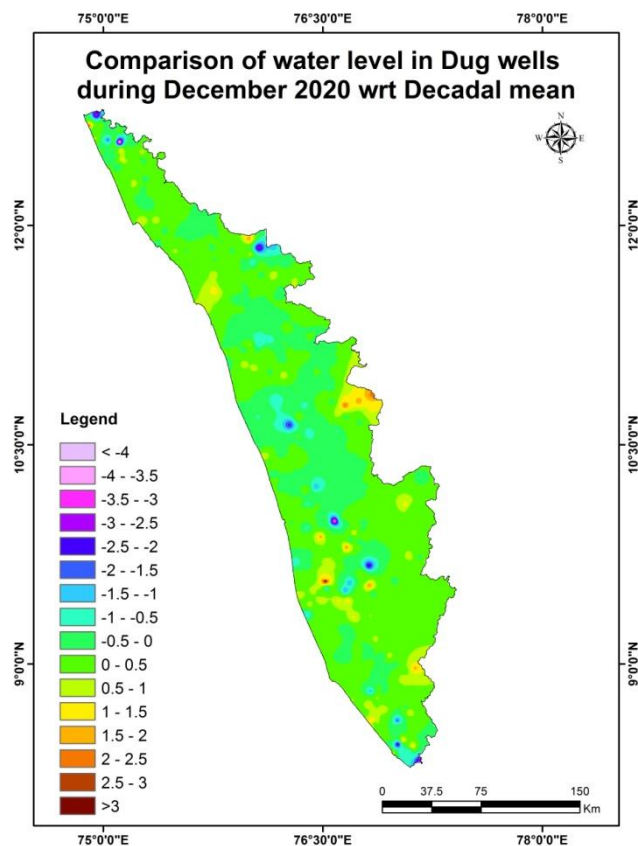
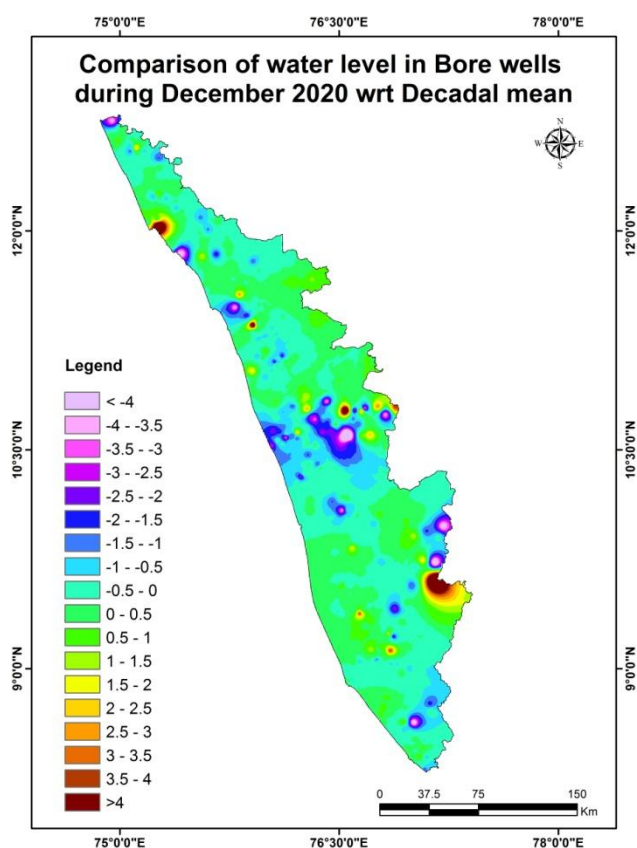


Fig:7. Comparison of water level in Dug wells during December 2020 wrt Decadal mean



Comparison of the water level in the observation bore wells during December 2020 with that of the decadal mean. It has been noticed that 55% of bore wells show fall in water level, and 45% of the wells shows marginal rise, no remarkable change in water level. Out of 55 % of the bore wells shows a falling trend , 51 % shows a fall in water level less than 0.5m, 19 % show fall in the range between 0.5 - 1m, 7% show fall in the range between 1-1.5 m, 10% of wells show a fall in range between 1.5 - 2m ,2% show a fall in range between 2-2.5 m, 4% of bore wells show a fall in range between 2.5-3 m ,0.05% of bore wells show a fall in range between 3-3.5m, 3% 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 December 2020 with respect to decadal mean is appended. (Annexure-III)



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

Comparison of the water level in the observation tube wells during December 2020 with that of the decadal mean reveals that 24 % of tube wells recorded a falling trend and 76 % of the tube

wells show marginal rise/no remarkable change in water level. Out of 24 % of the tube wells shows a falling trend, 63% of the tube wells show fall in water level less than 0.5m and 37% of tube wells show fall in the range between 0.5 - 1m. Table showing water level comparison of tube wells during December 2020 with respect to decadal mean is appended. (Annexure-III)

## **Summary**

### **Rainfall**

- During NE monsoon season 2019, the state received excess rainfall of 626.8 mm with a percentage departure +27 (normal rainfall 491.6 mm).
- During NE monsoon season 2020, the state received 365.3 mm rainfall which is 26% deficient rainfall than that of the normal rainfall.

### **➤ Groundwater level**

- The depth to groundwater level in the observation dug wells during the month of December 2020 range from a minimum of -0.11 m to a maximum of 17.63 mbgl , in bore wells -0.18 m to a maximum of 41.78 mbgl and in the tube wells 0.26 m to a maximum of 33.94 mbgl.
- Comparison of the water level in December 2020 with respect to the previous year, reveals that 73 % of observation dug wells, 76 % of bore wells and 48% of tube wells recorded a falling trend. Majority of the observation wells show decline in water level less than 0.5 m.
- Comparison of groundwater level in December 2020 with respect to the decadal mean reveals that 41 % of observation dug wells, 55 % of bore wells and 24% 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 dug wells and bore wells in the state show a decline in water level during December 2020 than that of the previous year (December 2019).

**Districtwise Observation well Frequency on December 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	0.84	14.77	Thiruvallam -Kovalam	Parassala	3	9	11	4	0
	Bore well	30	0.52	18.74	Peringamala (Venkolla)	Parassala	2	3	16	9	0
	Tube well	4	3.18	7.99	Azhoor	Sarkara-Chirayinkeezhu	0	2	2	0	0
Kollam	Dug well	24	1.08	10.2	Neendakara	Mantrothuruth	5	7	11	1	0
	Bore well	16	0.86	9.92	Kottarakkara	Vilakudy	1	2	13	0	0
	Tube well	9	2.44	33.94	Mayanad	Mynagappally	0	2	2	2	3
Pathanamthitta	Dug well	14	1.56	8.03	Kozhancherry	Kunnamthanam	3	10	1	0	0
	Bore well	25	-0.18	14.51	Erathu	Konni	3	6	13	3	0
Alappuzha	Dug well	19	-0.11	11.14	Nedumudi	Kattanam	11	7	0	1	0
	Bore well	2	3.41	4.14	Venmony	Mulakkuzha	0	2	0	0	0
	Tube well	21	0.26	17.55	Aroor	Charummoodu	8	10	1	2	0
Kottayam	Dug well	20	0.68	11.88	Kumarakam	Panachikkad	3	10	6	1	0
	Bore well	24	-0.11	17.76	Veliyannoor	Kanjirappally	5	9	7	3	0
Idukki	Dug well	20	0.45	7.58	Udumbanchola	Kattappana	5	11	4	0	0
	Bore well	23	1.42	31.54	Udumbannoor	Peerumade	2	7	7	4	3
Ernakulam	Dug well	38	0.2	8.22	Chellanam	Muvattupuzha	8	14	16	0	0
	Bore well	22	0.4	13.7	Assamanoor	Rayamangalam	3	5	12	2	0
	Tube well	1	10.82	10.82	Cochin	Cochin	0	0	0	1	0
Thrissur	Dug well	24	0.54	11.9	Nattika	Poyya	6	8	8	2	0
	Bore well	37	2.08	20.7	Madakkathara	Kandanassery	0	8	17	11	1
Malappuram	Dug well	26	1.38	12.82	Kondotty	Marakkara	1	11	11	3	0
	Bore well	29	1.34	41.78	Vazhikkadavu	Areekode	2	9	11	2	5

Groundwater level monitoring report \_ December 2020

Palakkad	Dug well	31	0.56	9.97	Kozhinjampara	Sreekrishnapuram	4	15	12	0	0
	Bore well	33	0.57	20.32	Kottayi	Ambalapara	2	7	13	10	1
Kozhikkode	Dug well	16	1.97	11.2	Perambra	Vanimel	1	7	7	1	0
	Bore well	32	0.52	29.49	Ramanattukara	Nellikode	2	10	9	7	4
Wayanad	Dug well	26	0.26	11.01	Poothadi	Cheeral	5	7	13	1	0
	Bore well	19	1.64	22.28	Muttil North	Thirunelly	1	2	6	9	1
Kannur	Dug well	36	0.94	16.21	Aralam	Kooveri	6	7	18	5	0
	Bore well	27	0.97	23.22	Vekkalam	Edakkad	2	4	9	10	2
Kasaragod	Dug well	46	2.32	17.63	Kanhangad	Kumbadaje	0	7	14	25	0
	Bore well	21	3.36	21.13	Beemanady	Bandadka	0	1	8	10	2

**Comparison of Water level December 2020 with respect to December 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	27	Rise	9	8	0	0	0	0	1	0	0	0
			Fall	18	6	5	0	3	1	1	1	0	1
	Bore well	30	Rise	7	4	2	0	0	0	0	0	0	1
			Fall	23	11	5	4	3	0	0	0	0	0
	Tube well	4	Rise	1	1	0	0	0	0	0	0	0	0
			Fall	3	2	0	0	0	1	0	0	0	0
Kollam	Dug well	24	Rise	13	10	2	0	1	0	0	0	0	0
			Fall	11	9	1	1	0	0	0	0	0	0
	Bore well	15	Rise	1	1	0	0	0	0	0	0	0	0
			Fall	14	7	4	2	0	1	0	0	0	0
	Tube well	9	Rise	2	1	0	1	0	0	0	0	0	0
			Fall	7	4	3	0	0	0	0	0	0	0

## Groundwater level monitoring report \_ December 2020

Pathanamthitta	Dug well	9	Rise	2	0	1	1	0	0	0	0	0	0
			Fall	7	6	1	0	0	0	0	0	0	0
	Bore well	10	Rise	1	1	0	0	0	0	0	0	0	0
			Fall	9	8	1	0	0	0	0	0	0	0
Alappuzha	Dug well	17	Rise	9	9	0	0	0	0	0	0	0	0
			Fall	8	5	3	0	0	0	0	0	0	0
	Bore well	1	Rise	0	0	0	0	0	0	0	0	0	0
			Fall	1	1	0	0	0	0	0	0	0	0
	Tube well	19	Rise	14	8	2	3	1	0	0	0	0	0
			Fall	5	5	0	0	0	0	0	0	0	0
Kottayam	Dug well	20	Rise	11	8	1	0	1	0	0	0	0	1
			Fall	9	3	4	1	0	1	0	0	0	0
	Bore well	24	Rise	10	5	2	1	1	1	0	0	0	0
			Fall	14	7	5	2	0	0	0	0	0	0
Idukki	Dug well	20	Rise	10	8	1	0	1	0	0	0	0	0
			Fall	10	9	1	0	0	0	0	0	0	0
	Bore well	20	Rise	9	6	2	0	0	0	0	0	0	1
			Fall	11	8	0	2	0	1	0	0	0	0
Ernakulam	Dug well	38	Rise	11	8	2	0	0	0	0	0	1	0
			Fall	27	24	1	1	0	0	0	0	1	0
	Bore well	22	Rise	8	7	0	0	0	1	0	0	0	0
			Fall	14	8	5	0	0	0	0	1	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	24	Rise	3	3	0	0	0	0	0	0	0	0
			Fall	21	15	3	1	0	1	1	0	0	0
	Bore well	37	Rise	6	4	0	0	1	0	1	0	0	0
			Fall	31	12	5	4	5	0	0	2	1	2
Malappuram	Dug well	26	Rise	8	4	2	1	1	0	0	0	0	0
			Fall	18	10	4	2	2	0	0	0	0	0

Groundwater level monitoring report \_ December 2020

	Bore well	28	Rise	8	5	1	0	0	1	0	0	0	1
			Fall	20	10	4	1	0	3	0	1	0	1
Palakkad	Dug well	31	Rise	6	4	1	0	1	0	0	0	0	0
			Fall	25	11	12	2	0	0	0	0	0	0
	Bore well	32	Rise	8	0	3	1	1	1	0	1	0	1
			Fall	24	8	5	3	4	3	0	1	0	0
Kozhikkode	Dug well	16	Rise	1	1	0	0	0	0	0	0	0	0
			Fall	15	6	4	5	0	0	0	0	0	0
	Bore well	31	Rise	6	4	0	0	0	0	1	0	0	1
			Fall	25	15	3	3	3	1	0	0	0	0
Wayanad	Dug well	26	Rise	4	2	0	1	0	1	0	0	0	0
			Fall	22	14	4	1	1	0	1	0	0	1
	Bore well	19	Rise	0	0	0	0	0	0	0	0	0	0
			Fall	19	10	4	4	1	0	0	0	0	0
Kannur	Dug well	36	Rise	1	1	0	0	0	0	0	0	0	0
			Fall	35	25	8	1	1	0	0	0	0	0
	Bore well	27	Rise	8	4	2	0	0	0	0	0	0	2
			Fall	19	11	3	3	1	1	0	0	0	0
Kasaragod	Dug well	45	Rise	10	9	1	0	0	0	0	0	0	0
			Fall	35	21	7	2	2	0	1	1	0	1
	Bore well	21	Rise	4	2	1	0	0	0	1	0	0	0
			Fall	17	7	3	2	2	1	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	27	Rise	17	7	7	2	1	0	0	0	0	0
			Fall	10	4	1	2	1	1	1	0	0	0
	Bore well	30	Rise	12	4	5	3	0	0	0	0	0	0
			Fall	18	11	4	0	2	0	0	0	0	1
	Tube well	4	Rise	3	2	1	0	0	0	0	0	0	0
			Fall	1	1	0	0	0	0	0	0	0	0
Kollam	Dug well	24	Rise	15	10	3	1	1	0	0	0	0	0
			Fall	9	9	0	0	0	0	0	0	0	0
	Bore well	16	Rise	2	2	0	0	0	0	0	0	0	0
			Fall	14	8	5	0	1	0	0	0	0	0
	Tube well	9	Rise	6	4	0	0	1	0	1	0	0	0
			Fall	3	1	2	0	0	0	0	0	0	0
Pathanamthitta	Dug well	11	Rise	8	3	2	3	0	0	0	0	0	0
			Fall	3	3	0	0	0	0	0	0	0	0
	Bore well	25	Rise	17	9	3	2	1	0	0	0	2	0
			Fall	8	6	0	0	0	1	1	0	0	0
Alappuzha	Dug well	19	Rise	13	10	3	0	0	0	0	0	0	0
			Fall	6	4	2	0	0	0	0	0	0	0
	Bore well	2	Rise	0	0	0	0	0	0	0	0	0	0
			Fall	2	2	0	0	0	0	0	0	0	0
	Tube well	20	Rise	17	13	2	1	1	0	0	0	0	0
			Fall	3	3	0	0	0	0	0	0	0	0
Kottayam	Dug well	20	Rise	11	7	1	0	1	1	0	0	0	1
			Fall	9	5	1	2	0	1	0	0	0	0
	Bore well	24	Rise	13	10	2	0	1	0	0	0	0	0



Groundwater level monitoring report \_ December 2020

	well		Fall	11	6	5	0	0	0	0	0	0	0
Idukki	Dug well	20	Rise	11	8	2	1	0	0	0	0	0	0
			Fall	9	9	0	0	0	0	0	0	0	0
	Bore well	23	Rise	12	7	2	1	1	0	0	0	0	1
			Fall	11	5	2	0	2	0	0	0	0	2
Ernakulam	Dug well	38	Rise	25	23	1	0	1	0	0	0	0	0
			Fall	13	9	2	1	0	0	0	0	1	0
	Bore well	22	Rise	10	9	1	0	0	0	0	0	0	0
			Fall	12	7	3	0	1	0	0	0	1	0
	Tube well	1	Rise	0	0	0	0	0	0	0	0	0	0
			Fall	1	0	1	0	0	0	0	0	0	0
Thrissur	Dug well	24	Rise	7	6	1	0	0	0	0	0	0	0
			Fall	17	14	2	0	0	1	0	0	0	0
	Bore well	37	Rise	8	7	0	0	0	0	1	0	0	0
			Fall	29	12	4	2	6	1	3	1	0	0
Malappuram	Dug well	26	Rise	16	11	5	0	0	0	0	0	0	0
			Fall	10	7	2	1	0	0	0	0	0	0
	Bore well	29	Rise	15	11	3	0	1	0	0	0	0	0
			Fall	14	5	3	1	1	1	2	0	1	0
Palakkad	Dug well	31	Rise	16	10	1	2	1	2	0	0	0	0
			Fall	15	10	5	0	0	0	0	0	0	0
	Bore well	33	Rise	18	4	5	2	1	1	3	0	1	1
			Fall	15	4	0	3	2	1	1	0	3	1
Kozhikkode	Dug well	16	Rise	9	6	2	1	0	0	0	0	0	0
			Fall	7	7	0	0	0	0	0	0	0	0
	Bore well	32	Rise	11	8	1	0	0	0	0	1	0	1
			Fall	21	13	4	2	0	0	1	0	0	1
Wayanad	Dug well	26	Rise	16	11	2	2	1	0	0	0	0	0
			Fall	10	5	2	2	0	0	1	0	0	0
	Bore	19	Rise	10	7	2	1	0	0	0	0	0	0

Groundwater level monitoring report \_ December 2020

	well		Fall	9	8	0	1	0	0	0	0	0	0
Kannur	Dug well	36	Rise	22	19	3	0	0	0	0	0	0	0
			Fall	14	14	0	0	0	0	0	0	0	0
	Bore well	27	Rise	16	12	1	1	0	0	0	0	0	2
			Fall	11	4	3	2	1	0	0	0	0	1
Kasaragod	Dug well	45	Rise	27	20	3	3	0	1	0	0	0	0
			Fall	18	14	1	0	1	0	1	0	0	1
	Bore well	21	Rise	10	7	1	1	0	1	0	0	0	0
			Fall	11	4	2	2	2	0	0	0	1	0

Observation well frequency on December 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	367	-	17.63	Nedumudi (Alappuzha)	Kumbadaje (Kasaragode)	61	130	132	44	0
Bore well	340	-	41.78	Erathu (Pathanamthitta)	Areekode (Malappuram)	25	75	141	80	19
Tube well	35	0.26	33.94	Aroor (Alappuzha)	Mynagappally (Kollam)	8	14	5	5	3
						23%	40%	14%	14%	9%

## Comparison of Water level December 2020 with respect to December 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	98	75	11	3	5	1	1	0	1	1
		%	27%	77%	11%	3%	5%	1%	1%	0%	1%	1%
		Fall	261	164	58	17	9	3	4	2	1	3
		%	73%	63%	22%	7%	4%	1%	2%	0.07%	0.03%	1%
Bore well	317	Rise	76	43	13	2	3	4	3	1	0	7
		%	24%	57%	17%	3%	4%	5%	4%	1%	0%	9%
		Fall	241	123	47	30	19	11	0	6	1	4
		%	76%	51%	20%	12%	8%	5%	0%	2%	0.04%	2%
Tube well	33	Rise	17	10	2	4	1	0	0	0	0	0
		%	52%	59%	12%	24%	6%	0%	0%	0%	0%	0%
		Fall	16	12	3	0	0	1	0	0	0	0
		%	48%	75%	19%	0%	0%	6%	0%	0%	0%	0%

## Comparison of Water level December 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	363	Rise	213	151	36	15	6	4	1	0	0	0
		%	59%	71%	17%	7%	3%	2%	0.04%	0%	0%	0%
		Fall	150	114	18	8	2	3	3	0	1	1
		%	41%	76%	12%	5%	1%	3%	3%	0%	0.07%	0.07%
Bore well	340	Rise	154	97	26	11	5	2	4	1	3	5
		%	45%	63%	17%	7%	4%	1%	3%	0.06%	2%	3%
		Fall	186	95	35	13	18	4	8	1	6	6
		%	55%	51%	19%	7%	10%	2%	4%	0.05%	3%	3%
Tube well	34	Rise	26	19	3	1	2	0	1	0	0	0
		%	76%	73%	11%	4%	8%	0%	4%	0%	0%	0%
		Fall	8	5	3	0	0	0	0	0	0	0
		%	24%	63%	37%	0%	0%	0%	0%	0%	0%	0%