GOVERNMENT OF KERALA

GROUNDWATER DEPARTMENT

NATIONAL HYDROLOGY PROJECT

GROUNDWATER LEVEL MONITORING REPORT

July 2020

GOVERNMENT OF KERALA
GROUNDWATER DEPARTMENT

GROUNDWATER LEVEL MONITORING REPORT – JULY 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 June-July 2019, the state received 868.7 mm rainfall, which is 27% deficient than that of the actual rainfall (1185.6mm).

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 June-July 2020 the state received 919.9 mm rainfall, which is 22% deficient than that of the actual rainfall.

Most of the wells in the state get recharged in this year than the previous year from the sufficient rainfall occurred during the pre-monsoon as well as from the monsoon months.

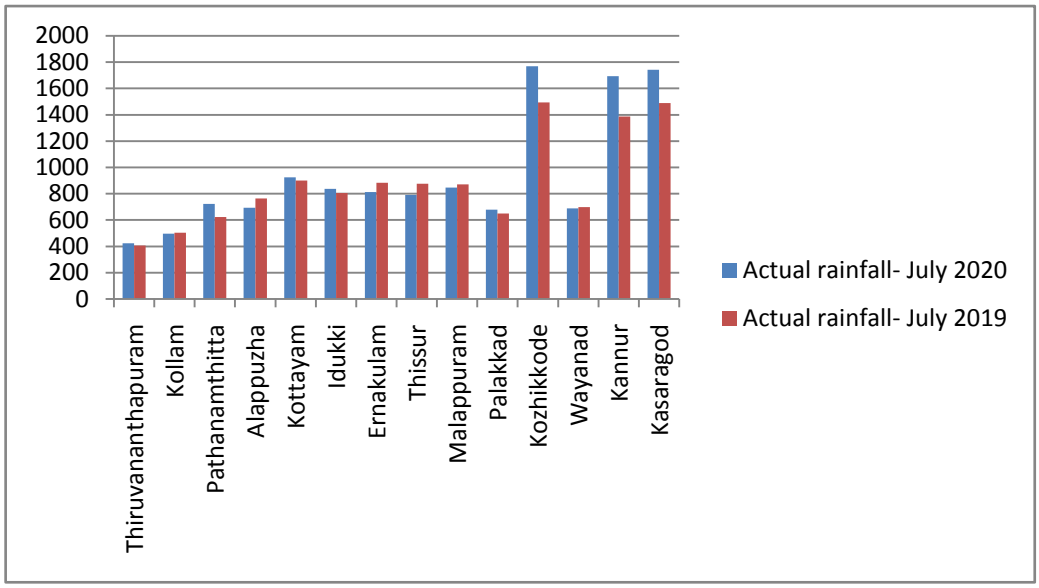


Fig:1. Comparison of actual rainfall occurred during July 2020 wrt 2019

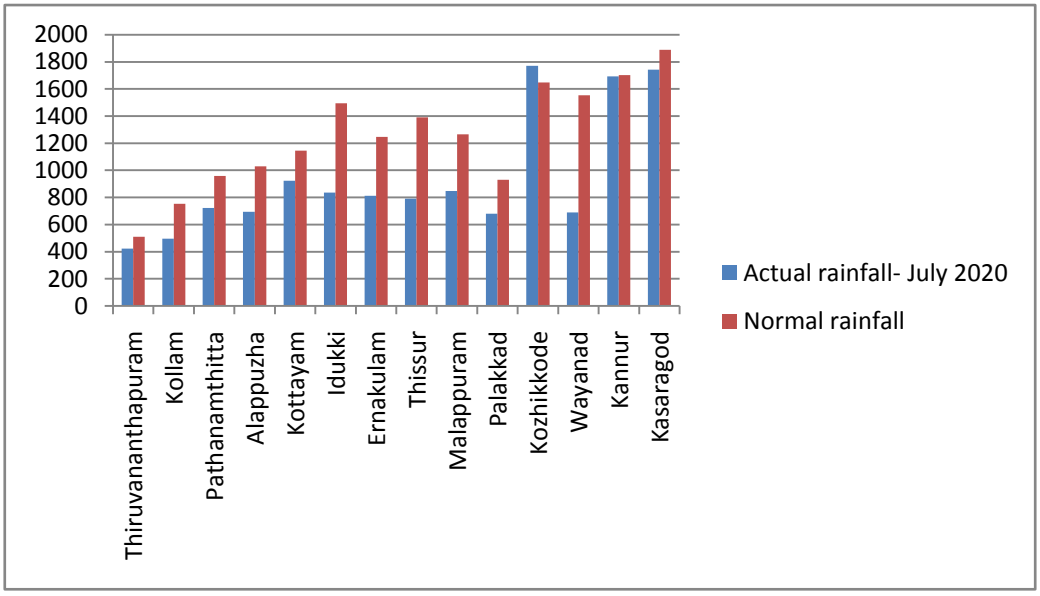


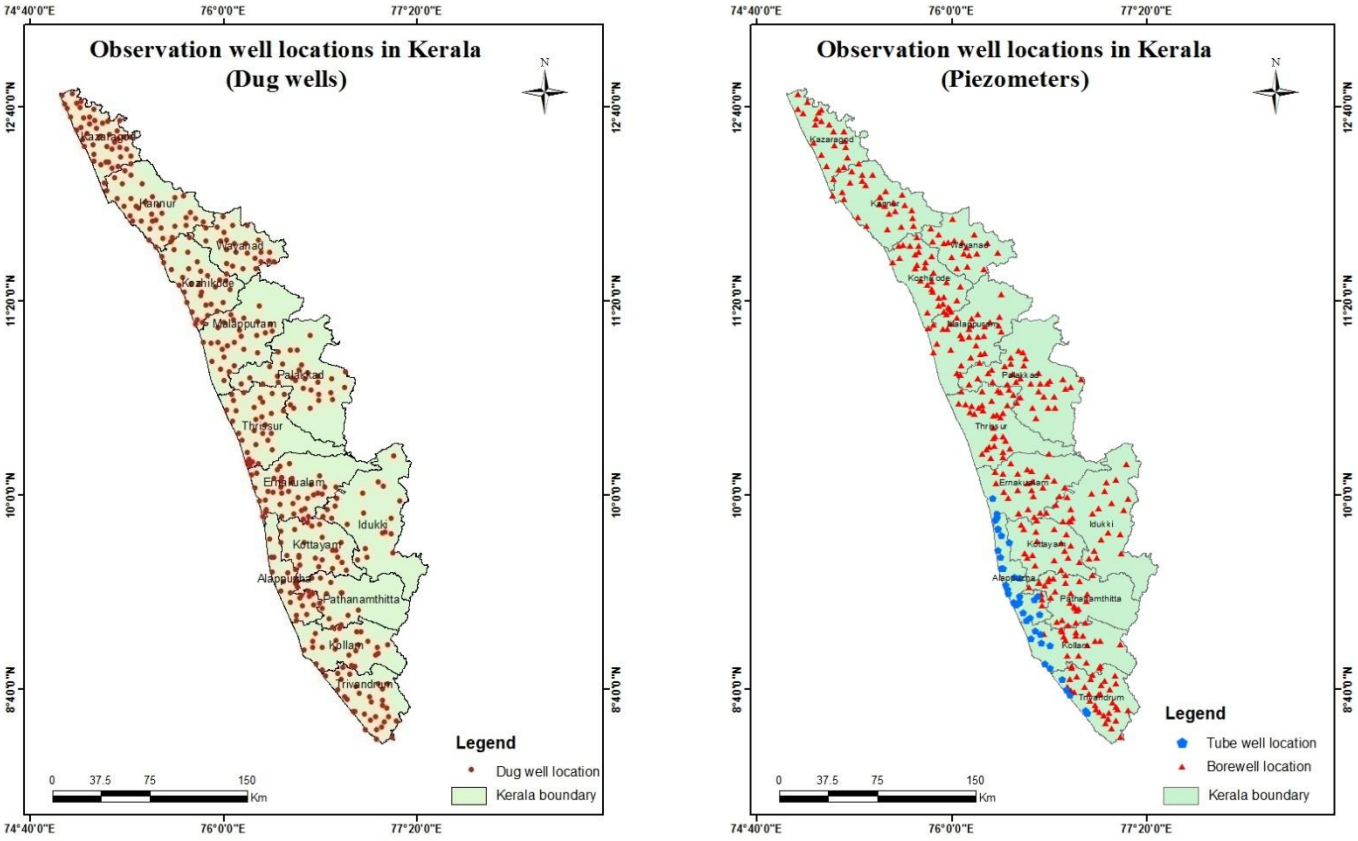
Fig:2. Comparison of actual rainfall occurred during July 2020 wrt Normal Rainfall

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 – July 2020

During the month of July 2020, groundwater level in 351 dug wells and 352 purpose built piezometers (bore wells- 335 and tube wells – 17) has been monitored. The data collected from the observation wells during the month of July 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 July 2020

Dug wells- The depth to groundwater level in the observation dug wells during the month of July 2020 ranges from a minimum of -0.02 m to a maximum of 14.89 mbgl. Out of 351 dug wells monitored water level in 29% of dug wells shows a depth to water level ranges from 0-2 m, 35% ranges between 2-5 m, 32% ranges between 5-10 m and 4% dug wells recorded depth to water level ranges between 10-20 mbgl. Table showing well frequency during July 2020 is appended. (Annexure-I)

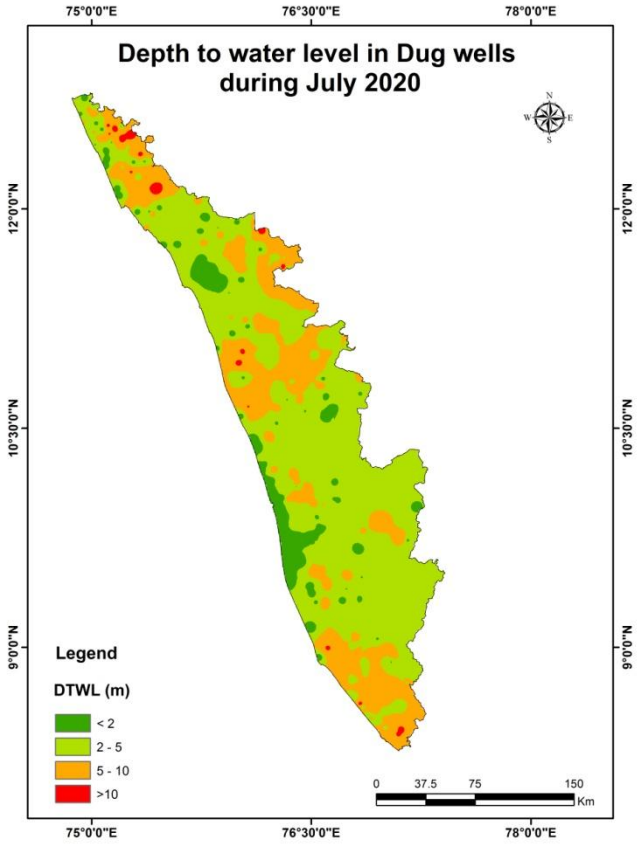


Fig:4. Depth to water level in Dug wells during July 2020

Borewells (hardrock terrain):- The depth to groundwater level in the observation bore wells during the month of July 2020 ranges from a minimum of -0.24 m to a maximum of 41.52 mbgl. Out of 335 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, 33% ranges between 5-10 m, 21% of bore wells ranges between 10-20 m, and 6% ranges more than 20 m . Table showing well frequency during July 2020 is appended. (Annexure-I)

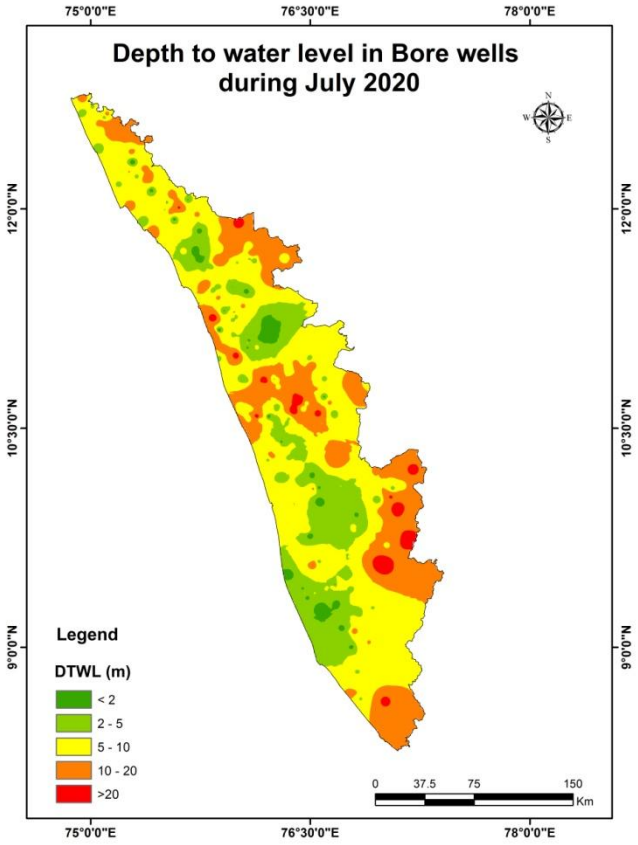


Fig:5. Depth to water level in Bore wells during July 2020

Tube wells (coastal sedimentary terrain) - The depth to groundwater level in the observation tube wells during the month of July 2020 range from a minimum of 2.13 m to a maximum of 34.62 mbgl . Out of 17 tube wells monitored in the state, water level in 35 % of tube wells shows a depth to water level range from 2-5 m, 41% of tube wells ranges between 5-10 m, 6 % of tube wells ranges between 10-20 m, and 18% ranges more than 20 m .Table showing well frequency is appended.(Annexure-I)

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

Comparison of the groundwater level in July 2020 with respect to the corresponding month in the previous year, indicates that 16 % of observation dug wells show a fall in water level and 84 % of the wells shows no remarkable change /marginal rise in water level. Out of 16% of the dug wells shows a falling trend, majority (48%) recorded fall in water level less than 0.5m , 35 % of dug wells show fall in the range between 0.5-1m ,9 % of dug wells show fall in the range between 1-1.5 m, 2% 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, 2% dug wells show a fall in water level between 2.5 - 3m and 2% dug wells show a fall in water level between 3 – 3.5m. Table showing water level comparison of dug wells during July 2020 with respect to July 2019 is appended. (Annexure-II).

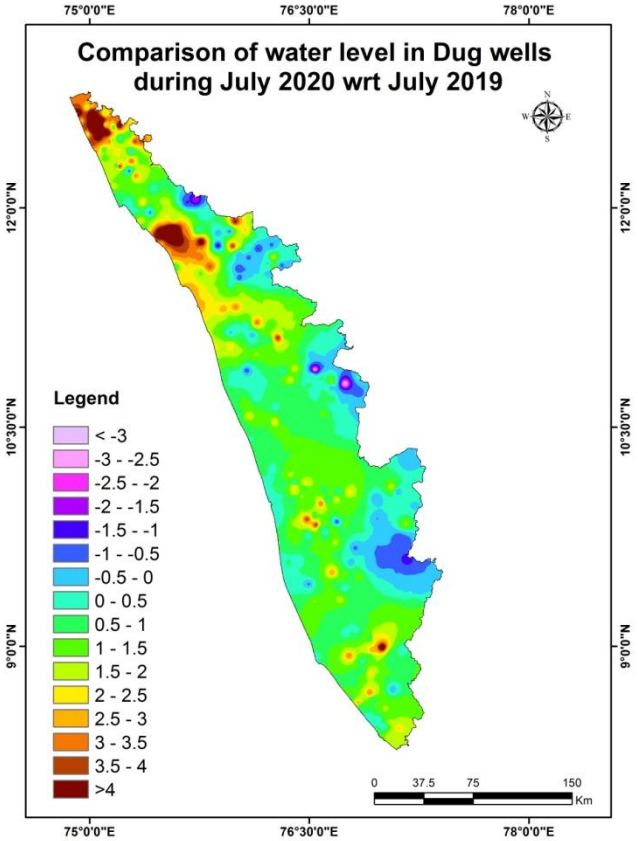


Fig:6. Comparison of water level in Dug wells during July 2020 wrt July 2019

Comparison of the water level in observation bore wells (hard rock terrain in midland and high land areas) in July 2020 with that of the previous year, it has been noticed that 15% of bore wells show fall in water level and 85 % of the wells shows no remarkable change / marginal rise in water level. Out of 15 % of the bore wells shows a falling trend , 57 % of the bore wells recorded fall in water level less than 0.5m, 15 % show fall in the range between 0.5 - 1m, 5 % of bore wells show fall in the range between 1 - 1.5m, 13 % of bore

wells show a fall in range between, 1.5-2m, 2% of bore wells show a fall in range between 2- 2.5m, 4% of bore wells show a fall in range between 2.5-3m and 2% of bore wells show a fall in water level more than 4m. Table showing water level comparison of bore wells during July 2020 with respect to July 2019 is appended. (Annexure-II)

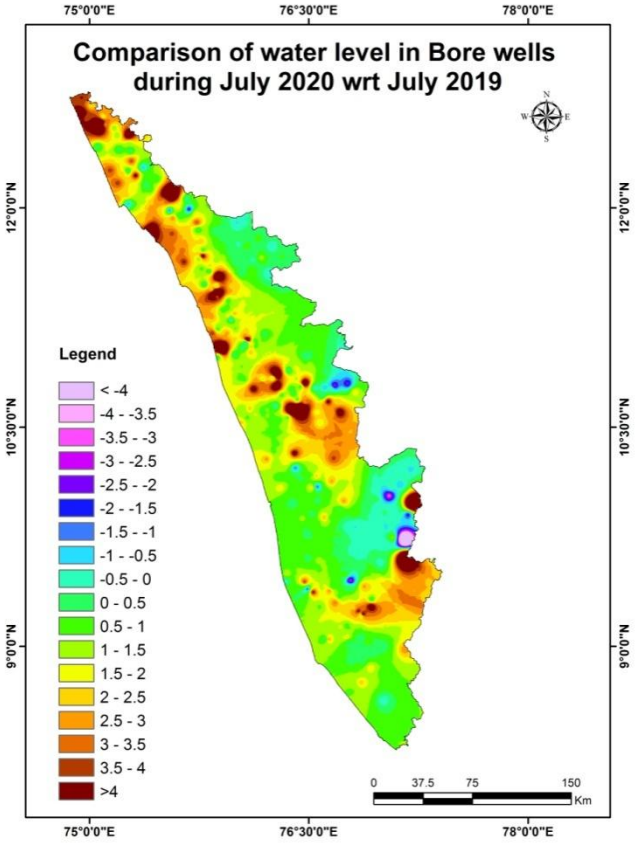


Fig:7. Comparison of water level in Bore wells during July 2020 wrt July 2019

Comparison of the water level in observation tube wells (in the coastal sedimentary areas) during July 2020 with that of the previous year reveals that 12 % of tube wells recorded a falling trend and 88 % of the wells shows no remarkable change /marginal rise of water level. Out of 12% of the tube wells shows a falling trend and all of the tube wells (100 %) recorded fall in water level less than 0.5m. Table showing comparison of water level during July 2020 with respect to July 2019 is appended. (Annexure-II)

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

Comparison of the water level in July 2020 with respect to the decadal mean, it has been noticed that 56 % of observation dug wells recorded a fall in water level and 44% of the wells shows marginal rise /no remarkable change in water level. Out of 56% of the dugwells shows a falling trend, 51% of the dug wells recorded fall in water level less than

0.5m, 27% show fall in the range between 0.5-1m, 14% of dug wells show fall in the range between 1-1.5m, 5 % 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, 0.01% of dug wells show a fall in water level between 2.5 - 3m and 0.01% dug wells show a fall in water level between 3 - 3.5m. Table showing water level comparison of dug wells during July 2020 with respect to decadal mean is appended. (Annexure-III)

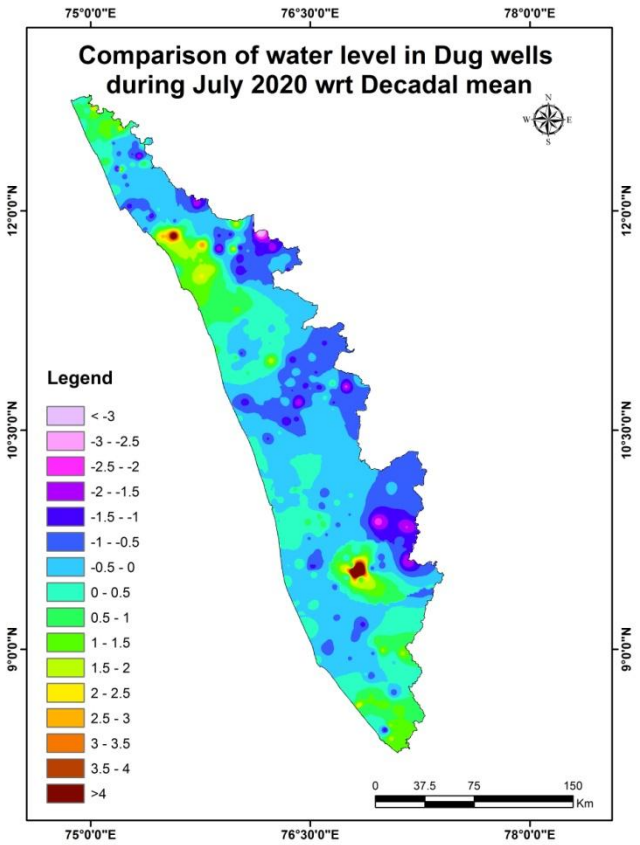


Fig:7. Comparison of water level in Dug wells during July 2020 wrt Decadal mean

Comparison of the water level in the observation bore wells during July 2020 with that of the decadal mean. It has been noticed that 62% of bore wells show fall in water level, and 38 % of the wells shows marginal rise, no remarkable change in water level. Out of 62 % of the bore wells shows a falling trend , 32 % shows a fall in water level less than 0.5m, 26 % show fall in the range between 0.5 - 1m, 13% show fall in the range between 1-1.5 m, 7% of wells show a fall in range between 1.5 - 2m ,3% show a fall in range between 2-2.5 m, 6% of bore wells show a fall in range between 2.5-3 m ,0.5% 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 11% of bore wells show a fall in water level more than 4 m. Table showing water level comparison of bore wells during July 2020 with respect to decadal mean is appended. (Annexure-III)

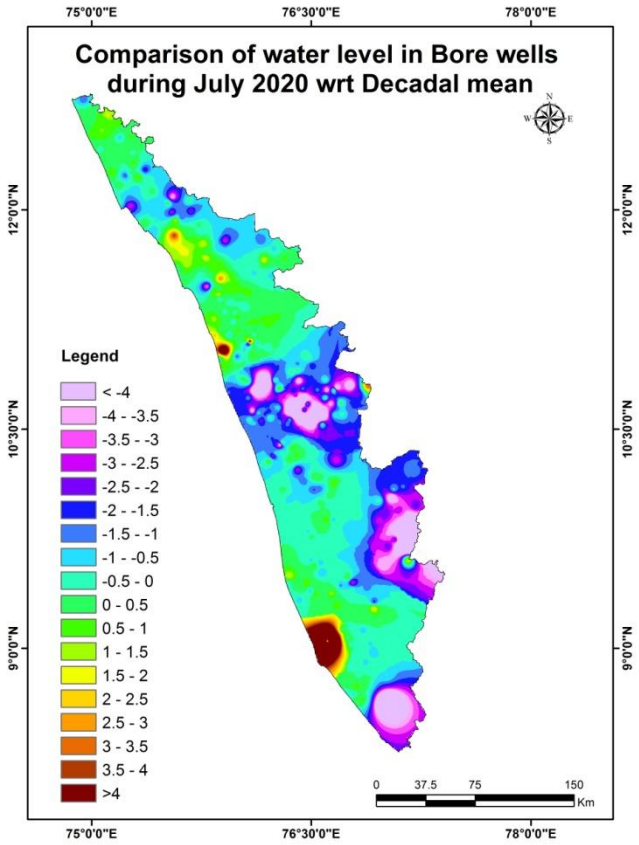


Fig:8. Comparison of water level in Bore wells during July 2020 wrt Decadal mean

Comparison of the water level in the observation tube wells during July 2020 with that of the decadal mean reveals that 53 % of tube wells recorded a falling trend and 47 % of the tube wells show marginal rise/no remarkable change in water level. Out of 53 % of the tube wells shows a falling trend, majority (56 %) of tube wells show fall in water level less than 0.5m and 44% of tube wells show fall in the range between 0.5-1 m. Table showing water level comparison of tube wells during July 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 June-July 2020 the state received 919.9 mm rainfall, which is 22% deficient than that of the actual rainfall.

Groundwater level

- The depth to groundwater level in the observation dug wells during the month of July 2020 range from a minimum of -0.02 m to a maximum of 14.89 mbgl , in bore wells -0.24 m to a maximum of 41.58 mbgl and in the tube wells 2.13 m to a maximum of 34.62 mbgl.
- Comparison of the water level in July 2020 with respect to the previous year, reveals that 16 % of observation dug wells, 15 % of bore wells and 12% of tube wells recorded a falling trend. Among the wells showing decline in water level, majority of the observation dug wells and bore wells and all the tube wells show decline in water level less than 0.5 m.
- Comparison of groundwater level in July 2020 with respect to the decadal mean reveals that 56 % of observation dug wells, 62 % of bore wells and 53% of tube wells recorded a falling trend. Among the wells showing decline in water level, majority of the observation dug wells and 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 wells in the state get recharged in this year than the previous year from the sufficient rainfall occurred during the pre-monsoon as well as from the monsoon months.

Districtwise Observation well Frequency on July 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
	Dug well	22	1.41	12.4	Kulathoor	Veiloor-Murukkumpuzha	3	6	10	3	0
	Bore well	27	0.5	23.13	Peringamala (Venkolla)	Anad	2	4	14	6	1
Thiruvananthapuram	Tube well	4	3.31	9.05	Azhoor	Sarkara-Chirayinkeezhu	0	1	3	0	0
	Dug well	22	0.78	11.11	Neendakara	Mantrothuruth	5	5	11	1	0
	Bore well	16	0.4	10.96	Kottarakkara	Vilakudy	1	3	11	1	0
Kollam	Tube well	7	2.73	34.62	Panmana	Mynagappally	0	2	1	1	3
	Dug well	14	1.02	7.01	Kozhancherry	Kunnamthanam	4	9	1	0	0
Pathanamthitta	Bore well	25	0.26	14.24	Erathu	Ezhamkulam	4	10	9	2	0
	Dug well	7	0.17	8.43	Pazhaveedu	Puliyoor	5	1	1	0	0
	Bore well										
Alappuzha	Tube well	5	2.13	8.49	Aryad south	Puliyur	0	3	2	0	0
	Dug well	18	0.05	9.29	Kumarakam	Panachikkad	6	9	3	0	0
Kottayam	Bore well	24	-0.09	16.67	Erumeli North	Muttampalam	6	9	7	2	0
	Dug well	19	1.25	8.17	Udumbanchola	Kattappana	2	14	3	0	0
Idukki	Bore well	22	1.44	33.17	Udumbannoor	Peerumade	1	7	4	5	5
	Dug well	32	-0.02	7.65	Chellanam	Kizhakambalam	16	9	13	0	0
	Bore well	22	-0.19	10.98	Velloorkunnam(vazhapilly)	Rayamangalam	4	10	6	2	0
Ernakulam	Tube well	1	9.56	9.56	Cochin	Cochin	0	0	1	0	0
	Dug well	24	0	10.54	Nattika, Valappad	Kunnamkulam	8	7	8	1	0
Thrissur	Bore well	36	-0.57	37.05	Kolazhy	Vadakkethara	3	11	12	6	4

	Dug well	26	0.59	12.13	Kondotty	Marakkara	6	9	9	2	0
Malappuram	Bore well	29	0.01	41.58	Karakunnu	Areekode	5	13	5	3	3
	Dug well	31	0.67	9.51	Alathur	Mannarkad	7	12	12	0	0
Palakkad	Bore well	33	1.2	27.47	Kuzhalmannam	Pattambi	2	4	12	12	3
	Dug well	35	0.1	9.66	Kakur	Vengery	16	12	7	0	0
Kozhikkode	Bore well	34	-0.24	27.12	Ramanattukara	Nellikode	8	9	9	6	1
	Dug well	26	1.09	12.68	Kunnathidavaka	Cheeral	4	9	11	2	0
Wayanad	Bore well	19	1.83	23.98	Muttil North	Thirunelly	1	2	6	9	1
	Dug well	29	0.48	14.75	Aralam	Kooveri	9	10	9	1	0
Kannur	Bore well	28	0.46	21.98	Kooveri	Kalliad	4	6	10	7	1
	Dug well	46	0.05	14.89	Pady	Bandadka	14	12	13	7	0
Kasaragod	Bore well	20	-0.4	18.34	Beemanady	Bandadka	1	4	6	9	0

Comparison of Water level July 2020 with respect to July 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	22	Rise	20	4	6	2	5	0	1	2	0	0
			Fall	2	2	0	0	0	0	0	0	0	0
	Bore well	8	Rise	6	0	1	4	0	1	0	0	0	0
			Fall	2	2	0	0	0	0	0	0	0	0
	Tube well	4	Rise	3	1	2	0	0	0	0	0	0	0
			Fall	1	1	0	0	0	0	0	0	0	0
Kollam	Dug well	21	Rise	21	3	8	4	1	0	3	1	0	1
			Fall	0	0	0	0	0	0	0	0	0	0
	Bore well	13	Rise	12	6	3	0	1	0	2	0	0	0
			Fall	1	1	0	0	0	0	0	0	0	0
	Tube well	7	Rise	6	3	2	0	1	0	0	0	0	0
			Fall	1	1	0	0	0	0	0	0	0	0
Pathanamthitta	Dug well	14	Rise	14	6	5	2	1	0	0	0	0	0
			Fall	0	0	0	0	0	0	0	0	0	0
	Bore well	25	Rise	24	5	5	3	1	2	3	1	0	4
			Fall	1	1	0	0	0	0	0	0	0	0
Alappuzha	Dug well	7	Rise	6	2	1	2	1	0	0	0	0	0
			Fall	1	0	1	0	0	0	0	0	0	0
	Bore well		Rise										
			Fall										
	Tube well	5	Rise	5	0	3	2	0	0	0	0	0	0
			Fall	0	0	0	0	0	0	0	0	0	0
Kottayam	Dug well	18	Rise	15	4	3	5	2	0	1	0	0	0

			Fall	3	2	1	0	0	0	0	0	0	0
	Bore well	24	Rise	19	4	9	2	0	0	2	0	1	1
			Fall	5	3	0	0	1	0	1	0	0	0
Idukki	Dug well	19	Rise	7	0	1	4	2	0	0	0	0	0
			Fall	12	5	5	2	0	0	0	0	0	0
	Bore well	22	Rise	8	3	2	1	0	0	0	0	0	2
			Fall	14	8	3	0	1	0	0	1	0	1
Ernakulam	Dug well	38	Rise	37	10	9	5	5	4	1	1	1	1
			Fall	1	1	0	0	0	0	0	0	0	0
	Bore well	22	Rise	20	4	6	2	3	1	3	1	0	0
			Fall	2	0	0	0	2	0	0	0	0	0
	Tube well	1	Rise	1	0	0	0	1	0	0	0	0	0
			Fall	0	0	0	0	0	0	0	0	0	0
Thrissur	Dug well	23	Rise	22	5	10	5	0	2	0	0	0	0
			Fall	1	1	0	0	0	0	0	0	0	0
	Bore well	36	Rise	35	6	7	10	4	2	2	0	2	2
			Fall	1	1	0	0	0	0	0	0	0	0
Malappuram	Dug well	26	Rise	21	4	2	7	4	1	1	1	0	1
			Fall	5	4	1	0	0	0	0	0	0	0
	Bore well	29	Rise	25	4	4	4	5	3	2	0	0	3
			Fall	4	2	0	1	1	0	0	0	0	0
Palakkad	Dug well	31	Rise	25	12	7	3	2	1	0	0	0	0
			Fall	6	3	1	0	0	0	1	1	0	0
	Bore well	33	Rise	26	2	4	5	4	1	2	0	1	7
			Fall	7	4	1	0	0	1	1	0	0	0
Kozhikkode	Dug well	17	Rise	17	0	1	6	1	1	4	2	1	1
			Fall	0	0	0	0	0	0	0	0	0	0
	Bore well	32	Rise	32	3	6	3	4	5	3	2	1	5
			Fall	0	0	0	0	0	0	0	0	0	0

Wayanad	Dug well	26	Rise	10	3	0	0	2	2	1	0	0	2
			Fall	16	6	7	2	0	1	0	0	0	0
	Bore well	19	Rise	14	7	6	1	0	0	0	0	0	0
			Fall	5	4	1	0	0	0	0	0	0	0
Kannur	Dug well	29	Rise	25	7	2	4	4	2	1	2	0	3
			Fall	4	1	1	1	1	0	0	0	0	0
	Bore well	28	Rise	23	6	0	0	4	3	3	1	3	3
			Fall	5	1	2	1	1	0	0	0	0	0
Kasaragod	Dug well	45	Rise	42	1	6	5	5	3	4	2	6	10
			Fall	3	1	2	0	0	0	0	0	0	0
	Bore well	20	Rise	20	4	1	3	1	1	2	0	3	5
			Fall	0	0	0	0	0	0	0	0	0	0

Comparison of Water level July 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	22	Rise	20	8	2	5	4	1	0	0	0	0
			Fall	2	0	1	0	1	0	0	0	0	0
	Bore well	8	Rise	4	0	4	0	0	0	0	0	0	0
			Fall	4	2	1	0	0	0	0	0	0	1
	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	22	Rise	10	7	0	1	2	0	0	0	0	0
			Fall	12	6	5	1	0	0	0	0	0	0
	Bore	16	Rise	5	5	0	0	0	0	0	0	0	0

	well		Fall	11	8	3	0	0	0	0	0	0	0
	Tube well	7	Rise	1	0	0	0	1	0	0	0	0	0
			Fall	6	2	4	0	0	0	0	0	0	0
	Dug well	8	Rise	0	0	0	0	0	0	0	0	0	0
			Fall	8	3	4	1	0	0	0	0	0	0
	Bore well	18	Rise	9	4	3	1	1	0	0	0	0	0
Pathanamthitta			Fall	9	5	1	2	1	0	0	0	0	0
	Dug well	6	Rise	3	3	0	0	0	0	0	0	0	0
			Fall	3	3	0	0	0	0	0	0	0	0
	Bore well		Rise										
			Fall										
	Tube well	5	Rise	4	3	0	1	0	0	0	0	0	0
Alappuzha			Fall	1	1	0	0	0	0	0	0	0	0
	Dug well	18	Rise	9	6	2	0	0	0	0	0	0	1
			Fall	9	4	4	0	1	0	0	0	0	0
	Bore well	24	Rise	10	4	2	2	1	0	0	0	0	1
Kottayam			Fall	14	5	7	0	1	0	1	0	0	0
	Dug well	19	Rise	0	0	0	0	0	0	0	0	0	0
			Fall	19	5	9	2	1	2	0	0	0	0
	Bore well	22	Rise	1	0	0	0	1	0	0	0	0	0
Idukki			Fall	21	3	6	2	2	2	2	0	1	3
	Dug well	38	Rise	22	17	4	1	0	0	0	0	0	0
			Fall	16	13	3	0	0	0	0	0	0	0
	Bore well	22	Rise	10	7	3	0	0	0	0	0	0	0
			Fall	12	6	2	2	1	0	1	0	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	24	Rise	7	7	0	0	0	0	0	0	0	0
Thrissur			Fall	17	10	2	4	0	1	0	0	0	0

	Bore well	35	Rise	5	5	0	0	0	0	0	0	0	0
			Fall	30	5	6	4	4	1	5	0	0	5
	Dug well	26	Rise	14	10	3	0	1	0	0	0	0	0
			Fall	12	11	0	1	0	0	0	0	0	0
	Bore well	29	Rise	13	6	5	0	0	0	0	0	0	2
Malappuram			Fall	16	5	5	4	1	0	0	0	0	1
	Dug well	30	Rise	3	2	1	0	0	0	0	0	0	0
			Fall	27	13	6	7	0	1	0	0	0	0
	Bore well	33	Rise	7	5	1	0	0	0	0	1	0	0
Palakkad			Fall	26	8	2	4	2	1	0	0	0	9
	Dug well	17	Rise	17	1	9	3	2	1	0	1	0	0
			Fall	0	0	0	0	0	0	0	0	0	0
	Bore well	33	Rise	26	8	6	5	4	1	0	1	0	1
Kozhikkode			Fall	7	4	2	0	0	0	0	0	1	0
	Dug well	26	Rise	3	1	0	0	1	1	0	0	0	0
			Fall	23	7	5	6	3	1	0	1	0	0
	Bore well	19	Rise	2	0	1	0	1	0	0	0	0	0
Wayanad			Fall	17	5	10	1	0	0	0	1	0	0
	Dug well	29	Rise	8	4	0	1	1	0	1	0	0	1
			Fall	21	11	7	1	2	0	0	0	0	0
	Bore well	28	Rise	11	7	2	1	0	0	0	0	1	0
Kannur			Fall	17	3	4	5	0	2	2	0	0	1
	Dug well	44	Rise	30	12	9	6	1	1	1	0	0	0
			Fall	14	7	3	2	1	0	1	0	0	0
	Bore well	20	Rise	15	8	5	1	1	0	0	0	0	0
Kasaragod			Fall	5	2	1	1	1	0	0	0	0	0

Observation well frequency on July 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	351	-0.02	14.89	Chellanam (Ernakulam)	Bandadka (Kasaragod)	105 29%	124 35%	111 32%	17 4%	0 0%
Bore well	335	-0.24	41.58	Ramanattukara (Kozhikode)	Areekoden(Malappuram)	42 13%	92 27%	111 33%	70 21%	19 6%
Tube well	17	2.13	34.62	Aryad south (Alappuzha)	Mynagappally (Kollam)	0 0%	6 35%	7 41%	1 6%	3 18%

Comparison of Water level July 2020 with respect to July 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	336	Rise	282	61	61	54	35	16	17	11	8	19
		%	84%	22%	22%	19%	12%	6%	6%	4%	3%	6%
		Fall	54	26	19	5	1	1	1	1	0	0
		%	16%	48%	35%	9%	2%	2%	2%	2%	0%	0%
Bore well	311	Rise	264	54	54	38	27	19	24	5	11	32
		%	85%	21%	21%	14%	10%	7%	9%	2%	4%	12%
		Fall	47	27	7	2	6	1	2	1	0	1
		%	15%	57%	15%	5%	13%	2%	4%	2%	0%	2%
Tube well	17	Rise	15	4	7	2	2	0	0	0	0	0
		%	88%	27%	47%	13%	13%	0%	0%	0%	0%	0%
		Fall	2	2	0	0	0	0	0	0	0	0
		%	12%	100%	0%	0%	0%	0%	0%	0%	0%	0%

Comparison of Water level July 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	329	Rise	146	78	30	17	12	4	2	1	0	2
		%	44%	53%	21%	13%	8%	3%	1%	0.01%	0%	1%
		Fall	183	93	49	25	9	5	1	1	0	0
		%	56%	51%	27%	14%	5%	3%	0.01%	0.01%	0%	0%
Bore well	307	Rise	118	59	32	10	9	1	0	2	1	4
		%	38%	50%	27%	8%	8%	0.08%	0%	2%	0.08%	4%
		Fall	189	61	50	25	13	6	11	1	2	20
		%	62%	32%	26%	13%	7%	3%	6%	0.50%	1%	11%
Tube well	17	Rise	8	6	0	1	1	0	0	0	0	0
		%	47%	74%	0%	13%	13%	0%	0%	0%	0%	0%
		Fall	9	5	4	0	0	0	0	0	0	0
		%	53%	56%	44%	0%	0%	0%	0%	0%	0%	0%