GOVERNMENT OF KERALA

GROUNDWATER DEPARTMENT

NATIONAL HYDROLOGY PROJECT

GROUNDWATER LEVEL MONITORING REPORT

June 2020

GOVERNMENT OF KERALA
GROUNDWATER DEPARTMENT

GROUNDWATER LEVEL MONITORING REPORT – JUNE 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 2019, the state received 378.6 mm rainfall, which is 48% deficient than that of the actual rainfall (724.5 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 June 2020 the state received 612.3 mm rainfall, which is 18% deficient than that of the actual rainfall.

Due to normal rainfall occurred during June 2020, most of the wells get recharged during this month than that of the previous year (June 2019).

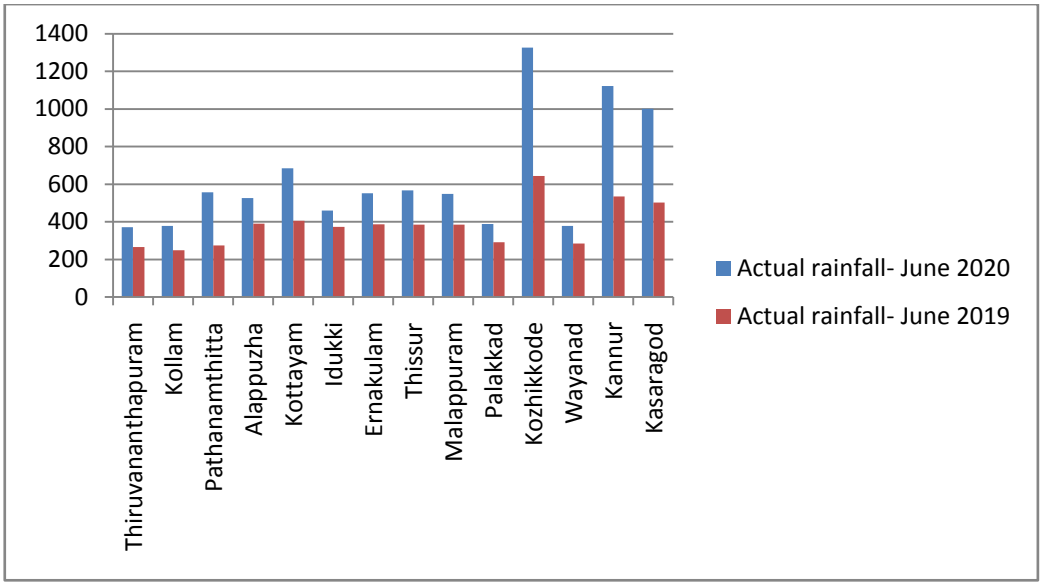


Fig:1. Comparison of actual rainfall occurred during June 2020 wrt 2019

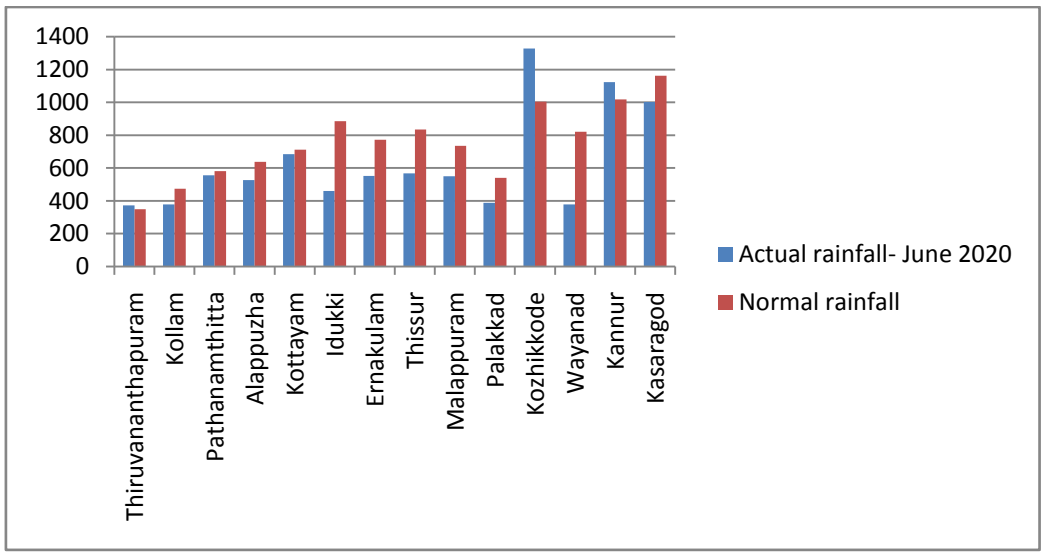


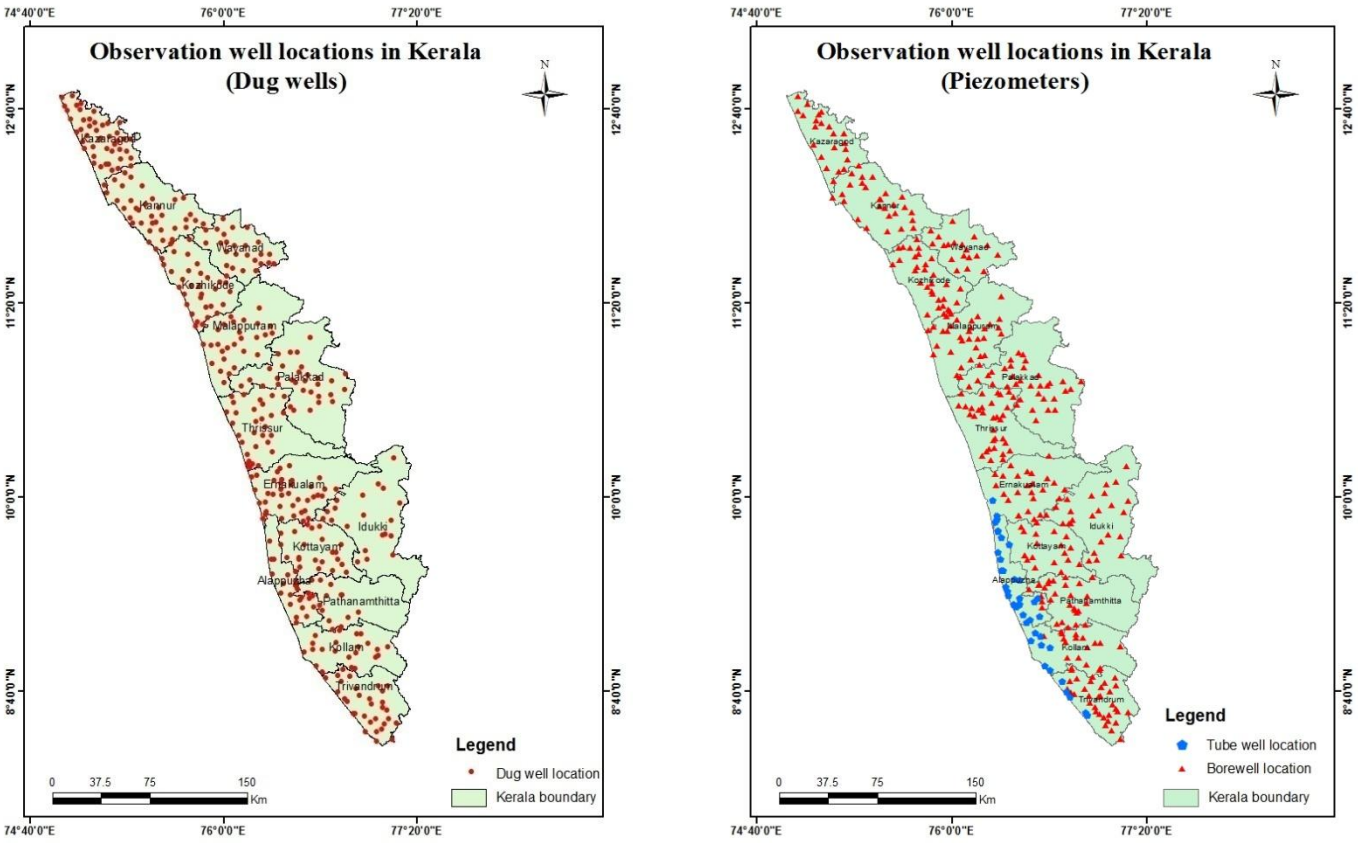
Fig:2. Comparison of actual rainfall occurred during June 2020 wrt Normal Rainfall

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 – June 2020

During the month of June 2020, groundwater level in 382 dug wells and 378 purpose built piezometers (bore wells- 336 and tube wells – 42) has been monitored. The data collected from the observation wells during the month of June 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 June 2020

Dug wells- The depth to groundwater level in the observation dug wells during the month of June 2020 ranges from a minimum of -0.14 m to a maximum of 14.98 mbgl. Out of 382 dug wells monitored water level in 24% of dug wells shows a depth to water level ranges from 0-2 m, 35% ranges between 2-5 m, 33% ranges between 5-10 m and 8% dug wells recorded depth to water level ranges between 10-20 mbgl. Table showing well frequency during June2020 is appended. (Annexure-I)

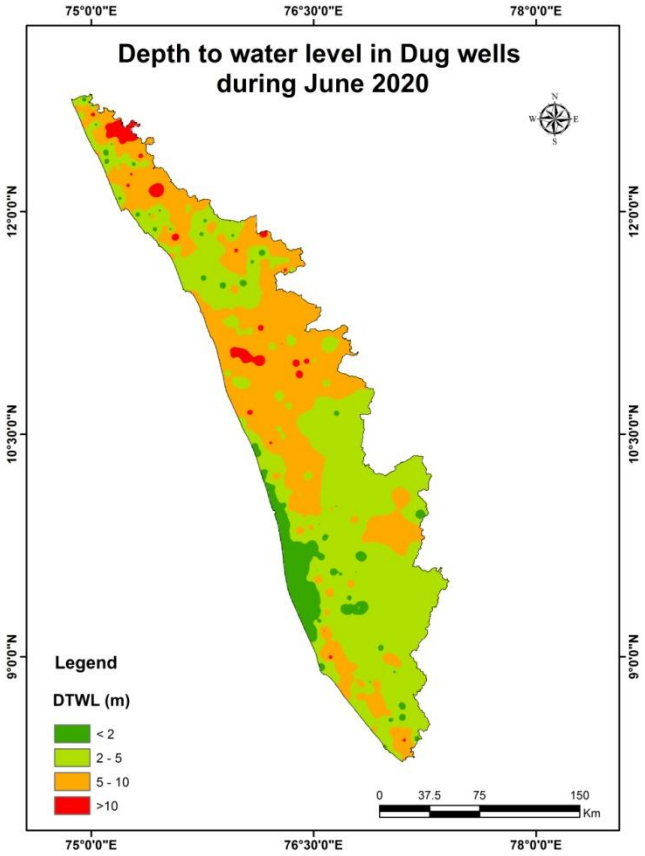


Fig:4. Depth to water level in Dug wells during June 2020

Borewells (hardrock terrain):- The depth to groundwater level in the observation bore wells during the month of June 2020 ranges from a minimum of -0.4 m to a maximum of 43.74 mbgl. Out of 336 bore wells monitored, water level in 11% of bore wells shows a depth to water level range from 0-2 m, 22 % ranges between 2-5 m, 31% ranges between 5-10 m, 27% of bore wells ranges between 10-20 m, and 9% ranges more than 20 m . Table showing well frequency during June 2020 is appended. (Annexure-I)

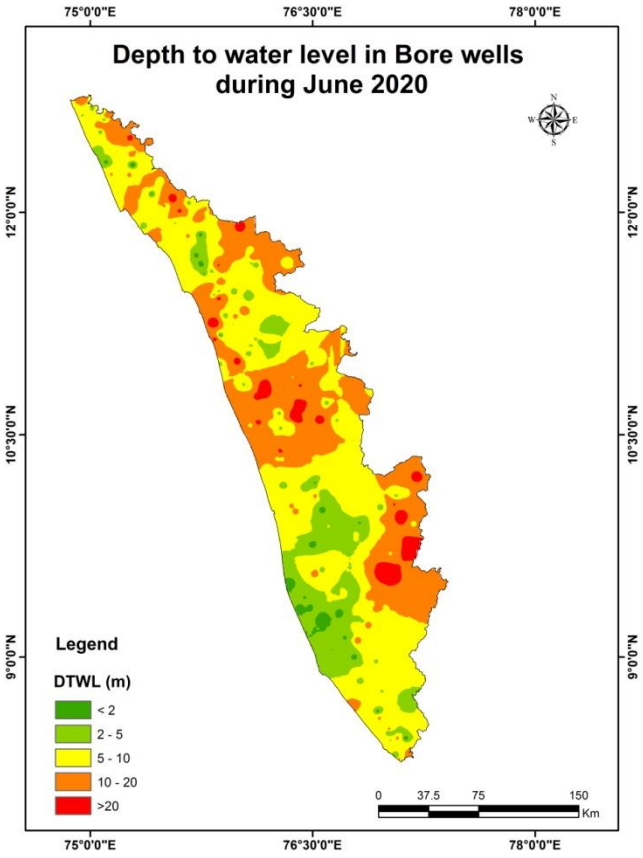


Fig:5. Depth to water level in Bore wells during June 2020

Tube wells (coastal sedimentary terrain) - The depth to groundwater level in the observation tube wells during the month of June 2020 range from a minimum of 0.34 m to a maximum of 34.95 mbgl . Out of 42 tube wells monitored in the state, water level in 26 % of tube wells shows a depth to water level range from 0-2 m, 40% of tube wells ranges between 2-5 m, 20% of tube wells ranges between 5-10 m, 7 % of tube wells ranges between 10-20 m, and 7% ranges more than 20 m .Table showing well frequency is appended.(Annexure-I)

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

Comparison of the groundwater level in June 2020 with respect to the corresponding month in the previous year, indicates that 18 % of observation dug wells show a fall in water level and 82 % of the wells shows no remarkable change /marginal rise in water level. Out of 18% of the dug wells shows a falling trend, majority (56%) recorded fall in water level less than 0.5m , 16 % of dug wells show fall in the range between 0.5-1m ,15 % of dug wells show fall in the range between 1-1.5 m, 3% of dug wells show a fall in the range between 1.5 -2m, 3% dug wells show a fall in water level between 2 - 2.5m, 2% dug wells

show a fall in water level between 3.5 - 4m and 5% dug wells show a fall in water level more than 4m. Table showing water level comparison of dug wells during June 2020 with respect to June 2019 is appended. (Annexure-II).

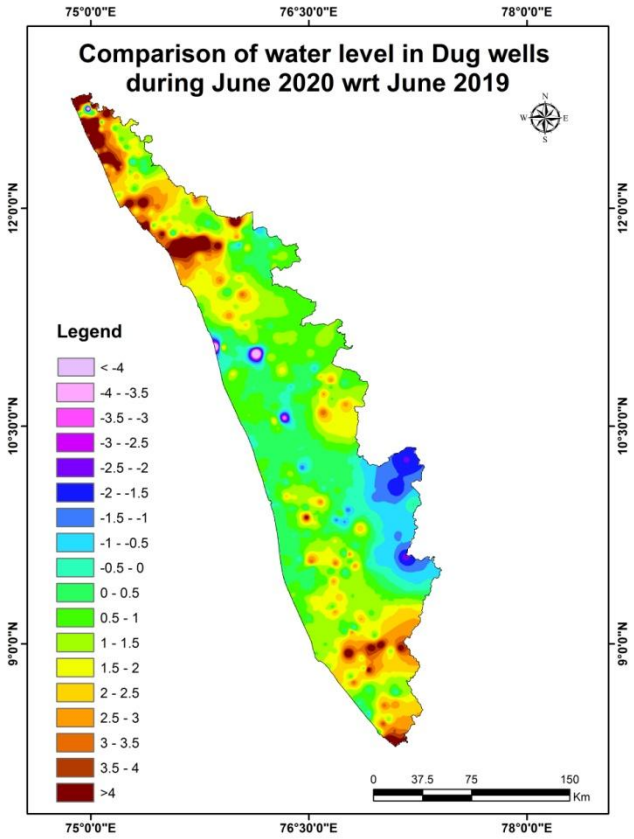


Fig:6. Comparison of water level in Dug wells during June 2020 wrt June 2019

Comparison of the water level in observation bore wells (hard rock terrain in midland and high land areas) in June 2020 with that of the previous year, it has been noticed that 22% of bore wells show fall in water level and 78 % of the wells shows no remarkable change / marginal rise in water level. Out of 22 % of the bore wells shows a falling trend , 44 % of the bore wells recorded fall in water level less than 0.5m, 23 % show fall in the range between 0.5 - 1m, 11% of bore wells show fall in the range between 1 - 1.5m, 4 % 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 , 3% 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 4m. Table showing water level comparison of bore wells during June 2020 with respect to June 2019 is appended. (Annexure-II)

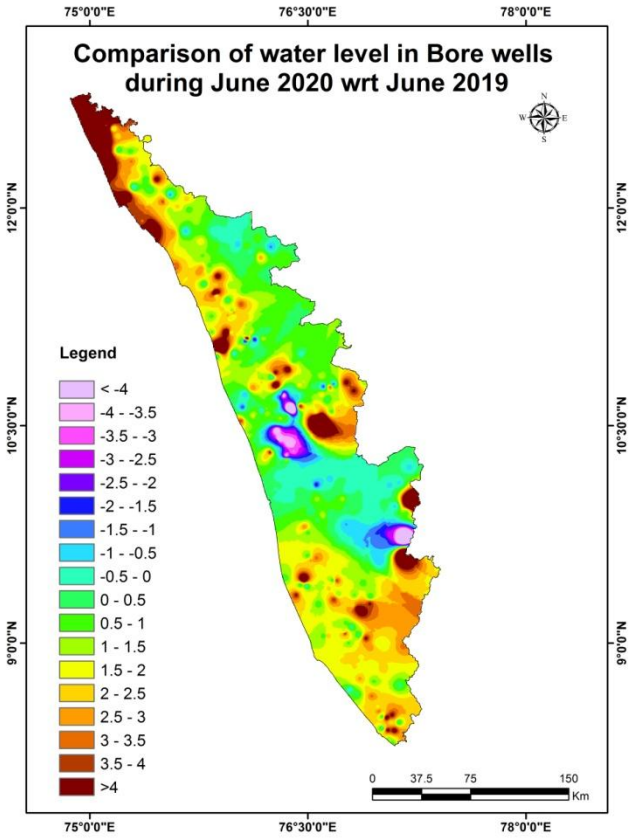


Fig:7. Comparison of water level in Bore wells during June 2020 wrt June 2019

Comparison of the water level in observation tube wells (in the coastal sedimentary areas) during June 2020 with that of the previous year reveals that 22 % of tube wells recorded a falling trend and 78 % of the wells shows no remarkable change /marginal rise of water level. Out of 22% of the tube wells shows a falling trend, majority (67 %)of the tube wells recorded fall in water level less than 0.5m, 11 % of tube wells show fall in the range between 0.5 - 1m, 11% of tube wells show fall in the range between 1 – 1.5m, and 11% of tube wells show a fall in water level between 3 - 3.5m. Table showing comparison of water level during June 2020 with respect to June 2019 is appended. (Annexure-II)

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

Comparison of the water level in June 2020 with respect to the decadal mean, it has been noticed that 46 % of observation dug wells recorded a fall in water level and 54 % of the wells shows marginal rise /no remarkable change in water level. Out of 46% of the dugwells shows a falling trend, 39% of the dug wells recorded fall in water level less than 0.5m, 28% show fall in the range between 0.5-1m, 17% of dug wells show fall in the range between 1-1.5m, 7 % of dug wells show a fall in range between 1.5-2m, 4 % of dug wells show a fall in range between 2 - 2.5m, 0.6% of dug wells show a fall in water level between 2.5 - 3m, 0.6% dug wells show a fall in water level between 3 - 3.5m, 2% dug wells show a fall in water level between 3.5 - 4m and 2% dug wells show a fall in water level more than 4m. Table showing water level comparison of dug wells during June 2020 with respect to decadal mean is appended. (Annexure-III)

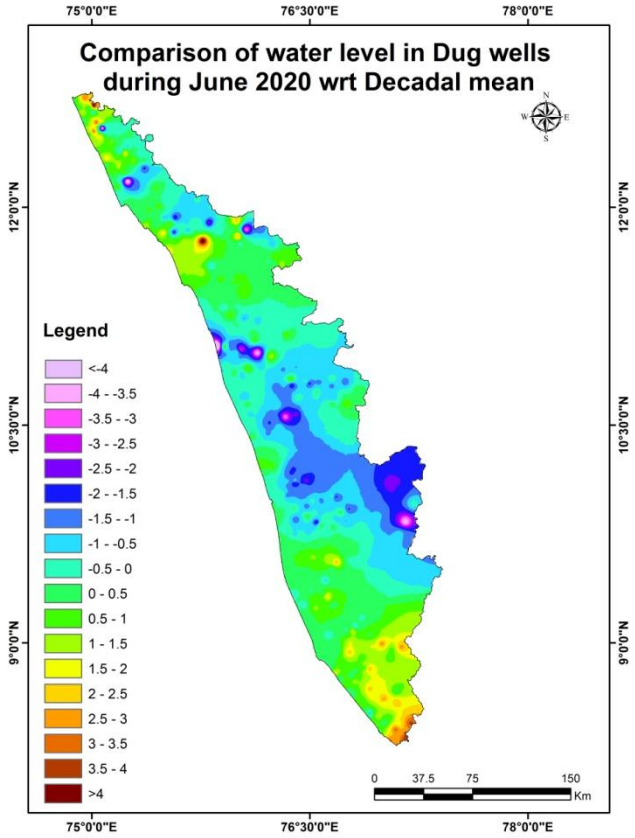


Fig:7. Comparison of water level in Dug wells during June 2020 wrt Decadal mean

Comparison of the water level in the observation bore wells during June 2020 with that of the decadal mean. It has been noticed that 57% of bore wells show fall in water level, and 43 % of the wells shows marginal rise, no remarkable change in water level. Out of 57 % of the bore wells shows a falling trend , 28 % shows a fall in water level less than 0.5m, 26 %

show fall in the range between 0.5 - 1m, 12% show fall in the range between 1-1.5 m, 7% of wells show a fall in range between 1.5 - 2m ,5% show a fall in range between 2-2.5 m, 2% of bore wells show a fall in range between 2.5-3 m ,1% 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 17% of bore wells show a fall in water level more than 4 m. Table showing water level comparison of bore wells during June 2020 with respect to decadal mean is appended. (Annexure-III)

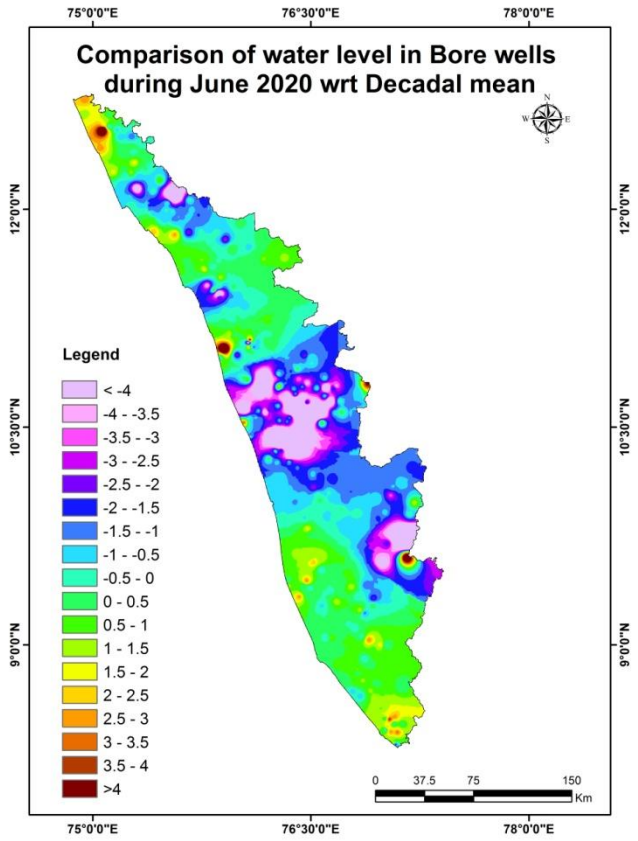


Fig:8. Comparison of water level in Bore wells during June 2020 wrt Decadal mean

Comparison of the water level in the observation tube wells during June 2020 with that of the decadal mean reveals that 41 % of tube wells recorded a falling trend and 59 % of the tube wells show marginal rise/no remarkable change in water level. Out of 41 % of the tube wells shows a falling trend, majority (71 %) of tube wells show fall in water level less than 0.5m and 29% of tube wells show fall in the range between 0.5-1 m. Table showing water level comparison of tube wells during June 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 2020 the state received 612.3 mm rainfall, which is 18% deficient than that of the actual rainfall.

Groundwater level

- The depth to groundwater level in the observation dug wells during the month of June 2020 range from a minimum of -0.14 m to a maximum of 14.98 mbgl , in bore wells -0.4 m to a maximum of 43.74 mbgl and in the tube wells 0.34 m to a maximum of 34.95 mbgl.
- Comparison of the water level in June 2020 with respect to the previous year, reveals that 18 % of observation dug wells, 22 % of bore wells and 22% 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 June 2020 with respect to the decadal mean reveals that 46 % of observation dug wells, 57 % of bore wells and 41% 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.
- Due to normal rainfall occurred during June 2020, most of the wells get recharged during this month and the percentage of fall in water level gets minimized than that of the previous year (June 2019).

District wise Observation well Frequency on June 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	24	0.78	10.7	Kulathoor	Perumkadavila	6	7	9	2	0
	Bore well	30	0.31	18.05	Keezharoor	Keezhattingal	4	7	12	7	0
Thiruvananthapuram	Tube well	4	3.37	9.48	Azhoor	Sarkara-Chirayinkeezhu	0	3	1	0	0
	Dug well	25	0.43	11.42	Neendakara	Mantrothuruth	7	9	8	1	0
	Bore well	15	0.25	9.64	Kottarakkara	Kadakkal	1	4	10	0	0
Kollam	Tube well	9	2.86	34.95	Panmana	Mynagappally	0	2	2	2	3
	Dug well	14	0.72	7.56	Kozhancherry	Kunnamthanam	4	9	1	0	0
Pathanamthitta	Bore well	21	0.45	14.92	Kalanjoor	Ezhamkulam	5	7	4	5	0
	Dug well	21	-0.14	10.38	Nedumudi	Kattanam	16	3	1	1	0
	Bore well	2	1.81	3.9	Venmony	Mulakkuzha	1	1	0	0	0
Alappuzha	Tube well	28	0.34	17.44	Aroor	Charummoodu	11	12	4	1	0
	Dug well	21	0.22	8.8	Monippally	Panachikkad	10	8	3	0	0
Kottayam	Bore well	23	0.28	16.83	Kaduthuruthy	Kanjirappally	8	9	4	2	0
	Dug well	19	1.15	8.55	Udumbanchola	Kattappana	2	9	8	0	0
Idukki	Bore well	23	1.65	38.66	Udumbannoor	Chakkupallam	1	7	6	4	5
	Dug well	38	-0.06	10.1	Chellanam	Kizhakambalam	11	14	12	1	0
	Bore well	23	0.06	12.34	Velloorkunnam(vazhapilly)	Rayamangalam	3	7	10	3	0
Ernakulam	Tube well	1	9.73	9.73	Cochin	Cochin	0	0	1	0	0
	Dug well	24	0.6	11.3	Pariyaram	Kunnamkulam	6	7	9	2	0
Thrissur	Bore well	37	2.6	40.28	Madakkathara	Vadakkethara	0	5	10	15	7

	Dug well	26	1.2	14.85	Kondotty	Othukkungal	1	11	9	5	0
Malappuram	Bore well	30	1.72	43.74	Kalikavu	Areekode	2	9	12	4	3
	Dug well	31	1.01	11.22	Alathur	Sreekrishnapuram	1	12	14	4	0
Palakkad	Bore well	33	2.3	28.47	Kuzhalmanna m	Pattambi	0	5	5	18	5
	Dug well	34	0.37	10.8	Cheruvannur	Vengery	6	14	13	1	0
Kozhikkode	Bore well	31	-0.25	30.15	Kuttiadi	Nellikode	4	8	9	5	5
	Dug well	26	0.15	11.65	Poothadi	Cheeral	5	7	11	3	0
Wayanad	Bore well	19	1.46	23.45	Muttil North	Thirunelly	1	2	6	9	1
	Dug well	35	0.68	14.92	Mangattidam	Koothuparamba	8	10	14	3	0
Kannur	Bore well	28	0.85	29.25	Kooveri	Eruvassy	2	3	12	9	2
	Dug well	44	0.23	14.98	Periya	Bandadka	7	13	16	8	0
Kasaragod	Bore well	21	-0.4	22.98	Beemanady	Bandadka	4	3	4	9	1

Comparison of Water level June 2020 with respect to June 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	20	1	4	2	2	3	2	2	2	2
			Fall	3	2	0	1	0	0	0	0	0	0
	Bore well	28	Rise	26	5	1	4	4	3	2	3	0	4
			Fall	2	0	2	0	0	0	0	0	0	0
	Tube well	4	Rise	4	0	3	0	0	0	0	0	0	1
			Fall	0	0	0	0	0	0	0	0	0	0
Kollam	Dug well	25	Rise	25	0	3	8	5	1	1	1	1	5
			Fall	0	0	0	0	0	0	0	0	0	0
	Bore well	14	Rise	14	1	1	0	4	4	1	1	0	2
			Fall	0	0	0	0	0	0	0	0	0	0
	Tube well	9	Rise	9	3	2	1	0	2	1	0	0	0
			Fall	0	0	0	0	0	0	0	0	0	0
Pathanamthitta	Dug well	14	Rise	12	1	5	1	1	1	3	0	0	0
			Fall	2	1	1	0	0	0	0	0	0	0
	Bore well	21	Rise	20	3	5	2	2	3	0	0	2	3
			Fall	1	1	0	0	0	0	0	0	0	0
Alappuzha	Dug well	18	Rise	18	5	4	4	4	1	0	0	0	0
			Fall	0	0	0	0	0	0	0	0	0	0
	Bore well	2	Rise	2	1	0	0	1	0	0	0	0	0
			Fall	0	0	0	0	0	0	0	0	0	0
	Tube well	27	Rise	18	6	4	5	1	1	1	0	0	0
			Fall	9	6	1	1	0	0	0	1	0	0

Kottayam	Dug well	21	Rise	15	4	1	3	2	0	2	2	1	0
			Fall	6	6	0	0	0	0	0	0	0	0
	Bore well	23	Rise	22	3	3	5	3	1	2	2	0	3
			Fall	1	0	1	0	0	0	0	0	0	0
Idukki	Dug well	19	Rise	3	1	0	1	0	1	0	0	0	0
			Fall	16	2	5	5	2	2	0	0	0	0
	Bore well	23	Rise	6	1	3	0	0	0	0	0	0	2
			Fall	17	6	6	3	0	0	1	0	0	1
Ernakulam	Dug well	38	Rise	27	7	8	5	4	1	0	1	0	1
			Fall	11	10	0	1	0	0	0	0	0	0
	Bore well	23	Rise	12	6	2	3	1	0	0	0	0	0
			Fall	11	8	2	0	0	1	0	0	0	0
	Tube well	1	Rise	1	0	0	1	0	0	0	0	0	0
			Fall	0	0	0	0	0	0	0	0	0	0
Thrissur	Dug well	23	Rise	19	8	8	2	0	1	0	0	0	0
			Fall	4	3	0	0	0	0	0	0	1	0
	Bore well	36	Rise	18	3	5	5	2	2	0	0	0	1
			Fall	18	5	2	2	1	0	0	0	2	6
Malappuram	Dug well	25	Rise	20	3	5	5	4	2	0	0	0	1
			Fall	5	2	1	0	0	0	0	0	0	2
	Bore well	29	Rise	23	3	5	6	3	2	0	0	1	3
			Fall	6	4	0	0	0	0	1	0	0	1
Palakkad	Dug well	31	Rise	26	8	6	6	1	1	2	2	0	0
			Fall	5	3	2	0	0	0	0	0	0	0
	Bore well	33	Rise	29	3	5	5	3	3	1	1	1	7
			Fall	4	0	2	0	2	0	0	0	0	0

Kozhikkode	Dug well	17	Rise	17	1	1	4	3	2	2	2	0	2
			Fall	0	0	0	0	0	0	0	0	0	0
	Bore well	31	Rise	29	1	7	5	2	6	2	3	1	2
			Fall	2	2	0	0	0	0	0	0	0	0
Wayanad	Dug well	25	Rise	19	6	3	3	3	1	0	1	0	2
			Fall	6	4	0	2	0	0	0	0	0	0
	Bore well	19	Rise	11	5	4	1	0	0	1	0	0	0
			Fall	8	6	0	2	0	0	0	0	0	0
Kannur	Dug well	33	Rise	31	1	7	4	3	1	5	3	0	7
			Fall	2	2	0	0	0	0	0	0	0	0
	Bore well	28	Rise	25	2	3	6	0	4	1	3	1	5
			Fall	3	0	2	1	0	0	0	0	0	0
Kasaragod	Dug well	40	Rise	38	3	2	2	5	4	6	4	0	12
			Fall	2	0	1	0	0	0	0	0	0	1
	Bore well	21	Rise	21	2	0	1	2	1	2	2	0	11
			Fall	0	0	0	0	0	0	0	0	0	0

Comparison of Water level June 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	24	Rise	22	7	2	3	3	2	1	2	2	0
			Fall	2	1	0	1	0	0	0	0	0	0
	Bore well	30	Rise	21	2	4	5	4	1	2	2	0	1
			Fall	9	4	3	0	0	1	0	0	0	1
	Tube well	4	Rise	3	0	3	0	0	0	0	0	0	0
			Fall	1	1	0	0	0	0	0	0	0	0
Kollam	Dug well	25	Rise	24	7	8	1	4	1	3	0	0	0
			Fall	1	1	0	0	0	0	0	0	0	0
	Bore well	15	Rise	12	1	8	1	0	0	0	1	0	1
			Fall	3	2	1	0	0	0	0	0	0	0
	Tube well	9	Rise	2	0	0	1	0	0	0	0	0	1
			Fall	7	3	4	0	0	0	0	0	0	0
Pathanamthitta	Dug well	12	Rise	6	3	2	1	0	0	0	0	0	0
			Fall	6	3	3	0	0	0	0	0	0	0
	Bore well	21	Rise	10	6	1	1	2	0	0	0	0	0
			Fall	11	6	2	2	0	1	0	0	0	0
Alappuzha	Dug well	19	Rise	16	9	5	1	0	1	0	0	0	0
			Fall	3	3	0	0	0	0	0	0	0	0
	Bore well	2	Rise	2	1	1	0	0	0	0	0	0	0
			Fall	0	0	0	0	0	0	0	0	0	0
	Tube well	27	Rise	19	14	3	2	0	0	0	0	0	0
			Fall	8	7	1	0	0	0	0	0	0	0
Kottayam	Dug well	21	Rise	16	10	3	2	0	1	0	0	0	0

			Fall	5	2	3	0	0	0	0	0	0	0
	Bore well	23	Rise	18	6	5	3	1	0	2	1	0	0
			Fall	5	1	4	0	0	0	0	0	0	0
Idukki	Dug well	19	Rise	1	1	0	0	0	0	0	0	0	0
			Fall	18	2	8	3	3	0	1	0	1	0
	Bore well	23	Rise	3	1	0	1	0	0	0	0	0	1
			Fall	20	4	8	0	4	0	0	1	0	3
Ernakulam	Dug well	38	Rise	6	6	0	0	0	0	0	0	0	0
			Fall	32	9	7	10	3	3	0	0	0	0
	Bore well	23	Rise	2	2	0	0	0	0	0	0	0	0
			Fall	21	4	6	5	4	1	1	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	24	Rise	7	3	4	0	0	0	0	0	0	0
			Fall	17	7	3	4	1	1	0	0	1	0
	Bore well	37	Rise	2	2	0	0	0	0	0	0	0	0
			Fall	35	2	7	4	1	3	2	1	1	14
Malappuram	Dug well	26	Rise	9	3	4	1	1	0	0	0	0	0
			Fall	17	10	2	2	0	0	0	1	0	2
	Bore well	30	Rise	14	5	3	2	0	0	1	1	0	2
			Fall	16	8	1	2	2	1	0	0	0	2
Palakkad	Dug well	31	Rise	6	4	1	1	0	0	0	0	0	0
			Fall	25	7	10	6	2	0	0	0	0	0
	Bore well	33	Rise	7	2	3	0	1	0	0	0	0	1
			Fall	26	6	2	4	2	1	0	0	3	8
Kozhikkode	Dug well	17	Rise	13	2	6	3	1	0	0	0	0	1
			Fall	4	3	1	0	0	0	0	0	0	0
	Bore well	31	Rise	19	9	5	3	0	2	0	0	0	0

			Fall	12	6	4	0	0	0	0	0	0	2
Wayanad	Dug well	26	Rise	19	11	5	1	0	1	1	0	0	0
			Fall	7	3	1	1	0	1	0	0	1	0
	Bore well	19	Rise	14	10	2	2	0	0	0	0	0	0
			Fall	5	3	1	0	0	0	1	0	0	0
Kannur	Dug well	35	Rise	18	7	6	4	1	0	0	0	0	0
			Fall	17	6	5	1	3	1	0	0	0	1
	Bore well	28	Rise	7	3	2	0	0	1	1	0	0	0
			Fall	21	5	8	4	1	1	0	0	0	2
Kasaragod	Dug well	42	Rise	30	9	7	4	3	3	0	3	0	1
			Fall	12	7	4	0	0	0	0	0	0	1
	Bore well	21	Rise	14	2	1	3	5	0	2	0	0	1
			Fall	7	3	3	1	0	0	0	0	0	0

Observation well frequency on June 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	382	-0.14	14.98	Nedumudi(Alappuzha)	Bandadka(Kasaragod)	90	133	128	31	0
						24%	35%	33%	8%	0%
Bore well	336	-0.4	43.74	Beemanady(Kasaragod)	Areekode(Malappuram)	36	77	104	90	29
						11%	22%	31%	27%	9%
Tube well	42	0.34	34.95	Aroor(Alappuzha)	Mynagappally(Kollam)	11	17	8	3	3
						26%	40%	20%	7%	7%

Comparison of Water level June 2020 with respect to June 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	352	Rise	290	49	57	50	37	20	23	18	4	32
		%	82%	17%	20%	17%	13%	7%	8%	6%	1%	11%
		Fall	62	35	10	9	2	2	0	0	1	3
		%	18%	56%	16%	15%	3%	3%	0%	0%	2%	5%
Bore well	331	Rise	258	39	44	43	27	29	12	15	6	43
		%	78%	15%	17%	17%	10%	11%	5%	6%	2%	17%
		Fall	73	32	17	8	3	1	2	0	2	8
		%	22%	44%	23%	11%	4%	1%	3%	0%	3%	11%
Tube well	41	Rise	32	9	9	7	1	3	2	0	0	1
		%	78%	28%	28%	21%	4%	9%	6%	0%	0%	4%
		Fall	9	6	1	1	0	0	0	1	0	0
		%	22%	67%	11%	11%	0%	0%	0%	11%	0%	0%

Comparison of Water level June 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	359	Rise	193	82	53	22	13	9	5	5	2	2
		%	54%	42%	27%	11%	7%	5%	3%	3%	1%	1%
		Fall	166	64	47	28	12	6	1	1	3	4
		%	46%	39%	28%	17%	7%	4%	0.60%	0.60%	2%	2%
Bore well	336	Rise	145	52	35	21	13	4	8	5	0	7
		%	43%	36%	24%	14%	9%	3%	6%	3%	0%	5%
		Fall	191	54	50	22	14	9	4	2	4	32
		%	57%	28%	26%	12%	7%	5%	2%	1%	2%	17%
Tube well	41	Rise	24	14	6	3	0	0	0	0	0	1
		%	59%	58%	25%	13%	0%	0%	0%	0%	0%	4%
		Fall	17	12	5	0	0	0	0	0	0	0
		%	41%	71%	29%	0%	0%	0%	0%	0%	0%	0%