

**GOVERNMENT OF KERALA**  
**GROUNDWATER DEPARTMENT**

**GROUNDWATER LEVEL MONITORING REPORT – JUNE 2021**

**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.

Actual Rain fall received in the state during June2021(1June to 01July) is 409.7mm which is -39% deficient from the Normal rainfall during the period which is 671.7mm. All the districts received less Actual rain than the normal rain fall and in Deficient category except Kottayam district (547.4mm) which is Normal(-15 % departure). Thiruvananthapuram district received the least actual rain fall,140.8mm (-56% departure).

During June-2020 the state received 612.3mm rainfall which is 18% deficient than the normal rainfall.

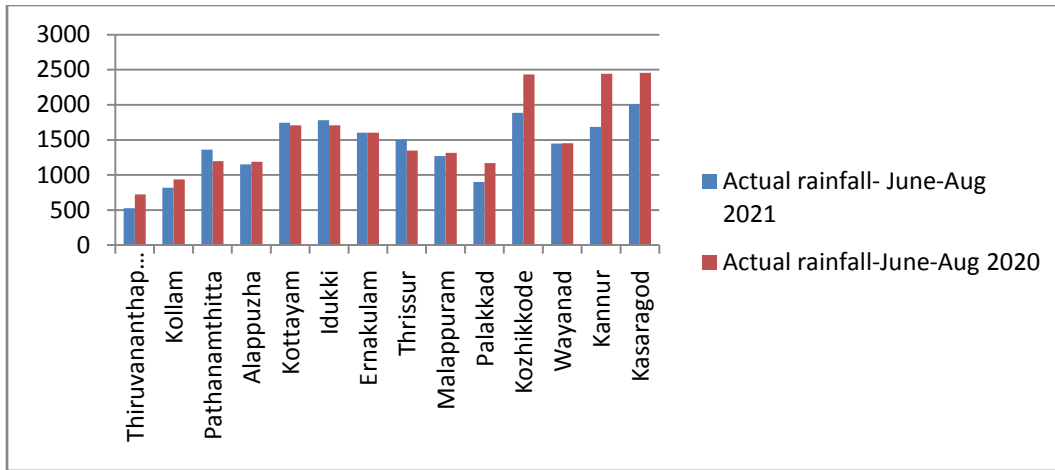


Fig:1. Comparison of actual rainfall occurred during June-August 2021 wrt 2020

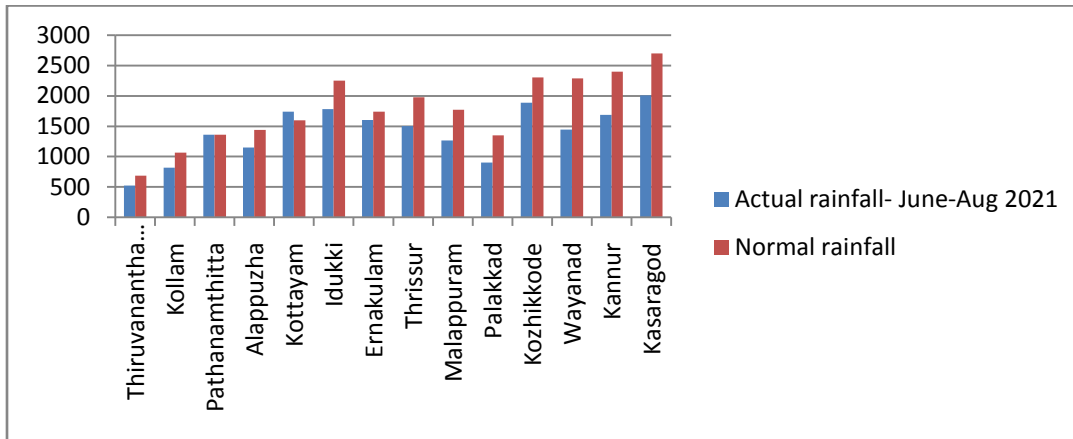


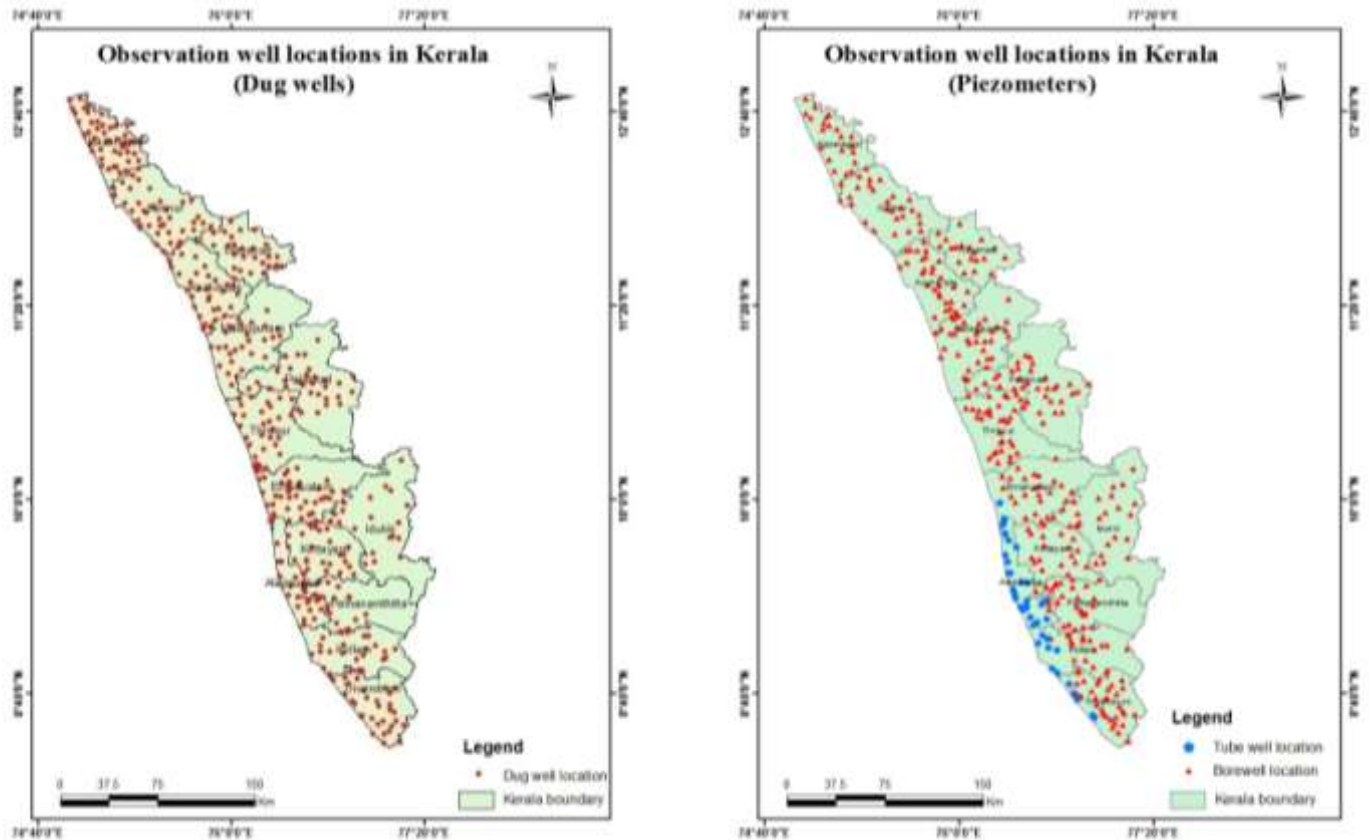
Fig:2. Comparison of actual rainfall occurred during June-August 2021 wrt Normal Rainfall

**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.



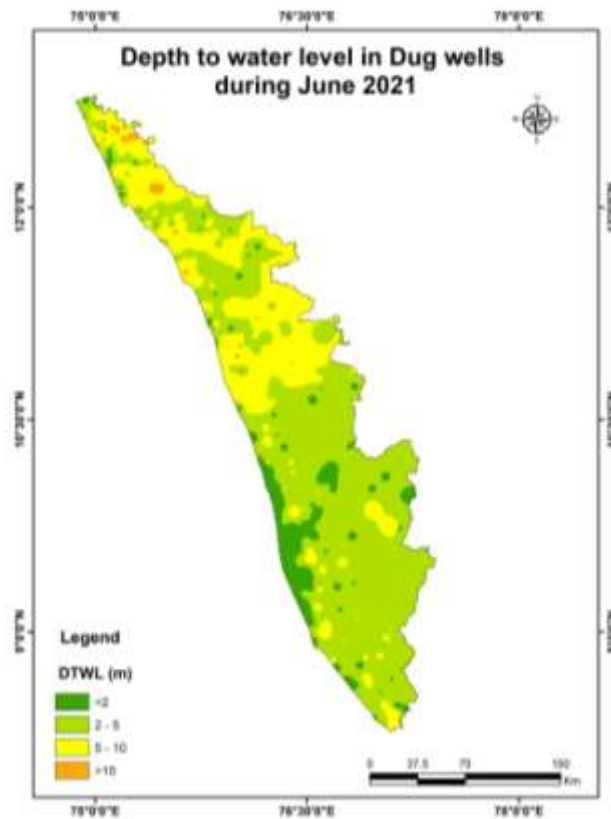
**Fig.3. Location map of observation dug wells and piezometers (bore wells & tube wells)**

### **Analysis of Groundwater level data – June 2021**

During the month of June 2021, groundwater level in 386 dug wells and 376 purpose built piezometers (bore wells- 347 and tube wells – 29) has been monitored. The data collected from the observation wells during the month of June 2021 has been compared with previous year’s corresponding month data and also with respect to decadal mean data of the corresponding month to assess the groundwater scenario in the state.

**I.Depth to Groundwater level during June 2021**

Dug wells:-The depth to groundwater level in the observation dug wells during the month of June 2021 ranges from a minimum of -0.8 m to a maximum of 15.6mbgl. Out of 386dug wells monitored water level in 27% 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. Dug wells in Thiruvananthapuram, Kollam,Pathanamthitta, Alappuzha, Kottayam, Idukki, andThrissur show water level below 10 mtrs.None of the wells in the state show water level above 20m. Table showing well frequency during June 2021 is appended. (Annexure-I)

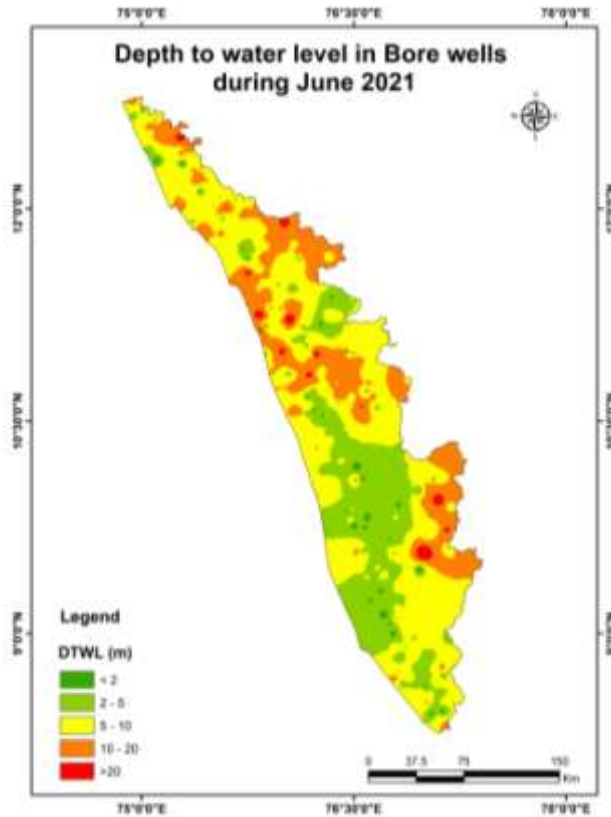


**Fig:4. Depth to water level in Dug wells during June 2021**

Borewells (hardrock terrain):-The depth to groundwater level in the observation bore wells during the month of June 2021 ranges from a minimum of -0.86m to a maximum of 48.39mbgl.Out of 347borewells monitored, water level in 12% of bore wells shows a depth to water level range from 0-2 m, 31 % ranges between 2-5 m, 31% ranges between 5-10 m, 21% of borewells ranges between 10-20 m, and 5% ranges more than 20 m . Borewells

in Thiruvananthapuram, Kollam, Pathanamthitta, Alappuzha and Kottayam districts show water level below 20 mbgl. Table showing well frequency during May 2021 is appended.

(Annexure-I)



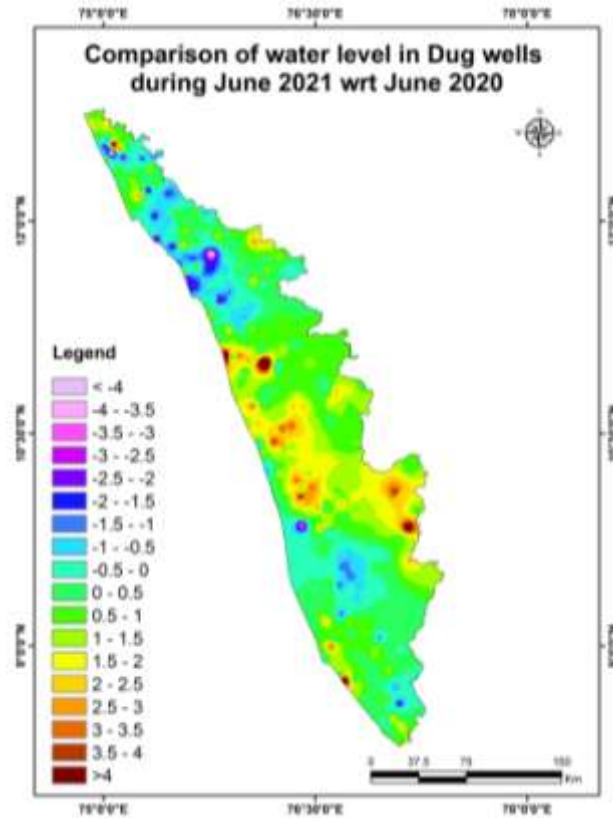
**Fig.5. Depth to water level in Bore wells during June 2021**

Tubewells (coastal sedimentary terrain):- The depth to groundwater level in the observation tubewells during the month of June 2021 ranges from a minimum of 0.39 m to a maximum of 34.23 mbgl. Out of 29 tube wells monitored in the state, water level in 28 % of tube wells ranges between 0-2m, 24 % of tube wells ranges between 2-5 m, 34% ranges between 5-10 m and 7% ranges between 10-20 and 7% ranges more than 20m. Table showing tube well frequency is appended. (Annexure-I)

## **II. Comparison of Groundwater level in June 2021 with respect to June 2020**

Comparison of the groundwater level in June 2021 with respect to the corresponding month in the previous year, indicates that 36 % of observation dug wells show a fall in water level and

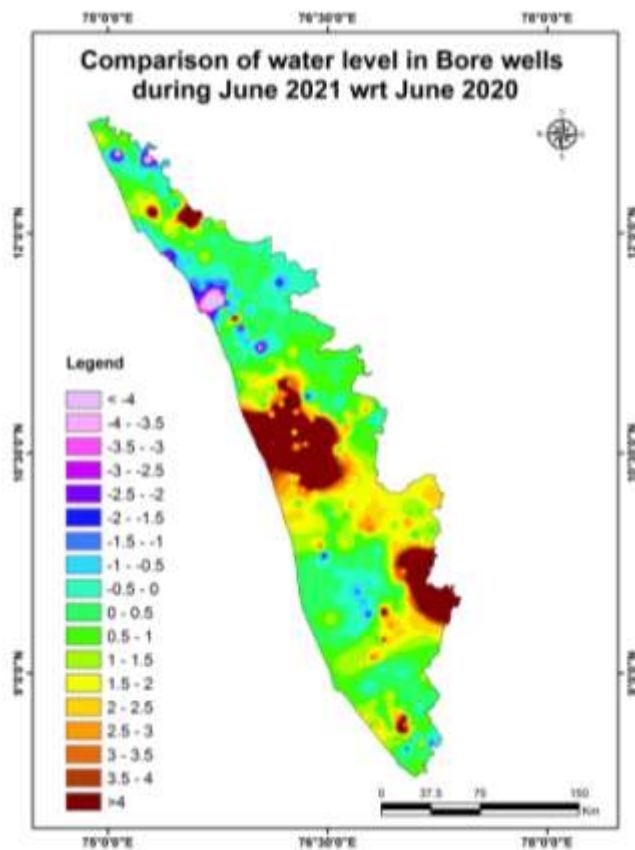
64 % of the wells shows no remarkable change /marginal rise in water level.Out of 36% of the dugwells shows a falling trend, 54% recorded fall in water level less than 0.5m, 16 % of dug wells show fall in the range between 0.5-1m,16% of dug wells show fall in the range between 1-1.5 m, 4% of dug wells show a fall in the range between 1.5 -2m and 10% dug wells show a fall in water level more than 2m. Table showing water level comparison of dug wells during June 2021with respect to June2020is appended. (Annexure-II).



**Fig:6. Comparison of water level in Dug wells during June 2021wrtJune 2020**

Comparison of the water level in observation bore wells (hard rock terrain in midland and high land areas) in June 2021with that of the previous year, it has been noticed that31% of bore wells show fall in water level and 69% of the wells shows no remarkable change/marginal rise in water level.Out of 31 % of the borewells 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, 9% 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, 9% of bore wells show a fall inwater level more than 2m. Table showing water level comparison of bore wells during June 2021with respect toJune2020 is appended.

(Annexure-II)



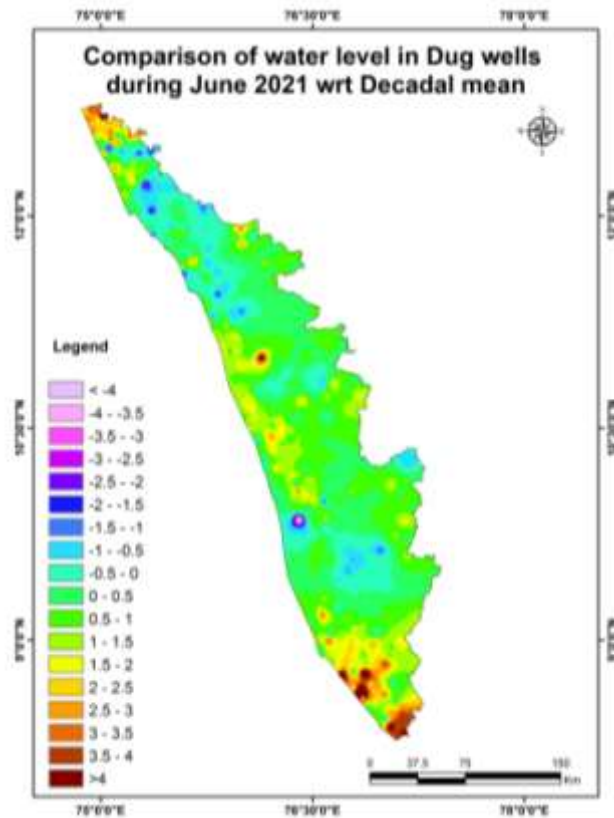
**Fig:7. Comparison of water level in Bore wells during June 2021 wrt June 2020**

Comparison of the water level in observation tube wells (in the coastal sedimentary areas) during June 2021 with that of the previous year reveals that 15 % of tube wells recorded a falling trend and 85 % of the wells shows no remarkable change /marginal rise of water level. Out of 9% of the tube wells showing a falling trend, 75% wells recorded fall in range between 0 to 0.5m and 25% wells recorded fall in range between 0.5 to 1m and no wells show a fall in water level above 1m. Table showing comparison of water level during June 2021 with respect to June 2020 is appended. (Annexure-II)



### III. Comparison of Groundwater level in June 2021 with respect to Decadal mean(2011- 20)

Comparison of the water level in June 2021 with respect to the decadal mean, it has been noticed that 30 % of observation dug wells recorded a fall in water level and 70% of the wells shows marginal rise /no remarkable change in water level. Out of 30% of the dugwells show a falling trend, 56% of the dug wells recorded fall in water level less than 0.5m, 25% show fall in the range between 0.5-1m, 12% 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 3% of dug wells show a fall in range more than 2m. Table showing water level comparison of dug wells during June 2021 with respect to decadal mean is appended. (Annexure-III)

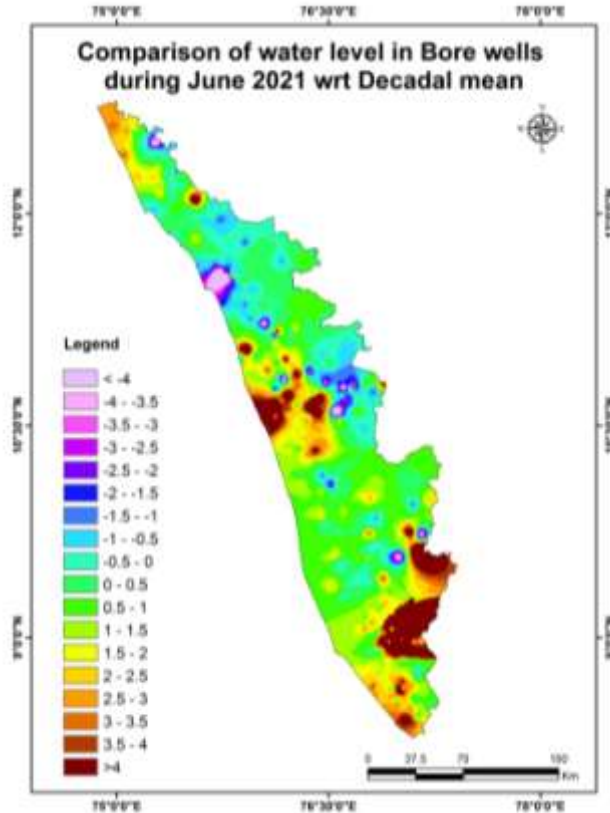


**Fig:7. Comparison of water level in Dug wells during June 2021 wrt Decadal mean**

Compared water level in the observation bore wells during June 2021 with that of the decadal mean. It has been noticed that 28% of bore wells show fall in water level, and 72% of the wells shows marginal rise, no remarkable change in water level. Out of 28 % of the bore wells shows a falling trend, 44 % shows a fall in water level less than 0.5m, 26 % show fall in



the range between 0.5 - 1m, 9% show fall in the range between 1-1.5 m, 4% of wells show a fall in range between 1.5 - 2m,17% show a fall in water level more than 2 m. Table showing water level comparison of bore wells during June 2021 with respect to decadal mean is appended. (Annexure-III)



**Fig:8. Comparison of water level in Bore wells during June 2021 wrt Decadal mean**

Comparison of the water level in the observation tube wells during June 2021 with that of the decadal mean reveals that 14 % of tube wells recorded a falling trend and 86 % of the tube wells show marginal rise/no remarkable change in water level. Out of 14 % of the tube wells shows a falling trend, 75% of the tube wells show fall in water level less than 0.5m and 25% show a fall in water level more than 2 m. Table showing water level comparison of tube wells during June 2021 with respect to decadal mean is appended. (Annexure-III)

## Summary

### Rainfall

- During June 2020 the state received 612.3 mm rainfall, which is 18% deficient than that of the actual rainfall.
- Actual Rain fall received in the state during June2021(1<sup>st</sup>June to 1<sup>st</sup>July) is 409.7mm which is -39% deficient from the Normal rainfall during the period which is 671.7mm. All the 14 districts received less rain fall than the normal rain fall in the season.

### Groundwater level

- The depth to groundwater level in the observation dug wells during the month of June 2021 range from a minimum of -0.8 m (recorded at Kazhakkootam, Thiruvananthapuram) to a maximum of 15.6mbgl,(recorded at Taliparamba, Kannur). In the case of bore wells minimum is recorded water level is -0.84 m (at Nedumangadu, Thiruvananthapuram) and maximum is of 48.39mbgl recorded at Areekode, Malappuram, Tube well at Thrikkunnappuzha, Alappuzha recorded the shallowest water level with 0.39m and maximum of 34.23mbgl was recorded at Sasthamkotta, Kollam.
- Among the dug wells 137 out of 378 showed a decline trend (36%) and in the case of bore wells 106 out of 343 piezometers are with declining water levels for this month (31%). If we consider tube wells 4 out of 27 observation wells showed declining trend (15%). In the case of wells (dug wells, bore wells, tube wells) with declining trend 55.9 % of the wells show decline in water level less than 0.5m.
- Comparison of groundwater level in June 2021 with respect to the decadal mean reveals that among all the observation dug wells 30 % (117 out of 386) and 28 % of bore wells (96 out of 345) and tube wells 14 % (4 out of 29) recorded a falling

trend. In the case of wells (dug wells, bore wells, tube wells) with declining trend 50.7 % of the wells show decline in water level less than 0.5m.

- In the state 14 dug wells show decline of water level more than 2m when compared with June-2020 data and decadal average. Dug well at Chattanchal, Kasaragod (Wellno. KSOW-09) showed maximum decline with respect to 2020-June and decadal mean. List of wells with 2m decline are annexed as IV.

Districtwise Observation well Frequency on June 2021

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	30	- 0.80	8.46	TVM OW28, Kazhakkootam	TVM OW22, Perumkadavila	9	14	7	0	0
	Bore well	33	- 0.84	16.21	13, Nedumangad	43, Vamanapuram	5	13	11	4	0
	Tube well	4	2.59	7.37	36, Chirayinkeezhu	37, Chirayinkeezhu	0	1	3	0	0
Kollam	Dug well	23	0.52	7.98	KLM OW 23, Ochira	KLM OW 24, Chittumala	5	10	8	0	0
	Bore well	16	0.12	8.12	KLM/6, Kottarakkara	KLM/07, Pathanapuram	2	5	9	0	0
	Tube well	7	2.27	34.23	KLM/17 ,Mughatahala	KLM/29, Sasthamkotta	0	1	3	1	2
Pathanamthitta	Dug well	14	1.03	6.73	PTAOB34A,Kozhancherry	PTA OW, Mallappally	5	8	1	0	0
	Bore well	25	0.00	11.34	PTA/19,Parakkode	PTA/20, Adoor	4	9	11	1	0
Alappuzha	Dug well	14	- 0.14	7.82	OW-27 Chambakkulam	OW-02 Kattanam	12	0	2	0	0
	Bore well	2	1.49	4.21	36 Punthala	35 Pennukkara	1	1	0	0	0
	Tube well	17	0.39	16.95	08 Thrikkunnappuzha	04 Charumoodu	8	5	3	1	0
Kottayam	Dug well	21	0.35	8.91	KTM-OW-11, Erattupetta	KTM-OW-4_, Pallom	7	9	5	0	0
	Bore well	24	- 0.09	16.20	10,Uzhavoor	20, Pallom	7	10	5	2	0
Idukki	Dug	20	0.43	8.94	73, Udumpanchola	71, Kattappana	5	12	3	0	0

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	well										
	Bore well	23	1.00	37.67	SO415,Elamdesom	SO428,Azhutha	2	9	5	4	3
Ernakulam	Dug well	39	0.07	10.30	E85, Kochi corporation	GWE-09, Amballur	18	15	6	0	0
	Bore well	22	-	12.78	BW101,Asamannur	BW100, Rayamangalam	3	13	5	1	0
	Tube well	1	9.61	9.61	TW 01, Kochi corporation	TW 01, Kochi corporation	0	0	1	0	0
	Dug well	31	0.00	9.64	TSROW16, Thalikkulam	TSROW12,Chowwannur	9	11	11	0	0
Thrissur	Bore well	38	0.36	27.59	TSR124, Puzhakkal	TSR122, Vadakkethara	6	13	10	7	2
	Dug well	25	0.35	12.06	MPM.OW.18, Kondotty	MPM.OW23, Vengara	4	9	9	3	0
Malappuram	Bore well	30	0.44	48.39	MPM169, Wandoor	MPM174, Areekode	4	9	11	3	3
	Dug well	30	0.62	10.24	PKD S-2, Alathur	PKD S-10, Sreekrishnapuram	3	14	12	1	0
Palakkad	Bore well	33	2.01	27.76	154,Mannarkad	136, Pattambi	0	6	9	16	2
	Dug well	33	0.51	11.43	QKKDO49, Kozhikkode	QKKDO60, Thodannur	6	14	11	2	0
Kozhikkode	Bore well	33	0.09	31.98	Kozhikkode, KKDPZ 197	KKDPZ 202, Perambra	3	10	9	7	4
	Dug well	26	0.25	12.25	SOW-10, Poothadi	SOW-4, Nenmeni	5	9	10	2	0
Wayanad	Bore well	19	1.64	23.67	WYD2c16,Muttill	WYD223, Thirunelli	1	2	6	9	1
	Dug well	36	0.58	15.60	KNR-POW-C23, Koothuparamba	KNR-POW-C8, Thaliparamba	7	9	17	3	0
Kannur	Bore well	27	0.92	22.14	KNRPz239,Thalipparamba	KNR-Pz228, Irikkur	1	6	9	10	1

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Kasaragod	Dug well	44	0.00	15.10	199, Kanhangad	200, Karadka	9	12	13	10	0
	Bore well	22	0.40	27.98	PZKGD241,Parappa	PZKGD242,Karadka	3	3	8	7	1

Comparison of Water level June 2021 with respect to June 2020

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 m
					No.	No.	No.	No.	No.
Thiruvananthapuram	Dug well	24	Rise	15	1	4	6	1	3
			Fall	9	4	1	2	1	1
	Bore well	33	Rise	22	9	1	3	2	7
			Fall	11	4	4	2	1	0
	Tube well	4	Rise	2	0	1	0	0	1
			Fall	2	1	1	0	0	0
Kollam	Dug well	23	Rise	16	8	1	6	0	1
			Fall	7	6	0	1	0	0
	Bore well	15	Rise	8	5	0	0	2	1
			Fall	7	5	2	0	0	0
	Tube well	7	Rise	7	1	1	2	0	3
			Fall	0	0	0	0	0	0
Pathanamthitta	Dug well	14	Rise	7	3	2	2	0	0
			Fall	7	3	0	4	0	0
	Bore well	25	Rise	16	4	3	2	7	0
			Fall	9	6	2	0	1	0
Alappuzha	Dug well	14	Rise	9	7	1	0	0	1
			Fall	5	4	1	0	0	0
	Bore well	2	Rise	1	1	0	0	0	0

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	well		Fall	1	1	0	0	0	0
	Tube well	15	Rise	13	10	1	2	0	0
			Fall	2	2	0	0	0	0
Kottayam	Dug well	21	Rise	3	2	1	0	0	0
			Fall	18	10	4	4	0	0
	Bore well	24	Rise	9	4	3	1	1	0
			Fall	15	9	3	2	0	1
Idukki	Dug well	20	Rise	19	2	8	5	1	3
			Fall	1	0	1	0	0	0
	Bore well	23	Rise	20	2	6	3	1	8
			Fall	3	2	1	0	0	0
Ernakulam	Dug well	38	Rise	29	4	5	3	6	11
			Fall	9	7	1	0	0	1
	Bore well	21	Rise	20	4	4	3	1	8
			Fall	1	1	0	0	0	0
	Tube well	1	Rise	1	1	0	0	0	0
			Fall	0	0	0	0	0	0
Thrissur	Dug well	31	Rise	26	2	3	6	5	10
			Fall	5	1	3	1	0	0
	Bore well	37	Rise	37	0	3	2	2	30
			Fall	0	0	0	0	0	0
Malappuram	Dug well	26	Rise	22	5	8	3	2	4
			Fall	4	3	1	0	0	0
	Bore well	30	Rise	23	5	7	3	2	6
			Fall	7	5	1	0	0	1
Palakkad	Dug well	30	Rise	27	11	5	5	3	3
			Fall	3	3	0	0	0	0
	Bore well	33	Rise	25	5	5	4	2	9
			Fall	8	4	3	0	0	1
Kozhikkode	Dug	33	Rise	10	4	1	4	0	1



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	well		Fall	23	9	5	4	0	5
	Bore well	32	Rise	12	4	3	3	0	2
			Fall	20	9	3	3	2	3
Wayanad	Dug well	26	Rise	15	6	4	2	0	3
			Fall	11	10	1	0	0	0
	Bore well	19	Rise	11	9	1	1	0	0
			Fall	8	7	0	0	0	1
Kannur	Dug well	36	Rise	15	7	4	1	1	2
			Fall	21	9	3	3	3	3
	Bore well	28	Rise	16	8	1	3	2	2
			Fall	12	6	3	2	0	1
Kasaragod	Dug well	42	Rise	28	11	4	7	3	3
			Fall	14	5	2	3	1	3
	Bore well	21	Rise	17	5	5	4	3	0
			Fall	4	2	0	0	0	2

Comparison of Water level June 2021 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 m
					No.	No.	No.	No.	No.
Thiruvananthapuram	Dug well	30	Rise	25	1	6	3	0	15
			Fall	5	3	1	1	0	0
	Bore well	32	Rise	29	5	2	5	3	14
			Fall	3	2	0	1	0	0
	Tube well	4	Rise	3	1	0	0	2	0
Fall			1	1	0	0	0	0	
Kollam	Dug well	23	Rise	20	2	6	1	4	7
			Fall	3	3	0	0	0	0

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	Bore well	16	Rise	12	2	1	3	0	6
			Fall	4	4	0	0	0	0
	Tube well	7	Rise	6	1	1	0	1	3
			Fall	1	1	0	0	0	0
Pathanamthitta	Dug well	14	Rise	9	7	1	1	0	0
			Fall	5	3	1	1	0	0
	Bore well	25	Rise	20	6	5	2	7	0
			Fall	5	5	0	0	0	0
Alappuzha	Dug well	14	Rise	11	5	4	1	0	1
			Fall	3	3	0	0	0	0
	Bore well	2	Rise	1	0	1	0	0	0
			Fall	1	1	0	0	0	0
	Tube well	17	Rise	15	5	4	5	1	0
			Fall	2	1	0	0	0	1
Kottayam	Dug well	21	Rise	8	3	5	0	0	0
			Fall	13	5	6	2	0	0
	Bore well	24	Rise	15	3	3	4	2	3
			Fall	9	4	4	1	0	0
Idukki	Dug well	20	Rise	16	10	2	2	2	0
			Fall	4	2	1	1	0	0
	Bore well	23	Rise	17	4	6	3	0	4
			Fall	6	1	1	2	0	2
Ernakulam	Dug well	38	Rise	29	11	5	9	1	3
			Fall	9	7	0	0	1	1
	Bore well	22	Rise	20	9	4	4	2	1
			Fall	2	0	0	1	0	1
	Tube well	1	Rise	1	1	0	0	0	0
			Fall	0	0	0	0	0	0
Thrissur	Dug well	31	Rise	26	7	4	4	4	7
			Fall	5	4	1	0	0	0

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	Bore well	37	Rise	37	3	5	4	4	21
			Fall	0	0	0	0	0	0
Malappuram	Dug well	26	Rise	25	11	6	3	1	4
			Fall	1	1	0	0	0	0
	Bore well	30	Rise	24	9	5	2	3	5
			Fall	6	4	0	0	0	2
Palakkad	Dug well	30	Rise	20	8	7	2	2	1
			Fall	10	6	3	1	0	0
	Bore well	33	Rise	18	5	2	4	1	6
			Fall	15	3	2	1	1	8
Kozhikkode	Dug well	33	Rise	15	4	6	1	3	1
			Fall	18	7	6	3	1	1
	Bore well	33	Rise	15	9	5	0	0	1
			Fall	18	5	9	0	2	2
Wayanad	Dug well	26	Rise	20	9	8	1	0	2
			Fall	6	5	1	0	0	0
	Bore well	19	Rise	12	10	2	0	0	0
			Fall	7	5	0	1	1	0
Kannur	Dug well	36	Rise	12	8	3	1	0	0
			Fall	24	13	5	4	1	1
	Bore well	28	Rise	16	5	9	2	0	0
			Fall	12	10	2	0	0	0
Kasaragod	Dug well	44	Rise	33	5	6	3	3	16
			Fall	11	3	4	1	2	1
	Bore well	21	Rise	17	2	1	1	3	10
			Fall	4	3	0	0	0	1

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Appendix: 4 List of open wells with more than 2m decline ( previous year & 10yr Mean).												
SNo	District	Block	GP/Municipality/Corporation	WellNo	Well_Type	Latitude	Longitude	Jun-2021	Jun-2020	Decadal Avg(2011-2020)	Fluctuation in Jun-2021 wrt.	
											WL	Jun-2020
1	Kozhikode	Badagaru	Thodannur	QKKDO60	Dug Well	11.54444	75.6425	11.430	9.120	10.884	-2.310	-0.546
2	Kozhikode	Quilandi	Balussery	QKKDO55	Dug Well	11.44472	75.83056	5.880	2.990	4.146	-2.890	-1.734
3	Kozhikode	Vadakara	Kunnummal	KKDOW017	Dug Well	11.66389	75.75278	4.470	2.370	3.507	-2.100	-0.963
4	Kozhikode	Vadakara	Thuneri	KKDOW020	Dug Well	11.76861	75.76361	9.840	5.010	9.089	-4.830	-0.751
5	Kozhikode	Vadakara	Vadakara	KKDOW176	Dug Well	11.595	75.58528	5.950	3.090	3.911	-2.860	-2.039
6	Ernakulam	Mulamthuruthy	Amballur	GWE-09	Dug Well	9.84938	76.40713	3.850	6.625	5.391	-2.775	-1.541
7	Kannur	Kannur	Kannur	KNR-MOW181	Dug Well	11.87639	75.37417	7.770	4.980	6.464	-2.790	-1.306
8	Kannur	Taliparamba	Payyannur	KNR-MOW190	Dug Well	12.22167	75.31555	7.530	5.000	4.303	-2.530	-3.227
9	Kannur	Thalassery	Koothuparamba	KNR-POW-C21	Dug Well	11.82528	75.49277	8.670	6.380	8.471	-2.290	-0.199
10	Kasaragod	Kasaragod	Karadka	KSOW-10	Dug Well	12.45556	75.14083	2.530	0.400	1.761	-2.130	-0.769
11	Kasaragod	Kasaragod	Kasaragod	KSOW-09	Dug Well	12.48	75.0575	12.770	7.000	8.733	-5.770	-4.038
12	Kasaragod	Kasaragod	Kasaragod	KSOW-25	Dug Well	12.5225	75.01334	7.740	5.060	8.464	-2.680	0.724
13	Thiruvananthapuram	Nedumangad	Vellanad	TVM OW09	Dug Well	8.58833	77.09666	3.570	1.160	3.336	-2.410	-0.234

## Observation well frequency on June 2021

## 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	386	-0.8	15.6	TVM OW28, Kazhakkootam, Thiruvananthapuram	Taliparamba, KNR- POW-C8	104 27%	145 38%	115 30%	22 5%	0 0%
Bore well	347	- 0.84	48.39	13, Nedumangadu, Thiruvananthapuram	MPM174, Areekode, Malappuram	42 12%	109 31%	108 31%	71 21%	17 5%
Tube well	29	0.39	34.23	08 Thrikkunnappuzha, Alappuzha	KLM/29, Sasthamkotta, Kollam	8 28%	7 24%	10 34%	2 7%	2 7%

**Comparison of Water level June 2021 with respect to June 2020      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 m
Dug well	378	Rise	241	74	51	50	22	45
		%	64%	31%	21%	21%	9%	18%
		Fall	137	74	23	22	5	13
		%	36%	54%	16%	16%	4%	10%
Bore well	343	Rise	237	65	42	32	25	73
		%	69%	27%	18%	13%	11%	31%
		Fall	106	61	22	9	4	10
		%	31%	57%	21%	9%	4%	9%
Tube well	27	Rise	23	12	3	4	0	4
		%	85%	53%	13%	17%	0%	17%
		Fall	4	3	1	0	0	0
		%	15%	75%	25%	0%	0%	0%

## Comparison of Water level June 2021 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 m
Dug well	386	Rise	269	91	69	32	20	57
		%	70%	34%	26%	12%	7%	21%
		Fall	117	65	29	14	5	4
		%	30%	56%	25%	12%	4%	3%
Bore well	345	Rise	249	73	44	32	27	73
		%	72%	29%	18%	13%	11%	29%
		Fall	96	42	25	9	4	16
		%	28%	44%	26%	9%	4%	17%
Tube well	29	Rise	25	8	5	5	4	3
		%	86%	32%	20%	20%	16%	12%
		Fall	4	3	0	0	0	1
		%	14%	75%	0%	0%	0%	25%