# GOVERNMENT OF KERALA
# GROUNDWATER DEPARTMENT

## GROUNDWATER LEVEL MONITORING REPORT – MARCH 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.

The winter rainfall (January-February) occurred in the state during 2020 is 9.6 mm, which is 57% deficient than that of the normal Rainfall (22.4 mm). From pre-monsoon season 2020 (March-May) the state received normal rainfall (387.5 mm).

While the winter rainfall occurred in the state during 2021 (January - February) is 114.1mm, which is 410% large excess than that of the normal rainfall. Most of the locations in the state get recharged from the excess rainfall occurred during this season. The pre-monsoon rainfall occurred in the state during 2021 is 750.9 mm which is 108% excess than that of the normal rainfall (361.5 mm). Since large excess rainfall occurred during pre-monsoon season, most of the observation wells got recharged during this season than that of the previous year (2020).

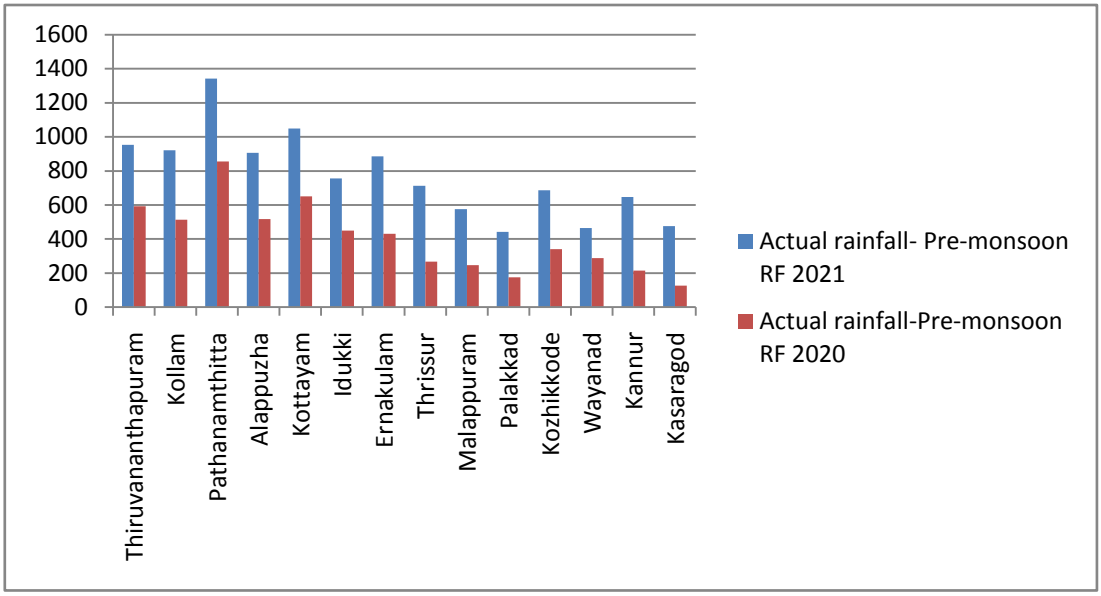



**Fig:1. Comparison of actual Pre-monsoon rainfall occurred during 2021 wrt 2020**

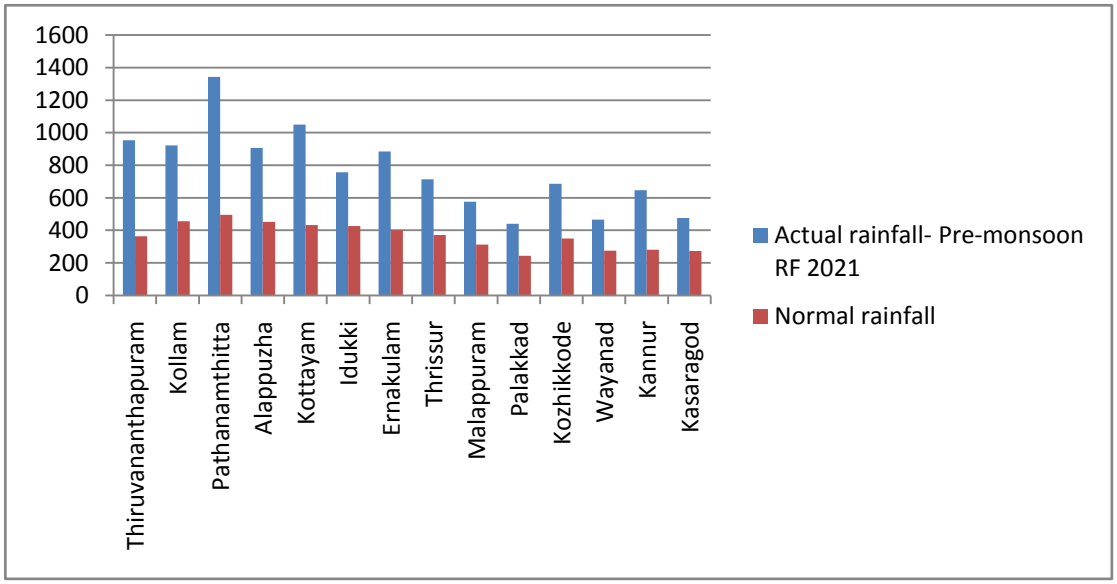



**Fig:2. Comparison of actual Pre-monsoon rainfall occurred during 2021 wrt Normal Rainfall**

**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.

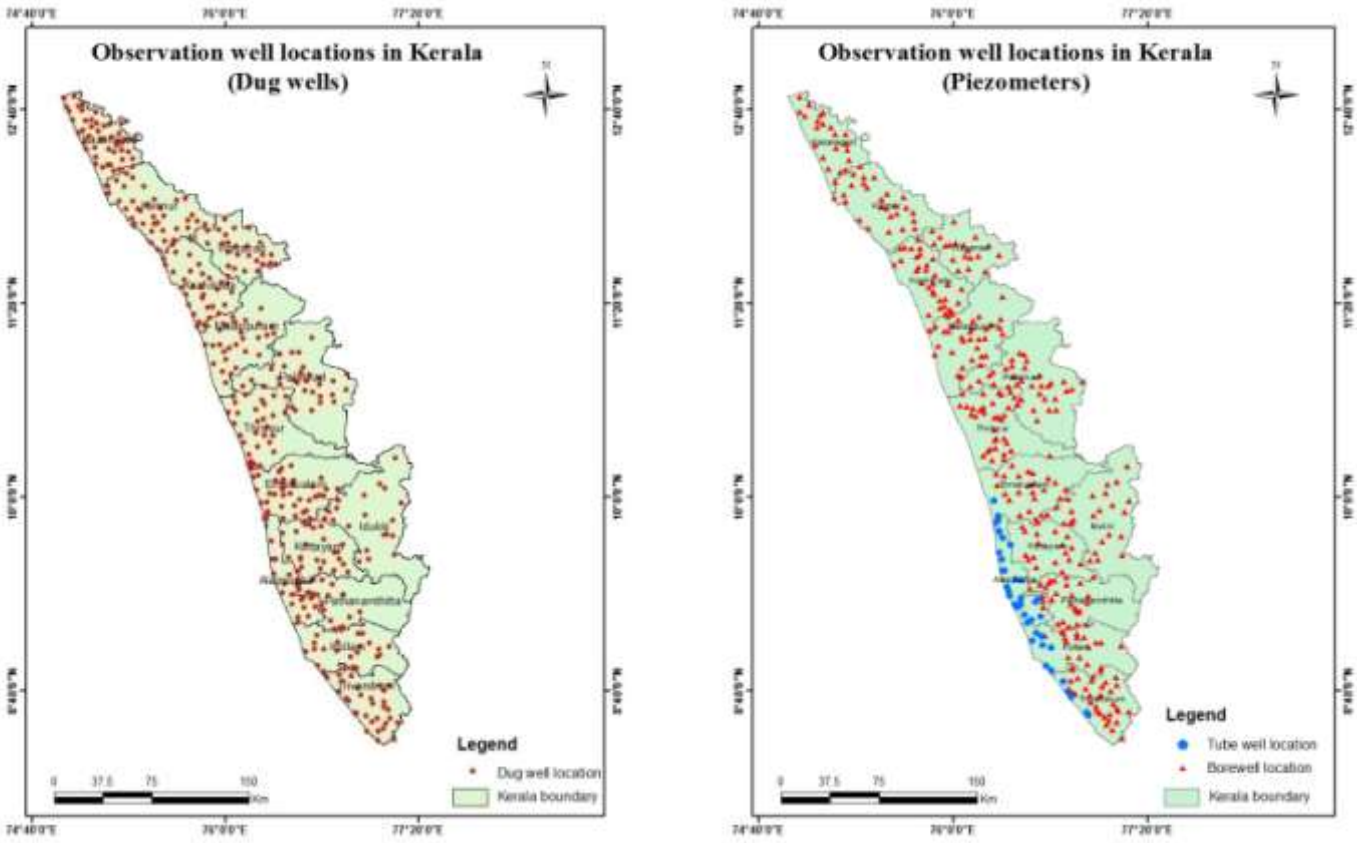



**Fig:3. Location map of observation dug wells and piezometers (bore wells & tube wells)**

## Analysis of Groundwater level data – March 2021

During the month of March 2021, groundwater level in 396 dug wells and 441 purpose built piezometers (bore wells- 370 and tube wells – 41) has been monitored. The data collected from the observation wells during the month of March 2021 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 March 2021

Dug wells- The depth to groundwater level in the observation dug wells during the month of March 2021 ranges from a minimum of -0.79 m to a maximum of 17.64 mbgl. Out of 396 dug wells monitored water level in 13% of dug wells shows a depth to water level ranges from 0-2 m, 30% ranges between 2-5 m, 43% ranges between 5-10 m and 14% dug wells recorded depth to water level ranges between 10-20 mbgl. Table showing well frequency during March 2021 is appended. (Annexure-I)

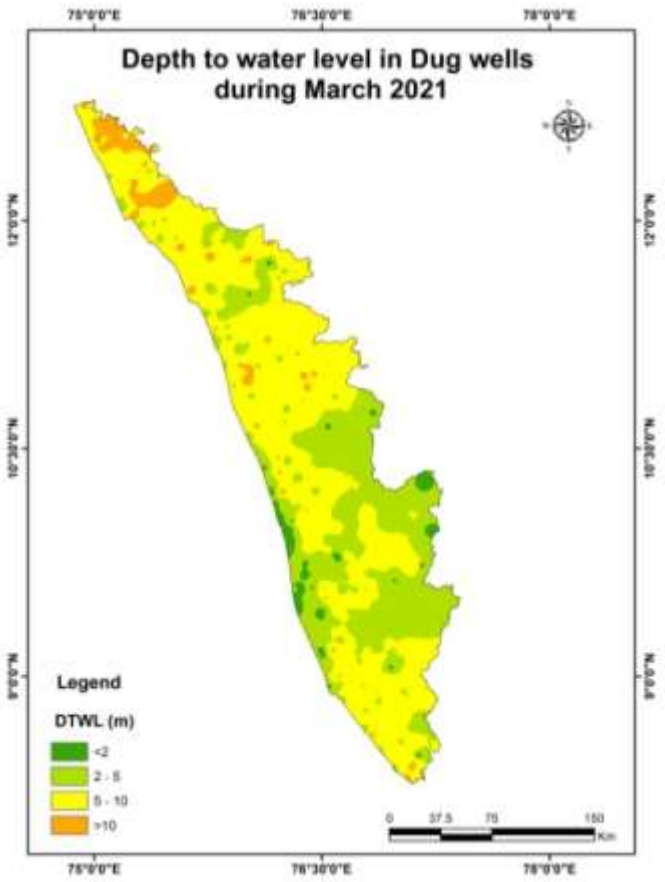



**Fig:4. Depth to water level in Dug wells during March 2021**

Borewells (hardrock terrain):- The depth to groundwater level in the observation bore wells during the month of March 2021 ranges from a minimum of -1.00 m to a maximum of 46.79 mbgl. Out of 370 bore wells monitored, water level in 7% of bore wells shows a depth to water level range from 0-2 m, 18 % ranges between 2-5 m, 38% ranges between 5-10 m, 28% of bore wells ranges between 10-20 m, and 9% ranges more than 20 m . Table showing well frequency during March 2021 is appended. (Annexure-I)

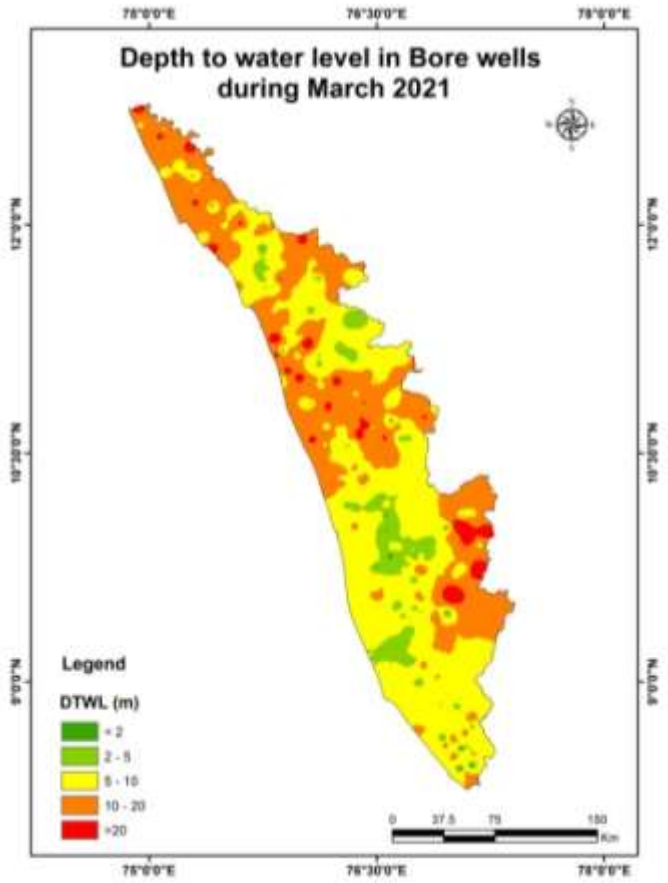



**Fig:5. Depth to water level in Bore wells during March 2021**

Tube wells (coastal sedimentary terrain) - The depth to groundwater level in the observation tube wells during the month of March 2021 range from a minimum of 0. 71 m to a maximum of 34.57 mbgl . Out of 41 tube wells monitored in the state, water level in 17 % of tube wells shows a depth to water level range from 0-2m, 37% of tube wells ranges between 2-5 m, 24 % of tube wells ranges between 5-10 m , 15% ranges between 10-20 m and 7% ranges more than 20m. Table showing well frequency is appended.(Annexure-I )

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

Comparison of the groundwater level in March 2021with respect to the corresponding month in the previous year, indicates that 41 % of observation dug wells show a fall in water level and 59 % of the wells shows no remarkable change /marginal rise in water level. Out of 41% of the dug wells shows a falling trend, 67% recorded fall in water level less than 0.5m , 19 % of dug wells show fall in the range between 0.5-1m, 6 % 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 4% dug wells show a fall in water level more than 2m. Table showing water level comparison of dug wells during March 2021with respect to March 2020 is appended. (Annexure-II).

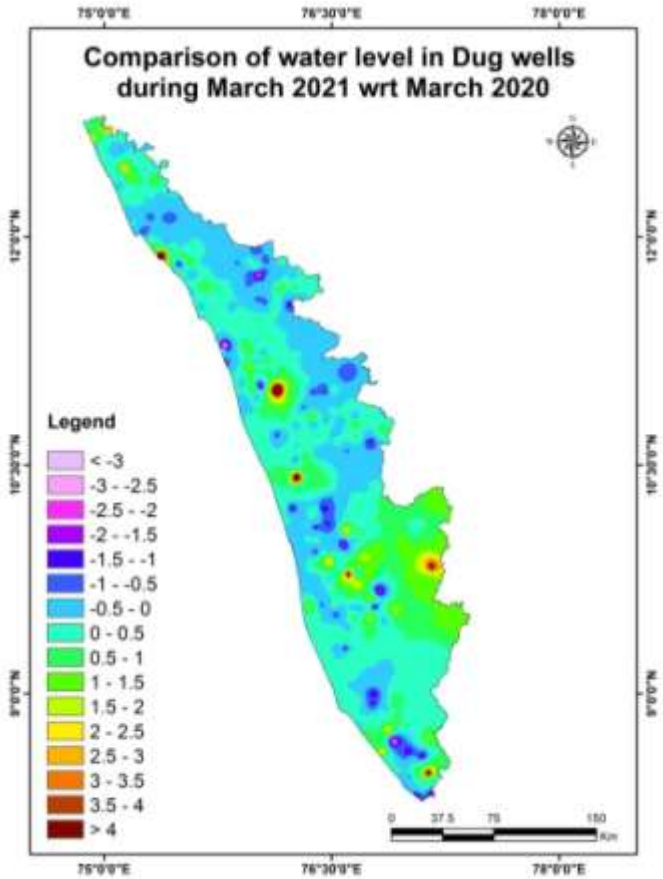



**Fig:6. Comparison of water level in Dug wells during March 2021 wrt March 2020**

Comparison of the water level in observation bore wells (hard rock terrain in midland and high land areas) in March 2021 with that of the previous year, it has been noticed that 41% of bore wells show fall in water level and 59% of the wells shows no remarkable change / marginal rise in water level. Out of 41 % of the bore wells shows a falling trend , 55 % of the

bore wells recorded fall in water level less than 0.5m, 18 % show fall in the range between 0.5 - 1m, 11 % of bore wells show fall in the range between 1 - 1.5m, 7 % of bore wells show a fall in range between, 1.5-2m, 9% of bore wells show a fall in water level more than 2m. Table showing water level comparison of bore wells during March 2021 with respect to March 2020 is appended. (Annexure-II)

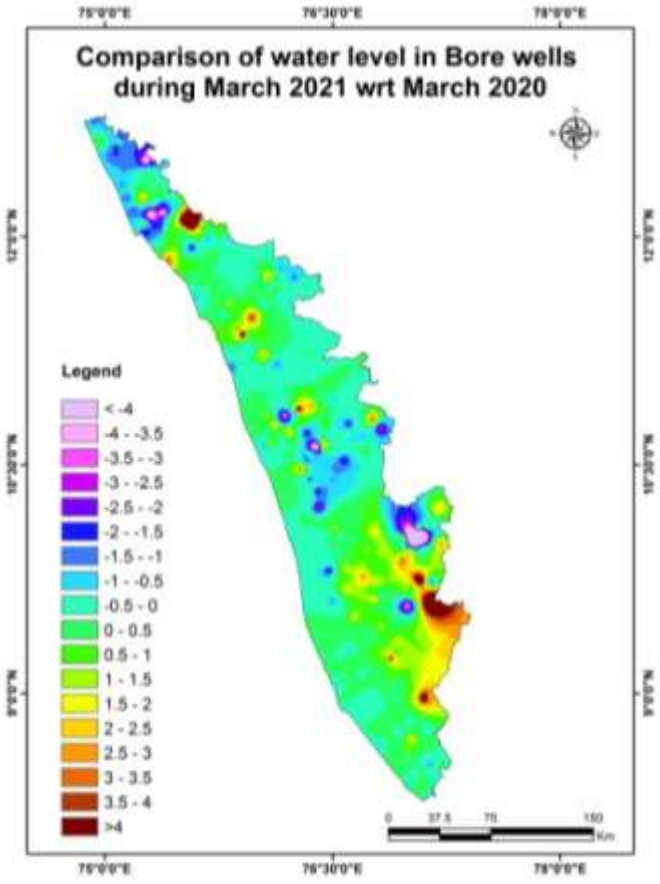



**Fig:7. Comparison of water level in Bore wells during March 2021 wrt March 2020**

Comparison of the water level in observation tube wells (in the coastal sedimentary areas) during March 2021 with that of the previous year reveals that 39 % of tube wells recorded a falling trend and 61 % of the wells shows no remarkable change /marginal rise of water level. Out of 39% of the tube wells showing a falling trend, 88% wells recorded fall in water level less than 0.5m, 6% wells show a fall in range between 0.5 to 1m and 6% wells show a fall in range between 1.5 to 2m. Table showing comparison of water level during March 2021 with respect to March 2020 is appended. (Annexure-II)

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

Comparison of the water level in March 2021 with respect to the decadal mean, it has been noticed that 27 % of observation dug wells recorded a fall in water level and 73% of the wells shows marginal rise /no remarkable change in water level. Out of 27% of the dug wells show a falling trend, 60% of the dug wells recorded fall in water level less than 0.5m, 24% show fall in the range between 0.5-1m, 6% 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 and 5% of dug wells show a fall in range more than 2m. Table showing water level comparison of dug wells during March 2021 with respect to decadal mean is appended. (Annexure-III)

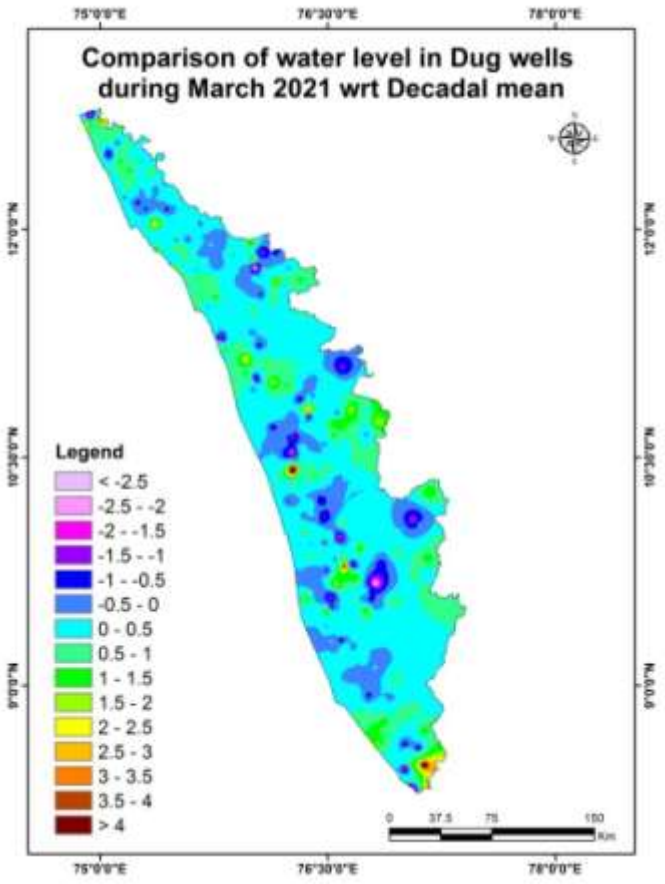



**Fig:7. Comparison of water level in Dug wells during March 2021 wrt Decadal mean**

Comparison of the water level in the observation bore wells during March 2021 with that of the decadal mean. It has been noticed that 43% of bore wells show fall in water level, and 57% of the wells shows marginal rise, no remarkable change in water level. Out of 43 % of the bore

wells shows a falling trend , 44 % shows a fall in water level less than 0.5m, 15 % 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, 22% show a fall in water level more than 2 m. Table showing water level comparison of bore wells during March 2021 with respect to decadal mean is appended. (Annexure-III)

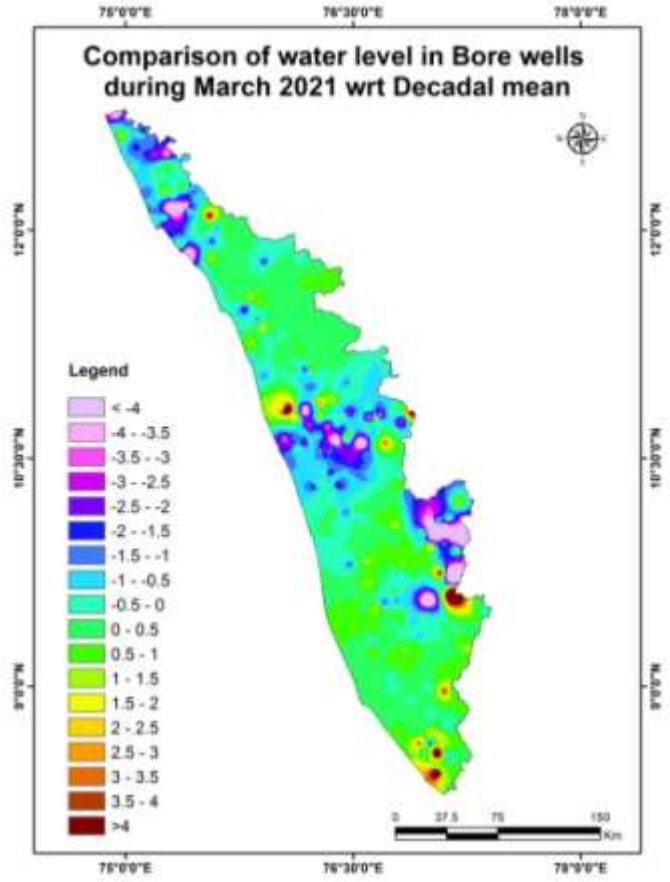



**Fig:8. Comparison of water level in Bore wells during March 2021 wrt Decadal mean**

Comparison of the water level in the observation tube wells during March 2021 with that of the decadal mean reveals that 40 % of tube wells recorded a falling trend and 60 % of the tube wells show marginal rise/no remarkable change in water level. Out of 40 % of the tube wells shows a falling trend, 63% of the tube wells show fall in water level less than 0.5m, 25% show fall in the range between 0.5-1 m , 6% show fall in the range between 1-1.5m and 6% show fall in the range between more than 2 m. Table showing water level comparison of tube wells during March 2021 with respect to decadal mean is appended. (Annexure-III)

## Summary

### Rainfall

- The winter rainfall (January-February) occurred in the state during 2020 is 9.6 mm, which is 57% deficient than that of the normal Rainfall (22.4 mm).
- The winter rainfall occurred in the state during 2021 (January - February) is 114.1mm, which is 410% large excess than that of the normal rainfall.
- The rainfall during the pre-monsoon (March-May 2020) occurred in the state is 387.5 mm, which is normal rainfall.
- The pre-monsoon rainfall occurred in the state during 2021 is 750.9 mm which is 108% large excess than that of the normal rainfall (361.5 mm)

### Groundwater level

- The depth to groundwater level in the observation dug wells during the month of March 2021 range from a minimum of -0.79 m to a maximum of 17.64 mbgl, in bore wells -1.00 m to a maximum of 45.79 mbgl and in the tube wells 0.71 m to a maximum of 34.57 mbgl.
- Comparison of the water level in March 2021 with respect to the previous year, reveals that 41 % of observation dug wells, 41 % of bore wells and 39% 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 March 2021 with respect to the decadal mean reveals that 27 % of observation dug wells, 46 % of bore wells and 40% 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 2 m during long term analysis will be monitored closely.
- Most of the locations in the state get recharged from the excess rainfall occurred during pre-monsoon season (March-May 2021) than that of the pre-monsoon season in the previous year (March-May 2020).

**Districtwise Observation well Frequency on March 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 | 31 | -0.60 | 13.32 | Keezharoor | Veiloor-Murukkumpuzha | 3 | 8 | 14 | 6 | 0 |
| | Bore well | 35 | -1.00 | 19.32 | Kottukal (Balaramapuram) | Parassala | 5 | 4 | 17 | 9 | 0 |
| | Tube well | 4 | 3.97 | 10.11 | Azhoor | Sarkara-Chirayinkeezhu | 0 | 1 | 2 | 1 | 0 |
| Kollam | Dug well | 25 | 0.74 | 11.39 | Karavoor | Mantrothuruthu | 4 | 6 | 12 | 3 | 0 |
| | Bore well | 16 | 1.65 | 11.07 | Kottarakkara | Vilakudy | 1 | 1 | 12 | 2 | 0 |
| | Tube well | 9 | 3.13 | 35.04 | Panmana | Mynagappally | 0 | 2 | 2 | 2 | 3 |
| Pathanamthitta | Dug well | 14 | 1.96 | 9.92 | Peringara | Kunnamthanam | 1 | 10 | 3 | 0 | 0 |
| | Bore well | 26 | 1.03 | 15.44 | Kalanjoor | Konni | 3 | 6 | 11 | 6 | 0 |
| Alappuzha | Dug well | 20 | 0.37 | 11.98 | Kidangara | Kattanam | 8 | 9 | 1 | 2 | 0 |
| | Bore well | 2 | 2.39 | 4.97 | Punthala | Pennukkara | 0 | 2 | 0 | 0 | 0 |
| | Tube well | 27 | 0.71 | 18.34 | Chingoly | Charumoodu | 7 | 12 | 6 | 2 | 0 |
| Kottayam | Dug well | 21 | -0.79 | 11.61 | Uzhavoor | Panachikkad | 4 | 7 | 8 | 2 | 0 |
| | Bore well | 45 | -0.12 | 22.93 | Veliyannoor | Kanjirappally | 7 | 16 | 16 | 4 | 2 |
| Idukki | Dug well | 20 | 0.65 | 9.09 | Udumbanchola | Ayyappancoil | 4 | 8 | 8 | 0 | 0 |
| | Bore well | 23 | 1.77 | 42.31 | Udumbannoor | Vellathuval | 1 | 6 | 8 | 3 | 5 |
| Ernakulam | Dug well | 38 | 0.24 | 9.56 | Chellanam | Perumbavur | 9 | 11 | 18 | 0 | 0 |
| | Bore well | 24 | 0.75 | 11.35 | Assmannoor | Kakkanadu | 3 | 7 | 13 | 1 | 0 |
| | Tube well | 1 | 11.35 | 11.35 | Cochi | Cochi | 0 | 0 | 0 | 1 | 0 |
| Thrissur | Dug well | 29 | 1.38 | 13.86 | Methala | Poyya | 6 | 7 | 12 | 4 | 0 |
| | Bore well | 36 | 1.99 | 30.62 | Chengallur | Elanad | 1 | 4 | 12 | 13 | 6 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Malappuram | Dug well | 26 | 2.36 | 15.25 | Kondotty | Othukkungal | 0 | 9 | 12 | 5 | 0 |
| | Bore well | 30 | 2.02 | 46.79 | Vazhikkadavu | Areekode | 0 | 7 | 14 | 5 | 4 |
| Palakkad | Dug well | 31 | 0.87 | 11.12 | Alathur | Mannarkad | 2 | 14 | 12 | 3 | 0 |
| | Bore well | 33 | 1.74 | 23.56 | Kuzhalmannam | Pattambi | 1 | 4 | 5 | 17 | 6 |
| Kozhikkode | Dug well | 33 | 1.54 | 13.51 | Kakur | Vanimel | 2 | 10 | 18 | 3 | 0 |
| | Bore well | 33 | 0.97 | 30.79 | Ramanattukara | Nellikode | 1 | 8 | 11 | 9 | 4 |
| Wayanad | Dug well | 26 | 0.37 | 14.21 | Poothadi | Anchukunnu | 4 | 7 | 11 | 4 | 0 |
| | Bore well | 18 | 1.99 | 23.20 | Muttil North | Thirunelly | 1 | 1 | 6 | 9 | 1 |
| Kannur | Dug well | 36 | 1.57 | 17.64 | Vekkalam | Kooveri | 3 | 7 | 18 | 8 | 0 |
| | Bore well | 28 | 1.30 | 25.70 | Vekkalam | Edakkad | 2 | 0 | 11 | 11 | 4 |
| Kasaragod | Dug well | 46 | 2.97 | 15.91 | Chittarikkal | Bandadka | 0 | 6 | 24 | 16 | 0 |
| | Bore well | 21 | 3.53 | 27.53 | Beemanady | Bandadka | 0 | 1 | 4 | 13 | 3 |

**Comparison of Water level March 2021 with respect to March 2020** **Annexure II**

| District | Well Type | No. of WL Measured | Water level | Total | 0 - 0.5 m No. | 0.5 - 1 m No. | 1-1.5m No. | 1.5 - 2 m No. | >2 m No. |
|---|---|---|---|---|---|---|---|---|---|
| Thiruvananthapuram | Dug well | 31 | Rise | 19 | 9 | 6 | 0 | 1 | 3 |
| | | | Fall | 12 | 5 | 2 | 0 | 4 | 1 |
| | Bore well | 33 | Rise | 23 | 20 | 1 | 0 | 1 | 1 |
| | | | Fall | 10 | 5 | 3 | 2 | 0 | 0 |
| | Tube well | 4 | Rise | 2 | 2 | 0 | 0 | 0 | 0 |
| | | | Fall | 2 | 1 | 1 | 0 | 0 | 0 |
| Kollam | Dug well | 25 | Rise | 17 | 13 | 4 | 0 | 0 | 0 |
| | | | Fall | 8 | 6 | 0 | 2 | 0 | 0 |
| | Bore well | 16 | Rise | 11 | 7 | 1 | 1 | 0 | 2 |
| | | | Fall | 5 | 5 | 0 | 0 | 0 | 0 |
| | Tube well | 9 | Rise | 9 | 8 | 1 | 0 | 0 | 0 |
| | | | Fall | 0 | 0 | 0 | 0 | 0 | 0 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Pathanamthitta | Dug well | 14 | Rise | 10 | 7 | 3 | 0 | 0 | 0 |
| | | | Fall | 4 | 4 | 0 | 0 | 0 | 0 |
| | Bore well | 25 | Rise | 19 | 13 | 2 | 1 | 2 | 1 |
| | | | Fall | 6 | 6 | 0 | 0 | 0 | 0 |
| Alappuzha | Dug well | 21 | Rise | 13 | 11 | 0 | 1 | 0 | 1 |
| | | | Fall | 8 | 7 | 0 | 1 | 0 | 0 |
| | Bore well | 2 | Rise | 1 | 1 | 0 | 0 | 0 | 0 |
| | | | Fall | 1 | 0 | 1 | 0 | 0 | 0 |
| | Tube well | 27 | Rise | 14 | 14 | 0 | 0 | 0 | 0 |
| | | | Fall | 13 | 12 | 0 | 0 | 1 | 0 |
| Kottayam | Dug well | 20 | Rise | 10 | 3 | 3 | 0 | 3 | 1 |
| | | | Fall | 10 | 6 | 2 | 0 | 1 | 1 |
| | Bore well | 24 | Rise | 14 | 3 | 4 | 0 | 4 | 3 |
| | | | Fall | 10 | 8 | 0 | 1 | 0 | 1 |
| Idukki | Dug well | 20 | Rise | 19 | 1 | 6 | 9 | 1 | 2 |
| | | | Fall | 1 | 1 | 0 | 0 | 0 | 0 |
| | Bore well | 23 | Rise | 20 | 3 | 5 | 5 | 1 | 6 |
| | | | Fall | 3 | 0 | 0 | 1 | 0 | 2 |
| Ernakulam | Dug well | 38 | Rise | 19 | 14 | 3 | 0 | 0 | 2 |
| | | | Fall | 19 | 12 | 3 | 2 | 1 | 1 |
| | Bore well | 23 | Rise | 15 | 10 | 3 | 0 | 1 | 1 |
| | | | Fall | 8 | 6 | 1 | 0 | 0 | 1 |
| | Tube well | 1 | Rise | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | Fall | 1 | 1 | 0 | 0 | 0 | 0 |
| Thrissur | Dug well | 30 | Rise | 24 | 20 | 2 | 1 | 0 | 1 |
| | | | Fall | 6 | 3 | 2 | 1 | 0 | 0 |
| | Bore well | 37 | Rise | 13 | 7 | 2 | 0 | 2 | 2 |
| | | | Fall | 24 | 10 | 6 | 2 | 4 | 2 |
| Malappuram | Dug well | 26 | Rise | 16 | 8 | 3 | 3 | 1 | 1 |
| | | | Fall | 10 | 8 | 1 | 0 | 0 | 1 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Bore well | 30 | Rise | 18 | 7 | 5 | 3 | 0 | 3 |
| | | | Fall | 12 | 9 | 1 | 0 | 1 | 1 |
| | Dug well | 31 | Rise | 13 | 7 | 4 | 1 | 1 | 0 |
| | | | Fall | 18 | 10 | 6 | 2 | 0 | 0 |
| | Bore well | 33 | Rise | 14 | 5 | 3 | 1 | 0 | 5 |
| Palakkad | | | Fall | 19 | 7 | 6 | 1 | 1 | 4 |
| | Dug well | 33 | Rise | 22 | 15 | 4 | 3 | 0 | 0 |
| | | | Fall | 11 | 7 | 2 | 0 | 0 | 2 |
| | Bore well | 33 | Rise | 19 | 14 | 1 | 0 | 2 | 2 |
| Kozhikkode | | | Fall | 14 | 9 | 4 | 0 | 1 | 0 |
| | Dug well | 26 | Rise | 9 | 5 | 3 | 1 | 0 | 0 |
| | | | Fall | 17 | 9 | 6 | 1 | 0 | 1 |
| | Bore well | 18 | Rise | 3 | 2 | 0 | 0 | 0 | 1 |
| Wayanad | | | Fall | 15 | 11 | 2 | 2 | 0 | 0 |
| | Dug well | 36 | Rise | 10 | 6 | 2 | 1 | 0 | 1 |
| | | | Fall | 26 | 19 | 6 | 1 | 0 | 0 |
| | Bore well | 28 | Rise | 28 | 28 | 0 | 0 | 0 | 0 |
| Kannur | | | Fall | 0 | 0 | 0 | 0 | 0 | 0 |
| | Dug well | 46 | Rise | 33 | 22 | 6 | 2 | 0 | 3 |
| | | | Fall | 13 | 12 | 1 | 0 | 0 | 0 |
| | Bore well | 21 | Rise | 7 | 5 | 1 | 0 | 0 | 1 |
| Kasaragod | | | Fall | 14 | 2 | 1 | 7 | 3 | 1 |

**Comparison of Water level March 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 | 31 | Rise | 27 | 9 | 8 | 4 | 2 | 4 |
| | | | Fall | 4 | 0 | 1 | 1 | 1 | 1 |
| | Bore well | 34 | Rise | 22 | 11 | 7 | 0 | 1 | 3 |
| | | | Fall | 12 | 8 | 2 | 0 | 1 | 1 |
| | Tube well | 4 | Rise | 2 | 2 | 0 | 0 | 0 | 0 |
| | | | Fall | 2 | 1 | 1 | 0 | 0 | 0 |
| Kollam | Dug well | 25 | Rise | 19 | 14 | 5 | 0 | 0 | 0 |
| | | | Fall | 6 | 4 | 2 | 0 | 0 | 0 |
| | Bore well | 16 | Rise | 7 | 6 | 0 | 0 | 0 | 1 |
| | | | Fall | 9 | 8 | 1 | 0 | 0 | 0 |
| | Tube well | 9 | Rise | 6 | 4 | 0 | 0 | 1 | 1 |
| | | | Fall | 3 | 2 | 1 | 0 | 0 | 0 |
| Pathanamthitta | Dug well | 13 | Rise | 10 | 9 | 1 | 0 | 0 | 0 |
| | | | Fall | 3 | 3 | 0 | 0 | 0 | 0 |
| | Bore well | 25 | Rise | 19 | 8 | 8 | 2 | 1 | 0 |
| | | | Fall | 6 | 4 | 1 | 1 | 0 | 0 |
| Alappuzha | Dug well | 19 | Rise | 8 | 4 | 2 | 0 | 1 | 1 |
| | | | Fall | 11 | 10 | 1 | 0 | 0 | 0 |
| | Bore well | 2 | Rise | 1 | 0 | 0 | 1 | 0 | 0 |
| | | | Fall | 1 | 0 | 1 | 0 | 0 | 0 |
| | Tube well | 26 | Rise | 16 | 12 | 3 | 0 | 1 | 0 |
| | | | Fall | 10 | 7 | 2 | 0 | 0 | 1 |
| Kottayam | Dug well | 21 | Rise | 10 | 4 | 2 | 2 | 1 | 1 |
| | | | Fall | 11 | 3 | 5 | 1 | 1 | 1 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Bore well | 24 | Rise | 15 | 8 | 3 | 2 | 1 | 1 |
| | | | Fall | 9 | 4 | 2 | 0 | 3 | 0 |
| | Dug well | 20 | Rise | 17 | 8 | 5 | 3 | 1 | 0 |
| | | | Fall | 3 | 1 | 1 | 1 | 0 | 0 |
| Idukki | Bore well | 23 | Rise | 17 | 5 | 7 | 1 | 1 | 3 |
| | | | Fall | 6 | 1 | 0 | 1 | 0 | 4 |
| | Dug well | 37 | Rise | 25 | 19 | 5 | 1 | 0 | 0 |
| | | | Fall | 12 | 8 | 2 | 1 | 0 | 1 |
| | Bore well | 23 | Rise | 15 | 11 | 3 | 1 | 0 | 0 |
| | | | Fall | 8 | 5 | 2 | 1 | 0 | 0 |
| Ernakulam | Tube well | 1 | Rise | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | Fall | 1 | 0 | 0 | 1 | 0 | 0 |
| | Dug well | 30 | Rise | 20 | 17 | 2 | 0 | 0 | 1 |
| | | | Fall | 10 | 5 | 3 | 1 | 0 | 1 |
| Thrissur | Bore well | 37 | Rise | 10 | 8 | 2 | 0 | 0 | 0 |
| | | | Fall | 27 | 10 | 2 | 4 | 0 | 11 |
| | Dug well | 26 | Rise | 23 | 12 | 6 | 3 | 1 | 1 |
| | | | Fall | 3 | 1 | 1 | 0 | 1 | 0 |
| Malappuram | Bore well | 30 | Rise | 18 | 9 | 6 | 1 | 2 | 0 |
| | | | Fall | 12 | 6 | 3 | 2 | 0 | 1 |
| | Dug well | 31 | Rise | 20 | 9 | 3 | 3 | 4 | 1 |
| | | | Fall | 11 | 8 | 2 | 1 | 0 | 0 |
| Palakkad | Bore well | 33 | Rise | 18 | 6 | 3 | 0 | 5 | 4 |
| | | | Fall | 15 | 2 | 3 | 2 | 1 | 7 |
| | Dug well | 33 | Rise | 28 | 16 | 9 | 3 | 0 | 0 |
| | | | Fall | 5 | 4 | 0 | 0 | 1 | 0 |
| Kozhikkode | Bore well | 33 | Rise | 20 | 13 | 3 | 2 | 0 | 2 |
| | | | Fall | 13 | 6 | 4 | 2 | 0 | 1 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Dug well | 26 | Rise | 17 | 10 | 3 | 2 | 2 | 0 |
| | | | Fall | 9 | 5 | 2 | 1 | 0 | 1 |
| | Bore well | 18 | Rise | 15 | 12 | 1 | 2 | 0 | 0 |
| Wayanad | | | Fall | 3 | 2 | 0 | 0 | 1 | 0 |
| | Dug well | 36 | Rise | 24 | 15 | 5 | 3 | 0 | 1 |
| | | | Fall | 12 | 9 | 3 | 0 | 0 | 0 |
| | Bore well | 28 | Rise | 13 | 8 | 3 | 0 | 1 | 1 |
| Kannur | | | Fall | 15 | 7 | 1 | 1 | 2 | 4 |
| | Dug well | 43 | Rise | 37 | 17 | 12 | 5 | 1 | 2 |
| | | | Fall | 6 | 3 | 2 | 0 | 1 | 0 |
| | Bore well | 21 | Rise | 7 | 3 | 2 | 0 | 2 | 0 |
| Kasaragod | | | Fall | 14 | 3 | 1 | 4 | 2 | 4 |

**Observation well frequency on March 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 | 396 | -0.79 | 17.64 | Uzhavoor (Kottayam) | Kooveri (Kannur) | 50 | 119 | 171 | 56 | 0 |
| | | | | | | 13% | 30% | 43% | 14% | 0% |
| Bore well | 370 | -1.00 | 46.79 | Kottukal (Thiruvananthapuram) | Areekode (Malappuram) | 26 | 67 | 140 | 102 | 35 |
| | | | | | | 7% | 18% | 38% | 28% | 9% |
| Tube well | 41 | 0.71 | 34.57 | Chingoly (Alappuzha) | Mynagappally (Kollam) | 7 | 15 | 10 | 6 | 3 |
| | | | | | | 17% | 37% | 24% | 15% | 7% |

**Comparison of Water level March 2021 with respect to March 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 | 397 | Rise | 234 | 141 | 49 | 22 | 7 | 15 |
| | | % | 59% | 60% | 21% | 9% | 3% | 7% |
| | | Fall | 163 | 109 | 31 | 10 | 6 | 7 |
| | | % | 41% | 67% | 19% | 6% | 4% | 4% |
| Bore well | 346 | Rise | 205 | 125 | 28 | 11 | 13 | 28 |
| | | % | 59% | 61% | 14% | 5% | 6% | 14% |
| | | Fall | 141 | 78 | 25 | 16 | 10 | 12 |
| | | % | 41% | 55% | 18% | 11% | 7% | 9% |
| Tube well | 41 | Rise | 25 | 24 | 1 | 0 | 0 | 0 |
| | | % | 61% | 96% | 4% | 0% | 0% | 0% |
| | | Fall | 16 | 14 | 1 | 0 | 1 | 0 |
| | | % | 39% | 88% | 6% | 0% | 6% | 0% |

**Comparison of Water level March 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 | 391 | Rise | 285 | 163 | 68 | 29 | 13 | 12 |
| | | % | 73% | 57% | 24% | 10% | 5% | 4% |
| | | Fall | 106 | 64 | 25 | 7 | 5 | 5 |
| | | % | 27% | 60% | 24% | 6% | 5% | 5% |
| Bore well | 347 | Rise | 197 | 108 | 48 | 12 | 14 | 15 |
| | | % | 57% | 55% | 24% | 6% | 7% | 8% |
| | | Fall | 150 | 66 | 23 | 18 | 10 | 33 |
| | | % | 43% | 44% | 15% | 12% | 7% | 22% |
| Tube well | 40 | Rise | 24 | 18 | 3 | 0 | 2 | 1 |
| | | % | 60% | 75% | 13% | 0% | 8% | 4% |
| | | Fall | 16 | 10 | 4 | 1 | 0 | 1 |
| | | % | 40% | 63% | 25% | 6% | 0% | 6% |