

**GOVERNMENT OF KERALA
GROUNDWATER DEPARTMENT**

GROUNDWATER LEVEL MONITORING REPORT – March 2022

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 3107 mm; some 7,030 crore m³ of water. 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 2021 (January - February) is 114.1mm, which is 410% large excess than that of the normal rainfall. All the districts got Large Excess rainfall during this period. Most of the locations in the state get recharged from the excess rainfall occurred during this season.

The winter rainfall (January-February) occurred in the state during 2022 (January - February) is 14.9mm, which is -33% Deficient than that of the normal rainfall(22.4mm).Only Thiruvananthapuram district got Excess rainfall (57.1mm). Pathanamthitta and Idukki districts got normal rainfall, 47.3mm and 26.3mm respectively. Even though it is in normal category it is also lesser than the Normal rain fall of the districts ie -18 and -9 respectively. Malappuram district received No rain during the season.All the other districts got Deficient and Large deficient rainfall.

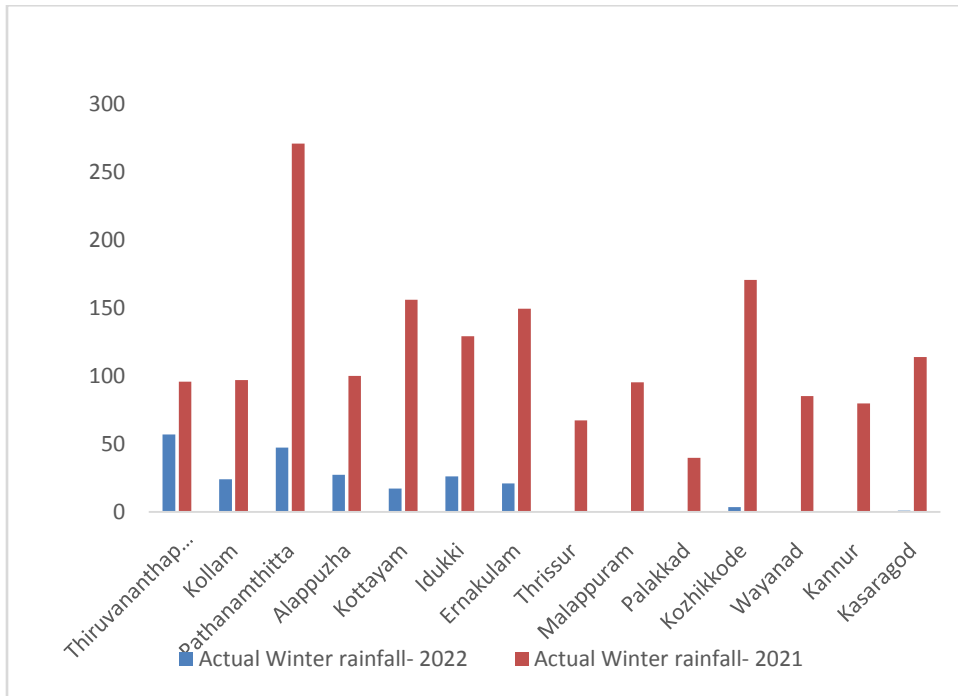


Fig:1. Comparison of actual winter rainfall occurred during 2022 wrt 2021

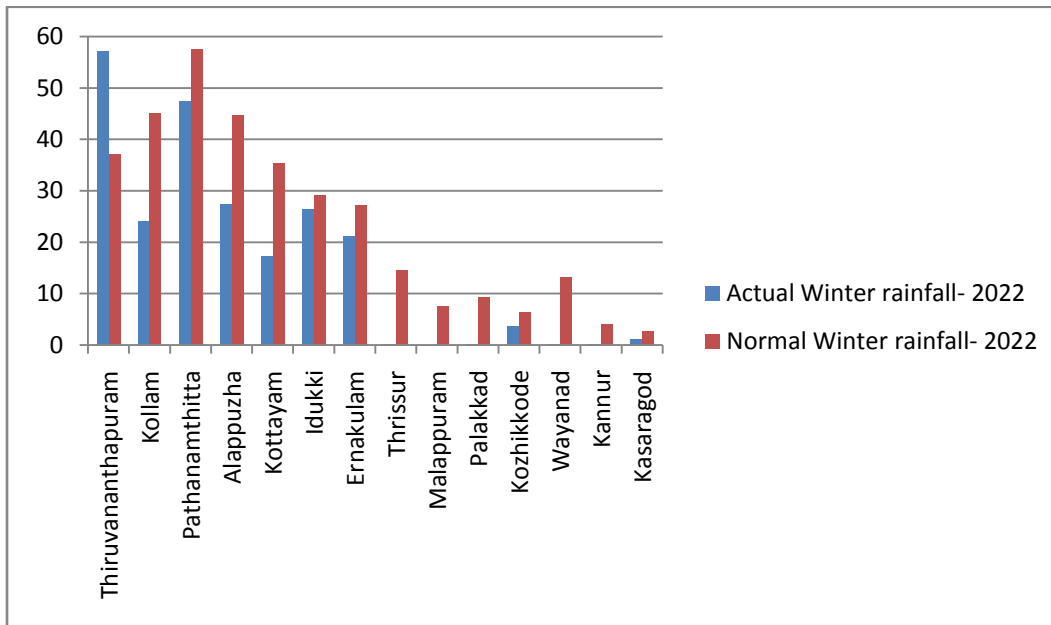


Fig: 2. Comparison of actual winter rainfall occurred during 2022 wrt Normal Rainfall 2022

Geology: Kerala, the southernmost state of Indian peninsula, is having a geographical area of 38863 km². 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 hydro geological units. Observation wells includes dug wells (owned by public and private) and purpose built piezometer (bore wells and tube wells). Water level data has been collected monthly and water samples collected and analysis done periodically.

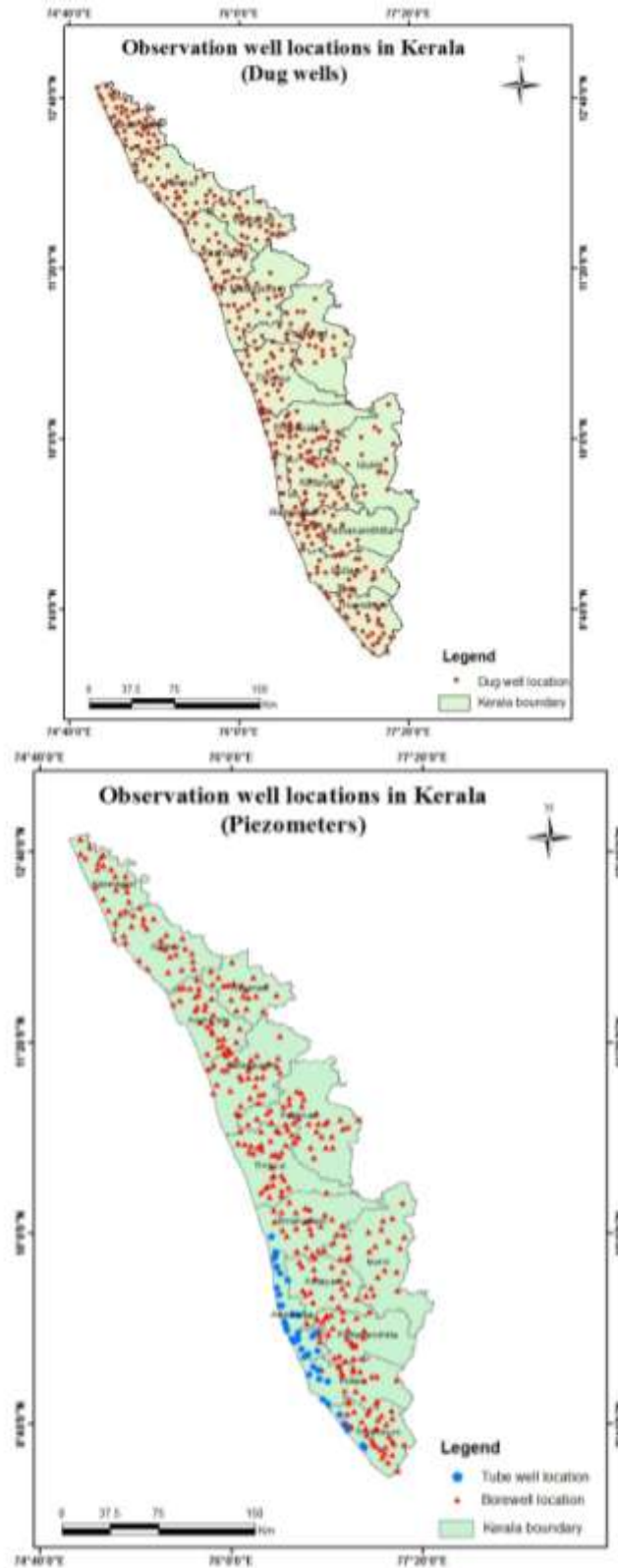


Fig: 3. Location map of observation dug wells and piezometers (bore wells & tube wells)

Analysis of Groundwater level data –March2022

During the month of March2022, groundwater level in 451 dug wells and 390purpose built piezometers (bore wells- 348 and tube wells – 42) has been monitored. The data collected from the observation wells during the month of March 2022 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 March 2022

Dug wells:-The depth to groundwater level in the observation dug wells during the month of March 2022 ranges from a minimum of -0.75mbglin GWE-07 Chellanam, Ernakulamto a maximum of 14.54mbglin TSROW21 Poyya, Thrissur. Out of 451dug wells monitored water level in 11% of dug wells (50nos) shows a depth to water level ranges from ≤ 2 m, 30%(137nos) ranges between 2-5 m, 45% (203nos) ranges between 5-10 m and 14% dug wells (61 nos) recorded depth to water level ranges between 10-20 mbgl. Dug wells inIdukki and Eranakulam show water level less than 10m.None of the wells in the state show water level above 20m. Table showing well frequency during March 2022 is appended . (Annexure-

AbstractI)

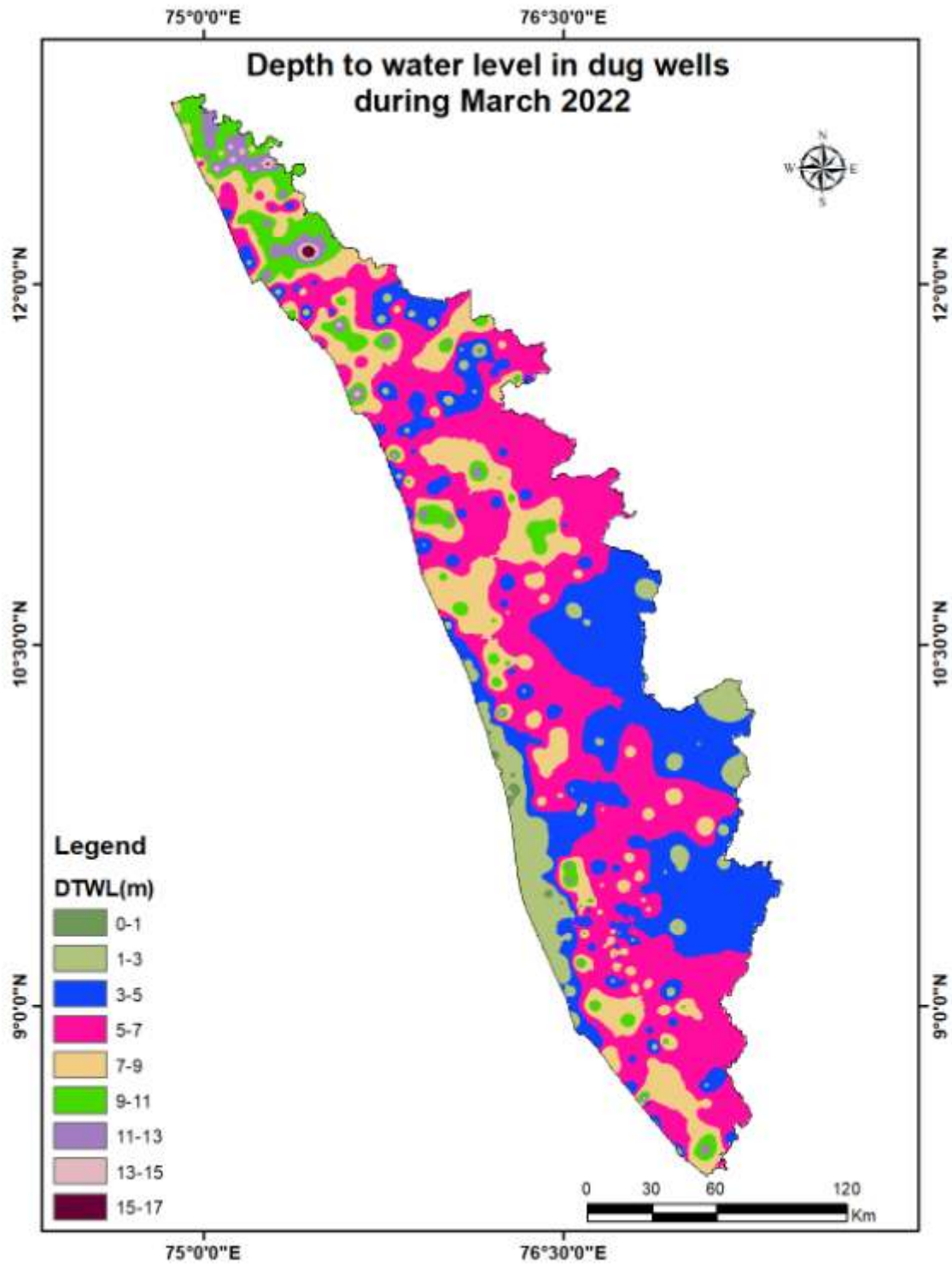


Fig: 4. Depth to water level in Dug wells during March 2022

Bore wells (hard rock terrain):-The depth to groundwater level in the observation bore wells during the month of March2022 ranges from a minimum of -0.52m in 151 Chitturto a maximum of 46.98mbgl in MPM174, Areekode, Malappuram.Out of 348bore wells monitored, water level in 5% of bore wells (16nos) shows a depth to water level range from 0-2 m, 20% rangesbetween 2-5 m, 39% ranges between 5-10 m, 27% ofbore wells ranges between 10-20 m, and 9% ranges more than 20 m. Bore wells in Trivandrum, Kollam,and Alappuzhaand Ernakulamdistricts show water level below20 mbgl. Table showing well frequency during March 2022 is appended (Annexure-IabstractI)

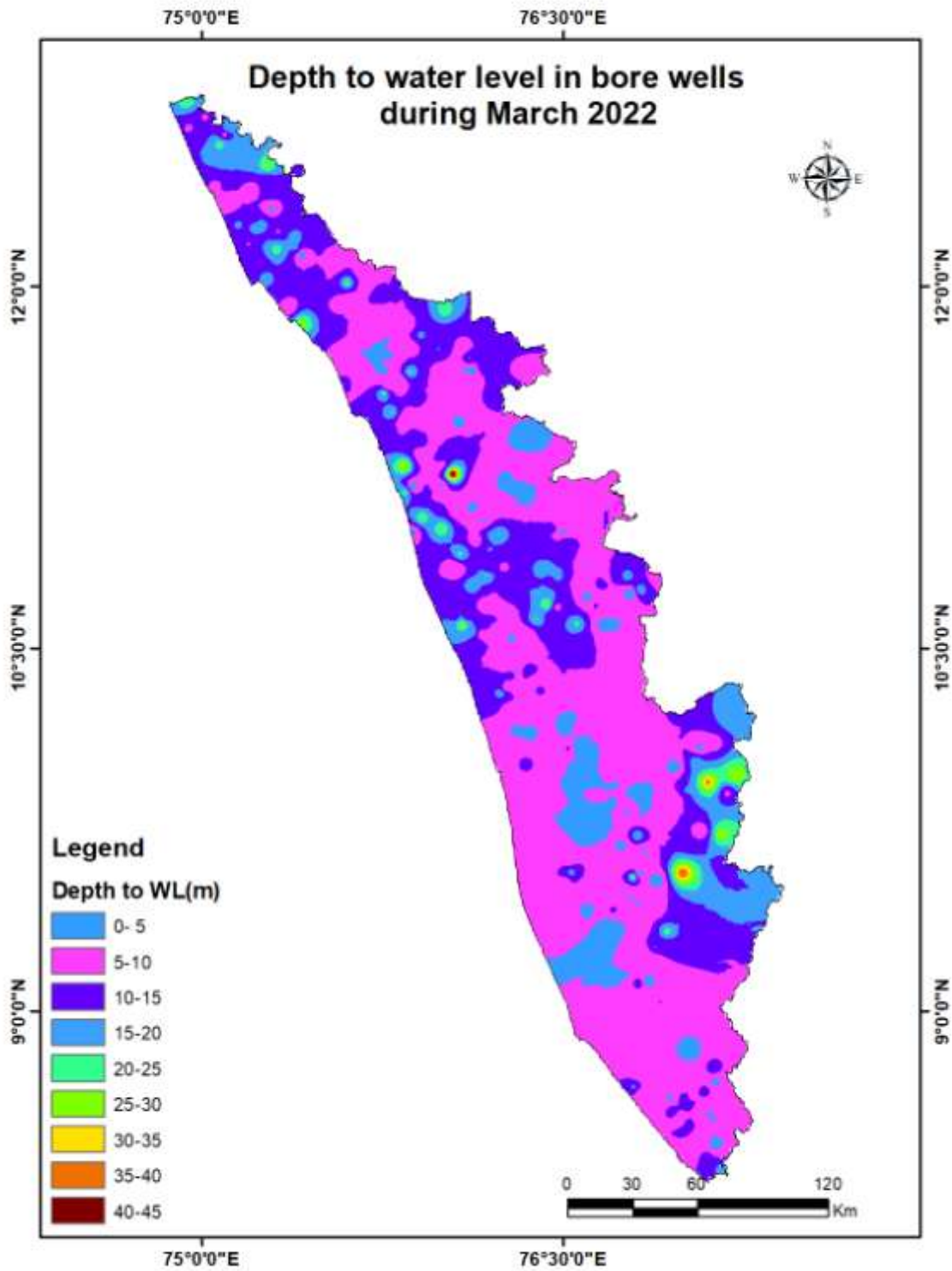


Fig: 5. Depth to water level in Bore wells during March 2022

Tubewells (coastal sedimentary terrain):-The depth to groundwater level in the observation tubewells during the month of March 2022 ranges from a minimum of 0.797mbgl Alappuzha to a maximum of 34.25mbgl, Kollam. Out of 42tube wells monitored in the state, water level in 19% of tube wells ranges between 0-2m, 36 % of tube wells ranges between 2-5 m, 26% ranges between 5-10 m and12%ranges between10-20 and 7%(only 3 wells in Kollam district) ranges more than 20m.Table showingtube well frequency is appended.(Annexure-I abstract I)

II.Comparison of Groundwater level March 2022with respect to March 2021

Comparison of the 448nos of groundwater level in March2022with the corresponding month in the previous year indicates that 48 % of **observation dug wells**(215nos) show a fall in water level and 52% of the dug wells(233nos) show no remarkable change /marginal rise in water level.Out of 48% of the dugwells (215nos) showing falling trend, 66% (141nos) recorded fall in water level less than 0.5m, 20% of dug wells show fall in the range between 0.5-1m, 7% of dug wells show fall in the range between 1-1.5 m, 2% of dug wells show a fall in the range between 1.5 -2m and 6% of the dug wells show a fall in water level more than 2m.List of open wells showing more than 2m fluctuation is appended in annexure V.Table showing water level comparison of dug wells during March 2022 with respect to March 2021is appended. (Annexure-I abstractII).

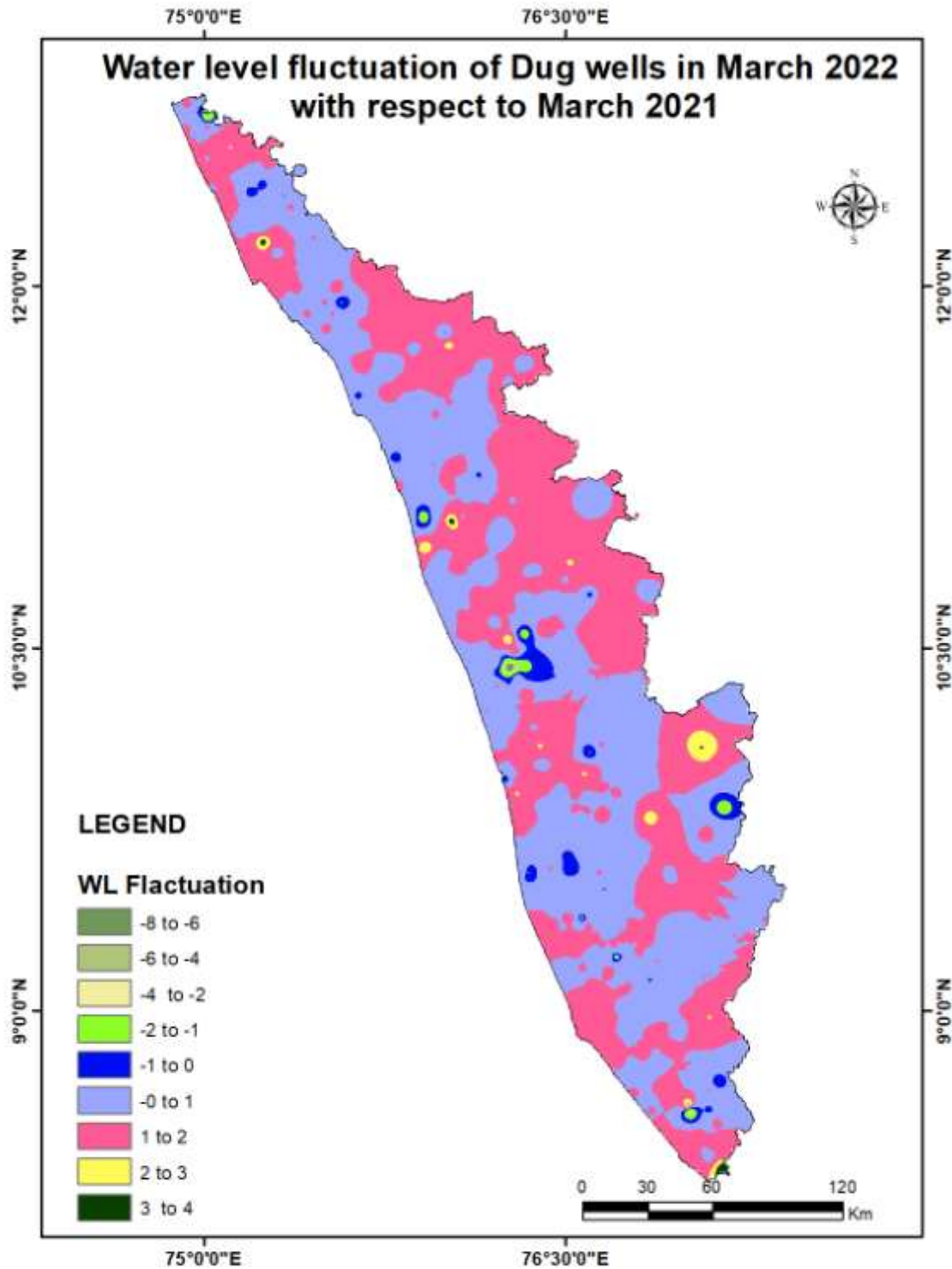


Fig: 6. Comparison of water level in Dug wells during March 2022 with respect to March 2021

Comparison of the 347 nos water level in observation bore wells (hard rock terrain in midland and high land areas) in March 2022 with that of the previous year, it has been noticed that 40% of bore wells (140nos) show fall in water level and 60% of the wells (207nos) shows no remarkable change/marginal rise in water level. Out of 40 % of the bore wells showing falling trend, 61% of the bore wells (85nos) recorded fall in water level less than 0.5m, 15 % show fall in the range between 0.5 - 1m, 8% of bore wells show fall in the range between 1 - 1.5m, 5% of bore wells show a fall in range between 1.5-2m, 11% of bore wells show a fall in water level more than 2m. Table showing water level comparison of bore wells during March 2022 with March 2021 (Annexure-I abstract II) is appended

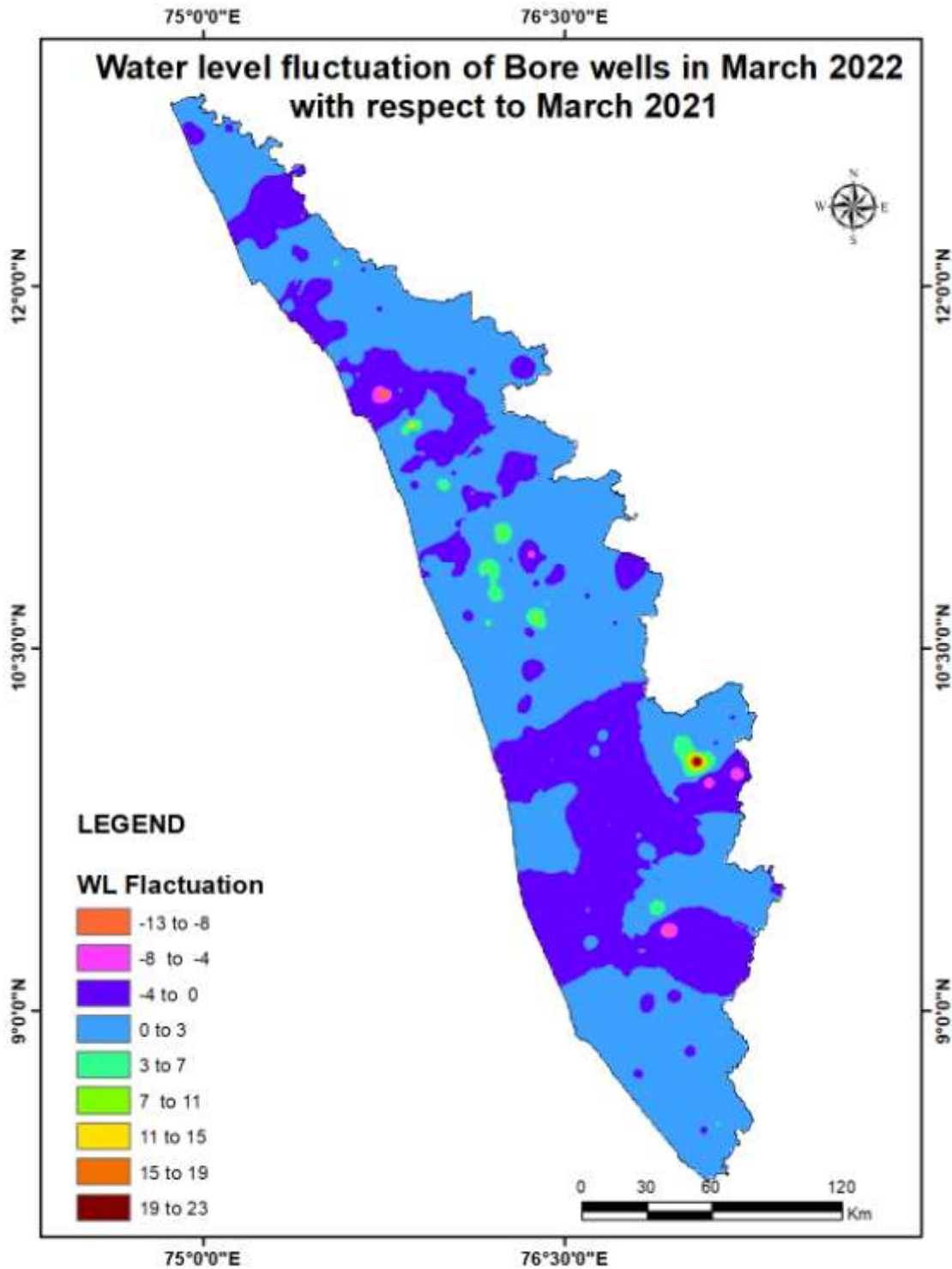


Fig: 7. Comparison of water level in Bore wells during March 2022 wrt March 2021

Comparison of the 41nos water level in **observation tube wells** (in the coastal sedimentary areas)during March 2022 with that of the previous year reveals that 24 % of tube wells(10 nos) recorded a falling trend and 76 % of the wells (31nos) shows no remarkable change /marginal rise of water level.Out of 24% of the tube wells showing a falling trend, 90% of wells recorded fall in range between 0 to 0.5m and10% (only 1 well in Alappuzha district) show fall in the range between 0.5 - 1m. None of the tube wells show a fall in water level more than 1m. Table showing comparison of water level during March 2022 with respect to March 2021 is appended. (Annexure-I abstract II)

III.Comparison of Groundwater level in March 2022with respect to Decadal mean(2012- 21)

On comparison of the (384nos) water level in March 2022with respect to the decadal mean, it has been noticed that 30% of observation dug wells (114nos) recorded a fall in water level and70% of the wells (270nos) shows marginal rise /no remarkable change in water level.Out of 30% of the dugwells show a falling trend, 65% of the dug wells (74nos) recorded fall in water level less than 0.5m, 12% show fall in the range between 0.5-1m, 13% of dug wells show fall in the range between1-1.5m, 2% of dug wells show a fall in range between 1.5-2m and 8% of dug wells show a fall in range more than 2m. List of open wells showing more than 2m fluctuation is appended in annexure V. Table showing water level comparison of dug wells during March 2022 with respect to decadal mean is appended. (Annexure-I abstract III)

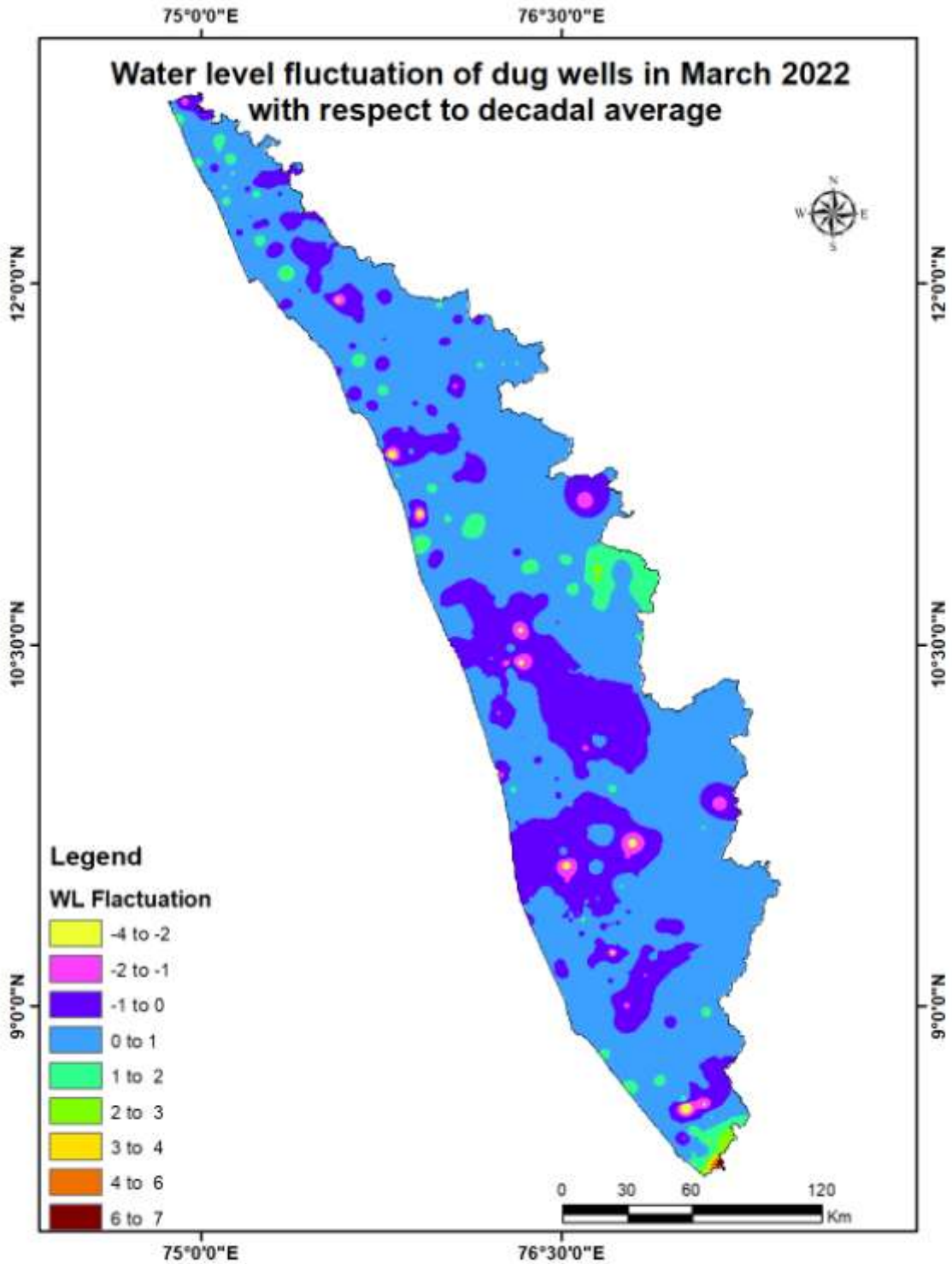


Fig: 7. Comparison of water level in Dug wells during March2022 wrt Decadal mean

Compared water level in the 340nos observation bore wells during March 2022 with that of the decadal mean. It has been noticed that 52% of bore wells (178nos) show fall in water level, and 48% of the wells (162nos) shows marginal rise, no remarkable change in water level. Out of 52% of the bore wells shows a falling trend, 48% (85nos) shows a fall in water level less than 0.5m, 20 % show fall in the range between 0.5 - 1m, 11% show fall in the range between 1- 1.5m, 9% of wells show a fall in range between 1.5 - 2m, 12% show a fall in water level more than 2 m. Table showing water level comparison of bore wells during March 2022 with respect to decadal mean is appended. (Annexure-I abstract III)

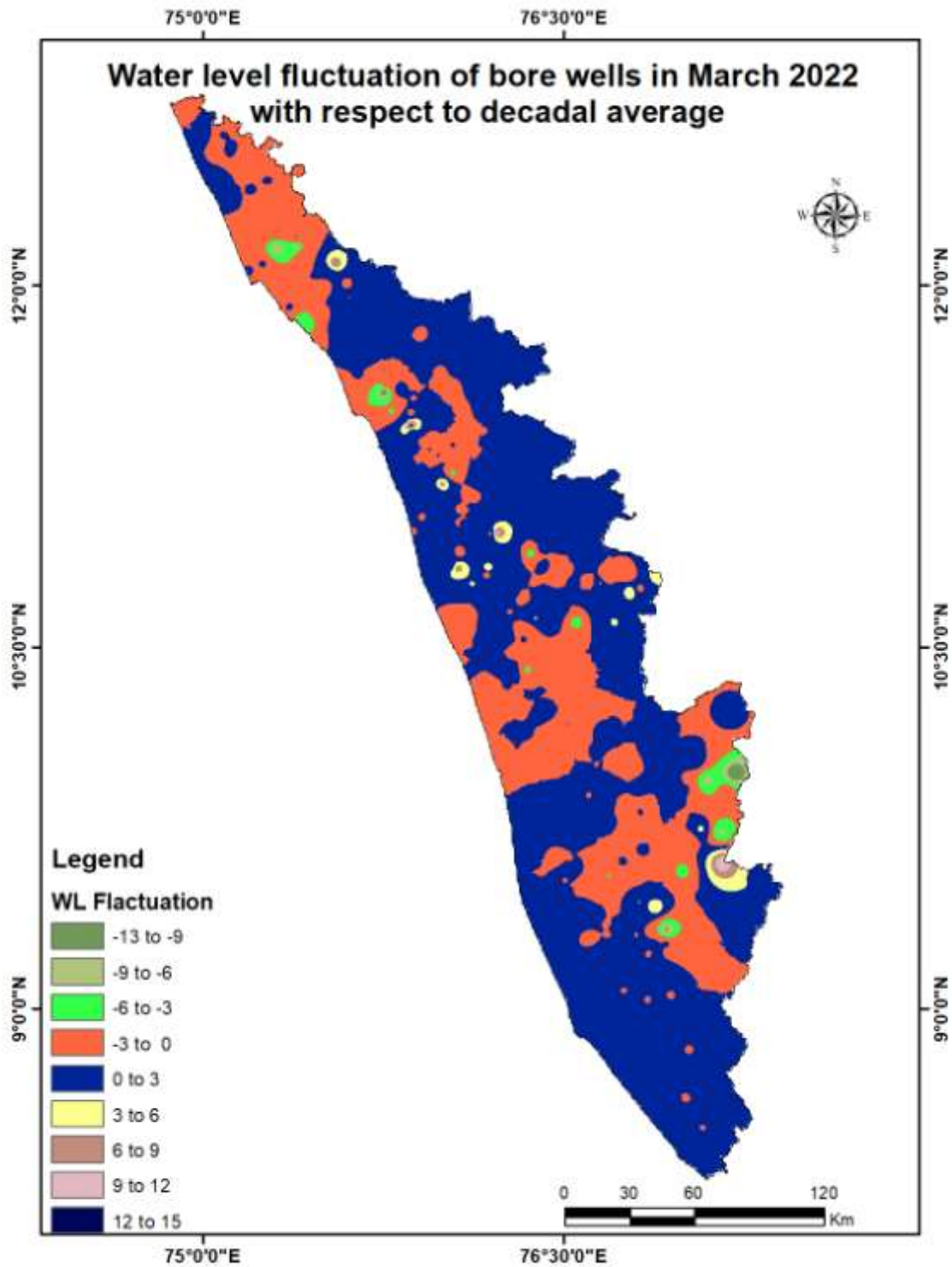
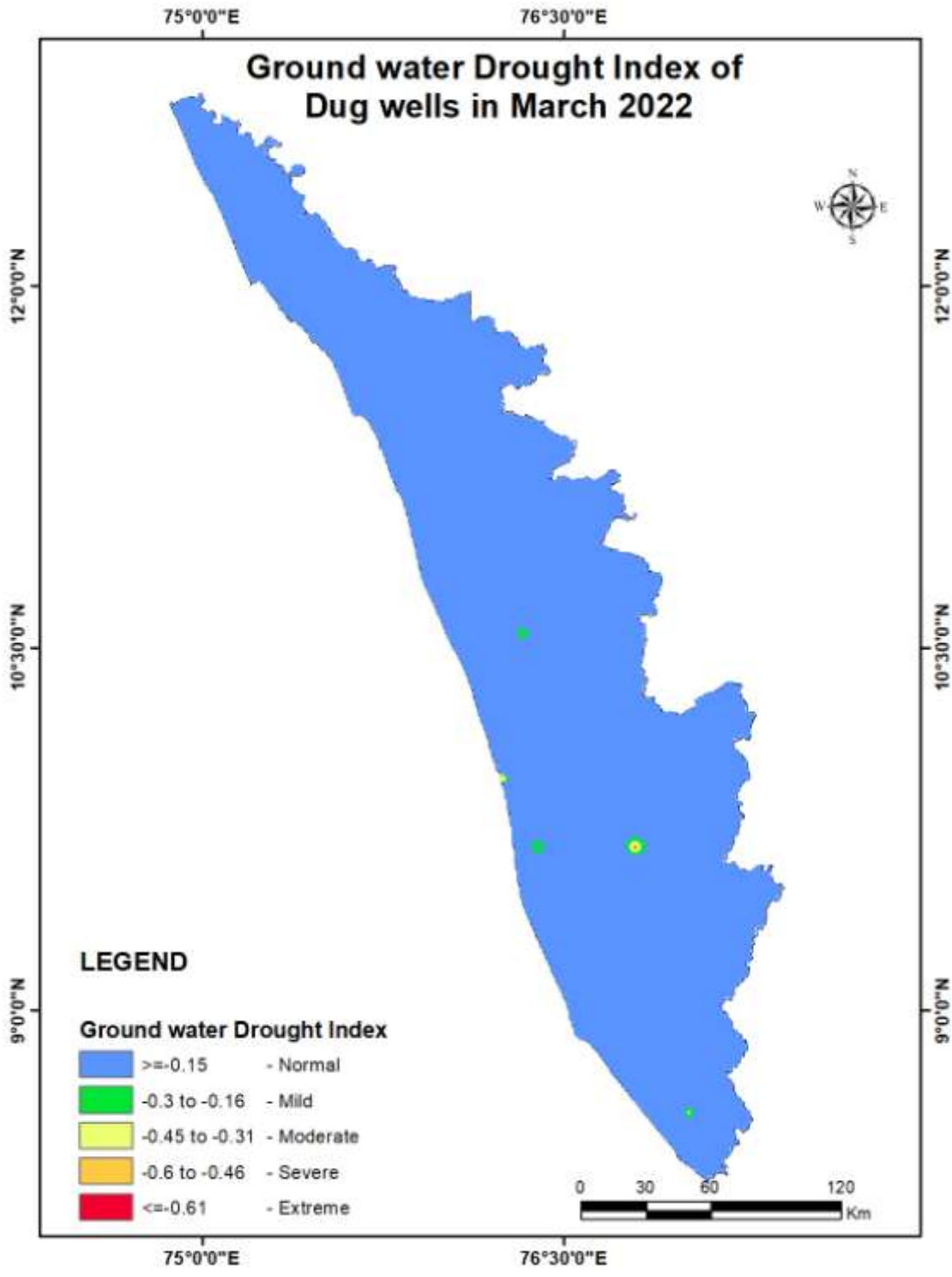


Fig: 8. Comparison of water level in Bore wells during March 2022 wrt Decadal mean

Comparison of the 38nos water level in the **observation tube wells** during March 2022 with that of the decadal mean reveals that 21 % of tube wells recorded a falling trend and 79 % of the tube wells show marginal rise/no remarkable change in water level. Out of 21 % of the tube wells shows a falling trend, 88% of the tube wells(7nos) show fall in water level less than 0.5m and 12% of wells show fall in the range 0.5-1 m Table showing water level comparison of tube wells during March 2022 with respect to decadal mean is appended. (Annexure-I abstract III)



Groundwater Draught Index

Calculated groundwater draught index of the dugwells in the state during March 2022. Out of 451 observation dug wells, 427 wells comes under the normal category, 18 wells comes under the mild category and 3 comes under the moderate category. Dugwell OW21 at Nedumangadu in Thiruvananthapuram fall in severe category, E86 Kochi Corporation Ernakulam and KTM-OW-11 Poonjar in Kottayam fall in extreme category. Table showing GWDI is appended as Annexure VI

Summary

Rainfall

- 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 Actual winter rainfall (January-February) occurred in the state during 2022 is 14.9 mm, which is -33% deficient than that of the normal Rainfall (22.4 mm).
- Only Thiruvananthapuram District got more rain fall than the normal rain fall. All other districts got rain fall less than the district normal rain fall

Groundwater level

- The depth to groundwater level in the observation dug wells during the month of March 2022 range from a minimum of -0.75 m to a maximum of 14.54mbgl, in bore wells -0.520 m to a maximum of 46.98mbgl and in the tubewells 0.797m to a maximum of 34.25mbgl.
- Comparison of groundwater level in March 2022 with respect to the previous year reveals that 48% of observation dug wells, 40 % of bore wells and 24% of tube wells recorded a falling trend. 43% of total observation wells (365 out of 836) show falling trend. 64% of the observation wells with falling trend (236 out of 365) show decline in water level less than 0.5 m.
- Comparison of the water level in March 2022 with the, decadal mean reveals that 30 % of observation dug wells (114 out of 384), 52% of bore wells (178 out of 340) and 21% of tube wells recorded a falling trend. 39% of all the observation

wells(300 out of 762) show decline in water level. 55% of all the observation wells (166 out of 300) with falling trend show decline in water level less than 0.5 m.

- Dug wells showing decline of water level more than 2 m during long term analysis will be monitored closely. 12nos of open wells show more than 2m fluctuation on comparison of water level during the month with the previous year's same month data and 10nos open wells show more than 2m fluctuation on comparison of water level during the month with the decadal mean water level. Dug Well noTVM OW21 Nedumangadin Thiruvananthapuram,29 LPS Thumpamon in PATHANAMTHITTA, MPM OW 6A Tirurangadi in Malappuram, KNR-MOW173 Mattannur Municipality in KANNUR, TSROW20 Varandarappilly& TSROW3 Pananchery in THRISSUR show more than 2m fluctuation in both analyses.

Districtwise Observation well Frequency on March 2022

Annexure IV

District	Well Type	No. of WL measured	DTWL (mbgl)		Location		Depth range of wells (mts)				
			Min	Max	Min	Max	0 - 2	2 to 5	5 to 10	10 to 20	>20
Thiruvananthapuram	Dug well	29	1.230	14.330	TVM OW01 Athiyannur	TVM OW28 Kazhakkootam	2	8	16	3	0
	Bore well	32	0.430	17.790	3 Perumkadavila	25,Parassala, Thiruvananthapuram	2	4	18	8	0
	Tube well	4	3.630	10.150	36, Chirayinkeezhu, Thiruvananthapuram	37, Chirayinkeezhu, Thiruvananthapuram	0	1	2	1	0
Kollam	Dug well	25	0.810	11.310	KLM OW-18, Piravanthoor, KOLLAM	KLM-OW 24,Veliyam,KOLLAM	4	6	13	2	0
	Bore well	16	1.560	10.220	KLM/6, Kottarakkara Municipality, KOLLAM	KLM/10 Vilakkudy	1	0	13	2	0
	Tube well	9	2.710	34.250	KLM/25 Panmana	KLM/29, Sasthamkotta, KOLLAM	0	2	2	2	3
Pathanamthitta	Dug well	74	0.860	11.850	10 Seethathode Ranni	20 Civil Station Adoor Municipality	4	28	37	5	0

Groundwater level monitoring report _ March 2022

	Bore well	25	0.70	22.460	PTA/02, Kalanjoor, PATHANAMTHITTA	PTA/15, Chittar, PATHANAMTHITTA	2	8	10	4	1
Alappuzha	Dug well	18	0.236	11.947	OW-06 Pulinkunnu	OW-02 Kattanam, Mavelikara, Alappuzha	7	8	1	2	0
	Bore well	2	2.427	4.886	36 Punthala Venmony	35 Pennukkara, Chengannoor, Alappuzha	0	2	0	0	0
	Tube well	28	0.797	17.557	08 Thrikkunnappuzha	04 Charumoodu, Mavelikara, Alappuzha	8	12	7	1	0
Kottayam	Dug well	20	1.600	11.960	KTM-OW-5 Kumarakom	KTM-OW_6 Kottayam Municipality	4	6	8	2	0
	Bore well	23	-0.035	24.395	10, Uzhavoor, Kottayam	03 Kanjirappally	3	7	9	3	1
Idukki	Dug well	20	0.940	8.850	70 Vandanmedu	71 Kattappana Municipality	4	9	7	0	0
	Bore well	23	1.900	38.570	SO415, Udumbannoor, IDUKKI	SO428, Peermade, IDUKKI	1	6	7	5	4
Ernakulam	Dug well	38	-0.750	9.150	GWE-07 Chellanam	GWE-01 Kizhakkambalam	8	11	19	0	0
	Bore well	25	1.540	11.583	BW 101 Asamannur	BW 116 Thrikkakkara Municipality	3	6	14	2	0
	Tube well	1	10.980	10.98	TW 01, Kochi Corporation, ERNAKULAM	TW 01, Kochi Corporation, ERNAKULAM	0	0	0	1	0
Thrissur	Dug well	31	1.460	14.540	TSROW16, Valapad, Thrissur	TSROW21 Poyya	4	11	11	5	0
	Bore well	37	2.271	28.412	TSR126 Pudukad Kodakara	TSR136, Kandanassery, Thrissur	0	6	13	13	5
Malappuram	Dug well	25	2.815	12.640	MPM.OW.4A Tirur	MPM.OW.14 Wandoor	0	9	11	5	0
	Bore well	30	1.785	46.980	MPM185 Nilambur	MPM174, Areekode, Malappuram	1	8	13	3	5

Groundwater level monitoring report _ March 2022

Palakkad	Dug well	30	1.410	10.510	PKD S-2 Alathur	135 Mannarkad	2	14	11	3	0
	Bore well	34	-0.520	21.360	151 Chittur	145 Nemmara	1	6	8	17	2
Kozhikkode	Dug well	33	1.750	14.170	QKKDO54 Chelannur	QKKDO63 Kozhikode(corporation)	2	8	20	3	0
	Bore well	34	1.460	30.810	KKDPZ 197 Ramanattukara Municipality	KKDPZ 210 Kozhikode (corporation)	1	10	11	7	5
Wayanad	Dug well	26	0.250	12.700	SOW-10 Poothadi	167 Panamaram	4	7	12	3	0
	Bore well	19	2.120	22.870	WYD216 Muttil	WYD223 Thirunelly	0	4	5	9	1
Kannur	Dug well	36	1.350	18.080	KNR-MOW171 Kolayad	KNR-POW-C8 Chapparappadavu	5	6	15	10	0
	Bore well	27	1.900	26.910	KNRPz239 Chapparappadavu	KNRPz240 Kannur Corporation	1	2	10	11	3
Kasaragod	Dug well	46	2.830	15.630	KSOW-22 Parappa	200 Karadka	0	6	22	18	0
	Bore well	21	3.520	26.510	PZKGD241 Parappa	PZKGD242 Karadka	0	1	6	11	3

Comparison of Water level March 2022 with respect to March 2021

Annexure II

District	Well Type	No. of WL Measured	Water level	Total	0 - 0.5m	0.5 - 1m	1-1.5m	1.5 - 2m	>2m
					No.	No.	No.	No.	No.
Thiruvananthapuram	Dug well	31	Rise	20	15	3	0	0	2
			Fall	11	3	3	3	1	1
	Bore well	35	Rise	31	24	4	1	1	1
			Fall	4	4	0	0	0	0
	Tube well	4	Rise	3	2	1	0	0	0
			Fall	1	1	0	0	0	0
Kollam	Dug well	25	Rise	16	14	1	1	0	0
			Fall	9	7	2	0	0	0
	Bore well	16	Rise	11	10	1	0	0	0
			Fall	5	3	1	0	0	1
	Tube well	9	Rise	9	6	1	1	1	0
			Fall	0	0	0	0	0	0

Groundwater level monitoring report _ March 2022

Pathanamthitta	Dug well	73	Rise	27	24	3	0	0	0
			Fall	46	33	9	2	0	2
	Bore well	25	Rise	13	11	0	0	0	2
			Fall	12	9	2	0	0	1
Alappuzha	Dug well	18	Rise	12	11	1	0	0	0
			Fall	6	4	1	0	0	1
	Bore well	2	Rise	1	1	0	0	0	0
			Fall	1	1	0	0	0	0
	Tube well	27	Rise	18	13	4	0	0	1
			Fall	9	8	1	0	0	
Kottayam	Dug well	20	Rise	7	3	4	0	0	0
			Fall	13	7	2	3	1	0
	Bore well	23	Rise	8	5	2	1	0	0
			Fall	15	6	5	2	0	2
Idukki	Dug well	20	Rise	9	6	1	1	0	1
			Fall	11	9	1	0	0	1
	Bore well	23	Rise	7	3	0	0	2	2
			Fall	16	7	1	5	1	2
Ernakulam	Dug well	37	Rise	22	17	2	3	0	0
			Fall	15	9	4	1	0	1
	Bore well	24	Rise	8	7	0	0	0	1
			Fall	16	10	3	2	1	0

Groundwater level monitoring report _ March 2022

	Tube well	1	Rise	1	1	0	0	0	0
			Fall	0	0	0	0	0	0
Thrissur	Dug well	30	Rise	14	10	3	0	1	0
			Fall	16	9	4	0	0	3
	Bore well	37	Rise	27	9	6	3	2	7
			Fall	10	5	2	0	1	2
Malappuram	Dug well	25	Rise	13	7	3	1	1	1
			Fall	12	5	5	1	0	1
	Bore well	30	Rise	20	12	5	0	0	3
			Fall	10	8	0	0	0	2
Palakkad	Dug well	30	Rise	23	10	12	1	0	0
			Fall	7	3	3	1	0	0
	Bore well	33	Rise	25	5	9	4	3	4
			Fall	8	4	2	0	0	2
Kozhikkode	Dug well	33	Rise	9	8	1	0	0	0
			Fall	24	18	3	2	1	0
	Bore well	33	Rise	11	8	1	1	0	1
			Fall	22	15	2	2	1	2
Wayanad	Dug well	26	Rise	19	12	6	0	1	0
			Fall	7	5	1	1	0	0
	Bore well	18	Rise	14	9	2	2	1	0
			Fall	4	3	0	0	1	0

Groundwater level monitoring report _ March 2022

Kannur	Dug well	35	Rise	21	19	1	0	0	1
			Fall	14	10	3	0	0	1
	Bore well	27	Rise	18	13	1	0	2	2
			Fall	9	6	1	1	1	0
Kasaragod	Dug well	45	Rise	21	17	3	1	0	0
			Fall	24	19	1	2	1	1
	Bore well	21	Rise	13	5	0	5	2	1
			Fall	8	4	2	0	1	1

Comparison of Water level March 2022 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	26	7	10	4	1	4
			Fall	5	2	0	1	0	2
	Bore well	34	Rise	29	11	9	5	1	3
			Fall	5	4	1	0	0	0
	Tube well	4	Rise	4	3	1	0	0	0
			Fall	0	0	0	0	0	0
Kollam	Dug well	25	Rise	19	11	6	2	0	0
			Fall	6	4	1	1	0	0

Groundwater level monitoring report _ March 2022

	Bore well	16	Rise	8	6	1	0	0	1
			Fall	8	7	0	0	0	1
	Tube well	9	Rise	9	6	0	0	1	2
			Fall	0	0	0	0	0	0
Pathanamthitta	Dug well	12	Rise	8	8	0	0	0	0
			Fall	4	2	1	1	0	0
	Bore well	25	Rise	18	8	4	3	1	2
			Fall	7	5	1	0	0	1
Alappuzha	Dug well	16	Rise	7	7	0	0	0	0
			Fall	9	8	1	0	0	0
	Bore well	2	Rise	1	0	1	0	0	0
			Fall	1	0	1	0	0	0
	Tube well	25	Rise	18	10	6	0	1	1
			Fall	7	5	1	0	0	1
Kottayam	Dug well	20	Rise	7	4	1	2	0	0
			Fall	13	6	2	3	0	2
	Bore well	23	Rise	10	7	1	1	1	0
			Fall	13	6	5	0	0	2
Idukki	Dug well	20	Rise	17	8	7	1	1	0
			Fall	3	2	0	0	1	0

Groundwater level monitoring report _ March 2022

	Bore well	23	Rise	12	6	2	1	0	3
			Fall	11	3	3	0	1	4
Ernakulam	Dug well	36	Rise	24	20	2	1	1	0
			Fall	12	8	2	2	0	0
	Bore well	23	Rise	14	12	1	0	1	0
			Fall	9	5	1	0	2	1
	Tube well	1	Rise	0	0	0	0	0	0
			Fall	1	1	0	0	0	0
Thrissur	Dug well	31	Rise	17	14	3	0	0	0
			Fall	14	9	1	1	1	2
	Bore well	37	Rise	22	8	8	2	1	3
			Fall	15	6	3	1	1	4
Malappuram	Dug well	25	Rise	21	10	6	3	0	2
			Fall	4	1	1	1	0	1
	Bore well	30	Rise	22	10	7	2	0	3
			Fall	8	4	1	1	0	2
Palakkad	Dug well	30	Rise	27	10	9	5	0	3
			Fall	3	2	0	1	0	0
	Bore well	34	Rise	24	2	6	4	1	11

Groundwater level monitoring report _ March 2022

			Fall	10	2	1	0	2	5
Kozhikkode	Dug well	33	Rise	20	13	4	2	1	0
			Fall	13	11	1	0	0	1
	Bore well	34	Rise	19	12	4	0	0	3
			Fall	15	9	2	0	2	2
Wayanad	Dug well	26	Rise	22	11	7	4	0	0
			Fall	4	2	0	2	0	0
	Bore well	19	Rise	16	8	4	1	2	1
			Fall	3	2	0	0	1	0
Kannur	Dug well	35	Rise	25	16	6	1	1	1
			Fall	10	7	2	0	0	1
	Bore well	27	Rise	16	11	3	0	0	2
			Fall	11	5	2	0	1	3
Kasaragod	Dug well	44	Rise	30	12	9	7	1	1
			Fall	14	10	2	2	0	0
	Bore well	21	Rise	8	2	2	4	0	0
			Fall	13	3	3	2	2	3

Dug wells with more than 2meter Water Level Fluctuation											Appendix V				
SN o	District	Block	GP/Municipa lity/Corporat ion	WellNo	Well Type	Latitude(°)	Longitud e(°)	Mar- 2022	Mar- 2021	Mar- 2020	Decadal Avg(2012- 2021)		Fluctuation in Mar- 2022 wrt.		
											WL	Yr s	Mar- 2021	Mar- 2020	Decad al Avg
11	Thiruvanantha puram	Nedumangad	Nedumangad	TVM OW21	Dug Well	8.57667	77.02000	8.180	3.530	3.470	3.93	9	- 4.65	-4.71	-4.25
15	Thiruvanantha puram	Nedumangad	Vellanad	TVM OW09	Dug Well	8.58833	77.09666	8.170	6.940	5.000	5.86	10	- 1.23	-3.17	-2.31
41	PATHANAMTH ITTA	Mallappally	Thiruvalla Municipality	54 Civil Thiruvalla	Dug Well	9.38152	76.56963	8.820	5.610	9.010	7.31	2	- 3.21	0.19	-1.51
50	PATHANAMTH ITTA	Pandalam	Thumpamon	29 LPS Thumpamon	Dug Well	9.22217	76.71422	10.310	6.720	7.600	7.16	2	- 3.59	-2.71	-3.15
Additional open well, data monitoring start from september 2020															
13	ALAPPUZHA	Aryad	Mannancher y	OW-28 Mannancher y	Dug Well	9.57204	76.34734	2.776	0.514	2.716	2.55	9	- 2.26	-0.06	-0.23
1	Kottayam	Erattupetta	Poonjar	KTM-OW-11	Dug Well	9.67236	76.79691	3.900	3.760	1.640	1.39	10	- 0.14	-2.26	-2.51

Groundwater level monitoring report _ March 2022

15	Kottayam	Pallom	Kottayam Municipality	KTM-OW_6	Dug Well	9.58197	76.52125	11.960	10.360	10.500	9.42	9	1.60	-1.46	-2.54
17	IDUKKI	Nedumkandam	Nedumkandam	72	Dug Well	9.83611	77.15833	6.500	3.600	7.850	4.93	10	2.90	1.35	-1.569
22	ERNAKULAM	Kothamangalam	Nellikuzhi	GWE-14	Dug Well	10.06981	76.60320	4.680	2.560	5.280	3.43	9	2.12	0.60	-1.249
33	Malappuram	Tirurangadi	Tirurangadi	MPM OW 6A	Dug Well	11.04167	75.91389	12.525	8.950	8.520	9.61	10	3.57	-4.00	-2.920
45	Kozhikode	Kozhikode	Kozhikode(corporation)	QKKDO63	Dug Well	11.28528	75.79556	14.170	12.390	8.890	10.66	10	1.78	-5.28	-3.510
37	Kasaragod	Manjeshwar	Manjeshwar	210	Dug Well	12.69861	75.01389	12.770	8.370	11.750	11.63	10	4.40	-1.02	-1.144
7	KANNUR	Iritty	Mattannur Municipality	KNR-MOW173	Dug Well	11.93056	75.57219	10.700	8.560	8.840	8.37	10	2.14	-1.86	-2.333
9	THRISSUR	Kodakara	Pudukad	TSROW4	Dug Well	10.41900	76.27169	10.420	2.100	9.950	8.874	10	8.320	-0.47	-1.546
10	THRISSUR	Kodakara	Varandarappilly	TSROW20	Dug Well	10.42347	76.33169	8.580	6.000	6.050	6.097	10	2.580	-2.53	-2.483
21	THRISSUR	Ollukkara	Pananchery	TSROW3	Dug Well	10.55811	76.33152	4.980	2.100	3.200	2.676	10	2.880	-1.78	-2.304

Observation well frequency on March 2022

Annexure I 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	451	-0.75	14.54	GWE-07 Chellanam	TSROW21 Poyya	50	137	203	61	0
						11%	30%	45%	14%	0%
Bore well	348	- 0.520	46.98	151 Chittur	MPM174,Areekode,Malappuram	16	70	137	95	30
						5%	20%	39%	27%	9%
Tube well	42	0.797	34.25	08 Thrikkunnappuzha	KLM/29, Sasthamkotta, KOLLAM	8	15	11	5	3
						19%	36%	26%	12%	7%

Comparison of Water level March 2022 with respect to March 2021 Annexure I 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	448	Rise	233	173	44	8	3	5
		%	52%	74%	19%	3%	1%	2%
		Fall	215	141	42	16	4	12
		%	48%	66%	20%	7%	2%	6%
Bore well	347	Rise	207	122	31	17	13	24
		%	60%	59%	15%	8%	6%	12%
		Fall	140	85	21	12	7	15
		%	40%	61%	15%	9%	5%	11%
Tube well	41	Rise	31	22	6	1	1	1
		%	76%	71%	19%	3%	3%	3%
		Fall	10	9	1	0	0	0
		%	24%	90%	10%	0%	0%	0%

Comparison of Water level March 2022 with respect to 10 yrs mean Annexure I 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	384	Rise	270	151	70	32	6	11
		%	70%	56%	26%	12%	2%	4%
		Fall	114	74	14	15	2	9
		%	30%	65%	12%	13%	2%	8%
Bore well	340	Rise	162	89	34	13	10	16
		%	48%	55%	21%	8%	6%	10%
		Fall	178	85	36	20	16	21
		%	52%	48%	20%	11%	9%	12%
Tube well	38	Rise	30	19	5	2	2	2
		%	79%	63%	17%	7%	7%	7%
		Fall	8	7	1	0	0	0
		%	21%	88%	13%	0%	0%	0%