

GOVERNMENT OF KERALA
GROUNDWATER DEPARTMENT

GROUNDWATER LEVEL MONITORING REPORT – April 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 actual premonsoon rainfall occurred in the state during 2021 is 750.9 mm, which is 108% 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 actual premonsoon rainfall occurred in the state during 2022 is 668.5mm which is 85% Large Excess than that of the normal rainfall(361.5mm). All the districts got Large Excess rainfall except Thiruvananthapuram, Malappuram, Kollam and Alappuzha districts which got Excess rainfall. Ernakulam district got the highest rainfall 1007.6mm which is 152% large excess than the normal rainfall of the district in the season (400.6mm). Palakkad district got the lowest rainfall during the season, 396.8mm which is 63% large excess than the normal rainfall of the district and Malappuram district got 479.4mm rain fall which is 53% Excess than the normal rainfall of the district during the season.

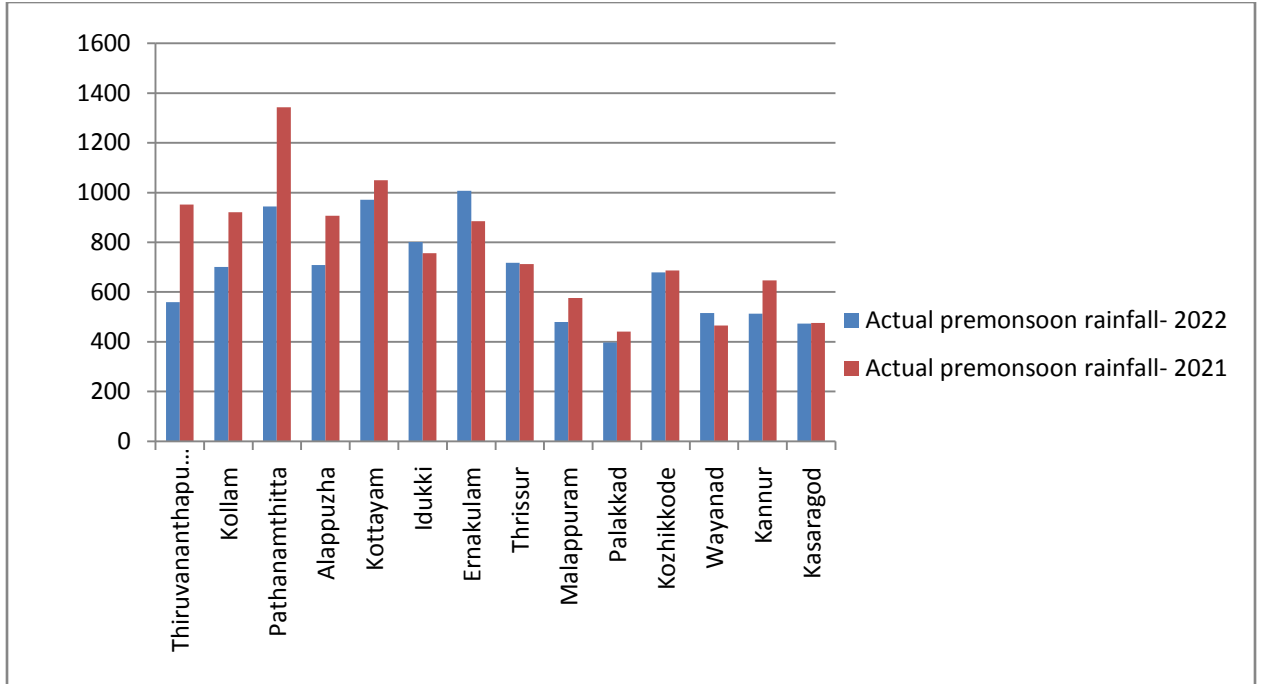


Fig:1. Comparison of actual pre monsoonrainfalloccurred2022 wrtactual pre monsoon rainfall 2021

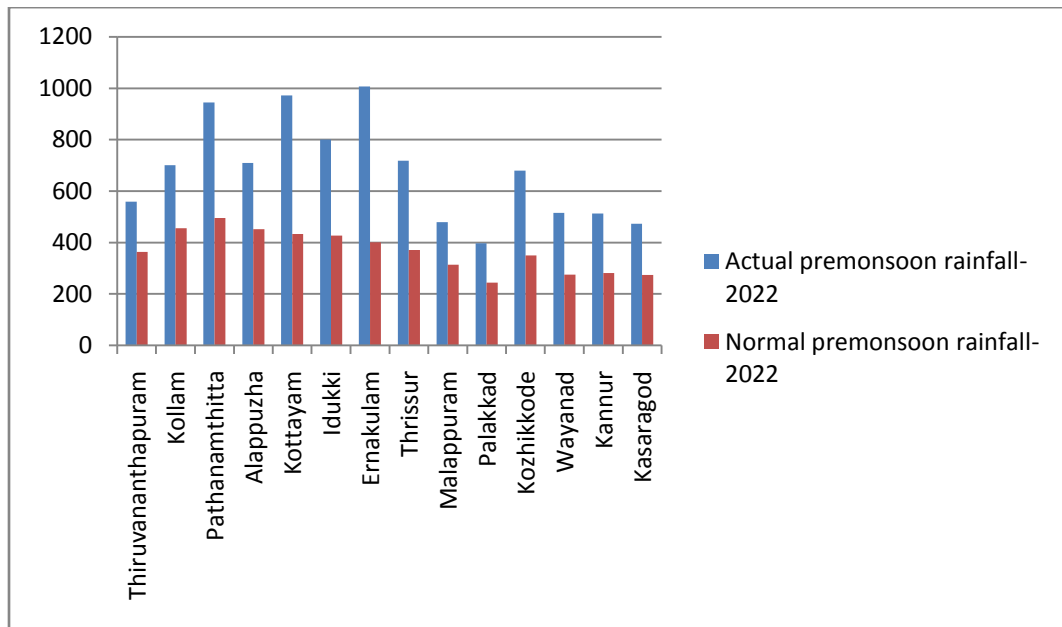


Fig:2. Comparison of actualpremonsoon rainfalloccurred 2022wrtNormal Rainfall 2022

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.

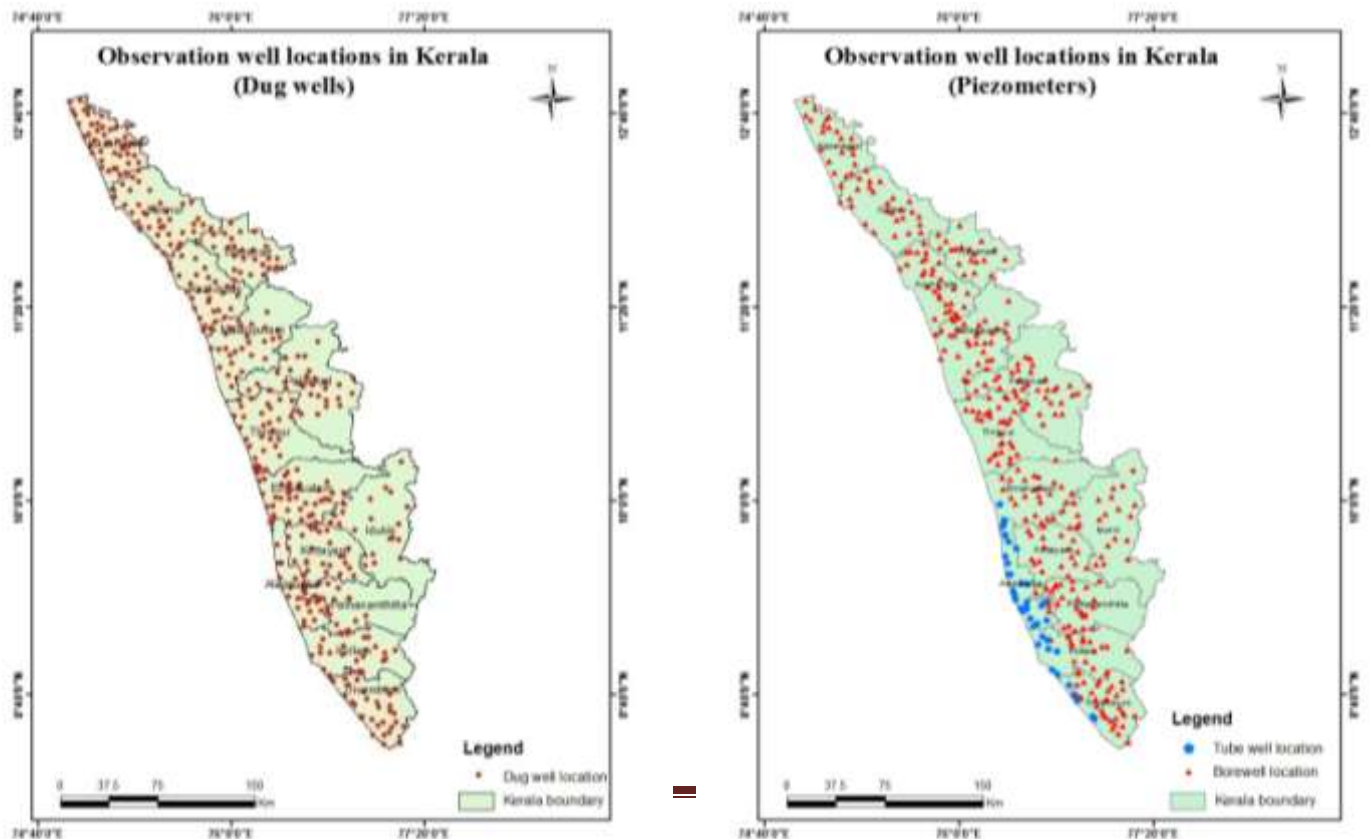


Fig: 3. Location map of observation dug wells and piezometers (bore wells & tube wells)

Analysis of Groundwater level data –April2022

During the month of **April2022**, groundwater level in 447 dug wells and 390purpose built piezometers (bore wells- 349 and tube wells – 41) has been monitored. The data collected from the observation wells during the month of April 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 April 2022

Dug wells:-The depth to groundwater level in the observation dug wells during the month of April 2022 ranges from a minimum of -0.8mbgl inTVM OW02 in Athiyannur, Thiruvananthapuram district to a maximum of 17.25mbglin KNR-POW-C8, Chapparappadavu,Kannur district. Out of 447dug wells monitored water level in 13% of dug wells shows a depth to water level ranges from ≤ 2 m, 32% ranges between 2-5 m, 42% ranges between 5-10 m and 13% dug wells recorded depth to water level ranges between 10-20 mbgl. Dug wells inIdukki and Ernakulam Districts show water level less than 10m.None of the wells in the state show water level above 20m.Table showing well frequency during April2022 is

appended

as

(Annexure-I)

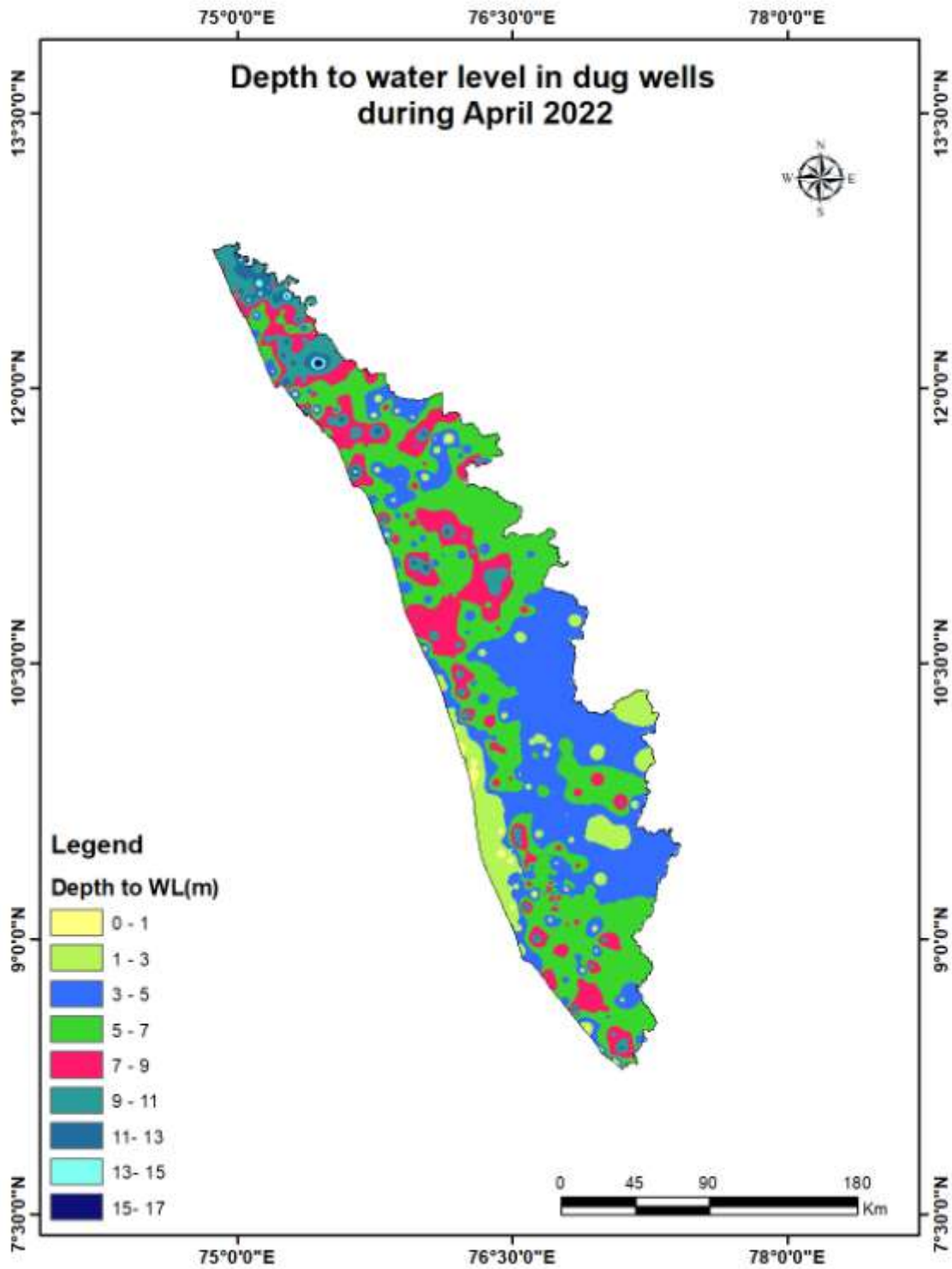


Fig: 4. Depth to water level in Dug wells during April2022

Bore wells (hard rock terrain):-The depth to groundwater level in the observation bore wells during the month of April2022 ranges from a minimum of -0.68m in05,Nemom, Neyyattinkarto a maximum of 46.98mbg in MPM174, Areekkod inn Malappuram district. Out of 349bore wells monitored, water level in 6% of bore wells shows a depth to water level range from 0-2 m, 19 % ranges between 2-5 m, 37% ranges between 5-10 m, 29% of bore wells ranges between 10-20 m, and 9% ranges more than 20 m .Bore wells inKollam Alappuzha and Eranakulamdistricts show water level below20 mbgl. Table showing well frequency during April2022 is appended. (Annexure-I)

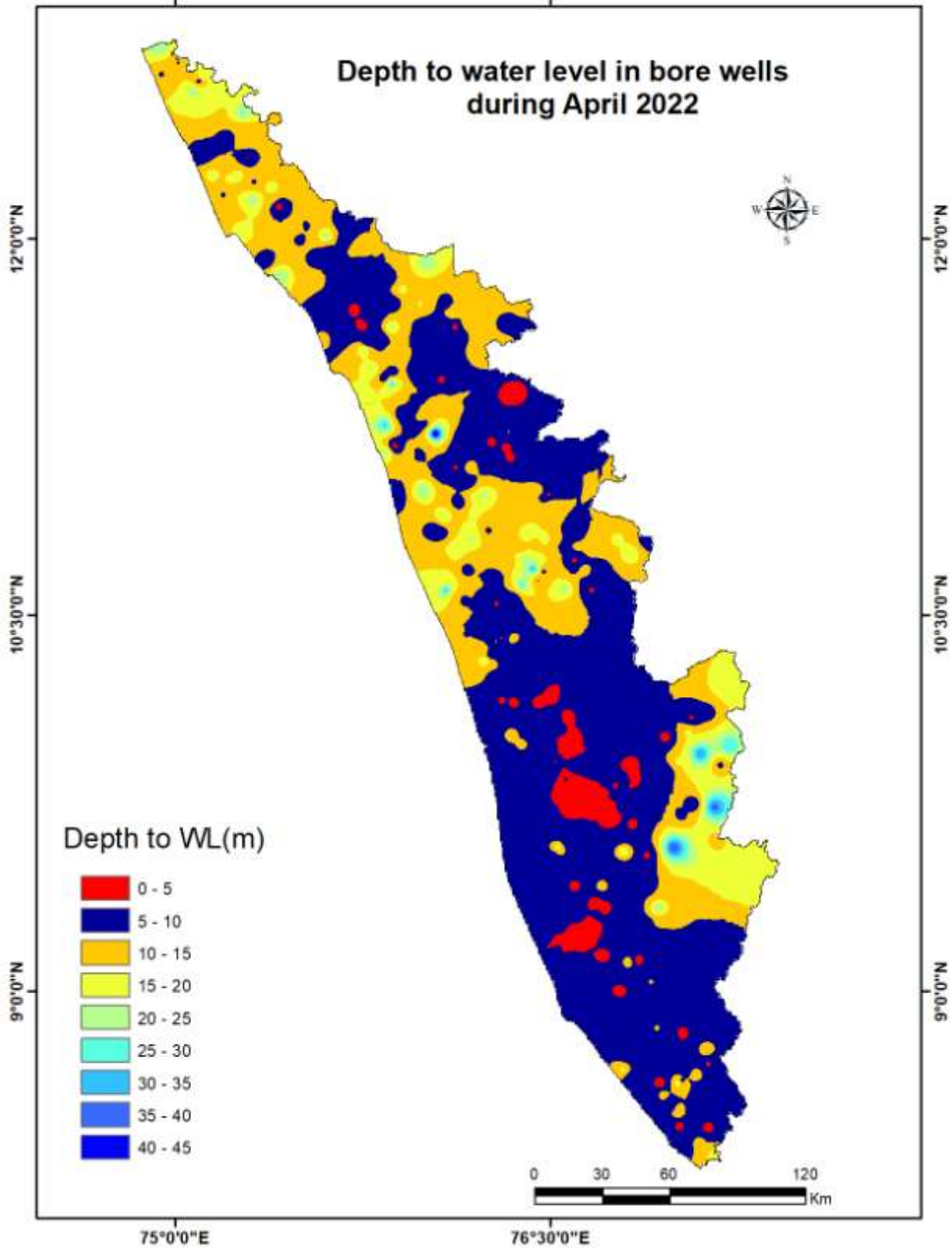


Fig:5. Depth to water level in Bore wells during April 2022

Tubewells (coastal sedimentary terrain):-The depth to groundwater level in the observation tubewells during the month of April 2022 ranges from a minimum of 0.34m in tube well no 08 Thrikkunnappuzha, Alappuzha to a maximum of 34.49mbgl, in KLM/29,Sasthamkotta,KOLLAM. Out of 41tube wells monitored in the state, water level in 19 % of tube wells ranges between 0-2m, 32 % of tube wells ranges between 2-5 m, 27% ranges between 5-10 m and15%ranges between10-20 and 7%(only 3 tube wells in Kollam district) ranges more than 20m.Table showing district wise tube well frequency is appended.(Annexure-I)

II.Comparison of Groundwater level April2022with respect toApril 2021

Comparison of the groundwater level in 442 observation dug wells during April2022with respect to the corresponding month in the previous year indicates that 43 % of observation dug wells show a fall in water level and 57 % of the dug wells show no remarkable change /marginal rise in water level.Out of 43% of the dugwells showing falling trend, 56% recorded fall in water level less than 0.5m, 29 % of dug wells show fall in the range between 0.5-1m, 8% 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 and 4% 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 IV. Table showing water level comparison of dug wells during April 2022 with respect to April 2021is appended. (Annexure-II).

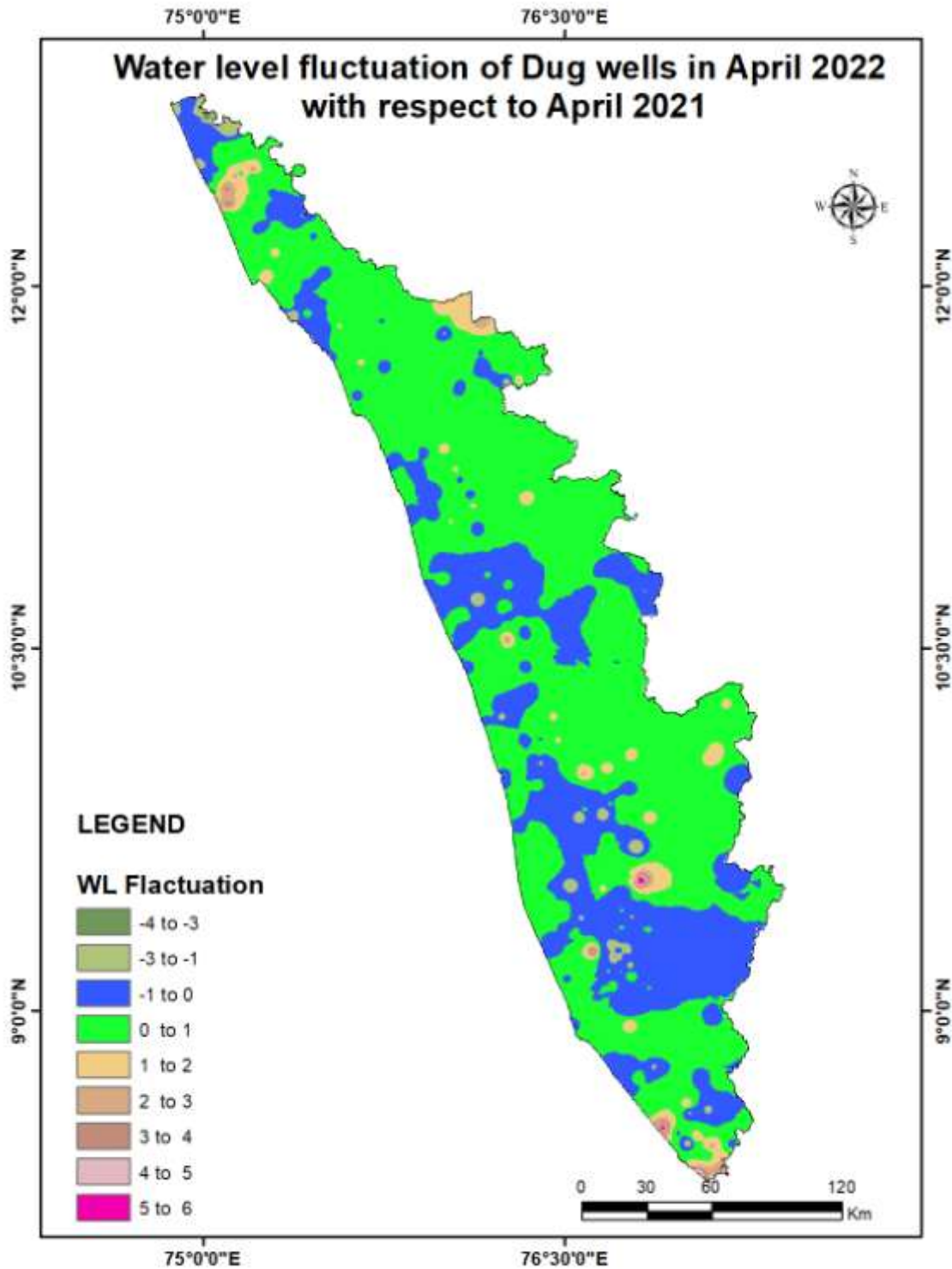


Fig: 6. Comparison of water level in Dug wells during April 2022 with respect to April 2021

Comparison of the water level in 345 observation bore wells (hard rock terrain in midland and high land areas) in April**2022**with that of the previous year, it has been noticed that 36% of bore wells show fall in water level and 64% of the wells shows no remarkable change/marginal rise in water level. Out of 36 % of the bore wells showing falling trend, 54% of the bore wells recorded fall in water level less than 0.5m, 16% show fall in the range between 0.5 - 1m, 5% of bore wells show fall in the range between 1 - 1.5m, 7% of bore wells show a fall in range between1.5-2m, 18% of bore wells show a fall inwater level more than 2m. Table showing water level comparison of bore wells during April2022with respect to April 2021 (Annexure-II) is appended.

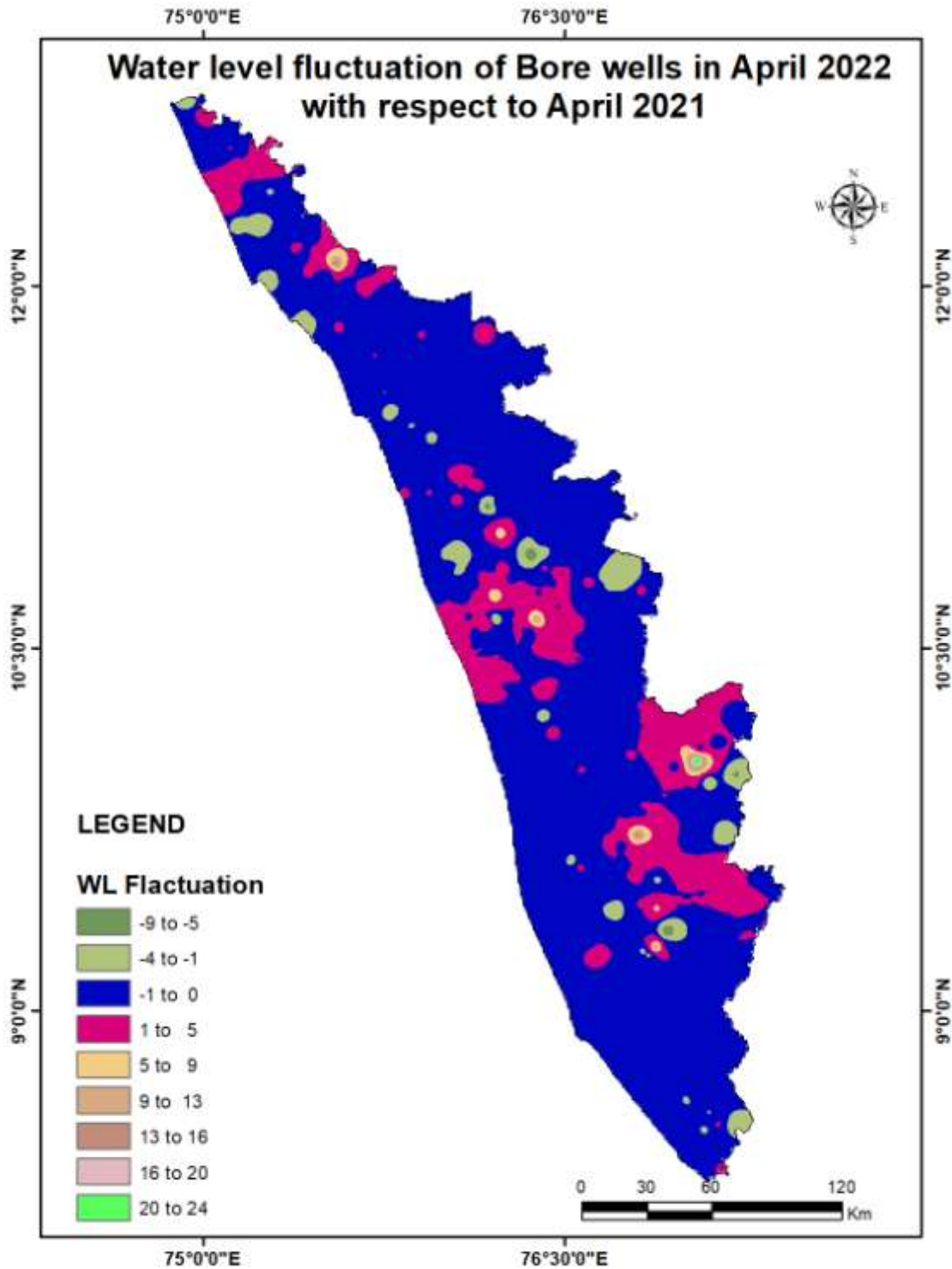


Fig:7. Comparison of water level in Bore wells during April2022wrtApril2021

Comparison of the water level in 40 observation tube wells (in the coastal sedimentary areas) during April 2022 with that of the previous year reveals that 32 % of tube wells recorded a falling trend and 68 % of the wells shows no remarkable change /marginal rise of water level. Out of 32% of the tube wells showing a falling trend, 92% of wells recorded fall in range between 0 to 0.5m 8% of the tube wells (only 1 well in Alappuzha district) show a fall in water level more than 2m. Table showing comparison of water level during April 2022 with April 2021 is appended. (Annexure-II)

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

On comparison of the water level in April 2022 with respect to the decadal mean, it has been noticed that out of 384 nos of observation dug wells 18% recorded a fall in water level and 72% of the wells shows marginal rise /no remarkable change in water level. Out of 18% of the dug wells show a falling trend, 68% of the dug wells recorded fall in water level less than 0.5m, 18% show fall in the range between 0.5-1m, 6 % 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 4% of dug wells (1 well each in Thiruvananthapuram, Kottayam and Kannur districts) show a fall in range more than 2m. List of open wells showing more than 2m fluctuation is appended in annexure IV. Table showing water level comparison of dug wells during April 2022 with respect to decadal mean is appended. (Annexure - III)

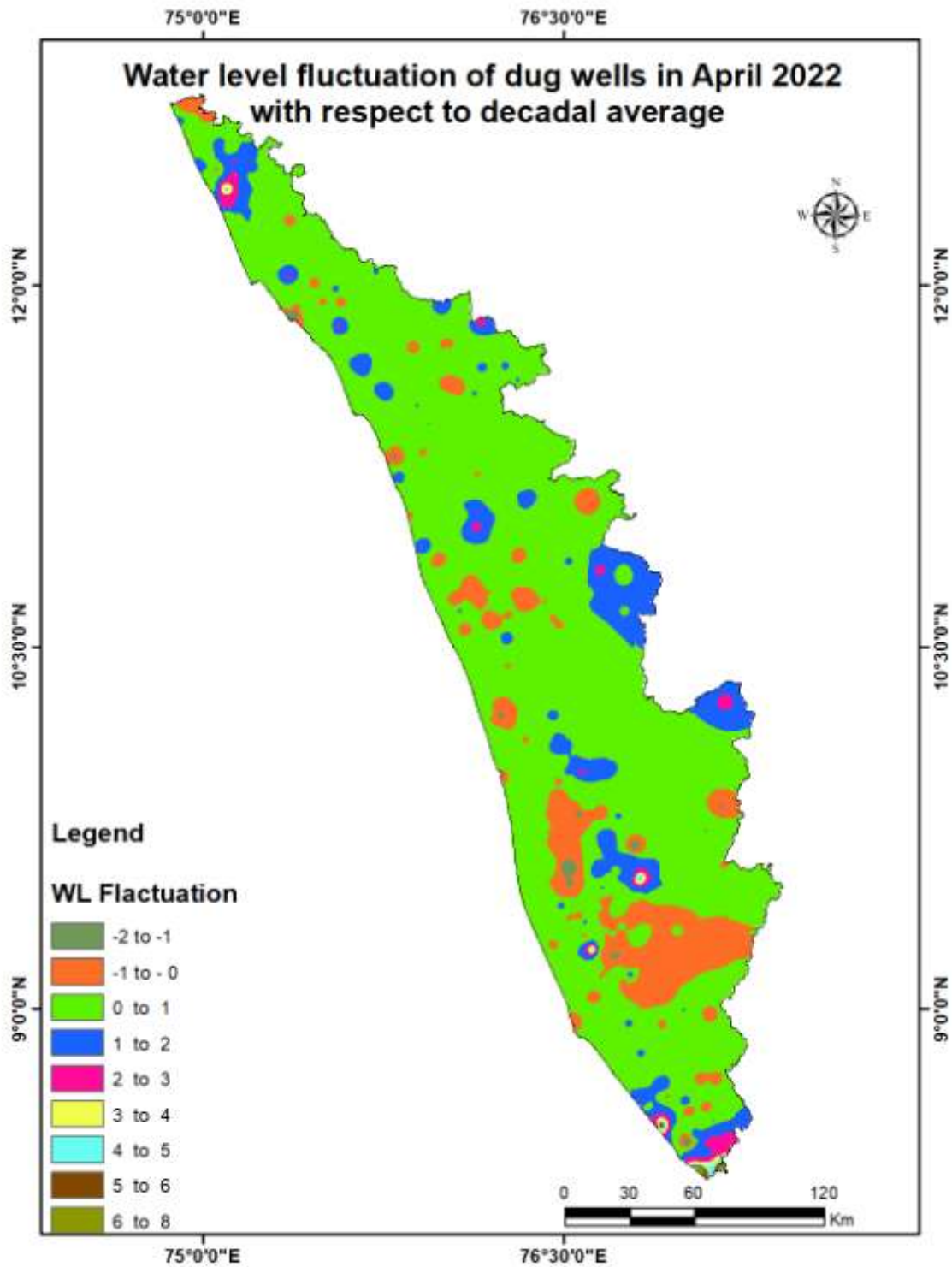


Fig:8. Comparison of water level in Dug wells during April 2022 wrt Decadal mean

Compared water level in the 347 observation bore wells during April 2022 with that of the decadal mean. It has been noticed that 30% of bore wells show fall in water level, and 70% of the wells shows marginal rise, no remarkable change in water level. Out of 30% of the bore wells shows a falling trend, 46% shows a fall in water level less than 0.5m, 15% show fall in the range between 0.5 - 1m, 7% show fall in the range between 1-1.5, 5% of wells show a fall in range between 1.5 - 2m, 27% show a fall in water level more than 2 m. Table showing water level comparison of bore wells during April 2022 with respect to decadal mean is appended. (Annexure-III)

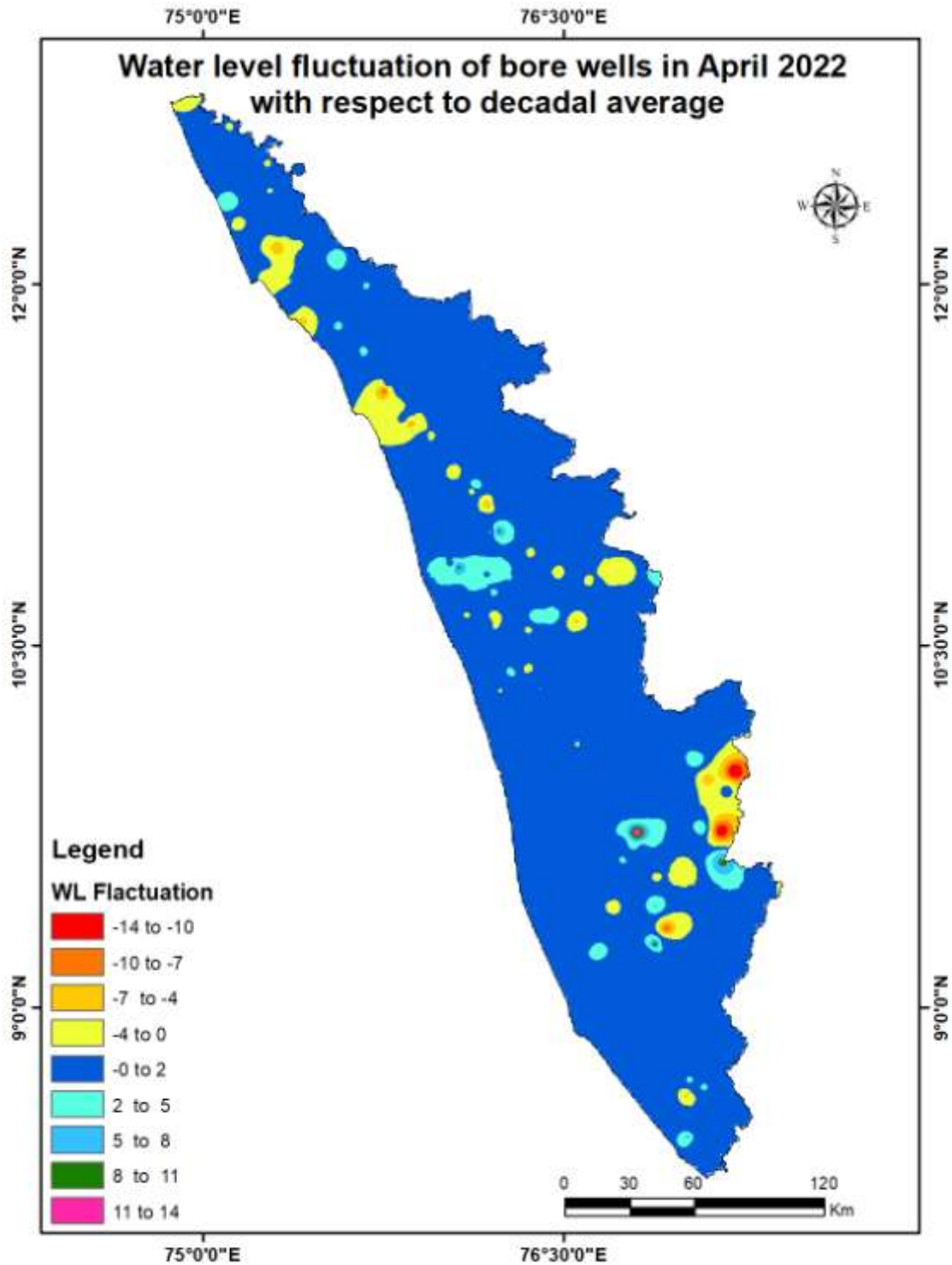


Fig:9. Comparison of water level in Bore wells during April 2022wrt Decadal mean

Comparison of the water level in the 39 observation tube wells during April 2022 with that of the decadal mean reveals that 18 % of tube wells recorded a falling trend and 82 % of the tube wells show marginal rise/no remarkable change in water level. Out of 18 % of the tube wells shows a falling trend, 72% of the tube wells show fall in water level less than 0.5m and 14% of wells show fall in the range 0.5-1 m and 14 % of wells show fall in the water level more than 2m. Table showing water level comparison of tube wells during April 2022 with respect to decadal mean is appended. (Annexure-III)

IV. Groundwater Draught Index

Calculated district wise and well wise groundwater draught index of the state during April 2022. District wise analysis suggests that Groundwater Drought Index of all the districts in the state are in Normal category. Well wise analysis suggests that out of 445 observation dug wells, 432 wells come under the normal category, 10 wells come under the mild category. Dugwell KTM-OW23 at Uzhavoor in Kottayam district and E86 Kochi Corporation Ernakulam fall in severe category, and KTM-OW-11 Poonjar in Kottayam fall in extreme category. Table showing GWDI is appended as Annexure V

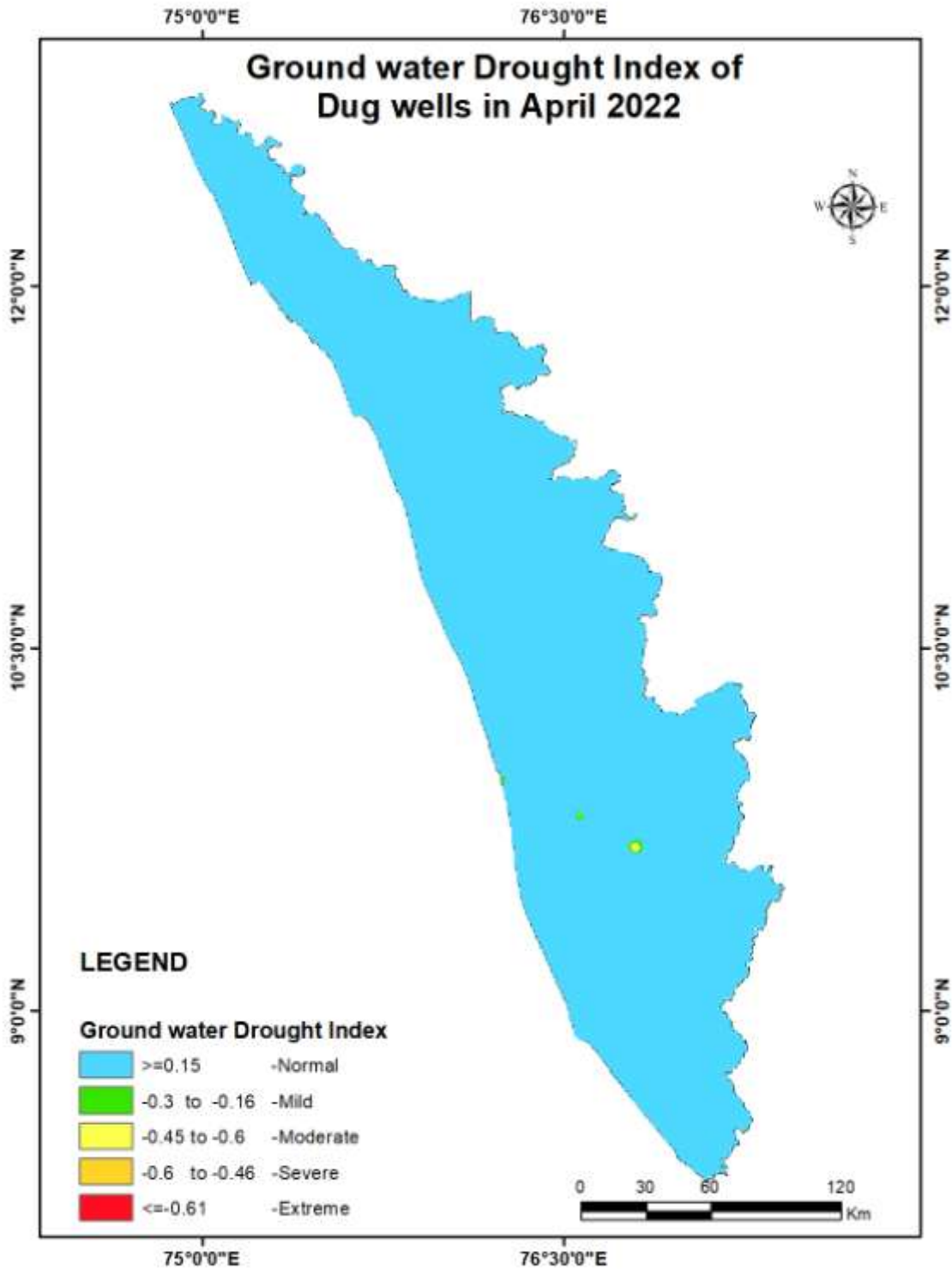


Fig-10 Groundwater drought index of dug well during April2022

Summary

Rainfall

- The premonsoon rainfall occurred in the state during 2021 (March - May) is 750.9mm, which is 108% large excess than that of the normal rainfall.
- The Actual premonsoon rainfall (March - May) occurred in the state during 2022 is 668.5 mm, which is 85% Large excess than that of the normal Rainfall (361.5mm).

Groundwater level

- The depth to groundwater level in the observation dug wells during the month of April 2022 range from a minimum of -0.8mbgl to a maximum of 17.25mbgl, in bore wells -0.68 m to a maximum of 46.98 mbgl and in the tubewells 0.34 to a maximum of 33.70mbgl. Details are given in Abstract I
- Comparison of groundwater level in April 2022 with respect to the previous year reveals that 43% of observation dug wells, 36 % of bore wells and 32% of tube wells recorded a falling trend. 39% of total observation wells (324 out of 827) show falling trend. 57% of the observation wells with falling trend (184 out of 324) show decline in water level less than 0.5 m. Details are given in Abstract II.
- Comparison of the water level in April 2022 with the, decadal mean reveals that 18 % of observation dug wells (68 out of 384), 30% of bore wells (104 out of 347) and 18% of tube wells (7 out of 39) recorded a falling trend. 23% of all the observation wells (179 out of 770) show decline in water level. 55% of all the observation wells (99 out of 179) with falling trend show decline in water level less than 0.5 m. Details are given in Abstract III
- Dug wells showing decline of water level more than 2 m during long term analysis will be monitored closely. 7 nos 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 4 nos open wells show more than 2m fluctuation on comparison of water level during the month with the decadal mean water level. Dug Well no. KTM-OW-11 at Poonjar, Kottayam shows more than 2m fluctuation in

both analyses. Suitable recharging measures may be taken to enhance the water level and to avoid further fall of water level. List of open wells showing more than 2m fluctuation is appended in annexure IV

- Ground water Drought Index of 99.3% of observation dug wells during April 2022 are in Normal and Mild categories and 0.7% fall in Severe and Extreme categories. Details are given in annexure V.

Districtwise Observation well Frequency on April 2022

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	29	-0.80	13.59	TVM OW02, Athiyannur	TVM OW28,Kazhakkootam.	4	7	16	2	0
	Bore well	35	-0.68	20.41	05, Nemom, Neyyattinkara	13,Nedumangad,Thiruvananthapuram	4	4	19	7	1
	Tube well	4	3.72	10.45	36,Chirayinkeezhu,Thiruvananthapuram	37,Chirayinkeezhu,Thiruvananthapuram	0	1	2	1	0
Kollam	Dug well	23	1.34	11.55	OW-31,Neendakara,KOLLAM	KLM OW 24,Munroethuruthu,KOLLAM	4	5	11	3	0
	Bore well	16	1.05	10.61	KLM/6,Kottarakkara Municipality,KOLLAM	KLM/8, Kadakkal	1	1	12	2	0
	Tube well	9	3.20	34.49	KLM/25, Panmana, Chavara	KLM/29, Sasthamkotta	0	2	2	2	3
Pathanamthitta	Dug well	74	0.70	12.03	10 Seethathode,Seethathode,PAT HANAMTHITTA	20 Civil Station,Adoor Municipality,PATHANAMTHITTA	6	29	36	3	0
	Bore well	25	0.57	23.30	PTA/02, Kalanjoor	PTA/15,Chittar,PATHANAMTHITTA	3	8	10	3	1
Alappuzha	Dug well	19	-0.70	11.92	OW-06 Pulinkunnu,Champakulam,Alappuzha	OW-02 Kattanam,Mavelikara,Alappuzha	7	10	1	1	0
	Bore well	2	-0.40	4.55	36 Punthala,Chengannoor,Alappuzha	35 Pennukkara,Chengannoor,Alappuzha	1	1	0	0	0
	Tube well	27	0.34	17.62	08 Thrikkunnappuzha	04 Charumoodu,Bharanikavu,Alappuzha	8	10	7	2	0
Kottayam	Dug well	18	0.35	12.23	KTM-OW-23,Uzhavoor,Kottayam	KTM-OW-4_,Pallom,Kottayam	4	9	3	2	0

Groundwater level monitoring report _ April 2022

	Bore well	22	-0.05	20.44	10, Veliyannur, Uzhavur	03,Kanjirappally,Kottayam	4	11	4	2	1
Idukki	Dug well	21	1.02	9.64	75,Marayoor,Idukki	IDK08,Kattappana Municipality,Idukki	6	8	7	0	0
	Bore well	23	2.05	39.18	SO415,Udumbannoor,Idukki	SO428,Peermade,IDUKKI	0	7	8	4	4
Ernakulam	Dug well	38	0.12	9.56	E88, Chellanam	GWE-01, Kizhakkambalam	10	12	16	0	0
	Bore well	26	0.03	11.32	BW 112, uvattupuzha Municipality	BW 116, Thrikkakkara Municipality	3	8	12	3	0
	Tube well	1	10.75	10.75	TW 01,Kochi Corporation,ERNAKULAM.	TW 01,Kochi Corporation,ERNAKULAM.	0	0	0	1	0
Thrissur	Dug well	31	1.74	14.47	TSROW16,Talikkulam,Thrissur	TSROW12,Chowwannur,Thrissur	5	10	11	5	0
	Bore well	37	1.89	32.60	TSR126,Puthukkad,Thrissur	TSR136,Kandanassery,Thrissur	1	3	14	14	5
Malappuram	Dug well	24	2.80	13.42	MPM.OW.18,Kondotty,Malappuram		0	9	11	4	0
	Bore well	29	1.85	46.98	MPM185, Nilambur	MPM174,Areekode,Malappuram	1	7	11	6	4
Palakkad	Dug well	30	1.57	10.83	PKD S-7,Chittur,Palakkad	PKD S-10,Sreekrishnapuram,Palakkad	1	16	10	3	0
	Bore well	33	2.77	21.99	160 PKD-12, Kuzhalmannam	160 PKD-2, Pattambi	0	4	8	18	3
Kozhikkode	Dug well	33	1.12	13.80	KKDOW 019,Melady,Kozhikkode	QKKDO60,Thodannur,Kozhikkode	3	9	18	3	0
	Bore well	34	0.86	32.40	KKDPZ 188, Kuttiyadi	KKDPZ 195, Unnikkulam	2	10	9	7	6
Wayanad	Dug well	26	0.30	13.60	SOW-10,Poothadi,WAYANAD	SOW-4,Nenmeni,WAYANAD	3	7	13	3	0
	Bore well	19	2.04	23.05	WYD216,Muttil,WAYANAD	WYD223,Thirunelly,WAYANAD	0	2	7	9	1
Kannur	Dug well	36	1.37	17.25	KNR-POW-C23,Koothuparamba,Kannur	KNR-POW-C8,Taliparamba,Kannur	4	7	15	10	0

Groundwater level monitoring report _ April 2022

	Bore well	27	1.65	24.26	KNRPz239,Taliparamba,Kannur	KNRPz240, Edakkad	1	0	11	12	3
Kasaragod	Dug well	45	2.05	15.75	199,Kanhangad,Kasaragod	200,Karadka,Kasaragod	0	6	20	19	0
	Bore well	21	3.52	25.90	PZKGD241,Parappa,Kasaragod	PZKGD242,Karadka,Kasaragod	0	2	4	12	3

Comparison of Water level April 2022 with respect to April 2021

Annexure II

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	29	Rise	16	8	2	0	2	4
			Fall	13	9	0	3	1	0
	Bore well	33	Rise	16	8	6	0	2	0
			Fall	17	11	1	1	1	3
	Tube well	4	Rise	3	2	1	0	0	0
			Fall	1	1	0	0	0	0
Kollam	Dug well	22	Rise	14	11	2	0	1	0
			Fall	8	6	2	0	0	0
	Bore well	16	Rise	13	9	4	0	0	0
			Fall	3	2	1	0	0	0
	Tube	8	Rise	7	4	1	0	1	1

Groundwater level monitoring report _ April 2022

	well		Fall	1	1	0	0	0	0
Pathanamthitta	Dug well	74	Rise	13	11	0	2	0	0
			Fall	61	25	25	7	2	2
	Bore well	25	Rise	6	3	0	0	1	2
			Fall	19	12	2	1	2	2
Alappuzha	Dug well	17	Rise	12	8	2	1	0	1
			Fall	5	2	3	0	0	0
	Bore well	2	Rise	1	0	0	0	0	1
			Fall	1	1	0	0	0	0
	Tube well	27	Rise	16	14	2	0	0	0
			Fall	11	10	0	0	0	1
Kottayam	Dug well	18	Rise	12	5	4	1	1	1
			Fall	6	1	1	0	1	3
	Bore well	22	Rise	14	7	1	3	1	2
			Fall	8	5	1	1	0	1
Idukki	Dug well	20	Rise	16	10	2	3	1	0
			Fall	4	3	1	0	0	0
	Bore well	23	Rise	17	9	4	1	0	3
			Fall	6	2	1	0	0	3
Ernakulam	Dug well	38	Rise	24	14	5	4	0	1
			Fall	14	6	7	1	0	0
	Bore well	25	Rise	11	6	2	2	0	1
			Fall	14	12	1	0	0	1
	Tube well	1	Rise	1	1	0	0	0	0
			Fall	0	0	0	0	0	0
Thrissur	Dug well	31	Rise	18	15	2	0	0	1
			Fall	13	9	2	1	1	0
	Bore well	37	Rise	31	9	7	1	4	10
			Fall	6	3	2	0	0	1
Malappuram	Dug	24	Rise	16	6	6	4	0	0

Groundwater level monitoring report _ April 2022

	well		Fall	8	8	0	0	0	0
	Bore well	29	Rise	20	8	6	1	2	3
			Fall	9	5	2	0	0	2
Palakkad	Dug well	30	Rise	18	10	7	1	0	0
			Fall	12	4	7	1	0	0
	Bore well	33	Rise	20	6	6	3	1	4
			Fall	13	5	2	1	2	3
Kozhikkode	Dug well	33	Rise	26	16	8	2	0	0
			Fall	7	6	1	0	0	0
	Bore well	33	Rise	20	14	3	3	0	0
			Fall	13	6	3	1	2	1
Wayanad	Dug well	26	Rise	20	8	7	1	2	2
			Fall	6	3	1	1	1	0
	Bore well	19	Rise	18	13	3	1	1	0
			Fall	1	1	0	0	0	0
Kannur	Dug well	36	Rise	24	14	6	3	1	0
			Fall	12	10	1	0	0	1
	Bore well	27	Rise	21	15	2	1	1	2
			Fall	6	2	2	0	0	2
Kasaragod	Dug well	44	Rise	24	13	6	1	0	4
			Fall	20	13	3	1	1	2
	Bore well	21	Rise	14	5	3	1	1	4
			Fall	7	0	2	1	1	3

Comparison of Water level April 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	29	Rise	23	5	4	7	2	5
			Fall	6	4	1	0	0	1
	Bore well	35	Rise	25	10	8	1	3	3
			Fall	10	6	3	0	0	1
	Tube well	4	Rise	4	3	1	0	0	0
			Fall	0	0	0	0	0	0
Kollam	Dug well	23	Rise	16	10	4	2	0	0
			Fall	7	7	0	0	0	0
	Bore well	16	Rise	7	5	1	1	0	0
			Fall	9	9	0	0	0	0
	Tube well	9	Rise	8	3	1	1	1	2
			Fall	1	1	0	0	0	0
Pathanamthitta	Dug well	13	Rise	8	4	4	0	0	0
			Fall	5	4	1	0	0	0
	Bore well	25	Rise	17	8	3	3	0	3
			Fall	8	5	1	0	0	2
Alappuzha	Dug well	19	Rise	15	7	4	3	0	1
			Fall	4	3	1	0	0	0
	Bore well	2	Rise	1	0	0	0	0	1
			Fall	1	1	0	0	0	0
	Tube well	25	Rise	19	13	5	1	0	0
			Fall	6	4	1	0	0	1
Kottayam	Dug well	18	Rise	13	2	3	4	3	1
			Fall	5	0	1	1	2	1
	Bore	22	Rise	19	5	4	4	4	2

Groundwater level monitoring report _ April 2022

	well		Fall	3	2	0	0	1	0
Idukki	Dug well	20	Rise	18	7	9	1	0	1
			Fall	2	1	0	1	0	0
	Bore well	23	Rise	14	5	3	2	1	3
			Fall	9	4	1	0	0	4
Ernakulam	Dug well	37	Rise	31	11	12	6	1	1
			Fall	6	4	2	0	0	0
	Bore well	24	Rise	18	9	8	0	1	0
			Fall	6	4	1	1	0	0
	Tube well	1	Rise	1	1	0	0	0	0
			Fall	0	0	0	0	0	0
Thrissur	Dug well	31	Rise	22	17	3	1	1	0
			Fall	9	6	2	1	0	0
	Bore well	37	Rise	22	9	6	3	0	4
			Fall	15	6	3	2	1	3
Malappuram	Dug well	24	Rise	21	5	11	2	2	1
			Fall	3	2	1	0	0	0
	Bore well	29	Rise	20	6	10	2	0	2
			Fall	9	3	2	0	1	3
Palakkad	Dug well	30	Rise	25	8	10	3	3	1
			Fall	5	5	0	0	0	0
	Bore well	33	Rise	24	8	1	5	2	8
			Fall	9	3	0	0	0	6
Kozhikkode	Dug well	33	Rise	31	11	15	2	2	1
			Fall	2	1	0	0	1	0
	Bore well	34	Rise	25	12	9	2	1	1
			Fall	9	2	2	1	1	3
Wayanad	Dug well	26	Rise	22	9	7	4	1	1
			Fall	4	2	1	1	0	0
	Bore	19	Rise	18	9	6	2	0	1

Groundwater level monitoring report _ April 2022

	well		Fall	1	1	0	0	0	0
Kannur	Dug well	36	Rise	31	18	8	3	0	2
			Fall	5	4	0	0	0	1
	Bore well	27	Rise	21	11	7	0	0	3
			Fall	6	0	2	0	0	4
Kasaragod	Dug well	45	Rise	40	21	6	5	3	5
			Fall	5	3	2	0	0	0
	Bore well	21	Rise	12	4	3	3	1	1
			Fall	9	2	1	3	1	2

Annexure IV - Open wells showing more than 2m fall

Water Level Data & Fluctuation															
SNo	District	Block	GP/Municipality/ Corporation	WellNo	Well_Type	Latitude(°)	Longitude(°)	Apr-2022	Apr-2021	Apr-2020	Decadal Avg(2012-2021)		Fluctuation in Apr-2022 wrt.		
											WL	Yrs	Apr-2021	Apr-2020	Decadal Avg
1	Thiruvananthapuram	Thiruvananthapuram	Nemom	TVM OW05	Dug Well	8.45028	77.01334	7.020	5.180	5.680	4.611	9	-1.840	-1.340	-2.409
2	PATHANAMTHITTA	Pandalam	Mezhuveli	61 Mezhuveli	Dug Well	9.26919	76.70159	9.850	7.620	9.850	8.735	2	-2.230	0.000	-1.115
3	PATHANAMTHITTA	Pandalam	Thumpamon	29 LPS Thumpamon	Dug Well	9.22217	76.71422	9.720	6.350	7.410	6.880	2	-3.370	-2.310	-2.840
4	Kottayam	Erattupetta	Poonjar	KTM-OW-11	Dug Well	9.67236	76.79691	2.940	0.590	0.540	1.121	10	-2.350	-2.400	-1.819
5	Kottayam	Pallom	Kottayam Municipality	KTM-OW_6	Dug Well	9.58197	76.52125	11.140	11.080	7.320	9.095	8	-0.060	-3.820	-2.045
6	Kottayam	Pallom	Kottayam Municipality	KTM-OW-4_	Dug Well	9.51750	76.52480	12.230	10.120	9.760	10.883	10	-2.110	-2.470	-1.347
7	Kottayam	Uzhavoor	Uzhavoor	KTM-OW-23	Dug Well	9.81008	76.56675	3.210	1.200	1.370	1.489	8	-2.010	-1.840	-1.721
8	KANNUR	Kannur	Kannur Corporation	KNR-MOW181	Dug Well	11.87747	75.37308	13.460	11.010	15.840	10.916	10	-2.450	2.380	-2.544
9	Kasaragod	Manjeshwar	Manjeshwar	207	Dug Well	12.64722	75.10889	10.350	7.370	10.610	10.379	10	-2.980	0.260	0.029
10	Kasaragod	Manjeshwar	Manjeshwar	210	Dug Well	12.69861	75.01389	13.500	8.940	13.200	12.576	10	-4.560	-0.300	-0.924

**Observation well frequency on April 2022
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	447	-0.8	17.25	TVM OW02	KNR-POW-C8, Chapparappadavu,KANNUR	57	144	188	58	0
				Athiyannur		13.00%	32.00%	42.00%	13.00%	0.00%
Bore well	349	-0.68	46.98	05,Nemom, Neyyattinkara	MPM174, Areekkod	21	67	129	99	32
						6.00%	19.00%	37.00%	29.00%	9.00%
Tube well	41	0.34	34.49	08 Thrikkunnappuzha	KLM/29,Sasthamkotta,KOLLAM	8	13	11	6	3
						19.00%	32.00%	27.00%	15.00%	7.00%

Comparison of Water level April 2022 with respect to April 2021 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	442	Rise	253	149	59	23	8	14
		%	57%	59%	23%	9%	3%	6%
		Fall	188	105	54	15	7	8
		%	43%	56%	29%	8%	3%	4%
Bore well	345	Rise	222	112	47	17	14	32
		%	64%	50%	21%	8%	7%	14%
		Fall	123	67	20	6	8	22
		%	36%	54%	16%	5%	7%	18%
Tube well	40	Rise	27	21	4	0	1	1
		%	68%	78%	14%	0%	4%	4%
		Fall	13	12	0	0	0	1
		%	32%	92%	0%	0%	0%	8%

Comparison of Water level April 2022 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	384	Rise	316	135	100	43	18	20
		%	82%	43%	32%	14%	5%	6%
		Fall	68	46	12	4	3	3
		%	18%	68%	18%	6%	4%	4%
Bore well	347	Rise	243	101	69	28	13	32
		%	70%	42%	28%	12%	5%	13%
		Fall	104	48	16	7	5	28
		%	30%	46%	15%	7%	5%	27%
Tube well	39	Rise	32	20	7	2	1	2
		%	82%	63%	22%	6%	3%	6%
		Fall	7	5	1	0	0	1
		%	18%	72%	14%	0%	0%	14%