

**GOVERNMENT OF KERALA
GROUNDWATER DEPARTMENT**

GROUNDWATER LEVEL MONITORING REPORT – JANUARY 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. 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 Northeast monsoon Rain fall received in the state during 2021 (1 Oct to 31 December 2021) is 1026.3 mm. It is 109% Large excess from the Normal rainfall during the period which is 491.6 All the districts received "Large excess" Actual rainfall than the normal rain fall except Alappuzha District which received 58% more rain than the Normal rain and comes under category "Excess". Pathanamthitta District received the highest rainfall; 1695.4mm which is 181% more from the normal rainfall of the district during the season which is 603.2mm.

The Northeast monsoon Rain fall received in the state during 2020 (1 Oct to 31 December 2020) is 365.3 mm .It is -26% Deficient from the Normal rainfall during the period which is 491.6 .All the districts received less rainfall than the normal rainfall during the Northeast monsoon rainfall during 2020.

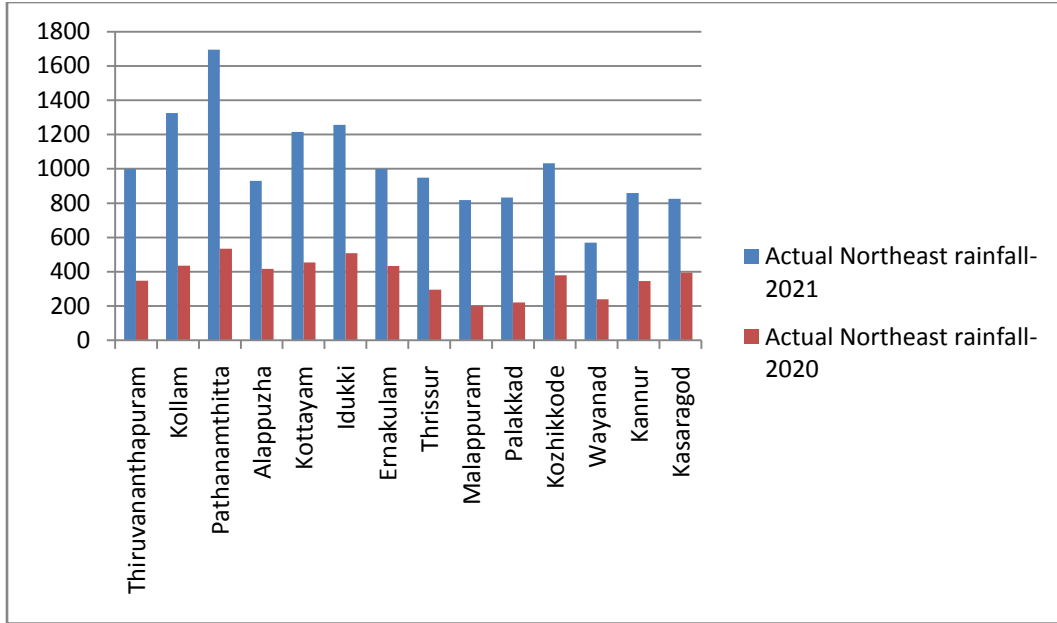


Fig:1. Comparison of actual rainfall occurred during Northeast Rainfall 2021 wrt 2020

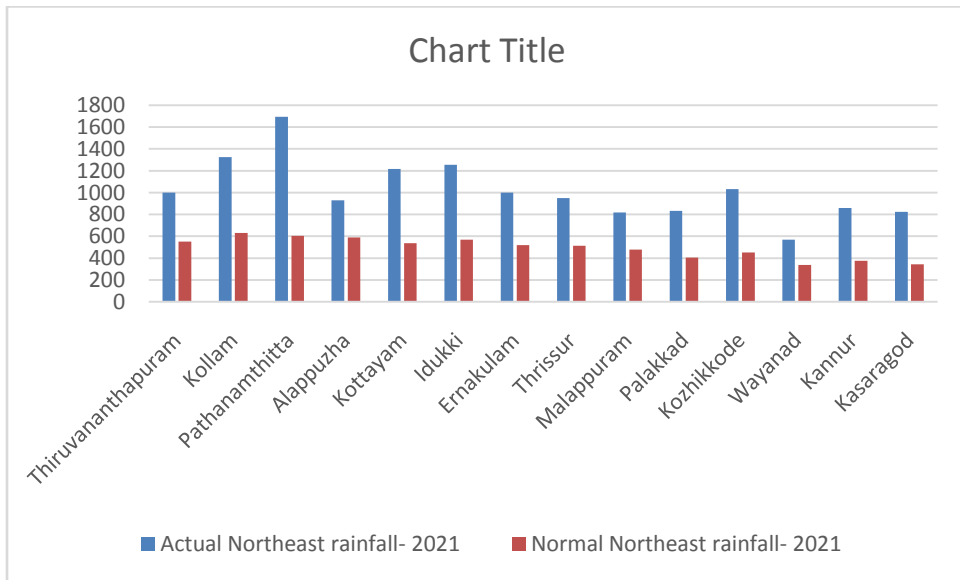


Fig:2. Comparison of Actual Northeast rainfall occurred during 2021 wrt Normal Northeast Rainfall

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.

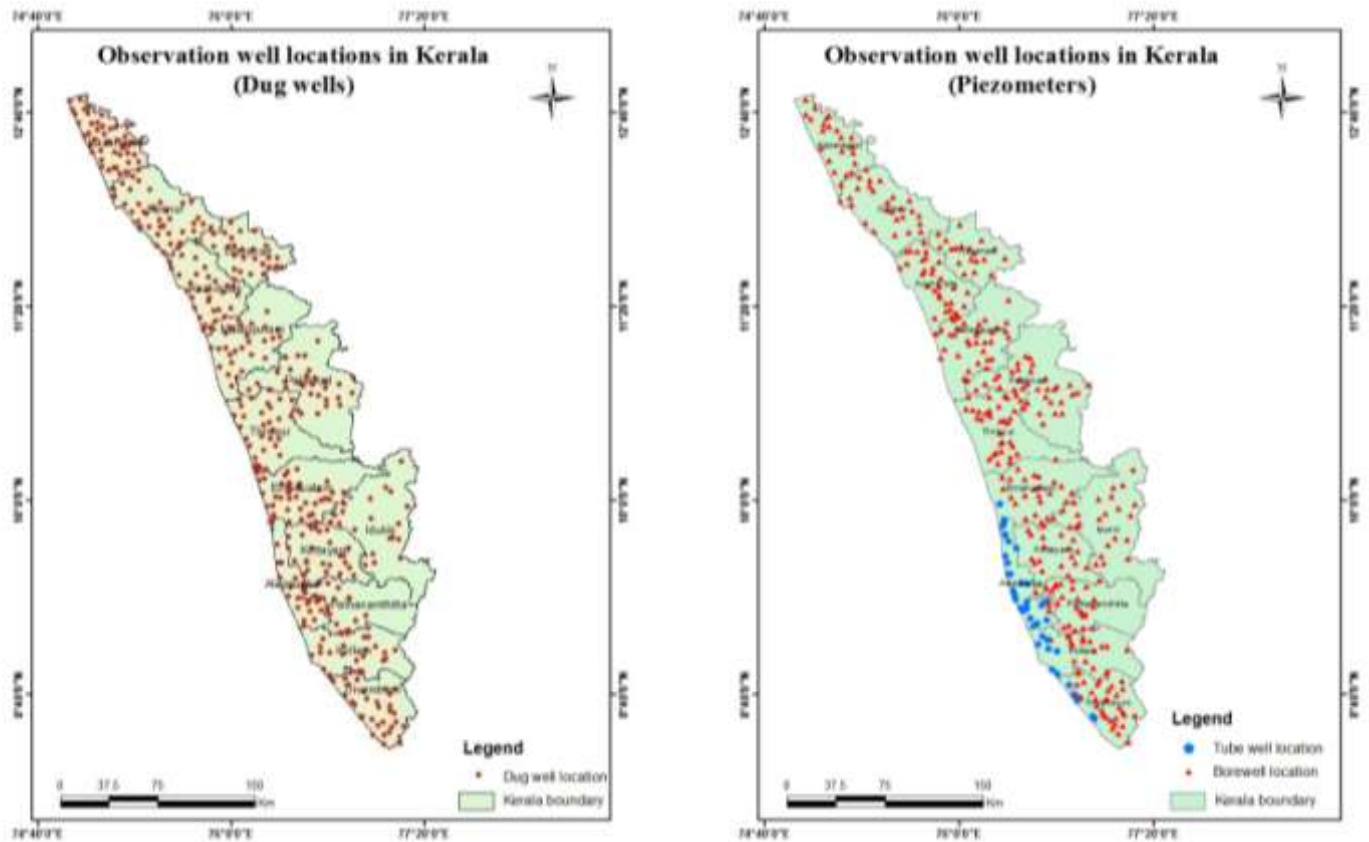


Fig. 3. Location map of observation dug wells and piezometers (bore wells & tube wells)

Analysis of Groundwater level data – – JANUARY 2022

During the month of January - 2022, groundwater level in 442 dug wells and 387 purpose built piezometers (bore wells- 347 and tube wells – 40) has been monitored. The data collected from the observation wells during the month of January – 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 January - 2022

Dug wells:-The depth to groundwater level in the observation dug wells during the month of January – 2022 ranges from a minimum of -0.75 m in E86,Kochi Corporation, Ernakulam to a maximum of 16.71mbgl, KNR-POW-C8, Taliparamba, Kannur. Out of 442dug wells monitored water level in 15% of dug wells shows a depth to water level ranges from ≤ 2 m, 34% ranges between 2-5 m, 44% ranges between 5-10 m and 7% dug wells recorded depth to water level ranges between 10-20 mbgl.Dugwells in,Palakkad , Ernakulam and Idukki districtsshow water level below 10m . None of the wells in the state show water level above 20m. Table showing well frequency during January – 2022is appended. (Annexure-I)

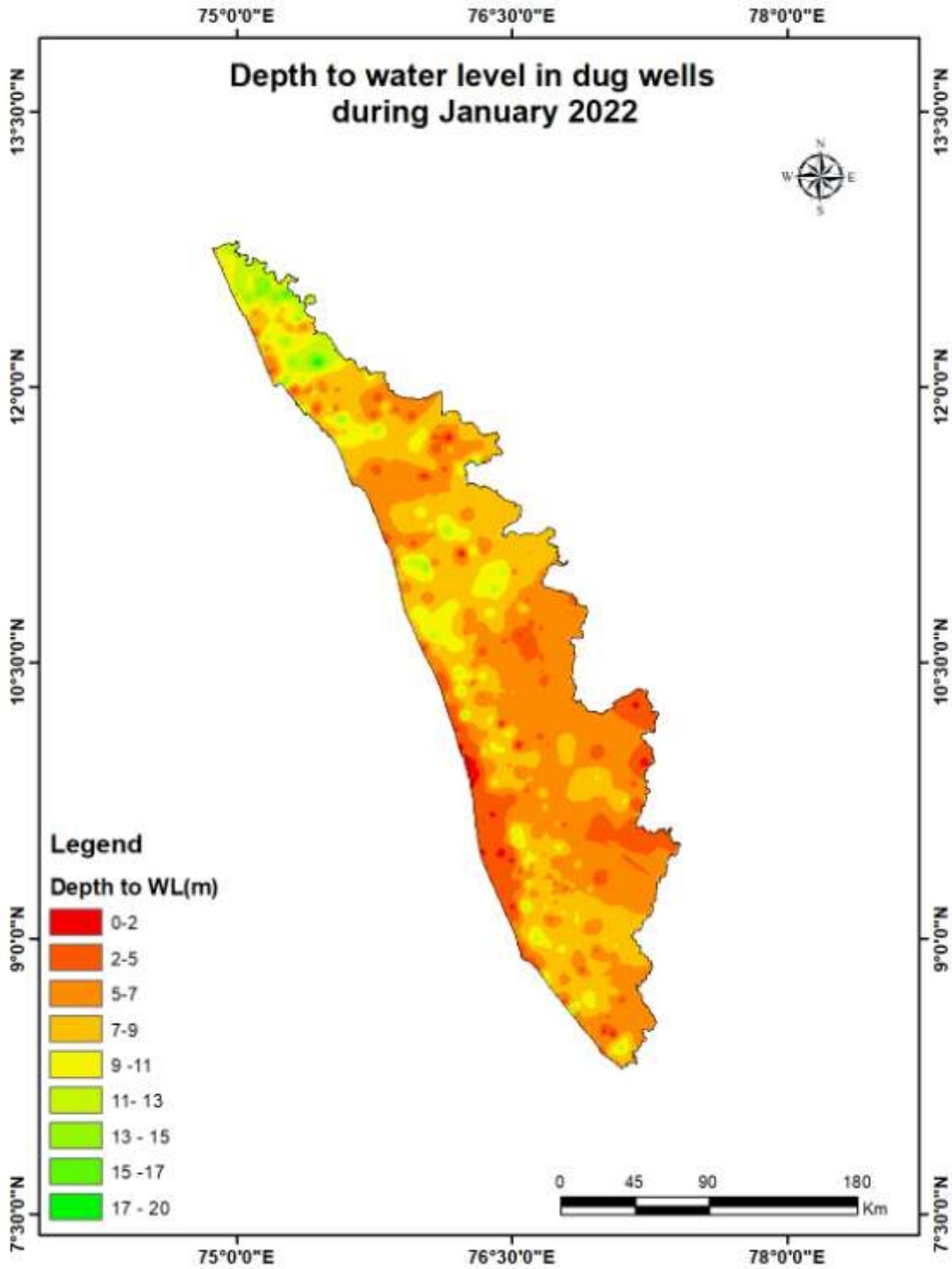


Fig:4. Depth to water level in Dug wells during January - 2022

Bore wells (hard rock terrain):-The depth to groundwater level in the observation bore wells during the month of January – 2022 ranges from a minimum of -0.68m 28, Vamanapuram, Thiruvananthapuram to a maximum of 45.19mbglMPPM174, Areekode, Malappuram. Out of 347 bore wells monitored, water level in 7% of bore wells shows a depth to water level range from 0-2 m, 22 % ranges between 2-5 m, 40% ranges between 5-10 m, 25% of bore wells ranges between 10-20 m, and 6% ranges more than 20 m .Bore wells in Thiruvananthapuram, Kollam, Alappuzha, and Ernakulam, districts show water level below 20 mbgl. Borewells in Kollam and Alappuzha shows water level below 10m. Table showing well frequency during January - 2022 is appended. (Annexure-I)

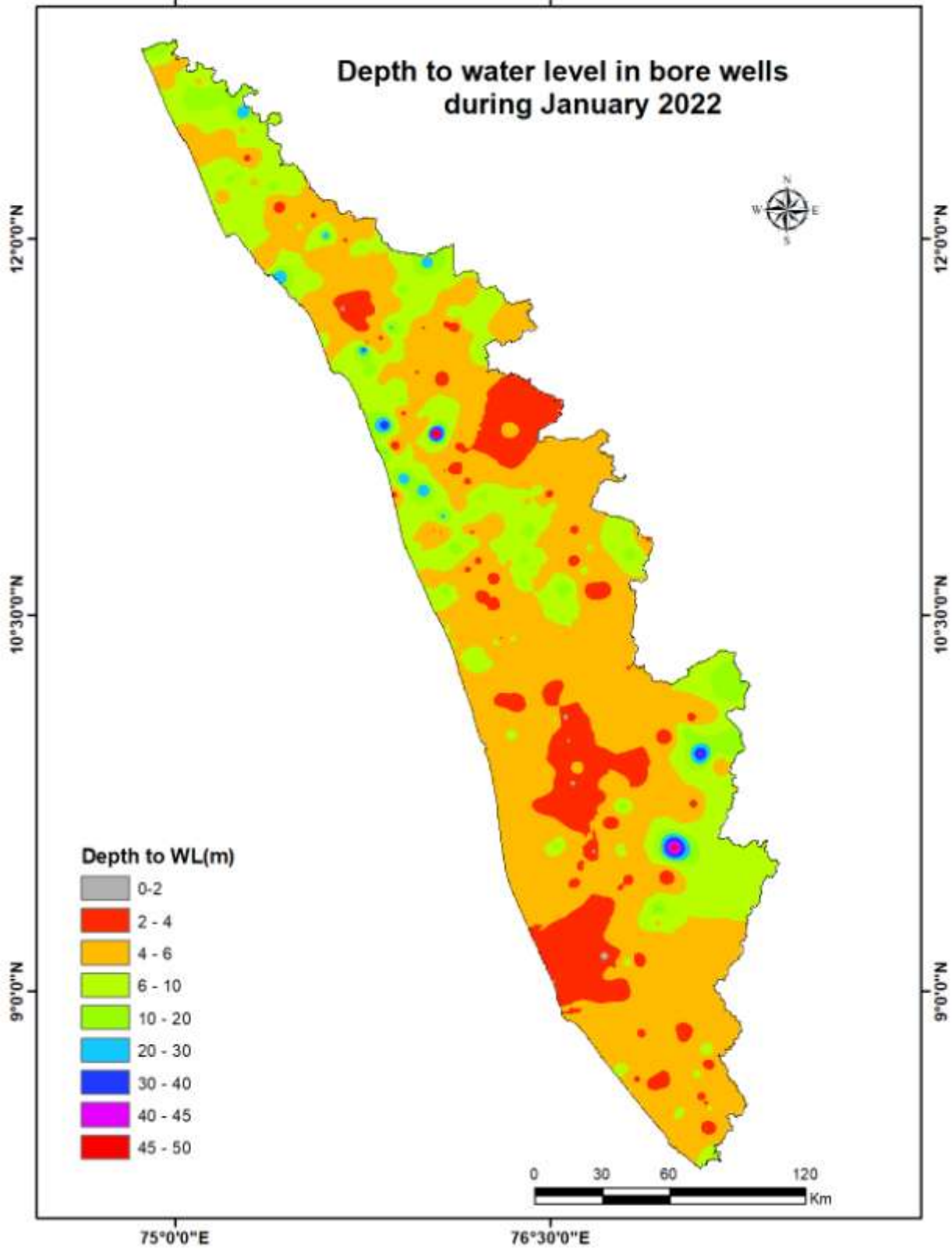


Fig:5. Depth to water level in Bore wells during January - 2022

Tubewells (coastal sedimentary terrain):-The depth to groundwater level in the observation tubewells during the month of January – 2022 ranges from a minimum of 0.71 m in well no 08 Thrikkunnappuzha, Alappuzha to a maximum of 33.01 bgl in KLM/29SasthamkottaSasthamkottaKOLLAM . Out of 40tube wells monitored in the state, water level in 27 % of tube wells ranges between 0-2m, 32 % of tube wells ranges between 2-5 m, 23% ranges between 5-10 m and10%ranges between10-20 and 8% ranges more than 20m. Tube wells in Thiruvananthapuram , Alappuzha and Ernakulam show water level below 20m and only 3 tube wells out of 8 in Kollam District show water level above20m. Table showingtube well frequency is appended.(Annexure-I)

II.Comparison of Groundwater level in January – 2022with respect toJanuary - 2021

Comparison of the groundwater level in **January – 2022**with respect to the corresponding month in the previous year indicates that 37 % of observation dug wells (137nos out of 374) show a fall in water level and 63 % of the wells (237nos out of 374) show no remarkable change /marginal rise in water level.Out of 37% of the dugwells showing falling trend, 66% , (91 out of 137) recorded fall in water level less than 0.5m, 20% of dug wells (27 out of 137)show fall in the range between 0.5-1m, 6% of dug wells (8 out of 137)show fall in the range between 1-1.5 m, 4% of dug wells (5 out of 137) show a fall in the range between 1.5 - 2m and 4% dug wells (6 out of 137) show a fall in water level more than 2m. Table showing water level comparison of dug wells during January – 2022 with respect to January – 2021is appended. (Annexure-II).

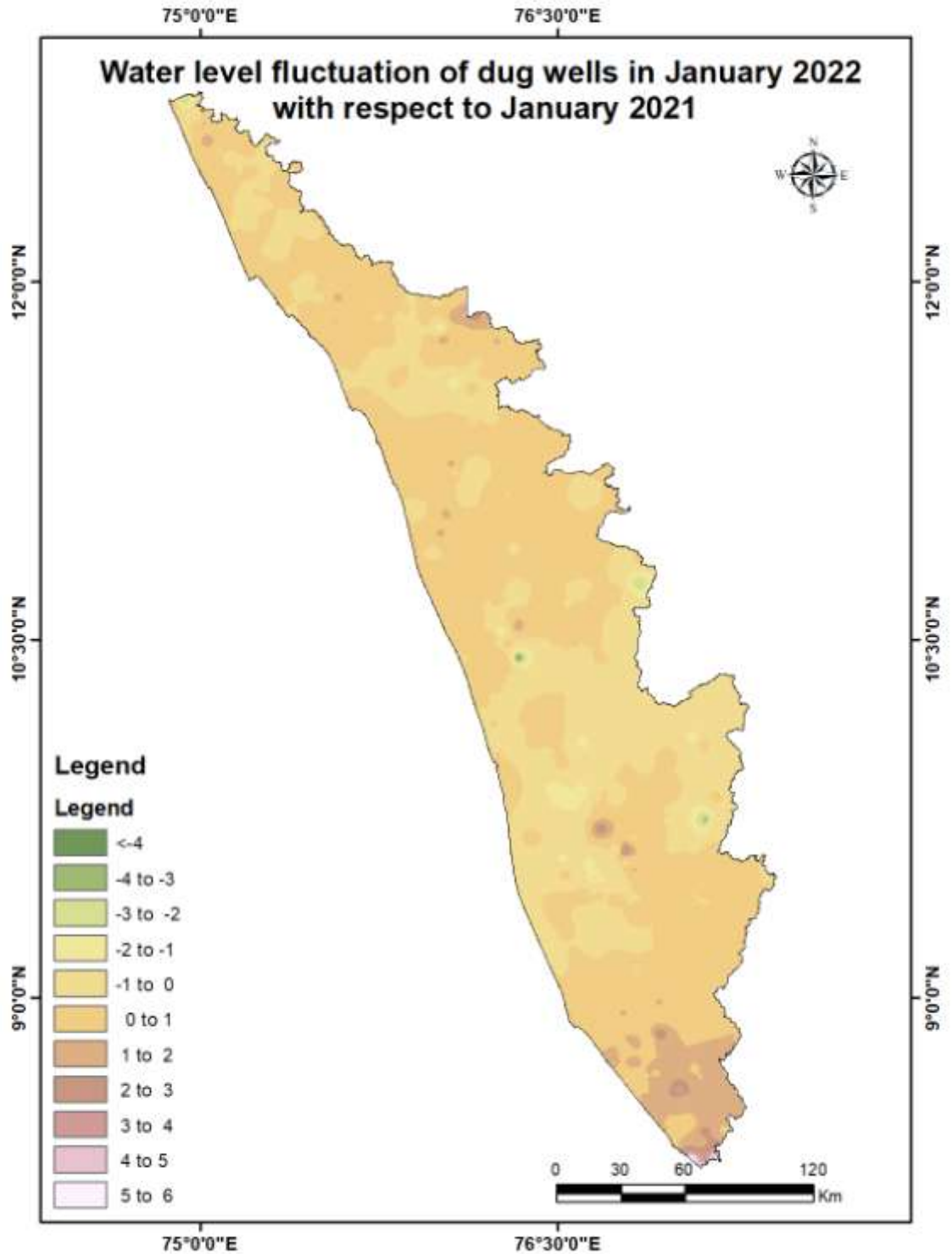


Fig:6. Comparison of water level in Dug wells during January – 2022with respect to January - 2021

On Comparison of the water level in observation bore wells (hard rock terrain in midland and high land areas) in **January – 2022** with that of the previous year, it has been noticed that 35% of bore wells (122 out of 345) show fall in water level and 65% of the wells (223 out of 345) shows no remarkable change/marginal rise in water level. Out of 35 % of the bore wells shows a falling trend, 53% of the bore wells (65 out of 122) recorded fall in water level less than 0.5m. Borewells in Kollam district show only rising trend. Borewells in Thiruvananthapuram, Alappuzha, Ernakulam, and Wayanad show Fluctuations below 2m. Table showing water level comparison of bore wells during **January – 2022 with respect to January - 2021**

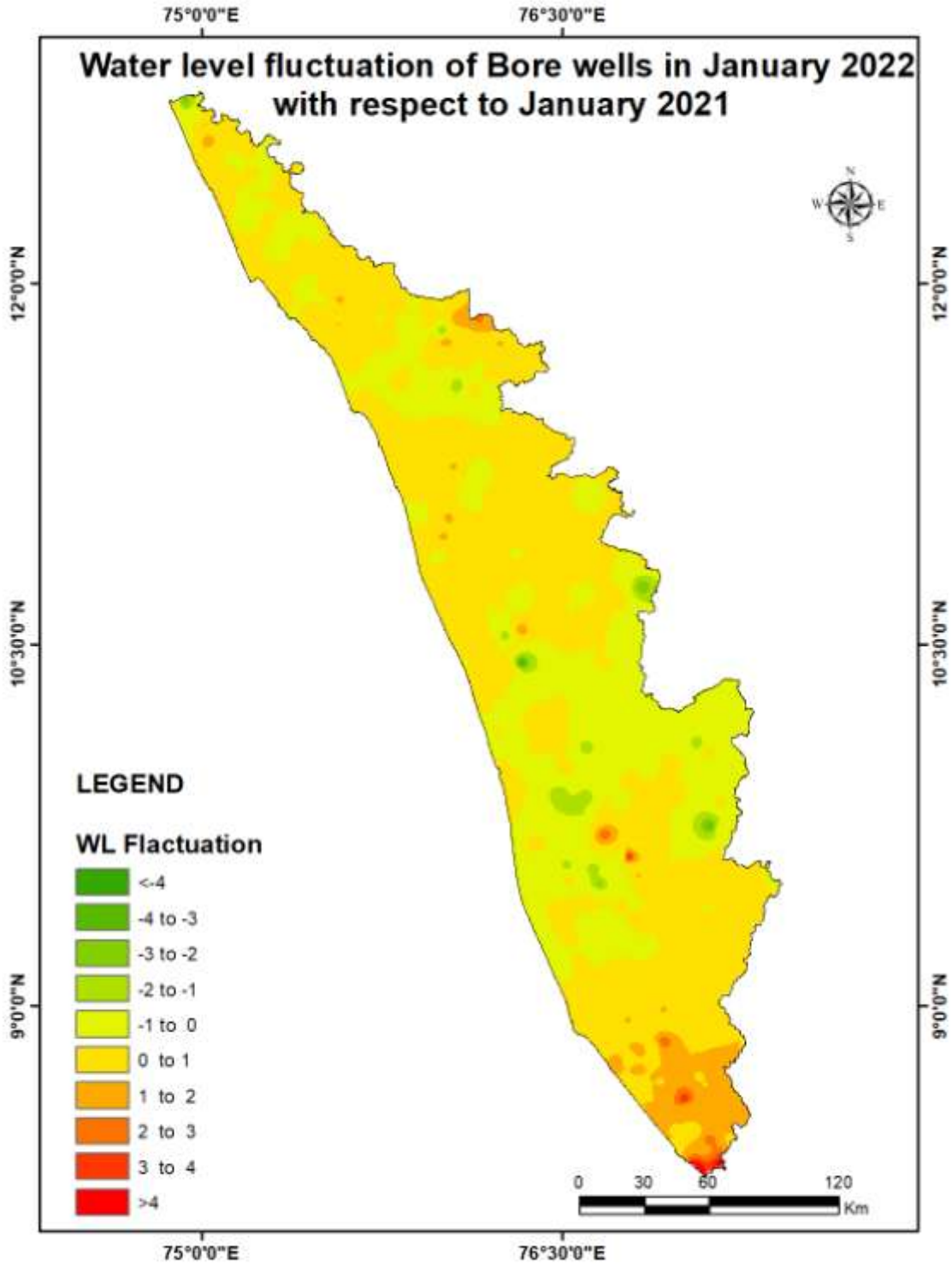


Fig:7. Comparison of water level in Bore wells during January 2022 wrt January 2021

Comparison of the water level in observation tube wells (in the coastal sedimentary areas) during **January 2022** with that of the previous year reveals that 67 % of the wells (26 out of 39) shows no remarkable change /marginal rise of water level and 33 % of tube wells (13 out of 39) recorded falling trend. Out of 33% of the tube wells showing a falling trend, 84% of wells (11 out of 13) recorded fall in range between 0 to 0.5m .8% of wells (1 out of 13) recorded fall in range between 0.5 to 1m and 8% of wells (1 out of 13) recorded fall in range between 1.5 to 2m . Tube wells in Thiruvananthapuram district and only one tube well in Ernakulam district show rise only. None of the bore wells show a fall in water level more than 2m. Table showing comparison of water level during January 2022 with respect to January 2021 is appended. (Annexure-II)

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

Comparison of the water level in January 2022 with respect to the decadal mean, it has been noticed that 14% of observation dug wells (54 out of 377) recorded a fall in water level and 86% of the wells (323 out of 377) shows marginal rise /no remarkable change in water level. Out of 14% of the dugwells showing falling trend, 65% of the dug wells (35 out of 54) recorded fall in water level less than 0.5m. Open wells in Kollam and Kozhikkode districts show rise only. Only 2 wells show more than 2m fall in water level. Table showing water level comparison of dug wells during January 2022 with respect to decadal mean is appended. (Annexure-III)

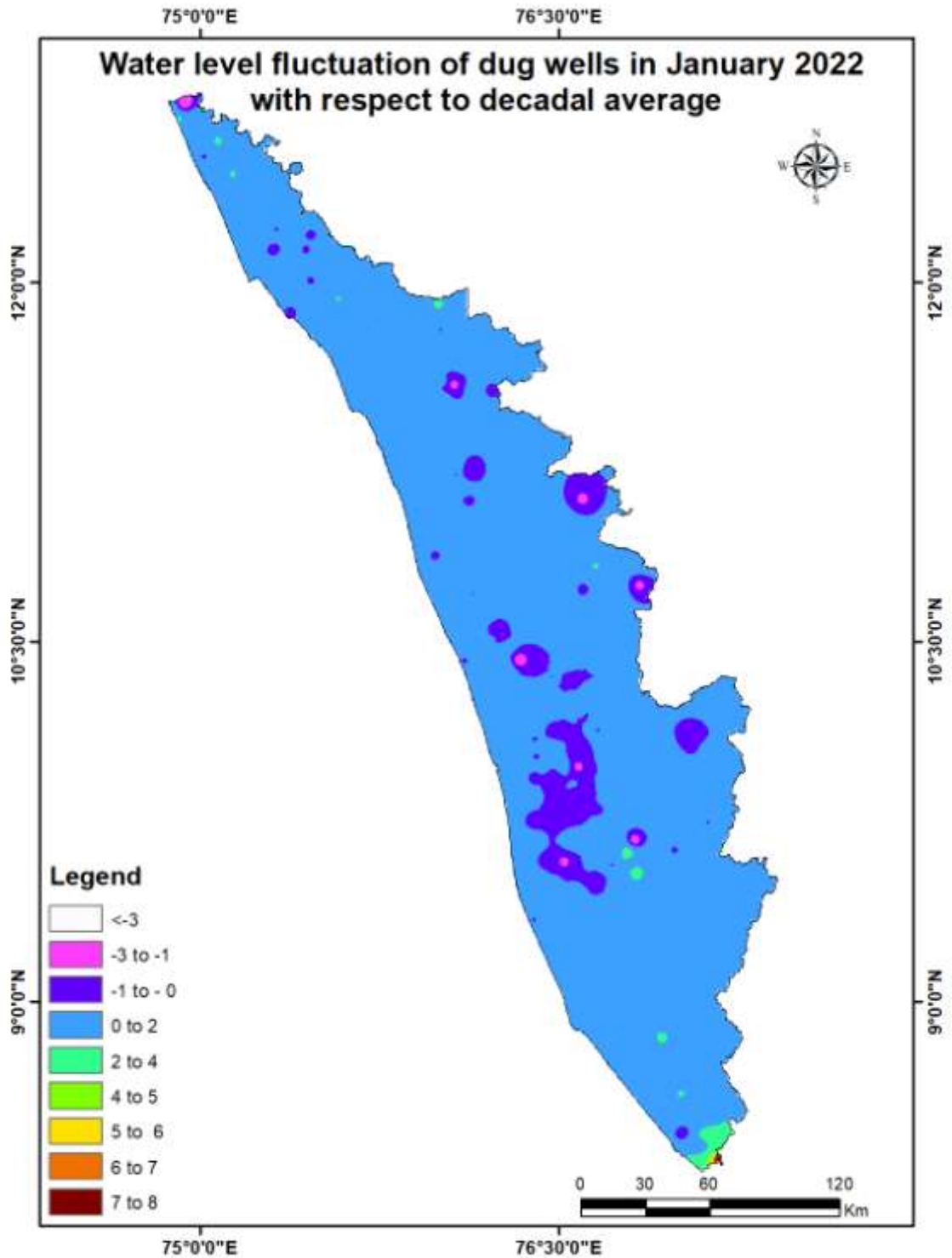


Fig:7. Comparison of water level in Dug wells during September 2021 wrt Decadal mean

Compared water level in the observation bore wells during January 2022 with that of the decadal mean. It has been noticed that 30% of bore wells (104 out of 345) show fall in water level, and 70% of the wells (241 out of 345) show marginal rise or no remarkable change in water level. Out of 30% of the bore wells shows a falling trend, 43% (45 out of 104) shows a fall in water level less than 0.5m. Table showing water level comparison of bore wells during January 2022 with respect to decadal mean is appended. (Annexure-III)

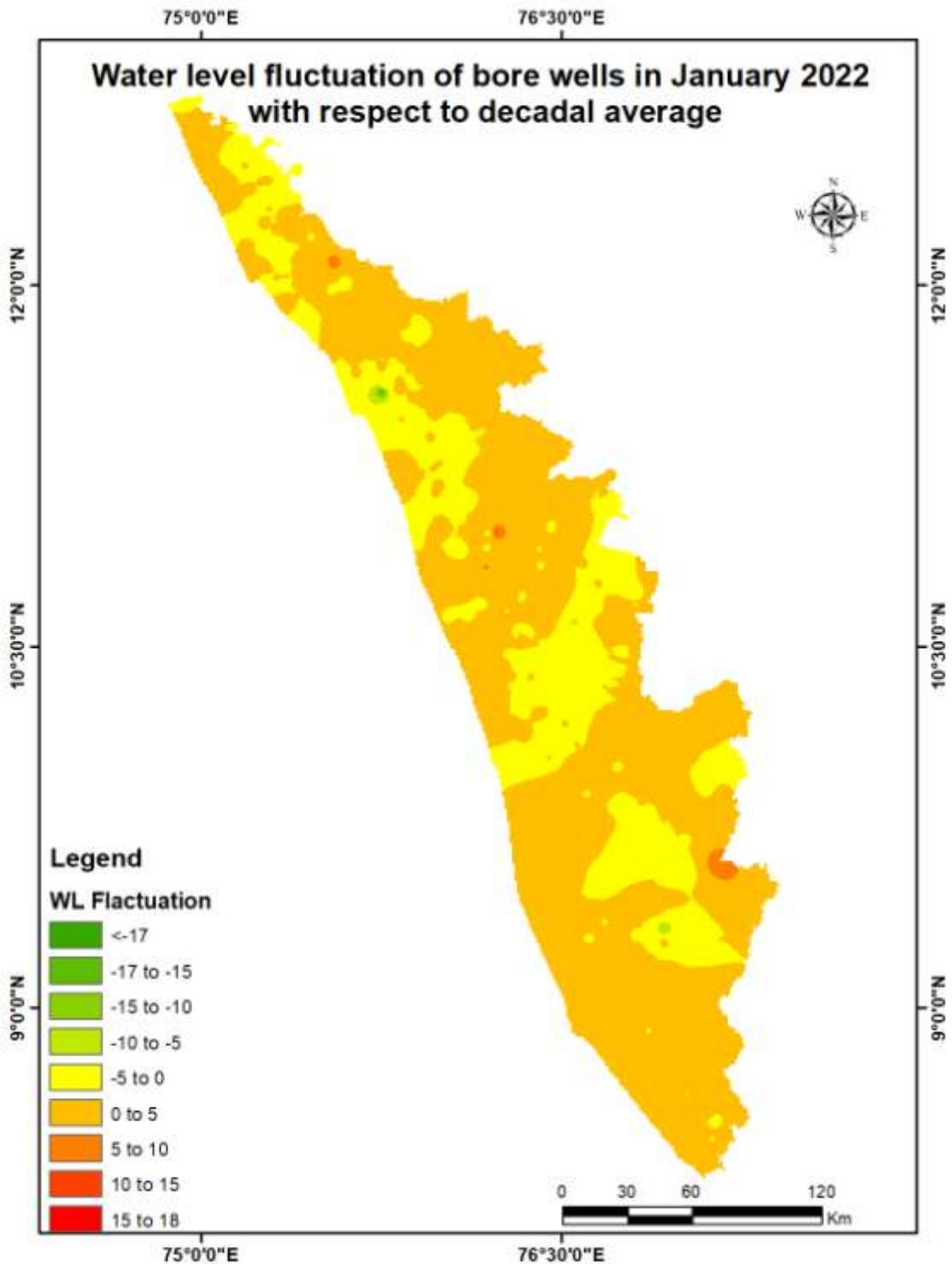


Fig:8. Comparison of water level in Bore wells during January 2022 wrt Decadal mean

Comparison of the water level in the observation tube wells during September 2021 with that of the decadal mean reveals that 13 % of tube wells (5 out of 40) recorded a falling trend and 87 % of the tube wells (35 out of 40) show marginal rise/no remarkable change in water level. Out of 13 % of the tube wells shows a falling trend, 60% of the tube wells (3 out of 5) show fall in water level less than 0.5m, 1 no well show fall in the range 0.5-1 m and 1 well show a fall in water level more than 2 m. Table showing water level comparison of tube wells during January 2022 with respect to decadal mean is appended. (Annexure-III)

IV. Drought Index for January 2022

Analysed the Drought Index of open wells in 14 districts. All the open wells in the state comes under Normal Groundwater deficit class (≥ -0.15) except few wells in Kottayam, Ernakulam, Thrissur, Palakkad, Wayanad and Kasargod. No wells comes under “Extreme” category. Details are appended (Annexure V)

Summary

Rainfall

- Actual Northeast monsoon Rain fall received in the state during 2021 (1 Oct to 31 December 2021) is 1026.3 mm. It is 109% Large excess from the Normal rainfall during the period which is 491.6
- The Northeast monsoon Rain fall received in the state during 2020 (1 Oct to 31 December 2020) is 365.3 mm .It is -26% Deficient from the Normal rainfall during the period which is 491.6 ..

Groundwater level

- The depth to groundwater level in the observation dug wells during the month of January 2022 range from a minimum of -0.75 m in E86 Kochi Corporation, Ernakulam to a maximum of 16.71 mbgl in KNR-POW-C8 Thalipparamba Kannur, in bore wells -0.68 m in tvm28 Vamanapuram, Thiruvananthapuram to a maximum of 45.19 mbgl in MPM174, Areekode, Malappuram and in the tubewells 0.71m in 08 Thrikkunnappuzha to a maximum of 33.01 mbgl in KLM/29 Sasthamkotta.
- Comparison of the water level in January 2022 with respect to the previous year, reveals that 37 % of observation dug wells (137 out of 374) , 35% of bore wells (122 out of 345) and 13% of tube wells (13 out of 39) recorded a falling

trend. Among all the 758 observation wells only 35.88% of wells (272nos) show declining trend. 61.39% of the observation wells with falling trend (167nos) show decline in water level less than 0.5 m.

- Comparison of groundwater level in January 2022 with respect to the decadal mean reveals that 14% of observation dug wells (54 out of 377), 30% of bore wells (104 out of 345) and 13% of tube wells (5 out of 40) recorded a falling trend. Among all the 762 observation wells only 21.39% of wells show declining trend. 50.9% of the observation wells with falling trend 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. Open wells showing decline of water level more than 2m are shown in Annexure IV. Fluctuation above 2m from January 2021 water level is noted in open wells no. Ktm-ow-3at Uzhavur, Kottayam, IDK08, Kattappana Municipality, Idukki, TSROW20Varandarappilly, Thrissur, PKD S-7, Chittur, Palakkad, 162, Vythiri, Wayanad and 208, Manjeshwaram, Kasaragod
- More than 2m Fluctuation from Decadal mean water level is noted in 2 open wells (TSROW20Varandarappilly, Thrissur, and 208, Manjeshwaram, Kasaragod District. These two wells show more than 2m fluctuation on comparison with the January 2021 also. Necessary Artificial recharge structures may be implemented to rise the water level.
- Drought index of open wells in each district other than Normal are attached (Annexure V). No wells come under “Extreme” category

Districtwise Observation well Frequency on January 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	30	1.24	12.88	TVM OW13, Corporation area , Thiruvananthapuram	TVM OW28,Kazhakkootam.	3	13	12	2	0
	Bore well	32	0.68	15.73	28,Vamanapuram,Thiruvananthapuram	25,Parassala,Thiruvananthapuram	3	5	17	7	0
	Tube well	4	2.67	8.31	36,Chirayinkeezhu,Thiruvananthapuram	37,Chirayinkeezhu,Thiruvananthapuram	0	1	3	0	0
Kollam	Dug well	24	1.06	10.22	OW-31,Neendakara,KOLLAM	KLM OW 24,Munroethuruthu,KOLLAM	3	7	13	1	0
	Bore well	16	0.98	8.97	KLM/6,Kottarakkara Municipality,KOLLAM	KLM/8, Kadakkal	1	2	13	0	0
	Tube well	8	2.35	33.01	KLM/17,Mayyanad,KOLLAM	KLM-31,Kollam Corporation,KOLLAM	0	1	2	2	3
Pathanamthitta	Dug well	78	0.72	10.70	10 Seethathode,Seethathode,PATHANAMTHITTA	20 Civil Station,Adoor Municipality,PATHANAMTHITTA	7	34	36	1	0
	Bore well	25	0.60	20.61	PTA/19, Erathu, Pathanamthitta	PTA/15,Chittar,PATHANAMTHITTA	2	8	12	2	1
Alappuzha	Dug well	20	0.01	10.93	OW-06 Pulinkunnu,Champakulam,Alappuzha	OW-02 Kattanam,Mavelikara,Alappuzha	10	7	2	1	0
	Bore well	2	2.88	4.43	36 Punthala,Chengannoor, Alappuzha	35 Pennukkara,Chengannoor ,Alappuzha	0	2	0	0	0
	Tube well	27	0.71	17.23	11 Cheriyannoor,Chengannoor,Alappuzha	04 Charumoodu,Bharanikavu ,Alappuzha	11	11	4	1	0

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Kottayam	Dug well	19	1.25	10.63	KTM-OW-23,Uzhavoor,Kottayam	KTM-OW-4_,Pallom,Kottayam	4	7	7	1	0
	Bore well	21	0.08	20.47	10, Uzhavur	03,Kanjirappally,Kottayam	4	6	8	2	1
Idukki	Dug well	20	0.63	7.95	75,Marayoor,Idukki	IDK08,Kattappana Municipality,Idukki	6	9	5	0	0
	Bore well	23	1.46	36.36	SO415,Udumbannoor,Idukki	SO428,Peermade,IDUKKI	1	7	7	6	2
Ernakulam	Dug well	38	0.75	9.27	E86,Kochi Corporation,ERNAKULAM	E95,Perumbavoor Municipality,Ernakulam	9	12	17	0	0
	Bore well	25	0.17	11.12	BW 101,Asamannur,ERNAKULAM	BW 116, Thrikkakkara Municipality	3	7	13	2	0
	Tube well	1	10.69	10.69	TW 01,Kochi Corporation,ERNAKULAM.	TW 01,Kochi Corporation,ERNAKULAM	0	0	0	1	0
Thrissur	Dug well	31	0.94	12.31	TSROW16,Talikkulam,Thrissur	TSROW12,Chowwannur,Thrissur	8	8	12	3	0
	Bore well	40	1.93	21.10	TSR124,Puzhakkal,Thrissur	TSR136,Kandanassery,Thrissur	1	7	18	12	2
Malappuram	Dug well	26	1.78	13.29	MPM.OW.18,Kondotty, Malappuram		1	10	11	4	0
	Bore well	30	1.27	45.19	MPM185, Nilambur	MPM174,Areekode,Malappuram	2	11	8	5	4
Palakkad	Dug well	31	0.83	9.87	PKD S-7,Chittur,Palakkad	PKD S-10,Sreekrishnapuram,Palakkad	1	18	12	0	0
	Bore well	33	1.27	20.33	160 PKD-12, Kuzhalmannam	157,Ottappalam,Palakkad	2	6	10	13	2
Kozhikkode	Dug well	17	1.78	11.05	KKDOW 019,Melady,Kozhikkode	QKKDO60,Thodannur,Kozhikkode	1	6	9	1	0
	Bore well	33	0.62	28.88	KKDPZ 197,Kozhikkode,Kozhikkode	KKDPZ 210,Kozhikkode (corporation),Kozhikkode	2	9	10	8	4
Wayanad	Dug well	26	0.20	11.05	SOW-	SOW-	5	6	14	1	0

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					10,Poothadi,WAYANAD	4,Nenmeni,WAYANAD					
	Bore well	19	1.80	21.67	WYD216,Muttill,WAYANAD	WYD223,Thirunelly,WAYANAD	1	2	7	8	1
Kannur	Dug well	36	0.88	16.71	KNR-POW-C23,Koothuparamba,Kannur	KNR-POW-C8,Taliparamba,Kannur	6	7	18	5	0
	Bore well	27	1.36	23.67	KNRPz239,Taliparamba,Kannur	KNRPz240, Edakkad	1	5	8	11	2
Kasaragod	Dug well	46	2.38	15.45	199,Kanhangad,Kasaragod	200,Karadka,Kasaragod	0	7	26	13	0
	Bore well	21	3.38	24.17	PZKGD241,Parappa,Kasaragod	PZKGD242,Karadka,Kasaragod	0	1	8	11	1

Comparison of Water level January 2022 with respect to January 2021 **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	31	Rise	31	6	8	10	3	4
			Fall	0	0	0	0	0	
	Bore well	37	Rise	35	8	11	12	1	3
			Fall	2	1	1	0	0	
	Tube well	4	Rise	4	0	2	2	0	0
			Fall	0	0	0	0	0	
Kollam	Dug well	24	Rise	22	12	6	3	0	1
			Fall	2	2	0	0	0	
	Bore well	16	Rise	16	10	5	0	1	0
			Fall	0	0	0	0	0	
	Tube well	8	Rise	6	1	1	3	0	1
			Fall	2	2	0	0	0	
Pathanamthitta	Dug well	14	Rise	8	6	2		0	0
			Fall	6	6	0	0	0	

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	Bore well	25	Rise	15	9	1	4	0	1
			Fall	10	8	0	0	1	1
Alappuzha	Dug well	19	Rise	7	7	0	0	0	0
			Fall	12	11	1	0	0	0
	Bore well	2	Rise	1	1	0	0	0	0
			Fall	1	1	0	0	0	0
	Tube well	26	Rise	15	11	3	1	0	0
			Fall	11	9	1	0	1	0
Kottayam	Dug well	19	Rise	5	2	0	1	0	2
			Fall	14	6	3	4	0	1
	Bore well	21	Rise	8	6	0	2	0	0
			Fall	13	7	0	2	0	4
Idukki	Dug well	19	Rise	10	9	0	1	0	0
			Fall	9	7	0	1	0	1
	Bore well	23	Rise	15	8	5	0	0	2
			Fall	8	4	0	1	0	3
Ernakulam	Dug well	38	Rise	14	10	3	1	0	0
			Fall	24	9	11	1	3	0
	Bore well	23	Rise	7	5	1	0	0	1
			Fall	16	7	7	1	1	0
	Tube well	1	Rise	1	1	0	0	0	0
			Fall	0	0	0	0	0	0
Thrissur	Dug well	31	Rise	21	18	2	0	1	0
			Fall	10	6	1	1	1	1
	Bore well	37	Rise	24	9	3	4	2	6
			Fall	13	7	4	0	1	1
Malappuram	Dug well	26	Rise	18	13	2	2	1	0
			Fall	8	5	3	0	0	0
	Bore well	30	Rise	17	12	1	0	0	4
			Fall	13	8	1	0	1	3

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Palakkad	Dug well	31	Rise	24	17	7	0	0	0
			Fall	7	4	2	0	0	1
	Bore well	32	Rise	20	11	3	5	0	1
			Fall	12	6	4	0	0	2
Kozhikkode	Dug well	16	Rise	12	9	3	0	0	0
			Fall	4	2	2	0	0	0
	Bore well	33	Rise	18	14	2	2	0	0
			Fall	15	9	3	1	0	2
Wayanad	Dug well	26	Rise	18	11	3	1	1	2
			Fall	8	4	2	0	1	1
	Bore well	18	Rise	17	12	2	2	1	0
			Fall	1	1	0	0	0	0
Kannur	Dug well	36	Rise	22	17	3	2	0	0
			Fall	14	13	1	0	0	0
	Bore well	28	Rise	18	12	4	1	1	0
			Fall	10	4	5	0	0	1
Kasaragod	Dug well	44	Rise	25	15	7	2	1	0
			Fall	19	16	1	1	0	1
	Bore well	20	Rise	12	7	1	2	0	2
			Fall	8	2	1	3	1	1

Comparison of Water level January 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	30	7	12	4	2	5
			Fall	1	0	1	0	0	
	Bore well	34	Rise	30	12	7	6	1	4
			Fall	4	3	0	1	0	0
	Tube well	4	Rise	3	1	0	2	0	0
			Fall	1	1	0	0	0	0
Kollam	Dug well	24	Rise	24	8	9	4	2	1
			Fall	0	0	0	0	0	0
	Bore well	16	Rise	13	10	1	0	2	0
			Fall	3	3	0	0	0	0
	Tube well	8	Rise	7	2	1	1	0	3
			Fall	1	0	1	0	0	0
Pathanamthitta	Dug well	14	Rise	13	12	1	0	0	0
			Fall	1	1	0	0	0	0
	Bore well	25	Rise	21	9	5	2	1	4
			Fall	4	2	0	0	0	2
Alappuzha	Dug well	19	Rise	17	11	6	0	0	0
			Fall	2	2	0	0	0	0
	Bore well	2	Rise	1	0	1	0	0	0
			Fall	1	1	0	0	0	0
	Tube well	27	Rise	25	13	9	2	1	0
			Fall	2	1	0	0	0	1
Kottayam	Dug well	19	Rise	9	4	2	1	0	2
			Fall	10	6	1	2	1	0
	Bore well	21	Rise	11	7	2	0	1	1
			Fall	10	6	0	3	0	1

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Idukki	Dug well	20	Rise	17	11	3	1	2	0
			Fall	3	2	1	0	0	0
	Bore well	23	Rise	17	8	4	1	1	3
			Fall	6	1	0	2	1	2
Ernakulam	Dug well	38	Rise	26	22	1	3	0	0
			Fall	12	8	3	0	1	0
	Bore well	23	Rise	16	13	3	0	0	0
			Fall	7	4	2	0	0	1
	Tube well	1	Rise	0	0	0	0	0	0
			Fall	1	1	0	0	0	0
Thrissur	Dug well	31	Rise	27	20	7	0	0	0
			Fall	4	2	0	1	0	1
	Bore well	37	Rise	22	8	5	4	4	1
			Fall	15	4	6	2	2	1
Malappuram	Dug well	26	Rise	21	11	8	2	0	0
			Fall	5	4	1	0	0	0
	Bore well	30	Rise	19	10	5	0	1	3
			Fall	11	2	3	1	1	4
Palakkad	Dug well	31	Rise	28	13	12	0	2	1
			Fall	3	0	1	2	0	0
	Bore well	33	Rise	22	4	4	4	1	9
			Fall	11	5	1	1	1	3
Kozhikkode	Dug well	17	Rise	17	7	8	2	0	0
			Fall	0	0	0	0	0	0
	Bore well	33	Rise	19	11	6	1	0	1
			Fall	14	7	3	0	2	2
Wayanad	Dug well	26	Rise	22	9	6	4	2	1
			Fall	4	2	1	0	1	0
	Bore well	19	Rise	18	8	7	0	3	0
			Fall	1	0	0	1	0	0

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Kannur	Dug well	36	Rise	29	17	7	3	1	1
			Fall	7	7	0	0	0	0
	Bore well	28	Rise	20	10	7	0	1	2
			Fall	8	4	1	0	1	2
Kasaragod	Dug well	45	Rise	43	26	11	2	1	3
			Fall	2	1	0	0	0	1
	Bore well	21	Rise	12	5	5	1	1	0
			Fall	9	3	2	2	1	1

List of open wells showing more than 2m fluctuation in January - 2022 wrt January - 2021 and Decadal Average

Water Level Data & Fluctuation more than 2 m															
SN o	District	Block	GP/Municip ality/Corpor ation	WellNo	Well_ Type	Latitude(°)	Longitud e(°)	Dec- 2021	Dec- 2020	Dec- 2019	Decadal Avg(2011- 2020)		Fluctuation in Dec-2021 wrt.		
											WL	Yrs	Dec- 2020	Dec- 2019	Decadal Avg
1	IDUKKI	Kattappan a	Kattappana Municipality	IDK08	Dug Well	9.74528	77.11750	7.950	4.630	9.000	7.713	10	-3.320	1.050	-0.237
2	Kottaya m	Changana ssery	Uzhavoor	Ktm-ow- 3	Dug Well	9.50417	76.65528	6.920	4.590	5.960	5.875	10	-2.330	-0.960	-1.045
3	Thrissur	Kodakara	Varandarap pilly	TSROW2 0	Dug Well	10.42347	76.33169	8.600	4.370	6.640	6.331	10	-4.230	-1.960	-2.269
4	Palakka d	Chittur	Chittur	PKD S-7	Dug Well	10.73667	76.83334	3.680	0.890	0.950	2.345	10	-2.790	-2.730	-1.335
5	WAYAN AD	Kalpetta	Vythiri	162	Dug Well	11.57316	76.05847	6.800	4.740	7.230	5.145	9	-2.060	0.430	-1.655
6	Kasarag od	Manjeshw aram	Manjeshwar	208	Dug Well	12.75139	74.93333	10.400	7.490	7.460	7.468	9	-2.910	-2.940	-2.932

Groundwater level comparison report – January 2022

Ground Water Drought Index for the period Jan-2022 (other than Normal)												
SN o	District	Block	GP/Municipality/Corporation	WellNo	Well_Type	Latitude(°)	Longitude(°)	Max Depth(m) to WL in Jan (2012-2021)	Mean Depth(m) to WL (2012-2021)	WL Depth in Jan-2022	Ground Water Drought Index Jan-2022	Ground Water Deficit Class
1	Kottayam	Meenac hil	Erattupetta	KTM-OW-11	Dug Well	9.67222	76.81445	3.730	1.943	3.730	-0.48	Severe
2	Kottayam	Meenac hil	Uzhavoor	KTM-OW-23	Dug Well	9.80944	76.57750	2.230	1.399	2.230	-0.37	Moderate
3	Kottayam	Vaikom	Kaduthuruthy	KTM-OW-12	Dug Well	9.75944	76.49250	2.150	1.291	1.630	-0.16	Mild
4	ERNAKULAM	Muvattupuzha	Muvattupuzha Municipality	E80	Dug Well	9.97967	76.57984	6.860	5.193	6.840	-0.24	Mild
5	Thrissur	Kodakara	Varandarappilly	TSROW20	Dug Well	10.42347	76.33169	8.600	6.331	8.600	-0.26	Mild
6	Thrissur	Thrissur	Puzhakkal	TSROW2	Dug Well	10.53333	76.26222	6.940	4.633	5.750	-0.16	Mild
7	Palakkad	Chittur	Chittur	PKD S-7	Dug Well	10.73667	76.83334	3.950	2.345	3.680	-0.34	Moderate
8	Palakkad	Mannarkad	Attappady	OW137	Dug Well	11.09472	76.59583	4.980	3.774	4.980	-0.24	Mild
9	WAYANAD	Kalpetta	Vythiri	162	Dug Well	11.57316	76.05847	7.230	5.145	6.800	-0.23	Mild
10	Kasaragod	Manjeshwaram	Manjeshwar	208	Dug Well	12.75139	74.93333	10.400	7.468	10.400	-0.28	Mild

Groundwater level comparison report – January 2022

Observation well frequency on January 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	442	-	16.71	E86,Kochi Corporation,ERNAKULAM	KNR-POW-C8,Taliparamba,Kannur	64	151	194	33	0
						14.48%	34.16%	43.89%	7.47%	0.00%
Bore well	347	-	45.19	28,Vamanapuram, Thiruvananthapuram	MPM174,Areekode,Malappuram	23	78	139	87	20
						6.63%	22.48%	40.06%	25.07%	5.76%
Tube well	40	0.71	33.01	08 Thrikkunnappuzha, Chengannoor,Alappuzha	KLM/29,Sasthamkotta,KOLLAM	11	13	9	4	3
						27.50%	32.50%	22.50%	10.00%	7.50%

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
374	Rise	237	152	46	23	7	9
	%	63%	64%	19%	10%	3%	4%
	Fall	137	91	27	8	5	6
	%	37%	66%	20%	6%	4%	4%
345	Rise	223	124	39	34	6	20
	%	65%	56%	17%	15%	3%	9%
	Fall	122	65	26	8	5	18
	%	35%	53%	21%	7%	4%	15%
39	Rise	26	13	6	6	0	1
	%	67%	50%	23%	23%	0%	4%
	Fall	13	11	1	0	1	0
	%	33%	84%	8%	0%	8%	0%

Comparison of Water level January 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	377	Rise	323	178	93	26	12	14
		%	86%	55%	29%	8%	4%	4%
		Fall	54	35	9	5	3	2
		%	14%	65%	17%	9%	6%	4%
Bore well	345	Rise	241	115	62	19	17	28
		%	70%	48%	26%	8%	11%	20%
		Fall	104	45	18	13	9	19
		%	30%	43%	17%	13%	9%	18%
Tube well	40	Rise	35	16	10	5	1	3
		%	88%	46%	28%	14%	3%	9%
		Fall	5	3	1	0	0	1
		%	12%	72%	14%	0%	0%	14%