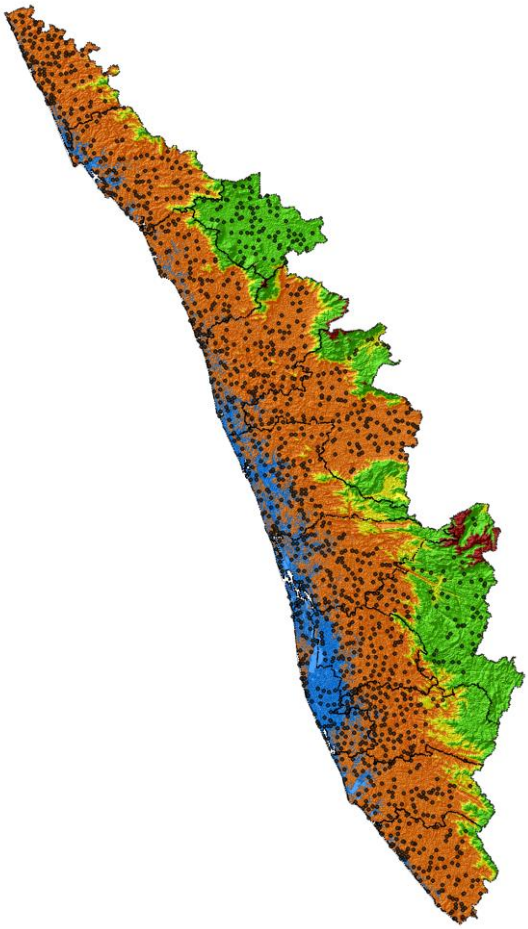
TECHNICAL REPORT SERIES

GOVERNMENT OF INDIA
MINISTRY OF JALSHAKTI
CENTRAL GROUND WATER BOARD

GROUND WATER YEAR BOOK OF KERALA (2018-2019)



KERALA REGION
THIRUVANANTHAPURAM

SEPTEMBER 2019

GROUND WATER YEAR BOOK OF KERALA
(2018-2019)

Table of Contents

List of Tables

List of Figures

Annexures

FOREWORD

Ground water is an important source of water for meeting the drinking, agricultural and industrial needs in India. Over the last few decades, the use of ground water in the country has increased manifold, exerting pressure on the limited resources available and threatening their long-term sustainability in many places. Kerala, though blessed with copious rainfall and abundant surface water resources, depends heavily on the limited ground water resources to meet its drinking and domestic water requirements, especially in the rural habitations. In the recent past, scarcity of drinking water resources during summer months is being faced by several habitations in the State with increasing regularity.

Kerala State has limited ground water development prospects owing to the largely undulating topography and predominance of crystalline rocks devoid of any primary porosity. Increasing demand of fresh water resources due to change in life styles, agricultural practices and urbanisation has resulted in increasing stress on the ground water regime in several areas of the State. Contamination of ground water resources from natural and anthropogenic sources is also emerging as a major threat to the sustainability of ground water resources in many areas. Anticipated impact of impending climate change and sea level rise also has the potential to change the ground water regime in the State. Scientific management of ground water resources of the State has become imperative to ensure prevention of further ground water depletion and contamination and to ensure its long-term sustainability.

To build a realistic ground water management strategy, assessment of ground water availability and its quality is a pre-requisite. With this in view, Central Ground water Board has established a network of Ground Water Monitoring Wells (GWMW) tapping different aquifers in the State. Presently, there are 1668 GWMW in Kerala State, out of which 1402 are dug wells tapping phreatic aquifers and 266 are bore wells /tube wells tapping deeper semi-confined/confined aquifers, which are monitored four times a year. The document “Ground Water Year Book Kerala (2018-19)” is a compilation of water level and water quality data collected from these wells during 2018-19. The behaviour of water level during the four monitoring periods and their fluctuations – both seasonal and long term, have been analysed and included in this report. Besides this, behaviour of piezometric heads of deeper aquifers in hard rock as wells as in sedimentary aquifers have also been discussed. The chapter on Hydrochemistry brings out the ground water quality of water samples collected from the wells tapping the phreatic aquifer.

The efforts of the Officers of CGWB, Kerala Region, Thiruvananthapuram in collecting the data and the meticulous work done by the team of officers comprising Dr. N. Vinayachandran, Scientist-D, Shri M. Santhana Subramani Scientist- C, Shri Sreehari Sarangan, AHG, Shri. Roopesh Krishana Sc-B, and Dr. Aneeshkumar, Astt Chemist. in compiling this document deserve appreciation. I hope this compilation will be of use to planners, policy makers and stakeholders in the field of ground water in Kerala.

Thiruvananthapuram,
September 2019.

(Dr. K.R.Sooryanarayana)
Regional Director (I/C)

1. Introduction

The awareness among the public about the importance of the groundwater has increased during the recent years. The need for groundwater being felt by all sectors because of the shortage of surface water sources to mitigate the growing needs of the society. Recently the problems of decline in water table, contamination of groundwater, seawater intrusion etc are being reported at many places. The shortage of rainfall in recent years and the increased utilisation of ground water caused concern among the public that water may become scarce commodity in future. In order to assess the real situation of ground water conditions, it is very essential to monitor the groundwater level and water quality over time and space. Central Ground Water Board is monitoring water level and quality through a network of Ground Water Monitoring Wells distributed throughout the State. The monitoring started from the year 1969 for nine monitoring wells and the numbers of monitoring wells were increased during the subsequent years and became 224 by the year 1979 and the number became 460 by the year 1988. Presently the total number of Ground Water Monitoring Wells (GWMWs) through out the Kerala State is 1668. Water level is being monitored four times a year during January, April, August and November months and water quality is being monitored from the water samples collected from GWMWs during April.

Kerala State is a narrow stretch of land covering 38863 sq.km area bordering the Lakshadweep Sea on the western side and Tamil Nadu and Karnataka States on the eastern side. The length of the State from north to south is 560 km and the average width is 70 km. with a maximum of 125 km. It lies between North latitudes $08^0$18’ and $12^0$48’ and East longitudes $74^0$52’ and $77^0$22’.

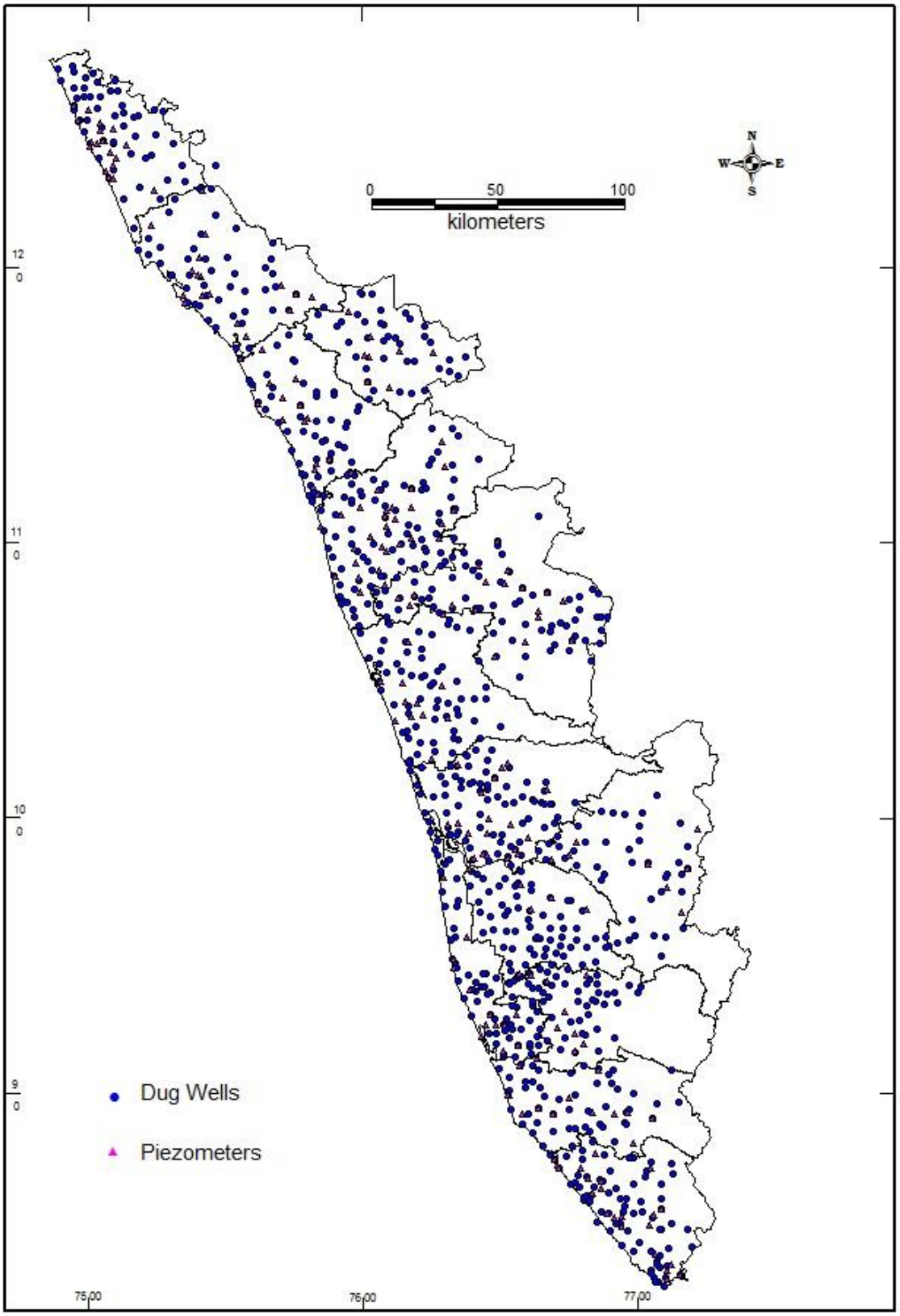
The total number of GWMWs as on 31.3.2019 is 1668. Out of these, 1402 are dug wells tapping phreatic aquifers and 266 are borewells /tubewells tapping deeper aquifers of confined / semi-confined nature. These GWMWs are spread over all the physiographic divisions of the State. About 62% of the GWMWs fall in the midland region, 18% in coastal plains, 15% in highlands and 5% in Plateau region. Among the GWMWs tapping phreatic aquifer, 65% are tapping laterite, 17% tapping weathered and fractured crystallines, 15% tapping coastal alluvium and 3% tapping riverine alluvium. The data

of these GWMWs was analyzed to understand the depth to water level scenario in the State, annual fluctuation in the water levels due to the monsoon recharge, long term trend in water levels and the nature of the quality of ground water and the salient features are brought out in this report. Maps of depth to water level, water level fluctuation with respect to April and decadal mean are prepared using the data of GWMWs tapping phreatic aquifer. Some hydrographs representing phreatic, semi-confined and confined aquifers in sedimentary and hard rock aquifers are also incorporated in this report. The district wise break-up of GWMWs are compiled (Table 1.1) and locations are shown in Fig.1.1. The water level data collected during the year 2018– 19 of GWMWs (dug wells) are given in Annexure-I. The hydro-chemical data of water samples collected during April 2018 are given in Annexure- II.

Table 1.1: District wise breakup of GWMWs in Kerala State as on 31-03-2019

#	Name of district	No. of GWMW as on 31-03-2019			Density GWMW/ km^2
		Dug wells	Piezometers	Total	
1.	Thiruvananthapuram	114	22	136	12.1
2.	Kollam	108	20	128	12.4
3.	Pathanamthitta	82	14	96	11.1
4.	Alappuzha	81	22	103	12.6
5.	Kottayam	99	8	107	19.2
6.	Idukki	69	8	77	31
7.	Ernakulam	123	18	141	15.1
8.	Thrissur	120	20	140	13.7
9.	Palakkad	120	42	162	18.0
10.	Malappuram	121	22	143	17.3
11.	Kozhikode	84	20	104	18.2
12.	Wayanad	75	9	84	15.5
13.	Kannur	100	16	116	20.8
14.	Kasaragod	106	25	131	14.5
Total		**1404**	**268**	**1668**	

Fig. 1.1: Location of Monitoring Wells in Kerala



2. Hydrogeology

The occurrence and movement of ground water is mainly controlled by factors like physiography, geological setting, etc and are described in the following paragraphs.

2.1 Physiography

Physiographically the State is divided into three major units viz. the coastal plains, the midlands and the hill ranges. The coastal plains have an elevation of less than 7.6m whereas the elevation of the midland ranges from 7.6 to 76 m and that of the hill ranges is more than 76 m above mean sea level (amsl). Along the hill ranges two distinct plateau regions are seen, the important being the Wayanad plateau, which covers major part of Wayanad district, the general elevation of which is above 700 m amsl. The other plateau is the Munnar plateau in Idukki district, the elevation of which is about 1000 m amsl.

2.2 Geology

Geologically 88% of the State is underlain by crystalline rocks of Archaean age, which is a part of the peninsular shield. The crystalline complex of Kerala is composed of charnockites, gneisses, schists, migmatites and rocks of the Wayanad supracrustals. Along the western portion of the State the crystalline rocks are overlain by the sedimentary formations of Tertiary age and Recent alluvial formations. The Tertiary sequence of formations have been divided into four beds viz. Alleppey, Vaikom, Quilon and Warkalli, the age of which ranges from Eocene to Lower Miocene. Laterites of Sub-recent age derived from the crystallines as well as sedimentary formations are seen all along the midlands. Along the coastal plains, sedimentaries and laterites are overlain by alluvium of Recent age. The geological succession in Kerala is given in Table 2.1.

Table 2.1: Regional Geological Setting of Kerala

Age	Formation	Lithology
Recent	Alluvium	Sand, clay, riverine alluvium etc. and flood plain deposits of Kuttanad area
Sub-Recent	Laterite	Derived from crystalline and sedimentary rocks
Tertiary	Warkalli	Sand stone, clays with lignite seams
	Quilon	Limestone, marl and clay
	Vaikom	Sandstone with pebbles and gravel beds, clay and lignite
	Alleppey	Carbonaceous clay and fine sand
Undated	Intrusives	Dolerite, Gabbro, Granites, Quartzo-feldspathic Veins
Archaean	Wayanad group	Granitic gneiss and Schists
	Charnockites	Charnockites and associated rocks
	Khondalites	Khondalites suite of rocks and its associates

2.3 Occurrence of Groundwater

Ground water occurs under phreatic, semi-confined and confined conditions in the above formations. The weathered crystallines, laterites and alluvial formations form the major phreatic aquifers, whereas the deep fractures in the crystallines and the granular zones in the Tertiary sedimentary formations form the semi-confined and confined aquifers.

Thick zones of weathered crystallines are seen along midland region. The depth to water level in the weathered crystallines in the midland area ranges from 3 to 16 mbgl. The midland area sustains medium capacity dug wells for irrigation. Along the hill ranges, the crystalline rocks are covered by thin weathered zone. Mostly dug wells that can cater to domestic needs are feasible along topographic lows. Bore wells tapping deeper fracture aquifer are feasible along potential fractures in the midland and hill ranges. Potential fractures are seen down to 240 mbgl and the most productive zone lies between 60 and 175 mbgl and the discharge of bore wells range between 36,000 and 1,25,000 lph. Of the four Tertiary beds, the two beds viz. the Vaikom and Warkalli form potential aquifers. The oldest Alleppey beds contain brackish water as inferred from electrical logs, whereas the Quilon beds are poor aquifers. The Vaikom aquifer is seen all along the coast between Quilon and Ponnani and the piezometric surface ranges from 1 to 18 m above msl. The aquifer is extensively developed between Quilon and Kayamkulam. The aquifer contains fresh water south of Karuvatta in Alleppey district and also in isolated pockets in Ernakulam district. The annual flow in the aquifer is computed as 43 MCM, of which 10 MCM is brackish. The Warkalli aquifer is seen south of Cochin. The piezometric head in the aquifer varies from 2.6 m above msl to 10

m below msl. The aquifer is largely developed in and around Alleppey. The annual flow in the aquifers is computed as 63 MCM and the draft is around 22 MCM.

Laterites are the most widely distributed lithological unit in the State and the thickness of the formation varies from a few meters to about 30m. The depth to water level in the formation ranges from less than a meter to 25 mbgl. Laterite forms potential aquifers along valleys and can sustain medium duty irrigation wells with the yields in the range of 0.5 - 6 m^3 per day.

The alluvium forms potential aquifer along the coastal plains and ground water occurs under phreatic and semi-confined conditions in this aquifer. The thickness of this formation varies from few meters to above 100 m and the depth to water level ranges from less than a meter to 6 mbgl. Filter point wells are feasible wherever the saturated thickness exceeds 5 m.

3. Rainfall distribution in Kerala during 2018-19

3.1 Introduction

Rainfall is the major source of ground water recharge and the rainfall pattern plays an important role on the water levels in the phreatic aquifers and in the deeper aquifers. The rainfall data received from India Meteorological Department, Thiruvananthapuramfor the period from April 2018 to March 2019 is analysed and discussed in this report.

3.2 Annual rainfall distribution

The total rainfall ranged from 1829 to 4852 mm during the period from April 2017 to March 2018. The maximum rainfall was recorded in Idukki district and the minimum in Thiruvananthapuram district. During the southwest monsoon season, Thiruvananthapuramdistrict recorded 1024 mm and Idukki district recorded 3794 mm, which are the lowest and highest rainfall respectively. During the northeast monsoon season, Kasaragod district recorded the lowest rainfall of 209 mm and Pathanamthitta district recorded the highest rainfall of 905 mm.

3.3 Monthly rainfall distribution

The monthly rainfall data for all the fourteen districts are given in Table 3.1. The state used to receive adequate rainfall during the months of June to September i.e. south-west monsoon in all the 14 districts. Almost, ten districts recorded with normal rainfall and four districts with deficient rainfall during the month of October to December due to the influence of north-east monsoon season.

3.4 Normal rainfall vs. actual rainfall

The actual rainfall during different seasons has been compared with the normal rainfall of the seasons to find out the variation of the rainfall and is discussed in detail in the following paragraphs.

3.4.1 Summer period

The seasonal rainfall and their percentage departure from normal rainfall are given in Table 3.2. During the months of April-May 2018, the departure of pre-monsoon rainfall varied from - 8 to 90 % in different districts. As per the IMD norms, three districts received large excess types of rainfall, seven districts received excess rainfall and remaining four districts were recorded with normal rainfall during this period. The maximum departure towards negative side was observed in Kollam district with a maximum deviation of - 8% from the normal. There is no scanty rainfall observed. The details are presented in Fig.3.1(a) and table. 3.2.

3.4.2 South-west monsoon period

During the southwest monsoon season from June to September 2018, the departure of rainfall in the districts varied from -19% to 57%. The maximum deficit rainfall recorded in Kasaragod district out of all fourteen rainfall districts. Record time for all the districts, seven districts recorded normal rainfall, six districts received excess rainfall and the one district received large excess rainfall as per IMD Classification. The details are given in Fig.3.1(b) and table.3.2.

3.4.3 North-east monsoon period

During the northeast monsoon season from October to December 2018, the departure of rainfall varied from -38 % to 49 % in different districts. The maximum departure towards deficient rainfall recorded in Kasaragod and Palakkad district. Seven Districts have recorded normal rainfall, only four districts recorded excess rainfall during this season, three districts recorded deficient type of rainfall. The details are presented in Fig.3.1(c) and table.3.2.

3.4.4 Winter period

During the months of January to March 2019, the departure of rainfall varied from -100 % to 2 %. The maximum departure towards large excess rainfall recorded in

Kasaragod district. Eight districts are recorded large deficient type of rainfall, three districts had been recorded deficient type rainfall during this season. Normal rainfall is observed in two districts during this winter season. 'No rain' is received in Kasaragod district in this season. This may be mainly recent development of climate. The details are presented in Fig.3.1(d) and table.3.2.

3.5 Seasonal rainfall contribution to the total rainfall of the year 2018-19

The seasonal rainfall contributions to the total rainfall in percentages are given in Table 3.3 and shown in Fig.3.1. The pattern shows that the southwest monsoon season's contribution is increasing from south to north and maximum in eastern part whereas, during the northeast monsoon season the rainfall is increasing from north to south. The other two seasons do not follow any specific pattern.

The rainfall during April and May contributes 9.89 % to 18.95 %, south-west monsoon season from June to September 55.95% to 81.38 %, north-east monsoon season from October to December 6.84 % to 24.43 % and January to March 0.0% to 142.1 % in different districts.

3.6 Comparison of 2018-19 rainfall with previous year rainfall

The rainfall in various seasons of 2018-19 has been compared with the previous year rainfall for the assessment of the change in the ground water regime. The details are given in the following paragraphs.

3.6.1 Summer season

The rainfall of April and May 2018 has been compared with the summer rainfall of 2017 and the departure is given in Table 3.4 and Fig.3.3. The departure in summer rainfall in the district varied from 373 % to -24.2 %. The negative departure is observed only in Kollam district and the remaining thirteen districts during the season received positive departure and the maximum positive departure is observed in Kasaragod district.

Comparatively, this summer season recorded excess rain rainfall than the previous year summer season.

3.6.2 Southwest monsoon season

The rainfall during June to September in 2018 has been compared with that in 2017 and the departure is given in Table 3.4 and Fig.3.3. The departure varied from -8.3 % to 85.7%. All districts recorded excess rainfall in comparison with the previous year southwest monsoon season except Kasaragod district. The average rainfall during the season is 2425 mm which is 71% of the annual rainfall.

3.6.3 Northeast monsoon season

The rainfall during October to December 2018 has been compared with that 2017 and the departure is given in Table 3.4 and Fig.3.3. The departure varied from -47 % to 82.3 %. Twelve districts recorded much excess rainfall in comparison with previous year northwest monsoon season and two districts viz. Thiruvananthapuram and Kollam Districts recorded less rainfall in comparison with previous year North east monsoon seasonal rainfall

3.6.4 Winter season

The rainfall during January to March of 2019 has been compared with the rainfall of January to March 2018 and the departure is given in Table 3.4 and Fig.3.3. The departure varied from -100 % to -4.2 %. During the winter season, No rain in Kasaragod District. Deficient to large deficient rainfall was recorded in remaining districts in comparison with the previous year winter season. Record time the state has received deficient rainfall during this season, and this may be mainly due to climate change.

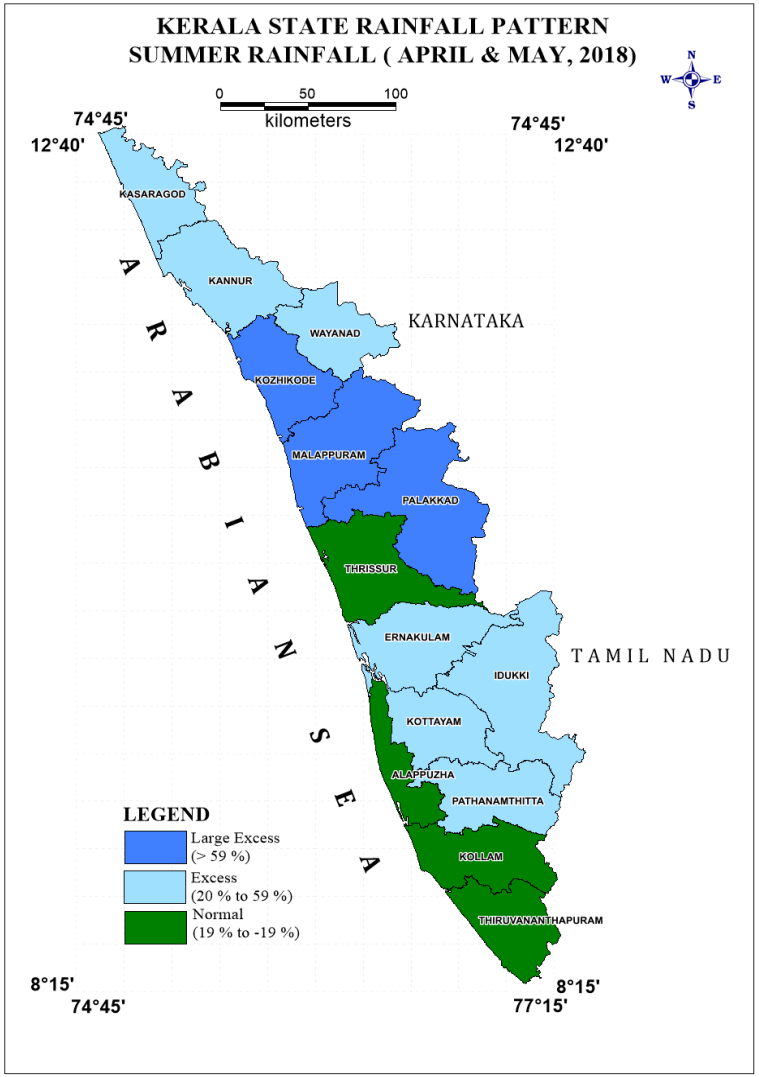


Fig 3.1(a): Depature of Rainfall from normal during April – May 2018

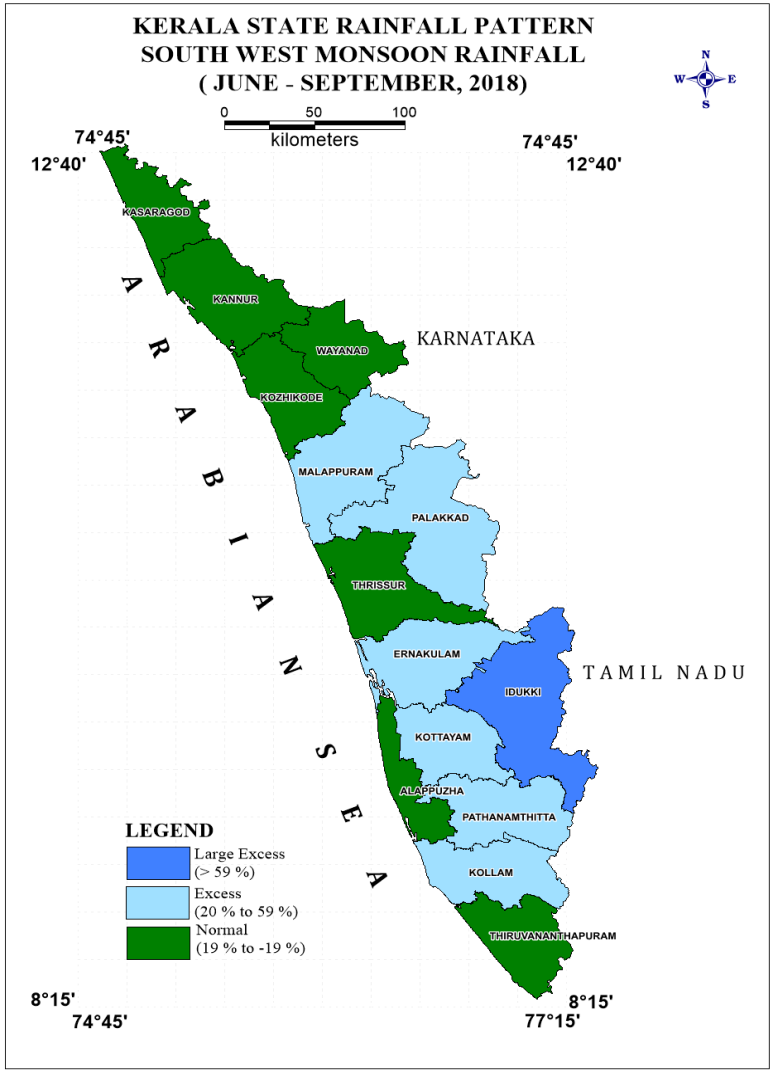


Fig 3.1(b): Depature of Rainfall from normal during June – September2018

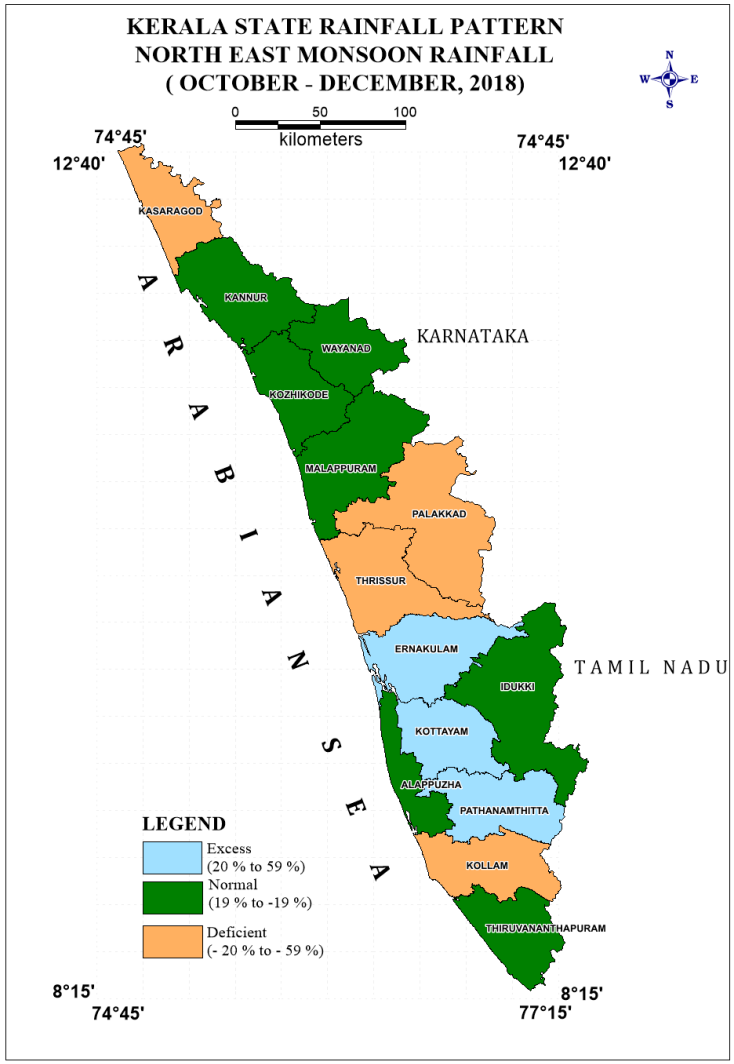


Fig 3.1(c): Depature of Rainfall from normal during October – Dec 2018

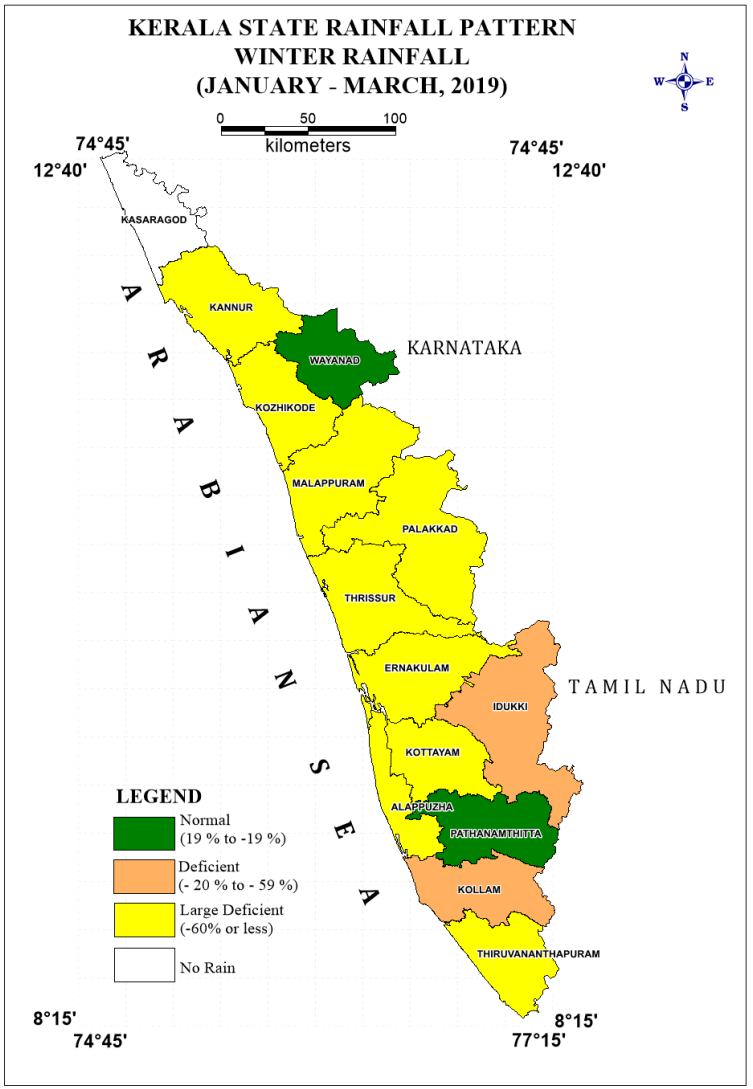


Fig 3.1(d): Depature of Rainfall from normal during Jan – Mar 2018

Table 3: Monthly Rainfall Distribution during 2018-19, mm

#	District	2018									2019			Total
		April	May	June	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	
1	Allapuzha	105.5	309.2	567.1	650.2	608.2	72.8	326.6	154.5	65.7	0	3	9.3	2872.1
2	Kannur	86.2	346.1	975.3	969.5	685.4	11.9	256	25.6	23	0	0	0.8	3379.8
3	Ernakulam	193.2	324.9	833.5	1044.2	648.4	63.1	402.7	246.9	56.6	0	6.5	4.55	3824.6
4	Idukki	134.8	356	806.4	1296	1478.9	212.4	325.6	194.3	6.5	3	22.9	15.8	4852.6
5	Kasaragod	81.9	331	972.4	780.9	636.9	36.1	145.9	42.4	20.2	0	0	0	3047.7
6	Kollam	128.3	246.7	459.2	485.4	644.1	117.7	317.9	163	22.4	0	17.8	65.3	2667.8
7	Kottayam	245.1	403.1	814.3	921.6	617.1	54.1	389.5	344.2	65.2	3	13.9	14.1	3885.2
8	Kozhikode	79	563	1081.8	1037.4	836	29.3	267.8	57.5	35	0	0	1.9	3988.7
9	Malappuram	105.4	403.6	860.8	888.4	914.5	59.9	277	110.9	13	0	0.4	2.8	3636.7
#	Palakkad	73.5	353.6	679.9	776.9	848.8	72.3	227.7	37.9	1.1	0	3.8	1.5	3077
#	Pathanamthitta	223.2	433.8	558.2	672	764.9	169.2	615.9	209.9	78.8	0	75.3	66.8	3868
#	Thiruvananthapuram	79	267.7	355.9	237.5	373.8	56.5	207.9	207.7	31.3	0	11.9	0.2	1829.4
#	Trichur	30.9	347.1	629.3	732.8	734.7	49.9	274.2	51.9	7.5	2.1	1.5	3.7	2865.6
#	Waynad	105.6	267.4	814.4	1089	1053.5	111.4	242.5	44.6	13.9	0	14.5	13.5	3770.3

IMD Classification

Large Excess: +60% and above, Excess: +20% to +59%, Normal: +19% to -19%, Deficient: -20% to -59%, Large Deficient: -60% or less, No rain: -100%

Table 3.2: Seasonal Rainfall, Normal Rainfall and the percentage Departure in 2018-19 in Kerala State

#	District	Summer Season			S.W. Monsoon Season			N.E. Monsoon Season			Winter season		
		2018			2018			2018			2019		
		April + May	Normal	% Dep	June to September	Normal	% Dep	October to December	Normal	% Dep	January to March	Normal	% Dep
1	Allapuzha	414.7	432.7	-4	1898.3	1745.9	9	546.8	572.1	-4	12.3	90.5	-86
2	Kannur	432.3	292.9	48	2642.1	2669	-1	304.6	345.1	-12	0.8	12.1	-93
3	Ernakulam	518.1	412.4	26	2589.2	2065	25	706.2	489.3	44	11.05	63.2	-83
4	Idukki	490.8	383	28	3793.7	2276.2	67	526.4	564.2	-7	41.7	79.1	-47
5	Kasaragod	412.9	264.5	56	2426.3	3007.5	-19	208.5	337.9	-38	0	11.7	-100
6	Kollam	375	407	-8	1706.4	1332.3	28	503.3	638.6	-21	83.1	113.8	-27
7	Kottayam	648.2	417.9	55	2407.1	1897.3	27	798.9	535.1	49	31	80.2	-61
8	Kozhikode	642	337.5	90	2984.5	2603.1	15	360.3	422.2	-15	1.9	21.3	-91
9	Malappuram	509	308.1	65	2723.6	2060.4	32	400.9	448.3	-11	3.2	18.3	-83
10	Palakkad	427.1	257.4	66	2377.9	1572.7	51	266.7	428	-38	5.3	31.9	-83
11	Pathanamthitta	657	479.6	37	2164.3	1715.7	26	904.6	624.2	45	142.1	138.9	2
12	Thiruvananthapuram	346.7	333.3	4	1023.7	871.3	17	446.9	522.7	-15	12.1	75.9	-84
13	Trichur	378	368.3	3	2146.7	2197.5	-2	333.6	469.4	-29	7.3	27.9	-74
14	Waynad	373	257.9	45	3068.3	2632.1	17	301	332.5	-9	28	30.6	-8

IMD Classification

Large Excess: +60% and above, Excess: +20% to +59%, Normal: +19% to -19%, Deficient: -20% to -59%, Large Deficient: -60% or less, No rain: -100%

Table 3.3: Seasonal Rainfall Distribution and their Percentage Contribution to Annual Rainfall (2018-19)

#	District	April & May		June to September		October to December		January to March		Annual rainfall
		2018		2018		2018		2019		
		Rainfall	%	Rainfall	%	Rainfall	%	Rainfall	%	mm
1	Allapuzha	414.7	14.44	1898.3	66.09	546.8	19.04	12.3	0.43	2872.1
2	Ernakulam	432.3	12.79	2642.1	78.17	304.6	9.01	0.8	0.02	3379.8
3	Idukki	518.1	13.55	2589.2	67.70	706.2	18.46	11.05	0.29	3824.6
4	Kannur	490.8	10.11	3793.7	78.18	526.4	10.85	41.7	0.86	4852.6
5	Kasaragod	412.9	13.55	2426.3	79.61	208.5	6.84	0	0.00	3047.7
6	Kollam	375	14.06	1706.4	63.96	503.3	18.87	83.1	3.11	2667.8
7	Kottayam	648.2	16.68	2407.1	61.96	798.9	20.56	31	0.80	3885.2
8	Kozhikode	642	16.10	2984.5	74.82	360.3	9.03	1.9	0.05	3988.7
9	Malappuram	509	14.00	2723.6	74.89	400.9	11.02	3.2	0.09	3636.7
10	Palakkad	427.1	13.88	2377.9	77.28	266.7	8.67	5.3	0.17	3077
11	Pathanamthitta	657	16.99	2164.3	55.95	904.6	23.39	142.1	3.67	3868
12	Thiruvananthapuram	346.7	18.95	1023.7	55.96	446.9	24.43	12.1	0.66	1829.4
13	Trichur	378	13.19	2146.7	74.91	333.6	11.64	7.3	0.25	2865.6
14	Waynad	373	9.89	3068.3	81.38	301	7.98	28	0.74	3770.3

IMD Classification

Large Excess: +60% and above, Excess: +20% to +59%, Normal: +19% to -19%, Deficient: -20% to -59%, Large Deficient: -60% or less, No rain: -100%

Table 3.4: Comparison of 2018-19 Seasonal Rainfall with the Previous Year Seasonal Rainfall of 2017-18

#	District	Summer Season April & May			S.W. Monsoon Season June to September			N.E. Monsoon Season October to December			Winter season January to March		
		2018 (mm)	2017 (mm)	% Dep	2018 (mm)	2017 (mm)	% Dep	2018 (mm)	2017 (mm)	% Dep	2019 (mm)	2018 (mm)	% Dep
1	Allapuzha	414.7	328.2	26.4	1898.3	1587.1	19.6	546.8	484.9	12.8	12.3	53.8	-77.1
2	Ernakulam	432.3	229.4	88.4	2642.1	2301.3	14.8	304.6	246.2	23.7	0.8	14.6	-94.5
3	Idukki	518.1	337.4	53.6	2589.2	2002.8	29.3	706.2	538.9	31.0	11.05	59.5	-81.4
4	Kannur	490.8	281.1	74.6	3793.7	2058.9	84.3	526.4	493.4	6.7	41.7	94.8	-56.0
5	Kasaragod	412.9	87.3	373.0	2426.3	2645.7	-8.3	208.5	180.1	15.8	0	30.8	-100.0
6	Kollam	375	494.5	-24.2	1706.4	1355.6	25.9	503.3	950	-47.0	83.1	122.8	-32.3
7	Kottayam	648.2	374.1	73.3	2407.1	1929	24.8	798.9	633.8	26.0	31	43.5	-28.7
8	Kozhikode	642	319.9	100.7	2984.5	2521.6	18.4	360.3	271.4	32.8	1.9	45.2	-95.8
9	Malappuram	509	149.5	240.5	2723.6	1928.2	41.3	400.9	343.8	16.6	3.2	25	-87.2
10	Palakkad	427.1	167.8	154.5	2377.9	1524	56.0	266.7	176.9	50.8	5.3	72.3	-92.7
11	Pathanamthitta	657	360.1	82.4	2164.3	1754	23.4	904.6	892.3	1.4	142.1	148.4	-4.2
12	Thiruvananthapuram	346.7	282.5	22.7	1023.7	764	34.0	446.9	667.3	-33.0	12.1	41.6	-70.9
13	Trichur	378	188.6	100.4	2146.7	1876	14.4	333.6	316.5	5.4	7.3	34.3	-78.7
14	Waynad	373	243.7	53.1	3068.3	1652	85.7	301	165.1	82.3	28	73.6	-62.0

IMD Classification

Large Excess: +60% and above, Excess: +20% to +59%, Normal: +19% to -19%, Deficient: -20% to -59%, Large Deficient: -60% or less, No rain: -100%

Fig. 3.2: Seasonal rainfall contribution to annual rainfall in percentage (2018-19)

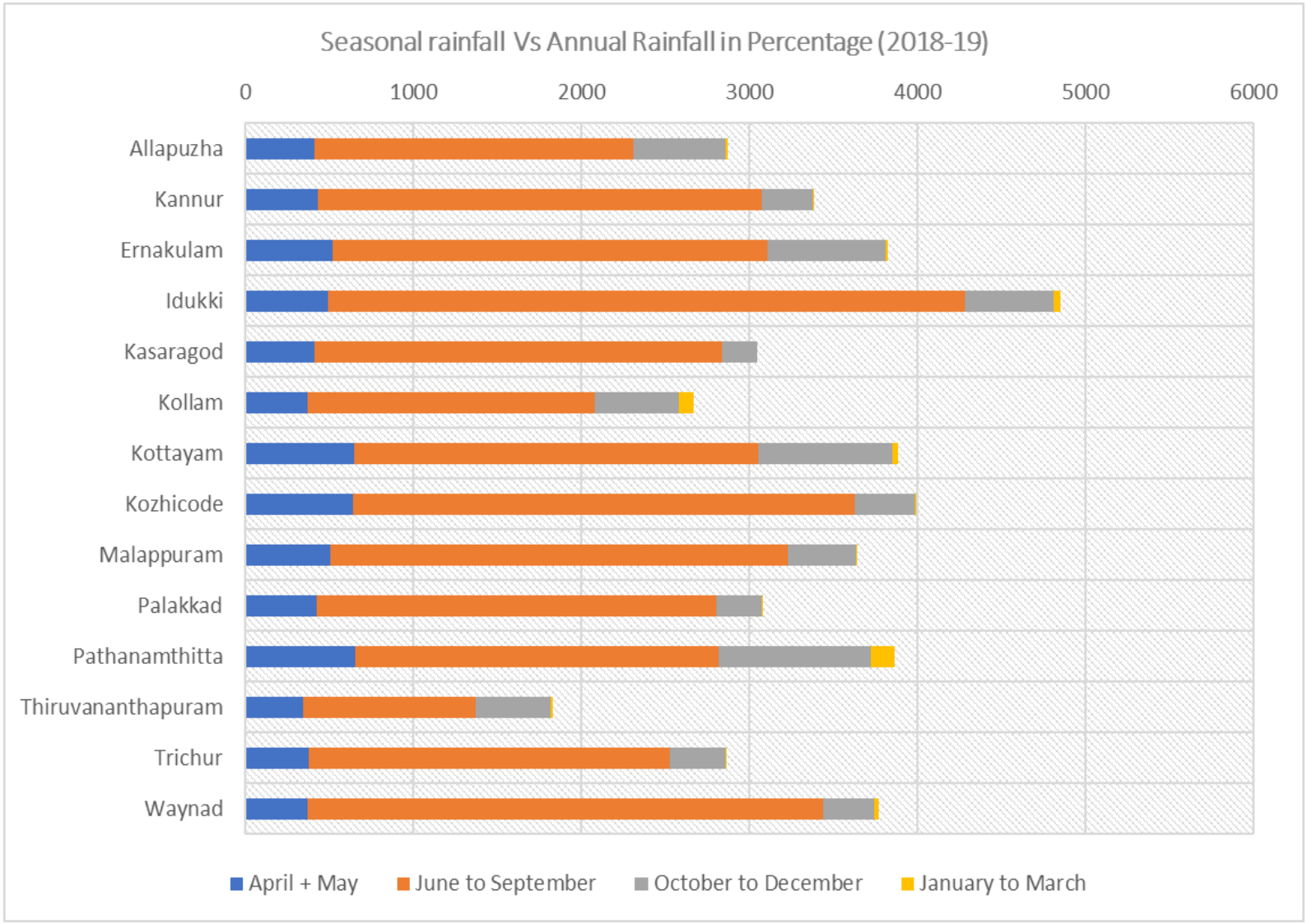
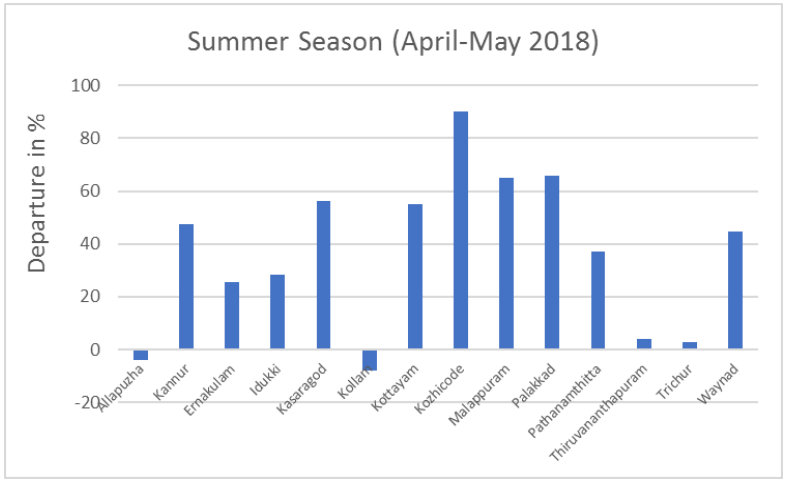
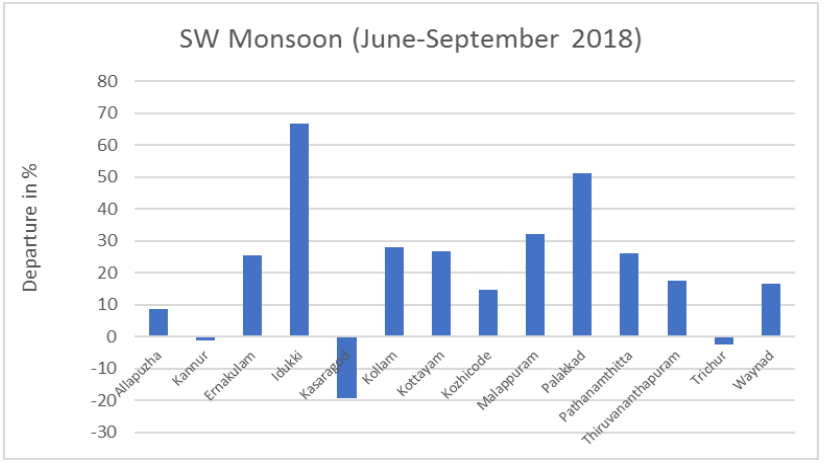
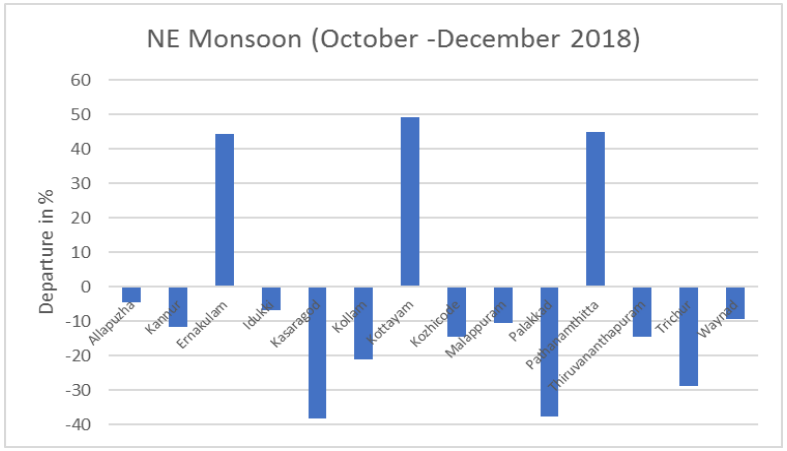


Fig.3.3 Seasonal Rainfall Departure from its Normal during the period 2018-19







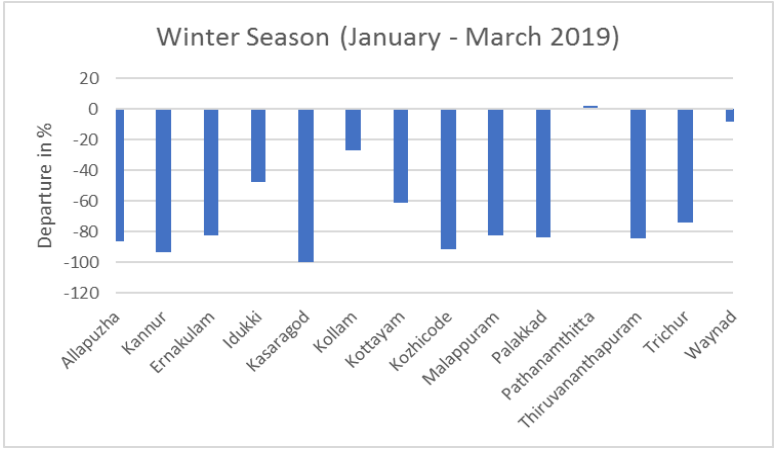
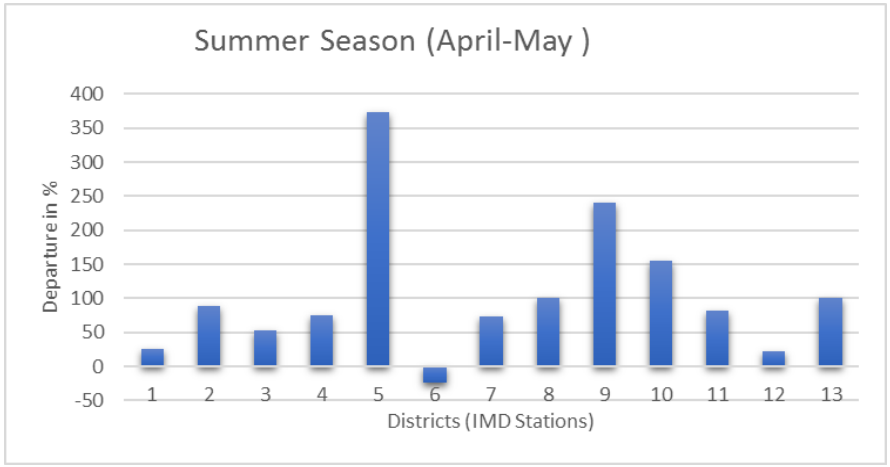
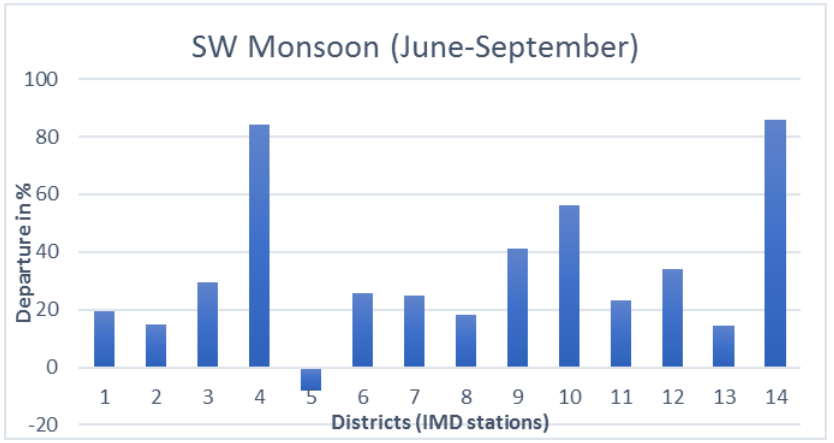
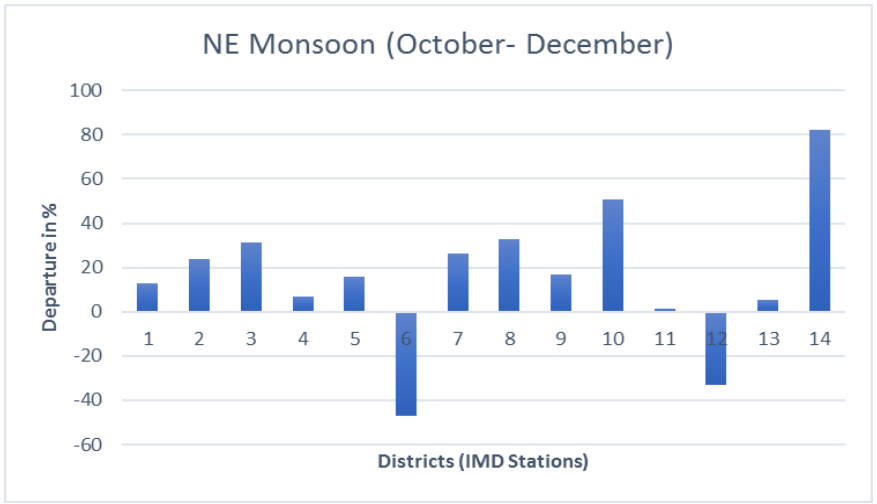
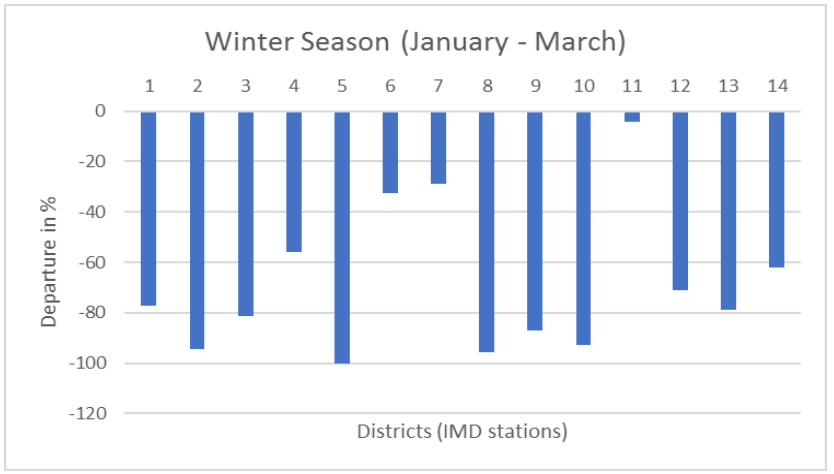


Fig.3.4 Comparison of Seasonal rainfalls of year (2018-19) with previous year (2017-18) rainfall









1. Alapuzha 2.Ernakulam 3. Idukki 4. Kannur 5. Kasaragod 6. Kollam 7. Kottayam 8. Kozhikode 9. Malapuram 10. Palakkad 11. Pathanamthitta 12. Thiruvananthapuram 13. Thrissur 14. Waynad

4. Depth to water level scenario during 2018-19

The depth to water level is being monitored from 1668 monitoring wells distributed throughout the State during the months of April, August, November and January. The water level measured during the month of April is taken as pre-monsoon water level and the data of August and November are taken as post-monsoon water level depending on the rainfall distribution. The water level data of GWMWs during 2018-19 is compiled in Annexure I.

The depth to water level mostly depends on the hydrogeological conditions of the area as well as topography, rainfall pattern etc. In coastal plains the depth to water level is generally restricted to 6 mbgl. In midland areas, where the undulating topography is seen, the depth to water level generally varies from near ground level to 25 mbgl. The variation is mostly due to topographical variations, thickness of lateritic overburden etc. In areas where laterites are underlain by sedimentary aquifers of Tertiary age, the water level goes very deep, even to the extent of 55 mbgl. In highlands the depth to water level is in the range of few cm to 10 mbgl depending on the topography and thickness of overburden (weathered zone).

4.1 Depth to water level during April 2018

During the month of April 2018, the depth to water level in the State varied widely from 0.09 to 65.40 mbgl in both dug wells and bore wells. Shallow water level in the range of 0 – 2 mbgl is mainly seen in Alappuzha district, coastal tracts of Ernakulam, Thrissur, Kozhikkod and Kollam districts and in the valley, portion located in Idukki district. The areas falling in the midland region generally show water level in the range of 2 – 10 mbgl. Water level of more than 20 m bgl is seen as isolated patches in Thiruvananthapuram, Malappuram and Kasargod districts. The district-wise well frequency for different ranges of depth to water level during April 2018 has been prepared and is given in Table 4.1. The analysis of the data reveals that 79.57 % of the monitoring wells (GWMWs) have water levels within the range of 0.1 to10 mbgl. Deeper water level (> 20 mbgl) is seen in Thiruvananthapuram, Palakkad, Malappuram and

Kasargod districts as isolated pockets which can be attributed to the local hydrogeological conditions such as thick lateritic overburden and the wells situated at elevated areas.

The map showing the depth to water level in Kerala State during April 2018 is given in Fig.4.1. In Kollam, Kannur, Palakkad and Thrissur districts, more than 50% of monitoring wells show water level greater than 5 m bgl.

4.2 Depth to water level during August 2018

During the month of August 2018, the depth to water level in Kerala State in dug wells varied widely from 0.17 to 55.9 mbgl. Shallow water level in the range of 0 – 2 mbgl is seen in Alappuzha, coastal tracts of Ernakulam to Kozhikode districts, as well as in the valley portion found in the eastern part of Idukki, Palaghat, Wayanad and Kozhikode districts. The areas falling in the midland region generally show water level in the range of 2 – 10 mbgl. Water level of more than 20 m bgl is seen as patches in Thiruvananthapuram, Malappuram and Kasargod districts. The district-wise well frequency for different ranges of depth to water level during August 2018 has been prepared and is given in Table 4.2. The analysis of the data reveals that 92.92 % of the monitoring wells (GWMWs) shows water level within the range of 0.1 to10 mbgl. Deeper water level (> 20 mbgl) is observed in Thiruvananthapuram (Kanjiramkulam, Melvettoor, Tirupuram, Pulluvila), Kasargod (Mavinakatta), Malappuram and Thrissur (Chowannur) districts as isolated pockets, which can be attributed to the local hydrogeological conditions mainly due to thick lateritic overburden and moreover the wells are located in an elevated area. The map showing the depth to water level in Kerala State during August 2018 is given in Fig.4.2. Only in Kollam district it is observed that more than 50% of monitoring wells show water level greater than 5 m bgl. Deepest water level is encountered in Thiruvananthapuramdistrict.

4.3 Depth to water level during November 2018

During the month of November 2018, the depth to water level in Kerala State in dug wells varied widely from 0.1 to 33.05 mbgl. Shallow water level in the range of 0 – 2 mbgl is seen in Alappuzha, coastal tracts of Ernakulam, Kollam, Thrissur and Kozhikode

districts, as well as in the valley portion found in the eastern part of Idukki, Palaghat, Wayanad and Kozhikode districts. The areas falling in the midland region generally show water level in the range of 2 – 10 mbgl. Water level of more than 20 m bgl is seen as patches in Thiruvananthapuram, Palakkad and Kasargod districts. The district-wise well frequency for different ranges of depth to water level during November 2018 has been prepared and is given in Table 4.3. The analysis of the data reveals that 89.53 % of the monitoring wells (GWMWs) shows water level within the range of 0.1 to 10 mbgl. Deeper water level (> 20 mbgl) is mainly observed in Thiruvananthapuram (Kanjiramkulam, Melvettoor, Tirupuram, Veyloor), Kasargod (Mavinakatta, Sastha Nagar) districts as isolated pockets, which can be attributed to the local hydrogeological conditions mainly due to thick lateritic overburden and moreover the wells are located in an elevated area.

The map showing the depth to water level in Kerala State during November 2018 is given in Fig.4.3. Kollam and Thrissur districts has observed more than 50% of monitoring wells show water level greater than 5 m bgl. Deepest water level is encountered in Thiruvananthapuramdistrict.

4.4 Depth to water level during January 2019

During the month of January, 2019, the depth to water level in the State varied widely from 0.45 to 55.6 mbgl in dug wells. Shallow water level in the range of 0 – 2 mbgl is seen in Alappuzha district, coastal tracts of Kollam, Ernakulam, Thrissur and Kozhikkod districts and in the valley, portion located in the eastern part of Idukki districts and also as small patches in Kottayam district. The areas falling in the midland region generally show water level in the range of 5 – 10 mbgl. Water level of more than 20 m bgl is seen as isolated patches in Thiruvananthapuram, Kasargod, Kannur and Kollam districts. The district-wise well frequency for different ranges of depth to water level during January 2019 has been prepared and is given in Table 4.4. The analysis of the data reveals that 86.10 % of the monitoring wells (GWMWs) have water levels within the range of 0.1 to10 mbgl. Deeper water level (> 20 mbgl) is seen in Thiruvananthapuram (Pulluvila, Veyloor, Tirupuram Poovar, and Kanjiramkulam), Kasargod and Kannur district as isolated pockets which can be attributed to the local hydrogeological conditions such as thick lateritic overburden and the wells situated at elevated areas.

The map showing the depth to water level in Kerala State during January 2019 is given in Fig.4.4. In Kollam, Kottayam, Thrissur and Pathanamthitta districts, more than 50% of monitoring wells show water level greater than 5 m bgl. Deepest water level is recorded in Thiruvananthapuram district.

Fig.4.1 Depth to water level April 2018

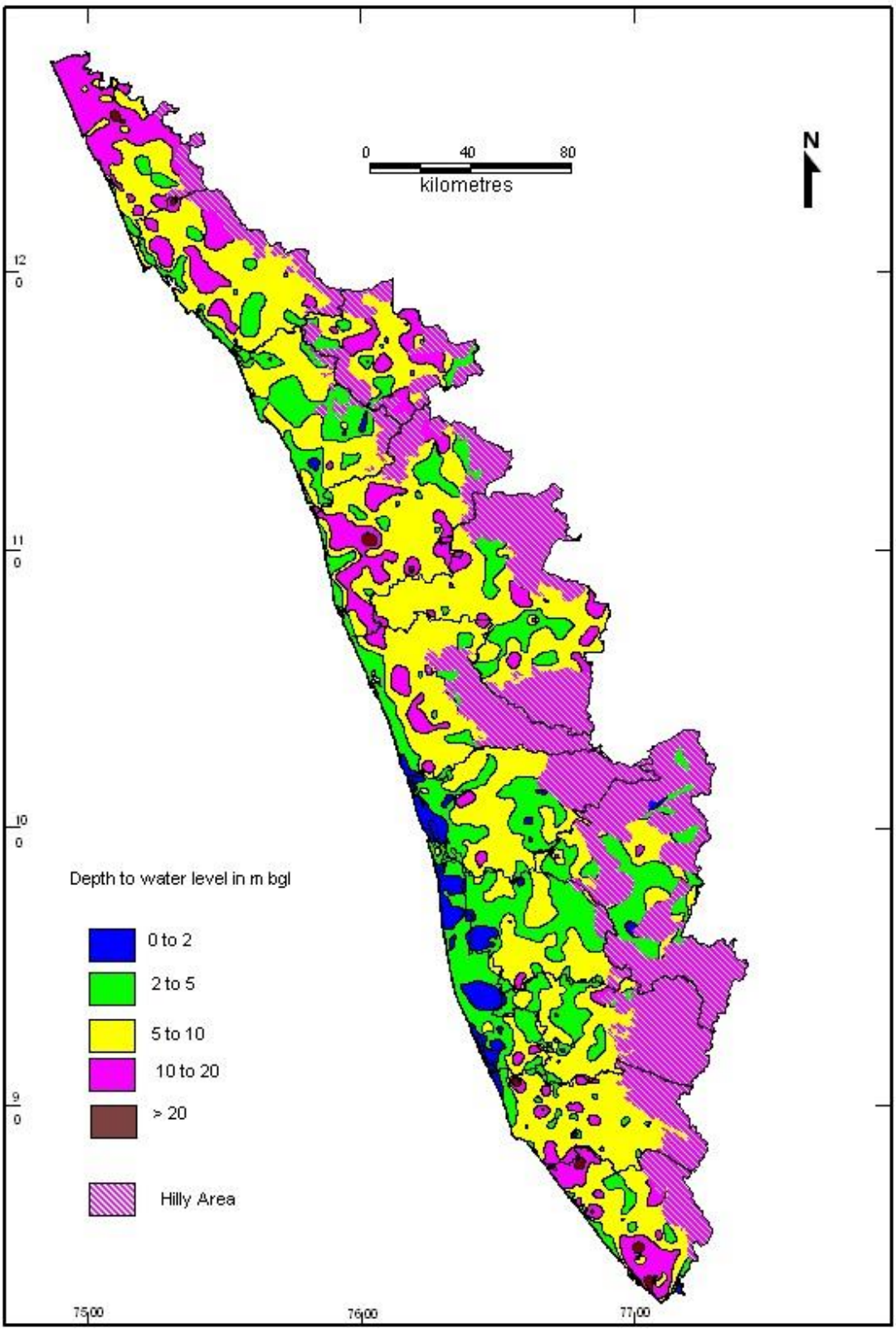


Fig.4.2 Depth to water level August 2018

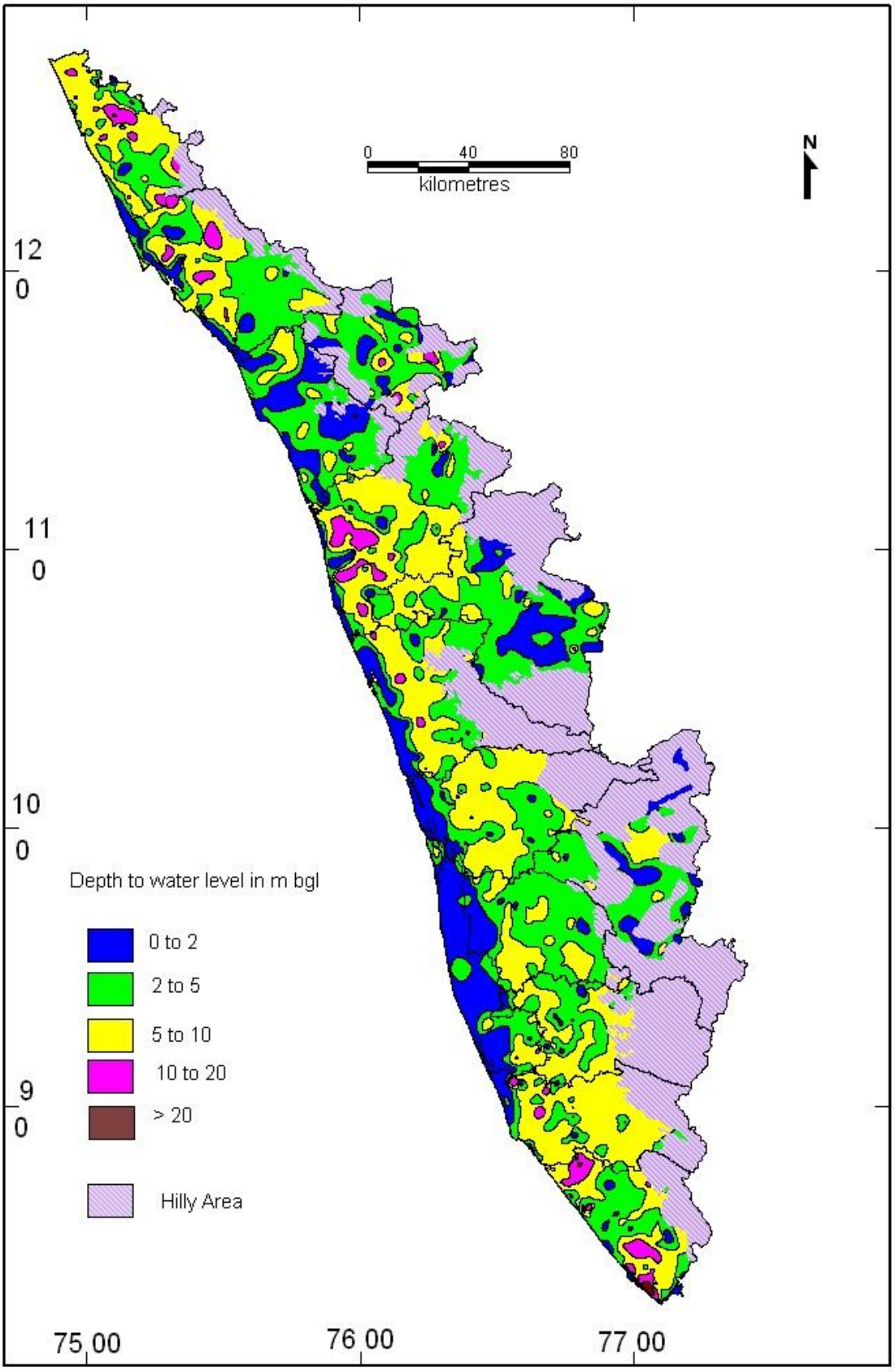


Fig.4.3 Depth to water level November 2018

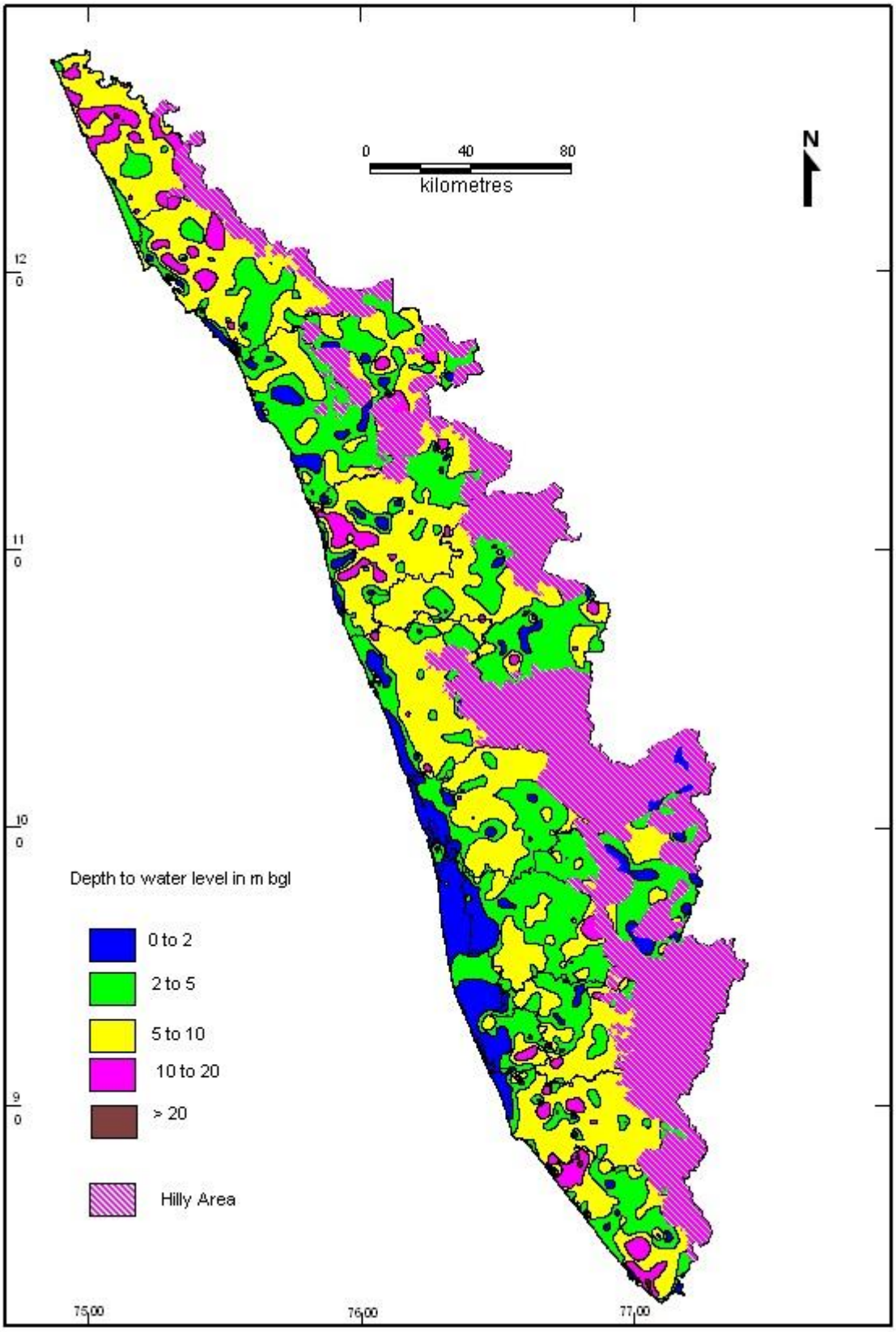


Fig.4.4 Depth to water level January 2019

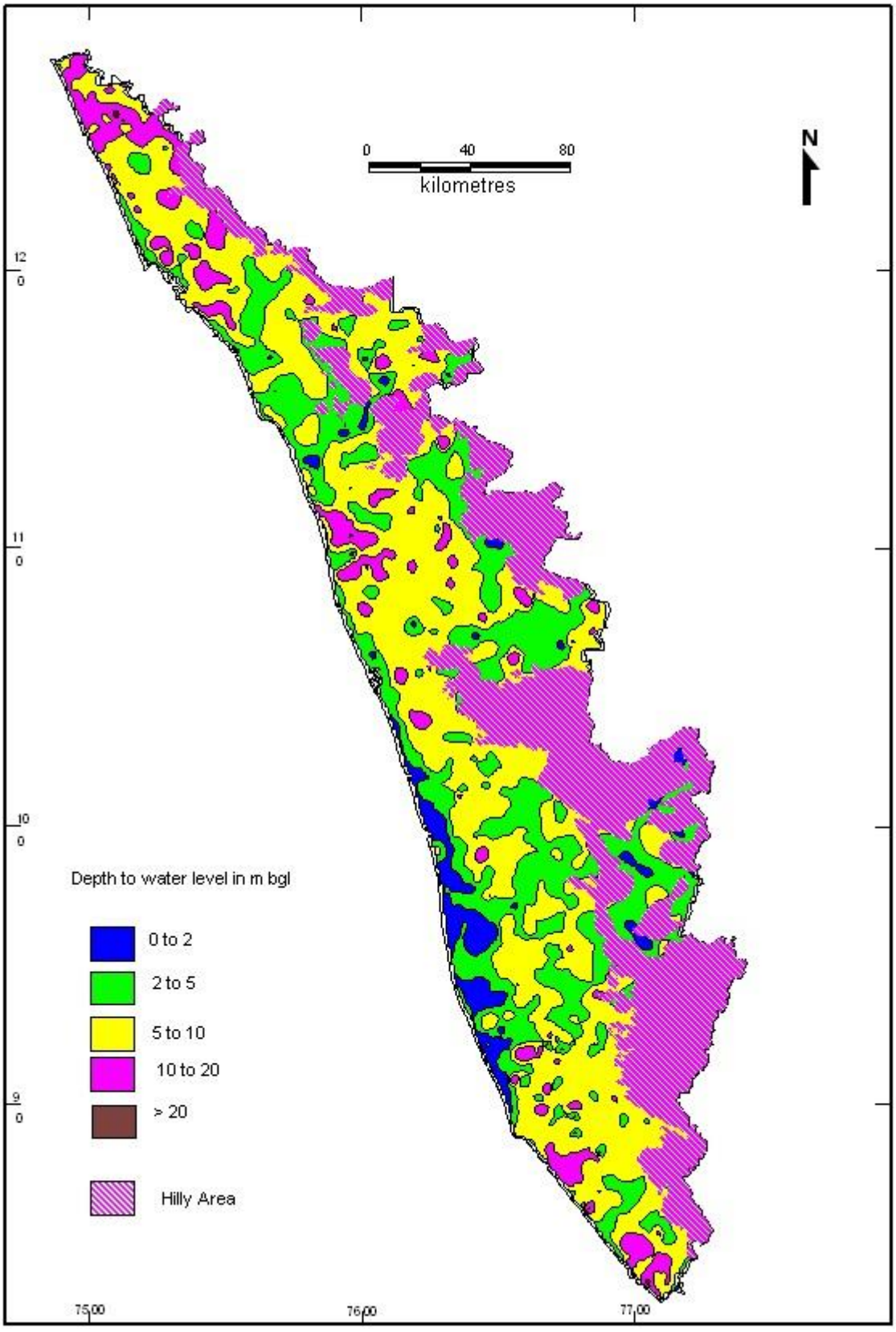


Table 4.1: District Wise Well Frequency for Different Ranges of Depth to Water Level for April 2018

District	No. of Wells Analysed	Depth to Water level(mbgl)		No. & Percentage of Wells Showing Depth to Water Table (mbgl) in the Range of					
		Min	Max	0.0 – 2.0	2.0 – 5.0	5.0 – 10.0	10.0 – 20.0	20.0 – 40.0	> 40.0
Alappuzha	74	0.09	12.77	28 37.84%	34 45.95%	6 8.11%	6 8.11%	0	0
Ernakulam	130	0.35	14.50	25 19.23%	44 33.85%	53 40.77%	8 6.15%	0	0
Idukki	69	0.48	13.84	3 4.35%	37 53.62%	25 36.23%	4 5.80%	0	0
Kannur	104	1.66	21.95	2 1.92%	21 20.19%	54 51.92%	25 24.04%	2 1.92%	0
Kasaragod	121	2.32	26.75	0	8 6.61%	41 33.88%	70 57.85%	2 1.65%	0
Kollam	105	0.72	30.00	4 3.81%	21 20.00%	62 59.05%	16 15.24%	2 1.90%	0
Kottayam	98	0.57	14.65	8 8.16%	44 44.90%	41 41.84%	5 5.10%	0	0
Kozhikode	92	0.46	13.74	7 7.61%	37 40.22%	43 46.74%	5 5.34%	0	0
Malappuram	122	1.83	37.72	2 1.64%	27 22.13%	56 45.90%	34 27.87%	3 2.46%	0
Palakkad	141	1.38	65.40	4 2.84%	33 23.40%	77 54.61%	19 13.48%	6 4.26%	2 1.42%
Pathanamthitta	88	1.20	16.35	4 4.55%	37 42.05%	43 48.86%	4 4.55%	0	0
Thiruvananthapuram	126	1.09	57.30	5 3.97%	23 18.25%	49 38.89%	39 30.95%	9 7.14%	1 0.79%
Thrissur	114	0.87	14.60	5 4.39%	37 32.46%	57 50.00%	15 13.16%	0	0
Wayanad	70	1.11	20.00	1 1.43%	22 31.43%	27 38.57%	20 28.57%	0	0
Total	**1454**	**0.09**	**65.40**	**98**	**425**	**634**	**270**	**24**	**3**

Table 4.2: District Wise Well Frequency for Different Ranges of Depth to Water Level for August 2018

District	No. of Wells Analysed	Depth to Water level(mbgl)		No. &Percentage of Wells Showing Depth to Water Table (mbgl) in the Range of					
		Min	Max	0.0 – 2.0	2.0 – 5.0	5.0 – 10.0	10.0 – 20.0	20.0 – 40.0	> 40.0
Alappuzha	79	0.26	10.44	58 73.42%	11 13.92%	9 11.39%	1 1.27%	0	0
Ernakulam	130	0.28	15.50	31 23.85%	34 26.15%	61 46.92%	4 3.10%	0	0
Idukki	70	0.17	10.54	17 24.29%	40 57.14%	12 17.14%	1 1.43%	0	0
Kannur	106	0.54	19.77	17 16.04%	36 33.96%	43 40.57%	10 9.43%	0	0
Kasaragod	123	0.50	21.00	13 10.57%	35 28.46%	55 44.72%	19 15.45%	1 0.81%	0
Kollam	101	0.33	18.30	15 14.85%	19 18.81%	61 60.40%	6 5.94%	0	0
Kottayam	100	0.32	10.85	17 17.00%	45 45.00%	37 37.00%	1 1.00%	0	0
Kozhikode	93	0.18	12.64	39 41.94%	32 34.41%	19 20.43%	3 3.23%	0	0
Malappuram	124	0.50	23.15	20 16.13%	34 27.42%	52 41.94%	17 13.71%	1 0.81%	0
Palakkad	116	0.25	19.30	40 34.48%	51 43.97%	21 18.10%	4 3.45%	0	0
Pathanamthitta	87	0.86	11.55	12 13.78%	36 41.38%	37 42.53%	2 2.30%	0	0
Thiruvananthapuram	109	0.25	55.90	18 16.51%	33 30.28%	39 35.78%	15 13.76%	3 2.75%	1 0.92%
Thrissur	106	0.24	11.30	21 19.81%	39 36.79%	41 38.68%	5 4.72%	0	0
Wayanad	69	0.26	17.82	24 34.78%	22 31.88%	17 24.64%	6 8.70%	0	0
Total	**1413**	**0.17**	**55.90**	**342 24.2%**	**467 33.05%**	**504 35.67%**	**94 6.65%**	**05 0.35%**	**01 0.07%**

Table 4.3: District Wise Well Frequency for Different Ranges of Depth to Water Level for November 2018

District	No. of Wells Analysed	Depth to Water level(mbgl)		No. &Percentage of Wells Showing Depth to Water Table (mbgl) in the Range of					
		Min	Max	0.0 – 2.0	2.0 – 5.0	5.0 – 10.0	10.0 – 20.0	20.0 – 40.0	> 40.0
Alappuzha	80	0.28	11.78	55 68.75%	13 16.25%	7 8.75%	5 6.25%	0	0
Ernakulam	134	0.3	15.4	33 24.63%	39 29.1%	58 43.28%	4 2.99%	0	0
Idukki	72	0.44	9.88	19 26.39%	39 55.17%	14 19.44%	0	0	0
Kannur	106	0.83	20.66	10 9.43%	29 27.36%	49 46.23%	17 16.04%	1 0.94%	0
Kasaragod	123	1.53	22.18	3 2.44%	16 13.01%	68 55.28	34 27.64%	2 1.63%	0
Kollam	105	0.55	21.16	17 16.19%	15 14.29%	63 60.00%	9 8.57%	1 0.95%	0
Kottayam	96	0.56	11.3	18 18.75%	42 43.75%	34 35.42%	2 2.08%	0	0
Kozhikode	92	0.32	12.94	19 20.55%	39 42.39%	30 32.61%	4 4.35%	0	0
Malappuram	125	0.38	19.19	18 14.4%	28 22.40%	58 46.4%	21 16.80%	0	0
Palakkad	141	0.70	31.7	20 14.18%	61 43.26%	51 36.27%	6 4.26%	3 2.13%	0
Pathanamthitta	88	0.90	15.5	11 12.5%	32 36.36%	41 46.59%	4 4.55%	0	0
Thiruvananthapuram	115	0.10	33.05	11 9.57%	37 32.17%	43 37.29%	20 17.39%	4 6.90%	0
Thrissur	114	0.70	12.6	18 15.79%	31 27.19%	28 50.88%	7 6.14%	0	0
Wayanad	71	0.78	16.68	11 15.49%	24 33.8%	29 39.44%	8 11.27%	0	0
Total	1462	0.1	33.05	263 17.98%	445 30.43%	602 41.17%	141 9.64%	11 0.75%	0

Table 4.4: District Wise Well Frequency for Different Ranges of Depth to Water Level for January 2019

District	No. of Wells Analysed	Depth to Water level(mbgl)		No. & Percentage of Wells Showing Depth to Water Table (mbgl) in the Range of					
		Min	Max	0.0 – 2.0	2.0 – 5.0	5.0 – 10.0	10.0 – 20.0	20.0 – 40.0	> 40.0
Alappuzha	83	0.75	20.85	43 51.81%	26 31.33%	6 7.23%	7. 8.43%	1 1.20%	0
Ernakulam	134	0.45	14.79	26 19.40%	40 29.85%	61 45.52%	7 5.22%	0	0
Idukki	71	0.47	10.79	10 14.08%	40 56.34%	20 28.17%	1 1.41%	0	0
Kannur	103	1.40	21.50	7 6.80%	21 20.39%	50 48.54%	24 23.30%	1 0.97%	0
Kasaragod	123	1.97	23.60	1 0.81%	11 8.94%	59 47.97%	50 40.65%	2 1.63%	0
Kollam	113	0.62	20.08	11 9.73%	14 12.39%	73 64.60%	14 12.39%	1 0.88%	0
Kottayam	99	0.99	12.95	12 12.12%	35 35.35%	48 48.48%	4 4.04%	0	0
Kozhikode	92	0.97	13.84	10 10.87%	43 46.74%	35 38.04%	4 4.35%	0	0
Malappuram	123	1.02	16.33	6 4.76%	33 26.19%	59 46.83%	25 20.32%	0	0
Palakkad	125	1.10	11.3	8 5.88%	54 39.71%	56 41.18%	7 5.6%	0	0
Pathanamthitta	90	1.08	13.18	5 5.49%	36 39.56%	44 48.35%	5 5.55%	0	0
Thiruvananthapuram	109	0.09	55.6	5 4.59%	26 23.85%	48 44.04%	26 23.85%	4 3.67%	0
Thrissur	119	0.56	15.75	10 8.40%	40 33.61%	59 49.58%	10 8.40%	0	0
Wayanad	70	1.10	17.59	9 12.86%	18 25.71%	34 48.57%	09 12.86%	0	0
Total	**1454**	**0.45**	**55.6**	**163 11.21%**	**437 30.05%**	**652 44.84%**	**193 13.27%**	**9 0.61%**	**0**

5. Water level fluctuation in Kerala during 2018-2019

In Kerala the premonsoon water level measurements are carried out during April and postmonsoon measurements during August and November. The fourth water level measurement is during January. The estimation of water level fluctuation between premonsoon and postmonsoon is very important in the estimation of natural recharge to groundwater regime, which gives the dynamic resource of available groundwater.

The water level fluctuation between and pre and postmonsoon periods in coastal alluvium, riverine alluvium and valley fills are mostly restricted to 4 meters. In laterites water level fluctuation is generally in the range of a few centimetres to 9 metres, but mostly restricted to 4 m. In crystalline areas the water level fluctuation is in the range of a few cm to 6m.

5.1 Fluctuation between April 2018 and August 2018

Comparison of August 2018 water level with that of April 2018 indicates rise in water level in the range of 0 – 8.00 metres in most parts of the State, whereas fall in water level also is noticed in certain small isolated pockets mainly in Thrissur, Ernakulam, Thiruvananthapuram and Kollam districts. In the southern districts of Kerala, the rise in water level is in the range of 0 – 4 m as seen in major parts of the area, whereas in the northern districts of Kerala rise in water level up to 8 m is seen. Rise in water level is represented by 91.48 % of total monitoring wells. The map of Kerala showing fluctuation between April 2018 and August 2018 is given in fig. 5.1. District-wise well frequency for different ranges of water level fluctuation (April 2018 and August 2018) is given in Table 5.1.

5.2 Fluctuation between April 2018 and November 2018

Comparison of November 2018 water level with that of April 2018 indicates rise in water level in the range of 0 – 8.00 metres in most parts of the State, whereas fall in water level also is noticed in certain small isolated pockets mainly in Ernakulam, Thrissur, Kottayam, Pathanamthitta, Kollam and Alappuzha districts. Rise in water level in the range of 0-4 m were observed mostly in all districts of the state, whereas fall in the water

level in the range of 0-4 m is mainly noticed as isolated patches from Thrissur to Kollam districts on the southern part and Kasaragod, Kannur, Kozhikode and Malappuram districts on the northern part of the state. Rise in water level is represented by 89.58 % of total monitoring wells

The map of Kerala showing fluctuation between April 2018 and November 2018 is given in Fig. 5.2. District-wise well frequency for different ranges of water level fluctuation (April 2018 and November 2018) is given in Table 5.2.

5.3 Fluctuation between April 2018 and January 2019

Comparison of January 2019 water level with that of April 2018 indicates rise in water level fluctuation in the range of 0 – 4.00 metres in most parts of the State whereas fall in water level fluctuation is noticed in certain small isolated pockets mainly in Kottayam, Pathanamthitta, Ernakulam, Thrissur and small patches in Kozhikkod, Wayanad, Thiruvananthapuram, Kollam, Alappuzha, Kannur and Kasargod districts. In general, the rise in water level is in the range of 0-2 m through out all districts except Kottayam and Pathanamthitta where fall is slightly predominant. Rise in water level in the range of 4 m and above is noticed in isolated pockets in Palakkad, Idukki, Wayanad, Malappuram, Thiruvananthapuram and Kasaragod districts. Rise in water level is represented by 75.27 % of total monitoring wells.

The map of Kerala showing fluctuation between January 2019 and April 2018 is given in Fig.5.3. District-wise well frequency for different ranges of water level fluctuation (January 2019 and April 2018) is given in Table 5.3.

Fig.5.1 Water level fluctuation between April 2018 and August 2018

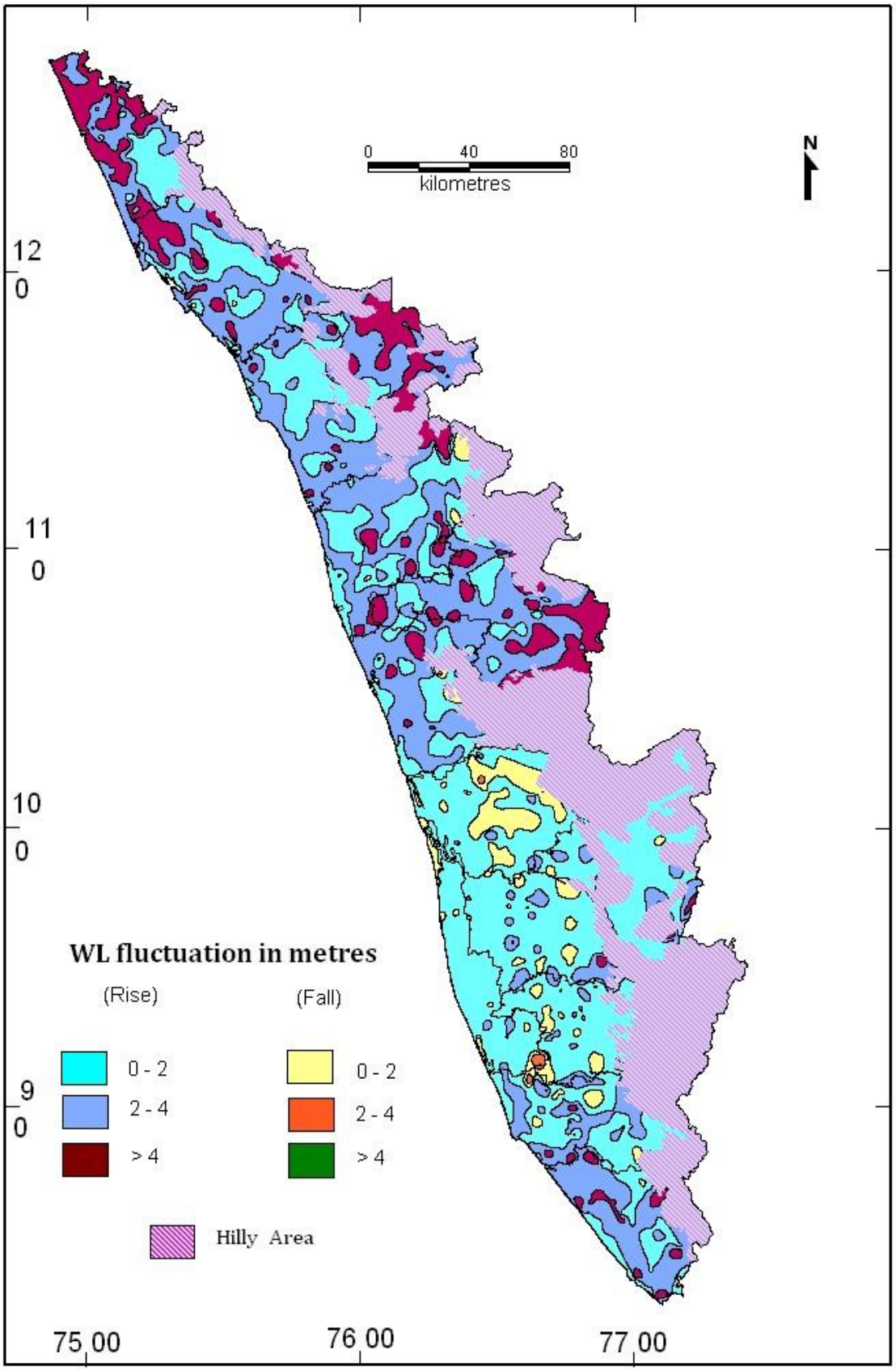


Fig.5.2 Water level fluctuation between April 2018 and November 2018

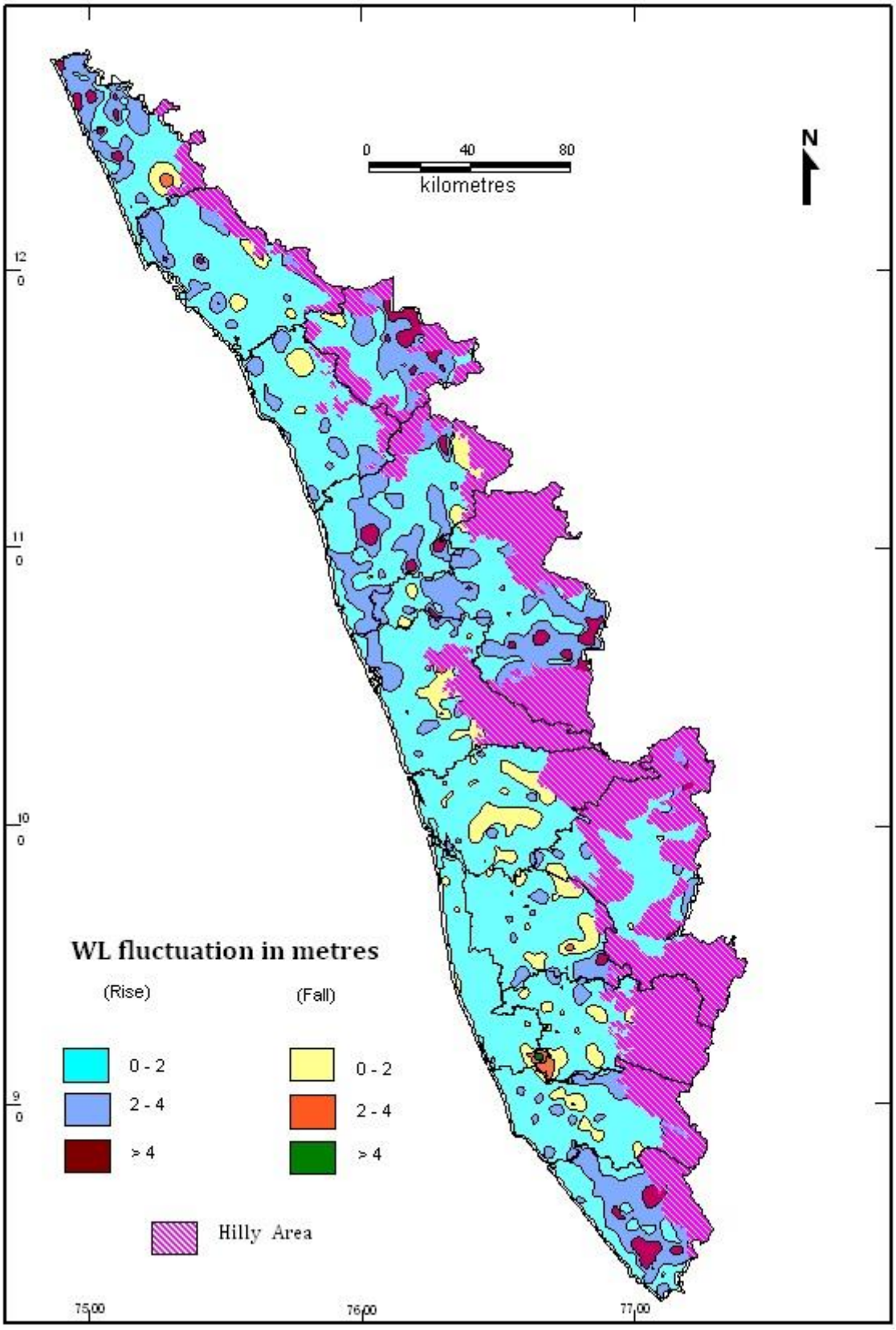


Fig.5.3 Water level fluctuation between April 2018 and January 2019

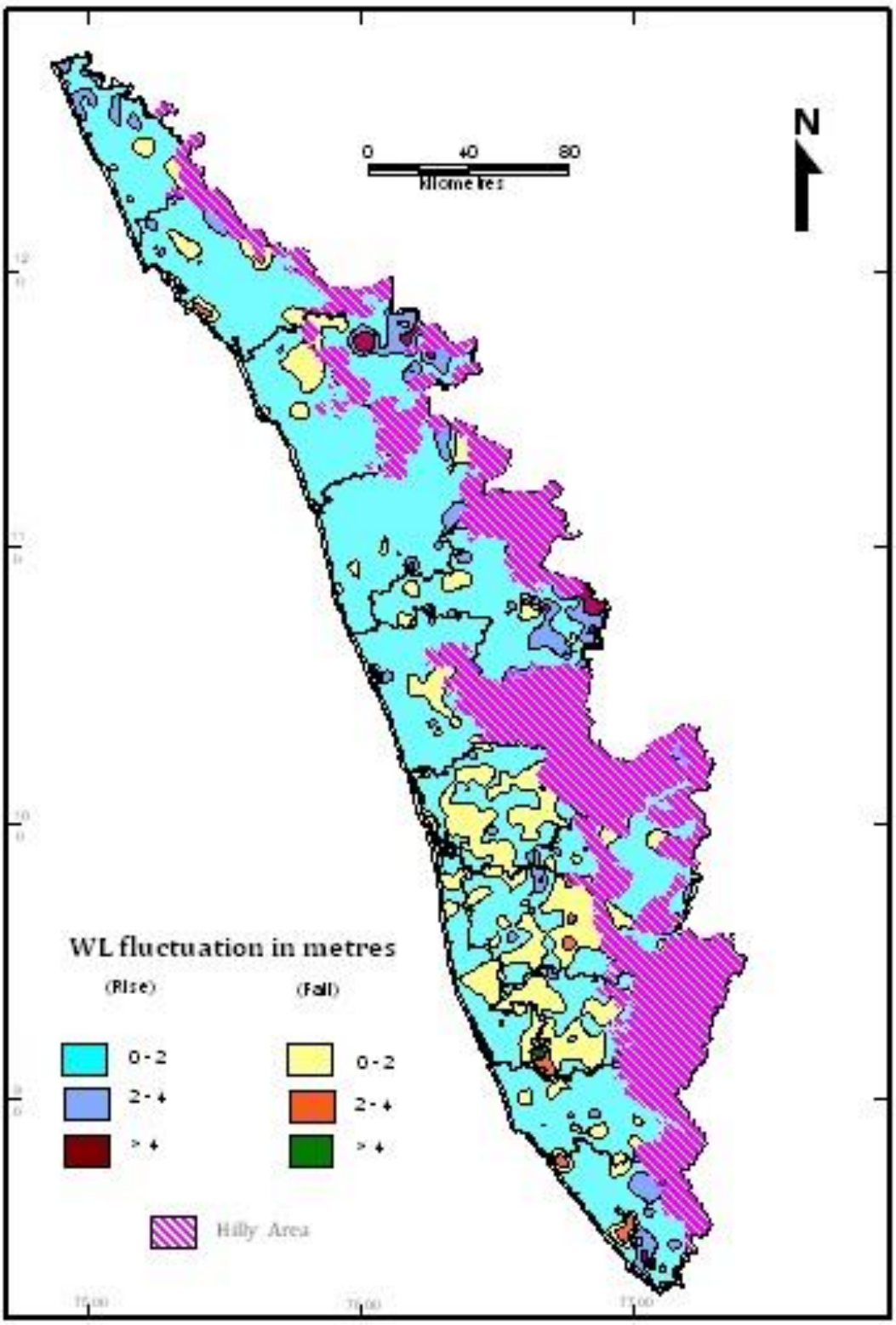


Table 5.1: District wise – Water Level Fluctuation and Frequency Distribution for Different Ranges from April 2018 – August 2018

District	No. of Wells	Range of Fluctuation (m)				No. &Percentage of Wells /Percentage Showing Fluctuation						Total No. of Wells	
		Rise		Fall		Rise			Fall			Rise	Fall
		Min	Max	Min	Max	0 to 2	2 to 4	>4	0 to 2	2 to 4	>4		
Alappuzha	66	0.20	5.35	0.06	3.93	49 74.24%	6 9.09%	1 1.52%	8 12.12%	2 3.03%	0	56	10
Ernakulam	125	0.03	4.23	0.01	2.33	76 60.80%	5 4.00%	1 0.80%	39 31.20%	4 3.20%	0	82	43
Idukki	67	0.06	5.24	0.01	0.69	45 67.16%	14 20.90%	5 7.46%	3 4.48%	0	0	64	3
Kannur	104	0.41	7.01	0.13	0.78	39 37.50%	40 38.46%	22 21.15%	3 2.88%	0	0	101	3
Kasaragod	121	0.10	13.98	-	-	25 20.66%	32 26.45%	64 52.89%	0	0	0	121	0
Kollam	95	0.12	11.70	0.03	3.47	44 46.32%	33 34.74%	8 8.42%	9 9.47%	1 1.05%	0	85	10
Kottayam	97	0.02	5.01	0.03	1.45	67 69.07%	15 15.46%	2 2.06%	13 13.40%	0	0	84	13
Kozhikode	91	0.04	7.06	-	-	41 45.05%	43 47.25%	7 7.69%	0	0	0	91	0
Malappuram	120	0.07	24.25	0.08	3.44	55 45.83%	41 34.17%	17 14.17%	6 5.00%	1 0.83%	0	113	7
Palakkad	115	0.20	47.30	0.80	0.80	21 18.26%	48 41.74%	44 38.26%	1 0.87%	0	0	113	1
Pathanamthitta	82	0.01	4.00	0.04	2.20	57 69.51%	11 13.41%	0	22 14.63%	1 1.22%	0	68	13
Thiruvananthapuram	102	0.13	17.12	0.81	2.38	33 32.35%	39 38.24%	28 27.45%	1 0.98%	1 0.98%	0	100	2
Thrissur	97	0.12	6.59	0.11	4.76	32 32.99%	48 49.48%	9 9.28%	5 5.15%	1 1.03%	1 1.03%	89	7
Wayanad	69	0.06	12.01	-	-	18 26.09%	18 26.09%	33 47.83%	0	0	0	69	0
Total	**1351**	**0.01**	**47.30**	**0.01**	**4.76**	**602**	**393**	**241**	**100**	**11**	**1**	**1236**	**112**

Table 5.2: District wise – Water Level Fluctuation and Frequency Distribution for Different Ranges from April 2018 – November 2018

District	No. of Wells	Range of Fluctuation (m)				No. &Percentage of Wells /Percentage Showing Fluctuation						Total No. of Wells	
		Rise		Fall		Rise			Fall			Rise	Fall
		Min	Max	Min	Max	0 to 2	2 to 4	>4	0 to 2	2 to 4	>4		
Alappuzha	66	0.09	2.08	0.06	5.04	57 86.36%	1 1.52%	0	5 7.58%	1 1.52%	2 3.03%	58	8
Ernakulam	129	0.01	4.3	0.03	2.15	90 69.77%	6 4.65%	1 0.78%	27 20.93%	2 2.33%	0	97	30
Idukki	69	0.01	6.05	0.04	0.9	49 71.01%	11 15.94%	4 5.8%	5 7.25%	0	0	64	5
Kannur	104	0.14	11.54	0.17	10.61	75 72.19%	18 17.31%	4 3.85%	5 4.81%	1 0.96	1 0.96%	97	7
Kasaragod	121	0.05	10.38	1.09	6.3	63 52.07%	37 30.58%	19 15.70%	1 0.83%	0	1 0.83%	119	2
Kollam	97	0.05	8.84	0.35	2.09	61 62.89%	23 23.71%	2 2.06%	10 10.31%	1 1.03%	0	86	11
Kottayam	93	0.01	4.96	0.04	2.7	58 62.37%	14 15.05%	1 1.08%	19 20.43%	1 1.03%	0	73	20
Kozhikode	91	0.01	4.69	0.01	1.32	62 68.13%	22 24.18%	2 2.2%	5 5.49%	0	0	86	5
Malappuram	121	0.03	19.03	0.06	3.77	70 57.85%	36 29.75%	16 8.26%	4 3.31%	1 0.83%	0	116	5
Palakkad	139	0.1	43.4	0.4	1	59 42.45%	47 33.81%	28 20.14%	4 2.88%	0	0	134	4
Pathanamthitta	83	0.05	3.98	0.02	2.46	60 72.29%	7 0.43%	0	15 18.07%	1 1.2%	0	67	16
Thiruvananthapuram	104	0.20	13.21	0.63	2.28	47 45.19%	43 41.35%	10 9.62%	2 1.92%	1 0.96%	0	100	3
Thrissur	105	0.02	6.24	0.02	3.8	65 61.9%	14 13.33%	4 3.82%	18 17.14%	4 3.81%	0	83	22
Wayanad	70	0.10	9.61	0.34	2.03	30 42.86%	22 31.43%	15 21.43%	2 2.86%	1 1.43%	0	67	3
Total	**1392**	**0.2**	**2.08**	**0.01**	**10.61**	**846 60.77%**	**301 21.62%**	**100 7.18%**	**122 8.76%**	**15 1.07%**	**4 0.28%**	**1247 89.58%**	**141 10.12%**

Table 5.3: District wise – Water Level Fluctuation and Frequency Distribution for Different Ranges from April 2018 - January 2019

District	No. of Wells	Range of Fluctuation (m)				No. &Percentage of Wells /Percentage Showing Fluctuation						Total No. of Wells	
		Rise		Fall		Rise			Fall			Rise	Fall
		Min	Max	Min	Max	0 to 2	2 to 4	>4	0 to 2	2 to 4	>4		
Alappuzha	66	0.05	1.39	0.04	14.40	39 59.09%	0	0	23 34.85%	0	2 3.03%	39	25
Ernakulam	128	0.01	2.6	0.01	2.26	64 49.61%	4 3.10%	0	56 43.41%	5 3.88%	0	68	61
Idukki	68	0.01	4.50	0.04	1.14	42 61.76%	8 11.76%	2 2.94%	16 23.53%	0	0	52	16
Kannur	101	0.04	2.94	0.02	4.30	74 73.27%	6 5.94%	0	15 14.85%	3 2.97%	1 0.99%	80	19
Kasaragod	112	0.01	4.29	0.15	1.42	76 63.87%	23 19.33%	2 1.78%	11 9.82%	0	0	101	11
Kollam	100	0.05	3.23	0.03	2.35	82 81.19%	4 3.96%	0	12 11.88%	2 1.98%	0	86	14
Kottayam	96	0.02	3.35	0.02	3.40	43 44.79%	4 4.17%	0	45 46.88%	4 4.17%	0	47	49
Kozhikode	91	0.05	3.71	0.01	2.03	72 79.12%	5 5.49%	0	13 14.29%	1 1.10%	0	77	14
Malappuram	120	0.01	7.52	0.03	0.78	88 72.73%	13 10.74%	5 4.16%	14 11.52%	0	0	106	14
Palakkad	128	0.05	10.9	0.01	1.4	75 55.56%	23 17.04%	12 9.37%	12 9.37%	0	0	110	12
Pathanamthitta	85	0.02	3.28	0.05	3.89	37 43.53%	3 3.53%	0	42 49.41%	2 2.35%	0	40	44
Thiruvananthapuram	100	0.01	10.14	0.18	4.35	64 64.00%	15 15.00%	7 7.07%	7 7.00%	5 5.00%	1 1.00%	87	13
Thrissur	110	0.03	5.89	0.01	4.91	68 61.82%	7 6.36%	1 0.91%	32 29.09%	0	1 0.91%	76	33
Wayanad	69	0.01	7.60	0.26	2.23	42 60.87%	12 17.39%	9 13.04%	5 7.25%	1 1.45%	0	63	6
Total	**1371**	**0.01**	**10.14**	**0.01**	**14.4**	**866 63.16%**	**127 9.26%**	**38 2.77%**	**303 22.10%**	**23 1.67%**	**05 0.36%**	**1032 75.27%**	**331 24.14%**

6. Comparison of 2018-19 water levels with the decadal mean (2008-2017)

Water levels during the year 2018-19 in comparison with the decadal mean (2008-2017) value of the respective measurements is discussed in this chapter. The analysis brings out the deviations in water level from the general behaviour of water level of the past decade. In general, the change in water level is confined to the range of +2 to –2 m.

6.1 Fluctuation between Mean April (2008-2017) and April 2018

The change in water level over the last ten years period is brought out by the comparison of water level with the mean value of April 2018 measurements of the period 2008-2017.This analysis indicate that the change in water level is mostly restricted to +2 (rise) to -2 (fall) m as recorded by 91.21 % of GWMW. However, fall in water level is predominant and continuous in all districts from Thrissur to Kasargod and isolated patches in southern districts as represented by 45.53 % of monitoring wells. In Kozhikkod and Thrissur districts, fall in the range of 0-2 m bgl is more than 50 % of total GWMW. The Rise in water level is predominant in southern districts starting from Ernakulam to Thiruvananthapuram and isolated patches in northern districts as represented by 54.32 % of total GWMW. Alappuzha district has highest no of wells (78.38%) with rising trend in the range of 0-2 m bgl. One well each in Malappuram and Palakkad district have recorded no fluctuation. The frequency of wells showing rise and fall in different ranges (0-2m,2-4m, 4m) when compared with decade mean water level is given in Table 6.1. The Fig.6.2 shows the water level fluctuation in the state for April 2018 with respect to Decadal mean (2008-2017).

6.2 Fluctuation between Mean August (2008-2017) and August 2018

The change in water level over the last ten years period is brought out by the comparison of water level with the mean value of August measurements of the period 2008-2017.This analysis indicate that the change in water level is mostly restricted to +2(rise) to -2(fall) m as recorded by 88.60 % of GWMW. However, rise in water level is as represented by 48.50 % of monitoring wells. The frequency of wells showing rise and fall in different ranges (0-2m,2-4m, 4m) when compared with decade mean water level is

given in Table5.3. Fig.5.3 shows the water level fluctuation in the state for August 2018 with respect to Decadal mean (2008-2017).

6.3 Fluctuation between Mean November (2005-2014) and November 2015

The change in water level over the last ten years period is brought out by the comparison of November 2018 water level with the mean value of November measurements of the period 2008-2017.This analysis indicate that the change in water level is mostly restricted to +2(rise) to -2(fall) m as recorded by 93.79 % of GWMW. However, rise in water level is as represented by 39.85 % of monitoring wells. The frequency of wells showing rise and fall in different ranges (0-2m, 2-4m, 4m) when compared with decade mean water level is given in Table5.3. Fig.5.3 shows the water level fluctuation in the state for November 2018 with respect to Decadal mean (2008-2017).

6.4 Fluctuation between Mean January (2009-2018) and January 2019

The change in water level over the last ten years period is brought out by the comparison of water level with the mean value of January measurements of the period 2009-2018.This analysis indicate that the change in water level is mostly restricted to +2(rise)to -2(fall) m as recorded by 96.74 % of GWMW. However, fall in water level is represented by 49.51 % of monitoring wells. Rise in water level is observed as isolated patches in all districts. The frequency of wells showing rise and fall in different ranges (0-2m,2-4m, 4m) when compared with decade mean water level is given in Table 6.4. Fig.6.4 shows the water level fluctuation in the state for January 2019 with respect to Decadal mean (2009-2018).

Fig.6.1 Water level fluctuation with respect to mean (April 2018 vs mean of 2008-2017)

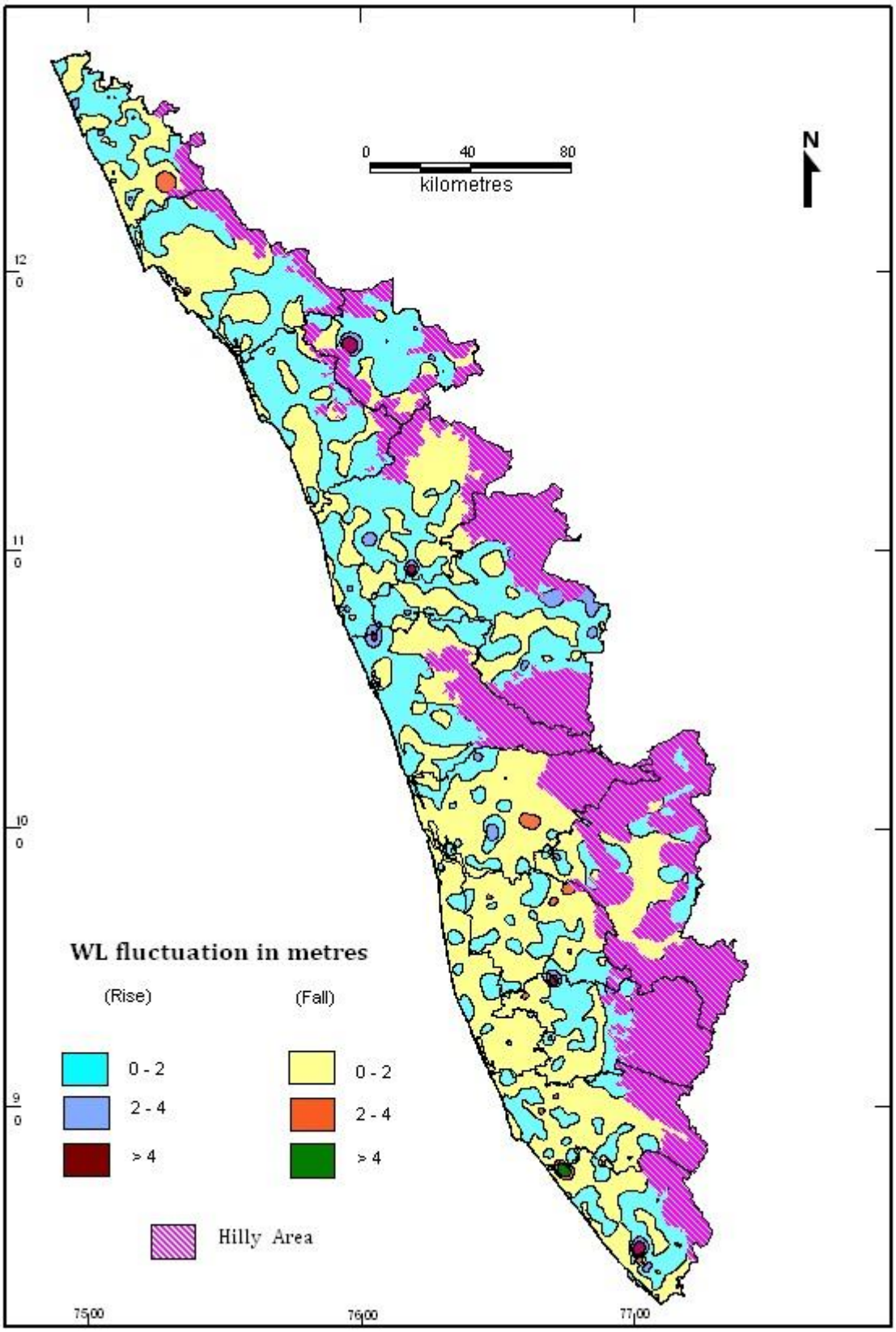


Fig.6.2 Water level fluctuation with respect to decadal mean (mean of August 2008-2017 vs August 2018)

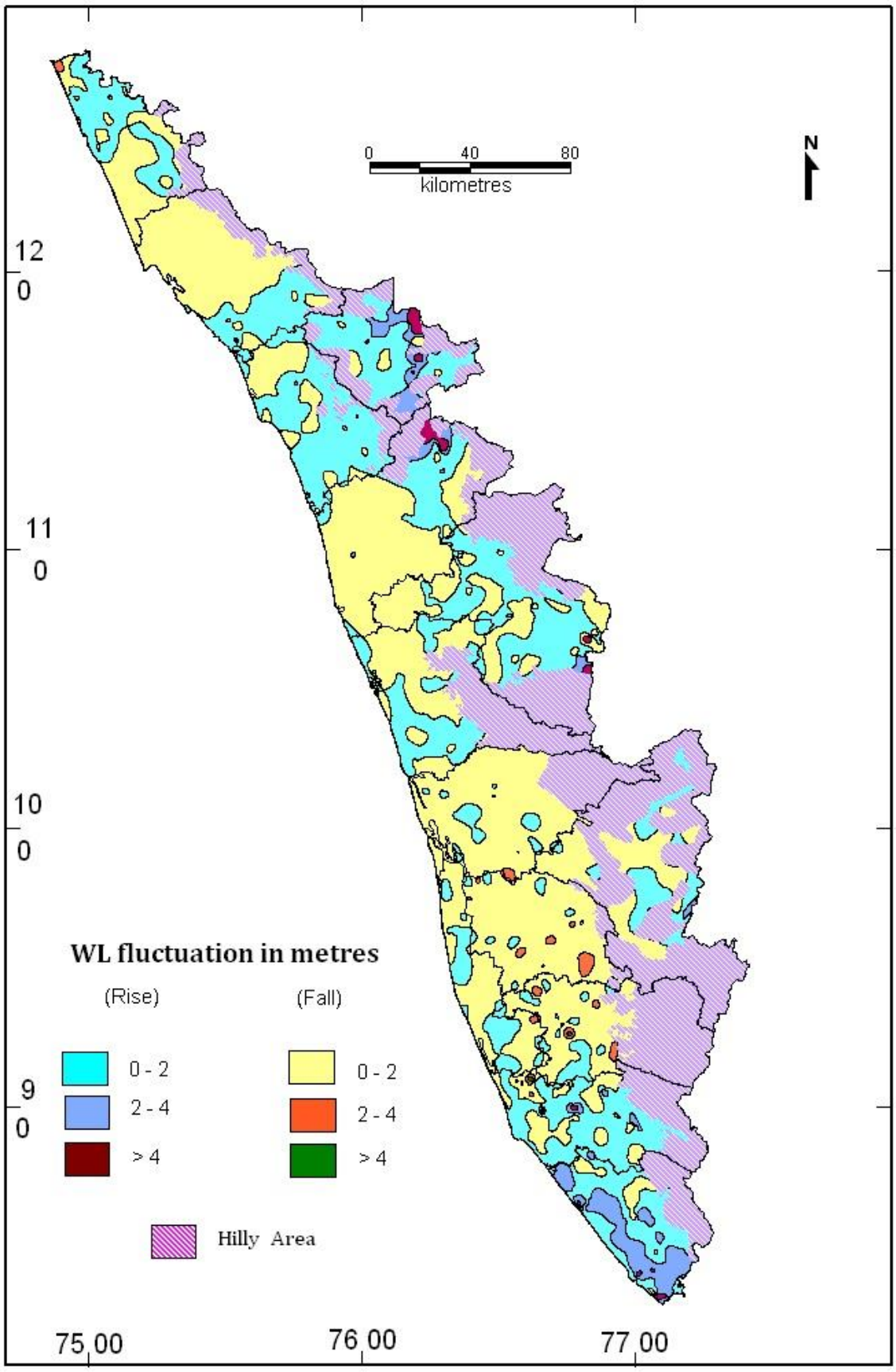


Fig.6.3 Water level fluctuation with respect to mean (mean of November 2008-2017 vs November 2018)

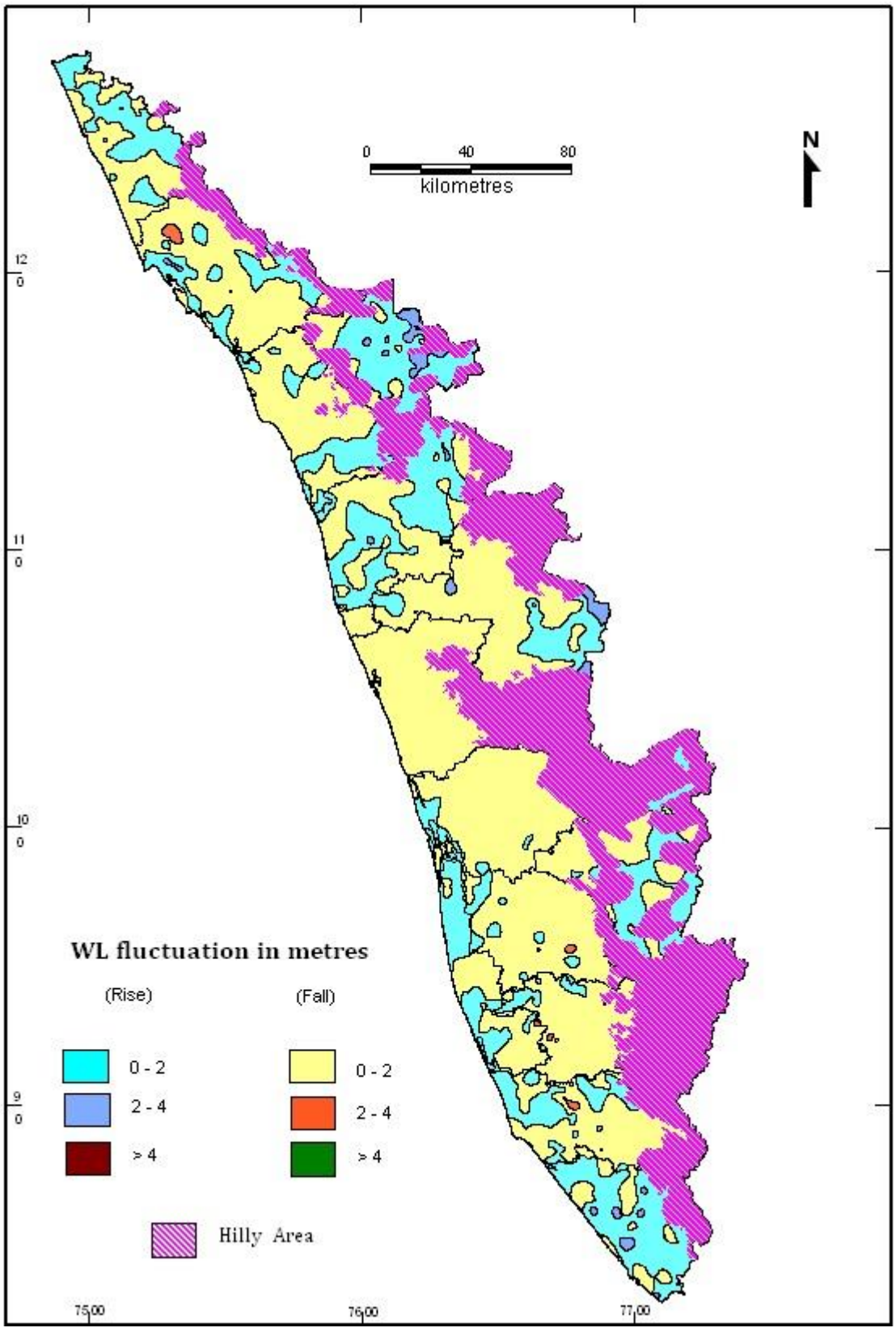


Fig.6.4 Water level fluctuation with respect to mean (mean of January 2009-2018 vs January 2019)

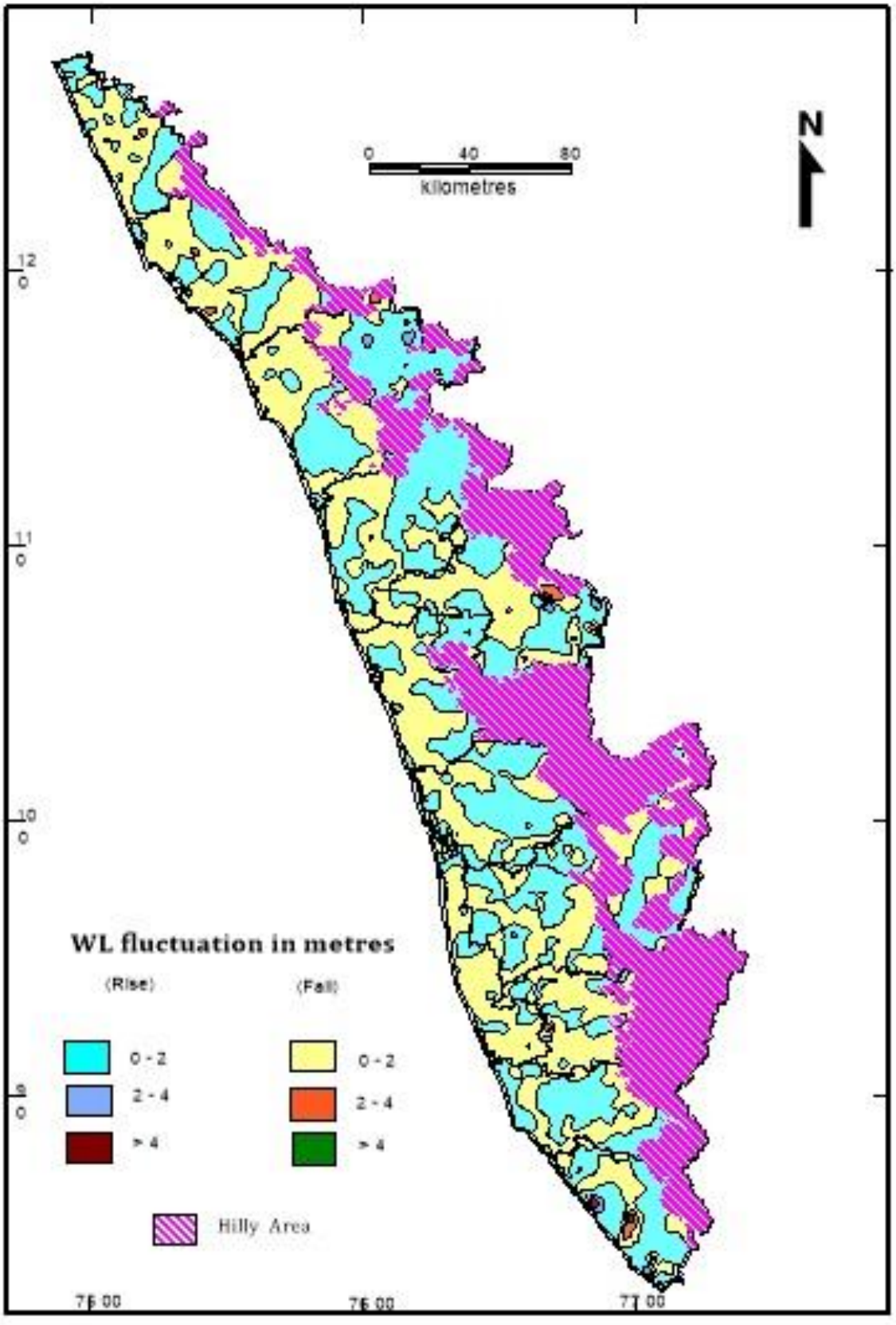


Table 6.1: District wise – Water Level Fluctuation with Mean and April 2018 (April 2018 – Mean (April 2008-2017))

District	No. of Wells	Range of Fluctuation (m)				No.& Percentage of Wells /Percentage Showing Fluctuation							Total No. of Wells	
		Rise		Fall		Rise			Fall			No Fluctuation	Rise	Fall
		Min	Max	Min	Max	0 to 2	2 to 4	>4	0 to 2	2 to 4	>4			
Alappuzha	74	0.01	1.99	0.02	1.2	58 78.38%	0	0	16 21.62%	0	0		58	16
Ernakulam	130	0.01	3.95	0.01	3.73	86 66.15%	3 2.31%	0	38 29.23%	3 2.31%	0		89	41
Idukki	69	0.05	2.41	0.01	3.13	35 50.72%	1 1.45%	0	30 43.48%	3 4.35%	0		36	33
Kannur	104	0.03	13.37	0.02	2.83	48 46.15%	5 4.81%	3 2.88%	47 45.19%	1 0.96%	0		56	48
Kasaragod	121	0.01	6.97	0.02	4.04	59 48.76	1 0.83%	2 1.65%	48 39.67%	10 8.26%	1		62	59
Kollam	105	0.02	4.50	0.01	13.78	55 52.38%	5 4.76%	1 0.95%	42 40.00%	1 0.95%	1 0.95%		61	44
Kottayam	98	0.05	3.62	0.00	2.42	58 59.18%	4 4.08%	0	34 34.69%	2 2.04%	0		62	36
Kozhikode	91	0.01	2.68	-	2.04	40 43.96%	1 1.10%	0	49 53.85%	1 1.10%	0		41	50
Malappuram	121	0.01	7.05	0.02	5.84	57 47.11%	2 1.65%	3 2.48%	52 42.98%	4 3.31%	2 1.65%	1 0.83%	62	58
Palakkad	141	0.02	10.17	0.02	22.60	62 43.97%	2 1.42%	3 2.13%	57 40.13%	9 6.38%	7 4.96%	1 0.71%	67	73
Pathanamthitta	88	0.00	2.42	0.02	5.45	48 54.55%	1 1.14%	0	35 39.77%	3 3.41%	1 1.14%		49	39
Thiruvananthapuram	126	0.01	6.05	0.03	6.21	64 50.79%	6 4.76%	1 0.79%	50 39.68%	3 2.38%	2 1.58%		71	55
Thrissur	107	-	5.43	0.00	4.22	45 42.06%	0	2 1.87%	57 53.27%	2 1.87%	1 0.93%		47	60
Wayanad	70	0.00	1.24	0.01	6.04	24 34.29%	0	0	42 60.00%	3 4.29%	1 1.43%		24	46
Total	1445	0.00	13.37	0.00	22.60	**739** 51.14%	**31** 2.14%	**15** 1.03%	**579** 40.07%	**45** 3.11%	16 1.11%	**2** **0.14%**	**785** 54.32%	**658** 45.53%

Table 6.2: District wise – Water Level Fluctuation and Frequency distribution for different range between Decadal Mean (August 2008-2017) and August 2018

District	No. of Wells	Range of Fluctuation (m)				No. &Percentage of Wells /Percentage Showing Fluctuation						Total No. of Wells	
		Rise		Fall		Rise			Fall			Rise	Fall
		Min	Max	Min	Max	0 to 2	2 to 4	>4	0 to 2	2 to 4	>4		
Alappuzha	79	0.00	1.92	0.03	3.34	30 37.97%	0	0	48 60.76%	1 1.27%	0	30	49
Ernakulam	130	0.02	1.28	0.01	2.78	15 11.54%	0	0	108 83.08%	7 5.38%	0	15	115
Idukki	70	0.00	3.12	0.01	1.85	24 34.29%	2 2.86%	0	44 62.86%	0	0	26	44
Kannur	106	0.01	13.32	0.01	3.99	42 39.62%	3 2.83%	1 0.94%	59 55.66%	1 0.94%	0	46	60
Kasaragod	123	0.00	5.70	0.01	3.06	62 50.41%	0	1 0.81%	57 46.34%	2 1.63%	0	63	59
Kollam	100	0.01	5.03	0.00	4.96	52 52.00%	5 5.00%	3 3.00%	35 35.00%	4 4.00%	1 1.00%	60	40
Kottayam	100	0.02	0.90	0.00	2.97	13 13.00%	0	0	79 79.00%	8 8.00%	0	13	87
Kozhikode	92	0.01	2.39	0.00	2.12	53 57.61%	5 5.43%	0	33 35.87%	1 1.09%	0	58	34
Malappuram	124	0.00	6.35	0.01	4.07	36 29.03%	5 4.03%	4 3.23%	75 60.48%	3 2.42%	1 0.81%	45	79
Palakkad	113	0.03	11.15	0.03	5.08	62 54.87%	12 10.62%	7 6.19%	30 26.55%	1 0.88%	1 0.88%	81	32
Pathanamthitta	87	0.02	1.52	0.02	4.55	27 31.03%	0	0	54 62.07%	5 5.75%	1 1.15%	27	60
Thiruvananthapuram	109	0.27	12.02	0.05	3.79	46 41.20%	38 34.86%	11 10.09%	13 11.93%	1 0.92%	1 0.92%	95	14
Thrissur	102	-	1.80	0.04	2.01	57 55.88%	0	0	44 43.14%	1 0.98%	0	57	45
Wayanad	69	0.01	7.04	0.10	0.44	44 63.77%	16 23.19%	6 8.70%	3 4.35%	0	0	66	3
TOTAL	**1404**	**0.00**	**13.32**	**0.00**	**5.08**	**562**	**86**	**33**	**682**	**35**	**5**	**681**	**722**

Table 6.3: District wise – Water Level Fluctuation with Mean and November 2018 (November 2018 – Mean (November 2008-2017))

District	No. of Wells	Range of Fluctuation (m)				No. &Percentage of Wells /Percentage Showing Fluctuation						Total No. of Wells	
		Rise		Fall		Rise			Fall			Rise	Fall
		Min	Max	Min	Max	0 to 2	2 to 4	>4	0 to 2	2 to 4	>4		
Alappuzha	78	0.01	1.93	0.02	7.15	42 53.85%	0	0	34 43.59%	1 1.28%	1 1.28%	42	36
Ernakulam	134	0	1.39	0.01	2.25	46 34.33%	0	0	87 64.93%	1 0.75%	0	46	88
Idukki	72	0.01	1.99	0.0	1.51	33 45.83%	0	0	39 54.17%	0	0	33	39
Kannur	106	0.01	10.47	0.02	3.04	36 33.96%	2 1.89%	2 1.89%	63 59.43%	3 2.83%	0	40	66
Kasaragod	123	0.0	1.62	0.0	3.64	51 41.46%	0		69 56.1%	2 1.63%	0	51	71
Kollam	105	0.01	2.53	0.01	5.04	30 20.57%	2 1.89%	0	66 62.86%	6 5.717%	1 0.95%	32	73
Kottayam	96	0.03	3.17	0.0	2.85	13 13.54%	1 1.04%	0	78 81.25%	4 4.17%	0	14	82
Kozhikode	92	0.03	2	0.0	2.16	29 31.52%	0	0	62 67.39%	1 1.09%	0	29	63
Malappuram	125	0.02	3.48	0.01	3.58	62 49.6%	4 3.2%	0	58 46.4%	1 0.8%	0	66	59
Palakkad	141	0.02	11.75	0.02	4.31	42 29.79%	10 7.09%	4 2.84%	79 56.03%	5 3.5%	1 0.71%	56	85
Pathanamthitta	86	0.01	1.4	0.07	3.08	19 22.09%	0	0	64 74.42%	3 3.49%	0	19	67
Thiruvananthapuram	115	0.01	8.25	0.04	3.5	72 62.61%	8 6.9%	4 3.48%	28 24.35%	3 2.61%	0	84	31
Thrissur	110	0.01	1.7	0.06	3.34	16 14.55%	0	0	88 80.00%	6 5.45%	0	16	94
Wayanad	70	0	4.12	0.03	1.9	38 34.29%	12 17.14%	1 1.43%	19 27.14%	0	0	51	19
Total	**1453**	**1.39**	**0.03**	**0.0**	**7.15**	**529 36.4%**	**39 2.68 %**	**11 0.76%**	**834 57.39%**	**36 2.48%**	**3 0.21%**	**579 39.85%**	**873 60.08%**

Table 6.4: District wise – Water Level Fluctuation and frequency distribution for different ranges from January 2019 -decadal mean (January 2009-2018)

District	No. of Wells	Range of Fluctuation (m)				No. &Percentage of Wells /Percentage Showing Fluctuation						Total No. of Wells	
		Rise		Fall		Rise			Fall			Rise	Fall
		Min	Max	Min	Max	0 to 2	2 to 4	>4	0 to 2	2 to 4	>4		
Alappuzha	80	0.00	0.81	0.01	3.74	21 26.25%	0	0	56 70.00%	2 2.50%	0	21	58
Ernakulam	134	0.01	2.14	0.00	3.95	65 48.51%	1 0.75%	0	66 49.25%	1 0.75%	0	66	67
Idukki	71	0.01	1.76	0.00	1.72	39 54.93%	0	0	32 45.07%	0	0	39	32
Kannur	103	0.03	1.53	0.02	3.95	42 40.70%	0	0	57 55.34%	4 3.88%	0	42	61
Kasaragod	122	0.02	2.13	0.00	2.39	52 42.28%	2 1.63%	0	63 51.22%	4 3.30%	0	54	67
Kollam	111	0.01	2.36	0.00	1.84	64 56.64%	1 0.88%	0	46 40.71%	0	0	65	46
Kottayam	99	0.02	2.37	0.00	1.86	50 50.51%	1 1.01%	0	48 48.48%	0	0	51	48
Kozhikode	92	0.02	1.99	0.00	2.71	43 46.74%	0	0	48 52.17%	1 1.09%	0	43	49
Malappuram	121	0.00	1.81	0.03	1.44	76 60.32%	0	0	45 35.71%	0	0	76	45
Palakkad	129	0.01	2.48	0.02	3.46	60 44.12%	4 2.94%	0	61 44.85%	4 2.94%	0	64	65
Pathanamthitta	90	0.01	2.02	0.01	4.23	26 28.89%	1 1.11%	0	62 68.89%	0	1 1.11%	27	63
Thiruvananthapuram	107	0.04	5.58	0.01	4.60	72 66.06%	3 2.75%	2 1.86%	27 24.77%	2 1.83%	1 0.92%	77	30
Thrissur	115	0.01	4.33	0.00	3.85	50 43.48%	0	1 0.87%	62 53.91%	2 1.74%	0	51	64
Wayanad	70	0.01	2.54	0.08	2.45	46 65.71%	4 5.71%	0	18 25.71%	2 2.86%	0	50	20
Total	**1444**	**0.00**	**5.58**	**0.00**	**4.6**	**706 48.89%**	**17 1.17%**	**03 0.20%**	**691 47.85%**	**22 1.52%**	**2 0.13%**	**726 50.27%**	**715 49.51%**

7. Long term ground water level trend

The long-term water level data was analyzed for the period of 2009-2018. The analysis of pre-monsoon water level trend for the last decadal period (i.e. during 2009– 2018) indicates that only 35.8% of GWMWs have recorded negligible change in water level in the range of +0.05 to –0.05 m/year. 26.66 % of monitoring wells have recorded declining trend in the range of 0.05 to 0.2 m/year 14.4 % of monitoring wells have recorded declining trend above 0.2 m/year while 6.8% of monitoring wells have recorded rising trend above 0.2 m/year. 16.4% of monitoring wells show rise in the range of 0.05 to 0.2 m/year. From the above data, it is clear that the long-term trend for the pre-monsoon period indicates an overall fall in water level. The maps showing pre-monsoon water level trend for the period 2009-2018 is shown in fig. 7.1

The analysis of post-monsoon water level trend for the last decadal period (i.e. during 2009– 2018) indicates that 33.64 % of GWMWs have recorded negligible change in water level in the range of +0.05 to –0.05 m/year. The 33.07 % of monitoring wells have recorded declining trend in the range of 0.05 to 0.2 m/year and 11.74 % of monitoring wells have recorded declining trend above 0.2 m/year. 14.46 % of monitoring wells have recorded rising trend in the range of 0.05 to 0.2 m/year and 8.07 % of monitoring wells have recorded rising trend above 0.2 m/year. The data analysis indicates that the long-term ground water level trend shows a falling trend in major portions of the state. The maps showing post-monsoon water level trend for the period 2009-2018 is shown in fig. 7.2

Typical hydrographs showing insignificant change in water level are depicted in Fig.s 7.3 & 7.4. Many of the monitoring wells which are showing declining pre-monsoon water level, have a rising or a steady post monsoon water level trend, indicate resilience of water level with recharge in the aquifer system and safe levels of ground water extraction. (Fig.7.5 & 7.6). A few monitoring wells like Palakkad, Angadikkal North, Pathanamthitta District have shown falling trend of both pre-monsoon and post-monsoon water levels (Fig.7.7 & 7.12) indicating over exploitation or reduced recharge in the area.

Fig.7.1 Pre-monsoon water level trend map (2009-2018), Kerala

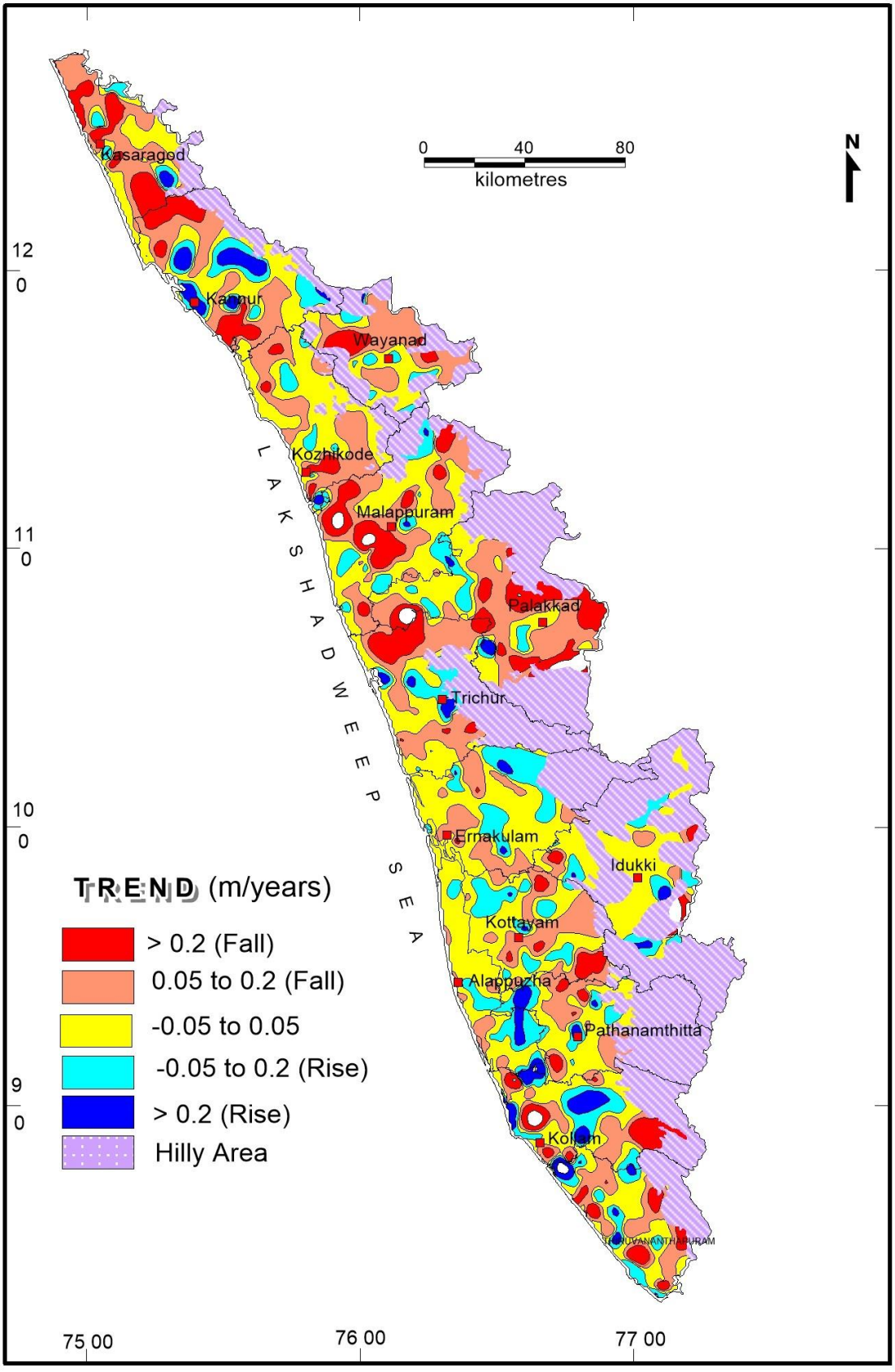


Fig.7.2 Post-monsoon water level trend map (2009-2018), Kerala

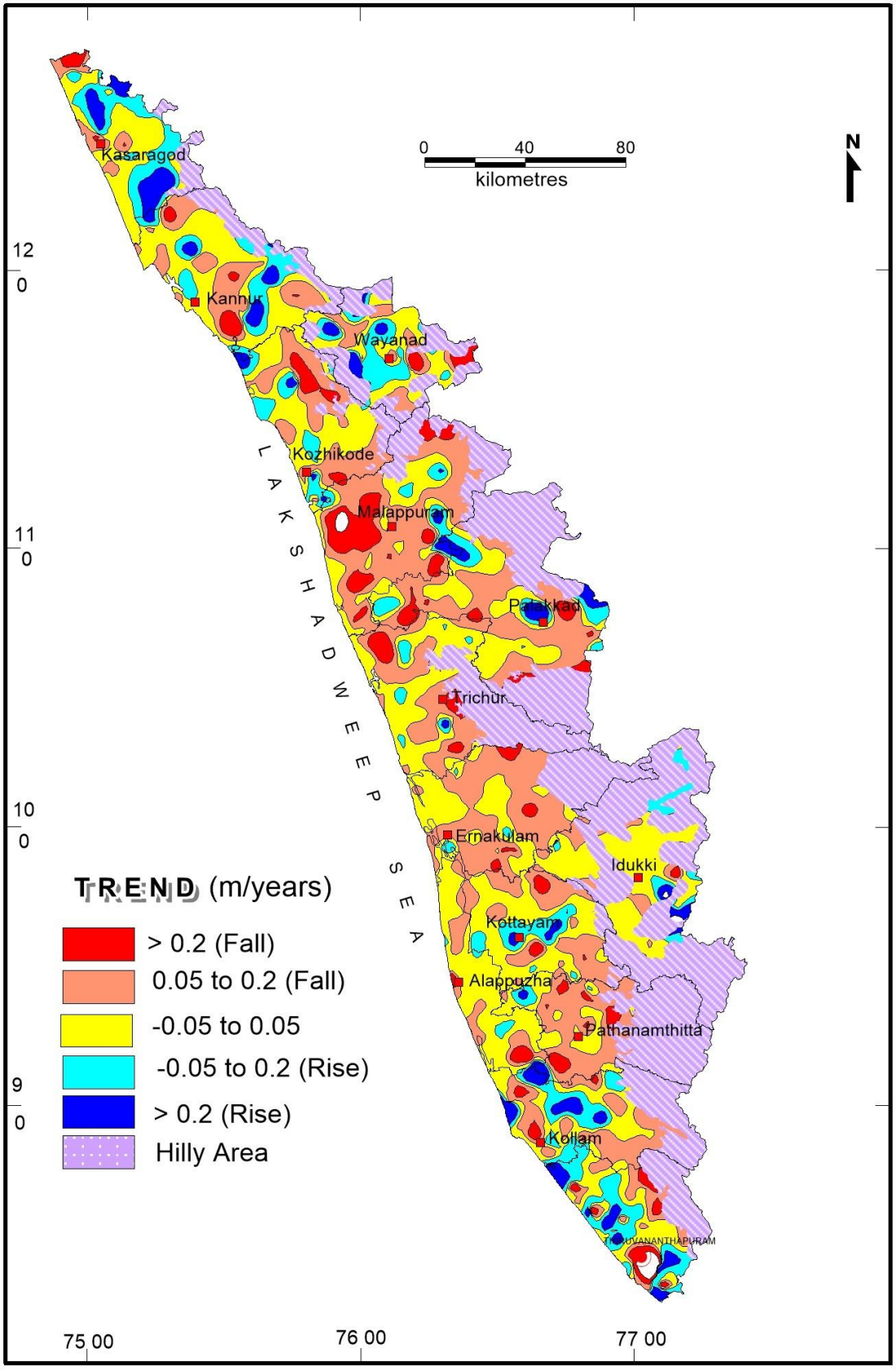


Fig.7.3: Hydrograph of GWMWs tapping phreatic aquifer in laterites at Arukutti, Alappuzha District

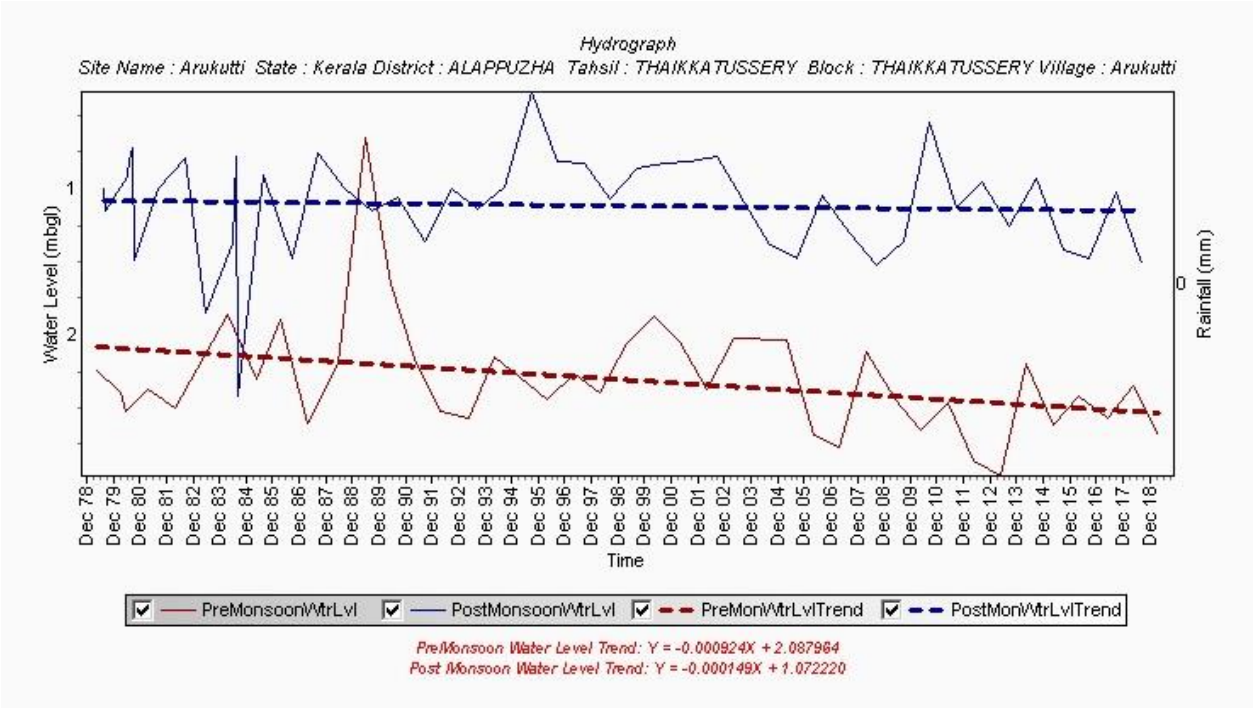


Fig.7.4: Hydrograph of GWMW tapping phreatic aquifer in laterites at Naykatti, Wayanad District

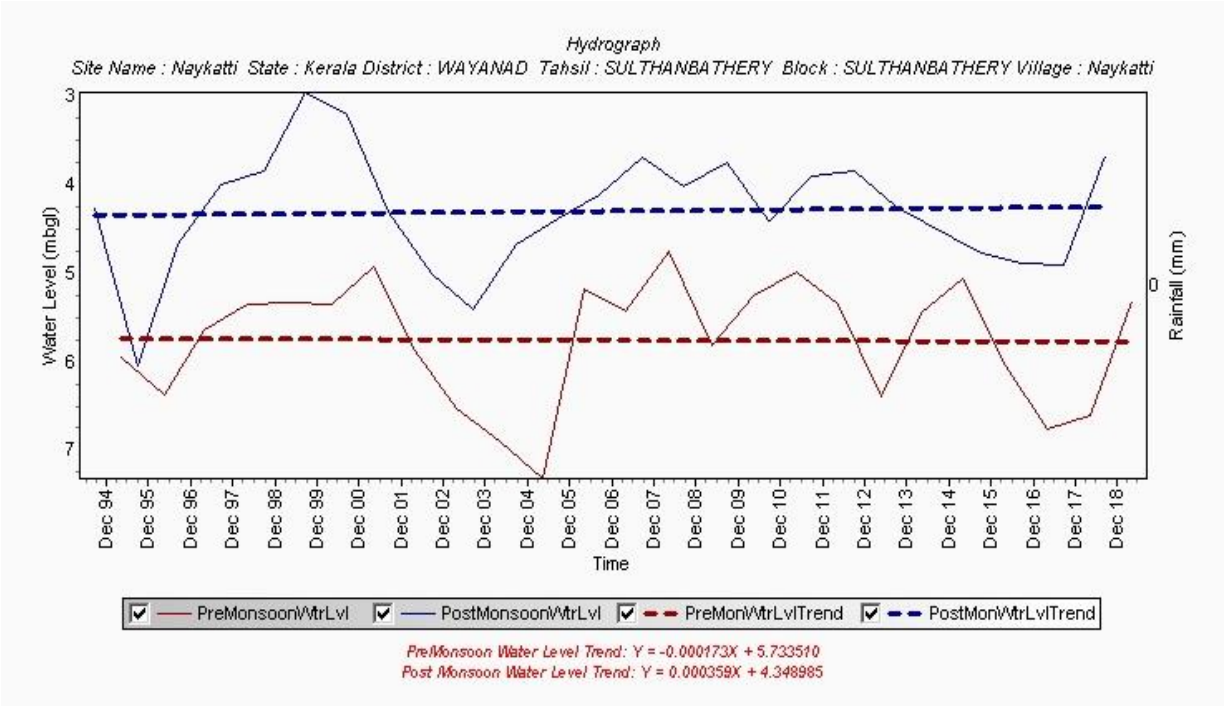


Fig7.5: Hydrograph of GWMW tapping phreatic aquifer in laterites at Naduvathumuzhi, Pathanamthitta

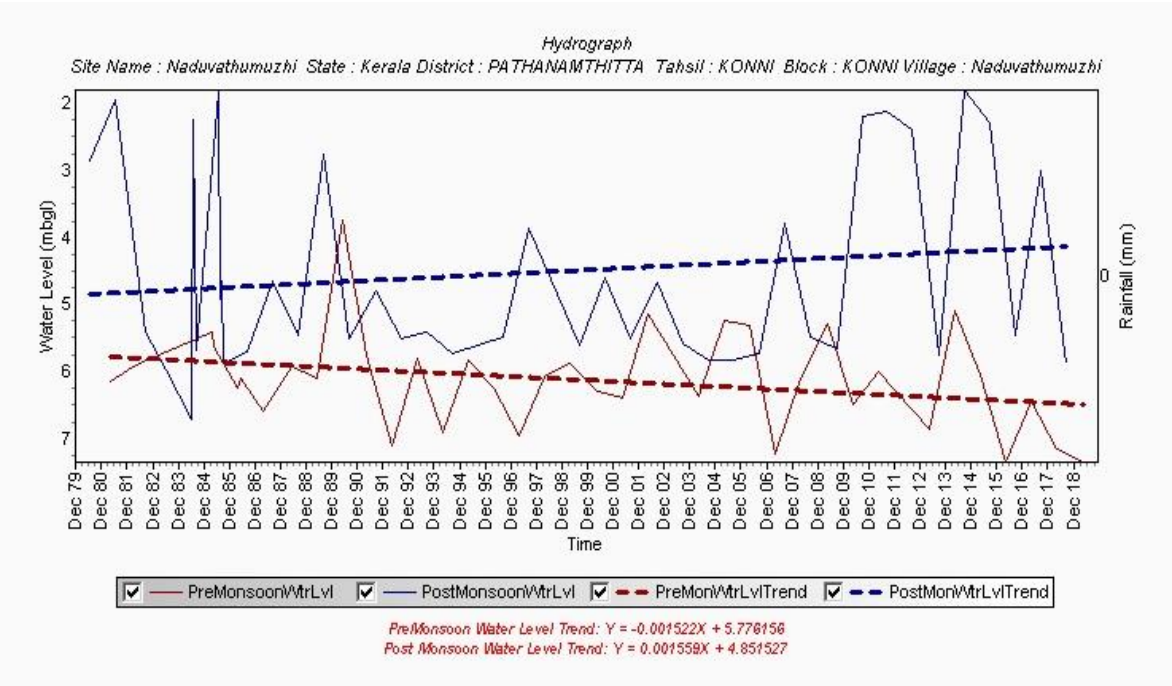


Fig.7.6: Hydrograph of GWMW tapping phreatic aquifer in laterites at Kasaragod, Kasaragod District

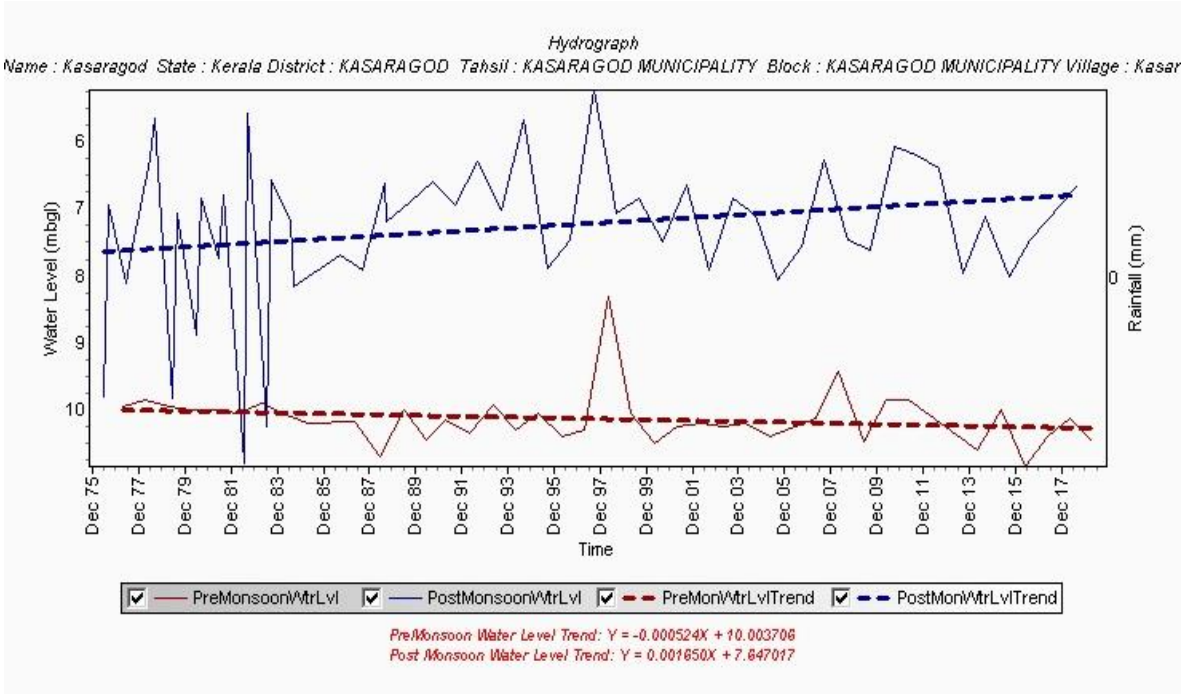


Fig.7.7: Hydrograph of GWMW tapping phreatic aquifer in laterites at Kozhikode, Kozhikode District

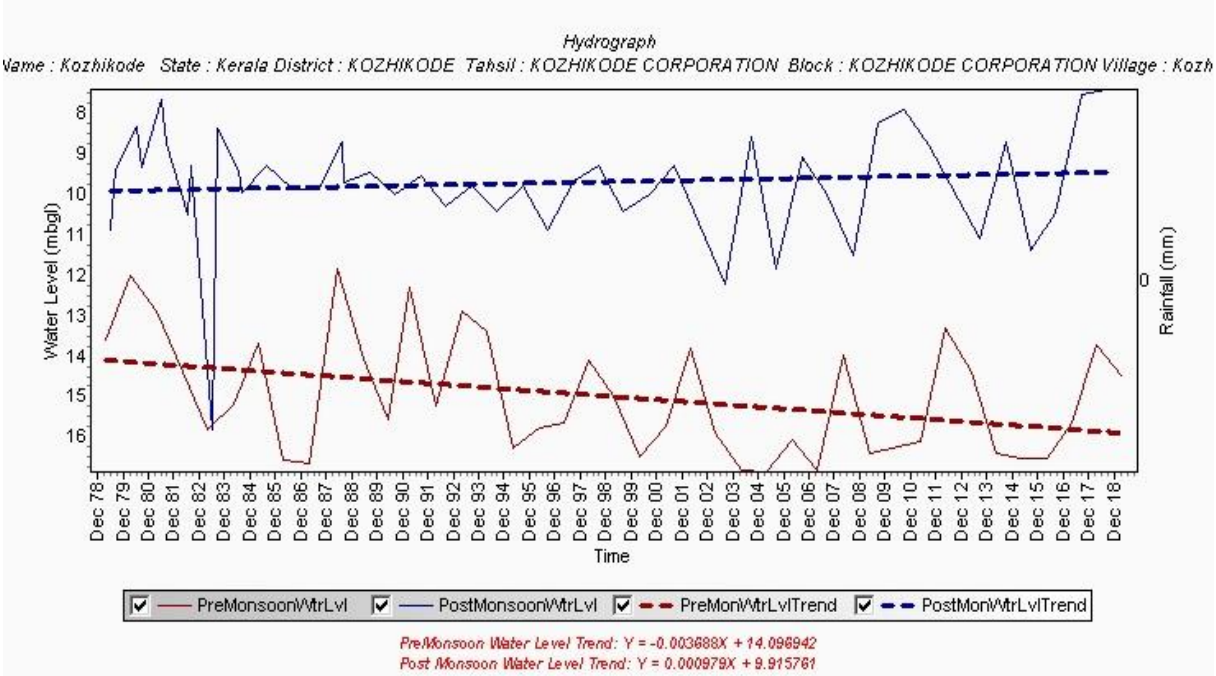


Fig.7.8: Hydrograph of GWMW tapping phreatic aquifer in weathered crystallines at Pullur, Kasaragod District

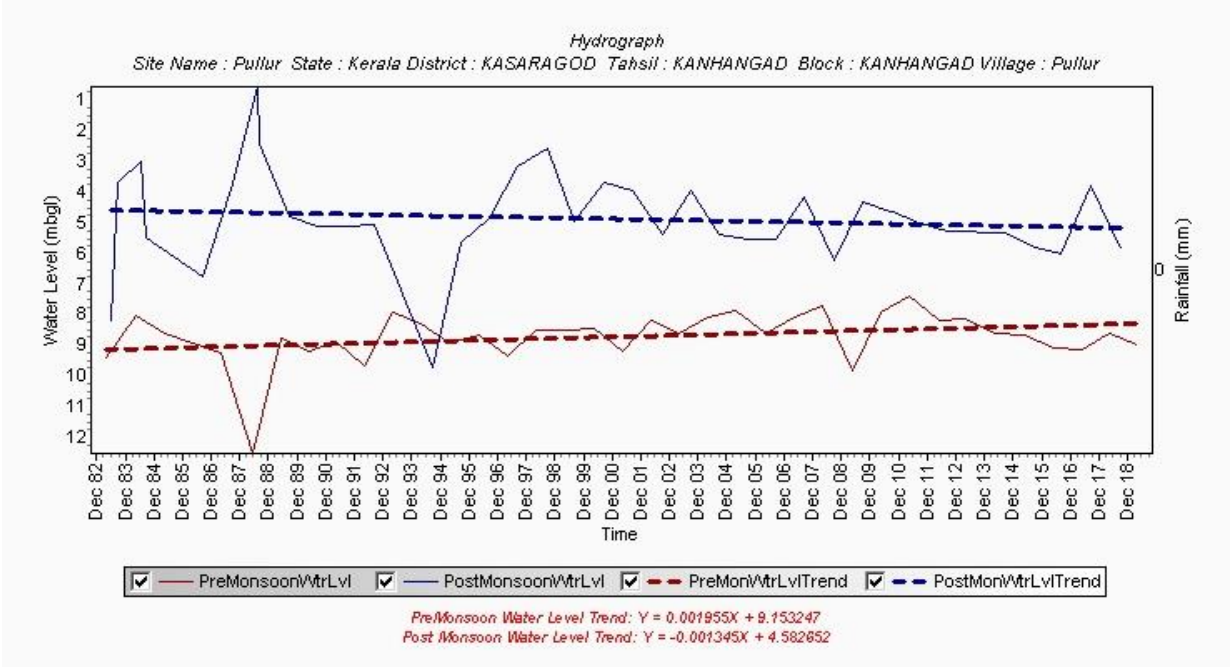


Fig.7.9: Hydrograph of GWMW tapping phreatic aquifer in laterites at Akkal, Kollam District

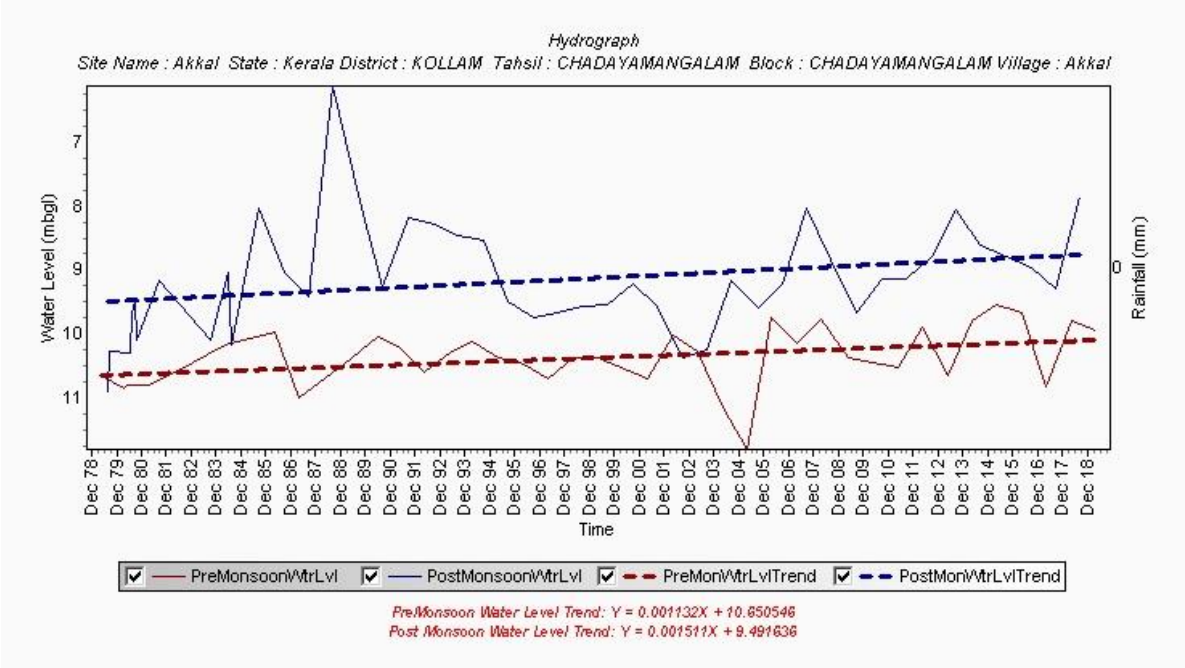


Fig.7.10: Hydrograph of GWMW tapping phreatic aquifer in laterites at Kottapadi, Ernakulam District

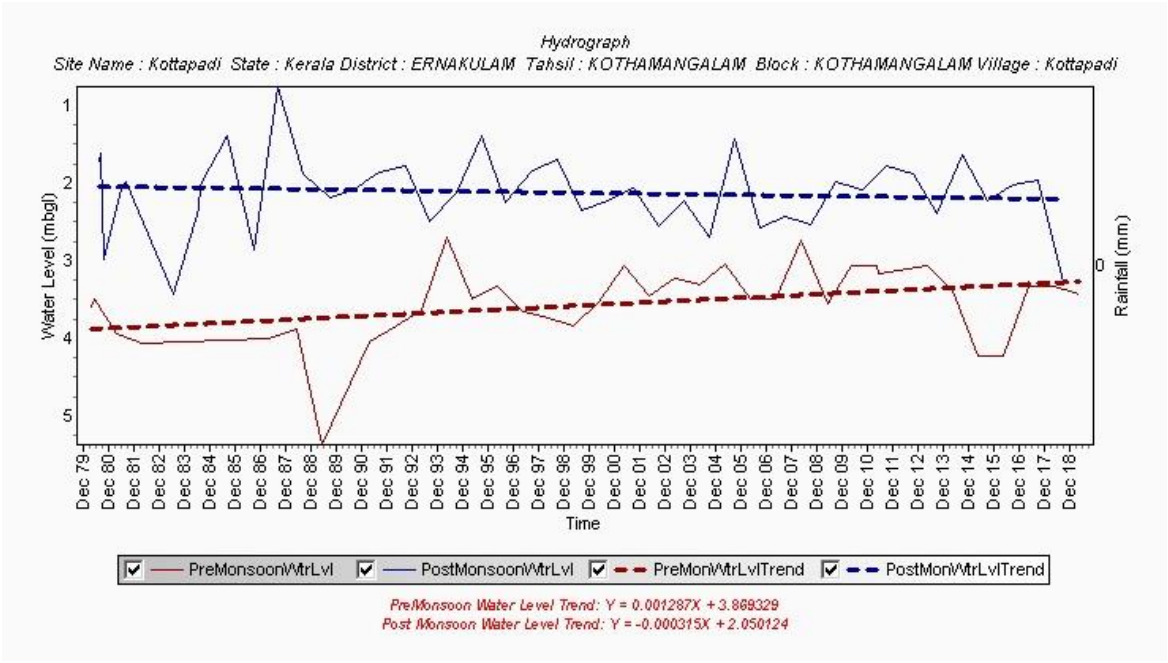


Fig.7.11: Hydrograph of GWMW tapping phreatic aquifer in laterites at Angadikkal North, Pathanamthitta District

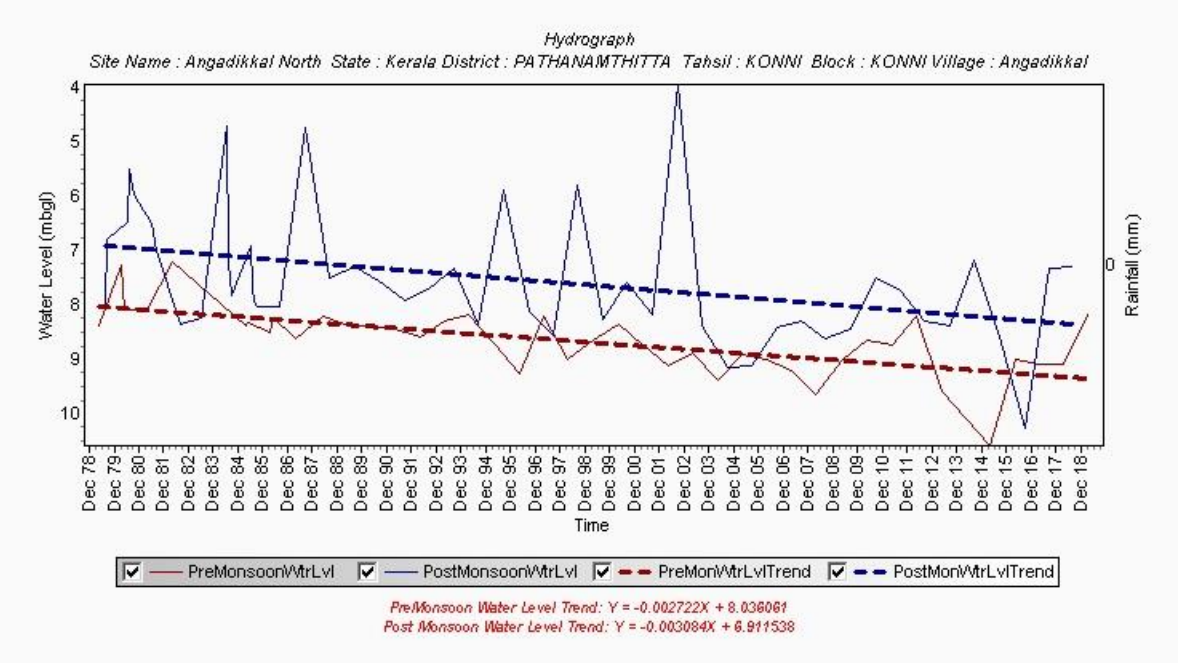
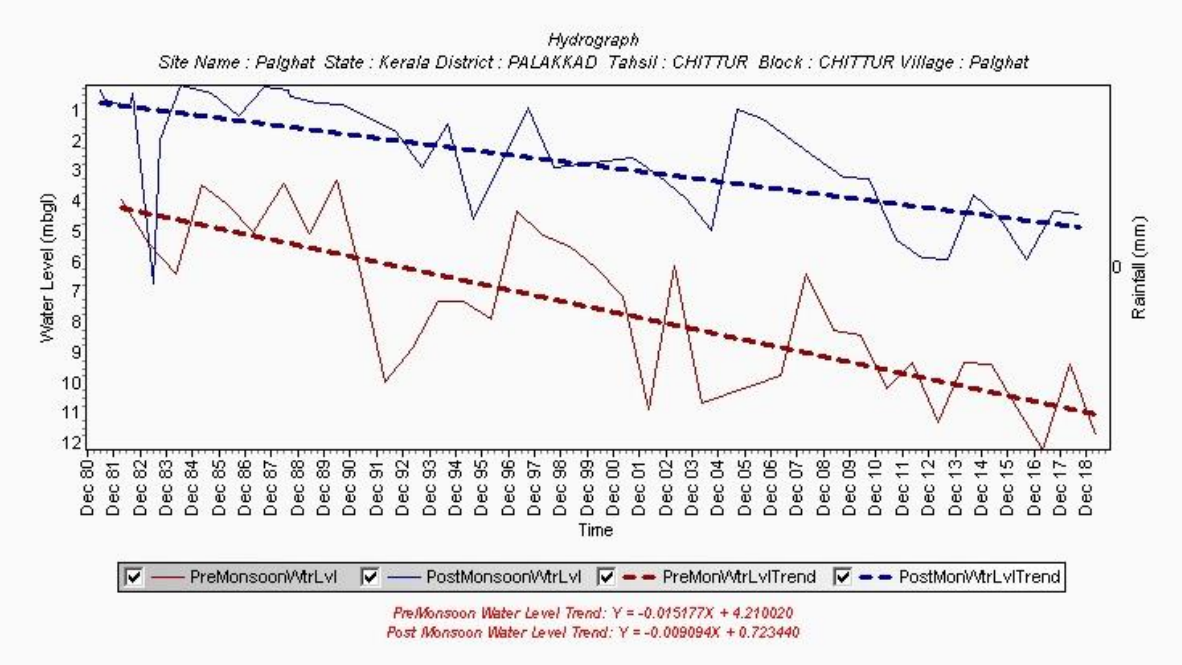


Fig.7.12: Hydrograph of GWMW tapping phreatic aquifer in laterites at Palaghat, Palakkad District



8. Behaviour of piezometric heads in deep aquifers of confined/semiconfined nature during the year 2018-2019

A total of 266 piezometers constructed by CGWB in various districts of the State are being monitored four times a year. Out of these 51 piezometers (Tube wells) are located in sedimentary areas. The depth of these piezometers ranges from 10 to 450 m. The remaining 117 piezometers (Bore wells) are in hard rock areas and the depth of these wells ranges from 10 to 300 m. About 44% of these borewells are tapping shallow fracture zones within 30 metres depth. Water level from these wells are being monitored periodically during the months of April, August, November and January. The analysis of the data acquired from these piezometers is discussed below.

8.1 Sedimentary area

In the deeper aquifers of Tertiary age, ground water occurs under confined / semi-confined conditions. In the shallow aquifers in Tertiary formation in northern Kerala and in Recent alluvial formations in coastal plains, ground water occurs under unconfined to semi-confined condition. The piezometric heads in these aquifers is at about 18 m. amsl in the eastern boundary of recharge areas of Tertiary beds and reduced to near MSL in coastal areas. The depth to piezometric heads in deep tube wells tapping confined aquifers ranges from 0.92 to 63.0 mbgl during April 2018 (premonsoon). The annual fluctuation of the piezometric head in the year 2018–19 is mostly restricted to 3 metres. Free flowing wells are also encountered in some places and the decline in head with time is inferred from the reduction in free flow. Analysis of the long term piezometric head data of deeper aquifers at Karthikapally tapping Quilon and Warkali formations are showing a declining trend in both during pre-monsoon and post-monsoon. Hydrographs of piezometers at Karthikapally (Alleppey District) tapping Warkali and Quilon aquifers are shown in Fig. 8.1 & 8.2.

8.2 Crystalline Area

In hard rock areas, groundwater occurs under confined / semi-confined conditions in the deep fracture zones and unconfined to semi-confined conditions in shallow fractured

zones. The depth to piezometric heads in bore wells ranges from 0.91 to 97.5 m bgl during pre-monsoon period (April 2018). About 54.9 % of the borewells in the hard rock areas are showing piezometric head of less than 10 mbgl. The annual fluctuation of piezometric head (between April and November months) is in the range of 0.3 – 10 metres. The hydrographs of the hard rock piezometers are given in Figs. 8.3 & 8.4.

Fig 8.1: Hydrograph of Piezometer tapping Warkalai aquifer at Karthikapally, Alappuzha District

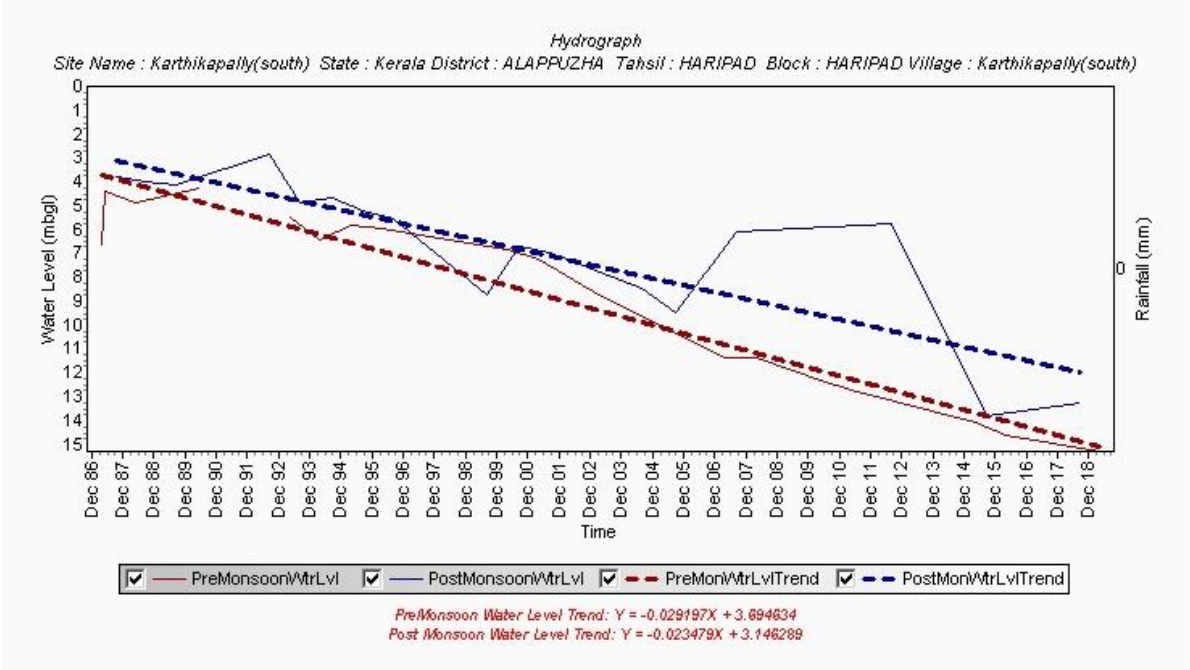


Fig 8.2: Hydrograph of Piezometer tapping Quilon aquifer at Haripad(e), Alappuzha District

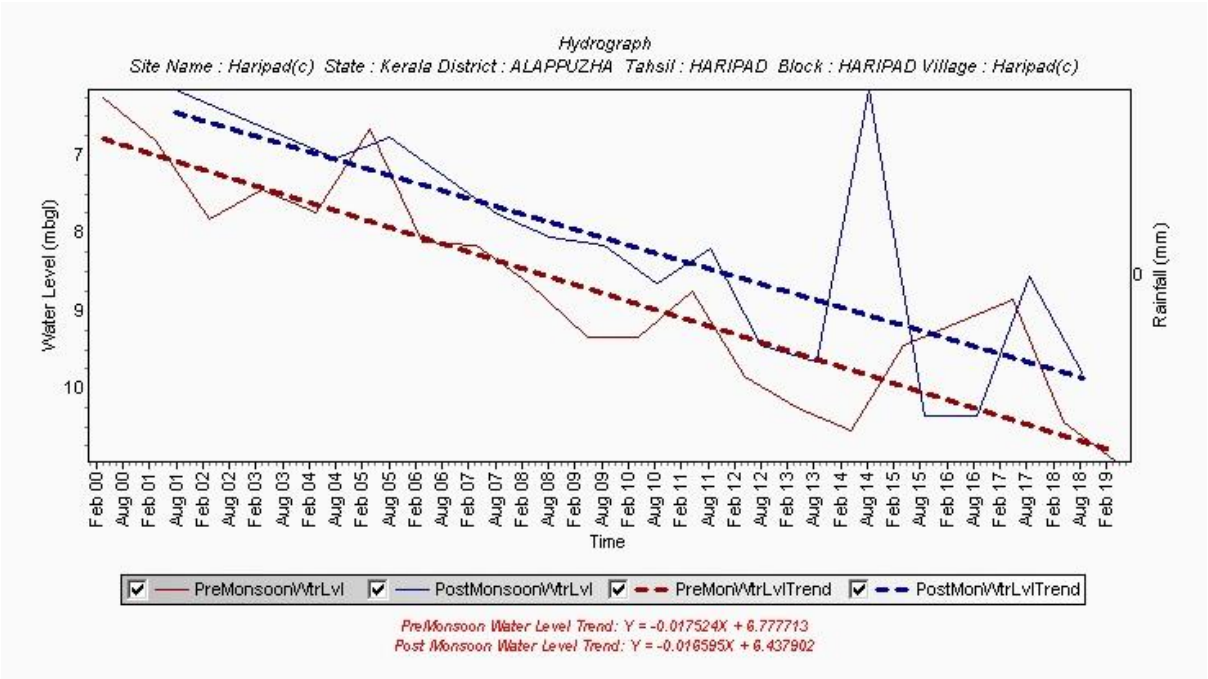


Fig. 8.3: Hydrograph of Piezometer tapping fractured aquifers at Veliyanad, Ernakulam District

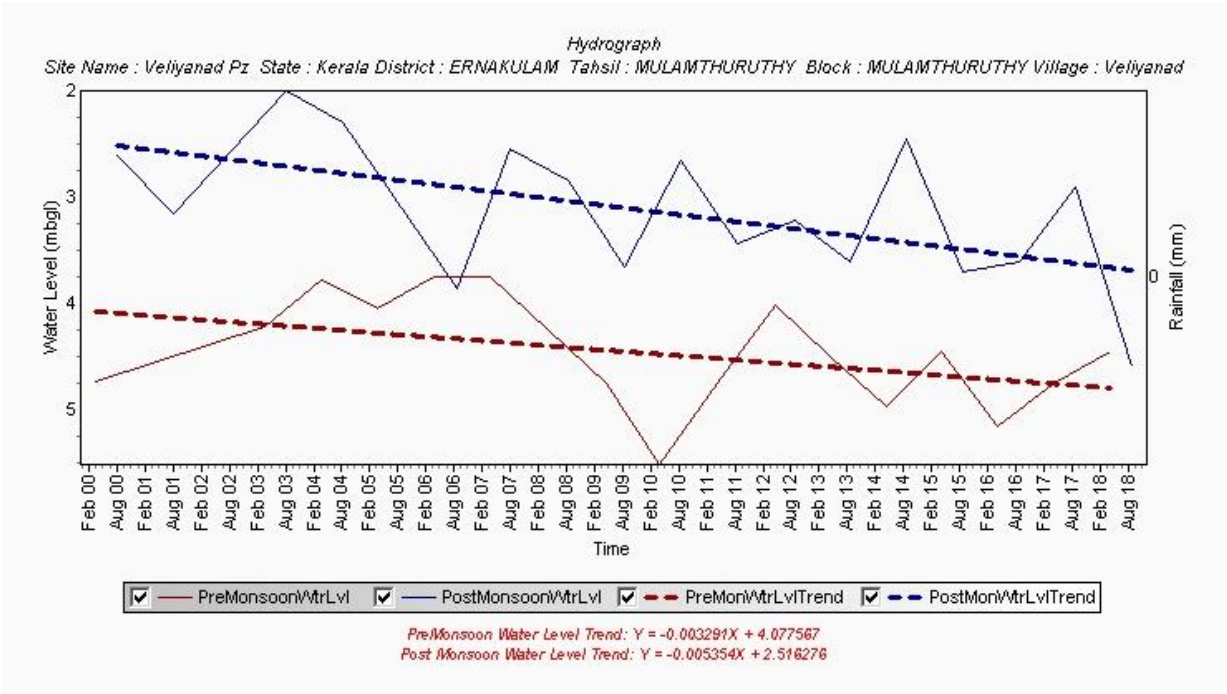
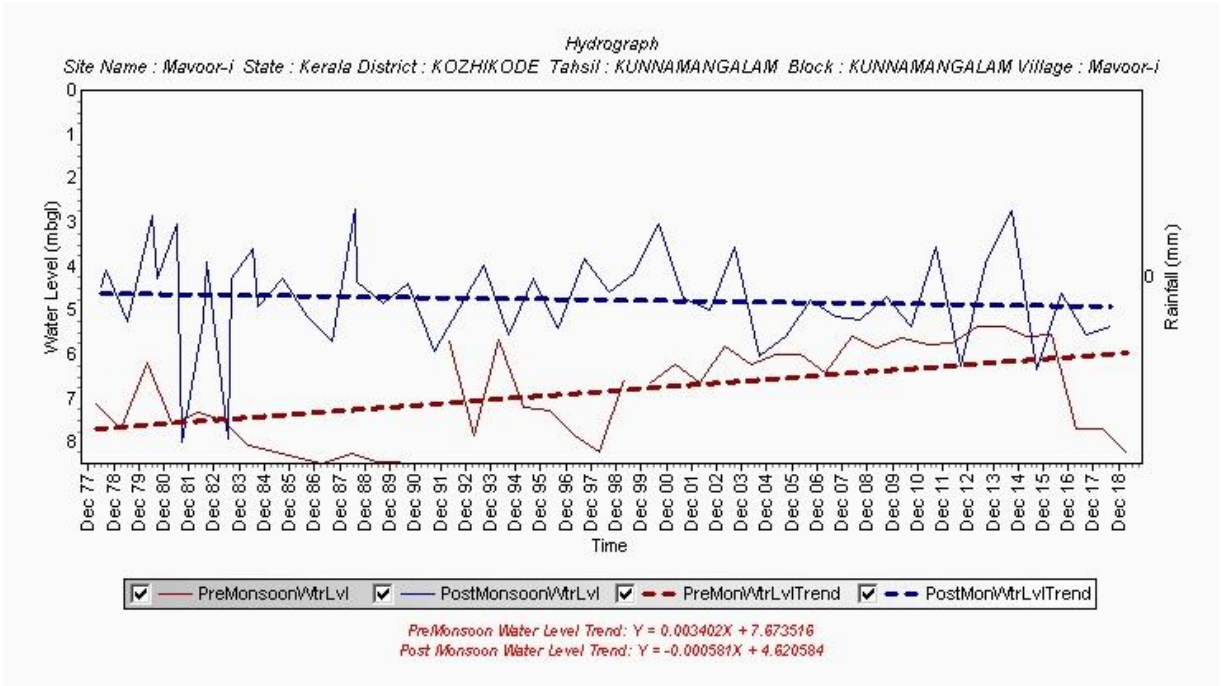


Fig. 8.4: Hydrograph of Piezometer tapping fractured aquifers at Mavoor-I, Kozhikode District



9. Hydrochemistry

9.1 Introduction

Inorganic, organic and biological constituents present in water determine its suitability for drinking, irrigation and industrial purposes. Groundwater generally has higher dissolved mineral concentrations than surface waters. This is due to the contact between the CO_2 bearing water and rocks and soils in the ground and availing the longer period of time for dissolution. Additionally, CO_2 may be added to the water in the soil by the activities of the soil microorganisms. As water leaves the soil zone and passes through the groundwater system, the concentration of organic matter greatly decreases (either through bacterial decay or adsorption) and the concentration of the common major ions increases. Contamination of groundwater depends on at least three factors, viz.

- The vulnerability of the groundwater in the particular area of contamination: This depends on types of soil and geologic characteristics of the formation, including depth to the water table, texture of the soil and bedrock characteristics. For example, groundwater underlying sandy soil is more vulnerable than groundwater under clay soil, shallow aquifers are more vulnerable than deeper aquifers.
- Well depth and construction: with shallow wells being more susceptible to contamination than deep wells and wells that are not adequately sealed at the top or defective in construction bringing in contamination
- The availability of excess pollutants leaching to the groundwater: which may be either due to seepage of industrial pollutants, chemical fertilizers and pesticides in agricultural fields or mineral constituents in the formation itself where ground water occurs.

9.2 Water Quality Monitoring

In order to assess the water quality as well as to understand changes in water quality over time and space CGWB Kerala Region is maintaining about 362 water quality monitoring stations (dug wells) and 30 trend cum surveillance stations in the State. All major ions, fluoride, electrical conductivity and pH are evaluated for the water samples collected from the groundwater quality station (Ground Water Monitoring Wells) once in every year in the month of April. Intermittently, as per specific monitoring programmes minor and trace elements such as Iron, Arsenic, Cadmium, Strontium etc are also monitored. Fluoride and Iron are monitored from trend cum surveillance stations four times in a year coinciding with water level monitoring periods.

9.3 Methods and Methodology

Water quality investigations are conducting in the Chemical Laboratory of Central Ground Water Board (CGWB), Kerala Region, Trivandrum. The chemical Laboratory of CGWB, Kerala Region is equipped with all the major instruments like Atomic Absorption Spectrophotometer, UV-VIS Spectrophotometer, Visible Spectrophotometer, Flame photometer, Nephelo Turbidity meter, P^H meter and EC meter to carry out the analytical work. To determine the various parameters in the chemical laboratory, the analytical methods followed are as per Standard Methods (APHA, 2012), are summarized in Table-9.1. The chemical quality of shallow ground water in Kerala State has been evaluated by sampling and analyzing the water samples from Ground Water Monitoring Wells (GWMW). The samples are collected during the month of April representing the pre-monsoon quality. So as to minimize the effects of biological activities and pollution from point sources the water samples are collected from the wells in the month of April. During April 2018, 607 water samples were collected and analyzed for pH, EC, total hardness, calcium, magnesium, sodium, potassium, carbonate, bicarbonate, sulphate, chloride, fluoride and nitrate concentrations. The chemical analysis data of water samples is presented in Appendix-1.

Table 9.1: Analytical method of the parameters analyzed in CGWB, KR Laboratory

#	**Parameters**	**Instrument used**	**Methods Adopted**
1	p^H	p^H Meter	Potentiometric
2	Electrical Conductivity	EC Meter	Conductivity Cell Potentiometric
3	Total Hardness	By Titration	EDTA Titrimetric
4	Calcium	By Titration	EDTA Titrimetric
5	Magnesium		By Computation using 'TH' and 'Ca' Data
6	Sodium	Flame Photometer	Flame Emission Photometry
7	Potassium	Flame Photometer	Flame Emission Photometry
8	Carbonate	By Titration	Volumetric Analysis
9	Bicarbonate	By Titration	Volumetric Analysis
10	Chloride	By Titration	Argentometric
11	Sulphate	Spectrophotometer& Nephelo Turbidimeter	Turbidimetric
12	Fluoride	Spectrophotometer& Ion Meter	SPADNS Method & With ION Selective Electrode
13	Nitrate	UV-VIS Spectrophotometer	Ultraviolet Spectrophoto metric Screening
14	Phosphate	Spectrophotometer	Stannous Chloride Method
15	Silicate	Spectrophotometer	Molybdosilicate Method
16	Boron	Spectrophotometer	Carmine Method
17	Bromide	Ion Meter	With ION Selective Electrode
18	Iodide	Ion Meter	With ION Selective Electrode
19	Heavy Metals	Atomic Absorption Spectro photometer	Flame Atomic Absorption Method

(APHA, 2012)

During the year 2018-2019, 607numbers of water samples were received from 14 districts of Kerala state. Ground water samples have been analyzed and have interpreted for this study. 13 chemical variables (specific conductance, pH, Total Hardness, Ca, Mg, Na, K, Cl, SO_4, NO_3, CO_3, HCO_3, and F) were analyzed for NHS. The range of chemical parameters in the study area based on the data 2018 (Premonsoon) are given table 9.2. Detailed Chemical analysis data of the samples summarized in Annexure No 1.

Table 9.2: The range of chemical parameters in the study area of CGWB –KR Region

#	PARAMETER	UNIT	RANGE	
			MIN	MAX
1	pH	……..	3.0	8.89
2	Specific Conductance	µS/cm @ $25^0{}_C$	28.0	2900
3	Chloride	mg/l	1.4	764
4	Fluoride	mg/l	ND	1.29
5	Nitrate	mg/l	0	244
6	Total hardness as CaCO3	mg/l	2	565
7	Calcium	mg/l	0	154
8	Magnesium	mg/l	0	154
9	Sulphate	mg/l	ND	227
10	Sodium	mg/l	2.62	360
11	Potassium	mg/l	0.06	81

Discussion

In Kerala State a vast majority of the area, quality of groundwater is suitable for domestic, irrigation and industrial purposes. The chemical contamination of groundwater in the State in some parts is due to agricultural activities, industrialisation and other human interventions. Geogenic contamination of groundwater is identified in certain areas of Palakkad and Alappuzha districts registering relatively higher Electrical conductivity and fluoride concentration. The major hydro chemical findings with different parameters in this region are as follows.

Electrical Conductivity

The electrical conductivity of water is its ability to carry electric current. The ions of the constituents dissolved in water are responsible for conducting the electric current. Hence the electrical conductivity value is proportional to the constituents dissolved in the water and the measurement of electrical conductivity can be used to find out the total dissolved solids of the sample. Kerala state receives a very good amount of rain during the monsoon period. Because of this intense rainfall and steep topographic gradient actively flushes the products of

weathering leading to low dissolved solids in ground water. Also ground water is generally filtered and purified naturally by the earth.

As per the data presented in the Appendix I, the shallow ground water in Kerala State is generally of good quality. Out of 607water samples, the electrical conductivity value of 531 (87.1%) water samples are in the range 0-500 microsiemens/cm at 25^0C, 64 (10.6%) water samples are in the range of 501-1000 microsiemens/cm at 25^0C and 12 (1.9%) water samples are in the range 1001-2000 microsiemens/cm at 25^0C. The highest electrical conductivity value of > 2000 microsiemens/cm at 25^0C is registered in some wells in Ernakulam District as shown in Table 9.3. The locations where the electrical conductivity value had exceeded 1000 microsiemens/cm at 25^0C in districts are all in Coastal plains. Due to closeness to sea and backwaters even during the summer months a marginal increase of dissolved solids is observed in the wells situated in coastal area.

Table 9.3: Showing Wells having EC > 2000 µS/cm at 25^0C

#	District	Location	MS/cm at 25^0C
1	Ernakulam	Cheriyakadavu	2300
2	Ernakulam	Elur North	2900
3	Ernakulam	Chellanum	2300
4	Ernakulam	Kandakadavu	2500

The frequency distribution of electrical conductivity data of Ground Water Monitoring Wells of Kerala State is presented in state wise, district wise and formation wise in Tables 9.4 and 9.5.

Table 9.4: Frequency Distribution of Electrical Conductivity in Ground Water Monitoring Wells in Kerala State

Electrical Conductivity Range (microsiemens/cm at 25^0C)	No. of Monitoring Wells	(%)
0-500	531	87.5
501-1000	64	10.6
>1000	12	1.9

Table 9.5: District wise Frequency Distribution of Electrical Conductivity in GWMWs

#	District	Total number of Monitoring Wells	Electrical Conductivity (Micro Siemens/cm at 25^0C)					
			0-500		501-1000		>1000	
			Number of Samples	%	Number of Samples	%	Number of Samples	%
1	Kasaragod	19	19	100.0	0	0.0	0	0.0
2	Kannur	49	46	93.9	3	6.1	0	0.0
3	Kozhikode	39	33	84.6	5	12.8	5	12.8
4	Wayanad	17	15	88.2	2	11.8	0	0.0
5	Malappuram	46	40	87.0	5	10.9	1	2.2
6	Thrissur	50	42	84.0	7	14.0	1	2.0
7	Palakkad	29	14	48.3	14	48.3	1	3.4
8	Ernakulam	53	41	77.4	6	11.3	6	11.3
9	Kottayam	25	23	92.0	2	8.0	0	0.0
10	Idukki	21	18	85.7	3	14.3	0	0.0
11	Alappuzha	68	52	76.5	8	11.8	1	1.5
12	Pathanamthitta	61	52	85.2	8	13.1	1	1.6
13	Kollam	118	114	96.6	4	3.4	0	0.0
14	Thiruvananthapuram	40	36	90.0	3	7.5	1	2.5

pH

All water samples reported the pH values between 3.0 and 8.9 and are within the acceptable limit as per BIS,108 samples show pH < 6.8 while 3 samples having high pH > 8.5. The lower pH 3 may be attributed to the presence of high Nitrate, Sulphate or chloride in the water samples.

Chloride

The chloride values range from 1.14 to 764 mg/L and 98.8 % water samples reported having less than 250 mg/l. Rest 1.2 % of samples have Chloride concentration more than 250 mg/l but less than 1000 mg/L. The Chloride concentration in all samples is within the acceptable limit of BIS and can be used for all purpose. The concentration of chloride in excess of the permissible limits of BIS specification are found in some wells (>250 mg/L). On perusal of the chemical analysis data it is understood that these wells are situated either in the coastal plains Minerals in which chloride is an essential component are not very common, and chloride is more likely to be present as an impurity. The human activities might be a major factor in chloride circulation in water. Chloride compounds are used by humans in

many applications as industrial solvents, pesticides etc. and can be added to the subsurface via industrial discharges, sewage, animal wastes and in turn they are leached in to the ground water. Chloride concentration found to be in excess of BIS specifications in wells situated in the coastal plains is due to the tidal effects of sea.

Fluoride

Fluoride is one of the common elements in the earth crust, where it occurs in amounts comparable to carbon, nitrogen or chloride (McGraw-Hill 1987). It is the most electronegative of all the elements. Electronegativity is the relative tendency of an atom to acquire negative charge. In solutions, it forms F^- ions. Fluoride ions have the same charge and nearly the same radius as hydroxide ions; thus, the ions may replace each other in mineral structures.

Sources of Fluoride

Fluorite (CaF_2) is the principal fluoride bearing mineral and is a common accessory mineral in granite, granite-gneisses and pegmatite. This mineral has a rather low solubility and occurs in both igneous and sedimentary rock. Apatite [Ca_5(Cl, F, OH) $(PO_4)_3$] commonly contains fluoride. Amphiboles such as hornblende and some of the micas, may contain fluoride which has replaced part of the hydroxide. Aluminium fluoride and hydroxyl-fluoride species occurring in rocks include cryolite (Na_3AlF_6) and ralstonite. The latter mineral ranges in composition from NaMgAl (F, OH) $_{6.H2O}$ to Al_2(F, OH)$_6$. H_2O the end member of a solid solution series. These minerals are rare but could become fluoride source during weathering.

The geochemistry and genesis of high fluoride groundwater all over India has been studied by B.K. Handa (1975) and he has derived the following general characteristics which are common to high fluoride ground water.

1. High fluoride ground waters are generally associated with low calcium content, there being a negative correlation between the two ions. This is reasonable in view of the low solubility of fluorite.
2. High fluoride ground waters are generally associated with high bicarbonate ions, and in some cases with high nitrate ions.
3. Although the ground waters are generally under saturated with respect to fluorite, in many cases they are saturated or even supersaturated with respect to this mineral

4. In many cases the ground waters appear to be saturated with respect to calcite and fluorite. Fluoride is an important parameter for evaluating ground water quality. The concentration of fluoride ranges from trace to 1.29 mg/L. 99.5% of the water samples having concentration of Fluoride is less than 1.0 mg/l. Four samples having the Fluoride concentration higher than BIS limit (>1.0mg/L) (Table 6)

Table 9.6: Locations showing the Fluoride concentration higher than BIS limit (>1.0mg/L)

#	District	Location	Fluoride >1 mg/l (BIS).
1	Calicut	Beypore	1.08
2	Palakkad	Chittoor	1.06
3	Palakkad	Meenkara	1.29

Nitrate

Nitrate is an important parameter for evaluating ground water quality it ranges from Trace to 244 mg/L. Concentration of Nitrate in 92.3 % water sample from network wells shows < 45 mg/L less than BIS limit. While 7.7 % of samples are associated with nitrate concentration more than 45 mg/l (BIS). The anthropogenic wastes in the form of unregulated disposal of village sewages in open water bodies contribute Nitrate. Among them eight wells in study area having iron concentration > 100 but less than 250 mg/L. Table No 7 Shows Nitrate concentration more than BIS limt (>45.0) in the study area.

Table 9.7: Samples showing Nitrate concentration more than BIS limit (>45.0mg/L)

#	**District**	**Location**	**NO_3 mg/L**
1	Calicut	Badagara	46
2	Calicut	Beypore	244
3	Calicut	Calicut Beach	98
4	Calicut	Naduvattom	75
5	Calicut	Kallai	61
6	Idukki	Irratayar	66
7	Idukki	Kattapana	137
8	Idukki	Poopara	60
9	Idukki	Vandiperiyar	74
10	Kannur	Koothuparamba	83
11	Kannur	Thaliparamba	46
12	Kasarakode	Chelad	45
13	Kasarakode	Bekal	**60**
14	Kasarakode	Naimarmoola	**59**
15	Kollam	Anchalumoodu	53

16	Kollam	Karunagapally	47
17	Kollam	Mayyanadu	146
18	Kollam	Kalluvathukal	102
19	Kollam	Ambalamkunnu	64
20	Kollam	Roaduvila	128
21	Kollam	Meeyanoor	54
22	Kollam	Nellikunnu	58
23	Kollam	Chunda	45
24	Kollam	Karukone	47
25	Malappuram	Chungathara	56
26	Malappuram	Kalikavu	50
27	Malappuram	Mangalam	90
28	Malappuram	Manjeri	49
29	Malappuram	Parrappanangadi	52
30	Malappuram	Perumpadappu	67
31	Malappuram	Pulamanthol	50
32	Malappuram	Paravanna	47
33	Palakkad	Chavadiyur	61
34	Palakkad	Kanjikode	76
35	Palakkad	Meenakshipuram	78
36	Palakkad	Pudhunagaram	52
37	Palakkad	Vadakkancherry	47
38	Pathanamthitta	Enathu	59
39	Pathanamthitta	Konni	60
40	Thiruvanathapuram	Balaramapuram	123
41	Thiruvanathapuram	Kazhakuttam (DCB)	61
42	Thiruvanathapuram	Perumkuzhi	117
43	Thiruvanathapuram	Pudukurichi	68
44	Trichur	Keechery	67
45	Trichur	Kodungallur	58
46	Trichur	Perinjanam	103
47	Wayanad	Padinjarattara	84

Total Hardness

Hardness of the water is the capacity of water to neutralise soap. Hardness is mainly caused by Chloride, Sulphate, Carbonate & Bicarbonates of Calcium and Magnesium salts. Water hardness results from the solution of alkaline earth minerals, namely calcium and magnesium from the soil, rocks and from direct pollution by wastes. Calcium and magnesium

carbonates (limestone and dolomite) are prevalent in the earth crust but are only sparingly soluble in pure water. Water that contains carbon dioxide (CO_2) or other acidic constituents readily dissolves carbonate minerals. In the presence of CO_2, the carbonates are converted to the more soluble bicarbonates.

$$CaCO_3 + CO_2 + H_2O \leftrightarrow Ca(HCO_3)_2$$

Water with hardness less than 200-300 mg/L may derive practically all of their alkaline earths from carbonate rocks. Gypsiferous shale and evaporates often contain large quantities of more soluble sulphates and chlorides of calcium and magnesium. Water that traverse these deposits may have a hardness of several hundred mg/litre or more.

Classification of Hardness

This classification is based on the value of total Hardness. Ground water may be classified in to four types Soft, Moderate hard, Hard and Very Hard (Table No 8).

Table 9.8: Ground water samples summarised as per classification of Hardness

No. of Samples	Soft (0-60) mg/l	Mod. Hard (61-120) mg/l	Hard (121-180) mg/l	Very Hard more than 180 mg/l
607	364	137	56	50
Per cent	60	22.6	9.2	8.2

As per the classification, Ground water is soft in nature (60%). About 22.6 % and 9.2 % of samples belong to moderately hard and hard categories respectively. 8.2 % samples fall in very hard category.

10. Sum Up

1. The total number of Ground Water Monitoring Wells (GWMW) in Kerala State as on 01.04.2018 was 1668. These monitoring wells include 1402 dug-wells tapping phreatic aquifers and 266 piezometers tapping phreatic zones and deeper aquifers in sedimentary as well as hard rock terrains the water level monitoring was carried out in the months of April, August and November 2018 and January 2019. Water sampling was carried out in 607 GWMWs (dug-wells) during the month of April 2018.

2. The monitoring wells are spread over in all the physiographic regions of the State. 62 % of which fall in the midland region, 18 % in coastal plains, 15 % in high lands and 5 % in plateau region.

3. Out of the monitoring wells tapping phreatic aquifer, 65% of the well are tapping lateritic aquifer which is the widely distributed aquifer in the state, 17% tapping weathered and fractured crystallines followed by coastal alluvium and river alluvium represented by 15 % and 3 % respectively.

4. The total rainfall ranged from 1829 to 4852 mm during the period from April 2017 to March 2018. The maximum rainfall was recorded in Idukki district and the minimum in Thiruvananthapuram district. During the southwest monsoon season, Thiruvananthapuramdistrict recorded 1024 mm and Idukki district recorded 3794 mm, which are the lowest and highest rainfall respectively. During the northeast monsoon season, Kasaragod district recorded the lowest rainfall of 209 mm and Pathanamthitta district recorded the highest rainfall of 905 mm.

5. During the southwest monsoon season from June to September 2018, the departure of rainfall in the districts varied from -19% to 57%. The maximum deficit rainfall recorded in Kasaragod district out of all fourteen rainfall districts. Record time for all the districts, seven districts recorded normal rainfall, six districts received excess rainfall and the one district received large excess rainfall as per IMD Classification

6. During the northeast monsoon season from October to December 2018, the departure of rainfall varied from -38 % to 49 % in different districts. The maximum departure towards deficient rainfall recorded in Kasaragod and Palakkad district. Seven

Districts have recorded normal rainfall, only four districts recorded excess rainfall during this season, three districts recorded deficient type of rainfall

7. During the months of January to March 2019, the departure of rainfall varied from -100 % to 2 %. The maximum departure towards large excess rainfall recorded in Kasaragod district. Eight districts are recorded large deficient type of rainfall, three districts had been recorded deficient type rainfall during this season. Normal rainfall is observed in two districts during this winter season. 'No rain' is received in Kasaragod district in this season

8. The depth to water level mostly depends on the hydrogeological conditions of the area as well as topography, rainfall pattern etc. In coastal plains the depth to water level is generally restricted to 6 mbgl. In midland areas, where the undulating topography is seen, the depth to water level generally varies from near ground level to 25 mbgl. The variation is mostly due to topographical variations, thickness of lateritic overburden etc. In areas where laterites are underlain by sedimentary aquifers of Tertiary age, the water level goes very deep, even to the extent of 55 mbgl. In highlands the depth to water level is in the range of few cm to 10 mbgl depending on the topography and thickness of overburden (weathered zone).

9. During April 2018 about 79.57% of monitoring wells was showing water level within the depth range of 0.10 to 10 mbgl. Whereas about 92.92% of monitoring wells were showing water level of less than 10 mbgl during August 2018.

10. The water level fluctuation in phreatic aquifers due to the monsoon recharge is mostly restricted to 4 metres rise in the southern part of the state and it ranges upto 8 mts in the northern distircts of kerala Rise in water level is represented by 91.48 % of total monitoring wells

11. Comparison of water level data of the year 2018 – 2019 with the decadal mean value of the period 2008 – 2017 and 2009-2018 indicates that majority of monitoring wells (91.21%-April, 88.60%-August, 93.79%- November, 96.74%-January) have recorded either rise or fall in water level with the magnitude of less than 2 m. indicating insignificant change in water level over the past decade.

12. The long-term water level data was analysed for the period of 2009-2018. The analysis of pre-monsoon water level trend for the last decadal period (i.e. during 2009– 2018) indicates that only 35.8% of GWMWs have recorded negligible change in water level in the range of +0.05 to –0.05 m/year. 26.66 % of monitoring wells have recorded declining trend in the range of 0.05 to 0.2 m/year 14.4 % of monitoring wells have recorded declining trend above 0.2 m/year while 6.8% of monitoring wells have recorded rising trend above 0.2 m/year. 16.4% of monitoring wells show rise in the range of 0.05 to 0.2 m/year.

13 The analysis of post-monsoon water level trend for the last decadal period (i.e during 2009– 2018) indicates that 33.64 % of GWMWs have recorded negligible change in water level in the range of +0.05 to –0.05 m/year. The 33.07 % of monitoring wells have recorded declining trend in the range of 0.05 to 0.2 m/year and 11.74 % of monitoring wells have recorded declining trend above 0.2 m/year. 14.46 % of monitoring wells have recorded rising trend in the range of 0.05 to 0.2 m/year and 8.07 % of monitoring wells have recorded rising trend above 0.2 m/year.

14 Ground water in Kerala state is fresh and potable in most of the areas. Two geogenic contaminants, fluoride (F^-) and Nitrate (NO_3) are present above the permissible limits of BIS in isolated pockets. Fluoride concentrations above the permissible limit are observed in some of the wells (GWMW) in Attappadi and Chittur Taluks of Palakkad district. Iron contamination is more prevalent but isolated in nature. Nitrate above the permissible limit of 45mg/l is observed in wells polluted from human interventions such as agriculture, organic matter decay etc.

Annexure I: Ground Water Level Data of GWMW's in Kerala State during 2018-19

District	LOCATION	WELL TYPE	Apr-18	Aug-18	Nov-18	Jan-19
Alappuzha	Adikattukulangara	Dug Well	5.37	3.6	4.75	5.29
	Alapuzha Town	Dug Well	7.7	3.16	3.5	3.7
	Alleppey	Dug Well	2.04	1.77	1.83	2.11
	Ambalapuzha	Dug Well	2.15	0.81	0.39	1.8
	Aranootimangalam	Dug Well	7.16	6.78	6.88	
	Arukutti	Dug Well	2.35	1.51	1.09	1.9
	Arur	Dug Well	1.83	0.91	0.5	1.7
	Champakulam	Dug Well	0.7		0.35	0.9
	Chandirur (R1)	Dug Well	2.04	1.36	1.14	1.79
	Charummoodu	Dug Well	6.45	8.51	11.49	20.85
	Chelakkad	Dug Well	1.14	0.78	0.8	1.2
	Chengannur	Dug Well		7.1	4.5	8.01
	Chennithala South	Dug Well	2.72	1.08	1.02	
	Cherthalai	Dug Well	0.65	0.95	2.06	0.84
	Cheruvaranam	Dug Well	2.25	1.35	1.12	2.02
	Chettikulangara	Dug Well	2.05	0.93	0.85	1.9
	Edathua(R2)	Dug Well	0.72	0.78	0.4	1.15
	Eramallur	Dug Well	2.08	1.41	1.29	1.81
	Haripad	Dug Well	2.82	0.66	0.74	1.43
	Idakunnam	Dug Well	12.4	10	11.76	12.9
	Kadaikadu (Cheriyanad)	Dug Well	4.08	4.25	4.14	3.71
	Kaidavana-R1	Dug Well		0.44	0.53	0.83
	Kalavamkodam	Dug Well	1.68	1.45	1.15	1.89
	Kalavur	Dug Well	1.37	0.61	0.55	1.58
	Kallissery	Dug Well	4.2	3.16	3.11	4.1
	Kandiyur (R1)	Dug Well	3.4	1.26	1.97	2.89
	Kanichukulangara	Dug Well	2.4	1.87		2.35
	Karumancherry	Dug Well	0.92	0.28	0.35	1.1
	Karuvatta (R1)	Dug Well		0.92	0.9	1.88
	Kattanam	Dug Well	12.25	10.44	11.15	11.75
	Kattoor (R1)	Dug Well	1.69	0.99	0.9	1.43
	Kayamkulam	Dug Well	1	0.26	0.28	0.77
	Kayippuram (Muhamma)	Dug Well		0.93	0.96	2.06
	Kokkothamangalam	Dug Well	2.4	1.3	1.3	2.01
	Kudassanad	Dug Well			5.2	5.3

District	LOCATION	WELL TYPE	Apr-18	Aug-18	Nov-18	Jan-19
	Kuttitheruvu (Kayamkulam)	Dug Well		1.04	1.85	2.63
	Kuzhamathu	Dug Well	12.77		11.55	12.5
	Mahadevikad	Dug Well	0.91	1.4		
	Mancombu	Dug Well	0.09		2.08	1.5
	Mannanchery	Dug Well	2.85	1.4	1.62	2.2
	Mannar	Dug Well	4.6	2.12	3.51	4.48
	Mavelikara	Dug Well	3.19	1.24	1.68	2.47
	Mulakuzha (R1)	Dug Well		4.71	4.82	5.17
	Mulakuzha1	Dug Well			4.82	
	Muthukulam	Dug Well	2.5	1.34	0.92	2.3
	Muttam	Dug Well	2.35	0.73	1.35	
	Muttar	Dug Well	1.2		0.92	1.54
	Naduvattom	Dug Well	2.23	1.25	0.85	1.52
	Nangiarkulangara	Dug Well	1.83	0.8	0.75	1.33
	Nedumudi (Pupalli)	Dug Well			1.4	0.75
	Neerkunnam(R1)	Dug Well		1.42		
	Neerkunnam(R2)	Dug Well		1.42	1.68	2.8
	Nooranad	Dug Well	4.6	8.53	9.26	10.17
	Oachira1 (Krishnapuram) (R1)	Dug Well	3.67	1.53	2.7	3.2
	Ottappunna	Dug Well	3.08	2.1	1.6	2.74
	Pacha (R3)	Dug Well	1.46	0.78	0.54	1.34
	Pallarimangalam	Dug Well	2.02	1.12	1.05	1.6
	Panavally	Dug Well	1.65	1.08	0.82	1.65
	Pandanad	Dug Well	3.35	2.98	3.26	3.52
	Panurkara	Dug Well	1.7	0.85	0.5	1.85
	Parayakkad	Dug Well	2.15	0.92	1.7	2.15
	Parumala (R1)	Dug Well	6.7	4.63		6.74
	Pathiyur (R1)	Dug Well	1.42	0.48	0.41	1.13
	Pattanakad	Dug Well	1.6	0.65	0.34	1.17
	Punnapra (R1)	Dug Well		0.94		1.75
	Purakkad (R1)	Dug Well	2.71	1.74	2.11	2.57
	Ramankari (R1)	Dug Well	1.83	0.74	1.68	
	Thaikattusseri (R1)	Dug Well	1.25	1.05	0.65	1.7
	Thakazhi	Dug Well		0.68		
	Thalavadi (R1)	Dug Well		1.1	0.93	
	Thamarakulam	Dug Well	3.05	3.2	3.22	
	Thaneermukkam	Dug Well	0.93	1.14	0.77	
	Thevery	Dug Well	2.3		1.17	

District	LOCATION	WELL TYPE	Apr-18	Aug-18	Nov-18	Jan-19
	Thuravur	Dug Well		1.56		
	Thuravur (R1)	Dug Well		0.93	1	
	Thyckal Beach	Dug Well	0.81	1.03	0.4	
	Trikkunnapuzha (R2)	Dug Well	1.55	0.8	0.82	
	Valavanad (R1)	Dug Well		0.54		
	Vallikunnam	Dug Well		0.95	1.63	
	Vanaswargam	Dug Well	1.97	0.95		
	Vandanam	Dug Well		1.44		
	Veeyapuram (R1)	Dug Well	2.85			
	Venmani (R1)	Dug Well	2.8	1.81	1.55	
	Chettikulangara Pz	Tube Well		1.2	1.24	1.97
	Ezhupunna Pz	Tube Well	1.5	0.5	0.9	1.43
	Haripad(c)	Tube Well	10.45	9.83	9.67	10.05
	Haripad(n)	Tube Well	10	8.98	9.08	9.44
	Haripad(s)	Tube Well			9.78	
	Haripad(w)	Tube Well	10.65	5.3		10.12
	Kalarkode(e)	Tube Well	2.56	2.32	5.48	
	Kalarkode(s)	Tube Well	1.92		2.37	
	Kalarkode(w)	Tube Well	12.66	12.3	12.68	12.2
	Karthikapally(south)	Tube Well		13.3	13.58	14.08
	Karumady	Tube Well			1.71	2.01
	Kattanam1	Tube Well	11.62	9.8	10.4	11.1
	Krishnapuram(n)	Tube Well	16.9	16.64	16.56	16.73
	Krishnapuram(s)	Tube Well	6.6	5.1	5.56	6.17
	Mannancherry Temple (Kavungal)	Tube Well				8.25
	Mannar	Tube Well	6.07			
	Muthukulam Pz	Tube Well	0.92	1.25		1.2
	Muttam(south)	Tube Well	5.12	3.87	4.53	5.19
	Preethigulangara-centre	Tube Well	12.54	11.96	11.79	12
ERNAKULAM	Edakkattuvoyal PZ	Bore Well	10.15	9.23	9.06	9.5
	Aikaranad1 (Kadayiruppu)	Bore Well	2.65	3.8	3.87	3.73
	Arakuzha Pz	Bore Well	4.8	5.3	4.97	5.2
	Illithode	Bore Well	6.02	6.24	6.02	5.51
	Irumbanam2	Bore Well	3.13			
	Kanjiramattom	Bore Well	14.5	13.92	13.82	13.94
	Kizhakombu	Bore Well	4.3	3.78	3.3	6.9
	Kodussery	Bore Well	8.02	7.82	7.98	8.03

District	LOCATION	WELL TYPE	Apr-18	Aug-18	Nov-18	Jan-19
	Koovappady	Bore Well	6.35	4.51	6.61	6.12
	Malayattur1	Bore Well		8.82	9.01	9.63
	Mullankunnu	Bore Well	14.2	15.5	15.4	14.79
	Namakuzhi Pz	Bore Well	8.4	7.55	6	8.73
	Poothrikka Pz	Bore Well		9.19	8.87	10.48
	Punnakad Pz	Bore Well		2.23	1.93	
	Thirumaradi	Bore Well	4.25	3.75	4.45	4.58
	Vazhakam Pz	Bore Well	4.37	4.57	4.57	3.59
	Veliyanad Pz	Bore Well	4.45	4.59	3.45	4.33
	Aikaranad	Dug Well	5.15	7.42	7.3	5.5
	Alwaye (Aluva)	Dug Well	12.2	10.36	10.65	11.15
	Anchalpetty-R1	Dug Well	5.8	6	5.85	5.87
	Angamali (R1)	Dug Well	7.3	6.74	6.82	
	Anicadu	Dug Well	1.85	1.71	1.77	2.37
	Arakunnam	Dug Well	11.9	8.9	8.73	
	Arakuzha	Dug Well	6.25	6.15	5.9	6.36
	Attara (Kokunnu)	Dug Well	7.07	7.5	7.2	4.75
	Chalakka	Dug Well	2.65	2.33	2.17	2.64
	Chellanum South	Dug Well	1.01	1.13	0.83	1.06
	Chengamanad	Dug Well	9.38	8.37	8.73	9.35
	Cherai South	Dug Well	1.5	1.58	1.33	1.1
	Cheria Kadavu	Dug Well	1.35	1.02	0.72	0.96
	Cherukadapuram	Dug Well	2.17	1.7	1.62	1.99
	Chowara (R1)	Dug Well	6.3	6.23	6.41	6.15
	Chulli (R1)	Dug Well	4.65	3.98	3.35	4.5
	East Marady	Dug Well	5.95	5.78	5.7	5.92
	Edakkatuvayal	Dug Well	11.52	11.02	10.75	10.97
	Edapally	Dug Well	1.92	1.62	1.51	1.87
	Edavanakad	Dug Well	0.35	0.68	0.47	0.85
	Elur North (R1)	Dug Well	1.8	2.25	2.09	2.48
	Eranakulam South	Dug Well	0.55		0.52	0.45
	Fort cochin	Dug Well	2.1	2.38	1.43	2.28
	Ilanji	Dug Well	6.8	6.1	5.58	7.25
	Illithode 1	Dug Well	4.95	6.46	5.6	4.69
	Irumbanam (R1)	Dug Well	4.11	1.49	1.06	1.89
	Kadavoor	Dug Well	5.95	5.03	5.25	6.06
	Kadungallur	Dug Well	1.48		1.65	2.16
	Kalady (R1)	Dug Well	4.45	6.78	4.44	6.17

District	LOCATION	WELL TYPE	Apr-18	Aug-18	Nov-18	Jan-19
	Kallorkad	Dug Well	3.5	3.05	3.18	3.22
	Kalur	Dug Well	6.85	5.15	5.1	6.11
	Kandakadavu	Dug Well	0.83	1.15	0.98	0.98
	Kanjiramattom DW	Dug Well	7.25	6.88	6.6	7.7
	Kanjur	Dug Well	8.55	7.1	6.95	7.37
	Kapprassery	Dug Well	1.67	1.94	1.48	1.77
	Karukadam	Dug Well	1.4	3.09	2.97	3.21
	Karukutti (R2)	Dug Well	6.05	7.15	8.18	8.22
	Keerampara	Dug Well	2.75	1.67	1.57	1.26
	Keezhillam	Dug Well	6.05	8.12	7.82	6.97
	Kizhakkambalam	Dug Well	5.45	4.95	4.98	5.62
	Kizhakombu DW	Dug Well	4.75	4.1	3.32	5.26
	Kodanad	Dug Well	2.9	3.02	2.77	4.01
	Kodussery (R1)	Dug Well	8.75	8.28	8.6	8.83
	Koothattukulam (R1)	Dug Well	4.67	3.64	4.34	3.85
	Koovapady	Dug Well	6.87	5.97	6.01	6.25
	Kothamangalam (R3)	Dug Well	4.55	4.32	4.28	3.95
	Kottapadi	Dug Well	3.33	3.28	2.93	3.79
	Kottapuram (Alangadu)	Dug Well	2.55	1.88	1.79	2.25
	Kottapuram (Veliyanad)	Dug Well	6.05	5.99	6.02	6
	Kumbalangi (R2)	Dug Well	1.6	1.7	0.99	1.17
	Kundannur (R1)	Dug Well	0.8	0.28	0.3	0.7
	Kunnukara	Dug Well	7.53	7.87	7.78	6.34
	Kurumassery	Dug Well		8.53	9.17	8.38
	Kuruppampady	Dug Well	5.4	5.21	4.81	5.75
	Kuthukuzhi	Dug Well	4.25	3.57	3.45	4.65
	Malayattur	Dug Well	7.75	7.23	7.16	7.5
	Malipuram	Dug Well	0.65	0.83	0.62	0.98
	Mallussery	Dug Well	4.98	4.14	4.15	4.7
	Mamala	Dug Well	5.55	5.09	4.78	5.33
	Mamallassery (R1)	Dug Well	5.45	5.32	5.1	5.18
	Manjapra	Dug Well		5.29	5.46	3.57
	Mannur	Dug Well	4.9	5.03	4.7	3.6
	Maradu	Dug Well	1.45	0.77	0.85	0.98
	Mulanthuruthi	Dug Well	8.6	8.19	8.38	8.51
	Mullankunnu	Dug Well	10.45	8.78	9.35	10.32
	Munambam (R1)	Dug Well	1.15	0.87	0.83	1.19
	Muvattupuzha	Dug Well	7.3	6.86	5.82	6.4

District	LOCATION	WELL TYPE	Apr-18	Aug-18	Nov-18	Jan-19
	Nallimolam (R1)	Dug Well	7.65	5.95	5.75	6.17
	Namakuzhi	Dug Well	6.35	6.58	6.45	6.85
	Nayarambalam	Dug Well	1.45	1.18	0.93	1.24
	Nellikuzhi	Dug Well	2.75	4.74	4.4	4.85
	Neriyamangalam (R1)	Dug Well	8.32	6.66	6.32	7.69
	Njarakkal	Dug Well	0.8	0.77	0.65	0.92
	North Parur	Dug Well	0.85	0.76	0.55	0.98
	Okkal	Dug Well	2.25	3.2	2.38	3.15
	Oonnukal	Dug Well	5.75	5.08	5.41	6.2
	Paingottur	Dug Well	5.25	4.78	4.55	5.51
	Palakuzha North	Dug Well	6.43	5.63	5.81	6.18
	Pallikara-Chittanadu (wonderla)	Dug Well	5.38	7.15	7.18	7.17
	Palluruthy	Dug Well	1.75		1.02	1.42
	Pambakuda	Dug Well	4.95	5.95	5.2	6.41
	Parakkadavu	Dug Well	3.15	2.37	2.36	3.01
	Paravur	Dug Well	2.25	1.23	1.44	1.99
	Pattimattom (R2)	Dug Well	6.05	5.75	5.59	5.89
	Payyal	Dug Well	4.45	3.65	3.55	4
	Peechanikad (R1)	Dug Well	6.75	6.34	6.45	6.65
	Perumbadavam	Dug Well	6.65	6.22	6.44	6.62
	Perumbavoor (R2)	Dug Well	5.1	5.95	5	5.89
	Pezhakkapallil	Dug Well	3.8	4.28	4.1	4.47
	Pindimana	Dug Well	4.52	1.25	1.1	2.99
	Piravom	Dug Well	5.75	5.82	5.85	5.95
	Poothotta	Dug Well	2.18	1.62	2.11	2.56
	Poothrikka	Dug Well	8.65	8.03	7.9	8.3
	Pothanikad (R2)	Dug Well	4.52	4.43	3.75	4.87
	Pulluvazhi	Dug Well	5.3		5.2	
	Punithura	Dug Well	1.9	1.37	1.1	2.97
	Punnakad1	Dug Well	0.63	1.64	1.37	1.98
	Puthankurissu (Neriyamangalam Road)	Dug Well	3.65	4.6	2.98	3.21
	Puthankurisu (R1) (Kolencherry)	Dug Well	3.2	3.29	4.7	4.8
	Ramamangalam	Dug Well	6.75	7.32	6.75	6.83
	Randar	Dug Well	4.68	4.21	4.25	5.14
	Sreemoolanagaram	Dug Well	10.55	8.68	8.68	9.36
	Thabore	Dug Well	9.95	5.72	5.65	8.7
	Thaikkattukara	Dug Well	2.95	1.89	1.56	2.5
	Thalakode	Dug Well	4.5	3.82	3.8	3.71

District	LOCATION	WELL TYPE	Apr-18	Aug-18	Nov-18	Jan-19
	Thattekad (R1)	Dug Well	1.7	3.71	3.71	3.86
	Thirumaradi DW	Dug Well	4.5	4.75	4.05	5.28
	Thrikalathur	Dug Well		5.53	5.42	3.88
	Thuruthi	Dug Well	2.15	3.22	3.02	2.79
	Trikkakara	Dug Well	9.2	8.67	8.55	9.82
	Tripunithura	Dug Well	3.3	1.84	2.07	2.62
	Udayamperoor	Dug Well	4.35	2.51	2.59	3.25
	Vadavucode (Kolencherry)	Dug Well	1.3	1.44	1.31	1.93
	Valakam	Dug Well	6	6.01	6.03	6.1
	Valayanchirangara	Dug Well	7.27	7.64	7.39	7.14
	Vallom (R2)	Dug Well	7.1	6.48	6.47	6.95
	Varapuzha	Dug Well	2.05	0.85	0.64	1.43
	Vazhakkulam North	Dug Well	5.95	6.35	5.93	6.33
	Veliyanad	Dug Well	8.65	5.67	5.5	6.05
	Vypeen	Dug Well	0.6	0.55	0.35	1.09
	Vytila	Dug Well	2.32	1.67	1.47	1.88
	Kadavanthara	Tube Well	6.1	6.54	6.22	6.6
IDUKKI	Alakode	Bore Well	4.99	4	4.08	4.31
	Anakkara	Bore Well	49.4		54.4	
	Karimkunnam2	Bore Well	2.5	2.44	2.55	2.84
	Karumannur	Bore Well	4.06		3.56	3.76
	Kattappana	Bore Well	11.77	6.25	8.28	9.53
	Thankamoni	Bore Well	2.58		1.98	2.26
	Adimali	Dug Well	5.71	5.72	5.45	6.37
	Alakkode DW	Dug Well	4.3	3.88	4	4.18
	Ambazhachal	Dug Well	5.51	3.56	4.42	4.66
	Amravathi	Dug Well	3.65	2.76	2.82	2.87
	Anakkara	Dug Well	6.74	5.34	6.18	7.08
	Anavilasam	Dug Well	7.3	3.46	4.89	5.82
	Arikuzha	Dug Well		2.71	4.85	5.06
	Balagram (Third camp)	Dug Well	4.68	2.42	2.37	2.81
	Byson Valley	Dug Well	13.84	8.97	9.24	9.34
	Carady Goody Estate	Dug Well	2.43	1.58	1.52	1.83
	Chathurangapara	Dug Well	0.48	0.17	0.47	0.47
	Cheenikuzhi	Dug Well	2.42	1.06	1.55	2.46
	Cheriyar	Dug Well	3.08	3.02	2.84	2.88
	Chittoor	Dug Well	4.2	3.77	3.85	

District	LOCATION	WELL TYPE	Apr-18	Aug-18	Nov-18	Jan-19
	Churuli	Dug Well	2.62	1.97	1.32	2.57
	Cumbummettu	Dug Well	6.85	2.41	2.49	3.96
	Devikulam	Dug Well		2.78	2.94	3.39
	Elamdesom	Dug Well	6.2	4.94	5.67	6.68
	Elappara	Dug Well	1.42	1.34	1.49	1.51
	Idukki	Dug Well	4.25	3.11	3.13	3.72
	Irattayar (R1)	Dug Well	2.9	2.51	2.38	2.71
	Kaliyar	Dug Well	5.45	4.82	4.73	5.23
	Kanchiyar	Dug Well	9.85	6.58	8.71	9.51
	Karimkunnam (R1)	Dug Well	2.2	2.89	3.1	3.34
	Karumanoor DW	Dug Well	4.2	3.26	3.2	3.96
	Kattapana	Dug Well	3.8	1.93	2.19	2.84
	Kochera	Dug Well	4.8	0.17	0.99	2.53
	Kodikulam east	Dug Well	5.51	4.24	4.05	4.36
	Kolani	Dug Well	3.8	3.04	3	3.84
	Kolapra	Dug Well	5.2	4.27	4.17	4.29
	Kulamavu	Dug Well	7.8	4.94	5.68	7.3
	Kumaramangalam	Dug Well	3.9	2.78	3.7	4.25
	Kumili	Dug Well	3.75	1.64	1.83	2.46
	Kuttikanam (R1)	Dug Well	5.74	5.22	4.02	6.79
	Machiplavu	Dug Well	7.3	6.73	6.93	8.37
	Manjappara	Dug Well	2.5	1.35	1.34	1.78
	Marykulam	Dug Well	4	2.62	3.14	3.68
	Memala	Dug Well	4.71	3.67	3.41	4.6
	Moolamattam	Dug Well	5.8	5.28	5.5	5.86
	Mundiyeruma	Dug Well	5.38	4.07	4.17	5.04
	Munnar	Dug Well	1.33	0.48	0.98	1.25
	Murikkassery	Dug Well	10.44	9.71	9.88	
	Murukkady	Dug Well	7.2	2.24	1.15	3.03
	Nedumkandam	Dug Well	5.52	2.99	3.19	4.71
	Nirmala City	Dug Well	2.2	0.82	0.86	1.34
	Njarukutty	Dug Well	3.51	1.32	1.95	2.62
	Pambadumpara	Dug Well	3.1	2.27	2.19	2.34
	Pampanar	Dug Well		0.89	0.92	1.47
	Pannimattom	Dug Well	4	2.76	3.1	3.38
	Peerumedu	Dug Well	3	2.88	2.78	2.79
	Perumuttom	Dug Well	4.42	3.94	4.57	3.21
	Peruvanthanam	Dug Well	4.55	2.41	1.98	2.48

District	LOCATION	WELL TYPE	Apr-18	Aug-18	Nov-18	Jan-19
	Poopara	Dug Well	2.2	0.72	0.72	1.13
	Rajakkad	Dug Well	8.58	8.71	8.62	8.98
	Rajakumary	Dug Well	11.27	10.54	8.73	10.79
	Thankamani	Dug Well	2.2	0.76	1.07	1.19
	Thodupuzha	Dug Well	11.08	7.18	7.65	7.87
	Thumbachi	Dug Well	4.6	2.71	3.03	4.37
	Udumbanchola	Dug Well	5.97	3.63	4.37	7.03
	Udumbannur	Dug Well	7.39	4.37	4.39	5.31
	Valara (R2)	Dug Well	9.84	8.11	7.99	9
	Vallakadavu	Dug Well	4.77	2.91	2.94	3.66
	Vandanmedu (R1)	Dug Well	3.9	2.42	2.32	2.23
	Vandiperiyar	Dug Well	6.51	6.28	6.25	7.17
	Vazhithala	Dug Well	5.69	2.96	3.03	3.15
	Vellilamkandam	Dug Well	6.25	3.81	4.37	5.71
KANNUR	Kakkeyamkadu	Bore Well	4.82	1.9	2.44	3.84
	Kankole1	Bore Well	10.85	5.5	7.59	8.57
	Karumathur	Bore Well	11.52	4.51	6.81	9.3
	Kelakkam	Bore Well	11.79	8.29	10.06	11.13
	Kizhallur	Bore Well	6.1	2.34	4.9	5.4
	Kolacheri	Bore Well	8.4	6.84	8	8.1
	Kommery	Bore Well	3.32	1.91	3.51	4.21
	Kottayampoyil	Bore Well	12.44	9.4	9.97	11
	Manathana	Bore Well	7.14	3.61	6.5	7.23
	Munderi	Bore Well	5	3.32	4.13	4.82
	Panoor	Bore Well	5.15	2.66	5.32	5.38
	Parassinikadavu	Bore Well	21.95	19.77	20.66	21.5
	Pulingome1	Bore Well	9.04	5.7	7.21	7.78
	Alacode (R1)	Dug Well	13.6	9.15	10.35	10.71
	Alavil	Dug Well	7.6	3.9	4.89	6.3
	Ambilad	Dug Well	14.5	11.05	2.96	14.07
	Andoor	Dug Well	6.41	6	5.63	5.84
	Anjarakandi	Dug Well	6.13	6.26	7.89	8.95
	Chakkarakkale	Dug Well	12.76	7.43	8.65	10.89
	Chala	Dug Well	9.88	7.33	8.42	
	Chalad	Dug Well	6.43	3.02	4.28	5.97
	Chavassery	Dug Well	5.66	3.52	3.99	4.07
	Cheleri	Dug Well	13.8	9.45	11.48	12.83

District	LOCATION	WELL TYPE	Apr-18	Aug-18	Nov-18	Jan-19
	Chepparapadavu	Dug Well	3.65	2.4	2.61	3.25
	Cherupuzha	Dug Well	5.4	4.18	4.69	5.23
	Cheruthazam	Dug Well	11.95	7.63	8.23	9.01
	Chundaparambu	Dug Well	7.11	6.46	6.52	6.75
	Chural	Dug Well	7.83	4.7	6.4	6.85
	Dharmadam	Dug Well	3.6	1.5	1.72	2.57
	Echilamvayal	Dug Well	6.01	1.54	3.22	4.63
	Edakkad	Dug Well	3.26	0.76	1.28	1.97
	Edayannur	Dug Well	5.57	3.82	4.46	4.69
	Edoor	Dug Well	4.88	1.72	3.47	4.23
	Elambara	Dug Well	4.72	3.18	4.15	4.28
	Ettikkulam	Dug Well	10.27	7.36	8.63	10.29
	Ezhilode	Dug Well	14.9	9.88	11.99	14.93
	Irikkur	Dug Well	6.63	3.62	4.95	6.24
	Kadannapally	Dug Well	12.45	9.75	10.98	11.17
	Kakkathodu	Dug Well	4.4	3.46	3.67	3.79
	Kalliassery	Dug Well	8.8	5.9	6.98	7.49
	Kallumutty	Dug Well	7.53	6.61	6.83	6.13
	Kanhirangad	Dug Well	13.23	9.05	12.35	14.22
	Kannapuram	Dug Well	2.92	1.47	1.83	2.37
	Kannavam	Dug Well	5.98	3.16	4.99	5.49
	Kannur	Dug Well	8.45	7.95	8.31	9.9
	Kannur-Thana	Dug Well	9.35	10.13	9.71	13.65
	Karikottakari	Dug Well	8.85	3.15	5.95	8.87
	Kelakam	Dug Well	10.76	5.68	9.04	10.78
	Kizhpalli	Dug Well	7.27	4.06	5.41	6.17
	Kolachery	Dug Well	9.23	8.11	8.47	8.74
	Kolakkad	Dug Well	9.72	8.04	9.08	9.62
	Kolayad	Dug Well	8.25	4.39	7.23	7.57
	Kommeri	Dug Well	3.72	2.98	4.11	4.42
	Koothuparamba	Dug Well	12	5.98	10.39	12.75
	Koottumukham	Dug Well	6.25	5.59	5.6	5.66
	Kottayampoil	Dug Well	8.8	5.93	7.02	7.82
	Kottiyur	Dug Well	8.18	7.56	7.25	7.38
	Kotty	Dug Well	2.96	1.61	2.16	2.61
	Kozhichal	Dug Well	6.5	4.75	5.05	5.75
	Kunnaru	Dug Well	2.68	0.96	1.27	2
	Kunnoth	Dug Well	7.74	2.72	5.72	6.6

District	LOCATION	WELL TYPE	Apr-18	Aug-18	Nov-18	Jan-19
	Kuppam	Dug Well	2.3	1.7	1.79	1.84
	Kuyilur	Dug Well	3.98	2.64	3.62	3.98
	Mahe (R1)	Dug Well	1.85	1.1	1.4	1.58
	Manantheri	Dug Well	8.6	3.16	6.97	7.53
	Manattana	Dug Well	4.15	2.72	2.95	3.27
	Mathamangalam (R1)	Dug Well	6.87	0.54	5.78	7.06
	Mathil	Dug Well		5.48	7.85	9.97
	Mattanur	Dug Well	7.85	5.01	6.99	8.03
	Mayyil	Dug Well	11.15	10.27	10.18	10.29
	Mekunnu	Dug Well	7.08	4.92	5.49	6.24
	Mele Chovva	Dug Well	6.53	6.97	6.37	7.26
	Melepukkom	Dug Well	8.97	6.77	7.83	8.33
	Melur	Dug Well	4.43	2.27	2.98	3.75
	Meruvambayi	Dug Well	7.84	2.91	5.18	5.74
	Mokeri	Dug Well	11.16	7.54	9.12	10.33
	Munderi	Dug Well	7.63	6.22	7.23	7.95
	Muzhakunnu	Dug Well	5.49	3.31	4.47	4.54
	Nayattupara	Dug Well	11.4	8.52	9.4	11.73
	Nellunni	Dug Well	4.97	3.21	3.69	4.11
	Neruvambram	Dug Well	16.66	10.99	12.4	16.05
	Nuchiyad	Dug Well	5.4	3.7	7.75	8.1
	Oduvalli	Dug Well	17.18	16	16.4	16.68
	Palleri	Dug Well	9.27	5.1	6.42	7.98
	Pallikkuni	Dug Well	4.01	1.39	2.89	3.44
	Palloor (Mahe)	Dug Well	9.7	5.31	9.23	8.96
	Pannoor	Dug Well	5.34	2.44	3.63	4.6
	Panunda	Dug Well	15.3	9.66	11.72	13.02
	Pappinissery West	Dug Well	2.52	0.95	1.25	1.95
	Parassinikadavu DW	Dug Well	14.56	13.3	13.68	14.1
	Pariyaram	Dug Well	14	11.48	12.54	13.25
	Pathiriyad	Dug Well	8.57	5.51	7.1	8.29
	Pattiyam	Dug Well	3.2	1.02	1.71	2.39
	Pattuvam	Dug Well	2.62	0.88		
	Payyannur	Dug Well	6.56	3.06	4.51	5.46
	Pazhayangadi	Dug Well	2.35	0.77	1.13	1.75
	Peravoor	Dug Well	5.22	3.59	4.98	5.13
	Peringome (R1)	Dug Well	7.97	5.75	7.74	7.97
	Pinarayi	Dug Well	12.26	9.74	11.38	11.87

District	LOCATION	WELL TYPE	Apr-18	Aug-18	Nov-18	Jan-19
	Pukkundu	Dug Well	13.6	7.88	9.72	12.84
	Pulingome	Dug Well	6.46	4.98	5.84	6.06
	Puthiyatheru	Dug Well	9.52	4.6	6.56	7.62
	Ramantalai	Dug Well	9.58	5.22	7.93	8.97
	Sreekandapuram	Dug Well		5.03	6.2	7.62
	Taliparamba	Dug Well	9.7	9.01	9.36	9.65
	Thalassery	Dug Well	6.11	2.32	3.54	4.84
	Thazhe Chovva	Dug Well	1.66	0.54	0.83	1.4
	Ulikkal (R1)	Dug Well	5.57	3.22	4.94	5.53
	Vaaram	Dug Well	6.06	4.04	4.97	5.43
	Valakkai	Dug Well	5.26	4.32	4.76	4.97
	Valapattanam	Dug Well	5.6	3.85	4.39	
	Vattiyamthodu	Dug Well	8.05	3.9	5.77	6.57
	Vayyakara	Dug Well	21.9	19.41	19.3	19.78
	Vengad	Dug Well	13.9	10.07	11.96	12.87
	Cannanore1	Tube Well	13.3	9.08	10.18	
KASARAGOD	Bella	Bore Well	13.73	8.43	11.95	12.67
	Bovikkanam	Bore Well	14.47	7.7	14.42	15.15
	Chalingal Pz	Bore Well	9.8	4.3	9.17	10.8
	Chamundikunnu	Bore Well	10.55	8.73	10.05	10.85
	Chattanchal	Bore Well	14.99	10.8	13.6	14.27
	Cherkala	Bore Well	7.75	3.21	9.64	11.99
	Karindalam	Bore Well	23.39	21.83	29	31.37
	Kumbala	Bore Well	17	3.52	9.9	12.6
	Kundamkuzhi	Bore Well				9.8
	Kuniya	Bore Well	15.66	2.8	5.28	8.83
	Madhur	Bore Well	11.2	2.9	5.5	8
	Mangad	Bore Well	17.68	3.7	7.73	12.54
	Manjeshwar	Bore Well	13.55	6.99	7.99	8.73
	Mylatti	Bore Well		0.96	5.91	6.54
	Pachakkad CPCRI	Bore Well	11.5	6.64	7.9	9.11
	Pallikkara	Bore Well	8.9	4.79	6.84	9.92
	Periye Pz	Bore Well	14.4	6.22	6.6	9.67
	Seethamgulli	Bore Well	9.22	2.7	7.1	9.37
	Vidyanagar	Bore Well	10.3	5.89	8.58	9.63
	Adhuru (R1)	Dug Well	10.69	4.53	7.64	9
	Adkasthala	Dug Well	12	8.25	10.32	10.7

District	LOCATION	WELL TYPE	Apr-18	Aug-18	Nov-18	Jan-19
	Adoor	Dug Well	12.67	7.85	11.27	12.32
	Ajannur DW	Dug Well	12.94	8.52	9.44	11.45
	Ambalathara	Dug Well	6.45	1.47	3.8	5.08
	Anangoor	Dug Well	9.7	7.5	9.19	9.1
	Angadimogar	Dug Well	11.49	4.97	9.54	11.76
	Arladuka	Dug Well	17.7	12.5	13.55	15.2
	Badiadka-R1	Dug Well	15.67	10.97	12.09	13.54
	Bandadka	Dug Well	10.1	10	10.05	10.03
	Bangathadka	Dug Well	19.5	14.48	14.74	15.9
	Banputhadka	Dug Well	8.45	6.84	7.34	8.2
	Bayar	Dug Well	12.85	6.28	8.47	10.15
	Bedadka-R1	Dug Well	12.93	11.2	12.4	12.6
	Bedradka	Dug Well	14.68	7.75	10.85	12.55
	Bedrampalla (R1)	Dug Well	9.12	0.5	4.15	6.51
	Bekal	Dug Well	9.9	5.84	8.48	8.99
	Bela (R1)	Dug Well	12.18	10.24	10.35	10.75
	Bethoorpara	Dug Well	12.42	7.53	8.8	10.45
	Bhimanadi (R1)	Dug Well	2.41	1.74	8.71	9.11
	Bhimanadi-II	Dug Well	5.3	3.7	4.37	4.97
	Chalingal	Dug Well	8.2	4.4	7.62	8.95
	Chamundikunnu DW	Dug Well	12.02	9.08	10	10.41
	Chattanchal DW	Dug Well	13.38	10.6	12.7	12.95
	Cheemeni	Dug Well	8.96	4.71	6.98	7.28
	Cherkala	Dug Well	10.73	4.05	9.04	10
	Chittarikal	Dug Well	5.18	4.84	4.99	5.61
	Choyankod (R1)	Dug Well	7.51	3.5	5.76	6.55
	Dharmathadka	Dug Well	10.66	5.46	9.08	9.25
	Elambachi	Dug Well	5.01	1.97	3.06	3.93
	Iriyani	Dug Well	11.05	8.39	9.19	10.02
	Jodukallu	Dug Well	10.26	6.54	8.13	9.45
	Kadambar	Dug Well	13.2	9.95	10.92	12.8
	Kadappallam	Dug Well	16	9.4	9.5	11.92
	Kakkadavu (R1)	Dug Well	12.12	11.58	11.85	11.88
	Kalathur	Dug Well	15.5	5.75	8.87	11.58
	Kalichanadukkam	Dug Well	5.27	5.16	5.18	5.2
	Kalikadavu	Dug Well	6.5	2.05	4.66	5.38
	Kanhangad Coast (R1)	Dug Well	2.73	2.16	2.38	2.51
	Kanhangad Town	Dug Well	10.63	6.23	8.31	9.18

District	LOCATION	WELL TYPE	Apr-18	Aug-18	Nov-18	Jan-19
	Kaniyala	Dug Well	6.4	1.38	4.58	5.15
	Kannadipara	Dug Well	11.8	7.94	10.71	11.37
	Karinthalam	Dug Well	13.7	7.4	9.72	11.6
	Kasaragod	Dug Well	10.13	6.65	8.82	9.55
	Kayyur	Dug Well	9.26	5.2	6.82	7.22
	Kinningar	Dug Well	7.58	1.87	5.08	6.35
	Kolichal	Dug Well	5.13	2.52	4.43	4.59
	Koliyarpadavu (R1)	Dug Well	11.62	8.2	8.56	9.54
	Koolom Road	Dug Well	9.8	5.83	8.85	9.28
	Kottiyadi	Dug Well	9.58	6.2	7.71	8.39
	Kovval	Dug Well	8.68	4.16	6.63	7.72
	Kudlu	Dug Well	10.52	3.92	8.48	9.69
	Kumbadaje	Dug Well	10.94	6.3	8.45	9.71
	Kumbla (R1)	Dug Well	14.28	4.86	9.35	11.27
	Kundamkuzhy	Dug Well	8.05	2.26	4.89	6.35
	Kuttikol	Dug Well	14.8	14.7	14.67	14.7
	Madhur	Dug Well	16.1	7.9	10.72	13.65
	Mandecap	Dug Well	9.88	5.02	6.28	7.32
	Mangad	Dug Well	13	6.05	10.22	11.89
	Mangalpady (R1)	Dug Well	12.8	7.6	10.46	11.37
	Manjeswar	Dug Well		6.78	3.45	3.98
	Mavinakatta	Dug Well	26.75	21	22.18	23.6
	Mavungal	Dug Well	8.45	2.54	5.79	5.82
	Melparamba	Dug Well	15.26	8.76	12.61	13.9
	Miyapadavu	Dug Well	13.2	10.9	11.27	11.25
	Mogral (R1)	Dug Well	11.52	1.51	9.37	10.92
	Mogral Puthur	Dug Well	13.73	5.82	8.2	9.53
	Movvar	Dug Well	14.35	13.65	13.83	13.88
	Muligadde	Dug Well	11.17	5.67	8.68	9.08
	Muliyar	Dug Well	7.13	3.75	5.74	6.2
	Mulleria	Dug Well	19	16.7	17.14	17.1
	Munnad	Dug Well	10.23	9.12	10.08	11.65
	Naimarmoola	Dug Well	8.92	7.03	8.57	8.75
	Nattakkal	Dug Well	12.87	12.16	12.15	13.6
	Nellikatta	Dug Well	9.12	5	7.15	8.1
	Nileshwar	Dug Well	5.76	2.05	3.94	4.82
	Odayanchal	Dug Well	3.27	2.07	2.57	2.89
	Pachambla	Dug Well	10.8	5.58	7.57	8.84

District	LOCATION	WELL TYPE	Apr-18	Aug-18	Nov-18	Jan-19
	Padiyathadka	Dug Well	9.43	5.55	7.08	7.85
	Paivalike	Dug Well	10.15	7.06	8.38	9.54
	Pallam	Dug Well	9.95	4.1	7.49	8.61
	Panathur	Dug Well	11.02	8.61	10.55	10.84
	Parappa north	Dug Well	9.1	7.4	8.6	8.73
	Peraladkam	Dug Well	6.77	3.51	6.27	6.27
	Periyattadukkam	Dug Well	11.12	4.14	7.53	8.75
	Periye	Dug Well	11.6	7.03	8.51	9.45
	Perla	Dug Well	8.9	5.02	6.96	7.12
	Poinachi-R1	Dug Well	14	13.4	13.65	13.8
	Pookatta	Dug Well	18	10.45	13.15	15.15
	Povval	Dug Well	12.5	11.3	12.43	12.49
	Pullur	Dug Well	8.6	5.85	7.31	7.95
	Putheriyadukkam	Dug Well	10.84	10.45	10.45	11.2
	Puthige	Dug Well	14.25	6.38	7.81	11.59
	Rajapuram	Dug Well	6.22	4.95	5.72	6.13
	Ramdas Nagar (Kudlu)	Dug Well	15.62	6.45	11.05	12.51
	Sasthangode (Sastha Nagar)	Dug Well	22.23	19.3	20.59	21.1
	Sorga	Dug Well	9.95	4.25	6.68	7.53
	Thachangad	Dug Well	12	5.18	8.74	10.14
	Thaniyadi	Dug Well	5.71	4.2	4.53	4.8
	Thoyammel	Dug Well	11.53	8.72	9.47	10.52
	Trikaripur	Dug Well	4.21	1.05	2.14	2.85
	Udinur Central	Dug Well	4.38	1.75	2.66	3.3
	Ukkinadka	Dug Well	10.2	4.88	5.17	5.91
	Uppla	Dug Well	13.55	7.9	9.2	10.9
	Vorkady	Dug Well	14.25	10.5	11.75	12.75
	Yethadka	Dug Well	5.58	3.3	5.22	5.19
	Ajannur(s1)	Tube Well				1.97
	Ajannur(s2)	Tube Well	2.32	0.51	1.55	
	Ajannur(s3)	Tube Well	2.71	0.6	1.63	
	Ajannur(s4)	Tube Well	2.33	0.6	1.59	2.06
KOLLAM	Anchal	Bore Well	8.83		7.2	7.2
	Chadayamangalam Pz	Bore Well	1.02	0.1		
	Kalluvathukkal	Bore Well	4.88		6.82	5.55
	Koovakad	Bore Well	4.41		3.5	3.8
	Nellikunnam Pz New	Bore Well	2.4	1.8	0.77	1

District	LOCATION	WELL TYPE	Apr-18	Aug-18	Nov-18	Jan-19
	Pathanapuram	Bore Well	0.19	0.75		0.65
	Ummmannur	Bore Well		8	9.9	10.7
	Vazhathopu	Bore Well	6.54	4.15	4.9	5.5
	Yeroor1	Bore Well	6.05	3.8	4.95	5.78
	Achenkovil (R1)	Dug Well	6.05		3.97	5.3
	Ailara	Dug Well	2.51	1.92	1.9	2.31
	Akkal	Dug Well	9.81	7.86	8.82	9.3
	Alayamon	Dug Well	6.98	6.55	6.88	8.28
	Alumoodu	Dug Well		5.25	7.92	9
	Anayadi	Dug Well	12	10.15	11.62	12.55
	Anchal DW	Dug Well		8.75	8.9	9.9
	Anchalammud (R1)	Dug Well	10.05	7.3	8.25	8.55
	Ariyankavu	Dug Well	6.98		3.97	5.82
	Avaneswaram	Dug Well	4.88	6.08	3.96	4.63
	Ayathil	Dug Well	8.38	6.55	6.5	7.7
	Ayur	Dug Well	7.62	8.21	7.97	9.35
	Bharathipuram	Dug Well	9.89	8.18	8.8	9.25
	Bhoothakulam	Dug Well			10.8	11.28
	Chadayamangalam (R1)	Dug Well	9.23	7.6	10.55	10.18
	Chakkuvalli	Dug Well	8.2	4.5		6.6
	Channapetta	Dug Well	11.81	9.3	10.25	11.4
	Chathannur	Dug Well	10.8	8.05	8.58	8.82
	Chenkulam	Dug Well	5.75	4.45		5.35
	Chithara	Dug Well	8.47	6.63	6.85	7.65
	Choorakulam Jn	Dug Well		6.15	6.3	6.58
	Cinemaparambu (R1)	Dug Well	12.04	6.75	9.8	11
	East Kallada	Dug Well	5.16	3.25	1.03	3.81
	Edamon	Dug Well	9.53	7.02	7.62	8.8
	Edamulakkal	Dug Well	6.05	5.85	5.85	5.85
	Edayam	Dug Well	13.03	9.3	10.45	9.8
	Ezhamkulam	Dug Well	8.8	5.1	7.85	8.45
	Ezhukone	Dug Well	4.64			
	Ezhukone (R1)	Dug Well	4.64	2.29	1.94	3.75
	Iravipuram (R1)	Dug Well	3.3	1.13	1.88	2.63
	Ithikara	Dug Well	15.9	13.43	14.9	15.55
	Kadakkal	Dug Well	8.39	6.86	7.01	7.62
	Kadapuzha	Dug Well	2.49	2.37	2.13	2.38
	Kalluvathukkal	Dug Well	8.55	6.6	7.6	8.05

District	LOCATION	WELL TYPE	Apr-18	Aug-18	Nov-18	Jan-19
	Kalluvettumkuzhi	Dug Well	8.77			8.8
	Kamukanchery	Dug Well		5.47	8.19	8.77
	Kandanchira	Dug Well	7.32	5.6	6.6	6.6
	Kangathumukku	Dug Well	6.57	4.3	5.3	5.72
	Kanjiramkode	Dug Well	7.71	4.97	5.33	5.97
	Kanjiramvila	Dug Well	6.69	7.2	7.06	7.7
	Karamkode	Dug Well	11.15	8.95	8.7	10.4
	Karavaloor	Dug Well		5.35	5.52	6.1
	Karukone	Dug Well	8.11	5.73	6.1	7.4
	Karunagapally	Dug Well	2.88	0.35	1.32	1.72
	Karunthalakode	Dug Well				1.28
	Kollam (Quilon)	Dug Well	7.94	6.82	7.77	7.71
	Koovakad DW	Dug Well			3.84	4.95
	Kottakayam	Dug Well	9.98		7.22	7.8
	Kottamkulangara	Dug Well	2.17	0.33	1.05	1.1
	Kottarakara (R1)	Dug Well	15.06	10.1	17.15	14.6
	Kottathala	Dug Well	7.84	5.32	8.7	
	Kottiyam	Dug Well	9.06	7.91	8.16	8.18
	Kulakada	Dug Well	7.02	5.12	5.38	6.8
	Kulapadam	Dug Well	7.44	6.62	6.54	6.9
	Kulathupuzha	Dug Well	6.1	3.92	4.6	5.35
	Kumbalam (R1)	Dug Well	20.76	17.67	19.12	20.08
	Kunnada	Dug Well	11.1	7.9	7.95	9.82
	Kunnathur	Dug Well	18.03	13.98	16.82	16.92
	Kuripalli	Dug Well	9.69	7.49	8.29	9.41
	Kurungapalli	Dug Well				1.3
	Kutavettur	Dug Well	7.4	6.5	6.8	6.65
	Madathara	Dug Well	4.59	5.69	5.56	5.41
	Manakarakavu-Vendar	Dug Well	7.92	6.42	7.3	7.45
	Manapalli	Dug Well	6.73	4.78	5.08	5.43
	Mayyanad	Dug Well	5.91	3.45	4.7	5.2
	Meenad	Dug Well	5.49	4.11	4.48	4.9
	Meenkulam	Dug Well	8.53	7.61	7.78	8.12
	Mulavana	Dug Well	10.96	9.1		10.5
	Muthukumel	Dug Well	6.51	5.43	5.13	6.08
	Mynagapalli	Dug Well	10.81	7.18	7.75	8.6
	Nallila	Dug Well	5.95	5.5	5.6	5.82
	Nedungolam	Dug Well	12.35	7.38	9.05	11.11

District	LOCATION	WELL TYPE	Apr-18	Aug-18	Nov-18	Jan-19
	Neendakara (R1)	Dug Well	0.72	0.75	1.2	0.62
	Nellikunnam DW	Dug Well	0.95	1	0.9	1.44
	Nilamel	Dug Well	4.63	3.6	3.65	3.97
	Oachira1	Dug Well	1.65	0.8	0.75	
	Odanavattom	Dug Well	8.17	4.05	4.26	5.48
	Ottakkal	Dug Well	7.15	6.25	6.62	7.6
	Oyur	Dug Well	9.58	5.95	7.52	8.55
	Palamoodu	Dug Well	10.69			9.55
	Pallickal	Dug Well	5.8	4.45		5.7
	Pangalukadu	Dug Well	5.39	5.21		5.16
	Panmana-Manayil	Dug Well	3.35	1.4	1.82	2.12
	Paravur	Dug Well	8.48	6.4	7.4	8.04
	Paripally (R1)	Dug Well	12.17	7.7	9.4	10.71
	Pattanapuram	Dug Well	9.66	7.09	7.14	8.32
	Pavitreswaram	Dug Well	4.45	3.8	2.42	4
	Perinad	Dug Well	8.16	8.89	6.07	7.14
	Perumkulam	Dug Well	6.35	5.94	6.02	6.4
	Pozhikara	Dug Well	6.08	4.2	5.3	5.6
	Punalur-I (R1)	Dug Well				10.24
	Punalur-I (R2)	Dug Well				10.7
	Punnala (R1)	Dug Well	8.58	6.7	6.2	7.38
	Puthoor	Dug Well	4.69	5.1	6.15	6.85
	Roduvila	Dug Well	9.1	1.42	6.67	7.37
	Sasthamkottah (R1)	Dug Well	6.74	6.37	6.27	6.67
	Sooranadu	Dug Well	5.81	9.28	4.82	5.18
	Tadicaud (R1)	Dug Well	8.92	5.7	6.86	7.32
	Tevalakara	Dug Well	8.3	5.75	7	9.25
	Thattamala	Dug Well	2.97	1.37	1.77	2.47
	Thenmala	Dug Well	7.31		6.51	6.83
	Thodiyur	Dug Well		1.07	1.3	1.87
	Ummannur	Dug Well	9.13	6.55	9.75	8.13
	Vadakkumthala west	Dug Well	3.29	3.05	1.5	1.73
	Vallikavu	Dug Well	1.4	0.8	0.55	
	Vavvakkavu	Dug Well	3.21	1.1	1.82	2
	Vazhathoppu	Dug Well	4.78	6.78	6.53	7.13
	Veliyam	Dug Well	9.93	7.22	8.37	9.3
	Vilakkupara	Dug Well	8.97	5.95	8.12	8.92
	Yeroor	Dug Well	3.77	2	1.67	2.25

District	LOCATION	WELL TYPE	Apr-18	Aug-18	Nov-18	Jan-19
	Chavara-e	Tube Well				1.8
	Chavara-n1	Tube Well	15.25			
	Chavara-west	Tube Well	2.4		0.6	
	Manappalli	Tube Well	30	18.3	21.16	18.6
	Perinad1	Tube Well	63			
	Trikkadavur	Tube Well	13.48			12.78
	Vayyankara	Tube Well	15.5	15		15.8
KOTTAYAM	Ettumannur	Bore Well	0.97	0.65	1.21	1.05
	Kidangoor	Bore Well	7.3	6.32	6.3	7.55
	Kuravilangad	Bore Well	5.85	3.14	3.58	4.68
	Poonjar	Bore Well	5.79	5.24	5.38	5.68
	Thrikodithanam	Bore Well	16.25	9.67	11.76	14.25
	Anandasram	Dug Well	8.11	7.72	7.85	8
	Arunuttimangalam	Dug Well		6.07	5.92	5.97
	Ayamkudi	Dug Well	9.62	8.78	7.68	10.3
	Ayarkunnam	Dug Well	4.83	3.97	4.93	6.15
	Brahmamangalam	Dug Well	9.01	8.73	7.44	8.45
	Chamampathal	Dug Well	3.3	3.15	3.2	3.9
	Changanasserry	Dug Well	3.47	2.4	2.51	3.49
	Chempu	Dug Well	2.07	1.36	1.93	2.38
	Chengalam South	Dug Well	2.21	0.62	1.25	0.99
	Cheruthikara	Dug Well	5	4.3	4.48	4.8
	Cheruvalli	Dug Well	5.9	5.7	1.9	6.3
	Chotti	Dug Well	4.25	3.95	4.45	5.55
	Chungam	Dug Well	4.37	3.52	3.47	3.77
	Edakadathy	Dug Well	11.5	9.23	9.15	9.25
	Edamaruku	Dug Well	3.5	3.35	3.4	4.5
	Edinjillam	Dug Well	3.94	1.42	1.7	2.5
	Elamkulam	Dug Well	4.48	3.57	3.42	6.22
	Erumeli	Dug Well	5.17			
	Ethakuzhy (Kallara)	Dug Well	3.97	2.72	2.65	3.2
	Ettumannur East (R1)	Dug Well	7.79	4.51	4.7	6.35
	Iykarakunnam	Dug Well	10.22	7.82	7.97	9.32
	Kadaplamattom	Dug Well	5.07	5.1	5.25	5.5
	Kaduthuruthi	Dug Well	6.47	5.37	5.87	5.72
	Kalakatty	Dug Well	5.44	4.14	4.34	6.04
	Kalathipady	Dug Well	9.91	5.8	7.7	6.6

District	LOCATION	WELL TYPE	Apr-18	Aug-18	Nov-18	Jan-19
	Kalathur	Dug Well	6.25	6.36	6.56	7.19
	Kangazha	Dug Well	5.34	5.9	6.05	6.6
	Kanjirapally	Dug Well	7.2	7.9	9.9	10.6
	Kidangur-R1	Dug Well	4.31	4.22	5.1	4.9
	Kollappally	Dug Well	3.25	2.98	3.07	3.23
	Kooroppada	Dug Well	4.2	2.9	2.28	4.6
	Koothrappally	Dug Well	4.61	4.05	4.65	5.15
	Kottayam (R1)	Dug Well	12.59	9.9	11.19	11.49
	Kozha	Dug Well	1.8	2	1.95	2.35
	Kozhuvanal	Dug Well	5	4.53	4.58	4.58
	Kudavechur	Dug Well	2.15	1.5	1.78	1.9
	Kumarakom	Dug Well	1.4	0.75	0.56	1.08
	Kummannur	Dug Well	8.6	5.2	5.25	5.25
	Kuravilangad1	Dug Well	6	3.52	3.9	6.05
	Kurichy (Sachivothamapuram)	Dug Well	6.92	6.55	6.89	7.15
	Kuruppanthara	Dug Well	2	1.45	1.35	1.6
	Kuttikal-R1	Dug Well		3.24	3.4	2.51
	Kuvapalli	Dug Well	7.15	6.23		5.8
	Madapally	Dug Well	2.21	1.32	1.5	2
	Manimala	Dug Well	4.72	4.45	4.85	5.1
	Mannanam	Dug Well	7.34	5.68	5.82	8.2
	Marangattupalli	Dug Well	5.02	2.87	2.92	2.97
	Melukavu Mattom	Dug Well	3.4	4.54	5	5.75
	Mevellur	Dug Well	2.6	2.69	2.85	3.15
	Monipalli	Dug Well	1.16	2.28	2.32	2.47
	Mukkada	Dug Well	9.16	5.78	5.75	7.9
	Mukkoottuthara	Dug Well	4.44	2.58	2.58	3.7
	Mundakayam	Dug Well	9.46	4.45	4.5	
	Mundukuzhi	Dug Well	10.65	6.75	7.02	9.3
	Mutholi	Dug Well	6.26	6.1	6.25	6.48
	Narianganam	Dug Well	4.45	3.95	4.13	5.02
	Nedumkunnam	Dug Well	5.05	6.27	6.6	5.5
	Neendur	Dug Well	4.02	2.88	2.6	3.4
	Paippad	Dug Well	9.2	7.2	7.44	7.3
	Palai	Dug Well	5.27	5.02	4.72	5.85
	Palamkadavu	Dug Well	2.63	1.95	1.51	1.8
	Pallikkathodu (R1)	Dug Well	6.15	5.95	5.73	6.18
	Pallom (Nattagam)	Dug Well	7.15	5.6	6.29	7.11

District	LOCATION	WELL TYPE	Apr-18	Aug-18	Nov-18	Jan-19
	Pambadi	Dug Well	7.9	5.5	7.4	8.7
	Panackapalam Jn	Dug Well	4.9	4.51	4.75	5
	Paruthumpara	Dug Well	7.13	6.83	6.9	7.2
	Plakkalpadi	Dug Well	6.2	5.12	5.25	6.6
	Ponad	Dug Well	9.2	5.75	6.05	7.68
	Ponthanpuzha	Dug Well	6.68	4.25		5.2
	Poovathilappu	Dug Well	4.4	3.54	3.65	3.75
	Pravithanam	Dug Well	4.5	4.31	4.9	5.42
	Pulikkal Kavala	Dug Well	4.44	3.48	3.6	3.6
	Pulikuttisseri	Dug Well	1.65	1.1	0.7	1.3
	Punjar	Dug Well	0.57	0.32	1.2	2.2
	Punnaveli	Dug Well	5.91	3.95	4.35	4.55
	Puthupally	Dug Well	7.15	6.5	6.55	6.9
	Ramapuram (R1)	Dug Well	5.58	3.69	4.05	4.5
	Teekoy	Dug Well	4.25	4.1	4.1	5.3
	Thalayolaparambu (R1)	Dug Well	2.9	2.5	2.5	2.8
	Thazhathangadi	Dug Well	2.2	2.13	2.08	2.5
	Thekethukavala	Dug Well	4.89	5.6	5.55	5.7
	Thidanad	Dug Well	4.28	5.73		7.48
	Thiruvanchoor	Dug Well	3.9	3.13		3.97
	Thiruvarpu	Dug Well	1.71	1.3	1.38	1.85
	Thottakam	Dug Well	2.11	1.58	1.25	2.98
	Thottakkad	Dug Well	5.46	5.44	5.65	6.8
	Trikodithanam	Dug Well	14.65	10.85	11.3	12.95
	Udayanapuram	Dug Well	2.2	1	1.03	1.4
	Urulikunnam	Dug Well	4.8	3.69	3.88	4.13
	Uzhavoor (R1)	Dug Well	3.2	2.41	2.65	2.98
	Vaikom	Dug Well	3.25	3.59	2.83	3
	Vakathanam	Dug Well	5.4	5.75	5.1	6.3
	Vazhur	Dug Well	4.8	4.55	4.85	4.9
	Vechur	Dug Well	2.01	1.06	1.39	1.8
	Vellur-III	Dug Well		2.03	2.28	2.62
	Vempalle	Dug Well	2.37	1.6	1.91	1.64
	Veyilkanampara (Kondur)	Dug Well	5.35	4.7	5.1	7.4
	Chempu - I(East)	Tube Well	2.17	2.04	1.98	2
	Chempu- West	Tube Well	1.55	0.56	0.94	1.21
KOZHIKODE	Balussery pz	Bore Well	8.44	5.3	5.4	7.01

District	LOCATION	WELL TYPE	Apr-18	Aug-18	Nov-18	Jan-19
	Cheruvannur pz	Bore Well	8.78	3.89	5.2	7.4
	Chevayur pz	Bore Well	31	16.35	20.23	30.38
	Kalikadavu pz	Bore Well	3.5	1.29	2.26	2.64
	Karuvannur pz	Bore Well	0.46	0.2	0.47	1.11
	Kokallur pz	Bore Well	7.35	6.84	7.1	7.21
	Thodannur(west)	Bore Well	6.67	3.66	5.25	5.36
	Thuneri pz	Bore Well	5.99	2.66	3.85	4.06
	Vellimadakunnu pz	Bore Well	19.77	18.21	19.17	22.39
	Atholi	Dug Well	4.56	1.11	3.66	4.45
	Azhinjilam	Dug Well	2.65	0.78	1.04	1.89
	Badagara (Vadakara)	Dug Well	6.02	4.33	6.05	6.09
	Balusseri	Dug Well	7.35	4.07	6.13	7
	Beypore	Dug Well	4.18	0.73	1.47	2.64
	Bhumivathukkal	Dug Well	9.47	5.87	6.78	7.09
	Calicut Beach	Dug Well	2.98	1.46	2.34	
	Chaliyam	Dug Well	3.41	1.07	2.32	2.98
	Chelavur	Dug Well	9.02	6.18	8.69	9.17
	Chemencheri	Dug Well	4.24	1.4	2.03	2.98
	Cheruvannur West	Dug Well	6.52	3.12	3.82	4.38
	Chevayur	Dug Well	13.65	11.01	12.94	13.6
	Chiulavi (Niravamal)	Dug Well	9.46	5.27	7.1	8.07
	Chulur	Dug Well	4.56	2.65	3.11	3.99
	Devarkoil	Dug Well	6.94	6.73	8.26	
	Elattur	Dug Well	3.69	1.27	1.98	2.75
	Feroke DW	Dug Well	13.16	11.52	12.02	12.17
	Iringallur	Dug Well	3.61	1.34	2.72	3.49
	Kakkayam	Dug Well	3.47	2.97	3.17	3.25
	Kakkur	Dug Well	6.49	2.83	4.52	5.51
	Kallachi	Dug Well	1.92	0.45	1.75	1.78
	Kallai	Dug Well	5.05	2.78	3.71	4.46
	Kannankara (Chelannur)	Dug Well	1.28	0.34	0.4	1.01
	Kannoor	Dug Well	5.22	3.88	4.32	4.76
	Karaparamba	Dug Well	2.84	2.29	2.49	2.79
	Kariyathumpara	Dug Well	2.94	1.48	2.82	2.87
	Karuvannur	Dug Well	3.23	2.77	3.22	3.46
	Kayapanachi	Dug Well	5.49	3.69	4.12	4.69
	Kodencherry	Dug Well	1.34	0.79	0.99	1.2
	Koduvalli	Dug Well	8.85	4.91	6.67	8.12

District	LOCATION	WELL TYPE	Apr-18	Aug-18	Nov-18	Jan-19
	Koduvalli North	Dug Well	6.11	1.31	1.42	5.08
	Koothali	Dug Well	5.02	3.73	4.57	5.15
	Kottakadavu	Dug Well	13.08	11.09	12.4	13.84
	Kozhikode	Dug Well	13.74	7.42	10.71	12.52
	Kunnamangalam	Dug Well	13.22	6.16	8.79	9.51
	Kunnumakkara	Dug Well	2.88	1.08	1.31	2.1
	Kurachund	Dug Well	4.58	4.32	5.4	5.73
	Kuttiyadi	Dug Well	7.46	7.42	7.54	7.71
	Malayamma	Dug Well	4.96	0.99	2.06	4.97
	Manassery	Dug Well	3.68	1.45	2.52	3.38
	Mattanodu	Dug Well	9.02	7.1	8.16	8.83
	Mavoor-i	Dug Well	7.67	5.35	6.88	7.59
	Mavoor-ii	Dug Well	9.87	6.31	8.62	9.22
	Melady 1	Dug Well	2.05	0.84	1.4	1.64
	Meppayur	Dug Well	4.34	2.33	3.78	3.89
	Moodali	Dug Well	4.11	0.65	1.5	2.57
	Mukkali	Dug Well	5.35	2.14	3.69	4.78
	Muliyangal	Dug Well	2.7	1.16	1.45	2.52
	Mullankunnu	Dug Well	1.67	0.18	1.08	1.54
	Murampathy	Dug Well	5.7	4.12	5.48	6.42
	Nadapuram	Dug Well	4.91	1.16	2.28	3.46
	Naduvannur	Dug Well	7.35	5.56	6.71	7.21
	Naduvattom	Dug Well	8.11	3.4	5.75	7.01
	Nallalam	Dug Well	3.84	0.34	1.35	2.11
	Nanminda	Dug Well	6.94	4.19	5.26	6.15
	Narikuni	Dug Well	3.84	0.54	2.09	2.56
	Nayarkuzhi	Dug Well	7.8	5.39	5.86	6.36
	Orkattery	Dug Well	5.81	1.31	1.87	3.67
	Pathimangalam (R1)	Dug Well	9.78	8.69	8.88	9.13
	Pavangad	Dug Well	2.95	0.57	1.14	2.2
	Perambra	Dug Well	4.31	1.77	2.91	2.99
	Perumpally	Dug Well	4.67	1.43	3.16	3.76
	Peruvayal	Dug Well	7.67	4.35	5.99	6.56
	Pudukayam	Dug Well	9.66	6.38	7.54	8.03
	Pudupadi	Dug Well	3.09	1.62	2.56	2.86
	Pudupanam	Dug Well	5.83	4.2	4.83	5.43
	Punnasseri	Dug Well	8.19	4.84	5.73	7.27
	Puthur	Dug Well	8.25	5.87	6.81	7.61

District	LOCATION	WELL TYPE	Apr-18	Aug-18	Nov-18	Jan-19
	Quilandy	Dug Well	6.78	3.45	4.72	5.72
	Ramanattukara (R2)	Dug Well	3.75	1.31	2.08	2.18
	Tamarasseri	Dug Well	1.77	0.58	0.86	0.97
	Thenamkuzhi	Dug Well	4.87	1.12	2.62	3.62
	Thikkodi	Dug Well	6.82	3.51	6.29	
	Thiruvallur	Dug Well	2.55	0.84	1.41	1.96
	Thiruvambady	Dug Well	5.34	2.59	2.91	3.89
	Thodannur	Dug Well	9.02	6.01	6.27	6.66
	Thuneri1	Dug Well	4.82	3.05	3.76	4.31
	Ulliyeri	Dug Well	3.6	2.09	2.9	3.37
	Unnikulam	Dug Well	2.67	1.45		
	Valayam	Dug Well	7.38	5.59	5.91	6.61
	Vattoli	Dug Well	4.71	3.19	4.36	4.99
	Vellimadakunnu	Dug Well	13.11	12.64	12.87	13.04
	Villyapalli	Dug Well	7.68	6.01	6.48	6.72
	West Pudupadi	Dug Well	3.86	2.06	3.63	3.89
	Chombala(pz)	Tube Well		2.22	2.71	4.88
	Chombala(w1)	Tube Well	5.04	1.74	3.12	4.44
	Chombala(w2)	Tube Well	5.01	1.25	2.95	4.33
	Chombala(w3)	Tube Well	5.2		3.25	4.64
	Chombala(w4)	Tube Well		1.65		
	Meladi	Tube Well	1.94	0.7	1.53	1.63
MALAPPURAM	Ammnikad Pz	Bore Well	11.44	2.68	3.62	4.39
	Anakkayam	Bore Well		4.58	4.79	
	Chemmalassery Pz	Bore Well	32.31	8.06	13.28	17.78
	Edakkara (Karunechi)	Bore Well	19.06	10.94	14.24	15.9
	Edakkulam	Bore Well		13.63	12.7	14.44
	Kaladi (Kadancherry) Pz	Bore Well	9.57	6.86	7.01	7.85
	Karavarakundu Pz	Bore Well	13.21	10.06	10.6	12.11
	Karulayi	Bore Well		1.5	1.81	2.65
	Mankeri Pz	Bore Well	22.46	3	5.77	8.27
	Nediyirippu Pz	Bore Well	2.54	0.7	0.66	1.13
	Othukkungal	Bore Well	37.72	23.15	19.19	30.6
	Pandalur	Bore Well	9.19	6.26	7.4	7.95
	Parambilpeedika	Bore Well	31.35	25.84	34.65	41.81
	Ponmala (Mannazhi)	Bore Well				8.86
	Puzhakkattkiri	Bore Well	8.22	4.7	5.81	6.4

District	LOCATION	WELL TYPE	Apr-18	Aug-18	Nov-18	Jan-19
	Thelakkad	Bore Well	13.54	7.22	5.88	11.02
	Thiruvali	Bore Well	7.34	4.72	5.15	5.84
	Thozhuvannur	Bore Well	22.75	7.39	10.89	13.79
	Thuvur	Bore Well	11.97	7.39	8.15	10.14
	Valancheri Pz	Bore Well	20.51	16.61	16.85	18.34
	Akkaparambu	Dug Well	10.17	7.54	8.35	10.45
	Amminikad	Dug Well	4.88	4.15		4.29
	Anakkayam	Dug Well	7.96	7.13		7.52
	Angadipuram	Dug Well		6.55	7.77	8.76
	Anjuvadi	Dug Well	1.94	2.08	2.25	2.72
	Arikode	Dug Well	10.09	6.64	7.5	8.62
	Ariyallur	Dug Well	4.57	1.43	2.13	3.12
	Athanikal- Vallikunnu	Dug Well	9.18	12.62	12.95	4.42
	Athanikkal	Dug Well	6.02	2.59	3.47	
	Athirumada	Dug Well	13.99	11.9	12.26	13.39
	Beeranchira	Dug Well	10.91	7.05	6.95	7.58
	Buliyampadam (Velumbiampadam) (R1)	Dug Well	11.38	5.62	8.11	9.52
	Chamravattom	Dug Well	2.86	1.62	1.38	1.78
	Chemmalassery	Dug Well	11.18	5.08	5.13	6.46
	Cherani	Dug Well	7.11		5.42	5.9
	Cherukara	Dug Well	7.29	6.2	6.55	6.64
	Cherukode	Dug Well	6.42	5.04	5.39	5.95
	Cherukulam	Dug Well		8.88	10.26	10.85
	Chokkad	Dug Well	4.66	2.31	2.52	3.72
	Chungathara (R1)	Dug Well	3.91	2.3	2.98	2.57
	Edappal	Dug Well	14.93	11.8		11.75
	Edavanna (R1)	Dug Well	10.48	7.4	9.1	9.98
	Edayur	Dug Well	7.84	6.8	6.94	7.38
	Eriyad	Dug Well	4.28	2.4	2.83	3.05
	Iswaramangalam	Dug Well	3.28	1.05	0.78	1.94
	Kadalundi	Dug Well	5.41	3.54	4.14	4.58
	Kadampuzha	Dug Well	12.16	10.14	10.18	11.78
	Kadannamanna	Dug Well	8.23	3.46	5.5	6.75
	Kadungapuram	Dug Well	9.02	7.18	8.83	9.25
	Kalikavu	Dug Well	5.31	3.62	3.96	4.99
	Kanjiramukku	Dug Well	6.11	3.57	4.46	5.12
	Karathur	Dug Well	10.62	8.59	8.5	10.07
	Kariavattam	Dug Well	8.48	6.85	7.19	7.76

District	LOCATION	WELL TYPE	Apr-18	Aug-18	Nov-18	Jan-19
	Karipol	Dug Well	9.31	9.39	9.47	9.3
	Karulai	Dug Well	8.29	7.31	7.7	8.42
	Karumbil	Dug Well	13.01	11.39	11.86	12.3
	Karunechi	Dug Well	19.67	11.78	14.17	16.33
	Karuvankallu	Dug Well	8.81	7.57	7.53	8.19
	Karuvarakundu	Dug Well	4.42	1.95	2.33	3.13
	Kattumunda (R1)	Dug Well	12.38	8.34	9.6	11.32
	Kavanur1	Dug Well	11.81	8.67	9.85	11.05
	Kizhumuri - Oorakam	Dug Well	10.39	9.59	9.68	9.87
	Kondotty	Dug Well	4.12	1.55	1.76	2.44
	Kottakkal	Dug Well	8.63	8.2	8.36	8.66
	Kottapuram	Dug Well	7.56	4.92	5.49	6.08
	Krishnapuram Puthentheru	Dug Well	4.03	1.34	1.59	2.77
	Kulattur	Dug Well	5.81	3.62	3.98	5.24
	Kunnumpuram	Dug Well	14.07	12.19	12.56	12.95
	Kuruva (Padaparamba)	Dug Well	13.58	12.15	11.64	11.96
	Kuttipuram	Dug Well	4.51	1.15	1.58	3
	Malappuram	Dug Well	7.54	6.84	7.25	7.76
	Mangalam (R1)	Dug Well	3.35	2.67	2.78	3.99
	Manjeri	Dug Well	5.06	3.81	4.8	4.65
	Mankeri	Dug Well	7.82	4	4.76	6.06
	Marancheri	Dug Well	7.81	4.7	6.01	6.82
	Marutha (R1)	Dug Well	9.53	4.88	5.72	7.29
	Meenedathur	Dug Well	3.52	1.06	1.28	
	Melattur	Dug Well	6.99	5.91	6.45	6.66
	Moochikkal (Clari Moochikkal)	Dug Well	2.65	0.54	0.6	1.02
	Moothedam	Dug Well	5.86	1.15	1.62	2.53
	Mudikode	Dug Well	5.32	3.35	5.04	5.2
	Narokavu	Dug Well	14.77	9.45	10.93	12.45
	Nediyirippu	Dug Well	4.84	6.6	1.81	2.75
	Nellikuth	Dug Well	7.24	5.45	5.92	6.3
	Nilambur (R1)	Dug Well	4.31	2.65	3.59	3.93
	Olavattur	Dug Well	9.31	7.27	7.66	10.09
	Othukkungal DW	Dug Well	15.52	9.02	9.03	12.6
	Padikkal	Dug Well	9.69	8.8	8.97	9.72
	Pandalur DW	Dug Well	8.65	6.99	7.18	7.45
	Pandikkad (R1)	Dug Well	6.26	3.7	4.6	5.06
	Paral	Dug Well	7	5.83	6.46	6.03

District	LOCATION	WELL TYPE	Apr-18	Aug-18	Nov-18	Jan-19
	Parambilpeedika	Dug Well	12.75	12.1	12.04	12.43
	Parappanangadi	Dug Well	3.47	0.83	1.22	2.12
	Parappur	Dug Well	12.31	11.91	12.04	12.13
	Paravana	Dug Well	5.26	3.65	4.16	4.27
	Pathiriyal	Dug Well	7.82	6.21	7.01	7.18
	Payyanad	Dug Well	8.58	7.14	7.82	8.2
	Perinthalmanna (R1)	Dug Well	6.27	6.2	6.17	6.35
	Perumpadappu	Dug Well	6.52	1.8	3.77	5.4
	Peruvakkad	Dug Well	7.17	5.4	5.84	6.29
	Ponnani (R1)	Dug Well	1.83	1.5	1.6	1.76
	Pookottoor	Dug Well	3.54	0.5	0.38	2.07
	Pookottumpadam	Dug Well	4.39	2.55	3.83	3.41
	Pukattery	Dug Well	9.39	7.92	8.35	8.9
	Pukothu	Dug Well	7.32	4.77	6.16	7.7
	Pulamantol	Dug Well	10.57	7.16	7.67	8.8
	Purathur	Dug Well	2.07	1.48	1.4	1.79
	Puthenkulam	Dug Well	3.72	1.88	2.24	3.32
	Puzhakkatteri	Dug Well	6.36	4.52	5.05	5.92
	Ramankulam	Dug Well	6.1	4.4	6.16	6.34
	Ramapuram	Dug Well	13.52	4.38	4.87	6
	Tachinganedam	Dug Well	7.57	4.35	4.78	6.47
	Tanur	Dug Well	5.64	3.14	3.6	3.98
	Tenjippalam (R1)	Dug Well	13.83	11.63	12.9	13.37
	Thavanur	Dug Well	11.31	8.84	8.51	8.54
	Thazhekod Kappumugham	Dug Well	9.32	5.57	7.3	8.05
	Thazhekode	Dug Well	7.16	6.54	6.84	7.09
	Thirunavaya	Dug Well	5.24	4.28	4.32	4.6
	ThiruvaliDW	Dug Well	3.21	0.92	1.07	1.59
	Thrikkalangode	Dug Well	4.86		1.4	2.2
	Thuvur DW	Dug Well	10.42	7.3	8.26	9.62
	Tirukkad	Dug Well	9.23	5.88	6.21	7.84
	Tirur	Dug Well	13.42	13.5	11.64	12.02
	Tirurangadi	Dug Well	13.02	11.55	12.09	12.31
	Tripanachi	Dug Well	11.76	8.73	9.83	10.68
	Uppada	Dug Well	2.92	1.12	1.44	2.09
	Vadakkemanna	Dug Well	8.52	4.15	6.17	7.7
	Valancheri (R1)	Dug Well	10.22	8.26	8.82	9.35
	Valavannur	Dug Well	13.78	10.72	11.08	14.3

District	LOCATION	WELL TYPE	Apr-18	Aug-18	Nov-18	Jan-19
	Valiyakunnu	Dug Well	7.81	7.97	7.78	8.25
	Vaniyambalam	Dug Well	7.8	3.95	4	6.19
	Vazhakkad	Dug Well	4.23	3.29	3.32	3.61
	Vazhikadavu	Dug Well	4.07	4.51	6.04	4.24
	Vellila (R1)	Dug Well	7.45	6.11	5.82	6.11
	Vengad	Dug Well	8.02	6.64	6.8	7.92
	Venniyur	Dug Well	9.22	8.15	8.22	8.58
	Vettom1	Dug Well	3.51	1.67	1.62	3.32
	Vylattur (R2)	Dug Well	10.86	9.68	10.03	9.57
	Wandur	Dug Well	9.72	7.47	8.16	8.83
	Vettom	Tube Well	3.69	2.32	2.44	2.92
PALAKKAD	Chullimada Pz	Bore Well	6.5	1.9	5.1	
	Kadukkankunnu	Bore Well	6.5	1.5	5.8	
	Kallepully	Bore Well	8.2	3.3		
	Kanjikode (FCRI)	Bore Well	10.07		5.8	5.5
	Kannadi	Bore Well	1.6		0.7	1.25
	Karimpuzha	Bore Well	5		2.9	4.5
	Koduvayur	Bore Well	9.02		3.62	5.62
	Kongad	Bore Well	6.9		4.4	5.6
	Kozhipara Pz	Bore Well	11.06		1.3	3.3
	Kunnamkattupathy Pz	Bore Well	12.25	2.15	5.35	
	Kunnissery	Bore Well	11.8		8.7	6.9
	Lakkidi Thekkumangalam	Bore Well	21.9		16.1	17
	Malampuzha OW	Bore Well	15.3	3.9	8.8	
	Malampuzha Pz	Bore Well	11.4		8.3	11.3
	Melarkode	Bore Well	21.2		18	19.4
	Moochangundu	Bore Well	80.3		16.9	21.3
	Mundur Pz	Bore Well	35.6		20.5	24.5
	Muttikulangara Pz	Bore Well	20.3	14.3	11.9	
	Nanniyodu Pz	Bore Well	42.97	19.3	31.7	
	Nellikattiri Pz	Bore Well	24.2	7.8	11	
	Nemmara1	Bore Well	5.3		3.4	5.5
	Padur	Bore Well	10.4		7.3	12
	Panayur (Athikodu) Pz	Bore Well	3.9		2.1	5.5
	Pattambi Pz	Bore Well	7.67		6.8	7.6
	Peringottukurissu	Bore Well	12.1		11.5	11.8
	Plachimada	Bore Well	12.1		8.5	11.1

District	LOCATION	WELL TYPE	Apr-18	Aug-18	Nov-18	Jan-19
	Pullundassery	Bore Well	6.24		3.8	4.5
	Thenkara	Bore Well	1.55		0.9	1.5
	Thirumittacode	Bore Well	26.3		10.3	15.3
	Trithala Pz	Bore Well	5.6		4.5	4.7
	Vadakarapathy Pz	Bore Well	65.4	18.1	22	
	Vannamada Pz	Bore Well	23.3	15.42	10	
	Vennakara	Bore Well	11.7		11.5	
	Villooni	Bore Well	97.5		20.5	
	Adiparanda	Dug Well	8.55	2.7	5	
	Alanallur	Dug Well	18.4	6.95	8.2	
	Alathur	Dug Well	7.66	1.76	3.06	
	Ambalappara	Dug Well	8.6	5	7.2	
	Ariyur (R1)	Dug Well	11.8	5.62	8.2	
	Athikode	Dug Well	7.2	1.5	3.2	
	Athipetta	Dug Well	3.7	2	2.1	
	Banglow Kunnu	Dug Well	9.35	6.5	8.05	
	Chalisseri	Dug Well	10.5	6.8	8.3	
	Chemmampathi	Dug Well	10.3	2.3	3.3	
	Cherpulassery (R1)	Dug Well	10.05	8.05	6.05	
	Chittoor	Dug Well	6.05	2.1	3.1	
	Chulliar Dam	Dug Well	5.75	2.35	4.45	
	Chullimada (R1)	Dug Well	4.3	1.1	3.5	
	Chunnambuthara	Dug Well	3.85	2.15	2.9	
	Dhoni	Dug Well	8.3	2.7	6.1	
	Ellissery	Dug Well	7.3	3.8	6.3	
	Erattakulam	Dug Well	4.33	1.43	1.43	
	Eruthenpathi	Dug Well	9.2	1.55	2.7	
	Gopalapuram	Dug Well	19.2	3.1	5.9	
	Kadampazhipuram	Dug Well	4.35	3.75	4.05	
	Kalladikode	Dug Well	9.9	6.2	8.5	
	Kambilichungam	Dug Well	4.4	1.1	2.1	
	Kanjikode	Dug Well	8	2.95	4.35	
	Kanjirapuzha	Dug Well	5.3	1.3	2.3	
	Kannadi	Dug Well	5.3	1	1.9	
	Kannimari	Dug Well	5.6	1.7	3.2	
	Karimpuzha	Dug Well	3.1	1.3	1.8	
	Kavassery	Dug Well	3.4	1.2	1.6	3.05
	Kodumbu	Dug Well	4.52	1.1	2.6	2.1

District	LOCATION	WELL TYPE	Apr-18	Aug-18	Nov-18	Jan-19
	Kodunthirapalli	Dug Well	3.8	1.3	1.5	4.85
	Koduvayur	Dug Well	7.5	2.3	2.9	4.5
	Kollengode -I	Dug Well	4.8	1.6	2.75	3
	Kollengode- II	Dug Well	3.9	1.5	1.8	3.3
	Kongad1	Dug Well	5.7	3.6	4.7	5.3
	Koolimattom	Dug Well	3.2	1.2	1.6	1.5
	Koonathara	Dug Well	4.2	1.8	1.8	2.8
	Koottanad	Dug Well	9.6	8.9	10.1	10.2
	Koppam (R1)	Dug Well	5.3	5.1	6	6.7
	Koppanur	Dug Well	6.52	2.02	2.82	3.42
	Kottapuram	Dug Well	8.55	6.5	7.3	8.5
	Kottassery (Vattassery)	Dug Well	4.7	2.45	3.1	3.8
	Kottayi	Dug Well	9.8	4.3	7.5	10.3
	Kozhinjampara-R1	Dug Well	9.4	2.25	4.7	6
	Kozhipara	Dug Well	5.7		2.75	5.4
	Kudallur	Dug Well	8.1	3.4	5.4	6.4
	Kulakkad	Dug Well	7.1	2.9	6.7	7.8
	Kumaramputtur	Dug Well		1.34	2.54	3.54
	Kumaranallur	Dug Well	10.7	7.6	6.7	9.6
	Kunisseri	Dug Well	4.65	0.6	1.8	3.2
	Kuzhalmannam	Dug Well	3.25	1.65	1.85	2.45
	Lakkidi (Ramakrishnapadi)	Dug Well	9.2	5.4	7.2	7.7
	Malampuzha	Dug Well	3.45	1.75	2.15	3.05
	Mankara	Dug Well	5.6	3.4	4.3	4.2
	Mannarkkad (R1)	Dug Well	4.3	1.9	3.9	4.3
	Mathur	Dug Well	5.1	2.4	3.3	4.1
	Mattumanda	Dug Well	4.1	2.5	2.95	3.5
	Meenakshipuram	Dug Well	7.8	1.5	3.75	5.6
	Meenkara	Dug Well	10.1	1	2.3	4.6
	Melarkode	Dug Well	7.95	4.65	7.3	7.5
	Moochankundu	Dug Well	10.55	2.85	5.55	8.45
	Mulayankavu	Dug Well	9.2	5.6	6.2	7.9
	Mundur	Dug Well	4.1	0.45	1.7	3
	Muthalamada1	Dug Well	8.28	2.18	3.53	5.08
	Naikarapadi	Dug Well	6.55		3.65	4.65
	Nalliapalli	Dug Well	5	1.9		3.5
	Nanniyode	Dug Well	6.7	2.7	3.7	3.4
	Nedupuni	Dug Well	8.4	2.3	4.7	5.7

District	LOCATION	WELL TYPE	Apr-18	Aug-18	Nov-18	Jan-19
	Nellaya	Dug Well			3.22	
	Nellikatteri	Dug Well	9.5	7	6.3	8.3
	Nemmara	Dug Well	5.17	2.77	3.17	4.57
	Noorani (Palakkad West)	Dug Well	2.5	1.8	2.2	3.2
	Odannur	Dug Well	7.4	3.44	6.74	4.94
	Ongallur	Dug Well	8.34	7.04	7.34	8.34
	Oothara	Dug Well	4	0.95	1.4	3.2
	Ottapalam	Dug Well	8.5	6.9	7.65	6.9
	Padur DW	Dug Well	7.1	3.1	4.75	6.1
	Palamattom	Dug Well	8.8	3.2	6.3	
	Palappuram-ii	Dug Well	8.65	5.45	6.25	7.25
	Palghat	Dug Well	9.4	4.4	6.2	10.26
	Pallavur	Dug Well	5.4	1.05	2	3.4
	Panayur (Athikode)	Dug Well	2.6	2.6	1.4	1.1
	Parali (Chakkanthara)	Dug Well	3.4	1.3	2.2	2.9
	Pattambi	Dug Well	6.25	4.15	6.15	5.4
	Pattanchery	Dug Well	5.35	1.55	2	1.65
	Peringode	Dug Well	9.15	8.15	9.25	9.15
	Peringottukurissu DW	Dug Well	6.2	2.6	4.2	5.1
	Perumatty1	Dug Well	4.4	1.9	3.4	3.5
	Pookkottukavu	Dug Well	8.4	2.3	4.1	
	Pudhunagaram	Dug Well	7	2.1	3.6	5.1
	Pudhupariyaram	Dug Well	5.4	2.5	4.1	6.3
	Pullundassery	Dug Well	3.3	2.6	2.8	3.3
	Punchapadam	Dug Well	7.7	7.2	7.1	7.5
	RVP Pudhur	Dug Well	9.1	1.6	4.6	
	Shoranur	Dug Well	12.35	5.95	6.35	6.35
	Sreekrishnapuram	Dug Well	9.12	7.82	7.82	8.27
	Tannirkod	Dug Well	9.75	3.25	7.7	8.25
	Tenkara	Dug Well	3.05	1.15	2.9	
	Thachanattukara	Dug Well	11.92	7.92	9.52	10.92
	Thachanpara	Dug Well	2.3	1.2	1.3	2
	Thirumittamcode (Chathanur)	Dug Well	5.2	3.7	5.6	6
	Thiruvegapuram	Dug Well	9.14	7.14	7.84	8.29
	Tholanur	Dug Well	3.5	2.4	3.2	2.7
	Trittala	Dug Well	6.3	7.1	6.2	4.5
	Ummini	Dug Well	6.65	3.75	5.05	4.7
	Vadakkancherry	Dug Well	4.6	2.9	2.9	4.3

District	LOCATION	WELL TYPE	Apr-18	Aug-18	Nov-18	Jan-19
	Vadanamkkurissi	Dug Well	5.3	3.3	4	5
	Vallapuzha	Dug Well	6.2	2.5	3.2	5.4
	Vaniyamkulam	Dug Well	8.8	4.1	5.2	6.5
	Vannamada	Dug Well	9.7	2.2	3.8	5.7
	Velanthavalam	Dug Well	12.6	1.5	4.4	6.3
	Vilayur	Dug Well	6.5	4	6.5	6.5
	Viyyakurissi	Dug Well	4.35	1.95	2.45	2.95
	Walayar	Dug Well	10.05	0.25	1.85	3.55
PATHANAMTHITTA	Chetheckal	Bore Well	3.58	1.65	1.25	2.82
	Elanthoor	Bore Well	2.9	1.8	1.67	2.27
	Ezhamkulam	Bore Well	6.7			
	Kadumeenchira Pz	Bore Well	16.35		15.5	15.5
	Kalleli Pz	Bore Well	4.9	4.25	4.55	5.37
	Koipuram Pz	Bore Well	12.1	11.24	11.3	11.6
	Kottangal Pz	Bore Well	3.35	1.7	2.12	2.75
	Kunnamthanam	Bore Well	3.05	2.82	2.52	3.15
	Malayalapuzha Pz	Bore Well	18.3	10.87	14.5	18.3
	Pandalam	Bore Well	4.25	3.7	3.5	4.16
	Thayattumala	Bore Well	9.35	9.35	8.51	9.15
	Vallicode	Bore Well	4.09	2.2	2.95	4.05
	Adoor (R2)	Dug Well	10.1	8.97	11.85	10.47
	Adoor Bypass	Dug Well	3.76	3.17	3.4	4.64
	Anappara Kw	Dug Well			3.38	
	Angadikkal North	Dug Well	9.1	7.3	8.32	9.4
	Angamuzhi	Dug Well	5.77	5.6	6.24	5.74
	Aranmula	Dug Well		2.8	6	6.67
	Aranmula (R2)	Dug Well	6.23	3.05		
	Areekadavu Kw	Dug Well			4.3	
	Aruvapulam	Dug Well	3.4	2.77	2.84	3.92
	Athiringal (R1)	Dug Well	8.58	7.55	7.4	7.8
	Athumbukulam	Dug Well	4.02	3.18	3.15	4
	Chalappally	Dug Well	5	1.87	1.8	2.05
	Chandanappaly Kw	Dug Well			8.85	
	Cherukole (Puthamon) Kw	Dug Well			4.88	
	Cherukolpuzha (Airoor)	Dug Well	4.77	4.81	5.37	6.18
	Chethekkal	Dug Well	3.7	1.46	2.11	3.21
	Chittar (R1)	Dug Well	9.83	8.12	8.65	10.1

District	LOCATION	WELL TYPE	Apr-18	Aug-18	Nov-18	Jan-19
	Churakkod	Dug Well	6.53	4.97	6.08	6.31
	Edakkulam	Dug Well	5.8	5.91	5.71	6.2
	Edakulam Kw	Dug Well			7.6	
	Edathiramon Kw	Dug Well			2.24	
	Elakollur Kw	Dug Well			3.88	
	Elanthur	Dug Well	3.9	2.55	2.4	3.62
	Elavumthitta	Dug Well	8.2	5.72	6.05	7.37
	Enathu	Dug Well	8.38	5.02	5.36	7.78
	Eraviperoor	Dug Well	2.4	2.35	2.15	3.2
	Ezhamkulam	Dug Well	6.8	5.7	6.51	7.6
	Ezhumattoor	Dug Well	5.17	4.78	3.93	4.59
	Kadambanad	Dug Well	3.69	5.09	6.15	7.58
	Kadammanitta	Dug Well		5.02		6.2
	Kadumeenchira	Dug Well	8.62		6.72	7.81
	Kaipattoor	Dug Well	6.85	6.18	6.44	6.93
	Kalanjoor	Dug Well	4.85	7.05		8.2
	Kalleli Kw	Dug Well			1.48	
	Kallooppara	Dug Well	4.67	5.57		
	Karinkulam (R1)	Dug Well	5.52	2.26	2.21	2.65
	Kaviyur (R1)	Dug Well	6.7	6	7.65	6.94
	Kidanganoor	Dug Well	5.1		4.5	4.8
	Kodumon	Dug Well	6.67	6.3	6.3	7
	Kodumon Kw	Dug Well			5.4	
	Koipuram (R1)	Dug Well	7.9	6.71	6.8	6.95
	Konni	Dug Well	5.88	5.28	5.41	5.8
	Koodal	Dug Well	5.7	7.27	6.64	6.87
	Kottanadu	Dug Well	4.57	3.87	3.71	4.49
	Kottangal	Dug Well	2.55	3.01	1.41	1.91
	Kozhenchery	Dug Well	1.85	1.72	1.55	2.16
	Kudutha	Dug Well	7.97	6.13	6.85	8.05
	Kulanada	Dug Well	10	7.15	9.7	11.62
	Kumbanad	Dug Well	7.03	6.23	5.98	7.23
	Kumplampoika	Dug Well	2.25	2.33	2.2	2.37
	Kunnamthanam1	Dug Well		11.55	10.6	13.18
	Kuttoor	Dug Well	6	2.94	3.9	4.17
	Laha balawadi	Dug Well	2.6	2.35	2.55	2.7
	Laha peruman	Dug Well	10.1	9.91	9.7	9.86
	Malayalapuzha	Dug Well	6.77	6.35	6.1	6.53

District	LOCATION	WELL TYPE	Apr-18	Aug-18	Nov-18	Jan-19
	Mallappally	Dug Well	4.2	4.05	3.7	4.17
	Maniyar	Dug Well	5.16	4.95	5.63	5.5
	Mannadi	Dug Well	3.57	1.36	1.93	3
	Manthuga Kw	Dug Well			5.25	
	Murani	Dug Well	2.8	2.71	2.27	2.92
	Muthoor (R1)	Dug Well	3.95	3.05	2.62	3.65
	Naduvathumuzhi	Dug Well	7.15	5.87	6.07	6.56
	Naranganam (R1)	Dug Well	2.46	2.62	2.64	3
	Nellimugal Kw	Dug Well			9.35	
	Nilakkal New	Dug Well	5.75	5.1	5.62	5.15
	Omallur(R1)	Dug Well	8.42	7.84	7.95	7.87
	Padiyinippara Kw	Dug Well			6.03	
	Pamba Kw	Dug Well			1.96	
	Pandalam Town	Dug Well	1.2	0.86	0.9	1.08
	Pandalam-1	Dug Well	3.9	2.55	3.64	4.39
	Paranthal	Dug Well	5.12		5.14	5.17
	Pathanamthitta (R1)	Dug Well	3.18	3.32	3.26	3.49
	Pazhakulam Kw	Dug Well			8.78	
	Peringara (R1)	Dug Well	2.43	1.85	1.81	1.98
	Plappally	Dug Well	2.51	1.94	2.18	2.77
	Podiyadi	Dug Well	1.9	1.46	1.71	1.95
	Poothangara	Dug Well	5.5	4.3	5.2	5.58
	Prakkanam	Dug Well		9.28		
	Prakkanam (R1)	Dug Well		9.28	9.4	9.44
	Pulikeezh	Dug Well	3.25	2.36	2.7	3.25
	Pullad	Dug Well	5.95	6.07	6.4	6.36
	Ranni i	Dug Well		2.4	1.8	4.93
	Ranni Perunad	Dug Well		7.95	6.35	6.85
	Thadiyur	Dug Well	7.68	7.4	7.3	7.82
	Thannithodu	Dug Well	7.05	6.9	6.71	7.01
	Thatta (R1)	Dug Well	1.6	1.42	1.62	1.67
	Thelliyur	Dug Well	8.56	7.15	7.31	8.86
	Thiruvalla	Dug Well	7	6.41	6.81	7.78
	Thumpaman	Dug Well	8.25	7.1	7.95	8.5
	Ullannur	Dug Well	6.88	7.7	7.1	8.85
	V Kottayam	Dug Well	9.15		9.28	9.51
	Vadasserikara	Dug Well	3.78	3.77	4.03	4.24
	Vaipur	Dug Well	7	3	3.02	3.72

District	LOCATION	WELL TYPE	Apr-18	Aug-18	Nov-18	Jan-19
	Vakayar (Valiakavu)	Dug Well	2.27	2.24	2.79	3.04
	Valiyakkavu Kw	Dug Well			2.79	
	Vallamkulam	Dug Well	5	3.67	4.35	5.31
	Vallikod	Dug Well	5.6	2.52	4.08	5.28
	Vazhamuttom Kw	Dug Well			5.55	
	Vechoochira (R1)	Dug Well	4.43	4.47		4.7
	Vennikulam	Dug Well	4.1	3.11	2.97	3.38
THIRUVANANTHAPURAM	Ariyanadu Pz	Bore Well	7.38	6.75		
	Attingal Pz	Bore Well	6.63	4.9	6.2	6.1
	Chengal Pz	Bore Well	21.06		16.25	
	Kariyavattom Pz	Bore Well	13.49	2.42		
	Kulathoor pz	Bore Well	13.53	1	9.8	10.68
	Manambur Pz	Bore Well	12.37	10.28	11.4	11.11
	Mangalapuram Pz	Bore Well			18.5	
	Mannanthala Pz	Bore Well		6.05	5.4	7.18
	Nemom Pz	Bore Well	4.74			
	Pattom Pz	Bore Well		4.83	6.1	7.32
	Peringamala Pz	Bore Well	12.2	11.28	9.5	10.02
	Perumkadavila Pz	Bore Well	9.85	7.54	7.65	8.02
	Ponganadu Pz	Bore Well	7.3		3.3	5.37
	Thattattumala	Bore Well	6.33	4.93		5.67
	Udayankulangara Pz	Bore Well	12.17		10.8	9.9
	Vazhakkad Pz	Bore Well	11.88		8.6	
	Vengod Pz	Bore Well	7.79	4.85	6.2	6.27
	Vilappilsala Pz	Bore Well	9.46			7.63
	Amboori	Dug Well	9.18	6.98	6.25	9.17
	Anappara Valayanki	Dug Well	10.37	5.01	4.1	6.05
	Anjengo	Dug Well	1.55		1.3	1.22
	Aralumoodu	Dug Well	12.15	10.27	10.5	16.5
	Ariyanadu	Dug Well	5.68	3.5	3.5	4.5
	Arukannukuzhi	Dug Well	6.65	4.53	3.68	4.49
	Aruvikara	Dug Well	4.12	1.59	1.45	2.93
	Athazhamangalam	Dug Well	20.8	17.26	18.3	17.7
	Attingal	Dug Well	10.71	6.25	8.95	9.59
	Ayyankode	Dug Well	10.38	5.17	5.39	7.59
	Azhoor	Dug Well	12.82	6.34	11.25	11.05
	Balaramapuram(R1)	Dug Well	13.2	4.6	6.95	8.51

District	LOCATION	WELL TYPE	Apr-18	Aug-18	Nov-18	Jan-19
	Bharathanoor	Dug Well	7.52	7.02	7.1	7.46
	Changa	Dug Well	8.46	6.7	5.5	6.5
	Chaykottukonam	Dug Well	8.97	4.72	8.2	6.86
	Cheeranikara	Dug Well	9.01	3.32	9.64	7.02
	Chembur	Dug Well	10.75	5.49	7.21	9.33
	Chennampara	Dug Well	9.87	5.73	6.21	8.12
	Cherunniyur	Dug Well	14.79	11.17	13.9	14.3
	Chirayinkeezh	Dug Well	12.07		9	9.34
	Chittagode	Dug Well	6.98	5.24	5.43	6.44
	Chowara	Dug Well	19.6			
	Chullimanoor	Dug Well	6.82	5.85	4.05	6.39
	Edavai	Dug Well			0.1	
	Ithye	Dug Well	8.53	6.37	6.5	7.34
	Kadakkavur(R1)	Dug Well	4.32	1.82	3	3.4
	Kallar	Dug Well	4.33	3.48	2.56	3.94
	Kallikkad	Dug Well	2.3	0.5	1.4	1.99
	Kandala	Dug Well	12.12	11.23	7.6	9.9
	Kanjiramkulam	Dug Well	60	49.01		
	Kanjiramkulam Church	Dug Well	24.26	21.36	21.46	21.66
	Kappil	Dug Well	10.94		10.5	11.4
	Karakulam	Dug Well	3.82	1.79	2.47	
	Kariavattom	Dug Well	3.82	1.35	1.65	2.39
	Karinga	Dug Well	2.85	1.35	1.97	2.32
	Kattakkada	Dug Well		1.65	2.14	3.52
	Kazhakkuttom	Dug Well	3.78	2.1	2.7	
	Kilimannor	Dug Well	7.29	5.11	6.15	6.69
	Kochuveli(R1)	Dug Well	2.35	1.22	2.35	
	Korani	Dug Well	8.43	4.33	6.7	7.17
	Kulathur	Dug Well	10.79	6.26	8.36	8.33
	Madavur	Dug Well	12.23	6.84	9.42	11.12
	Malayadi	Dug Well	6.67		3.77	4.27
	Mangalapuram	Dug Well		15.87	17.77	18.37
	Mannanthala	Dug Well	7.92	4.8	5.05	7.04
	Maruthamala	Dug Well	8.82	5.59	5.76	7.04
	Meenangal	Dug Well	9.51	6.1	6.2	7.23
	Melvettoor	Dug Well	34.79	33.6	33.05	
	Mulloor	Dug Well	23.96	15.5	18.66	19.56
	Murukumpuzha(R1)	Dug Well	3.68	1.85	2.57	

District	LOCATION	WELL TYPE	Apr-18	Aug-18	Nov-18	Jan-19
	Muzhi	Dug Well	4.16			
	Nagapuram	Dug Well	16.32	14.49	14.46	15.46
	Nanniyode	Dug Well	5.87	4.25	2.85	6.09
	Navaikulam	Dug Well	12.55	7.6	9.35	10.65
	Nedumangad	Dug Well	9.02	5.37	5.81	7.47
	Neyyattinkara	Dug Well	13.54	9.75	11.2	11.97
	Ookod	Dug Well	10.8	7	9.56	10.2
	Ottashekharamangalam	Dug Well	3.58	3.45	3.35	4.04
	Palayamkunnu	Dug Well	10.72	7.97	10.27	14.16
	Palode	Dug Well	6.46	7.27	2.65	3.6
	Panavoor	Dug Well		2.75	2.88	3.48
	Pangode	Dug Well	5.33	3.7	4.3	6.51
	Parandakuzhi	Dug Well	14.6	9.68	4.18	14.24
	Parandod	Dug Well	5.87	3.4	3.06	4.76
	Parassala	Dug Well	1.09	0.25	0.75	0.9
	Peringamala	Dug Well	8.52	7.35	6.25	8.9
	Perumathura	Dug Well			1.95	1.74
	Perumgulam	Dug Well	7.8	5.33	7.23	7.32
	Perumgur (R1)	Dug Well	5.84	1.78	1.24	3.86
	Perumkuzhi	Dug Well	3.86	1.51	2.83	3.31
	Perunkadavila	Dug Well	12.29	9.63	10.1	10.98
	Pirappankod	Dug Well	7.48	2.78	4.05	5.31
	Ponganadu	Dug Well	6.4		3.3	5.05
	Ponmudi (R1)	Dug Well	4.1		3.9	
	Poonthura (R1)	Dug Well		2.79	2.85	3.01
	Poovachal	Dug Well	12.83	9.7	10.3	11.17
	Poovar-ii	Dug Well	20.1	15.3	17.65	19.12
	Pothencod	Dug Well			8.04	
	Pozhiyoor(R1)	Dug Well	4.1	1.72	2.42	4.34
	Pudukurichi	Dug Well	3.17	2.65	2.89	2.91
	Pulluvila	Dug Well	57.3	55.9		55.6
	Puvar School (New)	Dug Well		4.22	4.32	5.92
	Sasthanthala	Dug Well		2.08	3.27	5.06
	Sasthavattom	Dug Well	4.93	1.51	2.75	3.57
	Shankaramugham	Dug Well	7.56	5.26	5.86	6.31
	Tekkada	Dug Well	4.14	2.52	3.55	3.82
	Thalikkuzhi Kw	Dug Well	12.99			
	Tholicode	Dug Well	8.47	7.78	5	6.51

District	LOCATION	WELL TYPE	Apr-18	Aug-18	Nov-18	Jan-19
	Thonakkal	Dug Well	20.81	3.69	7.6	10.67
	Thumba	Dug Well	3.66	2.38	3.2	3.12
	Tirupuram	Dug Well	24.26	26.64	26.54	
	Trivandrum	Dug Well	13.03	10.35	10.12	16.42
	Udyankulangara	Dug Well	11.25	8.3	9.8	10.6
	Uzhamalakkal	Dug Well	5.92	2.1	2.15	3.38
	Vakkom	Dug Well	5.11	1.57	3.55	3.66
	Valakkad	Dug Well	11.51	6.99	10.11	11.16
	Vamanapuram	Dug Well	3.88	1.52	1.4	3.8
	Varkala	Dug Well	14.16	11.3	12.42	13.42
	Vattapara	Dug Well	10.27	5.85	5.75	7.88
	Vattavila	Dug Well	7.76	6.97	9.73	11.21
	Vazhichal	Dug Well	6.51	4.94	5.2	5.92
	Veeranakavu	Dug Well			5.25	
	Vellanad	Dug Well	6.08	4.5	4.65	4.68
	Vellarada(R1)	Dug Well	4.45	2.42	2.45	4.63
	Vellayani (Poonkulam)	Dug Well	16.6	14.35	15.28	15.08
	Venganoor	Dug Well	20.52	16.4	19.52	
	Vengod	Dug Well	7.8	3.92	6.07	6.89
	Venjaramoodu	Dug Well	10.25	6.78	7.4	8.9
	Venpakal	Dug Well	9.64	4.46		
	Veyloor	Dug Well	26.24	14.52	24.12	25.12
	Vilapilshala	Dug Well	8.45	7.1		7.52
	Vithura	Dug Well	14.12	8.01	6.17	9.36
	Vizhinjam	Dug Well	1.5	0.62	0.78	0.93
	Edava	Tube Well		11.1	11.4	9.3
	Varkala Deep	Tube Well	20.5	16.92	19.25	19.25
	Varkala(shallow)	Tube Well	18.5	7.98	16.3	5.26
THRISSUR	Arimpur	Bore Well	9.25	1.48	6.85	7.02
	Ayyanthole Pz	Bore Well	19.4	4.42		16.66
	Chazhur (Anthikad)	Bore Well	13.12	9.93	11.52	12.04
	Chelakara Pz	Bore Well	7.55			5.98
	Cheruthuruthi School	Bore Well	24.7	4.62	30.5	17.9
	Chowannur	Bore Well	28.75	21.66	25.68	28.93
	Desamangalam	Bore Well				8.35
	Kecheri Pz	Bore Well	9	6.74	7.4	7.96
	Kodakara Pz	Bore Well	12.46	9.13	11.26	12.16

District	LOCATION	WELL TYPE	Apr-18	Aug-18	Nov-18	Jan-19
	Madakkathara Pz	Bore Well	9.7	8.3	12.75	11.09
	Mapranam Pz	Bore Well	14.4	11.2		13.16
	Palakal	Bore Well	14.67	3.71	11.87	13.24
	Poyya (poopathy)	Bore Well	11.35	8.57	8.96	11.14
	Ramavarmapuram	Bore Well	21.6	10.5	18.5	12.7
	Varandarapalli	Bore Well	6.65	7.46		7.58
	Varavoor Pz	Bore Well			9.5	9.19
	Velur	Bore Well	31.17	5.17	11.35	19.37
	Adatt	Dug Well	13.79	11.3		12.13
	Akalad	Dug Well	4.22	2.01	3.35	3.69
	Amballur	Dug Well	7.22	6.41	8.3	8.05
	Annamanada	Dug Well	5.22	3.1	4.06	4.56
	Arimpur1	Dug Well	5.37	2.5	4.55	4.78
	Athani	Dug Well	8.3	3.8	7.75	7.36
	Athani Parambu	Dug Well		0.95		1.31
	Attoor	Dug Well	7.73	7.61		7.73
	Ayyanthole	Dug Well	12.2	8.5	10.05	8.85
	Azhikode (R2)	Dug Well	1.53	0.53	0.78	1.09
	Chalakudi	Dug Well	9.17	7.76	8.33	8.56
	Chammannur	Dug Well		2.27	3.07	3.67
	Chavakkad	Dug Well	4.07	1.39	1.77	2.5
	Chelakara	Dug Well	5.11	2.59	2.98	3.9
	Chelakod	Dug Well	4.3	2.02	4.55	3.12
	Chengallur (Rendamkallu)	Dug Well	5.82	6.83	8	7.31
	Cherenkonam	Dug Well		4.39	5.51	6.02
	Cherpu	Dug Well	9.88	7.05	8.3	8.63
	Cherukunnu	Dug Well	5.41	2.61	3.6	4.79
	Cheruthuruthi (R1)	Dug Well	7.26	2.1	2.65	
	Choondal	Dug Well	9.77	6.82	8.45	8.91
	Chowannur	Dug Well	12	7.76	9.45	10.22
	Deshamangalam	Dug Well	8.77	6.52	7.7	7.85
	East Fort (Thrissur)	Dug Well	8.05	7	8.3	8.34
	Echipara	Dug Well	3.88	2.03	3.68	2.9
	Edamuttom	Dug Well	2.4	0	0.9	1.52
	Edathrinji	Dug Well	0.87	0.75	0.85	1.07
	Engandiyur-R1	Dug Well	3.87	2.07	2.63	3.21
	Eriyad (R1)	Dug Well	1.8	0.24	1.01	1.38
	Erumapetty	Dug Well	8.1	5.28	7.03	7.89

District	LOCATION	WELL TYPE	Apr-18	Aug-18	Nov-18	Jan-19
	Eyyal Ambalam Jn	Dug Well	9.45	7.41	8.56	8.85
	Guruvayur	Dug Well			1.04	
	Guruvayur (R1)	Dug Well	2.09	2.2		3.25
	Irinjalakuda -I	Dug Well	8.61	5.7	6.65	7.55
	Kallettumkara	Dug Well	5.72	4	5.17	5.95
	Kallumpuram	Dug Well	8.8	7.41	8.1	
	Kallumpuram (R1)	Dug Well	8.7			8.23
	Kallur	Dug Well	9.32	7.52	7.83	8.05
	Kanjirapally (Dream World Park)	Dug Well	4.82	3.38	4.65	4.84
	Kannara	Dug Well	6.45	4.49	5.8	5.93
	Karamuck (Vadanappally)	Dug Well		0.82		3.5
	Karikkad	Dug Well		5.36	7.65	7.92
	Karuppadanna	Dug Well	3.86	0.26	1.34	2.36
	Kattakampala (R1) (Pazhanji)	Dug Well	13.41	10.76	11.3	11.88
	Kattoor (R1)	Dug Well	5.51	1.16	1.56	2.74
	Kecheri (R1)	Dug Well	8.68	6.6	7.35	7.95
	Killimangalam	Dug Well	7.81	5.97	6.8	6.98
	Kizhakkumuri	Dug Well		6.12	6.8	7.97
	Kodakara	Dug Well	9.14	6.04	7.39	7.99
	Kodali	Dug Well	7.24	4.06	6.12	6.78
	Kodasserry	Dug Well	4.22	1.6	4.3	0.56
	Kodungallur (R1)	Dug Well	3.96	2.81	3.12	3.42
	Konnakuzhi-ii	Dug Well	4.47	4.75	5.83	
	Koorkancheri (R1)	Dug Well	18.35			8.91
	Koratty	Dug Well	17.74	6.13	7.46	7.84
	Kottappadi	Dug Well	4.19	0.83	1.12	1.57
	Kundannur	Dug Well	7.59	1	1.35	1.7
	Kunnamkulam	Dug Well	8.28	7.01	7.05	7.08
	Kurancherry	Dug Well	6.46			
	Kurunchikara	Dug Well	11.91	8.45	9.7	10.5
	Kuttanellur	Dug Well	8.78	7.84	8.8	8.87
	Logamalleswaram	Dug Well	3.52	2	2.3	2.61
	Madakkathara	Dug Well	3.6	8.36	7.4	
	Mala	Dug Well	9.6	7.26	8.34	8.76
	Manalur	Dug Well	3.42	2.3	1.5	2.34
	Mannamangalam	Dug Well	4	4.6	5.4	5.37
	Mannuthy	Dug Well	2.09	2.39	5.75	7
	Mapranam	Dug Well	14.6	10.4	12.6	15.75

District	LOCATION	WELL TYPE	Apr-18	Aug-18	Nov-18	Jan-19
	Mathilakom (R1)	Dug Well	4.39	1.95	3.05	3.92
	Mattathur	Dug Well	8.27	5.43	8	
	Mulankunnathukavu	Dug Well	7.67	5.3	6.83	7.3
	Mullassery	Dug Well	4.99	1.38	0.98	2.37
	Mullurkara (Vazhathodu Jn)	Dug Well	5.29	2.77	3.75	4.11
	Mundur	Dug Well	8.31	8.31	7.78	
	Mupliyam	Dug Well	8.09	4.54	5.6	6.86
	Muringur	Dug Well	6.34		6.12	6.81
	Muriyad	Dug Well	11.1	6.91	8.4	8.64
	Nandipulam	Dug Well	11.84		7	7.22
	Nattika 1	Dug Well	4.42		1.75	2.22
	Nellai	Dug Well	9.14			
	Olarikara	Dug Well	16.94		8.3	8.88
	Ollur	Dug Well	14.95		7.9	8.26
	Orumanayur	Dug Well	4.71		1.81	2.57
	Padakulam	Dug Well	5.94		2.41	2.94
	Palakkal	Dug Well	18.26		9.5	9.74
	Paliyamthuruthu	Dug Well	1.91		1.13	1.16
	Pallichira	Dug Well	4.57		4.1	4.52
	Pallikandam	Dug Well	4.51		2.9	2.91
	Pallikunnu	Dug Well	15.01		7.86	8.41
	Panamukku	Dug Well	16.16		8.1	8.54
	Pappali	Dug Well			3.65	
	Parappukara (R1)	Dug Well	4.46	4.22	3.42	4.5
	Parappur	Dug Well	13.44	8.4	9.4	10.38
	Pariyaram	Dug Well	6.55	5.05	6.45	6.7
	Pattikad (R1)	Dug Well	1.9	4.25	4.95	2.07
	Pavaratty1	Dug Well	3.49	1.3	1.4	2.25
	Pazhayannur (R1)	Dug Well	5.83	3.3	5.2	5.93
	Pazhuvil	Dug Well	10.25	8.2	10.3	9.92
	Peechi (R1)	Dug Well		5.2	6.25	6.24
	Perambra	Dug Well	14.92	4.85	7.24	7.53
	Perinjanam (R2)	Dug Well	2.3	0.5	1.12	
	Perumpilavu Junction	Dug Well	10.04	7	10.1	9.91
	Potta	Dug Well	3.84	1.85	3.95	3.1
	Poyya	Dug Well	12.55	10.08	11.17	12.41
	Pudukad1	Dug Well	2.89	1.96	2.25	2.45
	Pullikanni	Dug Well	3.52	3.4	0.7	1.89

District	LOCATION	WELL TYPE	Apr-18	Aug-18	Nov-18	Jan-19
	Punnayoor	Dug Well	5.69	2.63	3.98	4.65
	Puthenchira East	Dug Well	9.42	7.62	8.65	8.74
	Ramanchetty	Dug Well	5.15	3.27	4.05	4.49
	Tekkumkara (Konathukunnu)	Dug Well	8.25	5.37	6.55	7.75
	Trichur	Dug Well	7.75	5.8	6.63	7.22
	Triprayar	Dug Well	4.42	2.25	3.1	3.57
	Vadanapalli	Dug Well	4.4	2.82	3.38	3.91
	Vaniyampara	Dug Well	4.94	0.87	3.07	4.03
	Varavur	Dug Well	6.62	4.93		6.05
	Vellanikara	Dug Well	2.33	1.91	2.3	3
	Vellikulangara (Maramkad Jn)	Dug Well	6.3	3.3	7	5.11
	Velupadam	Dug Well	5.91	3.3	5.18	5.64
	Velur	Dug Well	8.29	5.2	6.87	7.2
	Vettikkattiri	Dug Well		2.72	6.25	7.13
	Viyyur	Dug Well	4.47	2.05	2.78	3.61
	Wadakkancherry	Dug Well	11.81	8.87	9.8	10.5
	Arattukadavu	Tube Well	0.98	1.48	0.86	0.84
	Engandiyur Pz	Tube Well		2.59	6.3	3.7
WAYANAD	Kottathara	Bore Well		2.02	2.85	4.16
	Pookode	Bore Well	2.41	1	1.65	1.89
	Pozhutana1	Bore Well	2.95		2.16	2.84
	Thavinjal Pz	Bore Well	2.08	1.94	2.95	3
	Valliyurkavu(e)	Bore Well	2.22	0.29	0.75	1.32
	Valliyurkavu(w)	Bore Well	2.26	0.31	0.78	1.33
	Ambalavayal	Dug Well	8.21	6.82	7.57	7.28
	Appapara	Dug Well	6.58	2.49	2.91	6.52
	Arimula	Dug Well	9.2	5.88	6.17	7.79
	Baveli	Dug Well	9.04	1.53	3.27	5.49
	Begur	Dug Well	11.69	6.14	6.51	7.13
	CC Junction	Dug Well	11.71	6.89	9.11	9.91
	Cheenkeri	Dug Well	10.3	3.86	5.51	6.13
	Chellakod	Dug Well	8.74	4.14	6.19	7.34
	Chenad	Dug Well	16.84	11.04	11.15	12.3
	Cheyyambam	Dug Well	3.98	1.14	2.88	
	Chulliyod	Dug Well	14.76	12.03	11.01	12.26
	Dasanakkara	Dug Well	3.75	1.97	4.09	4.69
	Kalpetta-R1	Dug Well	3.07	0.97	1.06	1.21

District	LOCATION	WELL TYPE	Apr-18	Aug-18	Nov-18	Jan-19
	Kamblakat	Dug Well	18	11.94	15.58	16.72
	Kanjirangad	Dug Well	2.29	0.69	1.64	2.03
	Kappiset	Dug Well	14	1.99	5.37	9.68
	Karani	Dug Well	9.55	5.02	6.79	6.92
	Kattikulam	Dug Well	6.75	1.44	5.75	6.47
	Kavumandam	Dug Well	6.16	3.93	4.75	5.03
	Kellur -5th Mile	Dug Well	12.9	1.24	3.29	6.41
	Koliyadi	Dug Well	2.69	0.29	1.9	3.51
	Koodal Kadavu	Dug Well	16.03	9.24	13.26	14.23
	Koroth	Dug Well	3.6	1.81	2.76	3.86
	Kottathara	Dug Well	5.33	1.88	4.35	4.73
	Kottavayal	Dug Well	4.66	2.69	3.89	3.96
	Krishnagiri	Dug Well	7.34	2.89	3.51	4.67
	Kuppadi	Dug Well	20	17.82	15.69	15.63
	Lakkidi	Dug Well	1.11	0.26	0.93	1.1
	Mampayil	Dug Well	2.38	2.32	2.89	3.03
	Manjapara	Dug Well	8.76	3.62	5.61	7.22
	Mannanthody	Dug Well	8.57	4.14	5.4	6.64
	Melaputhenkunnu	Dug Well	17.8	11.34	11.53	12.92
	Meppady	Dug Well	17.65	12.08	16.68	17.59
	Minangadi	Dug Well	7.14	4.41	5.24	6.02
	Moolankavu	Dug Well	8.21	4.31	4.12	6.03
	Mullankolly	Dug Well	4.83	1.08	2.98	3.94
	Muthunga (R1)	Dug Well	3.82		2.31	
	Muttil	Dug Well	3.49	1.23	2.03	2.52
	Nadavayal	Dug Well	8.19	2.14	3.51	4.61
	Naykatti	Dug Well	6.61	3.67	4.07	4.59
	Nedugarana	Dug Well	8.95	5.13	6.73	7.63
	Neervaram	Dug Well	16.82	5.83	11.38	13.52
	Nenmeni Kunnu	Dug Well	3.11	1.37	1.28	1.83
	Noolpuzha (R1)	Dug Well	3.48	1.31	2.19	2.77
	Ondyangadi	Dug Well	10.83	5.84	8.71	9.25
	Pachilakkad	Dug Well	9.95	5.34	6.33	7.48
	Padinjarattara (R1)	Dug Well	8.8	3.55	6.93	7.93
	Pakkam	Dug Well	7.06	2.64	3.59	4.68
	Pallikunnu	Dug Well	9.55	5.61	7.43	8.42
	Panamaram	Dug Well	4.31	2.34	2.65	2.98
	Pattanikoopu	Dug Well	10.5	3.05	5.35	6.86

District	LOCATION	WELL TYPE	Apr-18	Aug-18	Nov-18	Jan-19
	Perikallur	Dug Well	13.75	1.75	6.27	9.54
	Perya	Dug Well	5.56	1.35	5.21	5.35
	Pookode1	Dug Well	2.82	1.49	2.13	2.46
	Pozhutana	Dug Well	6.4	5.04	6.16	6.34
	Pulpally	Dug Well	3.4	0.99	2.94	3.32
	Punchvayal	Dug Well	10.34	5.38	5.91	8.48
	Sulthan Battery	Dug Well	6.91	2.29	3.02	5.24
	Talapuzha	Dug Well	2.4	0.59	1.33	1.43
	Taruvana	Dug Well	11.13	3.72	7.05	8.7
	Thetrode	Dug Well	15.9	3.05	7.47	9.29
	Thirunelly (R1)	Dug Well	6.4	2.66	4.31	4.54
	Tholpetty	Dug Well	11.56	1.39	3.49	6.87
	Thonichal	Dug Well	6.55	1.91	3.68	5.32
	Ullisseri	Dug Well	4.77	0.69	0.98	1.59
	Uppupara	Dug Well			6.26	7.25
	Vaduvanchal	Dug Well	9.37	6.21	7.7	7.97
	Valad (R1)	Dug Well	10.89	5.92	9.86	10.55
	Vallathur	Dug Well	2.87	0.89	0.87	1.5
	Vallithodu (Periye)	Dug Well	7.72	7.41	9.75	9.95
	Valliyur kavu	Dug Well	2.51	0.37	1.08	1.68
	Varayal	Dug Well	4.35	3.94	4.13	4.63
	Vellamunda	Dug Well	12.68	3.32	4.41	5.08
	Vengapalli	Dug Well	15.23	6.92	12.01	13.87
	Vyittiri	Dug Well	7.56	5.62	7.11	7.55

Annexure II: The chemical analysis data of water samples collected form National Hydrograph Wells April 2018

The chemical analysis data of water samples collected form National Hydrograph Wells April 2018															
#	**District**	**Location**	**pH**	**EC in**	**TH as**	**Ca**	**Mg**	**Na**	**K**	**CO_3**	**HCO_3**	**SO_4**	**Cl**	**F**	**NO_3**
1	Allappy	Alleppey Town	7.21	500	165	42	15	35	14	TR	177	25	43	0.41	42
2		Alleppey	7.96	290	144	51	3.9	7.1	3.2	TR	182	7.7	11	0.02	0.47
3		Ambalapuzha	7.89	360	176	49	13	9.7	11	TR	250	2.6	8.5	0.12	7.7
4		Arukutti	7.5	260	120	42	3.9	7.3	2.3	TR	128	21	9.9	0.08	7.7
5		Aroor	7.15	220	94	32	3.4	4.9	2.3	TR	120	4.1	9.9	0	0.59
6		Champakulam	7.32	560	175	42	17	44	3.5	TR	171	30	82	0.17	4.9
7		Chandirur	7.13	220	82	29	2.4	8.2	4.3	TR	80	13	21	0.04	1.7
8		Charummoodu	7	62	18	6.4	0.49	3.4	0.2	TR	12	5.2	7.1	0.09	4.7
9		Chelakkad	7.46	310	120	35	7.8	19	4	TR	146	7.4	31	0.05	1.6
10		Chennithala South	8.79	280	46	15	1.9	34	2.1	4.8	44	29	44	0	20
11		Cherthala	8.89	260	54	10	6.8	29	3.5	4.8	46	12	48	0.04	1.9
12		Cheruvaranam	7.96	139	48	17	1.5	5.2	3.6	TR	51	13	9.9	0.22	3.2
13		Chettikulangara	7.62	131	50	16	2.4	4.9	2.1	TR	51	7.7	11	0.02	0.69
14		Edathuva	7.87	470	92	22	8.8	63	4.7	TR	146	11	78	0.4	1.4
15		Eramallur	6.84	310	96	35	2.1	4.7	2	TR	-	3.1	8.5	0.17	2.8
16		Haripad	7.69	320	110	39	3.2	14	3.8	TR	117	17	23	0.03	6.8
17		Idakkunnam	7.95	88	12	1.5	2	9	0.51	TR	7.3	1.3	13	0.16	6.7
18		Kadaikkadu (Cheriyanadu)	7.15	107	15	4.6	0.83	12	2.7	TR	4.9	2.1	21	0.16	16
19		Kalavamkodam	7.08	210	96	35	2.2	6.7	3.9	TR	100	17	13	0.09	3.1
20		Kalavur	7.48	104	46	16	1.5	5.8	3.2	TR	44	9.5	5.7	0.22	1.8
21		Kallissery	7.13	98	28	9.1	1.2	6.3	1.5	TR	17	7.6	7.1	0.15	17
22		Kandiyoor	7.07	270	97	33	3.7	15	8.6	TR	54	28	26	0.16	40
23		Kanichukulangara	7.39	198	92	35	1.1	5.6	1.5	TR	120	4.5	11	0.14	1.7
24		Karumancherry	7.56	240	119	40	4.4	7.9	5.5	TR	139	14	13	0.12	2.2

The chemical analysis data of water samples collected form National Hydrograph Wells April 2018															
#	**District**	**Location**	**pH**	**EC in**	**TH as**	**Ca**	**Mg**	**Na**	**K**	**CO_3**	**HCO_3**	**SO_4**	**Cl**	**F**	**NO_3**
25		Kattanam	5.03	48	9.2	1.4	1.4	5.2	0.38	TR	Tr	1.2	11	0.1	4.5
26		Kattoor	6.77	380	125	44	3.6	26	0.43	TR	176	3.5	43	0.28	5.8
27		Kayamkulam	7.53	310	92	31	3.3	22	7.9	TR	92	29	28	0	10
28		Kayipuram (Muhamma)	6.93	172	48	18	0.58	12	5.5	TR	39	18	21	0.09	15
29		Kokkothamangalam	-	230	55	20	1	12	6.2	TR	-	9.4	23	0.24	3.6
30		Kuzhamathu	7.1	114	18	7.2	0.05	13	3	TR	2.4	3.8	21	0.08	19
31		Mahadevikkad	7.58	610	172	43	16	70	7.3	TR	268	14	64	0.38	13
32		Mankombu	7.68	550	138	36	12	51	6.3	TR	110	58	103	0.24	1.3
33		Mannancherry	7.2	290	82	28	3.3	20	9.2	TR	66	48	27	0.12	7.6
34		Mannar	7.28	510	85	28	3.9	56	15	TR	24	98	70	0.16	29
35		Mavelikkara	8.37	167	36	13	1.2	13	5	2.4	20	19	16	0.13	6.6
36		Mulakuzha	7.16	181	29	9.1	1.4	17	6.7	TR	17	9.9	30	0.04	21
37		Muthukulam	6.21	270	61	17	4.6	21	3.7	TR	12	59	33	0	3.7
38		Muttam	7.16	500	122	45	2.4	38	9.6	TR	104	76	68	0.01	0
39		Muttar	7.33	450	150	29	19	16	1.8	TR	152	10	51	0	4.5
40		Naduvattom (Pallipad)	6.76	290	111	30	8.6	11	5.6	TR	93	31	16	0	2
41		Nangiarkulangara	6.73	151	56	21	1.1	4	0.7	TR	54	13	7.1	0	0
42		Nooranad	6.73	33	6	Tr	1.5	3.7	1.1	TR	4.9	2.7	5.7	0	2.4
43		Pacha	8.14	770	138	12	26	88	17	TR	238	22	107	0.2	9.1
44		Pallarimangalam	7.98	157	66	23	1.9	2.6	1.3	TR	71	12	2.8	0.12	0.94
45		Panavally	7.97	151	55	18	2.2	4.7	3.2	TR	73	4.3	8.5	0	1.6
46		Pandanad	8.12	101	34	5.6	4.8	5	2	TR	37	5.9	7.1	0	0
47		Panurkara	7.62	370	154	37	15	19	4.6	TR	152	16	28	0	2
48		Parayakkad	7.38	390	160	50	8.8	9.7	12	TR	183	17	26	0	1.5
49		Parumala	7.29	47	10	1.6	1.5	4	0.26	TR	4.9	1.5	8.5	0	7.3
50		Pathiyur	7.26	910	180	32	24	81	32	TR	195	96	114	0.3	7.4
51		Pattanakkad	7.48	610	275	40	43	31	4.7	TR	317	5.4	39	0.2	7.6

The chemical analysis data of water samples collected form National Hydrograph Wells April 2018															
#	**District**	**Location**	**pH**	**EC in**	**TH as**	**Ca**	**Mg**	**Na**	**K**	**CO_3**	**HCO_3**	**SO_4**	**Cl**	**F**	**NO_3**
52		Purakkad	8.11	310	78	24	4.4	22	8.3	TR	104	18	33	0.03	3.9
53		Ramankari	7.51	570	150	22	23	39	7.6	TR	152	25	82	0.38	1.3
54		Taikattusseri	7.61	470	120	46	1.5	34	14	TR	201	7.6	37	0.16	23
55		Thamarakulam	7.57	115	18	5.6	1	10	2.2	TR	9.8	4.9	20	0	7.6
56		Tanneermukkom	7.24	400	98	35	2.4	35	5.2	TR	116	30	47	0.16	9.2
57		Thevery	7.31	280	76	19	6.8	18	5	TR	80	27	28	0.05	1
58		Thyckal Beach	8.55	1640	205	26	34	250	22	TR	195	52	341	0.34	8.2
59		Trikunnapuzha	7.82	480	110	37	4.4	23	19	TR	152	16	41	0.21	4.3
60		Veeyapuram	7.52	161	44	17	0.49	4.8	2.1	TR	24	21	16	0	8.1
61		Venmani	7.43	157	24	5.6	2.4	15	3.7	TR	15	7.1	21	0.06	23
62	Calicut	Badagara	5.72	450	100	33	4.4	30	11	TR	49	25	61	0	46
63		Balusseri	5.58	270	28	9.6	0.97	24	5.7	TR	12	2	40	0.39	25
64		Beypore	6.17	890	230	66	16	67	15	TR	122	35	89	1.08	244
65		Chelavur	5.1	360	12	4.8	0	40	2.1	TR	9.8	3	47	0.35	45
66		Chemencheri	5.1	290	60	22	0.97	17	4.8	TR	41	33	27	0.23	11
67		Devarkoil	5.1	300	44	14	2.4	24	4.1	TR	9.8	14	47	0	36
68		Elattur	6.02	290	68	24	1.9	16	1.2	TR	34	26	31	0.11	21
69		Kakkayam	6.35	73	14	4	0.97	6.8	1.5	TR	20	3.2	8.5	0.07	2.8
70		Kayapanachi	5.52	2000	375	34	70	286	3.8	TR	37	57	660	0.07	3.8
71		Koduvalli	6.3	112	30	8	2.4	8.9	1.3	TR	56	1.8	7.1	0.02	1.4
72		Koothali	5.16	74	12	3.2	0.97	7.4	2.2	TR	7.3	2.2	11	0	10
73		Kozhikode	5.64	220	76	27	1.9	13	1.4	TR	37	13	28	0.03	13
74		Mavoor II	5.15	118	10	3.2	0.49	9.2	7	TR	12	3.1	17	0	5.3
75		Mukkali	5.1	143	18	6.4	0.49	14	4.4	TR	9.8	11	18	0.11	19
76		Nadapuram	5.52	174	42	14	1.9	16	3.3	TR	51	7.3	24	0.11	6.9
77		Perambra	5.36	120	20	6.4	0.97	9	1.9	TR	17	2.6	14	0	11
78		Pudukayam	5.29	65	10	3.2	0.49	7.4	0.6	TR	17	1.5	9.9	0.03	2.9

The chemical analysis data of water samples collected form National Hydrograph Wells April 2018															
#	**District**	**Location**	**pH**	**EC in**	**TH as**	**Ca**	**Mg**	**Na**	**K**	**CO_3**	**HCO_3**	**SO_4**	**Cl**	**F**	**NO_3**
79		Pudupadi	4.94	112	14	4.8	0.49	8.1	6.3	TR	9.8	3.5	20	0	6.1
80	Calicut	Quilandy	6.27	390	92	34	1.9	41	11	TR	151	24	52	0.26	7.7
81		Ramanattukara	6.59	750	155	32	18	103	12	TR	201	116	92	0.46	3.8
82		Thamarasseri	5.95	143	36	14	0.49	8.8	5.9	TR	49	5	16	0	0.57
83		Thiruvallur	5.45	109	20	8	0	7.3	6.3	TR	29	4.7	11	0	5.2
84		Tikkodi	4.26	123	18	5.6	0.97	9	6.5	TR	0.01	9.3	18	0	14
85		Azhinilam	5.35	129	20	6	0.97	12	5.8	TR	12	7.6	27	0	2.9
86		Calicut Beach	6.75	630	270	98	6.1	27	14	TR	250	29	43	0	98
87		Chaliyam	6.6	530	164	58	4.4	33	6.6	TR	183	32	57	0	12
88		Cheruvannur West	5.8	430	86	20	8.8	34	8	TR	24	21	81	0	30
89		Farooq	6.09	340	70	22	3.4	20	8.9	TR	41	19	31	0	40
90		Meladi	6.53	290	118	46	0.97	6.7	5.1	TR	156	6.8	8.5	0.06	1.6
91		Naduvattom	6.38	450	130	46	3.4	38	12	TR	92	33	57	0	75
92		Nallalam	6.02	340	72	22	4.4	25	8.5	TR	37	49	40	0	12
93		Orkattery	6.46	320	102	31	5.8	19	5.9	TR	107	25	28	0.13	1.6
94		Karaparambu	6.14	290	92	33	2.4	14	6.6	TR	85	29	23	0	0.7
95		Pavangad	6.52	470	184	67	3.9	24	9.4	TR	250	7.2	37	0	0.98
96		Iringallur	6.01	220	22	8	0.49	21	6.4	TR	24	8.2	36	0	3.6
97		Kallai	6.78	520	174	66	2.4	30	13	TR	146	40	46	0.04	61
98		Kottakadavu	5.93	115	20	7.2	0.49	9.1	6.1	TR	20	1.8	21	0	6.2
99		Puduppanam	5.59	198	24	8	0.97	24	5.3	TR	15	5.9	38	0	14
100		Moodadi	6.24	155	42	14	1.9	9.6	5.5	TR	49	3.2	18	0	4.7
101	Ernakulam	Palluruthy	6.6	280	120	45	1.9	6.9	6.3	TR	139	14	1.4	0.35	13
102		Kumbalangi	7.71	660	240	82	8.5	38	30	TR	299	18	64	0.13	13
103		Cheriyakadavu	7.5	2300	400	96	39	305	22	TR	354	10	548	0.08	19
104		Vypeen	7.91	1080	265	76	18	111	23	TR	403	17	128	0.33	21
105		Edapally	7.87	410	156	53	5.80	15	5.8	TR	189	21	16	0.00	2.90

The chemical analysis data of water samples collected form National Hydrograph Wells April 2018															
#	**District**	**Location**	**pH**	**EC in**	**TH as**	**Ca**	**Mg**	**Na**	**K**	**CO_3**	**HCO_3**	**SO_4**	**Cl**	**F**	**NO_3**
106		Elur North	7.34	2900	565	154	44	314	9.7	TR	110	88	764	0.16	43
107		Varapuzha	6.97	270	82	28	2.9	11	6.3	TR	83	15	20	0.2	3.4
108		Nayarambalam	7.24	460	176	53	11	15	6.4	TR	201	44	21	0.09	2
109		Munambam	7.67	250	90	33	1.9	8.3	6.7	TR	139	9.7	8.5	0.15	1.8
110		Fort Cochin	7.4	600	245	62	22	20	5.6	TR	268	30	32	0.02	3
111		Chellanum	7.77	2300	420	104	39	277	32	TR	403	3.1	533	0.18	22
112		North Paravur	7.21	370	128	42	5.4	11	14	TR	152	27	16	0.19	1.8
113		Malipuram	7.54	410	132	46	3.9	25	4.8	TR	165	3.1	38	0.09	4.9
114		Kandakadavu	7.36	2500	285	60	33	367	29	TR	73	89	676	0.3	37
115		Cherai	7.53	191	74	29	0.49	4.6	1.9	TR	88	0.54	8.5	0.02	5.2
116		Edavanakkad	7.04	310	122	42	4.4	11	3.7	TR	134	18	16	0.15	2.7
117		Paravur	7.04	128	44	17	0.49	4.5	2.4	TR	51	3.6	4.3	0	3.7
118		Njarakkal	7.62	490	188	64	6.8	22	5.5	TR	226	33	28	0.14	7.7
119		Thaikattukara	7.27	580	120	28	12	60	11	TR	61	142	53	0.11	9
120		Kunnukara	7.16	122	14	4	1	17	2	TR	4.9	0	23	0.05	12
121		Cherukadappuram	7.78	390	134	31	14	20	1	TR	165	1	41	0.15	2.5
122		Parakadavu	6.84	330	78	18	8.3	19	12	TR	61	16	50	0.04	1.7
123		Chengamanad	6.83	119	24	6.4	1.9	14	3.1	TR	12	0	18	0	18
124		Mallussery	6.77	122	14	3.2	1.5	17	4	TR	4.9	0	24	0.16	16
125		Karukutty	6.17	105	26	5.6	2.9	8.9	1.3	TR	27	0.58	11	0.02	12
126		Kottapuram	6.18	158	36	10	2.4	16	5.3	TR	37	16	16	0	4.1
127		Aluva	6.11	195	28	8	1.9	17	17	TR	9.8	16	26	0	24
128		Trikkakkara	6.5	300	72	26	1.5	30	3.3	TR	78	4.2	50	0	7.6
129		Chalakka	6.8	280	56	14	5.4	33	2.7	TR	85	4	40	0.26	4.8
130		Angamali	6.7	240	50	17	1.9	20	8.6	TR	44	18	34	0	10
131		Chulli	6.63	142	42	11	3.4	14	1.4	TR	27	0	17	0.05	24
132		Malayattur	6.69	106	28	7.2	2.4	6.2	3.5	TR	27	6.7	9.9	0	8.1

The chemical analysis data of water samples collected form National Hydrograph Wells April 2018															
#	**District**	**Location**	**pH**	**EC in**	**TH as**	**Ca**	**Mg**	**Na**	**K**	**CO_3**	**HCO_3**	**SO_4**	**Cl**	**F**	**NO_3**
133		Aikaranad	5.9	40	6	1.6	0.49	3.1	1.3	TR	7.3	0.38	7.1	0	0.38
134		Tripunithura	6.98	660	230	70	13	32	18	TR	232	70	50	0	28
135		Perumbadavam	6.03	73	18	3.2	2.4	4.1	1.7	TR	15	0.19	11	0	1.9
136		Puthotta	6.92	410	118	41	3.9	26	6.2	TR	116	25	44	0	5.5
137		Mulanthuruthi	6.49	152	24	8.8	0.49	17	2.2	TR	7.3	0.29	24	0	24
138		Punithura	6.46	310	94	30	4.9	19	3.3	TR	95	12	30	0.05	13
139		Udayamperur	6.94	230	76	28	1.5	14	3.4	TR	73	9	17	0.03	13
140		Anchalpetty	6.56	77	18	5.6	0.97	4.9	1.6	TR	12	3.3	11	0	3.1
141		Vallom	6.41	117	22	6.4	1.5	15	3.5	TR	22	0.29	16	0	9.8
142		Kundannur	7.44	300	72	19	5.8	25	4.5	TR	85	8.3	48	0.05	0.57
143		Maradu	7.6	790	280	88	15	49	5.9	TR	378	18	50	0.12	11
144		Ernakulam South	7.23	630	195	68	6.1	43	10	TR	226	17	75	0.14	8.4
145		Vyttila	6.54	300	72	25	2.4	16	30	TR	100	27	27	0	1.4
146		Vazhakulam North	6.45	116	38	9.6	3.4	8	2.7	TR	32	5.3	11	0	9.9
147		Irumbanam	7.16	1060	185	42	19	144	16	TR	189	42	235	0.47	3.2
148		Neriyamangalam	7.01	91	22	4.8	2.4	6.6	2.3	TR	15	3	16	0	5.7
149		Pothanikad	6.68	176	40	15	0.49	12	12	TR	41	12	16	0	19
150		Kottapadi	6.66	76	24	6.4	1.9	5.1	0.48	TR	27	1.9	8.5	0	2.4
151		Kothamangalam	6.56	200	62	18	3.9	12	5.1	TR	27	14	20	0	32
152		Muvattupuzha	6.62	181	62	17	4.9	5.7	8.6	TR	56	28	9.9	0	9.3
153		Koothattukulam	6.75	290	70	21	4.4	18	21	TR	61	9.4	31	0	44
154	Idukki	Adimali	5.04	176	24	8	1	17	3.6	TR	2.4	5.6	26	0.12	24
155		Chinikuzhi	7.57	105	32	8.8	2.4	6.9	2.1	TR	46	1.8	5.7	0	0.87
156		Chittur	7.03	44	8	3.2	0	3.2	0.8	TR	12	0	2.8	0	3.5
157		Elapara	6.71	195	46	14	2.9	12	5.4	TR	22	5.2	28	0	20
158		Irratayar	6.84	710	65	14	7.3	97	6.3	TR	18	3.9	149	0	66
159		Idukki	6.01	74	18	4.8	1.5	5.3	1.5	TR	24	1.9	7.1	0	2.1

The chemical analysis data of water samples collected form National Hydrograph Wells April 2018															
#	**District**	**Location**	**pH**	**EC in**	**TH as**	**Ca**	**Mg**	**Na**	**K**	**CO_3**	**HCO_3**	**SO_4**	**Cl**	**F**	**NO_3**
160		Kaliyar	6.16	123	36	12	1.5	6.6	5.1	TR	29	10	9.9	0	16
161		Karimkunnam	6.22	250	68	21	3.9	20	4.7	TR	54	12	38	0	16
162		Kattapana	3	650	105	24	11	49	29	TR	0	13	85	0.2	137
163		Koilkadavu	6.5	290	86	22	7.8	21	4.6	TR	78	13	45	0	7.7
164		Kulamavu	6.39	135	28	6.4	2.9	11	3.1	TR	9.8	0.68	17	0	28
165		Kumaramangalam	6.27	90	22	5.6	1.9	6.5	1.8	TR	15	3.8	11	0	16
166		Kumili	7.11	330	126	34	10	17	7.5	TR	141	26	26	0.45	4.1
167		Kuttikanam	7.01	116	28	6.4	2.9	7.2	3.5	TR	7.3	3.3	18	0	16
168		Moolamattom	6.89	93	32	8	2.9	5.8	0.8	TR	24	4.7	7.1	0	12
169		Munnar	6.06	91	18	4	1.9	7.8	1.9	TR	12	0.68	17	0	3.8
170		Nedumkandam	-	300	58	14	5.4	28	6.9	TR	-	18	54	0.22	1.2
171		Poopara	7.32	450	106	26	9.7	37	12	TR	61	18	67	0	60
172		Vandanmedu	6.9	111	22	5.6	1.9	9.7	3.9	TR	24	0.34	13	0	13
173		Vandiperiyar	6.92	520	95	18	12	42	33	TR	30	2.8	85	0	74
174		Vellilamkandam	5.65	83	14	4	1	5.2	2.8	TR	4.9	3.6	14	0	8.8
175		Kottiyur	6.8	96	12.2	8.0	8.5	5.3	0.7	TR	18	3.9	7.1	0.06	2.3
176		Muzhakunnu	6.02	152	60	14.0	6.1	10	3.6	TR	85	3.9	25	0.12	6.0
177		Kannavam	5.6	58	30	4.0	4.9	5.4	0.6	TR	30	0.5	11	0.00	3.4
178		Koothuparamba	5.62	350	95	20.0	10.9	25	10	TR	12	6.2	39	0.00	83
179		Mokeri	5.3	200	25	6.0	2.4	31	1.9	TR	18	2.6	57	0.12	3.8
180		Kannur	7.07	280	85	24.0	6.1	18	8.5	TR	31	35	43	0.00	30
181		Chakkarakkale	6.44	230	40	6.0	6.1	24	7.0	TR	12	0.0	67	0.02	18
182		Cheleri	6.2	36	12	2.4	1.5	2.1	0.8	TR	5	0.0	10	0.00	3.2
183		Chepparapadavu	6.51	76	20	4.0	2.4	6.3	0.7	TR	22	0.0	16	0.00	4.2
184		Dharmadam	7.05	182	48	15.2	2.4	17	3.4	TR	49	6.0	36	0.00	6.0
185		Kanapuram	7.84	350	140	56.1	0.0	17	6.1	TR	159	1.0	36	0.07	13
186		Kozhichal	7.07	117	25	4.0	3.6	3.8	0.7	TR	37	0.0	11	0.00	2.1

The chemical analysis data of water samples collected form National Hydrograph Wells April 2018															
#	**District**	**Location**	**pH**	**EC in**	**TH as**	**Ca**	**Mg**	**Na**	**K**	**CO_3**	**HCO_3**	**SO_4**	**Cl**	**F**	**NO_3**
187		Mahe	7.76	560	275	86.2	14.6	34	12	TR	360	1.0	50	0.07	0.7
188		Mattannur	6.94	131	26	6.4	2.4	9.0	5.8	TR	4.9	0.0	24	0.00	21
189		Payyanaur	6.74	210	75	20.0	6.1	12	3.7	TR	12	0.0	28	0.00	39
190		Peringome	6.39	200	56	12.8	5.8	16	5.5	TR	34	0.0	30	0.00	21
191		Ramanthali	6.38	47	8	2.4	0.5	4.0	0.5	TR	2.4	0.0	10	0.00	1.7
192		Thallassery	7.61	450	150	50.1	6.1	29	16	TR	140	32.0	53	0.00	23
193		Thaliparamba	7	230	60	16.0	4.9	16	8.9	TR	18	0.0	32	0.00	46
194		Ulikkal	6.37	77	16	3.2	1.9	4.7	0.9	TR	15	0.0	10	0.00	4.5
195		Valapattanam	6.57	300	60	16.0	4.9	40	1.7	TR	24	0.1	67	0.00	20
196		Alavil	6.85	102	18	5.6	1.0	10	0.5	TR	10	4.0	20	0.00	2.6
197		Chala	6.82	78	32	4.0	5.4	7.1	1.3	TR	20	1.0	14	0.00	4.3
198		Chelad	6.72	230	42	14	1.9	21	4.0	TR	15	7.5	14	0.00	45
199		Cheruthazham	5.84	145	6	2.4	0.00	10	1.0	TR	4.9	0.0	16	0.00	6.1
200		Edakkad	6.95	177	60	18	3.4	11	1.6	TR	44	19	20	0.14	0.5
201		Ellikulam	6.78	83	18	6.4	0.5	5.7	1.6	TR	22	0.0	14	0.00	7.1
202		Ezhilode	7.15	146	52	5.6	9.2	8.0	2.8	TR	66	0.0	13	0.20	6.7
203		Kalliassery	7.02	127	40	11	2.9	8.5	3.1	TR	20	0.0	23	0.00	4.2
204		Kannur Thana	7.09	178	46	14	2.9	11	7.5	TR	32	8.0	23	0.00	15
205		Kunnaaru	7.67	520	58	14	5.4	70	11	TR	166	26	74	0.08	3.9
206		Kuppam	7.5	134	28	8.8	1.5	5.6	5.0	TR	27	2.0	13	0.00	5.9
207		Melechera	7.23	87	24	8.0	1.0	4.1	1.1	TR	27	0.0	10	0.00	1.5
208		Palleri	7.2	128	28	8.8	1.5	11	2.3	TR	34	0.0	20	0.00	5.1
209		Panuda	5.29	104	14	3.2	1.5	9.5	2.1	TR	7.3	0.0	17	0.00	18
210		Pappinaserry	7.46	700	235	78	10	46	6.7	TR	165	22	128	0.22	3.4
211		Parassinikadavu	7.41	300	60	14	6.08	34	5.2	TR	79	0.0	46	0.14	11
212		Pazhayangadi	7.46	350	170	60	4.86	11	1.8	TR	195	20	21	0.00	4.1
213		Puthiya theru	7.31	220	48	13	3.89	19	4.0	TR	22	16	33	0.00	22

The chemical analysis data of water samples collected form National Hydrograph Wells April 2018															
#	**District**	**Location**	**pH**	**EC in**	**TH as**	**Ca**	**Mg**	**Na**	**K**	**CO_3**	**HCO_3**	**SO_4**	**Cl**	**F**	**NO_3**
214		Thazhechowa	7.14	185	32	8.0	2.9	14	12	TR	37	11	24	0.00	4.5
215		Varam	7.04	86	14	2.4	1.9	9.1	1.3	TR	10	0.0	16	0.00	8.1
216		Pinarayi	3.71	137	16	2.4	2.4	18	1.1	TR	0	0.0	31	0.00	23
217		Melur	7.21	186	76	26	2.9	9.2	2.2	TR	81	5.0	20	0.00	3.0
218		Munderi	6.81	103	18	1.6	3.4	10	2.0	TR	7.3	0.0	21	0.18	18
219		Pattuvam	6.96	330	45	10	4.9	12	6.0	TR	43	10	14	0.00	0.5
220		Kolancherry	6.99	125	22	0.0	5.4	7.6	2.3	TR	21	2.5	16	0.00	7.8
221		Mayyil	6.96	162	42	13	2.43	14	3.5	TR	39	5.0	30	0.21	2.0
222		Neruvambram	6.94	72	26	9.6	0.49	1.7	0.8	TR	22	1.0	7.1	0.00	4.8
223		Kotty	7.39	300	145	17	25.0	13	4.5	TR	134	32	25	0.01	5.1
224	Kasarakode	Anadimegar	6.97	107	28	4.8	3.9	7.7	1.5	TR	20	1	14	0.00	2.7
225		Bendadeka	6.92	87	30	11	0.5	3.3	1.5	TR	41	0	11	0.00	1.9
226		Bekal	3.90	270	42	7.2	5.8	30	3.7	TR	0	0	55	0.00	60
227		Chayankode	6.30	126	20	3.2	2.9	13	3.4	TR	12	0	21	0.00	25
228		Chittarikkal	6.70	90	26	4.0	3.9	3.4	0.4	TR	27	0	7.1	0.00	5.1
229		Kanjahangad	6.47	165	28	6.4	2.9	17	2.7	TR	4.9	0	38	0.04	43
230		Kasarkode	6.42	220	55	14	4.9	17	4.0	TR	6.1	0	46	0.00	20
231		Kumbala	7.86	280	120	32	9.7	12	3.5	TR	153	0	18	0.21	4.2
232		Anjeswar	7.49	176	48	11	4.9	11	3.0	TR	54	0	20	0.00	6.2
233		mulleriya	7.22	152	30	6.4	3.4	11	4.7	TR	12	0	21	0.15	27
234		Nileswaram	7.18	182	62	18	3.9	4.3	7.9	TR	24	0	30	0.00	20
235		Odayanchal	7.00	82	10	4.0	0.0	5.5	1.0	TR	22	0	11	0.00	4.5
236		Paivaligai	7.25	145	32	9.6	1.9	14	3.0	TR	37	0	27	0.03	1.7
237		Panathur	7.11	166	34	8.0	3.4	15	1.3	TR	20	0	34	0.03	12
238		Parappa North	6.39	125	45	3.2	2.4	4.4	0.8	TR	24	1	10	0.00	1.4
239		Perla	6.77	175	105	14	1.9	12	3.9	TR	83	0.25	24	0.00	14.9
240		Poinachi	6.54	73	40	3.2	1.9	4.5	1.2	TR	7.3	0.05	11	0.00	6

The chemical analysis data of water samples collected form National Hydrograph Wells April 2018															
#	**District**	**Location**	**pH**	**EC in**	**TH as**	**Ca**	**Mg**	**Na**	**K**	**CO_3**	**HCO_3**	**SO_4**	**Cl**	**F**	**NO_3**
241		Povval	6.96	168	65	8.0	1.5	12	1.5	TR	39	1	20	0.00	19
242		Pullar	6.89	94	55	6.4	1.5	5.4	2.3	TR	20	1	14	0.00	6.7
243		Trikannipur	6.74	58	40	5.6	0.5	3.1	0.2	TR	27	0	11	0.15	1.2
244		Uppala	7.13	117	50	3.2	2.9	11	2.75	TR	49	0	11	0.00	4.4
245		Ajannur	7.33	122	32	6.4	3.8912	6.9	2.03	TR	36.6	1	12.78	0	4.06
246		Chamundikunnu	7.18	210	80	22	6.08	13.3	2.94	TR	85.4	2.5	28.4	0.1	7.46
247		Elambachi	7.41	270	55	18	2.432	33.65	0.82	TR	48.8	0	56.8	0	13.26
248		Kanhangad coast	7.5	210	90	28	4.864	11.2	3.5	TR	85.4	10	21.3	0	3.53
249		Kannadipara	7.31	59	10	3.2	0.4864	5.34	0.5	TR	7.32	0	11.36	0	3.85
250		Kudla	5.9	190	40	5.6	6.3232	13.2	4.3	TR	9.76	1	28.4	0	11.00
251		Mangalapady	6.44	132	24	6.4	1.9456	16.1	1.3	TR	24.4	0	26.98	0	2.73
252		Mavungal	6.26	63	14	4.0	0.9728	5.5	0.84	TR	9.76	0	12.78	0.04	6.75
253		Melparamba	6.42	195	34	8.8	2.9184	22.9	7.1	TR	21.96	0	106.5	0	13.61
254		mogral	6.5	92	28	8.0	1.9456	5.82	0.65	TR	24.4	0	14.2	0	5.22
255		Mogral Puthur	6.97	143	50	10	5.8368	8.74	1.76	TR	41.48	8	17.04	0.08	9.42
256		Putheriyadukam	6.8	90	28	10	0.4864	3.88	1.76	TR	17.08	5	11.36	0	6.42
257		Thachangad	7	122	38	11	2.432	8.51	2.4	TR	31.72	0	22.72	0	4.76
258		Udinur	6.93	60	20	7.2	0.4864	4.1	0.16	TR	17.08	0	12.78	0	0.10
259		Naimarmoola	3.06	560	65	12	8.512	56	11.8	TR	0	36	106.5	0	59.16
260		Cherkalu	6.29	95	18	5.6	0.9728	6.02	0.55	TR	14.64	0	14.2	0	5.00
261		Chalingal	6.19	51	8	3.2	0	12.9	0.86	TR	7.32	0	12.78	0	6.70
262		Kayyar	6.44	137	24	6.4	1.9456	13.67	3.9	TR	17.08	4	25.56	0.08	8.94
263		Cheemeni	6.50	57	12	3.2	0.9728	4.32	0.67	TR	2.44	0	11.36	0	6.15
264		Kalikadavu	6.35	70	12	2.4	1.4592	11	0.62	TR	4.88	0	24.14	0	6.90
265	Kollam	Iravipuram	7.12	450	134	41	7.8	40.8	14.0	TR	134	39	53	0.06	33
266		Kollam	7.07	170	46	15	1.9	11.6	2.0	TR	17	25	23	0.06	6.6
267		Anchalumoodu	3.91	300	44	10	4.4	32.8	10	TR	0	1.5	67	0.17	53

The chemical analysis data of water samples collected form National Hydrograph Wells April 2018															
#	**District**	**Location**	**pH**	**EC in**	**TH as**	**Ca**	**Mg**	**Na**	**K**	**CO_3**	**HCO_3**	**SO_4**	**Cl**	**F**	**NO_3**
268		Perinad	5.86	132	24	4.8	2.9	17.3	1.1	TR	24	0	34	0.02	4.6
269		Needakara	7.28	260	152	48	7.8	21.4	2.4	TR	159	21	46	0.02	2.6
270		Vadakumthala West	7.3	280	84	18	9.2	34.1	7.7	TR	49	55	57	0.07	1.3
271		Karunagapally	7.83	420	210	74	6.3	38.0	12	TR	195	45	53	0.05	47
272		Vallikkavu	7.57	310	102	34	4.4	24.4	1.5	TR	92	20	46	0.00	4.0
273		Ochira	7.81	520	225	74	9.7	32.0	15	TR	250	66	36	0.00	4.9
274		Manappali	7.56	67	16	5.6	0.5	4.3	0.5	TR	15	0	14	0.07	1.0
275		Sooranadu	4.56	117	20	4.0	2.4	15.1	3.0	TR	0.0	0	28	0.03	21
276		Anayadi	6.1	56	14	4.0	1.0	5.4	1.6	TR	12	0	17	0.04	2.7
277		Sasthmkotta	5.97	117	18	6.4	0.5	13.8	2.2	TR	7	3.0	30	0.00	14
278		Kadpuza	6.82	109	46	14	2.9	6.8	1.9	TR	46	3.0	13	0.09	0.6
279		Pavithreswaram	6.42	65	14	2.4	1.9	7.6	2.7	TR	4.9	3.0	18	0.00	4.4
280		Cinemaparmpu	6.63	83	26	8.8	1.0	8.8	0.6	TR	29	1.0	18	0.09	4.2
281		Ithikara	6.6	127	36	11	1.9	10.8	4.4	TR	15	1.0	27	0.00	18
282		Mayyanadu	6.67	680	164	62	2.4	68.5	24	TR	24	35	124	0.21	146
283		Ayathil	4.24	122	14	2.4	1.9	8.3	5.7	TR	0	1.0	18	0.00	23
284		Kumbalam	6.48	83	26	4.8	3.4	6.2	0.5	TR	29	1.0	14	0.03	7.9
285		East Kallada	6.63	260	58	14	5.8	29.5	5.7	TR	20	10	62	0.30	33
286		Ezhukone	6.71	100	18	6.4	0.5	12.2	2.0	TR	20	0.0	23	0.02	7.6
287		Paripalli	6.11	59	16	3.2	1.9	8.4	1.1	TR	7.3	1.5	16	0.00	14
288		Kalluvathukal	6.96	270	40	12	2.4	48.2	2.9	TR	76	6.0	61	0.11	5.1
289		Kudavettur	7.16	290	75	20	6.1	29.9	2.5	TR	49	2.0	55	0.00	38
290		Nallila	3.68	102	14	2.4	1.9	8.7	1.8	TR	0	1.0	11	0.21	19
291		Perumkulam	6.18	142	25	6.0	2.4	19.7	5.3	TR	10	1.0	45	0.00	13
292		Vendar (Manakkarakavu)	6.31	136	20	4.0	2.4	16.9	6.8	TR	12	0.5	34	0.00	18
293		Kulapadam	7.53	360	155	44	11	32.7	7.5	TR	193	3.0	61	0.30	1.6
294		Kottiyam	6.97	90	18	6.4	0.5	4.7	2.5	TR	15	5.0	13	0.00	1.8

The chemical analysis data of water samples collected form National Hydrograph Wells April 2018															
#	**District**	**Location**	**pH**	**EC in**	**TH as**	**Ca**	**Mg**	**Na**	**K**	**CO_3**	**HCO_3**	**SO_4**	**Cl**	**F**	**NO_3**
295		Pozhikara	7.37	220	80	16	9.7	21.1	3.8	TR	71	11	33	0.11	7.6
296		Thattamala	7.37	260	90	26	6.1	21.1	9.2	TR	63	45	40	0.12	2.0
297		Meenad	7.25	240	85	26	1.9	20.7	2.7	TR	61	8	47	0.10	5.1
298		Ummannur	6.06	177	25	6.0	2.4	24.58	5.76	TR	12	0.5	36	0.00	41
299		Nellikunnam	7.31	220	115	36	6.1	6.78	2.2	TR	128	9.3	14	0.08	26
300		Vayakkal	7.45	550	120	32	9.7	46	39.5	TR	92	69	89	0.00	0.9
301		Edamulakkal	7.28	79	30	8.0	2.4	5.89	3.48	TR	24	2.4	14	0.06	3.4
302		Vazhathope	6.96	60	35	4.0	6.1	4.46	1.87	TR	18	2.4	14	0.00	6.0
303		Koovakad	6.49	44	25	4.0	3.6	2.85	1.6	TR	18	2.4	11	0.00	3.4
304		Ayiranalloor	6.48	65	20	6.0	1.2	6.68	1.63	TR	24	0.8	11	0.00	5.3
305		Kalluvathukal	5.43	450	85	26	4.9	46.5	10.5	TR	12	3.9	85	0.00	102
306		Valamanur	6.14	80	35	6.0	4.9	0.89	0.37	TR	18	0.8	14	0.00	6.5
307		Oyur	4.35	91	25	6.0	2.4	7.86	3.1	TR	6.1	0.0	21	0.00	19
308		Ambalamkunnu	5.85	430	55	10	7.3	58	10	TR	12	0.0	96	0.00	64
309		Roaduvila	6.52	720	70	20	4.9	78	11	TR	55	0.3	124	0.20	128
310		Chenkulam	6.25	110	15	4.0	1.2	14.4	1.9	TR	12	1.0	18	0.00	14
311		Adichanalloor	6.28	96	20	4.0	2.4	8.3	3.7	TR	18	9.7	14	0.20	3.3
312		Meeyanoor	5.43	210	30	6.0	3.6	32.4	2.69	TR	6.1	0.0	39	0.00	54
313		Veliyam	6.64	160	30	8.0	2.4	18.14	3.16	TR	37	8.8	28	0.00	1.2
314		Veliyam NHS	6.38	280	60	10	8.5	33.5	10.03	TR	18	4.0	60	0.01	35
315		Nedumankavu	6.55	300	95	30	4.9	27.35	3.85	TR	116	1.7	43	0.00	16
316		Odanavattom	6.75	180	95	28	6.1	4.5	3.65	TR	104	5.1	11	0.62	3.2
317		Nellikunnu	6.18	360	40	11	2.9	49	10.02	TR	34	11	64	0.00	58
318		Kilioor	5.38	102	14	3.2	1.5	12.24	2.51	TR	4.9	0.0	26	0.00	11
319		Kareepra	6.16	105	22	7.2	1.0	6	3.3	TR	10	0.0	14	0.18	12
320		Karuvel	6.97	81	24	8.8	0.49	5.13	2.7	TR	31	0.0	10	0.19	5.2
321		Pavithreswaram	6.68	47	10	3.2	0.49	4.7	2.2	TR	7.3	0.0	10	0.00	8.3

The chemical analysis data of water samples collected form National Hydrograph Wells April 2018															
#	District	Location	pH	EC in	TH as	Ca	Mg	Na	K	CO_3	HCO_3	SO_4	Cl	F	NO_3
322		Kottathala	6.91	62	12	4.0	0.49	5.3	4.5	TR	17	0.0	10	0.02	4.1
323		Panvely	6.89	350	42	11	3.4	44.8	13	TR	20	0.0	75	0.00	41
324		Ummannur DW NHS	6.7	149	30	7.2	2.9	13.7	6.74	TR	10	0.0	30	0.00	19
325		Edayam	4.35	94	16	1.6	2.9	16	1.46	TR	0.0	0.0	27	0.08	12
326		Thadicadu	6.17	197	26	6.4	2.4	21	7.7	TR	22	0.0	33	0.00	17
327		Chakkuvarakkal	5.96	126	14	3.2	1.5	15.23	8	TR	10	0.0	28	0.04	13
328		Chengamanadu	6.36	179	34	10	1.9	18.27	7.14	TR	44	0.0	27	0.05	14
329		Avaneswaram	6.4	86	18	6.4	0.5	8.2	3.2	TR	22	0.0	18	0.02	5.1
330		Randalummoodu	6.67	280	62	19	3.4	30.47	7.9	TR	63	0.0	50	0.08	16
331		Pattazhy	6.59	100	28	7.2	2.4	9.64	1.58	TR	22	0.0	18	0.08	6.6
332		Pattazhy II	3.85	290	22	4.8	2.4	35.64	5.8	TR	0.0	0.0	68	0.24	29
333		Methukummel	6.25	162	66	7.2	12	7.69	7.4	TR	10	0.0	31	0.00	27
334		Pakistan Mukku	5.06	137	12	4.0	0.49	18.49	3.1	TR	2.4	0.0	28	0.00	27
335		Kulakadu	6.05	95	20	7.2	0.49	10.5	1.5	TR	24	0.0	18	0.00	6.5
336		Puthur Mukku	6.30	69	12	4.8	0.00	6.76	3.41	TR	17	0.0	11	0.04	5.2
337		Kalayapuram	4.80	480	48	10	5.8	63.5	16	TR	4.9	0.0	143	0.19	17
338		Mailom	6.53	230	28	7.2	2.4	17.4	12.5	TR	24	0.0	48	0.05	6.0
339		Kottarakara	6.46	160	22	4.0	2.9	18.54	5.2	TR	17	0.0	34	0.12	19
340		Manchalloor	6.36	100	14	3.2	1.5	8.9	6.3	TR	10	0.0	20	0.05	13
341		Pathanapuram	6.67	100	22	4.0	2.9	9.7	5.8	TR	20	0.0	24	0.05	8.3
342		Kunnida	6.27	68	6.0	0.8	1.0	9	4.03	TR	7.3	0.0	18	0.06	5.4
343		AchanKovil	7.20	350	84	21	7.8	22.8	32	TR	100	15	54	0.19	11.9
344		Kottakayam	7.12	47	8.0	3.2	0.00	6	1.68	TR	17	0.0	7.1	0.00	3.8
345		Kuninnayyam	6.88	28	8.0	2.4	0.49	5.6	1.58	TR	15	0.0	10	0.00	0.0
346		Karavur	6.70	62	14	4.0	1.0	7.4	2.3	TR	20	0.0	10	0.18	11
347		Piravanthur	6.89	147	34	10	2.4	12.5	3.2	TR	32	0.0	24	0.20	21
348		Kamukencherry	6.99	48	8.0	2.4	0.5	8.04	2.74	TR	17	0.0	10	0.02	3.0

The chemical analysis data of water samples collected form National Hydrograph Wells April 2018															
#	**District**	**Location**	**pH**	**EC in**	**TH as**	**Ca**	**Mg**	**Na**	**K**	**CO_3**	**HCO_3**	**SO_4**	**Cl**	**F**	**NO_3**
349		Punnala	6.84	92	20	4.0	2.4	8.46	4.41	TR	27	0.0	16	0.00	8.2
350		mathra	6.60	122	24	8.0	1.0	7.51	7.95	TR	4.9	0.0	24	0.05	19
351		Mavila	6.94	183	40	8.8	4.4	21.5	5.6	TR	41	4.0	33	0.02	19
352		Nettayam	6.76	136	34	13	0.5	12.3	4.06	TR	46	2.6	16	0.00	15
353		Anchal	6.87	160	28	8.0	1.9	17.6	5.5	TR	32	1.6	21	0.06	20
354		Kottakal	6.99	115	22	8.0	0.49	14.5	2.94	TR	44	0.5	18	0.00	5.5
355		Chunda	6.92	220	44	17	0.49	23.6	1.59	TR	27	0.0	31	0.03	45
356		Ayur	6.8	60	10	4.0	0.00	8	3.1	TR	20	0.0	10	0.00	7.5
357		Alayamon	6.7	156	22	8.0	0.49	19.1	6.14	TR	24	0.0	31	0.09	21
358		Choora Kulam	6.3	56	6.0	2.4	0.00	5.8	3.4	TR	7.3	0.0	10	0.00	7.1
359		Edamon	6.26	36	6.0	1.6	0.49	3.47	2.34	TR	7.3	0.0	4.3	0.09	5.2
360		Ottakal	6.31	60	12	4.0	0.49	6.62	4.1	TR	10	0.0	16	0.00	12
361		Ayankavu	7.08	108	30	10	1.0	11.29	1.72	TR	46	0.1	18	0.29	4.3
362		Thenmala	6.99	47	8.0	3.2	0.00	8	1.5	TR	10	0.0	13	0.02	4.5
363		Kulathupuza	6.31	210	20	4.8	1.9	27.64	9.5	TR	2.4	0.1	44	0.06	44
364		Ezhamkulam	6.7	156	38	10	3.4	12.1	4.6	TR	27	0.4	26	0.00	28
365		Bharathipuram	6.41	450	90	20	9.7	48.6	13.6	TR	2.4	26	98	0.29	42
366		Thumpod	6.68	74	6.0	2.4	0.00	5.47	4.1	TR	12	0.0	5.7	0.00	5.3
367		Villakkupara	6.48	85	14	4.0	1.0	9.82	3.1	TR	15	0.0	17	0.03	7.8
368		Ailara	6.14	74	10	3.2	0.49	9.23	2.2	TR	12	0.0	18	0.00	4.1
369		Feroor	7.65	410	102	31	5.8	46.8	4.2	TR	189	9.7	46	0.44	5.9
370		Karukone	6.73	240	22	5.6	1.9	24.9	8.47	TR	12	0.0	43	0.11	47
371		Meenkulam	6.52	156	22	4.8	2.4	17.24	3.02	TR	15	0.0	31	0.08	12
372		Kondonchira	6.41	95	12	4.0	0.49	9.52	4.87	TR	4.9	0.0	20	0.04	15
373		Madathara	6.81	115	28	10	1.0	11.53	3.8	TR	22	4.7	21	0.05	12
374		Chithara	6.94	155	28	10	1.0	18.73	2.9	TR	32	0.0	26	0.00	16
375		Pangidukad	6.81	45	10	3.2	0.49	4.34	1.5	TR	4.9	0.0	11	0.09	2.7

The chemical analysis data of water samples collected form National Hydrograph Wells April 2018															
#	**District**	**Location**	**pH**	**EC in**	**TH as**	**Ca**	**Mg**	**Na**	**K**	**CO_3**	**HCO_3**	**SO_4**	**Cl**	**F**	**NO_3**
376		Kadakkal	6.57	176	20	6.4	1.0	20.98	11.6	TR	10	0.0	40	0.01	25
377		Poredom	4.61	270	26	4.8	3.4	32.92	10.14	TR	0.0	0.0	61	0.15	43
378		Akkal	6.46	135	36	4.0	6.3	14.72	3.93	TR	22	0.0	21	0.00	19
379		Karadikkonam	6.46	86	12	4.0	0.49	8.68	4.37	TR	12	0.0	14	0.21	18
380		Vellaravottom	6.81	144	32	11	1.0	11.75	11.8	TR	54	4.9	20	0.20	1.7
381		Chedayamangalam	6.95	136	14	4.8	0.49	20.1	5.34	TR	20	0.0	34	0.15	7.3
382		Nilamel	7	105	34	13	0.49	6.99	3.28	TR	51	0.0	14	0.23	4.6
383	Kottayam	Changanassery	6.42	630	105	28	8.5	56	22	TR	24	43	107	0	44
384		Chempu	6.85	220	66	22	2.9	9.4	5.5	TR	88	4.7	16	0	0.63
385		Cheruthikkara	6.7	86	16	5.6	0.49	6.6	1.7	TR	12	2.8	9.9	0	9.4
386		Ettumannoor	6.52	85	14	4	1	7.1	2.7	TR	9.8	0.73	14	0	10
387		Kaduthuruthi	6.41	160	28	8.8	1.5	14	3.2	TR	15	4.1	20	0	25
388		Kanjirapally	6.32	94	26	8	1.5	4	1.5	TR	20	5.6	5.7	0	9.9
389		Kottayam	6.21	51	10	3.2	0.49	3.7	0.7	TR	2.4	2.2	7.1	0	8.2
390		Kozha	6.21	68	14	4	1	4	2.5	TR	9.8	2.2	7.1	0	11
391		Kumarakom	7.47	410	162	56	5.4	16	3.6	TR	195	7.6	30	0	3.8
392		Naranganam	6.93	37	10	2.4	1	2.3	0.9	TR	7.3	0.1	5.7	0	7.4
393		Neendur	5.8	178	20	5.6	1.5	15	7.1	TR	7.3	1.8	27	0	21
394		Paipad	5.78	250	44	16	1	19	7.6	TR	7.3	9.8	33	0	43
395		Pala	5.89	79	18	5.6	1	4.2	0.69	TR	22	2.4	5.7	0	5.7
396		Palamkadavu	6.67	280	64	14	7.3	28	1.2	TR	68	11	43	0.06	3.7
397		Pallikathodu	6.48	62	12	4.8	0	3.5	1.3	TR	7.3	1.1	7.1	0	13
398		Pallom (Nattagam)	6.33	93	20	6.4	1	5.8	3.1	TR	12	13	9.9	0.06	6.6
399		Pambadi	6.41	72	20	6.4	1	3.3	1	TR	9.8	4.5	7.1	0	1.3
400		Paruthumpara	6.26	179	16	6.4	0	20	6.2	TR	9.8	2.1	36	0	20
401		Plakkalpadi	6.25	132	16	4	1.5	13	4.2	TR	9.8	1.2	23	0	14
402		Pulikuttisseri	6.76	220	78	26	2.9	7.4	1.5	TR	61	17	20	0.02	10

The chemical analysis data of water samples collected form National Hydrograph Wells April 2018															
#	**District**	**Location**	**pH**	**EC in**	**TH as**	**Ca**	**Mg**	**Na**	**K**	**CO_3**	**HCO_3**	**SO_4**	**Cl**	**F**	**NO_3**
403		Talayolaparambu	6.37	210	50	12	4.9	14	2.4	TR	29	18	28	0	5.7
404		Tottakkad	6.15	54	16	4.8	1	3	0.7	TR	9.8	0.96	8.5	0	8
405		Vaikom	7.52	680	230	68	15	38	8.3	TR	232	26	78	0.29	9.6
406		Vazhur	6.92	43	14	4	1	2.3	0.6	TR	12	0.64	4.3	0	3.8
407		Velloor II	6.75	74	24	8	1	4.2	0.8	TR	24	3.5	5.7	0	0.59
408		Amminikkad	7.27	81	22	4.8	2.4	4.6	1.2	TR	27	0.87	8.5	0.11	3.3
409		Arikode	7.02	230	72	22	3.9	16	2.9	TR	59	8.2	27	0	21
410		Chokkad	7.38	400	124	30	12	34	2.6	TR	151	5.5	18	0.2	14
411		Chungathara	7.7	860	280	50	38	73	9.6	TR	268	45	121	0.39	56
412		Edappal	7.23	110	34	8.8	2.9	7	0.68	TR	22	1.3	14	0.01	14
413		Edavanna	7.13	136	38	11	2.4	10	1.2	TR	34	0	18	0.04	18
414		Iswaramangalam	7.4	290	80	22	6.3	35	0.92	TR	132	17	27	0.39	1.9
415		Kadalundi	7.57	1060	425	118	32	70	4.7	TR	232	227	117	0.48	2.2
416		Kalikavu	7.02	270	50	14	3.4	22	7.4	TR	7.3	1.3	37	0	50
417		Kanjiramukku	7.1	370	64	22	2.4	45	5.9	TR	43	7.6	80	0.17	34
418		Kariavattom	7.06	137	30	7.2	2.9	14	2.5	TR	22	0	26	0.11	16
419		Karulai	7.32	350	114	22	15	26	0.86	TR	134	12	36	0.15	15
420		Kondotty	7	182	34	7.2	3.9	17	1.2	TR	17	1.7	40	0.03	15
421		Kottakkal	6.98	440	80	22	5.8	47	13	TR	92	0.51	92	0	13
422		Kuruva	7.05	148	52	18	1.9	7.1	3.5	TR	78	1.4	7.1	0	6.9
423		Kuttipuram	7.34	430	118	23	15	34	11	TR	116	22	51	0.34	40
424		Malappuram	6.87	168	38	10	2.9	12	3.5	TR	29	4.1	24	0	22
425		Mangalam	6.61	650	175	48	13	46	21	TR	18	96	75	0.3	90
426		Manjeri	7.4	670	120	34	8.5	72	17	TR	85	28	128	0.21	49
427		Maruda	7.46	220	68	15	7.3	14	1.4	TR	73	1.2	23	0.09	22
428		Melattur	7.42	230	56	14	4.9	21	0.77	TR	59	1	36	0	16
429		Nilambur	6.93	179	26	5.6	2.9	18	3.2	TR	9.8	0	31	0	27

The chemical analysis data of water samples collected form National Hydrograph Wells April 2018															
#	**District**	**Location**	**pH**	**EC in**	**TH as**	**Ca**	**Mg**	**Na**	**K**	**CO_3**	**HCO_3**	**SO_4**	**Cl**	**F**	**NO_3**
430		Parrappanangadi	7	630	190	64	7.3	38	14	TR	122	51	68	0.08	52
431		Perumpadappu	5.93	430	66	22	2.9	41	6.2	TR	6.1	15	71	0	67
432		Ponnani	7.31	930	275	92	11	65	10	TR	159	20	206	0.12	5
433		Pulamanthol	7.21	460	64	16	5.8	45	17	TR	37	8.5	81	0.11	50
434		Tanur	6.85	230	30	9.6	1.5	21	10	TR	27	6.7	36	0	18
435		Tirunavaya	7.36	430	152	34	16	27	1.8	TR	159	29	38	0.21	18
436		Thuvur	7.2	120	24	5.6	2.4	9.9	2.7	TR	15	0	16	0	22
437		Tirur	6.9	230	38	12	1.9	26	2.3	TR	12	11	41	0	26
438		Valancheri	6.72	430	80	16	9.7	42	7.7	TR	18	1.4	102	0.18	33
439		Vazhikadavu	7.02	350	116	27	12	21	3.2	TR	116	14	36	0.05	12
440		Vylattur	6.89	220	24	7.2	1.5	26	5.1	TR	29	1.7	36	0.01	19
441		Athanickal	6.31	100	24	4.8	2.9	8.6	1.5	TR	7.3	1.8	16	0.01	13
442		Ariyalur	7.52	430	168	64	1.9	17	7.6	TR	201	29	28	0	3.6
443		Chiramangalam	7.32	69	16	4.8	1	3.7	0.71	TR	9.8	1.9	11	0	5.7
444		Krishnapuram (Puthentheru)	7.01	300	54	18	1.9	25	12	TR	18	35	36	0.03	32
445		Meenadathur	6.88	250	54	20	1	15	5.6	TR	4.9	19	33	0	40
446		Anjuvadi	7.09	350	144	46	6.8	7.8	14	TR	183	2.3	14	0.06	12
447		Paravanna	4.12	240	46	16	1.5	16	4.4	TR	0	19	26	0	47
448		Vettom	6.28	220	52	8.8	7.3	17	2.5	TR	17	36	28	0	0.67
449		Purathur	7	460	146	45	8.3	27	14	TR	201	14	34	0.03	3.1
450		Chamravattam	6.94	210	70	17	6.8	9.8	1.4	TR	78	4.4	16	0.23	1.4
451		Thavannur	6.88	145	42	15	1	5.4	5.2	TR	51	1.8	9.9	0.04	10
452		Marancheri	6.75	133	28	8	1.9	9.1	2.6	TR	12	3.3	16	0	16
453		Beeranchira	4.82	230	28	6.4	2.9	24	5.9	TR	Tr	0	45	0	42
454	Palakkad	Agali	7.65	810	285	94	12	60	8	TR	360	50	68	0.58	14
455		Alanallur	7.28	173	45	8	6.1	16	6.5	TR	31	14	36	0.12	5.3
456		Alathur	7.96	840	335	80	33	62	5.5	TR	256	60	156	0.72	3.5

The chemical analysis data of water samples collected form National Hydrograph Wells April 2018															
#	**District**	**Location**	**pH**	**EC in**	**TH as**	**Ca**	**Mg**	**Na**	**K**	**CO_3**	**HCO_3**	**SO_4**	**Cl**	**F**	**NO_3**
457		Athipetta	7.75	530	160	34	18	32	16	TR	171	16	64	0.42	2.4
458		Chalisseri	7.45	170	25	6	2.4	17	4.5	TR	12	0	36	0.04	23
459		Chavadiyur	7.66	790	265	30	46	46	2.7	TR	323	26	50	0.71	61
460		Cherpulassery	7.75	400	80	18	8.5	29	28	TR	92	5.5	64	0.31	25
461		Chittoor	7.6	660	185	44	18	64	4.9	TR	323	6	43	1.06	9.7
462		Chullimada	7.63	310	115	24	13	13	4.5	TR	159	11	14	0.58	1.4
463		Kalladikode	4.59	170	8	0.8	1.5	19	1.2	TR	0	0	30	0.1	22
464		Kanjikode	7.7	1420	315	82	27	123	81	TR	409	80	188	0.36	76
465		Karimpuzha	7.53	174	74	20	5.8	6.5	3.4	TR	76	9	9.9	0.18	2.9
466		Koppam	7.42	270	40	8.8	4.4	26	2.8	TR	32	0	50	0.12	24
467		Kozhinjampara	7.36	760	245	70	17	48	4.4	TR	146	43	135	0.3	20
468		Kuzhalmannam	7.6	730	195	32	28	63	9.5	TR	165	90	96	0.64	8.4
469		Mankara	7.62	310	68	14	8.3	30	4.5	TR	83	21	41	0.21	4.2
470		Mannarkkad	7.65	470	142	46	6.8	25	14	TR	117	31	47	0.32	20
471		Meenakshipuram	7.76	830	315	92	21	50	9	TR	348	32	60	0.38	78
472		Meenkara	7.83	860	315	76	30	48	12	TR	329	33	107	1.29	6.4
473		Mundur	7.85	350	96	18	12	24	3.3	TR	115	8.5	38	0.39	6.5
474		Nenmara	7.02	640	175	44	16	50	8.5	TR	153	31	96	0.6	22
475		Ottapalam	7.12	310	36	8.8	3.4	39	0.55	TR	39	1.5	57	0.16	23
476		Palakkad	7.44	720	220	36	32	53	1.9	TR	238	36	82	1	18
477		Pattambi	7.39	320	70	14	7.8	27	5.6	TR	54	22	45	0.22	12
478		Pudhunagaram	7.63	970	240	56	24	80	30	TR	299	50	103	0.72	52
479		Shornur	7.37	210	54	14	4.4	13	2.9	TR	27	6.5	21	0.18	0.29
480		Tavalam	7.62	400	135	26	17	22	0.68	TR	110	7.5	50	0.28	30
481		Trithala	7.67	660	210	56	17	41	2.8	TR	220	30	75	0.26	1.9
482		Vadakkancherry	7.9	590	205	42	24	43	4.9	TR	183	36	78	0.26	47
483	Pathanamthitta	Aranmula	6.31	300	90	20.0	9.7	14.76	1.21	TR	85	12.5	32.0	0.16	17.32

The chemical analysis data of water samples collected form National Hydrograph Wells April 2018															
#	**District**	**Location**	**pH**	**EC in**	**TH as**	**Ca**	**Mg**	**Na**	**K**	**CO_3**	**HCO_3**	**SO_4**	**Cl**	**F**	**NO_3**
484		Enathu	7.35	740	105	28.1	8.5	63.5	27.5	TR	67	34.3	117	0.45	59.00
485		Kaviyur	6.99	460	15	2.0	2.4	5.29	0.69	TR	6	2.55	14	0.00	2.40
486		Konni	6.57	390	80	18.0	8.5	21.7	9	TR	12	4.06	75	0.19	60.00
487		Kootanadu	5.76	122	22	4.0	2.9	9.9	3.52	TR	12	3.5	23	0.01	13.20
488		Mallapally	5.68	105	16	5.6	0.5	10.45	1.61	TR	7	5.36	20	0.02	15.00
489		Muthoor	6.03	230	34	11.2	1.5	18.33	4	TR	20	21.1	34	0.09	9.64
490		Naduvathumuzhi	6.17	79	22	4.8	2.4	4.22	1.48	TR	24	3.3	9	0.01	6.90
491		Nilakkal	7.62	158	34	10.4	1.9	10.48	2.3	TR	17	0.01	34	0.01	8.53
492		Pandalam	7.12	83	22	3.2	3.4	6.66	0.32	TR	20	2.02	14	0.00	4.10
493		Pathanamthitta	7.09	240	56	20.8	1.0	12.36	8.22	TR	56	22.45	17	0.02	8.12
494		Peringara	7.13	210	62	12.8	7.3	12.44	0.77	TR	78	6.8	28	0.24	0.40
495		Podiyadi	7.43	260	100	18.4	13.1	8.31	0.8	TR	110	9.78	14	0.35	1.84
496		Pulikeezh	7.39	230	90	28.9	4.4	6.52	0.51	TR	100.0	13.9	14	0.20	0.06
497		Thelliyur	7.8	110	32	8.0	2.9	6.64	1.88	TR	39	2.9	11	0.00	3.50
498		Thiruvalla	7.37	220	64	20.8	2.9	11.22	3.82	TR	71	12	26	0.18	10.80
499		Ullannur	6.99	51	12	2.4	1.5	3.64	2.16	TR	9.8	2.7	9	0.00	6.44
500		Vadasserikkara	6.87	120	44	15.2	1.5	2.81	0.47	TR	46	7.17	10	0.03	6.10
501	Thiruvanathapuram	Anjengo	7.47	340	136	49	3.4	16	3.6	TR	164	17	27	0.28	0.75
502		Attingal	6.55	220	52	15	3.4	20	0.93	TR	56	4.5	28	0.2	21
503		Azhoor	7.02	290	34	8.8	2.9	30	3.9	TR	22	8	53	0.23	13
504		Balaramapuram	7.12	770	200	40	24	56	16	TR	37	16	160	0.3	123
505		Cherunniyoor	4.79	115	14	2.4	2	5.6	0.62	TR	traces	2.5	20	0.17	7.5
506		Chirayinkeezh	6.25	390	36	5.6	5.4	57	1.5	TR	2.4	0	99	0.28	36
507		Chittagodu	7.52	270	50	10	5.8	36	4	TR	31	9.5	75	0.28	28
508		Kadakkavur	6.46	300	76	18	7.3	21	3	TR	22	34	36	0.4	35
509		Kallar	6.74	105	10	2.4	0.97	5.2	0.95	TR	15	1.5	8.5	0.08	1.7
510		Kanjiramkulam (church)	7	280	18	4.8	1.5	21	12	TR	7.3	20	37	0.3	29

The chemical analysis data of water samples collected form National Hydrograph Wells April 2018															
#	**District**	**Location**	**pH**	**EC in**	**TH as**	**Ca**	**Mg**	**Na**	**K**	**CO_3**	**HCO_3**	**SO_4**	**Cl**	**F**	**NO_3**
511		Kappil	7.39	260	76	22	5.4	16	3.5	TR	61	17	34	0.31	6.9
512		Kazhakuttam (DCB)	7	450	132	42	6.3	46	2.4	TR	68	73	54	0.11	61
513		Kilimanoor	7.62	240	28	6.4	2.9	21	0.87	TR	39	0	30	0.2	18
514		Kochuveli	7.39	240	96	35	2	8.6	2.8	TR	88	30	13	0.19	5.3
515		Korani	6.35	140	12	2.4	1.5	14	2.4	TR	20	0	26	0.1	6.2
516		Kulathur	6.41	111	16	4.8	0.97	11	1	TR	24	0	17	0.06	1.4
517		Mannanthala	6.87	270	26	4	3.9	33	3.3	TR	7.3	1	58	0.12	42
518		Murukumpuzha	5.72	106	22	5.6	2	5.5	0.35	TR	9.8	12	14	0.08	0.31
519		Nagapuram	6.16	125	18	2.4	2.9	13	0.35	TR	17	0	24	0.11	4.9
520		Nedumangad	6.62	75	20	6.4	0.97	2.7	0.56	TR	22	2.5	11	0.2	1
521		Neyyattinkara	7.07	210	26	4.8	3.4	24	2.9	TR	12	0	31	0.4	30
522		Palayamkunnu	7.37	174	38	10	2.9	15	1	TR	34	6.6	27	0.31	5.1
523		Palode	6.72	189	24	6.4	2	21	3.4	TR	22	7	37	0.22	21
524		Parassala	7.5	380	54	14	4.4	53	14	TR	73	12	71	0.4	8.8
525		Perumgulam	4.29	210	20	4	2.4	21	5	TR	0	0	31	0.31	42
526		Perumkuzhi	6.85	550	150	42	11	46	12	TR	49	40	64	0.44	117
527		Pudukurichi	7.45	690	190	54	13	58	11	TR	183	27	85	0.34	68
528		Pozhiyoor	7.57	1570	230	36	34	248	12	TR	244	218	291	0.31	34
529		Pulluvila	5.74	132	8	1.6	0.97	12	0.06	TR	2.4	0	23	0.1	4
530		Sasthavattom	7.23	170	18	2.4	2.9	19	4	TR	17	5	30	0.17	2.3
531		Thonnakkal	5.48	160	18	4	2	16	0.63	TR	4.9	3.5	30	0.2	19
532		Thumba	7.05	300	72	23	3.4	25	6.7	TR	46	23	38	0.2	33
533		Thriuvananthapuram	6.58	260	36	7.2	4.4	28	5.4	TR	17	5	48	0.24	31
534		Vakkom	6.95	280	42	11	3.4	30	1.6	TR	24	21	44	0.23	13
535		Vamanapuram	7.61	340	135	44	6.1	24	4.8	TR	159	9.5	46	0.07	10
536		Varkala	4.44	220	32	traces	7.8	21	2.4	TR	0	0	38	0.36	30
537		Vattavila	7.59	56	2	0	0.49	4.5	1.2	TR	4.9	0	20	0.33	3

The chemical analysis data of water samples collected form National Hydrograph Wells April 2018															
#	**District**	**Location**	**pH**	**EC in**	**TH as**	**Ca**	**Mg**	**Na**	**K**	**CO_3**	**HCO_3**	**SO_4**	**Cl**	**F**	**NO_3**
538		Vellayani (Poonkulam)	7.73	400	150	50	6.1	31	2.7	TR	189	9	53	0.12	31
539		Vidura	6.47	125	18	3.2	2.4	11	1.3	TR	7.3	6.5	21	0.14	21
540		Vazhakkad	5.42	179	14	3.2	1.5	18	3	TR	traces	0	27	0.15	35
541	Trichur	Adatt	6.14	189	26	7.2	1.9	20	4	TR	17	0	33	0.12	21
542		Annamanada	6.09	220	28	8	1.9	25	6.8	TR	7.3	1	45	0.07	23
543		Chalakudy	5.75	73	14	4	0.97	6.1	1.9	TR	9.8	0	11	0.07	7.3
544		Chavakkad	6.43	240	62	22	1.9	17	6.3	TR	63	20	28	0.09	1.5
545		Chelakkara	7.25	390	126	26	15	27	4.7	TR	154	17	38	0.6	5.4
546		Cherpu	6.53	108	14	4.8	0.49	12	3.6	TR	32	1.6	14	0.1	3.9
547		Cheruthuruthi	7.5	430	168	38	18	24	2.9	TR	232	13	28	0.5	3.1
548		Echipara	7.33	89	22	6.4	1.5	7.1	1.4	TR	27	8.1	7.1	0.06	2.5
549		Engandiyur	7.16	300	116	39	4.4	12	4.5	TR	122	24	17	0.04	14
550		Eriyad	7.31	260	80	26	3.4	16	3.6	TR	90	8.4	31	0.06	2.7
551		Guruvayur	6.74	260	66	18	4.9	22	3	TR	88	4.1	34	0.19	1.9
552		Irinjalakuda	6.64	250	74	25	2.9	11	6.6	TR	37	28	24	0	24
553		Kallumpuram	6.83	179	42	10	3.9	14	4	TR	27	15	23	0.07	15
554		Kallur	6.77	130	26	5.6	2.9	9.7	6	TR	24	0	20	0.11	9.2
555		Keechery	5.7	340	54	10	6.8	33	7.5	TR	7.3	0	55	0.11	67
556		Kodungallur	6.9	1000	205	68	8.5	102	27	TR	146	65	174	0.22	58
557		Kundannur	7.68	850	335	60	45	45	7	TR	360	33	103	0.37	2.2
558		Mala	6.28	147	28	8	1.9	8.5	8	TR	20	14	17	0.28	9.7
559		Manalur	6.4	49	12	2.4	1.5	5.3	1	TR	9.8	0	8.5	0.07	2.3
560		Manamangalam	6.56	45	8	1.6	1	5	0.73	TR	12	0	5.7	0.11	3
561		Mulankunnathukavu	6.75	240	46	12	3.9	18	12	TR	39	16	24	0.14	26
562		Mupiliyam	6.56	180	34	8	3.4	16	5.4	TR	9.8	0.41	26	0.02	40
563		Muriyad	6.7	240	32	7.2	3.4	25	7.1	TR	20	2	57	0	4.8
564		Pattikkad	6.91	170	62	15	5.8	7.3	2.1	TR	73	6.2	8.5	0.15	6.9

The chemical analysis data of water samples collected form National Hydrograph Wells April 2018															
#	**District**	**Location**	**pH**	**EC in**	**TH as**	**Ca**	**Mg**	**Na**	**K**	**CO_3**	**HCO_3**	**SO_4**	**Cl**	**F**	**NO_3**
565		Perinjanam	7.41	640	185	62	7.3	44	18	TR	128	35	71	0.08	103
566		Punnayoor	7.43	97	32	11	1	4.4	2.7	TR	49	0.92	4.3	0	0.91
567		Tekkumkara	6.85	69	16	5.6	0.49	5.1	1.7	TR	22	1.2	8.5	0	3.8
568		Trichur	7.01	109	28	8	1.9	8.2	2	TR	20	6.2	18	0.07	3.8
569		Triprayar	7.63	380	114	42	2.4	27	12	TR	122	33	40	0	13
570		Wadakkancherry	7.56	125	30	8	2.4	9.9	2	TR	41	0	16	0	2.9
571		Mapranam	6.3	68	16	6.4	0	4.9	0.88	TR	20	0	9.9	0	4.3
572		Karuppadana	7.28	590	90	18	11	80	7	TR	116	28	114	0.28	1
573		Palayamthuruthu	7.54	590	185	40	21	48	4.6	TR	220	0	96	0.09	5.1
574		Padakulam	7.66	310	104	41	0.49	18	3.8	TR	146	5.4	26	0	3.3
575		Azhikode	7.55	260	96	34	2.9	12	1.4	TR	115	3	24	0	3.1
576		Logamalleswaram	7.69	350	114	44	1	25	7.1	TR	159	6.2	37	0.06	3.5
577		Mathilakam	7.71	450	114	42	1.9	39	6.8	TR	110	22	58	0	39
578		Edanthrinji	7.58	101	34	13	0.49	4	1.6	TR	44	0	7.1	0.03	1.3
579		Kattoor	7.66	320	112	35	5.8	19	2.2	TR	116	9.4	41	0.16	4.3
580		Edamuttam	7.64	320	130	50	1.5	13	7.1	TR	195	1.9	9.9	0.05	3
581		Nattika	7.01	230	82	27	3.4	9.2	5.7	TR	93	6.7	18	0.09	5
582		Pazhuvil	6.94	182	28	8.8	1.5	18	2.1	TR	24	4.3	37	0.14	11
583		Arimpur	6.76	220	38	10	2.9	19	8.9	TR	20	0.01	37	0.11	23
584		Parappur	6.73	112	12	4	0.49	11	5	TR	29	0.87	11	0	11
585		Pavaratty	6.92	185	78	28	1.9	6.4	2.2	TR	90	13	11	0.14	2.4
586		Mullassery	7.52	270	98	35	2.4	16	7.6	TR	107	20	30	0.02	3.4
587		Vadanapally	7.32	140	38	14	1	8.2	3.5	TR	37	7.5	20	0.07	2.1
588		Orumanayur	7.5	890	240	76	12	70	14	TR	189	6.5	196	0	8.1
589		Kottapadi	7.13	1130	320	82	28	99	13	TR	409	23	185	0.41	18
590		Kodungallur	7.54	650	235	42	32	38	3.2	TR	232	16	89	0.24	5.6
591	Wayanad	Ambalavayal	6.21	250	54	18	2.4	22	5.2	TR	32	12	33	0	35

The chemical analysis data of water samples collected form National Hydrograph Wells April 2018															
#	**District**	**Location**	**pH**	**EC in**	**TH as**	**Ca**	**Mg**	**Na**	**K**	**CO_3**	**HCO_3**	**SO_4**	**Cl**	**F**	**NO_3**
592		Chenad	6.12	147	40	15	0.49	6.9	2	TR	46	1.8	11	0.1	9.3
593		Kalpetta	6.52	400	106	34	4.9	25	20	TR	146	18	37	0.17	5.3
594		Kamblakat	6	187	48	12	4.4	15	1.1	TR	41	0.88	13	0	40
595		Koroth	5.78	95	26	8.8	0.97	7.5	1.4	TR	32	2.2	8.5	0	3.7
596		Mananthody	6.62	420	116	36	6.3	26	17	TR	122	30	31	0.05	38
597		Minangadi	6.48	270	78	24	4.4	18	27	TR	76	17	21	0.17	23
598		Muthanga	6.32	530	180	39	20	28	1.8	TR	152	4.5	82	0.09	17
599		Noolpuzha	6.44	151	50	11	5.4	9.8	1.5	TR	83	3.8	5.7	0.04	1.5
600		Padinjarattara	6.11	340	82	21	7.3	28	2.2	TR	30	8.6	38	0.2	84
601		Perikallur	6.5	550	156	38	15	51	3.2	TR	177	19	71	0.04	26
602		Pulpally	6.63	420	132	27	16	32	1.9	TR	159	9	47	0.31	11
603		Sulthan Bathery	6.97	450	128	33	11	26	27	TR	159	30	34	0.12	17
604		Tirunelly	6.57	191	70	24	2.4	8.8	3.4	TR	98	4.8	8.5	0	2.3
605		Vaduvanchal	5.91	179	40	12	2.4	11	6.2	TR	12	0	18	0	45
606		Valatt	5.95	62	22	6.4	1.5	6.4	0.47	TR	27	0.88	4.3	0	1.6
607		Vyttiri	6.1	270	70	21	4.4	18	9.9	TR	41	28	33	0.08	19

Central Ground Water Board
Kerala Region, Thiruvananthapuram
Phone: 0471-2442175, 2555026
Fax: 0471 – 2442191
e-mail: rdkr-cgwb@nic.in
Visit us: www.cgwb.gov.in, www.mowr.gov.in

केंद्रीय भूमिजल बोर्ड
केरल क्षेत्र , तिरुवनंतपुरम
दूरभाष : 0471 - 2442175, 2555026
फाक्स : 0471 – 2442191
ईमेल: rdkr-cgwb@nic.in
वेब साईट: www.cgwb.gov.in, www.mowr.gov.in