

DROUGHT SITUATION ASSESSMENT

JUNE – JULY 2021



Kerala State Drought Monitoring Cell
[inter alia State Emergency Operations Centre]
Kerala State Disaster Management Authority

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1.INTRODUCTION

Drought is a recurring extreme climate event over land characterized by below-normal precipitation over a period of months to years. Drought is a temporary dry period, in contrast to the permanent aridity in arid areas. It is a temporary aberration, unlike aridity or even seasonal aridity (in terms of a well-defined dry season), which is a permanent feature of climate. Drought in contrast is a recurrent, yet sporadic feature of climate, known to occur under all climatic regimes and is usually characterized by variability in terms of its spatial expanse, intensity and duration. Conditions of drought appear primarily, though not solely, on account of substantial rainfall deviation from the normal and / or the skewed nature of the spatial / temporal distribution to a degree that inflicts an adverse impact on crops over an agricultural season or successive seasons. What is universally accepted is that drought stems from a deficiency or erratic distribution in rainfall but the spread and intensity of the calamity is contingent on several factors, including the status of surface and ground water resources, agro-climatic features, cropping choices and patterns, socio-economic vulnerabilities of the local population etc. It is difficult to provide a precise and universally accepted definition of drought due to its complex nature and varying characteristics that manifest across different agro-climatic regions of the world.

The State of Kerala experiences seasonal drought like conditions every year during the summer months. Even in the years of normal rainfall, summer water scarcity problems are severe in the midland and highland regions. With the implementation of a number of irrigation projects, the idea of drought in Kerala slowly shifted to unirrigated paddy, and upland crops. The water scarcity in summer is mainly reflected in dry rivers and lowering of water table. This adversely affects the rural and urban drinking water supply. In the period 1881 to 2000, Kerala experienced 66 drought years. It is noticed that aridity index of different parts of the state has increased which is an indication of increase in the frequency of drought years. The changes in the land and water management practices affected the fresh water availability during summer months. Although the deviation in the annual rainfall received in Kerala, in any year from the long-term average is very small, there is considerable variation in the rainfall availability during the different seasons.

Drought may be different types: Meteorological drought, hydrological drought and agricultural drought. As per the Drought manual 2016 the declaration of drought should satisfy any of the five categories of indices are recommended for developing a monitoring matrix for drought. The five categories of indices are Rainfall, Vegetation, Water, Crop and others. Rainfall is considered to be the most important indicator and therefore related meteorological data should be mandatorily considered in making any assessment of drought. The other indices are to be evaluated in conjunction with the rainfall related data to assess the impact of rainfall deficiency.

2.RAINFALL

Southwest monsoon has sets over Kerala on 3rd June 2021. India Meteorological Department, in its first stage long range forecast of southwest monsoon issued on 16th April 2021 predicted 45% probability for monsoon seasonal rainfall to be above normal (104 to 110% of long period average). In the updated long-range forecast issued on 1st June 2021 predicted 45% probability for monsoon rainfall during the 2021 monsoon season (June to September) over Kerala to be below normal. This demanded a detailed investigation of rainfall characteristics of Kerala. Fig 1 shows the tercile probability forecast for 2021 southwest monsoon season.

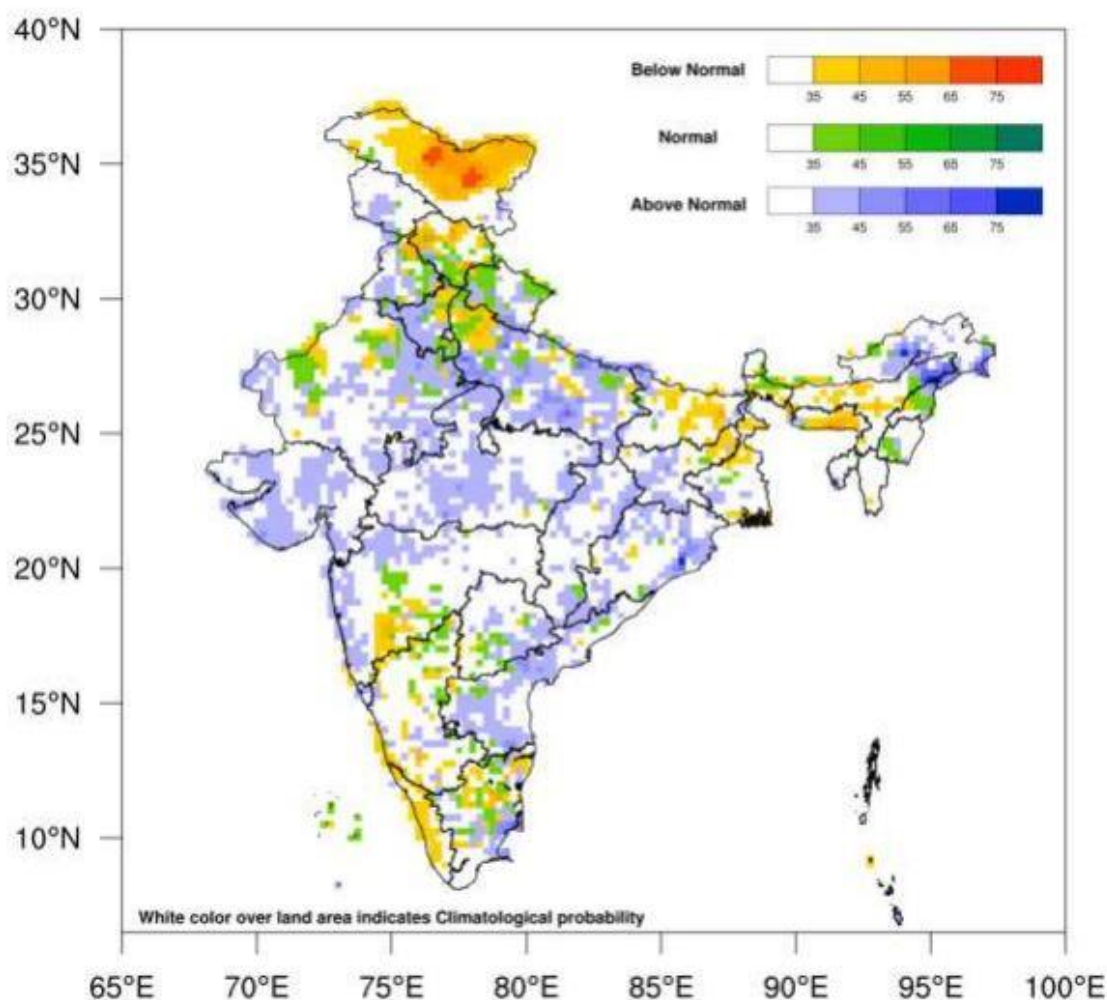


Figure 1: Tercile probability rainfall forecast for 2021 southwest monsoon (source: IMD)

Rainfall is the most important indicator in the determination of drought. A departure in rainfall from its long period average (LPA) of 30 years or more is considered as credible indicator of drought

The IMD classification of rainfall deviation is as follows

- **Normal:** +19 to -19% deviation from long period average rainfall

- **Deficient:** -20 to -59% deviation from long period average rainfall
- **Large deficient:** -60 to -99% deviation from long period average rainfall
- **No rain:** -100% deviation from long period average rainfall

In addition, indicators such as Standardized Precipitation Index (SPI) and occurrence of dry spell are also considered. Dry spell is an indicator of anomalies in the distribution of rainfall. A dry spell is consecutive 3-4 weeks after the due date for the onset of monsoon with rainfall less than 50% of the normal in each of the weeks. SPI is used as an indicator of deviation of rainfall from the normal and can serve as a more robust statistical indicator under certain conditions as compared to simple rainfall deviations (Drought Manual, 2016)

Standardized precipitation Index (SPI) Categories is as follows

- **Extremely dry:** < -2
- **Severely dry:** -1.99 to -1.5
- **Moderately dry:** -1.49 to -1.0
- **Mildly dry:** -0.99 to 0
- **Mildly wet:** 0 to 0.99
- **Moderately wet:** 1.0 to 1.49
- **Severely wet:** 1.5 to 1.99
- **Extremely wet:** > 2

In the determination of drought, the mandatory indicators viz, rainfall deviation or dry spell and SPI are considered to assess if the first drought trigger is set off.

Matrix for rainfall deviation and dry spells (Trigger 1)

Rainfall deviation/SPI	Dry Spell	Drought trigger
Deficit or scanty RF/SPI < -1	Yes	Yes
Deficit or scanty RF/SPI < -1	No	Yes if rainfall is scanty or SPI < -1.5 , else No
Normal RF/SPI > -1	Yes	Yes
Normal RF/SPI > -1	No	No

The daily rainfall data collected from 67 stations by IMD as part of its Integrated Agricultural Data Platform (IADP) for 1 June 2021 – 31 July 2021 were used for the analysis.

2.1. Situation Assessment

As per district wise seasonal rainfall data, all districts except Kottayam (-3%), Pathanamthitta (-10%) and Ernakulam (-16%) experiences deficit in rainfall (Fig 2). The districts Palakkad (-38%), Wayanad, Malappuram and Kannur (-37%) shows highest deficiency. Table 1 shows the rainfall data from IMD stations that were used in the assessment and its percentage departure. Based on the analysis, it is evident that majority of the stations in the State had a deficit of rainfall by the end of July 2021. Out of 67 stations, Kannur and Haripad stations are under large deficient category and 52 stations are under deficient category. Kurudamannil, Mayiladumpara, Kanjirappally, Kayamkulam, Ernakulam South, CIAL Kochi, Vellanikkara, Palakkad stations received above normal rainfall. Week wise analysis (Table 2) reveals that more number of stations experience large deficient rainfall in week 9 (27Jul-02Aug).



Figure 2: Seasonal rainfall 2021 -1st July 2021 to 31st July 2021

Table 1: Meteorological station wise distribution of rainfall during southwest monsoon over Kerala (1 June-31 July, 2021)

<i>District</i>	<i>Station</i>	<i>Normal Rainfall (1991-2020)</i>	<i>Actual Rainfall</i>	<i>Deviation (%)</i>	<i>Category</i>
Kannur	Kannur	2333.03	923.8	-60.4	Large Deficient
Kannur	Taliparamba	2338.68	1290.6	-44.82	Deficient
Kannur	Thalasserry	2045.49	963	-52.92	Deficient
Kannur	Irikkur	2150.22	1302.5	-39.42	Deficient
Kasargode	Hosdurg	2373	1339.6	-43.55	Deficient
Kasargode	Kudulu	2104.15	1458	-30.71	Deficient
Kozhikode	Kozhikode	1446.68	1145.8	-20.8	Deficient
Kozhikode	Vadakara	2450.19	1051.6	-57.08	Deficient
Kozhikode	Quilandy	1998.78	1076.8	-46.13	Deficient
Wayanad	Mananthavady	1664.22	1234.5	-25.82	Deficient
Wayanad	Vythiri	2485.94	1645.4	-33.81	Deficient
Wayanad	Ambalavayal	1032.39	729.4	-29.35	Deficient
Wayanad	Kuppady	969.52	546.1	-43.67	Deficient
Malappuram	Nilambur	1623.51	849.6	-47.67	Deficient
Malappuram	Manjeri	1600.56	794.1	-50.39	Deficient
Malappuram	Perinthalmanna	1648.07	932.5	-43.42	Deficient
Malappuram	Ponnani	1630.04	802.2	-50.79	Deficient
Malappuram	Angadippuram	1610.66	874.6	-45.7	Deficient
Malappuram	Karipur AP	1457.75	949.3	-34.88	Deficient
Palakkad	Palakkad	505.69	839.6	66.03	Above Normal
Palakkad	Mannarkad	1403.36	764.2	-45.55	Deficient
Palakkad	Ottappalam	1519.67	796.6	-47.58	Deficient
Palakkad	Alathur	1181.97	893.6	-24.4	Deficient
Palakkad	Chittur	909.53	589.5	-35.19	Deficient
Palakkad	Kollengode	1070.92	703.8	-34.28	Deficient
Palakkad	Pattambi	1497.27	816.5	-45.47	Deficient
Palakkad	Thrithala	1456.26	791.3	-45.66	Deficient
Palakkad	Parambikulam	1391.84	591	-57.54	Deficient
Thrissur	Kodungallur	1769.47	1231.8	-30.39	Deficient
Thrissur	Irinjalakuda	1379.24	1021.1	-25.97	Deficient
Thrissur	Vadakkancherry	1674.76	879.4	-47.49	Deficient
Thrissur	Chalakudy	1601.53	1234.6	-22.91	Deficient
Thrissur	Enamackel	1601.9	1022.3	-36.18	Deficient
Thrissur	Vellanikkara	822.18	1099.9	33.78	Above Normal
Ernakulam	Kochi AP	1247.09	850.1	-31.83	Deficient
Ernakulam	Aluva	1532.59	1214	-20.79	Deficient
Ernakulam	Piravom	1955.69	1121.2	-42.67	Deficient
Ernakulam	Perumbavur	1529.99	1118.4	-26.9	Deficient
Ernakulam	CIAL Kochi	692.59	1074.6	55.16	Above Normal

Ernakulam	Ernakulam South	221.52	1023.5	362.03	Above Normal
Alappuzha	Alappuzha	1009.5	695.1	-31.14	Deficient
Alappuzha	Kayamkulam	1168.96	692.7	-40.74	Deficient
Alappuzha	Mavelikkara	1192.81	799.8	-32.95	Deficient
Alappuzha	Cherthala	1337.58	935.7	-30.05	Deficient
Alappuzha	Mancompu	1309.67	687.7	-47.49	Deficient
Alappuzha	Haripad	1260.3	395.4	-68.63	Large Deficient
Alappuzha	CPCRI Kayamkulam	159.58	687.7	330.95	Above Normal
Kottayam	Kottayam	1066.46	1050.4	-1.51	Normal
Kottayam	Vaikom	1675.38	1394.2	-16.78	Normal
Kottayam	Kumarakom	1185.2	884.2	-25.4	Deficient
Kottayam	Kozha	1136.03	1038	-8.63	Normal
Kottayam	Kanjirappally	643.87	1181.1	83.44	Above Normal
Idukki	Peermade	2213.43	1646.8	-25.6	Deficient
Idukki	Thodupuzha	1736.26	1239.8	-28.59	Deficient
Idukki	Munnar	2176.3	1447.3	-33.5	Deficient
Idukki	Idukki	1887.65	1572.8	-16.68	Normal
Idukki	Myladumpara	166.64	793.8	376.36	Above Normal
Pathanamthitta	Konni	1348.55	866.9	-35.72	Deficient
Pathanamthitta	Kurudamannil	150.4	874.4	481.4	Above Normal
Kollam	Kollam	1026.63	498	-51.49	Deficient
Kollam	Aryankavu	1069.84	598	-44.1	Deficient
Kollam	Punalur	764.94	591.4	-22.69	Deficient
Thiruvananthapuram	Trv City	328.43	363.8	10.77	Normal
Thiruvananthapuram	Trv AP	452.62	286.8	-36.64	Deficient
Thiruvananthapuram	Nedumangad	758.63	437.4	-42.34	Deficient
Thiruvananthapuram	Neyyattinkara	637.92	277.9	-56.44	Deficient
Thiruvananthapuram	Varkala	850	350.4	-58.78	Deficient

Table 2: Week wise analysis

	Week1 (01-07Jun)	Week 2 (08-14jun)	Week3 (15-21Jun)	Week4 (22-28Jun)	Week5 (29Jun-05Jul)	Week 6 (06-12Jul)	Week 7 (13-19Jul)	Week 8 (20-26Jul)	Week 9 (27Jul-02Aug)
	No of Stations	No of Stations	No of Stations	No of Stations	No of Stations	No of Stations	No of Stations	No of Stations	No of Stations
Large Deficient	18	10	8	49	48	14	3	2	62
Deficient	24	32	33	11	11	21	7	26	3
Normal	12	15	16	2	1	18	22	19	-

Most of the stations in Thiruvananthapuram, Palakkad, Malappuram districts received less than 50 % rainfall from normal in the consecutive 3-4 weeks. Out of 67 stations, 29 stations experience dry spell (Table 3).

Table 3: Meteorological stations experienced dry spell

<i>District</i>	<i>Station</i>
Kannur	Kannur
Kannur	Thalasserry
Kannur	Irikkur
Kozhikode	Vadakara
Wayanad	Mananthavady
Wayanad	Vythiri
Wayanad	Kuppady
Malappuram	Nilambur
Malappuram	Manjeri
Malappuram	Perinthalmanna
Malappuram	Angadippuram
Palakkad	Mannarkad
Palakkad	Ottappalam
Palakkad	Alathur
Palakkad	Chittur
Palakkad	Kollengode
Palakkad	Pattambi
Palakkad	Thrithala
Palakkad	Parambikulam
Ernakulam	Piravom
Alappuzha	Alappuzha
Alappuzha	Mancompu

Alappuzha	Haripad
Pathanamthitta	Konni
Kollam	Kollam
Thiruvananthapuram	Trv AP
Thiruvananthapuram	Nedumangad
Thiruvananthapuram	Neyyattinkara

2.2. Standardized Precipitation Index

Standardized Precipitation Index (SPI) expresses the actual rainfall as a standardized departure with respect to rainfall probability distribution function. Based on the analysis, it is evident that more than half of the stations are under dry condition. Out of the 67 stations 10 stations are under moderately dry category.

Table 4: Standardized Precipitation Index of July 2021(IMD stations)

<i>District</i>	<i>Station</i>	<i>SPI</i>	<i>Category</i>
Kannur	Kannur	-1.05	Moderately Dry
Kannur	Taliparamba	-0.92	Mildy Dry
Kannur	Thalasserry	-0.92	Mildy Dry
Kannur	Irikkur	0.24	Mildy Wet
Kasargode	Hosdurg	-0.41	Mildy Dry
Kasargode	Kudulu	-0.33	Mildy Dry
Kozhikode	Kozhikode	-0.24	Mildy Dry
Kozhikode	Vadakara	-0.7	Mildy Dry
Kozhikode	Quilandy	-0.16	Mildy Dry
Wayanad	Mananthavady	0.16	Mildy Wet
Wayanad	Vythiri	0.16	Mildy Wet
Wayanad	Ambalavayal	-0.08	Mildy Dry
Wayanad	Kuppady	-1.39	Moderately Dry
Malappuram	Nilambur	-1.05	Moderately Dry
Malappuram	Manjeri	-1.2	Moderately Dry
Malappuram	Perinthalmanna	-0.6	Mildy Dry
Malappuram	Ponnani	-0.7	Mildy Dry
Malappuram	Angadippuram	-0.41	Mildy Dry
Malappuram	Karipur AP	0.7	Mildy Wet
Palakkad	Palakkad	-0.33	Mildy Dry
Palakkad	Mannarkad	-1.05	Moderately Dry
Palakkad	Ottappalam	-0.6	Mildy Dry
Palakkad	Alathur	0	Mildy Dry
Palakkad	Chittur	-0.5	Mildy Dry
Palakkad	Kollengode	-0.24	Mildy Dry

Palakkad	Pattambi	-0.24	Mildy Dry
Palakkad	Thrithala	-0.6	Mildy Dry
Palakkad	Parambikulam	-0.8	Mildy Dry
Thrissur	Kodungallur	0.33	Mildy Wet
Thrissur	Irinjalakuda	0.24	Mildy Wet
Thrissur	Vadakkancherry	0.16	Mildy Wet
Thrissur	Chalakudy	0.08	Mildy Wet
Thrissur	Enamackel	0.5	Mildy Wet
Thrissur	Vellanikkara	0.16	Mildy Wet
Ernakulam	Kochi AP	1.05	Modertely wet
Ernakulam	Aluva	0.33	Mildy Wet
Ernakulam	Piravom	1.39	Modertely wet
Ernakulam	Perumbavur	-0.5	Mildy Dry
Ernakulam	CIAL Kochi	0.8	Mildy Wet
Ernakulam	Ernakulam South	-0.8	Mildy Dry
Alappuzha	Alappuzha	-0.08	Mildy Dry
Alappuzha	Kayamkulam	0.33	Mildy Wet
Alappuzha	Mavelikkara	1.64	Severely wet
Alappuzha	Cherthala	0.08	Mildy Wet
Alappuzha	Mancompu	1.64	Severely wet
Alappuzha	Haripad	-0.8	Mildy Dry
Alappuzha	CPCRI Kayamkulam	0.33	Mildy Wet
Kottayam	Kottayam	0.33	Mildy Wet
Kottayam	Vaikom	0.08	Mildy Wet
Kottayam	Kumarakom	0.7	Mildy Wet
Kottayam	Kozha	0.08	Mildy Wet
Kottayam	Kanjirappally	2.1	Extremely wet
Idukki	Peermade	0.41	Mildy Wet
Idukki	Thodupuzha	0.33	Mildy Wet
Idukki	Munnar	0	Mildy Dry
Idukki	Idukki	1.64	Severely wet
Idukki	Myladumpara	-0.24	Mildy Dry
Pathanamthitta	Konni	-0.8	Mildy Dry
Pathanamthitta	Kurudamannil	-0.16	Mildy Dry
Kollam	Kollam	-1.2	Moderately Dry
Kollam	Aryankavu	-0.24	Mildy Dry
Kollam	Punalur	-1.05	Moderately Dry
Thiruvananthapuram	Trv City	-0.5	Mildy Dry
Thiruvananthapuram	Trv AP	-1.39	Moderately Dry
Thiruvananthapuram	Nedumangad	-1.39	Moderately Dry
Thiruvananthapuram	Neyyattinkara	-1.39	Moderately Dry

Thiruvananthapuram	Varkala	0.16	Mildy Wet
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In the determination of drought, the mandatory indicators viz, rainfall deviation or dry spell and SPI are considered to assess if the first drought trigger is set off. In this analysis, it is found that first trigger is set off in 29 stations by the end of July 2021.

2.3. Drought triggered LSGs as per meteorological parameters by the end of July 2021

As per the analysis of IMD and Sky met stations there are 32 stations shows drought trigger in Kerala.

List of Drought triggered LSGs as per Meteorological Parameters

SL.No	Panchayath	Taluk	District
1	Amboori	Kattakada	Thiruvananthapuram
2	Anad	Nedumangad	Thiruvananthapuram
3	Aruvikkara	Nedumangad	Thiruvananthapuram
4	Aryanad	Nedumangad	Thiruvananthapuram
5	Aryancodu	Kattakada	Thiruvananthapuram
6	Athiyanthoor	Neyyatinkara	Thiruvananthapuram
7	Balaramapuram	Neyyatinkara	Thiruvananthapuram
8	Chenkall	Neyyatinkara	Thiruvananthapuram
9	Kadinamkulam	Thiruvananthapuram	Thiruvananthapuram
10	Kallikkad	Kattakada	Thiruvananthapuram
11	Kalliyoor	Thiruvananthapuram	Thiruvananthapuram
12	Kanjiramkulam	Neyyatinkara	Thiruvananthapuram
13	Karakulam	Nedumangad	Thiruvananthapuram
14	Karode	Neyyatinkara	Thiruvananthapuram
15	Karumkulam	Neyyatinkara	Thiruvananthapuram
16	Kattakada	Kattakada	Thiruvananthapuram
17	Kollayil	Neyyatinkara	Thiruvananthapuram
18	Kottukal	Neyyatinkara	Thiruvananthapuram
19	Kulathoor	Neyyatinkara	Thiruvananthapuram
20	Kunnathukal	Neyyatinkara	Thiruvananthapuram
21	Kuttichal	Kattakada	Thiruvananthapuram
22	Malayinkeezhu	Kattakada	Thiruvananthapuram
23	Manikkal	Nedumangad	Thiruvananthapuram
24	Maranallor	Kattakada	Thiruvananthapuram
25	Nanniyodu	Nedumangad	Thiruvananthapuram
26	Nedumangad(M)	Nedumangad	Thiruvananthapuram
27	Neyyattinkara(M)	Neyyatinkara	Thiruvananthapuram
28	Ottasekharamangalam	Kattakada	Thiruvananthapuram
29	Pallichal	Neyyatinkara	Thiruvananthapuram
30	Panavoor	Nedumangad	Thiruvananthapuram
31	Parassala	Neyyatinkara	Thiruvananthapuram
32	Peringammala	Nedumangad	Thiruvananthapuram
33	Poovachal	Kattakada	Thiruvananthapuram

34	Poovar	Neyyatinkara	Thiruvananthapuram
35	Pothencodu	Thiruvananthapuram	Thiruvananthapuram
36	Pullampara	Nedumangad	Thiruvananthapuram
37	Thiruvananthapuram(C)	Thiruvananthapuram	Thiruvananthapuram
38	Tholikkodu	Nedumangad	Thiruvananthapuram
39	Uzhamalakkal	Nedumangad	Thiruvananthapuram
40	Vellanad	Kattakada	Thiruvananthapuram
41	Vellarada	Neyyatinkara	Thiruvananthapuram
42	Vembayam	Nedumangad	Thiruvananthapuram
43	Venganoor	Thiruvananthapuram	Thiruvananthapuram
44	Vilappil	Kattakada	Thiruvananthapuram
45	Vilavoorakal	Kattakada	Thiruvananthapuram
46	Vithura	Nedumangad	Thiruvananthapuram
47	Karavaloor	Punalur	Kollam
48	Kollam(C)	Kollam	Kollam
49	Punaloor(M)	Punalur	Kollam
50	Thrikkaruva	Kollam	Kollam
51	Vilakudi	Pathanapuram	Kollam
52	Kanjirappuzha	Mannarkkad	Palakkad
53	Karakurissi	Mannarkkad	Palakkad
54	Karimpuzha	Ottapalam	Palakkad
55	Kumaramputhoor	Mannarkkad	Palakkad
56	Mannarkkad(M)	Mannarkkad	Palakkad
57	Anakkayam	Eranad	Malappuram
58	Mambadu	Nilambur	Malappuram
59	Manjeri(M)	Eranad	Malappuram
60	Nilambur(M)	Nilambur	Malappuram
61	Pulpatta	Eranad	Malappuram
62	Thrikkalangod	Eranad	Malappuram
63	Wandoor	Nilambur	Malappuram
64	Nenmeni	Suthanbathery	Wayanad
65	Noolpuzha	Suthanbathery	Wayanad
66	Sulthan Bathery(M)	Suthanbathery	Wayanad
67	Chirakkal	Kannur	Kannur
68	Kannur(C)	Kannur	Kannur

Table 5: List of LSGs having moderate dry condition as per meteorological parameters (source IMD& Skymet)

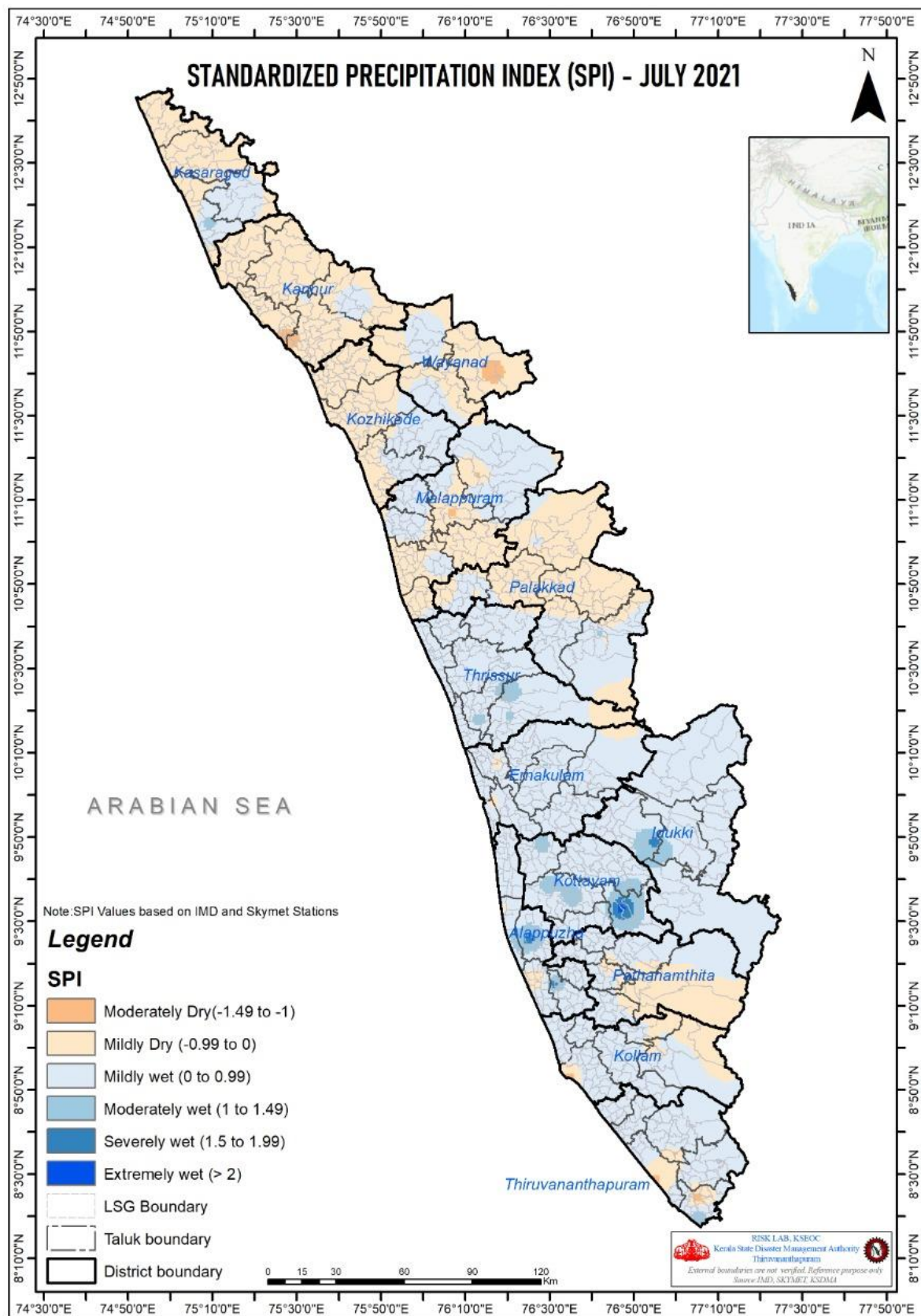


Figure 3: LSGs having drought severity classes based on the meteorological parameters (Source & Skymet)

3.RESERVOIR STORAGE INDEX STATUS

3.1. IRRIGATION

Based on the reservoir water levels in the month of June Reservoir Storage Indices are calculated respectively for each reservoir. The drought deficit totally contribute to a 48%, while the excess constitute about 42%. Based on the reservoir water levels in the month of July, Reservoir Storage Indices are calculated respectively for each reservoir. The drought deficit totally contributes to a 50%, while the excess constitutes about 50%.

	June	July
Extreme Case	2%	8%
Severe Case	7%	3%
Moderate Case	3%	4%
Mild Case	10%	2%
Normal Case	36%	33%
EXCESS	42%	50%

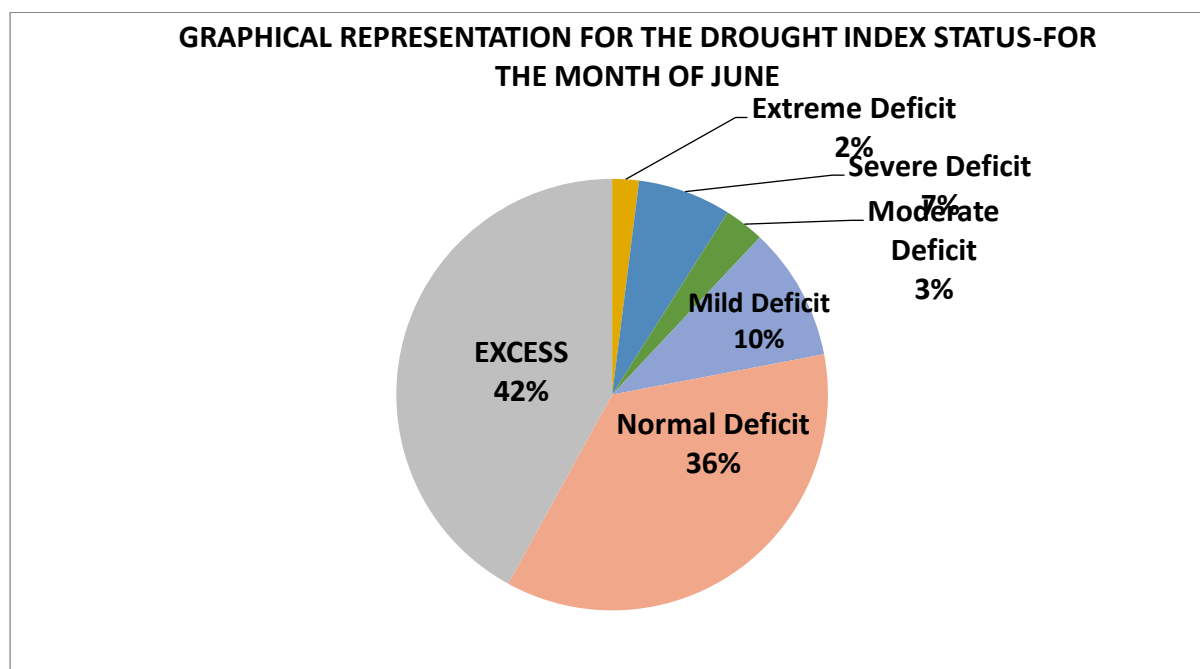


Figure 4: DROUGHT INDEX STATUS-FOR THE MONTH OF JUNE

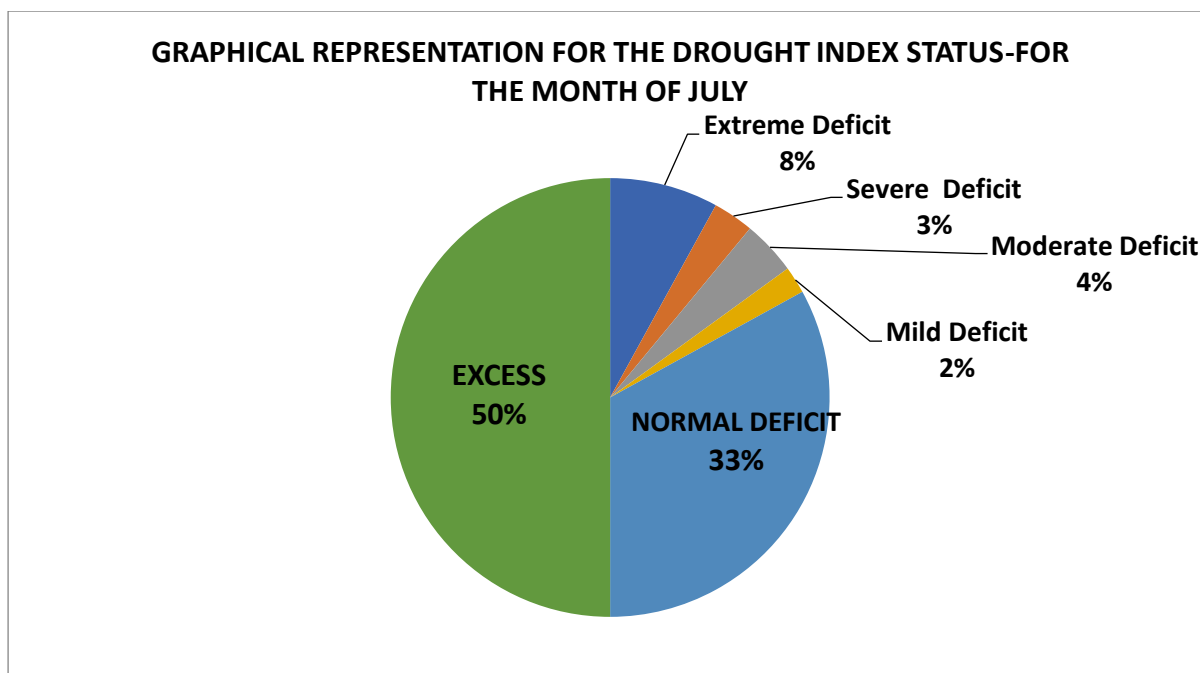


Figure 5: DROUGHT INDEX STATUS-FOR THE MONTH OF JULY

3.2. KSEBL

Based on the reservoir water levels in the month of June, Reservoir Storage Indices are calculated respectively for each reservoir. The drought deficit totally contributes to 70%, while the excess is about 30%. The reservoir water levels in the month of July, Reservoir Storage Indices are calculated respectively for each reservoir. The drought deficit totally contributes to 48%, while the excess is about 42%.

	<i>June</i>	<i>July</i>
Extreme Case	9%	4%
Severe Case	18%	6%
Moderate Case	11%	14%
Mild Case	9%	14%
Normal Case	23%	20%
EXCESS	30%	42%

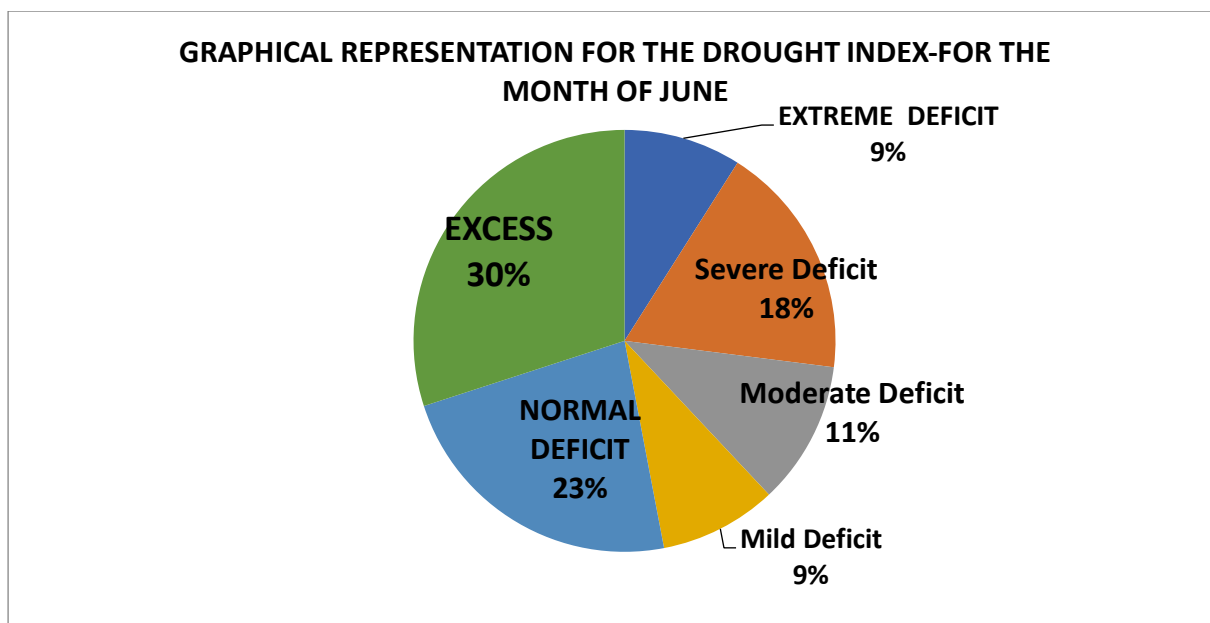


Figure 6: DROUGHT INDEX STATUS-FOR THE MONTH OF JUNE (KSEBL)

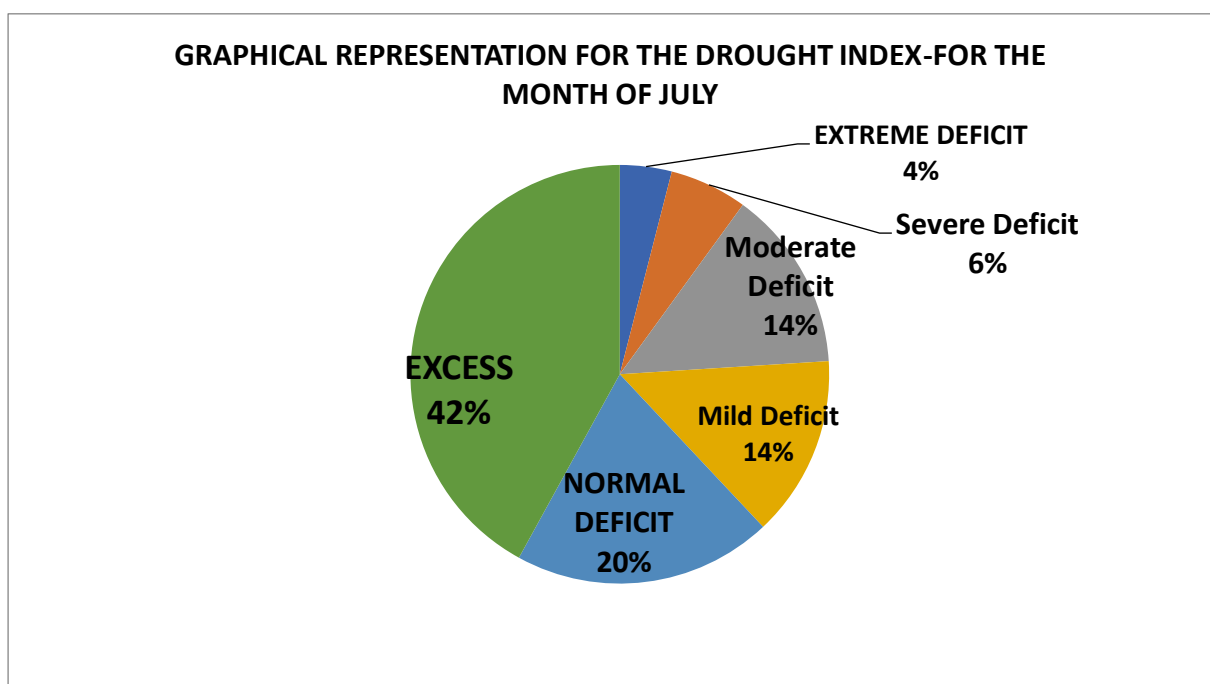


Figure 7: DROUGHT INDEX STATUS-FOR THE MONTH OF JULY(KSEBL)

4.NORMALISED DIFFERENCE VEGETATION INDEX

Normalized Difference Vegetation Index (NDVI) is an indicator of the vigor of vegetation cover. This product is derived from the MODIS sensor on-board Terra Satellite. This parameter 13 ranges from -1 to +1 where from about +0.5 to +1 represents vigorous green cover. Brighter the green cover and its vigor (a proxy of good crop) nearer will be the value of NDVI to +1. NDVI is an

indicator to be considered for drought declaration as per the Guidelines of Ministry of Agriculture. This parameter is monitored every 8 days and compared against long period average. The Manual for Drought Management, 2006 states that ‘the states declare drought only when the deviation of NDVI value for the normal is 0.4 or less. However, NDVI value needs to be applied in conjunction with other indicators and values. In a perennially vegetation covered tropical state like Kerala, the possibility of drastic departure of NDVI by an order of 0.4 will not be occur.

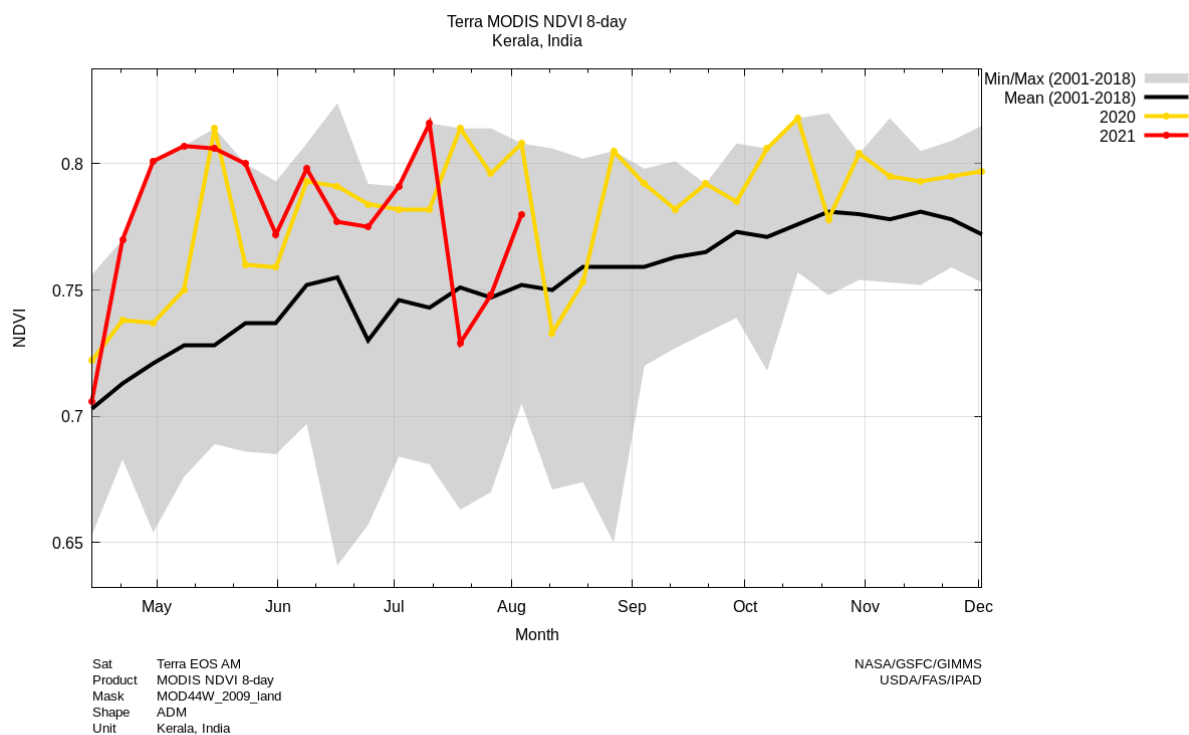


Figure 8 : NORMALISED DIFFERENCE VEGETATION INDEX -KERALA

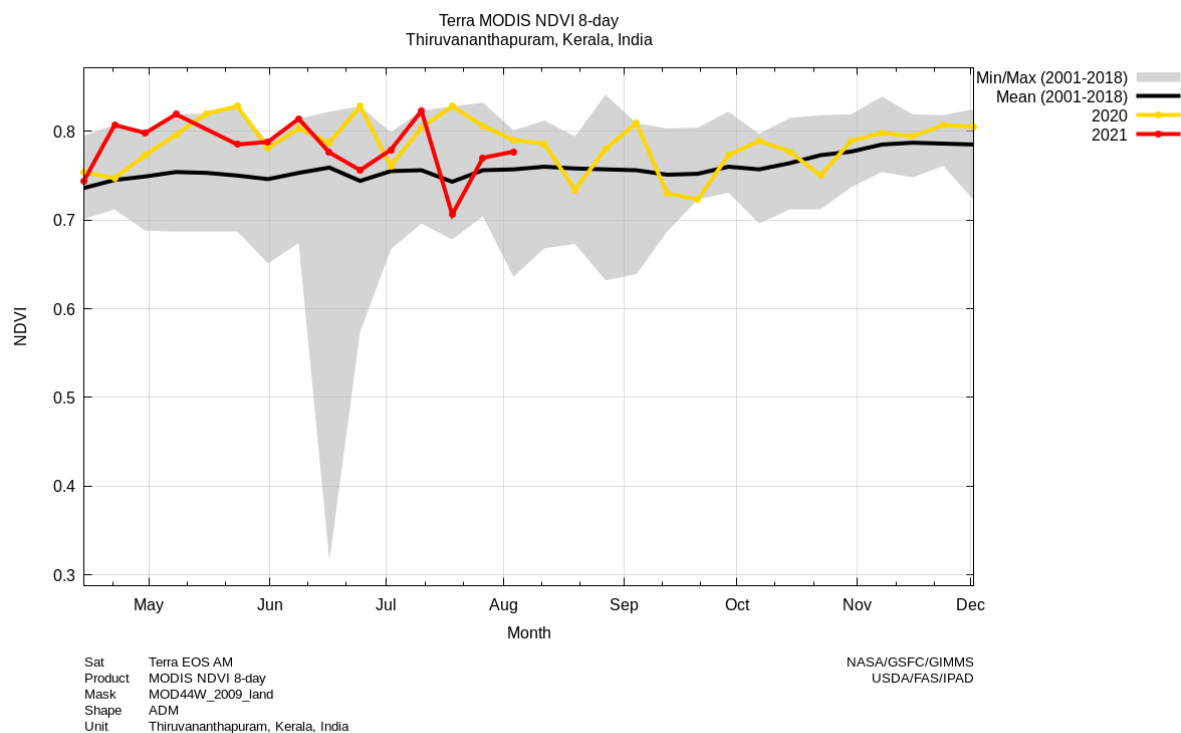


Figure 9: NORMALISED DIFFERENCE VEGETATION INDEX -TVM

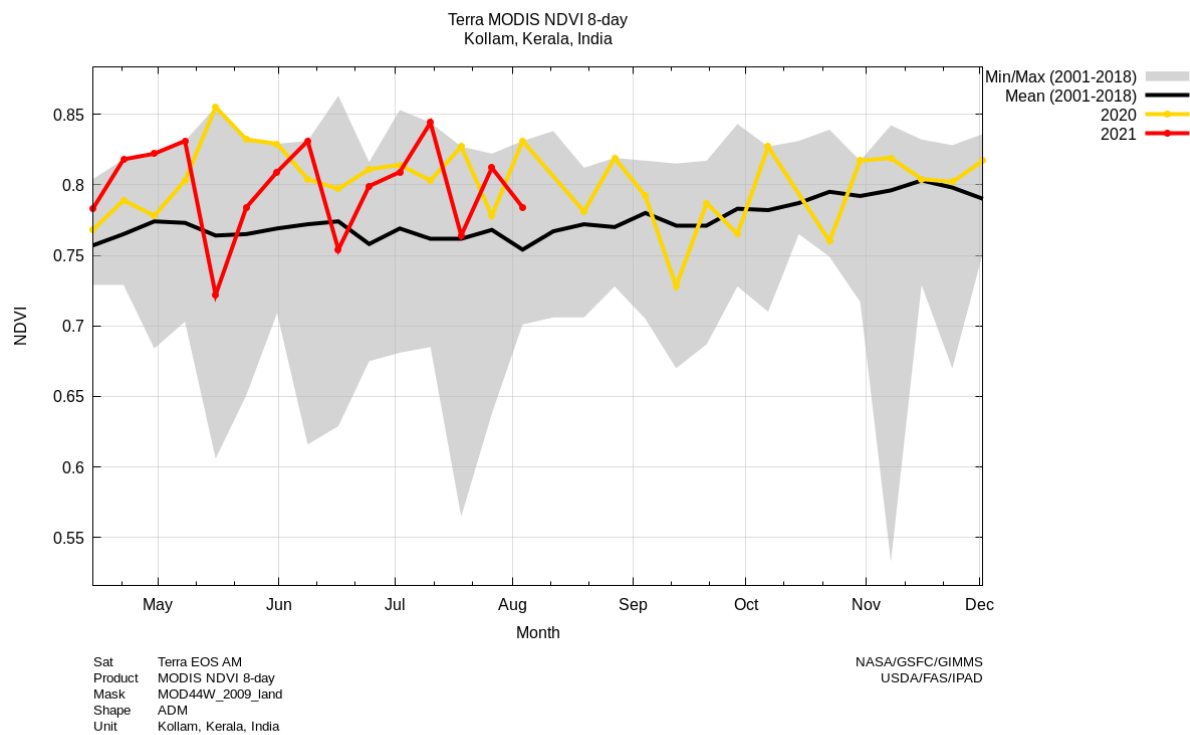


Figure 10: NORMALISED DIFFERENCE VEGETATION INDEX -KLM

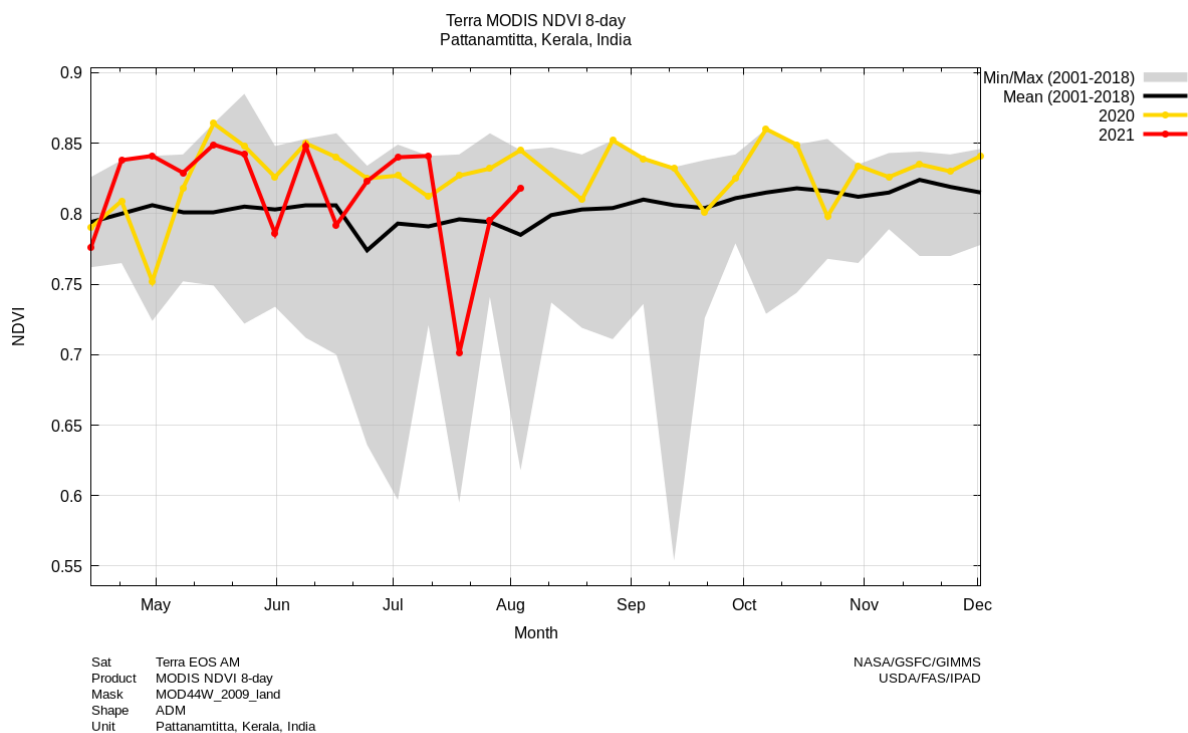


Figure 11 :NORMALISED DIFFERENCE VEGETATION INDEX -PTA

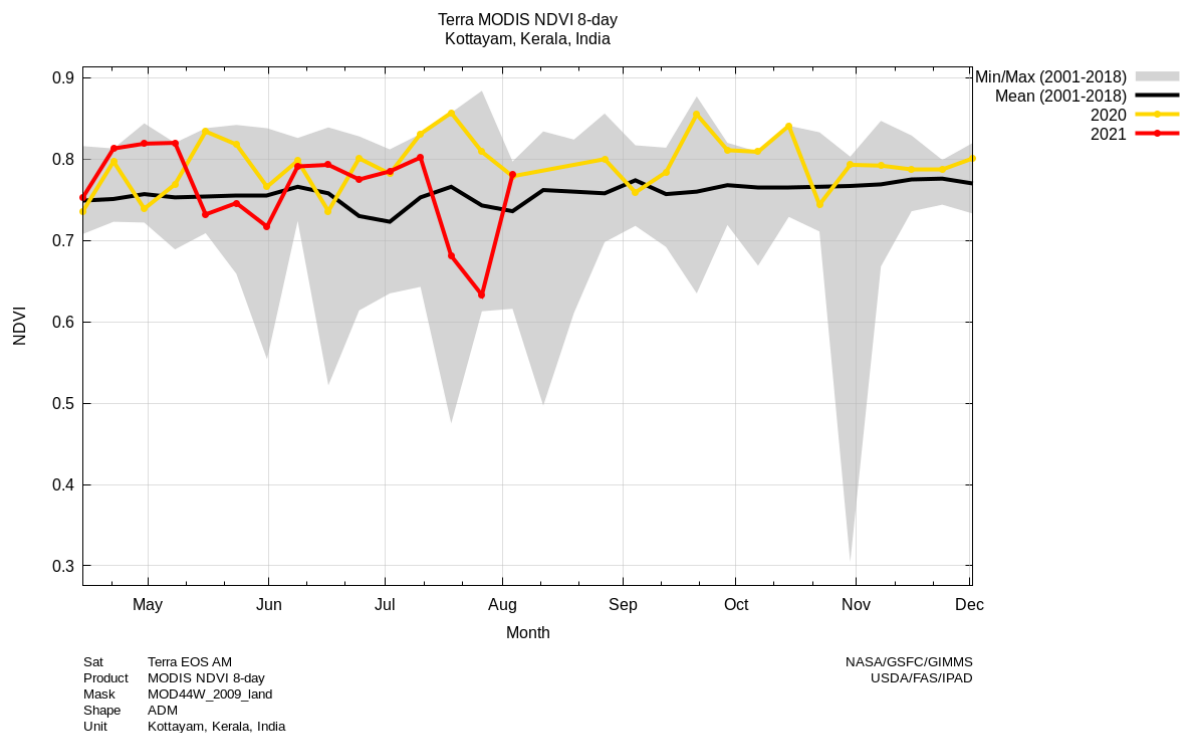


Figure 12: NORMALISED DIFFERENCE VEGETATION INDEX -KTM

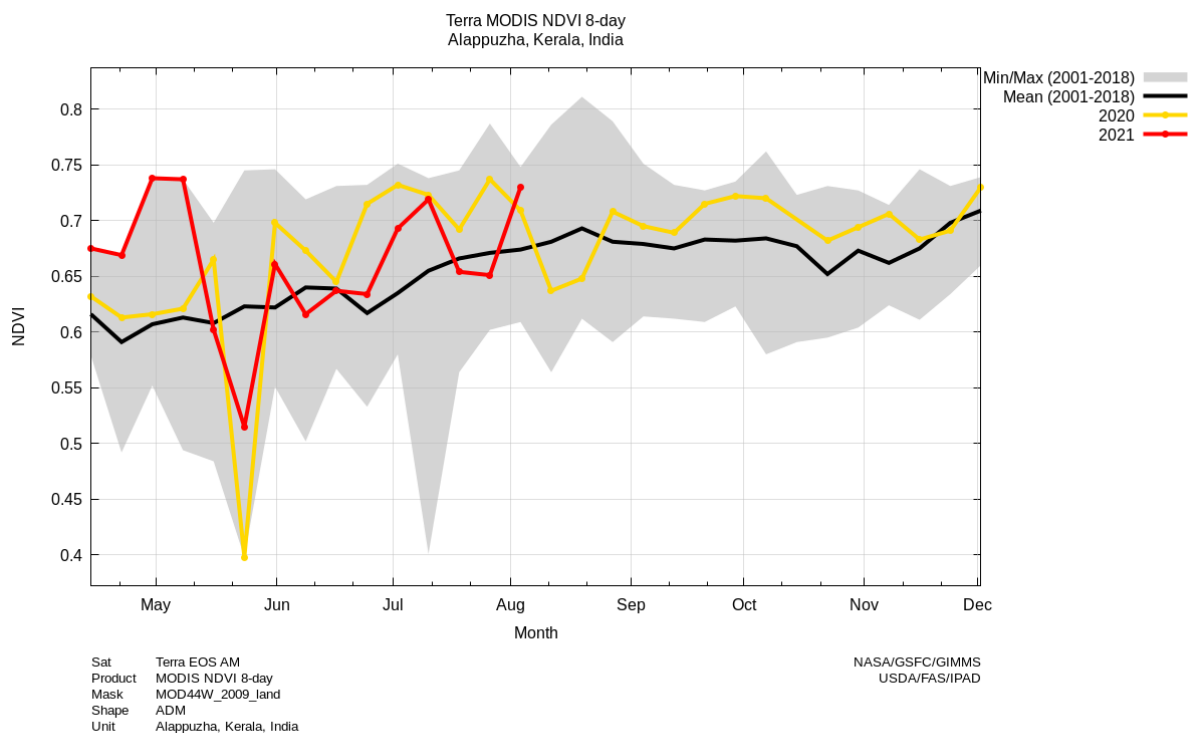


Figure 13: NORMALISED DIFFERENCE VEGETATION INDEX -ALP

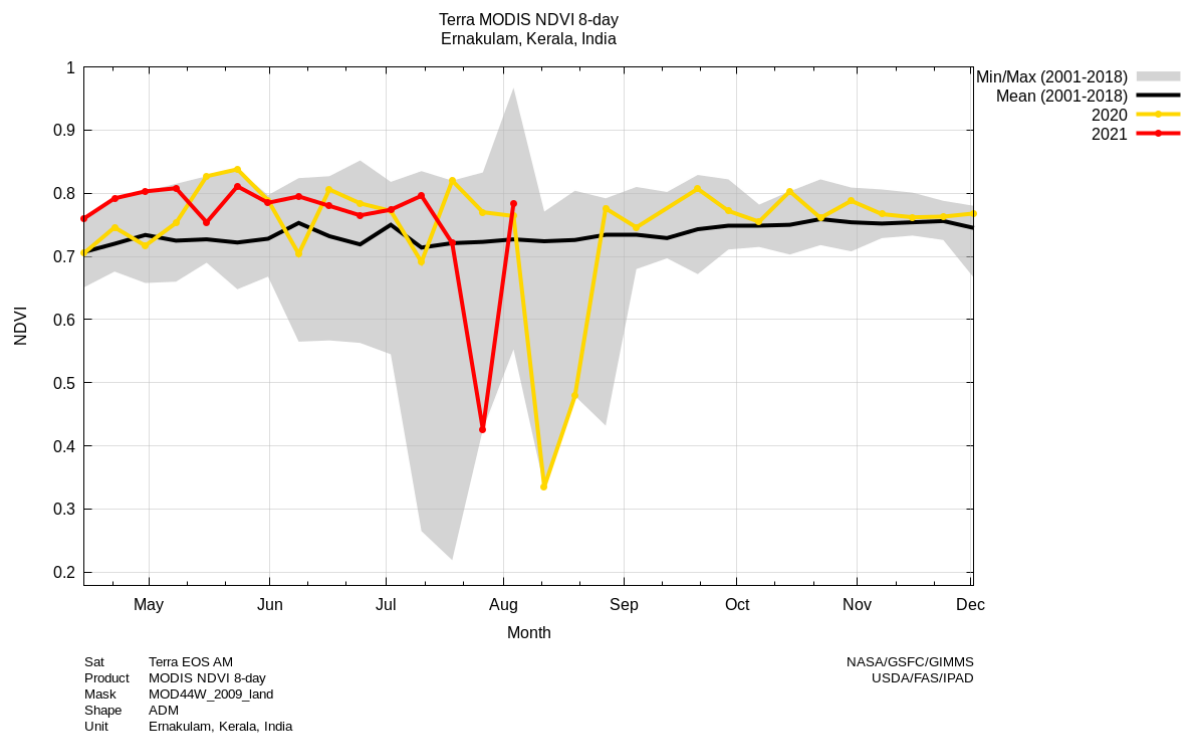


Figure 14: NORMALISED DIFFERENCE VEGETATION INDEX -EKM

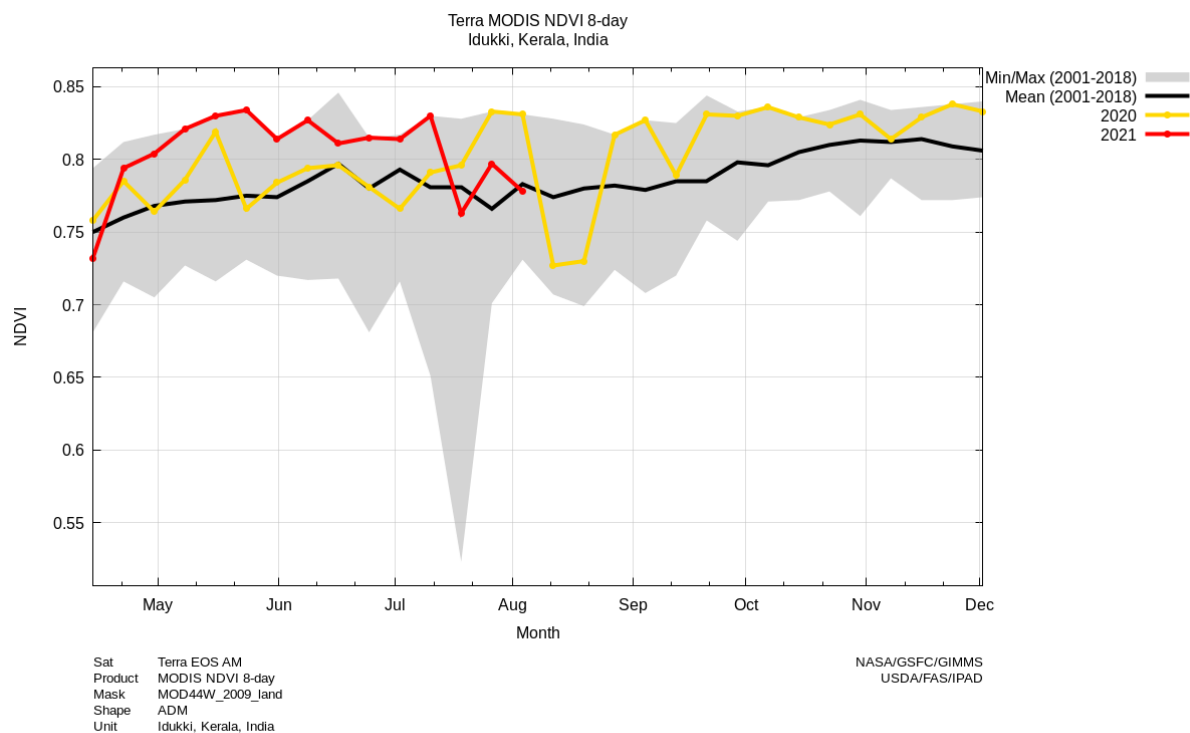


Figure 15: NORMALISED DIFFERENCE VEGETATION INDEX -IDK

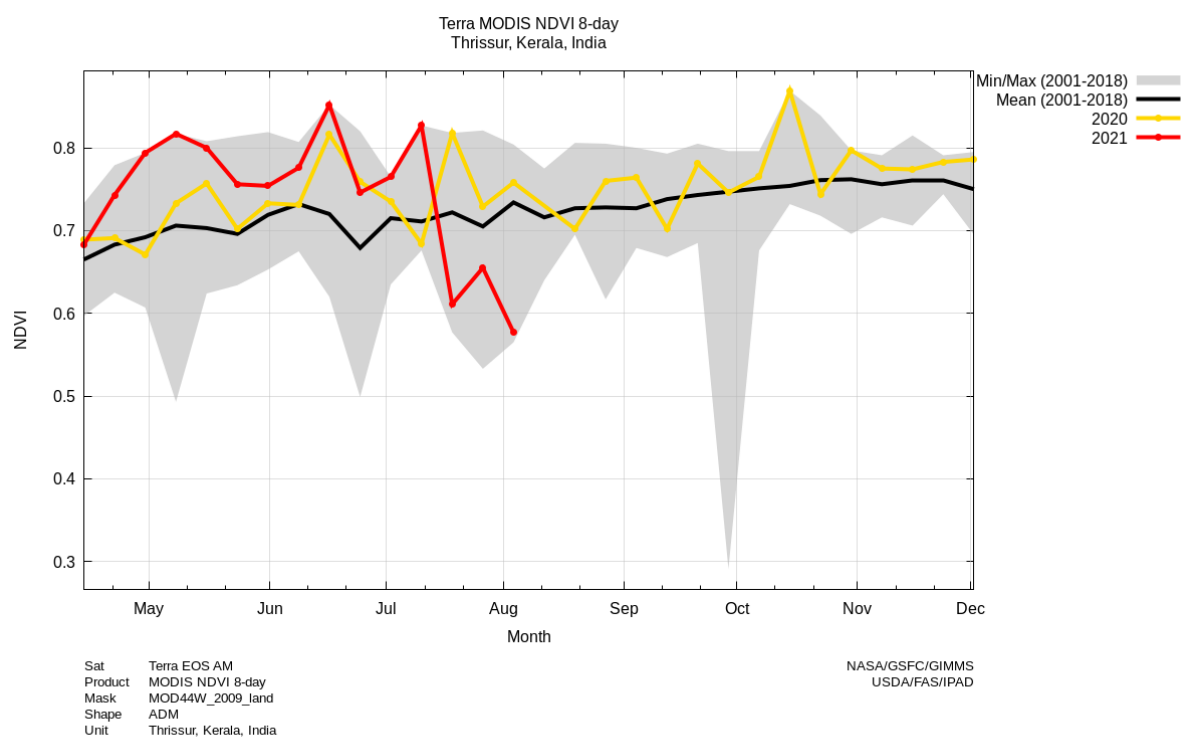


Figure 16: NORMALISED DIFFERENCE VEGETATION INDEX -TSR

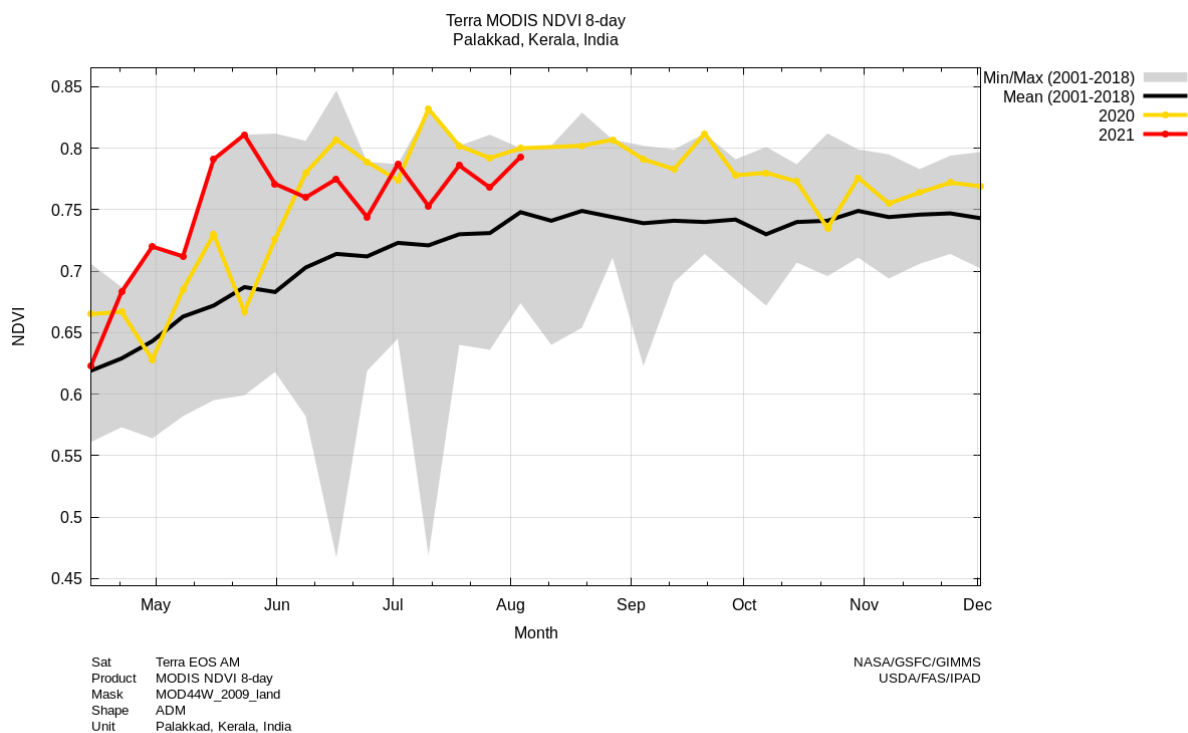


Figure 17: NORMALISED DIFFERENCE VEGETATION INDEX -PKD

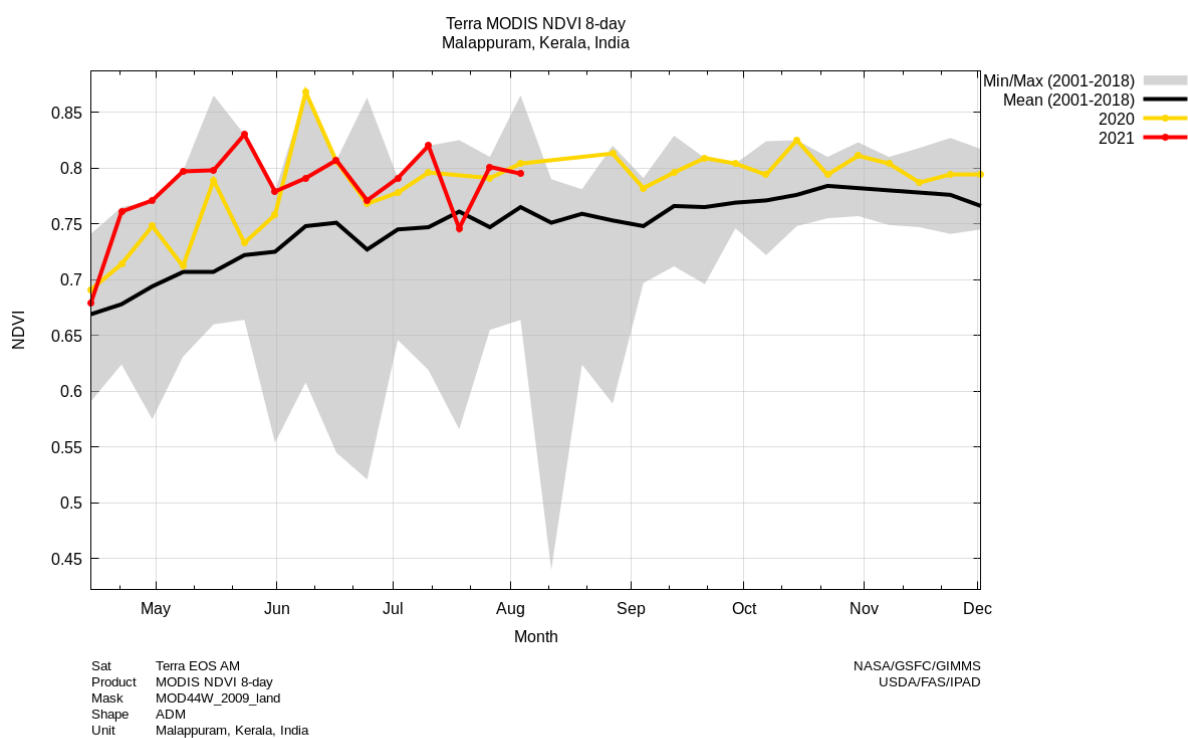


Figure 18: NORMALISED DIFFERENCE VEGETATION INDEX -MLPM

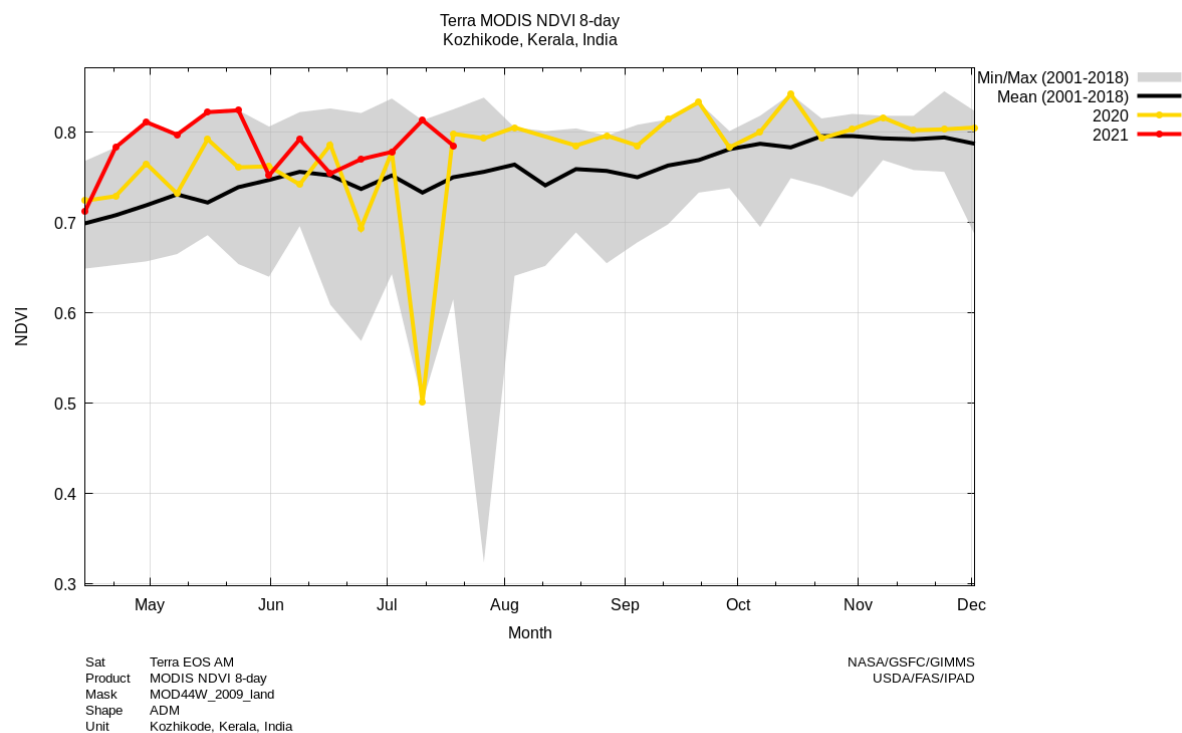


Figure 19: NORMALISED DIFFERENCE VEGETATION INDEX -KZD

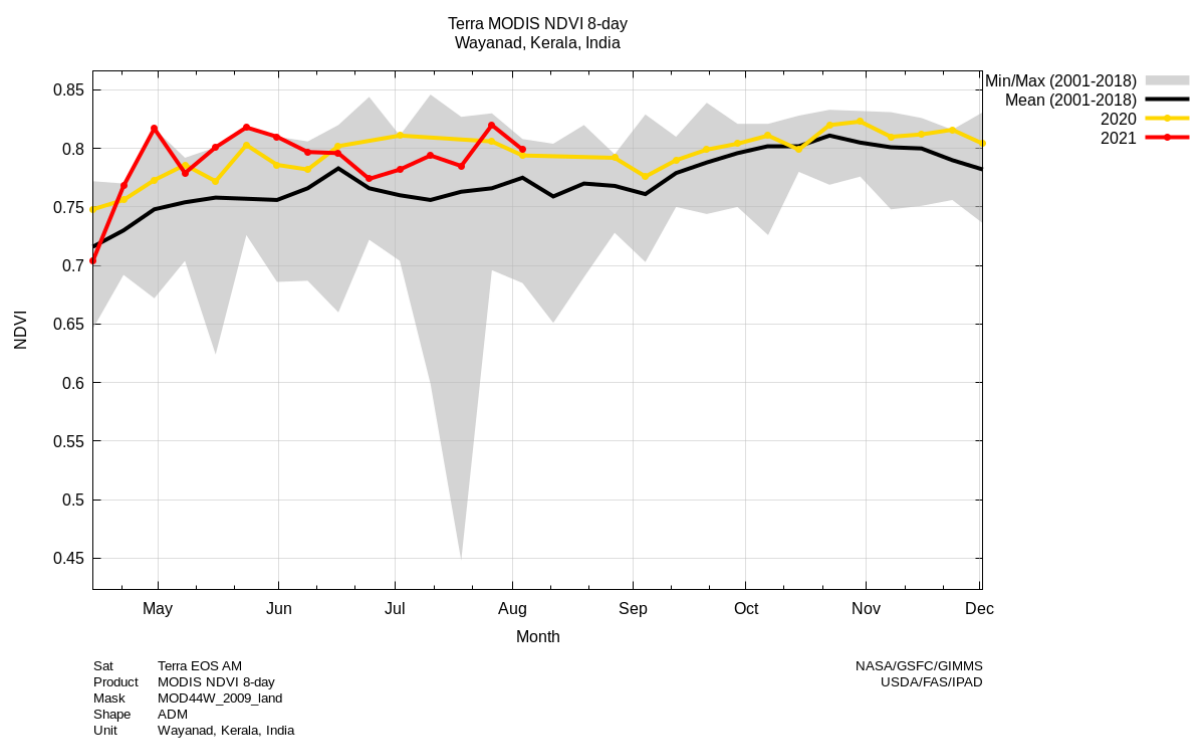


Figure 20 :NORMALISED DIFFERENCE VEGETATION INDEX -WYD

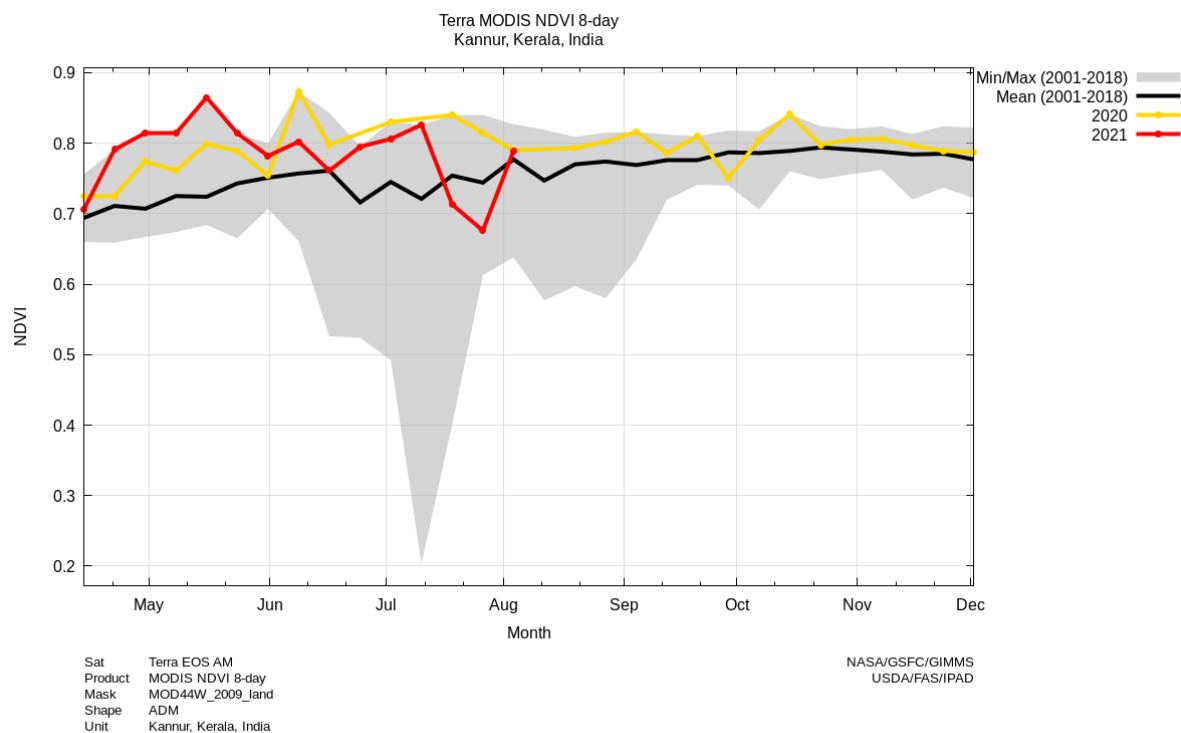


Figure 21: NORMALISED DIFFERENCE VEGETATION INDEX -KNR

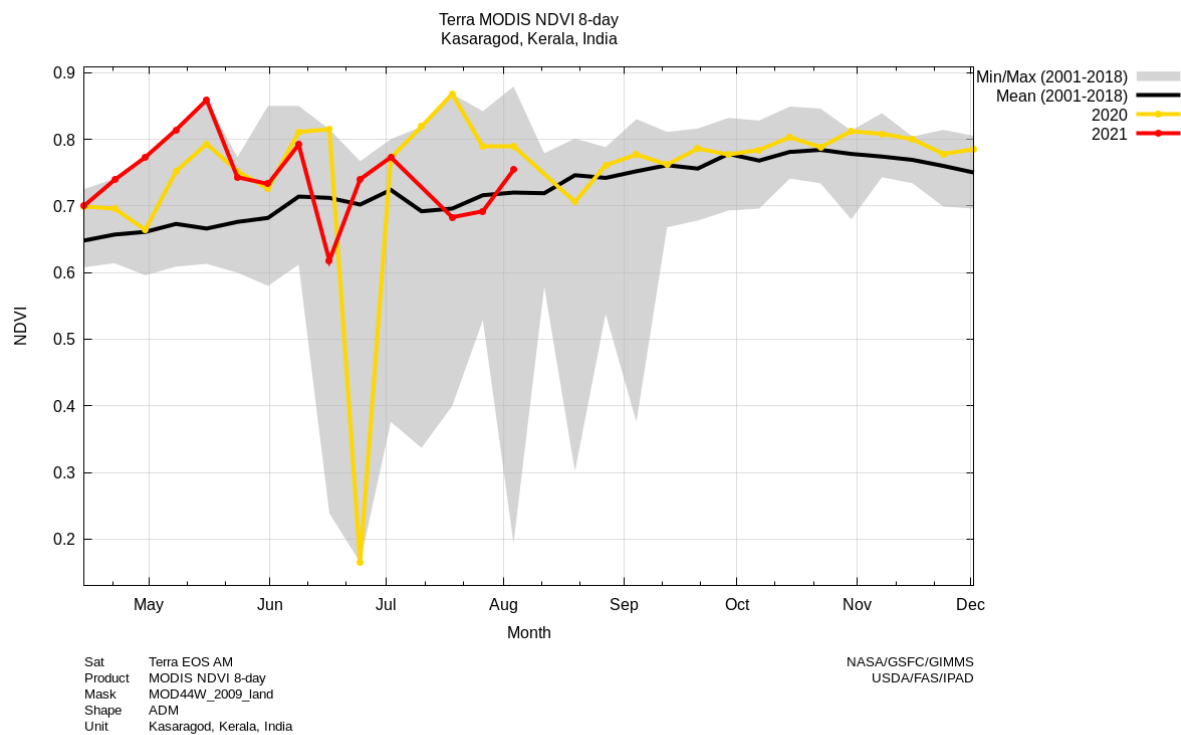


Figure 22: NORMALISED DIFFERENCE VEGETATION INDEX -KSD

5.GROUND WATER

According to Central Ground Water Board, 82% of Kerala's ground water is replenished annually by rainfall. In a hard crystalline bed rock region like Kerala. It is often noticed that extraction of water from deep bore wells and tube wells tend to affect the water level of surrounding open wells. These phreatic aquifers are replenished by ponds, streams and fresh water lakes. A reduction of 40% monsoon rainfall thus would affect about 50% of the replenishment of ground water in the State. Ground water level data from open wells were assessed across the state. Extreme drought situation is not seen.

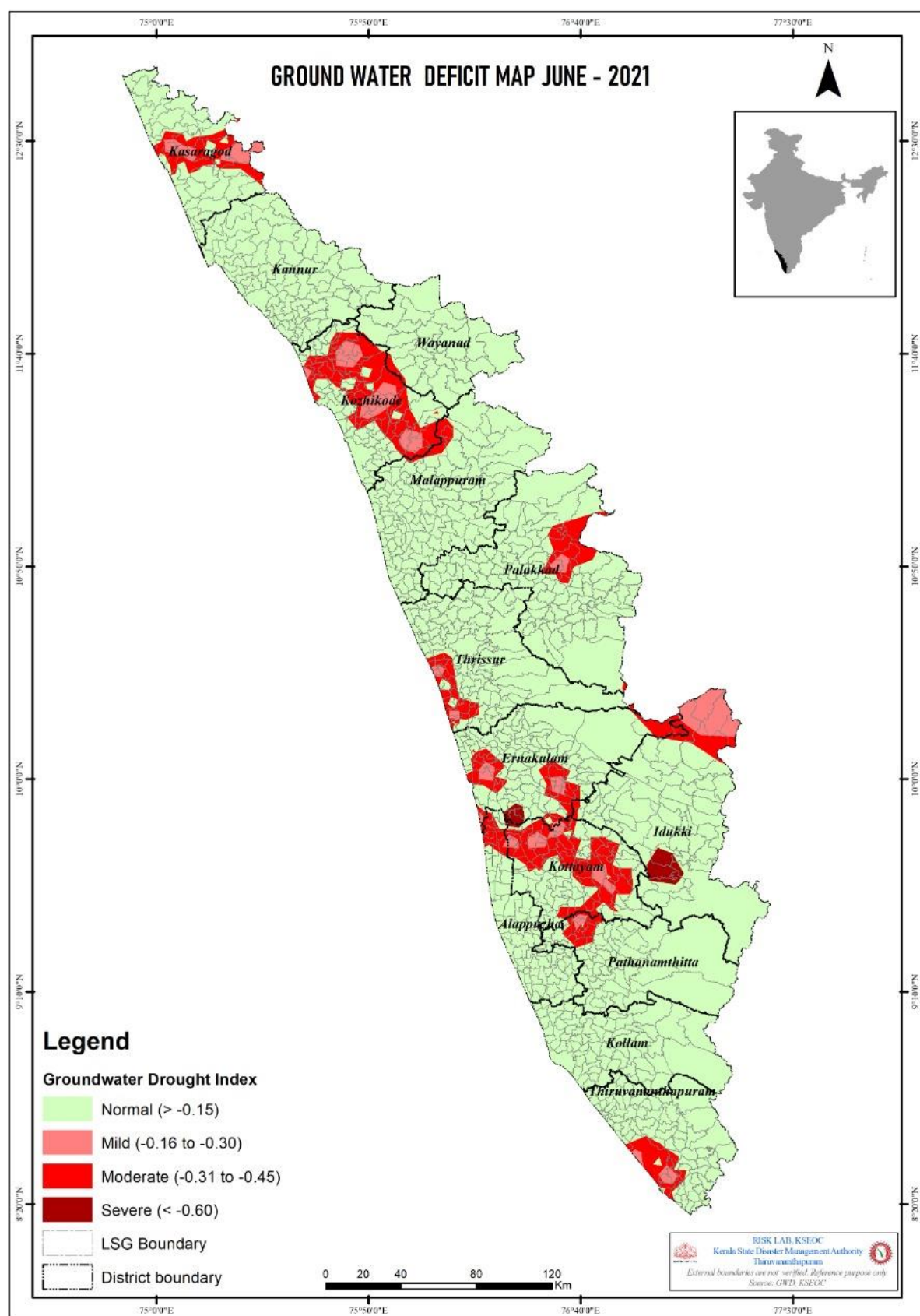


Figure 23 :GROUND WATER DEFICIT MAP

6.AGRICULTURE STATUS

The information on area under cultivation of paddy and horticultural crops and area under insurance scheme as per Kharif 2021 on district wise is collected from the department of agriculture and farmers welfare and is summarized below. Sown area for paddy crop for kharif 2021 in Kerala is 85,779 ha. Out of this 85,779 ha, 79,289 ha is under insurance scheme. Most of the farmers are under coverage of state insurance scheme. Data pertaining to area under Pradhan Mantri Bhasal Bhima Yojana and State Insurance is not provided from the Agriculture and Farmers Welfare Department up to now. Regarding horticulture crops, total sown area of horticulture crops as per kharif 2021, is 1985834 ha having highest area of cultivation in Idukki district (223002 ha). With respect to insured area, same trend is observed, highest is in Idukki having area of 218179 ha.

Total sown area of horticultural crops on district wise as per Kharif 2021 is 1985834 ha and the insurance covered area is 1927798.63 ha. Regarding horticulture crops, total sown area of horticulture crops as per kharif 2021, is 1985834 ha having highest area of cultivation in Idukki district (223002 ha). With respect to insured area, same trend is observed, highest is in Idukki having area of 218179 ha. Total sown area of horticultural crops on district wise as per Kharif 2021 is 1985834 ha and the insurance covered area is 1927798.63 ha

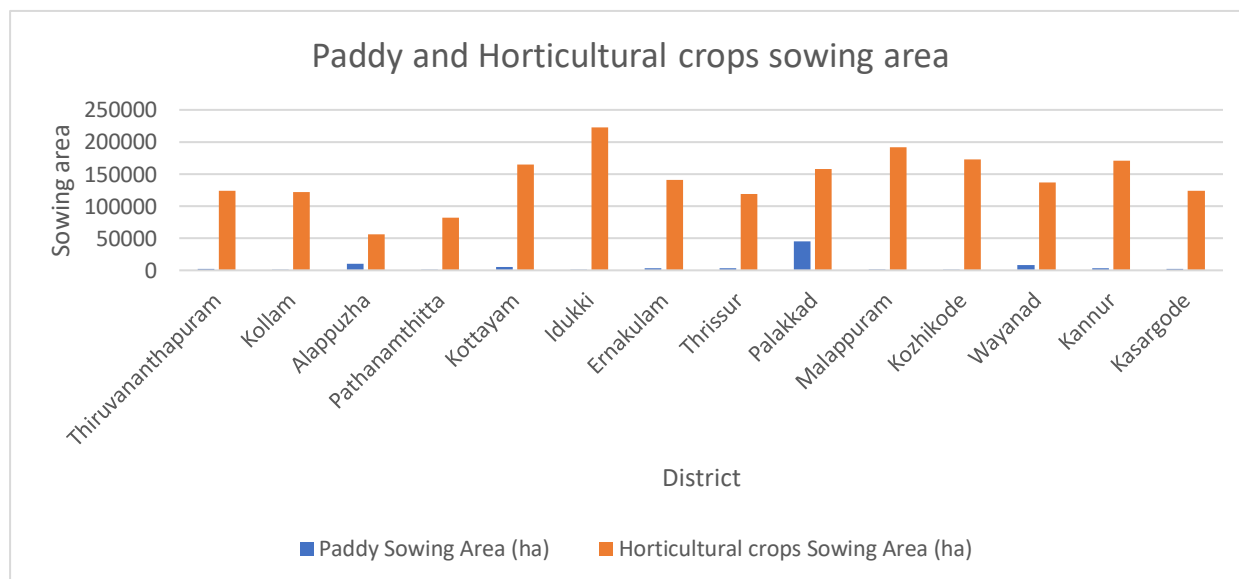


Figure 24: District wise paddy sowing and Horticultural crops sowing area

Sown area of individual horticultural crops and area under insurance (coconut, banana, vegetables, arecanut, pepper, coffee, rubber, cashew, tubers, betel vine, tapioca, ginger, nutmeg, clove, cardamom, cocoa, turmeric, groundnut, sesamum, sugarcane and pineapple) on district wise is given in table. 5 and table. 6 respectively. Among the horticulture crops, rubber has highest sown area of 534230 ha and lowest for sesamum (88 ha). The same trend is observed in case of insured area of individual horticulture crops.

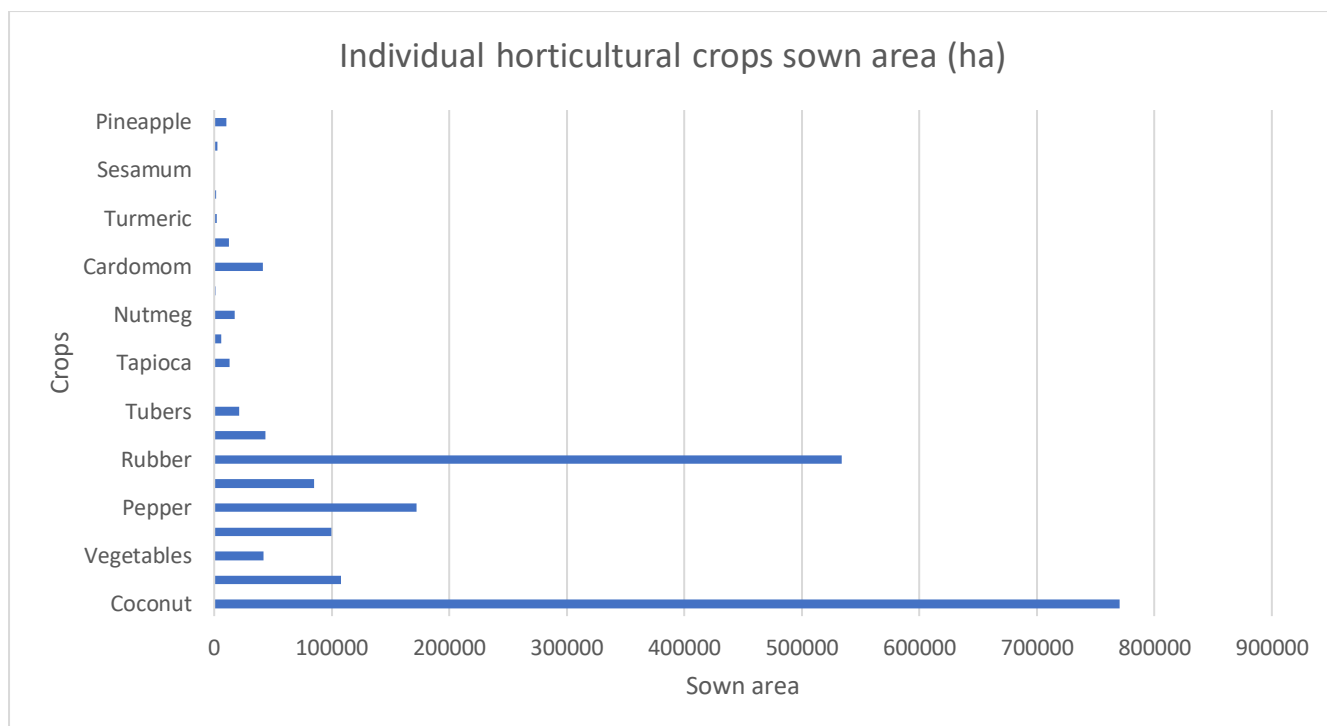


Figure 25: District wise different crops sowing area and insurance covered area

7.CONCLUSION

Based on the analysis the seasonal rainfall is deficient from -54 to -24 % from actual in twelve districts of Kerala. Out of 70 IMD stations 29 stations have dry spell. Mostly in Kannur, Palakkad, Malappuram, Wayanad, Alappuzha and Thiruvananthapuram districts. The meteorological drought triggering conditions satisfied in 29 IMD stations and 3 Skymet stations. The condition that may aggravate in the coming months if monsoon does not strengthen in August and September. The analysis of water storage of reservoirs under KSEB shows 49% in the month of June 45% in July. The Reservoirs storage under Irrigation in the month of June July is 30% and 37% respectively.

In conclusion, as per the Drought Manual 2016 the first trigger conditions satisfied in 68 LSGs having moderate dry conditions. These LSGs may be alerted for tackle the situations. The present condition that may aggravate in the coming months if monsoon does not strengthen in August and September.

Prepared by

- 1.Dr. Shinu Sheela Wilson – Meteorologist,
- 2.Ms. Lekshmi Vijayachandran-Hydrologist
- 3.Dr. Aswathy S. Nair – Agriculture Specialist
- 4.Mr. Faheed Jasin K.P – GIS Technician
- 5.Ms. Amrutha K, Hazard Analyst
