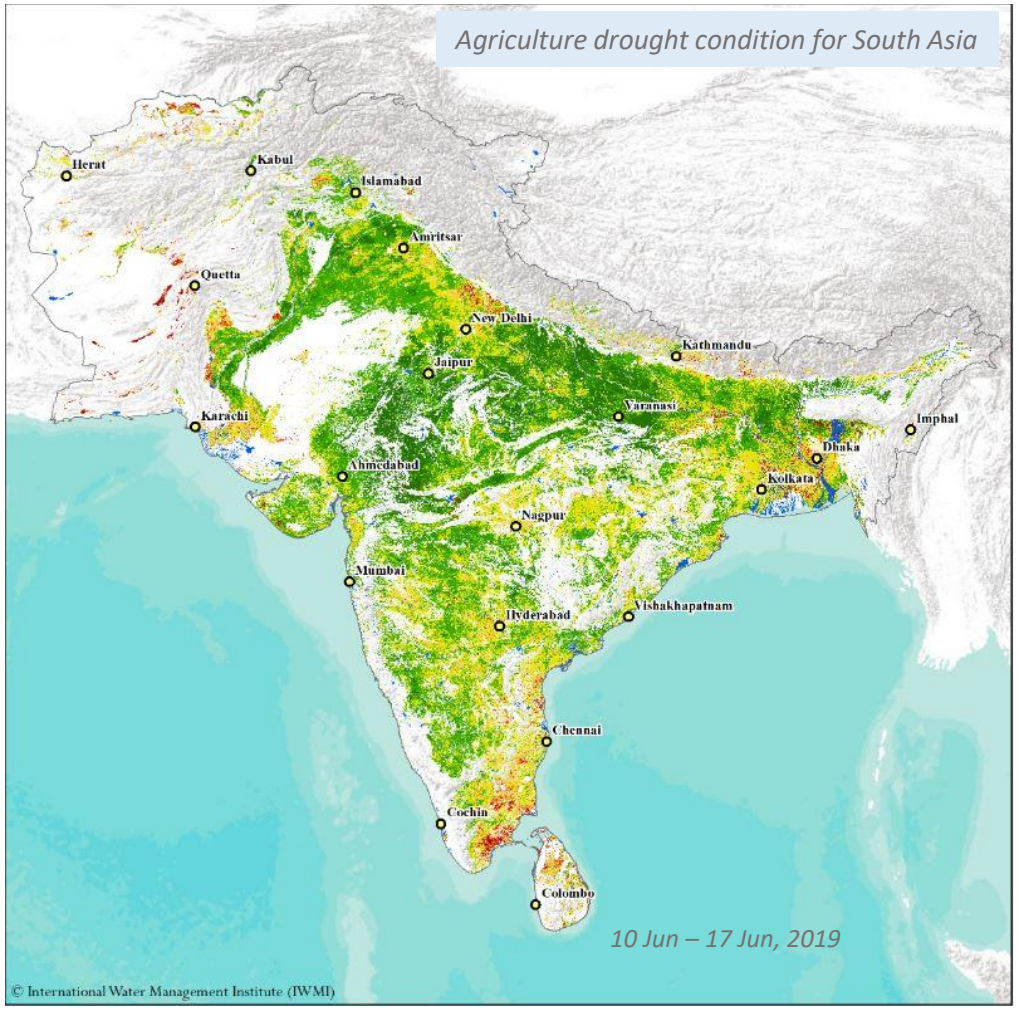
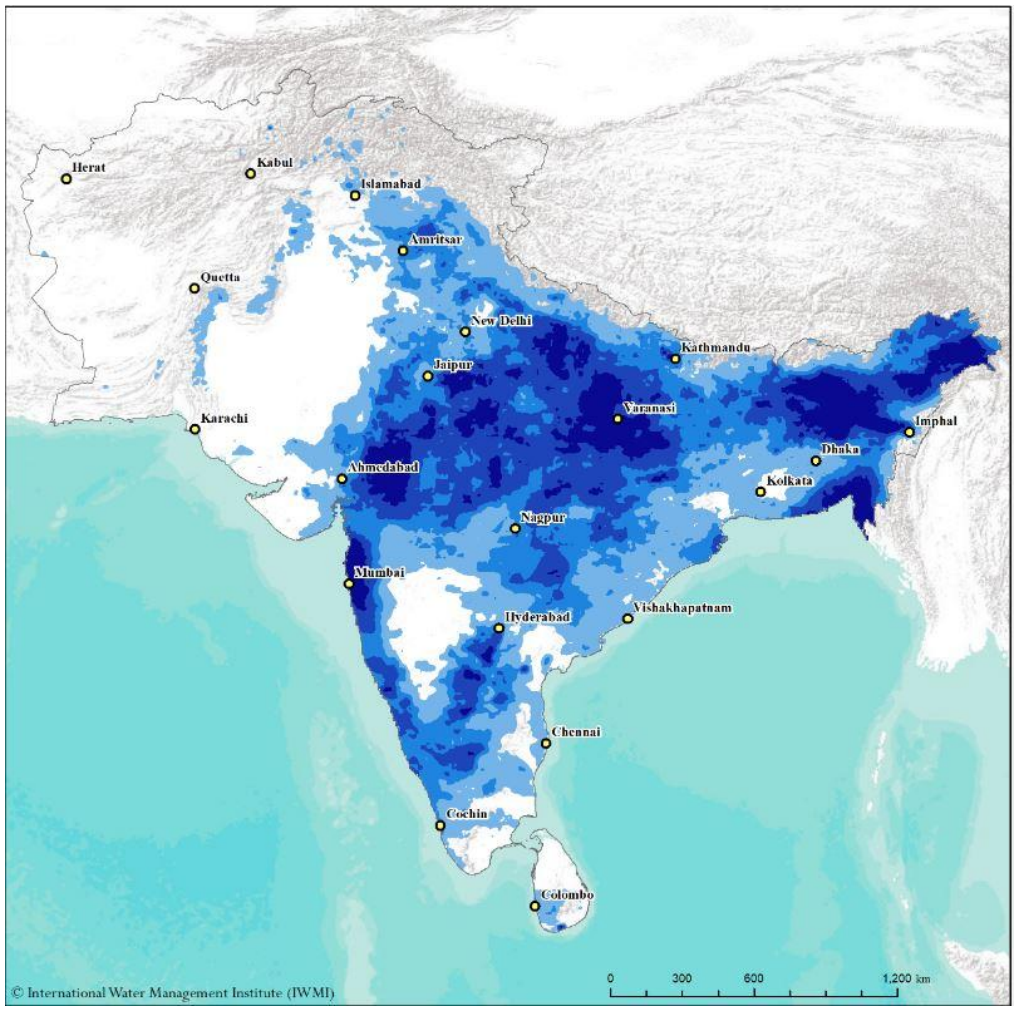
SADMS DROUGHT BULLETIN

11 July 2019 | ISSUE 05



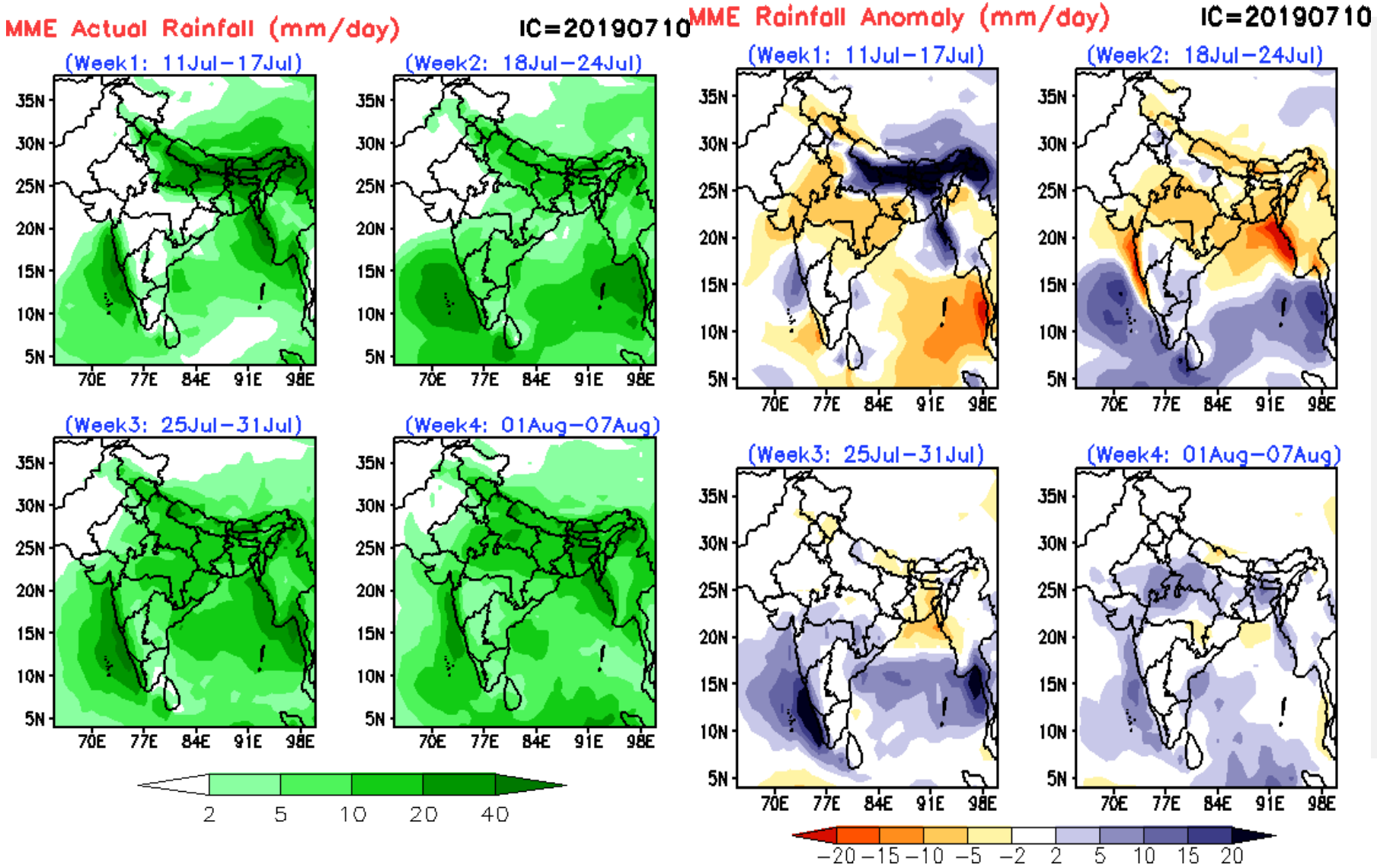


South Asia Drought Monitoring System (SADMS) drought weekly bulletin is produced by International Water Management Institute (IWMI) and is funded by the Indian Council of Agricultural Research (ICAR), the CGIAR Research Program on Water, Land and Ecosystems (WLE) and the Ministry of Agriculture, Forestry and Fisheries (MAFF), Japan. Development of the beta-monitoring system was made possible at this inception through IDMP supported by WMO/GWP. The bulletin supports the government and other users to strengthen the potential use of satellite technology and modeling tools to reduce the impacts on agriculture risks and support in drought contingency plans and mitigation efforts.

Published Date: 14 July 2019

Rainfall Summary - Predicted week wise rainfall for South Asia

Multi Model Ensemble *(MME) Seasonal Prediction System for 2019 Monsoon Season*



- Excess Rainfall for South and South-west Karnataka, UP, Bihar, Assam, West-Bengal and Kerala experience in the next week of 11th to 17 July;
- Nepal, Bhutan, south Assam, North and north east Arunachal might experience a increase in rainfall, however the rainfall anomaly explains deficit rainfall in last week of July.
- Most of India might experience increasing in rainfall by beginning of August.
- MP, UP, Bihar, Odisha, Jharkhand, Telangana and West Bengal may experience increasing rainfall from 25th June to 07th August.
- Sri Lanka for Northern, North Central and Eastern province explains normal rainfall but western might experience excess rainfall in month of end of July.
- Nepal rainfall anomaly explains a decrease in rainfall but in Bhutan it will slightly increase in end of July.
- Overall Pakistan shows normal in rainfall.

Image Source: Indian Institute of Tropical Meteorology (IITM) and India Meteorological Department (IMD) Pune, India

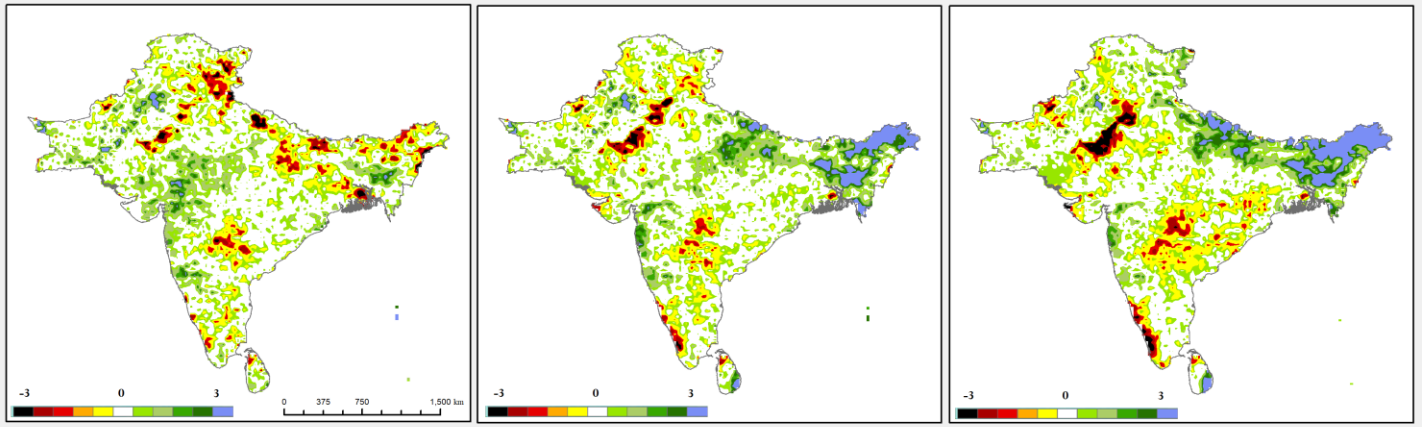
Note: The summary on country specific details described above based on the ERPAS MME information product do not imply the expression of any opinion whatsoever on the part of the IWMI and its partners as well the data provided by IITM.

SOUTH ASIA DROUGHT EARLY WARNING SYATEM (SADEWS)

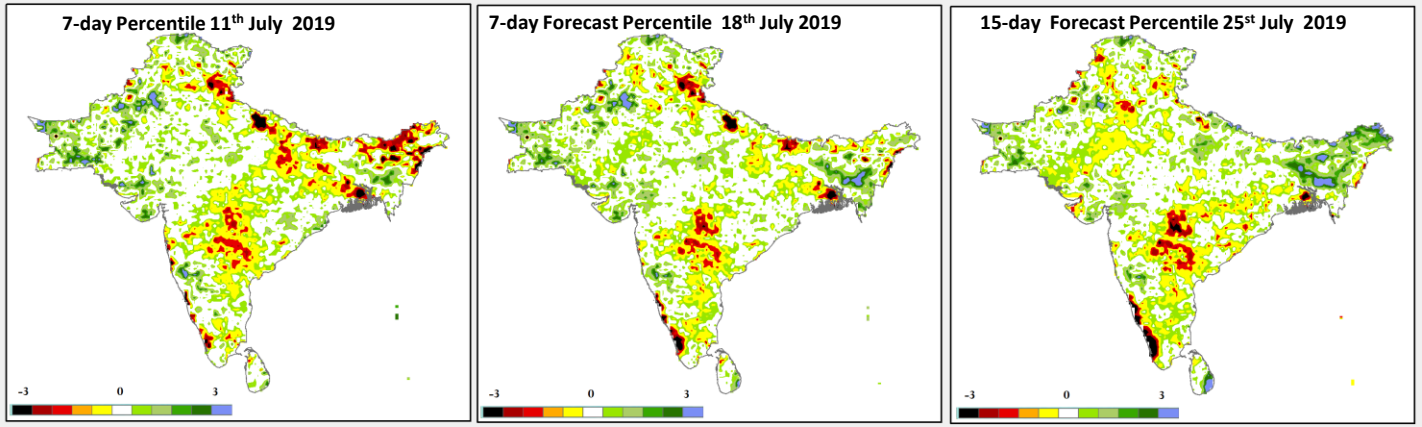
Current Condition: 11 July 2019
Forecast Period : 11 Jun and 25 July 2019
Standardized Soil Moisture and Runoff Index for regional drought and early warning

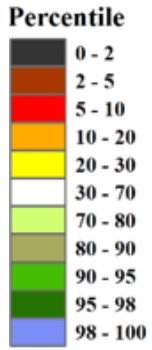
SOIL MOISTURE PERCENTILE (SMP)

7-day Percentile 11th July 2019 | 7-day Forecast Percentile 18th July 2019 | 15-day Forecast Percentile 25st July 2019



SOIL RUNOFF PERCENTILE (SRP)





Summary:

The experimental drought forecast products for research/scientific use based on 11th June 2019 initial condition. These forecast products are based on the real time weekly operational forecast generated by Global ENSemble (GENS), a weather forecast model made up of 21 separate forecasts, or ensemble members developed at The National Centers for Environmental Prediction (NCEP), NOAA.

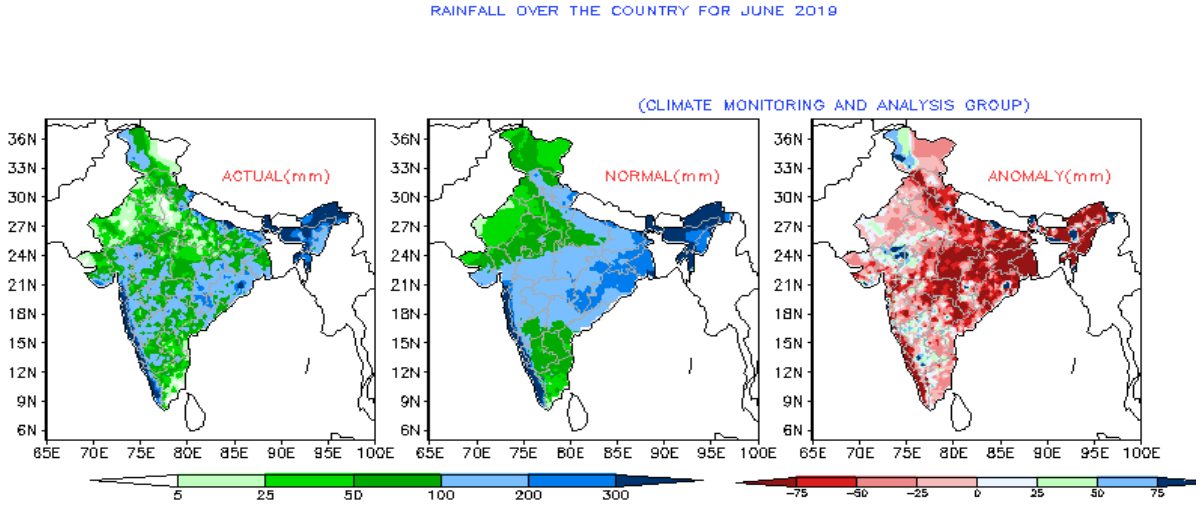
Drought Forecast Outlook:

- Rainfall of North –East states (Arunachal, Bihar, Uttar Pradesh) will be increasing and some states as Rajasthan and some parts of Hariyana will be decreased in coming two weeks.
- Initial condition on the Soil Runoff Index (SRI) explains similar trend to SSI.
- Dryness is increasing in the following week and it will be further increasing in the 3rd week of July over center part of India but there will be decreeing seen North boundary of the mainland.
- South and South East of Sri Lanka will get more rain when rainfall in Jammu & Kashmir are normal.
- The areas are in deficit rainfall condition which may affect the crop productivity and advance need for State and Local authorities for better planning and coordination on water resources management.

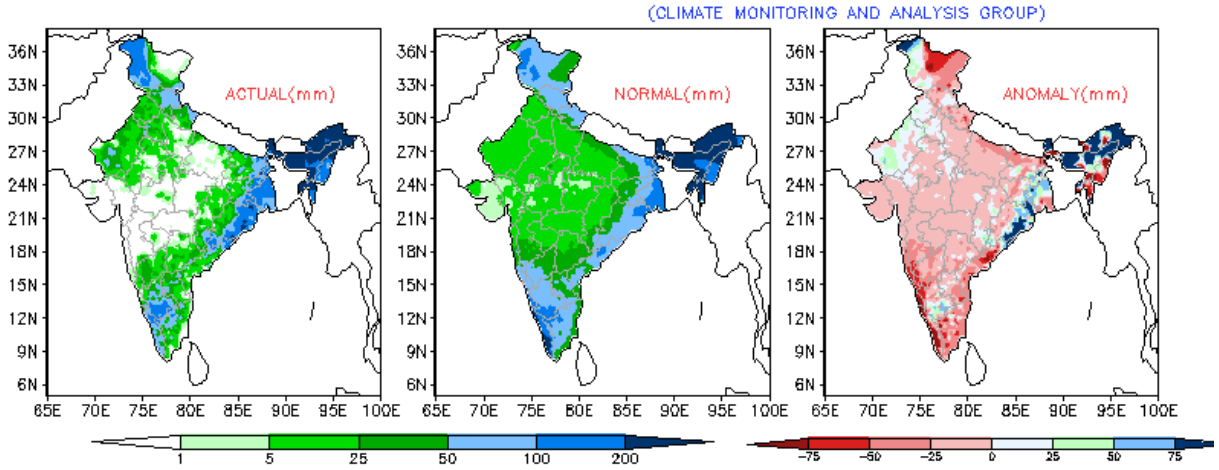
The SADEWS is regional scale early warning system developed as a collaborative project between International Water Management Institute (IWMI) and Indian Institute of Technology – Gandhinagar (IIT-GN).

INDIA – Monthly Rainfall Condition (Actual vs. Anomaly)

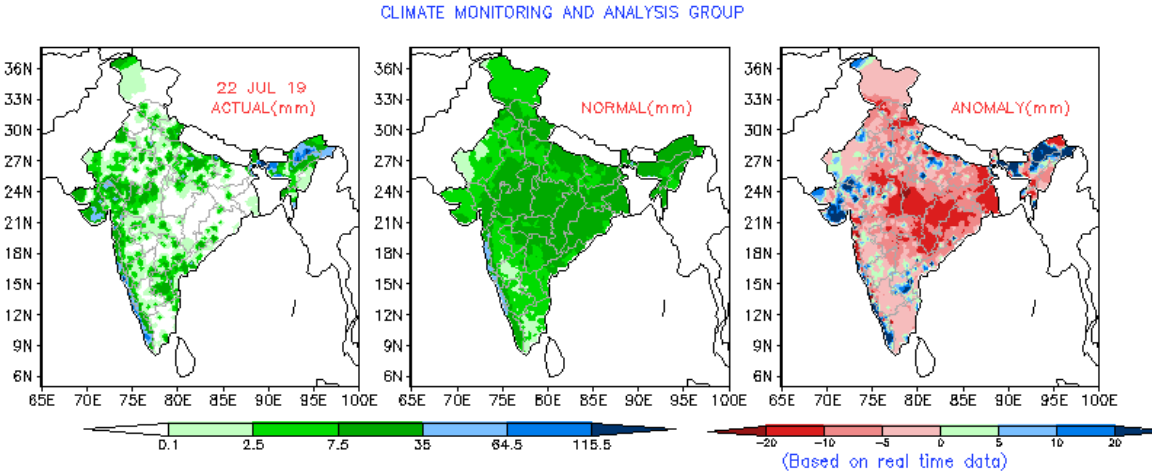
Actual Rainfall – May 2019



Actual Rainfall – June 2019



Actual Rainfall – Seasonal 2019 (June)



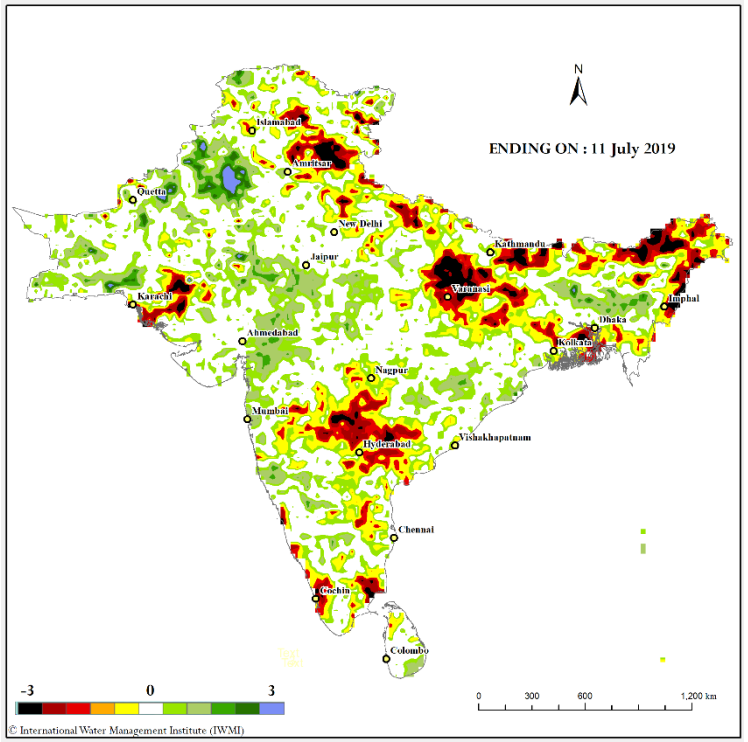
Data Source: IMD

- Overall there is an decrease in rainfall for the month of May compared to the long-term anomaly, however some coastal areas in Odisha and West Bengal, had excess rainfall in July.
- Month of May has experienced mostly negative anomalies across India except western terrestrial area.
- There has a reduction and slightly decreased in rainfall in the month of May, June and until July 22 all over the India.
- Overall there has been an slightly excess only western coastal belt.

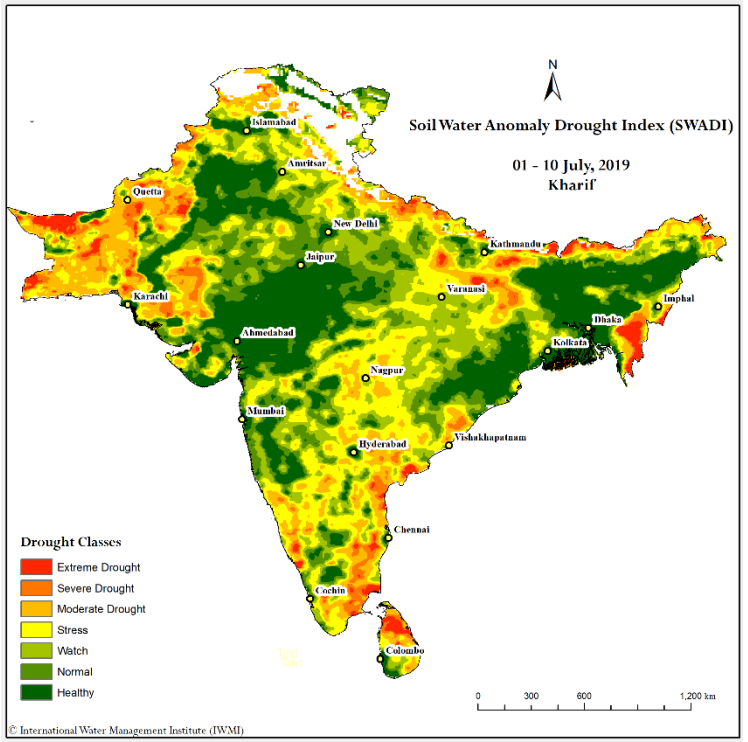
Note: Simple qualitative assessment on the performance on rainfall condition was described here to cross compare with SADMS – IDSI products for evaluation purpose only.

South Asia Drought Indices – A Comparison & Assessment

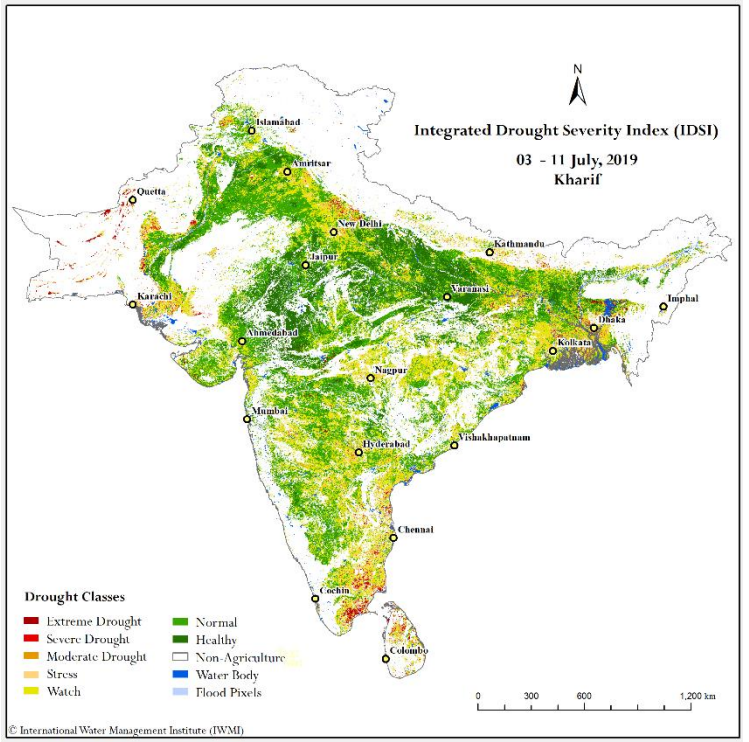
SA-DEWS



SWADI

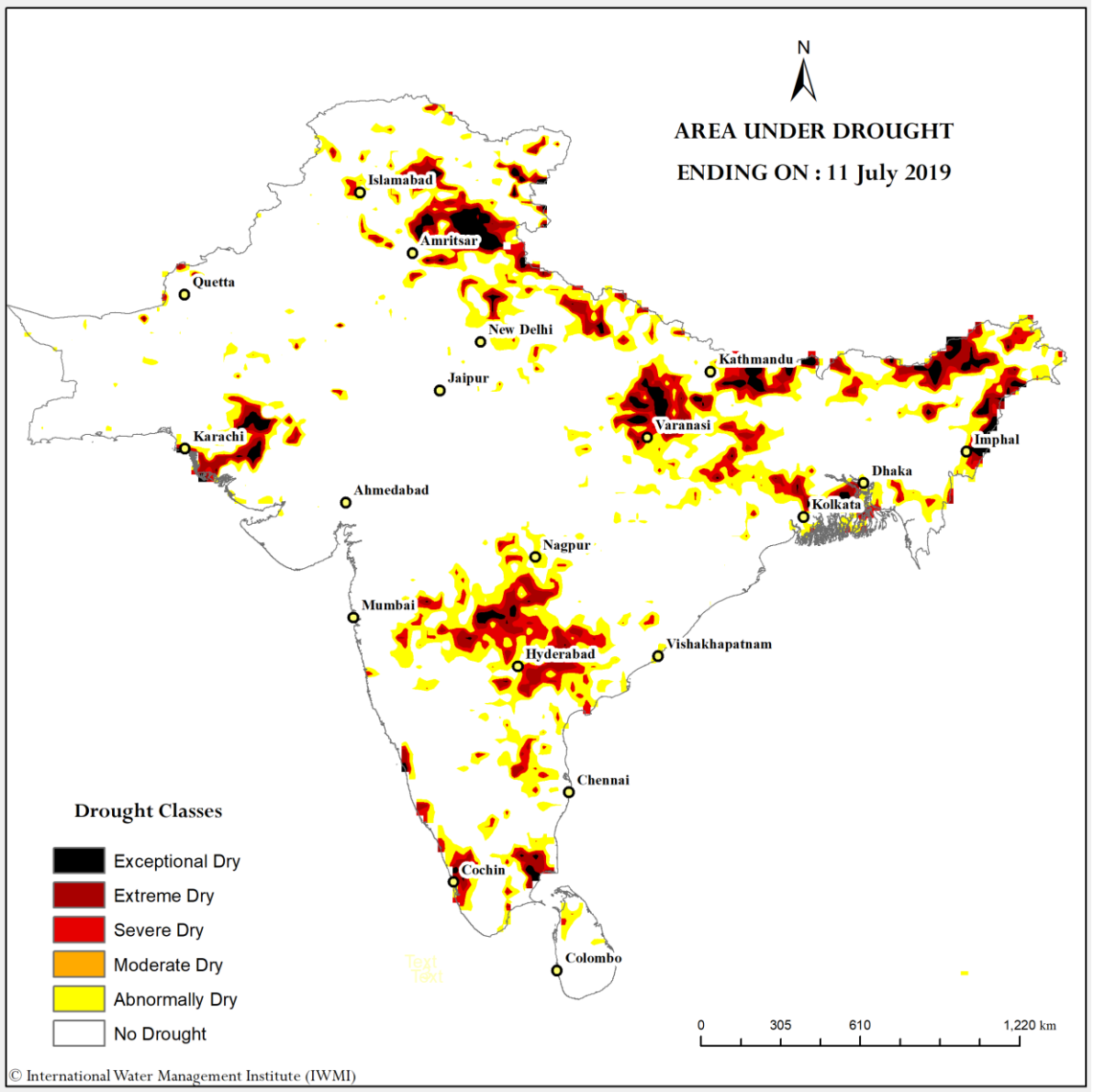


IDSI



- South Asia-Drought Early Warning System (SA-DEWS) is an integrated approach based on satellite estimates of rainfall temperature, wind and soil type utilized in VIC model and the derived outputs namely Standardized Precipitation Index (3-Month), Standardized Soil Moisture Index (SSI) and Standardized Runoff Index (SRI).
- Soil Water Anomaly Drought Index (SWADI) is derived from satellite based decadal soil moisture product of ASCAT provided by EUMETSAT.
- Integrated Drought Severity Index (IDSI) is an integrated index that has been formulated using VCI, TCI & PCI at 500m resolution for agricultural land-use over South Asia.
- It can be observed, that during this time period, all the three indices shows a relation with each other. The peninsular India is reviving from the drought situation, except Telangana, East Maharashtra, Punjab, south of Jharkhand and North AP.

South Asia Drought Forecast

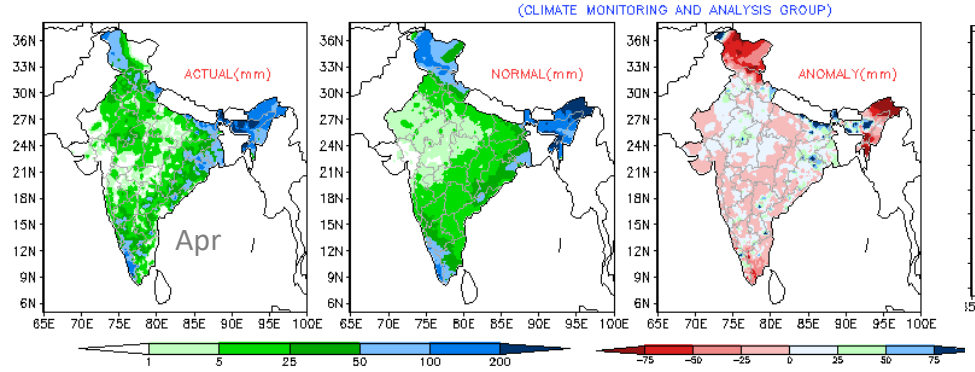


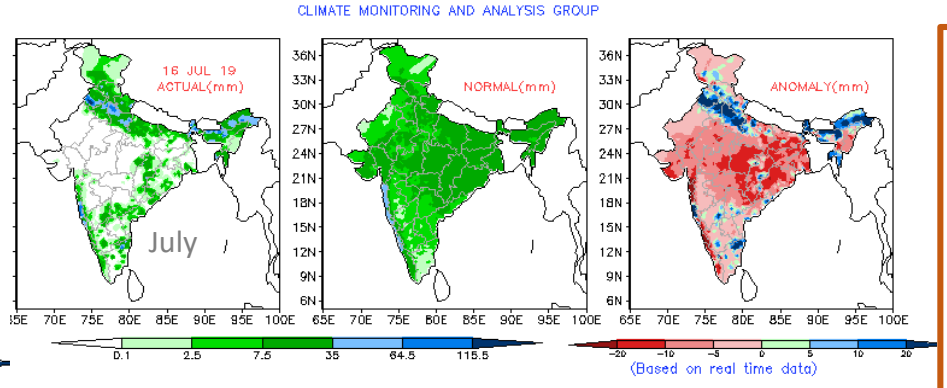
Summary:

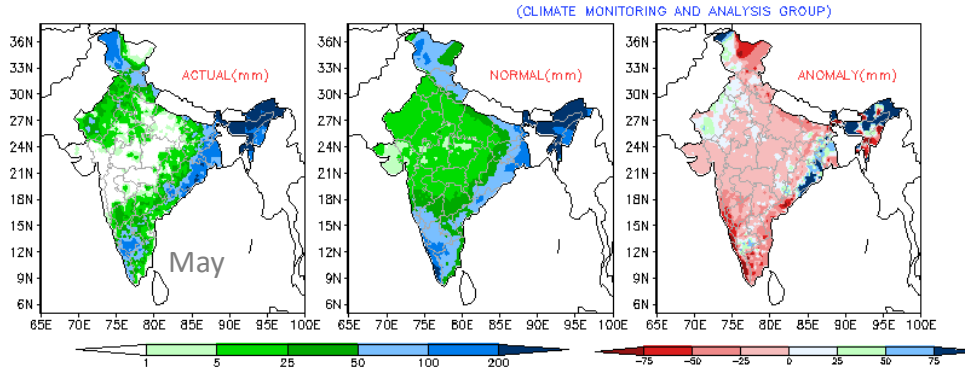
- Using the initial condition i.e. 11th July 2019 based on satellite rainfall estimates of 3B42RT daily time-step integrates in the VIC model and the derived outputs namely Standardized Precipitation Index (3-Month), Standardized Soil Moisture Index (SSI) and Standardized Runoff Index (SRI)
- The extreme values of all three conditions are statistically combined to generated areas under drought for entire South Asia
- Extreme/Exceptional dry condition dry condition can be seen some land areas of North boundary include; Himachal, Arunachal, Bihar, Telangana, Gujarat and Tamil Nadu
- Parts of northeastern belt of India observed to have increasing dry condition. Also, Bhutan, Nepal and northwest of Sri Lanka are under extremely/exceptionally severe drought condition.
- *Reference to IMD SPI data is well correlated to the area under drought predicted by drought algorithm.*

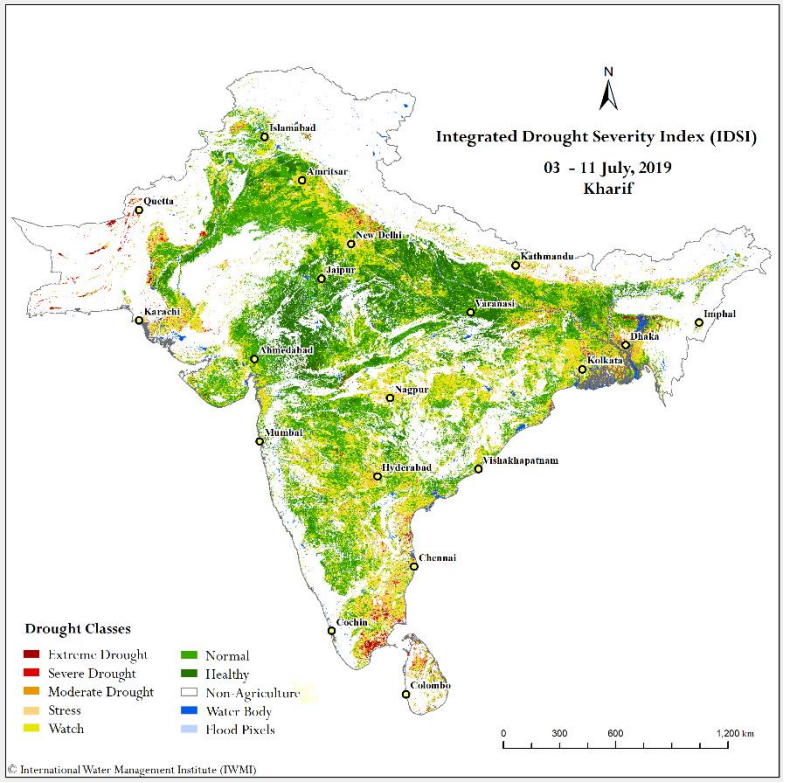
India – State wise analysis

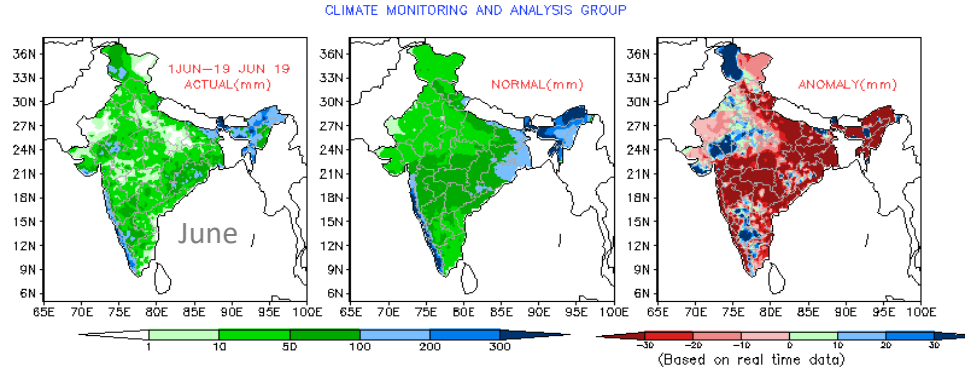
India Monthly Rainfall Comparison & Assessment











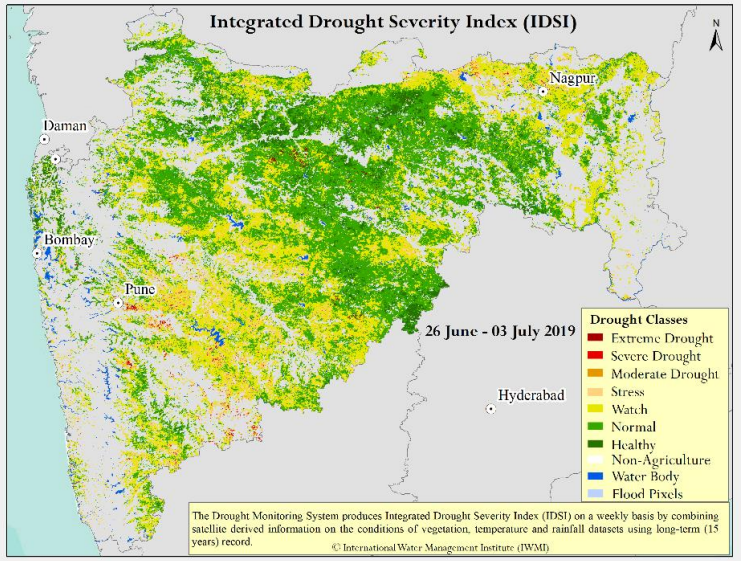
Summary:

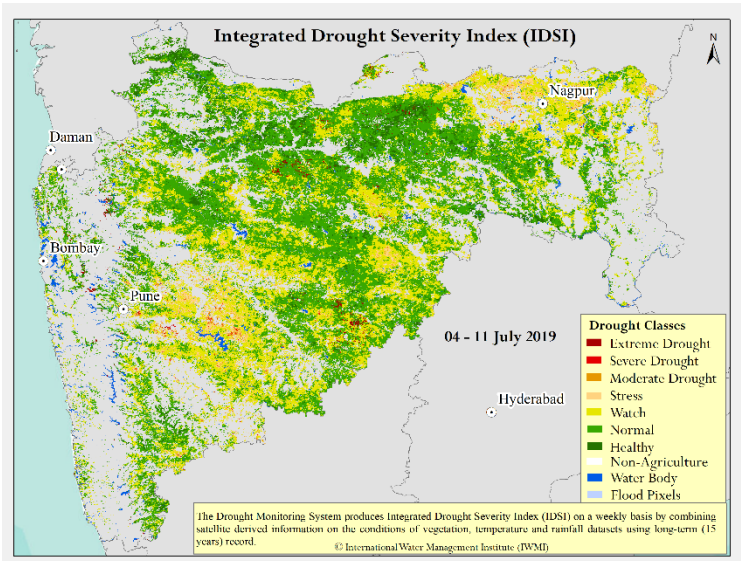
Rainfall deficit in whole India has became stable level, the negative rainfall anomaly level also declined simultaneously which is clearly reflected in the IDSI. In June, the anomaly level was higher than other months.

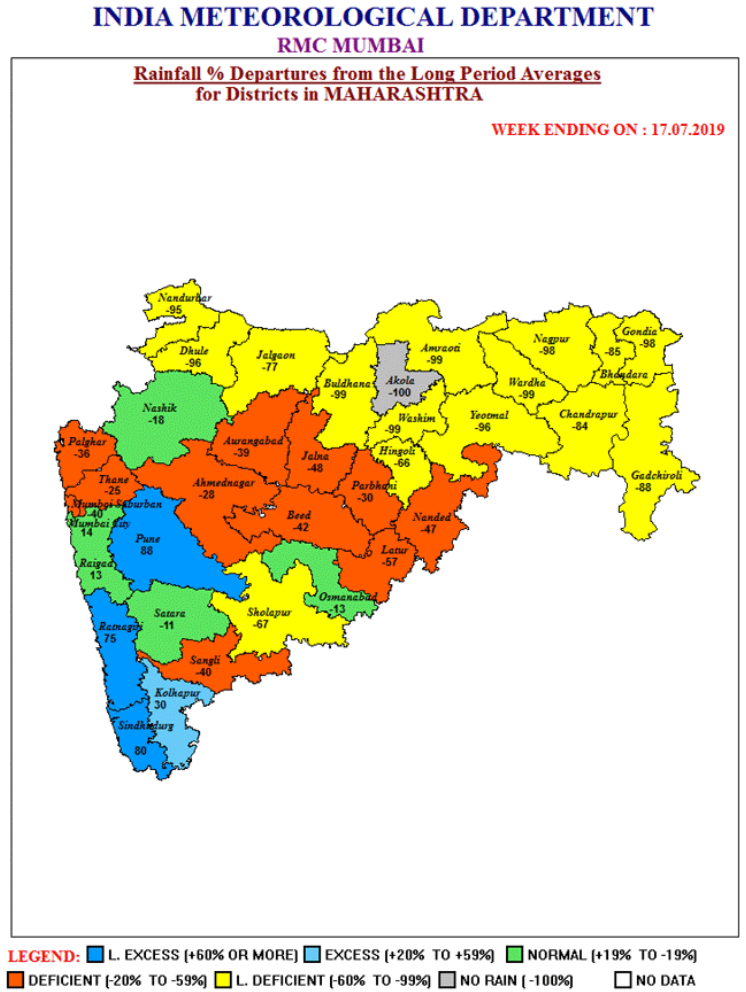
Normal and watch drought condition has most of the State in India.

Similar pattern has been revealed by monthly rainfall anomaly report from IMD.

South Asia Drought Monitoring System (SADMS) – Agriculture Assessment (Maharashtra)



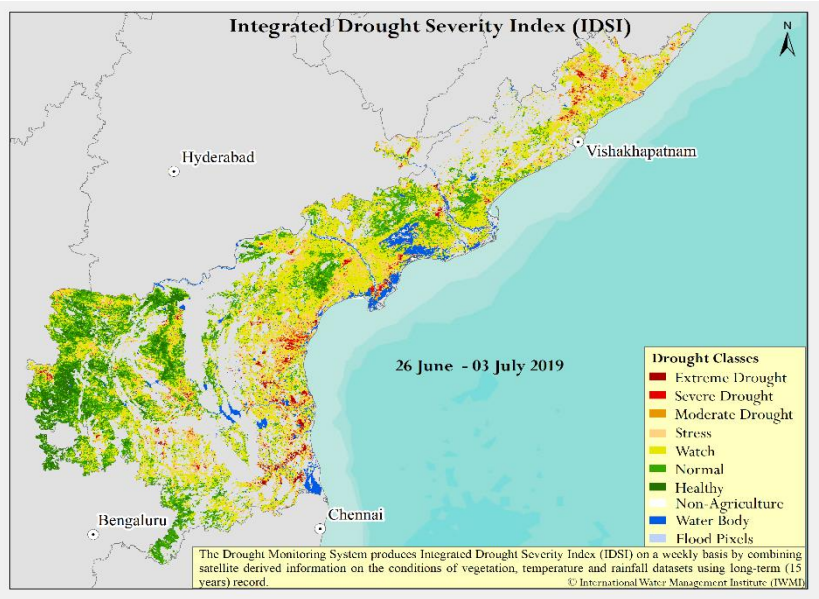


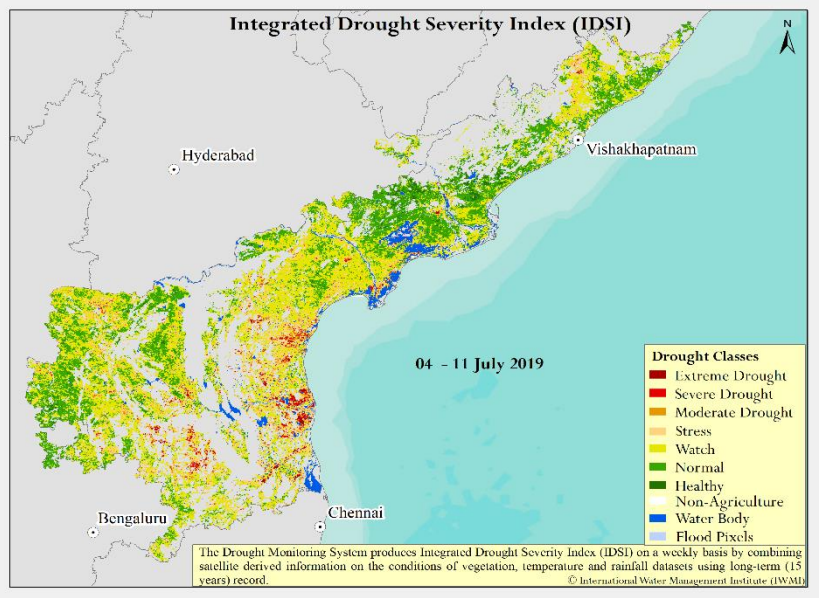


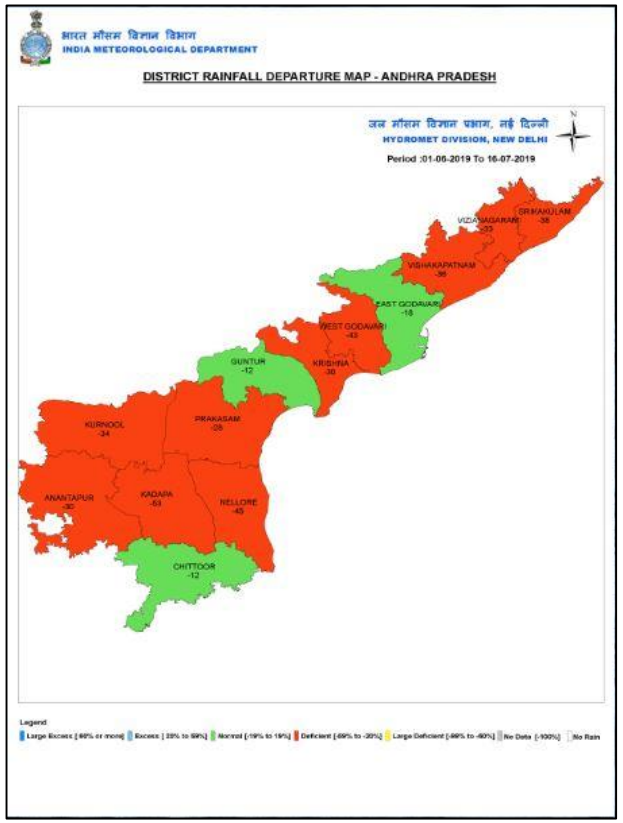
Summary:

- SADMS framework was applied for the agriculture drought monitoring in Maharashtra for current obtained mainly from satellite remote sensing data. The index (Integrated Drought Severity Index – IDSI), Indian Meteorological Rainfall maps were analysed to understand rainfall deficit which could help in validating the drought maps with the absence of in-situ observations.
- Except Pune, Ratnagiri, Sindhudurg, Kolhapur district all the district are under 19-99% rainfall deficient in month of July 2019. Also from Jan to May 2019 indicates the negative rainfall anomaly through out the state (refer slide 8).
- Rainfall deficit in whole state has increased the vegetation stress in the agricultural land, which is clearly reflected in the IDSI. Extreme to severe drought condition has most of the State. Similar pattern has been revealed by seasonal rainfall report from IMD. But due to occasional rainfall stress condition slightly reduced in central and southern region of state.

South Asia Drought Monitoring System (SADMS) – Agriculture Assessment (Andhra Pradesh)







Rainfall Status (Avg from 01-06-2019 to till date)
Actual 97.9mm, Deviation -44.1%

District-Wise, Month-Wise Rainfall Status from 01/06/2019

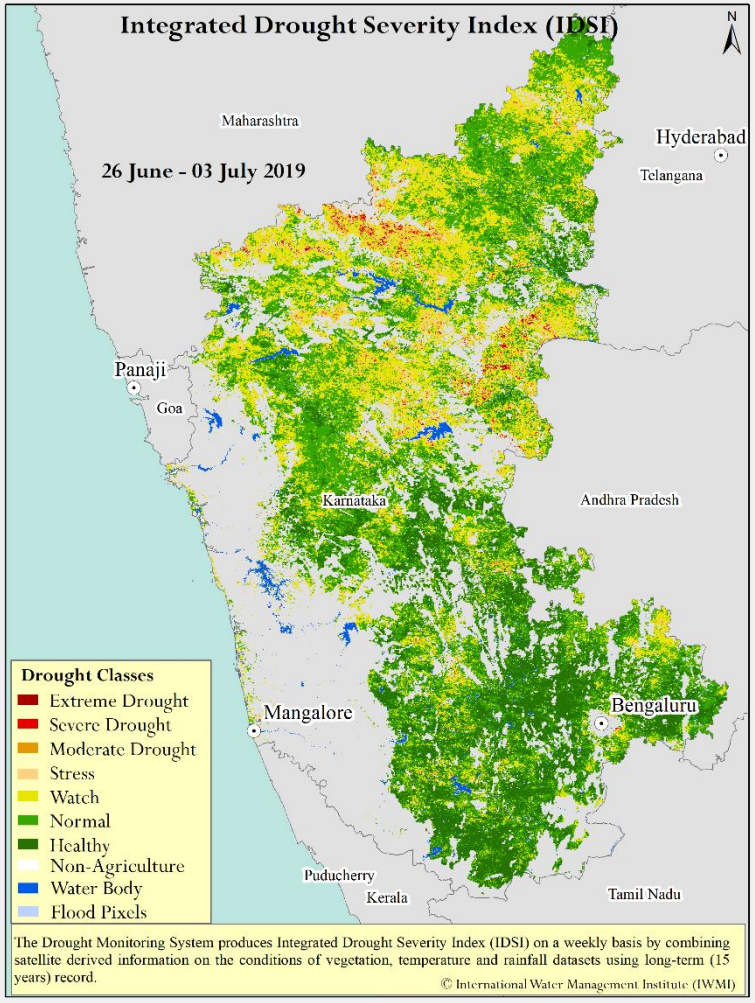
District	Actual	Normal	Deviation(%)	Status
Srikakulam	111.9	227.8	-50.9	Deficient
Vizianagaram	133.3	221.1	-39.7	Deficient
Vishakapatnam	159.8	226.1	-29.3	Deficient
East Godavari	149.9	245.1	-38.8	Deficient
West Godavari	107.9	241.9	-55.4	Deficient
Krishna	126.3	212.1	-40.5	Deficient
Guntur	105.2	170.3	-38.2	Deficient
Prakasham	64.7	109.3	-40.8	Deficient
Nellore	34.3	106.9	-67.9	Scanty
Chittoor	111.5	137.5	-18.9	Normal
Kadapa	53.4	128.9	-58.6	Deficient
Anantapur	59.5	106.8	-44.3	Deficient
Kurnool	70.9	142.8	-50.4	Deficient
State	97.9	175.1	-44.1	Deficient

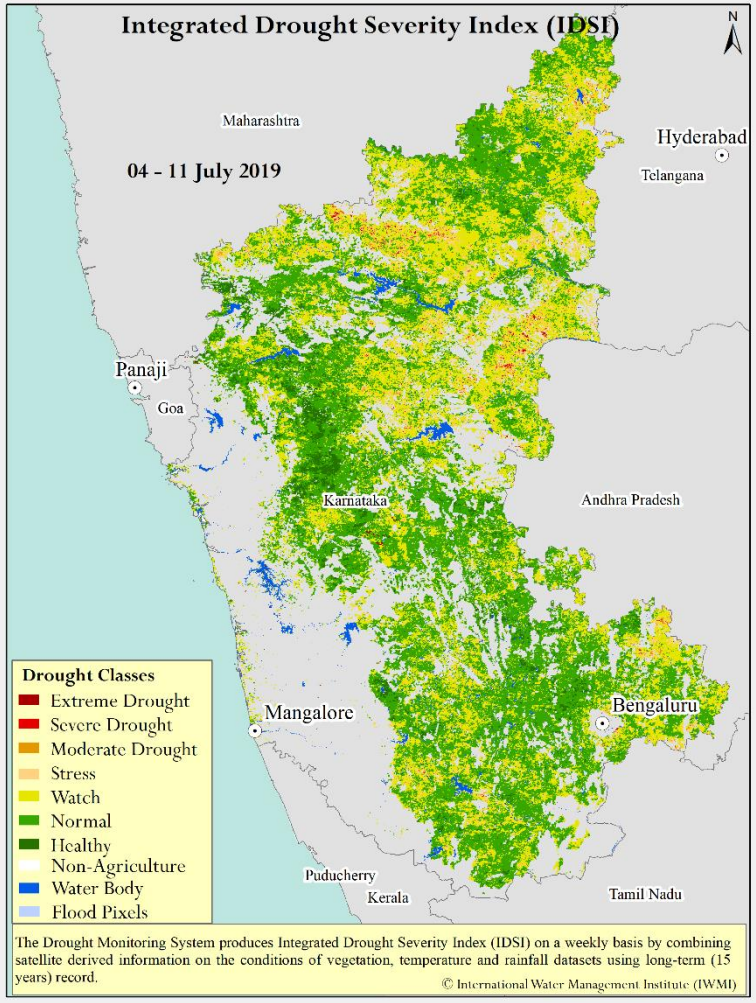
Data Source: APSDPS

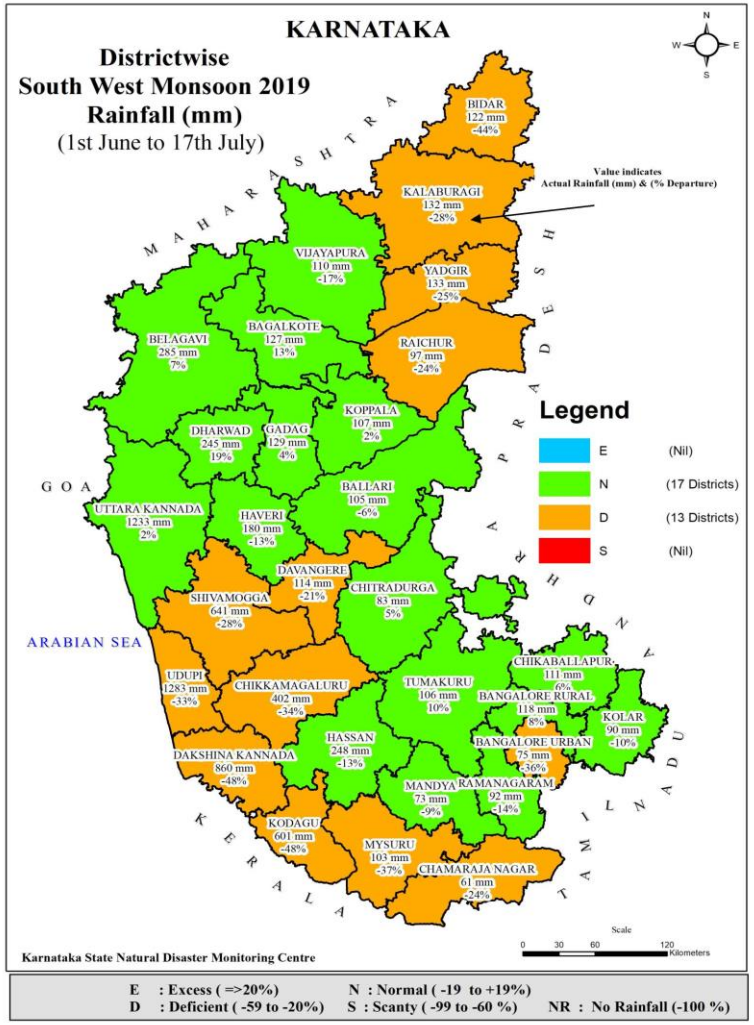
Summary:

- Out of the 13 districts in A.P., only one district had normal rainfall from June 01 to 16th July 2019;
- 'Normal to watch drought' category is still continue same as previous map all over the district.
- Due to declining negative rainfall anomalous level experience till 17 June 2019. it is the good indication for decreasing drought condition (refer slide 8). But A.P also have deficient rainfall status within this temporal distribution

South Asia Drought Monitoring System (SADMS) – Agriculture Assessment (Karnataka)

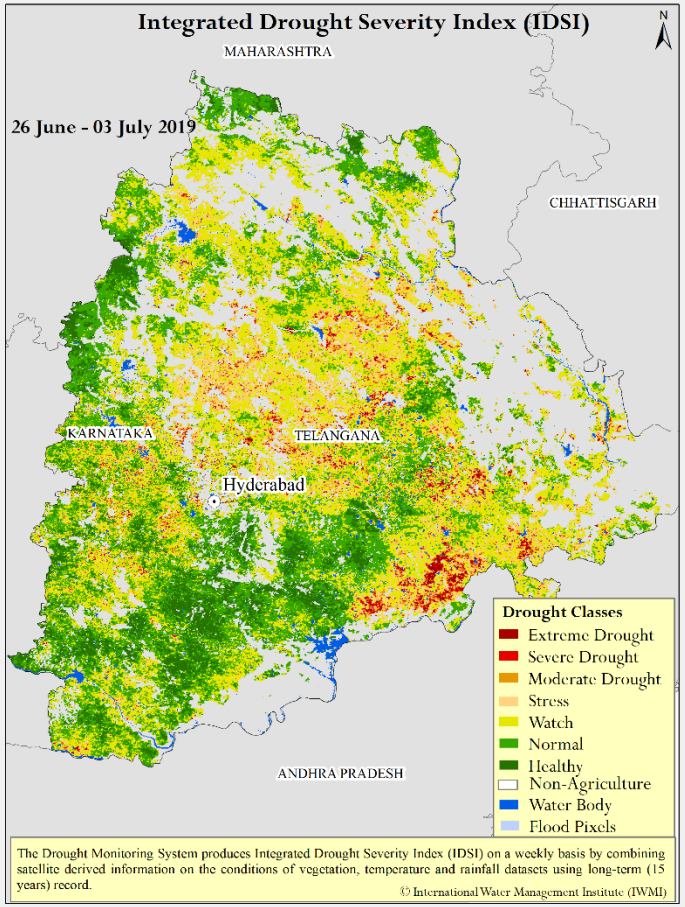


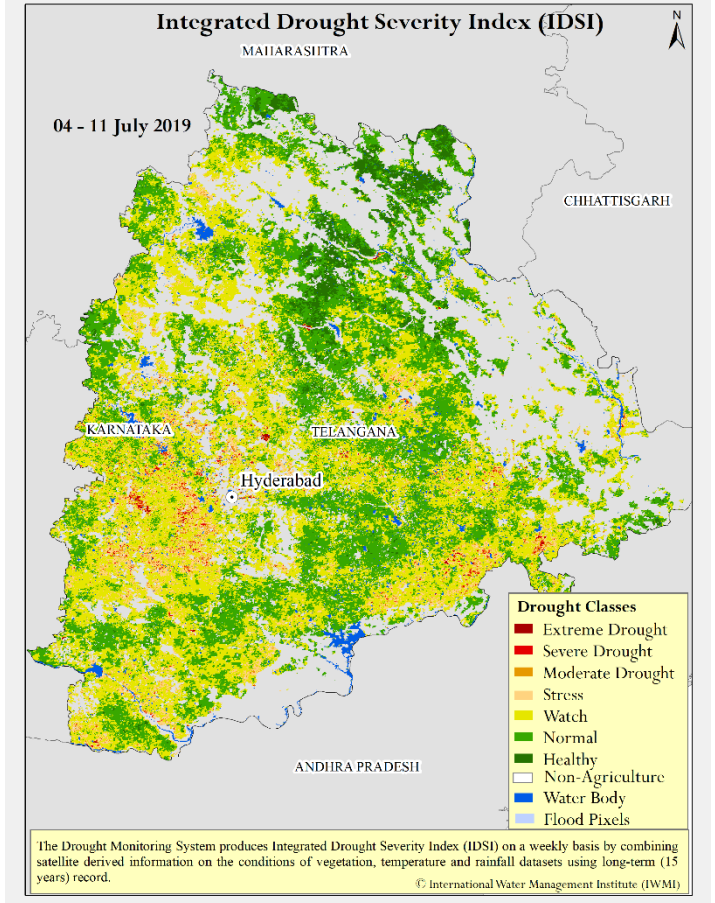


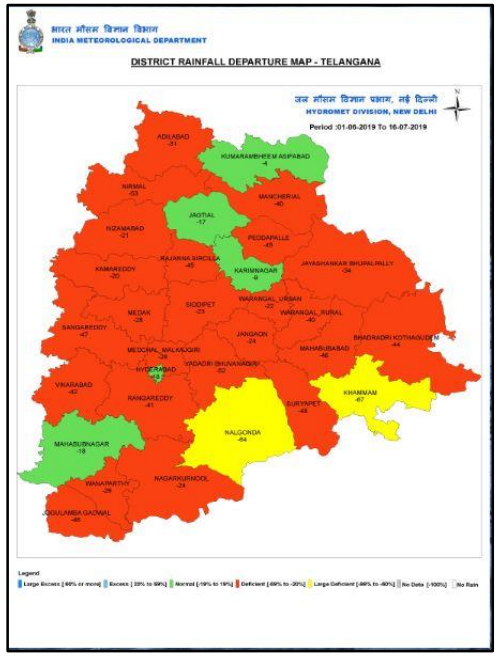


The Integrated Drought Severity Index (IDSI) for Karnataka were assessed at district level. The condition of vegetation has been slightly affected northern district and southern districts of the state, reduce the drought condition due to excess rainfall. Extreme drought condition in the many district has changing watch to normal from last week of current week of June.

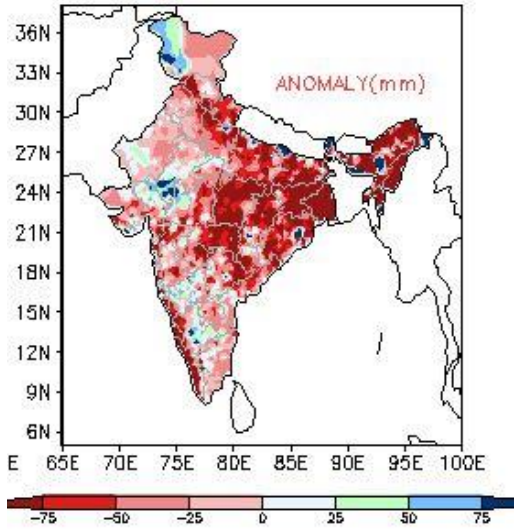
South Asia Drought Monitoring System (SADMS) – Agriculture Assessment (Telangana)







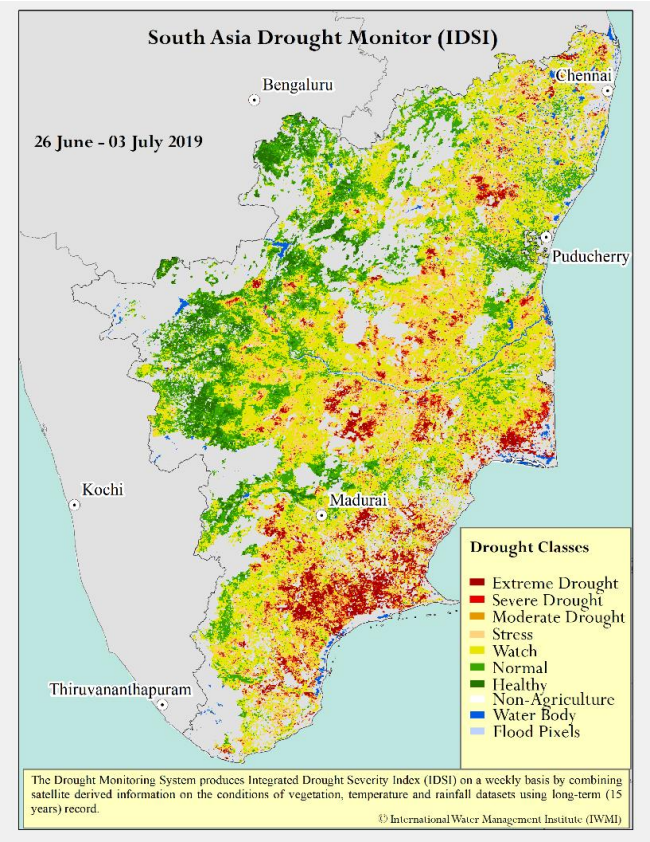
08 July – 15 July 2019

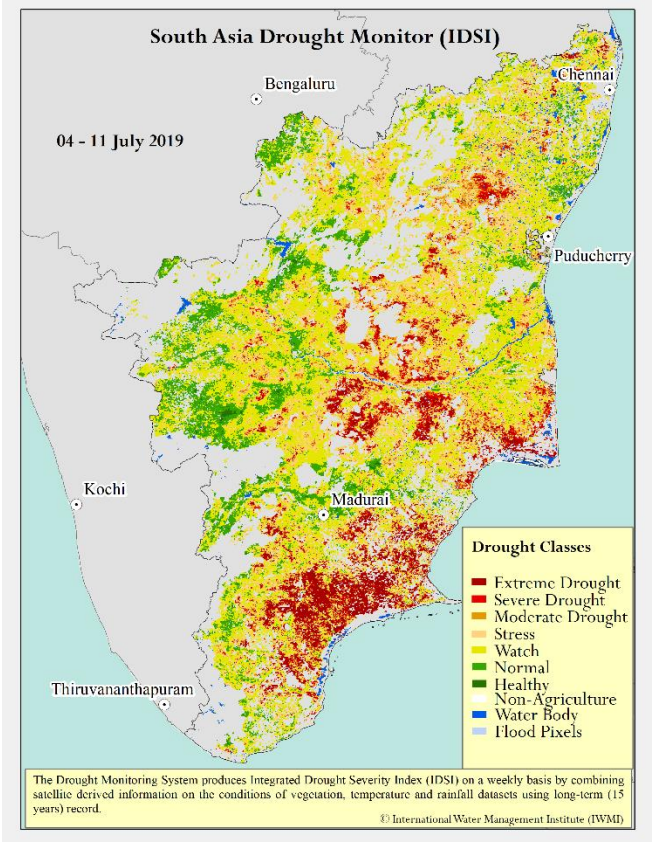


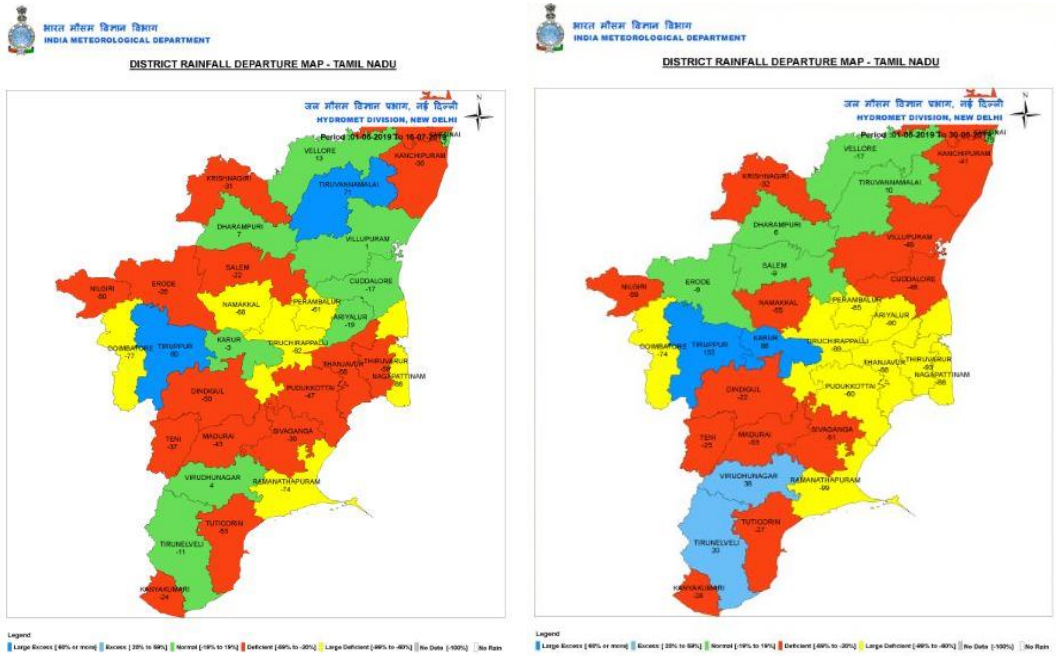
Summary:

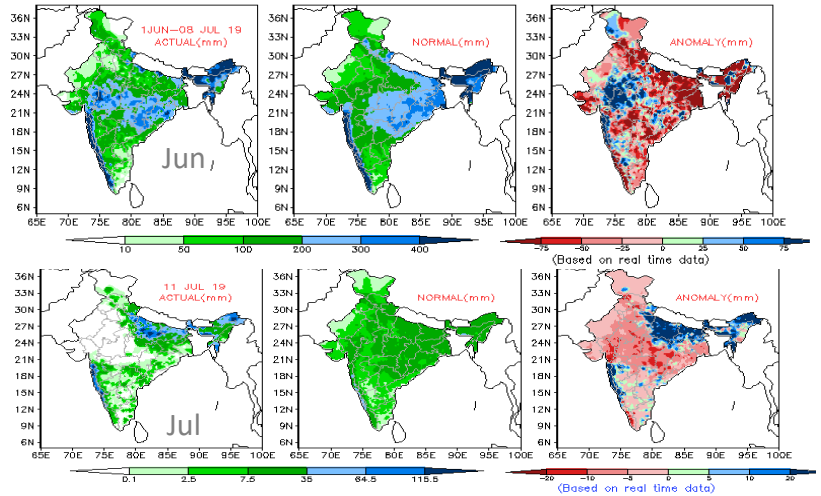
The Integrated Drought Severity Index (IDSI) for Telangana was assessed at district level. There seems to be continuation of same drought condition from previous week. More than 35-45 % of the state is under extreme to watch drought condition. South East district of the States are observed to have severe to watch category while some patches are represent the severe category.

South Asia Drought Monitoring System (SADMS) – Agriculture Assessment (Tamil Nadu)





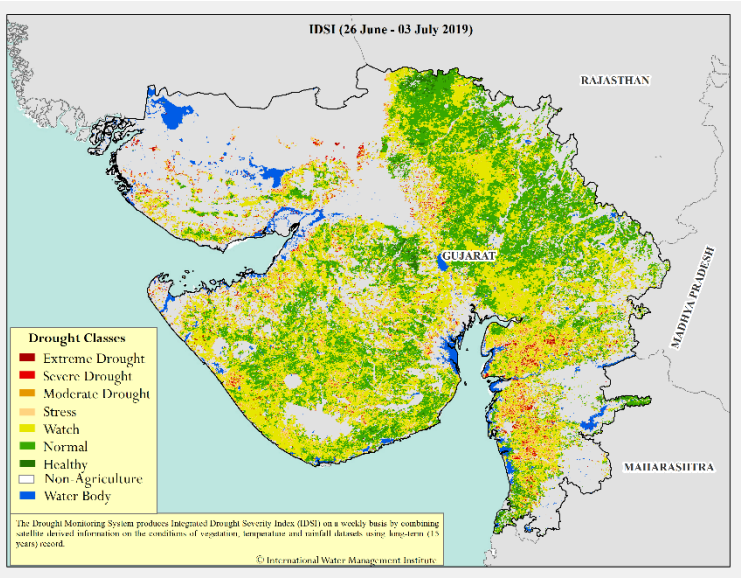


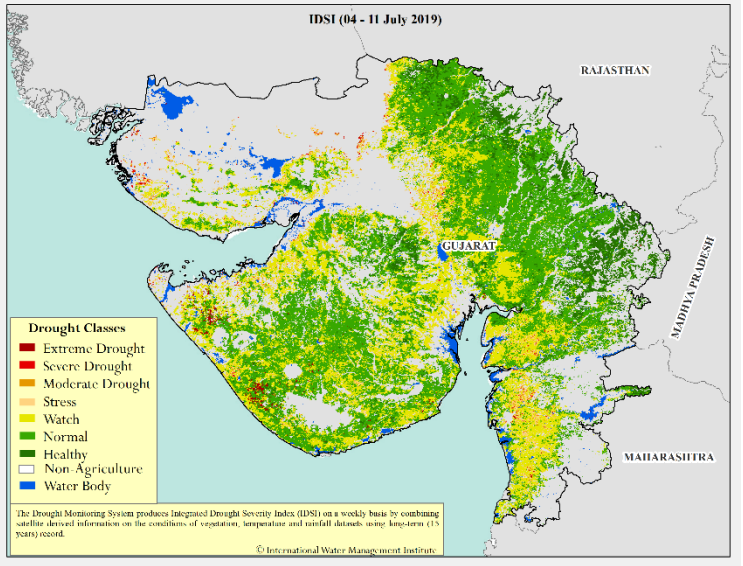


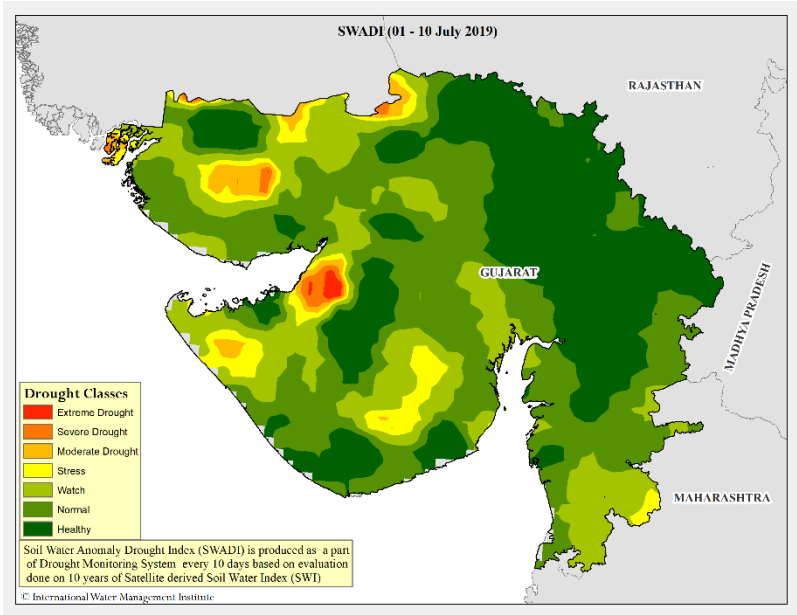
Summary:

- Overall drought condition is continued from previous analysis cycle. South-East, and central are quartile of Tamil Nadu seem to have 'severe' to 'extreme' at the week ending on 11th of July 2019. western districts also under the 'severe' to 'Watch' category with some extreme patches in IDSI which is giving the good correlation with rainfall anomaly as well .
- Overall, it can be observed that more than 50% area of the state have 'watch and normal' to 'extreme' drought classes and same spatial pattern is continue from previous week.

South Asia Drought Monitoring System (SADMS) – Agriculture Assessment (Gujarat)



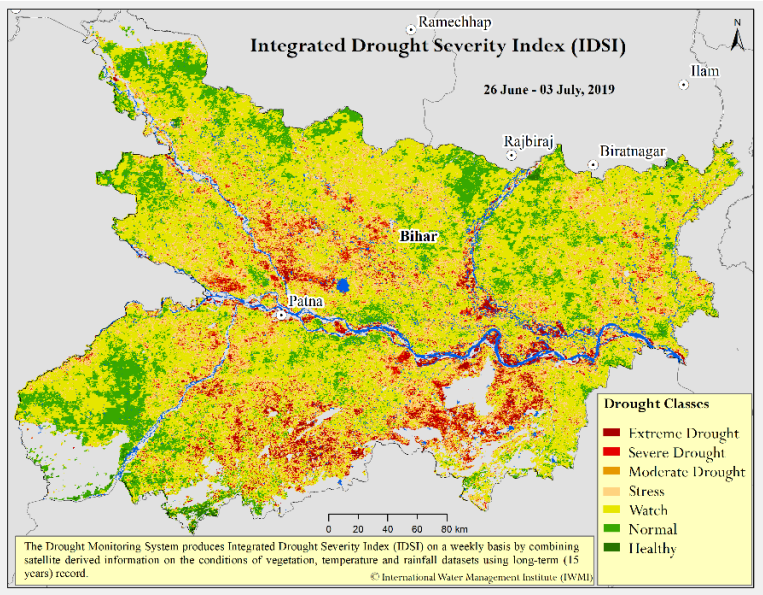


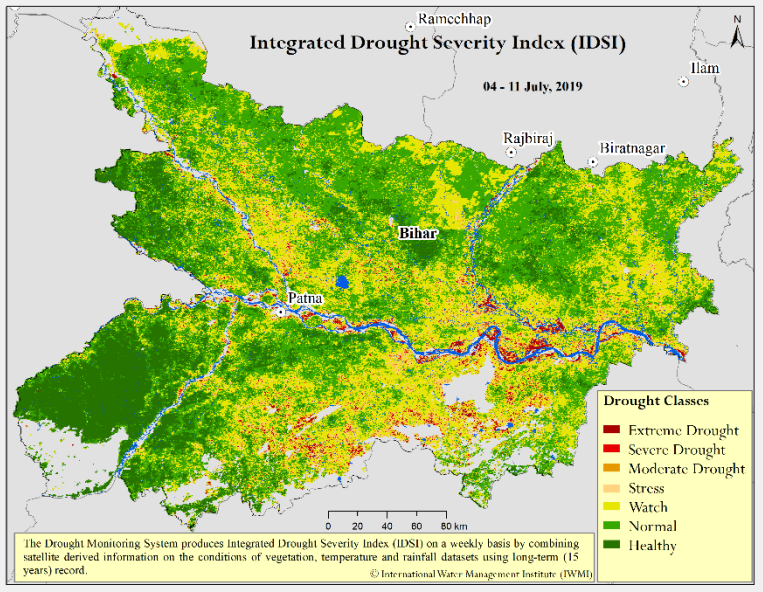


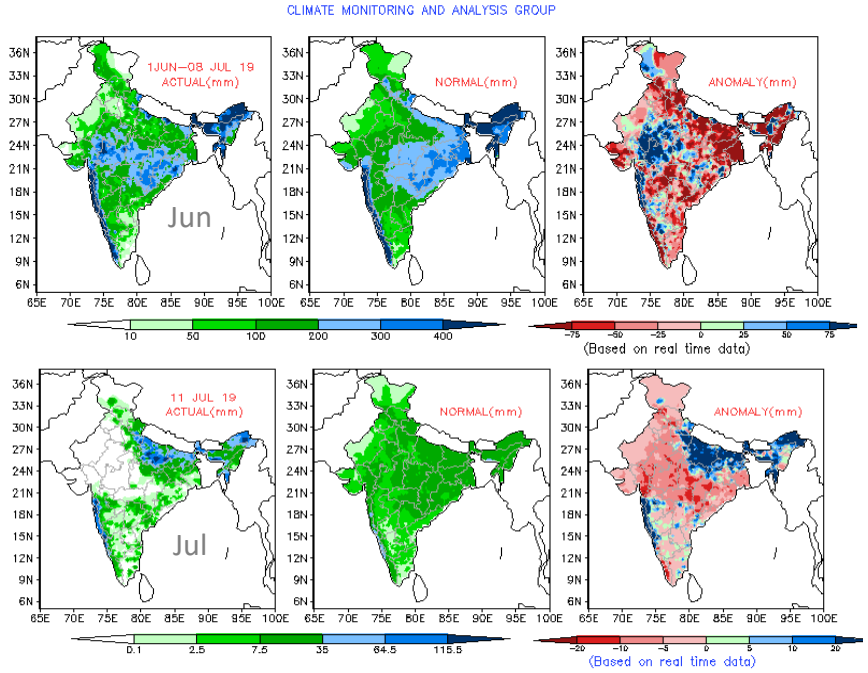
Summary:

- Overall the state is recovering from extreme to severe drought condition form previous to resent week.
- There is normal rainfall for few states but still several state under -59 to -20% rainfall deficient from 01st June 16 July
- Overall, it can be observed that most of the districts are recovering towards extreme to health category.

South Asia Drought Monitoring System (SADMS) – Agriculture Assessment (Bihar)







India Meteorological Department
Hydromet Division, New Delhi

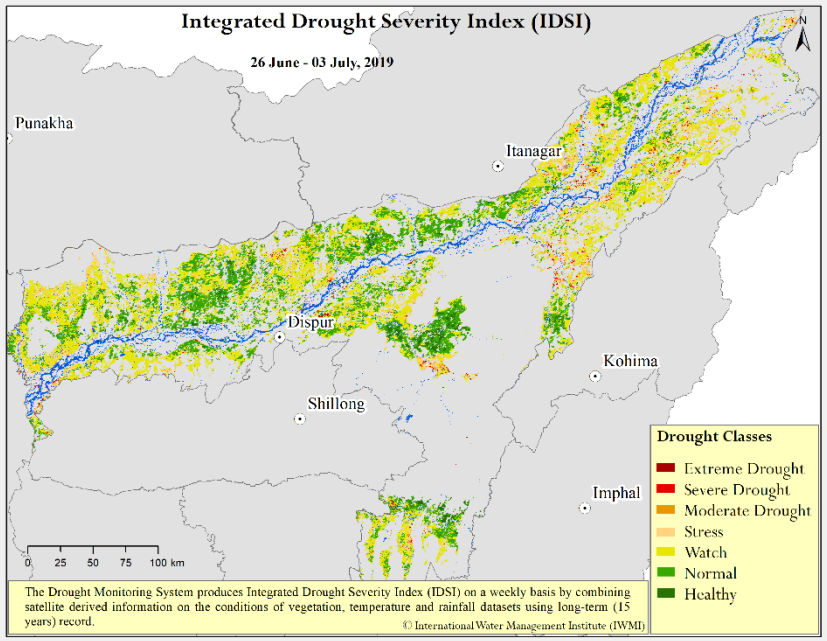
DISTRICT-WISE RAINFALL DISTRIBUTION

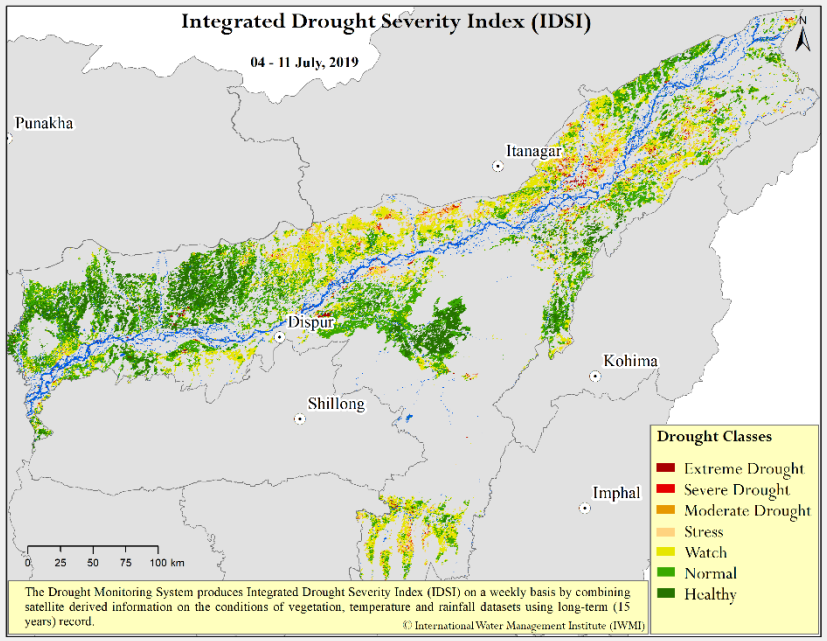
S NO	MET. SUBDIVISION/UT/STATE/DISTRICT	Day :16-07-2019 ACTUAL (mm)	NORMAL (mm)	%DEP.	CAT.	Period:01-06-2019 To 16-07-2019 ACTUAL (mm)	NORMAL (mm)	% DEP.	CAT.
	SUBDIVISION : BIHAR	3.7	13.5	-72%	LD	404.8	355.6	14%	N
1	ARARIYA	10.2	16.0	-36%	D	688.4	505.4	36%	E
2	ARWAL	0.0	8.2	-100%	NR	143.9	249.3	-42%	D
3	AURANGABAD	0.0	11.9	-100%	NR	169.9	275.9	-38%	D
4	BANKA	0.0	11.5	-100%	NR	186.7	316.0	-41%	D
5	BEGUSARAI	0.0	14.8	-100%	NR	152.2	356.6	-57%	D
6	BHABUA	0.0	15.0	-100%	NR	345.5	283.2	22%	E
7	BHAGALPUR	0.0	9.6	-100%	NR	334.5	355.3	-6%	N
8	BHOJPUR	0.0	14.2	-100%	NR	329.5	304.5	8%	N
9	BUXAR	0.5	6.6	-92%	LD	496.3	259.8	91%	LE
10	DRABHANGA	1.7	9.7	-82%	LD	448.7	301.0	49%	E
11	GAYA	0.0	12.7	-100%	NR	196.6	296.0	-34%	D
12	GOPALGANJ	7.5	14.9	-49%	D	666.1	335.2	99%	LE
13	JAHANABAD	0.0	12.3	-100%	NR	188.0	281.7	-33%	D
14	JAMUI	0.0	10.5	-100%	NR	219.2	333.0	-34%	D
15	KATIHAR	0.0	14.5	-100%	NR	433.2	415.4	4%	N
16	KHAGARIA	0.0	12.2	-100%	NR	340.6	368.7	-8%	N
17	KISHANGANJ	45.6	20.7	120%	LE	951.5	695.5	37%	E
18	LAKHISARAI	0.0	12.3	-100%	NR	217.5	276.7	-21%	D
19	MADHEPURA	0.0	16.3	-100%	NR	583.0	418.8	39%	E
20	MADUBANI	6.8	12.2	-44%	D	455.2	346.1	32%	E
21	MUNGER	0.0	12.0	-100%	NR	259.4	352.1	-26%	D
22	MUZAFFARPUR	2.7	12.4	-78%	LD	453.6	338.3	34%	E
23	NALANDA	0.0	13.0	-100%	NR	248.5	289.7	-14%	N
24	NAWADA	0.0	13.7	-100%	NR	177.5	288.3	-38%	D
25	PACHIM CHAMPARAN	23.4	16.8	40%	E	745.8	446.9	67%	LE
26	PATNA	0.0	15.6	-100%	NR	284.5	305.4	-7%	N
27	PURBA CHAMPARAN	6.2	13.1	-53%	D	567.1	358.7	58%	E
28	PURNIA	2.0	19.1	-90%	LD	538.3	558.1	-4%	N
29	ROHTAS	0.0	13.2	-100%	NR	132.4	265.6	-50%	D
30	SAHARSA	0.0	9.6	-100%	NR	392.0	503.7	-22%	D
31	SAMASTIPUR	0.0	14.0	-100%	NR	367.6	334.5	10%	N
32	SARAN	0.4	12.0	-96%	LD	499.1	309.0	62%	LE
33	SHEIKHPURA	0.0	11.4	-100%	NR	158.4	318.3	-50%	D
34	SHEOHAR	4.2	9.8	-57%	D	464.4	385.4	20%	E
35	SITAMARHI	4.1	14.3	-71%	LD	545.9	383.5	42%	E
36	SIWAN	2.3	11.2	-79%	LD	702.0	324.6	116%	LE
37	SUPAUL	6.6	13.8	-52%	D	602.0	410.3	47%	E
38	VAISHALI	0.0	18.3	-100%	NR	314.3	318.6	-1%	N

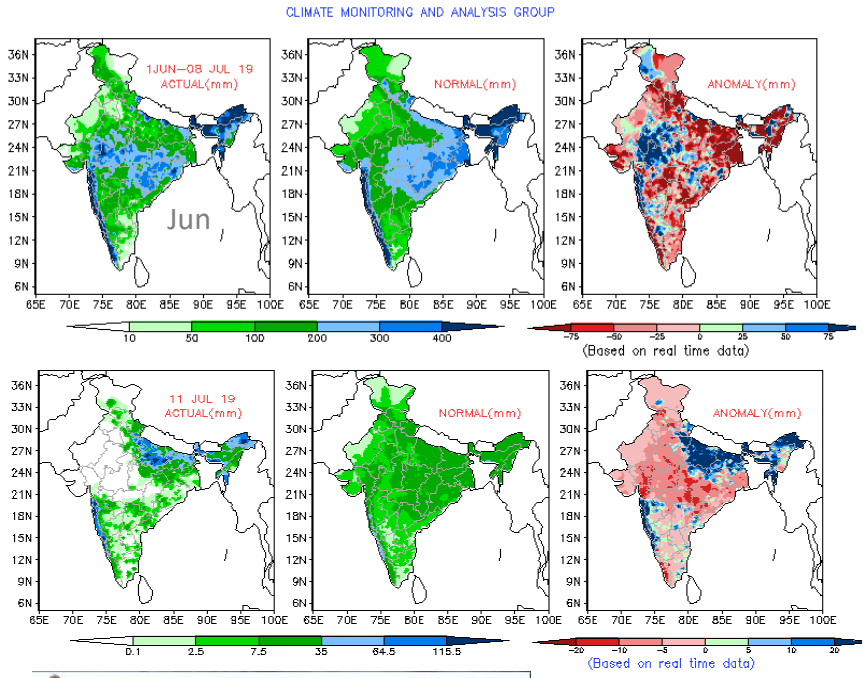
Summary:

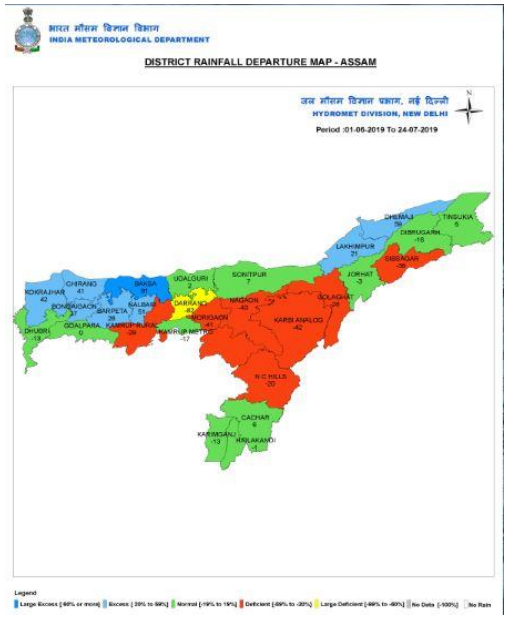
- The drought severity in all parts of Bihar seems to be extreme to watch in the previous weeks are ending on 26th June to 03rd July. Only north eastern districts has recover slightly from drought most probably same as to previous week.
- The drought severity in all parts of Bihar seems to be recovering to healthy in the weeks are ending on 11th of July. Most of the districts has recover from drought compare to previous week specially in southern districts.

South Asia Drought Monitoring System (SADMS) – Agriculture Assessment (Assam)









India Meteorological Department
Hydromet Division, New Delhi

DISTRICT-WISE RAINFALL DISTRIBUTION

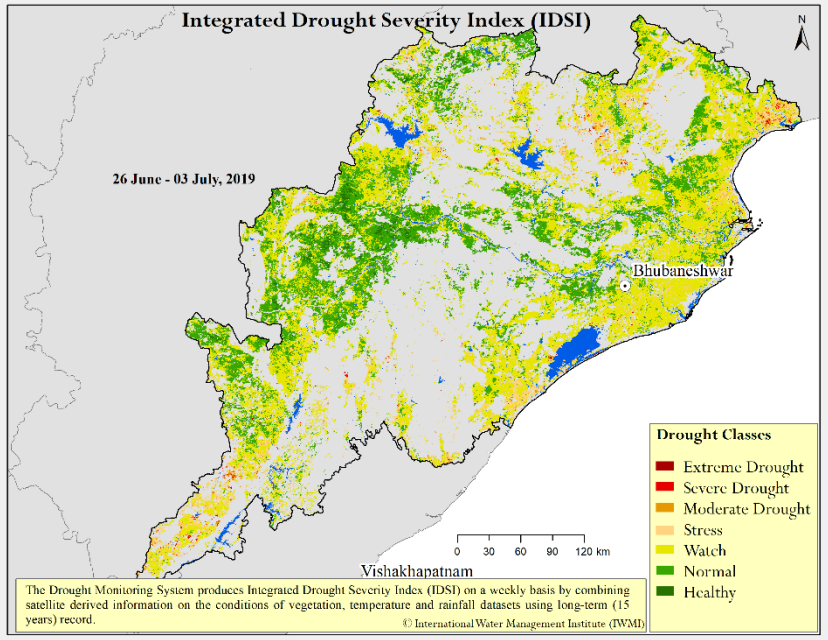
S NO	MET. SUBDIVISION/UT/STATE/DISTRICT	Day :30-06-2019 ACTUAL (mm)	NORMAL (mm)	%DEP.	CAT.	Period:01-06-2019 To 30-06-2019 ACTUAL (mm)	NORMAL (mm)	% DEP.	CAT.
	SUBDIVISION : ASSAM & MEGHALAYA	28.7	21.1	36%	E	451.2	635.9	-29%	D
	STATE : ASSAM	28.1	15.4	82%	LE	396.6	531.1	-25%	D
1	BAKSA	6.8	14.5	-53%	D	728.9	504.8	44%	E
2	BARPETA	66.7	33.4	100%	LE	586.3	908.2	-35%	D
3	BONGAIGAON	85.8	30.4	182%	LE	604.1	864.2	-30%	D
4	CACHAR	16.4	12.3	33%	E	609.7	648.3	-6%	N
5	CHIRANG	58.9	18.8	213%	LE	646.2	937.5	-31%	D
6	DARRANG	0.0	13.6	-100%	NR	63.6	519.9	-88%	LD
7	DHEMAJI		10.0		ND	606.5	624.5	-3%	N
8	DHUBRI	38.3	28.9	33%	E	422.0	828.5	-49%	D
9	DIBRUGARH	65.5	15.4	325%	LE	440.8	512.2	-14%	N
10	GOALPARA	57.1	23.3	145%	LE	564.6	701.2	-19%	N
11	GOLAGHAT	50.9	7.4	587%	LE	270.5	339.4	-20%	D
12	HAILAKANDI	8.0	13.7	-42%	D	576.2	564.0	2%	N
13	JORHAT	79.9	12.2	555%	LE	418.3	384.6	9%	N
14	KAMRUP METRO	4.9	10.0	-51%	D	241.0	351.7	-31%	D
15	KAMRUP RURAL	12.8	16.3	-21%	D	232.5	495.7	-53%	D
16	KARBI ANALOG	16.7	7.6	120%	LE	163.7	263.8	-38%	D
17	KARIMGANJ	6.2	17.4	-64%	LD	540.6	808.7	-33%	D
18	KOKRAJHAR	48.1	40.9	18%	N	615.8	1026.0	-40%	D
19	LAKHIMPUR	11.4	20.8	-45%	D	749.3	671.2	12%	N
20	MORIGAON	1.4	11.8	-88%	LD	178.2	369.1	-52%	D
21	N.C HILLS	4.2	10.8	-61%	LD	284.7	460.0	-38%	D
22	NAGAON	4.7	7.0	-32%	D	197.4	316.1	-38%	D
23	NALBARI	18.1	19.9	-9%	N	676.9	632.2	7%	N
24	SIBSAGAR	36.1	14.1	156%	LE	253.6	379.5	-33%	D
25	SONITPUR	16.0	7.5	113%	LE	389.4	382.4	2%	N
26	TINSUKIA	47.6	20.8	129%	LE	448.3	480.0	-7%	N
27	UDALGURI	11.6	10.4	12%	N	399.4	568.5	-30%	D

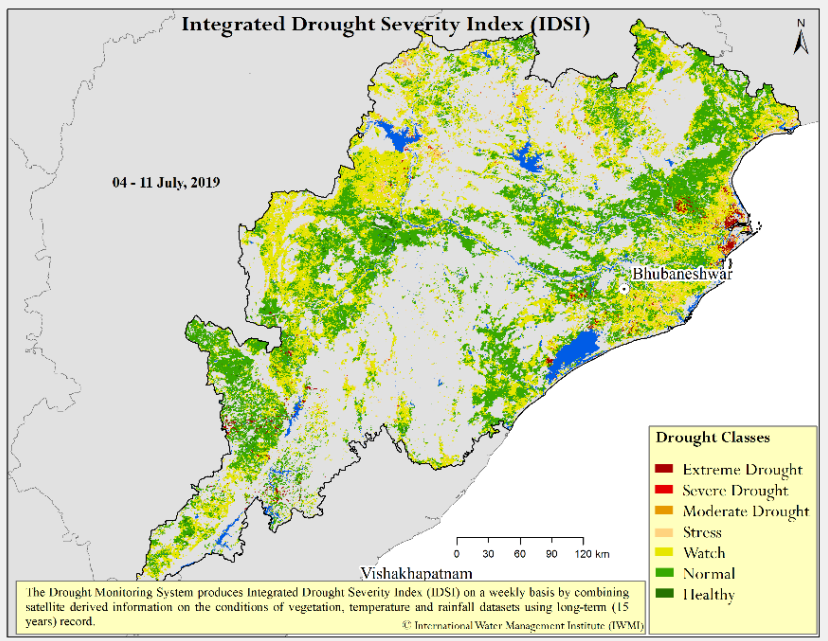
Summary:

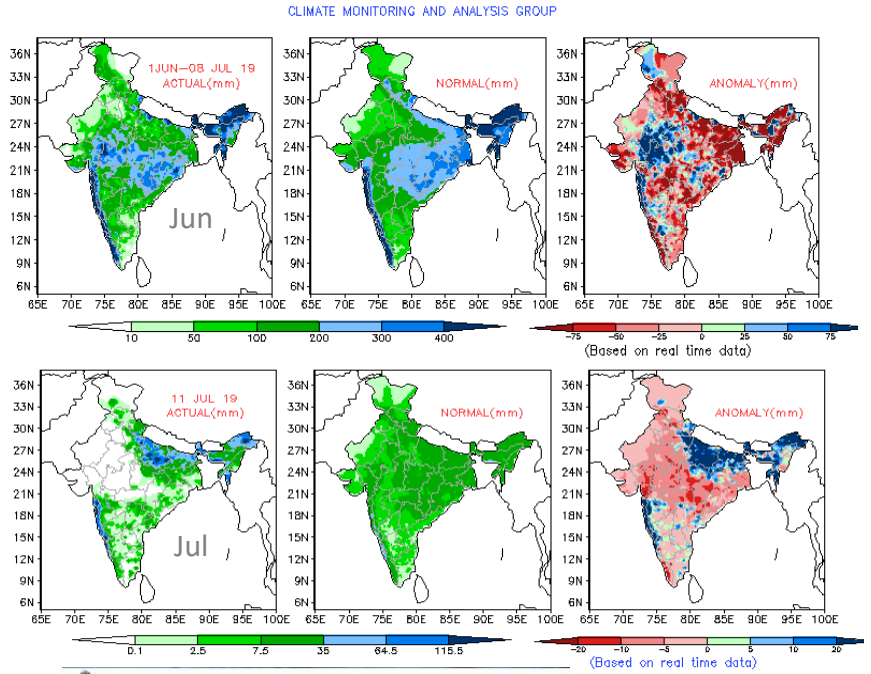
The drought severity in many parts of Assam seems to be decrease compare to previous week specially severe to watch drought category in previous week reduced up watch and moderate in north-eastern districts, simultaneously normal to healthy drought category observed rest of the area.

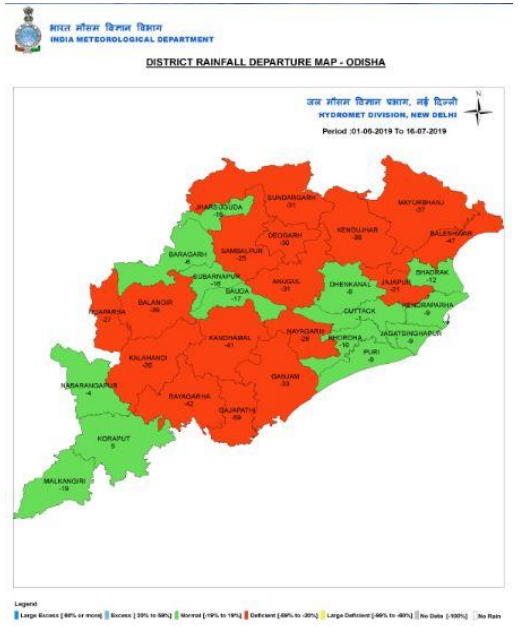
This has happened because of most of southern and eastern district shows reduction of deficit rainfall and increase the rainfall due to activation of South west monsoon over India.

South Asia Drought Monitoring System (SADMS) – Agriculture Assessment (Odisha)









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DISTRICT-WISE RAINFALL DISTRIBUTION

S NO	MET SUBDIVISION/UT/STATE/DISTRICT	Day :16-07-2019 ACTUAL (mm)	NORMAL (mm)	%DEP.	CAT.	Period:01-06-2019 To 16-07-2019 ACTUAL (mm)	NORMAL (mm)	% DEP.	CAT.
	SUBDIVISION : ODISHA	2.5	12.9	-81%	LD	286.4	381.1	-25%	D
1	ANUGUL	0.0	13.8	-99%	LD	243.2	355.0	-31%	D
2	BALANGIR	0.6	16.4	-96%	LD	248.3	404.4	-39%	D
3	BALESHWAR	11.8	9.6	23%	E	214.6	402.9	-47%	D
4	BARAGARH	12.5	16.5	-25%	D	375.9	399.7	-6%	N
5	BAUDA	0.0	25.1	-100%	NR	295.4	354.4	-17%	N
6	BHADRAK	0.0	10.5	-100%	NR	299.0	338.9	-12%	N
7	CUTTACK	4.0	11.2	-64%	LD	364.4	367.0	-1%	N
8	DEOGARH	0.0	14.2	-100%	NR	299.1	427.3	-30%	D
9	DHENKANAL	0.5	14.3	-97%	LD	326.3	358.2	-9%	N
10	GAJAPATHI	0.6	11.9	-95%	LD	142.1	350.5	-59%	D
11	GANJAM	3.9	8.2	-52%	D	191.9	284.6	-33%	D
12	JAGATSINGHAPUR	0.0	9.0	-100%	NR	293.5	322.3	-9%	N
13	JAJAPUR	0.0	11.4	-100%	NR	366.7	463.7	-21%	D
14	JHARSUGUDA	2.5	14.0	-82%	LD	334.7	396.2	-16%	N
15	KALAHANDI	1.5	15.2	-90%	LD	305.2	409.9	-26%	D
16	KANDHAMAL	0.2	14.6	-99%	LD	229.3	386.7	-41%	D
17	KENDRAPARHA	0.0	7.4	-100%	NR	297.4	328.0	-9%	N
18	KENDUJHAR	0.0	11.0	-100%	NR	242.7	393.6	-38%	D
19	KHORDHA	2.5	13.5	-81%	LD	293.4	347.7	-16%	N
20	KORAPUT	1.6	13.8	-89%	LD	409.7	390.3	5%	N
21	MALKANGIRI	0.0	10.2	-100%	NR	290.5	357.4	-19%	N
22	MAYURBHANJ	1.0	8.7	-89%	LD	278.0	439.5	-37%	D
23	NABARANGAPUR	12.8	13.3	-4%	N	418.4	433.9	-4%	N
24	NAYAGARH	7.6	17.5	-57%	D	265.3	357.7	-26%	D
25	NUAPARHA		13.5		ND	259.7	356.5	-27%	D
26	PURI	2.5	9.5	-74%	LD	271.6	299.9	-9%	N
27	RAYAGARHA	4.7	10.1	-54%	D	195.2	336.8	-42%	D
28	SAMBALPUR	1.0	14.2	-93%	LD	320.6	427.3	-25%	D
29	SUBARNAPUR	0.0	18.4	-100%	NR	329.3	391.6	-16%	N
30	SUNDARGARH	0.5	12.3	-96%	LD	279.9	406.9	-31%	D

Summary:

Through out the Odisha state the drought condition reduced watch to normal in IDSI category compare to previous week.

Around 50% observed deficient rainfall as well as Normal condition

Thanks….

Disclaimer

All content within this bulletin is based upon the most current available data. As the drought is a dynamic situation, the current realities may differ from what is depicted in this document. The product has not been validated and used only the weather forecast and remote sensing observation. We welcome the feedback from the end-users and request you to provide field observations and any other details which can improve the product quality and prediction skills in the near future.

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