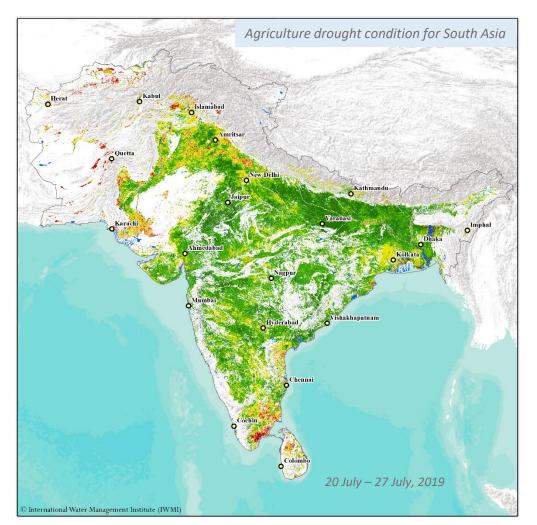
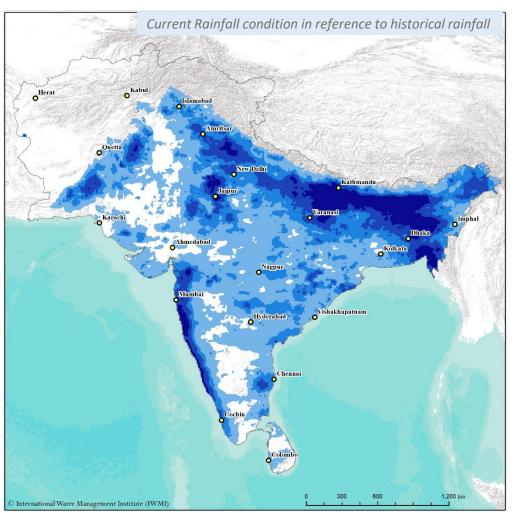
# SADMS DROUGHT BULLETIN

#### 27 July 2019 | ISSUE 07







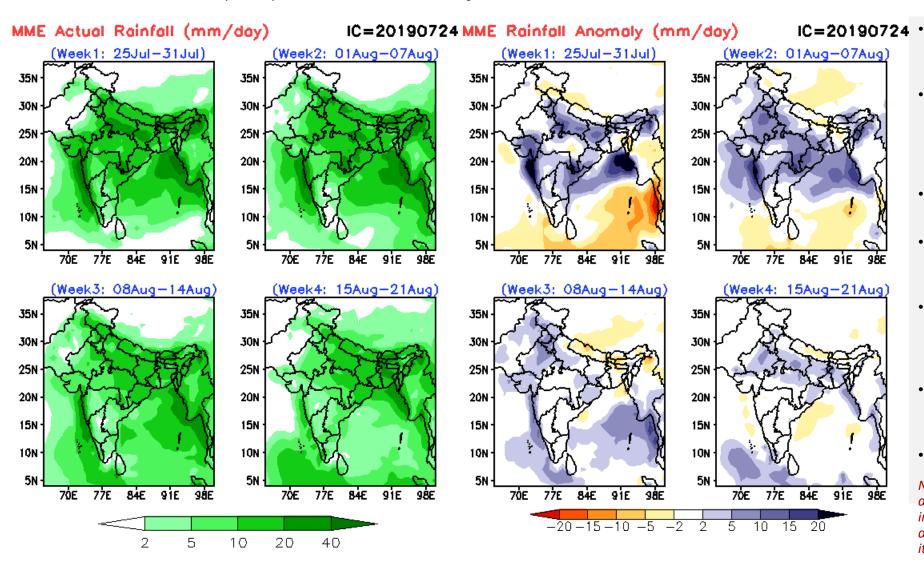




South Asia Drought Monitoring System (SADMS) drought weekly bulletin is produced by International Water Management Institute (IWMI) and is funded by the Indian Council of Agricultural Research (ICAR), the CGIAR Research Program on Water, Land and Ecosystems (WLE) and the Ministry of Agriculture, Forestry 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.

## Rainfall Summary - Predicted week wise rainfall for South Asia

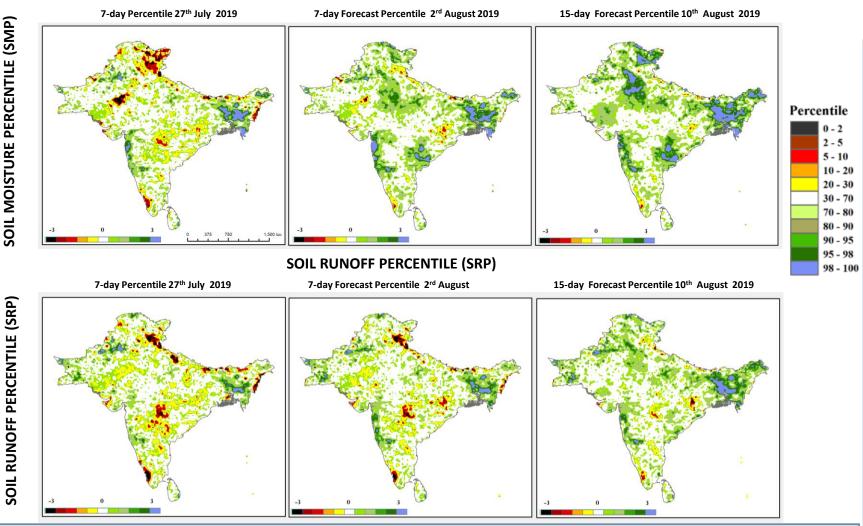
Multi Model Ensemble (MME) Seasonal Prediction System for 2019 Monsoon Season



- Rainfall for South and South-west Karnataka, west Maharashtra, UP and Kerala experience in the next week;
- Nepal, Bhutan, south Assam, North and north east Arunachal might experience a decrease 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 decreasing rainfall from 8<sup>th</sup> August to 21<sup>st</sup> 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 to mid August.
- 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.

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)



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).

Disclaimer: The designations employed and the presentation of material in this information product do not imply the expression of any opinion whatsoever on the part of the International Water Management Institute (IWMI) and its partners concerning the legal or development status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. The views expressed in this information product are those of the author(s) and do not necessarily reflect the views or policies of IWMI.

Current Condition: 27 July 2019

Forecast Period : 27 July and 10 Aug 2019 Standardized Soil Moisture and Runoff Index for regional drought and early warning

#### **Summary:**

The experimental drought forecast products for research/scientific use based on 19<sup>th</sup> July 2019 initial condition. These forecast products are based on the real time weekly operational forecast generated by Global ENSemble (GEFS), 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 Karnataka, Tamil Nadu, Kerala, Andhra Pradesh, Odisha, Chhattisgarh, Rajasthan, Haryana, Punjab, Maharashtra, UP, Bihar, MP and Telangana will be increasing rainfall in coming two weeks.
- Initial condition on the Soil Runoff Index (SRI) explains similar trend to SSI.
- Dryness is decreasing form end of July and it will be further decreasing in the 1<sup>st</sup> week of August all over India.
- West, South, and South west of Sri Lanka will get more rain when rainfall in Jammu & Kashmir is normal to deficit rainfall.
- 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.

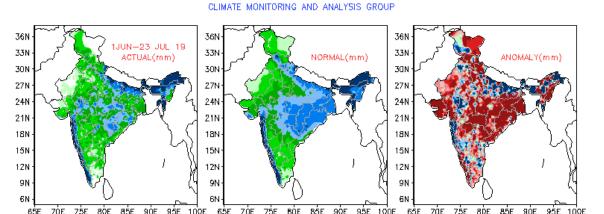
# INDIA - Monthly Rainfall Condition (Actual vs. Anomaly)

#### Actual Rainfall - June 2019

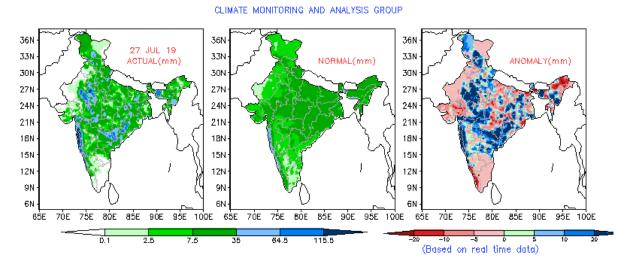
# (CLIMATE MONITORING AND ANALYSIS GROUP) 36N 33N 30N 27N 24N 24N 21N 18N 15N 15N 12N 9N 65E 70E 75E 80E 85E 90E 95E 100E 65E 70E 75E 80E 85E 90E 95E 100E 5 25 5D 100 200 300 -75 50 25 0 25 50 75

#### Actual Rainfall – July 2019

(Based on real time data)



### Actual Rainfall – Seasonal 2019 (till 27 July)

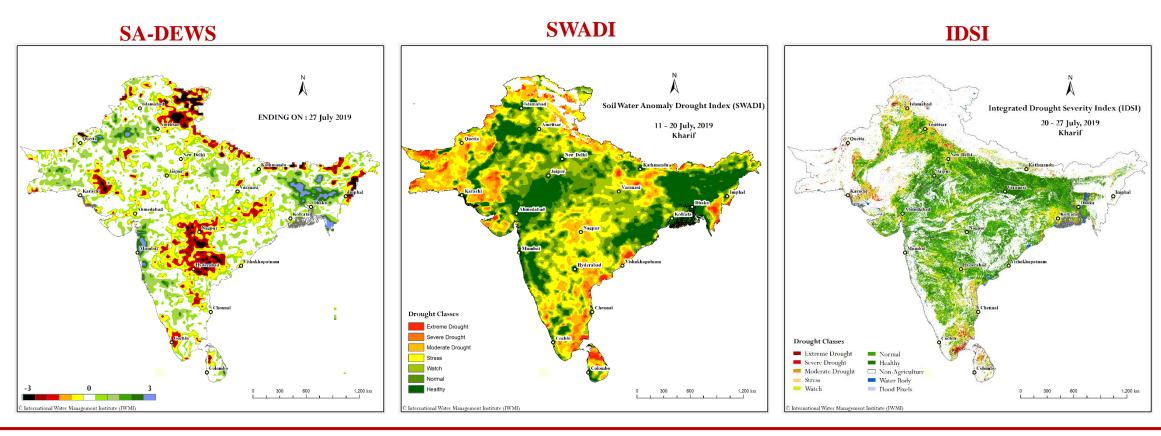


Data Source: IMD

- Several parts of the India there is an decrease in rainfall for the month of July compared to the long-term anomaly, however South, North and North west districts specially in Karnataka, Maharashtra, Odisha, Telangana, Bihar, South Rajasthan, Assam had excess rainfall in July.
- Month of June has experienced mostly negative anomalies across India except some patches of western and northern terrestrial area.
- There has a reduction and slightly decreased in rainfall in the month of May, June and it has increased from second week of July most part over the India.
- Overall there has been an slightly excess rainfall.

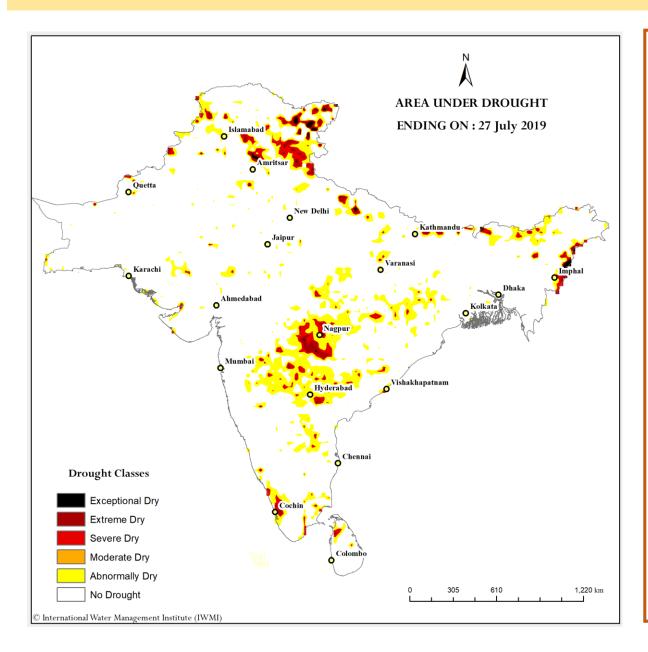
Note: Simple qualitative assessment on the performance on rainfall condition was described here to cross compare with SADMS – IDSI products for evaluation purpose only.

# **South Asia Drought Indices – A Comparison & Assessment**



- 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 to good condition except Tamilandu state and North and Northeast of Sri Lanka.

# **South Asia Drought Forecast**

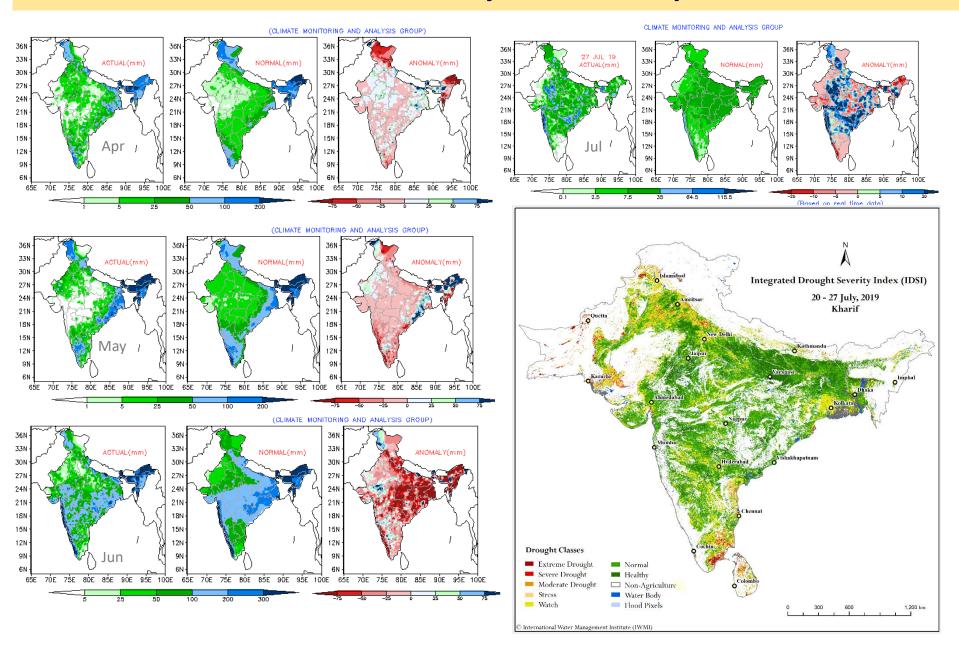


- Using the initial condition i.e. 27th July 2019 based on satellite rainfall estimates of 3B42RT daily time-step integrates in the VIC model and the derived outputs namely Standardized Precipitation Index (3-Month), Standardized Soil Moisture Index (SSI) and Standardized Runoff Index (SRI)
- The extreme values of all three conditions are statistically combined to generated areas under drought for entire South Asia
- Extreme dry condition of North of Telangana, Central and eastern Maharashtra, Tamil Nadu have reduced to moderate to abnormally dry condition.
- Part of Jammu & Kashmir, and parts of northeastern belt are observed to have decreasing dry condition. Also, North east of Sri Lanka are under Abnormally/moderate dry 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**

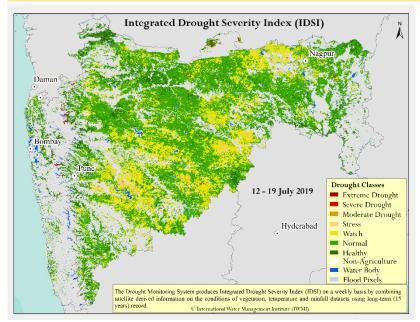


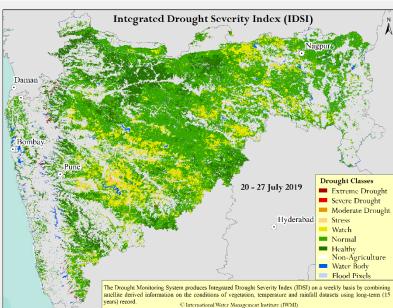
#### Summary:

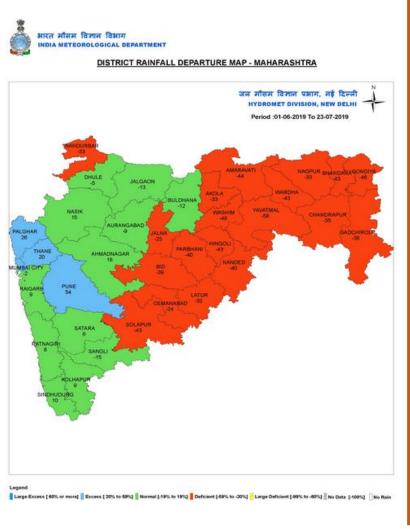
Rainfall deficit in whole India from April is recovered mostly on July month. However on July; the rainfall excess level of some area became much higher when compared with June. In many states of the country and the reduced the vegetation stress while converting severe drought to normal and healthy condition in the agricultural land, which is clearly reflected in the IDSI.

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

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

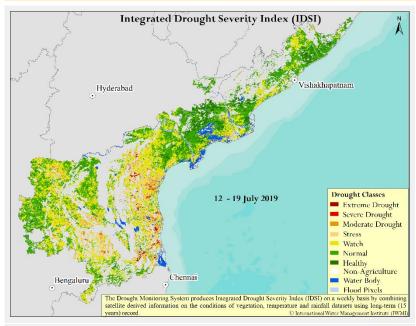


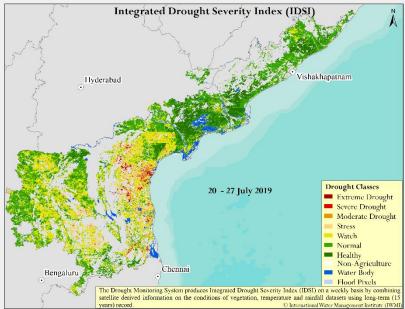


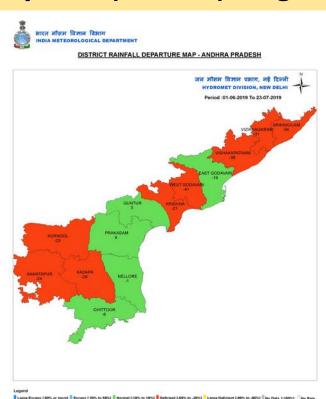


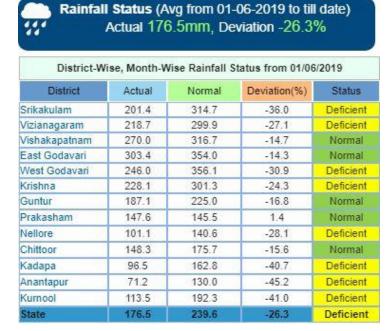
- SADMS framework was applied for the agriculture drought monitoring in Maharashtra for current obtained mainly from satellite remote sensing data. The index (Integrated Drought Severity Index IDSI), Indian Meteorological Rainfall maps were analysed to understand rainfall deficit which could help in validating the drought maps with the absence of in-situ observations.
- Several districts are denoted Excess and Normal level of drought at the beginning of July 2019.
   Also it is clearly indicate from rainfall anomaly.
- Increase of Rainfall in state has reduced the vegetation stress in the agricultural land, which is clearly reflected in the IDSI. Extreme to severe drought condition has improve in to normal most of the State. Similar pattern has been revealed by seasonal rainfall report from IMD.

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





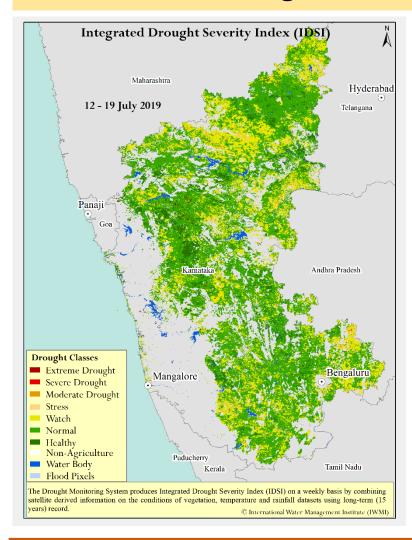


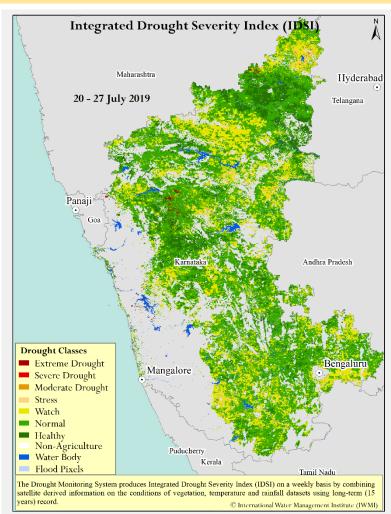


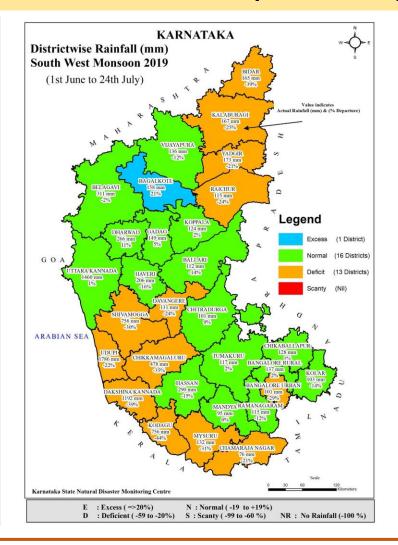
Data Source: APSDPS

- •Out of the 13 districts in A.P., only 5 districts had normal rainfall from June 1 to 26 July 2019;
- 'Stress to extreme drought' category is remain same all over the district from previous week in IDSI.
- •Negative rainfall anomalous condition has reduced from 01 June to 27 July 2019. it is the indication of reducing the extreme drought condition in to watch to normal category. Still few patches observed the drought condition in near eastern boundary of the state.

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



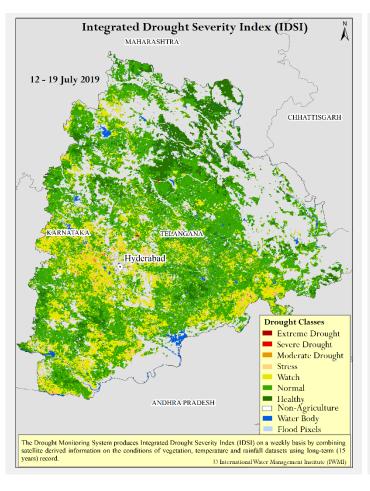


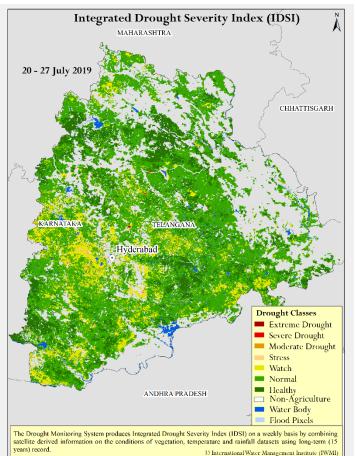


The Integrated Drought Severity Index (IDSI) for Karnataka were assessed at district level. All over the State reduce the drought condition due continues rainfall. Specially in majority of IDSI category of all districts are Normal to Healthy.

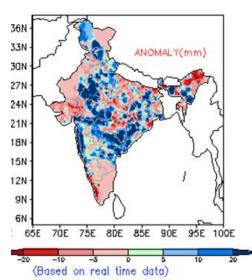
# South Asia Drought Monitoring System (SADMS) – Agriculture Assessment (Telangana)

01 June - 27 July 2019





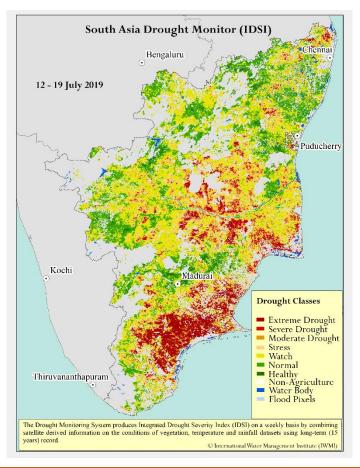


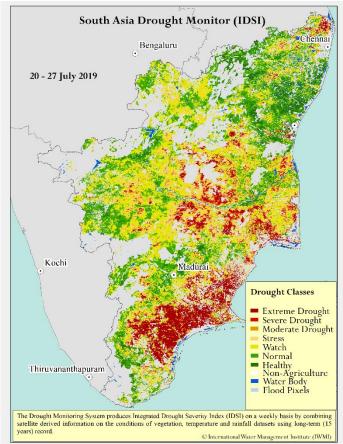


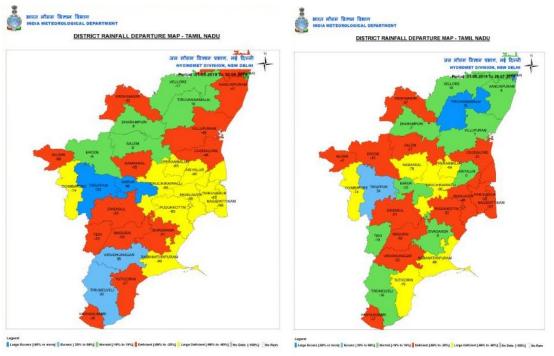
#### Summary:

The Integrated Drought Severity Index (IDSI) for Telangana was assessed at district level. There seems to reduction of drought condition compare to previous week. Considerable area the state is recovering watch to normal drought condition from last week. Most of the district in States are observed to normal to healthy category.

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

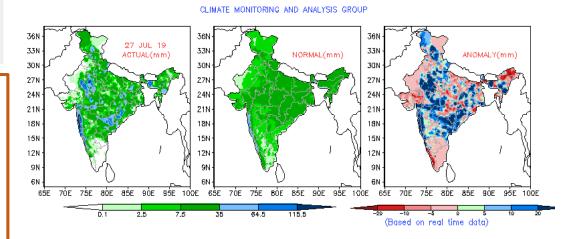




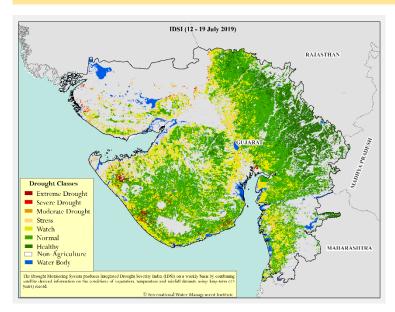


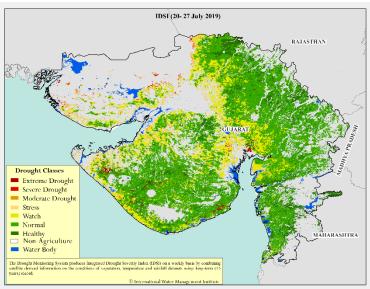
#### 01 June - 26 July 2019

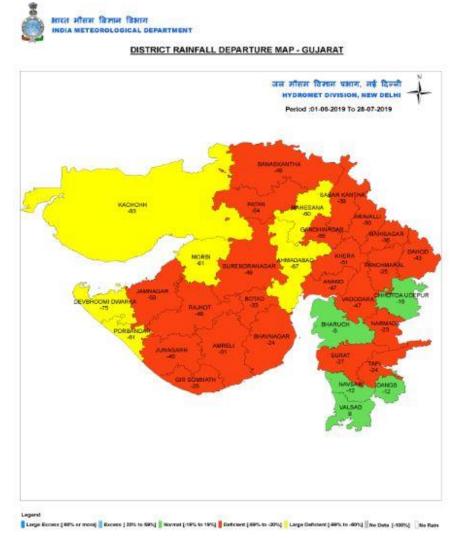
- Overall drought condition is still same condition from previous analysis cycle. Also south, South-East, quarter of Tamil Nadu seems to have 'moderate' to 'severe' drought at the week ending on 27<sup>th</sup> of July 2019. Most of western districts are under the 'watch' to 'Health' category in IDSI which is giving the good correlation with rainfall anomaly as well.
- Overall, it can be observed that 10-30% area of the state have 'extreme' to 'watch' drought classes and same spatial pattern is continue from previous week.

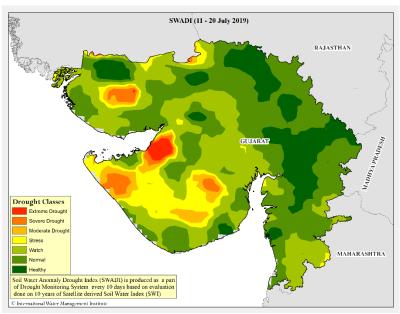


# South Asia Drought Monitoring System (SADMS) – Agriculture Assessment (Gujarat)



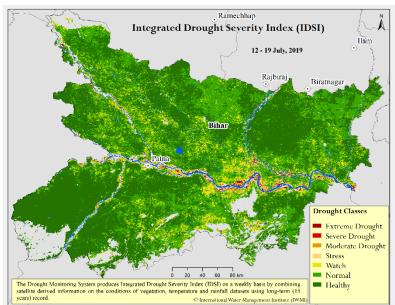


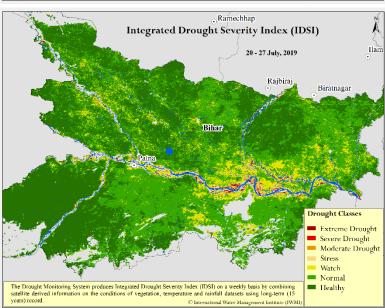


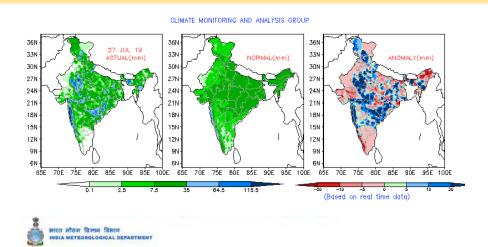


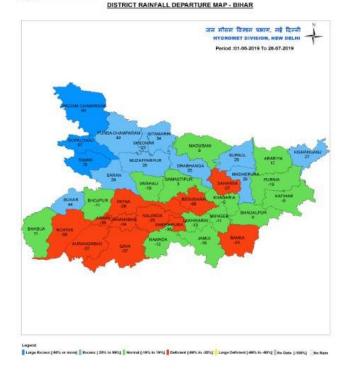
- Overall the state is recovering from watch to normal drought condition form previous to resent week.
- There is deficit rainfall for 80% of the state but still there are few districts with normal rainfall deficient from 1 June to 26 July.
- Overall, it can be observed that most of the districts are recovering towards health category.

# South Asia Drought Monitoring System (SADMS) - Agriculture Assessment (Bihar)









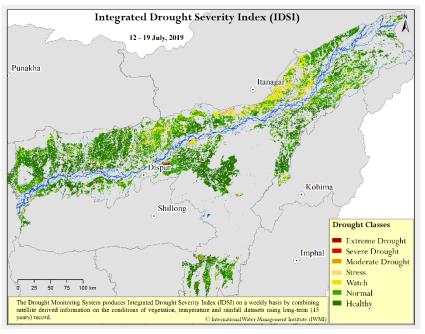


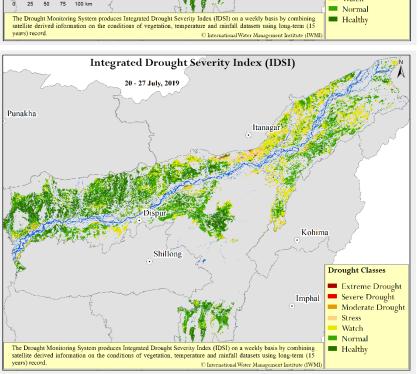
DISTRICT-WISE RAINEALL	DISTRIBI

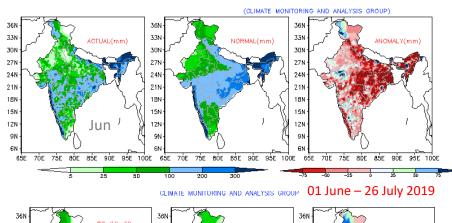
		Day :28-07-2019				Period:01-06-2019 To 28-07-2019			
S NO	MET. SUBDIVISION/UT/STATE/DIS TRICT	ACTUAL (mm)	NORMAL (mm)	%DEP.	CAT.	ACTUAL (mm)	NORMAL (mm)	% DEP.	CAT
18	PASCHIM SINGHBHUMI	18.4	10.3	79%	LE	285.8	469.3	-39%	D
19	PURBI SINGBHUMI	39.6	11.0	260%	LE	403.4	510.0	-21%	D
20	RAMGARH	25.1	8.9	182%	LE	257.9	475.2	-46%	D
21	RANCHI	6.5	12.6	-49%	D	267.5	511.9	-48%	D
22	SAHEBGANJ	16.4	9.6	71%	LE	793.2	610.8	30%	Е
23	SARAIKELA	18.5	9.7	91%	LE	269.0	495.6	-46%	D
24	SIMDEGA	25.8	14.8	74%	LE	387.6	631.3	-39%	D
	SUBDIVISION : BIHAR	7.5	12.1	-38%	D	512.0	484.6	6%	N
1	ARARIYA	2.0	14.9	-87%	LD	802.4	683.6	17%	N
2	ARWAL	18.1	9.9	83%	LE	211.6	347.4	-39%	D
3	AURANGABAD	3.5	13.4	-74%	LD	249.1	392.9	-37%	D
4	BANKA	3.8	8.8	-57%	D	316.2	418.5	-24%	D
5	BEGUSARAI	5.3	18.8	-72%	LD	213.1	484.5	-56%	D
6	BHABUA	0.6	16.1	-96%	LD	441.9	397.0	11%	N
7	BHAGALPUR	11.8	6.5	81%	LE	460.2	458.6	0%	N
8	BHOJPUR	25.6	10.9	135%	LE	379.5	427.1	-11%	N
9	BUXAR	2.2	11.4	-81%	LD	523.9	363.6	44%	E
10	DRABHANGA	4.2	10.6	-60%	LD	511.8	410.1	25%	Е
11	GAYA	9.2	11,1	-17%	N	254.5	405.6	-37%	D
12	GOPALGANJ	14.3	11.2	28%	E	756.9	454.3	67%	LE
13	JAHANABAD	26.5	6.1	334%	LE	243.6	367.3	-34%	D
14	JAMUI	11.0	8.6	27%	E	368.7	436.7	-16%	N
15	KATIHAR	3.6	7.7	-53%	D	488.7	539.6	-9%	N
16	KHAGARIA	4.5	10.4	-57%	D	450.9	473.3	-5%	N
17	KISHANGANJ	2.8	13.1	-79%	LD	1164.0	919.7	27%	Е
18	LAKHISARAI	13.1	4.5	192%	LE	324.1	373.6	-13%	N
19	MADHEPURA	8.8	10.7	-18%	N	701.1	542.4	29%	E
20	MADUBANI	4.6	13.5	-66%	LD	537.6	493.9	9%	N
21	MUNGER	6.0	10.5	-43%	D	423.8	475.1	-11%	N
22	MUZAFFARPUR	2.0	12.3	-84%	LD	592.0	462.3	28%	Е
23	NALANDA	15.9	11.1	44%	E	300.9	400.4	-25%	D
24	NAWADA	14.1	9.1	55%	E	337.8	383.6	-12%	N
25	PACHIM CHAMPARAN	3.0	17.2	-83%	LD	1019.2	626.6	63%	LE
26	PATNA	14.4	15.2	-5%	N	319.7	430.6	-26%	D
27	PURBA CHAMPARAN	1.7	11.6	-86%	LD	758.6	509.4	49%	E
28	PURNIA	1.0	12.6	-92%	LD	600.0	740.5	-19%	N
29	ROHTAS	0.3	14.2	-98%	LD	227.8	376.5	-39%	D
30	SAHARSA	18.1	14.5	25%	E	492.1	677.3	-27%	D
31	SAMASTIPUR	4.0	12.1	-67%	LD	465.8	451.2	3%	N
32	SARAN	12.2	12.7	-4%	N	541.6	421.4	29%	E
33	SHEIKHPURA	26.5	9.3	185%	LE	261.0	407.2	-36%	D
34	SHEOHAR	0.0	12.6	-100%	NR	639.2	519.2	23%	Е
35	SITAMARHI	2.2	14.4	-84%	LD	717.5	537.0	34%	Е
36	SIWAN	27.7	8.9	211%	LE	774.4	434.9	78%	LE
37	SUPAUL	6.9	14.5	-53%	D	701.0	561.1	25%	Е
38	VAISHALI	0.0	15.6	-100%	NR	363.4	448.9	-19%	N

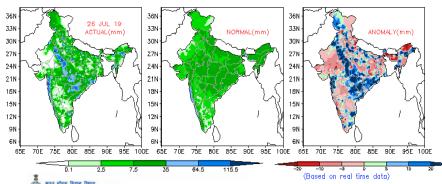
- The drought severity in all parts of Bihar seems to be recovering to healthy in the weeks are ending on 27<sup>th</sup> of July. Most of the districts are stable with healthy and normal level.
- This has happened because of all the district in Northern shows normal to excess rainfall but southern district rainfall has slightly increase compare to the previous week.

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













India Meteorological Department Hydromet Division, New Delhi

DISTRICT-WISE RAINFALL DISTRIBUTION

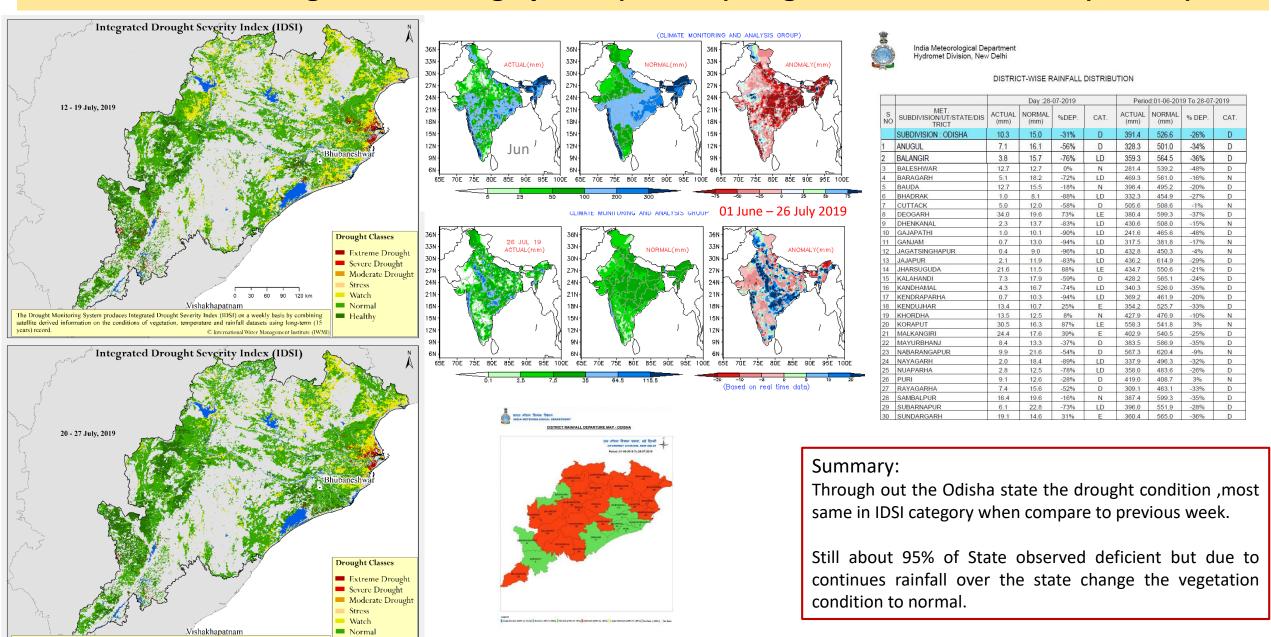
S NO		Day :28-07-2019				Period:01-06-2019 To 28-07-2019			
	MET. SUBDIVISION/UT/STATE/DIS TRICT	ACTUAL (mm)	NORMAL (mm)	%DEP.	CAT.	ACTUAL (mm)	NORMAL (mm)	% DEP.	CAT.
	STATE : ASSAM	2.3	12.3	-82%	LD	834.9	831.5	0%	N
1	BAKSA	0.0	8.7	-100%	NR	1414.1	777.3	82%	LE
2	BARPETA	0.0	20.4	-100%	NR	1741.8	1393.1	25%	E
3	BONGAIGAON	0.0	28.6	-100%	NR	1779.0	1367.1	30%	E
4	CACHAR	0.7	15.8	-96%	LD	1051.1	1002.4	5%	N
5	CHIRANG	0.5	8.7	-94%	LD	1940.0	1390.3	40%	E
6	DARRANG	0.0	4.7	-100%	NR	127.8	731.0	-83%	LD
7	DHEMAJI	8.0	7.3	10%	N	1644.6	973.4	69%	LE
8	DHUBRI	0.0	13.6	-100%	NR	1110.3	1294.3	-14%	N
9	DIBRUGARH	3.2	15.4	-79%	LD	753.9	864.4	-13%	N
10	GOALPARA	0.0	15.3	-100%	NR	1110.2	1082.8	3%	N
11	GOLAGHAT	1.6	12.3	-87%	LD	415.1	563.0	-26%	D
12	HAILAKANDI	4.7	15.5	-70%	LD	870.0	860.6	1%	N
13	JORHAT	1.3	7.1	-82%	LD	615.0	630.2	-2%	N
14	KAMRUP METRO	0.0	6.6	-100%	NR	429.7	546.2	-21%	D
15	KAMRUP RURAL	0.0	11.0	-100%	NR	501.1	746.0	-33%	D
16	KARBI ANALOG	0.8	9.3	-92%	LD	247.6	426.0	-42%	D
17	KARIMGANJ	0.0	13.6	-100%	NR	1119.8	1232.2	-9%	N
18	KOKRAJHAR	0.6	16.9	-97%	LD	2133.3	1554.1	37%	E
19	LAKHIMPUR	4.3	18.5	-77%	LD	1289.7	1093.2	18%	N
20	MORIGAON	0.0	11.4	-100%	NR	341.6	602.5	-43%	D
21	N.C HILLS	4.2	12.5	-66%	LD	561.6	648.5	-13%	N
22	NAGAON	6.1	8.3	-26%	D	338.6	527.0	-36%	D
23	NALBARI	0.0	14.2	-100%	NR	1364.0	955.0	43%	E
24	SIBSAGAR	17.3	13.4	29%	Е	444.7	635.2	-30%	D
25	SONITPUR	1.0	12.1	-92%	LD	678.8	644.0	5%	N
26	TINSUKIA	2.3	10.0	-77%	LD	827.8	829.6	0%	N
27	UDALGURI	4.2	9.9	-58%	D	954.5	842.7	13%	N

#### Summary:

The drought severity in many parts of Assam seems to be slightly increased compare to previous week. normal in north-eastern districts, simultaneously normal to watch drought category observed rest of the area.

This has happened because of most of central districts shows increase of deficit rainfall. However increase the rainfall sue to activation of South west monsoon over India.

# South Asia Drought Monitoring System (SADMS) - Agriculture Assessment (Odisha)



The Drought Monitoring System produces Integrated Drought Severity Index (IDSI) on a weekly basis by combining

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#### 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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