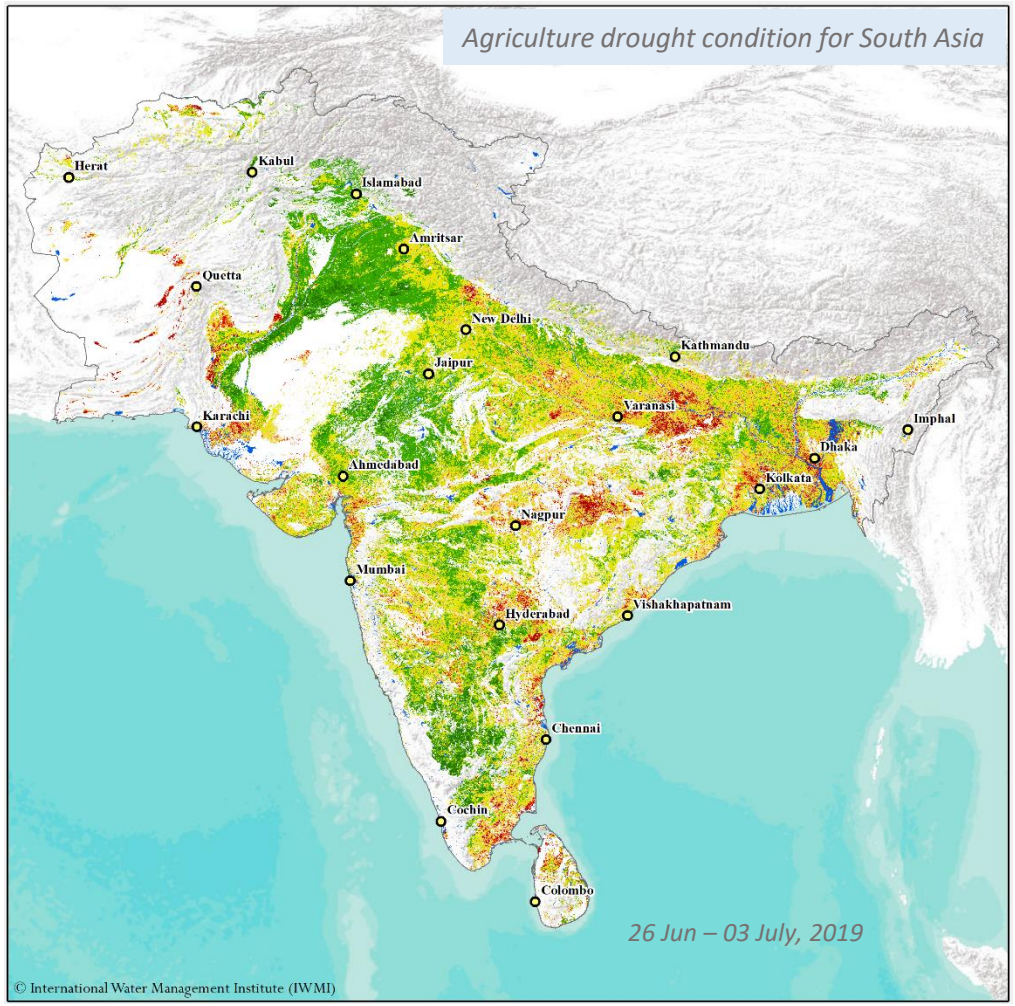
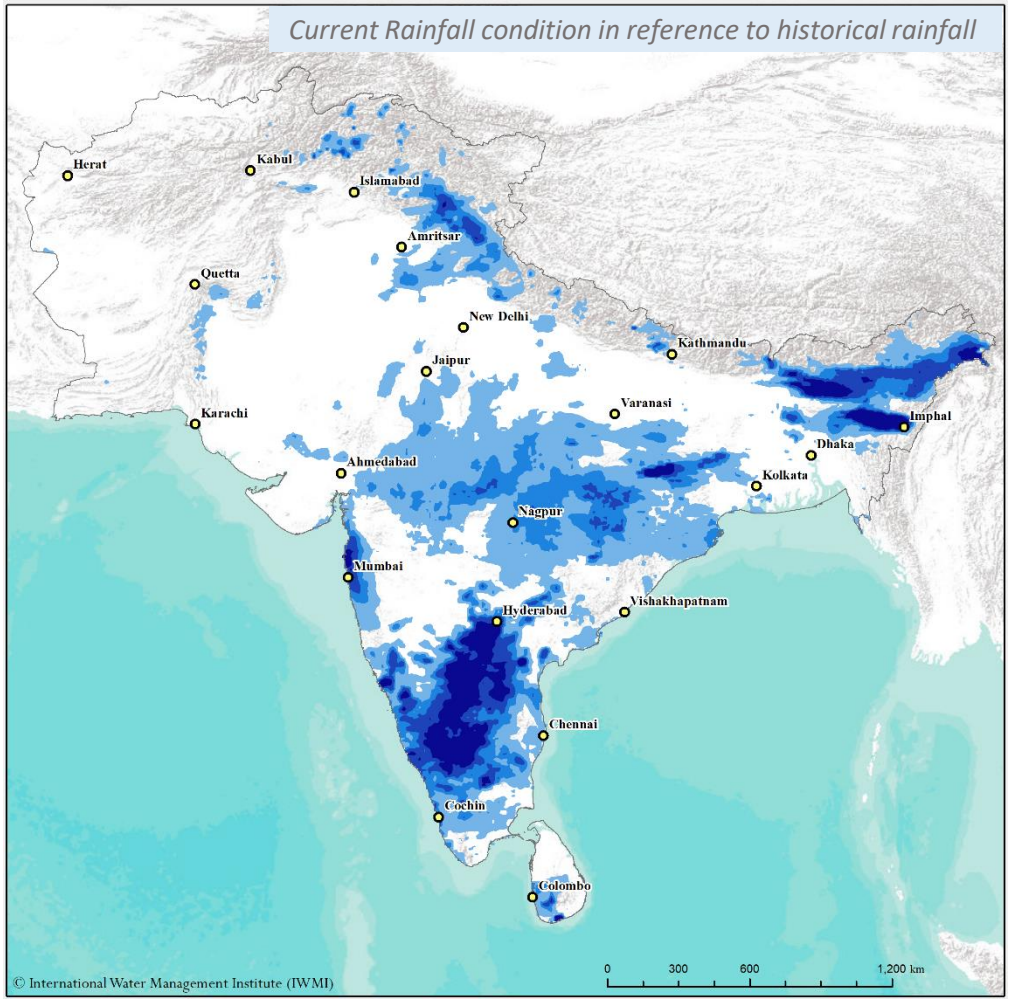
SADMS DROUGHT BULLETIN

03 July 2019 | ISSUE 04



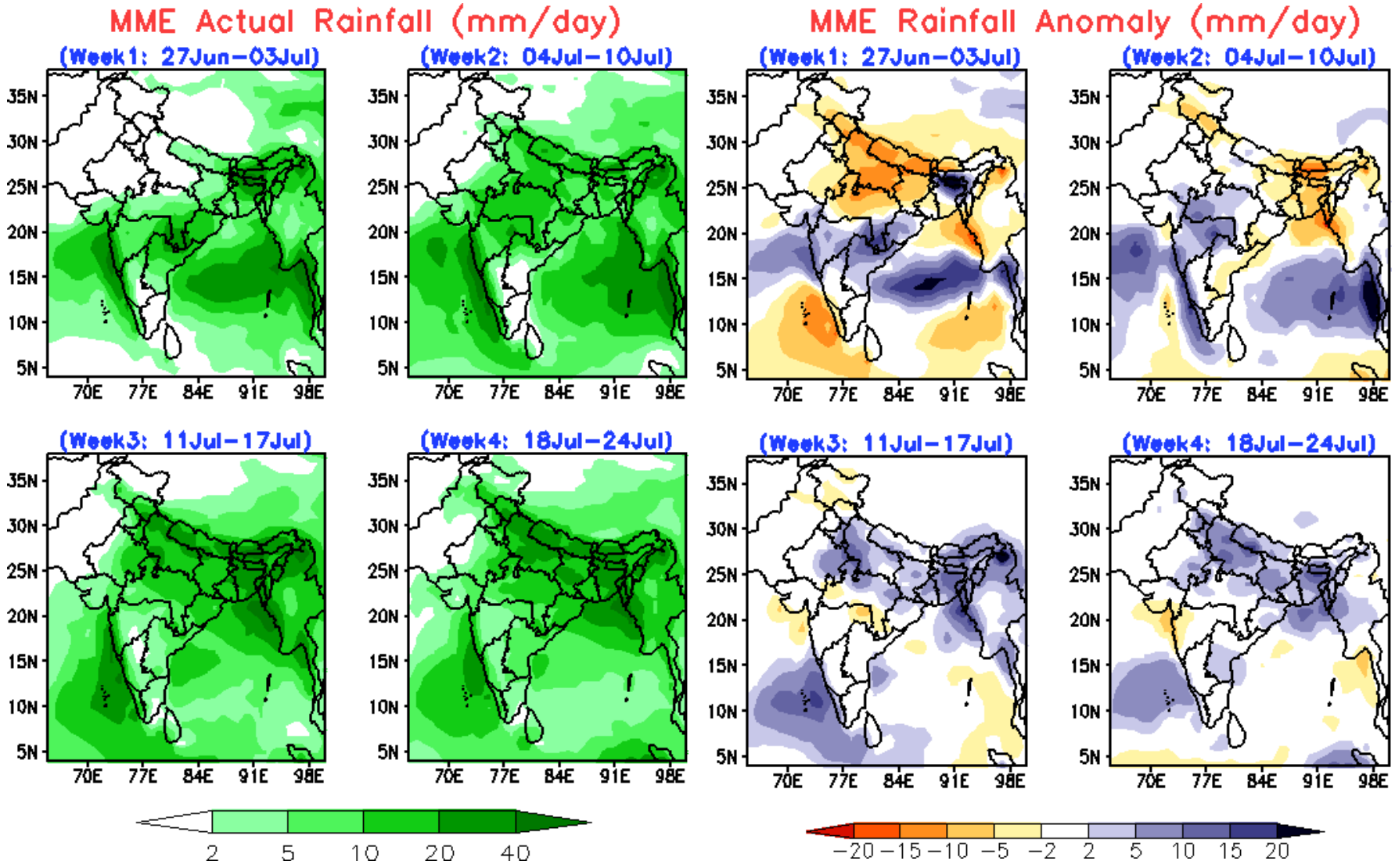


South Asia Drought Monitoring System (SADMS) drought weekly bulletin is produced by International Water Management Institute (IWMI) and is funded by the Indian Council of Agricultural Research (ICAR), the CGIAR Research Program on Water, Land and Ecosystems (WLE) and the Ministry of Agriculture, Forestry 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: 09 July 2019

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, Maharashtra, Andhra, Telangana and Kerala might experience in the next week; east Bhutan, north west Assam, south west Arunachal might experience a slight increase in rainfall, however the rainfall anomaly explains deficit rainfall.
- Most of India might experience increasing in rainfall by beginning of July.
- MP, UP, Bihar, Jharkhand, and West Bengal may experience slightly deficit rainfall from 27th June to 03rd July, but from 04th of July will experience excess normal rainfall.
- Sri Lanka for Northern, North Central and Eastern province explains normal rainfall but western and central might experience excess rainfall in month of July 2nd week.
- Beginning of July Nepal and Bhutan experience deficit of rainfall and from July second week the rainfall will be above normal
- Overall Pakistan shows no anomaly in rainfall.

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

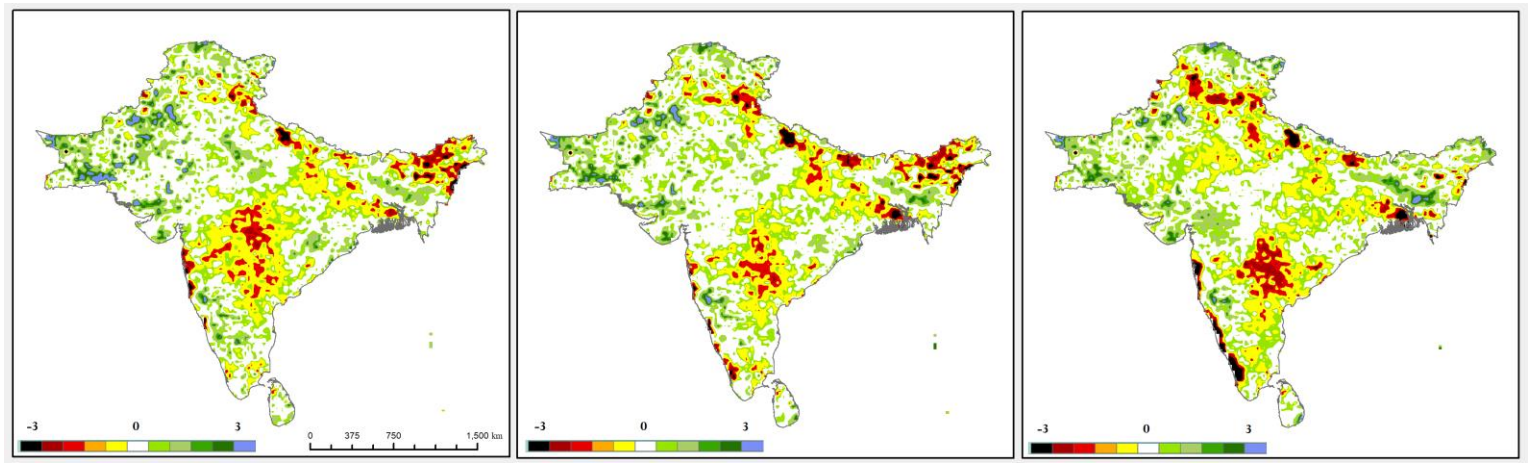
Note: The summary on country specific details described above based on the ERPAS MME information product do not imply the expression of any opinion whatsoever on the part of the IWMI and its partners as well the data provided by IITM.

SOUTH ASIA DROUGHT EARLY WARNING SYATEM (SADEWS)

Current Condition: 03 July 2019
Forecast Period : 03 July and 17 July 2019
Standardized Soil Moisture and Runoff Index for regional drought and early warning

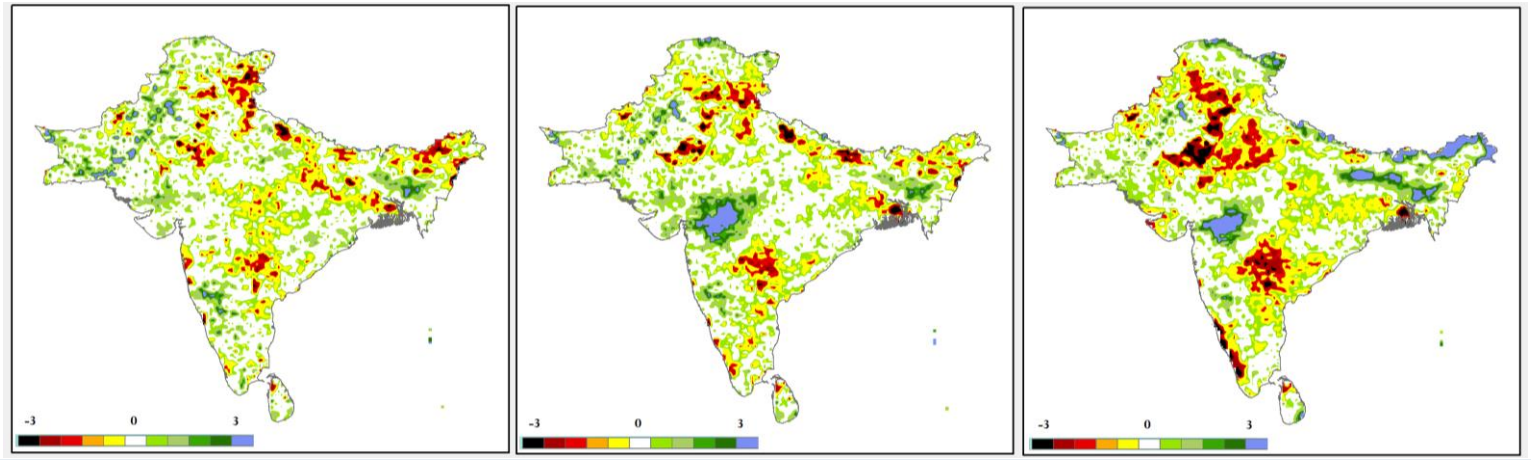
SOIL MOISTURE PERCENTILE (SMP)

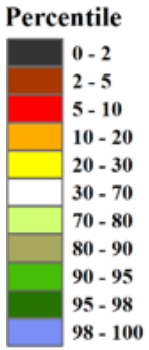
7-day Percentile 03rd July 2019 | 7-day Forecast Percentile 10th July 2019 | 15-day Forecast Percentile 17th July 2019



SOIL RUNOFF PERCENTILE (SRP)

7-day Percentile 03rd July 2019 | 7-day Forecast Percentile 10th July 2019 | 15-day Forecast Percentile 17th July 2019





Summary:

The experimental drought forecast products for research/scientific use based on 03rd July 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.

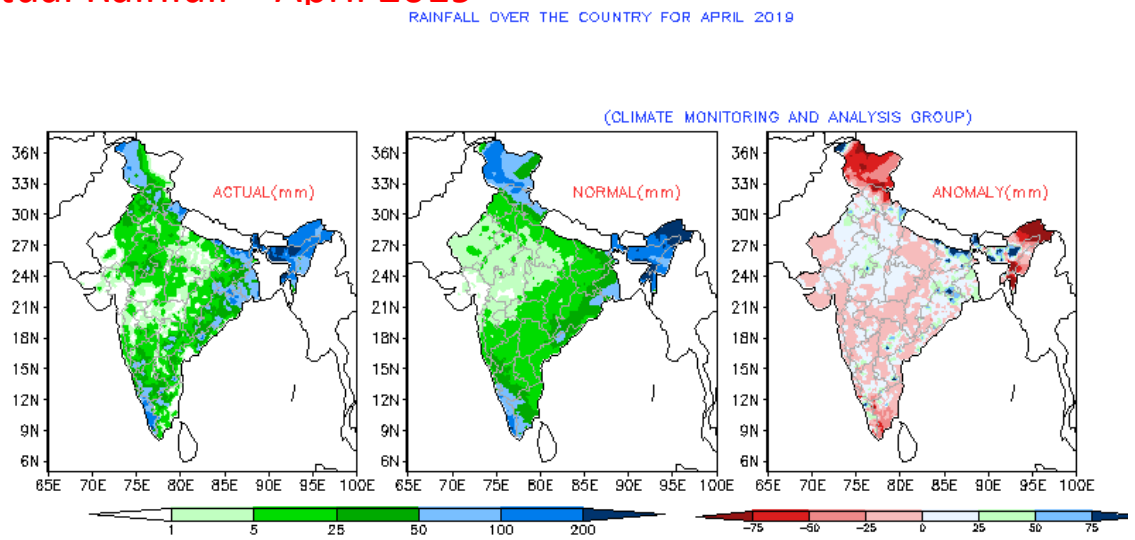
Drought Forecast Outlook:

- Rainfall of Karnataka, Tamil Nadu, Kerala, Andhra Pradesh, Odisha, Haryana, Punjab will be increasing. Drought condition in Rajasthan, MP and Telangana will be slightly increasing from July second week.
- 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 June over North western part of India such as Rajasthan, MP and UP.
- South and South west of Sri Lanka will get more rain but North, North central and Eastern peart will continue the current drought condition.
- Rainfall in Jammu & Kashmir and Bhutan is 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.

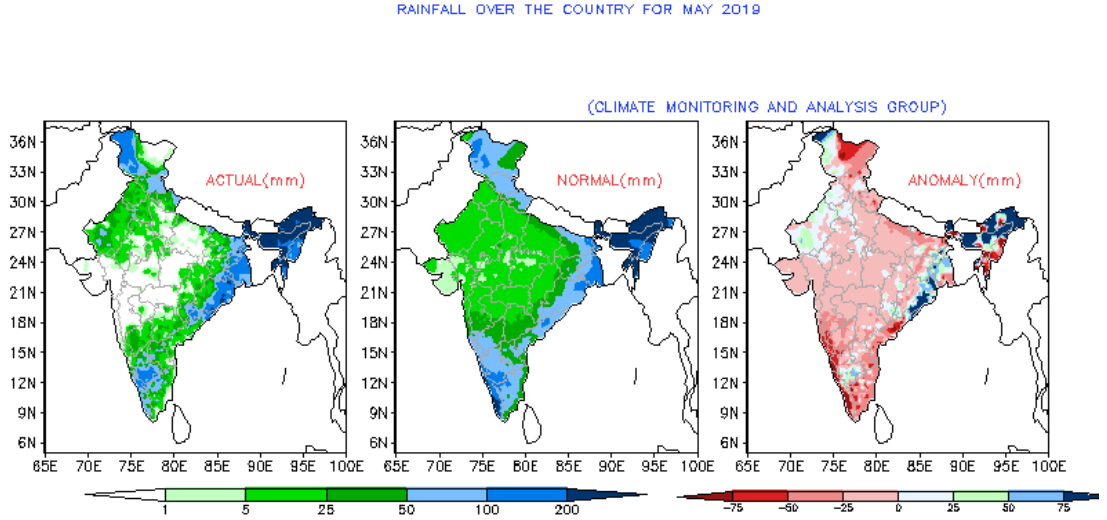
The SADEWS is regional scale early warning system developed as a collaborative project between International Water Management Institute (IWMI) and Indian Institute of Technology – Gandhinagar (IIT-GN).

INDIA – Monthly Rainfall Condition (Actual vs. Anomaly)

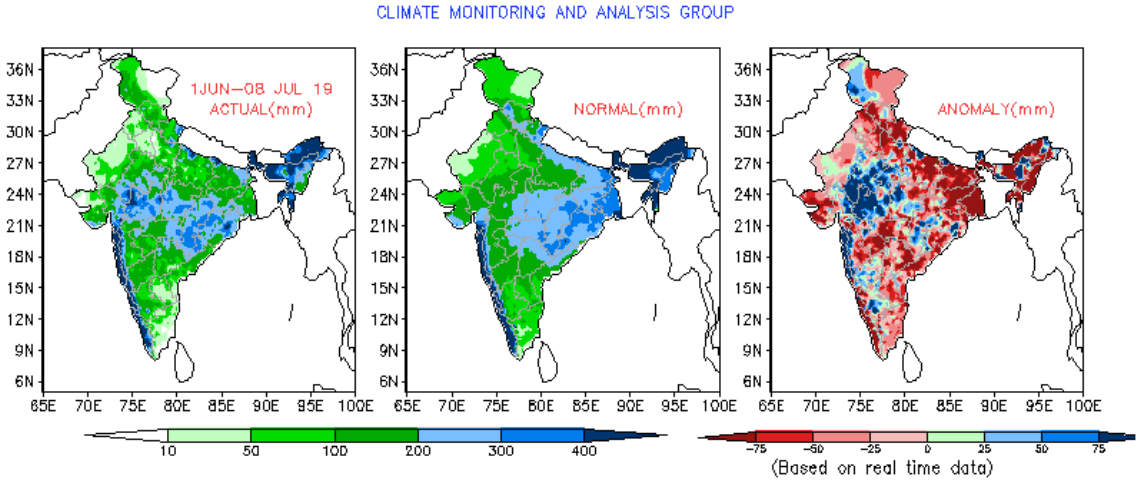
Actual Rainfall – April 2019



Actual Rainfall – May 2019



Actual Rainfall – Seasonal 2019



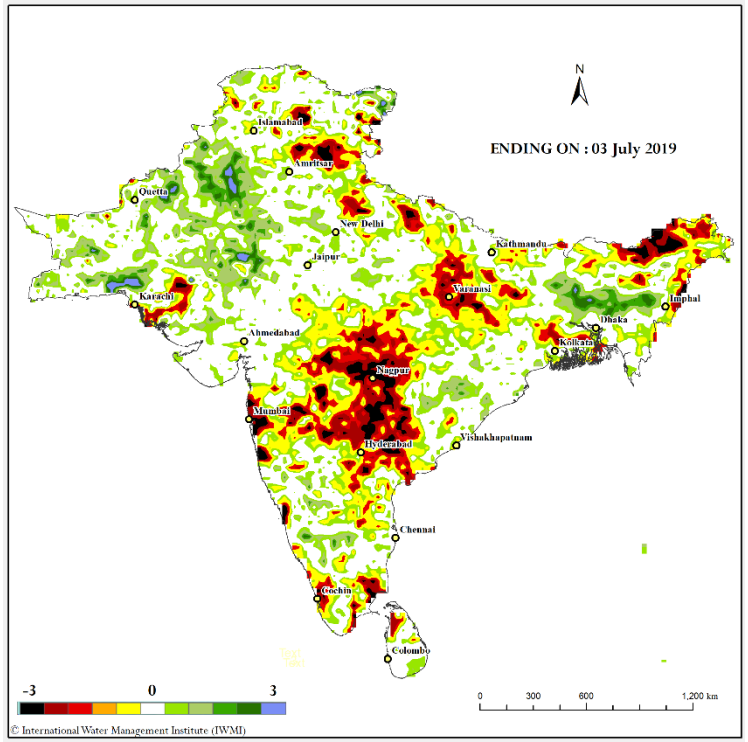
Data Source: IMD

- 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.
- Month of April has experienced mostly negative anomalies across India except small patches. Arunachal Pradesh, Manipur, Jammu & Kashmir experiences an excess negative rain anomaly.
- There has been a high reduction in rainfall in the month of April, May and until end of June and from July rainfall increase most part of India.
- Overall there has been an slightly excess rainfall central south belt (Karnataka) of India and from July will experience excess rainfall over India.

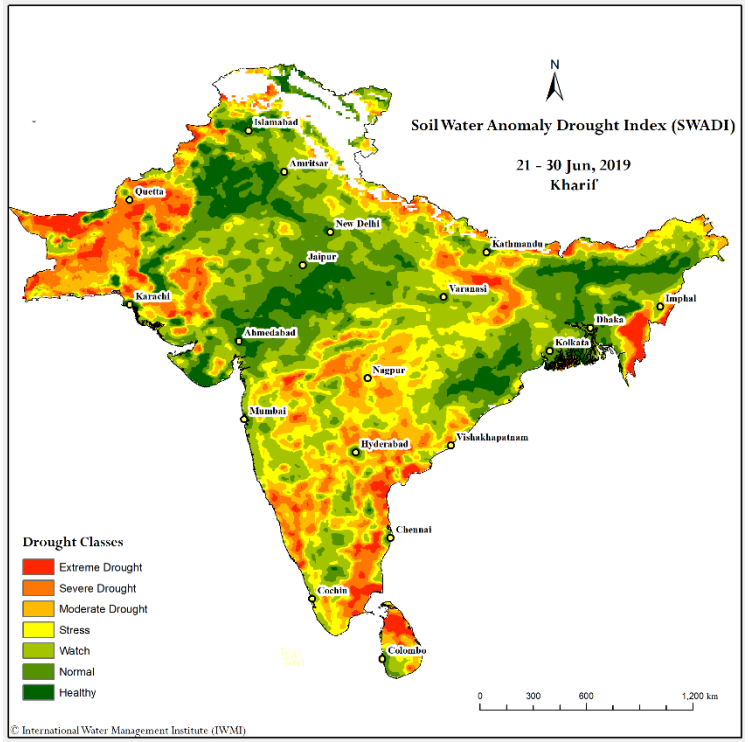
Note: Simple qualitative assessment on the performance on rainfall condition was described here to cross compare with SADMS – IDSI products for evaluation purpose only.

South Asia Drought Indices – A Comparison & Assessment

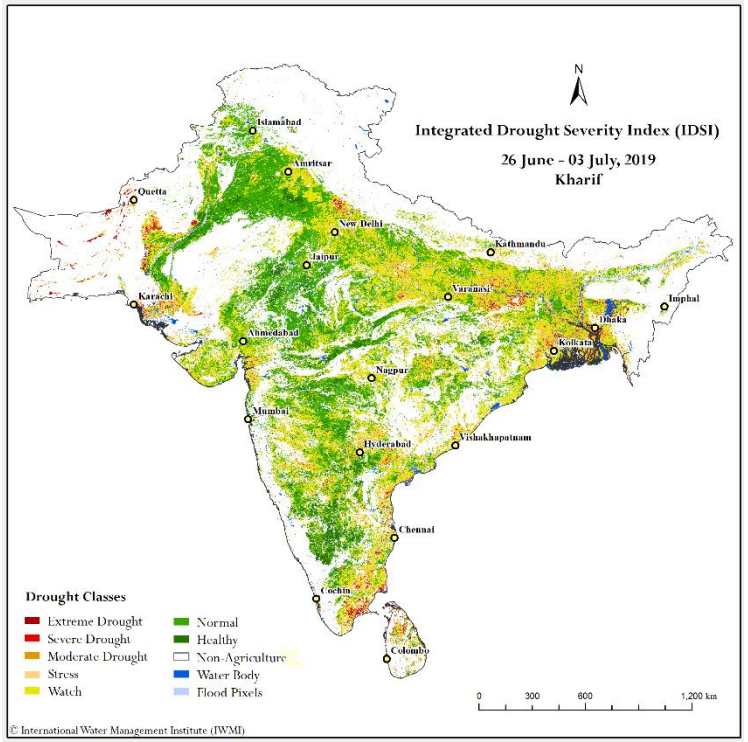
SA-DEWS



SWADI

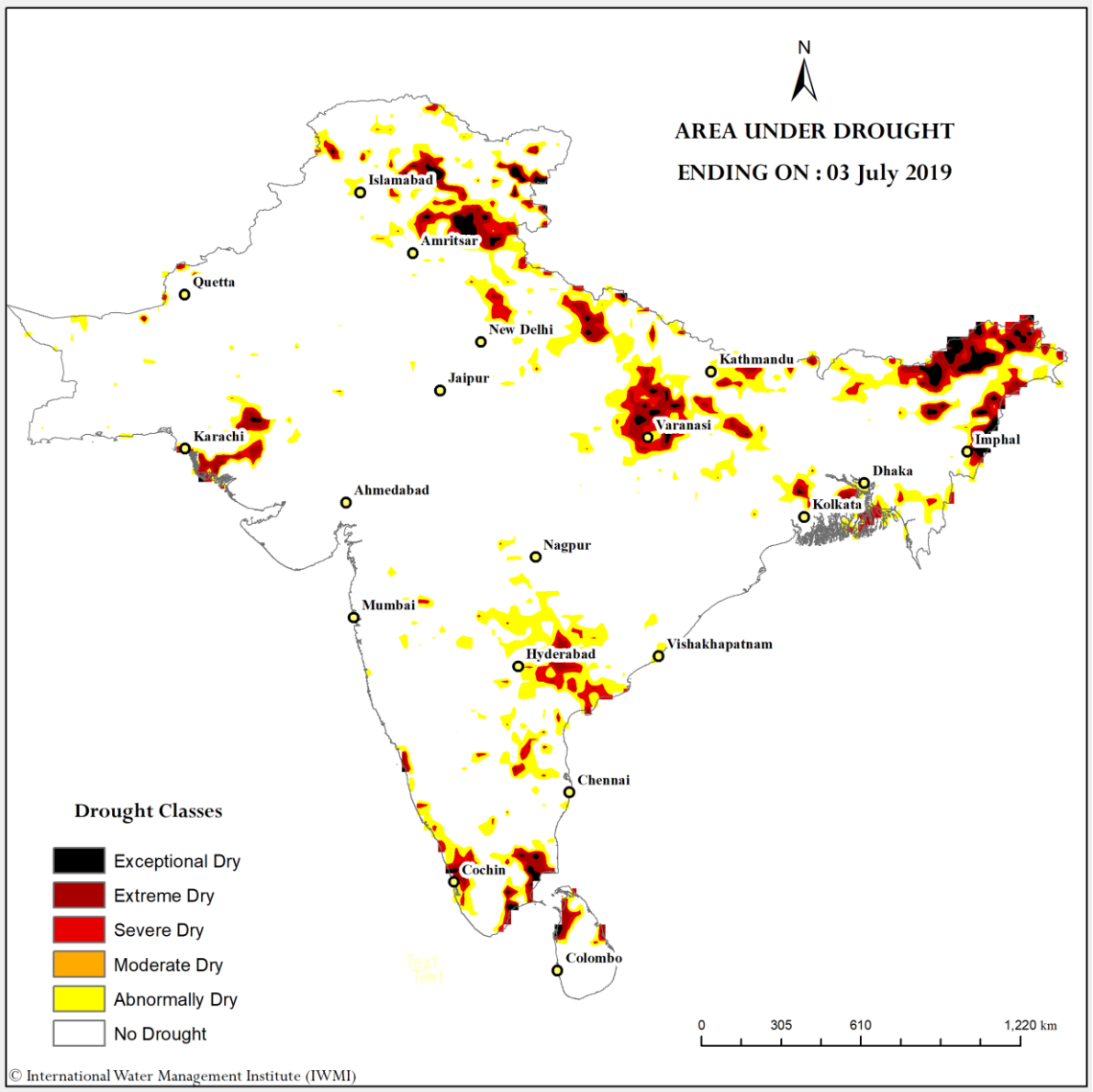


IDSI



- 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 to good condition except Southern Bihar, East Maharashtra, some part of Andhra, and part of MP.

South Asia Drought Forecast

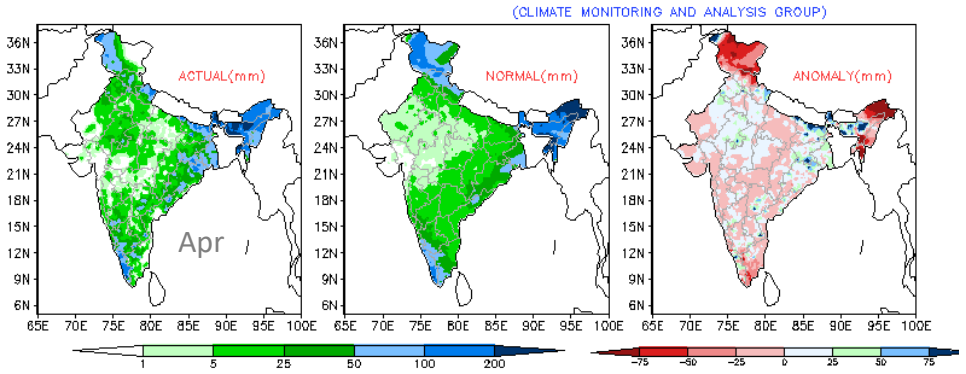


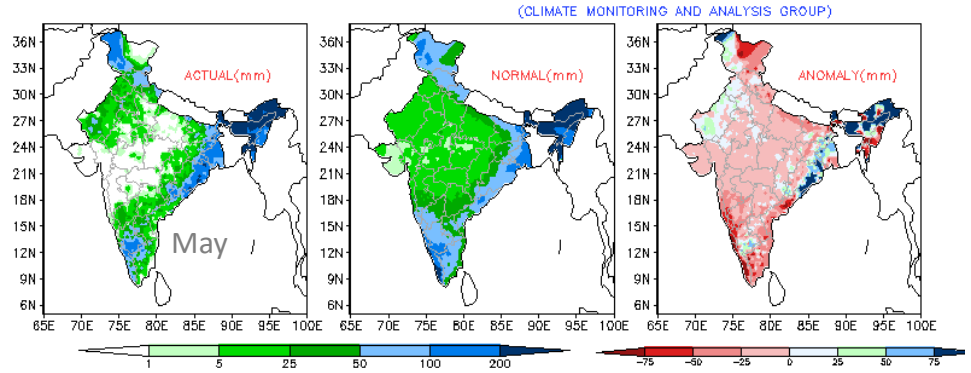
Summary:

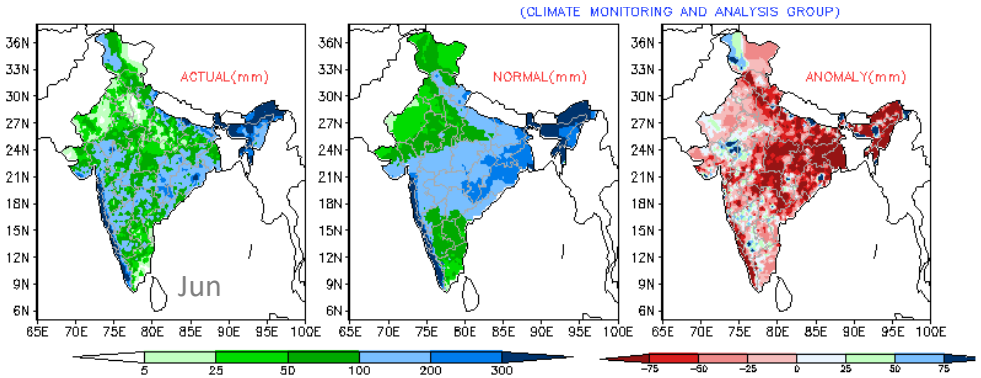
- Using the initial condition i.e. 3rd June 2019 based on satellite rainfall estimates of 3B42RT daily time-step integrates in the VIC model and the derived outputs namely Standardized Precipitation Index (3-Month), Standardized Soil Moisture Index (SSI) and Standardized Runoff Index (SRI)
- The extreme values of all three conditions are statistically combined to generated areas under drought for entire South Asia
- Extreme dry condition of Telangana, Arunachala Pradesh, Bihar, Assam and few patches of Tamil Nadu have increased to Severe to Extreme/Exceptional dry condition.
- Part of Jammu & Kashmir, and parts of northeastern belt are observed to have increasing dry condition. Also, North central 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.*

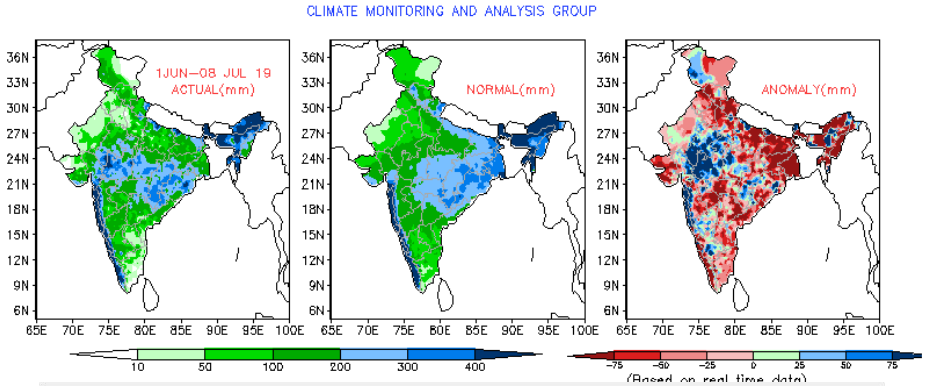
India – State wise analysis

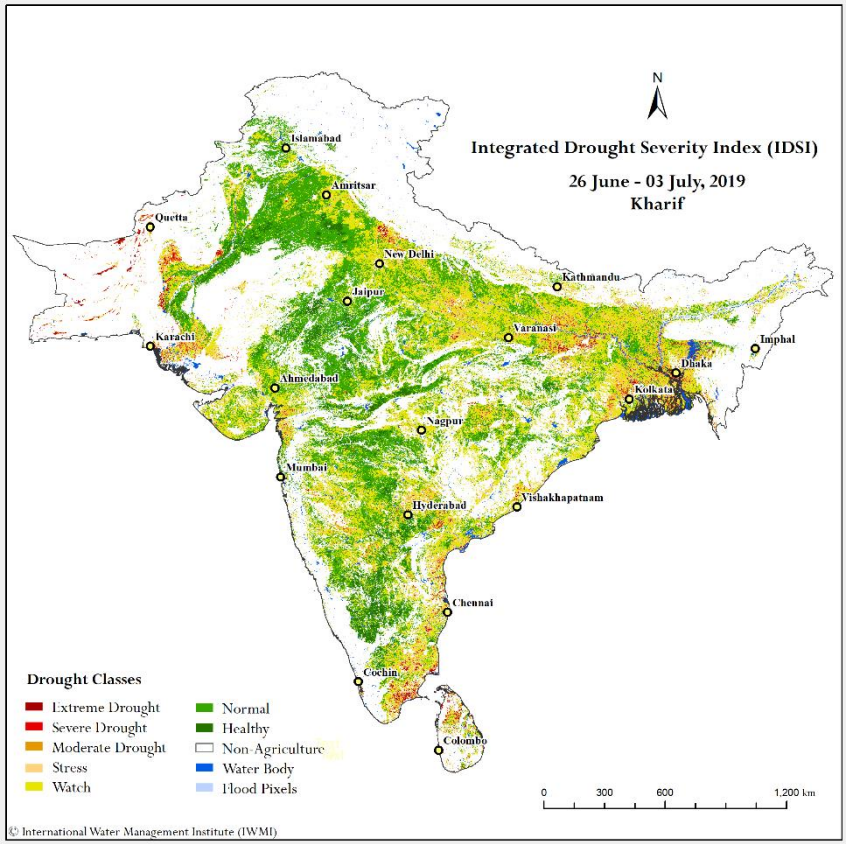
India Monthly Rainfall Comparison & Assessment











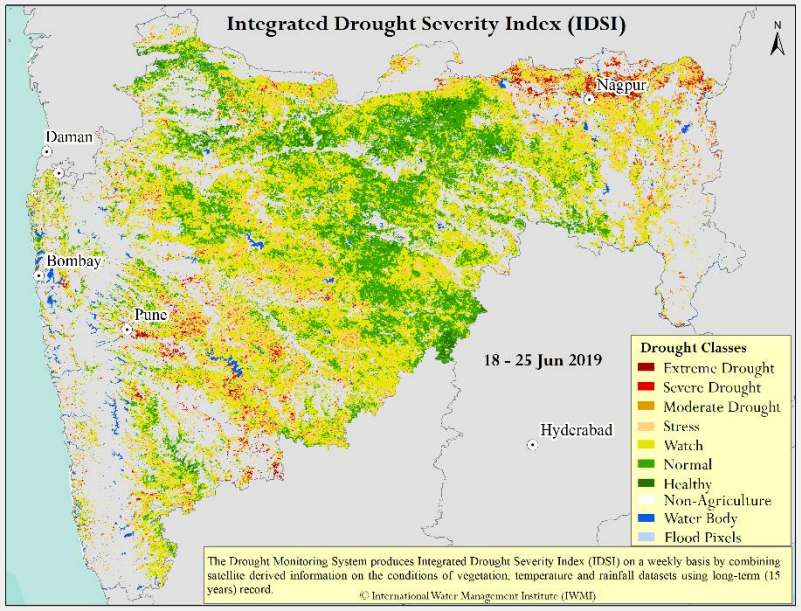
Summary:

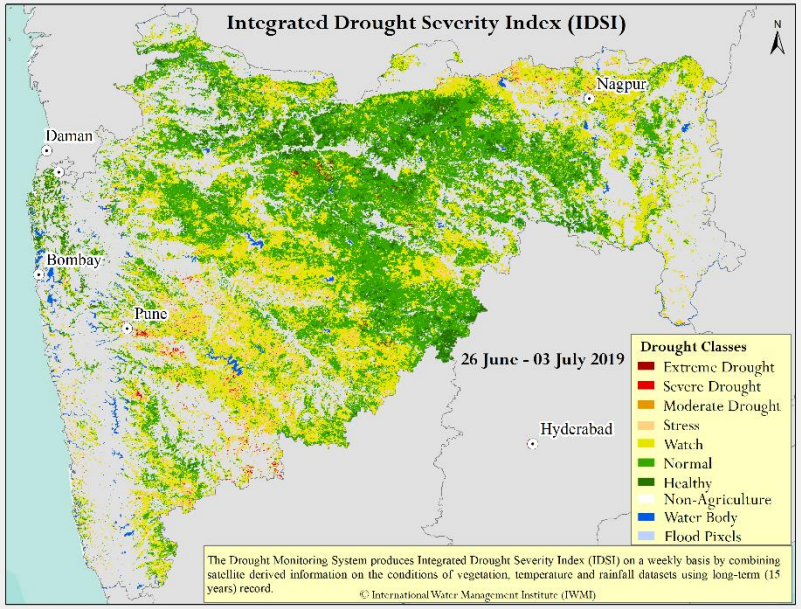
Rainfall deficit in whole India has increased, except April month more than 80% of the country under negative rainfall anomaly which is trigger the vegetation stress in the agricultural land, which is clearly reflected in the IDSI.

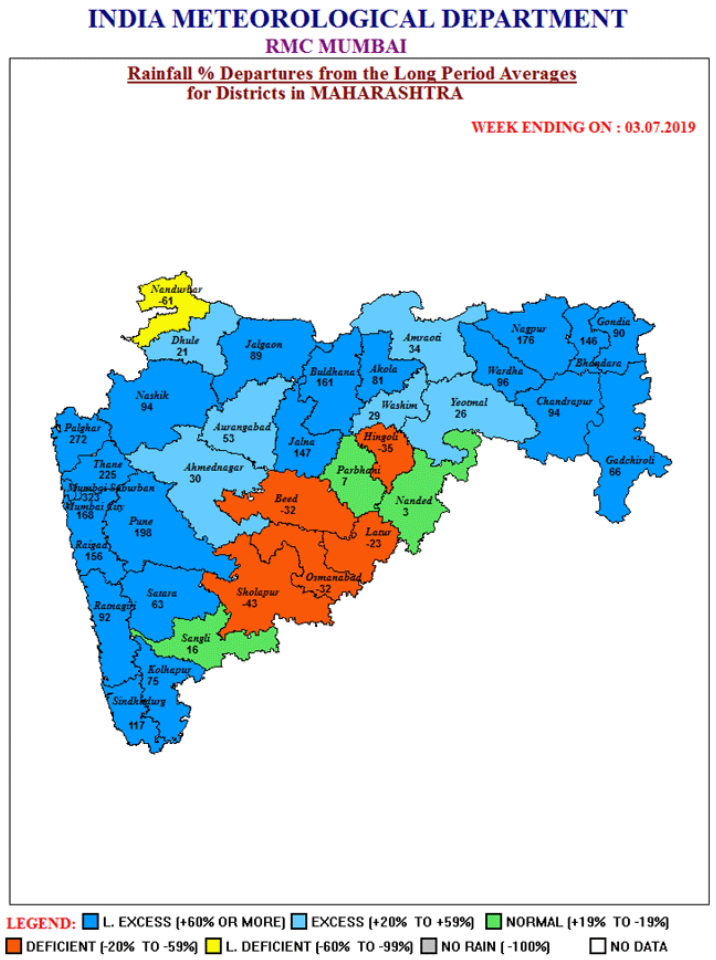
Extreme to severe drought condition has most of the State in India is recovering except Bihar and Chhattisgarh, and Tamil Nadu state.

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

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



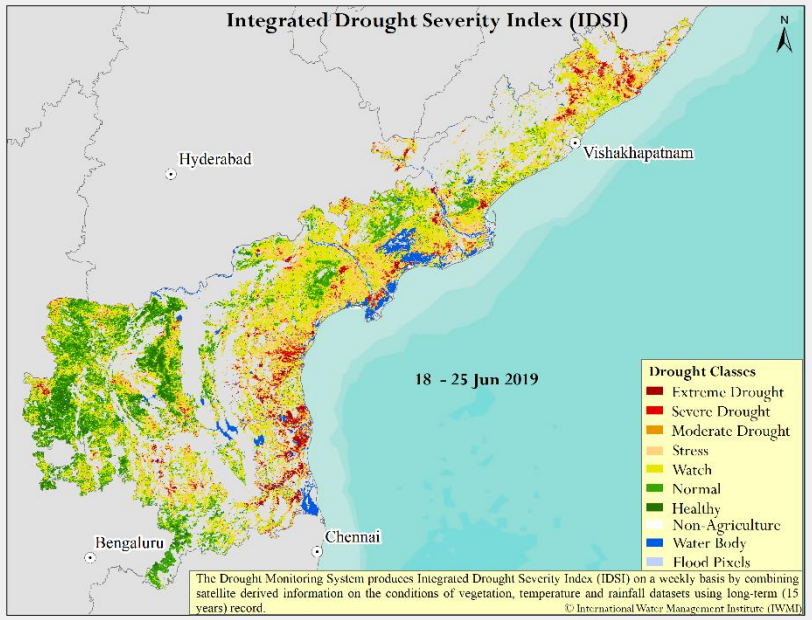


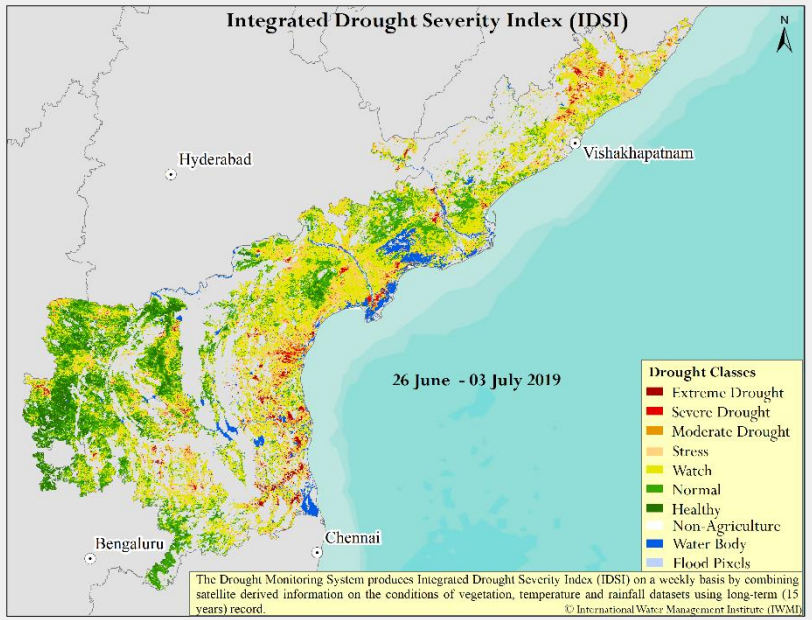


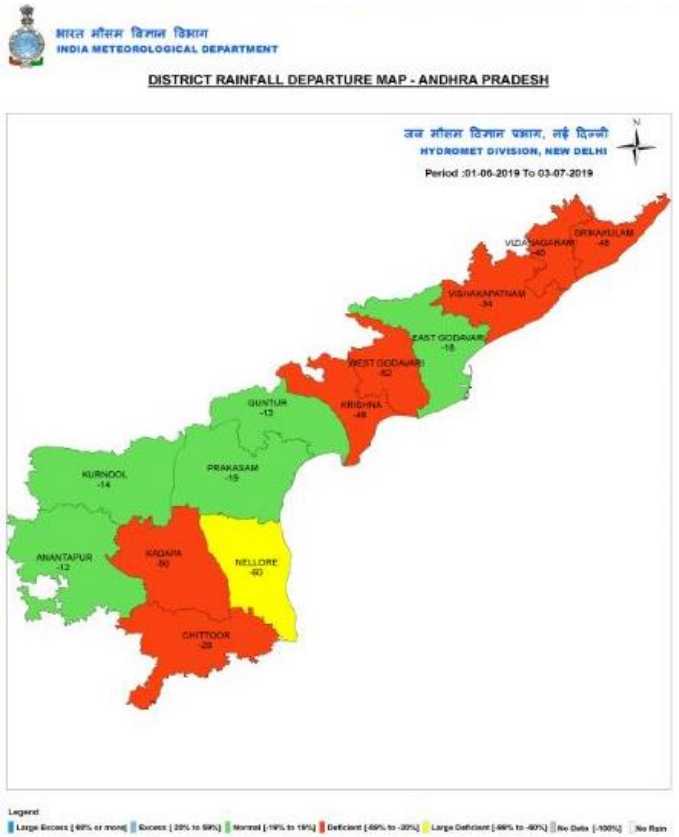
Summary:

- 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 Sothern and Eastern district most of the of the districts are recovering from 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)







Rainfall Status (Avg from 01-06-2019 to till date)
Actual 23.3mm, Deviation -66.7%

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

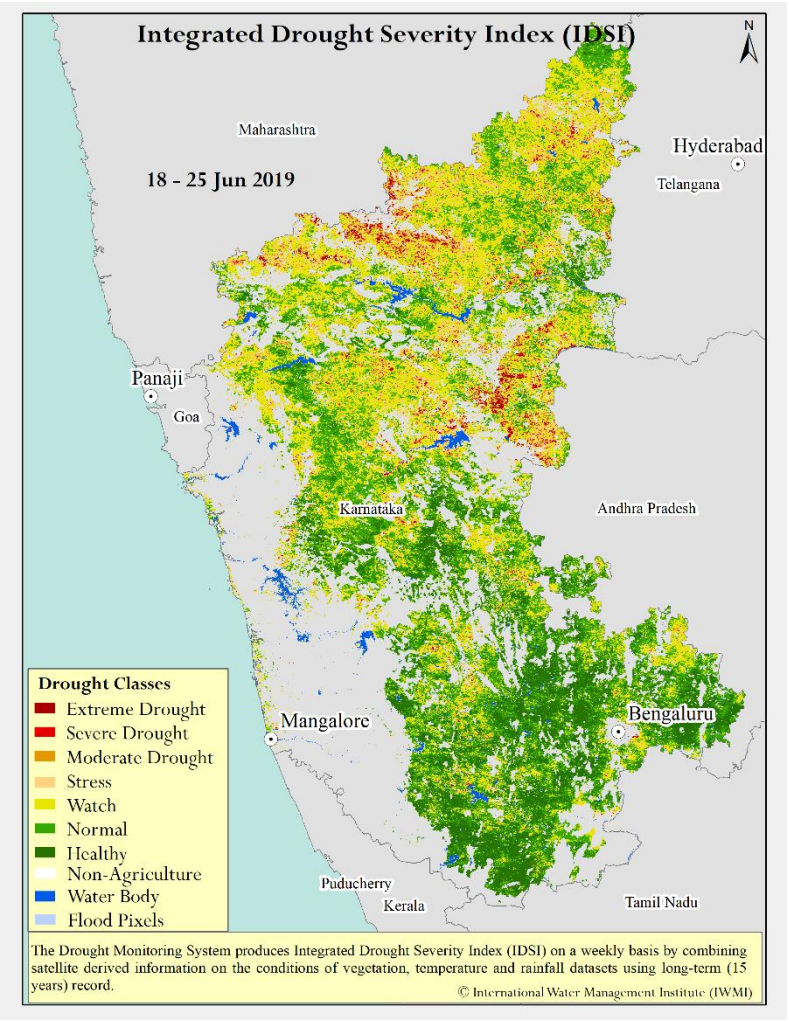
District	Actual	Normal	Deviation(%)	Status
Srikakulam	22.3	101.2	-78.0	Scanty
Vizianagaram	35.5	96.9	-63.4	Scanty
Vishakapatnam	43.7	99.7	-56.2	Deficient
East Godavari	34.5	87.2	-60.4	Scanty
West Godavari	15.5	80.2	-80.7	Scanty
Krishna	9.6	68.7	-86.0	Scanty
Guntur	21.3	61.4	-65.3	Scanty
Prakasham	8.5	43.0	-80.2	Scanty
Nellore	2.6	43.6	-94.0	Scanty
Chittoor	27.3	63.0	-56.7	Deficient
Kadapa	19.7	56.9	-65.4	Scanty
Anantapur	37.0	50.8	-27.2	Deficient
Kurnool	23.7	57.2	-58.6	Deficient
State	**23.3**	**70.0**	**-66.7**	**Scanty**

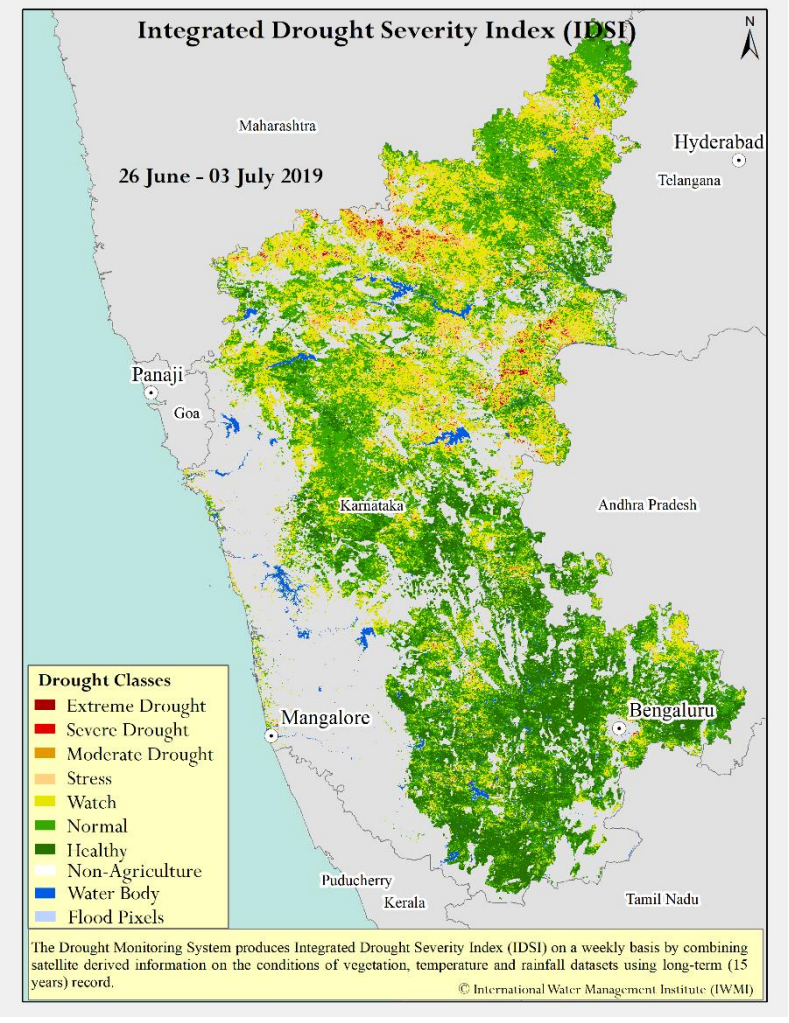
Data Source: APSDPS

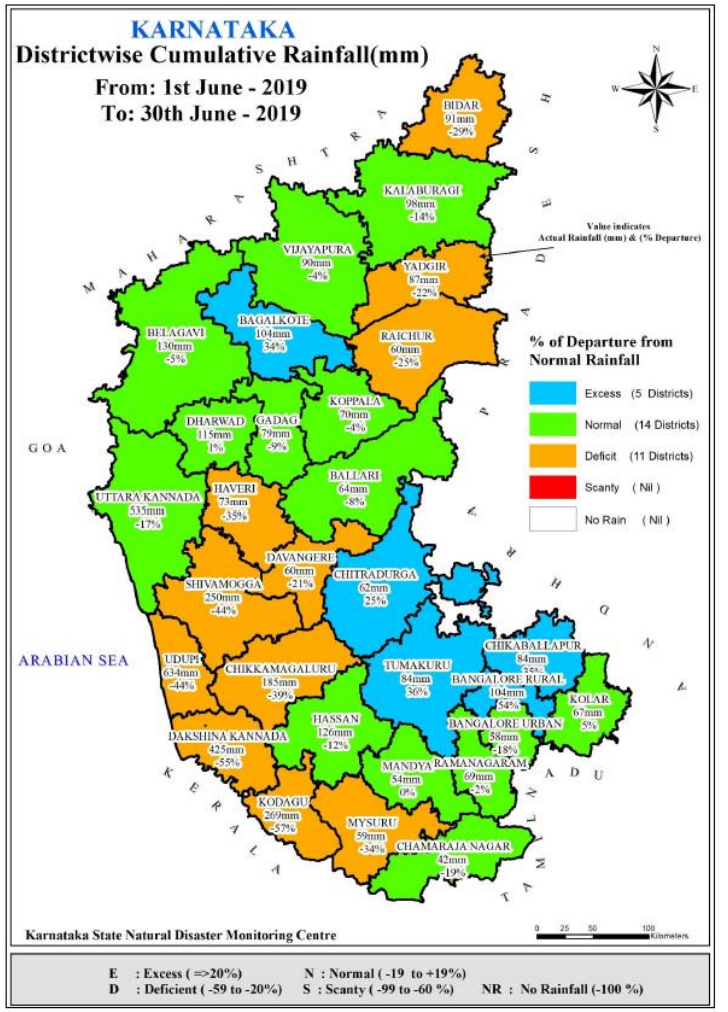
Summary:

- Out of the 13 districts in A.P., 8 districts had low rainfall from June 1 to 03 July 2019;
- 'Stress to extreme drought' category is reducing all over the district from previous week.
- Negative rainfall anomalous condition has reduced from 01 to 03 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 costal district of the state.

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

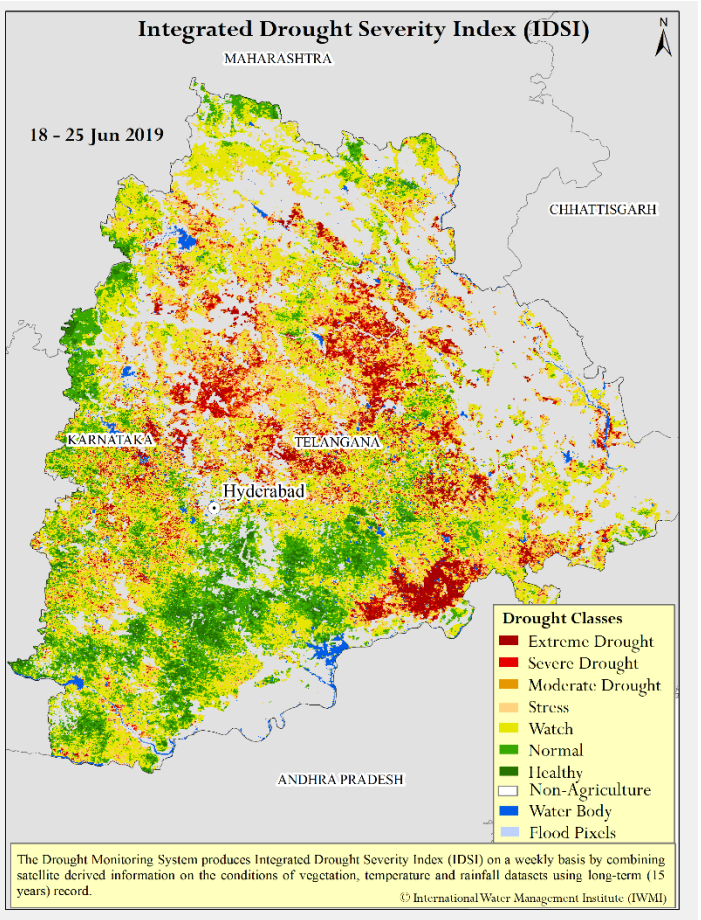


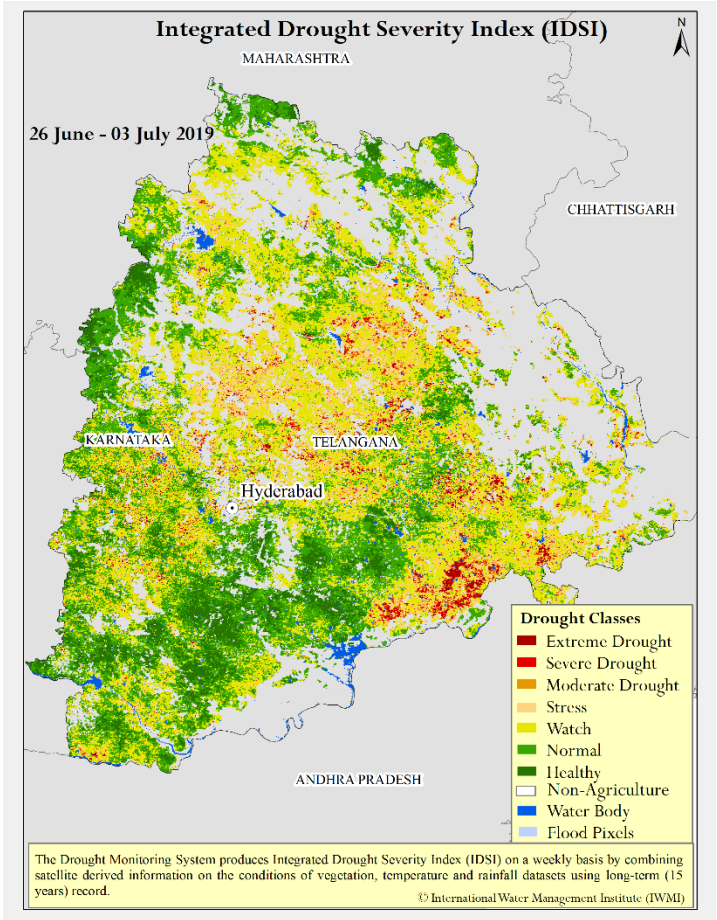




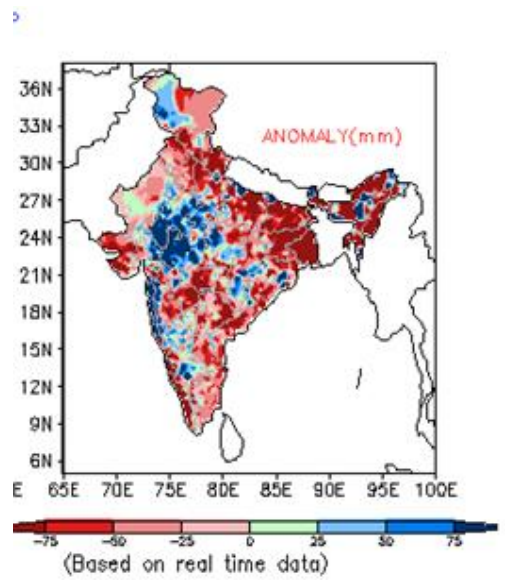
The Integrated Drought Severity Index (IDSI) for Karnataka were assessed at district level. The condition of vegetation has been slightly affected along north central district only, southern and eastern region of the State reduce the drought condition due to excess rainfall (Slide1). Extreme drought condition in the many district has changing watch to normal from last week of current week of June. Specially in Sothern districts are in Healthy category.

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





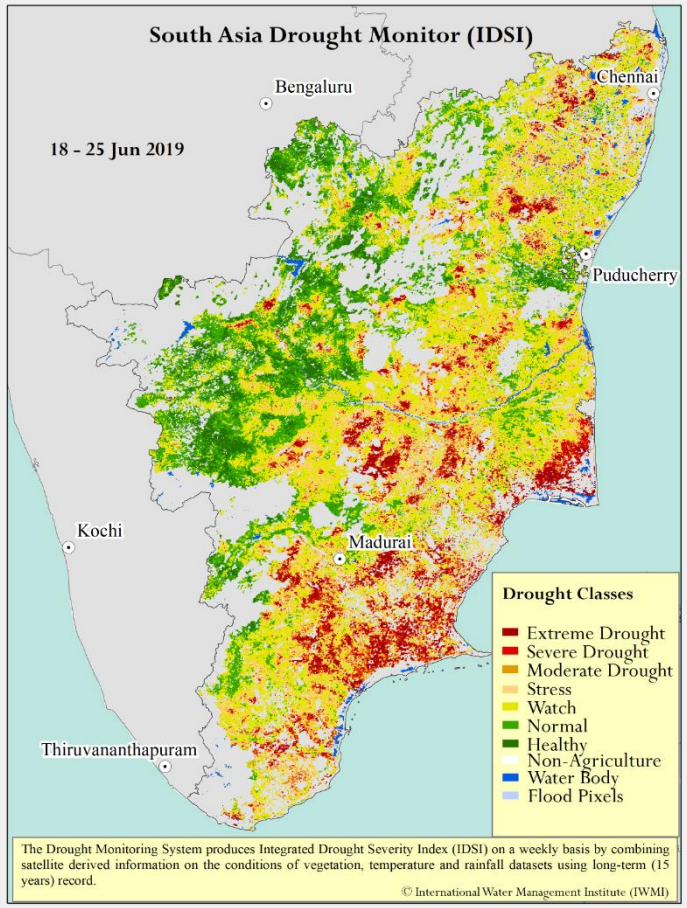
01 June – 08 July 2019

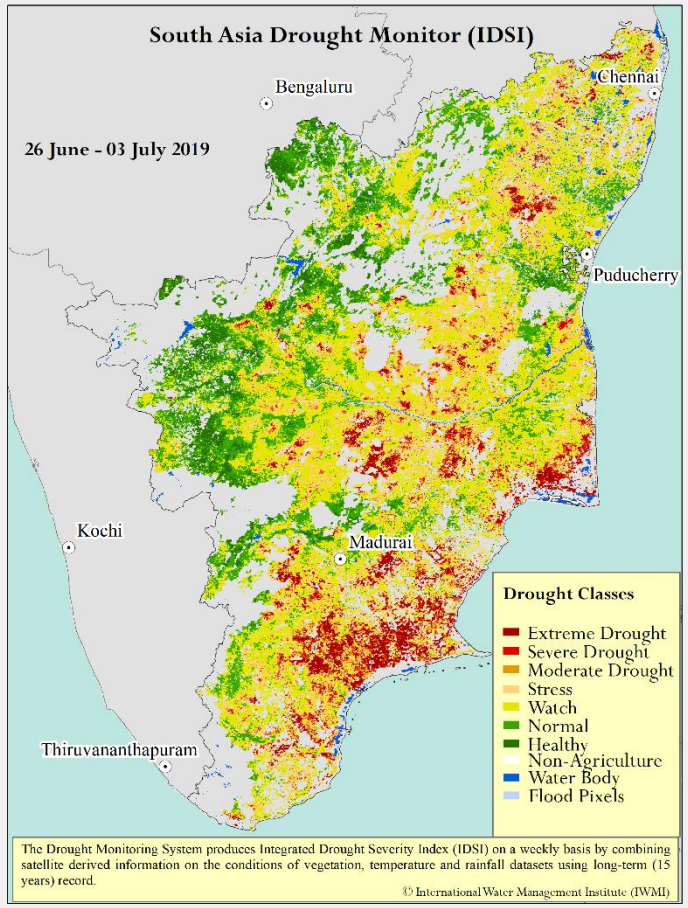


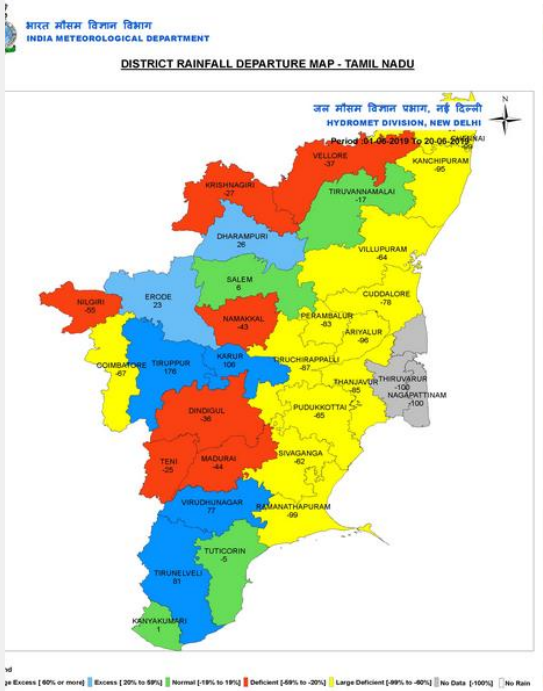
Summary:

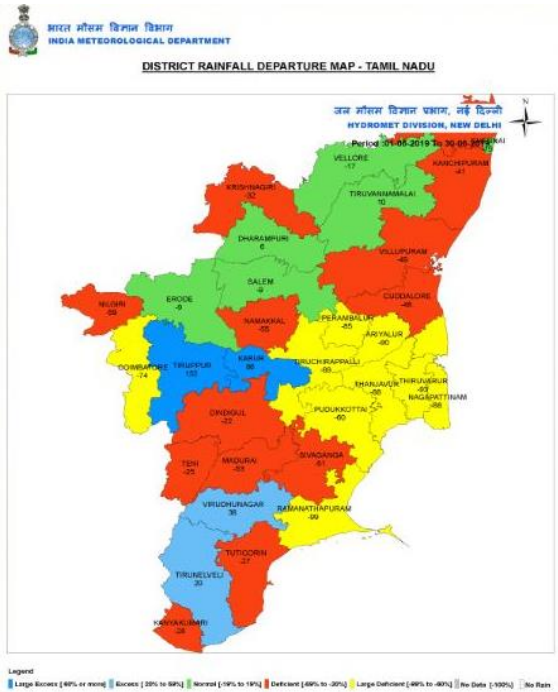
The Integrated Drought Severity Index (IDSI) for Telangana was assessed at district level. There seems to be reduction of drought condition from previous week drastically. More than 20 % of the state is recovering extreme to severe drought condition from last week to watch to moderate. South west district of the States are observed to have extreme to watch category while some patches are represent the severe category.

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

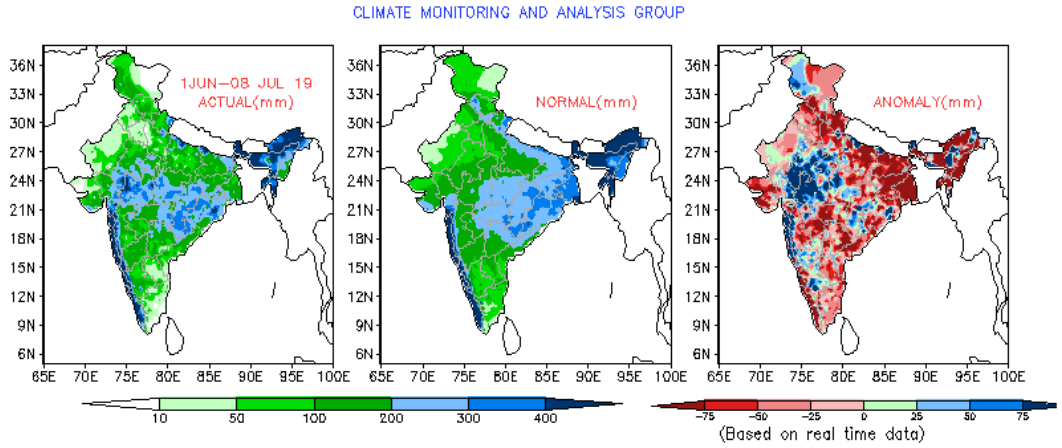








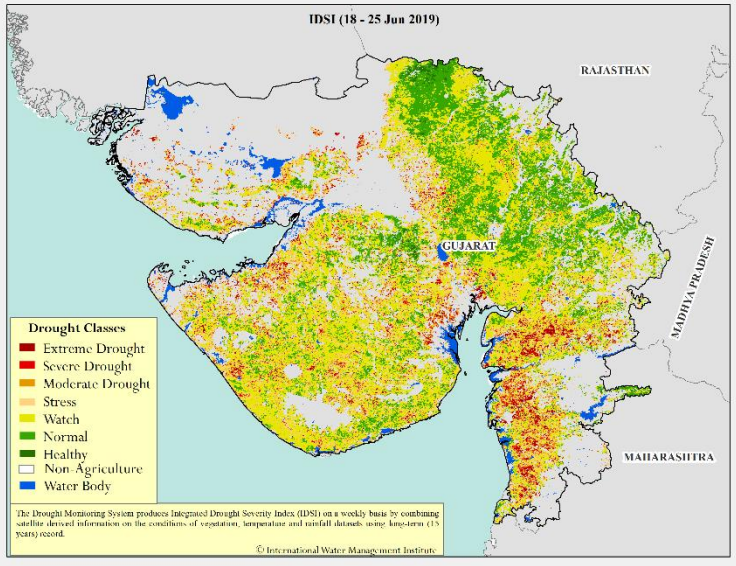
01 June – 08 July 2019

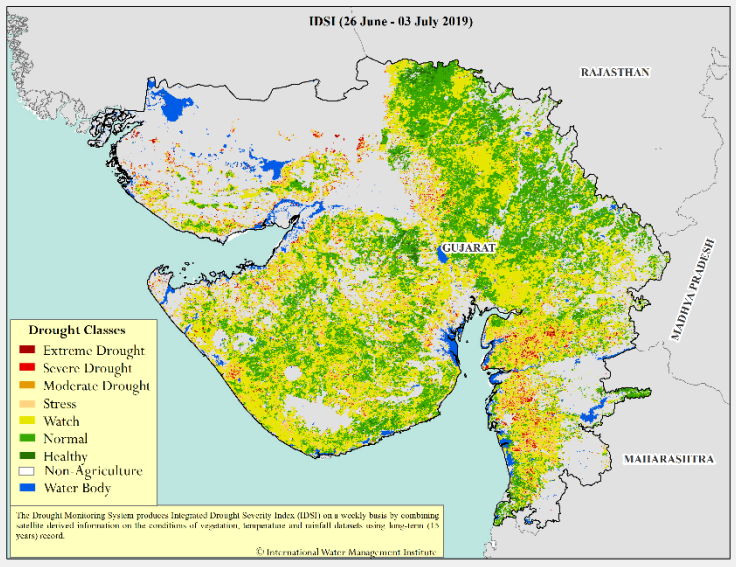


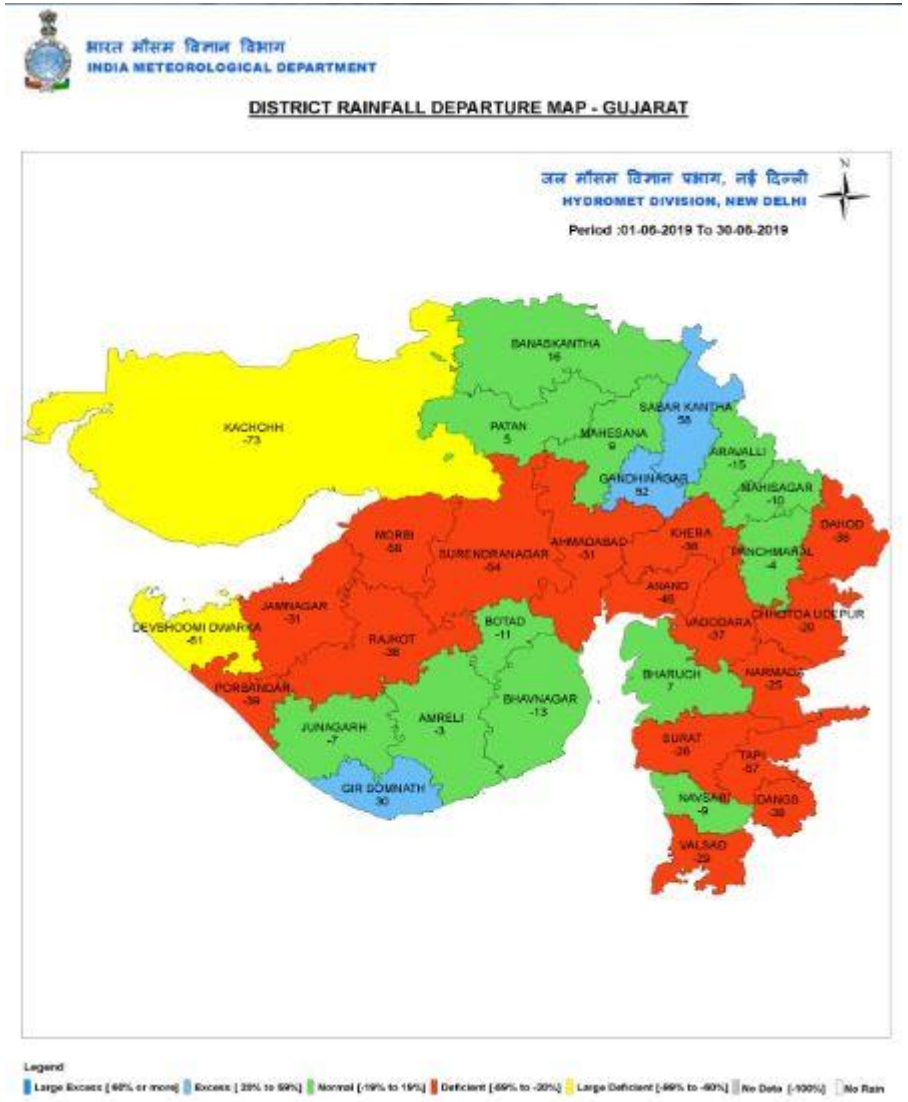
Summary:

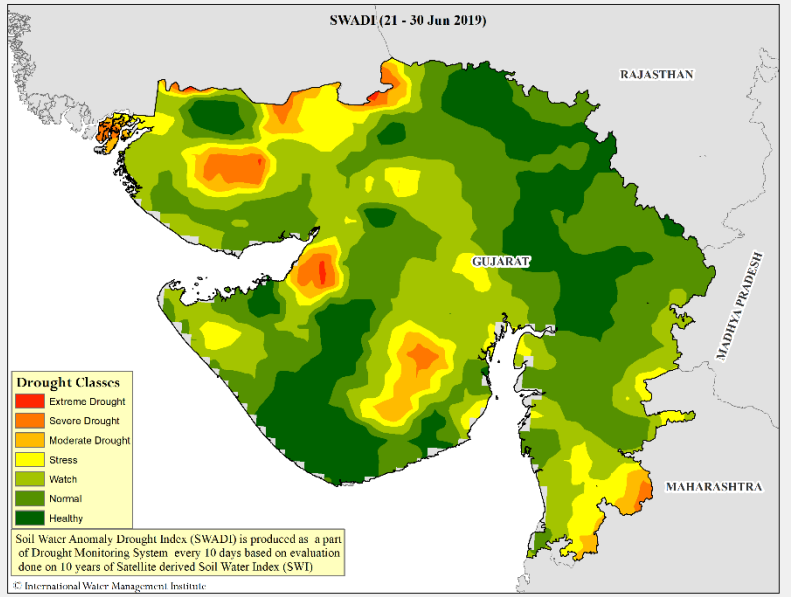
- Overall drought condition is slightly recovering from previous analysis cycle. Also south, South-East, North and of Tamil Nadu seem to have 'moderate' to 'severe' drought at the week ending on 03rd of June 2019. Most of western districts are under the 'watch' to 'Health' category in IDSI which is giving 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)





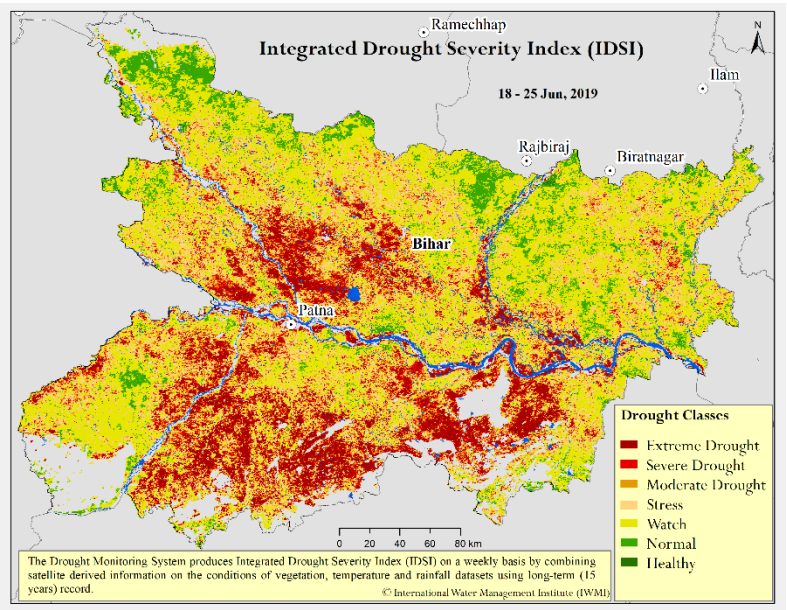


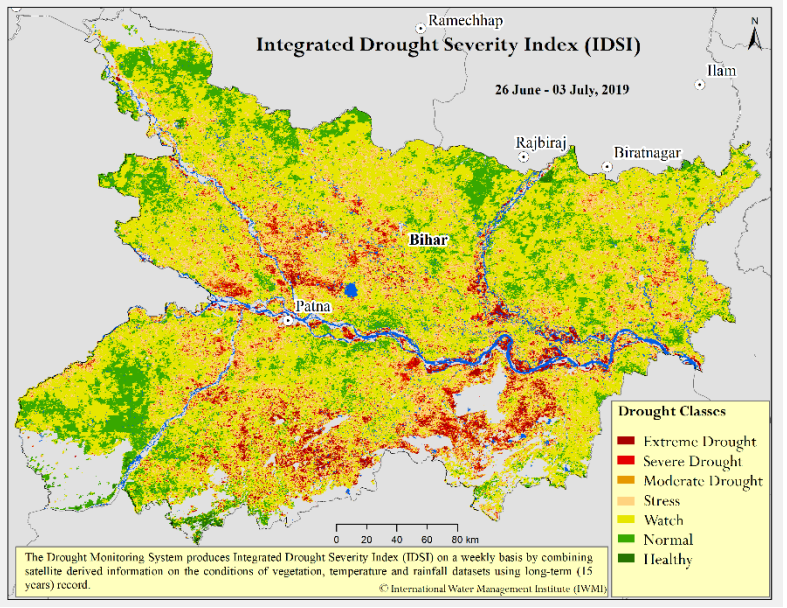


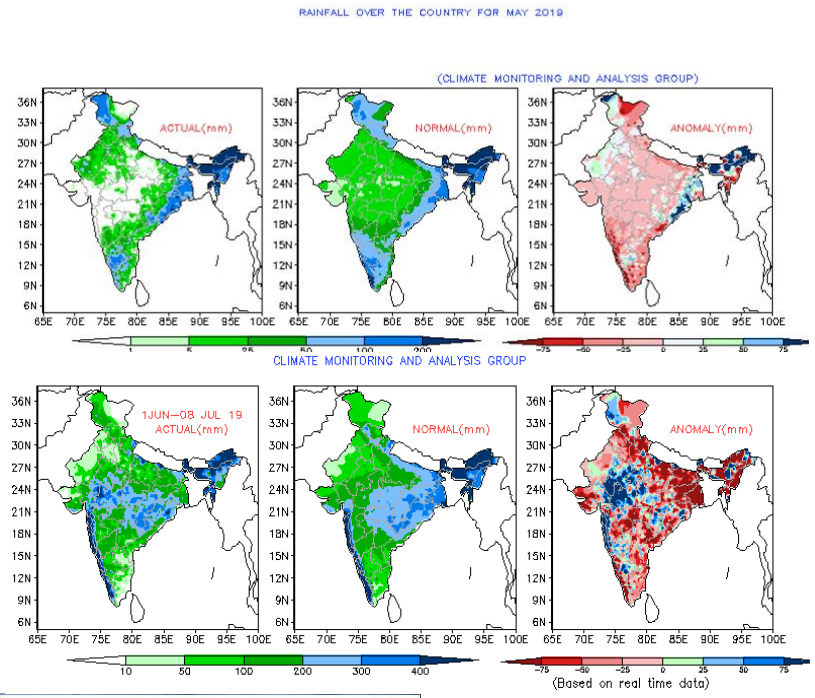
Summary:

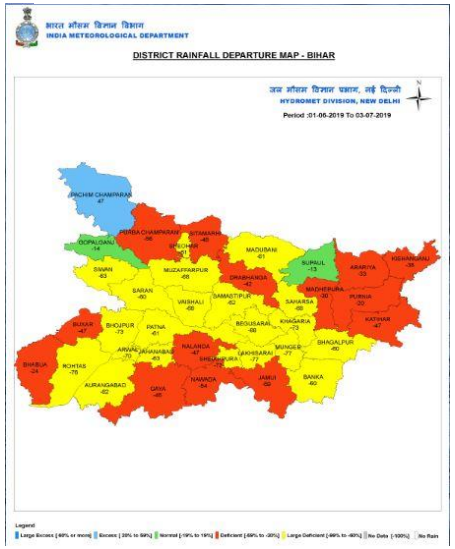
- Overall the state is recovering from extreme to watch drought condition form previous to resent week.
- There is excess to normal rainfall for 50% of the state but still there are few districts 50-100% rainfall deficient from 1 June to 03 July
- Overall, it can be observed that most of the districts are recovering from extremely severe drought towards moderate to watch category.

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









India Meteorological Department
Hydromet Division, New Delhi

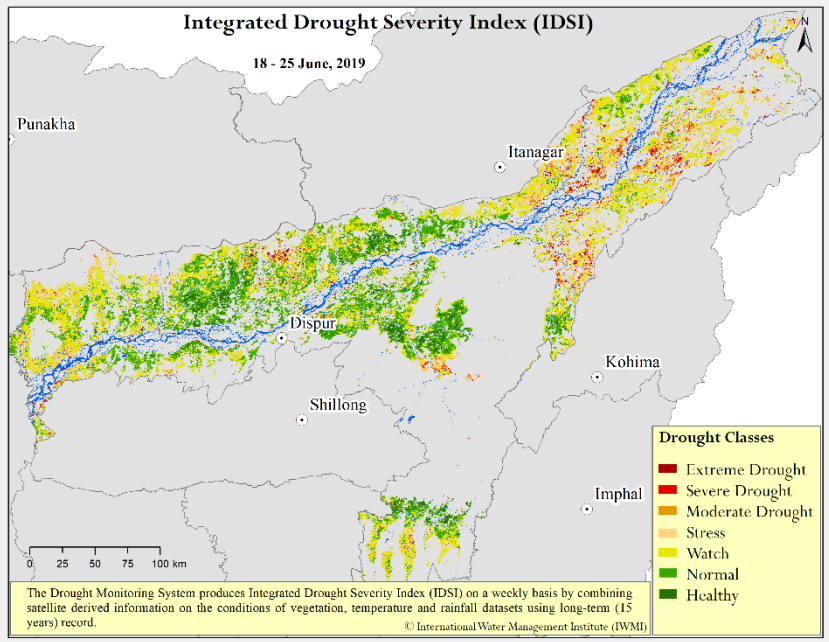
DISTRICT-WISE RAINFALL DISTRIBUTION

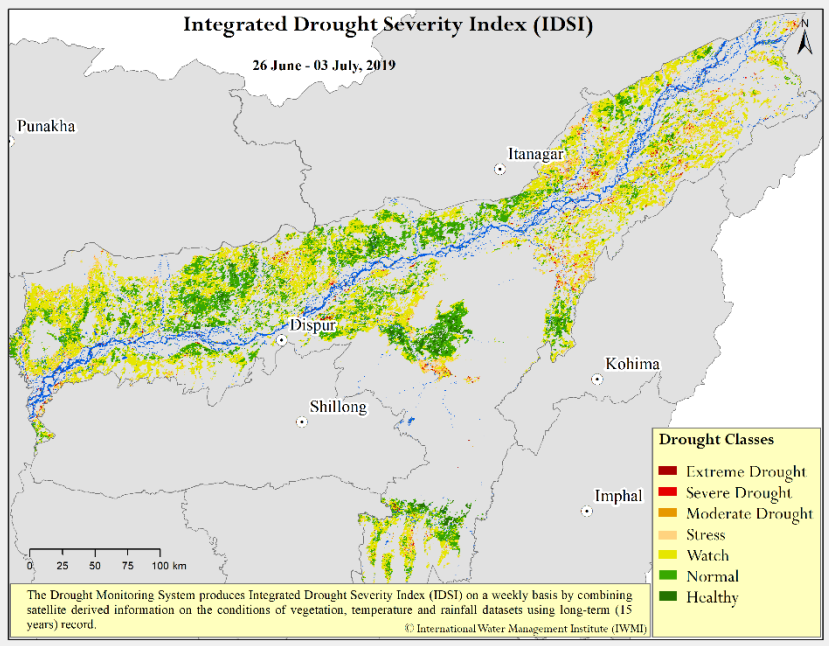
S NO	MET. SUBDIVISION/UT/STATE/DISTRICT	Day :12-06-2019				Period:01-06-2019 To 12-06-2019			
		ACTUAL (mm)	NORMAL (mm)	%DEP.	CAT.	ACTUAL (mm)	NORMAL (mm)	% DEP.	CAT.
	SUBDIVISION : BIHAR	1.7	9.7	-83%	LD	112.0	210.5	-47%	D
1	ARARIYA	0.0	13.0	-100%	NR	198.7	309.2	-36%	D
2	ARWAL	1.1	5.8	-80%	LD	39.6	132.6	-70%	LD
3	AURANGABAD	1.2	6.6	-81%	LD	27.8	154.8	-82%	LD
4	BANKA	9.2	9.4	-2%	N	79.7	187.8	-58%	D
5	BEGUSARAI	4.9	10.4	-53%	D	27.7	208.5	-87%	LD
6	BHABUA	0.0	6.4	-100%	NR	113.1	154.2	-27%	D
7	BHAGALPUR	13.9	10.8	28%	E	99.9	223.9	-55%	D
8	BHOJPUR	0.0	7.1	-100%	NR	39.5	152.8	-74%	LD
9	BUXAR	0.0	4.5	-100%	NR	68.6	133.1	-48%	D
10	DRABHANGA	0.0	7.4	-100%	NR	106.0	189.6	-44%	D
11	GAYA	0.1	5.3	-99%	LD	87.5	168.3	-48%	D
12	GOPALGANJ	0.0	10.9	-100%	NR	153.1	189.6	-19%	N
13	JAHANABAD	2.4	9.5	-75%	LD	53.7	147.6	-64%	LD
14	JAMUI	2.0	10.7	-81%	LD	79.8	200.0	-60%	LD
15	KATIHAR	1.2	9.2	-87%	LD	134.4	260.1	-48%	D
16	KHAGARIA	12.0	7.9	51%	E	72.3	230.4	-69%	LD
17	KISHANGANJ	0.0	19.5	-100%	NR	256.4	433.8	-41%	D
18	LAKHISARAI	9.4	8.5	11%	N	42.8	151.7	-72%	LD
19	MADHEPURA	0.3	9.0	-96%	LD	169.7	252.0	-33%	D
20	MADUBANI	0.0	13.0	-100%	NR	76.8	211.4	-64%	LD
21	MUNGER	0.0	10.4	-100%	NR	47.6	215.3	-78%	LD
22	MUZAFFARPUR	0.2	9.0	-97%	LD	62.8	202.4	-69%	LD
23	NALANDA	1.7	9.8	-82%	LD	84.1	166.2	-49%	D
24	NAWADA	1.9	9.0	-79%	LD	76.7	170.2	-55%	D
25	PACHIM CHAMPARAN	0.0	14.8	-100%	NR	377.3	271.5	39%	E
26	PATNA	0.4	7.8	-95%	LD	61.9	164.8	-62%	LD
27	PURBA CHAMPARAN	0.0	8.2	-100%	NR	95.4	222.7	-57%	D
28	PURNIA	1.0	14.6	-93%	LD	263.5	343.8	-23%	D
29	ROHTAS	2.6	7.2	-64%	LD	34.8	141.9	-75%	LD
30	SAHARSA	0.3	15.2	-98%	LD	93.3	304.7	-69%	LD
31	SAMASTIPUR	0.6	7.5	-92%	LD	74.0	200.7	-63%	LD
32	SARAN	1.8	8.8	-79%	LD	67.5	173.3	-61%	LD
33	SHEIKHPURA	0.0	10.7	-100%	NR	48.8	183.6	-73%	LD
34	SHEOHAR	0.0	11.7	-100%	NR	88.6	241.8	-63%	LD
35	SITAMARHI	0.0	14.1	-100%	NR	124.3	251.0	-50%	D
36	SIWAN	1.7	8.1	-79%	LD	64.9	180.7	-64%	LD
37	SUPAUL	0.0	10.1	-100%	NR	206.1	247.7	-17%	N
38	VAISHALI	0.0	7.3	-100%	NR	56.7	187.2	-70%	LD

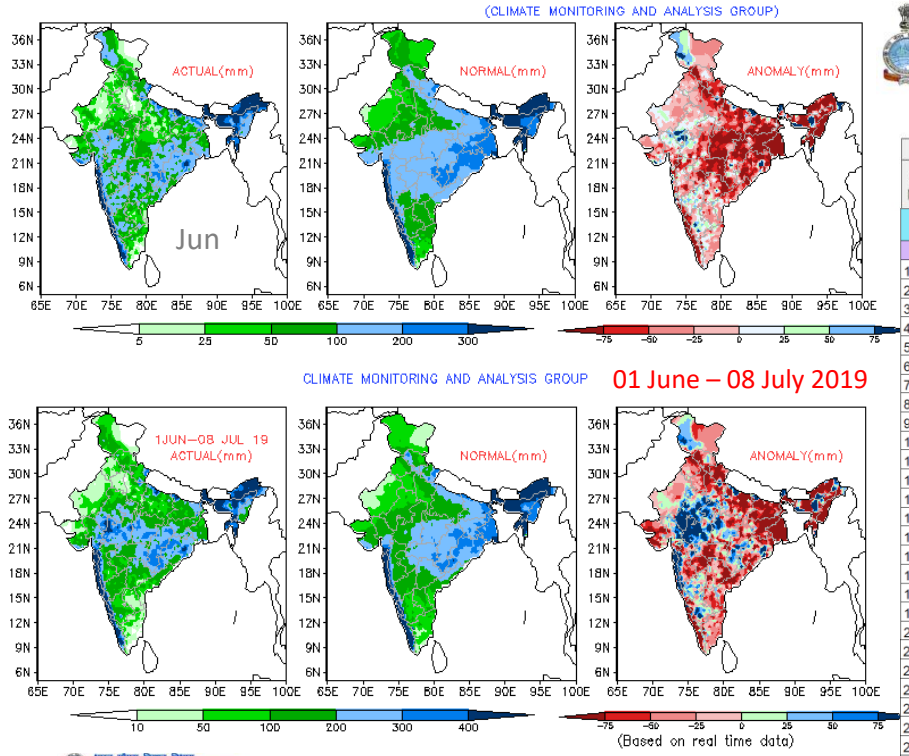
Summary:

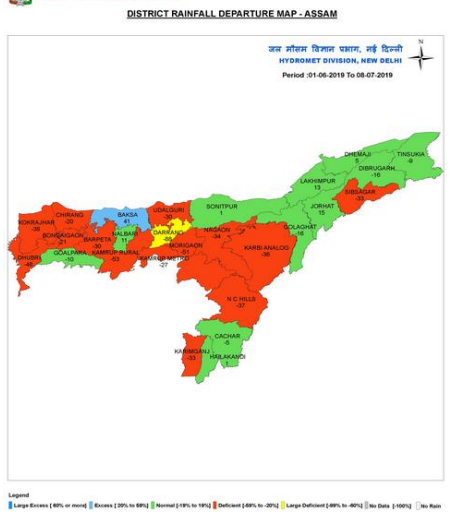
- The drought severity in all parts of Bihar seems to be recovering to severe in the weeks are ending on 3rd of July. Most of the districts has recover from drought compare to previous week specially in southern districts.
- This has happened because of all the district shows deficit rainfall compared to normal but the 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

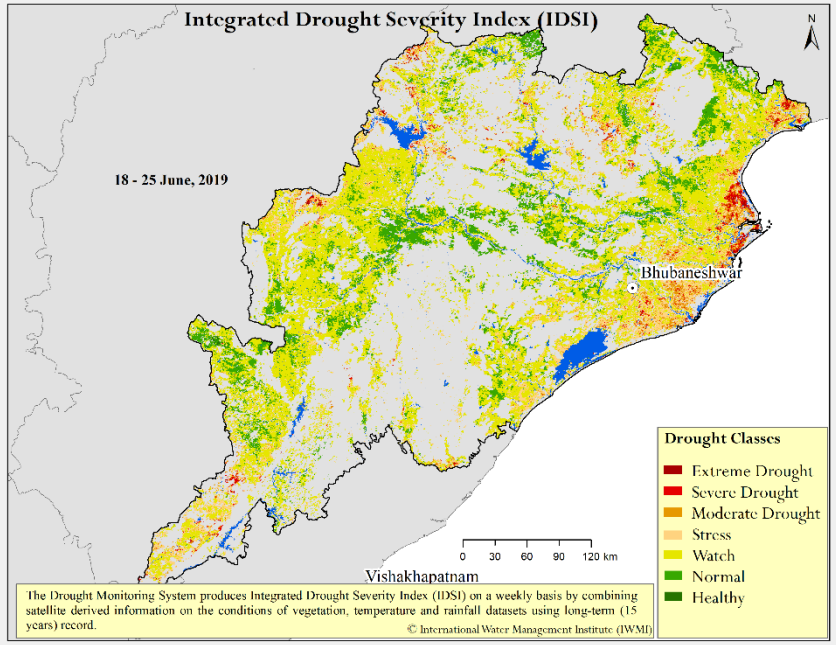
S NO	MET. SUBDIVISION/UT/STATE/DISTRICT	Day :30-06-2019 ACTUAL (mm)	NORMAL (mm)	%DEP.	CAT.	Period:01-06-2019 To 30-06-2019 ACTUAL (mm)	NORMAL (mm)	% DEP.	CAT.
	SUBDIVISION : ASSAM & MEGHALAYA	28.7	21.1	36%	E	451.2	635.9	-29%	D
	STATE : ASSAM	28.1	15.4	82%	LE	396.6	531.1	-25%	D
1	BAKSA	6.8	14.5	-53%	D	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

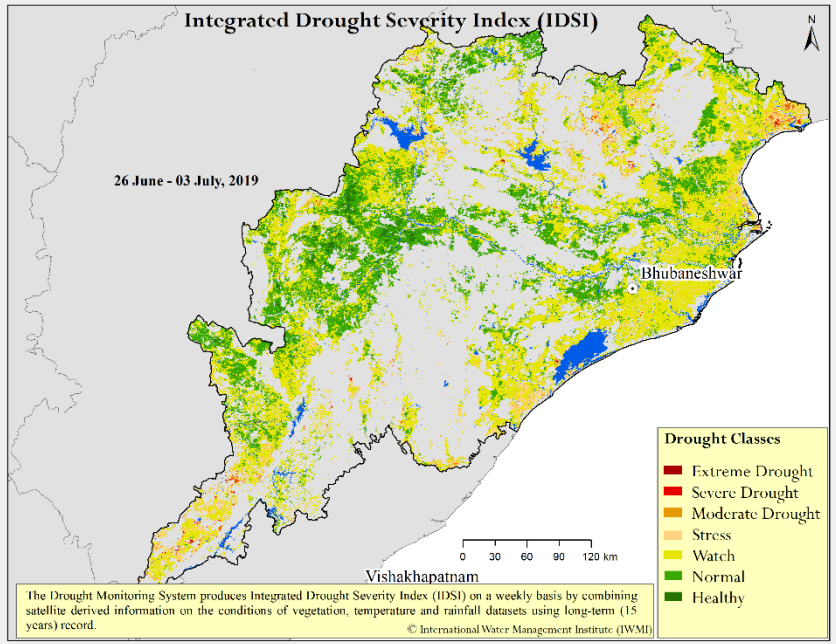
Summary:

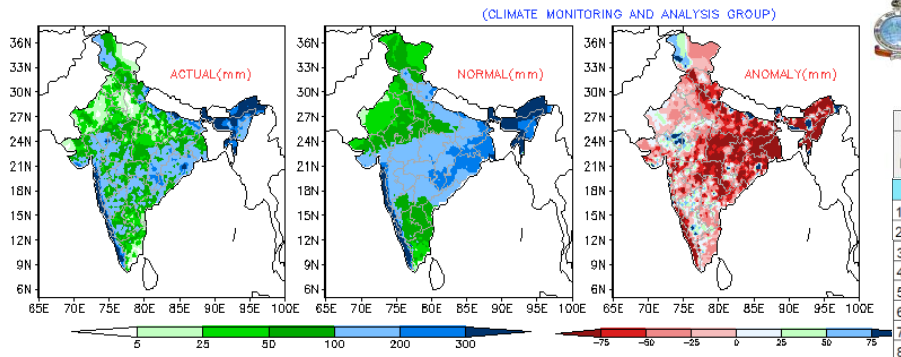
The drought severity in many parts of Assam seems to be decrease compare to previous week specially severe to watch drought category in previous week reduced up watch and moderate in north-eastern districts, simultaneously normal to healthy drought category observed rest of the area.

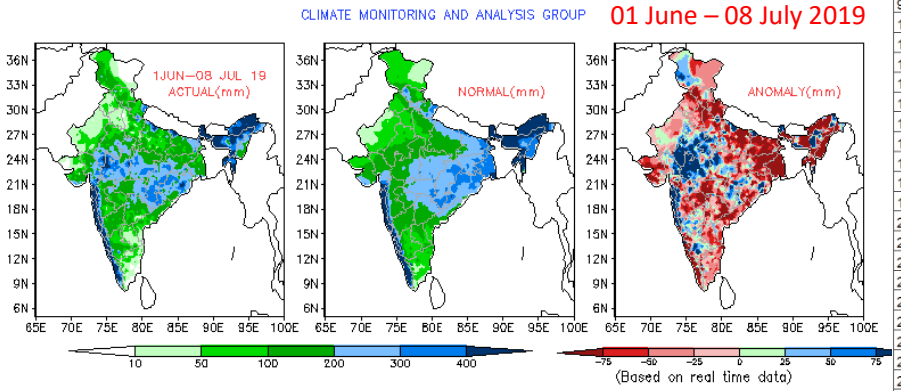
This has happened because of most of southern and eastern district shows reduction of deficit rainfall and increase the rainfall sue to activation of South west monsoon over India.

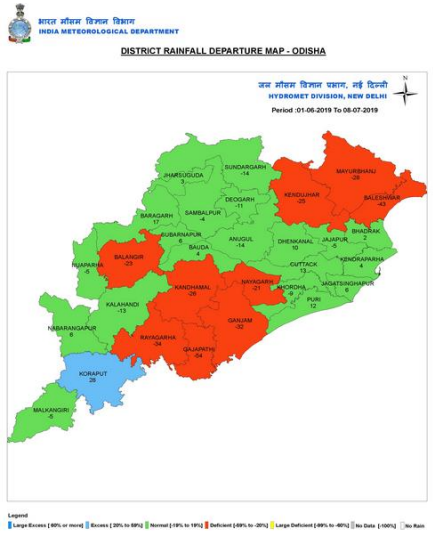
South Asia Drought Monitoring System (SADMS) – Agriculture Assessment (Odisha)











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 : ODISHA	7.8	11.2	-30%	D	261.9	286.9	-9%	N
1	ANUGUL	5.6	12.0	-53%	D	235.0	266.6	-12%	N
2	BALANGIR	3.9	13.0	-70%	LD	231.5	285.9	-19%	N
3	BALESHWAR	0.0	10.4	-100%	NR	186.8	324.0	-42%	D
4	BARAGARH	28.5	13.9	105%	LE	347.5	290.0	20%	E
5	BAUDA	0.7	15.5	-96%	LD	291.0	270.3	8%	N
6	BHADRAK	5.8	8.2	-29%	D	281.2	268.0	5%	N
7	CUTTACK	4.0	12.4	-68%	LD	331.3	287.8	15%	N
8	DEOGARH	9.6	13.5	-29%	D	290.3	316.2	-8%	N
9	DHENKANAL	5.6	10.2	-45%	D	308.6	271.8	14%	N
10	GAJAPATHI	2.9	9.7	-70%	LD	119.3	267.2	-55%	D
11	GANJAM	1.8	6.4	-72%	LD	150.9	217.3	-31%	D
12	JAGATSINGHAPUR	2.2	9.0	-76%	LD	276.0	253.0	9%	N
13	JAJAPUR	8.2	11.0	-26%	D	353.6	362.3	-2%	N
14	JHARSUGUDA	24.0	15.4	56%	E	317.8	297.4	7%	N
15	KALAHANDI	3.3	11.7	-72%	LD	273.0	298.4	-9%	N
16	KANDHAMAL	5.0	13.6	-63%	LD	218.1	287.8	-24%	D
17	KENDRAPARHA	8.5	6.7	27%	E	277.8	262.4	6%	N
18	KENDUJHAR	3.5	11.6	-70%	LD	235.9	309.0	-24%	D
19	KHORDHA	0.5	8.3	-95%	LD	244.2	259.5	-6%	N
20	KORAPUT	15.7	8.7	81%	LE	367.8	283.7	30%	E
21	MALKANGIRI	3.0	8.0	-62%	LD	230.9	258.6	-11%	N
22	MAYURBHANJ	8.4	9.4	-10%	N	258.2	354.6	-27%	D
23	NABARANGAPUR	10.2	10.1	1%	N	363.8	330.7	10%	N
24	NAYAGARH	0.0	9.6	-100%	NR	220.8	266.5	-17%	N
25	NUAPARHA	0.6	13.1	-95%	LD	254.8	252.6	1%	N
26	PURI	1.0	7.9	-87%	LD	264.8	231.4	14%	N
27	RAYAGARHA	8.1	10.1	-20%	D	171.1	250.2	-32%	D
28	SAMBALPUR	32.1	13.5	138%	LE	306.7	316.2	-3%	N
29	SUBARNAPUR	12.9	13.1	-1%	N	319.1	290.2	10%	N
30	SUNDARGARH	6.9	15.4	-55%	D	257.5	296.0	-13%	N

Summary:

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

Only 12 districts observed 10-50% deficient and all the other districts convert in to normal or above normal rainfall 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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