Fortnightly Report of Seasonal Condition
Integrated Seasonal Condition Monitoring System

Month of June 2016

NDVI

Satellite Image

Seasonal Condition

NDWI

TRAC

TELANGANA STATE
REMOTE SENSING
APPLICATIONS CENTRE

Planning Department, Government of Telangana, Hyderabad - 500 038
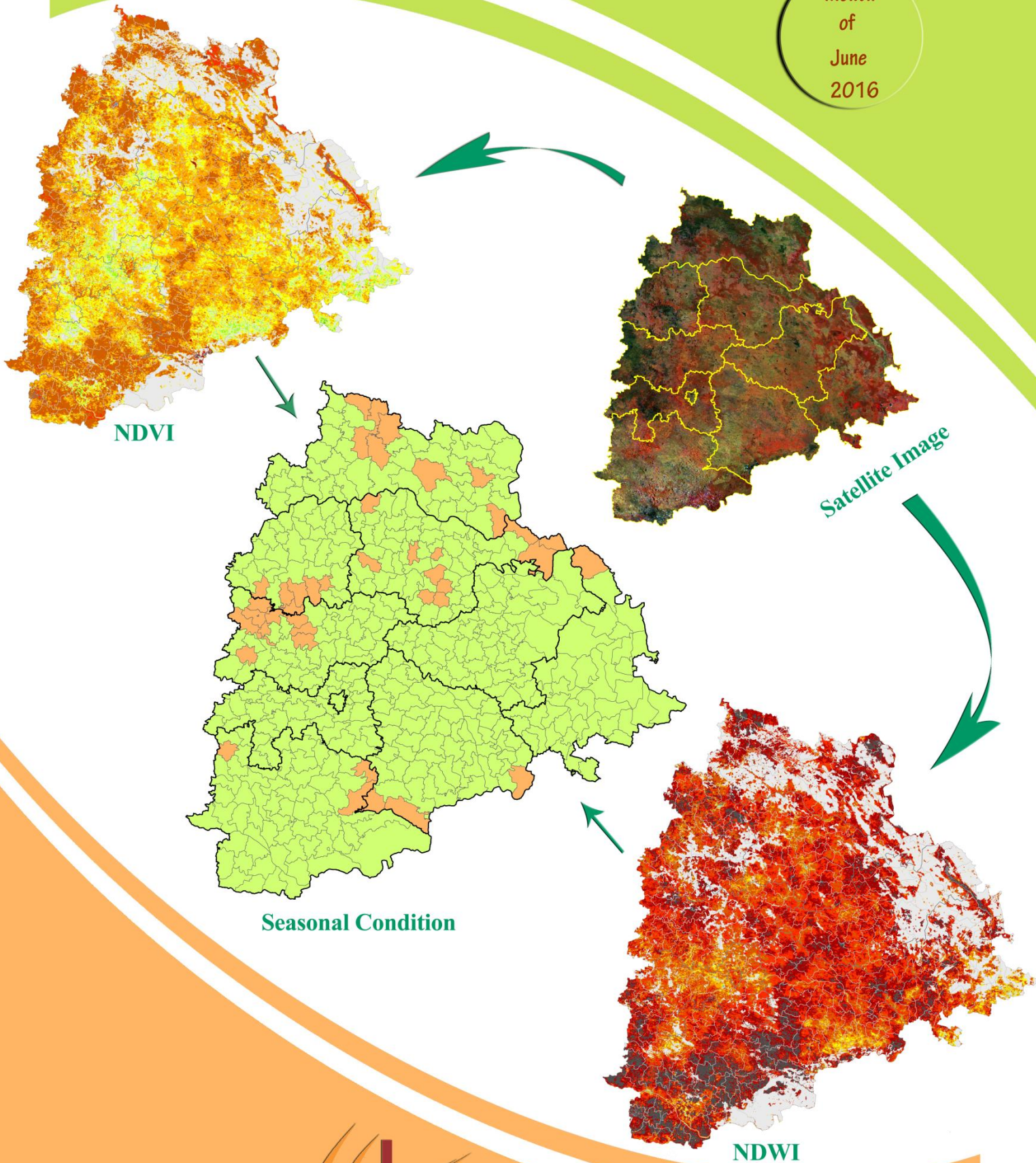
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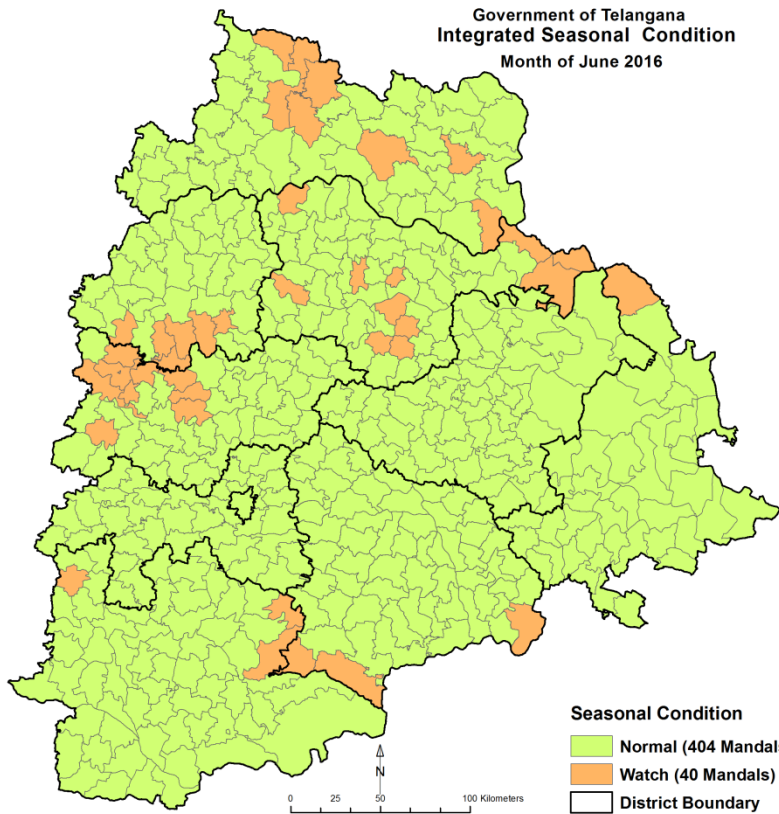
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HIGHLIGHTS

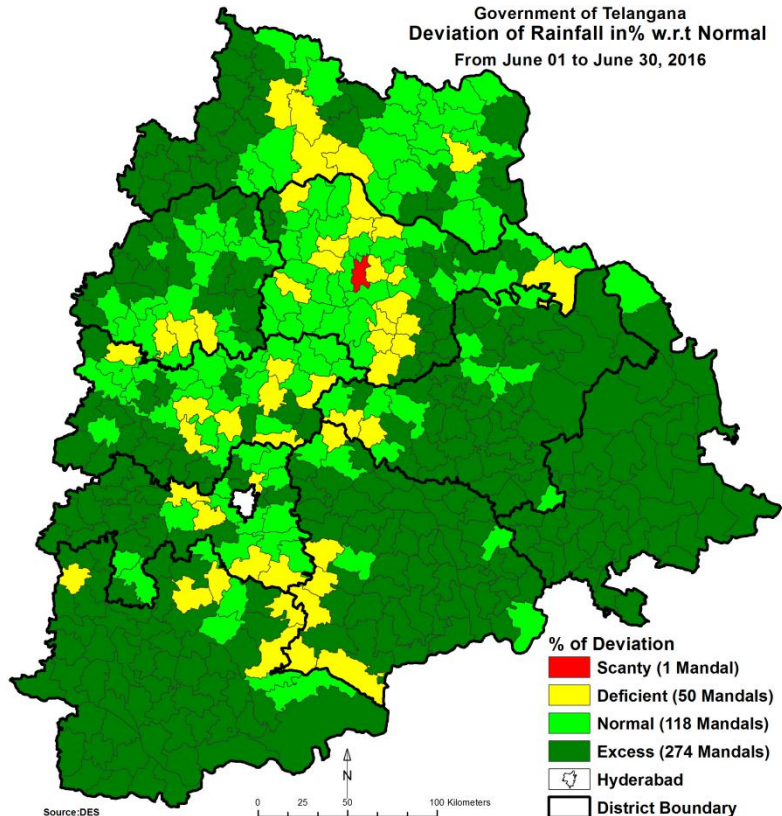## INTEGRATED SEASONAL CONDITION MONITORING SYSTEM (ISMS)

TELANGANA
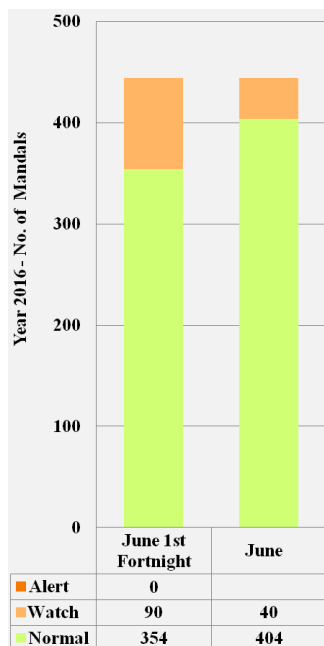
Cumulative Report up to 30th June, 2016

- Seasonal condition is categorised as **"Normal"** in **404** Mandals as on date 30th June 2016

- Seasonal condition is categorised as **"Watch"** in **40** Mandals as on date 30th June 2016

Government of Telangana
Integrated Seasonal Condition
Month of June 2016

Seasonal Condition
- Normal (404 Mandals)
- Watch (40 Mandals)
- District Boundary

Seasonal Condition Up to Month of June, 2016

Government of Telangana
Deviation of Rainfall in% w.r.t Normal
From June 01 to June 30, 2016

Source:DES

% of Deviation
- Scanty (1 Mandal)
- Deficient (50 Mandals)
- Normal (118 Mandals)
- Excess (274 Mandals)
- Hyderabad
- District Boundary

Rainfall from 1st June to 30th June, 2016

Seasonal condition of Telangana up to Month of June 2016

	June 1st Fortnight	June
Alert	0	
Watch	90	40
Normal	354	404

Rainfall 01st June to 30th June, 2016

- **01** Mandal out of 443 (**0.23%**) of state received **scanty rainfall**. **50** Mandals (**11.29%**) of the state received **deficit rainfall**.

- **118** Mandals (**26.64%**) and **274** Mandals (**61.85%**) have received **Normal** and **Excess** rainfall respectively.

- **No Rainfall (-100%)**
- **Scanty (-60 % to -90%)**
- **Deficient (-59% to -20%)**
- **Normal (-19% to +19%)**
- **Excess (>19%)**

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1. Background and Rationale

National Agricultural Drought Assessment and Monitoring System (NADAMS) project of National Remote Sensing Centre (NRSC), ISRO established a remote sensing based drought assessment protocol utilizing the NDVI and NDWI. The Government of India has established Mahalanobis National Crop Forecast Centre (MNCFC) under Department of Agriculture & Cooperation at New Delhi for carrying out drought assessment at national level.

The Department of Agriculture & Cooperation, Government of India published a drought manual in 2009 which suggested parameters like Rainfall deficiency, Area under sowing, NDVI, Moisture Adequacy Index (MAI) and some other indictors to declare drought. The Government of Telangana (GoTS) uses the following criterion for declaration of Drought.

1. Mandatory Condition - Rainfall deficiency of 25% (>1000 mm rainfall area) and 20% (999 to 750 mm rainfall area) and 15% (<750 mm rainfall area)

2. Minimum of two condition to be fulfilled out of following three

   a) Reduction in cropped areas of 50% and above under all principal crops.

   b) Reduction in yields(50% and above), in case of high input oriented crops ground nut, Bengal gram, hybrid sunflower yields may 40% reduction or above.

   c) Dry spells and its impact on crop damages.

Telangana State Development Planning Society (TSDPS) and CRIDA have developed software that assists in monitoring the all three agricultural, meteorological and hydrological drought situation. Telangana State Remote Sensing Applications Centre (TRAC) has established a protocol *Integrated Seasonal Condition Monitoring System (ISMS)*. The objectives of the ISMS are

- Concurrent monitoring of seasonal conditions using remote sensing, extensive weather network data and continuous ground truth.
- Develop an early warning (monitoring and forecasting) of drought using suite of indicators, which will help to increase drought preparedness, and identify and implement appropriate Disaster Risk Reduction (DRR) measures.
- Early Warning to the Districts/Mandals.

ISMS uses the rainfall data provided by Directorate of Economics & Statistics (DES), weekly progress of crop area sowings, ground water level and its fluctuation, command and non-command area, water releases data, reservoir levels in addition to the Normalized Difference Vegetation Index (NDVI) and Normalized Difference Water Index (NDWI) based methodology of MNCFC. This output is verified through ground truth, additionally in context of the state specific drought declaration criteria. The agricultural situation is classified in three to four categories as per the NRSC i.e. Normal,

Watch, Alert for June to August and Normal, Mild, Moderate and Severe for September to October. The details of the classification of agricultural situation are given in Table.1.

Table. 1. Classification of Agricultural situation

June - August	Normal	• Agricultural situation is normal
	Watch	• Progress of Agricultural situation is slow • Ample scope for recovery • No external intervention needed
	Alert	• Very slow progress of agricultural situation • Need for intervention. • Develop and implement contingency plans to minimise loss
September - October	Mild drought	• Crops have suffered stress slightly
	Moderate drought	• Considerable loss in production. • Take measures to alleviate suffering
	Severe	• High risk Significant reduction in crop yield • Management measures to provide relief

2. **Data used, Indicators and Methodology**

   2.1. **Data used**

   The details of data used under project is discussed in Table-2

Table. 2. Data source and indicators

Data source	Product	Indicators
MODIS (250/500m)	Surface reflectance	NDVI & NDWI
AWiFS	Surface reflectance	NDVI & NDWI
AWS/ DES	• Daily rainfall & soil moisture • Crop sown area • Crop cutting experiments	• Rainfall deviation • Dry spells • Soil moisture status • % deviation of crop sown area • Crop Yield
Agriculture Department	Weekly sowing progress	District wise sown areas deviation from normal
Irrigation Department	Reservoir levels/ Water release data	Command area Mandals under canal irrigation

2.2. Indicators and Index

2.2.1. Rainfall data

In Telangana, South-West Monsoon is crucial for agriculture sector. ISMS use mandal wise rainfall data provided by Directorate of Economics & Statistics (DES). This data is used for computation of meteorological drought situations and the conditions of the GoAP criteria.

2.2.2. Reservoir Water Levels

A scheme having Culturable Command Area (CCA) up to 2,000 hectares individually is classified as minor irrigation scheme. A scheme having CCA more than 2,000 hectares and up to 10,000 hectares individually is a medium irrigation scheme. A scheme having CCA more than 10,000 hectares is major irrigation scheme.

2.2.3. Water Release - Major and Medium Project

In Telangana, Water is released during Kharif season to major and medium command areas.

2.2.4. Crop Sowing Progress

Weekly crop sowing progress reports are taken from 'Season and Crop Coverage Report-Kharif 2014' of Commissionerate of Agriculture, Telangana. The report includes current status of Weather condition, Water level, Crop sowing and Agricultural Operations.

2.2.5. Vegetation Index

The crop/vegetation reflects high energy in the near infrared band due its canopy geometry and health of the standing crops/vegetation and absorbs high in the red band due to its biomass and photosynthesis. Uses of these contrast characteristics of vegetation in near infrared and red bands indicate both the health and condition of the crops/vegetation. Normalised Difference Vegetation Index (NDVI) is widely used for operational drought assessment because of its simplicity in calculation, easy to interpret and its ability to partially compensate for the effects of atmosphere, illumination geometry etc., (Malingreau 1986, Tucker and Chowdhary 1987, Jhonson, et al., 1993, Kogan 1995). NDVI is derived by the difference of these measurements and divided by their sum.

$$NDVI \ = \ \frac{(NIR - Red)}{(NIR + Red)}$$

The vegetation index is generated from each of the available satellite data irrespective of the cloud cover present. To minimize the cloud, monthly time composite vegetation index is generated.

2.2.6.   Surface Wetness Indicators

Shortwave Infrared (SWIR) band is sensitive to moisture available in soil as well as in crop canopy. In the beginning of the cropping season, soil back ground is dominant hence SWIR is sensitive to soil moisture in the top 1-2 cm. As the crop progresses, SWIR becomes sensitive to leaf moisture content. SWIR band provides only surface wetness information. When the crop is grown-up, SWIR response is only from canopy and not from the underlying soil. NDWI using SWIR can complement NDVI for drought assessment particularly in the beginning of the cropping season. NDWI is derived as under;

$$NDWI = \frac{(NIR - SWIR)}{(NIR + SWIR)}$$

Where, Near Infra Red and SWIR are the reflected energy in these two spectral bands. Higher values of NDWI signify more surface wetness.

2.2.7.   Vegetation Condition Index

Kogan (1995) developed Vegetation Condition Index (VCI) using the range of NDVI as under,

$$VCI = \frac{(NDVI - NDVI\ min)}{(NDVI\ max - NDVI\ min)} * 100$$

The current drought assessment expressed as percentage of deviation of NDVI and NDWI based on 10 year NDVI and NDWI index values. The minimum and maximum value of NDVI and NDWI, the VCI discriminated between the weather components.
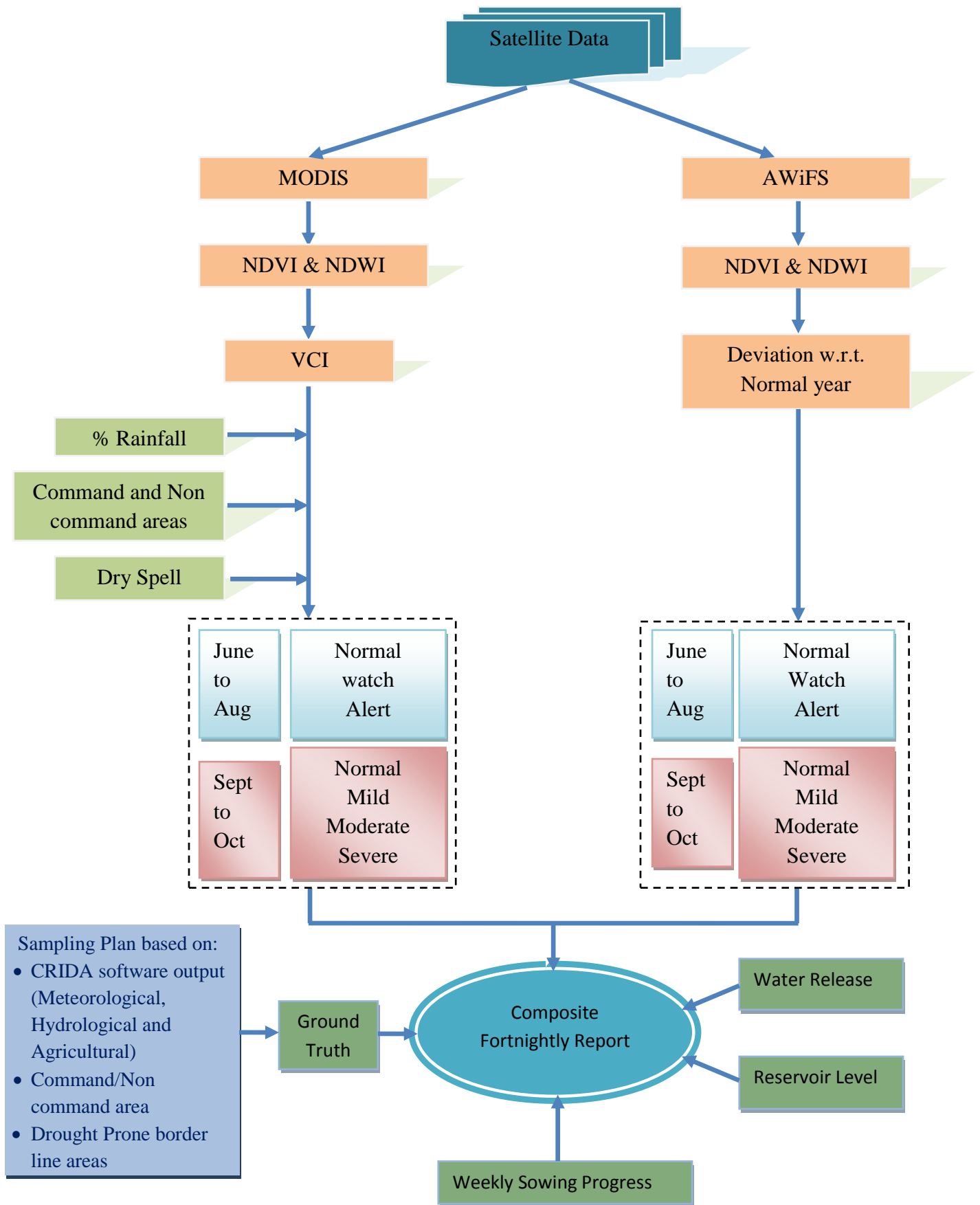
2.3 Methodology

Figure 1: Flow chart of drought assessment methodology

The methodology to assess and monitor the agricultural conditions and situation in the state at district and Mandal level uses IRS Resourcesat-2 AWiFS data. The Indian Remote Sensing satellite (IRS) Resourcesat-2 having AWiFS (Advanced Wide Imaging Field Sensor) payload collects data in two spectral bands 0.62-0.68μm (red) and 0.77-0.86 μm (near infrared) with spatial resolution of 56 m and ground swath of 740 Km with a revisit period of 5 days. Along with this MODIS 250/500m satellite data provide spectra, radiometric and spatial resolutions products for better monitoring of the agriculture. The combination of AWiFS and MODIS is useful to increase the frequency of images

The different activities carried out through ISMS commence with acquisition of MODIS (250m) and AWiFS (56m) satellite data. The satellite data being processed and NDVI and NDWI indices are developed. Based on these indices deviation with respect to normal year (2013) is calculated and Mandal wise statistics are derived. The agricultural situation is assessed incorporating Rainfall deviation, Command and non command areas, dry spell, CRIDA software outputs, Drought prone border line areas, Crop sown area progress and ground truth along with Satellite derived indices. The flow chart of methodology is shown in Figure 1.

3. Present status up to Month of June 2016

3.1. Rainfall data

The status of rainfall as on 30th June 2016 is shown in Table 3. Nearly 0.23 percent (01 out of 443) mandals of the Telangana state received Scanty rainfall (-60% to-90%), 11.29 percent (50 mandals) are deficit (-20% to -59%), 118 mandals are Normal (+19% to-19%)and 274 mandals received Excess (+19% or more) rainfall up to Month of June, 2016.

Table 3 Rainfall status as on 30th June 2016

Sl. No	District Name	No. of Mandals	No Rain -100%	Scanty -60% to -99%	Deficient -20% to -59%	Normal -19% to +19%	Excess >19%
1	Adilabad	52	--	--	5	21	26
2	Nizamabad	36	--	--	3	16	17
3	Karimnagar	57	--	1	16	27	13
4	Medak	46	--	--	8	20	18
5	Ranga reddy	37	--	--	5	13	19
6	Mahabubnagar	64	--	--	5	5	54
7	Nalgonda	59	--	--	6	5	48
8	Warangal	51	--	--	2	10	39
9	Khammam	41	--	--	0	1	40
	State Total	**443**	**--**	**1**	**50**	**118**	**274**

SOURCE: DE&S, HYDERABAD

The % deviation of Actual & Normal rainfall received up to 30th June 2016 is shown in Fig. 2, 3,4,5 & 6 respectively.

Figure 2: Deviation of Rainfall in percent w.r.t. Normal from June 01st to June 07th, 2016

Figure 3: Deviation of Rainfall in percent w.r.t. Normal from June 08th to June 15th, 2016

Integrated Seasonal Condition Monitoring System (June 2016)

Figure 4: Deviation of Rainfall in percent w.r.t. Normal from June 16th to June 22nd, 2016
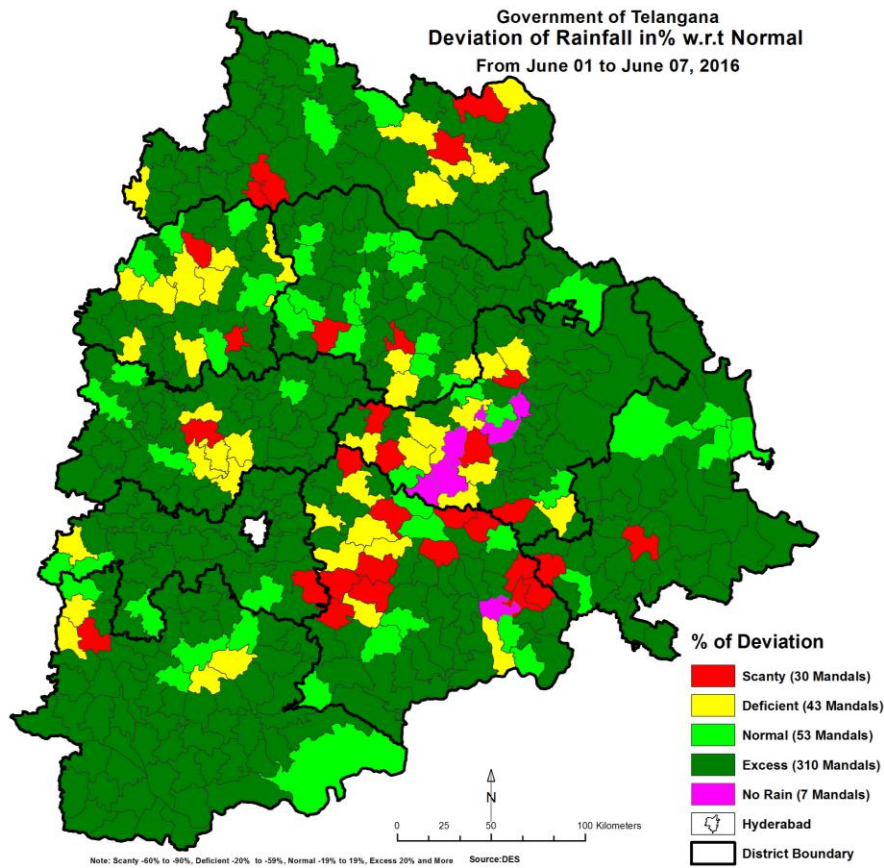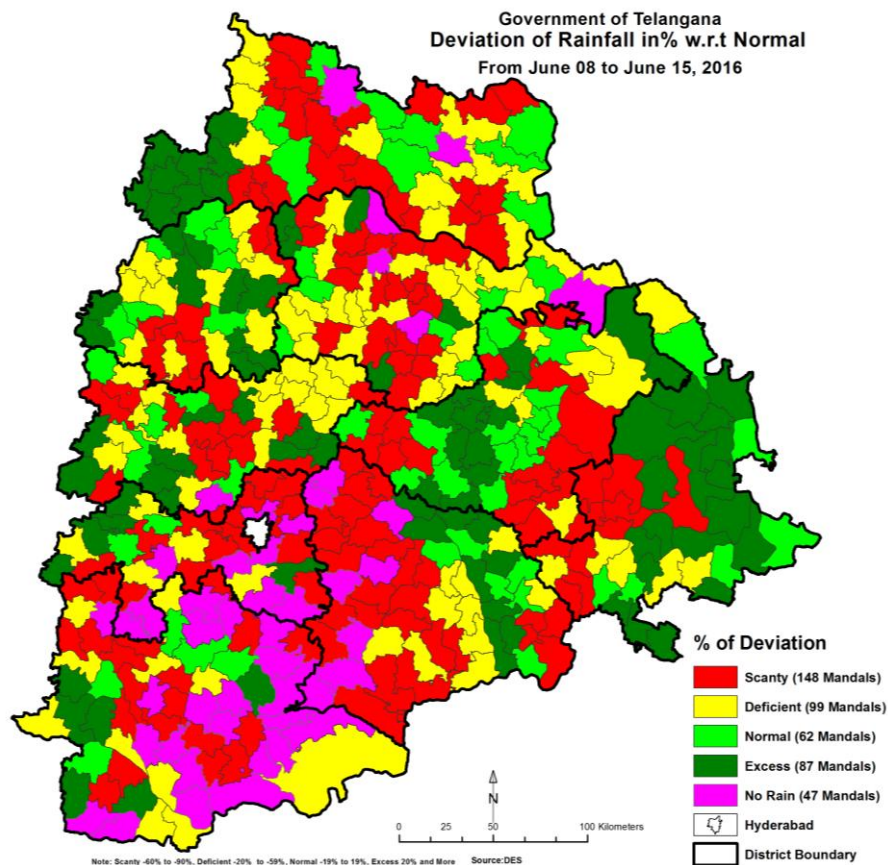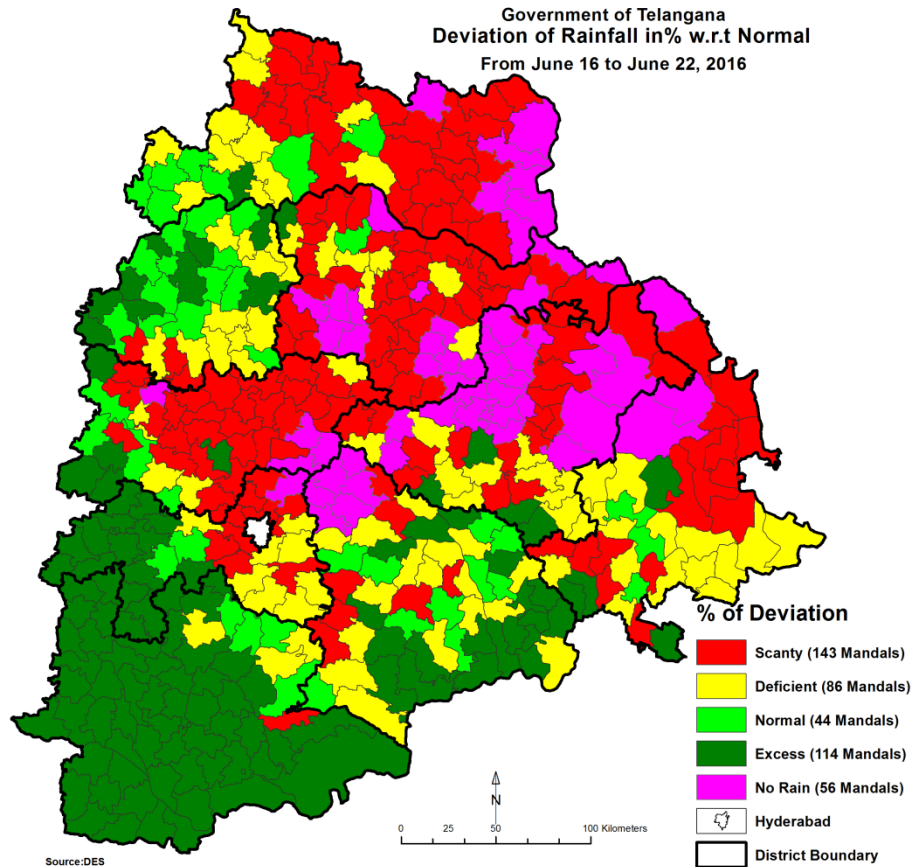

Figure 5: Deviation of Rainfall in percent w.r.t. Normal from June 23rd to June 30th, 2016

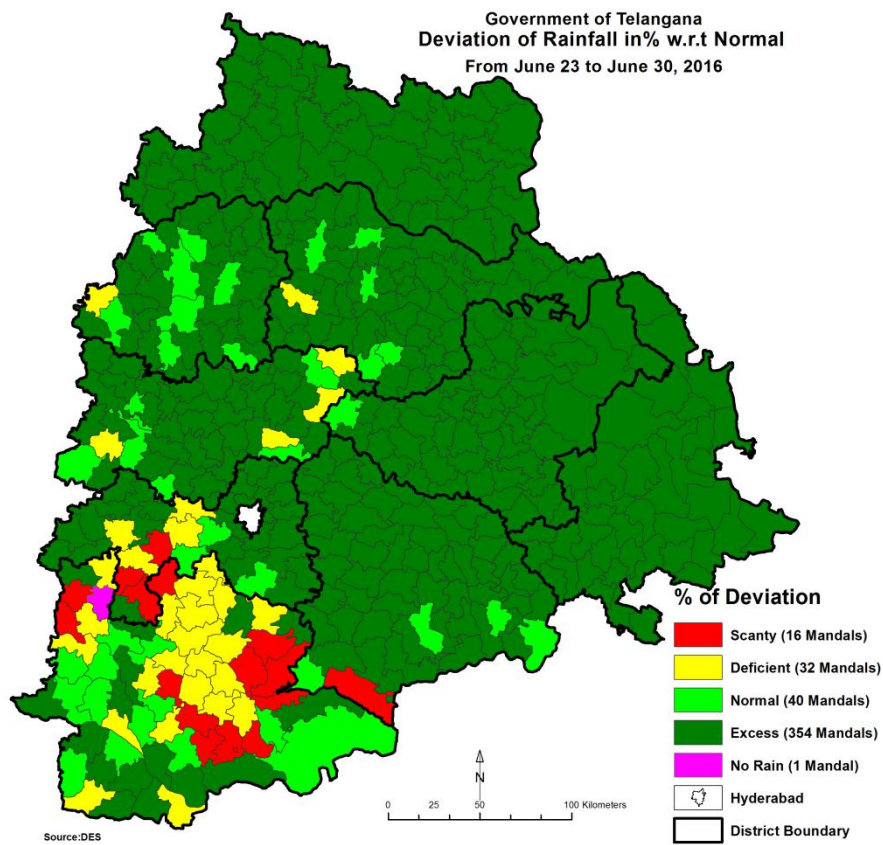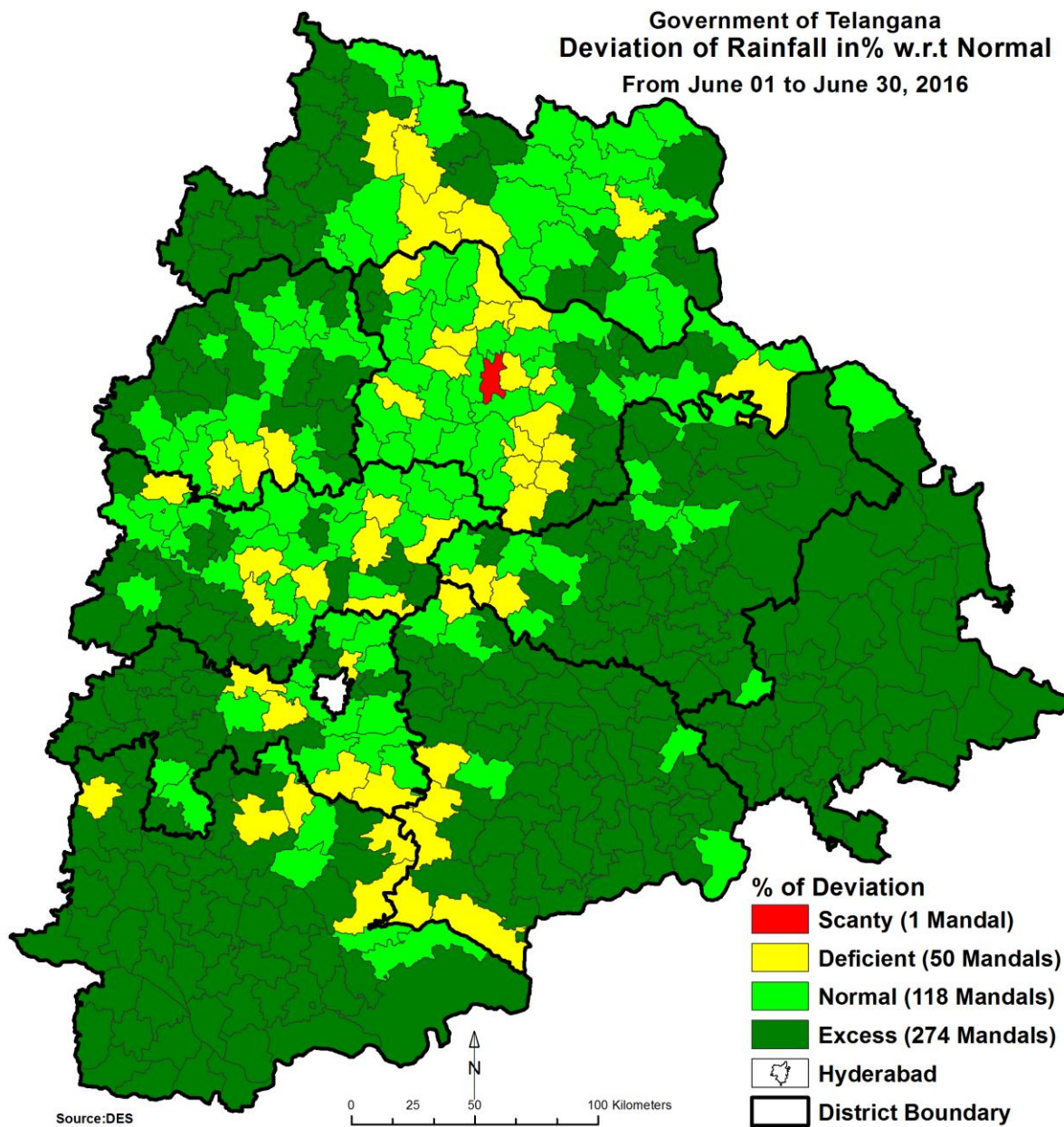Figure 6: Deviation of Rainfall in percent w.r.t. Normal from June 01st to June 30th, 2016

3.2. Reservoir Water Levels

All the major reservoirs are holding 241.96 TMC as on 30-06-2016, and as on date last year the level had stood at 390.24 TMC. The details of water levels of all major reservoirs as on 30-06-2016 are furnished hereunder in Table 4.

Table 4: Reservoir Water Levels

Sl No	Reservoir Name	Time	FRL	Gross Capacity	THIS YEAR				LAST YEAR	
					As on 30/June/2016				As on 30/June/2015	
			(feet)	(TMC)	Level	Gross Storage	Inflow	Outflow	Level	Gross Storage
					(in feet)	(TMC)	(Cusecs)	(Cusecs)	(in feet)	(TMC)
Krishna Basin										
1	Almatti	09:32	1705	129.721	1658.63	14.34	286	0	1688.45	61.61
2	Jurala	09:33	1045	11.941	1031.43	3.23	924	33	1035.1	6.09
3	Nagarjunasagar	09:34	590	312.045	504.5	122.52	400	400	513	136.82
4	Narayanapur	09:32	1615	37.646	1594.98	15.62	65	0	1600.75	20.65
5	Srisailam	09:33	885	215.807	780.5	20.56	1868	33	802.2	30.06
6	Tungabhadra	09:32	1633	100.86	1579.15	3.81	899	194	1604.04	25.13
7	Ujjaini	09:32	1630	117.24	1594.04	35.23	0	155	1607.29	56.21
Godavari Basin										
8	Jaikwad	09:34	1522	102.732	1487.56	16.72	0	116	1495.31	27.42
9	Kaddam	09:36	700	7.6	673.7	2.62	3832	70	691.975	5.679
10	Lower Manair Dam	09:36	920	24.074	876.6	2.38	0	97	884.5	4.22
11	Nizam sagar	09:35	1405	17.803	1364	0	0	0	1377.4	0.94
12	Singur	09:35	1717.9	29.91	1666.81	0.29	0	25	1690.35	4.21
13	Sri Ram Sagar	09:36	1091	90.313	1046.6	4.64	0	91	1057.6	11.2

SOURCE: IRRIGATION DEPARTMENT, HYDERABAD

*Reading as on 30.06.2016

3.3. Vegetation Index

The NDVI (Normalized Difference of Vegetation Index) for Month of June 2016 is shown in the figures and also compared with 2015 and 2014. The year 2013 is treated as a normal year. The Mandal wise NDVI, Monthly agricultural Situation for the year 2016, 2015 and 2014, deviation of NDVI w.r.t. 2013 are shown in the Figures 7, 8, 9, 10 and 11 respectively. The NDVI deviations with respect to the Month of June 2013 indicate that parts of Adilabad, Khammam, Medak, Mahabubnagar, Nalgonda, Nizamabad, and Warangal districts are under stress condition. As per rainfall distribution the progress of agricultural situation is normal and the vegetation condition in the state is likely to improve in coming fortnight.

Figure 7: NDVI- MODIS (250m): Month of June 2016

Figure 8: NDVI - MODIS (250m), Fortnightly Agricultural situation from June 2016

Figure 9: NDVI - MODIS (250m), Time Composite of Agricultural situation from June 2016

Figure 10: NDVI - MODIS (250m), Monthly Agricultural situation from June 2016, 2015 and 2014

Figure 11: NDVI deviation (MODIS - 250m) Month of June 2016 w.r.t. 2013

3.4. Surface Wetness Indicators

The map indicates status of moisture availability in soil as well as in crop canopy for Month of June 2016. The year 2013 is treated as a normal year. The Mandal wise NDWI situation from the year 2016, 2015 & 2014, Monthly agricultural Situation deviation of NDWI w.r.t. 2013 are shown in the Figures 12, 13, 14, 15 and 16 respectively. The NDWI deviations with respect to Month of June 2013 indicate that parts of Adilabad, Karimnagar, Khammam, Mahabubnagar, Medak, Nalgonda, Nizamabad, Rangareddy, and Warangal districts are under mild stress condition. As per rainfall distribution the progress of agricultural situation is normal and the soil moisture condition in the state is likely to improve in next fortnight.
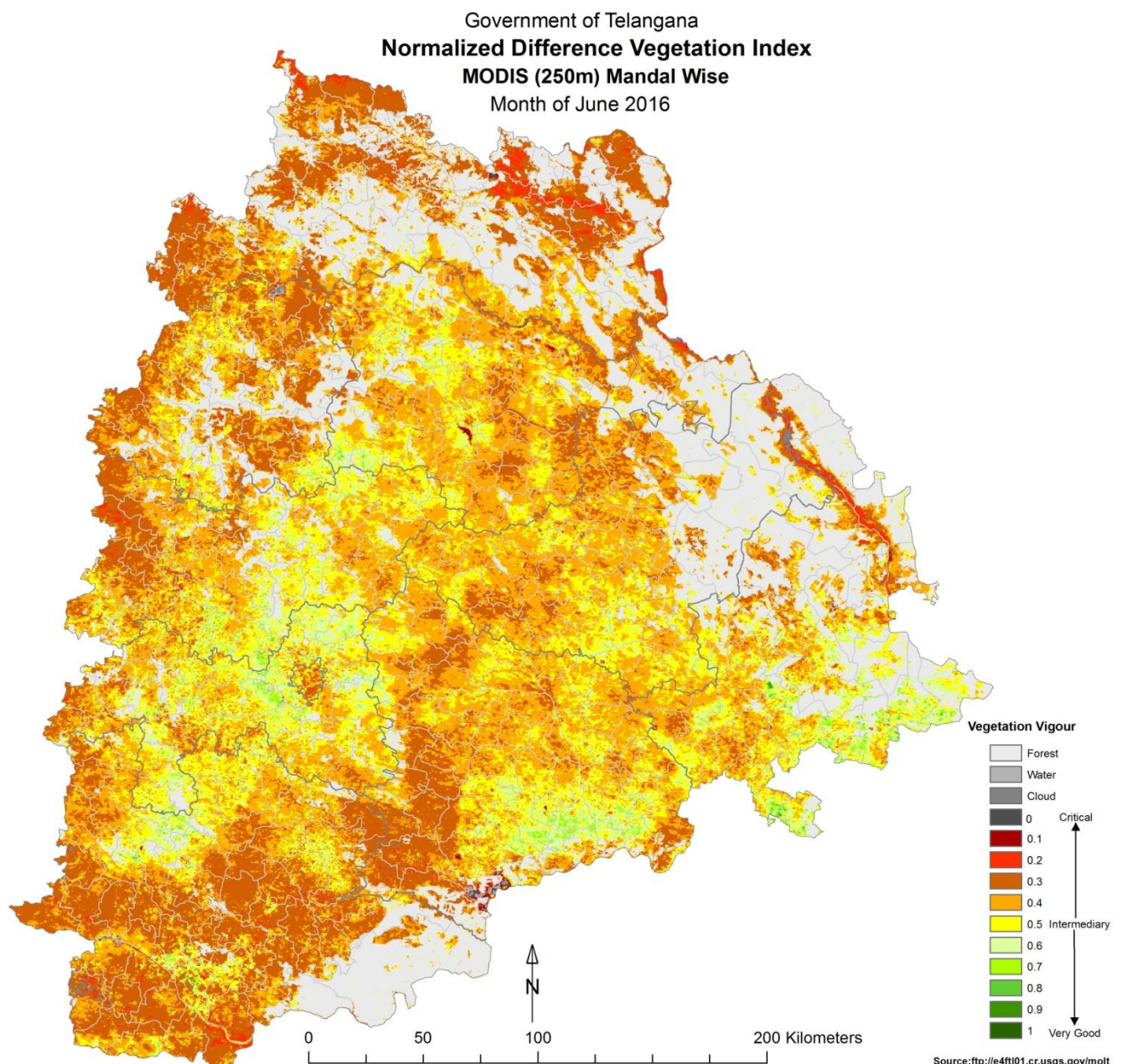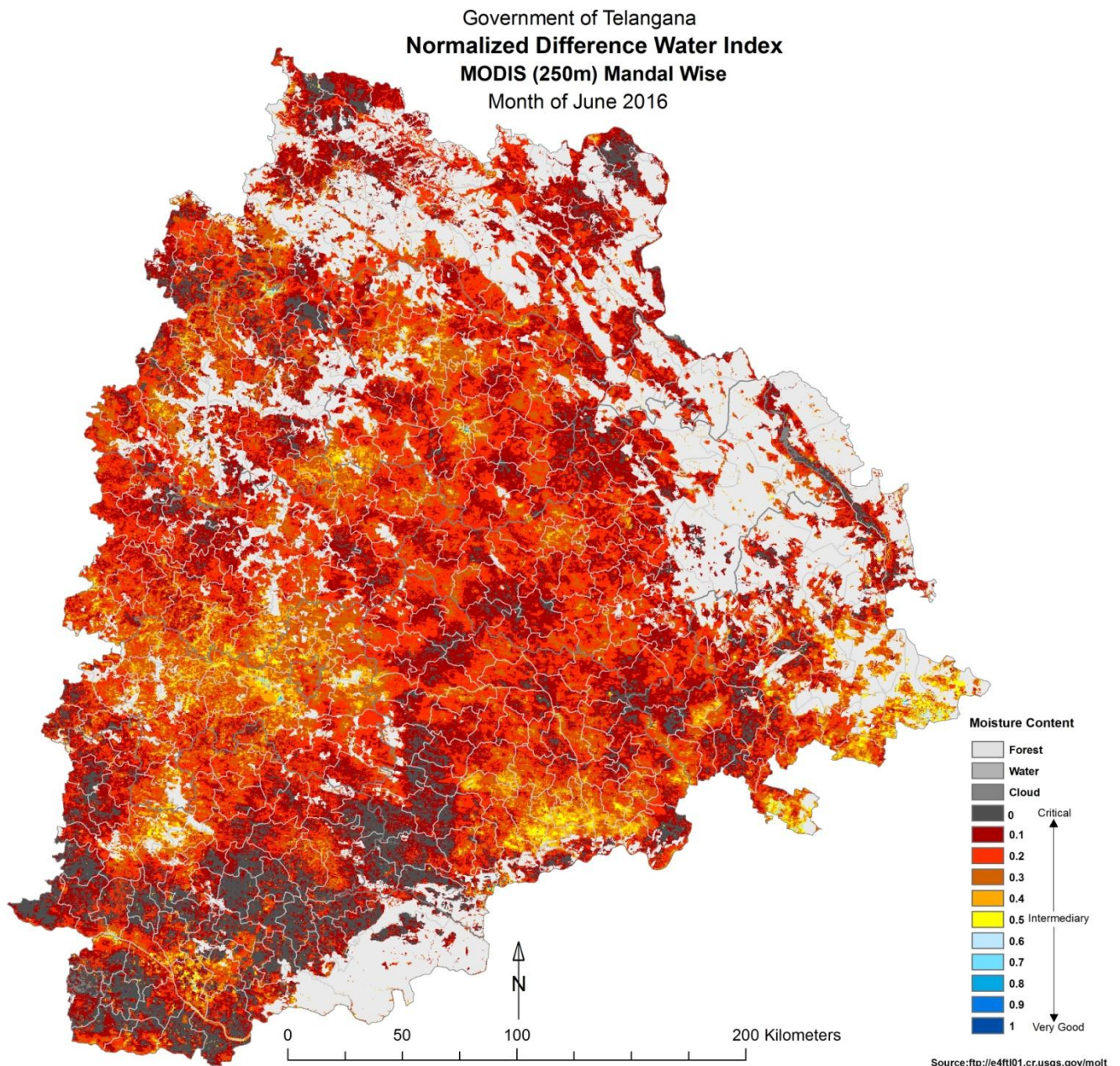

Figure 12: NDWI-MODIS (250m): Month of June 2016

Government of Telangana
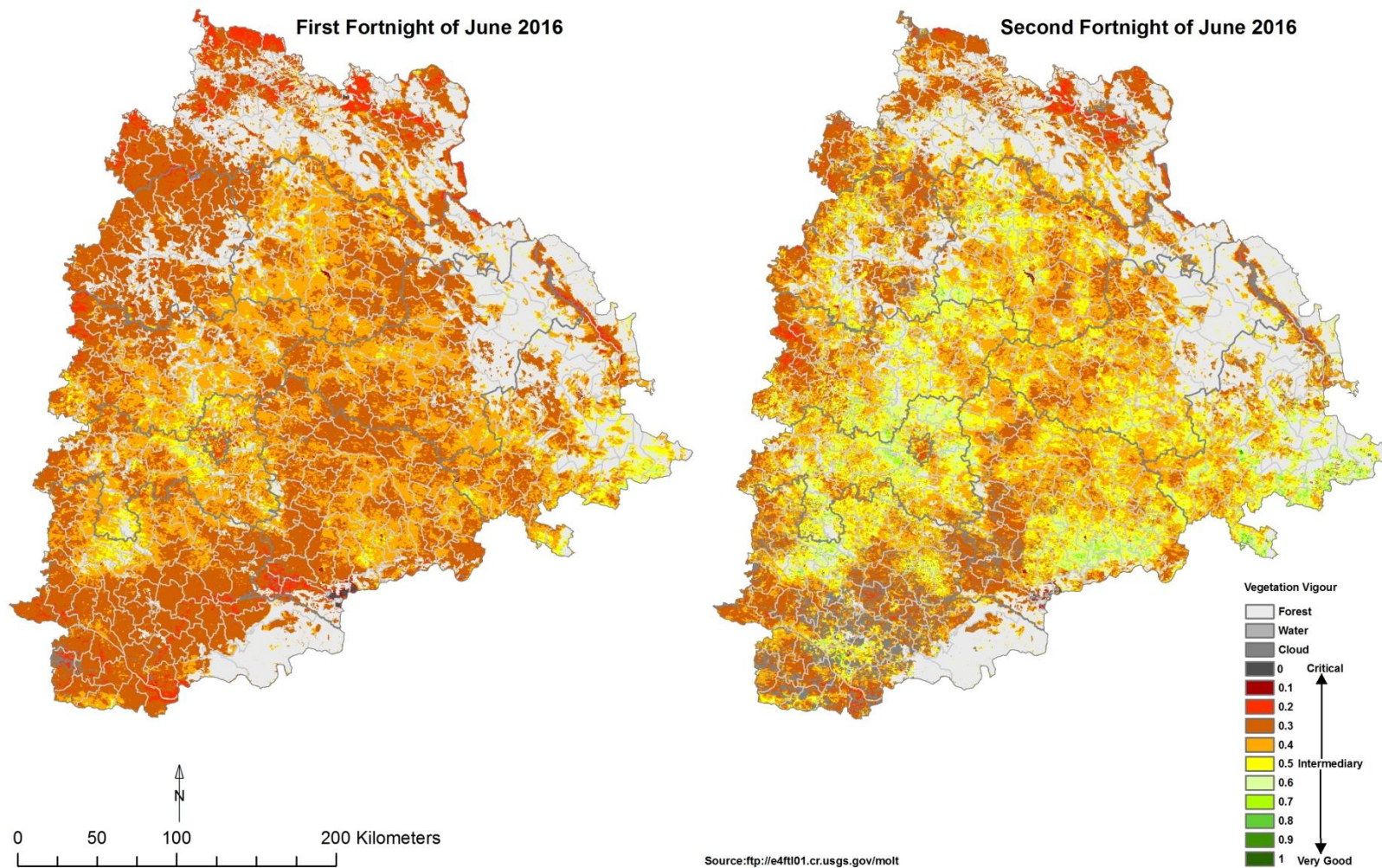**Normalized Difference Water Index**
MODIS (250m) Mandal Wise

First Fortnight of June 2016

Second Fortnight of June 2016

Moisture Content

Forest
Water
Cloud
0   Critical
0.1
0.2
0.3
0.4
0.5 Intermediary
0.6
0.7
0.8
0.9
1   Very Good

0   50   100   200 Kilometers

Source:ftp://e4ftl01.cr.usgs.gov/molt
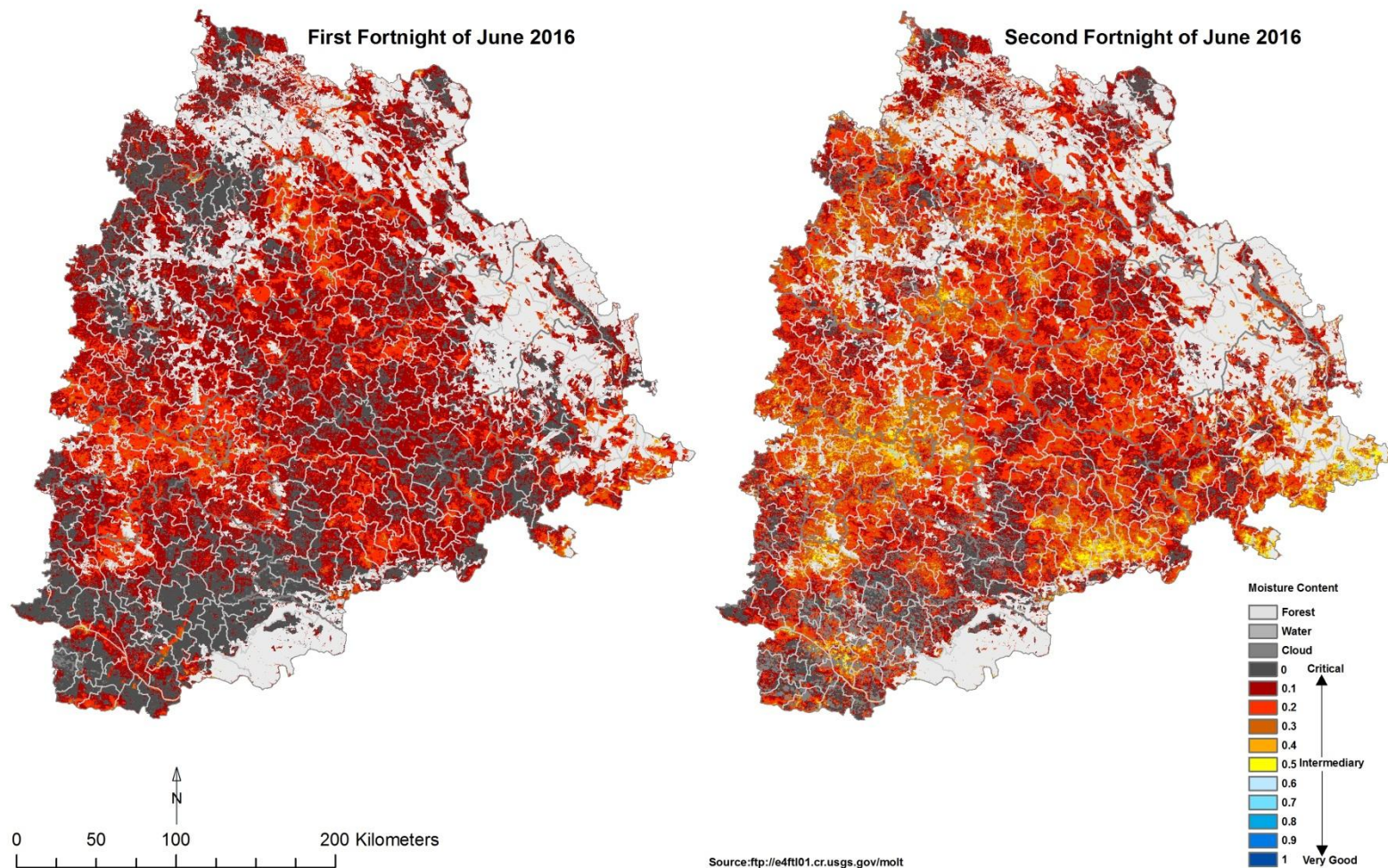
Figure 13: NDWI - MODIS (250m), Fortnightly Agricultural situation from June 2016

Integrated Seasonal Condition Monitoring System (June 2016)
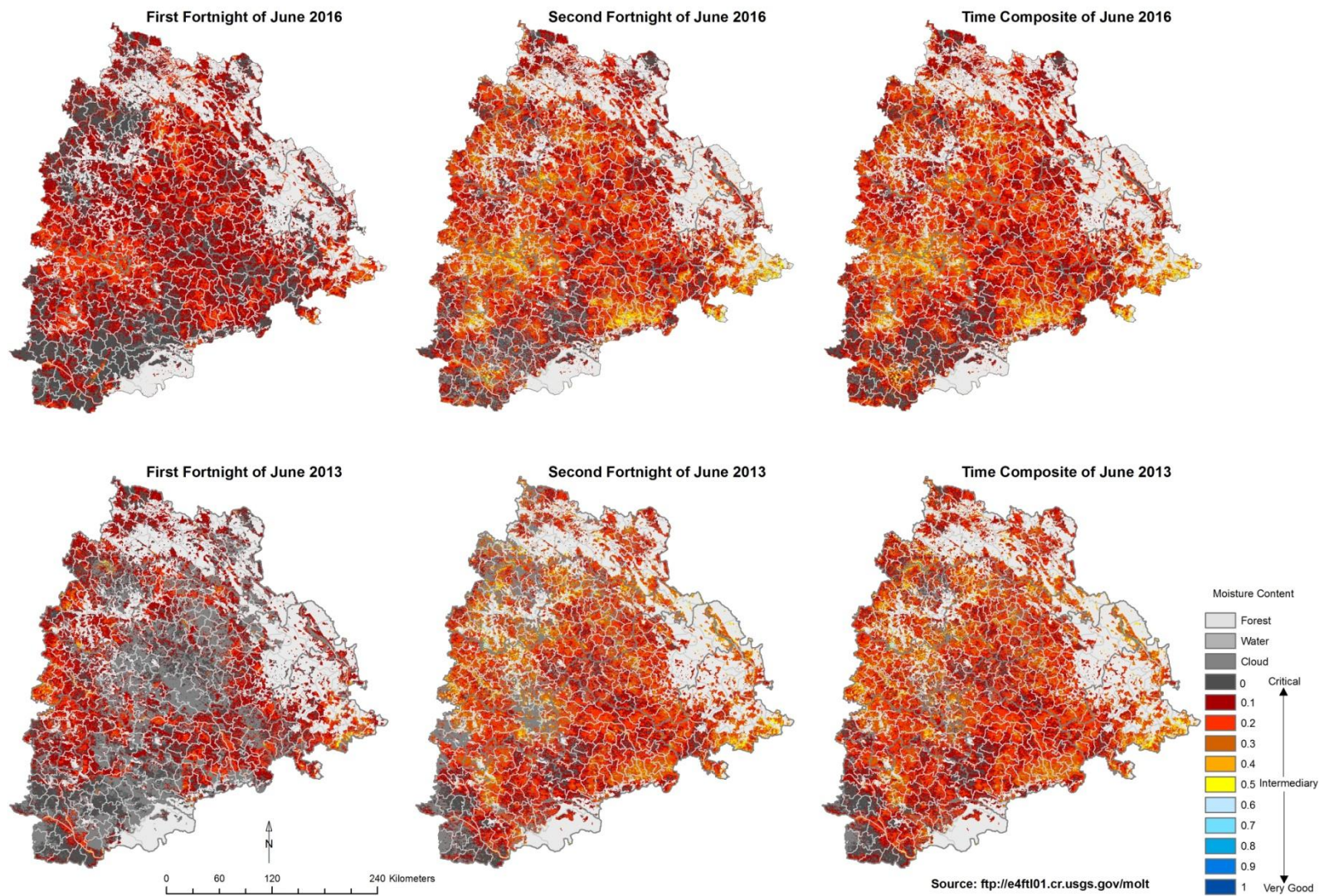
Figure 14: NDWI - MODIS (250m), Time Composite of Agricultural situation from June 2016

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Figure 15: NDWI- MODIS (250m), Monthly Agricultural situation from June 2016, 2015 and 2014

Figure 16: NDWI deviation (MODIS - 250m) Month of June 2016 w.r.t. 2013

3.5. Drought situation of Mandals:

3.5.1. Composite Criteria

The drought situation in the state is assessed using different indicators viz., NDVI, NDWI and Rainfall deviation of mandals. Compositing all indicators, mandals were categorised into Normal, and Watch. Mandal-wise analysis for the Month of June 2016 indicated "Normal" agricultural situation in 404 Mandals. The agricultural situation is categorized as "Watch" in 40 Mandals. The Mandals under Normal and Watch categories are given in the Table-5 and their spatial distribution is shown in Figure 17.

Figure 17: Mandal wise Drought Assessment based on ISMS Criterion

Table 5: Mandals under Normal and Watch categories based on ISMS criteria

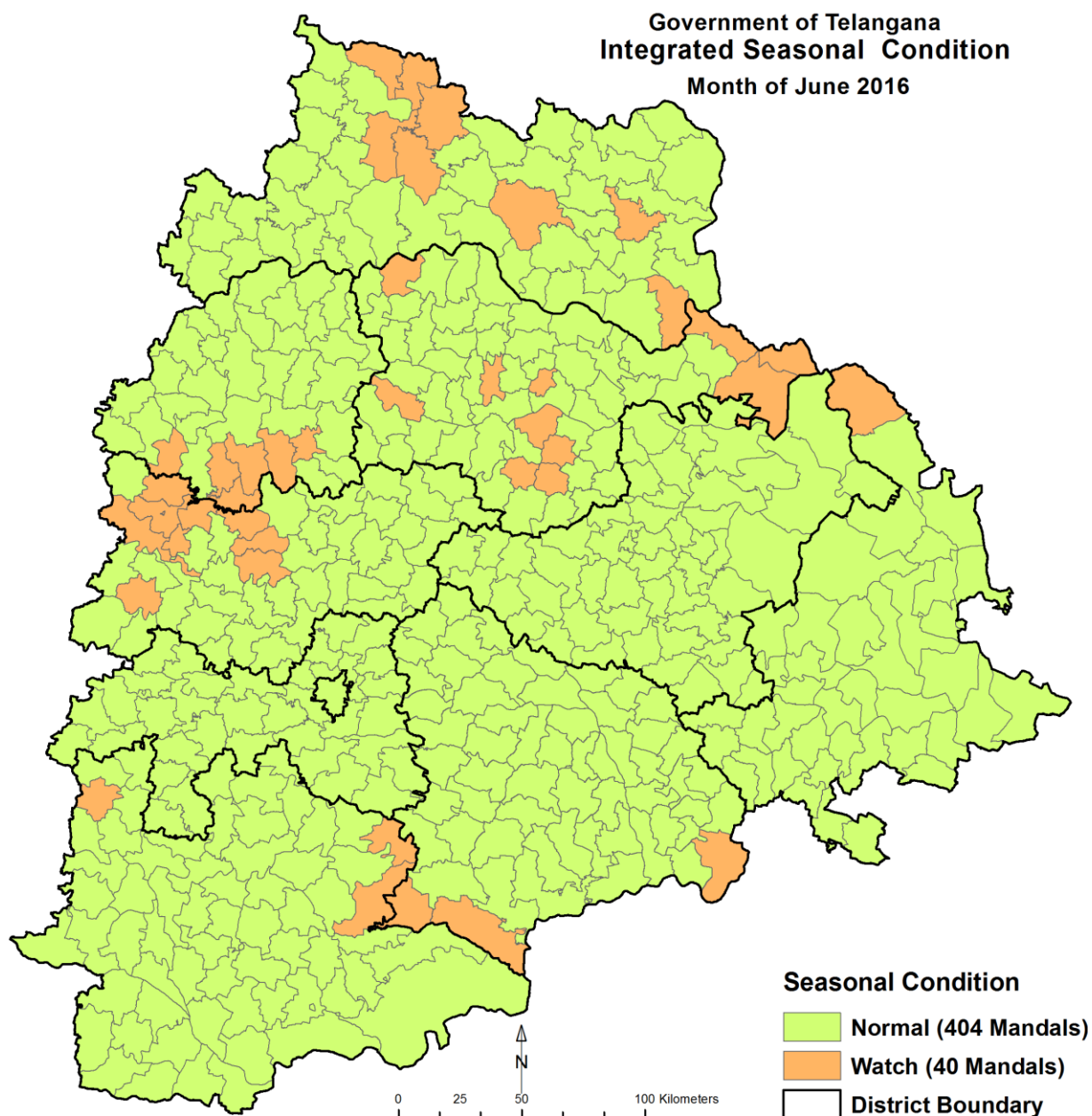| District Name	Normal	Watch
Adilabad	**Total: 44** Adilabad,, Asifabad, Bazarhathnoor, Bejjur, , Bellampalle, Bhainsa, Boath, Dahegaon, Dandepalle, Dilawarpur, Gudihathnoor, Ichoda, Jainoor, Jaipur, Jannaram, Kaddam (Peddur), Kagaznagar, Kasipet, Kerameri, Khanapur, Kotapalle, Kouthala, Kubeer, Kuntala, Lokeswaram, Laxmanchanda, Luxettipet, Mamda, Mancherial, Mandamarri, Mudhole, Nennal, Neradigonda, Nirmal, Rebbana, Sarangapur, Sirpur, Sirpur (T), Talamadugu, Tamsi, Tandur, Tanoor, Vemanpalle, Wankdi.	**Total: 8** Bela, Bhimini, Chennur, Inderavelly, Jainad, Narnoor, Tiryani, Utnoor
Karimnagar	**Total: 47** Bejjanki, Bheemadevarpalle, Boinpalle, Chandurthi, Choppadandi, Dharmapuri, Dharmaram, Elkathurthi, Ellanthakunta, Gambhiraopet, Gangadhara, Gollapalle, Husnabad, Huzurabad, Ibrahimpatnam, Jagtial, Jammikunta, Julapalle, Kamalapur, Kamanpur, Karimnagar, Kataram, Kathlapur, Kodimial, Koheda, Koratla, Malharrao, Mallial, Manthani, Medipalle, Metpalle, Mustabad, Mutharam (Manthani), Odela, Peddapalle, Pegadapalle, Raikal, Ramagundam, Sarangapur, Sircilla, Srirampur, Sultanabad, Timmapur (LMD Colony), Veenavanka, Velgatoor, Vemulawada, Yellareddipet.	**Total: 10** Chigurumamidi, Eligedu, , Konaraopeta, Mahadevpur, Mallapur, Manakondur, Mutharam (Mahadevpur), Ramadugu, Saidapur, Shankarapatnam,.
Khammam	**Total: 40** Aswapuram, Aswaraopeta, Bayyaram, Bhadrachalam, Bonakal, Burgampahad, Chandrugonda, Cherla, Chinthakani, Dammapeta, Dummugudem, Enkuru, Garla, Gundala, Julurpad, Kallur, Kamepalle, Khammam (Rural), Khammam (Urban), Konijerla, Kusumanchi, Kothagudem, Madhira, Manuguru, Mudigonda, Mulkalapalle, Nelakondapalle, Palwancha, Penuballi, Pinapaka, Sathupalle, Singareni, Tallada, Tekulapalle, Thirumalayapalem, Vemsoor, Venkatapuram, Wyra, Yellandu, Yerrupalem.	**Total: 01** Wazeed.
Mahabubnagar	**Total: 61** Achampet, Addakal, Alampur, Amangal, Amrabad, Atmakur, Balanagar, Balmoor, Bijinapalle, Bhoothpur, Bomraspet, Chinnachintakunta, Damaragidda, Devarkadra, Dhanwada, Dharur, Farooqnagar, Gadwal, Ghanpur, Ghattu, Gopalpeta, Hanwada, Ieej, Itikyal, Jadcherla, Kalwakurthy, Keshampet, Kodair, Kodangal, Koilkonda, Kollapur, Kondurg, Kosgi, Kothakota, Kothur, Lingal, Maddur, Maganoor, Mahbubnagar, Makthal, Maldakal, Manopad, Midjil, Nagarkurnool, Narayanpet, Narva, Nawabpet, Pangal, Pebbair, Peddakothapalle, Peddamandadi, Tadoor, Talakondapalle, Telkapalle, Thimmajipet, Uppununthala, Utkoor, Veepangandla, Veldanda, Waddepalle, Wanaparthy.	**Total: 03** Doulathabad, Madgul, Vangoor.
Medak	**Total: 37** Alladurg, Andole, Chegunta, Chinnakodur, Doultabad, Dubbak, Gajwel, Hathnoora, Jagdevpur, Jinnaram, Kangti, Kohir, Kondapak, Kondapur, Medak, Mirdoddi, Mulug, Munpalle, Nangnoor, Narsapur, Nyalkal,	**Total: 09** Jharasangam, Kalher, Kowdipalle, Kulcharam, Manoor, Narayankhed,

	Patancheru, Pulkal, Raikode, Ramayampet, Ramchandrapuram, Sadasivpet, Sangareddy, Shankarampet (R), Shivampet, Siddipet, Tekmal, Thoguta, Tupran, Wargal, Yeldurthy, Zahirabad.	Papannapet, Regode, Shankarampet[A].
Nalgonda	**Total: 56** Alair, Anumula, Atmakur(S), Atmakur(M), Bibinagar, Bhongir, Bommalaramaram, Chandur, Chilkur, Chivvemla, Chinthapalle, Chityala, Choutuppal, Dameracherla, Devarakonda, Garidepalle, Gundala, Gurrampode, Huzurnagar, Jajireddigudem, Kangal, Kattangoor, Kethepalle, Kodad, Marriguda, M.Turkapalle, MattamPalle. Miryalaguda, Mothkur, Mothey, Munugode, Munagala, Nadigudem, Nakrekal, Nalgonda, Nampalle, Narketpalle, Narayanapur, Neredcherla, Nidamanur, Nuthankal, Peddadiserlapalle, Peddavoora, Penpahad, Pochampalle, Rajapet, Ramannapeta, Saligouraram, Suryapet, Thipparthi, Thirumalgiri, Thripuraram, Thungathurthi, Valigonda, Vemulapalle, Yadagirigutta.	**Total:03** Chandampet, Gundlapalle, Mellacheruvu.
Nizamabad	**Total: 30** Armur, Balkonda, Banswada, Bheemgal, Bhiknoor, Bichkunda, Birkoor, Bodhan, Dharpalle, Dichpalle, Domakonda, Gandhari, Jakranpalle, Jukkal, Kammarpalle, Kotgiri, Machareddy, Madnoor, Makloor, Mortad, Nandipet, Navipet, Nizamabad, Nizamsagar, Ranjal, Sadasivanagar, Sirkonda, Varni, Velpur, Yedpalle.	**Total: 06** Kamareddy, Lingampet, Nagareddipet, Pitlam, Tadwai, Yellareddy.
Rangareddy	**Total: 37** Balanagar, Bantwaram, Basheerabad, Chevella, Dharur, Doma, Gandeed, Ghatkesar, Hayathnagar, Ibrahimpatnam, Kandukur, Keesara, Kulkacharla, Maheswaram, Malkajgiri, Manchal, Marpalle, Medchal, Moinabad, Mominpet, Nawabpet, Pargi, Peddemul, Pudur, Qutubullapur, Rajendranagar, Saroornagar, Serilingampally, Shabad, Shamirpet, Shamshabad, Shankarpalle, Tandur, Uppal, Vicarabad, Yacharam, Yelal.	**Total: 00**
Warangal	**Total: 51** Atmakur, Bachannapet, Bhupalpalle, Chennaraopet, Cherial, Chityal, Devaruppula, Dharmasagar, Dornakal, Duggondi, Eturnagaram, Geesugonda, Ghanpur(Mulug), Ghanpur (Station), Govindaraopet, Gudur, Hanamkonda, Hasanparthy, Jangaon, Kesamudram, Khanapur, Kodakandla, Kothagudem, Kuravi, Lingalaghanpur, Maddur, Mahabubabad, Mangapet, Maripeda, Mogullapalle, Mulug, Nallabelly, Narmetta, Narsimhulapet, Narsampet, Nekkonda, Nellikudur, Palakurthi, Parkal, Parvathagiri, Raiparthy, Regonda, Raghunathpalle, Sangam, Shayampet, Tadvai, Thorrur, Venkatapur, Warangal (Fully Urban), Wardhannapet, Zaffergadh.	**Total: 00**

4. Conclusions

Highlights of seasonal conditions at the end of the Month, June 2016 are as follows:

➤ Total **01 Mandal** received **scanty** rainfall in State. Scanty rainfall was recorded in district of Karimnagar (01).

➤ **50 Mandals** of state received **Deficient** rainfall. Deficient rainfall was recorded in Adilabad (05), Nizamabad (03), Karimnagar (16), Medak (08), Ranga Reddy (05) Mahabubnagar (15), Nalgonda (06) and Warangal (02) Districts.

➤ **118 Mandals** received **Normal** rainfall in State. Normal rainfall was recorded in Adilabad (21), Nizamabad (16), Karimnagar (27), Medak (20), Ranga Reddy (13) Mahabubnagar (05), Nalgonda (05), Warangal (10), and Khammam (01) Districts.

➤ **274 Mandals** of state received **Excess** rainfall in State. Excess rainfall was recorded in Adilabad (26), Nizamabad (17), Karimnagar (13), Medak (18), Ranga Reddy (19) Mahabubnagar (54), Nalgonda (48), Warangal (39), and Khammam (40) Districts.

➤ Mandal wise analysis by the end of first fortnight of June, 2016 indicated "Normal" agricultural situation in **404** Mandals and in **40** Mandals are in "Watch" category.

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http://drought.unl.edu/portals/0/docs/international/GovtIndiaDroughtManual.pdf

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Government of Telangana
Integrated Seasonal Condition
Month of June 2016
Mandal wise Major Crops, Kharif, 2015-16
Adilabad District
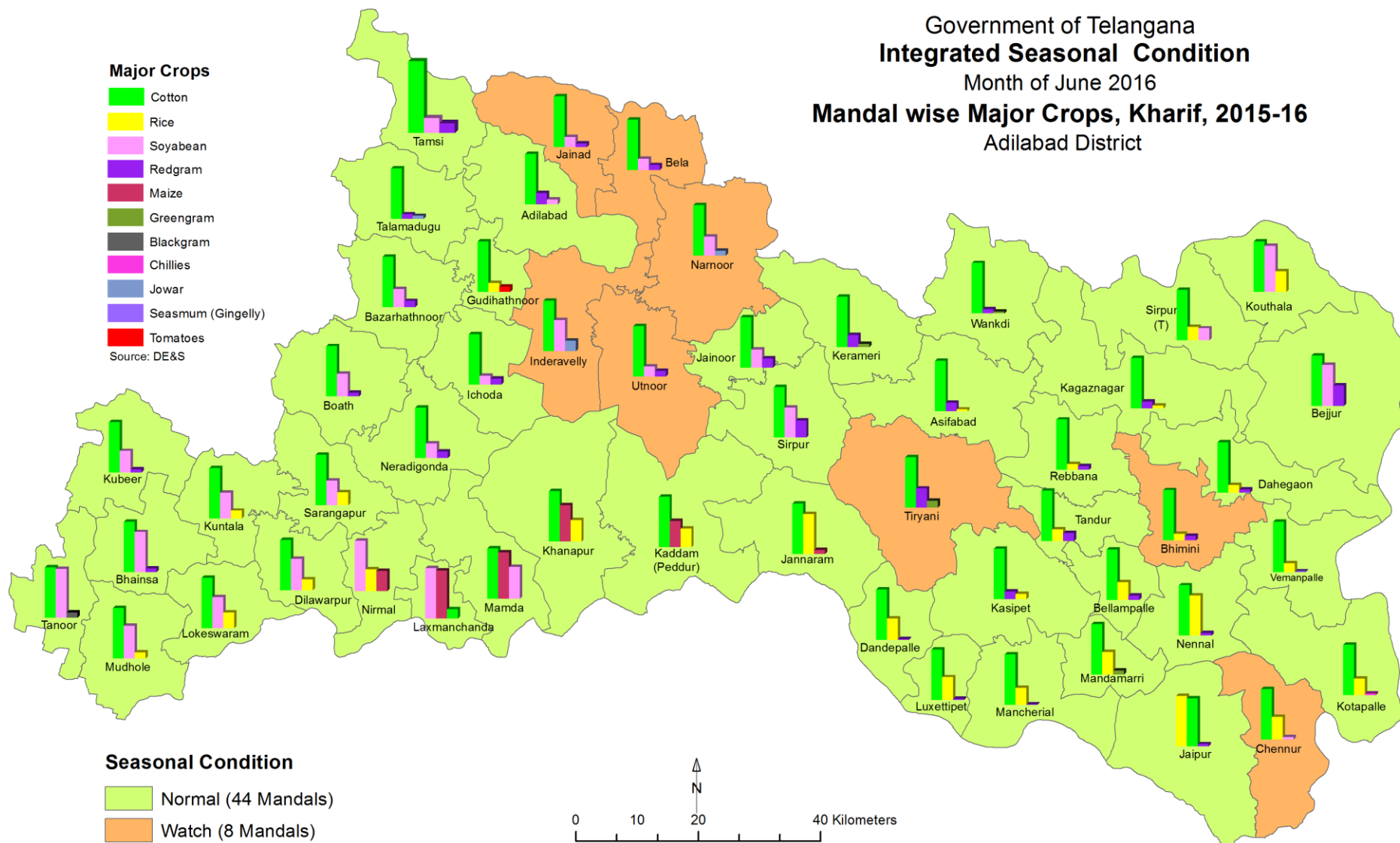
Major Crops

- Cotton
- Rice
- Soyabean
- Redgram
- Maize
- Greengram
- Blackgram
- Chillies
- Jowar
- Seasmum (Gingelly)
- Tomatoes

Source: DE&S

Seasonal Condition

- Normal (44 Mandals)
- Watch (8 Mandals)

0   10   20   40 Kilometers

N

Integrated Seasonal Condition Monitoring System (June 2016)

Government of Telangana
Integrated Seasonal Condition
Month of June 2016
Mandal wise Major Crops, Kharif, 2015-16
Karimnagar District
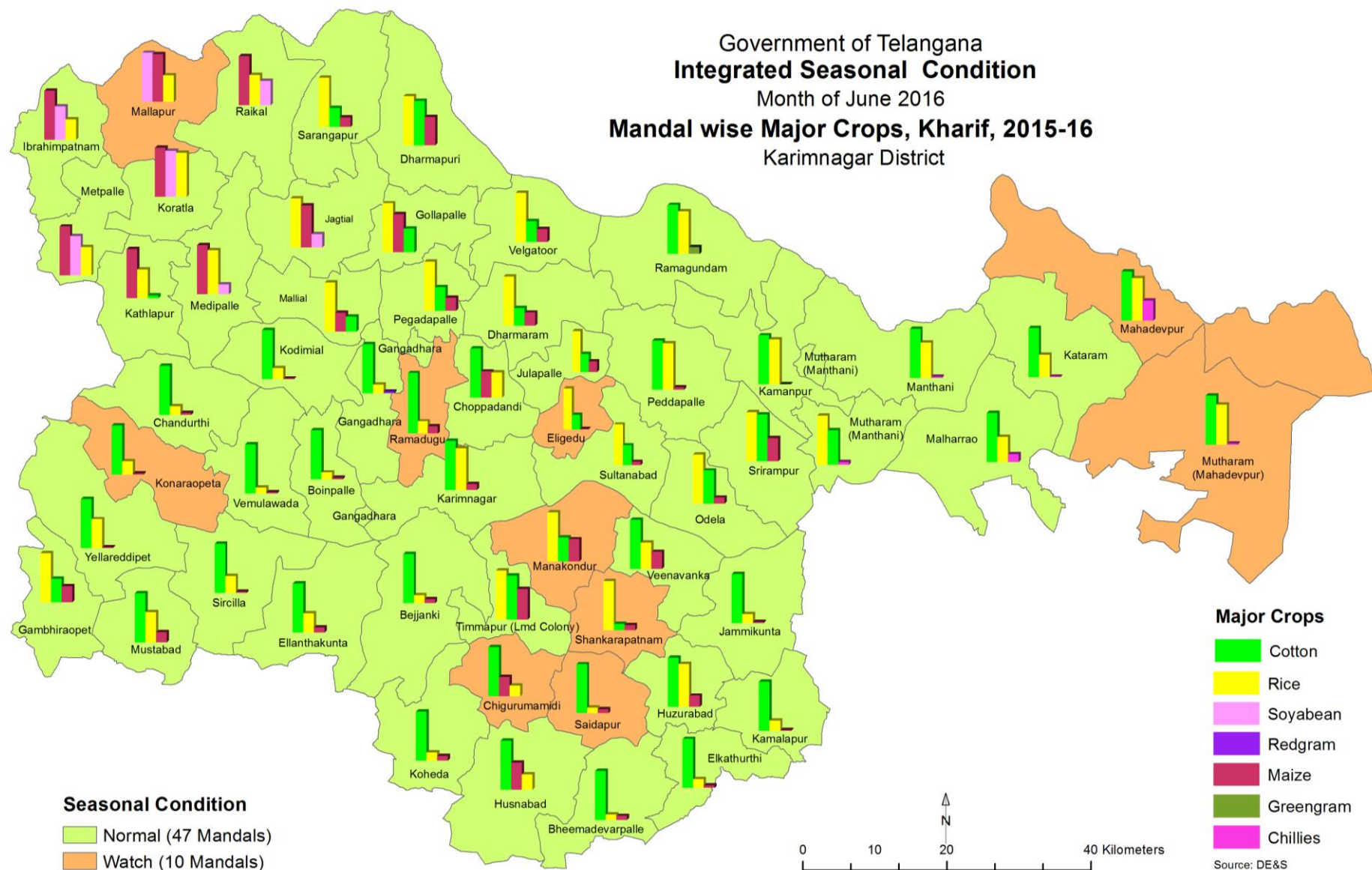
Major Crops

- Cotton
- Rice
- Soyabean
- Redgram
- Maize
- Greengram
- Chillies

Seasonal Condition

- Normal (47 Mandals)
- Watch (10 Mandals)

0   10   20   40 Kilometers

Source: DE&S

Integrated Seasonal Condition Monitoring System (June 2016)

Government of Telangana
Integrated Seasonal Condition
Month of June 2016
Mandal wise Major Crops, Kharif, 2015-16
Khammam District

Seasonal Condition

Normal (40 Mandals)

Watch (1 Mandal)

Major Crops

Cotton

Rice

Redgram

Maize

Greengram

Chillies

Sugarcane Planted

Sugarcane Ratoon

Source: DE&S

Integrated Seasonal Condition Monitoring System (June 2016)

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Government of Telangana
Integrated Seasonal Condition
Month of June 2016
Mandal wise Major Crops, Kharif, 2015-16
Mahabubnagar District

Major Crops

- Cotton
- Rice
- Redgram
- Maize
- Chillies
- Greengram
- Castor
- Jowar
- Groundnut
- Onion

Source: DE&S

Seasonal Condition

- Normal (61 Mandals)
- Watch (3 Mandals)

0   10   20   40 Kilometers

Integrated Seasonal Condition Monitoring System (June 2016)

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Government of Telangana
Integrated Seasonal Condition
Month of June 2016
Mandal wise Major Crops, Kharif, 2015-16
Medak District

Major Crops

- Cotton
- Rice
- Soyabean
- Redgram
- Maize
- Greengram
- Sugarcane

Source: DE&S

Seasonal Condition

- Normal (37 Mandals)
- Watch (9 Mandals)

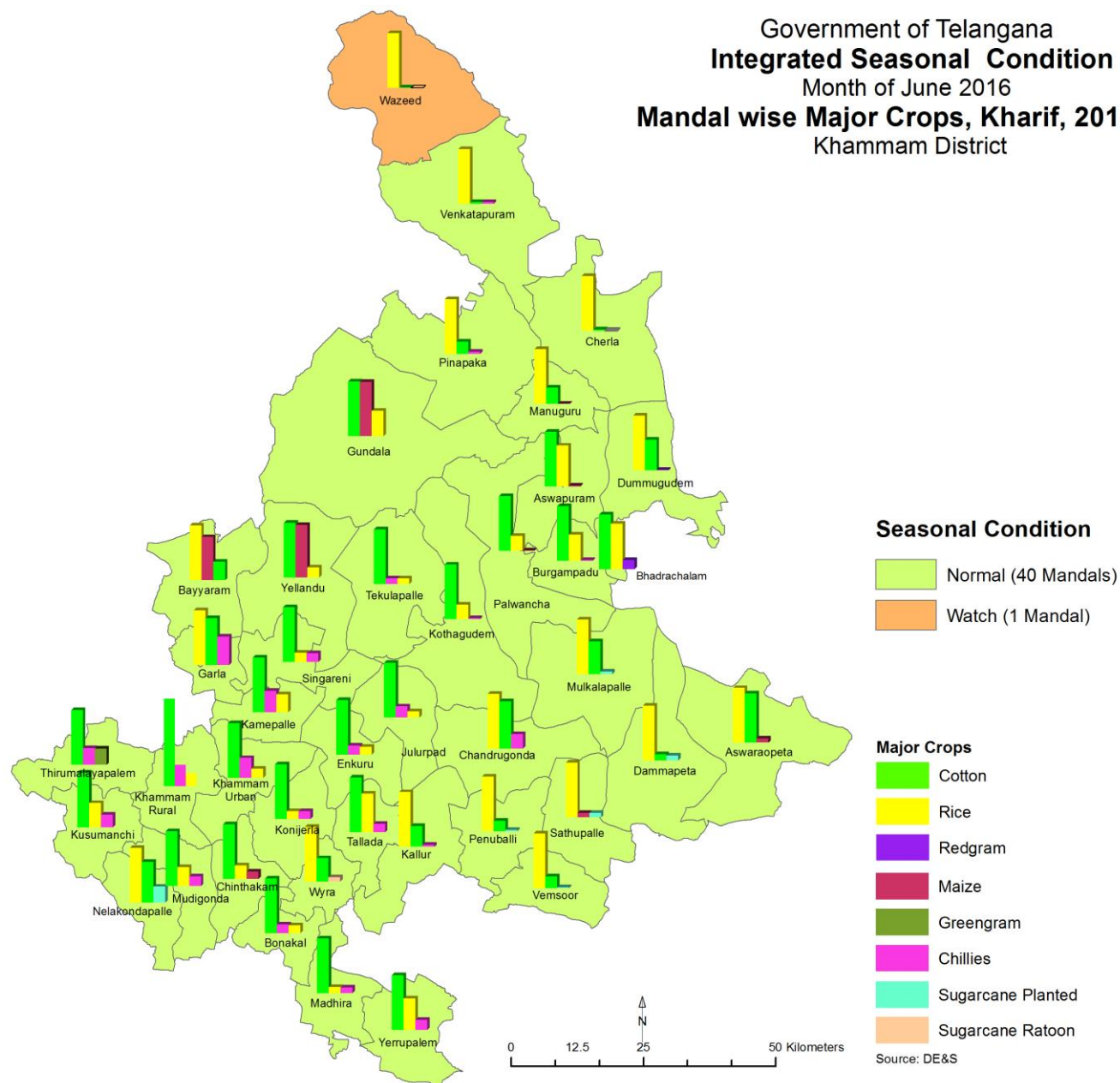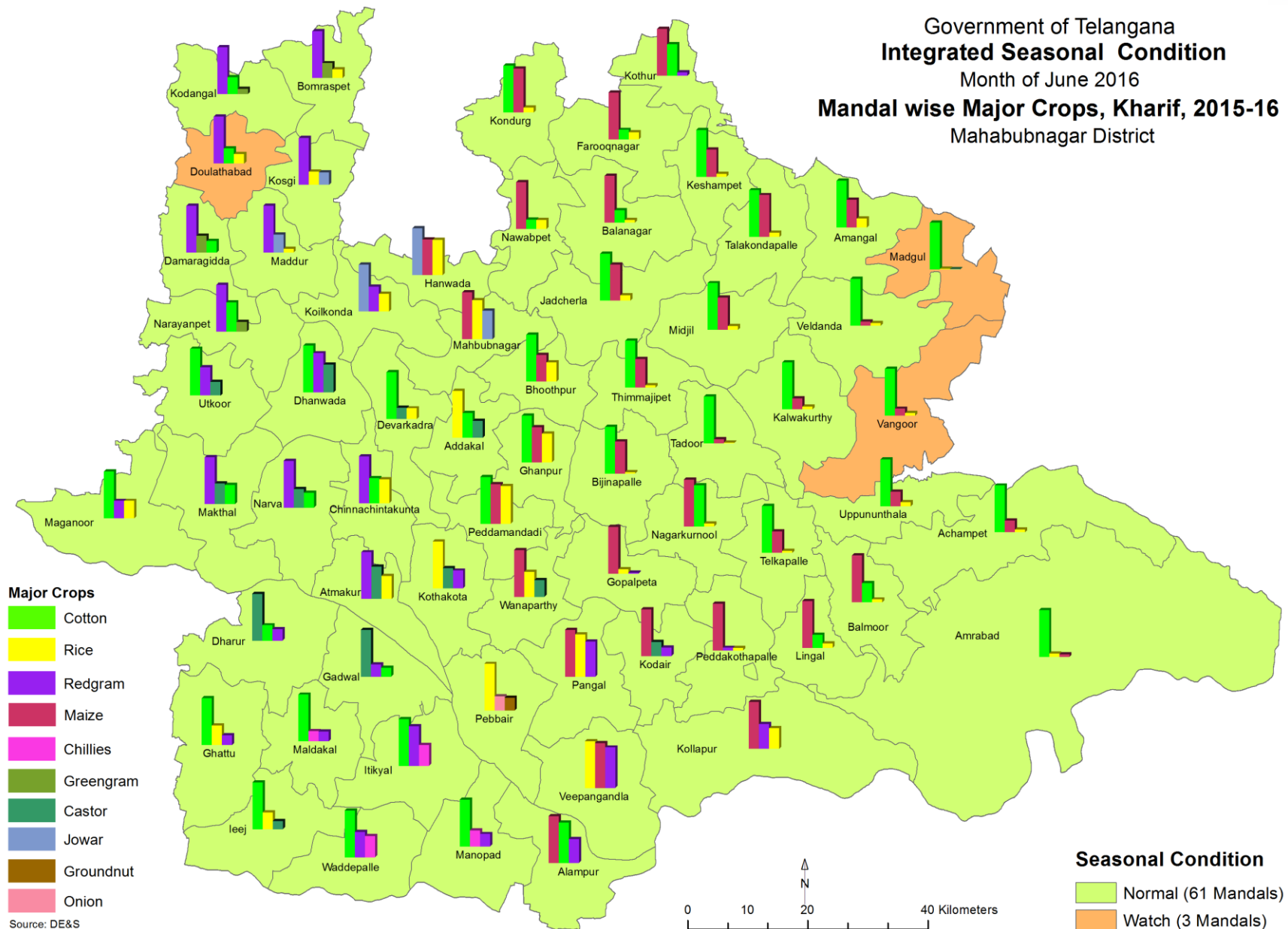*Integrated Seasonal Condition Monitoring System (June 2016)*

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Government of Telangana
Integrated Seasonal Condition
Month of June 2016
Mandal wise Major Crops, Kharif, 2015-16
Nalgonda District

Major Crops

- Cotton
- Rice
- Redgram
- Maize
- Sugarcane
- Greengram
- Chillies
- Jowar

Source: DE&S

Seasonal Condition

- Normal (56 Mandals)
- Watch (3 Mandals)

Integrated Seasonal Condition Monitoring System (June 2016)

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Government of Telangana
Integrated Seasonal Condition
Month of June 2016
Mandal wise Major Crops, Kharif, 2015-16
Nizamabad District

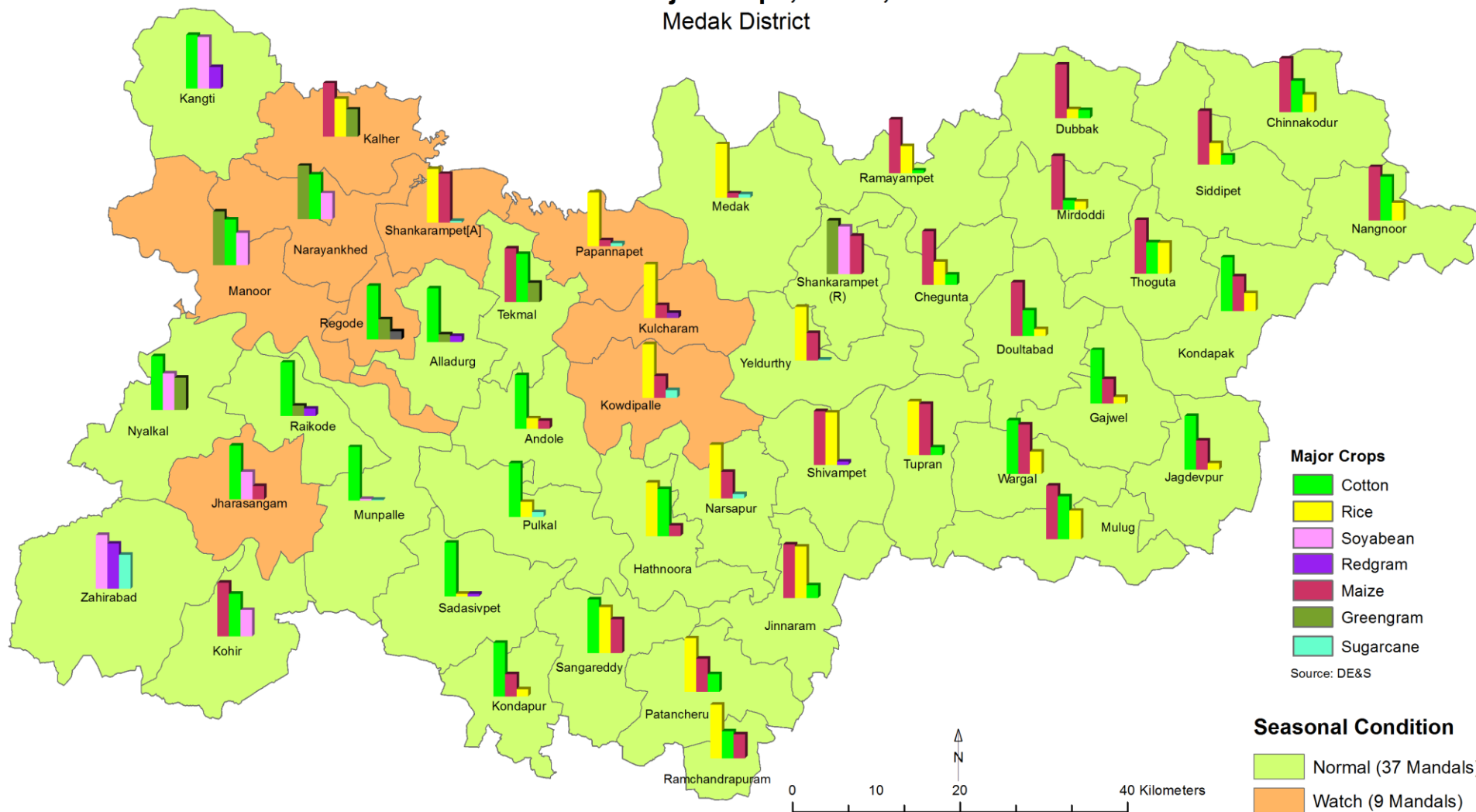**Major Crops**

- Cotton
- Rice
- Soyabean
- Redgram
- Maize
- Greengram
- Sugarcane

Source: DE&S

Seasonal Condition

- Normal (30 Mandals)
- Watch (6 Mandals)

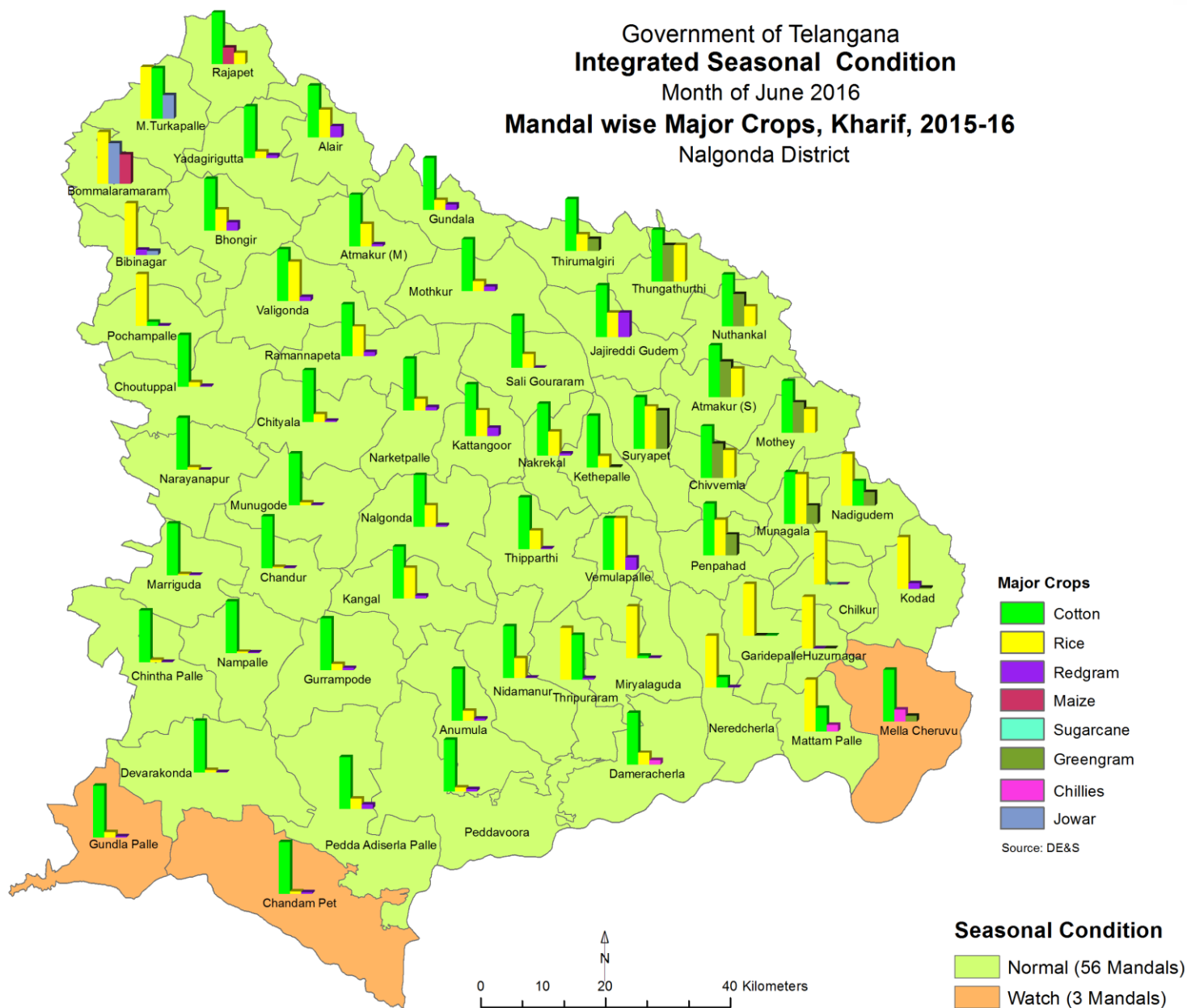*Integrated Seasonal Condition Monitoring System (June 2016)*

Government of Telangana
Integrated Seasonal Condition
Month of June 2016
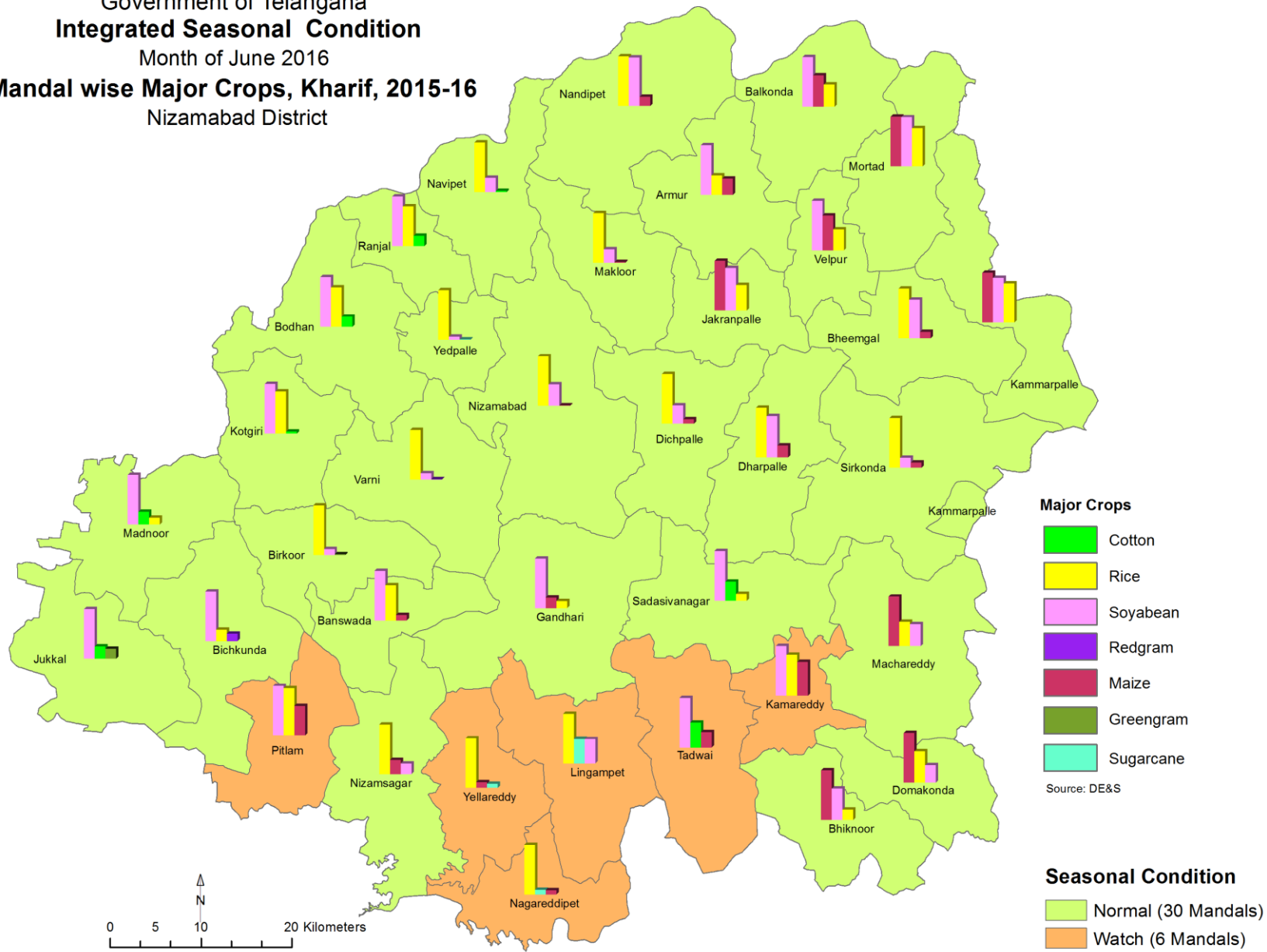**Mandal wise Major Crops, Kharif, 2015-16**
Rangareddy District

Major Crops

- Cotton
- Rice
- Redgram
- Maize
- Greengram
- Blackgram
- Jowar
- Tomatoes

Source: DE&S

Medchal
Shamirpet
Qutubullapur
Keesara
Balanagar
Serilingampally
Ghatkesar
Marpalle
Mominpet
Bantwaram
Nawabpet
Shankarpalle
HYDERABAD
Uppal
Peddemul
Vicarabad
Chevella
Moinabad
Rajendranagar
Saroornagar
Hayathnagar
Tandur
Dharur
Pudur
Shamshabad
Ibrahimpatnam
Basheerabad
Yelal
Pargi
Shabad
Maheswaram
Manchal
Doma
Kandukur
Yacharam
Gandeed
Kulkacharla

N

0   10   20   40 Kilometers

Seasonal Condition

Normal (37 Mandals)

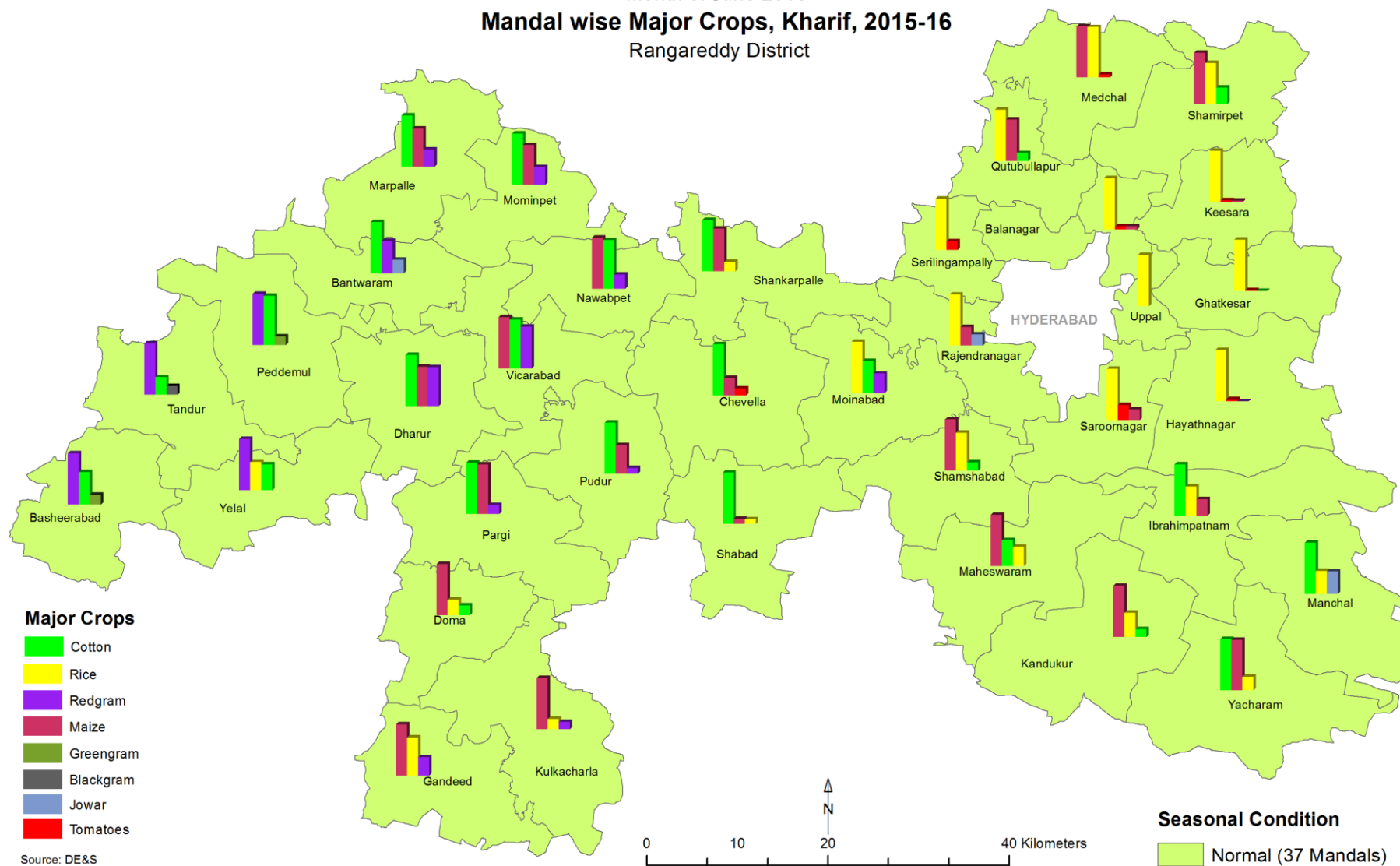*Integrated Seasonal Condition Monitoring System (June 2016)*

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Government of Telangana
Integrated Seasonal Condition
Month of June 2016
Mandal wise Major Crops, Kharif, 2015-16
Warangal District

Seasonal Condition

Normal (51 Mandals)

Major Crops

Cotton
Rice
Redgram
Maize
Chillies
Greengram
Seasmum (Gingelly)

Source: DE&S

Integrated Seasonal Condition Monitoring System (June 2016)

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