Team
Telangana State Remote Sensing Applications Centre (TRAC)

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Acknowledgement

We take this opportunity to express our sincere thanks to Directorate of Economics and Statistics, Telangana State Developing Planning Society, and India Meteorological Department for providing rainfall data. We also express our gratitude to Department of Agriculture and Irrigation Department for sharing progress of crop sowings and reservoir water levels data respectively for integrated seasonal condition monitoring of the state.
**HIGHLIGHTS**

**INTEGRATED SEASONAL CONDITION MONITORING SYSTEM (ISMS) - TELANGANA**

Cumulative Report up to 15th August, 2021

- Seasonal condition is categorised as “Normal” in 504 Mandals as on date 15th August, 2021
- Seasonal condition is categorised as “Watch” in 85 Mandals as on date 15th August, 2021
- Seasonal condition is categorised as “Alert” in 5 Mandals as on date 15th August, 2021

**Rainfall 01st June to 15th August, 2021**

- 80 Mandals (13.47%) of the state received Large Excess rainfall,
- 204 Mandals (34.34%) of the state received Excess rainfall,
- 42 Mandals out of 594 (7.07%) of state received Deficient rainfall.
- 268 Mandals (45.12%) have received Normal rainfall respectively.

Seasonal Condition First Fortnight of August 2021

Rainfall from 1st June to 15th August 2021

Seasonal condition of Telangana First Fortnight of August 2021
## CONTENTS

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Description</th>
<th>Page No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Background and Rationale</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Data used, Indicators and Methodology</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>Present status up to First Fortnight of August 2021</td>
<td>7</td>
</tr>
<tr>
<td>3.1</td>
<td>Rainfall data</td>
<td>7</td>
</tr>
<tr>
<td>3.2</td>
<td>Reservoir Water Levels</td>
<td>12</td>
</tr>
<tr>
<td>3.3</td>
<td>Crop Sowing Progress</td>
<td>13</td>
</tr>
<tr>
<td>3.4</td>
<td>Vegetation Index</td>
<td>16</td>
</tr>
<tr>
<td>3.5</td>
<td>Surface Wetness Indicator</td>
<td>19</td>
</tr>
<tr>
<td>3.6</td>
<td>Drought situation of Mandals</td>
<td>22</td>
</tr>
<tr>
<td>3.7</td>
<td>District Wise NDVI / NDWI / VCI</td>
<td>25</td>
</tr>
<tr>
<td>4</td>
<td>References</td>
<td>26</td>
</tr>
</tbody>
</table>

## List of Tables

<table>
<thead>
<tr>
<th>Table No.</th>
<th>Description</th>
<th>Page No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Classification of agricultural situation</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>Data source and indicators</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>Rainfall status as on 15th August 2021</td>
<td>8</td>
</tr>
<tr>
<td>4</td>
<td>Reservoir water levels</td>
<td>12</td>
</tr>
<tr>
<td>5</td>
<td>District Wise Crop Sowing Area - Up to the week ending 11.08.2021</td>
<td>14</td>
</tr>
<tr>
<td>6</td>
<td>Mandals under Watch and Alert category based on ISMS criteria</td>
<td>23</td>
</tr>
<tr>
<td>7</td>
<td>District wise NDVI / NDWI / VCI Status</td>
<td>25</td>
</tr>
</tbody>
</table>
## List of Figures

<table>
<thead>
<tr>
<th>Figure No.</th>
<th>Description</th>
<th>Page. No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Location of Automatic Weather Stations</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>Flow chart of drought assessment methodology</td>
<td>6</td>
</tr>
<tr>
<td>3</td>
<td>Deviation of rainfall in percent w.r.t. normal from June 01st to June 15th, 2021</td>
<td>9</td>
</tr>
<tr>
<td>4</td>
<td>Deviation of rainfall in percent w.r.t. normal from June 01st to June 30th, 2021</td>
<td>9</td>
</tr>
<tr>
<td>5</td>
<td>Deviation of rainfall in percent w.r.t. normal from June 01st to July 15th, 2021</td>
<td>10</td>
</tr>
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<td>Deviation of rainfall in percent w.r.t. normal from June 01st to July 31st, 2021</td>
<td>10</td>
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<td>Deviation of rainfall in percent w.r.t. normal from June 01st to August 15th, 2021</td>
<td>11</td>
</tr>
<tr>
<td>8</td>
<td>District wise deviation from normal crop sown area as on date 11-08-2021</td>
<td>13</td>
</tr>
<tr>
<td>9</td>
<td>District wise deviation (graph) from normal crop sown area as on date 11-08-2021</td>
<td>15</td>
</tr>
<tr>
<td>10</td>
<td>NDVI - MODIS: First Fortnight of August 2021</td>
<td>16</td>
</tr>
<tr>
<td>11</td>
<td>NDVI - MODIS, Fortnightly agricultural situation from August 2021, 2020 and 2019</td>
<td>17</td>
</tr>
<tr>
<td>12</td>
<td>NDVI deviation (MODIS - 250m), First Fortnight of August 2021 w.r.t. 2013</td>
<td>18</td>
</tr>
<tr>
<td>13</td>
<td>NDWI - MODIS: First Fortnight of August 2021</td>
<td>19</td>
</tr>
<tr>
<td>14</td>
<td>NDWI - MODIS, Fortnightly agricultural situation from August 2021, 2020 and 2019</td>
<td>20</td>
</tr>
<tr>
<td>15</td>
<td>NDWI deviation (MODIS - 250m), First Fortnight of August 2021 w.r.t. 2013</td>
<td>21</td>
</tr>
<tr>
<td>16</td>
<td>Mandal wise drought assessment based on First Fortnight of August ISMS criterion</td>
<td>22</td>
</tr>
</tbody>
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1. **Background and Rationale**

Drought is a complex natural hazard. It is defined as any deficiency of water to satisfy the normal need to agriculture, livestock, industry, or human population. Drought assessment and monitoring is essential for the agricultural sector to take appropriate mitigation measures. Drought indices derived from satellite data play a major role in assessing the health and condition of the crops/vegetation.

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

The Department of Agriculture and Cooperation, Government of India published a drought manual in 2016 which suggested parameters like rainfall deficiency, area under sowing, NDVI, NDWI, Moisture Adequacy Index (MAI) and other indictors to declare drought. State Government monitor drought by obtaining information from various sources on key variables of drought which include rainfall, reservoir / lake water levels, surface water / groundwater, soil moisture and sowing / crop conditions etc. The key variables for monitoring drought in Telangana are:

- Meteorological Data - Rainfall and other parameters like Temperature, Wind speed and Relative Humidity (AWS data)
- Weather forecast - Short, medium, extended range
- Soil Moisture (Moisture Adequate Index)
- Sown Area / Crop Health / Stress
- Satellite based Vegetation Index (NDVI/NDWI)
- Stream Flow - Discharge
- Groundwater Levels
- Reservoir and Lake Storage / Level
- Impacts - distress sale and migration of cattle, human migration, fodder availability, drinking water, animal health, employment opportunities in agriculture sector

An extensive weather observation network of 1044 Automatic Weather Stations (AWS) is established in Telangana. Telangana State Development Planning Society (TSDPS) monitors the data and maintains the networks. Figure 1 showing the location of AWS stations in Telangana.
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 (DE&S), weekly progress of crop area sowings, groundwater 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

<table>
<thead>
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<th>Duration</th>
<th>Condition</th>
<th>Description</th>
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<tr>
<td>July - August</td>
<td>Normal</td>
<td>• Agricultural situation is normal</td>
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<tr>
<td></td>
<td>Watch</td>
<td>• Progress of agricultural situation is slow</td>
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<td></td>
<td></td>
<td>• Ample scope for recovery</td>
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<td></td>
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<td>• No external intervention needed</td>
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<td></td>
<td>Alert</td>
<td>• Very slow progress of agricultural situation</td>
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<td></td>
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<td>• Need for intervention.</td>
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<td></td>
<td></td>
<td>• Develop and implement contingency plans to minimise loss</td>
</tr>
<tr>
<td>September - October</td>
<td>Mild drought</td>
<td>• Crops have suffered stress slightly</td>
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<tr>
<td></td>
<td>Moderate drought</td>
<td>• Considerable loss in production.</td>
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<td></td>
<td></td>
<td>• Take measures to alleviate suffering</td>
</tr>
<tr>
<td></td>
<td>Severe</td>
<td>• High risk significant reduction in crop yield</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Management measures to provide relief</td>
</tr>
</tbody>
</table>

1. Data used, Indicators and Methodology

2.1. Data used

Details of data used under project are discussed in Table 2.

Table. 2. Data source and indicators

<table>
<thead>
<tr>
<th>Data source</th>
<th>Product</th>
<th>Indicators</th>
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<tbody>
<tr>
<td>MODIS (250/500m)</td>
<td>Surface reflectance</td>
<td>NDVI &amp; NDWI</td>
</tr>
<tr>
<td>AWiFS</td>
<td>Surface reflectance</td>
<td>NDVI &amp; NDWI</td>
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<tr>
<td>AWS/ DES</td>
<td>Daily rainfall</td>
<td>Rainfall deviation</td>
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<td></td>
<td>Crop sown area</td>
<td>Dry spells</td>
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<td></td>
<td>Crop cutting experiments</td>
<td>Crop yield</td>
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<td>Agriculture Department, GoTS</td>
<td>Weekly sowing progress</td>
<td>District wise sown areas deviation from normal</td>
</tr>
<tr>
<td>Irrigation Department, GoTS</td>
<td>Reservoir levels/ Water release data</td>
<td>Command area Mandals under canal irrigation</td>
</tr>
</tbody>
</table>
2.2. Indicators and Index

2.2.1. Rainfall data
In Telangana, South-West Monsoon is crucial for agriculture sector. ISMS uses integrated (AWS+DES+IMD) Mandal wise rainfall data provided by Directorate of Economics & Statistics (DES). This data is used for computation of meteorological drought situation and to derive the mandal wise spatial distribution of rainfall in the state.

2.2.2. Reservoir water levels and water release - major and medium project
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. In Telangana, water is released during Kharif season to major and medium command areas.

2.2.3. Crop sowing progress

2.2.4. 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, 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.
2.2.5. Surface wetness indicator

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 background 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;

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

Higher values of NDWI signify more surface wetness. The wetness index is generated from each of the available satellite data irrespective of the cloud cover present. To minimize the cloud, monthly time composite wetness index is generated.

2.2.6. 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.
1.3 Methodology

Figure 2: 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. Indian Remote Sensing satellite (IRS) Resourcesat-2 having Advanced Wide Imaging Field Sensor (AWiFS) payload collects data in two spectral bands 0.62-0.68 µm (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 250/500 m 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 (250 m) and AWiFS (56 m) 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, 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 2.

3. Present status up to First Fortnight of August 2021

3.1. Rainfall data

The status of rainfall as on 15th August 2021 is shown in Table 3.

- 80 Mandal (13.47%) of the state received Large Excess (+60% and above) rainfall.
- 204 Mandals (34.34%) of the state received Excess (+20% to +59%) rainfall.
- 42 Mandals (7.07%) of state received Deficient (-20% to -59%) rainfall.
- 268 Mandals (45.12%) have received Normal (+19% to -19%) rainfall.
### Table 3. Rainfall status as on 15th August 2021

<table>
<thead>
<tr>
<th>S. No</th>
<th>District Name</th>
<th>Large Excess</th>
<th>Excess</th>
<th>No Rain</th>
<th>Normal</th>
<th>Deficient</th>
<th>Large Deficient</th>
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<td></td>
</tr>
<tr>
<td>32</td>
<td>Warangal_Urban</td>
<td>1</td>
<td>9</td>
<td>1</td>
<td>11</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>33</td>
<td>Yadadri Bhuvanagiri</td>
<td>3</td>
<td>9</td>
<td>5</td>
<td>17</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>80</strong></td>
<td><strong>204</strong></td>
<td><strong>268</strong></td>
<td><strong>42</strong></td>
<td><strong>594</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**SOURCE:** DE&S
Integrated Seasonal Condition Monitoring System (ISMS)

Figure 3: Deviation of rainfall in percent w.r.t. normal from June 01st to June 15th, 2021

Figure 4: Deviation of rainfall in percent w.r.t. normal from June 01st to June 30th, 2021

Integrated Seasonal Condition Monitoring System (ISMS)
Figure 5: Deviation of rainfall in percent w.r.t. normal from June 01st to July 15th, 2021

Figure 6: Deviation of rainfall in percent w.r.t. normal from June 01st to July 31st, 2021
Figure 7: Deviation of rainfall in percent w.r.t. normal from June 01st to August 15th, 2021
3.2. Reservoir water levels

All the major reservoirs are holding 1072.32 TMC as on 15-08-2021 and as on date last year the level had stood at 852.26 TMC. The details of water levels of all major reservoirs as on 15-08-2021 are furnished hereunder in Table.4.

Table.4. Reservoir Water Levels

<table>
<thead>
<tr>
<th>PARTICULARS OF MAJOR RESERVOIRS AS ON 15 / August / 2021</th>
<th>THIS YEAR</th>
<th>LAST YEAR</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>As on 15 / August / 2021</td>
<td>As on 15 / August / 2020</td>
</tr>
<tr>
<td></td>
<td>Level</td>
<td>Gross Storage</td>
</tr>
<tr>
<td></td>
<td>(in feet)</td>
<td>(TMC)</td>
</tr>
</tbody>
</table>

Krishna Basin

<table>
<thead>
<tr>
<th>Sl No</th>
<th>Reservoir Name</th>
<th>Time</th>
<th>FRL (feet)</th>
<th>Gross Capacity (TMC)</th>
<th>As on 15/08/2021 Level (in feet)</th>
<th>As on 15/08/2020 Level (in feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Almatti</td>
<td>6:00</td>
<td>1705</td>
<td>129.721</td>
<td>1704.72</td>
<td>1702.76</td>
</tr>
<tr>
<td>2</td>
<td>Jurala</td>
<td>6:00</td>
<td>1045</td>
<td>9.657</td>
<td>1044.13</td>
<td>1043.31</td>
</tr>
<tr>
<td>3</td>
<td>Nagarjunasagar</td>
<td>6:00</td>
<td>590</td>
<td>312.045</td>
<td>589.6</td>
<td>565.4</td>
</tr>
<tr>
<td>4</td>
<td>Narayanapur</td>
<td>6:00</td>
<td>1615</td>
<td>37.646</td>
<td>1612.47</td>
<td>1612.27</td>
</tr>
<tr>
<td>5</td>
<td>Srisailam</td>
<td>6:00</td>
<td>885</td>
<td>215.807</td>
<td>882</td>
<td>876.7</td>
</tr>
<tr>
<td>6</td>
<td>Tungabhadra</td>
<td>6:00</td>
<td>1633</td>
<td>100.86</td>
<td>1632.91</td>
<td>1631.62</td>
</tr>
<tr>
<td>7</td>
<td>Ujjaini</td>
<td>6:00</td>
<td>1630</td>
<td>117.2</td>
<td>1623.97</td>
<td>1619.31</td>
</tr>
</tbody>
</table>

Godavari Basin

<table>
<thead>
<tr>
<th>Sl No</th>
<th>Reservoir Name</th>
<th>Time</th>
<th>FRL (feet)</th>
<th>Gross Capacity (TMC)</th>
<th>As on 15/08/2021 Level (in feet)</th>
<th>As on 15/08/2020 Level (in feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>Jaikwad</td>
<td>6:00</td>
<td>1522</td>
<td>102.732</td>
<td>1508.96</td>
<td>1513.93</td>
</tr>
<tr>
<td>9</td>
<td>Kaddam</td>
<td>6:38</td>
<td>700</td>
<td>7.6</td>
<td>695.28</td>
<td>695.93</td>
</tr>
<tr>
<td>10</td>
<td>Lower Manair Dam</td>
<td>7:00</td>
<td>920</td>
<td>24.074</td>
<td>915.1</td>
<td>901</td>
</tr>
<tr>
<td>11</td>
<td>Nizam sagar</td>
<td>6:00</td>
<td>1405</td>
<td>17.803</td>
<td>1397.41</td>
<td>1377.66</td>
</tr>
<tr>
<td>12</td>
<td>Singur</td>
<td>6:00</td>
<td>1717.93</td>
<td>29.91</td>
<td>1711.72</td>
<td>1683.4</td>
</tr>
<tr>
<td>13</td>
<td>Sri Ram Sagar</td>
<td>6:00</td>
<td>1091</td>
<td>90.313</td>
<td>1089.2</td>
<td>1076.1</td>
</tr>
</tbody>
</table>

Source: Irrigation Department, Hyderabad
3.3. Crop Sowing Progress

For the 11th August 2021, the total area sown in the state **104,22,992** ha as against the normal sown area of **92,88,317** ha. as on date. The details are shown in Figure 8 and the deviation graph is shown in Figure 9.

Figure 8: District wise deviation from normal crop sown area as on date 11-08-2021
Table 5: District Wise Crop Sowing Area - Up to the week ending 11.08.2021

<table>
<thead>
<tr>
<th>S. No</th>
<th>District Name</th>
<th>Normal (ha)</th>
<th>Actual (ha)</th>
<th>Deviation %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mahabubnagar</td>
<td>453788</td>
<td>294080</td>
<td>-35.19</td>
</tr>
<tr>
<td>2</td>
<td>Wanaparthy</td>
<td>129000</td>
<td>100974</td>
<td>-21.73</td>
</tr>
<tr>
<td>3</td>
<td>Suryapet</td>
<td>244605</td>
<td>195803</td>
<td>-19.95</td>
</tr>
<tr>
<td>4</td>
<td>Warangal Urban</td>
<td>141555</td>
<td>118254</td>
<td>-16.46</td>
</tr>
<tr>
<td>5</td>
<td>Jayashankar Bhupalpally</td>
<td>212313</td>
<td>180976</td>
<td>-14.76</td>
</tr>
<tr>
<td>6</td>
<td>Jogulamba Gadwal</td>
<td>222928</td>
<td>191334</td>
<td>-14.17</td>
</tr>
<tr>
<td>7</td>
<td>Rangareddy</td>
<td>359500</td>
<td>310271</td>
<td>-13.69</td>
</tr>
<tr>
<td>8</td>
<td>Nagarkurnool</td>
<td>479980</td>
<td>427403</td>
<td>-10.95</td>
</tr>
<tr>
<td>9</td>
<td>Khammam</td>
<td>391075</td>
<td>356370</td>
<td>-8.87</td>
</tr>
<tr>
<td>10</td>
<td>Warangal Rural</td>
<td>284214</td>
<td>267279</td>
<td>-5.96</td>
</tr>
<tr>
<td>11</td>
<td>Hyderabad Rural</td>
<td>0</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>12</td>
<td>Jangaon</td>
<td>251349</td>
<td>253885</td>
<td>1.01</td>
</tr>
<tr>
<td>13</td>
<td>Siddipet</td>
<td>421154</td>
<td>427209</td>
<td>1.44</td>
</tr>
<tr>
<td>14</td>
<td>Medchal Malkajigiri</td>
<td>14209</td>
<td>15107</td>
<td>6.32</td>
</tr>
<tr>
<td>15</td>
<td>Rajanna Sircilla</td>
<td>197173</td>
<td>211210</td>
<td>7.12</td>
</tr>
<tr>
<td>16</td>
<td>Nirmal</td>
<td>340540</td>
<td>366203</td>
<td>7.54</td>
</tr>
<tr>
<td>17</td>
<td>Mahabubabad</td>
<td>245024</td>
<td>269106</td>
<td>9.83</td>
</tr>
<tr>
<td>18</td>
<td>Adilabad</td>
<td>499727</td>
<td>556098</td>
<td>11.28</td>
</tr>
<tr>
<td>19</td>
<td>Nizamabad</td>
<td>368906</td>
<td>426908</td>
<td>15.72</td>
</tr>
<tr>
<td>20</td>
<td>Kumarambheem Asifabad</td>
<td>300058</td>
<td>373285</td>
<td>24.40</td>
</tr>
<tr>
<td>21</td>
<td>Kamareddy</td>
<td>359702</td>
<td>454454</td>
<td>26.34</td>
</tr>
<tr>
<td>22</td>
<td>Bhadradi Kothagudem</td>
<td>261628</td>
<td>331592</td>
<td>26.74</td>
</tr>
<tr>
<td>23</td>
<td>Vikarabad</td>
<td>414110</td>
<td>530378</td>
<td>28.08</td>
</tr>
<tr>
<td>24</td>
<td>Nalgonda</td>
<td>725584</td>
<td>929401</td>
<td>28.09</td>
</tr>
<tr>
<td>25</td>
<td>Karimnagar</td>
<td>246576</td>
<td>318203</td>
<td>29.05</td>
</tr>
<tr>
<td>26</td>
<td>Jagtial</td>
<td>199043</td>
<td>257027</td>
<td>29.13</td>
</tr>
<tr>
<td>27</td>
<td>Yadadri Bhuvanagiri</td>
<td>254046</td>
<td>340210</td>
<td>33.92</td>
</tr>
<tr>
<td>28</td>
<td>Mancherial</td>
<td>180102</td>
<td>243691</td>
<td>35.31</td>
</tr>
<tr>
<td>29</td>
<td>Sangareddy</td>
<td>509159</td>
<td>689490</td>
<td>35.42</td>
</tr>
<tr>
<td>30</td>
<td>Peddapalle</td>
<td>180150</td>
<td>245033</td>
<td>36.02</td>
</tr>
<tr>
<td>31</td>
<td>Mulugu</td>
<td>38785</td>
<td>60488</td>
<td>55.96</td>
</tr>
<tr>
<td>32</td>
<td>Medak</td>
<td>184540</td>
<td>307546</td>
<td>66.66</td>
</tr>
<tr>
<td>33</td>
<td>Narayanpet</td>
<td>177794</td>
<td>373724</td>
<td>110.20</td>
</tr>
<tr>
<td></td>
<td></td>
<td>92,88,317</td>
<td>104,22,992</td>
<td></td>
</tr>
</tbody>
</table>
Figure 9: District wise deviation (graph) from normal crop sown area as on date 11-08-2021
3.4. Vegetation index

The Normalized Difference of Vegetation Index (NDVI) for the First Fortnight of August 2021 is shown in the figures and also compared with 2020 and 2019. The year 2013 is treated as a normal year. Mandal wise NDVI, Fortnightly agricultural situation for the year 2021, 2020 and 2019, deviation of NDVI w.r.t. 2013 are shown in the Figures 10, 11, and 12 respectively. As per NDVI deviation w.r.t normal mild stress is observed in parts of Jangoan, Khammam, Mahabubabad, Mahabubnagar, Nalgonda, Nagarkurnool, Siddipet and Suryapet districts. As per rainfall distribution the progress of agricultural situation and the vegetation condition in the state is normal and likely to improve in coming fortnight.

Figure 10: NDVI - MODIS: First Fortnight of August 2021
Figure 11: NDVI - MODIS, Fortnightly agricultural situation from August 2021, 2020 and 2019
Figure 12: NDVI deviation (MODIS - 250m), First Fortnight of August 2021 w.r.t. 2013
3.5. Surface wetness indicator

The map indicates status of moisture availability in soil as well as in crop canopy for the First Fortnight of August 2021. The year 2013 is treated as a normal year. Mandal wise Normalized Difference Water Index (NDWI) situation the year 2021, 2020 & 2019, Fortnightly agricultural situation deviation of NDWI w.r.t. 2013 are shown in the Figures 13, 14 and 15 respectively. As per NDWI deviation w.r.t normal Khammam, Mahabubabad, Mahabubnagar, Nalgonda, Nagarkurnool, Siddipet, Suryapet and Wanaparthy 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 very much likely to improve in next fortnight.
Figure 14: NDWI - MODIS, Fortnightly agricultural situation from August 2021, 2020 and 2019
Figure 15: NDWI deviation (MODIS - 250m), First Fortnight of August 2021 w.r.t. 2013
3.6. Drought situation of Mandals

3.6.1 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, Watch. Mandal-wise analysis for the First Fortnight of August 2021 indicated “Normal” agricultural situation in 504 Mandals. The agricultural situation is categorized as “Watch” in 85 Mandals, The agricultural situation is categorized as “Alert” in 5 Mandals. The Mandals under Watch categories are given in the Table 6 and their spatial distribution is shown in Figure 16.

Figure 16: Mandal wise drought assessment based on August ISMS criterion
<table>
<thead>
<tr>
<th>District Name</th>
<th>Watch(85)</th>
<th>Alert(05)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bhadradri Kothagudem</td>
<td>Total: 07 Allapalli, Aswapuram, Burgampadu, Cherla, Gundala, Laxmidevipalli, Manuguru.</td>
<td>Total: 01 Karakagudem.</td>
</tr>
<tr>
<td>Jagtial</td>
<td>Total: 06 Beerpur, Buggaram, Gollapalle, Ibrahimpatnam, Kathlapur, Kodimial.</td>
<td></td>
</tr>
<tr>
<td>Jangoan</td>
<td>Total: 01 Bachannapeta.</td>
<td></td>
</tr>
<tr>
<td>Jogulamba Gadwal</td>
<td>Total: 07 Dharur, Gadwal, Maldakal, Manopad, Rajoli, Undavelli, Waddepalle.</td>
<td>Total: 01 Alampur.</td>
</tr>
<tr>
<td>Khammam</td>
<td>Total: 01 Thallada.</td>
<td></td>
</tr>
<tr>
<td>Komaram Bheem Asifabad</td>
<td>Total: 01 Chintalamanepally.</td>
<td></td>
</tr>
<tr>
<td>Mahabubabad</td>
<td>Total: 04 Chinnagudur, Kesamudram, Mahabubabad, Nellikudur.</td>
<td></td>
</tr>
<tr>
<td>Mahabubnagar</td>
<td>Total: 07 Bhoothpur, Gandeed, Hanwada, Jadcherla, Koilkonda, Mahabubnagar Rural, Nawabpet.</td>
<td></td>
</tr>
<tr>
<td>Medak</td>
<td>Total: 02 Chilipched, Manoharabad.</td>
<td></td>
</tr>
<tr>
<td>Medchal Malkajgiri</td>
<td>Total: 01 Shamirpet.</td>
<td>Total: 02 Kalwakurthy, Thimmajipeta.</td>
</tr>
<tr>
<td>Nagar Kurnool</td>
<td>Total: 04 Charakonda, Kollapur, Lingal, Nagar Kurnool.</td>
<td></td>
</tr>
<tr>
<td>Nalgonda</td>
<td>Total: 04 Adavi devula palli, Anumula Haliya, Chandur, Nakrekal.</td>
<td></td>
</tr>
<tr>
<td>Nirmal</td>
<td>Total: 01 Pembi.</td>
<td></td>
</tr>
<tr>
<td>District</td>
<td>Total</td>
<td>Sublocations</td>
</tr>
<tr>
<td>---------------</td>
<td>-------</td>
<td>-------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Nizamabad</td>
<td>03</td>
<td>Dichpalle, Indalwai, Mendora.</td>
</tr>
<tr>
<td>Peddapalli</td>
<td>02</td>
<td>Elgaid, Julapalle.</td>
</tr>
<tr>
<td>Rajanna Sircilla</td>
<td>01</td>
<td>Konaraopeta.</td>
</tr>
<tr>
<td>Rangareddy</td>
<td>03</td>
<td>Maheshwaram, Moinabad, Nandigam.</td>
</tr>
<tr>
<td>Sangareddy</td>
<td>07</td>
<td>Gummadidala, Jharasangam, Jinnaram, Kalher, Kohir, Mogdampalle, Sirgapoor.</td>
</tr>
<tr>
<td>Siddipet</td>
<td>04</td>
<td>Chinnakodur, Gajwel, Husnabad, Jagadevpur.</td>
</tr>
<tr>
<td>Suryapet</td>
<td>04</td>
<td>Nagaram, Neredcherla, Suryapet, Thungathurthi.</td>
</tr>
<tr>
<td>Vikarabad</td>
<td>04</td>
<td>Kotepally, Kulkacharla, Pargi, Yelal.</td>
</tr>
<tr>
<td>Wanaparthy</td>
<td>02</td>
<td>Amarchinta, Gopalpeta.</td>
</tr>
<tr>
<td>Warangal Rural</td>
<td>02</td>
<td>Nallabelly, Narsampet</td>
</tr>
<tr>
<td>Warangal Urban</td>
<td>03</td>
<td>Dharmasagar, Elkathurthi, Velair.</td>
</tr>
</tbody>
</table>
### 3.7. District Wise NDVI / NDWI / VCI

**Table 7: District wise NDVI / NDWI / VCI Status**

<table>
<thead>
<tr>
<th>S.No</th>
<th>District</th>
<th>NDVI Value</th>
<th>Average NDVI</th>
<th>NDWI Value</th>
<th>Average NDWI</th>
<th>VCI (NDVI)</th>
<th>VCI (NDWI)</th>
<th>VCI Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Adilabad</td>
<td>0.502</td>
<td>0.367</td>
<td>0.426</td>
<td>0.286</td>
<td>75.505</td>
<td>84.819</td>
<td>Normal</td>
</tr>
<tr>
<td>2</td>
<td>Bhadradri-Kothagudem</td>
<td>0.383</td>
<td>0.333</td>
<td>0.277</td>
<td>0.271</td>
<td>69.913</td>
<td>56.293</td>
<td>Normal</td>
</tr>
<tr>
<td>3</td>
<td>Hyderabad</td>
<td>0.348</td>
<td>0.300</td>
<td>0.293</td>
<td>0.224</td>
<td>60.778</td>
<td>65.549</td>
<td>Normal</td>
</tr>
<tr>
<td>4</td>
<td>Jagtial</td>
<td>0.254</td>
<td>0.205</td>
<td>0.228</td>
<td>0.156</td>
<td>50.785</td>
<td>63.957</td>
<td>Normal</td>
</tr>
<tr>
<td>5</td>
<td>Jangaon</td>
<td>0.459</td>
<td>0.430</td>
<td>0.437</td>
<td>0.350</td>
<td>70.455</td>
<td>86.305</td>
<td>Normal</td>
</tr>
<tr>
<td>6</td>
<td>Jayashankar-Bhupalpally</td>
<td>0.520</td>
<td>0.411</td>
<td>0.416</td>
<td>0.292</td>
<td>85.842</td>
<td>86.875</td>
<td>Normal</td>
</tr>
<tr>
<td>7</td>
<td>Jogulamba-Gadwal</td>
<td>0.270</td>
<td>0.292</td>
<td>0.211</td>
<td>0.233</td>
<td>52.816</td>
<td>47.416</td>
<td>Mild</td>
</tr>
<tr>
<td>8</td>
<td>Kamareddy</td>
<td>0.407</td>
<td>0.262</td>
<td>0.301</td>
<td>0.175</td>
<td>78.053</td>
<td>74.068</td>
<td>Normal</td>
</tr>
<tr>
<td>9</td>
<td>Karimnagar</td>
<td>0.528</td>
<td>0.366</td>
<td>0.463</td>
<td>0.293</td>
<td>80.733</td>
<td>89.044</td>
<td>Normal</td>
</tr>
<tr>
<td>10</td>
<td>Khammam</td>
<td>0.478</td>
<td>0.402</td>
<td>0.390</td>
<td>0.309</td>
<td>76.466</td>
<td>75.423</td>
<td>Normal</td>
</tr>
<tr>
<td>11</td>
<td>Komaram Bheem-Asifabad</td>
<td>0.433</td>
<td>0.385</td>
<td>0.330</td>
<td>0.297</td>
<td>68.465</td>
<td>63.287</td>
<td>Normal</td>
</tr>
<tr>
<td>12</td>
<td>Mahabubabad</td>
<td>0.321</td>
<td>0.323</td>
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<td>0.259</td>
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*Normalized Difference Vegetative Index (NDVI) Value - Current year NDVI
*Normalized Difference Wetness Index (NDWI) Value - Current year NDWI
*Average NDVI - Average of previous 17 years NDVI
*Average NDWI - Average of previous 17 years NDWI
*VCI (NDVI) - Vegetation Condition Index based on NDVI
*VCI (NDWI) - Vegetation Condition Index based on NDWI
*NDVI/NDWI Condition - VCI>=60 (Normal), VCI>=40 (Mild), VCI>=20 (Moderate), VCI<20 (Severe)
4. References

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Integrated Seasonal Condition Monitoring System (ISMS)