Rainfall August 2021

NDVI Aug 2021

Issue Date: 2 Sep 2021

Sep 2021 | Issue 7

# South Asia Drought Outlook

How to use the bulletin?

- Tracks how likely the weather forecast for the next four weeks will have the dry spell or droughts, and to a lesser extent of lesser rainfall

- Maps drought situations at regional and national levels and for range of products from rainfall anomaly, SPI, vegetation index and composite drought index i.e. IDSI to assess the overall drought impacts

- Determine areas of short and long-term drought outlooks and drought alert maps

- Briefing of media reporting on drought impacts affecting the region's

The SADMS bulletin is published by the 15th of each month.
View and download the latest issues at :

https://www.iwmi.cgiar.org/resources/drought-monitoring-system/drought-bulletin/

Drought Outlook Summary

- Although the southwest monsoon forecast, which includes the northern, central, southern and northeastern states, is normal, significant rainfall is forecast for the period from late August to mid-September, but significant reduction in rainfall is expected for all states from mid - September to the end of September.

- The sub-season forecast for the end of November, 2021 is expected to be dry in small areas of the southern and central Indian states and in Afghanistan, the southern part of Pakistan as well as the northern regions of Bangladesh. However, significant rainfall is expected in the central and eastern states of India as well as in the northern parts of Pakistan. Clear dry weather is expected in Nepal, India and the Indo-Gangetic region of Bangladesh as well as the southern coastal areas of Sri Lanka.

- Although significant rainfall was recorded in South Asia at the end of July 2021, there was no significant rainfall in August 2021 except in Madhya Pradesh, Uttar Pradesh, Bihar of India and Bangladesh at the end of August. Therefore, in August, Poor vegetation in some districts has further intensified.

- According to the rain forecasts, Maharashtra, Bihar, and Assam will receive average rainfall till mid September and there is a high probability that the vegetation health will improve.

- Drought is less likely to occur in Sri Lanka as there is a healthier vegetation condition at present and normal rainfall is forecast for the next few months.

- In Bangladesh, an increase in dryness during July and August is indicated by all the drought monitoring indicators and sub-seasonal forecast shows the bellow normal rainfall from September to November 2021 which alarming the further increase of dryness in coming months.

- It is important the stakeholders adopt timely drought relief and response strategies to mitigate drought risks;

IRI Multi–Model Probability Forecast for Precipitation for September–October–November 2021, Issued August 2021
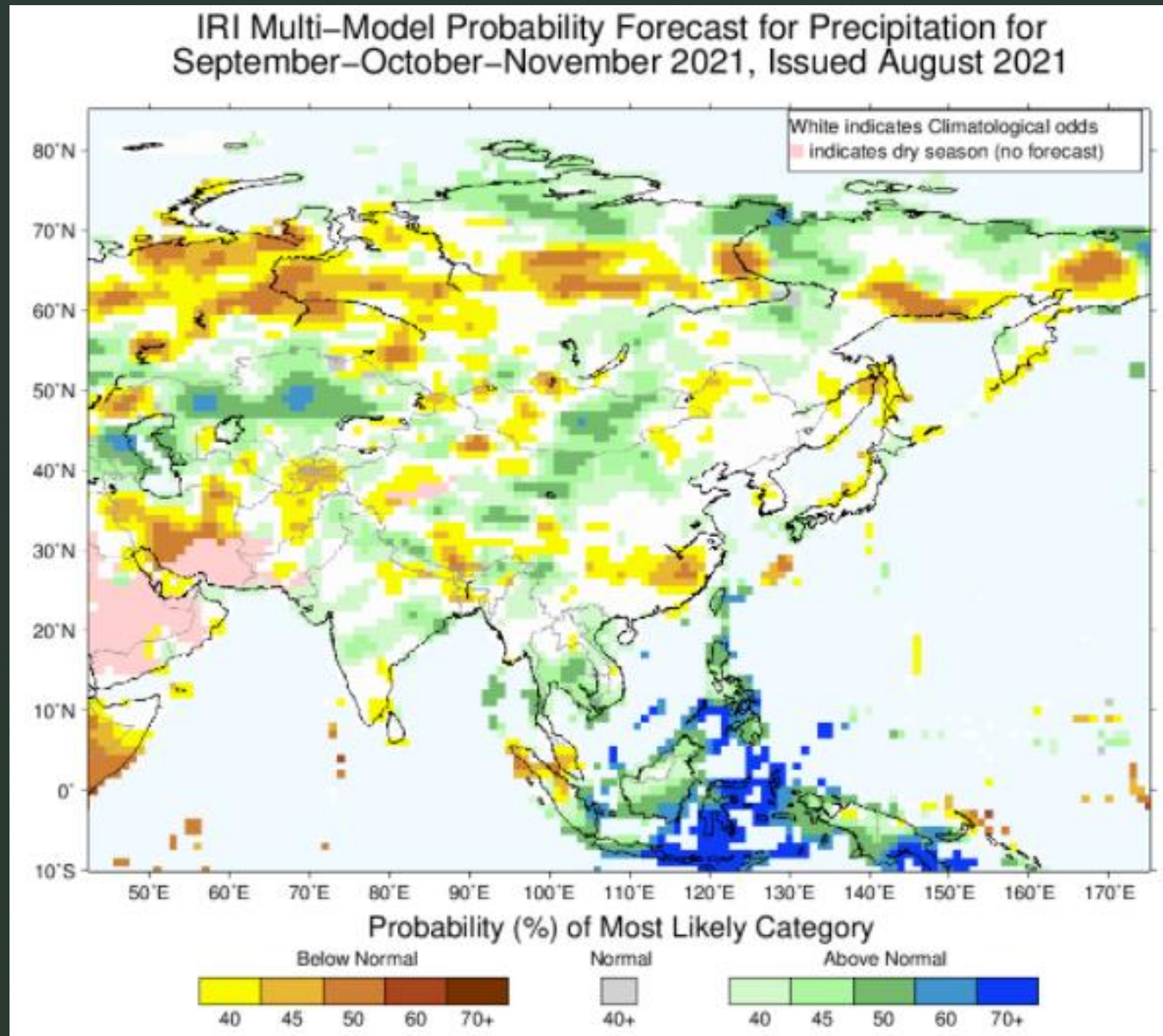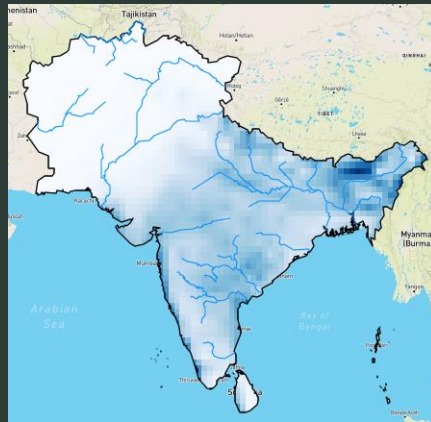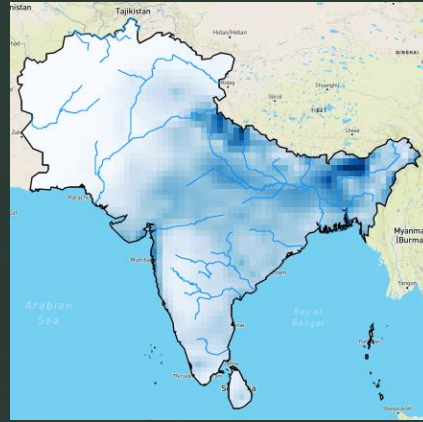
Source: IRI

Precipitation forecast for most parts of Western and Eastern India likely with above normal for Sep-Oct-Nov 2021. However, Northern Bangladesh, Southern Nepal, parts of northeastern India, Southern Sri Lanka, southern Pakistan and large part of Afghanistan will receive less rainfall.
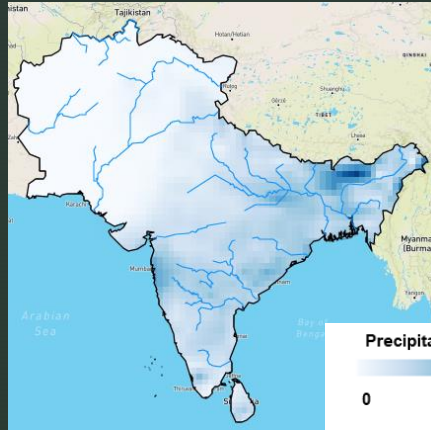
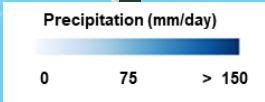**Weather forecast (Current and anomaly rainfall)**
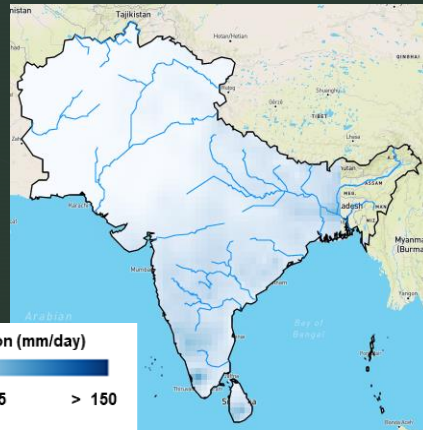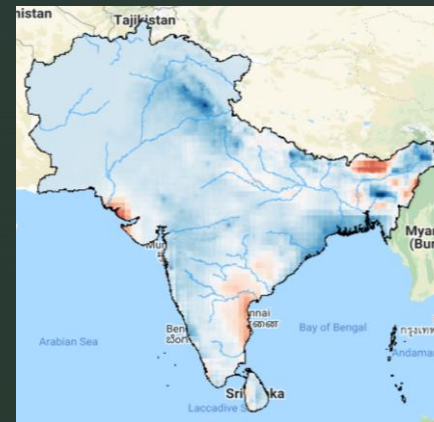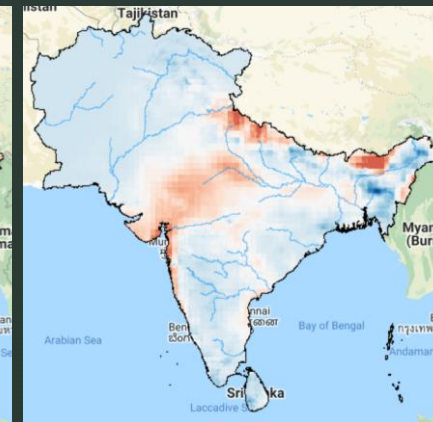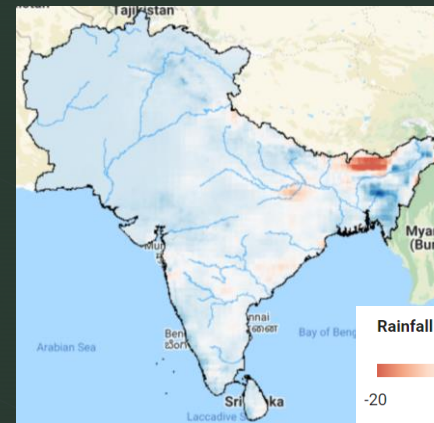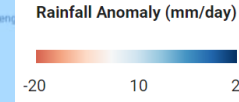
Week 1: 02 to 08 Sep

Week 2: 09 to 15 Sep

Week 02: 08 Sep
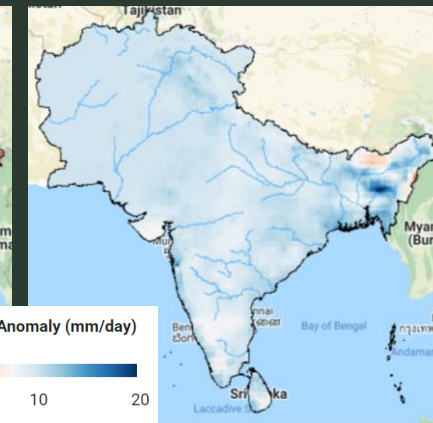
Week 2: 09 to 15 Aug

Week 3: 16 to 22 Sep

Week 4: 23 to 29 Sep

Week 3: 16 to 22 Sep

Week 4: 23 to 29 Sep

Precipitation (mm/day)

0   75   > 150

Rainfall Anomaly (mm/day)

-20   10   20

Sub-seasonal forecast and Extended Range Prediction group of IITM has been providing experimental real-time forecast of the active-break spells of Indian Summer Monsoon Rainfall since 2011 up to 4 pentad lead using an indigenously developed Ensemble Prediction system (EPS) based on the state-of-the-art Climate Forecast System Model Version 2 (CFSv2). This product provides 32 days of forecasted precipitation data with spatial resolution of ~50-km (0.5-deg x 0.5-deg).

To identify rainfall variability the sub-seasonal forecast data in reference to historical rainfall product from CHIRPS are used to determine areas of rainfall deficit. Values greater than 10 (mm/day) explains positive rainfall and values less than 10 (mm/day) shows possible areas of deficit rainfall which are likely under drought.

Actual Rainfall Distribution

Jul 2021

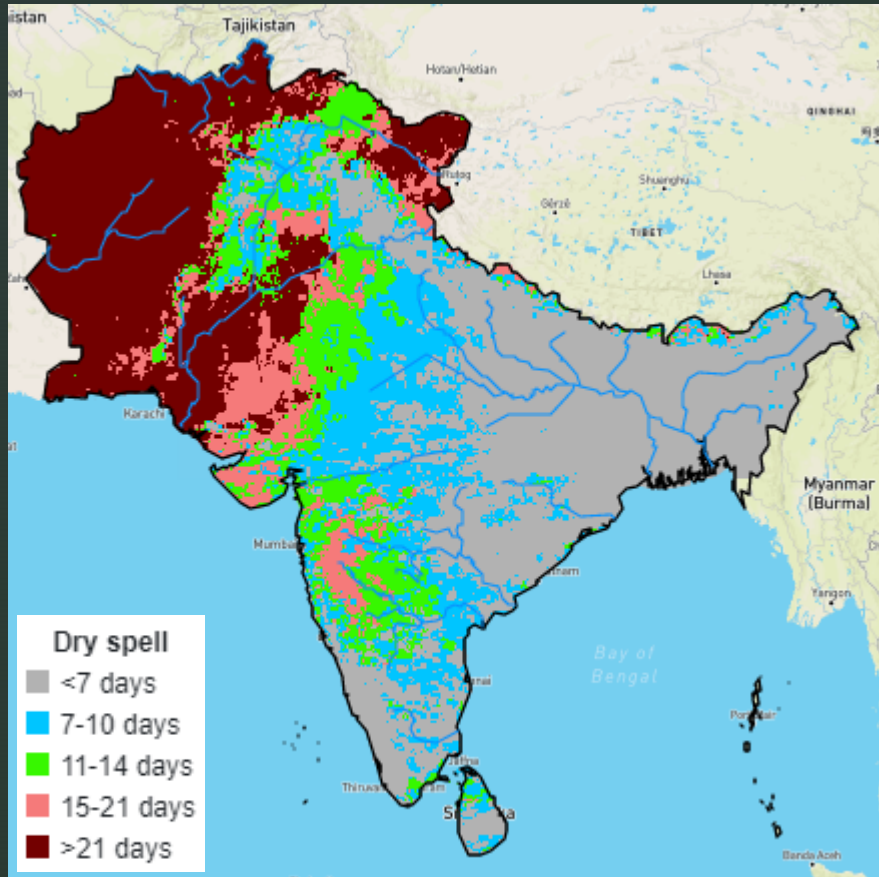**Aug 2021**

Rainfall (mm)
0   >1400

Rainfall (mm)
0   >1100
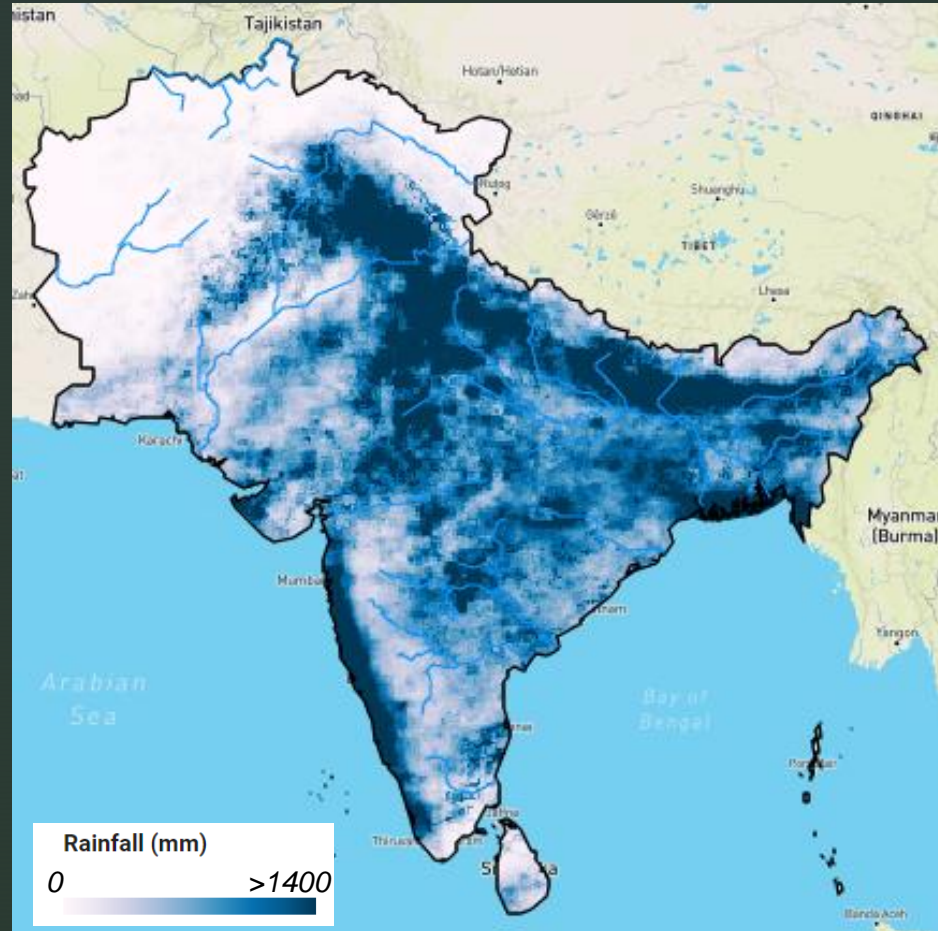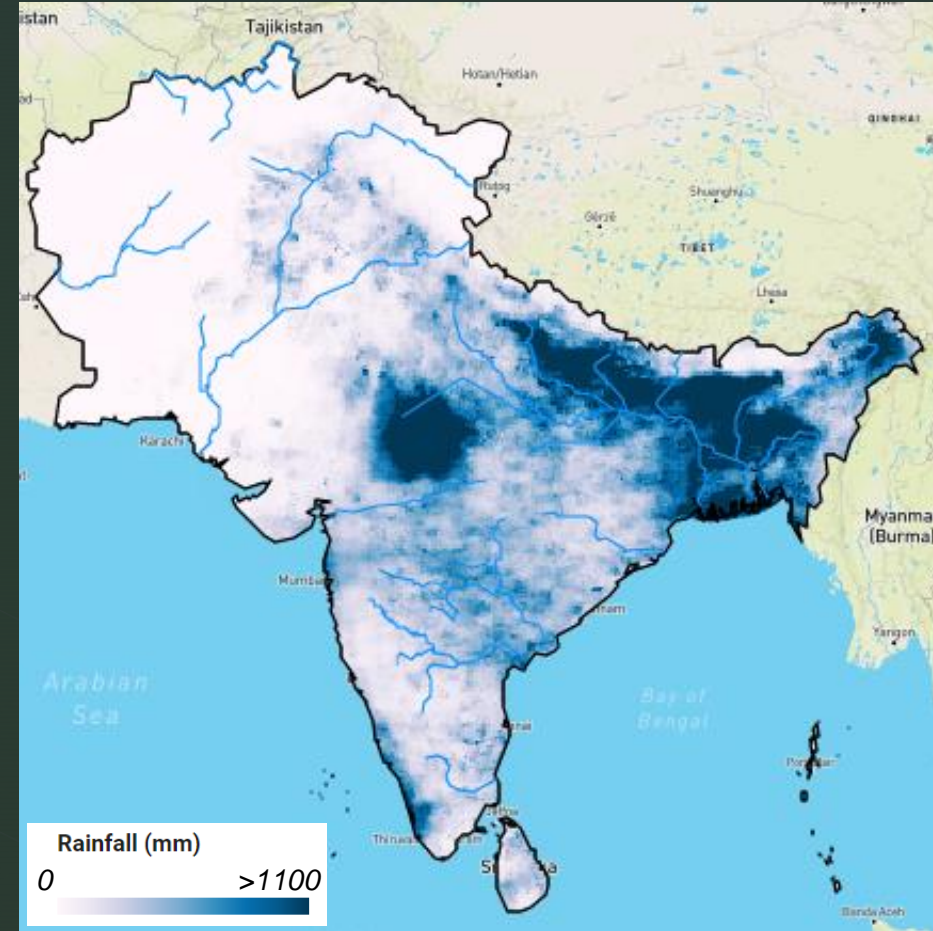
The Global Precipitation Measurement (GPM) data from the National Aeronautics and Space Administration (NASA) Goddard Space Flight Center sources was used to produce the spatial distribution of the monthly precipitation for South Asia. August clearly shows moderate to heavy rainfall over South Asia except Afghanistan, Pakistan and Sothern and central India, but for the whole of South Asia August shows a significant decrease in overall rainfall.

Aug 2021 (<2.5mm)

Aug 2021 (<10 mm)

Dry spell
- <7 days
- 7-10 days
- 11-14 days
- 15-21 days
- >21 days
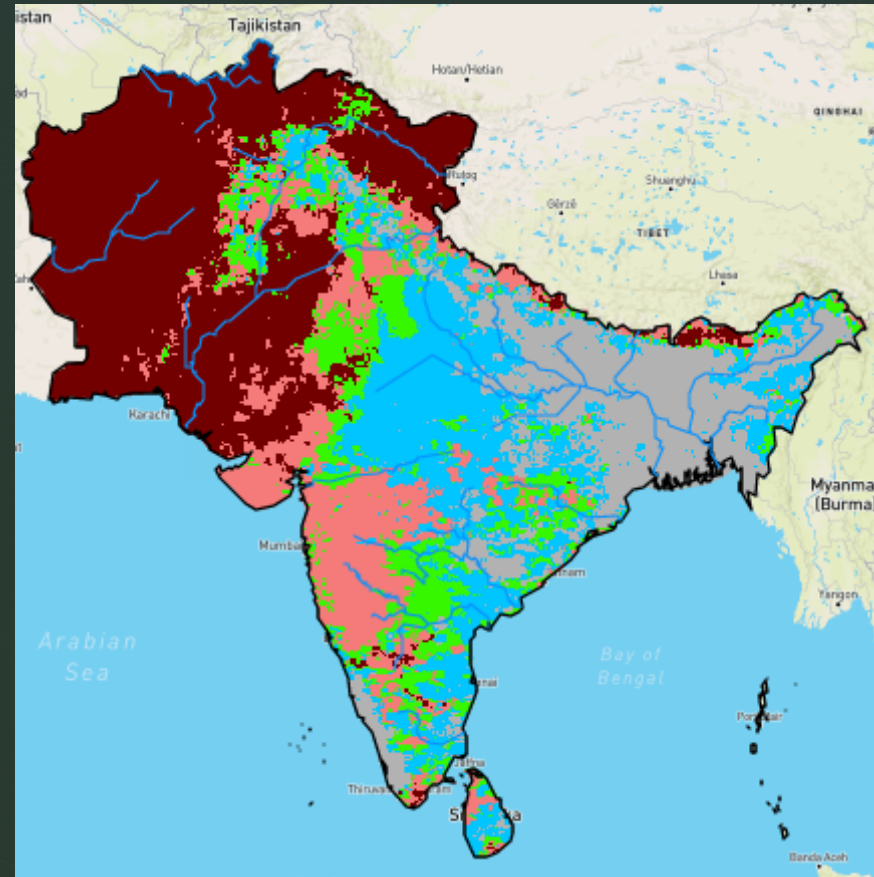
Dry Spell

- The dry-Spell is a good indicator of the likelihood of a drought as well as the presence of a prolonged period of drought. Similarly, this indicator reflects the tendency of rainfall over a period of time (short-term, medium-term or long-term).

- A dry spell is defined as the number of consecutive days with a daily precipitation amount below a certain threshold, such as 2.5, 5, 10 mm, preceded and followed by at least one day with rainfall exceeding the threshold. The maps uses rainfall product from GPM to calculate the dry spell for July at 2.5 and 10 mm

- The sub seasonal forecast and the dry spells can help users to develop agriculture contingency plan depending on the crop type and its condition.
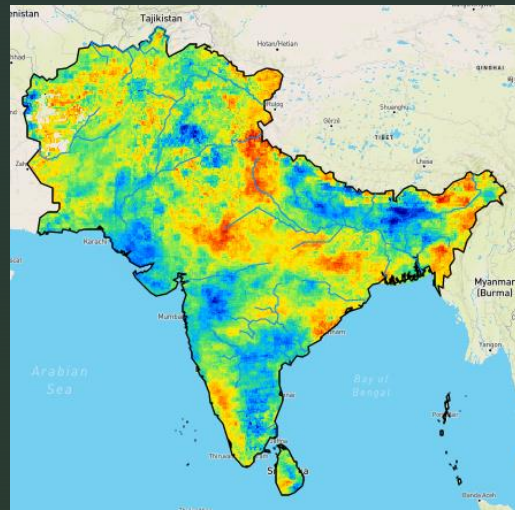
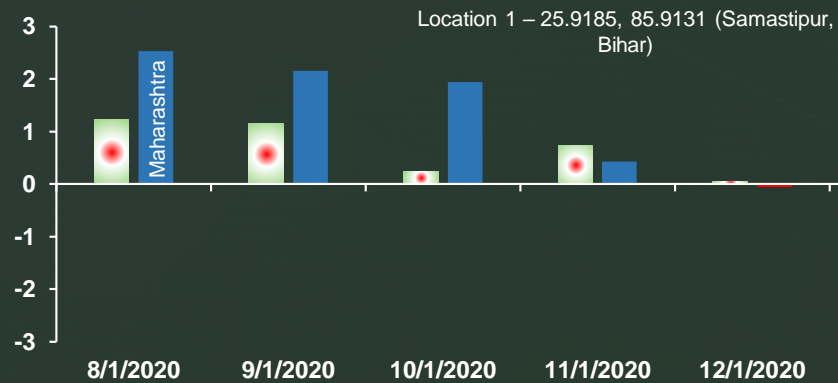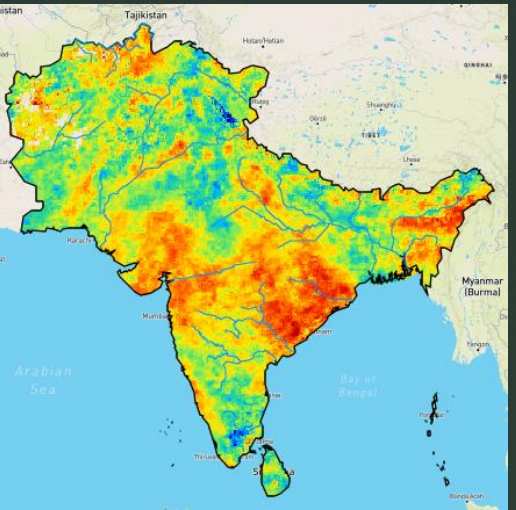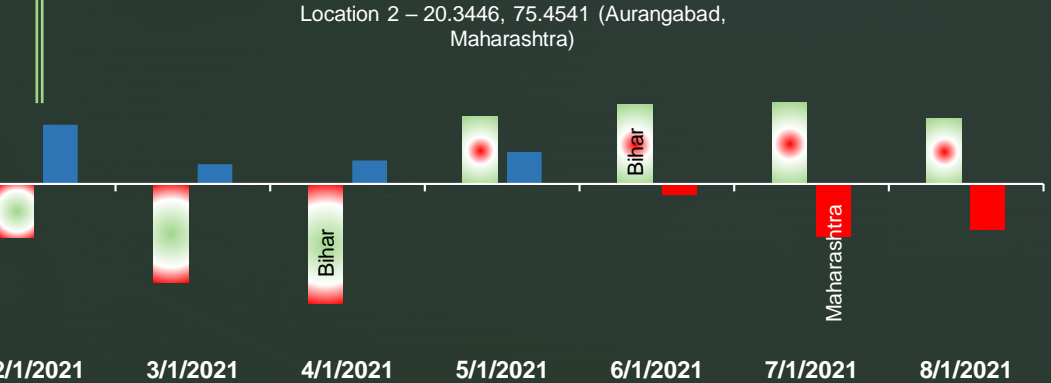**Standardize Precipitation Index (3 month SPI)**

3month SPI – Jul 2020
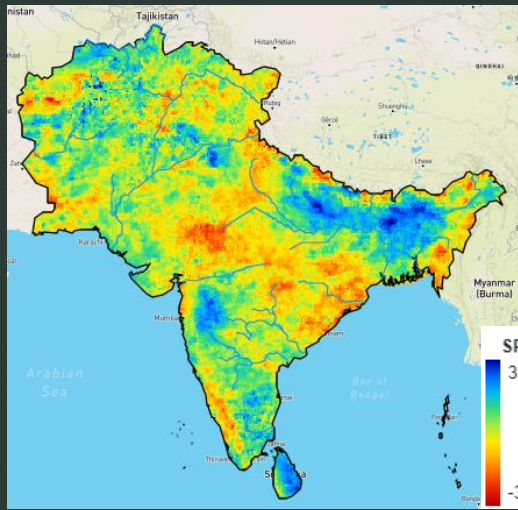
3month SPI – Jul 2021

3month SPI – Aug 2020

3month SPI – Aug 2021

SPI
3

-3

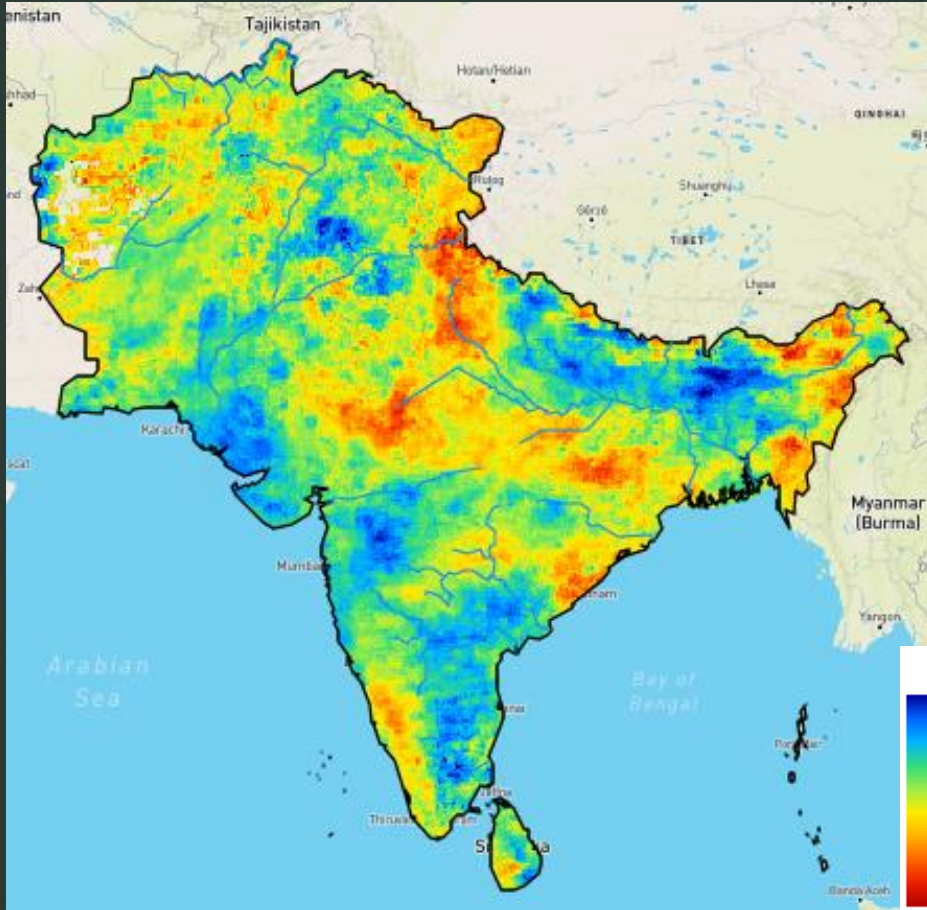Location 1 – 25.9185, 85.9131 (Samastipur, Bihar)
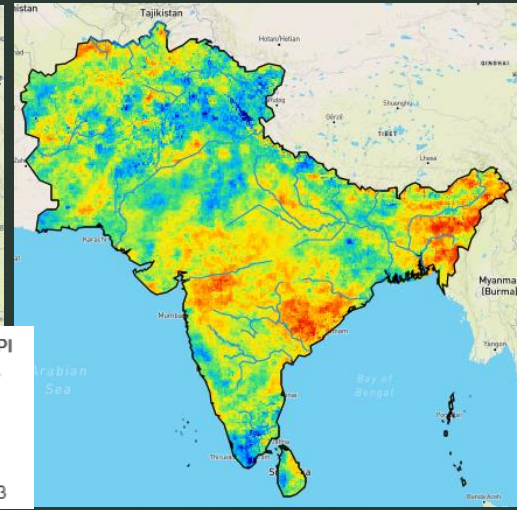
Location 2 – 20.3446, 75.4541 (Aurangabad, Maharashtra)

- The SPI is a measure of the number of standard deviations of observed cumulative precipitation deviates from the climatological average. The SPI values range are from -3 to +3 with negative values indicate droughts, while positive values indicate wet conditions. Severe drought conditions are determined by high negative values.

- The current SPI condition and sub-seasonal rainfall forecast together provides better understanding of the future drought occurrences and its impact on agriculture and smallholder farmers.

Standardize Precipitation Index (3 month SPI)

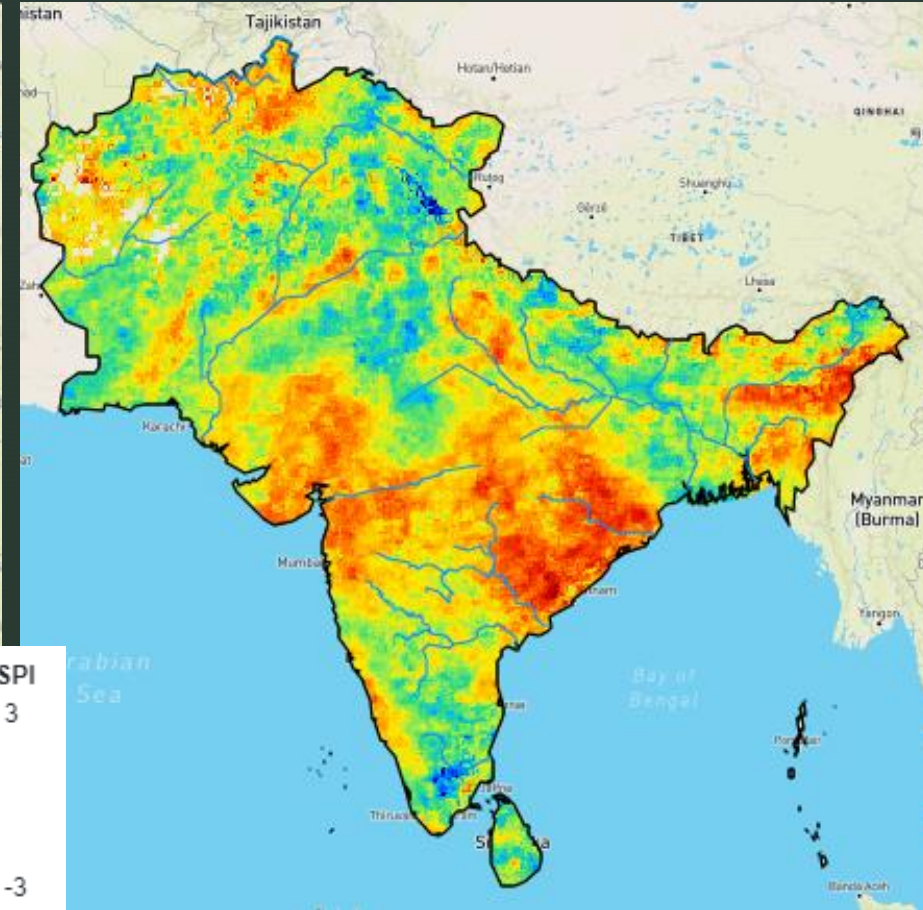**3month SPI – Aug 2020**

3month SPI – Aug 2021

- The SPI is a measure of the number of standard deviations of observed cumulative precipitation deviates from the climatological average. The SPI values range are from -3 to +3 with negative values indicate droughts, while positive values indicate wet conditions. Severe drought conditions are determined by high negative values.

- The states of Orissa, Maharashtra, Chhattisgarh, Assam and Gujarat showed significantly lower SPI in end of August 2021 compared to August 2020, which can also be identified as a meteorological drought.

Soil Moisture Condition Index (SMCI)
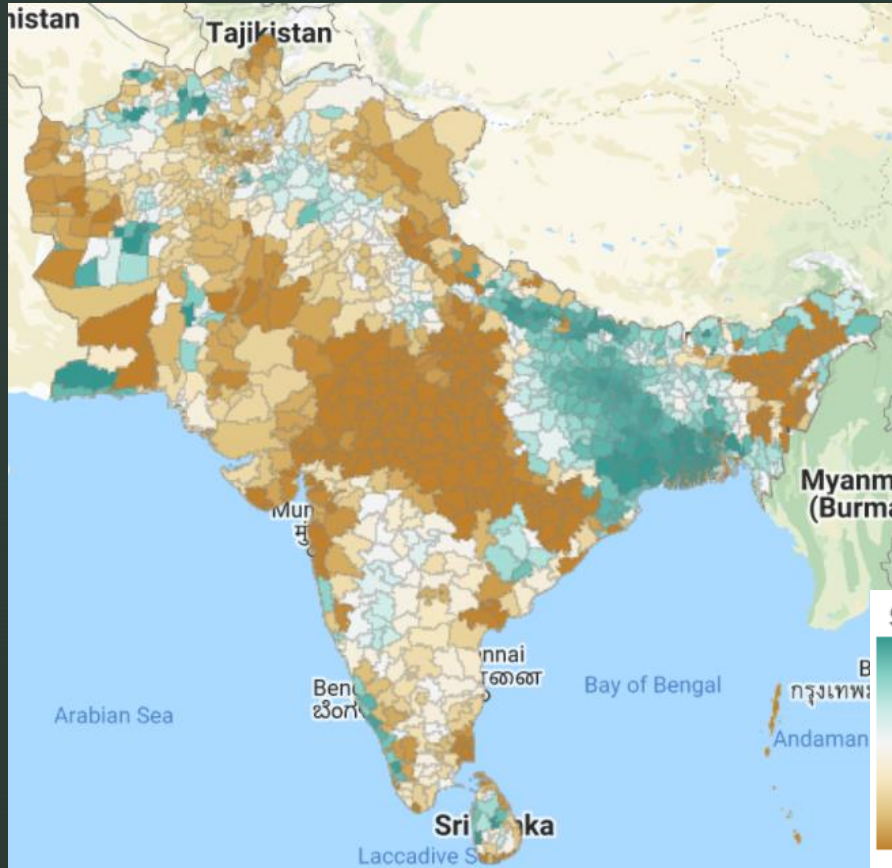
Jul 2021   **Aug 2021**
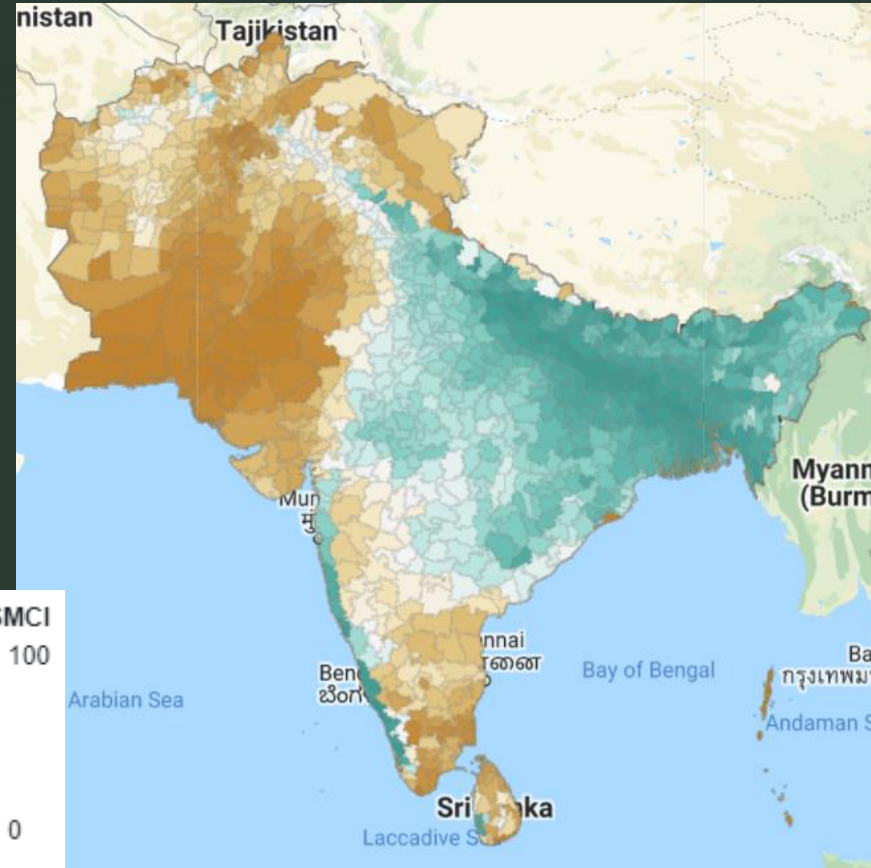
- SMAP satellite developed by NASA provides direct sensing of soil moisture in the top 5 cm of the soil column. Soil Moisture Condition Index (SMCI) represents soil moisture condition with respect to the historical values and the SMCI value range varies between 0-100, where the value nearby 0 represents extreme soil moisture stress, while values close to 100 explains extremely wet condition.

- Low soil moisture values can detect dry conditions while high values can be used to detect wet conditions. These conditions occur in proportion to the change in rainfall.

Jul 2021

Aug 2020

Aug 2021

Aug 2021

NDVI

VCI
- Extreme
- Severe
- Moderate
- No Drought
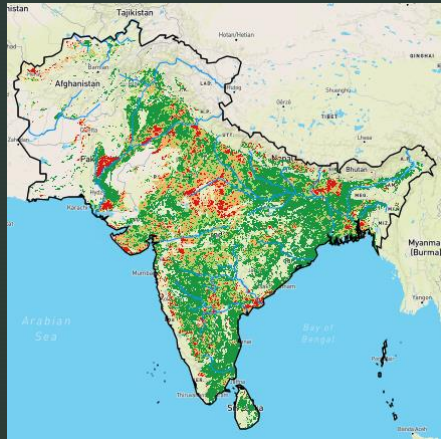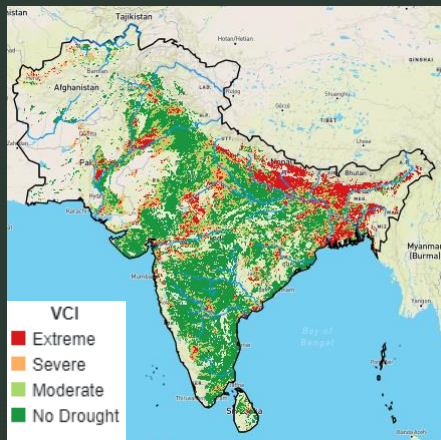
Vegetation Index

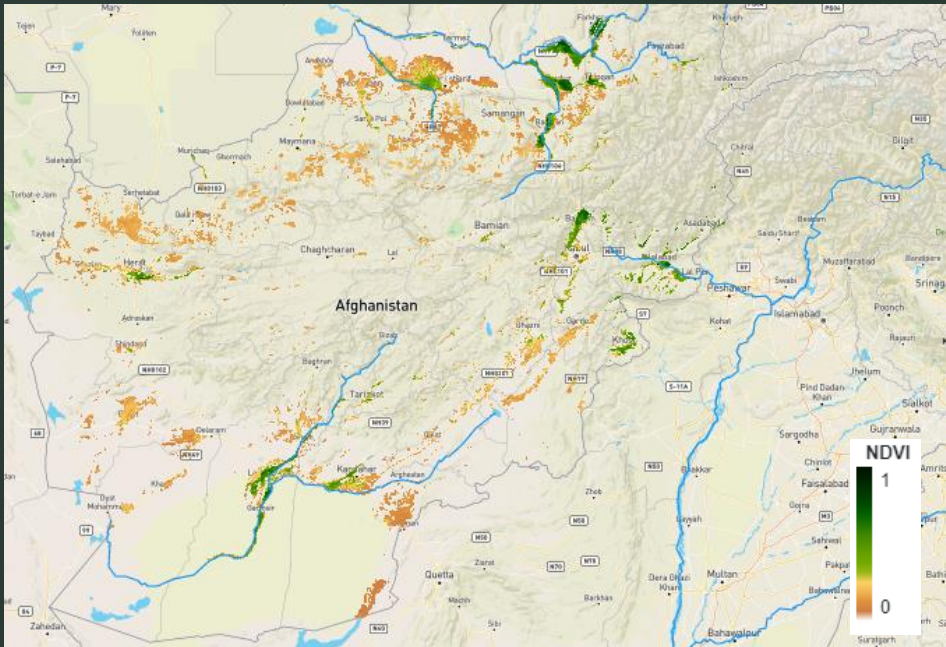- Vegetation Health Index (VHI) is a potential index for agricultural drought monitoring and forecasting. The VHI was developed using NASA' MODIS 16-day combined Terra and Aqua satellite data with a spatial resolution of 250m.

- VHI is an index characterizes the health of the vegetation by integrating NDVI and Temperature. The VHI is used for various purposes, of which its applicability in detecting and monitoring the phenomenon of drought.

- Extreme and Severe VHI classes indicating poor vegetation health while no-drought indicating high vegetation health status. Locations in eastern region of India e.g. Bihar with low values indicates areas of flooding.

- https://reliefweb.int/report/afghanistan/wfp-afghanistan-situation-report-16-august-2021

- https://www.climatechangenews.com/2021/08/24/afghanistan-risk-famine-amid-drought-taliban-takeover/

- https://www.downtoearth.org.in/news/climate-change/monsoon-2021-is-it-time-for-severe-drought-in-india-s-northeast-and-northwest--78767

- https://www.indiatoday.in/science/story/climate-change-iraq-syria-water-crisis-drought-food-shortage-global-warming-1844600-2021-08-24

Media Reports

Aug 2021 (NDVI)

Drought Severity (July)

Afghanistan outlook
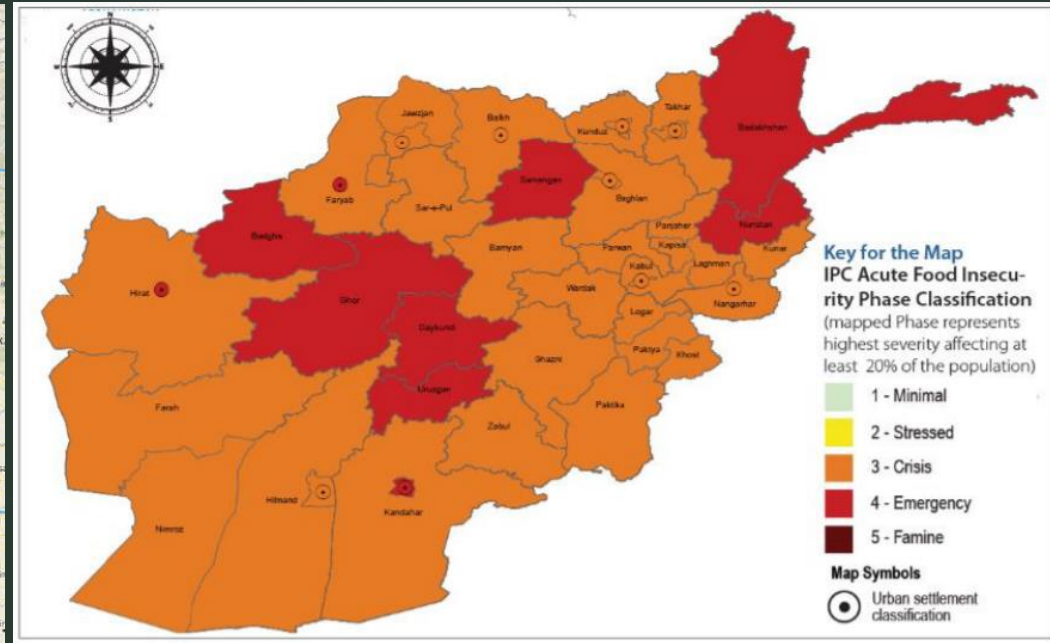
Afghanistan is experiencing drought situation similar to 2018 drought, which majority of the provinces are either acute food insecurity as per the IPC classification.

Drought situation is corroborated with the AF-DEWS tool explaining wide spread agricultural drought as captured from Integrated Drought Severity Index (IDSI) for July 2021.

Sub-seasonal forecast explains 40-45 bellow normal rainfall condition over central and Northern Afghanistan for the month of September to November.

Aug 2021 (NDVI)

Normalize Difference Vegetation Index (NDVI) usually used to identify vegetative health, and in Khulna, Rajshahi and Sylhet provinces of Bangladesh shows significant decreases of NDVI in first half of August compared to July indicates an increase in vegetative stress.

Standardized Precipitation Evapotranspiration Index (SPEI) showed negative values till the end of July and was turn to positive at the end of August. Therefore, the drought-like conditions that were shown until the end of July will subside in the next few weeks.

However, IRI 3-month sub-seasonal precipitation forecast with the possibilities of below average rainfall from Sep - November, the dryness can be further enhance further to a drought condition during next three months.

Bangladesh outlook
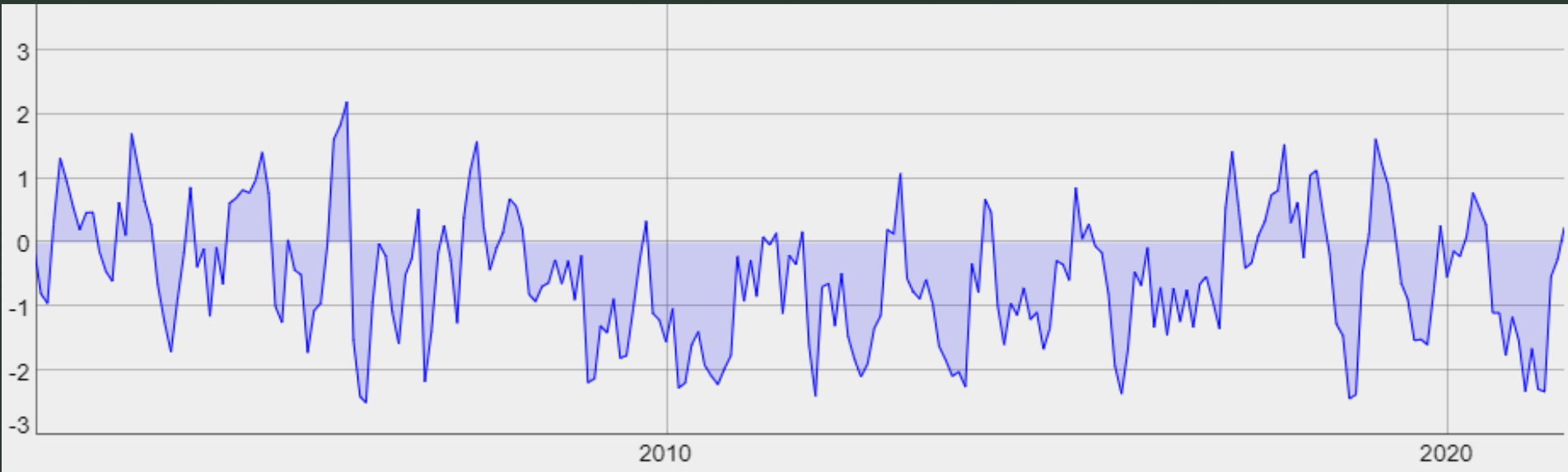
Source: https://spei.csic.es/   SPEI

In reference to rainfall anomaly map, several states i.e. Odisha, Gujarat, parts of Madhya Pradesh, part of Assam, West Bengal Chhattisgarh and costal region of Maharashtra and Karnataka received deficit rainfall and states such as Bihar, Part of Madhya Pradesh, etc. received excess rainfall.

SPI (3-month i.e. Jun-Jul-Aug) indicator for meteorological drought shows states of Odisha, parts of Maharashtra, Kerala, Chhattisgarh, Telangana, Madhya Pradesh, Gujarat and Western Uttara Pradesh are likely with deficit rainfall

Vegetation Health Index (VHI) shows considerable decreases of vegetation health specially in North and north-eastern state such as Northern UP, Bihar, Assam states and rest of the states the overall crop cover has significantly improved.

Agricultural drought i.e. Integrated Drought Severity Index (IDSI) explains States such as part of Maharashtra, Madhya Pradesh parts of Rajasthan and Wet Bengal are under drought situation, it is expected to recover till mid of September as per the sub-seasonal forecast with likely rainfall across India.
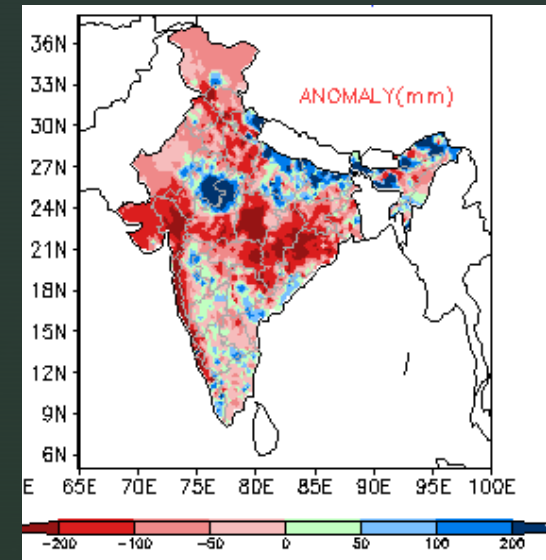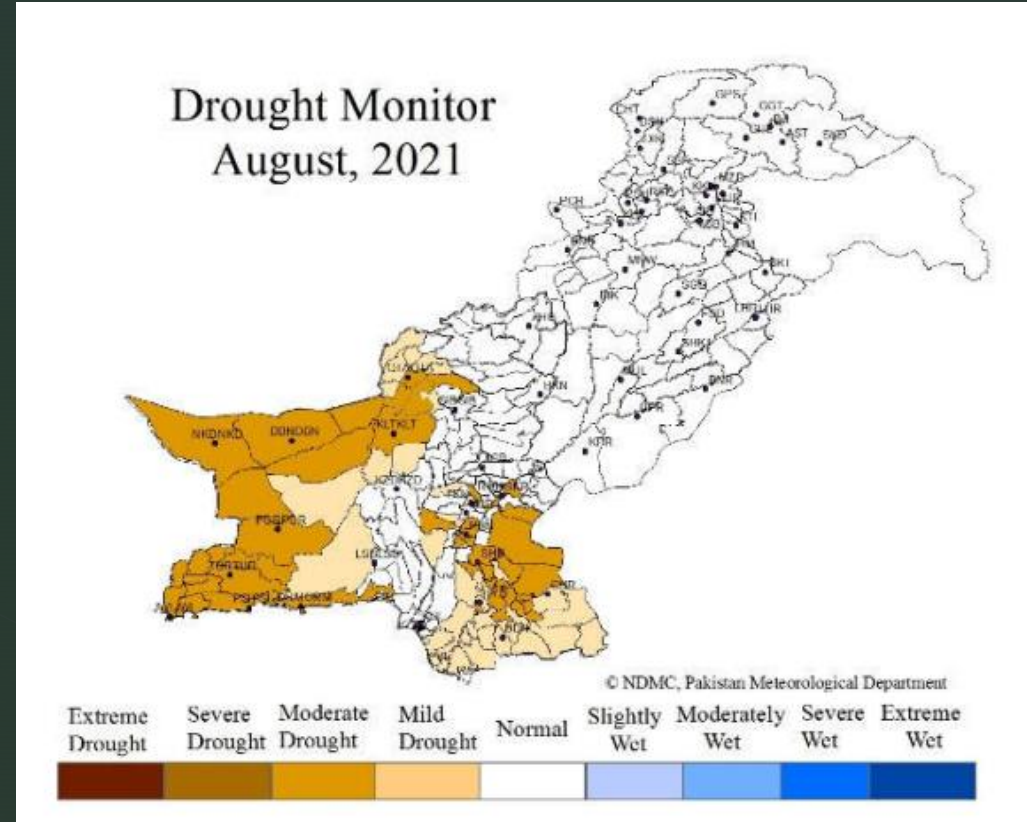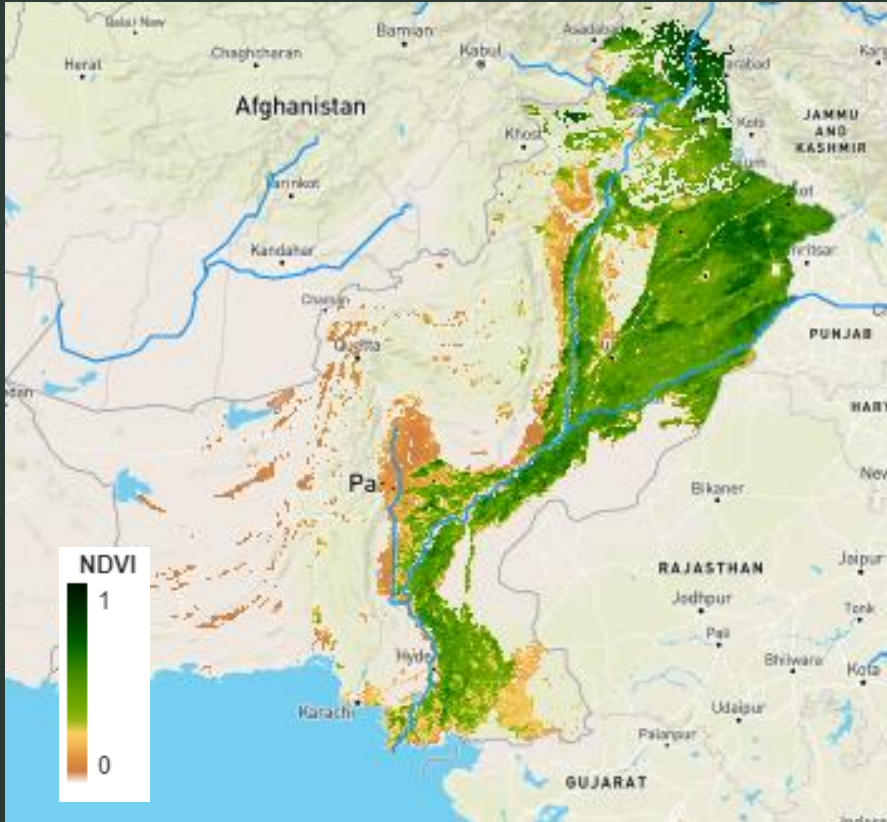

Rainfall anomaly for Aug 2021; Map Source: IMD
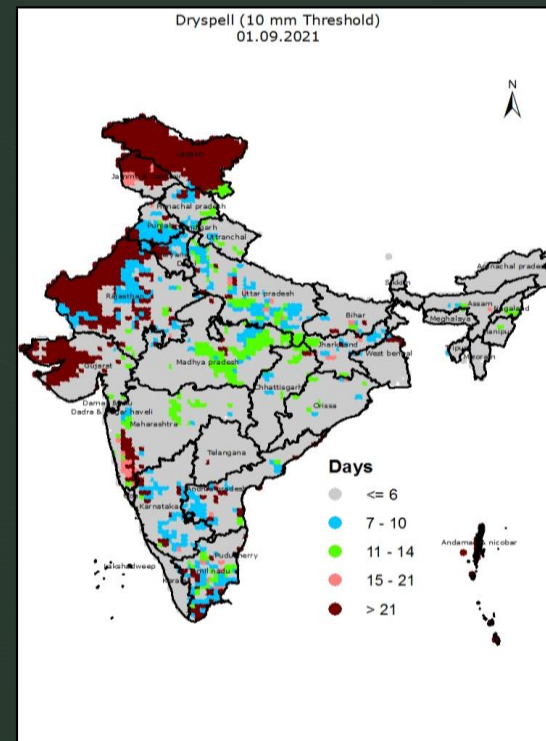
Dry spell (10mm threshold) Map Source: CRIDA

Source; NDMC

Pakistan outlook

According to the National Drought Monitoring Centre of Pakistan, 10 districts of Sindh Province and 6 districts of Balochistan province show mild to moderate drought conditions in July 2021.

Normalize difference Vegetation Index (NDVI) shows same vegetation condition like in both July and August over Sindh province and decrease in drought severity is also explained by NDMC in July.

As per ERPAS (1-month) and IRI (3-month) forecast explains significant reduction in rainfall for whole September, likely situation of increased dryness and drought situation.

SADMS team would like to acknowledge the support from the following partners for sharing the data and access to the geospatial platform.
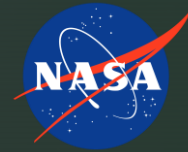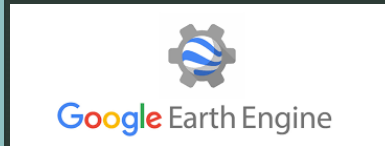
SADMS Team

IWMI: Giriraj Amarnath; Surajit Ghosh; Niranga Alahacoon; Alok Sikka

CRIDA/ICAR: KV Rao

Access archived south Asia bulletin (Click here)

For additional information or sharing feedback contact the team

Dr. Giriraj Amarnath
a.giriraj@cgiar.org or
wrd@iwmi.org

Disclaimer

The South Asia Drought Monitoring System (SADMS) was created by the International Water Management Institute (IWMI) with the support from CGIAR Research Program of Water, Land and Ecosystems (WLE); Indian Council of Agricultural Research (ICAR) and Japan's Ministry of Agriculture, Forestry and Fisheries (MAFF). The SADMS tool was developed specifically for the purpose of drought early warning to monitor the near real-time drought situation and enable timely action to be taken by the government authorities and relevant development organizations in South Asia.

IWMI, CGIAR WLE, ICAR or Japan's MAFF do not make any warranties on the country or basin boundaries used in this drought outlook, or about the completeness, reliability, and accuracy. Any decisions/actions taken based on this drought outlook are strictly at the discretion of the user, and IWMI, CGIAR WLE, ICAR or Japan's MAFF will not be liable for any loss or damage that may occur as a result of using the tool.

Thank You