

Aug 2021 | Issue 5

South Asia Drought Outlook



RESEARCH
PROGRAM ON
Water, Land and
Ecosystems



MAFF
Ministry of Agriculture,
Forestry and Fisheries
農林水産省

How to use the bulletin?

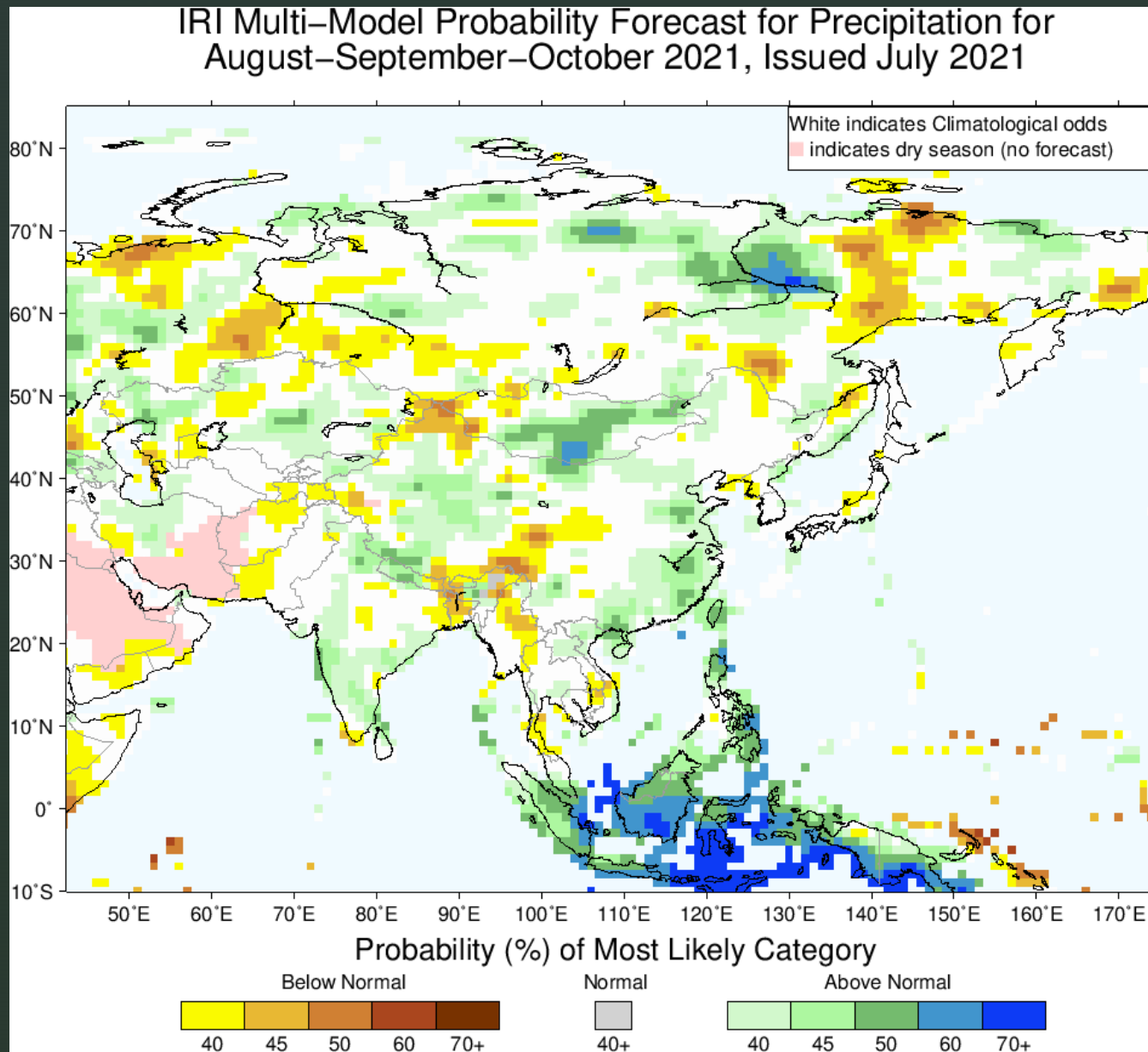
- Tracks how likely the weather forecast for the next four weeks will have the dry spell or droughts, and to a lesser extent of lesser rainfall
- Maps drought situations at regional and national levels and for range of products from rainfall anomaly, SPI, vegetation index and composite drought index 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

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Drought Outlook Summary

- Despite a revival of the Southwest Monsoon forecast for several states including Maharashtra, Madhya Pradesh, Southern states and northeast States are recording deficit rainfall received so far in June to mid of July, a significant rainfall has been recorded since late July.
- Sub-seasonal forecast till end August shows dry conditions in western and parts of southern states and good rainfall in the Indo-Gangetic region of Nepal, India and Bangladesh. Most part of the Pakistan and Afghanistan scattered or low rainfall forecast across next four week of rainfall.
- SPI 3-month for May and June 2021 explains drier condition in Sindh and Balochistan provinces and similarly the Southern, western and northwestern provinces in Afghanistan. In India states of MP, Maharashtra, Kerala, Odisha, parts of Andhra Pradesh, Telangana including norther eastern states experience in drought conditions.
- Despite significant rainfall has been recorded in South Asia by the end of July 2021, the poor vegetation for July 2021 shows in some states. The main reason for this may be the delay in the monsoon or the decrease in rainfall, which is well illustrated by the decrease in VCI in South Pakistan, Maharashtra, Madhya Pradesh and Bihar.
- According to the rain forecasts, Maharashtra, Madhya Pradesh, Uttara Pradesh and Bihar will receive significant rainfall in August 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 June and July is indicated by all the drought monitoring indicators and sub-seasonal forecast shows the bellow normal rainfall from August to October 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;

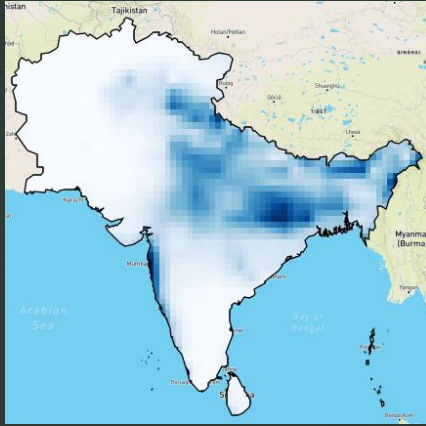


Source: IRI

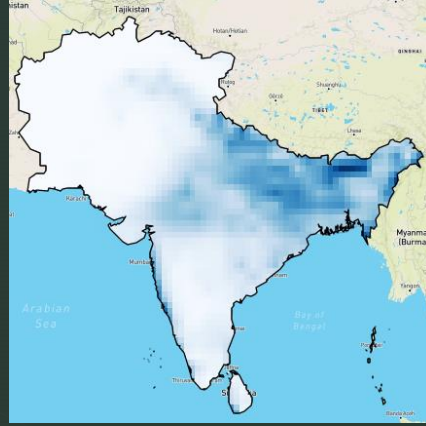
Precipitation forecast for most parts of North and Southern India is above normal for Aug-Sept-Oct 2021. However, central India and Sri Lanka receive normal rainfall, while Bangladesh and northeastern India, as well as southwestern Pakistan, Afghanistan receive below normal rainfall.

Weather forecast (Current and anomaly rainfall)

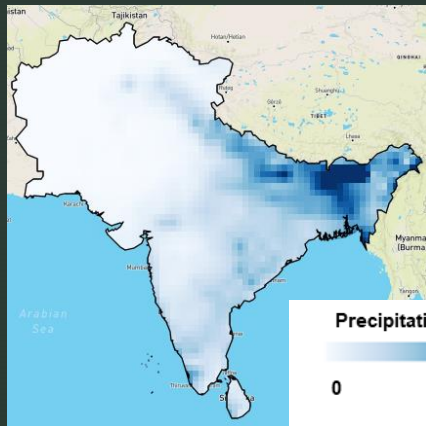
Week 1: 29 Jul to 04 Aug



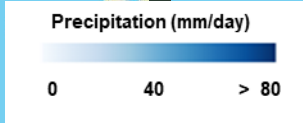
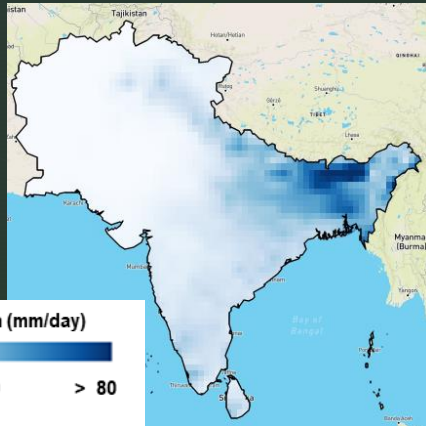
Week 2: 05 Aug to 11 Aug



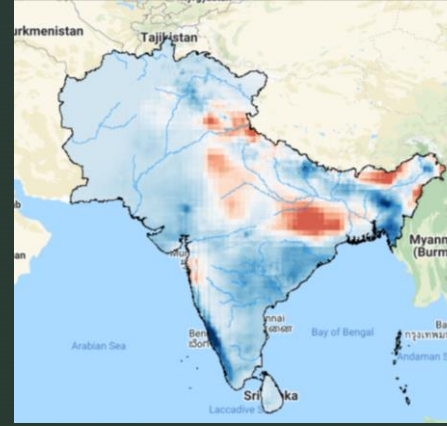
Week 3: 12 Aug to 18 Aug



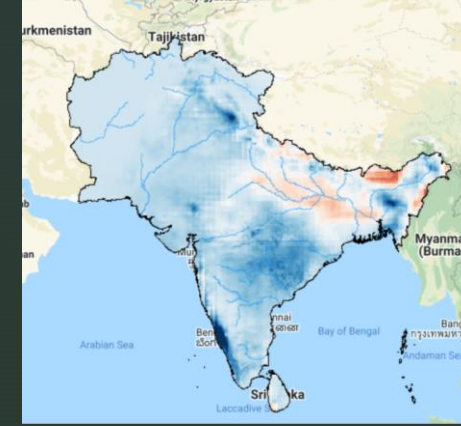
Week 4: 19 Aug to 25 Aug



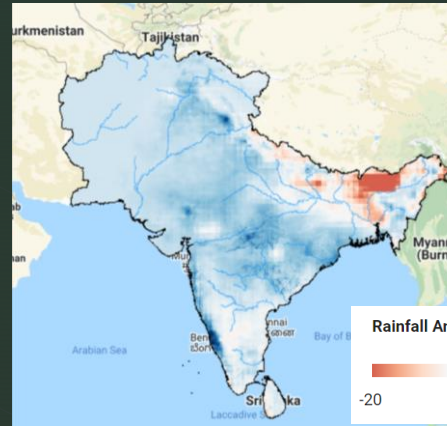
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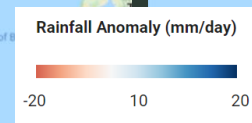
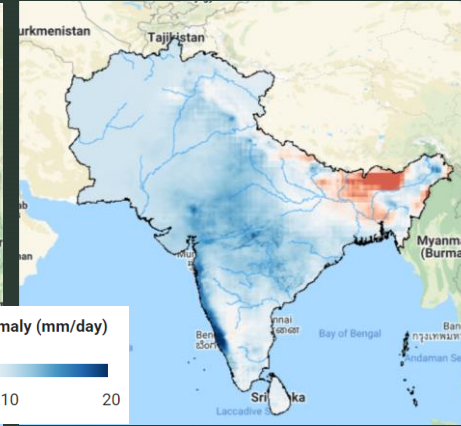
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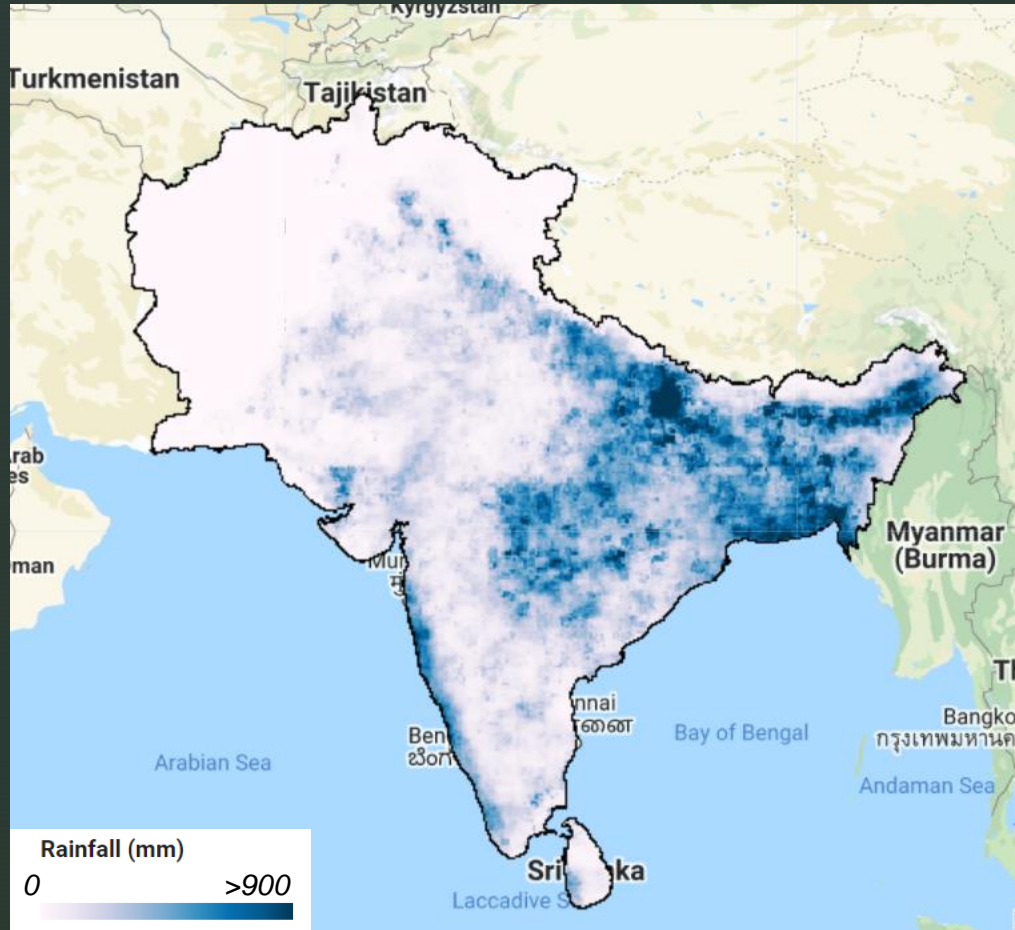
Week 4: 19 Aug to 25 Aug



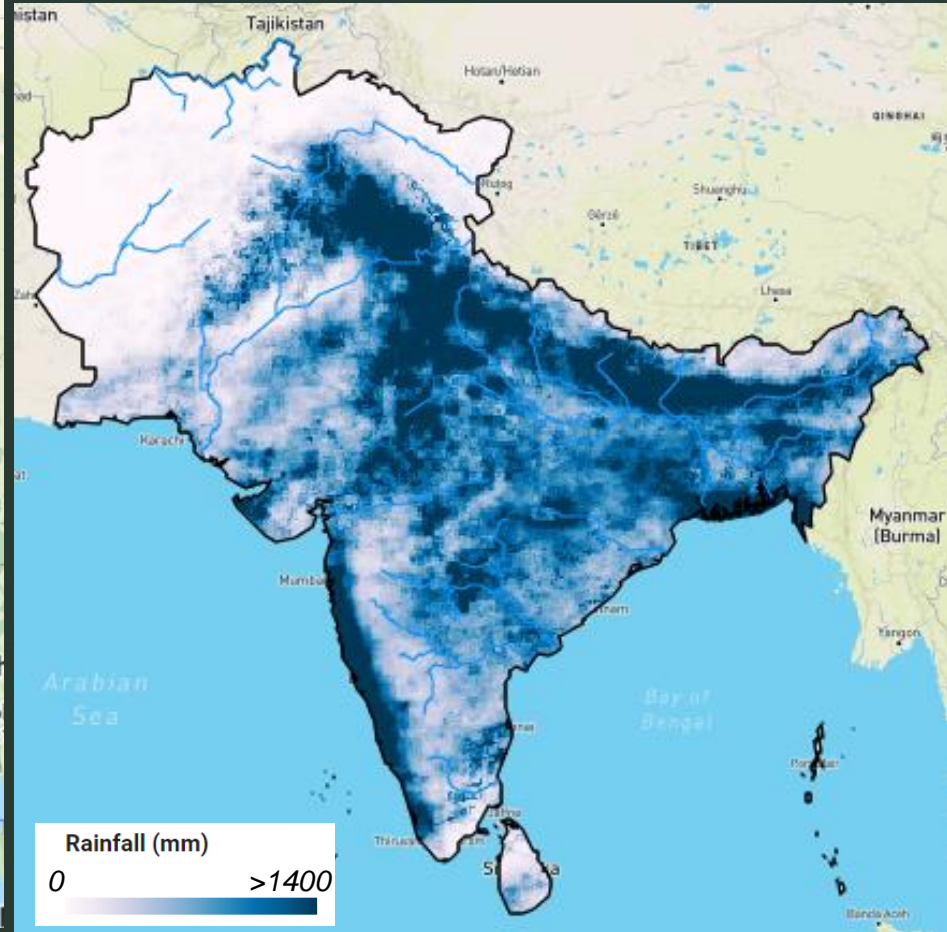
Sub-seasonal forecast and Extended Range Prediction group of IITM has been providing experimental real-time forecast of the active-break spells of Indian Summer Monsoon Rainfall since 2011 up to 4 pentad lead using an indigenously developed Ensemble Prediction system (EPS) based on the state-of-the-art 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.

Jun 2021

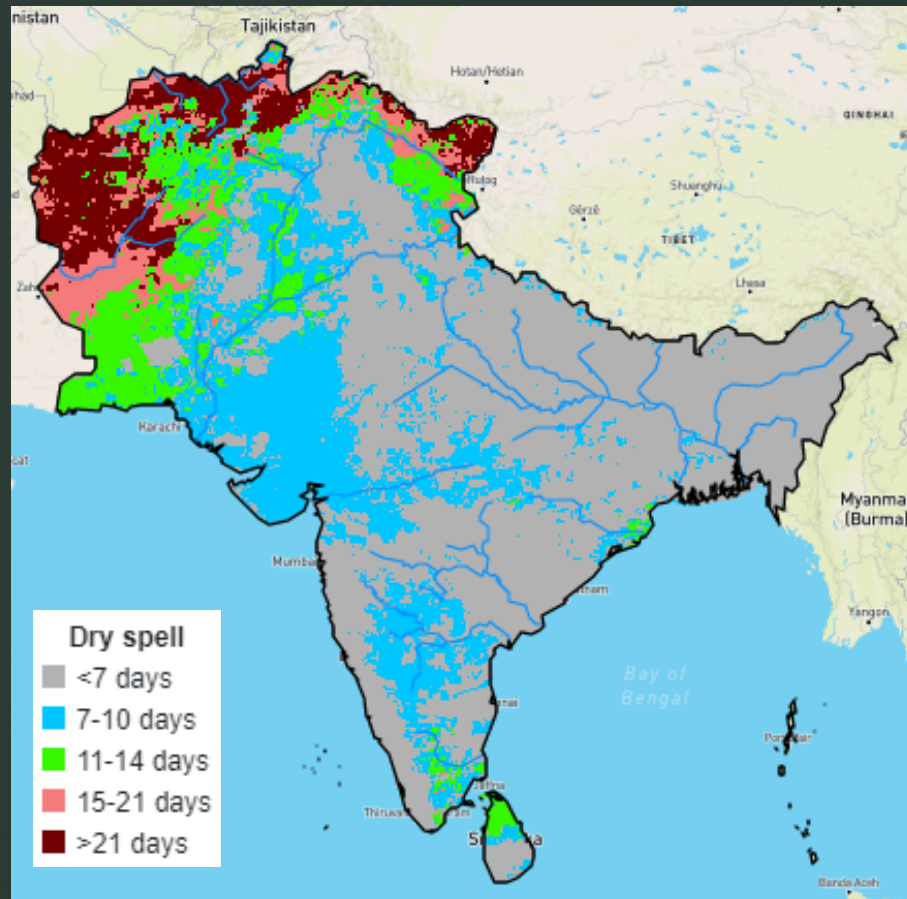


July 2021

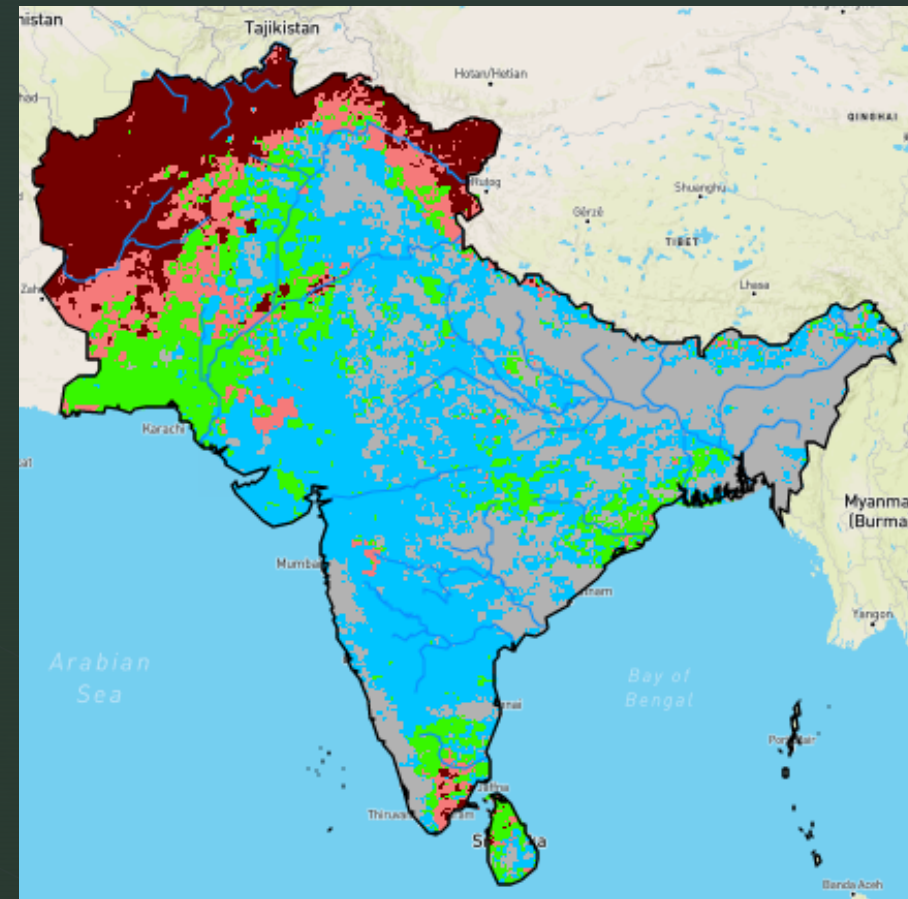


The Global Precipitation Measurement (GPM) data from the National Aeronautics and Space Administration (NASA) Goddard Space Flight Center sources was used to produce the spatial distribution of the monthly precipitation for South Asia. July month clearly shows moderate to high rainfall across south Asia except the Afghanistan and Northern Sri Lanka, however there is a overall recovery of rainfall in July for entire South Asia.

July 2021 (<2.5mm)

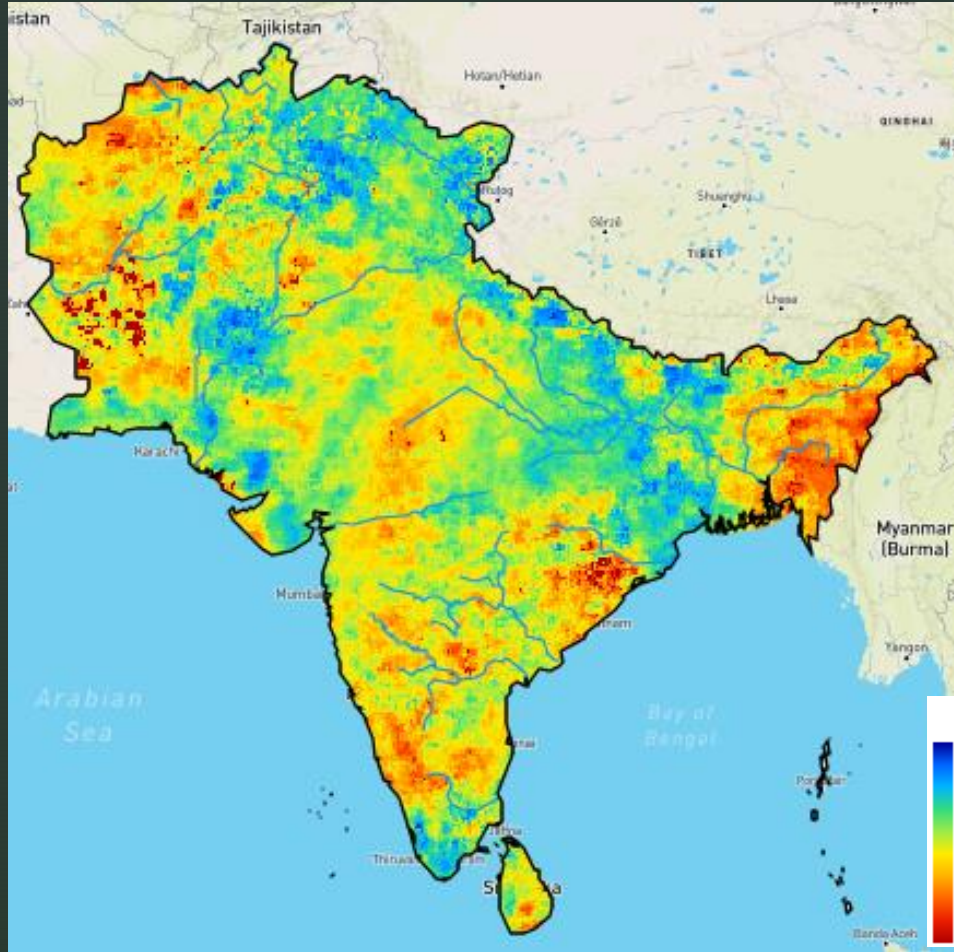


July 2021 (<10 mm)

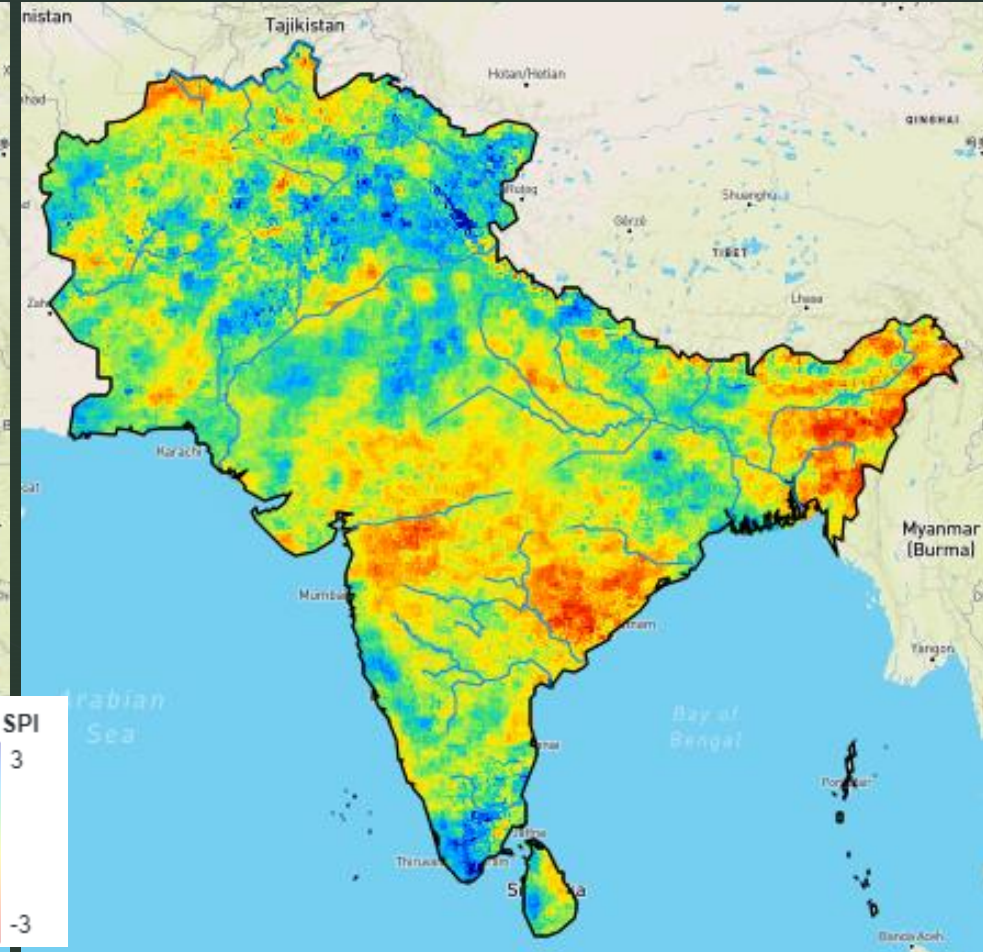


- The dry-Spell is a good indicator of the likelihood of a drought as well as the presence of a prolonged period of drought. Similarly, this indicator reflects the tendency of rainfall over a period of time (short-term, medium-term or long-term).
- A dry spell is defined as the number of consecutive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

3month SPI – June 2021



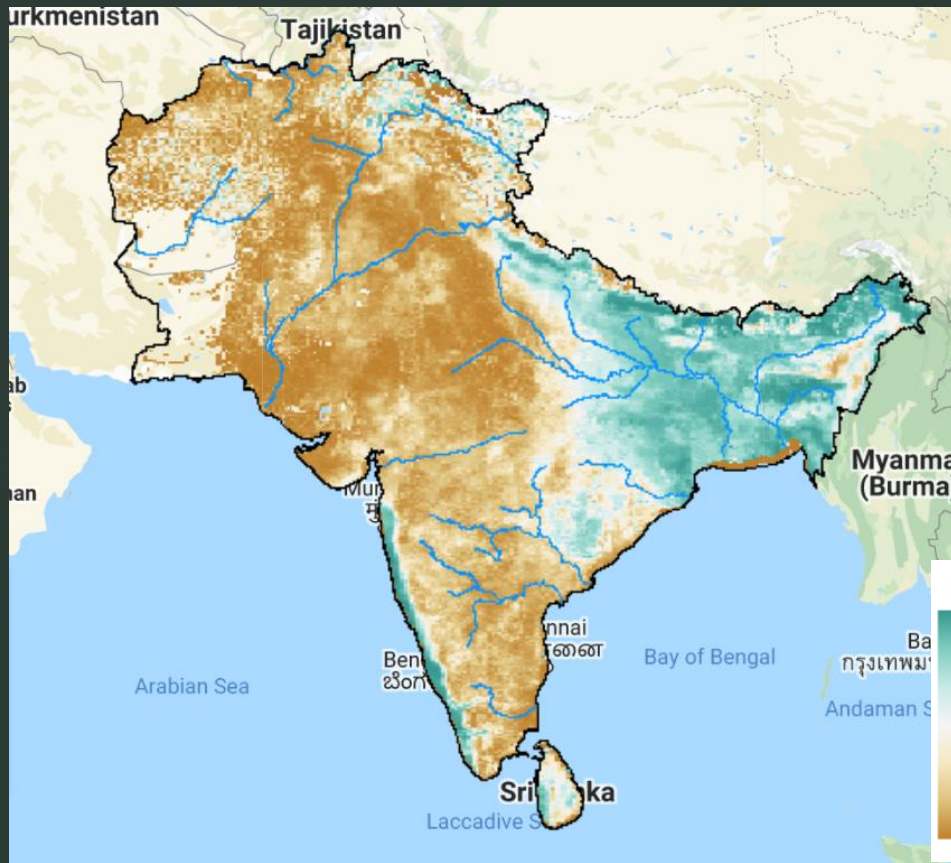
3month SPI – July 2021



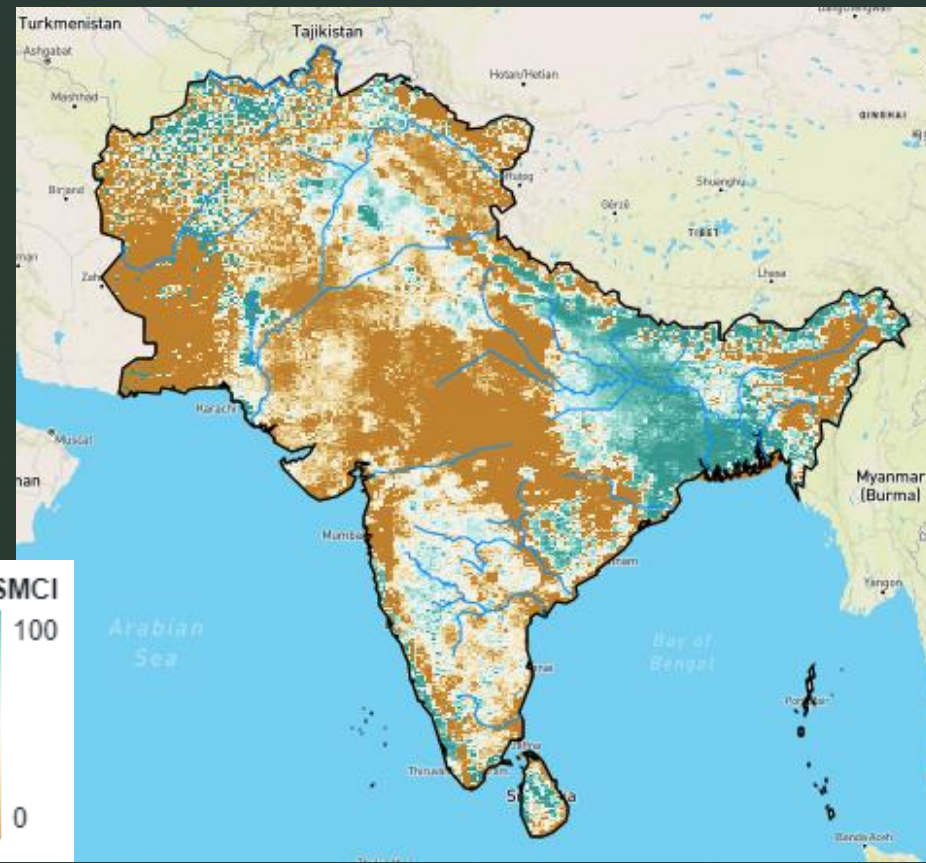
- The SPI is a measure of the number of standard deviations of observed cumulative precipitation deviates from the climatological average. The SPI values range are from -3 to +3 with negative values indicate droughts, while positive values indicate wet conditions. Severe drought conditions are determined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

Soil Moisture Condition Index (SMCI)

June 2021



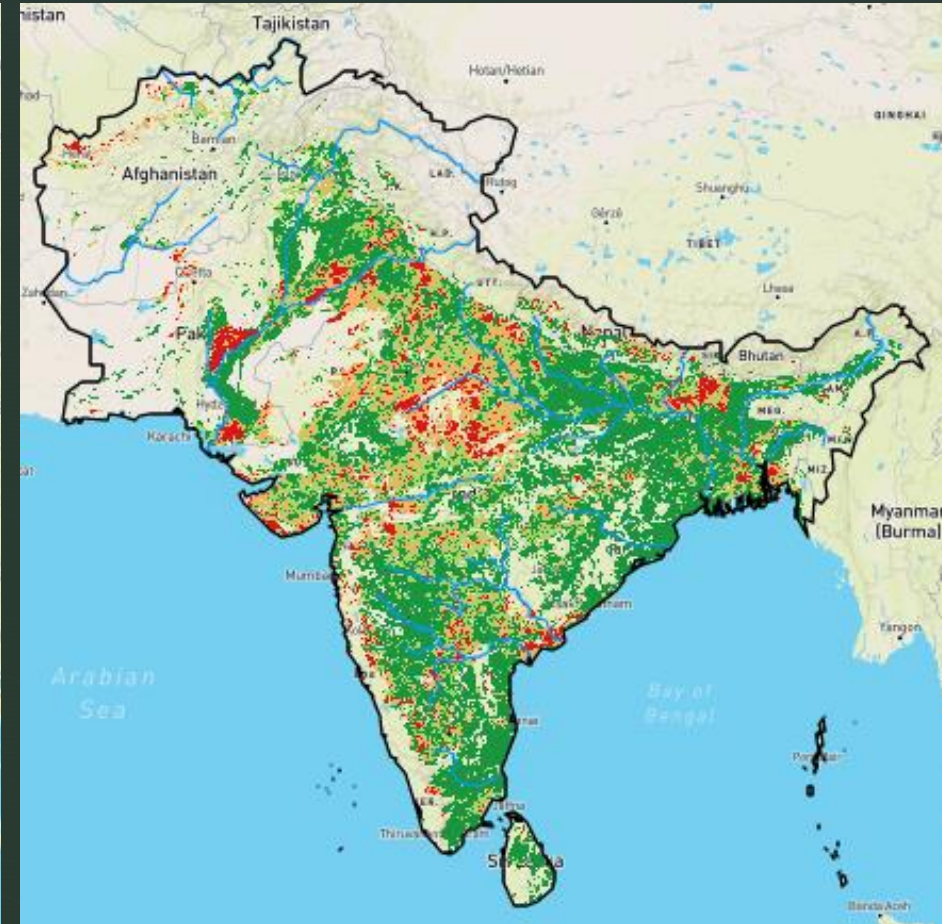
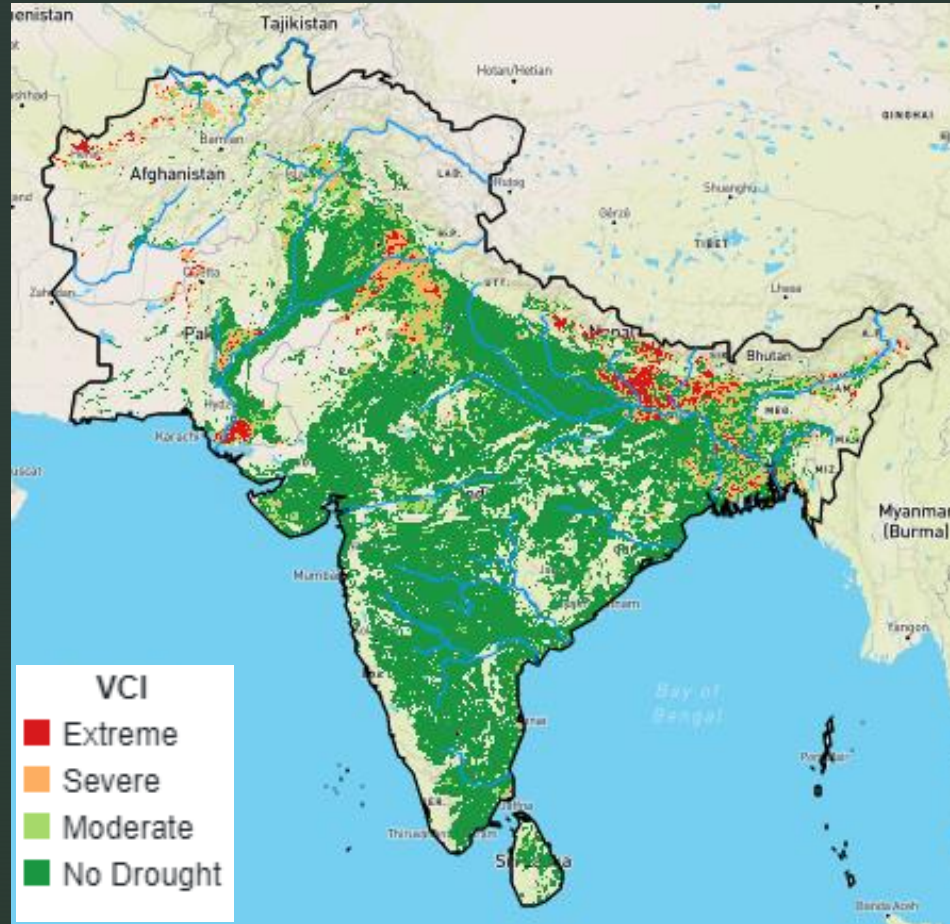
July 2021



- 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.

Jun 2021

Jul 2021



Vegetation Index

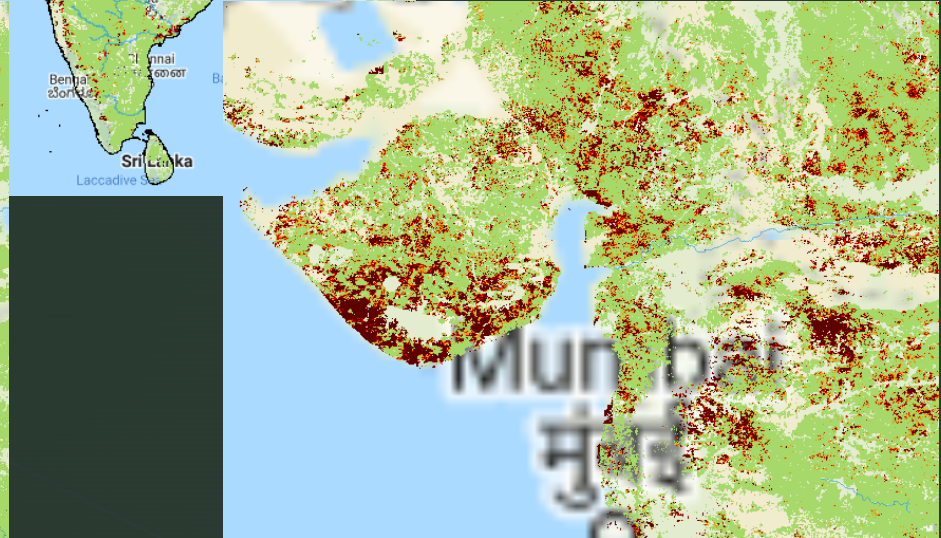
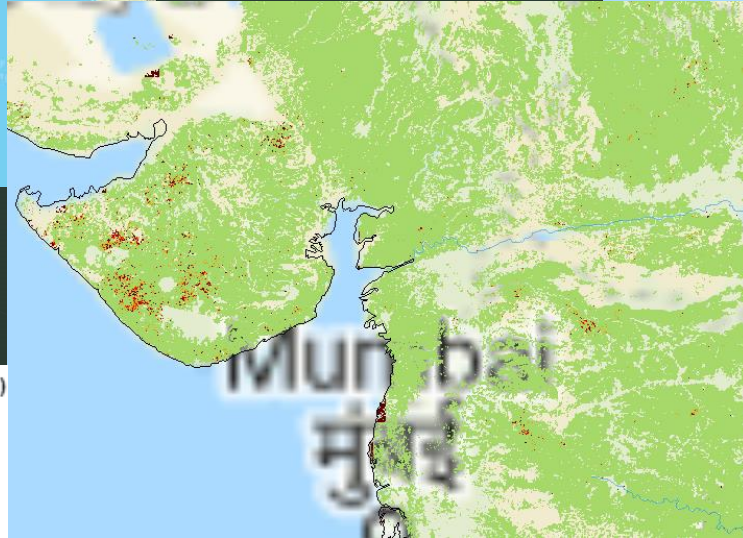
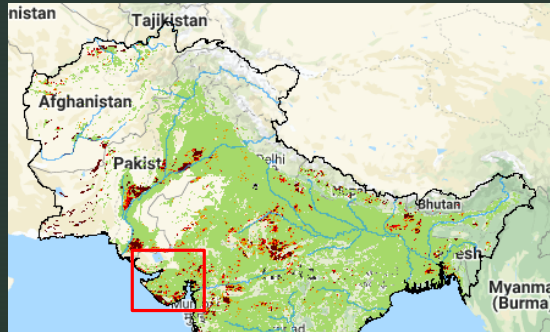
- Vegetation Health Index (VHI) is a potential index for agricultural drought monitoring and forecasting. The VHI was developed using NASA' MODIS 16-day combined Terra and Aqua satellite data with a spatial resolution of 250m.
- VHI is an index characterizes the health of the vegetation by integrating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

Integrated Drought Severity Index (IDSI)

Jun 2021



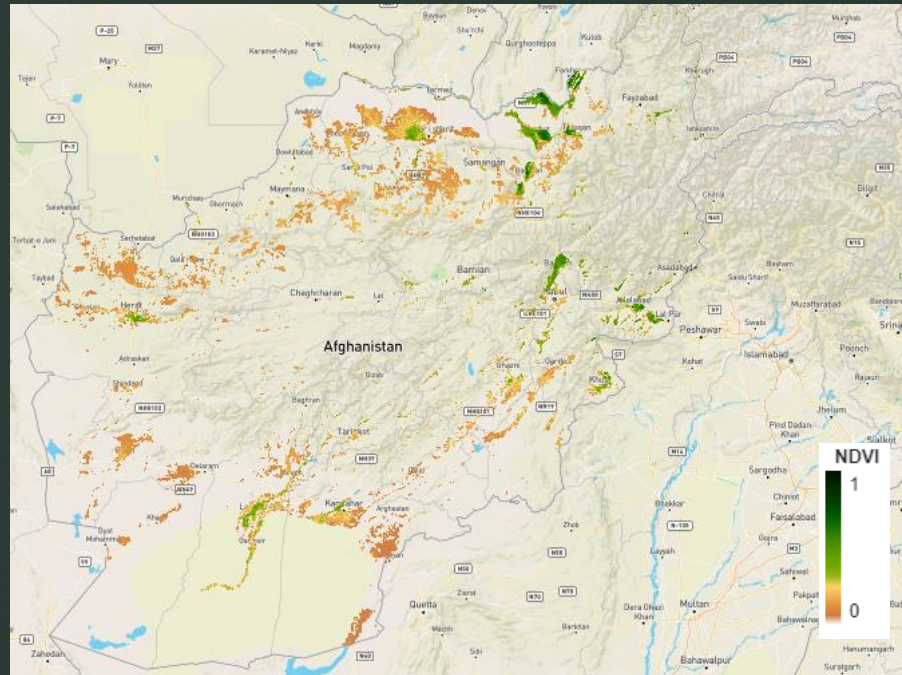
Jul 2021



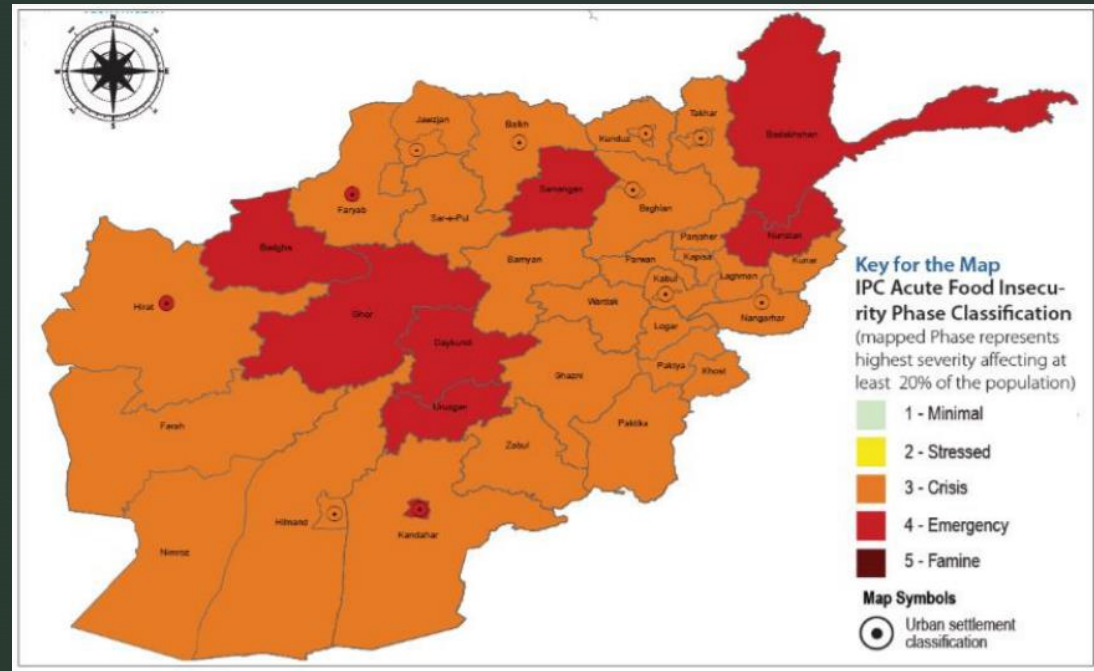
- IDSI explains areas of drought severity by considering precipitation (input to the system), soil moisture (storage of the system), actual ET (loss to the system) and VCI (vegetative response of the system). IDSI being a composite indicator would help determine the drought condition more reliably. The IDSI developed by IWMI incorporates multisource satellite data from MODIS to define Vegetation and evapotranspiration, precipitation data from CHIRPS, and soil moisture conditions derived FLDAS and SMAP.
- The IDSI of the zoomed areas Maharashtra, Telangana, Chhattisgarh and Andhra Pradesh clearly indicate a slight increase in drought from June to July.
- IDSI can be used as impact indicators to alert relevant agencies to develop timely early warning to early action to promote drought response strategies e.g. agriculture contingency plans at district level to mitigate drought risks;

- https://www.business-standard.com/article/current-affairs/monsoon-2021-rainfall-ends-7-below-normal-in-july-says-imd-121080100547_1.html
- <https://www.skymetweather.com/content/weather-news-and-analysis/monsoon-rains-courtesy-low-pressure-not-over-yet-north-india-to-see-some-showers-now/>
- <https://www.downtoearth.org.in/news/agriculture/climate-change-is-real-severe-drought-hits-assam-s-wet-regions-78200>
- <https://reliefweb.int/report/afghanistan/afghanistan-drought-operation-update-n-1-emergency-appeal-n-mdraf007>
- https://www.business-standard.com/article/international/pakistan-s-balochistan-province-faces-food-emergency-for-500-000-people-un-121072800136_1.html
- <https://www.climatechangepost.com/news/2021/7/22/extreme-drought-threatens-lives-millions-afghans/>

Jul 2021 (NDVI)



Drought Severity (July)



Source : Emergency Plan of Action (EPoA)

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 little or scattered rainfall for entire Afghanistan for the month of July.

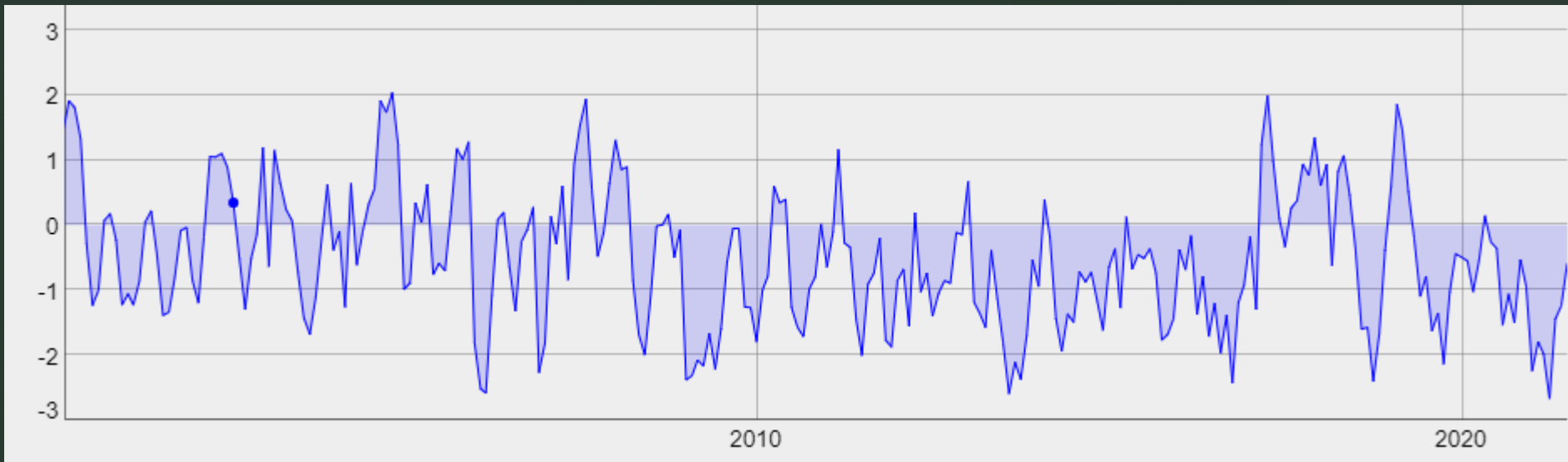
Jul 2021 (NDVI)



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

Standardized Precipitation Evapotranspiration Index (SPEI) indicates negative values since the start of the monsoon with likely areas under drought like situation

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



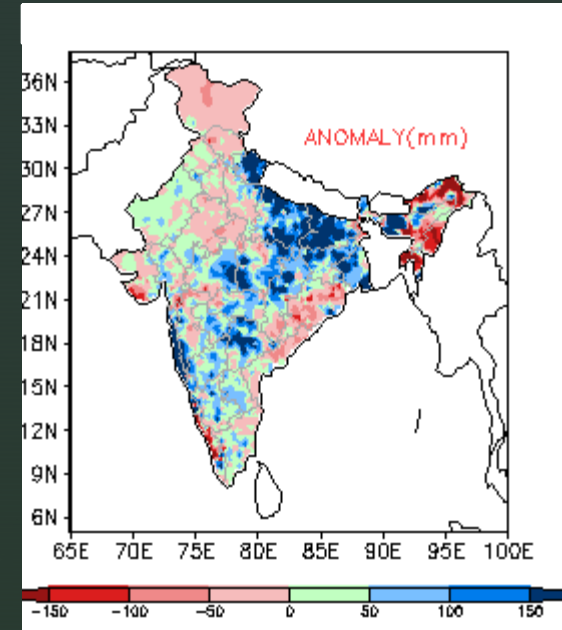
Source: <https://spei.csic.es/> SPEI

In reference to rainfall anomaly map, several states i.e. Odisha, Gujarat, parts of Madhya Pradesh, J&K received deficit rainfall and states such as Bihar, southern Uttara Pradesh, coastal Maharashtra, parts of West Bengal, Chhattisgarh etc. received excess rainfall.

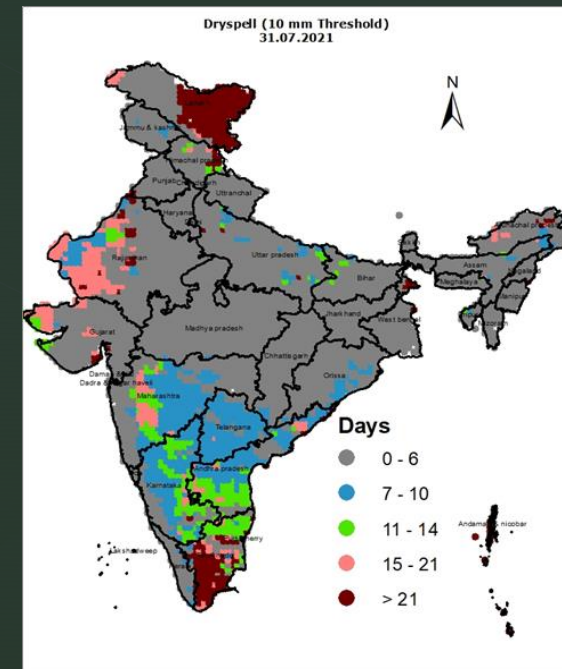
SPI (3-month i.e. May-June-July) indicator for meteorological drought shows states of Odisha, parts of Maharashtra, Kerala, Madhya Pradesh, Gujarat and Western Uttara Pradesh are likely with deficit rainfall

Vegetation Health Index (VHI) shows considerable decreases of vegetation health specially in Rajasthan, Gujarat, and Maharashtra 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 Gujarat, Maharashtra, Madhya Pradesh and parts of Rajasthan are under drought situation, it is expected to recover in August as per the sub-seasonal forecast with likely rainfall across India.

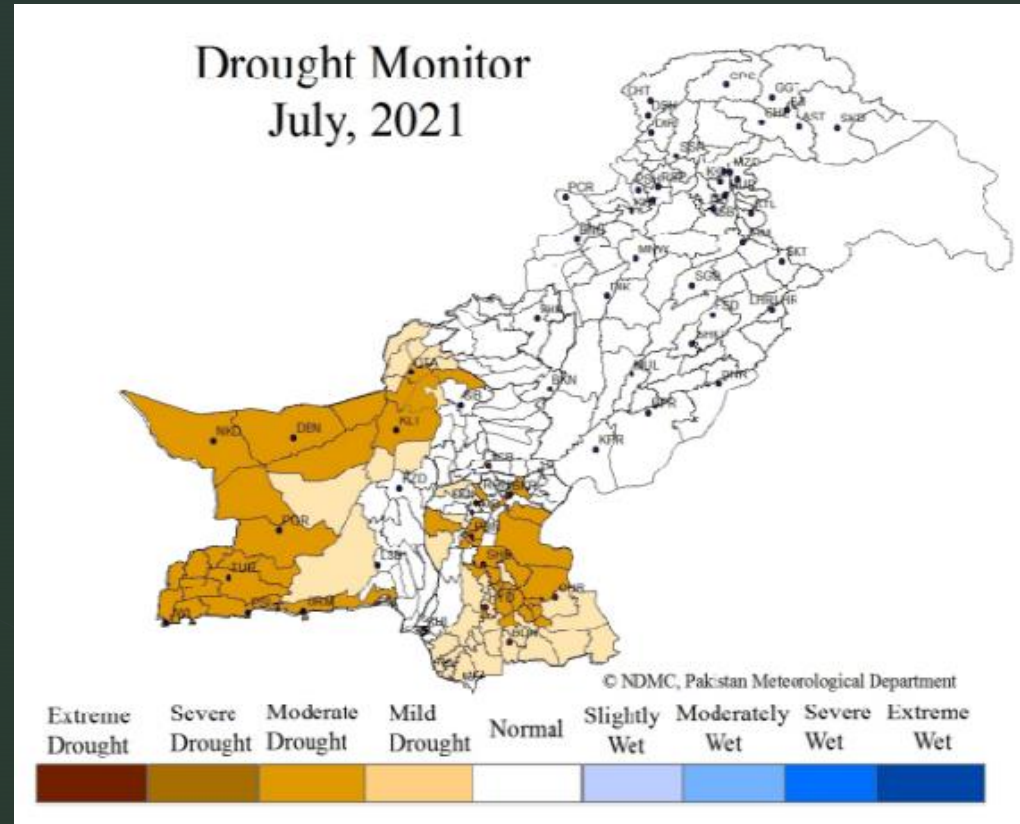
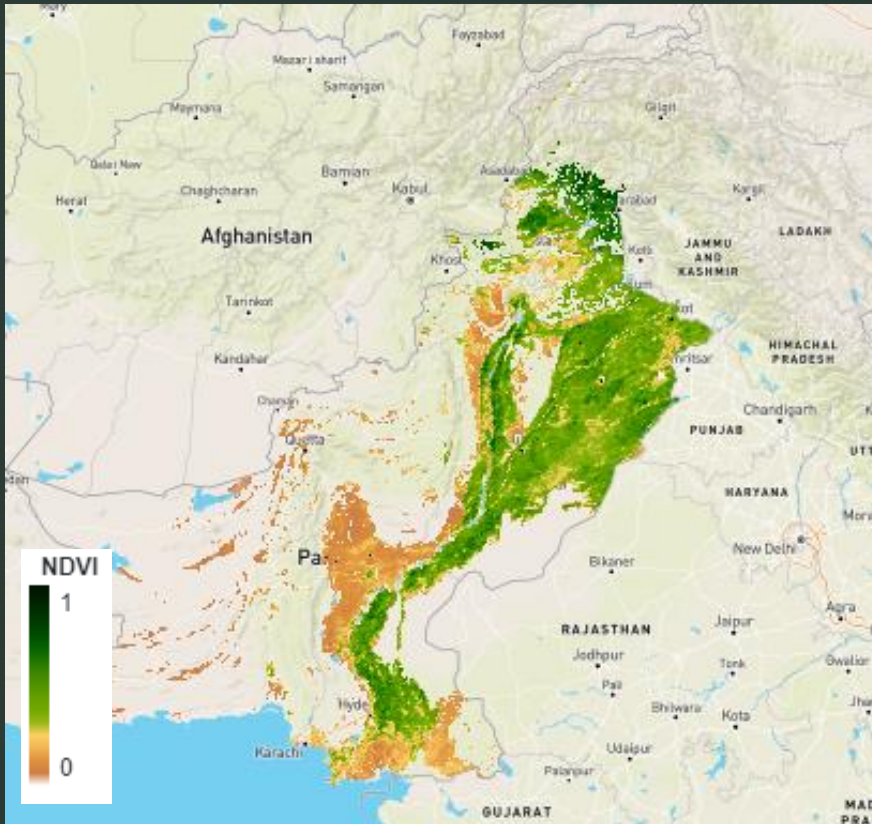


Rainfall anomaly for July 2021; Map Source: IMD



Dry spell (10mm threshold) Map Source: CRIDA

July 2021 (NDVI)



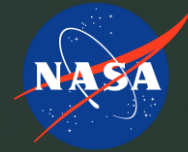
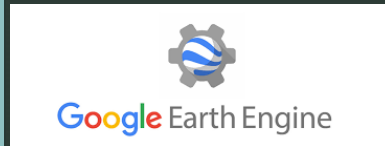
Source: NDMC

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 improved vegetation condition from June to July over Sindh province and the decrease in drought severity is also explained by NDMC.

As per ERPAS (1-month) and IRI (3-month) forecast explains significant reduction in rainfall for August, there will 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

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Access archived south Asia bulletin ([Click here](#))

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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.

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**Thank
You**

