

Sep 2021 | Issue 9

South Asia Drought Outlook



How to use the bulletin?

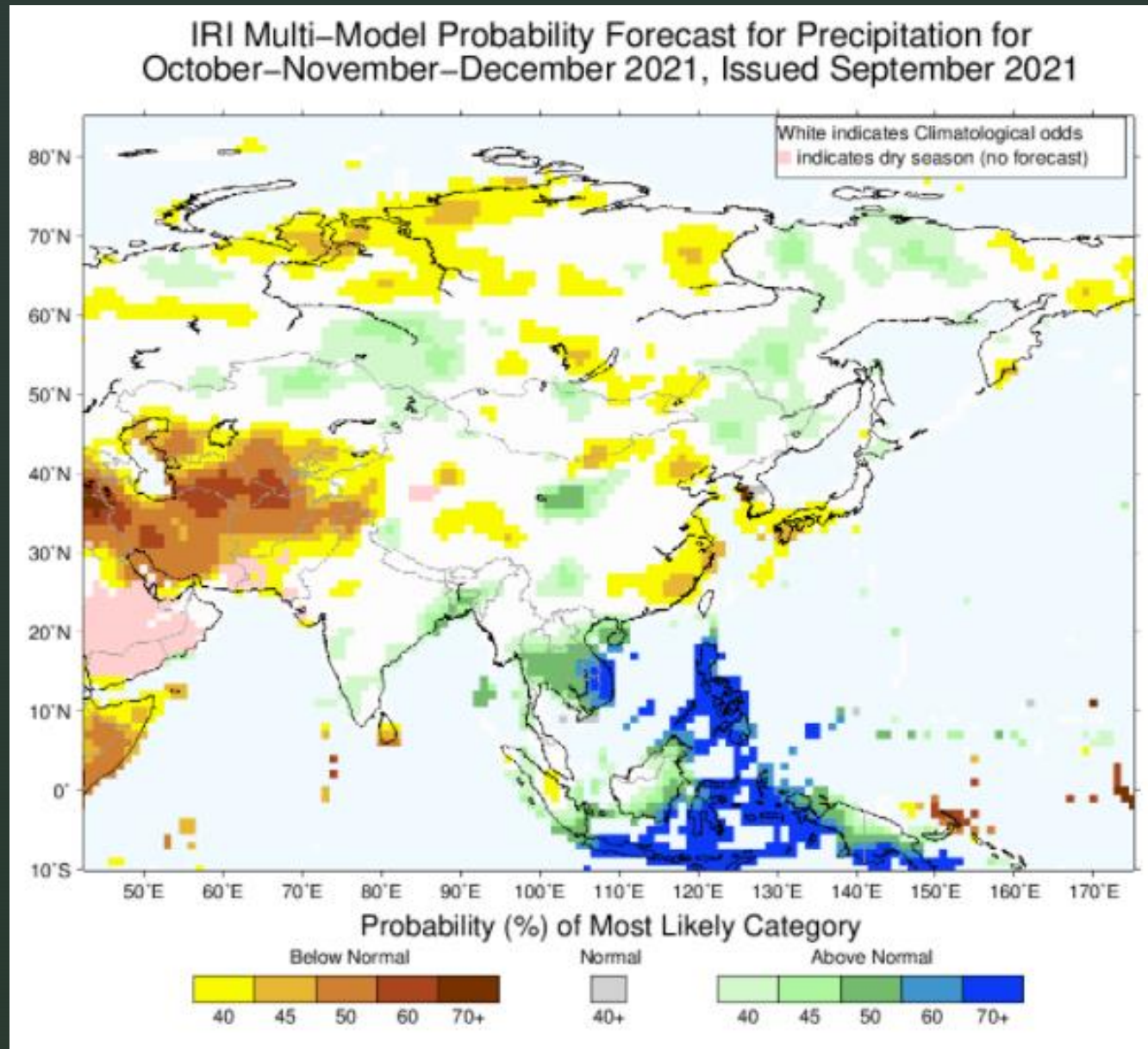
- Tracks how likely the weather forecast for the next four weeks will have the dry spell or droughts, and to a lesser extent of lesser rainfall
- Maps drought situations at regional and national levels and for range of products from rainfall anomaly, SPI, vegetation index and composite drought index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

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Drought Outlook Summary

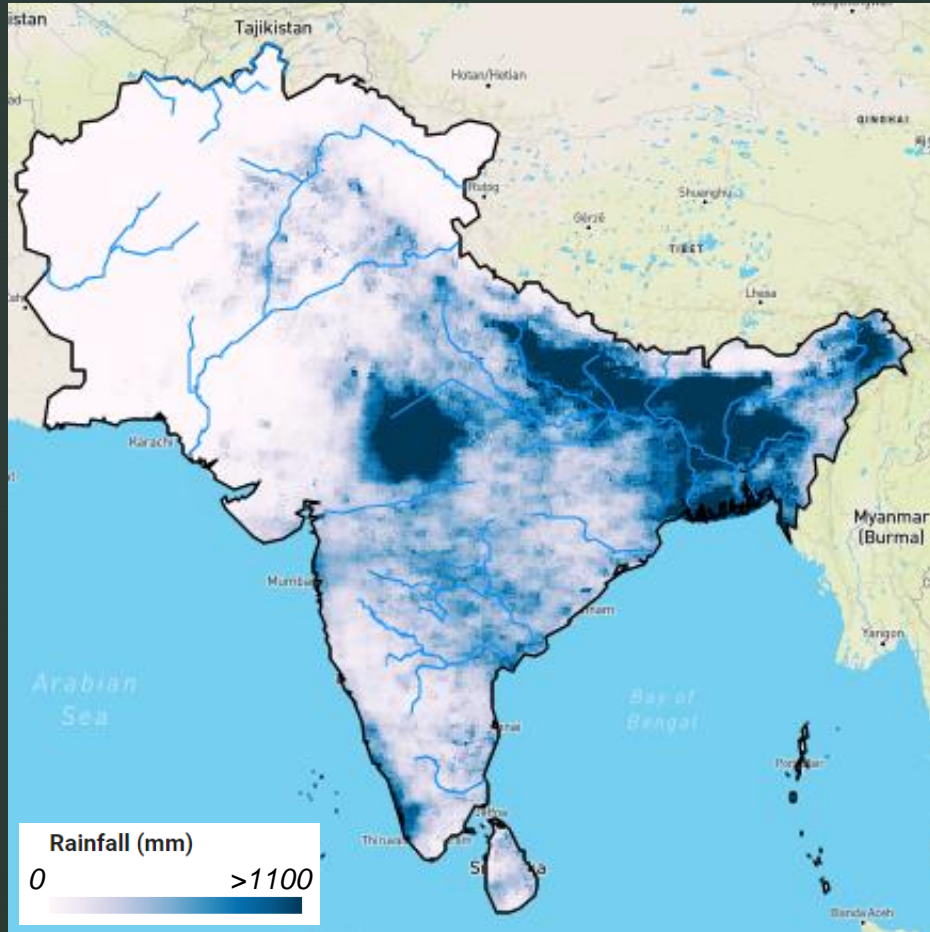
- As shown in the October-November to December 2021 sub-season forecast, only the western parts of Bangladesh will receive slightly above average rainfall while India, Nepal, and Bhutan will receive average rainfall. However, below-normal rainfall is forecast for most parts of northern Pakistan, Afghanistan, and Sri Lanka, with the average being between 40-70.
- South Asia received significant rainfall in July and August, while in September it dropped by about 50%. However, due to the rainfall received from July to the end of September, vegetative health growth has been significantly increased in all the other countries of Asia except Afghanistan.
- Also, Bangladesh and Sri Lanka received slightly higher rainfall, while other countries did not receive significant rainfall in September.
- In terms of the SPI index, the year 2021 will show a fairly meteorological drought compared to 2020. However, the IDSI index and rainfall from July to September show that there are no reports of severe agricultural droughts. This is mainly due to occasional light rains stop the continuation of dry-spells for a long time period.
- The Soil Moisture Condition Index (SMCI), like other droughts indices, shows drought conditions in Afghanistan, Pakistan, and the southern Indian states of Karnataka and Tamil Nadu.
- It is important the stakeholders adopt timely drought relief and response strategies to mitigate drought risks;



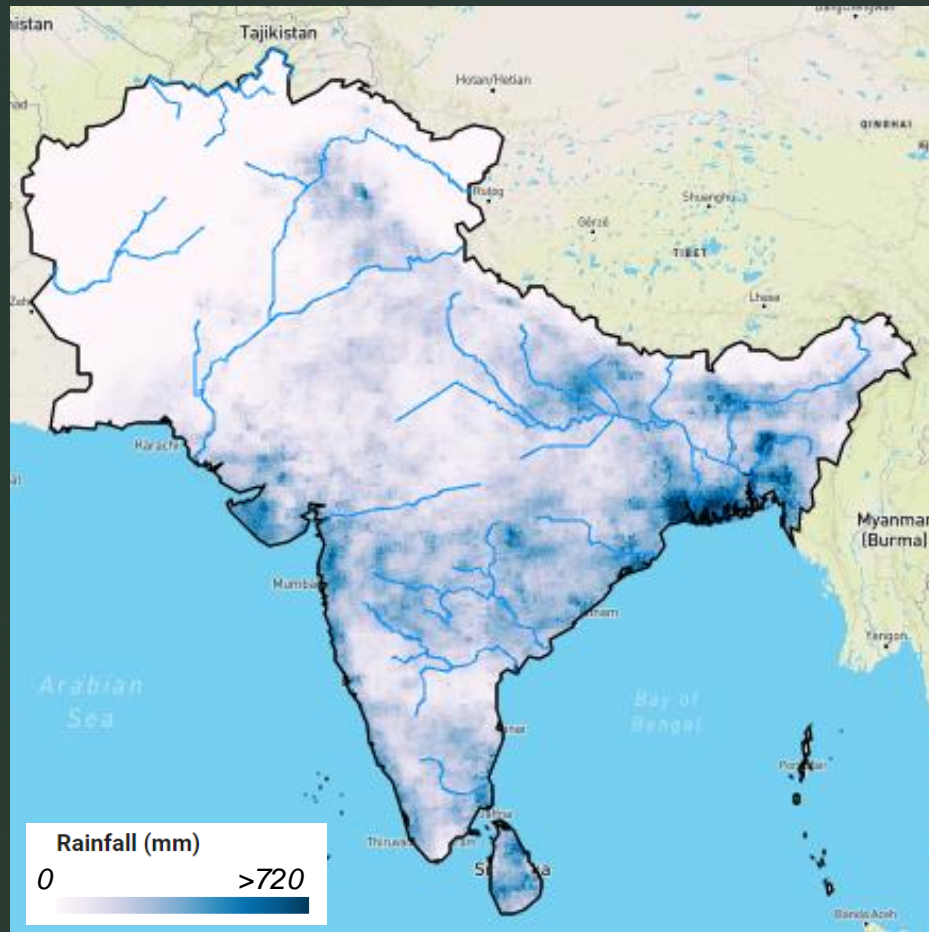
Source: IRI

Precipitation forecast for most parts of Bangladesh is above normal for Oct-Nov-Dec 2021 while India, Nepal, and Bhutan are under normal rainfall. However, most parts of northern Pakistan, Afghanistan, and Sri Lanka receive 40-70 below-average rainfall.

Aug 2021

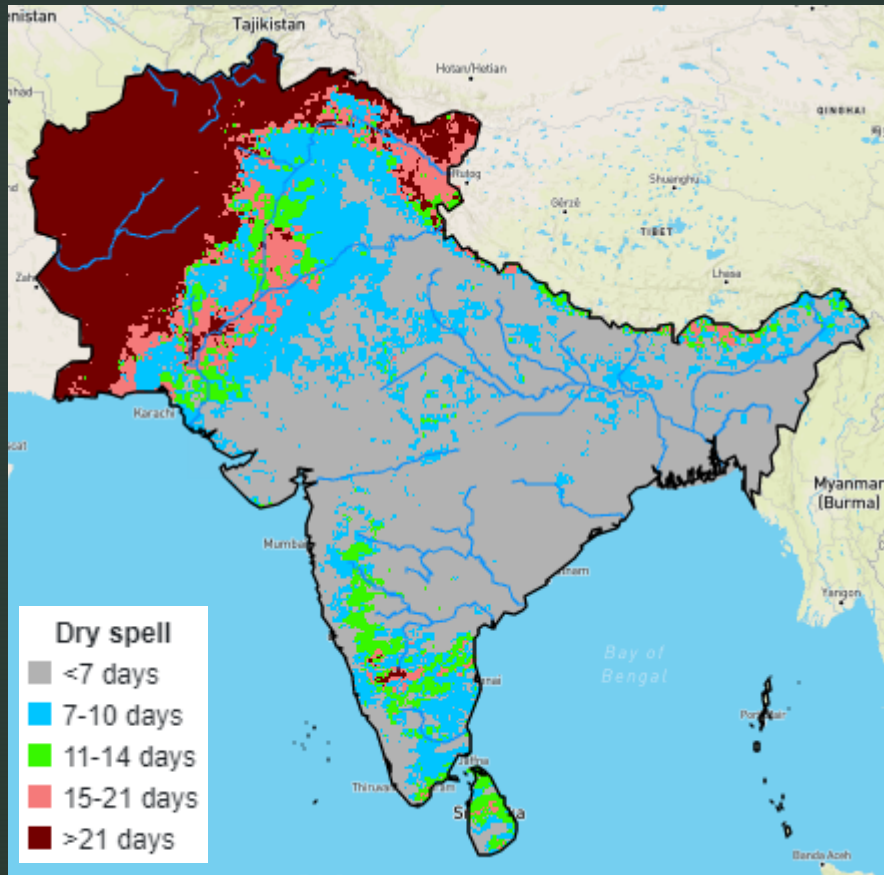


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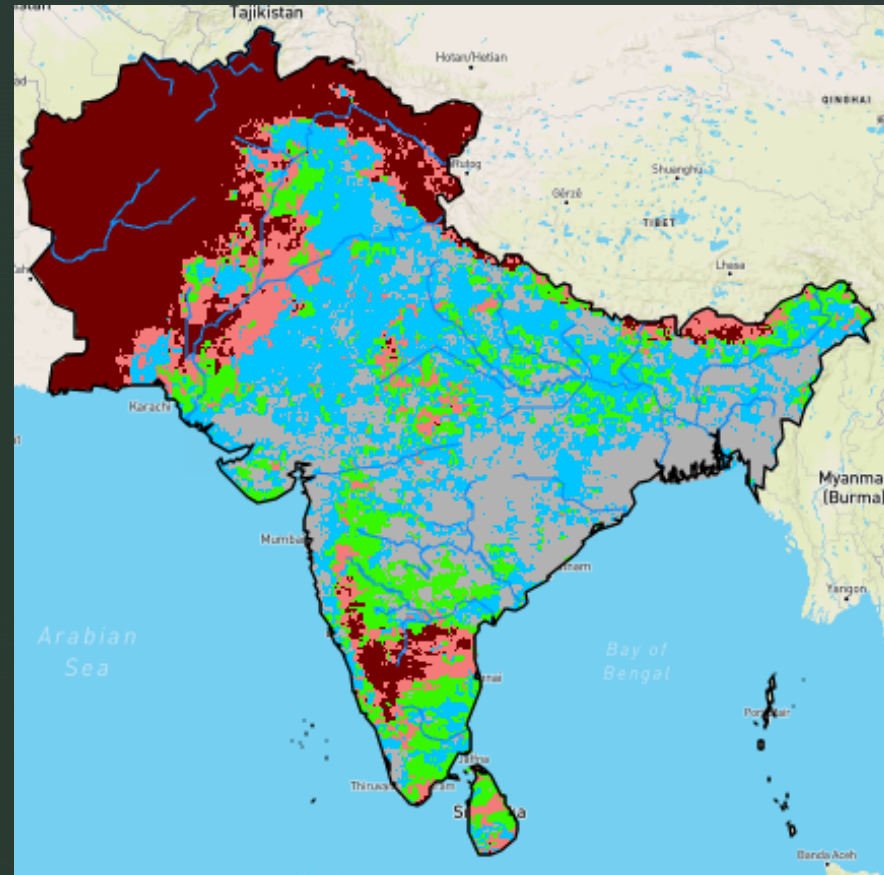


The Global Precipitation Measurement (GPM) data from the National Aeronautics and Space Administration (NASA) Goddard Space Flight Center sources was used to produce the spatial distribution of the monthly precipitation for South Asia. In September, all parts of South Asia received no significant rainfall except southern Bangladesh, and Sri Lanka.

Sep 2021 (<2.5mm)



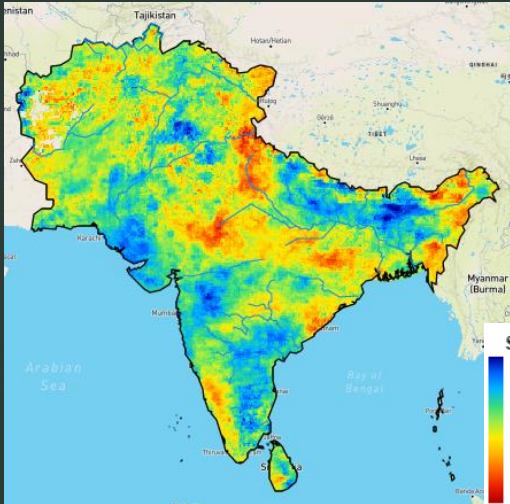
Sep 2021 (<10 mm)



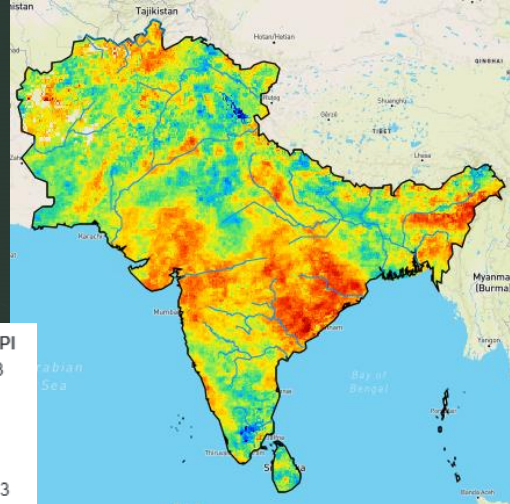
- The dry-Spell is a good indicator of the likelihood of a drought as well as the presence of a prolonged period of drought. Similarly, this indicator reflects the tendency of rainfall over a period of time (short-term, medium-term or long-term).
- A dry spell is defined as the number of consecutive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

Standardize Precipitation Index (3 month SPI)

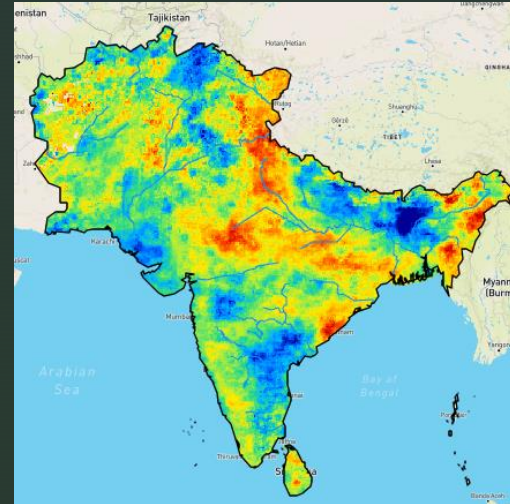
3month SPI – Aug 2020



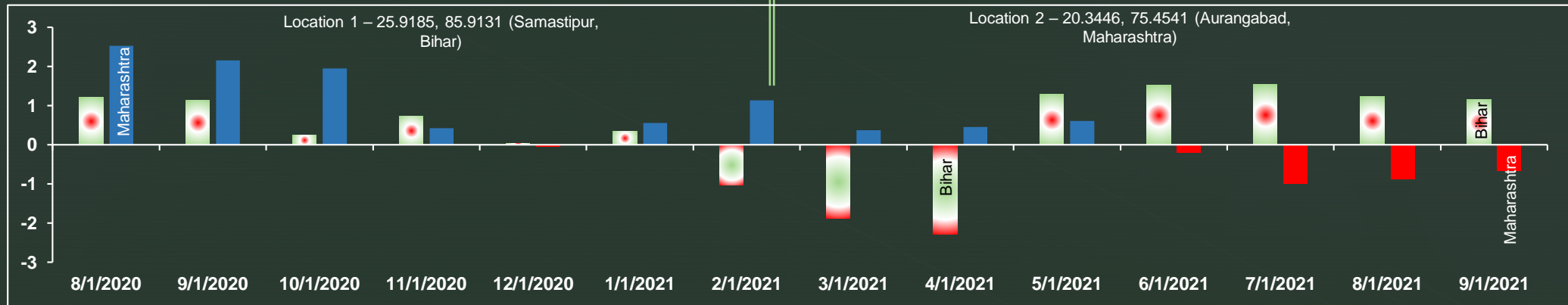
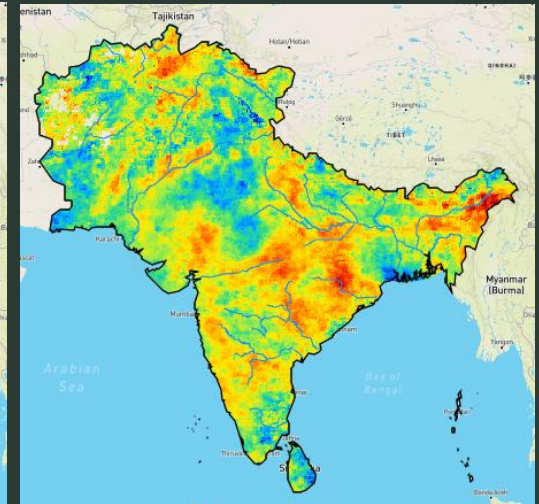
3month SPI – Aug 2021



3month SPI – Sep 2020

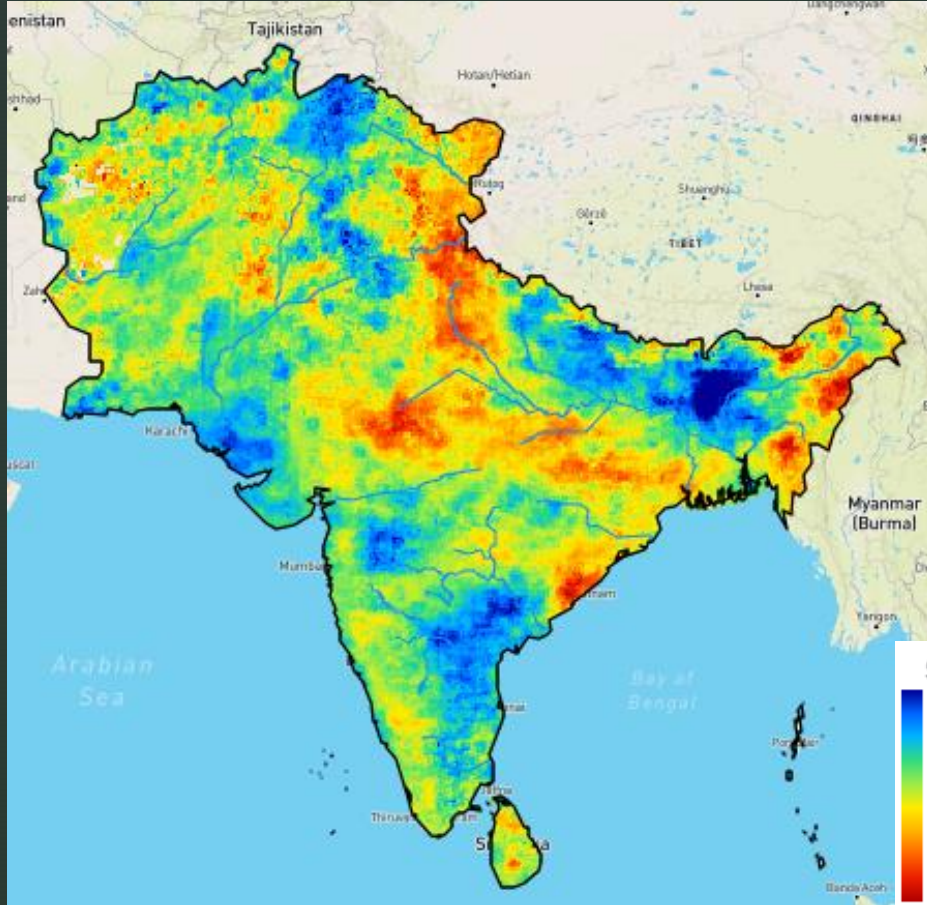


3month SPI – Sep 2021

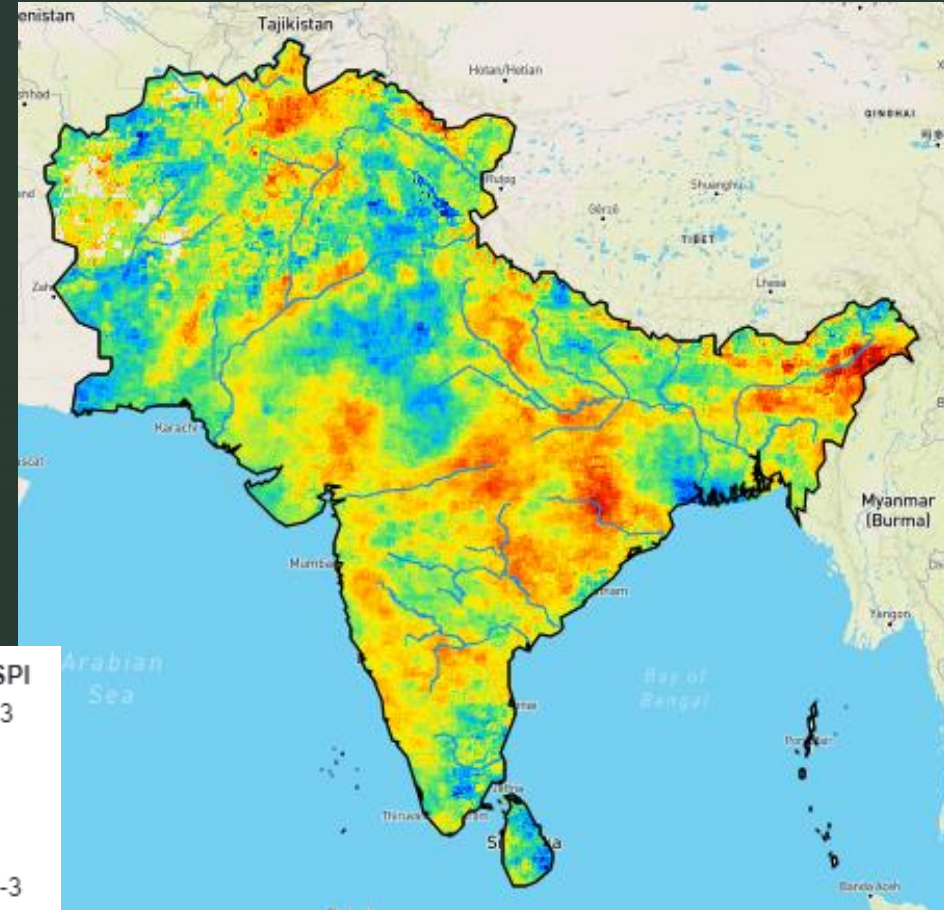


- The SPI is a measure of the number of standard deviations of observed cumulative precipitation deviates from the climatological average. The SPI values range are from -3 to +3 with negative values indicate droughts, while positive values indicate wet conditions. Severe drought conditions are determined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

3month SPI – Sep 2020



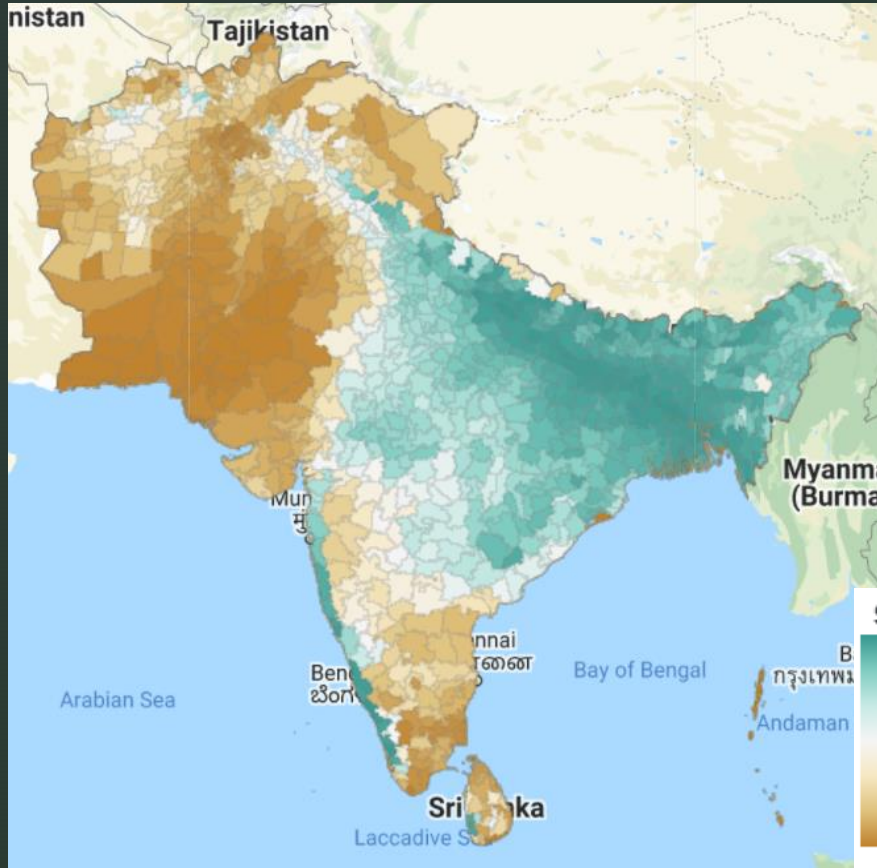
3month SPI – Sep 2021



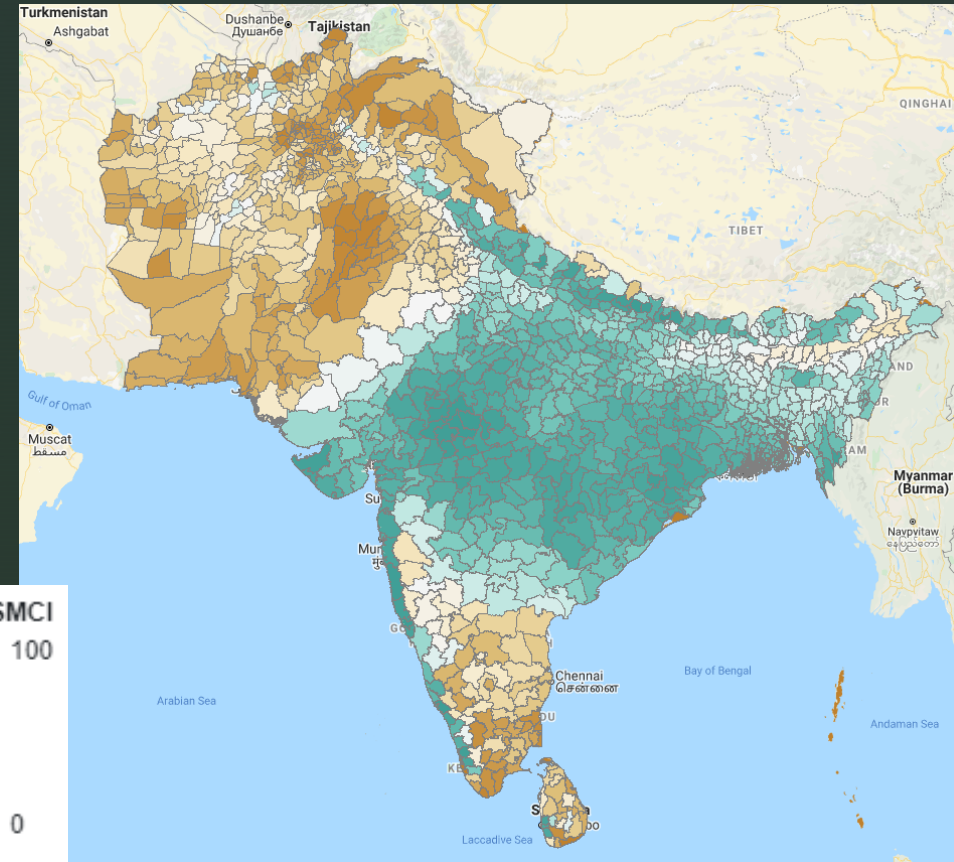
- The SPI is a measure of the number of standard deviations of observed cumulative precipitation deviates from the climatological average. The SPI values range are from -3 to +3 with negative values indicate droughts, while positive values indicate wet conditions. Severe drought conditions are determined by high negative values.
- The states of Orissa, Maharashtra, Chhattisgarh, Assam, Karnataka, Telangana and MP showed significantly lower SPI in end of September 2021 compared to September 2020, which can also be identified as a meteorological drought.

Soil Moisture Condition Index (SMCI)

Aug 2021

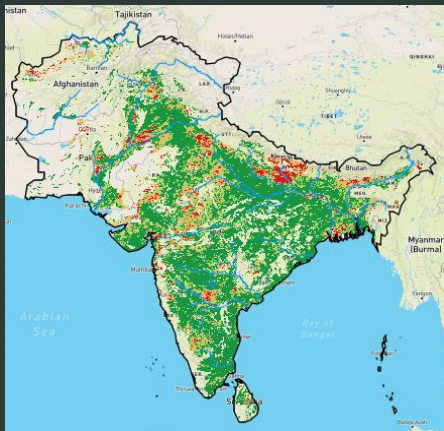


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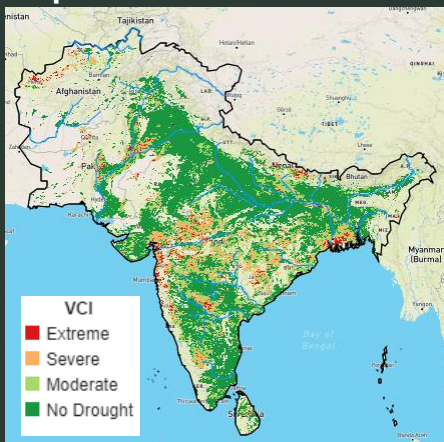


- SMAP satellite developed by NASA provides direct sensing of soil moisture in the top 5 cm of the soil column. Soil Moisture Condition Index (SMCI) represents soil moisture condition with respect to the historical values and the SMCI value range varies between 0-100, where the value nearby 0 represents 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.

Aug 2021



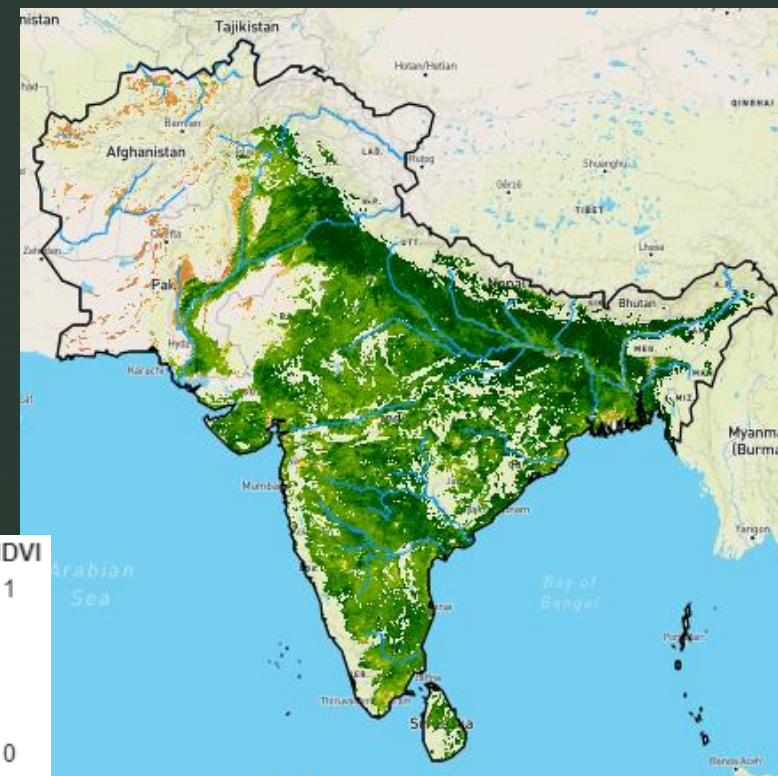
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Sep 2020



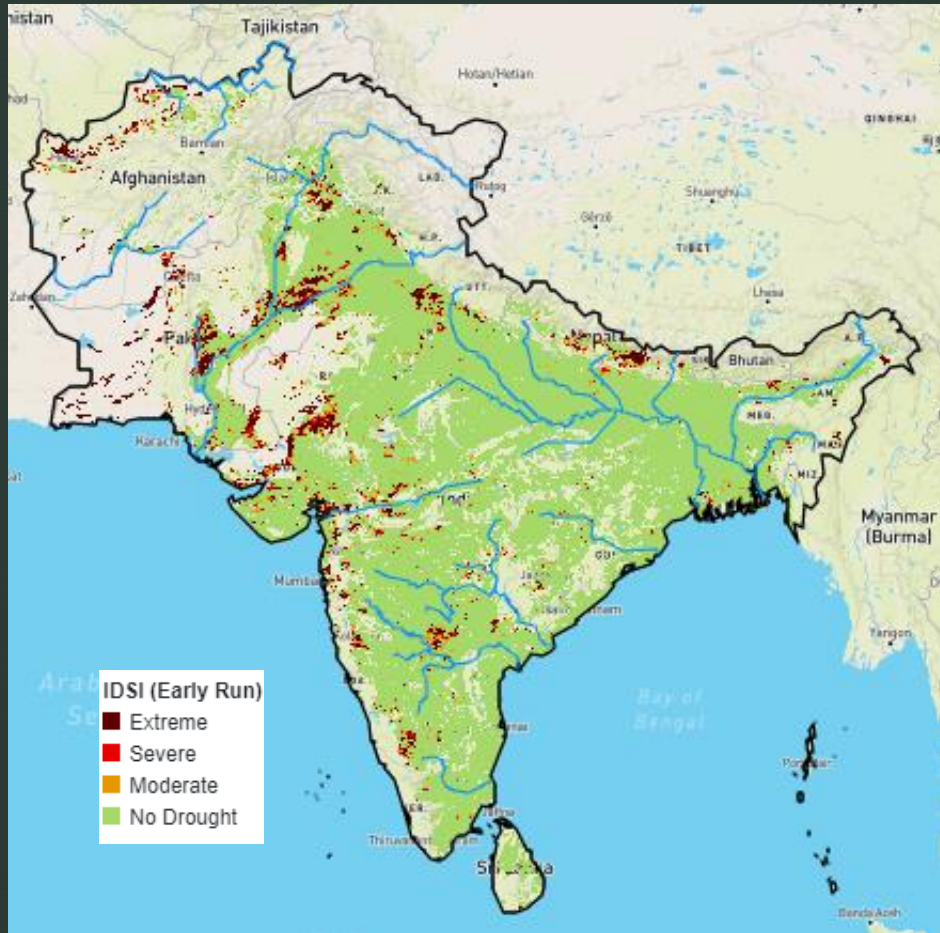
Sep 2021



- 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)

Aug 2021



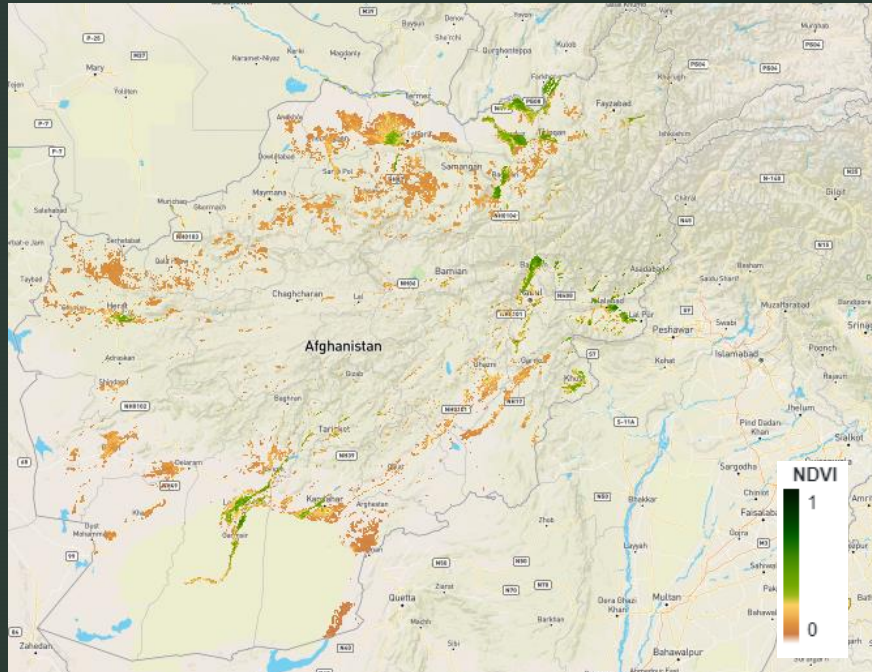
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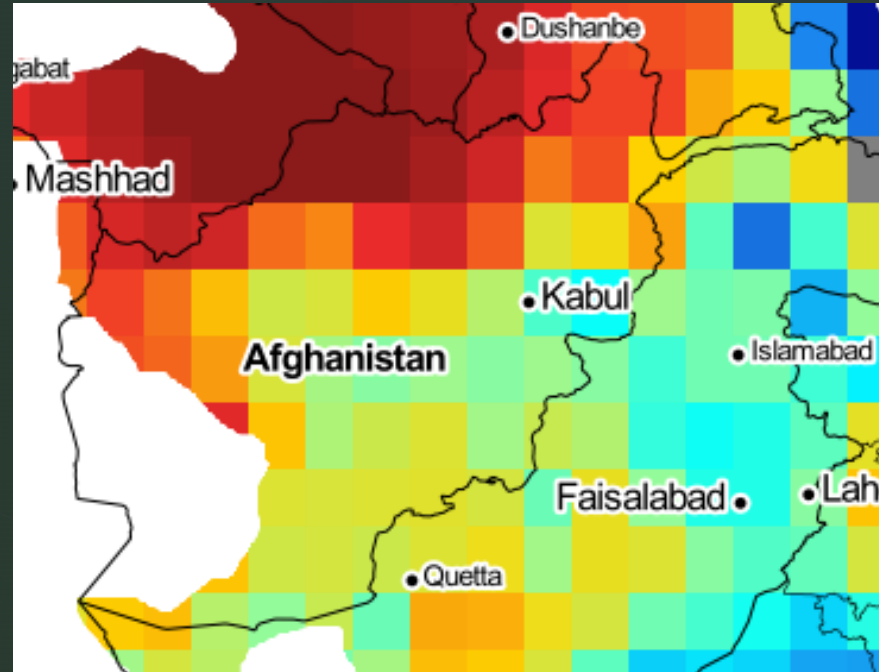
- IDSI explains areas of drought severity by considering precipitation (input to the system), soil moisture (storage of the system), actual ET (loss to the system) and VCI (vegetative response of the system). IDSI being a composite indicator would help determine the drought condition more reliably. The 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.
- IDSI can be used as an impact indicator 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.thenewhumanitarian.org/news/2021/10/6/rural-drought-to-urban-shortages-Afghanistans-new-hungry>
- <https://reliefweb.int/report/pakistan/drought-bulletin-pakistan-september-2021>
- <https://www.aninews.in/news/world/asia/pakistan-balochistan-facing-drought-like-situation20210927193258/>
- <https://www.newindianexpress.com/nation/2021/sep/07/drought-like-situation-in-30-per-centof-india-thanks-toinadequate-rainfall-2355334.html>
- <https://www.circleofblue.org/2021/daily-stream/the-stream-september-9-2021-90-of-india-experiencing-drought/>

29 Aug to 14 Sep 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 likely with acute food insecurity as per the IPC classification.

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

Sub-seasonal forecast explains 50-70 below normal rainfall condition over entire Afghanistan for the month of October to December.

Like the IDSI, the SPEI is also representing severe droughts in many parts of northern Afghanistan..

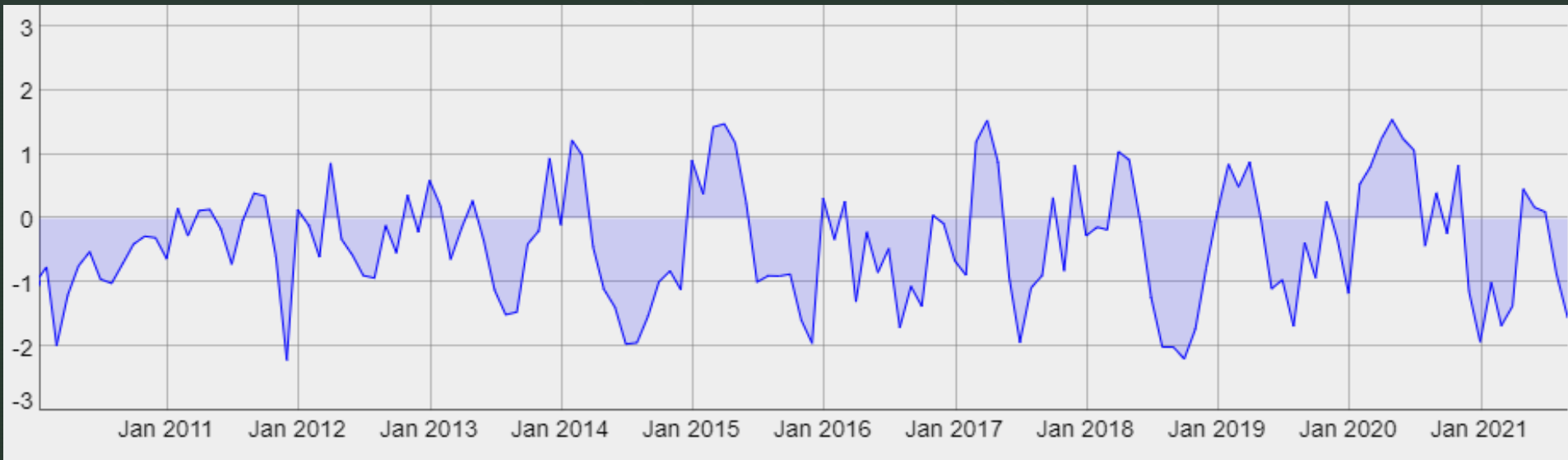
29 Aug to 14 Sep 2021 (NDVI)



Normalize Difference Vegetation Index (NDVI) usually used to identify vegetative health, and in Khulna, Rajshahi and Sylhet provinces of Bangladesh shows Healthy vegetation (high NDVI) in September compared to July and August indicates the decreases in vegetative stress.

The Standard Rainfall Evaporation Index (SPEI) showed negative values until the end of July and turned positive by end of August. But in September, the index turned negative again as rainfall in the central region of Bangladesh dropped significantly (ref - Rainfall map). Therefore, it may cause an increase in vegetation stress in those areas over the next few weeks.

However, IRI 3-month sub-seasonal precipitation forecast with the possibilities of above average rainfall from October – November- December, the there will be a high chance vegetation enhance to a healthy condition during next three months.



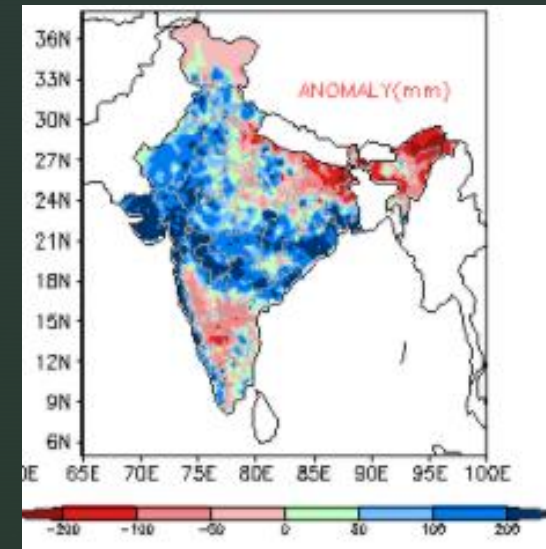
Source: <https://spei.csic.es/> SPEI

In reference to rainfall anomaly map, several states i.e. Karnataka, Tamil Nadu, Southern Maharashtra, Assam, and parts of UP and MP received deficit rainfall and states in the central and west and northeast India, etc. received excess rainfall.

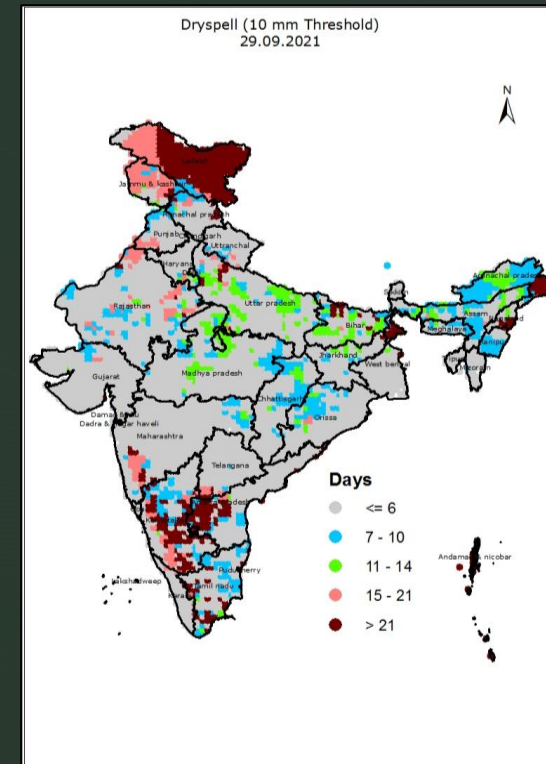
SPI (3-month i.e. Jun-Jul-Aug) indicator for meteorological drought shows states of Orissa, Maharashtra, Chhattisgarh, Assam, Karnataka, Telangana and MP are likely with deficit rainfall.

Vegetation Health Index (VHI) shows considerable increase in vegetation condition almost all the part of India.

Agricultural drought i.e. Integrated Drought Severity Index (IDSI) explains there is no significant drought in any part of India.

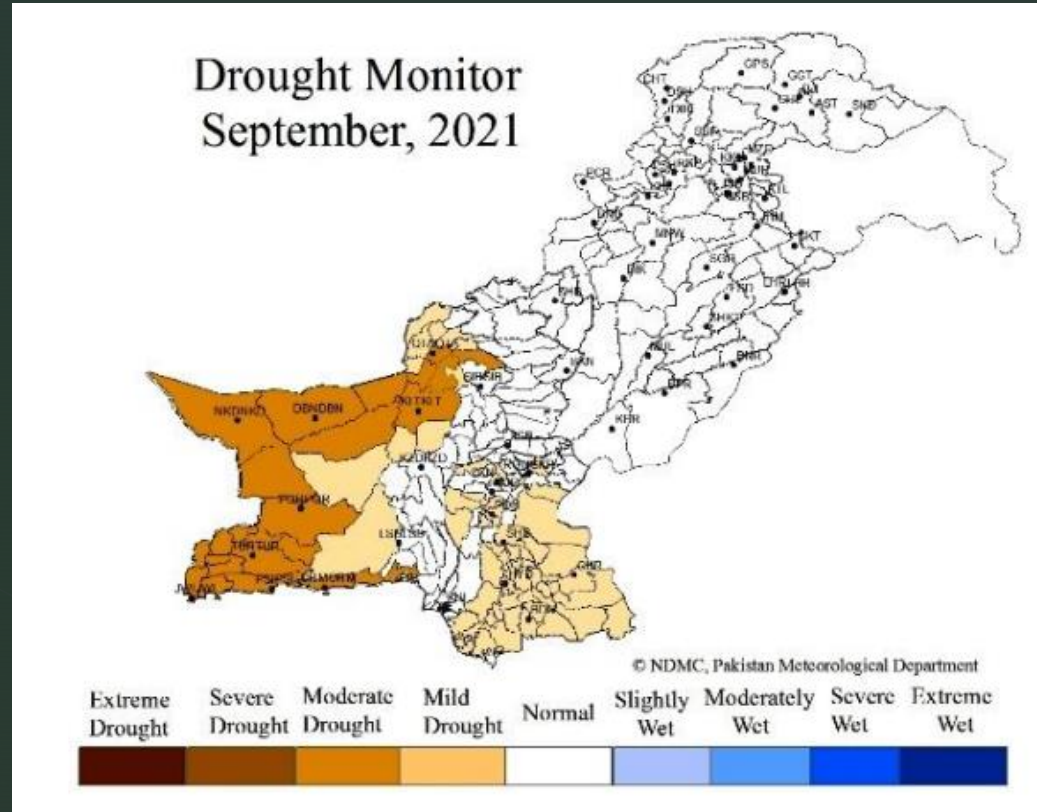
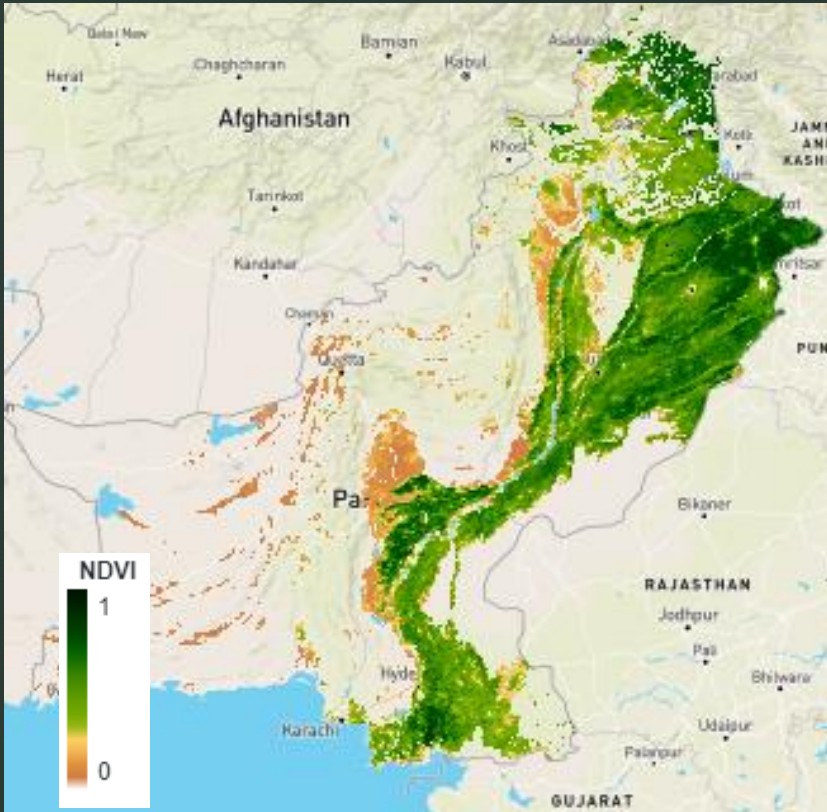


Rainfall anomaly for Sep 2021; Map Source: IMD



Dry spell (10mm threshold) Map Source: CRIDA

Sep 2021 (NDVI)



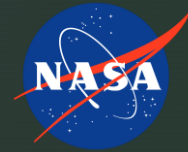
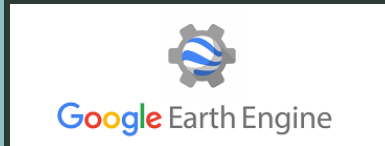
Source; NDMC

According to the National Drought Monitoring Centre of Pakistan, 10 districts of Sindh Province and 6 districts of Balochistan province mild to moderate drought conditions in August further enhanced (relief-web) in September 2021.

Normalize difference Vegetation Index (NDVI) shows slight reduction in vegetation condition compared to both July and August over Sindh province.

As per ERPAS (1-month) and IRI (3-month) forecast explains significant reduction in rainfall (40-70 below average) for the period of October to December, probability of drought situation is expected as per weather forecast.

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**

