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AFGHANISTAN Seasonal Monitor

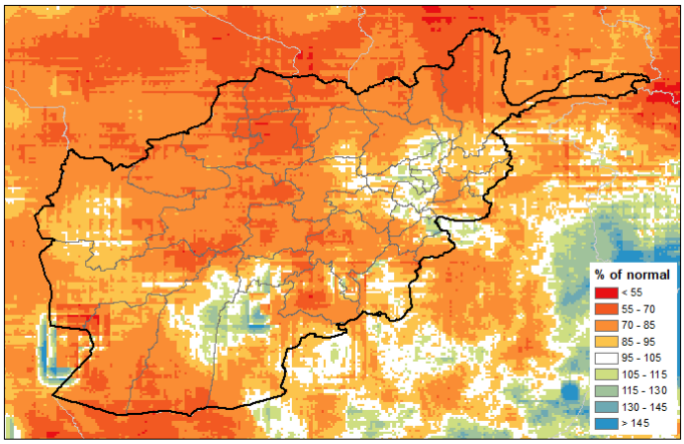
May 25, 2022

Low water availability is likely to limit overall progress of second season cultivation

KEY MESSAGES

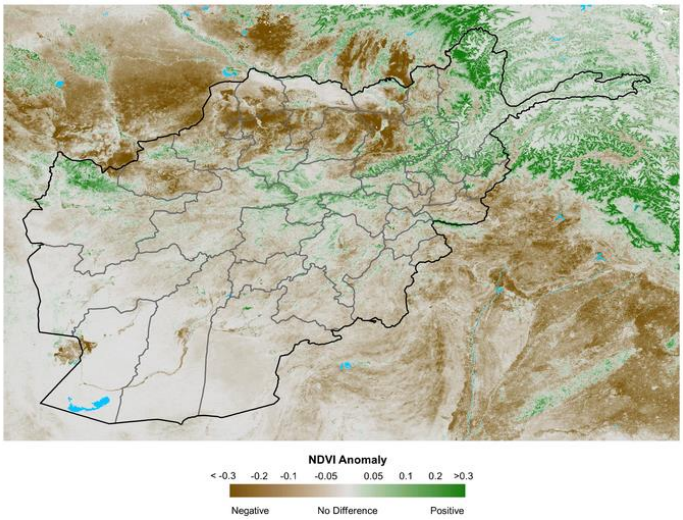
- Near-record low precipitation has been observed in the southwestern, northern, central highlands and northeastern parts of the country during the 2021-2022 wet season. Average to above-average cumulative precipitation for the same period was observed in parts of Helmand, Kandahar, and Kabul basins (**Figure 1**).
- Below-average precipitation, low soil moisture, and low snow water volumes have resulted in significant moisture stress in the northern wheat belt (**Figure 2**). As of May 22, 2022, below-average and near-record low snow water volumes persist in most basins of the country (**Figure 3)**.
- The European Centre for Medium-Range Weather Forecasts (ECMWF) predicts below-average precipitation from May 23 to June 6 (**Figure 4**). Wheat harvest operations are in progress and will continue until the middle of next month. The forecasted dry weather conditions in the coming two weeks are beneficial for the wheat that is in the senescence-harvest stage; however, extremely hot temperatures may harm the hardened grains in localized areas.
- Low soil moisture and above-average temperatures (**Figure 5**) are most likely through at least the end of September due to the ongoing La Niña. Low soil moisture along with low water availability in many basins will most likely lead to below-average second crop cultivation in the coming months.
- Wheat production losses have increased both in terms of severity and extent in 2022, compared to 2021 (**Figure 6**). In 2022, wheat production loss outlook in Jawzjan and Nimroz highlights more than 40 percent below average, 30-40 percent below average in Badghis, Ghor, Faryab, Sari Pul, Balkh, and Samangan in the north, and 20-30 percent below average in Herat and Farah in the west, Kunduz in the north, Dayakundi, Zabul, and Ghazni in the south, and Badakhshan in the east.

Figure 1: October 1, 2021 – May 20, 2022, precipitation percent of average from CHIRPS with respect to a 1981-2010 mean.



Source: *USGS/UCSB*

Figure 2: May 11-20, 2022, eVIIRS (375m) NDVI anomaly with respect to the 2012-2021 mean for the ten-day period.



Source: *USGS/EROS*

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UPDATE ON SEASONAL PROGRESS

Current conditions:

Meteorological, agricultural, and hydrological droughts are ongoing for the second successive year. As of May 20, large negative NDVI anomalies are observed within the northern wheat cultivating belt, from Badghis in the west to Takhar in the northeast.

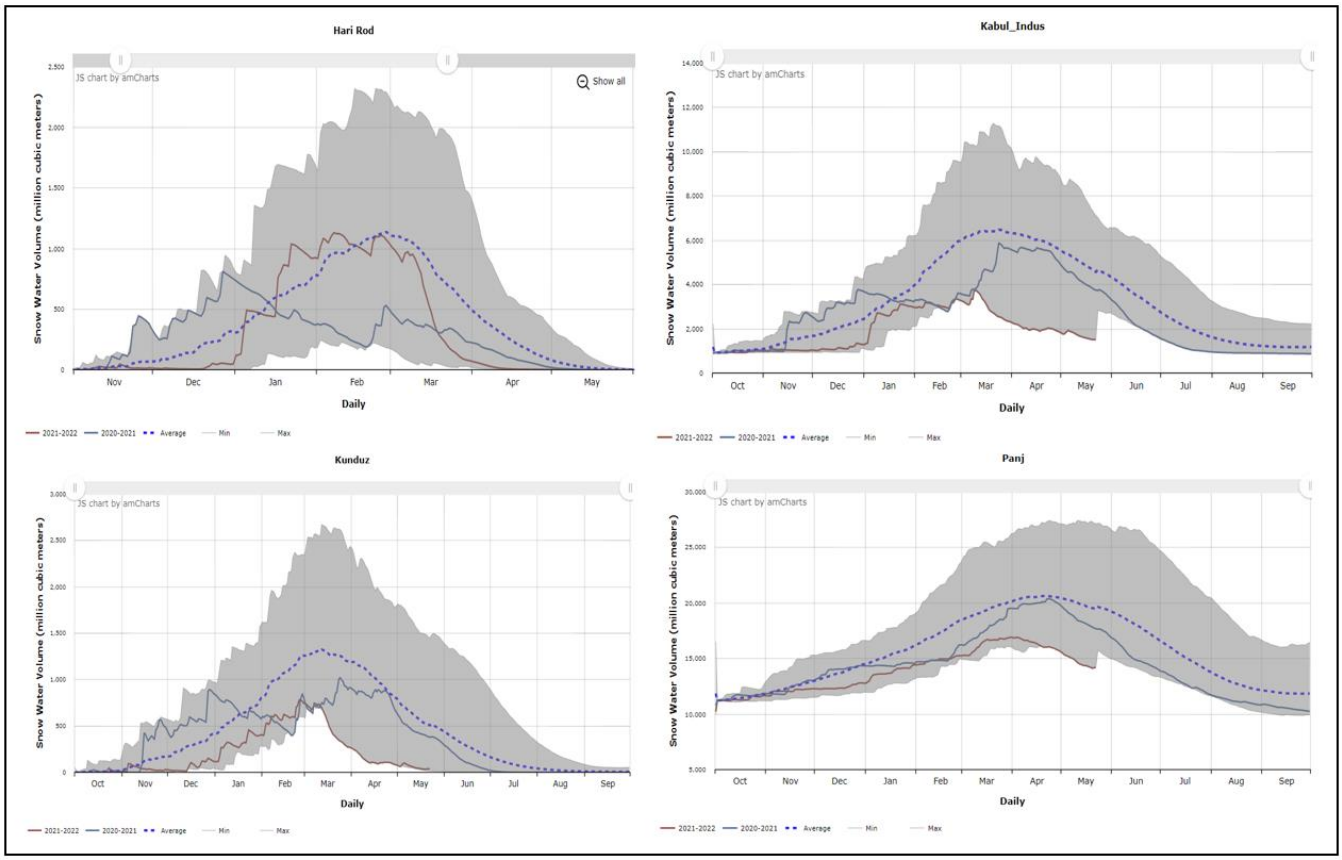
Precipitation anomalies:

Northern and northeastern parts of the country bordering Turkmenistan, Uzbekistan, and Tajikistan, and southern parts bordering Pakistan, have received 55 to 70 percent of average cumulative precipitation from October 1, 2021, to May 20, 2022. The Central highlands received 85-95 percent of average cumulative precipitation during the same period. Above-average precipitation (105 to 115 percent of average) was observed in parts of Helmand, Kandahar, and Kabul basins (**Figure 1**).

Snowpack and snow water volume:

Above-average temperatures have resulted in the rapid depletion of snow water volumes in most of the basins (**Figure 3**). As of May 22, record minimum snow water volumes are observed in Panj, Kokcha-Ab-I-Rustaq, Khanabad, Kunduz, and Kabul basins. Snow water volumes in the remaining basins reached zero in April, at least 2-3 weeks earlier than average. Low snow water volumes and low reservoir levels will reduce water availability, which may severely restrict second crop cultivation.

Figure 3. Seasonal snow water volume, compared to the historical average (blue dashed line), previous year (gray line), and minimum-maximum ranges (gray shading), for the Hari Rod, Kabul, Kunduz, and Panj basins, as of May 22.



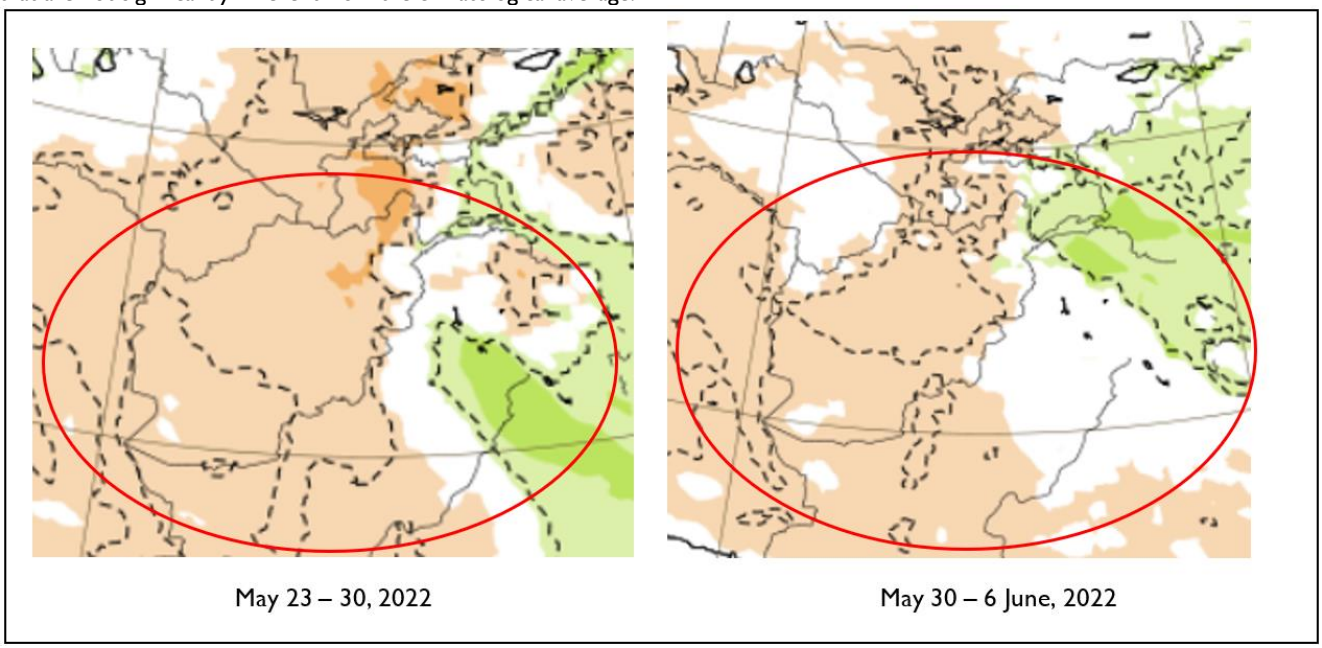
Source: *USGS/NASA*

FORECAST

Precipitation:

Based on ECMWF forecasts, above-average precipitation is forecast in the easternmost parts of Badakhshan while below-average precipitation is most likely in the rest of the country from May 23 through June 6 (**Figure 4**). Precipitation during the remainder of the season is expected to be below average, given the forecast persistence of La Niña.

Figure 4. Mean weekly precipitation anomalies from ECMWF made on May 22, for (left) May 23 – 30 , and (right) May 30 – 6 June. The dashed lines indicate precipitation anomalies that are significant at the 1 percent confidence level while the color shaded areas indicate precipitation anomalies that are significant at the 10 percent confidence level. White shading indicates forecast precipitation anomalies that are not significantly different from the climatological average.



Source: *ECMWF*

Temperatures:

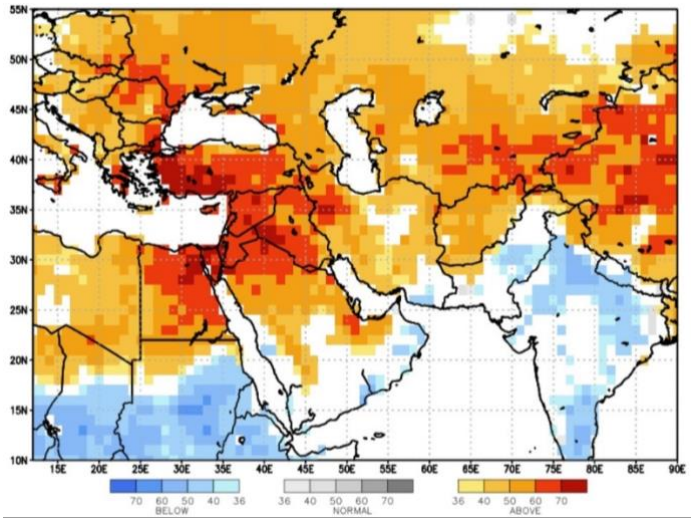
The North American Multi-Model Ensemble temperature forecast for Jul – Sep 2022 indicates a high probability of above-average temperatures across the country during the forecast period (Figure 5).

There is high probability that cultivation of second season crops will be below-average in view of low water availability and increased evaporative demands due to above-average temperatures during July – September.

Wheat production losses:

Generally, drought-induced losses in crop production consist of two components: firstly, due to reduction in total sown area caused by lack of sufficient precipitation during sowing period, and secondly, due to below-normal crop yields on account of poor health caused by moisture stress during its critical flowering and grain hardening stages.

Figure 5. The North American Multi-Model Ensemble (NMME) temperature tercile probability forecast for Jul-Sep 2022. Warm colors indicate the likelihood of temperature in the higher tercile.

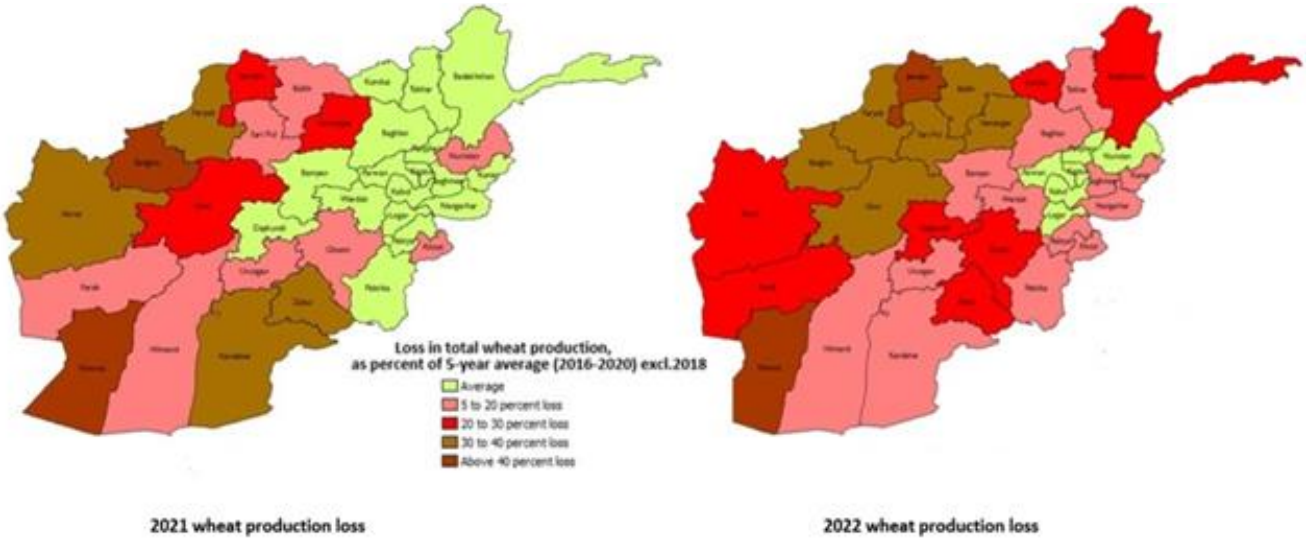


Source: *NOAA CPC*

In this instance, reduction in sown area was estimated based on the normalized difference aridity index (NDAI) difference between current season and that of a normal season. NDAI has been determined using the formula (PET - Precipitation) /

(PET + Precipitation) where PET represents potential evapotranspiration[1] while CHIRPS provides precipitation. Loss in wheat production due to below-average health during crop flowering stage in a given year was determined based on the difference between eVIIRS NDVI at flowering stage from mean NDVI (2012-2021).

Figure 6. Comparison of spatial variability in estimated wheat production losses during 2021 and 2022 in Afghanistan. Losses in total wheat production for 2021 and 2022 have been expressed relative to the most recent moving 5-year average (2016-2020) wheat production, excluding wheat production for 2018. Normally, a 5-year average excludes abnormally low values in its computation.



It can be seen from **Figure 6** that successive droughts in 2021 and 2022 have led to progressively increased wheat production losses from year to year. Provinces with average wheat production (colored in green) have reduced in number in 2022. On the other hand, wheat production losses in Badghis, Ghor, Faryab, Sari Pul, Balkh, and Samangan in the north have increased from 20-30 percent in 2021 to 30-40 percent below average; loss in Ghazni in the south increased from 5-20 percent in 2021 to 20-30 percent below average; and losses in Dayakundi in the central and Badakhshan in the east have increased from average to 20-30 percent below average in 2022 because of persistent increase in drought severity in these regions (**Figures 1 and 2**). It is also important to note that wheat production losses in Jawzjan and Nimroz are more than 40 percent of average in 2022. The progressively increasing wheat production shortfall combined with the lack of water availability for second crop cultivation does not bode well for food security in the coming season in the country.

[1] Hobbins, M. T. The variability of ASCE Standardized Reference Evapotranspiration: A rigorous, CONUS-wide decomposition and attribution. Transactions of the ASABE 59, 561–576, doi:10.13031/trans.59.10975 (2016).