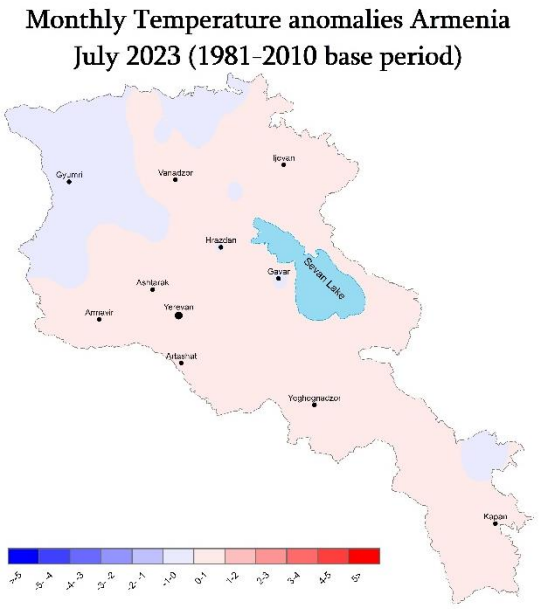
DROUGHT MONITORING BULLETIN

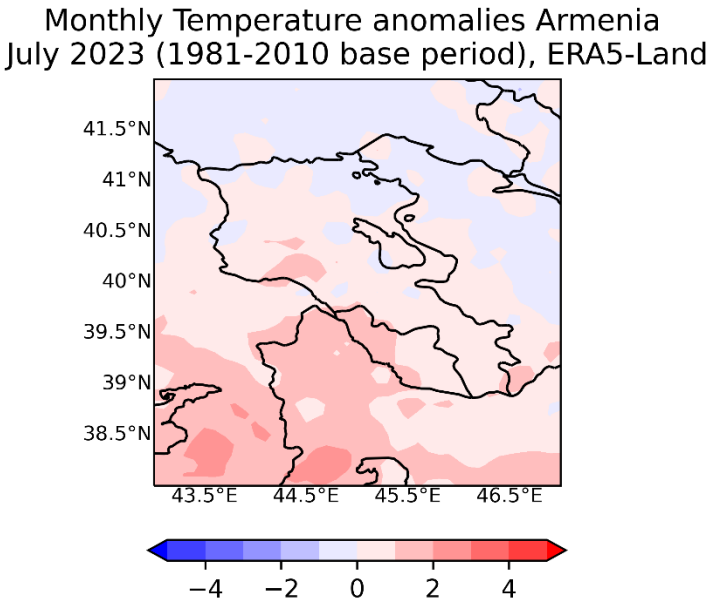
2023 July

Content

1. Monthly temperature anomaly

According to the observations of 43 meteorological stations of Armenia the average monthly air temperatures for July were close to normal (±1°C deviations relative to norm). At the same time, deviations of average monthly temperatures of the ERA5-Land global reanalysis successfully captured the observed temperature anomalies of over the territory of Armenia in July.



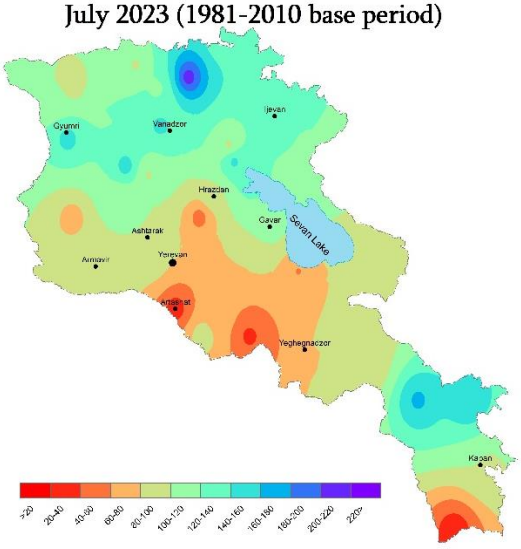


2. Monthly precipitation anomaly

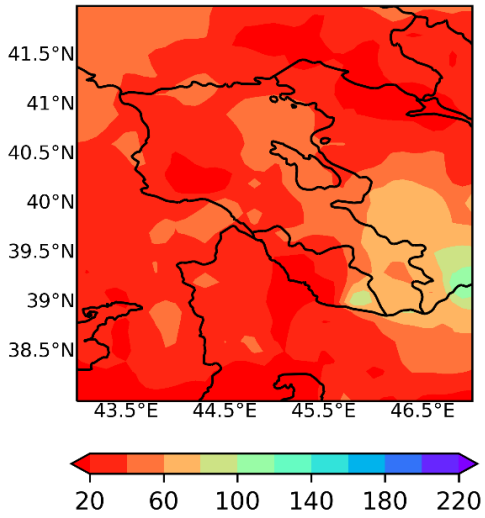
In July, the northern regions of the republic were wet, due to above-normal precipitation. About 220% of the normal monthly precipitation was observed in Odzun, Higher than normal precipitation was recorded in Syunik (150-170%). Precipitation in the rest regions of the republic was mostly close to the norm, except of the Ararat valley and the southern regions of Syunik, where less than normal precipitation was observed. The minimum precipitation was recorded in Artashat and Meghri stations, where the amount of precipitation was about 13% of the norm.

In contrast to the observations, ERA5-Land global reanalysis precipitation data show that in July precipitation in Armenia was mostly below normal. In most parts of the republic, 20-40% of the monthly precipitation norms was observed, and up to 60-80% in Syunik.

Monthly Precipitation anomalies (%) Armenia
July 2023 (1981-2010 base period)



Monthly Precipitation anomalies(%) Armenia
July 2023 (1981-2010 base period), ERA5-land

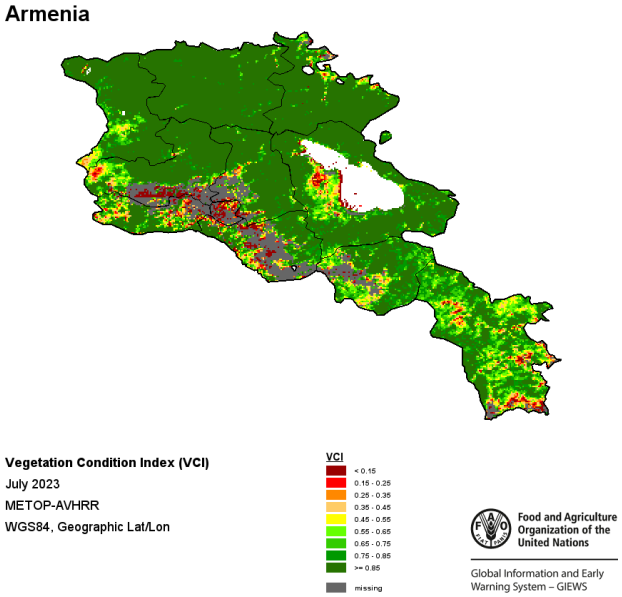


3. Drought indices

3.1 Vegetation Condition Index (VCI)

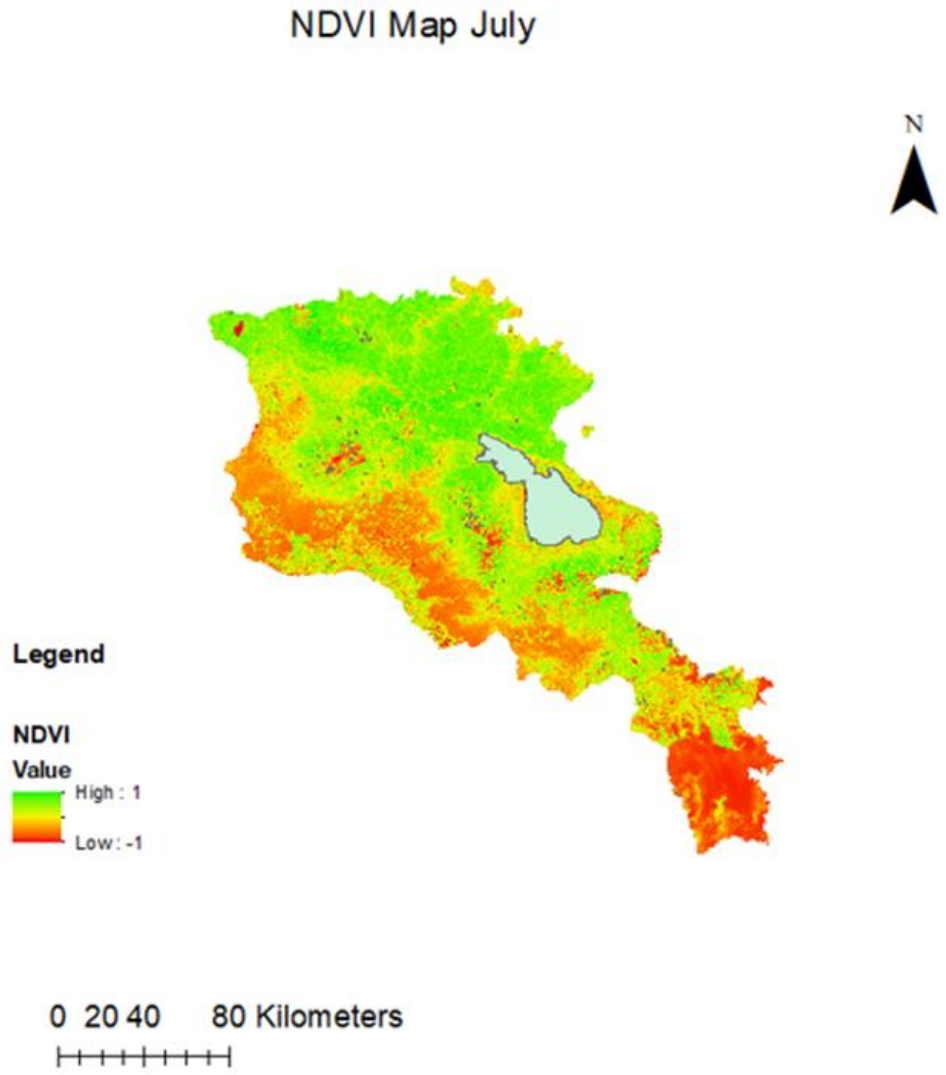
The Vegetation Condition Index (VCI) compares the current NDVI to the range of values observed in the same period in previous years. The VCI is expressed in percents and gives an idea where the observed value is situated between the extreme values (minimum and maximum) in the previous years. Lower and higher values indicate bad and good vegetation state conditions, respectively.

As can be seen from the July VCI map published on the FAO website, , unfavorable conditions were observed for the growth and development of vegetation in Ararat valley and valley regions of Syunik due to the high temperatures.



3.2 Normalized Difference Vegetation Index (NDVI)

The Normalized Difference Vegetation Index (NDVI) is an indicator of photosynthetically active biomass which is obtained by comparing the amount of absorbed visible red light and reflected infrared light. NDVI defines values from -1.0 to 1.0 where negative values coincide with areas devoid of vegetation. As can be seen from the July NDVI map based on the Landsat 8 satellite, (the spatial resolution is 60 m) drought conditions were observed in the Ararat valley and valley regions of Syunik.

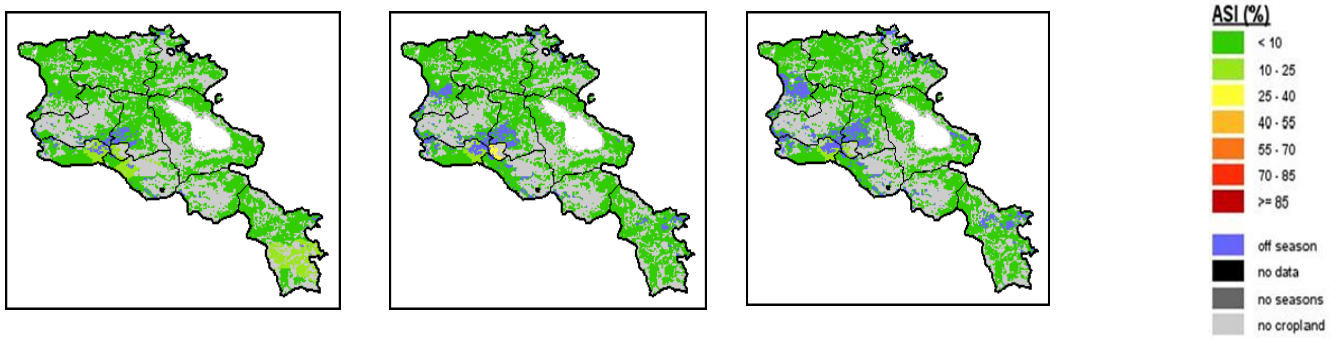


3.3 Agricultural Stress Index (ASI)

The Agricultural Stress Index (ASI) indicates the impact of agricultural drought. ASI integrates the temporal and spatial image of the Vegetation Health Index (VHI). ASI estimates the intensity and duration of dry spells during the growing season of agricultural crops. Areas with VHI values below 35 percent are

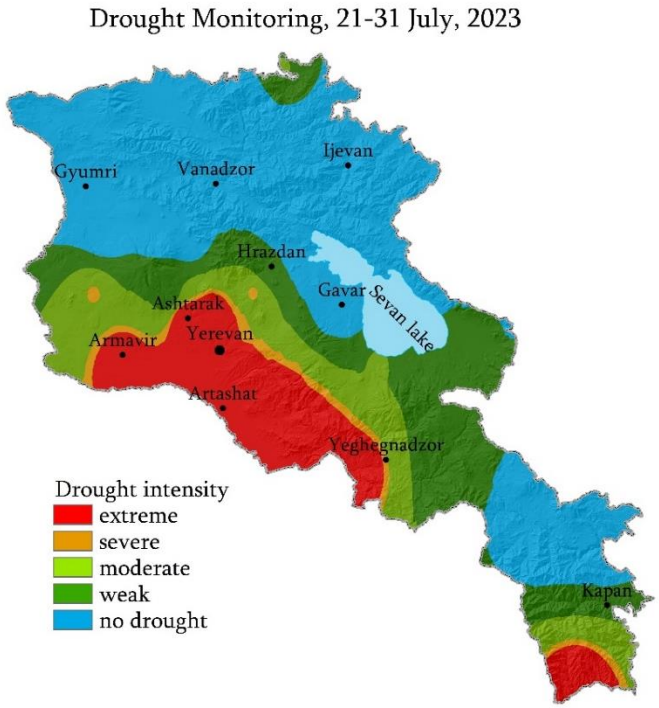
critical to assessing the intensity of drought. As can be seen from the data of July, there was no agricultural drought in the territory of the republic except for some parts of the Ararat valley. During July, grain crops and fruit trees were harvested in most parts of the valley regions of the republic

1st decade 2nd decade 3rd decade

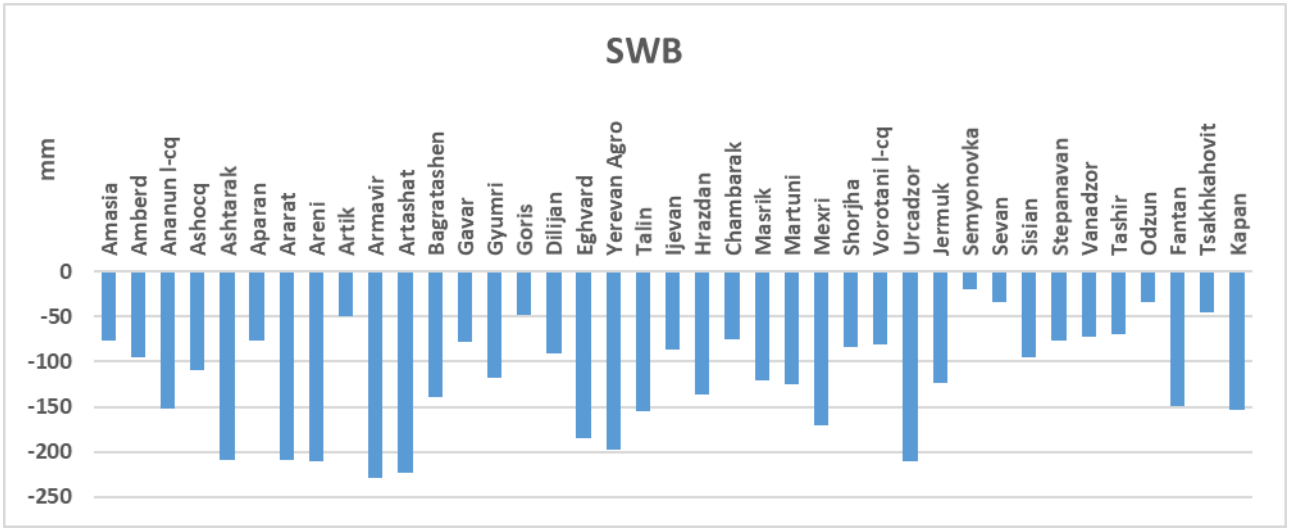


3.4 Assessment of meteorological drought intensity

Drought intensity was evaluated by Selyaninov's hydrothermal coefficient according to the data of 38 meteorological stations. The drought intensity map for the last 10 days of July shows that there were no drought conditions in the territory of Armenia, except for stations located in the Ararat valley and in the valley regions of Syunik, where severe drought conditions were observed.

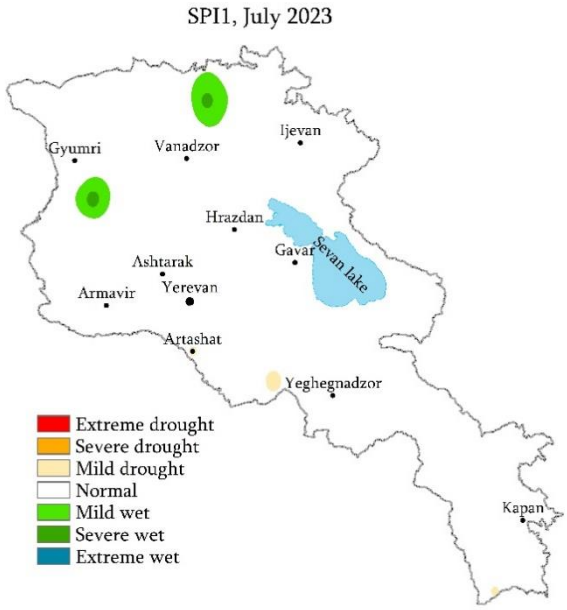


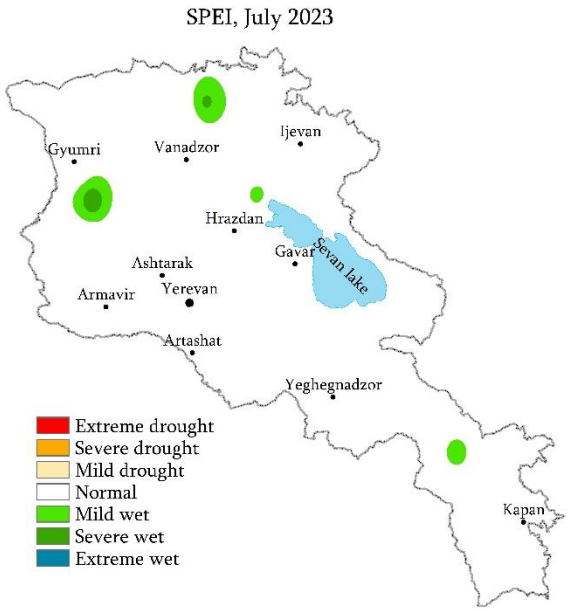
Drought intensity was evaluated based on the Standardized Precipitation Index (SPI) as well . SPI is a statistical indicator, which calculates and compares the amount of observed precipitation in a given month to long-term climatological precipitation distribution for the same period. SPI was calculated for monthly (SPI1) and quarterly (SPI3) periods.In addition the SWB (Soil Water Balance) was calculated which is an index based on the difference between monthly precipitation and potential evapotranspiration. Lastly, the SPEI drought index was calculated. SWB was used as input to calculate SPEI. Calculations were performed with the R Studio software package.

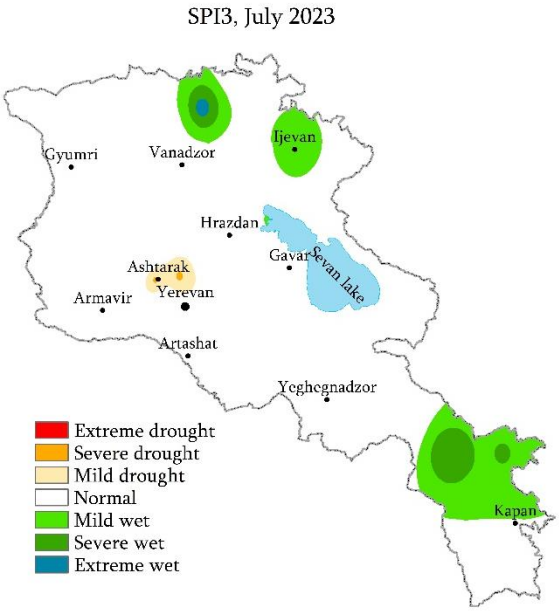


As can be seen from the maps, there were no observed drought conditions in July according to SPI1 and SPEI. SPI1 reflects very wet conditions for Odzun and Artik stations, and SPI3 also reflects wet

conditions for Ijevan, Sisian and Goris stations, which match the observed precipitation anomalies. Moderate and severe droughts were observed in some stations of the Ararat valley and Aragatsotn foothills according to SPI3.







In summary, analyzing the observed temperature and precipitation anomalies, as well as the values of the drought indices and vegetation conditions, we can conclude that the observed weather conditions in July led to the formation of drought conditions mainly in Ararat valley and valley regions

of Syunik, which is typical for the climatic conditions of that regions during the given period of the year.