DROUGHT MONITORING BULLETIN

2023 September

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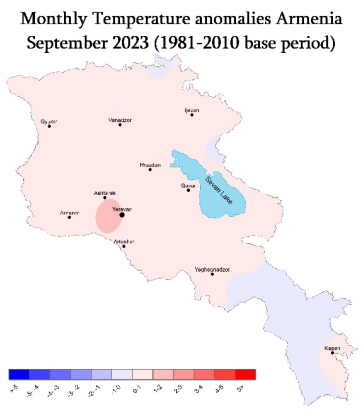
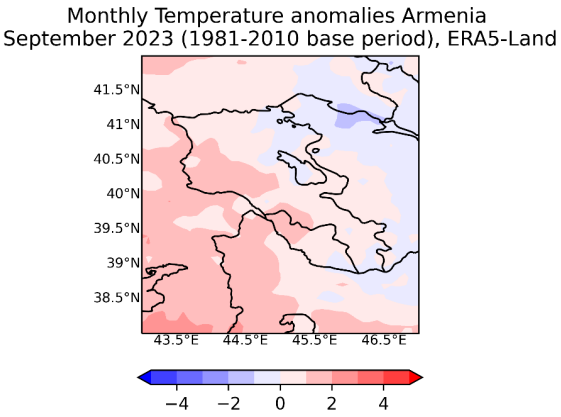
1. Monthly temperature anomaly

In September, the average monthly air temperatures were close to the norm (1981-2010) in Armenia. According to the observations of 43 meteorological stations in Armenia, the monthly temperature anomalies were mostly within the range of -1 to 1°C. The maximum deviation was observed at the Merdzavan station (1.4°C).The average monthly temperature map of ERA5-Land global reanalysisquite well reproduces the near-normal temperatures of over the territory of Armenia in September.

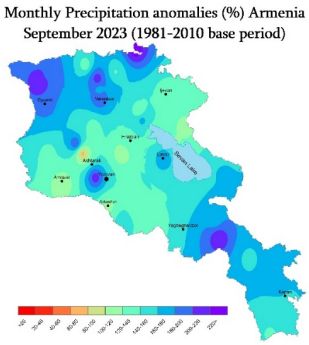


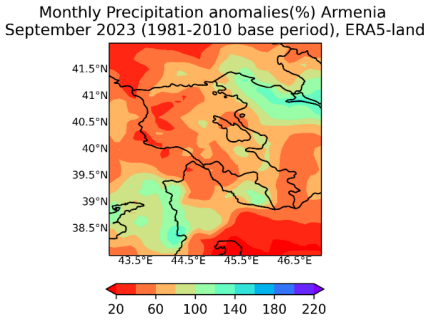


2. Monthly precipitation anomaly

In September, the main part of the republic received above-normal precipitation. The maximum amount of precipitation was recorded in Goris (96 mm), and the maximum deviation from the norm was recorded at Amasia, Vorotan-pass and Merdzavan meteorological stations (190-198%). The amount of precipitation was near the norm in the Ararat valley, and only in Amberd the amount of precipitation was significantly less than the norm, 55% of the norm.

In contrast to the observations, the ERA5-Land global reanalysis data show that September was dry in Armenia, and precipitation was mostly below normal. In the western regions of the republic, the amount of precipitation was 20-40% of the norm, and in the far north-eastern and eastern regions received up to 80% of the normal rainfall.

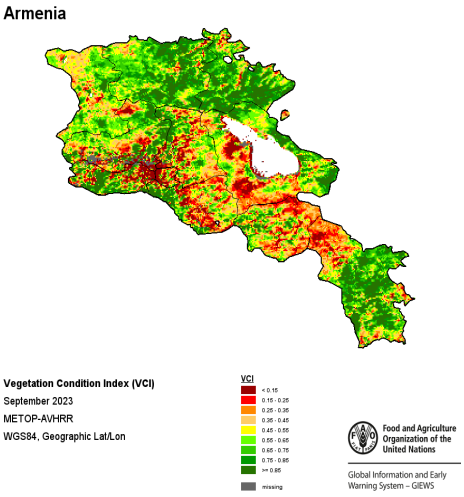




3. Drought indices

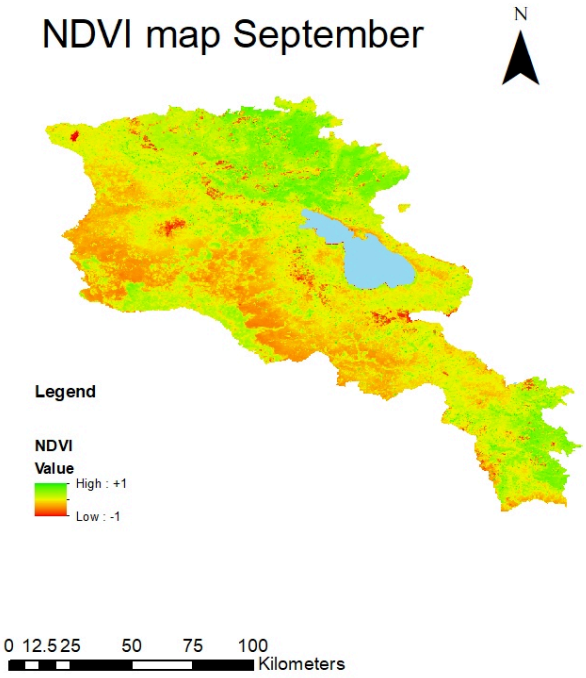
3.1 Vegetation Condition Index (VCI)

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 September VCI map published on the FAO website, Ararat valley, the foothills of Aragatsotn and Vayots Dzor, Lake Sevan basin and Syunik valley regions were characterized by unfavorable conditions for the growth and development of vegetation.



3.2 Normalized Difference Vegetation Index (NDVI)

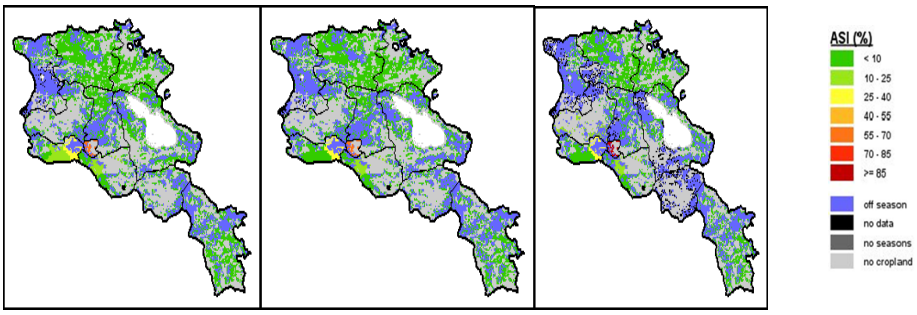
The Normalized Difference Vegetation Index (NDVI) is an indicator of photosynthetically active biomass which is obtained by comparing the amount of absorbed visible red light and reflected infrared light. NDVI defines values from -1.0 to 1.0 where negative values coincide with areas devoid of vegetation.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



3.3 Agricultural Stress Index (ASI)

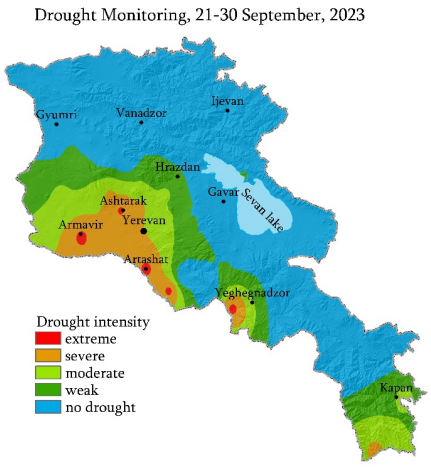
The Agricultural Stress Index (ASI) indicates the impact of agricultural drought. ASI integrates the temporal and spatial image of the Vegetation Health Index (VHI). ASI estimates the intensity and duration of dry spells during the growing season of agricultural crops. Areas with VHI values below 35 percent are critical to assessing the intensity of drought. As can be seen from the data of September, there was no agricultural drought in the territory of the republic except for some parts of the Ararat valley. During September in all regions of the republic, grain, vegetable and fruit crops were harvested. The observed precipitation in the last decade of September increased the soil moisture, improving the conditions for sowing, seeding, grain growth and development of winter wheat.

1st decade 2nd decade 3rd decade

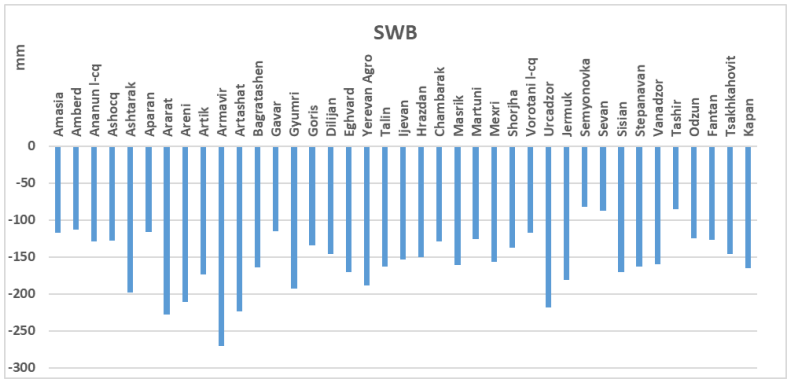


3.4 Assessment of meteorological drought intensity

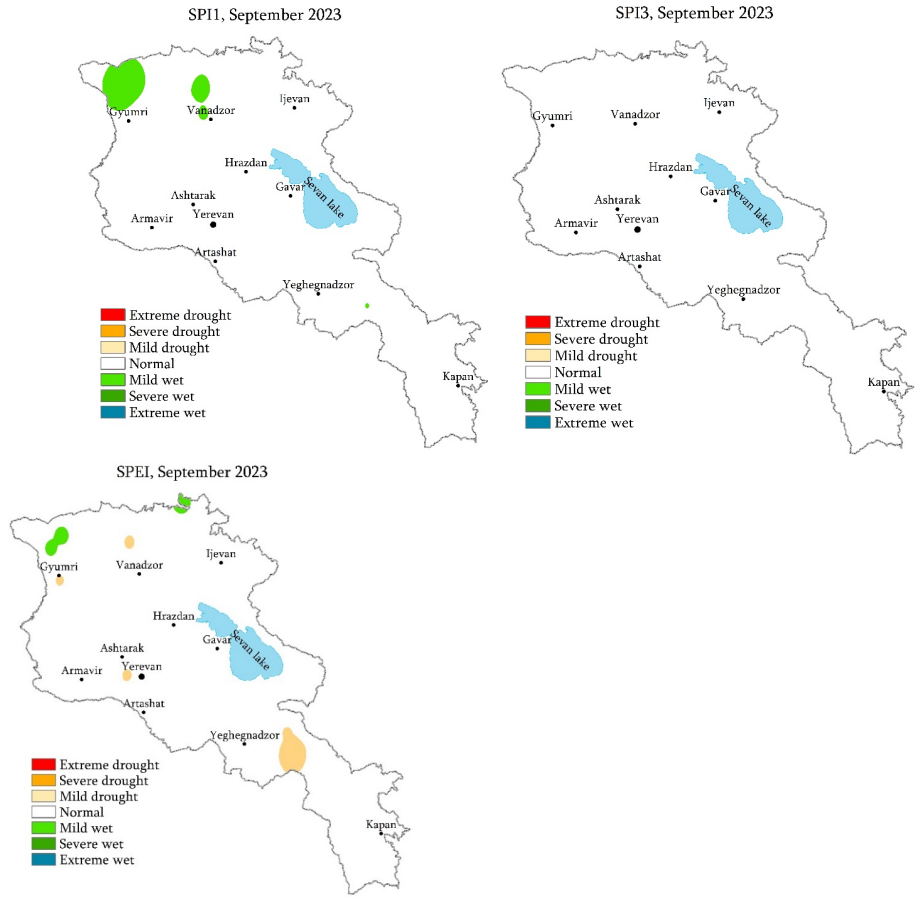
Drought intensity was evaluated by Selyaninov's hydrothermal coefficient according to the data of 38 meteorological stations. As can be seen from the map for the last 10 days of September, only the Ararat valley and Vayots Dzor valley regions were affected by severe and extreme drought conditions.



Drought intensity was further evaluated based on the Standardized Precipitation Index (SPI). 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. Calculations were performed with the R Studio software package.



In September, according to the SPI1, SPI3 and SPEI indices, there were no observed drought conditions in the republic.



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, in September, the drought conditions affected mostly the Ararat valley and the valley regions in Syunik and Vayots dzor.