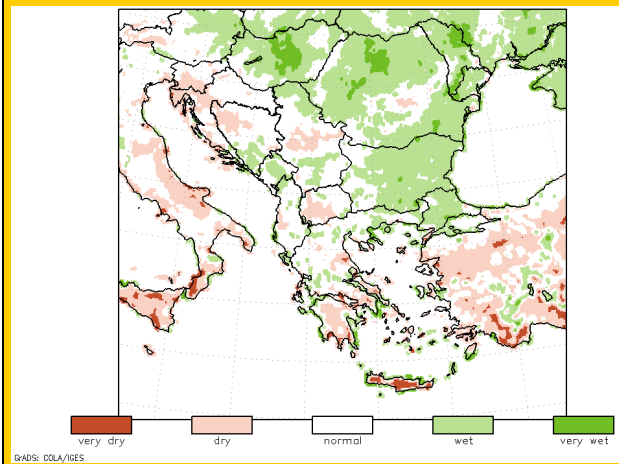


# DROUGHT MONITORING BULLETIN

April 2022

## HOT SPOT



After dry first three months of the year across various parts of the region, April offered some relief via normal or above-average precipitation level to northern and eastern part of the region. Figure on the left shows **accumulated surface water balance for April 2022 in percentile classes** on the base of the 1991-2020 period. It reveals April still brought less than normal amount of precipitation to the area in the north-west from Slovenia to central Serbia, to North Macedonia and across the region's southern parts including southern Greece and Turkey.

## AIR TEMPERATURE AND SURFACE WATER BALANCE

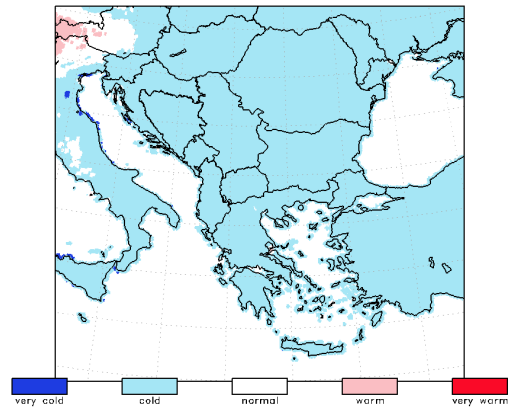
Figures in this section present anomalies of the average air temperature and accumulated surface water balance as well as classified values of the average **air temperature** and **surface water balance** in percentile classes for a 60-day period **from 2 March to 30 April 2022**.

AVERAGE AIR TEMPERATURE  
ANOMALY (°C)  
2 MARCH – 30 APRIL 2022



GHRS: COLA/IGES

AVERAGE AIR TEMPERATURE  
PERCENTILE CLASSES  
2 MARCH – 30 APRIL 2022

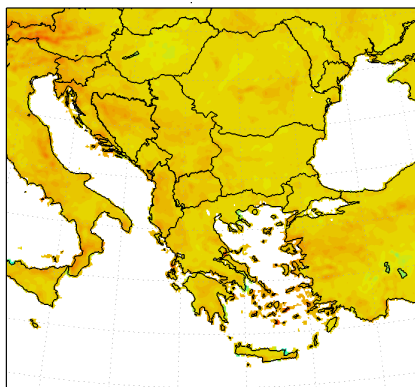


GHRS: COLA/IGES

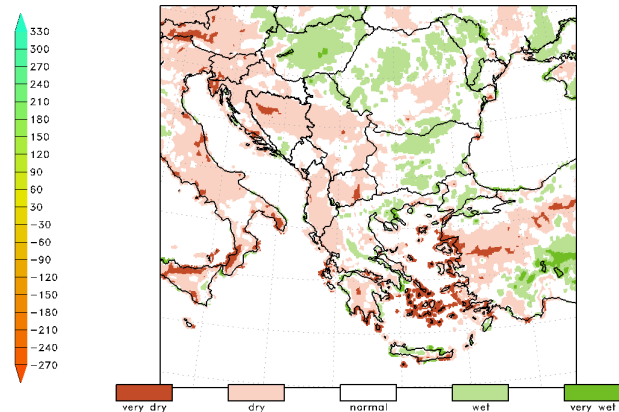
Temperature-wise April was mainly a cold month, especially over northern half of Balkan Peninsula where air temperatures rarely exceeded the average. Across that part of the region,

they mostly remained 2-4 °C below the average throughout the month. Only eastern Bulgaria, southern Greece and Turkey experienced slightly warmer than normal air temperatures in first dekad of April. In mid-April, a cold spell came into the region and anomalies as low as 3-4 °C below the average stretched across all of it, including its southern parts. At that time, daily air temperatures dropped to 0 °C across as south as Greece, in various parts of the region even down to freezing temperatures. When the cold spell was over, above-average air temperatures returned to Bulgaria and Greece, especially their southern areas, but mostly to Turkey where for a shorter period of time air temperatures were as high as 4-5 °C above the long-term average. A 60-day overview of air temperature conditions over March and April reveals there was more or less a continuous run of colder than normal air temperatures across northern half of Balkan Peninsula, and changing spells of high amplitude anomalies from the normal over Bulgaria, Greece and Turkey which, averaged over a month, resulted in April ending up 1-2 °C colder than normal, similar as elsewhere across the region.

ACCUMULATED WATER BALANCE  
ANOMALY (mm)  
2 MARCH – 30 APRIL 2022



ACCUMULATED WATER BALANCE  
PERCENTILE CLASSES  
2 MARCH – 30 APRIL 2022

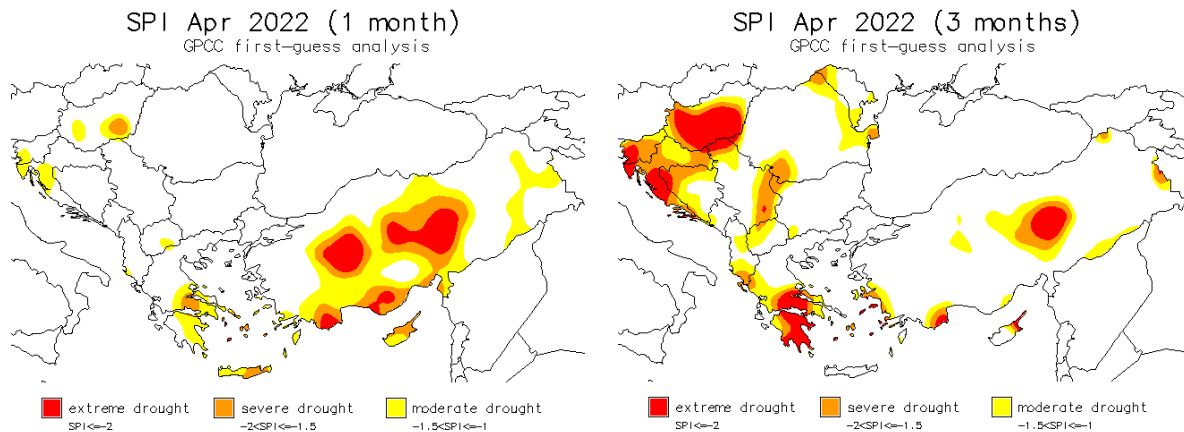


Above-average April precipitation level across northern and eastern part of the region, namely in central Hungary, Moldova, Romania and Bulgaria, contributed to a surplus of 60-day surface water balance in those countries. Accumulations over the March-April period exceeded the average surface water balance for this time of year for up to 60 mm over Moldova, Romania and Bulgaria, and up to 90 mm in central Hungary and over the limited area in central-western Turkey. All along the western part of Balkan Peninsula, southern Greece and most of Turkey where April but mostly March precipitation levels were considerably drier than normal, the 60-day accumulated surface water balance did not reach the average. The deficit of 60-120 mm indicates a dry to very beginning of spring across western and southern parts of the region.

## STANDARDIZED PRECIPITATION INDEX

*The drought situation with regard to the precipitation accumulation is presented by Standardized Precipitation Index (SPI). The SPI calculation is based on the distribution of precipitation over long time periods (30 years, in our case long-term average 1961-1990 was used). The SPI can be calculated at various time scales which reflect the impact of the drought on the availability of water resources. The long term precipitation record is fit to a probability distribution, which is then normalised so that the mean (average) SPI for any place and time period is zero. SPI values above zero indicate wetter periods and values less than zero indicate drier periods. Only the dry part of the extreme anomalies is presented on the maps.*

Standardized precipitation index for **April 2022** is shown in figures below. SPI for a one-month period indicates possible drought conditions which can have impact on vegetation, while SPI for a three-month period can be indicative also for surface water status.



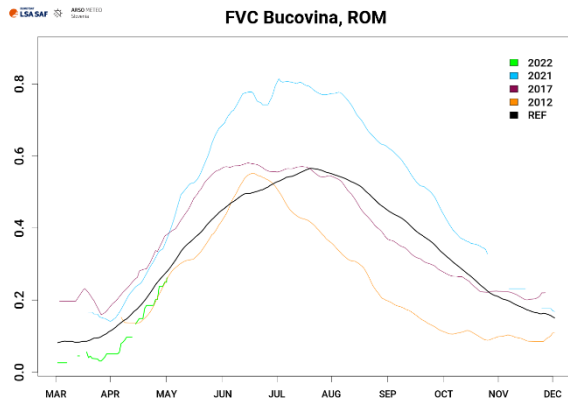
In April alone, vast part of central and southwestern Turkey experienced noticeable lack of rain. SPI for April shows that precipitation level was under-average, although to a lesser degree than in Turkey, also in southern Greece and in the north-west of the region, including parts of Slovenia, western Croatia as well as in localised area of southern Hungary. A 3-month overview of precipitation conditions through SPI3 shows a great portion of the region were exposed to severe to extreme drought conditions in early months of the year. Central Turkey and areas all along its borders received noticeably less rain than normal mostly in February and April, while severe to extreme level of drought across most of Balkan Peninsula comes on the account of much lower than normal rainfall rate in February and March. On the other hand, central and southern Greece recorded continuous period of under-average precipitation level from February through to April.

## REMOTE SENSING - FRACTION OF VEGETATION COVER

*Fraction of vegetation cover (FVC) is a vegetation index based on multi-channel remote sensing measurements (data from EUMETSAT's LSA SAF data base is used for products in this bulletin). FVC shows fraction of the total pixel area that is covered by green vegetation, which is relevant for applications in agriculture, forestry, environmental management and land use, it has also proved to be useful for drought monitoring. Values vary according to the vegetation stage and to the damages of possible natural disasters (including drought). FVC values are lower at the beginning of the growth season, the highest at the full vegetation development, then FVC slowly drops with vegetation senescence. Line shape depends on sort of the vegetation.*

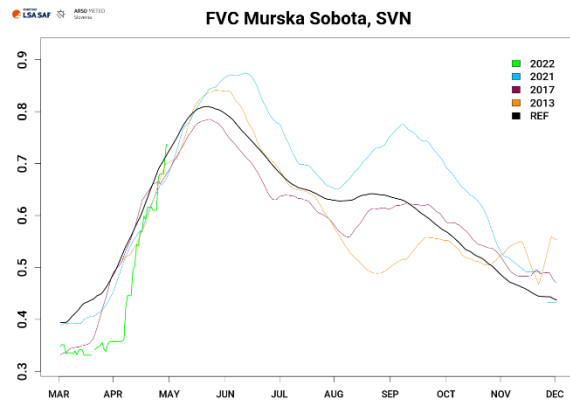
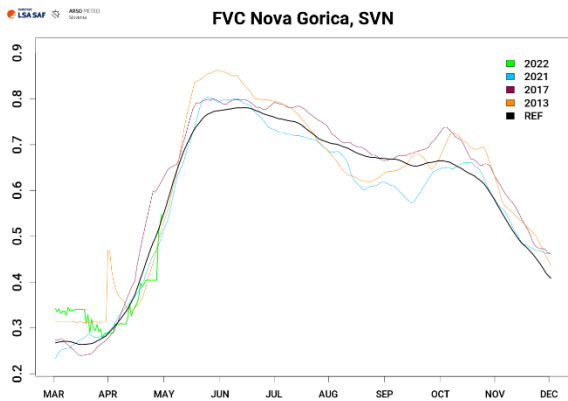
Graphs below present the **vegetation situation** as recorded **on 30 April 2022** at some locations across Southeastern Europe. FVC values for year 2022 are presented as a green line. Graphs also include reference line (2004–2021) in black, and lines in light blue (year 2021), magenta (year 2017) and orange (year 2012, or 2013 for Slovenia) for comparison. Possible missing values or sharp decline of values could be a result of a prolonged cloudy weather, extreme weather events, snow blanket or changes to product by product provider.

## ROMANIA



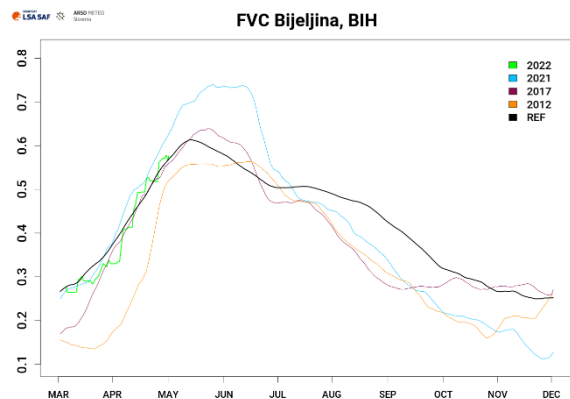
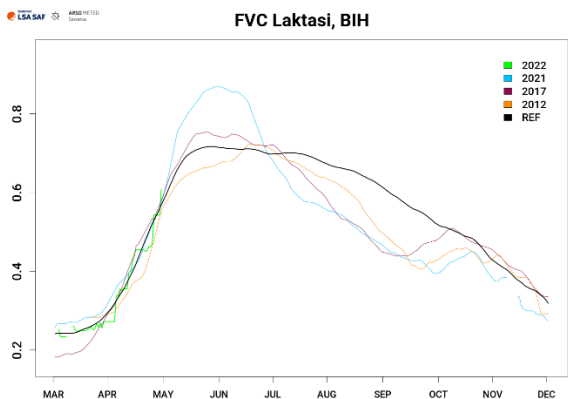
Vegetation season began approximately half a month later than normal in Bucovina, northern Romania and continued well especially from mid-April onward, according to FVC. At the end of April, the portion of cover with green vegetation was nearly as high as usual for this time of year.

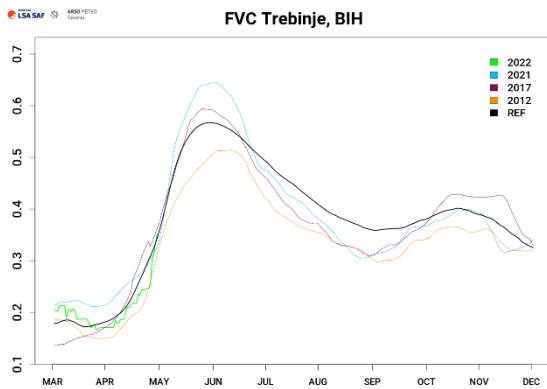
## SLOVENIA



Late winter vegetation cover in Nova Gorica, western Slovenia was higher than usual but a setback can be observed through FVC in second half of March, possibly due to persistent lack of rain. April weather conditions proved better for vegetation growth, which followed well its usual rate of growth throughout April. A short period of stress can also be observed in late April, similar as in vegetation growth in Murska Sobota, northeastern Slovenia, likely due to extremely low air temperatures. As for the latter location, vegetation season began well and experienced favourable growing conditions throughout April.

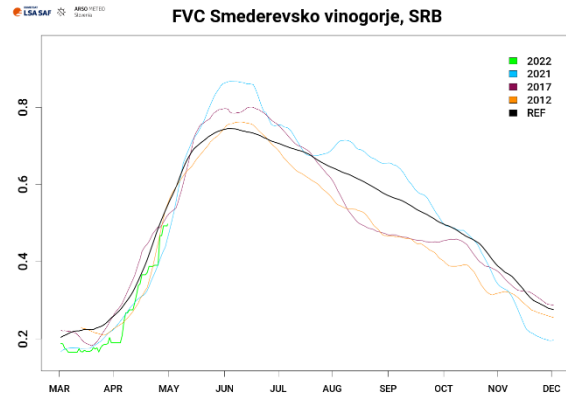
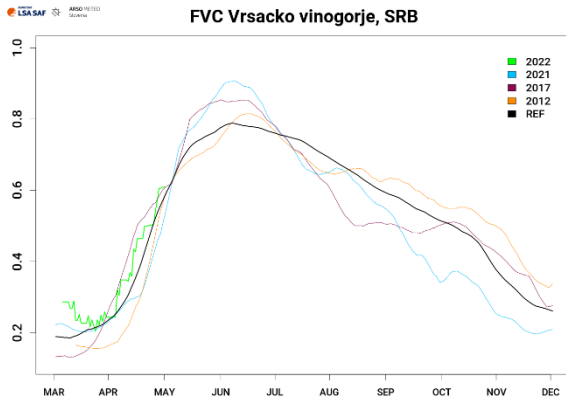
## BOSNIA AND HERZEGOVINA (REPUBLIC OF SRPSKA)





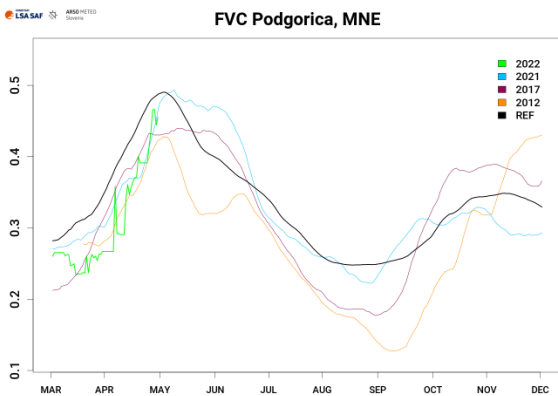
Vegetation season began as usual at all three locations in Bosnia and Herzegovina, with March and April offering favourable conditions for vegetation growth according to its usual rate. There can be little to no deviations observed at any of the locations in northwestern, northern and southern part of the country, according to FVC, indicating good beginning of the seasons in terms of vegetation growth.

## SERBIA



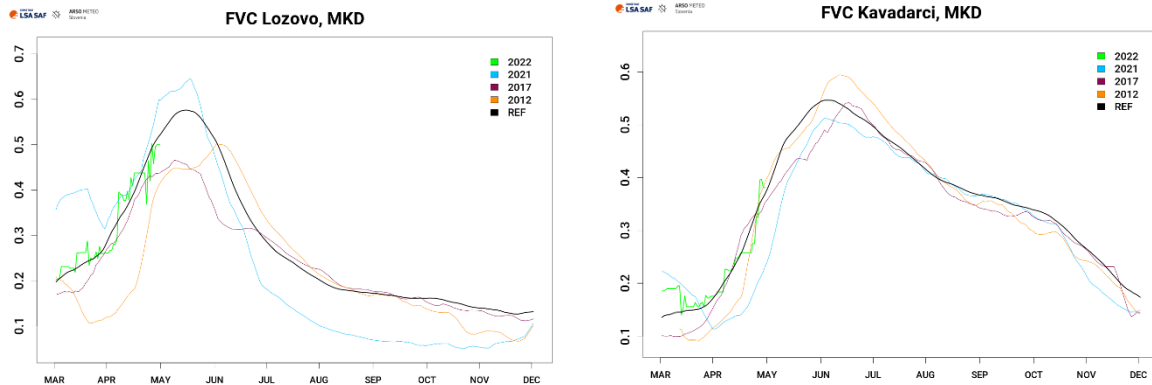
Vegetation season began slightly later than normal in Vrsacko vinogorje, northeastern Serbia. Favourable weather for vegetation growth came in early April and remained favourable throughout all month, according to consistently average to above-average FVC values for this location. Weather conditions to boost vegetation growth in spring came only in early April also in Smederevsko vinogorje, central Serbia. After that, its development continued at its usual rate of growth throughout the rest of the month.

## MONTENEGRO



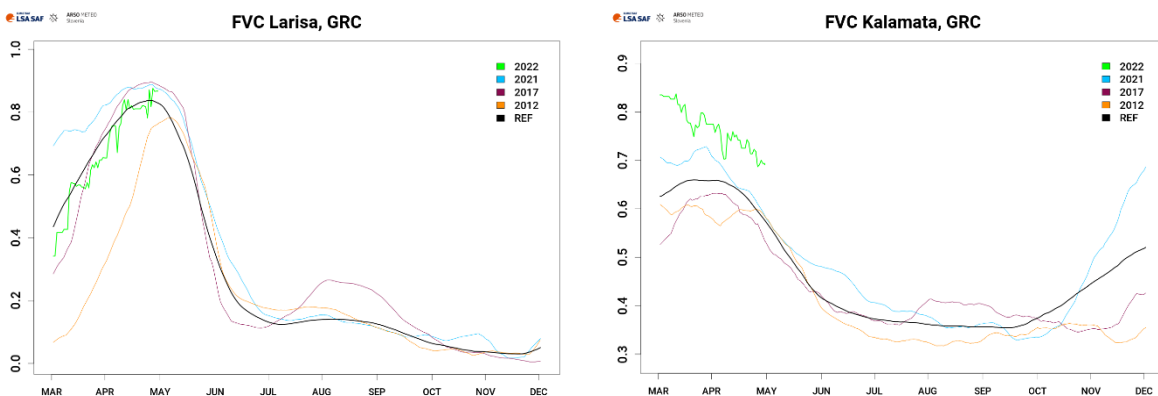
Vegetation season did not begin until early April also in Podgorica, southern Montenegro although normally its growth begins in early March already. Once vegetation growth began, it progressed well at its usual rate of growth throughout the rest of the month and reached its peak of the season at its usual time. Due to some delay in beginning of vegetation season, the peak value is slightly lower than normal but not far from its average value.

**NORTH MACEDONIA**



Vegetation season began well and as usual at both locations in North Macedonia. Vegetation seems to follow well its usual progress of development throughout March and April as the rate of growth as well as the level of cover with green vegetation appear normal, according to FVC index.

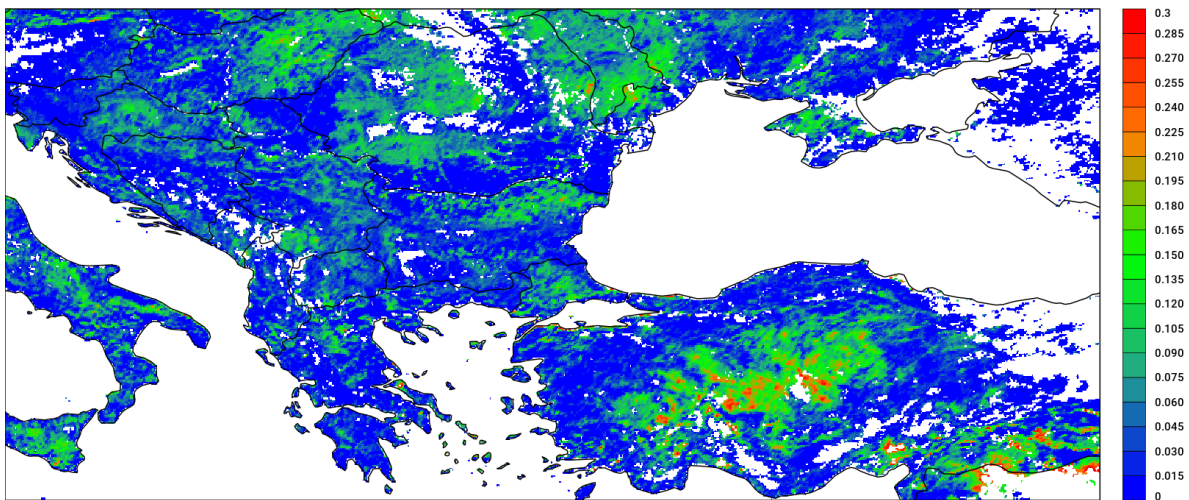
**GREECE**



In Larisa, central Greece vegetation season continued well in March and April with FVC values following its average line more or less well, although its level of development was in March was much higher last year. The peak cover with green vegetation appears to be exceeded at the end of April, indicating vegetation season could last a little longer than normally before the senescence phase would begin. Vegetation development in Kalamata, southern Greece appear to be very good, even better than last year as FVC values for early March indicate more than 20 % higher than normal cover with green vegetation, which even in its senescence phase throughout April remained some 15 % higher than usual.

Figure below shows negative anomaly of **accumulated 30-day FVC values** as recorded on **30 April 2022** in comparison to the past 18 years (2004-2021), and is used experimentally.

Monthly FVC Anomaly ( 30 Apr 2022 )



Monthly accumulations of FVC values indicate vegetation growth was lagging begin or not reaching its usual values across most part of eastern Hungary, as well as across central and eastern Balkan Peninsula, up to 15 %. Even higher deficit from its usual level of cover with green vegetation can be observed in central and central-western Turkey where FVC values stood 20-30 % lower than usual for end of April, indicating considerable lower than normal cover with green vegetation for this time of year.

## DROUGHT IMPACT REPORTS

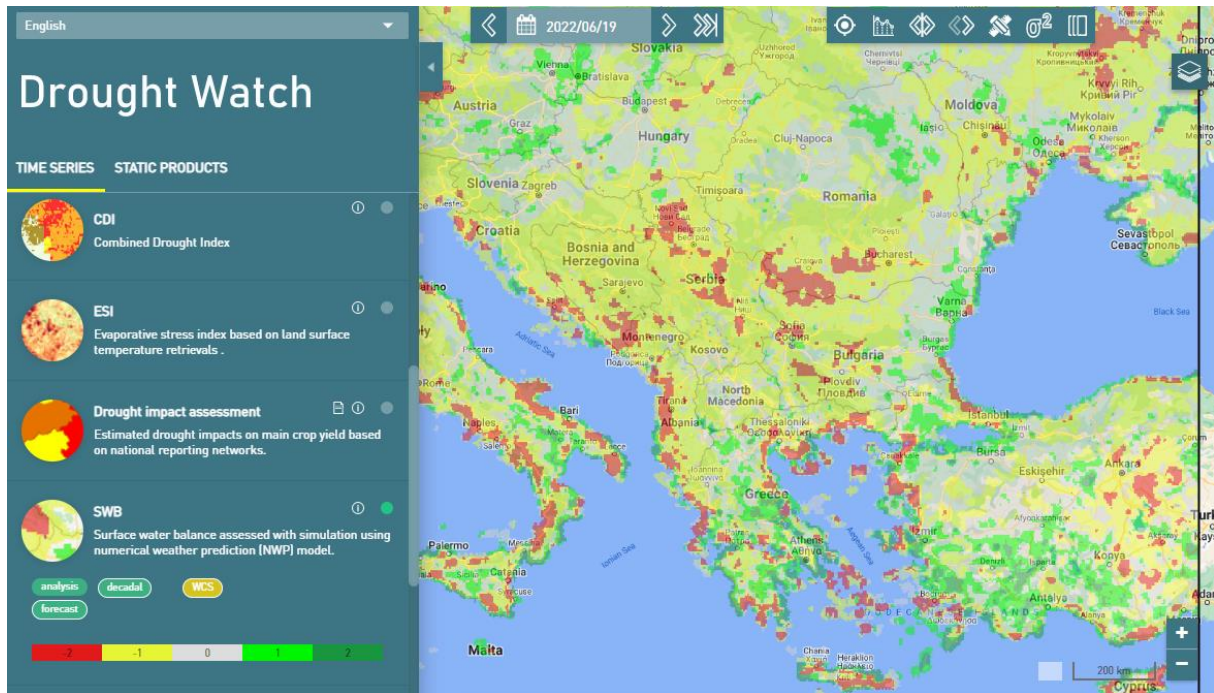
### HUNGARY

The aquatic life was increasingly threatened by prolonged drought in Hungary. Low water levels across the country were observed already back in June 2021 but autumn and winter offered poor to no recharge of water levels. After a dry spring also, most of the lakes and rivers across the country were less than 50 % full, with warm season still ahead. According to the National Water Directorate (OVF), water level of the lake Velence was at 99 centimeters at the end of April, about the same level at which last summer's period of mass fish death occurred, and with summer evaporation not yet begun<sup>[1]</sup>.

[1] <https://index.hu/belfold/2022/04/25/az-aszaly-veszelyeztetit-tavaink-elovilagat/>

## OUTLOOK

Figure below presents model simulations of the **60-day accumulated surface water balance anomaly** in historical percentile classes for the time period **from 21 April to 19 June 2022**, as seen in Drought Watch tool<sup>1</sup>.



<sup>1</sup> <https://www.droughtwatch.eu/>

Wider central and western Balkan Peninsula is expected to continue drier than normal accumulated surface water balance, in localized areas mainly across southern Romania, over Serbia and along the southern Adriatic Sea to a level of extreme anomalies from the normal for this time of year. Also a wider bordering area between Hungary and Romania, also southern Moldova, along the northern Adriatic Sea and in central and northern Turkey, accumulated surface water balance for the upcoming days indicate a period of deficit in comparison to its usual levels. On the other hand, surface water balance in localized areas in the north-west of the region, in northeastern Romania and along the western coast of the Black Sea is expected to be above-average for this time of year, while in the several localized areas over southern Greece and southwestern Turkey, the expected surplus of accumulated surface water balance will rank among the wettest for this time of year.

### Methodology

DMCSEE Drought monitoring bulletin is based on numerical weather prediction (NWP) model simulations over SE Europe, SPI index calculations, remote sensing and public media drought impact reports. Precipitation data is provided by Global Precipitation Climatology Centre (GPCC; <https://www.dwd.de/EN/ourservices/gpcc/gpcc.html>). NWP simulations are performed with Non-hydrostatic Mesoscale Model at ~7 km spatial resolution (NMM; <http://www.dtcenter.org/wrf-nmm/users/>). Historical DMCSEE model climatology is computed with NMM for time period between 1 January 1991 and 31 December 2020. European Centre for Medium Range Weather Forecast (ECMWF) ERA5 dataset (<http://www.ecmwf.int/en/forecasts/datasets/reanalyses-datasets/era5>) is used as input for simulations. Long-term averages (1991-2020), used for comparison of current weather conditions, are obtained from simulated dataset. Comparison of current values with long-term averages provides a signal on potentially ongoing drought. Remote-sensing product in the bulletin is based on the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT) Land SAF MSG Daily Fraction of Vegetation Cover product (<https://landsaf.ipma.pt/en/products/vegetation/fvc/>), presented for the checked and confirmed locations and using long-term averages from 2004 to the last full year (currently to 2021). Information on drought impacts are obtained from only freely available online reports of national authorities and media newspapers.