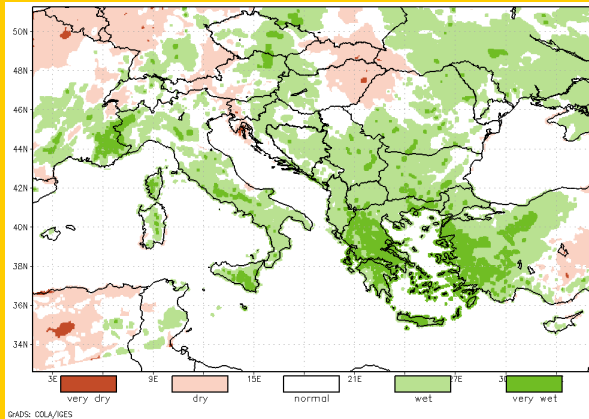


# DROUGHT MONITORING BULLETIN

August 2022

## HOT SPOT

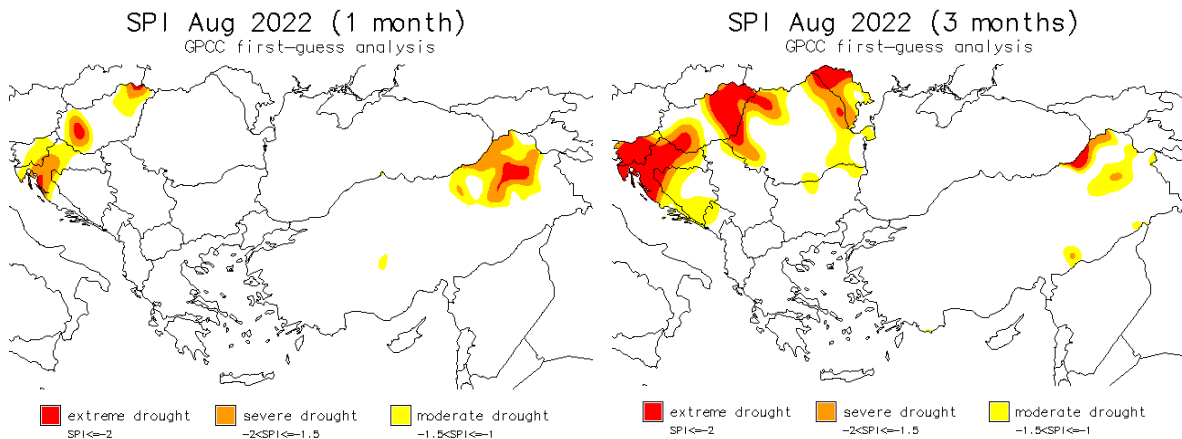


While most of the region experienced higher than normal precipitation amount this August, it was very dry across the northern belt and over vast part of eastern Turkey, as indicated by the figure on the left. It shows **precipitation percentiles for August 2022** on the base of 1991-2020 period. Along with poor precipitation amount received, central Turkey and Hungary-Romania bordering area experienced warmer than normal air temperatures, altogether aggravating surface water balance conditions.

## STANDARDIZED PRECIPITATION INDEX

*Drought situation with regard to the precipitation level is presented by Standardized Precipitation Index (SPI). The SPI calculation is based on the distribution of precipitation over long time periods (at least 30 years) and can be calculated at various time scales that reflect the impact of 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.*

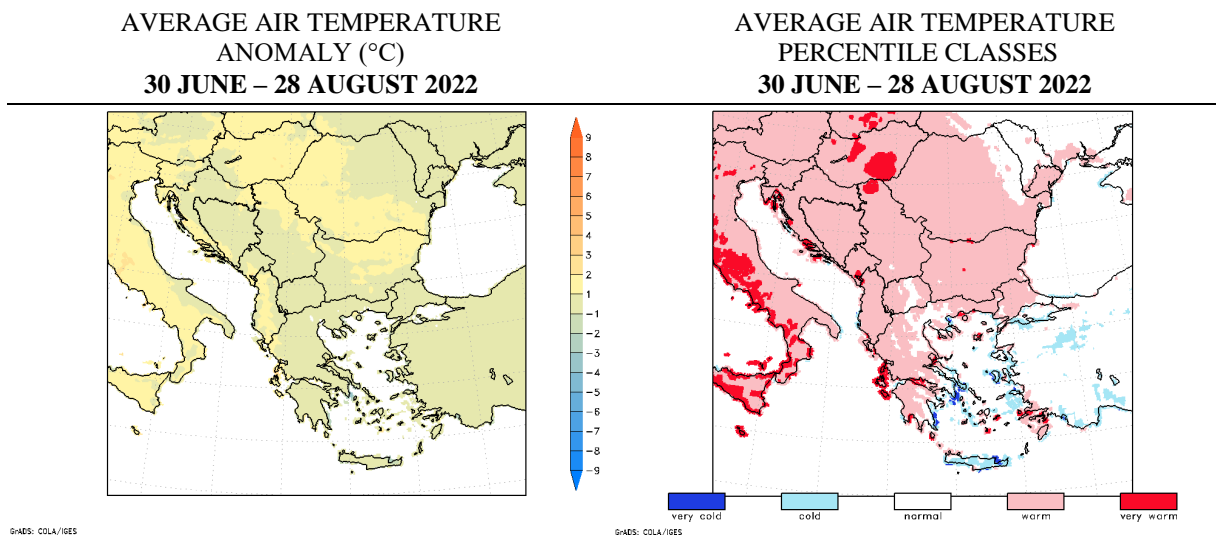
Standardized precipitation index for **August 2022** is shown in figures below. SPI for a one-month period indicates possible drought conditions which can have impact on vegetation, while SPI for a three-month period can be indicative also for surface water status.



Precipitation level in August was across most of the region either within the long-term normal or heavily increased, except in Hungary and Croatia as well as far northeastern Turkey where considerable lack of rain was present, indicating moderate to severe drought conditions, in localized areas even extreme drought. A longer, 3-month overview of precipitation conditions stretching over the summer months shows vast part of the northern Balkan Peninsula had been experiencing prolonged lack of rain, creating extreme drought conditions. They came mostly on the account of extremely dry June and severe to extreme July. Also over northeastern Turkey, accumulated precipitations over the last 3 months indicate moderate to severe drought as a result of severely to extremely dry July and August.

## AIR TEMPERATURE AND SURFACE WATER BALANCE

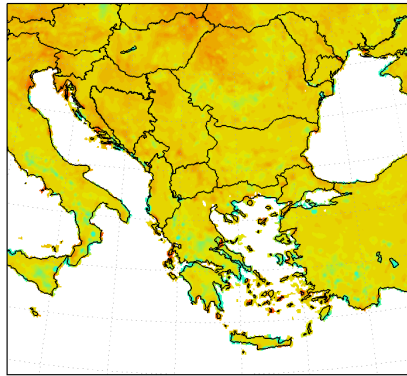
*Figures in this section present anomalies of the average air temperature and accumulated surface water balance as well as their classified values in percentile classes for a 60-day period from 30 June to 28 August 2022.*



In first two dekads of August, only scattered, localised areas experienced up to 2 °C warmer air temperatures, in southern Turkey up to 3 °C, while most of the region felt normal air temperatures for this time of year. In the last 10 days of the month, however, much warmer than normal air temperatures came into the region from the north-east, spreading across the entire northeastern half of Balkan Peninsula as well as central and eastern Turkey. In those parts of the region, average air temperatures at that time exceeded the normal for 3 °C, in northern Romania and northern Turkey up to 4 °C. Meanwhile, air temperatures remained about-average across the rest of the region, including western Turkey and southwestern half of Balkan Peninsula from Slovenia across Serbia to eastern Greece. Southwestern coast of Turkey felt even colder than normal air temperatures, up to 2 °C below the average.

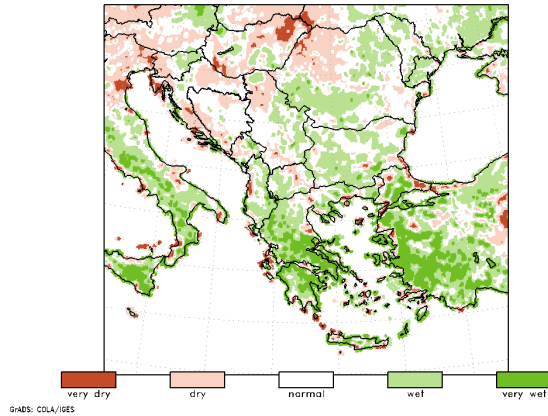
Air temperature averaged over a 60-day period covering July and August shows warmer than normal weather conditions across the entire Balkan Peninsula with the exception of Moldova and eastern Romania, and below-average air temperature conditions over the Aegean Sea area and scattered parts across western Turkey. Anomalies stretched up to 2 °C above the average, mostly over the belt from Hungary across Serbia and western Romania to northern Bulgaria, western Slovenia and along the Adriatic Sea, especially over coastal Croatia and Albania.

ACCUMULATED WATER BALANCE  
ANOMALY (mm)  
30 JUNE – 28 AUGUST 2022



©ADS: COLA/IGES

ACCUMULATED WATER BALANCE  
PERCENTILE CLASSES  
30 JUNE – 28 AUGUST 2022



©ADS: COLA/IGES

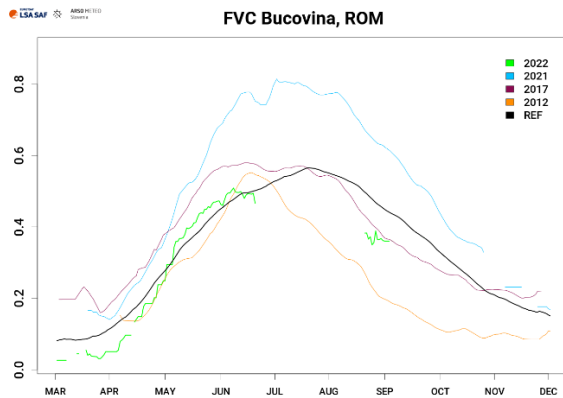
In the 60-day window covering mostly July and August, a vast part of northern half of Balkan Peninsula recorded noticeable deficit in surface water balance. Dry and warm weather conditions resulted in a 60-day surface water balance deficit of up to 120 mm across a greater part of the region's north, encircled by Slovenia, Croatia, northern Serbia and northwestern Romania, in northeastern Hungary between 150 and 210 mm. Several scattered areas across most of the other countries in northern and central belt of Balkan Peninsula and Turkey also experienced dry weather conditions resulting in below-average surface water balance, although the recorded 60-day deficit mostly reached up to 60 mm, locally up to 90 mm. Mostly across in southern parts of the region but locally in its central part, surface water balance over the last 60 days indicate a period with unusually high precipitation amount, resulting in surface water balance surplus of between 60-120 mm over southwestern Turkey, western and central Romania and southern Bulgaria, and up to 180 mm over central and southern Greece, locally even more.

## 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 the sort of vegetation at the given location.*

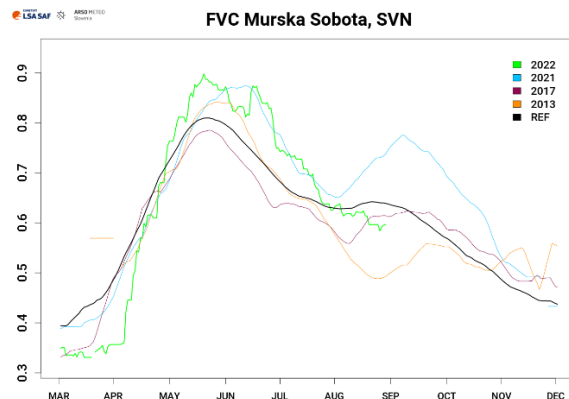
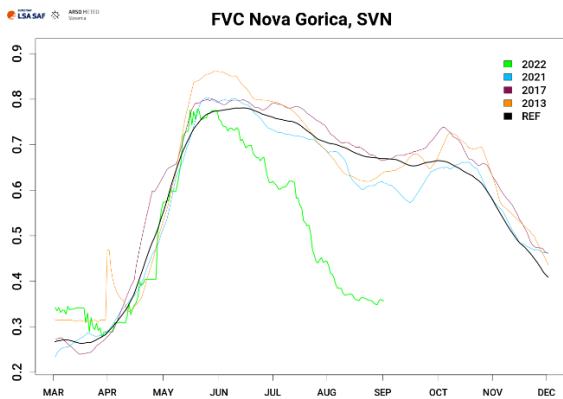
Graphs below present the **vegetation situation** as recorded on **31 August 2022** at selected locations across Southeastern Europe. FVC values for year 2022 are presented as a green line. Graphs also include reference line (2004–2021) in black, and lines in light blue (year 2021), magenta (year 2017) and orange (year 2012, or 2013 for Slovenia) for comparison. Possible missing values or their sharp decline could be a result of a prolonged cloudy weather, extreme weather events, snow blanket or changes to product by product provider.

## ROMANIA



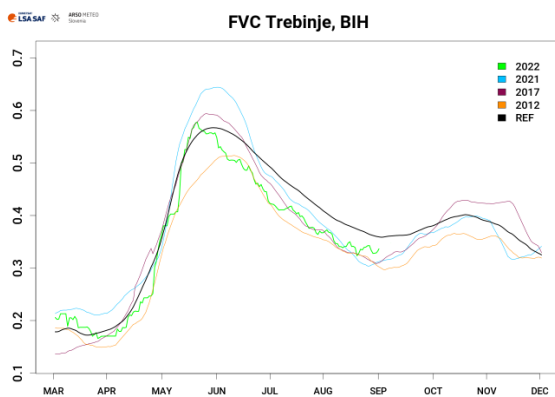
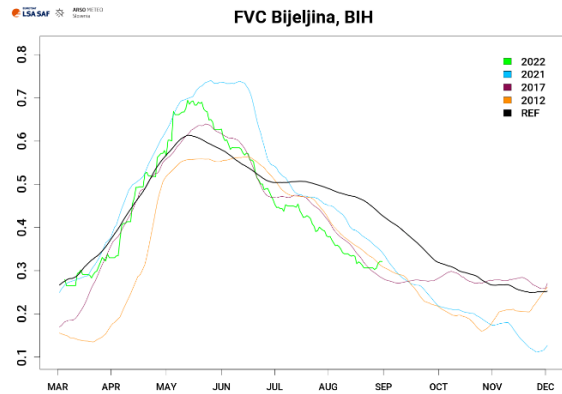
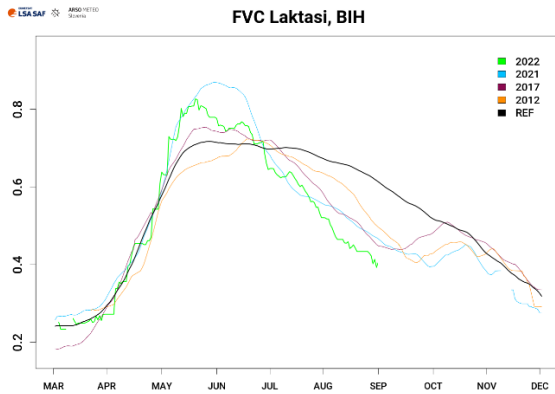
Vegetation season began well in Bucovina, norther Romania and progressed as expected in first months of the season. With June, before reaching its peak level of development, came unfavourable weather conditions that halted further development of the vegetation. Despite missing values from mid-June to mid-August, FVC values of late August indicate underaverage fraction of vegetation cover throughout summer months, up to 15 % lower, through slow but gradual decline in throughout July and August.

## SLOVENIA



In Nova Gorica, western Slovenia, vegetation followed its regular course of development in first two months of vegetation season. With unfavourable weather conditions at the end of spring, vegetation development began its drastic decline by June and vegetation cover continued to drop throughout all summer months, coming to an end only by the end of August. Since early June, fraction of vegetation cover dropped by 40 % and at the end of August stood about 30 % below its usual fraction of cover. Also in Murska Sobota, northeastern Slovenia, vegetation development progressed well in spring months, although according to FVC it seemed to began later than normal. In contrary to weather conditions in western part of the country, vegetation in Murska Sobota continued its development even beyond its usual peak values, and with vegetation cover remaining above-average from May to mid-July. Summer weather conditions brought above-average vegetation growth to an end by early August, which also dropped slightly below the normal throughout August.

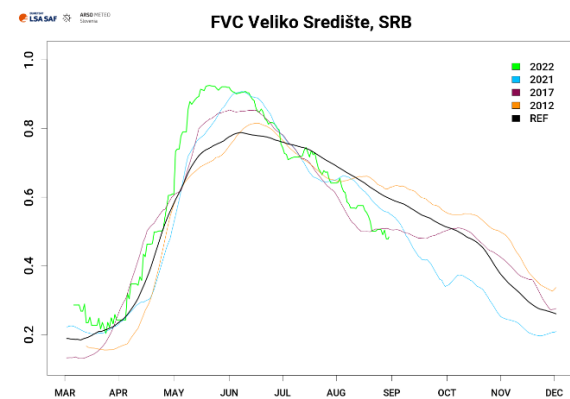
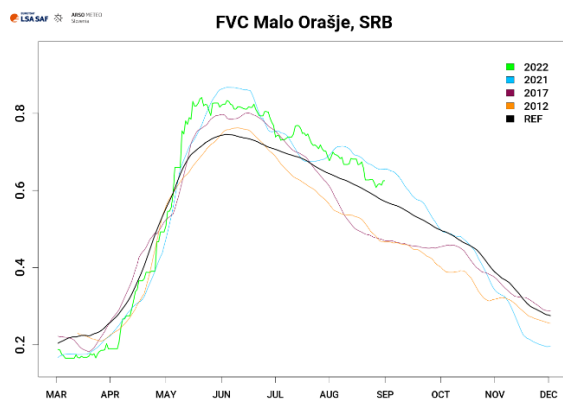
**BOSNIA AND HERZEGOVINA (REPUBLIC OF SRPSKA)**



Based on FVC values for this year, similar pattern of vegetation development this year can be observed for vegetation in Laktasi and Bijeljina along the northern border of Bosnia and Herzegovina. After a regular vegetation growth throughout April and even exceeded its peak level of cover for about 10 % by the end of spring, summer weather conditions changed the direction as vegetation senescence progressed at the continuous higher-than-normal rate from mid-May onwards. Fraction of vegetation cover dropped below the average before the end of June and continued to decline throughout summer months. At the end of August, FVC values stood about 20 % below the normal for Laktasi and up to 15 % lower for Bijeljina. In Trebinje, southern Bosnia and Herzegovina, vegetation development also followed its regular growth throughout spring, while the decline following unfavourable weather conditions in summer months resulted in constant below-average vegetation cover throughout all summer months, similar as in year 2012.

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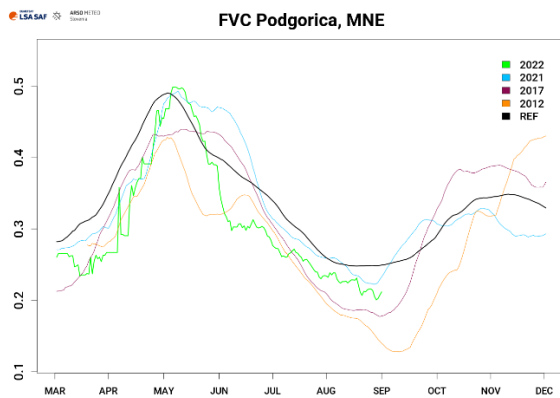
**SERBIA**



At both locations in Serbia, the growing part of vegetation season progressed more or less as expected and development seemed to progress well even into the peak period, exceeding the average peak coverage by 10-15 % by the end of the spring. Throughout summer months,

however, vegetation development went on different ways for the two locations: in Veliko Srediste, northeastern Serbia, unfavourable weather conditions sped up vegetation senescence as FVC values dropped at the much higher rate than normal for this time of year, similar as in 2017, and with vegetation cover dropping from above-average 90 % to below-average 50 % throughout summer months. In Malo Orasje in central Serbia, on the other hand, summer weather conditions do not appear to leave much impact on the rate of vegetation senescence, as it continued at the regular rate and thus kept fraction of vegetation cover about 10 % above the reference line throughout summer months.

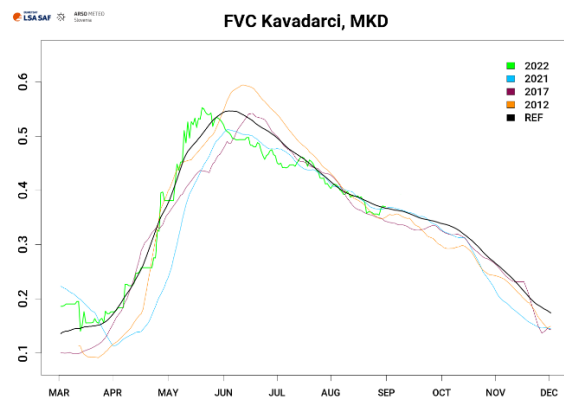
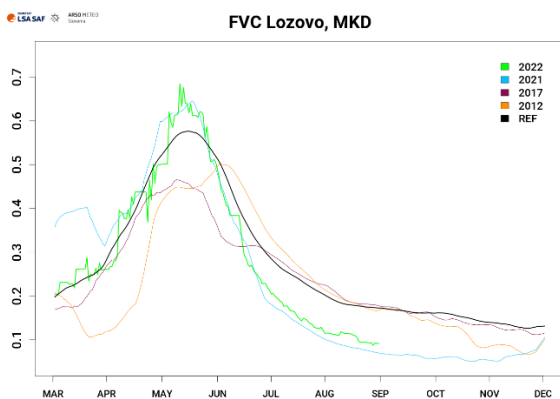
## MONTENEGRO



Although vegetation season in Podgorica, southern Montenegro began slightly later than normal, its development in spring months progressed well and reached its peak values by its usual time in early May. Weather conditions that followed in second part of vegetation season sped up the senescence phase also in this part of the region, with the rate of decline most evident right after the peak of the season when vegetation cover dropped from average 50 % to 30 % by the end of May. The decline that continued throughout

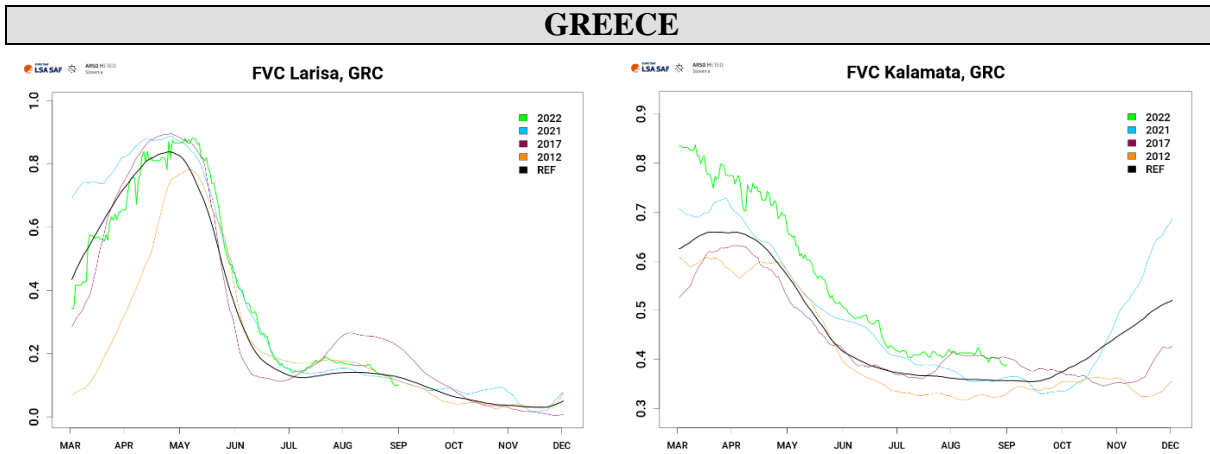
summer months kept the level of vegetation cover below the average, dropping to a fraction of cover of 20 % by the end of August.

## NORTH MACEDONIA



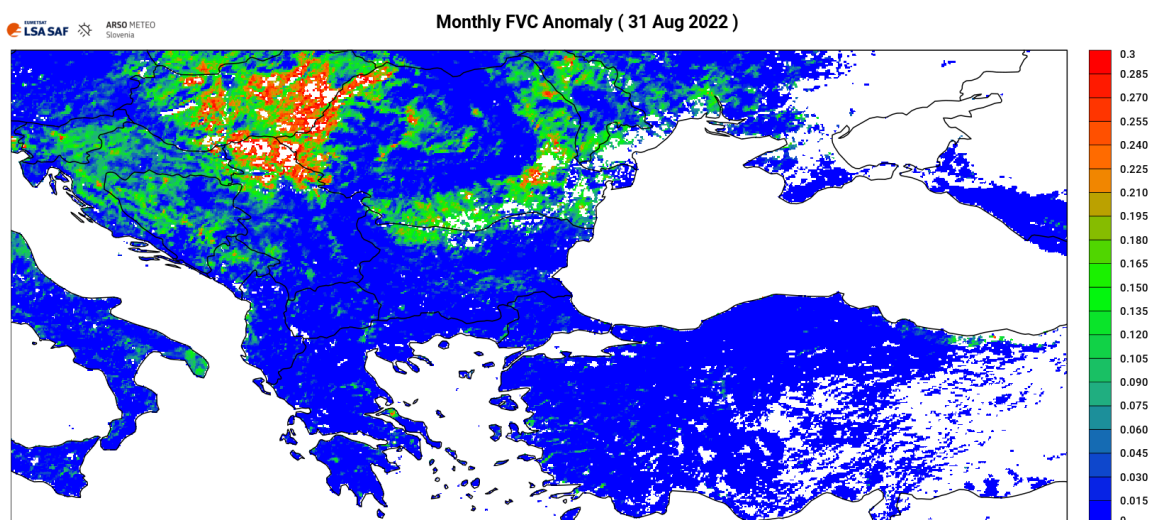
Vegetation development in Lozovo, central North Macedonia followed well its regular growing pattern this spring up until its peak time in mid-May and even exceeded its peak coverage by about 10 %. Summer weather conditions proved unfavourable for vegetation development in second part of its growing season, resulting in a decline in vegetation cover more rapid than normal. The sped-up senescence phase kept fraction of vegetation cover below the normal throughout all summer months, similar as in the previous year and resulted in only half of the normal August cover by the end of summer. Vegetation in Kavadarci in southern part of North Macedonia did not seem to be affected by weather conditions as much. After a regular spring development, hindered development can be observed at the end of May and decline in fraction

of cover up until mid-July, resulting in vegetation development not reaching its usual peak cover but entering senescence phase earlier. By the end of July, fraction of vegetation cover caught up on its regular level for that time of year and continued as usual throughout August.



According to FVC levels for this year, vegetation in Larisa, central Greece as well as in Kalamata, southern Greece did not appear to experience evident periods of drought stress. Ever since spring, fraction of vegetation cover remained continuously above-average in Kalamata, 10-20 % above the average at its peak time in spring months and up to 10 % throughout the rest of the months. Although the higher-than-normal vegetation cover is not exceeding the average for much, it still indicated favourable development conditions at the end of August. In Larisa, the growing part of the vegetation season followed more or less well its usual pattern with little deviations from the normal. Peak cover was reached slightly later but also slightly exceeded, followed by a regular rate of decline in vegetation cover which also began 1-2 weeks later than normal. Only by late August did fraction of vegetation cover fall below the reference line, although the deviation from the normal is minimal.

Figure below shows negative anomaly of **accumulated 30-day FVC values** as recorded on **31 August 2022** in comparison to the past 18 years (2004-2021), and is used experimentally.



At the end of August, fraction of vegetation cover was over a vast part of Balkan Peninsula noticeably below the average for this time of year. According FVC, with the exception of the Carpathians and southeastern Serbia, vegetation cover appeared to be reduced by up to 15 % across nearly all of the northern half of Balkan Peninsula, with even greater deficit of up to 30 % from the usual, locally more, across Pannonian Basin, including most of Hungary, northern Serbia and northwestern Romania, as well as in smaller size over eastern Romania. Some small, localised areas scattered across the Dinaric Alps also show evident deviation from the normal although the reason for reduced vegetation cover is likely other than drought. Across southern half of Balkan Peninsula and most of Turkey, level of vegetation cover were close to normal for this time of year, according to FVC, or only scattered, localised areas recorded deficit in vegetation cover, mostly below 10 %.

## DROUGHT IMPACT REPORTS

### HUNGARY

Drought damage has already been reported on more than 550,000 ha in Hungary. With agriculture works not yet completed, a significant number of additional drought reports are expected <sup>[1]</sup>. Drought caused several problems to livestock keepers. The pastures that burnt due to drought, and a decreased yield of mass and grain fodder forced producers to use purchased fodder and from further afield, altogether resulting in a drastic cost increase <sup>[2]</sup>. This year's drought did not affect only the crops that had already been harvested or were yet to be so, but it is likely to affect also autumn crops. The soil was reported so dry that it might be difficult to sow the autumn seeds properly and thus ensure ecologically significant secondary planting <sup>[3, 4]</sup>.

Fish population also suffered from the lack of rain. Several places went for months without noticeable amount of rain, and evaporation due to the scorching heat rapidly dried up the lakes, altogether making water ecosystem hostile to their population and threatening spawning grounds <sup>[5]</sup>.

[1] <https://www.agroinform.hu/szantofold/egyzetetes-az-aszalyhelyzet-okozta-karokrol-57980-001>

[2] <https://www.napi.hu/magyar-gazdasag/agrarmiszterium-allattenyeszto-aszalykar-tamogatas-takarmany.758234.html>

[3] [https://hirtv.hu/ahirtvhirei/az-aszaly-az-oszi-vetesre-is-kihat-2552236?utm\\_source=feed&utm\\_medium=rss](https://hirtv.hu/ahirtvhirei/az-aszaly-az-oszi-vetesre-is-kihat-2552236?utm_source=feed&utm_medium=rss)

[4] <https://piacesprofit.hu/cikkek/gazdasag/az-aszaly-miatt-elmaradhatnak-a-masodvetesek.html>

[5] [https://hirtv.hu/ahirtvkehirei/a-halallomany-is-megszenvedi-a-vizhiany-ivohelyeket-is-veszelyleztet-az-aszaly-2552203?utm\\_source=feed&utm\\_medium=rss](https://hirtv.hu/ahirtvkehirei/a-halallomany-is-megszenvedi-a-vizhiany-ivohelyeket-is-veszelyleztet-az-aszaly-2552203?utm_source=feed&utm_medium=rss)

### SLOVENIA

In agriculture, most visible impacts of drought this year were cobless corn and burned meadows. In some places the corn did not develop ears at all, in others it completely dried up, even the meadows were completely burned in many places, the second mowing offered only a sample of harvest, and livestock grazing was in early August no longer possible at all. According to the estimates of the Chamber of Agriculture and Forestry, this year's corn yield would be 40-50 % lower, with other cereals the losses were expected to be around 40 %, and with pumpkins and potatoes between 30-50 %. There should be about 40 % less hops, too. In the production of vegetables and fruits, the most damage was caused by high temperatures in fruits that were burnt and forced to ripen, so it was estimated that the damage would be at least 40 %, in some areas even from 80-100 %. There was also a large loss on meadows, according



to estimates on average around 50 %, and in some places up to 90 %. Livestock farmers, in particular, were already experiencing big problems because of this and were already barely providing fodder for the animals, and a large shortage of corn fodder was expected <sup>[1, 2]</sup>. Drought and high temperatures took their toll also on peach orchards in Vipava, western Slovenia. Of the harvested ones, fruits were of good quality, although in in plantations without irrigation, the fruits were small, but the yield itself was expected to be 30-40 % lower, according to the Agriculture Advisory Service Nova Gorica. Olive orchards too suffered from drought stress this summer <sup>[3, 4]</sup>. There were reports of drought affecting vineyards too. According to Vinakoper winery, southwestern Slovenia the berries were smaller across all vineyards, especially the exposed areas, and the quantities would certainly be smaller than average <sup>[5]</sup>. According to the Chamber of Agriculture, Forestry and Food Slovenia, the worst affected were livestock farmers, who have a large shortage of animal feed. According to their assessment, the damage already exceeded the damage caused by drought in 2017 when natural disaster was declared <sup>[6]</sup>.

There has never been such a bad and long-lasting hydrological drought in the last 17 years, according to the operators of hydropower plants on the lower Sava River, eastern Slovenia. Also nuclear power plant depend on water conditions of Sava river, which due to low Sava River water level and thus high water temperature had to activate reserve cooling <sup>[7]</sup>.

The prolonged drought, which has caused very low water levels in rivers and tributaries, also had a strong impact on fishing tourism and other activities on the rivers. Some fishing families had to completely band fishing for the first time ever, including Alpine and other mountainous regions. The ban on water activities on Savinja River, northern Slovenia was a severe blow to tourism in that region. The suspension of fishing occurred also in several rivers and its tributaries in the Alpine north-west, in some places on Soča, Sava Bohinjka and Mostnica, to ensure the preservation of the fish stock. Also several intervention catches of fish had to be carried out <sup>[8, 9]</sup>.

This year's drought also affects river tourism in the area of the Julian Alps, northwestern Slovenia. Due to the low water level, adjustments were necessary in a form of limitations or bans. Despite the higher costs and organizational problems, only up to six people are placed in the rafts instead of eight, and even this is a question of how long rafting will still be feasible due to the drought. The operators of the gorge were also thinking about temporarily stopping their activities <sup>[9]</sup>.

[1] <https://www.vecer.com/slovenija/koruzna-brez-klasov-in-pozgani-travniki-posledice-suse-so-vidne-na-vsakem-koraku-10292403>

[2] <https://www.rtvsllo.si/okolje/kmetijstvo/koruze-in-travinja-bo-polovico-manj-suse-pa-se-ni-konec/636066>

[3] <https://novice.svet24.si/clanek/novice/slovenija/62fce7a58fb26/kjer-ni-namakanja-bo-pridelek-za-30-do-40-odstotkov-manj>

[4] <https://www.rtvsllo.si/radio-koper/prispevki/pod-kraskim-robom-zgorelo-vec-hektarjev-oljk/637243>

[5] <https://www.rtvsllo.si/lokalne-novice/primorje/v-slovenski-istri-zacenjajo-s-trganjem-grozdja-susa-ima-vpliv-tudi-na-kakovost-vina/637308>

[6] <https://n1info.si/novice/slovenija/v-sloveniji-velika-skoda-zaradi-suse-zbornica-za-razglasitev-naravne-nesrece/>

[7] <https://www.dnevnik.si/1042994198/posel/novice/nuklearna-na-rezervnem-hlajenju>

[8] <https://www.delo.si/novice/okolje/ribolov-zaradi-hude-suse-ponekod-prvic-povsem-prepovedan/>

[9] <https://krog.sta.si/3071434/susa-terja-tudi-prilagoditve-turisticne-ponudbe-juljskih-alp>

## CROATIA

The expected decrease in yields of all crops was observed in August. The drought affected all parts of the country and adversely affected agricultural production. The damage from the drought in Medjimurje was 100 % on certain field crops, while the yields in orchards were on average about 30 % lower. In general, due to the drought, harvests will start earlier this season

in both orchards and vineyards. Due to the drought, the fruits were smaller. A prolonged dry period and high temperatures in continental vineyards reduced the grape harvest. But due to the lack of moisture, there were no diseases, and the malt was already very high. The grapes were of high quality and supremely sweet, but the yield is altogether expected to be reduced.

The eastern part of Croatia experienced extremely high temperatures. The rain that fell in the past few days did not manage to save the crops of the most important agricultural crops - soybeans, sunflowers and corn. Yields of sunflowers and soybeans were already halved. The only exception to this were fields under irrigation. Although the rain brought some greenery back to the soybean fields, it came too late for oilseed. Soybean yield suffered by more than 50 % as the grain was small and of poor quality. Sunflower yield was expected to be reduced by about 30 %, and of soybeans by about 50 % compared to the previous year.

The consequences of the drought are also visible on the islands, especially at the central Dalmatian ones, where it had not rained in months. Many islanders harvest blackberry fruits in August, but this year the blackberries dried up before ripening. The grass on most island meadows was completely dry. The olive crop failed in the absence of water. In addition to the lack of precipitation, a long-term period of high daytime and nighttime air temperatures, and especially an unusually long period with a storm that favors the drying of springs, puddles, and ponds on the island, was a big problem.

Extracted from:

[https://meteo.hr/klima.php?section=klima\\_pracenje&param=spi&el=prspi](https://meteo.hr/klima.php?section=klima_pracenje&param=spi&el=prspi)

[https://meteo.hr/klima.php?section=klima\\_pracenje&param=ocjena](https://meteo.hr/klima.php?section=klima_pracenje&param=ocjena)

[https://meteo.hr/proizvodi.php?section=publikacije&param=publikacije\\_publicacije\\_dhmz&el=bilteni](https://meteo.hr/proizvodi.php?section=publikacije&param=publikacije_publicacije_dhmz&el=bilteni) (preliminary report; publication is in preparation)

[https://meteo.hr/klima.php?section=klima\\_pracenje&param=spi&el=karte\\_suse&Week=220908](https://meteo.hr/klima.php?section=klima_pracenje&param=spi&el=karte_suse&Week=220908)

## **SERBIA**

This year's drought left considerable impact in agriculture production in Serbia, great damage was observed especially on corn and soybean, to lesser degree sunflowers and vegetables. In Sumadija, central Serbia and Banat region, northeastern Serbia, the beginning of the corn growing season was followed by a drought, with almost no winter moisture supply, followed by an alternation of warm and cold periods, and extremely high temperatures were recorded in June and July. In Banat, approximately 70 % of corn plots was burnt and destroyed by drought and hot days. The total yield is not expected to exceed 5 mio tons, which would suffice only for domestic needs and have very little left for export <sup>[1, 2]</sup>. Drought was also the primary factor in price increase of practically all types of fresh vegetables, including potatoes <sup>[3]</sup>.

Dry winter and prolonged periods of dry weather throughout spring and summer reduced the plum crop by a third compared to last summer. In addition to poor quantity, also quality of fruits is reduced as during drought stress plum tree draws water from the fruit, even from the leaf. Remaining fruits would mostly be used for brandy, while as sold fresh will not meet good quality <sup>[4]</sup>. Vineyards were also reported of experiencing damage due to drought, especially in northern half of Serbia. In Slankamenac Vineyards in northern Serbia, this year's lack of moisture leave consequences to the fruit, which did not ripen as it should, and many fruits fell off the branch. Harvest is expected much earlier, already in early September, with reduced yields and lower quality. Decrease in yield is expected by as much as 50 % <sup>[5]</sup>. Banat region too reports of dramatic consequences of drought to their vineyards. The chronic lack of moisture and the drought that lasts for two months caused drying of leaves on the vine. Grapes have small, unassembled berries. The yield will be lower, and its quality is questionable <sup>[6, 7]</sup>.

High temperatures and prolonged drought led to a drastic drop in the water level of many rivers in Serbia. The situation in August was most critical on the rivers Sava and Danube, also important transport rivers through which the majority of grain exports and coal imports go. Ships departing from Bulgaria and Romania were going with a significantly reduced capacity, both in reduced traffic as well as in reduced capacity of individual vessel. Because of this, navigation and fishing were endangered <sup>[8, 9, 10]</sup>. The level of the Danube River fell to one of the lowest in almost a hundred years. On the water border with Romania where the Danube usually flows powerfully, the hulls of more than 20 German warships sunk in the Second World War were discovered near the Serbian river port town of Prahova. In Serbia, the banks of the Danube in August resembled long sandy beaches, while sandy banks were also found in the middle of the river. Drought was causing serious problems in electricity generation and river transport. River transport was enabled by deepening the river bottom. Lower reaches of the Danube presented serious troubles for supply of crude oil, diesel and other derivatives via river transport, due to a three-week suspension of navigation on the Danube in Bulgaria <sup>[11, 12, 13]</sup>. Significant drop in water level was observed also for Djedinja river, downstream and through the center of Uzice, western Serbia. The inflow of water from the Vruci lake, which serves for the city's water supply, but also from the tributary river Susica on Zatibor, was in August extremely weak. Djedinja's water level downstream was in August even below the biological minimum <sup>[14]</sup>.

Drought, due to which the watercourses were reduced, affected the reduction of electricity production. According to the EPS hydropower plants, the hydrological situation had not been worse in the last almost 100 years, due to which the hydropower plants on the Danube, Drina and Lim produced minimal amounts of electricity <sup>[15]</sup>. Altogether, the main 16 hydroelectric power plants in Serbia, which produce 38 % of total national electricity production, reduced their production by a third <sup>[16]</sup>. Hydrological situation on the rivers Lim and Uvac has been the worst in in the last ten years. According to the director of Lim hydroelectric plants, inflow to Lima was in August between 10-15 cubic meters per second, which is significantly less than the biological minimum released under the Potpec hydroelectric plant. This greatly affected the production of electricity, which, compared to the same period last year, was reduced by 35 %. Due to the drought, the water levels in reservoirs for hydropower plants in Serbia have further dropped <sup>[17, 18]</sup>. The Djerdap hydroelectric power plant, which provides about a fifth of Serbia's electricity, also operated at the biological minimum, as its water level was only once in last 100 years lower than this year <sup>[9, 19]</sup>.

Drought, tropical temperatures and lack of precipitation this summer "dispersed" mosquitoes from the Serbian capital. Professional teams of the Sector of Ecology and Environmental Improvement, monitoring mosquito larvae and adults reported that their monitoring results so far showed a very low number of adult mosquitoes in the traps compared to previous years. High air temperatures, a greater number of tropical days, and a small amount of precipitation had the greatest effect on reducing the number of these insects. In addition, the low water level of the Sava and Danube also played role in fewer mosquitoes, due to no flooding of the coastal part of the rivers where the larvae of river mosquitoes develop, which, as they emphasize, are the most common area of Belgrade <sup>[20]</sup>.

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- [12] <https://www.blic.rs/biznis/privreda-i-finansije/susa-pojela-dunav-kod-rumunije-izronili-brodovi-potopljeni-1944-sada-je-decija-igra/ljkbbds>
- [13] <https://www.kamatica.com/analiza/susa-ugrozava-plovne-puteve-dunavom-kojima-ide-glavnina-izvoza-zitarica-i-uvoza-uglja/67265>
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## ROMANIA

According to the Ministry of Agriculture, drought compromised the harvest on 10,000 ha and 25 counties already reported the damage by early August. Wheat yield was about a fifth lower than in 2021 due to high temperatures and prolonged drought that hit the crops. Taking the average domestic consumptions into account, it was expected to meet domestic needs, with some surplus still left for the export. Drought affected also corn and sunflower crops and forced some farmers into an earlier harvest. Due to reduced production, sunflower and olive oil was expected to be sold at higher prices <sup>[1, 2, 3]</sup>. It was reported that by August, three quarters of the territory of Romania, the largest European corn producer, was affected by various degrees of drought <sup>[4]</sup>. Of fruits, most affected was table grape production, which was halved this year due to drought <sup>[5]</sup>.

Even the truffles are no longer available because of the drought. The heat and drought this year made the truffles appear almost a month later in the forests. Some managed to harvest only a quarter to half of the amount obtained last year. On the contrary, the fact that they are few made them even dearer. Depending on the quality, they could cost triple <sup>[6]</sup>.

The restrictions on water consumption imposed due to the drought in several parts of the country pushed some Romanians to look for alternative solutions, dig wells in their yards <sup>[7]</sup>.

In Zimnicea, southern Romania, dozens of ships were blocked due to the low level of the Danube river. Only a narrow stream of water remained from the Danube and a huge stretch of sand appeared. Where the river flow was still present, the water was no deeper than 1.40 m, barely reached the chest. Heavy ships and cruise ships could no longer pass and were forced to remain waiting, while other boats let go of their cargo in order to become lighter and thus be able to move forward on the water <sup>[8]</sup>. A blocked Danube causes a domino effect in the logistics chain in Romania and beyond. These delays in logistics will be reflected in increased prices to the end consumers <sup>[9]</sup>.

As the flow rate of Danube river was decreasing, the problems due to drought were multiplying. Islands began forming, which further disrupted riverc. Some cruise ships were forced to disembark their tourists as the ships could no longer move forward. At the same time, energy production also decreased. Experts said hydro plants were producing only a third of last year. And at the Cernavoda nuclear power plant, due to the reduced water level, the first level of warning was also reached. At the entrance to the country, at Bazias, the Danube river flow was less than half of its usual one <sup>[10]</sup>.

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## MONTENEGRO

The most severe consequences of drought in Montenegro this year were reflected in forest fires, low levels of rivers and lakes, significantly reduced capacity of water sources (some even dried up), problems in water supply for population and livestock, and in reduced electricity production.

The long-term drought affected mostly livestock and farmers due to the lack of water, reduced yield of hay for livestock feeding and the increase of the price for animal feed. Based on the information of farmers in Niksic and Savnik, central Montenegro, the yield of hay was halved, compared to the average. For a year and a half there had not been enough rainfall. As last year was also unproductive, many livestock farmers announced that they will sell the livestock to reduce the costs of drought consequences (poor yields, increased price for hay). The crops were also affected by the drought. In the surroundings of Niksic, the yield of winter cereals was lower by about 30 % compared to the last year, and in some parts of Pljevlja, northern Montenegro, up to 60 %. The reason for the low yield was also related to the distribution of precipitation during July, i.e. a rainless days in the period when the cereals needed moisture the most. Agricultural plants with deeper root system (fruits and vines) were less affected than arable and vegetable crops. Their yields are expected to be satisfactory.

A major consequence of drought was very low water levels of rivers, natural and artificial lakes. These left multiple negative consequences to ecology, tourism and electricity production. Particularly low water level and rapid disappearance was observed for Biogradsko Lake on Bjelasica mountain in the National Park, eastern Montenegro. Very low water level were recorded in artificial lakes Krupac and Slano near Niksic and Piva near Pluzine. Many water sources significantly reduced capacity and some of them even dried up in August. That caused problems in water supply in some places, for the public but livestock too. Due to drying up of watering ponds in some pastures and katuns of Durmitor, northern Montenegro, livestock farmers were forced to move their herds to lower areas where water was available. At the end of July, several municipalities imposed restrictions in water supply (Berane, Niksic, Bar and Kotor).

The Electric Power Company of Montenegro has two hydropower plants in its system (HE “Piva” and HE “Perucica”), with more than 50 % of the produced energy coming from hydro potential. However, since significantly less water accumulated in the lakes (e.g. 60 % less for hydropower plant Piva), and the consumption of electricity during the touristic season is very high, approximately 294 GWh needed to be imported, which caused additional costs of approximately 100 million euros, as announced by Electric Power Company of Montenegro.



*Photo 1: Krupac Lake (artificial lake, for HE “Perucica”). Source: Branka Čvorović*



Photo 2: Crno Lake (natural Lake in National Park "Durmitor"). Source: Branka Čvorović

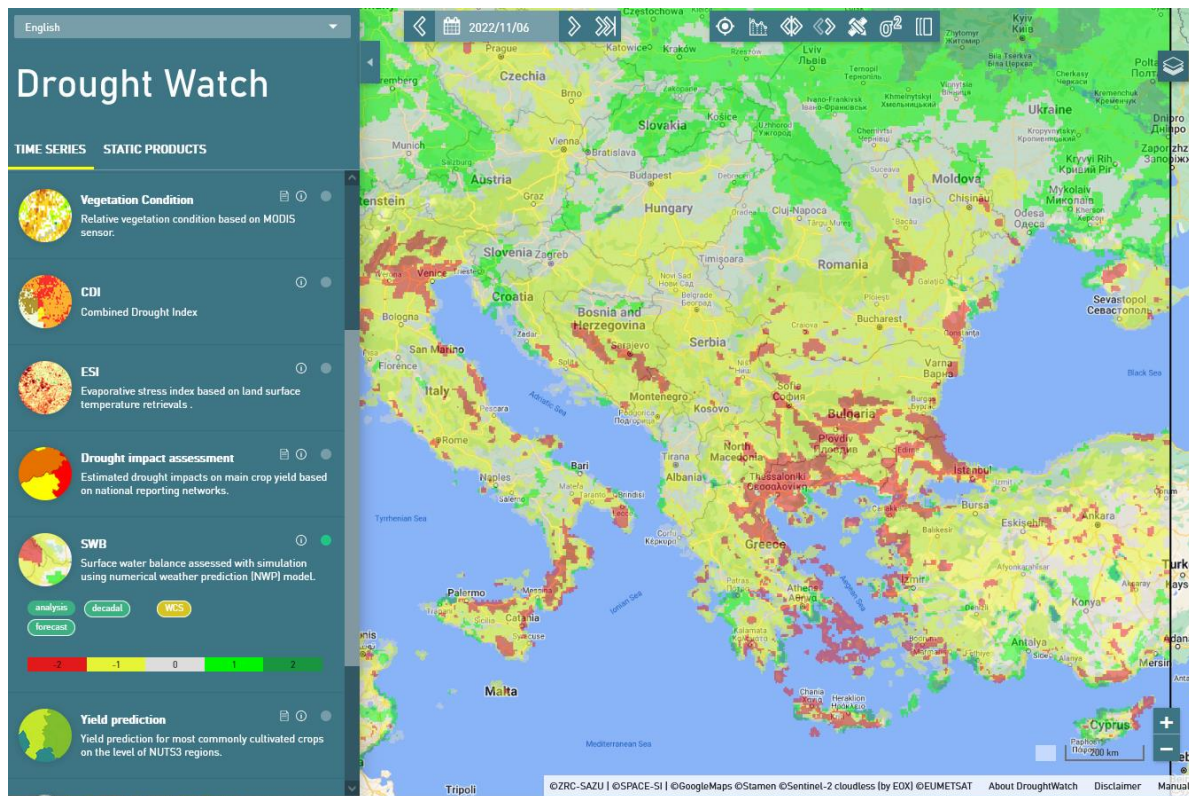
Many parts of the country experienced forest fires during July and August. Most severe fires and very difficult to cope with them were in the northwestern parts of the country (in the Municipality of Nikšić, Savnik, Zabljak and Pluzine) and in the coastal area (Boka Kotorska Bay and Municipality of Bar). Forest and low vegetation were burnt on very inaccessible terrain. Therefore helicopters and aviation of the police and the army of Montenegro took part in extinguishing them almost every day. Settlements and inhabitants were endangered too but greater material and environmental losses were avoided and human lives were protected. Roads and rail traffic was interrupted from Bar to Podgorica while 100 firefighters with 47 vehicles took part in extinguishing the fires as well as locals and volunteers. At the same time, several locations also in the Boka Kotorska Bay were affected by forest fires. Fires followed by strong winds and high temperatures developed above Morinje, Kamenar and Zalaza. The cause of forest fires in the hills above Kostanjica and Perast was lightning strike. The consequences from this summer's fires have not yet been estimated but they were multiple and large considering the forest fund, air pollution, losses in tourism and material costs for fire fighting.

Extracted from:

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## OUTLOOK

Figure below presents model simulations of the **60-day accumulated surface water balance anomaly** in historical percentile classes for the time period **from 8 September to 6 November 2022**, as seen in Drought Watch tool<sup>1</sup>.



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

According to the forecast 60-day surface water balance, much of the region will be under dry to even very dry conditions with the exception of northern belt stretching from coastal Croatia, over Slovenia and across only northern parts of Hungary, Romania and Moldova. Some localised areas which are expected to be under unusually wet conditions include parts of southern Greece and southwestern Turkey. Over much of the Aegean Sea area stretching over to Bulgaria, as well as scattered localised parts of North Macedonia, Bosnia and Herzegovina and southern Romania, the 60-day surface water balance is expected to be much reduced in comparison to its usual autumn values, indicating extremely low 60-day surface water balance for this time of year. Elsewhere across continental Balkan Peninsula, surface water balance is also expected to be unusually low, classifying among the driest 30 % of local records.

### 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>), shown against the averages of the 1961-1990 time period. 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 the 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.