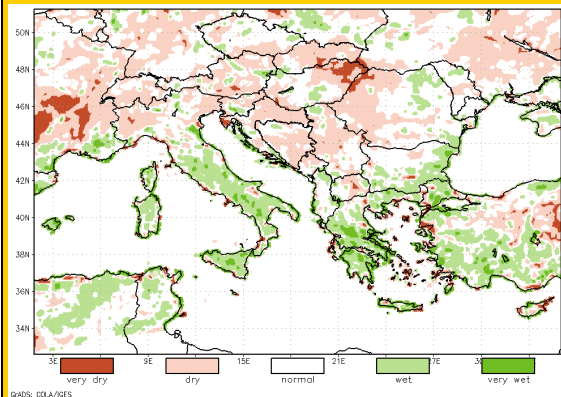


# DROUGHT MONITORING BULLETIN

August 2024

## HOT SPOT

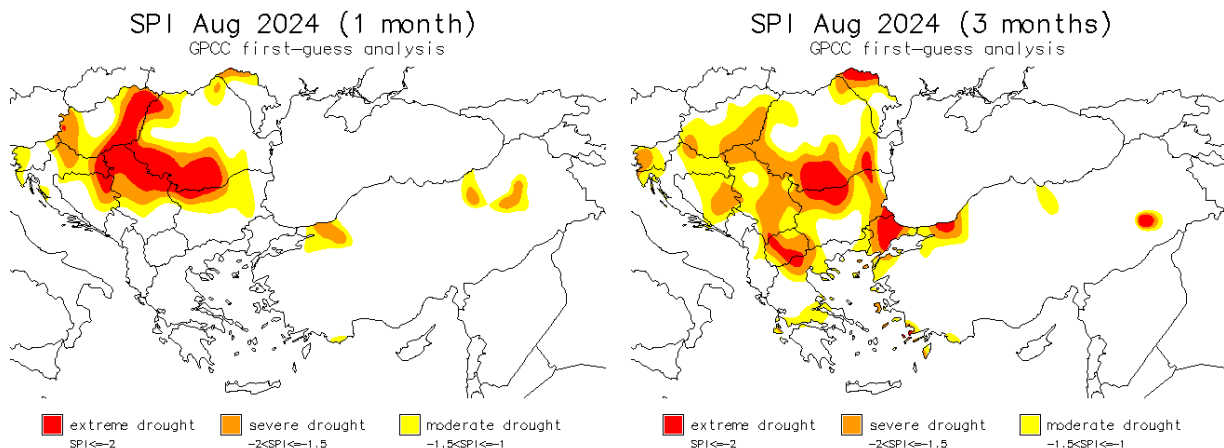


In addition to being hotter than normal over the region, especially across Balkan Peninsula where monthly average was exceeded by 2.5-4.5 °C, insufficient rainfall amount contributed to surface water balance deficit over northern half of the region, as shown by **surface water balance for August 2024 in percentile classes** based on 1991-2020 (figure, left). For central area between Bosnia and Herzegovina, southwestern Romania and North Macedonia, it was the 3<sup>rd</sup> consecutive month recording deficit, over northeastern Hungary it persisted since February, and much of the eastern areas last experienced surplus in April.

## STANDARDIZED PRECIPITATION INDEX

Drought situation with regard to 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 2024** 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.



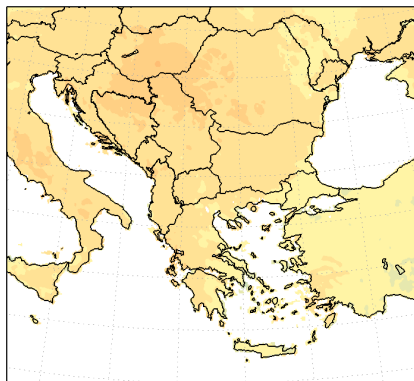
Lack of rain was this August most noticeable across wider central Balkan Peninsula and locally along its northern part and across localised areas in Turkey. Monthly rainfall deficit ranged between 50 and 100 mm, indicating severely to extremely dry conditions over this part of the region, especially over the Pannonian Basin lowlands, and to a lower degree also over parts of Slovenia, Bulgaria, Moldova and Turkey.

A 3-month overview covering June to August period reveals that due to considerable rainfall deficit most of Balkan Peninsula experienced some degree of drought conditions this summer. Anomalies were the greatest over northern Moldova and the lowlands in Danube river basin where rainfall amount was considerably underaverage throughout all three summer months, as well as locally in North Macedonia and also northwestern and southeastern Turkey where extreme anomalies mostly came as a result of extremely dry June, locally in Turkey also moderately dry August. In surrounding areas, especially across wider central part of Balkan Peninsula, the accumulated precipitation deficit indicated severely dry conditions this summer, mostly on the account of persisting moderate, sometimes severe lack of rain.

## AIR TEMPERATURE AND SURFACE WATER BALANCE

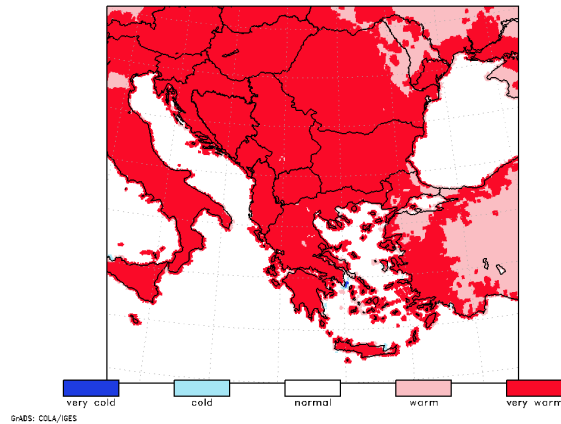
*Figures in this section show anomalies of the mean air temperature and accumulated surface water balance (precipitation reduced for evapotranspiration) as well as their absolute values in percentile classes for the given 60-day period.*

AVERAGE AIR TEMPERATURE  
ANOMALY (°C)  
30 JUNE – 28 AUGUST 2024



GHAS: COLA/IGES

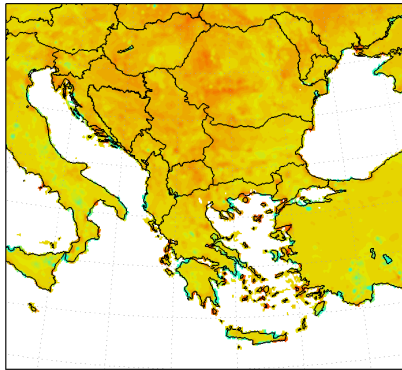
AVERAGE AIR TEMPERATURE  
PERCENTILE CLASSES  
30 JUNE – 28 AUGUST 2024



GHAS: COLA/IGES

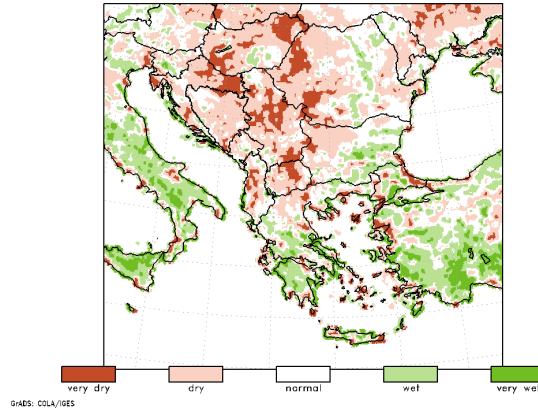
Over northern Adriatic Sea area and much of southern parts of the region, including Albania, Greece and western Turkey, air temperatures were consistently higher than normal throughout all month, while over the rest of Balkan Peninsula the period of unusual high air temperatures began after first dekad of the month with the coming of a heatwave. Mid-August proved especially warm across nearly the entire Balkan Peninsula with the exception of its eastern belt, as decadal mean air temperature was among the highest of local long-term records. The grip of the extreme heat slightly eased up in final days of the month across much of Balkan Peninsula while remaining warmer than normal, this time including central Turkey. However, well above-average air temperatures persisted into last days of August across Hungary, northern half of Serbia and western half of Romania, where August mean air temperature was thus 3.5–4.5 °C higher than usual. Across the rest of the Balkan Peninsula, August was at least 3 °C warmer than normal, in Turkey up to 2 °C.

ACCUMULATED WATER BALANCE  
ANOMALY (mm)  
30 JUNE – 28 AUGUST 2024



GH4DS: COLA/IGES

ACCUMULATED WATER BALANCE  
PERCENTILE CLASSES  
30 JUNE – 28 AUGUST 2024



GH4DS: COLA/IGES

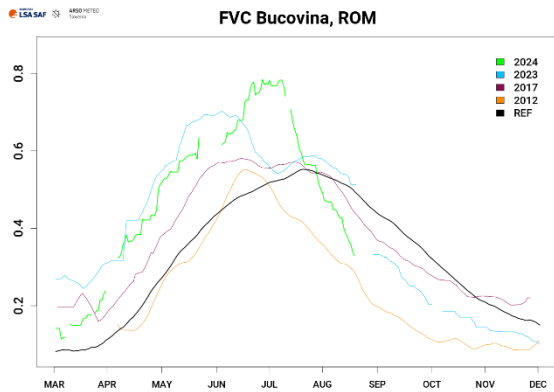
Considerable lack of rain in August over the central area and northern belt of Balkan Peninsula, along with increased evapotranspiration over the Pannonian Basin created noticeable surface water balance deficit this August across wider central part of Balkan Peninsula, while average or localised wet weather conditions this August kept much of Greece, Turkey, North Macedonia and coastal area of the Black Sea from experiencing noticeable surface water balance deficit this August. As surface water balance conditions were similar across the region also in July, the 60-day accumulations amounted to deficit of mostly 60–120 mm over most of Balkan Peninsula and the Aegean Sea area, but especially over Hungary, western half of Romania and southern Moldova where surface water balance deficit of 120–180 mm indicated very dry conditions. On the other hand, 60-day accumulations ranged mostly within the average values across southernmost areas of the region including southern continental Greece, southwestern Turkey and southeastern Bulgaria, where localised extreme precipitation contributed to locally unusually high surface water balance surplus of the July-August period.

## 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 in general low at the beginning of the growth season, the highest at full vegetation development, then FVC slowly drops with vegetation senescence. Line shape depends on the sort of vegetation at the given location.*

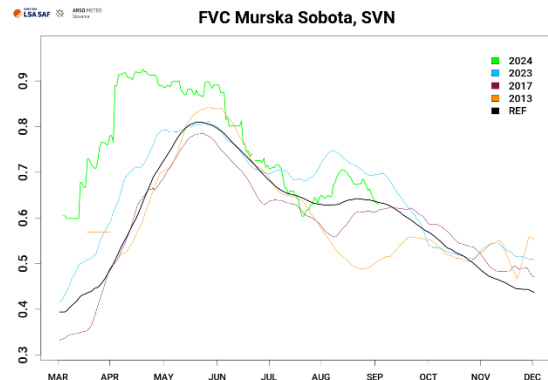
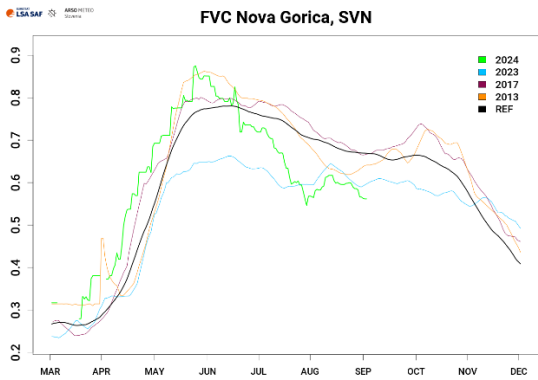
Graphs below present the **vegetation situation** as recorded on **2 September 2024** at selected locations across southeastern Europe. FVC values for year 2024 are presented in green line. Graphs also include reference line (2004–2023) in black, and lines in light blue (year 2023), magenta (year 2017) and orange (year 2012, or 2013 for Slovenia) for comparison. Missing values or their sharp decline can be linked to prolonged cloudy weather, extreme weather events, snow blanket, human intervention or changes to product by the product provider.

**ROMANIA**



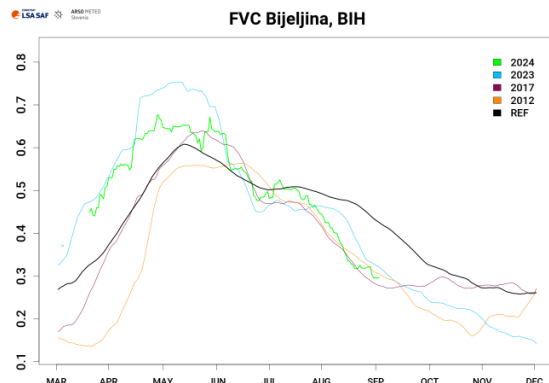
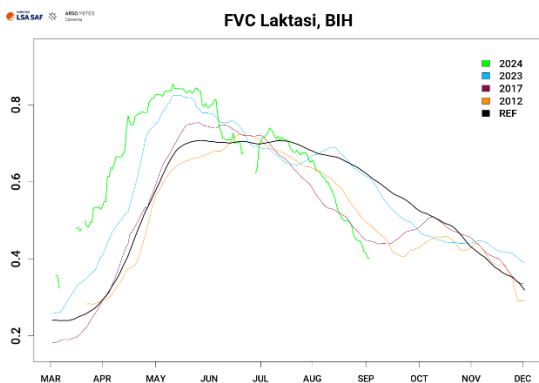
An earlier start of vegetation season in Bucovina, northern Romania and favourable conditions for growth throughout spring resulted in abundant extent of vegetation cover by early summer. Fraction of cover with green canopy was about 25 % greater than normal in early July, however, unfavourable weather conditions that followed sped up senescence phase and rapidly brought down total level of cover. It was level with the long-term average before the end of July, while persisting trend in the decline further shrank the fraction of cover, standing 20 % below the average in mid-August.

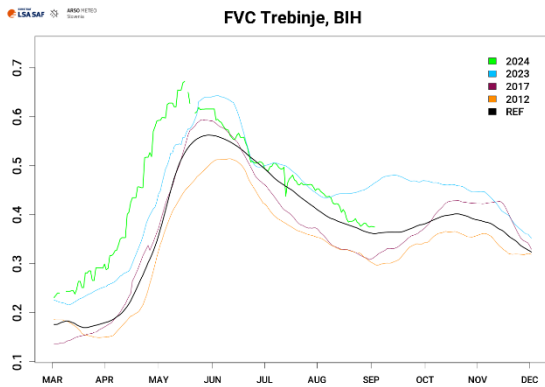
**SLOVENIA**



Vegetation season began about two weeks earlier in Nova Gorica, western Slovenia, with further growth progressing at the regular rate throughout spring. Slightly exceeded seasonal peak cover in early June has since then continuously declined at the rate faster than normal. It fell 20 % below the long-term average before the end of July, then only temporary increased again in early August although it remained 10–20 % below the average. In Murska Sobota, vegetation season began up to a month ahead of its regular time, with abundant development throughout the rest of spring. Peak cover lasted for nearly two months was followed by more or less average progression of the senescence phase, with slight but temporal boost in early August.

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

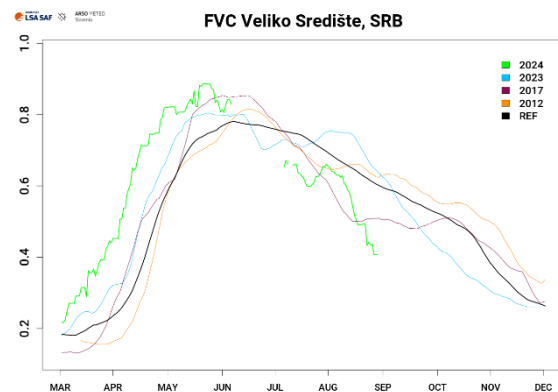
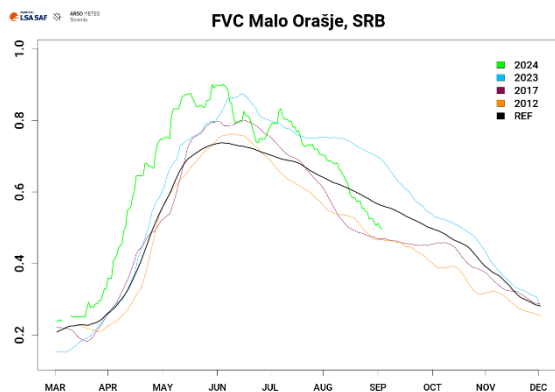




Abundant start to the vegetation season at all three locations in Bosnia and Herzegovina was followed by more or less regular progress of vegetation development throughout spring, as a result of which vegetation cover exceeded the average seasonal peak in mid-May by 10–15 %. Unfavourable weather conditions that followed sped up senescence phase, according to FVC index which shows generally faster than normal decline in fraction of cover with green vegetation throughout all summer months. In Bijeljina and

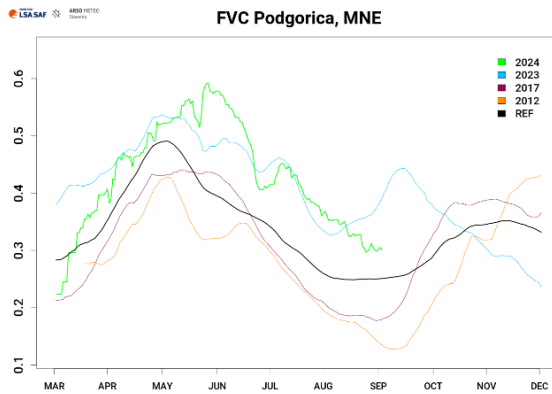
Laktasi along the northern part of the country, above-average fraction of cover fell below the average before the end of June, and after only a short-living recovery continued to drop at the rate much higher than normal throughout July and August, sitting 15–20 % below the long-term average at the end of August. In Trebinje, southern Bosnia and Herzegovina, senescence phase progressed as usual throughout summer months, without negative deviations from the normal.

**SERBIA**



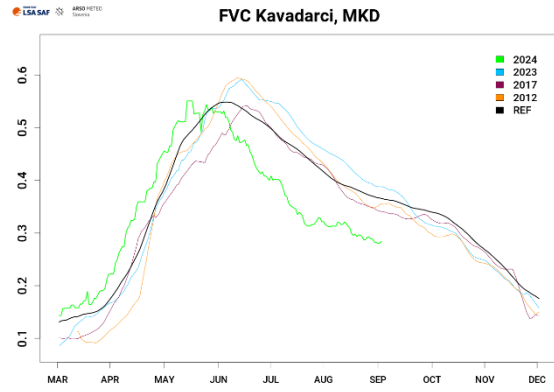
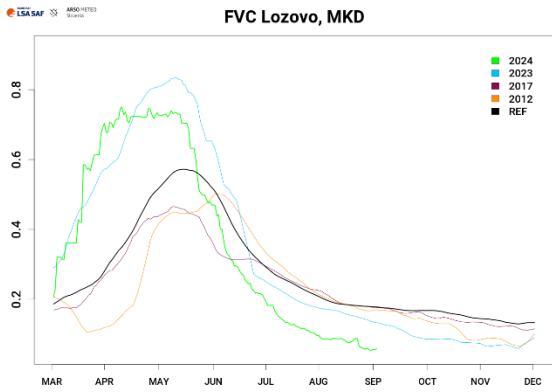
Vegetation season began earlier than normal at both locations in Serbia, in Veliko Srediste in the north-east it was advanced up to a month. Further growth and development progressed at the regular rate, which resulted in above-average vegetation cover at the time of seasonal peak in late May, for up to 20 %. In Malo Orasje, central Serbia fraction of cover with green vegetation rapidly declined soon afterwards, and temporal recovery in early July helped keep level of cover above the average in mid-summer. Unfavourable weather conditions that followed, prevented regular progression of senescence phase and contributed to continuous drop of FVC values throughout the rest of summer, falling up to 10 % below the average in second half of August. In Veliko Srediste, northeastern Serbia, vegetation cover appear to have declined much faster than normal during senescence phase, falling below the average in mid-June already and continued its negative trend throughout the rest of summer, as a result of which the level of cover with green vegetation was about 20 % lower than normal at the end of August, even below the extent reached at the similar time of the season in drought year 2017.

## MONTENEGRO



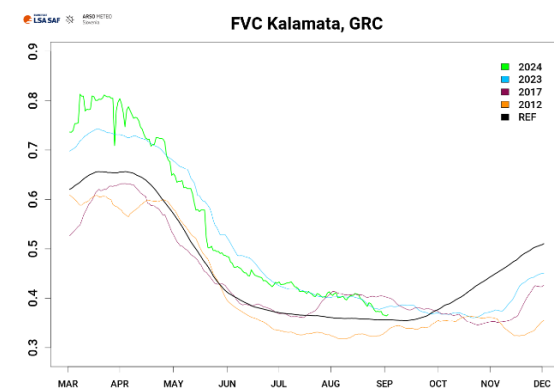
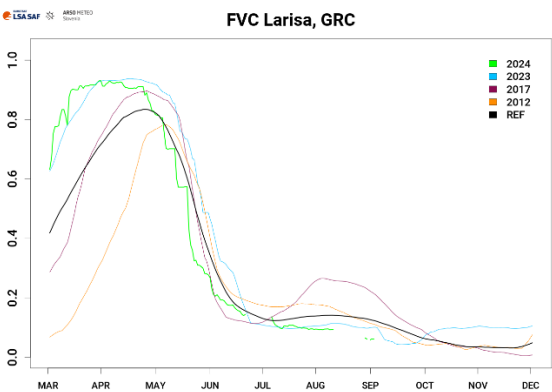
In Podgorica, southern Montenegro, vegetation season kicked in early at the unusually high rate of development, thus advancing the average level of cover during spring. Weather conditions supported further growth for another month after a regular peak time, expanding level of cover for another 15 %. Unfavourable weather brought much of the above-average FVC down before the end of June, but after a temporal improvement in early July FVC remained 10 % above the reference for the rest of the summer.

## NORTH MACEDONIA



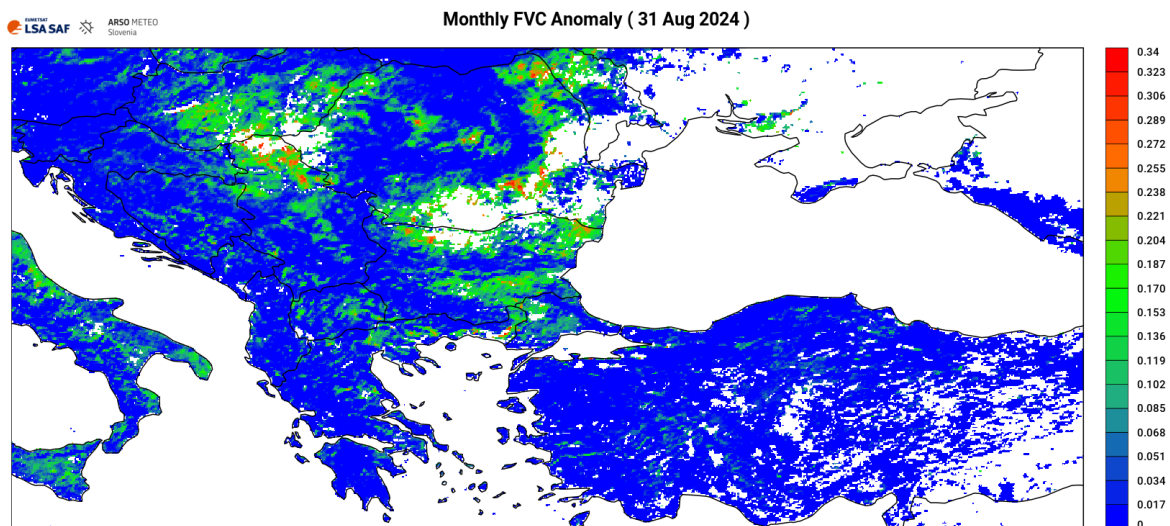
In Lozovo, central North Macedonia, vegetation boosted into growth in early March and by well advancing its development reached otherwise seasonal peak level of cover within 2–3 weeks. After further growth FVC remained high until its regular peak time in mid-May. In Kavadarci in the south, vegetation growth was slightly advanced in spring but mostly kept its regular pattern of development. Senescence phase was well advanced due to unfavourable weather conditions, as FVC dropped below the average before the end of May and continuously declined at the higher than normal rate for the rest of summer. At the end of August, FVC was in Kavadarci more than 10 % below the average, and in Lozovo at only about 5 % compared to the usual 20 %.

## GREECE



According to FVC index, vegetation in Larisa, central Greece experienced favourable first half of the season, with higher than normal growing rate during March and a well extended period of abundant peak cover that lasted from mid-March to May. Senescence phase appeared to have been slightly sped up afterwards, as FVC was soon brought below the reference in mid-May and continued to advance the decline in second half of the season. At the end of summer, FVC remained steady low, contrary to the expected slight expansion in level of cover, normal for this time of the year. Vegetation in Kalamata, southern Greece also experienced favourable growing season, as fraction of cover exceeded the seasonal peak by 15 %. Also senescence phase progressed well and in line with the reference pattern. Due to exceeded seasonal peak, fraction of cover with green vegetation remained up to 10 % above the reference throughout the rest of the summer, only with a noticeable rapid decline down to the average in second half of August.

Figure below shows negative anomaly of **accumulated 30-day FVC values** as recorded on **31 August 2024** in comparison to the past 20 years (2004–2023), and is used experimentally.



Noticeable decline in level of cover with green vegetation occurred across great part of Balkan Peninsula this August, especially its central-north and east. Over the Pannonian Basin lowlands stretching across Hungary, northern Serbia and far western Romania, healthy vegetation was at the end of August covering at least 20 % lesser fraction of unit than it normally does at this time of year, locally FVC stood about 30 % below the average or potentially lower as indicated by non-present FVC values at the core of this area. Similar situation appeared to be present in eastern parts of Balkan Peninsula, covering northern Moldova, eastern Romania, and a wider stretch along the lower Danube River basin, where FVC stood at least 15 % below the average, locally the negative anomaly indicates more than 35 % lower fraction of cover with green vegetation. To a lesser degree, lower than normal cover with healthy vegetation appeared all along the hilly parts of Balkan Peninsula, northeastern Greece and to a greater extent along central Bulgaria.

## DROUGHT IMPACT REPORTS

### CROATIA

The amount of rainfall in August, averaging around 40 mm in lowland areas and around 20 mm along the Adriatic coast, was insufficient to alleviate the effects of heat stress on plants, which was present almost the entire month. The drought in most regions during August caused significant damage to the agricultural sector, and without irrigation, it was very difficult to maintain optimal yields. In Slavonia region, eastern Croatia crops like **rapeseed, soybeans, sugar beets, and corn** suffered the most. Yields decreased locally by more than 80 %, and **natural disasters were declared** due to drought. Along the Adriatic, **olive trees** shriveled and were suffering from heat stress due to high day and night air temperatures.

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](https://meteo.hr/klima.php?section=klima_pracenje&param=spi&el=karte_suse)

### SERBIA

Extremely high temperatures and drought this year caused severe hardship for farmers in Serbia. The yields of all agricultural goods were somewhat reduced or poor in quality, fewer goods made to the market and their **prices** generally went up. Yields of nearly all main agricultural crops and vegetables were in generally reduced by 30–40 %. <sup>[1, 2]</sup> Most affected due to prolonged drought and extreme air temperatures was **corn**, the most represented agricultural crop in Serbia along with soybean. Harvest began in first half of August already, stalks were mostly dry, cobs small and humidity level only 11 %. There were different levels of damages to corn crops reported, between 30–70 %, some places even completely compensated. According to an agro-economic analyst, total corn crop damages in Serbia could reach 400–500 mio Serbian dinars. In Zrenjanin, northeastern Serbia, the vigilance of the agricultural guard service, voluntary fire brigades and fire-rescue brigades increased in August in order to prevent any potential fire that would cause further damage to dry crops. <sup>[3, 4, 5, 6]</sup> Farmers in Cacak, central Serbia reported also of poor **potato** yield, in addition to corn yield losses. In nearby area of Sumadija, corn yield was observed to be 30 % reduced. **Soybean** crops did not do any better either, and as a result, farmers would hardly be able to pay the costs invested in production. <sup>[7, 8]</sup> Heat waves accelerated **sunflower** development in Central Banat region, northeastern Serbia, thus harvest began three weeks earlier than usual and producers expect 30–40 % lower yield than expected. In addition to poor yield, also quality of the grain was affected, it appeared small and light in weight. <sup>[9, 10]</sup> In Vojvodina, northern Serbia, **oilseed**, like other agricultural crops, was harvested earlier than normal due to dry and hot summer, and harvest proved poor quality. The grains, usually the size of a pea, reached only the size of wheat grain and in places bore only about 8 % moisture. <sup>[11, 12]</sup> In several areas across northern Serbia, drought halved also **tomato** yield, and much of the rest of the fruits remained green and fell before ripening. <sup>[13, 14, 15]</sup>

All **fruits** ripened earlier due to high temperatures and lack of rainfall. Fruit trees obtained autumn colour of the leaves in mid-August already. Peaches and plums were in Srem, northern Serbia by mid-August already collected. In Cacak region, central Serbia pear harvest was due to lack of rain mostly affected in quality, thus most of pears will end up in processing. <sup>[16, 17, 18]</sup> Drought caused



earlier **grape** harvest. In Idos, northern Serbia, most of the vineyards were harvested before the end of August already. Drought increased sugar levels in grapes but reduced quantity. <sup>[19, 20]</sup> In Pirot, southeastern Serbia, this year's **honey** yields were several times lower than previous years. Beekeepers had an average of 2–3 kg of honey per hive, compared to 10–20 kg in previous years, in a good year even up to 50 kg. According to local beekeepers, reasons lie in rainy spring when bees could not collect nectar during the blooming of the acacia, and in extremely hot and dry summer which further reduced the availability of food and water for the bees, as well as their survival conditions. <sup>[21]</sup> **Calls for protests** arose due to farmers' dissatisfaction with response from the governing bodies to difficult farming situation. <sup>[22]</sup>

Scorching air temperatures and almost no rainfall over the summer months made several kilometers of natural area spanning across **Mount Cer appear yellow and withered**. Similar scenes could also be seen on other mountains such as Kosmaj, Divcibari etc. <sup>[23]</sup> Extreme heat wave and lasting drought affected almost all parts of Serbia, causing **fires, drought and water shortages** across much of the country. Many populated or natural areas experienced water supply problems or even completely **dried up local springs**. Thus, drinking water needed to be delivered with army, civil protection or water supply vehicles to supply for the basic daily needs, but in some places even that the minimum was difficult to be met. <sup>[24, 25, 26, 27]</sup> In municipalities of Lucani and Guca, western Serbia, several villages and towns did not have water supply during nighttime hours. A decision was made to impose much higher water prices for household water consumption over a **set daily water limit**. <sup>[28]</sup> Due to excessively high air temperatures and prolonged lack of rain, 20 villages of Sjenica municipality, western Serbia were left without water for over 2 months. Many water sources on Pester plateau where cattle normally grazes, dried up, leading to **livestock death**. <sup>[29, 30, 31]</sup> High temperatures and low water level caused **en-masse death of fish** in Dzerkarska River, southwestern Serbia to the extent of ecological disaster. <sup>[32, 33]</sup>

In mid-August, **state of emergency** was declared for territories of Sjenica and Gornji Milanovac, western Serbia due lasting drought and high air temperatures that caused problems in the water supply to the population as well as to feed livestock <sup>[34, 35, 36, 37]</sup>. Although restrictive measures on water consumption in municipality of Topola, central Serbia were introduced in mid-July due to severe drought, further worsening of hydrological conditions led to the state of emergency being declared in mid-August for part of its territory, mostly several rural settlements, as there was no capacity for even restrictive supply to rural settlements without jeopardizing the minimum supply of urban settlements with priority institutions such as kindergartens, schools, health center and the like <sup>[38, 39, 40]</sup>. Later in August, a state of emergency was declared on the territory of Nova Varos Municipality, western Serbia, where bad hydrological conditions led to the drying up of almost all springs and the water supply problems were critical for both urban and rural areas <sup>[41, 42]</sup>.

According to the representatives from Vode Vojvodina, due to low water level of Sava River in the Sabac sector, northwestern Serbia, islets appeared and the river could practically no longer be used for **navigation**. The situation was problematic also on the Banat watercourses, northeastern Serbia, encompassing smaller rivers coming from the territory of Romania, where there was no improvement observed in water levels for several days. <sup>[43]</sup>

[1] <https://vreme.com/ekonomija/posledice-suse-paradajz-zelen-kukuruz-i-krompir-izgoreli/>

[2] <https://moravainfo.rs/ocekuje-se-rast-cena-voca-povrca-i-zimnice/>

[3] <https://www.rts.rs/vesti/srbija-danas/5518105/smanjen-prinos-.html>

[4] <https://www.blic.rs/vesti/drustvo/agroanaliticar-za-blic-tv-o-toplotnom-talasu-i-susi-koji-su-obrali-kukuruz-i-pre/yrqdy0b>

[5] <https://www.b92.net/biz/srbija/vesti/52831/susa-u-srbiji-uzela-danak-steta-samo-na-kukuruzu-400-500-miliona-dolara/vest>

- [6] [https://www.rtv.rs/sr\\_lat/vojvodina/banat/poljoprivrednici-iz-kikinde-nisu-zadovoljni-prinosom-kukuruzi\\_1565043.html](https://www.rtv.rs/sr_lat/vojvodina/banat/poljoprivrednici-iz-kikinde-nisu-zadovoljni-prinosom-kukuruzi_1565043.html)
- [7] <https://www.rina.rs/item/21160-/>
- [8] <https://rtk.co.rs/susa-smanjila-rod-kukuruzi-za-30-odsto/>
- [9] <https://www.blic.rs/biznis/privreda/rod-suncokreta-za-trecinu-manji-od-proseka-zetva-se-privodi-kraju/1ky9h7q>
- [10] <https://www.dnevnik.rs/ekonomija/poljoprivreda/poranila-zetva-ularica-u-vojvodini-previsoke-temperature-i-susa-uticali-na>
- [11] <https://www.dnevnik.rs/ekonomija/poljoprivreda/foto-izuzetno-los-prinos-ularica-na-vojvodanskim-nivama-susa-sprzila-soju>
- [12] <https://www.dnevnik.rs/ekonomija/poljoprivreda/poranila-zetva-ularica-u-vojvodini-previsoke-temperature-i-susa-uticali-na>
- [13] <https://www.dnevnik.rs/ekonomija/poljoprivreda/susa-obrala-polovinu-roda-cena-omilenog-povrca-otisla-nebu-pod-oblake-25-08>
- [14] <https://www.alo.rs/vesti/drustvo/944648/povrtari-se-oparili-zbog-paradajza-u-banatu-poranila-berba/vest>
- [15] <https://www.dnevnik.rs/ekonomija/poljoprivreda/specifcna-godina-u-povrtarstvu-susa-i-insekti-zagorcali-paradajz-10-08>
- [16] <https://rtvnp.rs/2024/08/17/vrucina-i-susa-omlatile-okolo-150-000-tona-voca-u-srbiji/173148>
- [17] <https://www.euronews.rs/biznis/agrobiznis/134928/vocari-se-zale-kisa-nije-padala-vise-od-40-dana-to-je-uticalo-na-kvalitet-kruske/vest>
- [18] <https://www.mojnovisad.com/vesti/toplotni-talas-i-vocarstvo-ranije-sazrevanje-voca-i-uticaj-na-domacu-proizvodnju-id63864.html>
- [19] <https://www.dnevnik.rs/ekonomija/poljoprivreda/susret-proizvodaca-u-idosu-obrase-se-vinogradi-zbog-suse-ranije-nego-inace>
- [20] <https://www.politika.rs/sr/clanak/629203/Berba-grozda-u-nasoj-zemlji-drasticno-poranila>
- [21] <https://www.pirotskevesti.rs/losa-godina-za-pcelare-prinosi-znatno-manji-od-uobicajenog-proseka/>
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## MOLDOVA

The degree of damage on **corn and sunflower** crops due to intense drought and heat was estimated at 20–40%, with extremes of up to 80 % in some cases. Generally, crops in the central-eastern area of the country did better compared to that in the south of the country. <sup>[1]</sup> **Apple** producers expected about 15 % less fruit than last year, stating drought and deforestation of orchards as the main causes. <sup>[2]</sup> Drought considerably affected the quantity and quality of **grapes**. The total grape harvest in 2024 was expected to be 20–35 % lower than last year, and due to unusually high temperatures the harvest began 20–30 days earlier, starting in first days of August already. <sup>[3]</sup> Drought-affected **tobacco** farmers were asking for help from the authorities, since of the approximately 400 ha cultivated with tobacco, two thirds were affected by the drought. <sup>[4]</sup> The Commission for Exceptional Situations has allocated 100 million lei from the **Government Intervention Fund** for farmers affected by drought. <sup>[5]</sup>

One of the tourist attractions in the Republic of Moldova, the Saharna **waterfall** in the Rezina district, central-eastern Moldova stopped due to drought. And the flow of the Tipova waterfall from the same district also decreased considerably. <sup>[6]</sup>

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## ROMANIA

August heatwave, considered the longest in Romania's recent history, along with drought seriously affected crops, especially corn. On average, farmers reported halved harvests compared to last year. In Simnic area, southwestern Romania, crops established in spring such as **corn, sunflower, peas**, calamity was in proportion of near or reaching 100 %. Most farmers in the south of the country collected only few tens of kilograms of corn per hectaren. In Dolj County, southern Romania **wheat** harvest was also poor. According to the president of League of Associations of Agricultural Producers in Romania, national level harvest of corn and sunflower will be greatly reduced, about 30 %, and big problems were with **bean, pea and soy crops**, Romania even ended up importing 45 000 tons of beans from Egypt. <sup>[1, 2, 3]</sup> Farmers from Olt County, southern Romania requested that the county be declared a calamity zone due to the drought, as their spring crops (corn, sunflower, peas, chickpeas, etc.) were totally destroyed and the autumn crops (wheat, barley, rapeseed) were seriously affected. <sup>[4]</sup> The excessive heat hastened the ripening of the **vegetables**. Compared to last year, the prices for pickles could increase three times. <sup>[5]</sup> According to the estimates of the Pro Agro National Federation, severe drought in Romania affected approximately 2.5 mio ha of agricultural crops, represented in about 40 % of wheat, corn, rape and sunflower crops, with **major economic damage** that could reach 1.8 billion euros. With such high losses recorded in Romania, one of the EU's main corn and sunflower producers, the **EU-level corn production** is expected to fall. <sup>[6, 7]</sup>

The decrease in soil moisture affected agricultural producers and livestock breeders. **Donkey milk production** dropped by 57 % this year after pastures were scorched and the quality of the available grass decreased. <sup>[8]</sup> According to the owner of the first truffle plantation in Romania that obtained the accredited mountain product certificate, from Archita, central Romania **truffles** were becoming increasingly rare, both in the forest and in plantations, with production decreasing by about 40 % in the face of the excessive drought of the last two years. <sup>[9]</sup>

Prolonged heat and drought have caused several rivers to disappear entirely. Dozens more were near the drying out level, altogether destroying **ecosystems** at several locations. **Fish population** was observed disappearing, as well as the **birds and mammals** that fed on them. Restoring natural habitats is expected to take a long time, if there is enough water. Pointed out among others were the ecosystem areas depending on Susita river, southwestern Romania, which dried up, Lake Brates and Lake Talabasca in southeastern Romania, the latter declared a **protected area** which also dried up completely. <sup>[10, 11, 12]</sup> Considered one of the largest **wetlands** in southern Romania, Balta Comana (Neajlovu Delta) has become a dry field. The fish began dying, the birds left the place, and **tourism** was severely affected. <sup>[13]</sup>

Drought and lack of rain this summer contributed to the drastic drop in **Danube River** water level along the entire course of the river. In Bazias, southeastern Romania where Danube enters the country, flow rate in mid-August was almost half its normal. Several other critical points were detected along the river course, which is why the authorities were constantly **dredging the depth**

**of the navigable channel.** Under such low water conditions, **energy production** at the Iron Gates, southwestern Romania was also affected and at the Portile de Fier hydropower plant, it decreased by half. At Corabia, southern Romania, the appearance of sand dunes and islands greatly affected the **tourist boat traffic** on the river. Tourist boats were often suspended from leaving the port. In Galati, southeastern Romania, shipowners were notified in advance not to **load the ships** at full capacity. <sup>[14, 15, 16]</sup> Agricultural sector in Dolj county, southern Romania additionally affected by low water level in the Danube River, as its flow fell below 2500 m<sup>3</sup>/s and the water could no longer be pumped to the **irrigation canals**. Sand islands appeared in the area, and several localities were affected, such as Sadova, Calarasi, Bechet, Dabuleni. <sup>[17]</sup> Drought and heat waves affected water levels also in northwestern quarter of Romania. In late August, **Somes River** in the municipality of Satu Mare, northwestern Romania reached a new historical minimum level of -129 cm. Drought brought to the surface the pillars of the former bridge next to the Decebal bridge. In certain areas, the Somes river could be crossed without much difficulty. Out of 13 representative sections for hydrological drought monitoring in the Somes-Tisa hydrographic basin, two sections had flows below the minimum flow required to meet the quantitative requirements. <sup>[18]</sup> The **Sbant River** in Iasi County, northeastern Romania dried up almost along its entire 10-kilometer length. According to the Prut-Barlad Water Basin Administration, out of the 121 water courses in Iasi, 33 were completely dried up. <sup>[19]</sup>

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## BULGARIA

Due to high air temperatures and drought this year, which was the second dry year in a row, grain producers reported the worst harvest of corn and sunflower in the last 10 years. Average losses are expected at 30 %, with some areas experiencing worse scenarios. Farmers in the Yambol region, southeastern Bulgaria expect halved yields of **sunflower and corn** this year. Sunflower harvest started almost a month earlier, and yields were at only 50-60 kg per hectare, with very few farmers reaching 100 kg per hectare. In a normal season, corn yields were about 700 kg per hectare, but in

Rusensko, norther Bulgaria farmers harvested 450-500 kg per hectare. The area of Silistra, northeastern Bulgaria was more affected, yields were between 200 and 300 kg per hectare. <sup>[1, 2, 3]</sup> The drought this year left **bees** without pasture, especially in the field areas. Prolonged drought was forcing more people to give up beekeeping. In the last 5 years, production in Dobrich region alone, northeastern Bulgaria has fallen by 50 %. <sup>[4, 5]</sup>

On the **Danube River** near Antimovo, northwestern Bulgaria wide sandbars appeared. The place is known in the region as the Bare Island and comes out only during a prolonged drought. <sup>[6]</sup> The **Parvenetska River**, central Bulgaria, which presents a **water supply** for the village of Hrabrino and the two surrounding areas, was in mid-August almost completely dry, leaving no water for the residents. <sup>[7]</sup> At the **Cold Well hydropower plant**, southern Bulgaria, part of the dam turned into a green grass pasture where sheep and cows graze. As of late August, water levels in the dam were at 55 % of its full capacity, with decreasing trend. <sup>[8]</sup> A drastic drop in the water level occurred in the **Koprinka dam**, central Bulgaria as its water level was in mid-August at only 15 % of its capacity, with further draining continuing at 8 m<sup>3</sup>/s. Downstream from the dam, dead **sturgeon fish** were observed in the fish farm near Kazanlak. <sup>[9]</sup> According to th Ministry of Regional Development, 111 000 people were in early August affected by a **partial water regime** in 7 cities, 172 villages and 51 municipalities. Due to drought, water regime was imposed in Pleven, Lovec and Teteven in northern Bulgaria. According to the Ministry of Environment and Water, at the unusually low filling for this time of the year were in mid-August at the **dams** Kamchia (**water source** for Varna, Burgas and other settlements on the Black Sea coast), Yasna Polyana (water source for Burgas and settlements and resorts on the Southern Black Sea coast and Burgas region), Tica (water source for Shumen, Veliki Preslav and Targovishte) and Asenovets (main water source for Sliven). <sup>[10]</sup>

**Competition for the scarce water resource** also intensified among farmers in areas affected by drought. For over two months, there has been a **state of emergency** in the municipality of Straldza, eastern Bulgaria due to lack of water. In some villages there has been no water for months, for example, Palauzovo, Polyana, Alexandrovo, Irechekovo, Lyulin, Pravdino. There were also those with a water regime such as Jinot and Leyarovo, and in others the flow rate is reduced. <sup>[11]</sup>

[1] <https://econ.bg/Научи-за/Добивите-от-слънчоглед-са-двойно-по-ниски-заради-сушата-и-горещините-1-a-i.808340-at.10.html>

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## GREECE

**Olive producers** in Magnesia, central Greece were facing significant challenges due to prolonged heatwave and drought. The harvest of green, unripe olives typically begins in September but this year green olives were nowhere to be found. The adverse climate conditions caused the olives to shrivel, turn brown, and fall from the trees. This situation was especially critical in southwestern Magnesia where olive cultivation is a monoculture, putting producers at risk of losing their only source of income. <sup>[1]</sup>

According to a report from the Water Directorate of Central Macedonia, the significant reduction in rainfall and snowfall during the past winter and spring has led to a decrease in **available water reserves**. As a result, the problem has been exacerbated this year by the combination of the seasonal summer decline in reserves and the increased demand during the tourist season. <sup>[2]</sup>

The prolonged drought has severely impacted the production of the renowned Naxos **potato**, leading to a significantly reduced harvest this year. In fact, the crop will not be cultivated in August and September as usual, and by October, it will no longer be available on the market, according to the island's Union of Agricultural Cooperatives. For the first time in history, Naxos is preparing to import potatoes. Farmers report that production has dropped from 6,000 tons in 2022 to just 1,800 tons this year, putting this PDO (Protected Designation of Origin) product at risk of disappearing. The entire **farming and livestock sector** on the island, which sustains 50 % of the economy, is facing serious challenges due to the **water shortage**. <sup>[3, 4]</sup>

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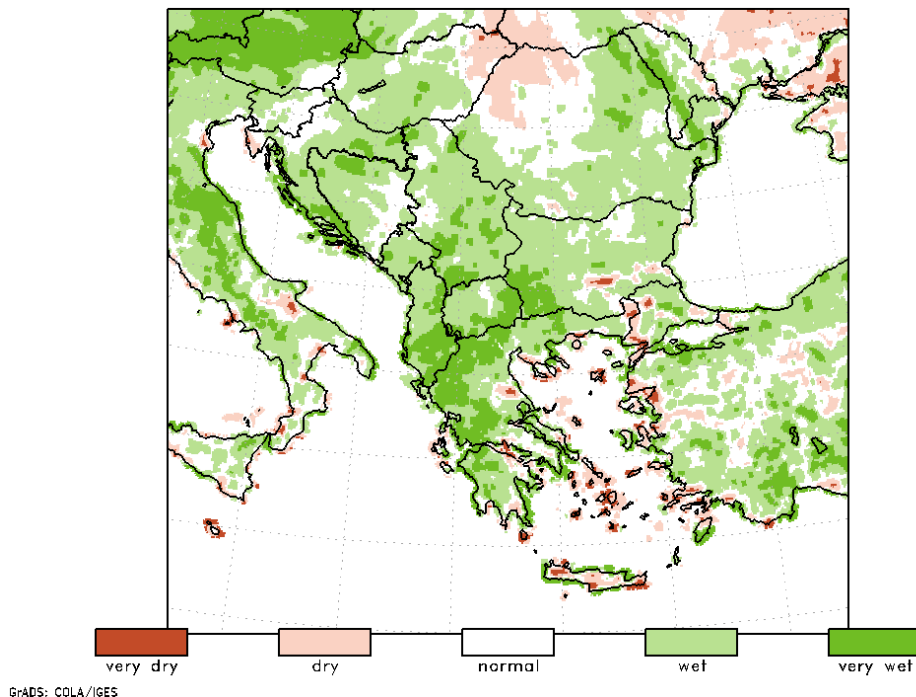
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[3] <https://www.newsbomb.gr/ellada/story/1576271/i-leipsydria-xytipse-kai-tin-patata-naksou-apo-ton-oktovrio-den-tha-yparxei-pouthena-stin-agera>

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## OUTLOOK

Figure below shows model simulations of the **60-day accumulated surface water balance** in historical percentile classes for the time period **between 9 August to 7 October 2024**.



Recent outlook for the 60-day surface water balance levels suggests general improvement across

the entire Balkan Peninsula into mostly wetter than normal conditions, especially over its southwestern areas where wider areas will experience very wet surface water balance levels. Although the border area between northern parts of Hungary and Romania will continue to experience drier than normal surface water balance conditions, the deficit is expected to lessen in comparison to the very dry conditions of the July-August period. Across western half of Turkey surface water balance levels will remain mostly wetter than normal for this time of year.

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### Methodology

DMCSEE Drought monitoring bulletin is based on numerical weather prediction (NWP) model simulations over SE Europe, SPI index calculations, remote sensing product 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 average 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 model climatology in terms of air temperature and surface water balance is computed with NMM on the base of 1 January 1991 to 31 December 2020 time period, using European Centre for Medium Range Weather Forecast (ECMWF) ERA5 dataset (<http://www.ecmwf.int/en/forecasts/datasets/reanalyses-datasets/era5>) 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 against long-term average or in percentile classes (the two extreme classes have a 5-percent range, and each of the middle three classes has a 30-percent range) 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 2023). Information on drought impacts are obtained from freely available online reports of national authorities and media newspapers.