ISSN 1831-9424

European Commission

Drought in Europe June 2025

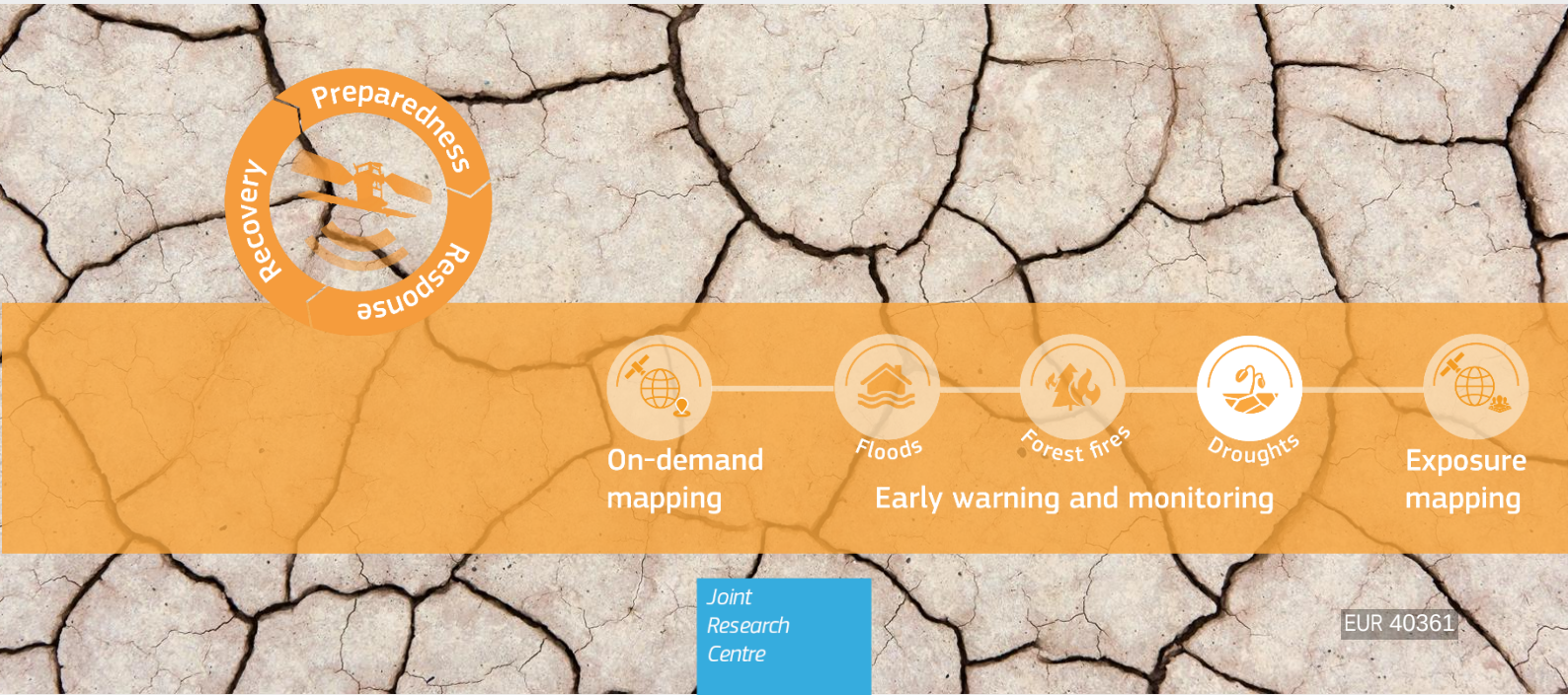
GDO Analytical Report

Toreti, A., Bavera, D., Acosta Navarro, J., Barbosa, P., De Jager, A., Ficchi, A., Fioravanti, G., Grimaldi, S., Hrast Essenfelder, A., Magni, D., Mazzeschi, M., McCormick, N., Salamon, P., Santos Nunes, S. and Volpi, D.,

Copernicus Europe's eyes on Earth

Emergency Management Service

2025



Joint Research Centre

EUR 40361

Contact information
Name: Andrea Toreti
Address: Via E. Fermi 2749, I-21027 ISPRA (VA), Italy
Email: Andrea.TORETI@ec.europa.eu

EU Science Hub
https://joint-research-centre.ec.europa.eu

JRC142857

EUR 40361

PDF ISBN 978-92-68-28765-1 ISSN 1831-9424 doi:10.2760/1544910 KJ-01-25-344-EN-N

Luxembourg: Publications Office of the European Union, 2025

How to cite this report: European Commission, Joint Research Centre, Toreti, A., Bavera, D., Acosta Navarro, J., Barbosa, P., De Jager, A., Ficchi, A., Fioravanti, G., Grimaldi, S., Hrast Essenfelder, A., Magni, D., Mazzeschi, M., McCormick, N., Salamon, P., Santos Nunes, S. and Volpi, D., *Drought in Europe - June 2025 – GDO Analytical Report*, Publications Office of the European Union, Luxembourg, 2025, https://data.europa.eu/doi/10.2760/1544910, JRC142857.

Drought in Europe - June 2025

JRC Global Drought Observatory (GDO) of the Copernicus Emergency Management Service (CEMS) – GDO/EDO data up to 10/06/2025

Drought in Europe - June 2025

JRC Global Drought Observatory (GDO) of the Copernicus Emergency Management Service (CEMS) – GDO/EDO data up to 10/06/2025

Abstract

- Drought conditions are affecting large parts of central, northern, and eastern Europe as well as northern Africa, the eastern Mediterranean, and the Middle East.
- Recent above-average temperatures in western Europe have exacerbated the effects of the prolonged lack of precipitation, particularly on soil moisture.
- Low flow conditions in river discharge are detected mostly in eastern Europe, in the Baltic Sea region, and in some rivers of Türkiye.
- Impacts on vegetation are emerging in eastern Europe. The already affected areas are mostly in the Mediterranean region.
- Seasonal forecasts point to a warmer than usual 2025 summer with dry conditions in a very large region extending from the UK to the Black Sea.

Combined Drought Indicator (CDI)

By late May, drought conditions have been gradually deteriorating across southern, eastern, and central Europe, with the Maghreb, the eastern Mediterranean, and the Middle East regions continuing to experience severe and prolonged drought.

According to the Combined Drought Indicator (CDI) [1] for late May 2025 (Fig. 1), several regions have been experiencing warning drought conditions, including the Baltic Sea region, Ireland, the UK, northern France, Benelux, part of Germany, Poland, Czechia, Slovakia, Belarus, most of Ukraine, southern Russia, central and western Romania, Bulgaria, some regions of Greece, small areas of the western Balkans, Cyprus, most of Türkiye, Malta, and the south-eastern Mediterranean islands. Some regions in central Europe, the Baltic Sea region, Scandinavia, southern Italy and Greece are under watch conditions due to a prolonged precipitation deficit. Some areas have been experiencing more severe alert drought conditions, particularly in the Mediterranean region, including south-eastern Spain, Cyprus, and most of North Africa, as well as central and south-eastern Türkiye and the Middle East. Alert conditions are rapidly intensifying in large areas of Ukraine and in the neighbouring countries, impacting crops and vegetation. Similar conditions are emerging in some areas of central Europe, the Baltic and the UK.

[1] For more details on the CDI, and the other GDO and EDO indicators of drought-related information used in the report, see the Appendix at the end of the document.

Drought in Europe - June 2025

JRC Global Drought Observatory (GDO) of the Copernicus Emergency Management Service (CEMS) – GDO/EDO data up to 10/06/2025

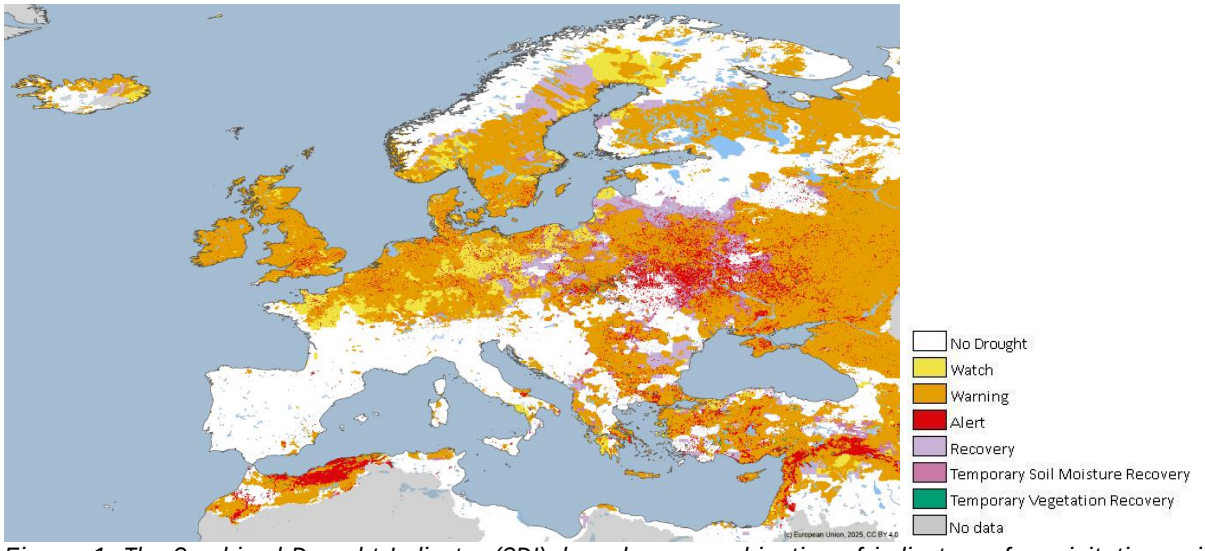


Figure 1: The Combined Drought Indicator (CDI), based on a combination of indicators of precipitation, soil moisture, and vegetation conditions, for late May 2025.[1]

Standardized Precipitation Index (SPI)

In late May 2025, SPI-3 (i.e. SPI computed for an accumulation period of 3 months)[2] shows wetter than normal conditions over large areas in the Iberian Peninsula, Italy, southern France, the Balkans, north-eastern Europe, and Norway. Dry anomalies are mainly detected in the UK, Ireland, northern France, Benelux, most of Germany, Denmark, southern Scandinavia (Fig. 2).

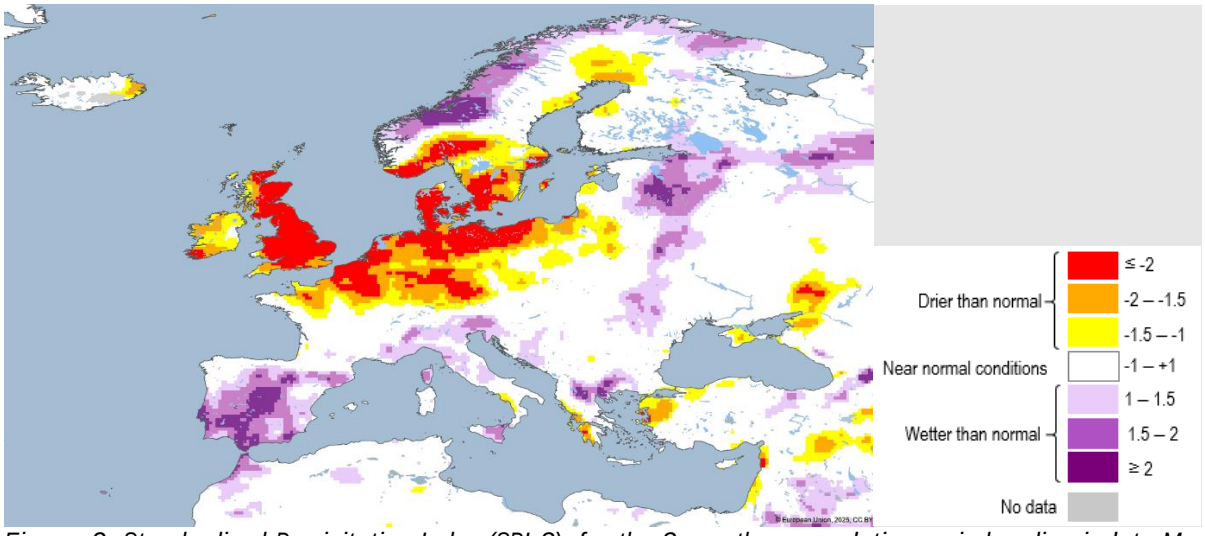


Figure 2: Standardized Precipitation Index (SPI-3), for the 3-month accumulation period ending in late May 2025.[2]

[2] For more details on the SPI, and the other GDO and EDO indicators of drought-related information used in this report, see the Appendix at the end of the document.

Drought in Europe - June 2025

JRC Global Drought Observatory (GDO) of the Copernicus Emergency Management Service (CEMS) – GDO/EDO data up to 10/06/2025

Temperature

In April-May 2025, most of western and northern Europe experienced above-average temperatures. The positive temperature anomalies affected mostly the Alps, south-western Scandinavia, north-western France, the UK, Ireland, northern Africa, and the Middle East with anomalies above 1.5 °C and peaks above 2.5 °C, for instance in Iceland and southern Norway (Fig. 3).

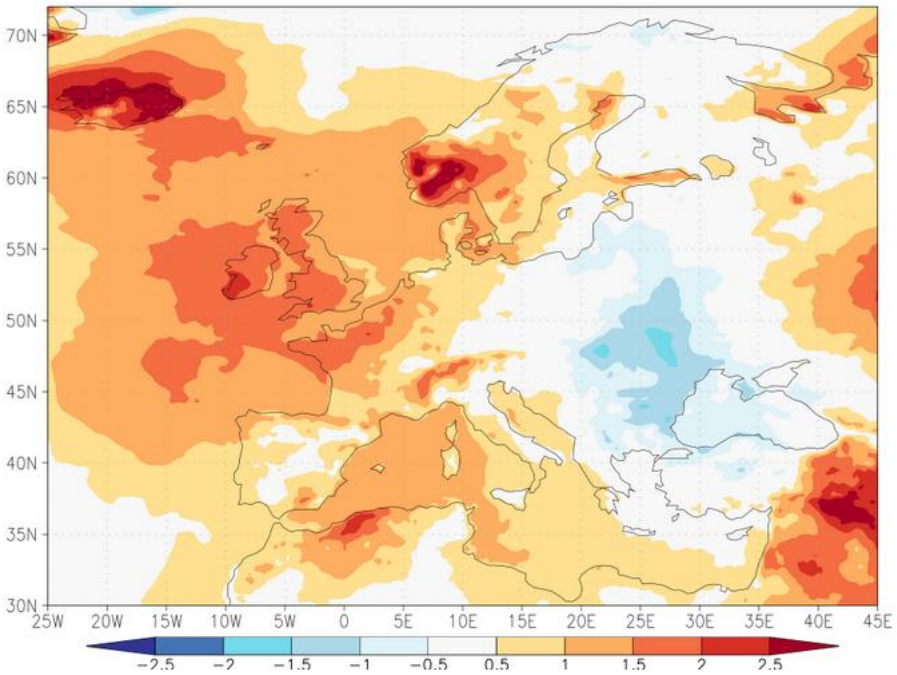


Figure 3: Average temperature anomalies (ERA5, baseline 1991-2020) for April-May 2025. Source: The KNMI Climate Explorer.[3]

[3] The KNMI Climate Explorer: https://climexp.knmi.nl

Drought in Europe - June 2025

JRC Global Drought Observatory (GDO) of the Copernicus Emergency Management Service (CEMS) – GDO/EDO data up to 10/06/2025

Soil moisture

By looking at the conditions in late May 2025, the Soil Moisture Index Anomaly[4] shows negative anomalies over large areas of the Euro-Mediterranean region, consistently with the precipitation deficit of the previous months, as shown by the SPI-3 (see Fig. 2). Wide regions in central-northern Europe, and particularly the UK, Ireland, northern France, Benelux, some regions in Germany, Denmark, southern Scandinavia, and the western Baltic regions are under drier-than-usual conditions. Some regions in eastern and south-eastern Europe, including Bulgaria, Romania, Ukraine, Türkiye, and south-western Russia are still under drier-than-usual conditions due to the prolonged precipitation deficit, despite the most recent SPI-3 positive anomaly. Some of the regions with the strongest negative precipitation anomalies were also affected by high temperatures (e.g. the UK and Ireland), which accelerated water loss from the soil due to increased evapotranspiration. Some areas show a Soil Moisture Anomaly below -2, corresponding to a very strong negative anomaly and being the driest class for this indicator. In the Mediterranean region, particularly in north-western Africa, and the eastern part of the basin drier than usual soil conditions are identified (Fig. 4).

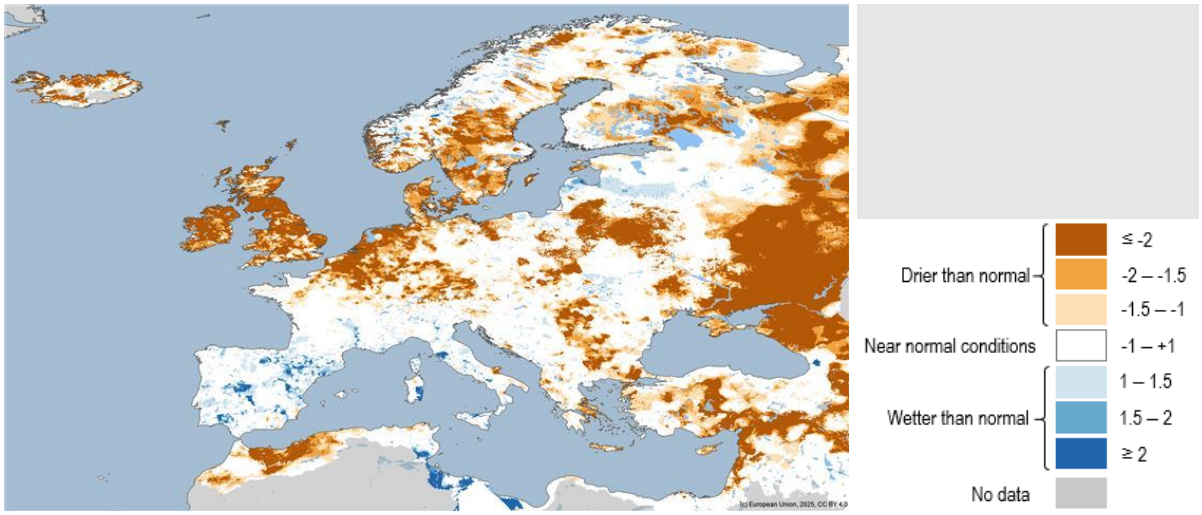


Figure 4: Soil Moisture Index Anomaly for late May 2025.[4]

Hydrology

In early June 2025, the Low-Flow Index (LFI) [5] shows critical hazard values mainly over eastern Europe and western Russia. The north-eastern part of Ukraine is particularly hit. Additionally, some localized critical river branches appear in the Balkans, Türkiye, Poland, Slovakia, Hungary, northern France and some rivers in Italy. Northern Africa is still under low flow conditions and hit by a long-lasting drought (Fig. 5)[6]. The flow reduction only partially correlates with the soil moisture anomaly pattern and the lack of precipitation over the last months (Fig. 2). These differences may be due to snow-related processes, quite relevant in this period of the year.

[4] For more details on the Soil Moisture Anomaly indicator, and the other GDO and EDO indicators of drought-related information used in this report, see the Appendix at the end of the document.

[5] For more details on the Low-Flow Index (LFI), and the other GDO and EDO indicators of drought-related information used in the report, see the Appendix at the end of the document.

[6] The meteorological forcings may be characterized by temporal inconsistencies in areas with lower station coverage at the eastern domain of the Lisflood domain. Caution should be adopted when interpreting LFI in those areas.

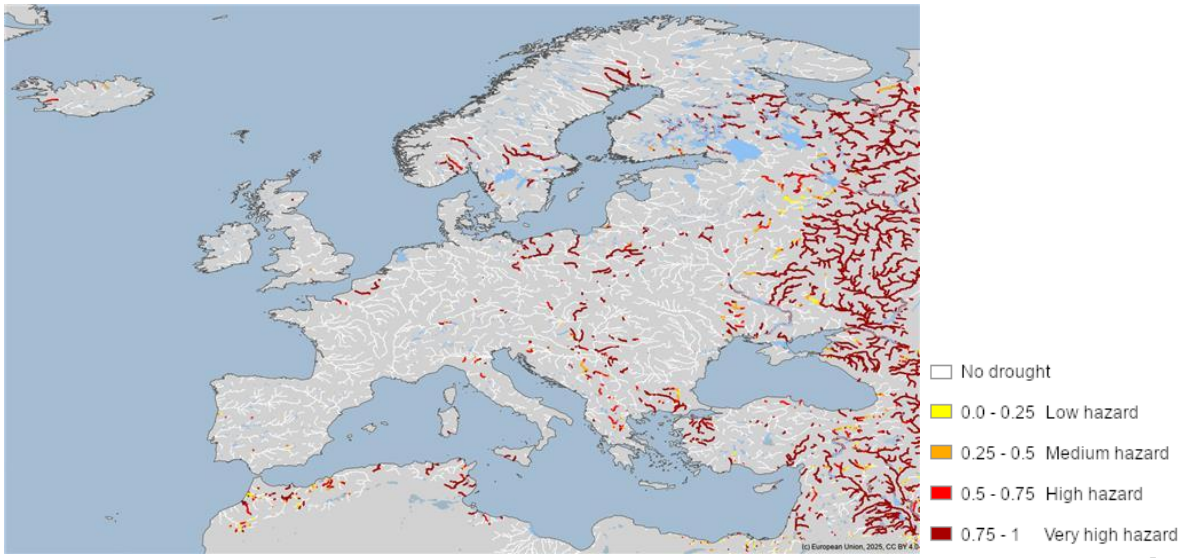


Figure 5: Low-Flow Index (LFI) for early June 2025. LFI ranges from 0 (no drought) to 1 (very high drought hazard).[5]

The Rhine River, as shown by both the LFI and the measured data, is currently not affected by low flow levels (Fig. 6, measured data are provided by the International Commission for the Protection of the Rhine ICPR). Despite the lower precipitation (especially in the downstream basin), the Rhine River basin flow is sustained by snowmelt processes and by the upstream basin contribution.

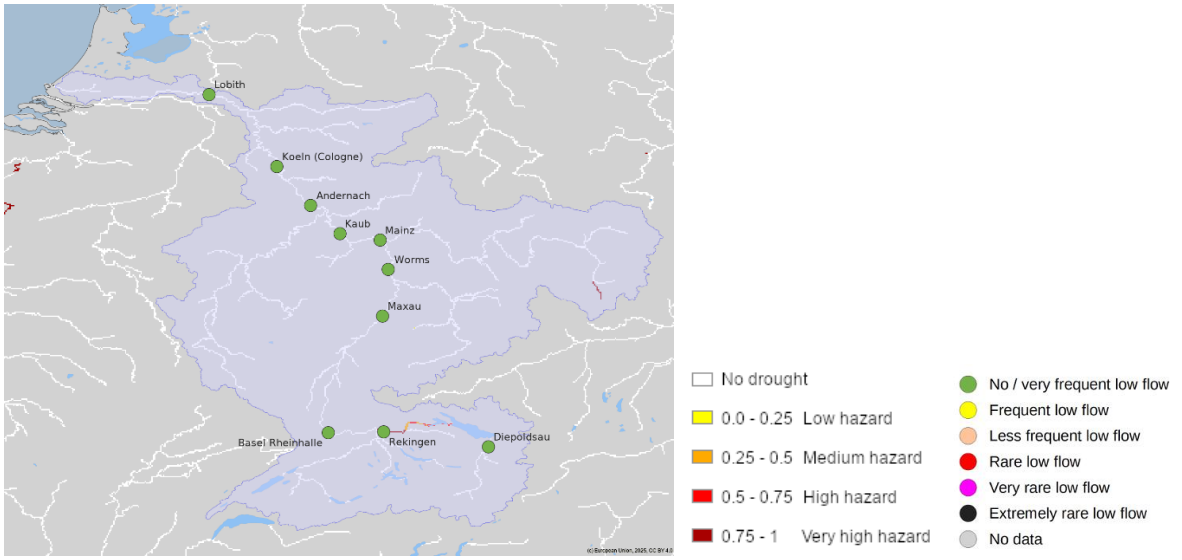


Figure 6: *Low-Flow Index (LFI) at early June 2025 compared to low flow assessment based on ICPR data. A Low-Flow Index of 0 corresponds to no drought and a value of 1 to the highest drought hazard.*

Vegetation

By looking at the conditions in late May 2025, the satellite-derived fAPAR (fraction of Photosynthetically Active Radiation) anomaly indicator[7] shows vegetation stress mainly over northern Africa, western Syria and south-eastern Türkiye. Over large areas in eastern Europe, negative anomalies are emerging (Fig. 7). In central-northern Europe wide areas of missing data do not allow for a proper assessment of the vegetation condition. Dedicated information on the agricultural yield forecast for Europe is provided in the JRC MARS (Monitoring Agricultural ResourceS) Bulletins[8].

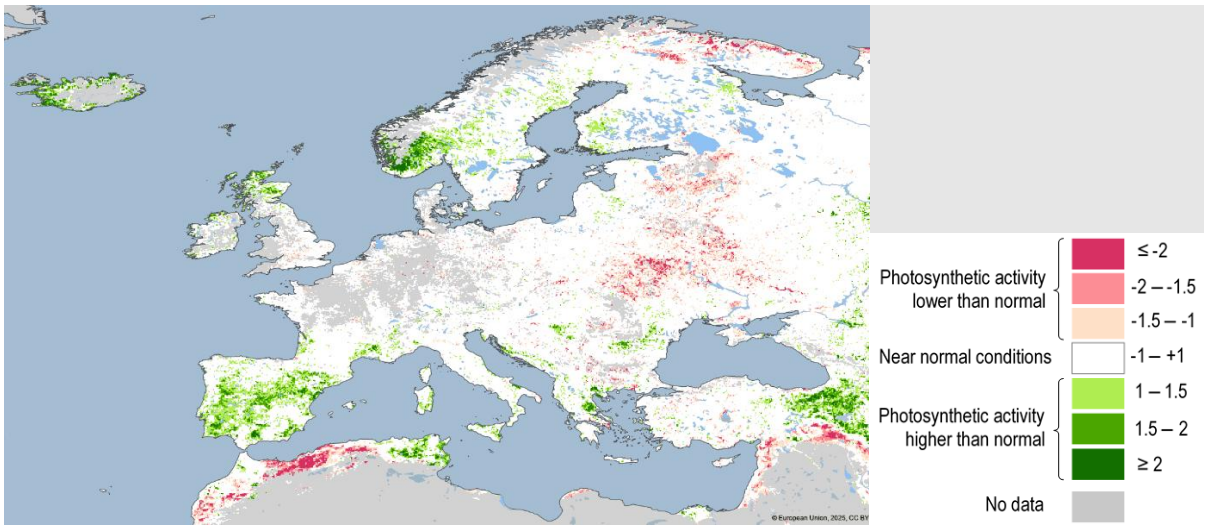


Figure 7*: Satellite-derived fAPAR anomaly indicator (measuring photosynthetic activity of vegetation), for late May 2025.*[7]

Seasonal forecast

Drier than normal conditions are forecasted from June to August 2025 by the multi-system ensemble (Fig. 8). over a very large region extending from the south-eastern UK to the Black Sea, and including most of eastern and south-eastern Europe as well as south-western Russia. Wetter than average conditions are mainly predicted for Iceland, the northern UK, and Norway. There is in general a good agreement among the single systems that compose the multi-system ensemble, pointing to higher confidence on the predictions.

[7] For more details on the satellite-derived Fraction of Absorbed Photosynthetically Active Radiation (fAPAR) anomaly indicator, and the other GDO and EDO indicators of drought-related information used in the report, see the Appendix at the end of the document.
[8] https://joint-research-centre.ec.europa.eu/monitoring-agricultural-resources-mars/jrc-mars-bulletin_en

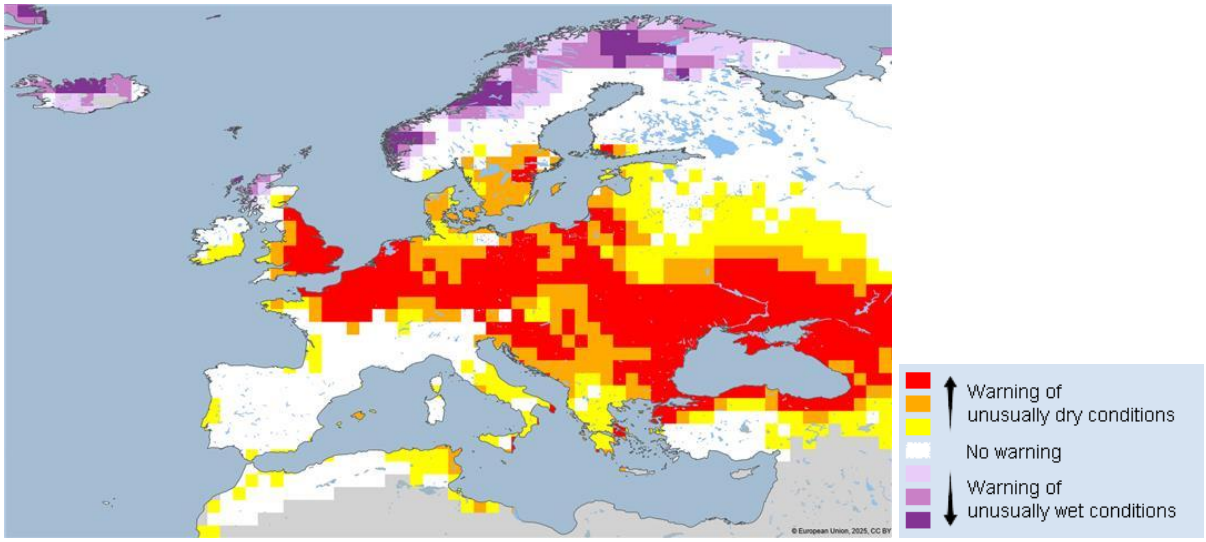


Figure 8: Multi-system Indicator for Forecasting Unusually Wet and Dry Conditions, June - August 2025, based on dynamic forecasting systems from eight producing centres : ECMWF (European Centre for Medium-Range Weather Forecasts), CMCC (Centro Euro-Mediterraneo sui Cambiamenti Climatici), DWD (Deutscher Wetterdienst), ECCC (Environment and Climate Change Canada), Météo France, NCEP (USA National Centers for Environmental Prediction), UKMO (UK Meteorological Office), BOM (Bureau of Meteorology, Australia). The baseline period is 1993-2016.[9]

Based on the Copernicus Climate Change Service (C3S) seasonal forecasts[10] (not shown here), warmer than usual conditions are likely to occur in Europe up to September 2025. Precipitation forecasts are generally below average, with slightly wetter forecast for northern Scandinavia and a dry anomaly for eastern Europe. Some differences and variability between models still give some uncertainties in terms of intensity and the spatial pattern of the seasonal precipitation forecast. However, they all point to a dry and hot summer in Europe. Close monitoring is required to assess the severity and the extent of the impacts over the coming season.

As shown in Figure 9, most of eastern Europe is expected to be affected by low flow anomalies in July 2025, with extreme low flow anomaly potentially affecting western Russia, south-eastern Türkiye, and central-eastern Mediterranean islands. In the regions highlighted in Figure 9, the prolonged lack of precipitation and the warmer than average temperatures are expected to trigger impacts on agriculture, ecosystems and energy production. Water resource management should be planned cautiously to reduce the risks and the impacts.

[9] For more details on the Indicator for Forecasting Unusually Wet and Dry Conditions, and the other GDO and EDO indicators of drought-related information used in the report, see the Appendix at the end of the document.

[10] https://climate.copernicus.eu/seasonal-forecasts

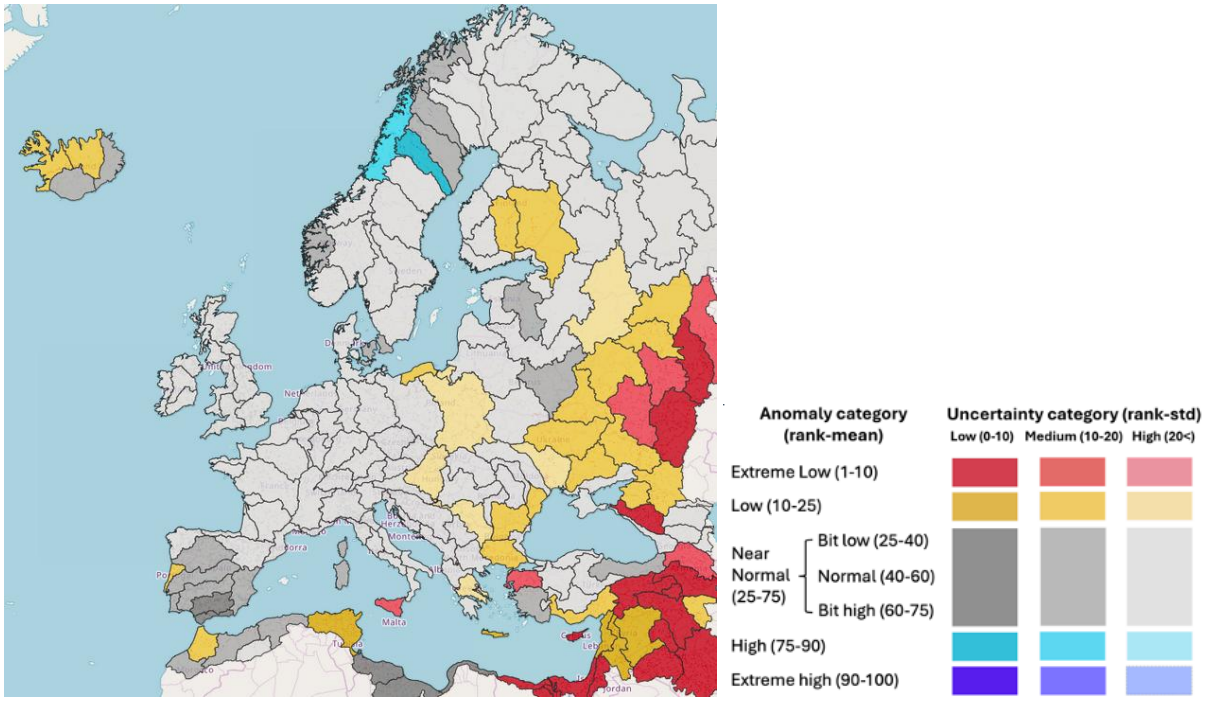


Figure 9: Seasonal forecast anomaly and uncertainty for July 2025 step within the 7 months simulation run from June to December 2025, information aggregated by basin. Different colours indicate the anomaly category, while the colour intensity shows the confidence level in the anomalies, with the lighter colours highlighting higher uncertainty. The forecast anomaly and uncertainty signals are derived by comparing the EFAS hydrological forecast driven by ECMWF SEAS5 to the 99-value percentile climatology. The climatology is generated using ECMWF SEAS5 reforecasts over a 20-year period.[11] (See also Technical Note below).

Technical note:

- *The regions displayed in Fig. 10 are 204 major basins within the EFAS domain, the basin delineation was done semi-automatically, and the basin borders align with the 1 arcmin (~1.5 km) OS LISFLOOD river network in EFAS. This allows large-scale variability in weather to be captured, and forecast information to be summarized. The map in Fig. 10 shows the forecast river flow anomaly per region for July 2025 step within the 7 months simulation run from June to December 2025. Different colours indicate the level of anomalies, while the colour intensity shows the confidence level in the anomalies, with the lighter colours highlighting lower confidence.*

- *The analysis results shown in Fig. 10 are based on the OS LISFLOOD hydrological model outputs driven by 51 ensemble members of the ECMWF SEAS5 seasonal forecast. More information on OS LISFLOOD: De Roo et al., 2000. "Physically based river basin modelling within a GIS: the LISFLOOD model". Hydrological Processes, 14, 1981–1992. Additional and updated information: Open Source Lisflood (*https://ec-jrc.github.io/lisflood/*)*

[11] Source: The CEMS European Flood Awareness System (EFAS): https://www.efas.eu, documentation at EFAS sub-seasonal and seasonal forecasting - Copernicus Emergency Management Service - CEMS - ECMWF Confluence Wiki

Reported impacts

The European JRC MARS Bulletin - Crop Monitoring in Europe, of May 2025[12] reported that spring 2025 has seen stark regional weather contrasts affecting European agriculture. North-western Europe (Benelux, northern France, Germany, Poland, Sweden) faces severe rainfall deficit, leading to critically low soil moisture and concerns over winter/spring crop yields, though impacts remain limited due to cooler temperatures. Conversely, the Iberian Peninsula, Italy, and Greece have experienced abundant rainfall, boosting growing conditions and forecasting 15–20% higher yields in Spain/Portugal. However, sowing delays persist in northern Spain/Portugal due to excessive rain. In the western Maghreb (Morocco, Algeria), eastern Ukraine, and Cyprus, irreversible yield declines are expected. The drought in the Maghreb and Ukraine caused crop failures, while Cyprus faced an early winter end, dry spells, and cold waves. Earlier drought concerns in Bulgaria and Romania have eased due to recent adequate rainfall. Overall, weather extremes are reshaping regional agricultural outcomes.

According to GEOGLAM (Group on Earth Observation Global Agricultural Monitoring) Crop Monitor bulletins of May 2025[13] Europe faces significant drought impacts on crop conditions, particularly for wheat, maize, and soybeans. Northern, central, and eastern Europe are experiencing abnormally dry to drought conditions, with June forecasts indicating above-average temperatures and potential below-average precipitation in eastern Europe, exacerbating stress on crops. As for wheat, dry weather in the EU (especially northern and central regions) is concerning as winter wheat enters the critical flowering stage, while prolonged dryness in southeastern Anatolia and drought/frosts in the Ukrainian southern and eastern regions threaten yields. Maize sowing in the EU is nearing completion under mostly favourable conditions, but drought persists in Ukrainian eastern and southern areas. Soybean sowing in Ukraine also faces challenges due to soil moisture deficits in drought-affected regions. Overall, the drought reveals regional differences in crop resilience, with northern and eastern Europe bearing the brunt of adverse weather, while southern European conditions remain relatively stable.

[12] https://publications.jrc.ec.europa.eu/repository/handle/JRC141393
[13] https://www.cropmonitor.org/

Appendix: GDO and EDO indicators of drought-related information[14]

The Combined Drought Indicator (CDI) of the European Drought Observatory (EDO) is used to identify areas that may be affected by agricultural drought. The CDI is derived by combining the Standardized Precipitation Index (SPI), the Soil Moisture Index Anomaly (SMA), and the fAPAR anomaly. Areas are classified according to three primary drought classes: (1) "Watch", indicating less than normal precipitation; (2) "Warning", indicating that also soil moisture is in deficit; (3) "Alert", indicating that also vegetation shows signs of stress. Three additional classes – i.e. "Recovery", "Temporary Soil Moisture Recovery" and "Temporary Vegetation Recovery" – identify the stages of drought recovery processes in terms of impacts on soil moisture and vegetation.

The Standardized Precipitation Index (SPI) provides information on the intensity and duration of the precipitation deficit (or surplus). SPI is used to monitor the occurrence of drought. The lower (i.e., more negative) the SPI, the more intense is the drought. SPI can be computed for different accumulation periods: the 3-month period is often used to evaluate agricultural drought and the 12-month (or even 24-month) period for hydrological drought, when rivers fall dry and groundwater tables lower.

Lack of precipitation induces a reduction of soil water content. The Soil Moisture Index Anomaly provides an assessment of the deviations from normal conditions of root zone water content. It is a direct measure of drought associated with the difficulty of plants in extracting water from the soil.

The satellite-based fraction of Absorbed Photosynthetically Active Radiation (fAPAR) monitors the fraction of solar energy absorbed by leaves. It is a measure of vegetation health and growth. Negative fAPAR anomalies with respect to the long-term average are associated with negative impacts on vegetation.

The Multi-system Indicator for Forecasting Unusually Wet and Dry Conditions provides early risk information for Europe. The indicator is computed from forecasted SPI-1, SPI-3, and SPI-6 derived from eight components: ECMWF (European Centre for Medium-Range Weather Forecasts), CMCC (Centro Euro-Mediterraneo sui Cambiamenti Climatici), DWD (Deutscher Wetterdienst), ECCC (Environment and Climate Change Canada), Météo France, NCEP (USA National Centers for Environmental Prediction), UKMO (UK Meteorological Office), BOM (Bureau of Meteorology, Australia).

[14] For more details on the GDO and EDO indicators: https://edo.jrc.ec.europa.eu/factsheets

Glossary of terms and acronyms

- *BOM: Bureau of Meteorology, Australia*
- *CDI: Combined Drought Indicator*
- *CMCC: Centro Euro-Mediterraneo sui Cambiamenti Climatici*
- *CEMS: Copernicus Emergency Management Service*
- *DWD: Deutscher Wetterdienst*
- *EC: European Commission*
- *ECCC: Environment and Climate Change Canada*
- *ECMWF: European Centre for Medium-Range Weather Forecasts*
- *EDO: European Drought Observatory*
- *EFFIS: European Forest Fire Information System*
- *ERA5: ECMWF Reanalysis v5*
- *ERCC: European Emergency Response Coordination Centre*
- *EU: European Union*
- *fAPAR: Fraction of Absorbed Photosynthetically Active Radiation*
- *GDO: Global Drought Observatory*
- *GEOGLAM: Group on Earth Observation Global Agricultural Monitoring*
- *HCWI: Heat and Cold Wave Index*
- *ICPR: International Commission for the Protection of the Rhine*
- *JRC: Joint Research Centre*
- *KNMI: Royal Netherlands Meteorological Institute*
- *LFI: Low-Flow Index*
- *MARS: Monitoring Agricultural Resources*
- *NCEP: National Centers for Environmental Prediction (United States of America)*
- *SEA5: Seasonal Forecasting System 5*
- *SMA: Soil Moisture Anomaly*
- *SPI: Standardized Precipitation Index*
- *SWE: Snow Water Equivalent*
- *UKMO: United Kingdom Met Office*
- *VIIRS: Visible Infrared Imaging Radiometer Suite*

GDO and EDO indicators versioning

The GDO and EDO indicators appear in this report with the following versions:

GDO, EDO indicator	*Version*
Combined Drought Indicator (CDI)	*v.4.0.0*
Soil Moisture Index (SMI) Anomaly (SMA)	*v.3.0.2*
Low-Flow Index (LFI)	*v.3.1.0*
fAPAR (fraction of Absorbed Photosynthetically Active Radiation) Anomaly (VIIRS)	*v.3.0.0*
Multi-system Indicator for Forecasting Unusually Wet and Dry Conditions	*v.2.0.0*
Standardized Precipitation Index (SPI) (ERA5)	*v.2.0.0*

Check https://drought.emergency.copernicus.eu/download for more details on indicator versions.

Distribution

For use by the ERCC and related partners, and publicly available for download at GDO website: https://drought.emergency.copernicus.eu/reports

List of Figures

Authors

European Commission, Joint Research Centre, Dir. Societal Resilience and Security, Disaster Risk Management Unit
Drought Team
Toreti A. (Team Leader), European Commission, Joint Research Centre, Ispra, Italy.

Bavera D., Arcadia SIT, Milano, Italy.

Acosta Navarro J., European Commission, Joint Research Centre, Ispra, Italy.

Barbosa P., European Commission, Joint Research Centre, Ispra, Italy.

de Jager A., European Commission, Joint Research Centre, Ispra, Italy.

Ficchì A., NRB Italy / Trasys International.

Fioravanti G., European Commission, Joint Research Centre, Ispra, Italy.

Hrast Essenfelder A., European Commission, Joint Research Centre, Ispra, Italy.

Magni D., Arcadia SIT, Milano, Italy.

Mazzeschi M., Unisystems, Luxembourg.

Santos Nunes S., Seidor, Milano, Italy.

Volpi D, European Commission, Joint Research Centre, Ispra, Italy.

Floods Team
Salamon P. (Team Leader), European Commission, Joint Research Centre, Ispra, Italy.

Grimaldi S., European Commission, Joint Research Centre, Ispra, Italy.

McCormick N., European Commission, Joint Research Centre, Ispra, Italy.

GETTING IN TOUCH WITH THE EU

In person

All over the European Union there are hundreds of Europe Direct centres. You can find the address of the centre nearest you online (european-union.europa.eu/contact-eu/meet-us_en).

On the phone or in writing

Europe Direct is a service that answers your questions about the European Union. You can contact this service:

— by freephone: 00 800 6 7 8 9 10 11 (certain operators may charge for these calls),

— at the following standard number: +32 22999696,

— via the following form: european-union.europa.eu/contact-eu/write-us_en.

FINDING INFORMATION ABOUT THE EU

Online

Information about the European Union in all the official languages of the EU is available on the Europa website (european-union.europa.eu).

EU publications

You can view or order EU publications at op.europa.eu/en/publications. Multiple copies of free publications can be obtained by contacting Europe Direct or your local documentation centre (european-union.europa.eu/contact-eu/meet-us_en).

EU law and related documents

For access to legal information from the EU, including all EU law since 1951 in all the official language versions, go to EUR-Lex (eur-lex.europa.eu).

Open data from the EU

The portal data.europa.eu provides access to open datasets from the EU institutions, bodies and agencies. These can be downloaded and reused for free, for both commercial and non-commercial purposes. The portal also provides access to a wealth of datasets from European countries.

Science for policy

The Joint Research Centre (JRC) provides independent, evidence-based knowledge and science, supporting EU policies to positively impact society

EU Science Hub
Joint-research-centre.ec.europa.eu

Publications Office
of the European Union