European Environment Agency

8th Environment Action Programme

Drought impact on ecosystems in Europe

8TH EAP HEADLINE INDICATOR, 2023

Drought impact on ecosystems in Europe

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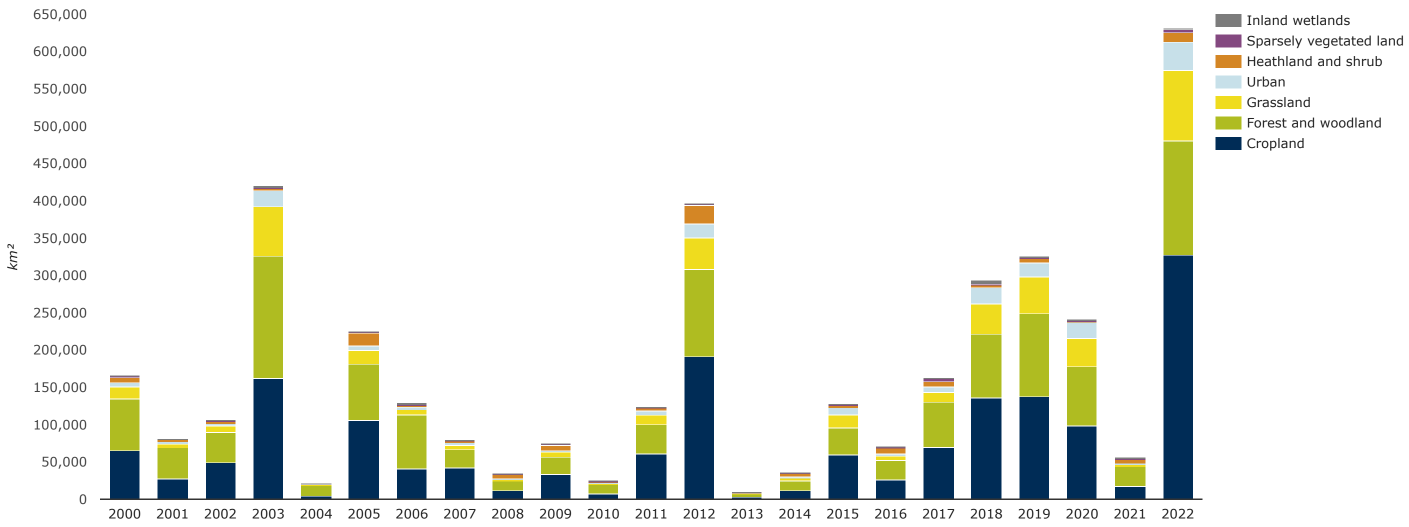
Monitoring meteorological drought impacts supports policy measures that target, among others, greenhouse gas removals and the adaptation of ecosystems to climate change. In 2022, Europe experienced its hottest summer and second warmest year on record, and consequently the largest overall drought impacted area: over 630,000km^2 as opposed to the 167,000km^2 annual average impacted area between 2000 and 2022. Between 2000 and 2022 there is an increasing trend in drought-impacted areas in the EU. Drought impacts may increase further if global mitigation and EU and national adaptation strategies are not effectively implemented.

Figure 1. Annual area of drought impact on vegetation productivity for 2000-2022, EU-27 (km²)



Source: EEA/Copernicus Land Monitoring Service and Copernicus Emergency Service.

Data used in the graph

YEAR	Cropland	Forest and woodland	Grassland	Urban	Heathland and shrub	Sparsely vegetated land	Inland wetlands
2000	65550	68524	15774	6274	7357	1791	328
2001	27976	40949	5616	2529	2710	1187	43
2002	49778	39345	8685	3191	3298	1167	1127
2003	161878	163271	66501	22348	1979	1268	2756
2004	4550	13823	1624	967	76	73	145
2005	105281	75762	18974	5685	17489	1372	49
2006	40365	72314	7260	3653	2436	453	3082
2007	41452	25725	5739	2875	2341	1097	146
2008	12214	11886	2134	1317	5607	1193	138
2009	32754	23455	7331	1580	7820	1122	937
2010	6755	13017	1821	586	1512	366	1296
2011	60794	39183	13459	5820	2881	695	643
2012	191067	117475	42476	17509	25209	2403	458
2013	2216	4522	1330	349	985	151	456
2014	12007	12728	3674	1360	5024	305	714
2015	59771	35924	17602	9557	3038	405	1546
2016	26466	25947	5311	2745	8454	887	1001
2017	69506	60711	12927	7219	7835	3263	1293
2018	135931	85708	39801	22597	3062	1029	5041
2019	136966	112556	49220	18487	5088	982	2320
2020	98045	79441	37836	21597	1535	564	2041
2021	17122	27040	2514	1690	4957	970	2077
2022	327795	152273	94281	37412	14012	3798	1648

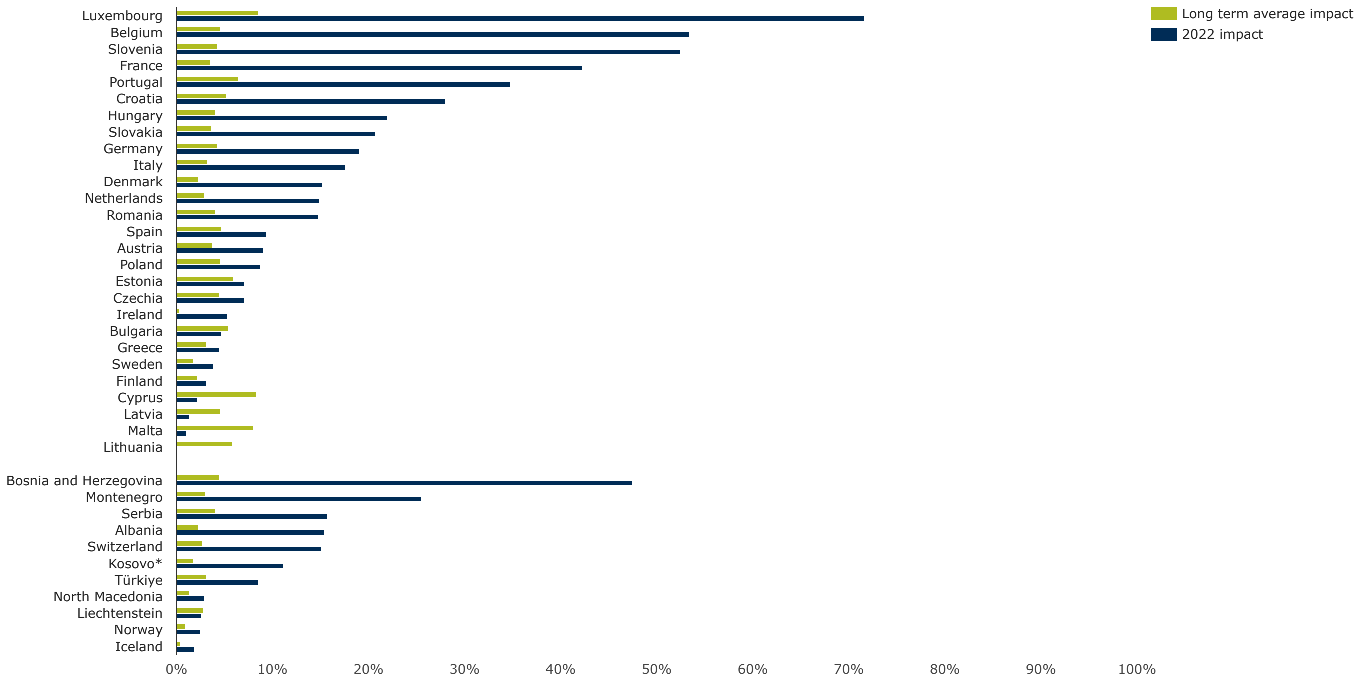
Drought impact hampers nature's ability to deliver a wide range of environmental, social and economic benefits. They impact the EU's ability to achieve its climate change mitigation objective [1][2] through decreasing carbon sequestration, and influence adaptation and the implementation of the EU biodiversity and soil strategies. Viable food production, sustainable management of natural resources and balanced territorial development, and long-term objectives of the EU Common Agriculture Policy are also affected by drought via decreasing soil moisture. It is therefore important that the EU takes action to decrease the severity of impacts and strengthen ecosystem resilience against climate change related droughts.

Europe experienced its hottest summer and second warmest year on record in 2022 with 631,000km^2 under drought impact (Figure 1, dashboard). This is an almost five-fold increase compared to the annual impact during 2000-2022, when ca. 167,000km^2 (4.2%) of EU land was affected every year by droughts due to low precipitation, high evaporation and heatwaves fuelled by climate change. The annual extent of intense drought impacts in the EU, of which six years were in the last decade, shows an increasing trend (Figure 1, dashboard) as a contributing factor to worsening ecosystem conditions [3].

During 2000-2022, the annual impacted area of EU cropland was around 73,000km^2 (ca. 5% of cropland, dashboard), contributing to crop failures. The average annual impacted area in forests was 56,000km^2 (ca. 4% of forests). Forests and woodlands sequester large amounts of carbon, but drought conditions slow this process. Grasslands and wetlands are among the most biodiverse areas in the EU, storing a large amount of carbon in the below ground biomass pool. When soil moisture is in deficit, this carbon is gradually released. The average annual drought impact on grassland was around 20,000km^2 (ca. 5% of grasslands) comparable to the area of Slovenia. In absolute values the annual impacted wetland area was less than 2% of EU wetland. Here an increasing trend can be observed which contributes to CO_2 emissions due to lower-than-normal ground water levels.

By 2030 the frequency and intensity of heatwaves is projected to increase[4] whereas in the continental and Mediterranean regions summer precipitation is projected to decrease [5]. Based on this and the current trends, drought impacted areas may not decrease by 2030. It is important that land management practices (e.g. cultivating drought tolerant and cover crops and leaving crop residuals on the ground) are adequately adjusted in a timely manner to mitigate future impacts of droughts and that EU and national adaptation strategies are effectively implemented.

Figure 2. Drought impact area during 2022 in comparison to the 2000-2020 average drought impact, in % of the country territory (EEA-38 region)



Source: EEA/Copernicus Land Monitoring Service and Copernicus Emergency Service.

Data used in the graph

Country	Long term average impact	2022 impact
Luxembourg	8.6	71.7
Belgium	4.6	53.4
Slovenia	4.3	52.4
France	3.5	42.3
Portugal	6.4	34.8
Croatia	5.2	28
Hungary	4	21.9
Slovakia	3.6	20.7
Germany	4.3	19
Italy	3.3	17.6
Denmark	2.3	15.2
Netherlands	2.9	14.8
Romania	4	14.7
Spain	4.7	9.3
Austria	3.7	9
Poland	4.6	8.8
Estonia	6	7.1
Czechia	4.5	7.1
Ireland	0.2	5.3
Bulgaria	5.4	4.7
Greece	3.2	4.5
Sweden	1.8	3.8
Finland	2.1	3.2
Cyprus	8.3	2.1
Latvia	4.6	1.4
Malta	8	1

Country	Long term average impact	2022 impact
Lithuania	5.9	0
Bosnia and Herzegovina	4.5	47.5
Montenegro	3	25.5
Serbia	4	15.7
Albania	2.2	15.4
Switzerland	2.7	15.1
Kosovo*	1.8	11.1
Türkiye	3.1	8.5
North Macedonia	1.4	2.9
Liechtenstein	2.8	2.6
Norway	0.9	2.5
Iceland	0.5	1.9

In most EU Member States, the 2022 drought impacted area was much larger than the 2000-2020 average impacted area (Figure 2). The largest impacts in 2022 occurred in Belgium, Luxembourg and Slovenia. Drought affected as much as 70% of Luxembourg's area in 2022, much above the annual average impacted area during 2000-2020 which was around 20% (Figure 2). Drought impacted above 50% of the territories in Belgium and Slovenia, much above the long-term average (below 10% of the territory). In 2022, drought was also dominant in France and Portugal impacting over 35% of the countries' area, while in Croatia almost 30% was impacted. In all these countries the 2022 drought largely exceeded the long-term average impacted area.

From the non-EU region, Bosnia and Herzegovina (47% of the country) and Montenegro (25% of the area) experienced highest impact in 2022.

The trend of drought-impacted areas as well as in the number of impacted countries continue to increase in the Member States and in the non-EU member and cooperating countries of the European Environment Agency (see dashboard).

Supporting information

Definition

This indicator only addresses meteorological droughts, hence the annual deficit in soil moisture due precipitation shortages as opposed to hydrological droughts which occur when low water supply becomes evident, especially in streams, reservoirs, and groundwater levels, usually after many months of meteorological drought. The indicator monitors anomalies and long-term trends in vegetation productivity based on remote sensing observed time series data of vegetation indices in areas that are under pressure from drought.

Drought pressure is computed as soil moisture deficit within the growing season, using the Soil Moisture Index (SMI)10 time series of the Copernicus EMS European Drought Observatory of the European Commission Joint Research Centre (EDO, 2019).

Drought impact during the growing season is indicated as a severe negative annual productivity anomaly in drought-pressured areas, i.e. areas with negative annual soil moisture anomalies. Detailed indicator specifications are described under 'Methodology'.

Methodology

Soil moisture deficit is calculated at the pixel level by deriving z-score anomalies from the Soil Moisture Index, such as:

SMA = SMI-SMI**MN (2001-2020)**/SMI**SD (2001-2020)**, (Equation 1)

Where SMA is Soil Moisture Anomaly, MN is the 2001-2020 average SMA and SD is the 2001-2020 standard deviation of the SMI. The calculated SMA values are then averaged within the growing season to derive the SMA(gs) time series.

The aggregation is performed by averaging the monthly SMA values extracted from the EDO within the vegetation growing season. The vegetation growing season was defined by using the start and the end date of the growing period (SOS or Start of Season and EOS or End Of Season, respectively) extracted from the Medium Resolution Vegetation Phenology and Productivity product of the Copernicus Land Monitoring Service. The SOS and EOS datasets can be explored and downloaded from EEA's data repository under sdi.eea.europa.eu. Direct links to the datasets:

SOS:

https://sdi.eea.europa.eu/catalogue/srv/eng/catalog.search#/metadata/a7b2369b-dd62-4d02-99e2-e5d74a8ec83a

EOS:

https://sdi.eea.europa.eu/catalogue/srv/eng/catalog.search#/metadata/a3cfb2c4-156a-413c-a73b-15ebbb016557

Annual drought pressure is derived at the pixel level and is simply defined as:

SMA(gs) < -1, (Equation 2) .

Negative soil moisture anomalies indicate that the annual average availability of soil moisture for plants is lower than the long-term normal condition and drops to such a level that it might impact vegetation productivity.

To indicate **drought pressure area**, strong negative soil moisture anomalies are selected by setting a maximum value at -1 standard deviation (std). The drought pressure area is the sum of those grid cells within each analytical unit (see later), where the growing season aggregated SMA values are < -1. This threshold was selected to allow the monitoring of vegetation responses to only considerable soil moisture deficits. Choosing the threshold of -1 std follows the recommendations of the European Drought Observatory (EDO11) of the European Commission's Joint Research Centre. This approach is also followed in the EEA indicator addressing soil moisture deficit (EEA, 2021). By applying this threshold, drought impacts can better be distinguished from response in vegetation anomalies due to other environmental pressures such as e.g. wildfires, storms or insects infestations. As vegetation productivity decline may be also caused by anthropogenic impacts, pixels with land use change were excluded from the statistical population based on the Copernicus Corine Land Cover 2000-2018 accounting layers datasets (12).

The **drought pressure intensity** is defined as the annual, growing season aggregated SMA values where SMA < -1, where aggregation is performed by temporal and spatial averaging within analytical units (see later).

Annual drought impact is quantified as:

SMA(gs)<0 and LINTa<-0.5, (Equation 2) ,

where LINTa (lLarge Integral anomaly) refers to the 2000-2022 annual anomalies in growing season productivity derived from remote-sensing data and approximated using vegetation indices (see more explanation below).

The LINT anomalies were calculated as standard deviations from the long-term mean:

LINTa(year xi-n)=(LINT(xi)-LINT(LTA))/LINT(std)), (Equation 3)

Where xi-n indexes the time series (from i=2000 till n=2021), LINT(LTA) is the long term (using the background of 2000-2020) average of the LINT values and LINT(std) is the long term (using the background) standard deviation of the LINT values for the same period.

The threshold of a -0.5 standard deviation for the vegetation anomalies was selected to indicate small deviations from the long-term mean and to allow for moderate productivity levels under drought impact to be accounted for. In a Europe-wide study, this is a pragmatic solution that provides a wide overview of drought impact situations in Europe. However, local studies might consider setting a lower or higher threshold to reflect local conditions.

The drought impact area is the sum of those grid cells within each analytical unit (see below) where the growing season aggregated SMA values are < -1 and the LINT anomalies are < -0.5. The drought impact intensity is defined as the annual aggregated LINT anomalies where SMA < -1 and LINTa < -0.5. Aggregation is performed by temporal and spatial averaging within analytical units.

For the analytical units of this indicator the following datasets were combined:

1 Administrative boundaries, aligned with the Corine Land Cover: https://sdi.eea.europa.eu/catalogue/srv/eng/catalog.search#/metadata/08c0e074-4a98-4545-bd85-f58fe3f74d82

2 Environmental Zones:

3 https://sdi.eea.europa.eu/catalogue/srv/eng/catalog.search#/metadata/6ef007ab-1fcd-4c4f-bc96-14e8afbcb688

4 Corine Land Cover accounting layers 2000 and 2018:

https://sdi.eea.europa.eu/catalogue/srv/eng/catalog.search#/metadata/fa9bd2f5-8006-42e7-8090-7b9f9b09bf29 and

https://sdi.eea.europa.eu/catalogue/srv/eng/catalog.search#/metadata/5a5f43ca-1447-4ed0-b0a6-4bd2e17e4f4d.

1 MAES ecosystem types derived from the Corine Land Cover as Look Up Tables (can be distributed upon request).

2 Land cover flows:

https://sdi.eea.europa.eu/catalogue/srv/eng/catalog.search#/metadata/835d25e0-b9dc-4fb9-a8b6-f9e5336fa357 .

The combination of the above datasets resulted in analytical units with 2,700,000 records in the database, which is easy to handle with desktop computers.

Vegetation productivity: LINT, or Large Integral

In summary, vegetation productivity is derived from remote-sensing observed time series data of vegetation indices. The vegetation index used for the LINT index is the Plant Phenology Index (PPI) (Jin and Eklundh, 2014). The PPI is based on the MODIS Nadir BRDF-adjusted reflectance product (MODIS MCD43 NBAR). The product provides reflectance data for the MODIS 'land' bands (1-7), adjusted using a bidirectional reflectance distribution function. This function models values as if they were collected from a Nadir view to remove so-called cross-track illumination effects. The PPI is a new vegetation index optimised for the efficient monitoring of vegetation phenology. It is derived from radiative transfer solution using reflectance in the visible-red (RED) and near-infrared (NIR) spectral domains. The PPI is defined as having a linear relationship with the canopy green Leaf Area Index (LAI) and its temporal pattern is very similar to the temporal pattern of gross primary productivity (GPP) estimated by flux towers at ground reference stations. The PPI is less affected by the presence of snow than other commonly used vegetation indices such as the Normalized Difference Vegetation Index (NDVI) or the Enhanced Vegetation Index (EVI).

The product is distributed with a 500m pixel size (MODIS Sinusoidal Grid) with an 8-day compositing period. The large integral, or LINT, used in this indicator is the mathematical integral calculation of the smoothed and gap-filled PPI time series data between the start and end of the growing season points, being the SOS and EOS datasets described above.

All input data sets are derived with wall-to-wall coverage of the land surface of the EEA-38 region.

No gap filling was needed.

Policy/environmental relevance

The indicator is a headline indicator for monitoring progress towards the 8th Environment Action Programme. It contributes mainly to monitoring aspects of the 8th EAP priority objective Article 2.2.b that shall be met by 2030: ‘continuous progress in enhancing and mainstreaming adaptive capacity, including on the basis of ecosystem approaches, strengthening resilience and adaptation and reducing the vulnerability of the environment, society and all sectors of the economy to climate change, while improving prevention of, and preparedness for, weather- and climate-related disasters’ [6]. More specifically, and in accordance with the European Commission Communication on the 8th EAP monitoring framework, the indicator assesses whether the EU will ‘decrease the area impacted by drought and loss of vegetation productivity’ by 2030 [7].

Justification for indicator selection

Droughts are extreme climate events that are induced by temporary water deficits and may be related to a lack of precipitation, soil moisture, streamflow or any combination of the three taking place at the same time. Droughts can occur in most parts of the world, even in wet and humid regions, and can have profound impacts on agriculture, industry, tourism and ecosystems and the services they provide. In arid and semi-arid ecosystems (including the Mediterranean regions), limited water availability is a recurrent phenomenon and governs plant growth and phenology. On the other hand, in temperate and boreal regions, sporadic prolonged dry periods can lead to water-limited conditions and have far-reaching impacts on ecosystems’ carbon balance and structure. The immediate impacts of droughts within the growing season (i.e. a few weeks in duration) are, for example, lead to decline in crop production, pasture growth and fodder supplies from crop residues. Prolonged water shortages (e.g. of several months) may, among other things, potentially increase wildfire occurrences.

The monitoring and assessment of drought impacts are complex because they vary in their severity and often depend on the different phases of the given drought event. Differences in the physiological response of vegetation to water deficits cause differences in the sensitivity and resilience of terrestrial ecosystems to drought, and ultimately influence the types of impacts that droughts have, i.e. slow growth or reduced greenness, that lead to loss of biomass or may even result in plant mortality. Consequently, significant changes in vegetation productivity provide an indication/early warning of imminent impacts on ecosystems’ equilibrium states.

Context description

In May 2020, the EU adopted a Biodiversity strategy for 2030 (COM(2020) 380 final), related to protecting and restoring nature. The strategy states that the ‘biodiversity crisis and the climate crisis are intrinsically linked. For the EU, the cost of not reaching the 2020 biodiversity strategy headline target of halting the loss of biodiversity and ecosystem services has been estimated at EUR50 billion per year. In addition to these economic costs, loss of biodiversity means that ecosystems and the societies that rely upon them are more fragile and less resilient in the face of challenges such as climate change, pollution and habitat destruction. Droughts have an impact on several land and soil functions, as well as ecosystem services, in both urban and rural areas. By putting pressure on natural ecosystems, droughts hampered the achievement of the EU biodiversity strategy’s 2020 objectives.

Climate change accelerates the loss of biodiversity through droughts, flooding and wildfires, while the loss and unsustainable use of nature in turn also contribute to climate change’. The new EU Strategy on Adaptation to Climate Change (COM(2021) 82 final) shows the importance of healthy soils in minimising impacts of floods and droughts. The new Soil Strategy for 2030 (COM(2021) 699 final) points out the crucial and urgent need to address the human caused impacts on soils due to climate change and it calls for the same level of protection for soils that is given to air and water. Therefore, the Commission strongly recommends integrating in the new EU Soil Strategy actions against erosion and desertification linked to extreme floods, droughts and fires. Climate change impacts are also reflected in the proposal for a nature restoration law, adopted in June 2022 by the European Commission, that aims to put all natural and seminatural ecosystems on the path to recovery by 2030. Droughts negatively affect agricultural ecosystems, the resilience of forest ecosystems and in urban ecosystems droughts indirectly affect the ability of green urban spaces to protect people against heatwaves. In particular, the impacts of extended droughts on ecosystems need to be assessed because they can lead to significant loss of vegetation productivity and irreversible damage to the condition of ecosystems and land degradation, in extreme cases desertification.

Drought pressures on natural ecosystems also play an important role in the EU's ability to implement its strategy on green infrastructure (GI). In contrast to the most common 'grey' (human-made, constructed) infrastructure approaches that serve one single objective, GI promotes multifunctionality, which means that the same area of land is able to perform several functions and offer multiple benefits if its ecosystems are in a healthy state. More specifically, GI aims to enhance nature's ability to deliver multiple valuable ecosystem goods and services, potentially providing a wide range of environmental, social, climate change adaptation and mitigation, and biodiversity benefits. Droughts diminish the normal condition of ecosystems and their capacity to provide services that could be integrated into GI.

The EU legislation for LULUCF as part of the 2030 climate target sets clear targets for the LULUCF sector for each Member States. The capacity of forests and other land uses to store and remove carbon from the atmosphere will depend on management as well as a number of natural circumstances, such as variations in growing conditions (soil quality, temperature, precipitation and droughts) and frequency of natural disturbances (storms and fires). The regulation provides some flexibility for EU Member States to compensate excess emissions due natural disturbances impacting forests during the period 2021-2025 and for the period 2026 to 2030 natural disturbances as well as the long-term impact of climate change resulting in excess emissions or diminishing sink that are beyond their control or the effects of an exceptionally high proportion of organic soils in the managed land area. As a condition for access to flexibilities related to natural disturbances, Member States must provide evidence to the Commission on the impact of these natural disturbances including historic level of natural disturbances for the period 2001-2020, the type of disturbance, information on the land areas affected, their geographical location and the associated emissions and where feasible information on measures the Member States undertook to prevent or limit the impact of those natural disturbances. For the long-term impact of climate change, Member States must submit evidence to the Commission including a quantitative assessment of the effects on net emissions or net removals in tonnes Co2 equivalent for the affected areas and shall be based on geographically explicit data and the best scientific evidence available. Those indices and data shall be based on observed changes covering at least the period 2001 to 2025 and on scientifically reviewed projections and observations for the period 2026 to 2030 and include climate characteristics relevant for the LULUCF sector such as aridity, mean temperatures, mean precipitations, frost days, the duration of meteorological or soil moisture droughts. Accounting for natural disturbances has been foreseen for forests only for the 2021-2025 reporting period, whereas the new LULUCF regulation foresees application to all land uses. The drought impact indicator can be used to confirm submitted MSs data when natural disturbances are reported especially from 2026 on when natural disturbances can be accounted for on all impacted lands.

The role of the common agricultural policy (CAP) is to provide a policy framework that supports and encourages producers to address economic, environmental (i.e. relating to resource efficiency, soil and water quality, and threats to habitats and biodiversity), climate and territorial challenges, while remaining coherent with other EU policies. This translates into three long-term CAP objectives: (1) viable food production, (2) sustainable management of natural resources and climate action, and (3) balanced territorial development. Given the pressure that droughts put on natural resources, agriculture's environmental performance has to improve through more sustainable production methods. Farmers also have to adapt to challenges stemming from changes to the climate by pursuing climate change mitigation and adaption actions.

Targets

No specific targets.

Accuracy and uncertainties

Methodology uncertainty

The approach cannot account for land use or land cover changes that have occurred within a pixel in the period of analysis. For example, clear cuts within forest ecosystems or the use of irrigation systems as part of management processes in agricultural areas might increase or decrease vegetation productivity independently of drought occurrences. This can introduce noise to the data sets that might further bias the assumed pixel-based relationships between drought pressure and vegetation productivity.

Another source of uncertainty is related to the simplification of the drought impact model for its implementation in the operational setting. On one hand, the same thresholds for deviations in soil moisture and vegetation production imply similar impacts/impact severity in different sectors (agriculture, forestry, etc), which gives an acceptable approximation on the continental scale but might need to be adjusted to local conditions. Still, in some cases, the start, end, severity and spatial extent of a drought, as well as the propagation of its impacts through the whole land systems, might change as a result of additional climate and/or surrounding biophysical conditions, such as temperature, snowpack, albedo and soil's water-holding capacity.

Data set uncertainty

The datasets represent the average impact on the productivity of all terrestrial ecosystems within an area covered by a pixel of 500m×500m. Therefore, the indicator can be used at coarse resolution only, indicating drought impacts on main terrestrial ecosystems. As opposed to field measurements, remote-sensing products measure vegetation's light absorption from a satellite at a height of several hundred kilometres, which might introduce bias due to atmospheric disturbances.

Rationale uncertainty

No uncertainty has been identified.

Data sources and providers

- Medium Resolution Vegetation Phenology and Productivity: Large integral (raster 500m), Oct. 2022, European Environment Agency (EEA)

Metadata

DPSIR

Impact

Topics

Agriculture and food # Biodiversity # Climate change adaptation

Tags

Biodiversity # Productivity # Land cover # 8th EAP # LSI011 # Drought impact # Ecosystems

Temporal coverage

2000-2022

Geographic coverage

Albania
Austria
Belgium
Bosnia and Herzegovina
Bulgaria
Croatia
Cyprus
Czechia
Denmark
Estonia
Finland
France
Germany
Greece
Hungary
Iceland
Ireland
Italy
Latvia
Liechtenstein
Lithuania
Luxembourg
Malta
Montenegro
Netherlands
North Macedonia
Norway
Poland
Portugal
Romania
Serbia
Slovakia
Slovenia
Spain
Sweden
Switzerland

Typology

Descriptive indicator (Type A - What is happening to the environment and to humans?)

UN SDGs

Climate action

Unit of measure

FIG1: Area of drought impact (km^2)

FIG2: Percentage

Frequency of dissemination

Once a year

Contact

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References and footnotes

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2. https://ec.europa.eu/clima/eu-action/european-green-deal/2030-climate-target-plan_en ↲
3. Background level is set to the 2000-2020 average drought impact. ↲
4. Climate-ADAPT, 2022a, 'Daily maximum temperature — monthly statistics, 2011-2099', *European Environment Agency* (https://climate-adapt.eea.europa.eu/en/metadata/indicators/daily-maximum-temperature-monthly-mean-2011-2099#details) accessed October 31, 2022. ↲
5. Climate-ADAPT, 2022b, 'Precipitation sum, 2011-2099', (https://climate-adapt.eea.europa.eu/en/metadata/indicators/precipitation-sum-2011-2099#details) accessed October 31, 2022. ↲
6. EU, 2022, Decision (EU) 2022/591 of the European Parliament and of the Council of 6 April 2022 on a general Union environment action programme to 2030, OJ L 114, 12.4.2022, p. 22-36. ↲
7. EC, 2022, COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS on the monitoring framework for the 8th Environment Action Programme: Measuring progress towards the attainment of the Programme's 2030 and 2050 priority objectives - COM/2022/357 final ↲