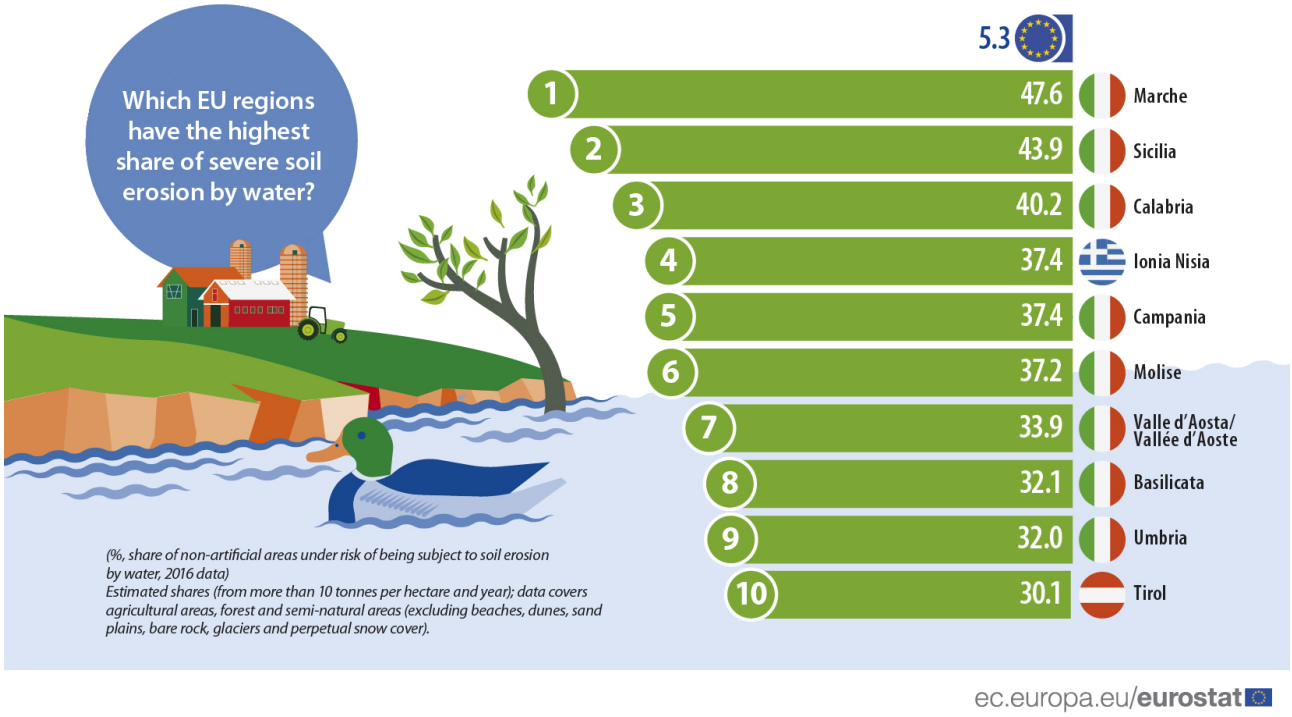
Environment statistics at subnational level

Statistics Explained

Data extracted in March 2020.
No planned article update.

" In 2017, the highest levels of air pollution for fine particulate matter were recorded in one of the four Greek capital regions, Kentrikos Tomeas Athinon, where the annual average was more than three times that of the EU-27. "

" Southern and mountainous regions of the EU tended to have the highest levels of severe soil erosion by water. "



Source: Eurostat

Climate change and environmental degradation are two of the most serious threats to the EU and the wider world. The United Nations (UN's) 2030 Agenda for Sustainable Development is a long-term strategy that seeks, among other socioeconomic and environmental goals, to protect the Earth from environmental degradation, through sustainable consumption and production, coupled with urgent action on climate change. The Agenda introduced a set of 17 sustainable development goals (SDGs) and to monitor progress the UN has adopted 232 indicators.

The sustainable development goals concerned with the environment are fully consistent with the European Green Deal which is the European Union's (EU's) growth strategy to become a modern, resource-efficient and sustainable economy — the first climate-neutral continent by 2050. The European Green Deal seeks to turn climate and

environmental challenges into opportunities, for example, by: undertaking to reduce net emissions of greenhouse gases to zero; ensuring economic growth is decoupled from resource use; cutting pollution; restoring biodiversity.

The first section of this article provides a description of land cover in the EU, with a particular focus on forests. The second section details information on air pollution and in particular exposure to fine particulate matter that may cause or aggravate, among others, a range of lung and cardiovascular diseases. The article concludes with statistics on soil, analysed in relation to soil sealing (imperviousness) and soil erosion.

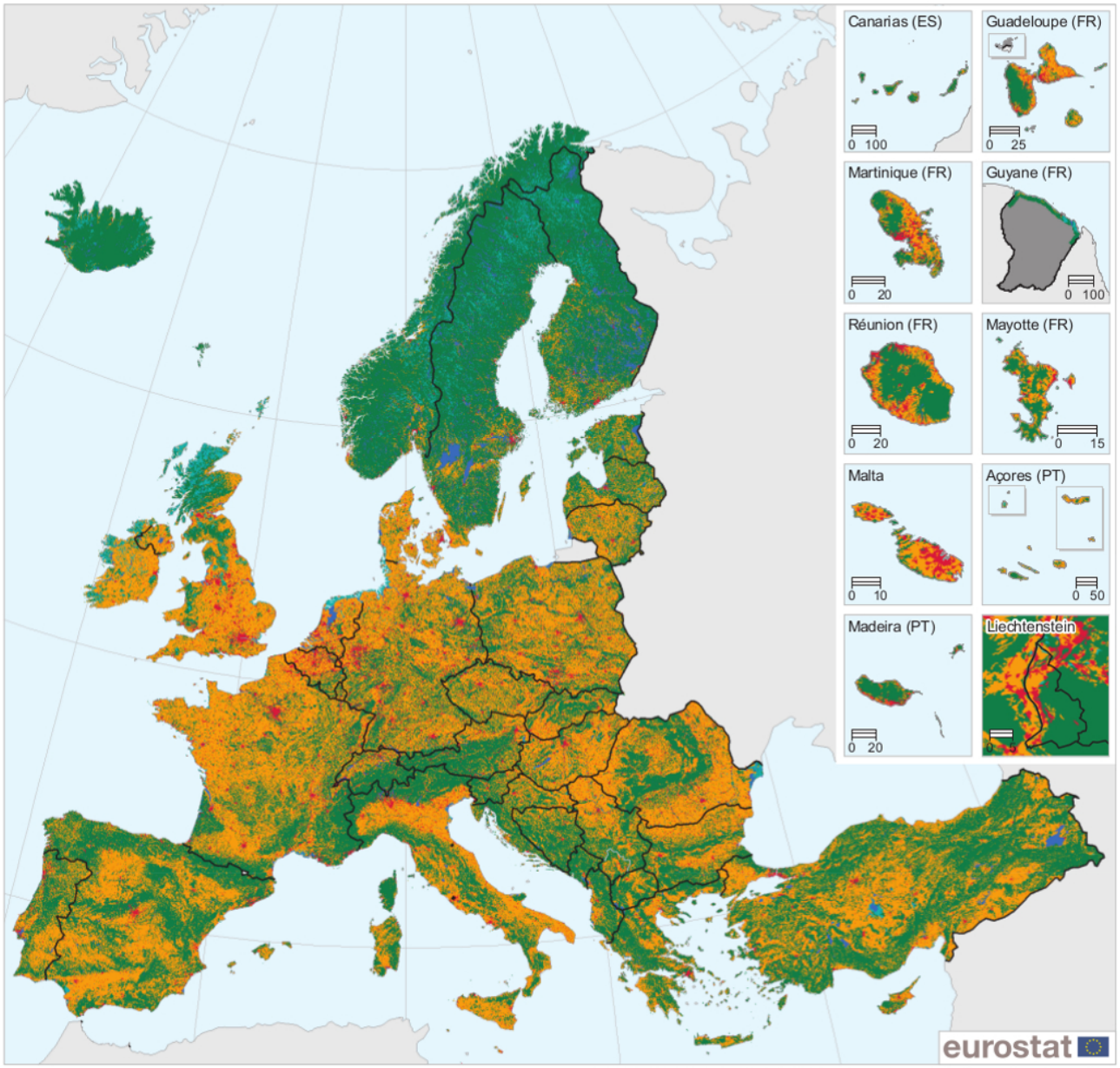
Land cover

Historically, human activity was generally assumed to have had little lasting impact on the land or the environment, as many people held a common belief that nature could restore or replenish itself. However, land has become a natural and economic resource used for multiple purposes: agriculture and forestry; mining, manufacturing and construction; distributive trades, transport and other services, as well as for residential and leisure use. The effects of certain phenomena — rising temperatures, the rapid disappearance of vast areas of forest, the gradual desertification of certain regions, or the rapid development of urban areas along coastlines — have contributed towards increasing awareness and recognition that land is a finite resource and its use constitutes one of the principal drivers of environmental change, with potential impacts on the climate, ecosystems, biodiversity and the overall quality of life.

The European Environment Agency (EEA) coordinates and integrates national databases on land cover into the Corine land cover (CLC) inventory. Through the visual interpretation of high-resolution satellite images, it produces an inventory of land cover, enabling various biophysical categories to be distinguished: artificial areas, agricultural areas, forests and semi-natural areas, wetland and water bodies. By analysing changes in these features, it is possible to support a broad range of environmental policy developments, such as: climate change mitigation, the conservation of biodiversity, agricultural or forest management, spatial planning, or the effects of soil sealing.

Map 1 presents data on land cover for 2018. Information is shown at a very fine level of detail, based on a matrix of 1 km^2 grid cells that overlay the EU territory. A high proportion of the EU's territory is used in an intensive form: for artificial land cover (urban settlements, industry and commercial units, or infrastructure). This is particularly true in some of the most densely populated parts of the EU, for example, Malta or an area covering much of Belgium, the Netherlands and north-west Germany. By contrast, forests and semi-natural areas (including moors, heathlands, bare rock, glaciers and perpetual snow) were more prevalent in sparsely populated areas of the EU — for example, the northern halves of Finland and Sweden or mountainous areas such as the Alps, the Pyrenees, or the Carpathians. Water covered a relatively low proportion of the total area of most EU Member States (particularly in southern parts of the EU). The main exceptions were Finland, Sweden and the Netherlands. The vast majority of the water cover in the Netherlands was composed of coastal wetlands, whereas there are several hundred thousand natural lakes across Finland and Sweden.

Land cover, 2018
(based on the most common form of land cover for a 1 km² grid)



Administrative boundaries: © EuroGeographics © UN-FAO © Turkstat
Cartography: Eurostat — GISCO, 05/2020.

- Artificial
- Agricultural
- Forest and semi-natural areas
- Wetlands
- Water bodies

0 200 400 600 800 km

The designation of Kosovo is without prejudice to positions on status, and is in line with UNSCR 1244/1999 and the ICJ Opinion on the Kosovo declaration of independence.

Source: Corine land cover 2018, European Environment Agency (EEA)

Map 1: Land cover, 2018 (based on the most common form of land cover for a 1 km² grid) Source: Corine land cover 2018, European Environment Agency (EEA)

Forest cover

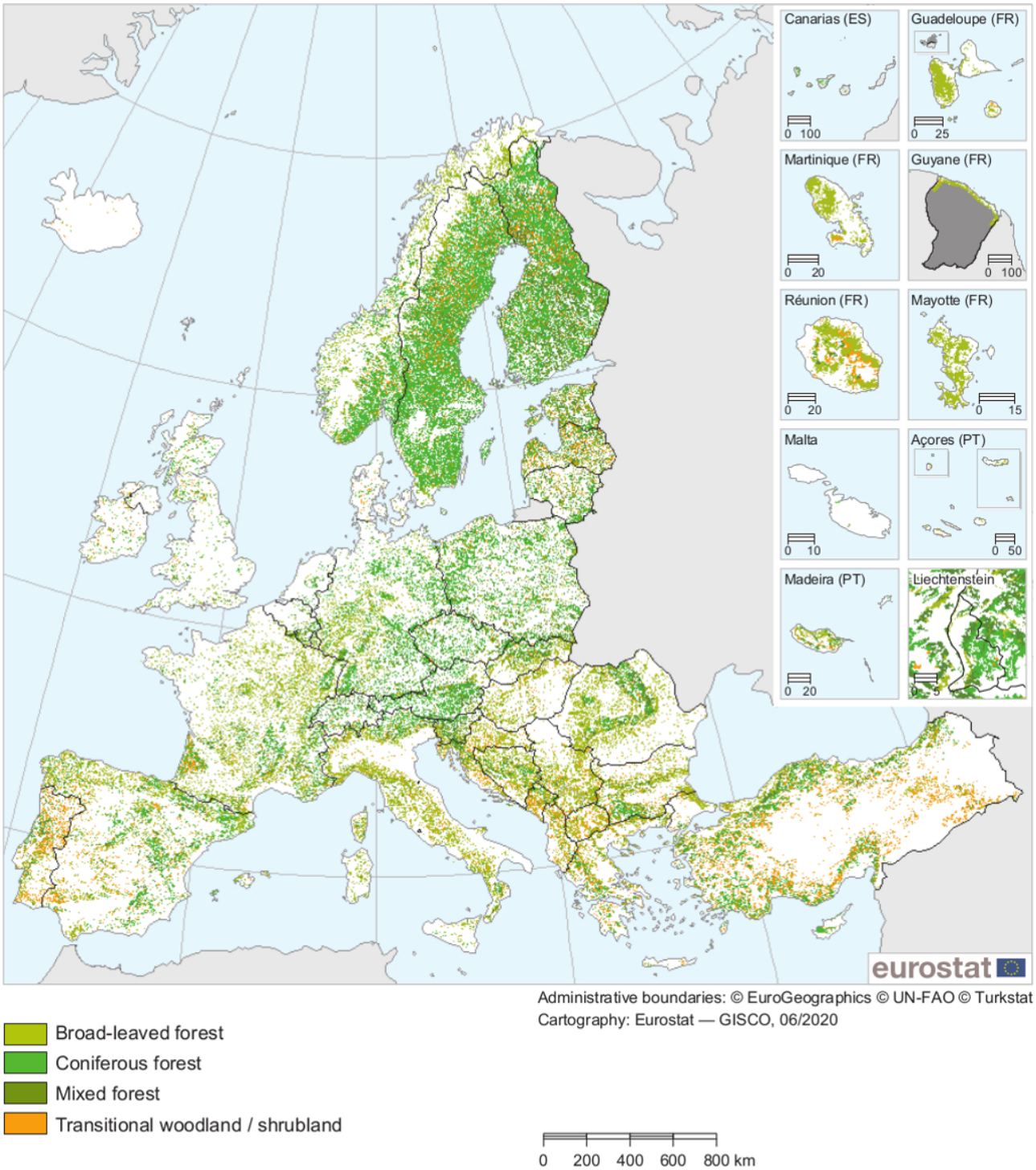
Forests are an essential part of the natural environment, providing habitats for a wide range of animal and plant life. One of the most important environmental roles that forests can play is to absorb carbon dioxide that would otherwise be in the atmosphere, thereby helping to mitigate climate change. Forests may also help protect landscapes against extreme weather events (such as floods or droughts) or related phenomena (such as erosion).

Contrary to much of the rest of the world, forest cover in the EU has increased gradually in recent years. According to the EEA, some 157 million hectares or 38 % of the EU-27's land surface was covered by forests in 2018. In absolute terms, the largest areas of forest cover were in Sweden (26.5 million hectares), Finland (21.5 million hectares) and France (14.4 million hectares). In relative terms, the highest proportions of forest tree cover were recorded in Finland (64 %), Sweden (59 %) and Slovenia (56 %); these were the only Member States to report that more than half of their land was covered by forests. By contrast, less than one tenth of the land surface areas of Denmark (9 %), the Netherlands (8 %) and Malta (1 %) were covered by forests.

Ecologically, the EU is one of the most forest-rich areas of the world, with great diversity in terms of different forest types, ranging from bogs and floodplain forests to boreal and alpine forests. In Nordic EU Member States and mountainous areas, coniferous forests predominate: they are typically composed of tall trees in dense stands, with little vegetation growing beneath the forest canopy. By contrast, broad-leaved and mixed forests cover much of mainland Europe to the north of the Alps. Southern Member States tend to have lower levels of forest cover or transitional woodland/shrubland and those forests that do exist tend to be characterised by trees that are less tall and less densely set, with more vegetation under the canopy.

Note that while the information for land cover and forest cover (as presented in Maps 1 and 2) is shown for 1 km^2 grid cells, the remain-
der of the data presented in this article are shown at a more aggregated, regional level, using the NUTS classification.

Forest cover, 2018
(based on the most common form of forest cover for a 1 km² grid)



The designation of Kosovo is without prejudice to positions on status, and is in line with UNSCR 1244/1999 and the ICJ Opinion on the Kosovo declaration of independence.

Source: Corine land cover 2018, European Environment Agency (EEA)

Map 2: Forest cover, 2018 (based on the most common form of forest cover for a 1 km^2 grid) Source: Corine land cover 2018, European Environment Agency (EEA)

Almost three quarters of the total land area of Corse (France), Mellersta Norrland (Sweden) and Pohjois- ja Itä-Suomi (Finland) was covered by forest and other wooded land

As noted above, the Corine land cover inventory is based on satellite images; such images can only be used to register forest cover if there are trees present. Field surveys allow for land that is temporarily unstocked (for example, due to harvesting, fire, or other natural disturbances) to continue to be classified as forest or other wooded land. Eurostat conducts a Land Use and Cover Area frame Survey (LUCAS) every three years. The survey is carried out in-situ, meaning that observations are made and registered on the ground by field surveyors, who classify land cover, land use and landscape features, while also taking a number of soil samples.

Figure 1 shows regional information for the EU regions with the largest areas and highest proportions of forest area and other wooded land. This information is based on harmonised definitions provided by the United Nations Food and Agriculture Organisation (FAO), whereby forests are defined as lands of more than 0.5 hectares (which are not primarily under agricultural or urban land use), with a tree canopy cover of more than 10 % and where trees should be able to reach at least 5 metres in height. Other wooded land is defined as that with a tree canopy cover of 5-10 % or a canopy cover of more than 10 % when smaller trees, shrubs and bushes are included. Note that this definition is somewhat broader than that used in Map 1.

Based on the above definitions, the EU-27 had 176 million hectares of forests and other wooded land in 2015; this corresponded to 42.6 % of its land area. In absolute terms and across NUTS level 2 regions, the largest areas of forest and other wooded land were recorded in Pohjois- ja Itä-Suomi (Finland) and Övre Norrland (Sweden), at 16.8 and 11.0 million hectares respectively. The 10 regions with the largest areas of forest and other wooded land (as shown in Figure 1) had a cumulative share of approximately one third of the EU-27's total area of forest and other wooded land.

In 2015, almost three quarters of the land area of Corse (France), Mellersta Norrland (Sweden) and Pohjois- ja Itä-Suomi was covered by forest and other wooded land. These were the highest shares recorded among NUTS level 2 regions, while Åland (Finland), Norra Mellansverige (Sweden) and Liguria (Italy) also recorded shares of more than 70.0 %. At the other end of the range, there were 15 regions in the EU-27 where the share of forest area and other wooded land was in single digits. These were principally located in the Netherlands and Vlaams Gewest (the northern half of Belgium), with the lowest shares in Prov. West-Vlaanderen (Belgium), Zeeland and Groningen (both the Netherlands; 2012 data for the latter).

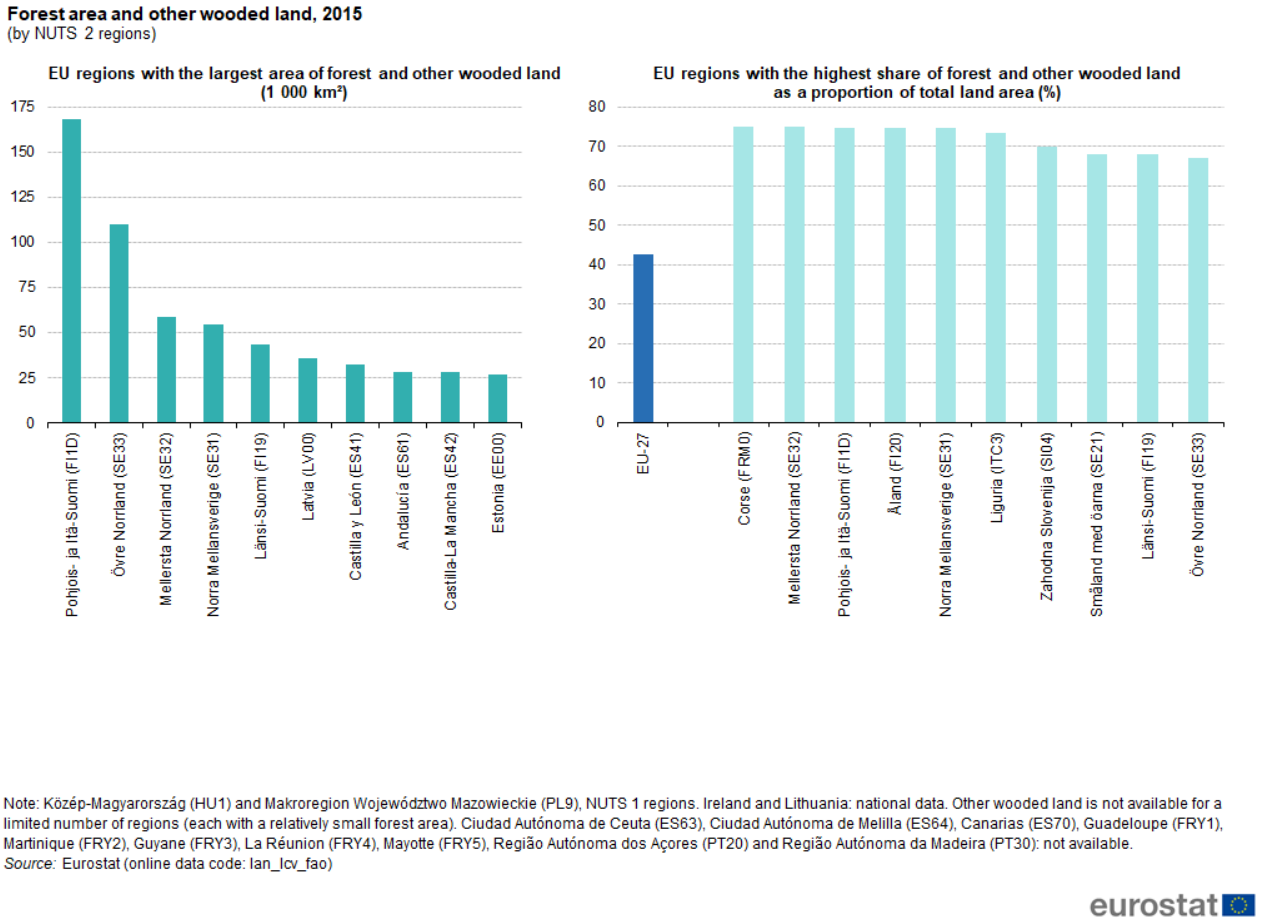


Figure 1: Forest area and other wooded land, 2015 (by NUTS 2 regions) Source: Eurostat (lan_lcv_fao)

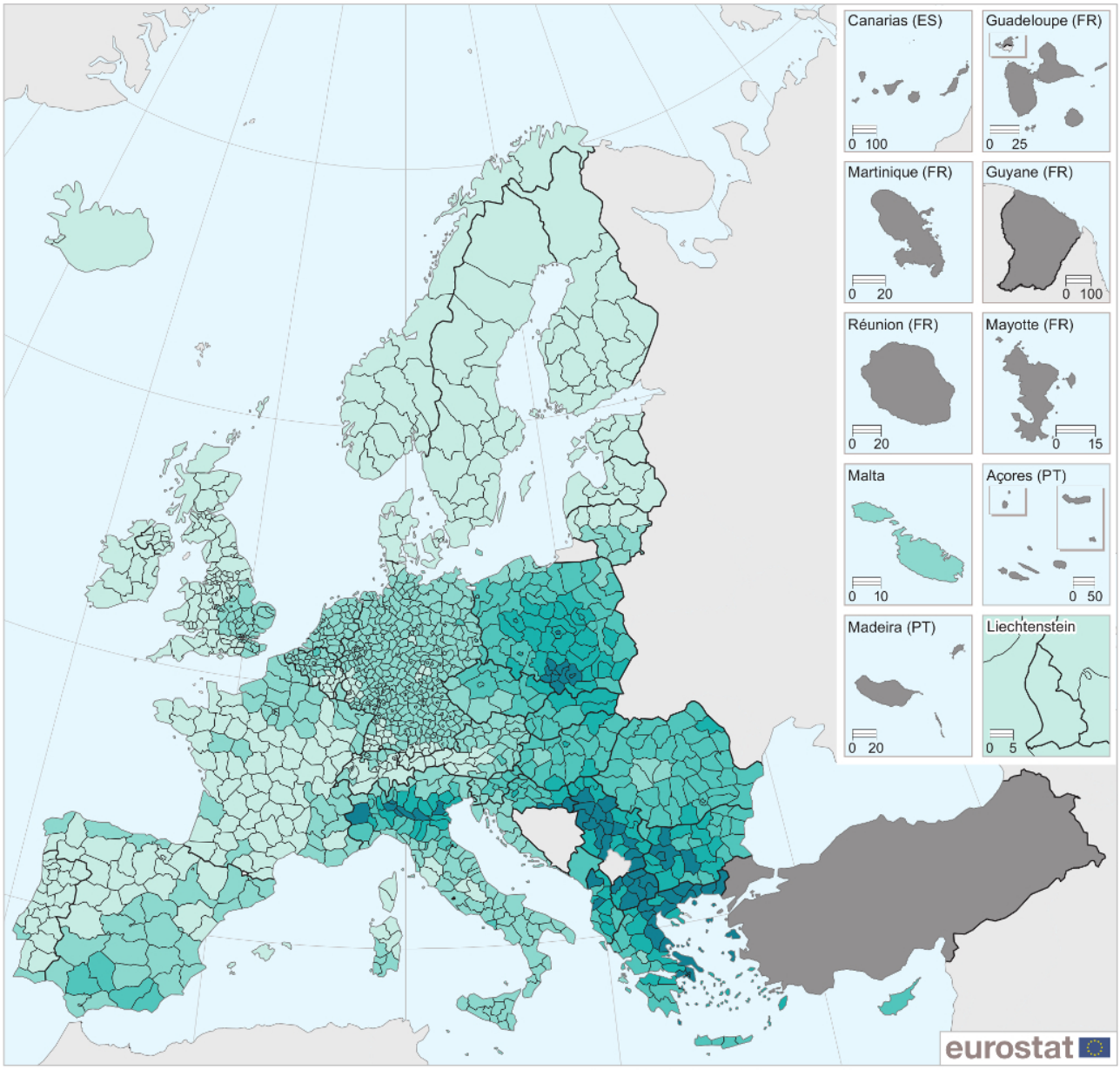
Air pollution

Air pollution may be anthropogenic (human-induced) or of natural origin. Examples of human-induced activities that lead to air pollution include the burning of fossil fuels (such as in conventionally-powered vehicles), industrial processes, agriculture or the treatment of waste. Examples of events that lead to naturally occurring air pollution include volcanic eruptions, desert dust, forest fires or sea-salt spray. Air pollution has the potential to harm both human health and the environment: particulate matter (PM), nitrogen dioxide and ground-level ozone are known to pose particular health risks. Long-term and peak exposures to these pollutants may be associated, among other impacts, with cardiovascular and respiratory diseases or an increased incidence of cancer.

Map 3 presents information for NUTS level 3 regions concerning average concentration levels of fine particulate matter (PM2.5— particles with a diameter of 2.5 micrometres or less) to which the population is exposed. The EU set an annual limit of 25 $\mu g/m^3$ for fine particulate matter in Directive 2008/50/EC on ambient air quality and cleaner air, while the World Health Organisation (WHO) set a more stringent, but non-binding guideline value, whereby annual mean concentrations should not exceed 10 $\mu g/m^3$ in order to protect human health. PM2.5is considered by the WHO as the pollutant with the highest impact on human health.

Although air quality in the EU has generally improved in recent decades, some urban populations remain exposed to high concentrations of air pollutants, for example, as a result of industrial and transport activities. Approximately one fifth of NUTS level 3 regions in the EU-27 (242 out of 1 155 regions for which data are available) had an average exposure to fine particulate matter that was less than the WHO target value of 10.0 $\mu g/m^3$. By contrast, around one tenth of all EU regions (125) presented average exposure of at least 20.0 $\mu g/m^3$, with 46 of these regions with exposure to at least 25.0 $\mu g/m^3$ (as shown by the darkest shade in Map 3). The highest population exposures were generally recorded in predominantly urban regions located in southern and eastern EU Member States (Bulgaria, Greece, Croatia, Italy and Poland). The highest value was registered in one of the four Greek capital regions: Kentrikos Tomeas Athinon (44.4 $\mu g/m^3$). By contrast, the lowest value (2.7 $\mu g/m^3$) was recorded in the predominantly rural region of Jämtlands län, in the middle of Sweden.

Exposure to air pollution by fine particulate matter (PM2.5), 2017
(µg/m³, by NUTS 3 regions)



EU-27 = 14.0

- < 10
- 10 - < 15
- 15 - < 20
- 20 - < 25
- ≥ 25
- Data not available

Administrative boundaries: © EuroGeographics © UN-FAO © Turkstat
Cartography: Eurostat — GISCO, 09/2020

0 200 400 600 800 km

Note: exposure to fine particulate matter expressed as population-weighted concentration in µg/m³. The population-weighted concentration indicates the concentration to which an average person in a specific spatial unit, here NUTS 3 regions, is exposed. The World Health Organisation has set an air quality guideline for annual mean concentrations that should not exceed 10 µg/m³, while the EU set an annual limit of 25 µg/m³ for fine particulate matter in the Ambient Air Quality Directive (2008/50/EC, Annex XIV). The PM2.5 population-weighted concentrations shown have been obtained from interpolated maps according to the methodology described in ETC/ATNI (2020) and references therein and not only from monitoring stations.

Source: European Environment Agency (EEA)

Map 3: Exposure to air pollution by fine particulate matter (PM2.5), 2017 (μg/m^3, by NUTS 3 regions) Source: European Environment Agency (EEA)

Soils

Soil is a vital resource that supports the production of food, while helping to regulate water quality and quantity and plays a role in species diversity. It is also an important factor in mitigating climate change, as it stores carbon (providing the second largest sink after the oceans). However, changes in land cover and land use have the potential to result in carbon losses, for example, as a result of draining peatlands, intensive agriculture or soil sealing.

Sealed soil surfaces

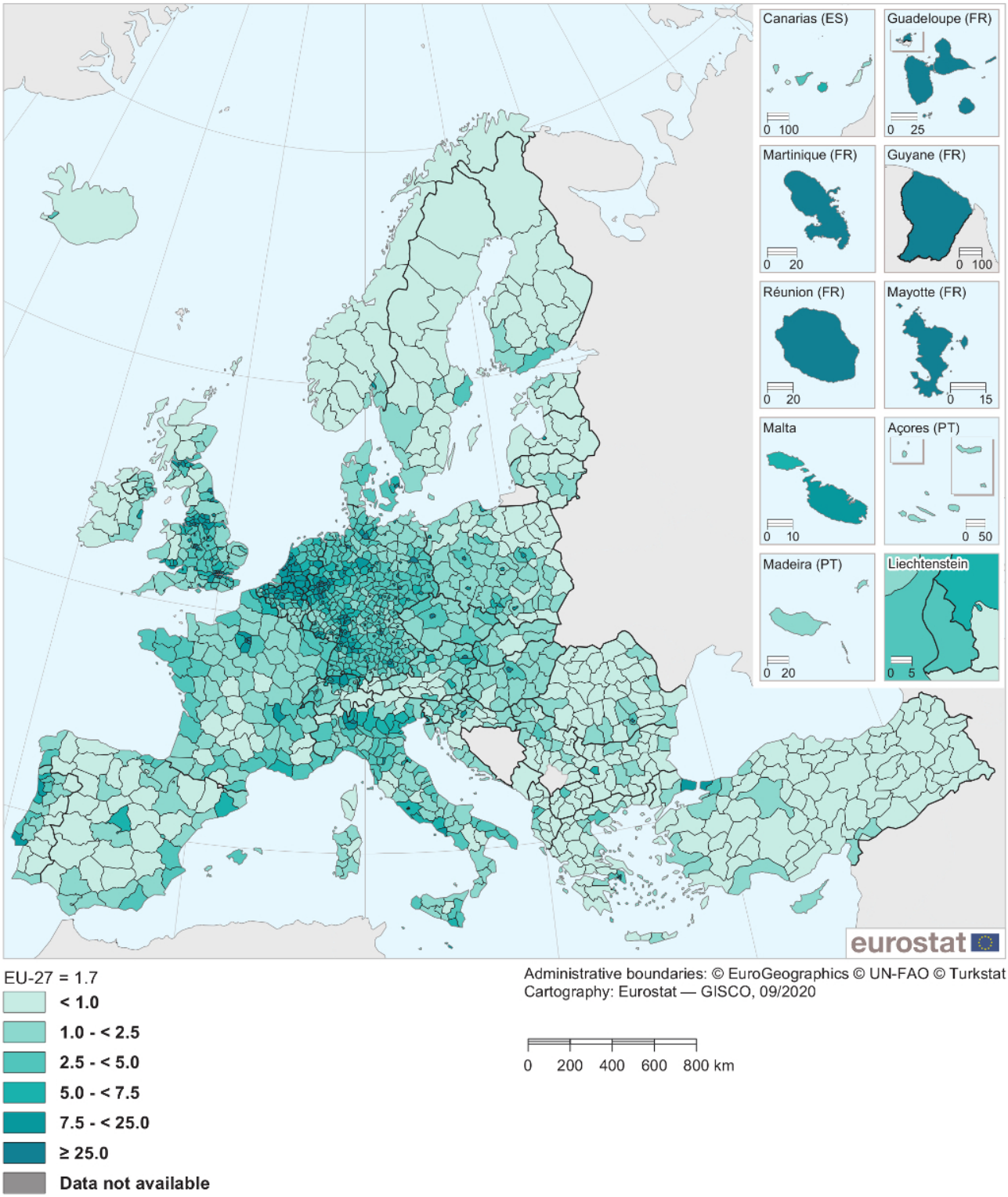
There is growing competition for finite land resources which has, in most EU Member States, resulted in increased use of land for urban or industrial developments as well as related infrastructure. These changes have potentially significant implications for soil functions (including carbon storage and sequestration). Soil sealing (or imperviousness) is defined as the covering of soil surfaces with impervious materials as a result of urban development and infrastructure construction (buildings, construction and laying completely/partially impermeable artificial materials such as asphalt, metal, glass, plastic or concrete). There are a range of factors that may affect the extent of soil sealing, among which: land availability; population size, density and distribution; housing type preferences; average numbers of occupants per household; spatial planning.

The indicator shown in Map 4 provides information on the share of the total land area impacted by soil sealing (as a result of artificial and urban land use). In 2015, according to the EEA, some 1.7 % of the EU-27's total land area was sealed. The highest levels of soil sealing were recorded in the most densely populated regions (as shown by the darkest shades in the map): these were generally capital and metropolitan regions, with a large number of the highest shares concentrated in north-west Germany.

Paris (France) had the highest share of sealed soil surfaces, 70.6 % in 2015

An analysis by NUTS level 3 regions reveals that the share of sealed soil surfaces in 2015 was highest at 70.6 % in Paris (France) — the most densely populated region in the EU-27. There were only two other regions in the EU — both of which were in the suburbs of Paris — where the share of sealed soil surfaces was above 50 %: Seine-Saint-Denis (55.1 %) and Hauts-de-Seine (52.2 %). By contrast, the lowest shares of sealed soil surfaces (0.1 %) were recorded in Evrytania (located in central Greece) and five northern or central regions of Finland (Lappi and Kainuu) and Sweden (Jämtlands län, Västerbottens län and Norrbottens län).

Sealed soil surfaces with impervious materials, 2015
(% of total land area, by NUTS 3 regions)



Note: the indicator provides information on the share of the total land area impacted by soil sealing resulting from artificial and urban land use, for example, building, construction and laying completely/partially impermeable artificial materials (such as asphalt, metal, glass, plastic or concrete).

Source: European Environment Agency (EEA)

Map 4: Sealed soil surfaces with impervious materials, 2015 (% of total land area, by NUTS 3 regions)
Source: European Environment Agency (EEA)

Soil erosion

Having looked at the impact of soil sealing from artificial and urban land use, this final section analyses another environmental impact on soils. Soil erosion — the physical displacement of soil particles — principally occurs as a result of water or wind processes (the former is covered here).

With climate change leading to more extreme weather events, there is an increased risk that storms and prolonged periods of rainfall or drought will result in higher levels of soil erosion. Processes like rain splash, overland flow/sheet wash and rill formation can remove soil, leading to, among other results: the potential loss of fertile topsoil; the breakdown of soil structures (and associated losses of soil carbon); a reduction in the level of stored water; an increased risk of flooding or landslides; the pollution of water bodies; or negative impacts on habitats and biodiversity.

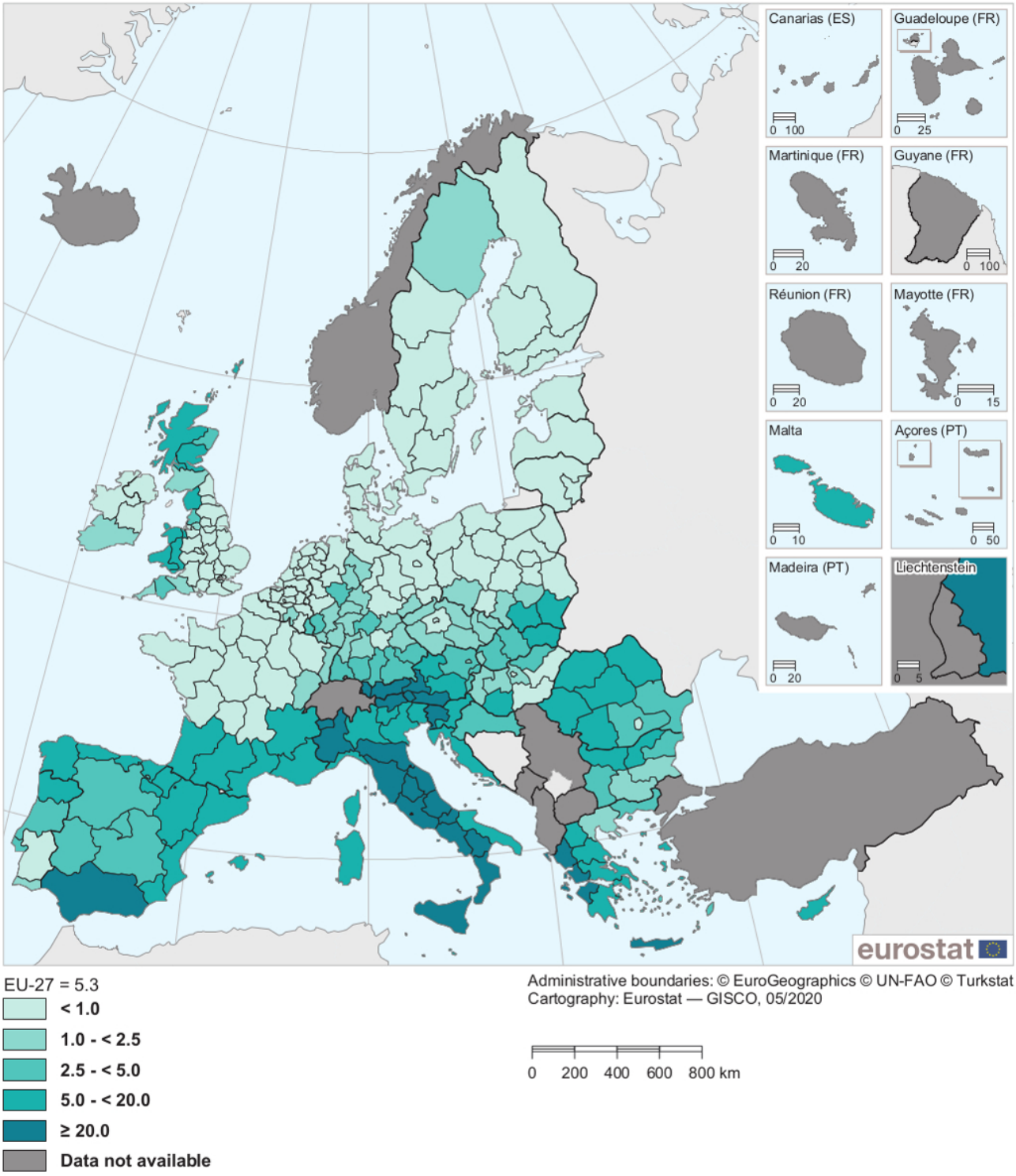
Severe soil erosion by water is defined as a situation where non-artificial areas — agricultural areas, forest and semi-natural areas (excluding beaches, dunes, sand plains, bare rock, glaciers and perpetual snow cover) — are under risk of being subject to the removal of upwards of 10 tonnes of soil per hectare and year. Estimates made by the European Commission's Joint Research Centre (JRC) suggest that some 5.3 % of the EU-27's non-artificial areas in 2016 were subject to severe soil erosion by water.

In Marche (Italy), an estimated 47.6 % of non-artificial areas were at risk of severe soil erosion by water

Map 5 shows that southern and mountainous regions of the EU tended to have the highest levels of severe soil erosion by water. This pattern was particularly apparent across Italy, in the Alps (Italy, Austria and Slovenia), the Pyrenees (along the border between Spain and France) or the Tatra Mountains (along the border between Poland and Slovakia), as well as in parts of southern Spain and Greece. The risk of soil erosion was particularly pronounced in regions where the local topography was composed of lengthy, steep slopes, or in regions around the Mediterranean Sea that were particularly prone to soil erosion by water because of long dry periods followed by heavy bursts of intense precipitation on steep slopes with fragile soils.

In 2016, there were 24 NUTS level 2 regions (out of 231 for which data are available) where at least one fifth of non-artificial areas were subject to severe soil erosion by water. These regions (as shown by the darkest shade in the map) were principally located in Greece, Italy and Austria. The highest risks were recorded in the Italian regions of Marche, Sicilia and Calabria, where upwards of 40 % of non-artificial areas were estimated to be subject to severe soil erosion by water. By contrast, estimates suggest that in 4 out of every 10 regions of the EU less than 1.0 % of non-artificial areas were subject to severe soil erosion by water. These regions with relatively low rates of soil erosion from water were usually very flat, for example: the lowland plains that run from northern France to the Baltic Member States. This was also the case on the plains of Hungary or Portugal, as well as across a majority of Irish and Nordic regions.

Severe soil erosion by water, 2016
(%, by NUTS 2 regions)



Note: severe soil erosion by water is defined as the estimated share of non-artificial areas under risk of being subject to soil erosion by water (from more than 10 tonnes per hectare and year). Non-artificial areas are agricultural areas, forest and semi-natural areas (excluding beaches, dunes, sand plains, bare rock, glaciers and perpetual snow cover).

Source: European Commission, Joint Research Centre (JRC)

Map 5: Severe soil erosion by water, 2016 (%, by NUTS 2 regions) Source: European Commission, Joint Research Centre (JRC)

Changes in soil organic carbon stocks in croplands

Most people are unaware that after the oceans, soil is the largest store of organic carbon on the planet, holding more organic carbon than all the vegetation on Earth and the atmosphere combined. Organic carbon is associated with living matter and is found in soil dwelling flora and fauna, together with plant and animal remains at various stages of decomposition, and humus (which is a stable form of decomposed matter). Through photosynthesis, plants take carbon dioxide out of the atmosphere, where upon the carbon becomes incorporated in the soil through roots or eventually as litter fall. In this context, soils have the capacity to regulate climate by offsetting carbon dioxide emissions elsewhere. However, this capacity is heavily dependent on how the land is used. Natural habitats tend to act as carbon sinks while land cover change (for example, deforestation) and some agricultural practices resulting in low return of organic material, mineralisation, leaching and erosion can lead to a loss of carbon from the soil. In addition, organic carbon is a major component of several key ecosystem services, which include soil fertility, nutrient cycling, water retention and pollution control. Soils with low levels of organic carbon will have lower resilience to pressures such as drought, compaction and flood prevention.

The amount of carbon in a soil sample is expressed as a (mass) percentage (for example as g per kg or as a percentage) relative to the mass of the sample. The concentration of organic carbon in most soils is generally around 3-5 % (but can be lower than 1 % in deserts) partially as a result of the low density of carbon compared with the mineral components of soil. Soils with more than 20 % carbon are referred to as organic soils or peat, where the carbon content can be as high as 90 %. The amount of organic carbon stored in soil is referred to as its stock. Changes in stocks are based on laboratory measurements of samples collected in a harmonised manner from all over the EU as part of the LUCAS survey.

Soils in the EU exhibit a general decrease in organic carbon stocks from north to south and west to east. The highest stocks are found in the wetter and cooler climates of Scandinavia and Ireland, while the lowest levels are found in drier and warmer regions (such as close to the Mediterranean Sea) and in high mountainous regions of the EU (where vegetation levels are low).

In overall terms, most cropland soils in the EU show relatively small changes in soil carbon stocks: however, cropland soils exhibit the lowest soil carbon stocks of all land cover types apart from artificial areas

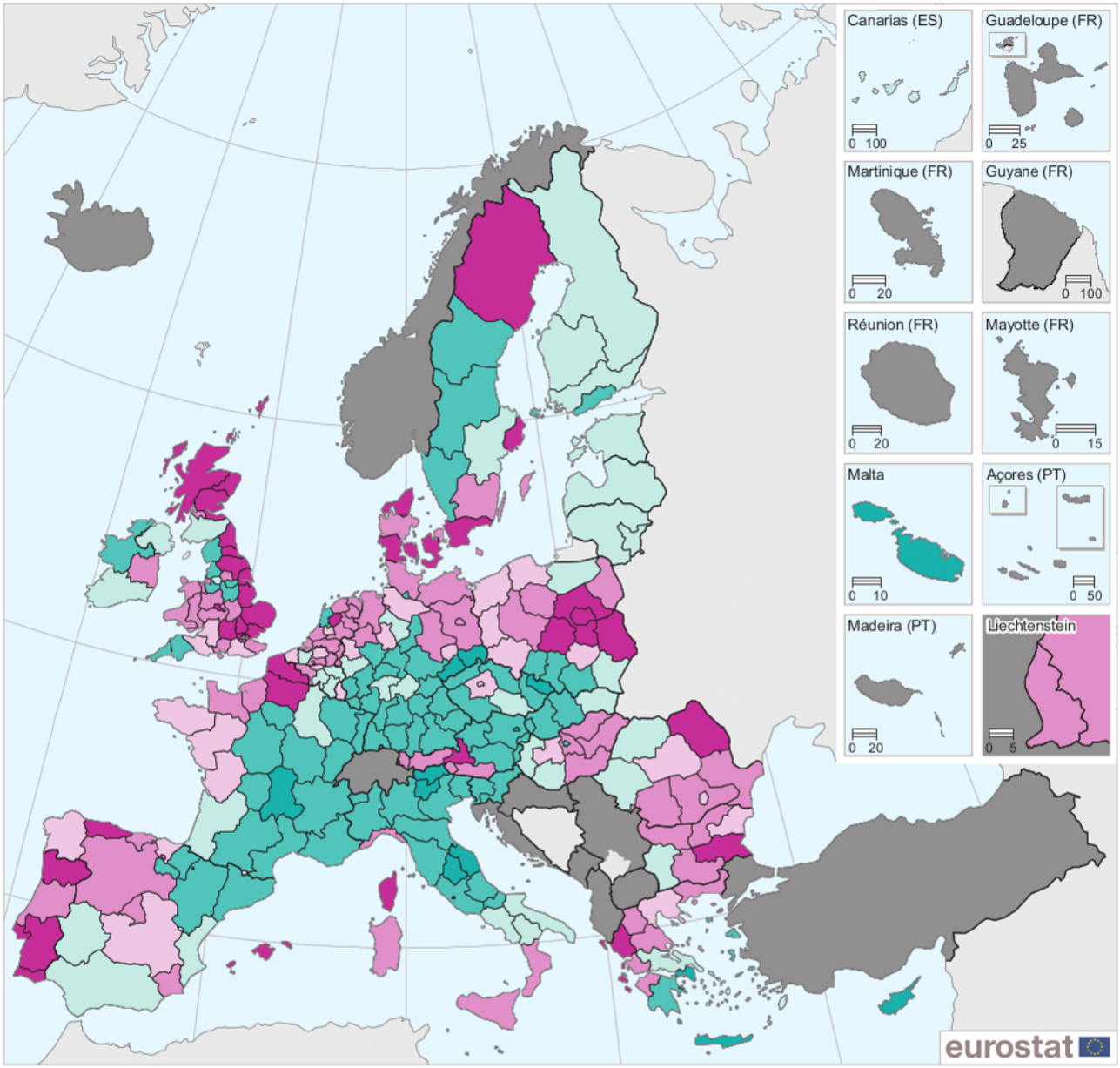
Croplands occupy just over 1 million km^2 of the EU, which is 23 % of the total land area. Croplands exhibit the lowest soil carbon stocks of all land cover types apart from artificial areas (around 17 g per kg — by comparison, average levels for permanent grasslands are almost 2.5 times higher). In addition, most croplands soils are thought to be already at sub-optimal levels, with around 2.6 % of arable soils showing soil organic carbon levels close to 1 %.

Map 12.6 shows the percentage changes in soil organic stocks in the uppermost 20 cm of cropland soils between 2009 (from 2012 for Bulgaria and Romania) and 2015.

Cropland soils in the EU recorded a small overall loss (-0.04 %) of carbon stocks between 2009 and 2015. Around 140 regions had decreasing soil carbon stocks with a mean reduction of -1.6 %, while some 120 regions displayed increasing levels with a mean increase of 1.4 %. Changes during the period were generally quite small, accounting for less than 1 % of the total stock. The map shows decreasing stocks in regions closer to the Atlantic Ocean (for example, Portugal, the northern regions of Spain, north-western France), the Benelux Member States, northern regions of Germany and Denmark. Decreases were also recorded in Bulgaria, Poland and Romania. Most of the regions surrounding the Alps had increasing stocks (except in parts of Austria). Increases were broadly found in most Alpine regions, in southern France, most of Germany, Czechia, parts of Slovakia, together with most regions of northern and central Italy. This pattern might reflect the impact of climate change, insofar as wetter and cooler areas are gradually becoming drier and warmer, resulting in the mineralisation of soil carbon. Unless action is taken, the continued loss of carbon from croplands will mean that the EU will not meet the sustainable development goal target on land degradation neutrality (SDG 15) by 2030 as a net loss of soil carbon is considered to indicate a degraded state.

When looking at the map, two other issues should be considered. Firstly, unless there is a dramatic environmental issue, changes in soil carbon stocks generally occur slowly over time. In this sense, one would not expect to see significant changes over a six-year period (as shown here). Secondly, although some regions do report large changes in soil organic stocks (for example, specific regions in Greece and northern Sweden) these should be viewed within the context of only a small part of their overall area being covered by croplands.

Overall change in soil organic carbon stock for croplands, 2009-2015
(%, by NUTS 2 regions)



EU = -0.04

- < -2.0
- -2.0 - < -0.5
- -0.5 - < 0.0
- 0.0 - < 0.5
- 0.5 - < 2.0
- ≥ 2.0
- Data not available

Administrative boundaries: © EuroGeographics © UN-FAO © Turkstat
Cartography: Eurostat — GISCO, 07/2020

0 200 400 600 800 km

Note: EU excluding Croatia. The indicator shows the changes in soil organic carbon stocks in croplands between 2009 and 2015 for a depth of 20 cm, relative to 2009 levels. Changes were assessed by fitting a machine learning algorithm (Gradient Boosting Trees model) on measured organic carbon concentrations of samples taken during the 2009 (2012 for Romania and Bulgaria) and 2015 LUCAS surveys.
While the results are presented for NUTS 2 regions, the area of cropland is smaller. Negative values indicate environmental degradation. Changes in soil organic carbon stocks generally occur slowly.

Source: European Commission, Joint Research Centre (JRC)

Map 6: Overall change in soil organic carbon stock for croplands, 2009-2015 (%, by NUTS 2 regions) Source: European Commission, Joint Research Centre (JRC)

Source data for figures and maps

Environment at subnational level

Data sources

Land cover and land use

Data on land cover and forest cover are derived from the Corine land cover (CLC) inventory . The Eionet network produces national CLC databases, with this work being coordinated by the EEA. These land cover inventories are produced by a majority of EU Member States by using visual interpretation of high resolution satellite imagery.

More information and results of the 2018 data collection exercise at:
https://land.copernicus.eu/pan-european/corine-land-cover/clc2018 .

Eurostat's Land Use and Coverage Area frame Survey (LUCAS) provides useful territorial information on land cover and land use. It may be used to analyse how agriculture, the environment and the countryside affect each other. LUCAS gathers harmonised data through direct observations by land surveyors on the ground. The EU territory is divided up using a grid whose nodes constitute around one million points. From this, sample points are selected on the basis of stratification information — with each of these points being visited by a field surveyor.

More information at: https://ec.europa.eu/eurostat/cache/metadata/en/lan_esms.htm .

Air pollution

The EEA is the source of statistics on air pollution from fine particulate matter (PM2.5— particles with a diameter of 2.5 micrometres or less). The EU set an annual limit of 25μg/m^3 for fine particulate matter in Directive 2008/50/EC on ambient air quality and cleaner air, while the World Health Organisation (WHO) set a more stringent, non-binding guideline value, whereby annual mean concentrations should not exceed 10μg/m^3 in order to protect human health. The National Emissions Ceilings (NEC) Directive (2016/2284/EU) which entered into force on 31 December 2016 presents EU reduction commitments for fine particulate matter.

Air quality may be assessed by the concentration of various pollutants in ambient air. PM2.5has been selected here, since it is the pollutant with the highest impact on human health, with no safe thresholds below which health impacts do not happen. The PM2.5population-weighted concentrations that are shown as an indication of population exposure, have been obtained from interpolated maps according to the methodology described in ETC/ATNI (2020) and references therein (ETC/ATNI, 2020, European air quality maps for 2017 — PM10, PM2.5, ozone, NO2and NOxspatial estimates and their uncertainties, Eionet report — ETC/ATNI 2019/9, European topic centre on air pollution, transport, noise and industrial pollution).

More information at:
https://www.eea.europa.eu/themes/air/air-quality-concentrations/air-quality-concentrations .

Soil

The EEA is the source of statistics on sealed soil surfaces (imperviousness) for built-up areas. The data presented are based on the Copernicus high resolution layer, which is designed to capture the percentage and change of soil sealing as a result of land take for artificial land use. The datasets with artificially sealed areas were produced using automatic derivation based on a calibrated normalised difference vegetation index (NDVI). These are per-pixel estimates of impermeable cover of soil (soil sealing) and are mapped as the degree of imperviousness (on a scale of 0-100 %).

More information at:
https://www.eea.europa.eu/data-and-maps/indicators/imperviousness-change-2/assessment .

The JRC is the source of information for data on soil erosion. The dataset only considers soil erosion from rain splash, overland flow (also known as sheet wash) and rill formation. The information was originally published for NUTS level 3 regions but has been aggregated to NUTS level 2 regions for the purpose of this publication. The data are produced on the basis of an empirical computer model (RUSLE2015) and therefore represent estimated values

of soil erosion rather than actual measurements. The model is based on high quality and peer reviewed published input layers for soil erodibility, rainfall erosivity, topography, land cover and conservation practices. Generally, artificial, sandy, rocky and icy surfaces as well as wetlands and water bodies have been excluded from the area on which the indicator is based.

More information at: https://esdac.jrc.ec.europa.eu/content/soil-erosion-water-rusle2015 .

The JRC is also the source of information for data on soil carbon changes. The dataset is derived from the soil module of the Land Use/Cover Area frame statistical Survey (LUCAS Soil), the only harmonised and regular collection of soil samples for the entire territory of the EU, addressing all major land cover types simultaneously. The soil module was first carried out in 2009 and then repeated on approximately 85 % of the same points in 2015 (together with other new locations). Organic carbon concentration (expressed in g per kg) are measured for a 500 g sample of soil from each location following an ISO standard procedure in a single laboratory (to avoid uncertainties due to differences in analytical procedure). Carbon found in carbonate minerals in the soil is removed. Croatia was not included in the 2009 or 2012 survey as it was not an EU Member State at the time while samples for Malta and Cyprus were acquired independently by the JRC. Soil organic carbon stocks were calculated for LUCAS sampling locations using a simple function based on texture and soil carbon concentrations. The resulting stocks are given in kilograms per hectare. These values were then used by a machine-learning algorithm (in other words, gradient-boosting machines), together with a range of environmental datasets to support the spatial predictions of soil organic carbon for areas not covered by the LUCAS sample. It should be noted that changes in soil organic carbon are quite small (expected given the short time interval). Around 70 % of the changes fall within a range of $\pm$ 4 g per kg, while only 10 % of the area is predicted to have changes greater than $\pm$ 12 g per kg. Moreover, many of the areas where large changes are predicted are areas where the model uncertainty is high due to a lack of samples (in other words, where the extent or area of croplands is small compared with the size of the NUTS region).

More information can be found at: https://esdac.jrc.ec.europa.eu/projects/lucas .

Panagos, P., C. Ballabio, S. Scarpa, P. Borrelli, E. Lugato and L. Montanarella, 'Soil related indicators to support agri-environmental policies', EUR 30090 EN, Publications Office of the European Union, Luxembourg, 2020, ISBN 978-92-76-15644-4, doi:10.2760/011194, JRC119220.

Orgiazzi, A., C. Ballabio, P. Panagos, A. Jones, A. and O. Fernández-Ugalde, 'LUCAS Soil, the largest expandable soil dataset for Europe: a review', European Journal of Soil Science, 2018, Vol. 69, pp. 140-153.

Context

The European Green Deal provides a roadmap for delivering a sustainable EU economy. To overcome the challenges of climate change and environmental degradation, the EU's new growth strategy aims to transform the EU into a modern, resource-efficient and competitive economy where: there are no net emissions of greenhouse gases by 2050; economic growth is decoupled from resource use; no person and no place is left behind. It is hoped that this can be done by turning climate and environmental challenges into opportunities across all policy areas.

Since the 2015 adoption of the 2030 Agenda for Sustainable Development , the EU has made progress towards delivering the sustainable development goals. The EU is fully committed to implementing the 2030 Agenda, and has embarked on a transition towards a low-carbon, climate-neutral, resource-efficient and circular economy. In particular, the EU's 2030 climate and energy framework sets out the objectives of: a 40 % cut in greenhouse gas emissions; a 32 % share of energy from renewable sources; and a 32.5 % improvement in energy efficiency (compared with 1990 levels).

Nature is in a state of crisis: the European Commission has identified five main issues that are thought to be driving a loss of biodiversity — changes in land and sea use, overexploitation, climate change, pollution and invasive alien species. The EU Biodiversity Strategy for 2030 — Bringing nature back into our lives (COM(2020) 380 final) aims to ensure that Europe's biodiversity will be on the path to recovery by 2030 for the benefit of people, the planet, the climate and the economy, in line with the 2030 Agenda for Sustainable Development and with the objectives of the Paris Agreement on Climate Change. As part of the strategy the EU foresees, among others: legal protection of at least 30 % of its land and sea area as part of a trans-European nature network; the protection of all remaining EU primary and old-growth forests; that at least 10 % of agricultural area is under high-diversity landscape features; that three billion new trees are planted in the EU; that at least 25 000 km of free-flowing rivers are restored.

The EU's forest strategy (COM(2013) 659 final) promotes the concept of sustainable forest management, safeguarding the balanced development of the multiple forest functions and the efficient use of forest resources. Forestry, along with farming, remains crucial for land use and the management of natural resources in the EU. Rural development policy is part of the EU's common agricultural policy which has been the main instrument for implementing forestry measures in recent years. The European Commission will put forward a new EU forest strategy in early 2021.

The European Commission adopted a Clean Air Policy Package in 2013. This aimed to achieve full compliance with existing air quality legislation by 2020 and further improve the EU's air quality by 2030 and thereafter. Its long-term objective is to achieve levels of air quality that do not result in unacceptable impacts on, and risks to, human health and the environment.

The European Commission adopted a Thematic Strategy for Soil Protection in 2006. A communication (COM(2006) 231 final) outlined the objectives of protecting soil functions and preventing further soil degradation in the EU, underlining the essential role that soil plays as a natural resource and recognising the threats that are posed by soil erosion. The European Commission has sought to mitigate the negative impact of sealing on soil functions by developing a set of best practices . The European Commission will put forward plans to update the EU's soil thematic strategy in 2021.

The loss of organic matter was highlighted as a major threat in the EU's soil thematic strategy and has been proposed as an indicator to assess the impact of the EU's common agricultural policy (CAP) . EU Member States are obliged to consider the impact of changes in soil carbon stocks on greenhouse gas emissions and removals from land use, land use change and forestry under Regulation (EU) No 2018/841 of 30 May 2018. The EU's Biodiversity Strategy for 2030 aims to step up efforts to increase organic carbon stored in soils by increasing the application of sustainable soil management practices and protecting carbon-rich ecosystems, while the EU's Farm to Fork Strategy (COM(2020) 381 final) demands that farming practices that remove carbon from the atmosphere and contribute to achieving climate neutrality would be better rewarded. In this policy context, a loss of soil organic carbon is considered as environmental degradation.

Other articles

- Agri-environmental indicators
- Air pollution statistics — emission inventories
- Biodiversity statistics
- Forests, forestry and logging
- Land cover statistics
- Land use statistics
- LUCAS — Land use and land cover survey

Publications

- Energy, transport and environment statistics — 2019 edition
- Eurostat regional yearbook
- Sustainable development in the European Union — Monitoring report on progress towards the SDGs in an EU context — 2019 edition

Main tables

- Environment (t_env)
- Emissions of greenhouse gases and air pollutants (source: EEA) (t_env_air) , see:

Exposure to air pollution by particulate matter (source: EEA) (sdg_11_50)

Database

- Environment (env)
- Emissions of greenhouse gases and air pollutants , see:

Air emission inventories (source: EEA) (env_air_ai)

- Forestry (for) , see:

Forest resources (for_sfm)

Area of wooded land (source: EFA questionnaire) (for_area_efa)
Area of wooded land (source: FAO - FE) (for_area)

- Land cover and land use, landscape (LUCAS) (lan)

Dedicated section

- Environment
- Forestry
- Land cover / use statistics
- Regions and cities

Data visualisation

- Eurostat statistical atlas (Chapter 12)
- Eurostat statistical atlas (LUCAS — land use/cover) 2018 edition
- Regional statistics illustrated

Methodology

Manuals and further methodological information

- Environment statistics — methodology
- Forestry statistics — methodology
- Land use/cover statistics (LUCAS) — methodology
- Methodological manual on territorial typologies — Eurostat — 2018 edition
- Redesign sample for Land Use/Cover Area Frame Survey (LUCAS) — Eurostat — 2018 edition

Metadata

- Air pollutants by source sector (ESMS metadata file — env_air_emis_esms)
- Land cover and land use, landscape (ESMS metadata file — lan_esms)

Legislation

- Directive 2001/81/EC of 23 October 2001 on national emission ceilings for certain atmospheric pollutants (NEC Directive) (Summary)
- Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe
- Summaries of EU legislation: cleaner air for Europe
- Summaries of EU legislation: national emission limits for certain air pollutants

External links

- Copernicus global land surface (European Commission — JRC)
- CORINE land cover (European Environment Agency — EEA)
- Environment (European Commission — Directorate-General for Environment)
- European Green Deal
- European soil data centre (European Commission — JRC)
- INSPIRE (Infrastructure for spatial information in Europe)
- Land use (European Environment Agency — EEA)

Maps can be explored interactively using *Eurostat's statistical atlas* (see user manual).

More recent regional statistics on environment are available in Eurostat 's annual flagship publication, the *Eurostat regional yearbook* .