G20 CLIMATE RISK ATLAS

Impacts, policy, economics

EUROPEAN UNION

With the scientific contribution of Enel Foundation

How to read the Atlas: graphs, colours and scenarios.

The maps used in this Atlas are taken from **The World Bank Official Boundaries** - ***https://datacatalog.worldbank.org/search/dataset/0038272*** (accessed on May 28, 2021). For the section Energy, the maps are based on Panoply Data Viewer ***https://www.giss.nasa.gov/tools/panoply/credits.html***

Each sector of this Atlas contains data and information on various climate scenarios.

When reported in graphs, the **colour black** indicates data and information referring to the current state, the past or the baseline.

When the authors refer to **RCP (Representative Concentration Pathways)**, the 3 colours used across the factsheet refer to 3 scenarios, which are 3 different development options with different levels of greenhouse gas emissions, **respectively low emissions (green), medium emissions (orange), and high emissions (red)**. The same colour code is used when RCPs are associated with Shared Socioeconomic Pathways (SSP).

In some cases, the authors refer to global warming scenarios. In these cases, the 3 colours used refer to a temperature rise of **1.5°C (green), 2°C (dark green), and 4°C (red)**.

When the authors refer exclusively to **Shared Socioeconomic Pathways - SSPs** (Population affected by river floods in the section: "Water"), data related to **SSP3** - that encompasses, among other things, slow economic growth, material-intensive consumption, and persisting or worsening inequalities – **are reported in a lighter shade**; **SSP5** – which refers to social and economic development that is coupled with an energy-intensive lifestyle and the abundant exploitation of fossil fuel resources – is shown using a **middle shade of the colour**, whereas data related to **the present** conditions **are represented in a dark shade**.

Further details on scenarios, methodologies, and the full list of references are available at: **www.g20climaterisks.org**

Concept and graphic design by element6.eu

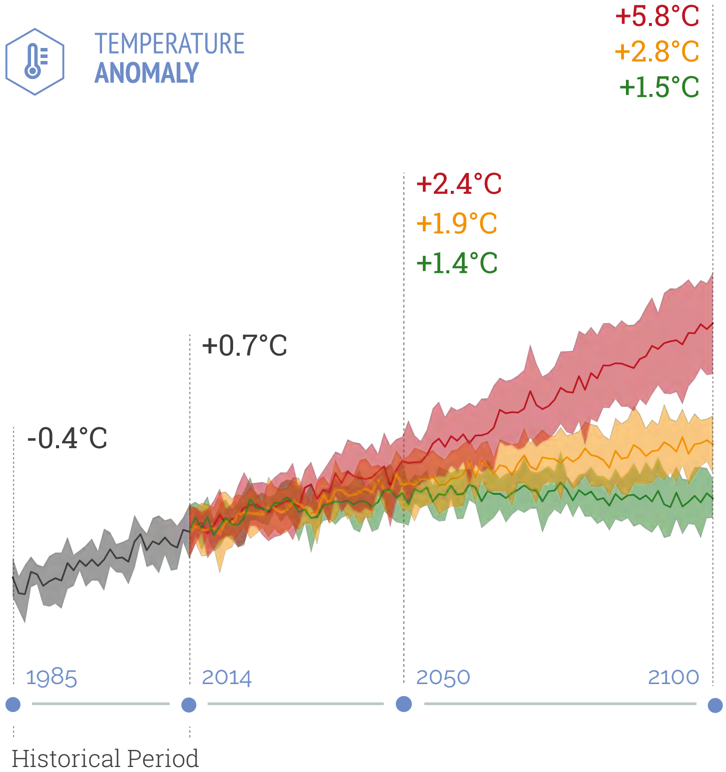
EUROPEAN UNION
CLIMATE

OVERVIEW

Europe is generally characterized by a temperate climate. Most of Western Europe has an oceanic climate, featuring cool to warm summers and cool winters. Southern Europe has a distinctively Mediterranean climate, which features warm to hot, dry summers and cool to mild winters. Central-eastern Europe is classified as having a continental climate, which features warm to hot summers and cold winters.

TEMPERATURE PROJECTIONS

Under a low emissions scenario projected temperature variations will remain contained at around +1.5°C, both by 2050 and 2100.
Under a high emissions scenario, with no reduction in GHG emissions, much greater temperature anomalies are expected by both 2050 and 2100.



TEMPERATURE

Most of Europe has seasonal temperatures in line with temperate climates around the world, although summers north of the Mediterranean Sea are cooler than in most other areas with temperate climates. Southern countries are the warmest.

MEAN TEMPERATURE

-3 27

Celsius degrees / Over 1991-2020

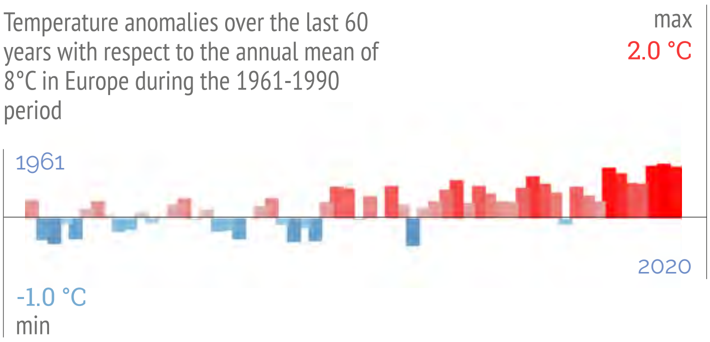
EXPECTED VARIATION FOR TEMPERATURE AT 2050

The indicators show variations in selected temperature characteristics for a thirty-year period centred on 2050 (2036-2065) with respect to the reference period 1985-2014.

Indicator			
Annual Mean Temperature	+2.5°C	+1.9°C	+1.6°C
Max Temperature of warmest month	+3.0°C	+2.3°C	+1.9°C
Min Temperature of coldest month	+2.8°C	+2.2°C	+1.8°C

TEMPERATURE TREND

Temperature anomalies over the last 60 years with respect to the annual mean of 8°C in Europe during the 1961-1990 period



PRECIPITATION

Parts of the Central European plains have a continental climate whereas the coastal lowlands of the Mediterranean area have more of a wet and dry seasonal pattern.
The rainy season extends from October to February, whereas the dry season is mainly in the summer months whereby precipitation can, in some years, be extremely scarce.
Precipitation patterns are highly variable over mountain area such as the Alps and Pyrénées due to factors such us the interaction between mountains and humid air masses coming from coastal areas.

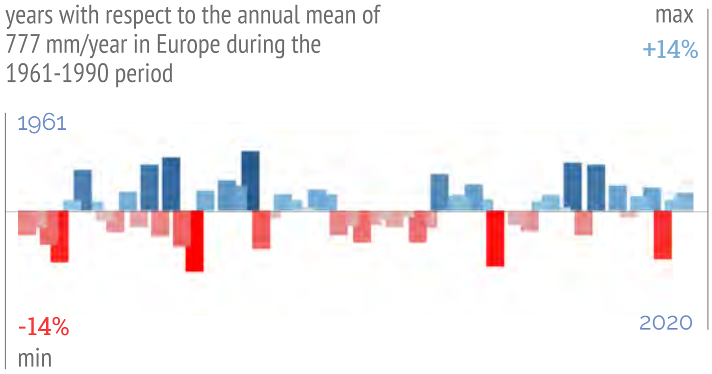
MEAN PRECIPITATION

79 — 3,331

mm/year / Over 1991-2020

PRECIPITATION TREND

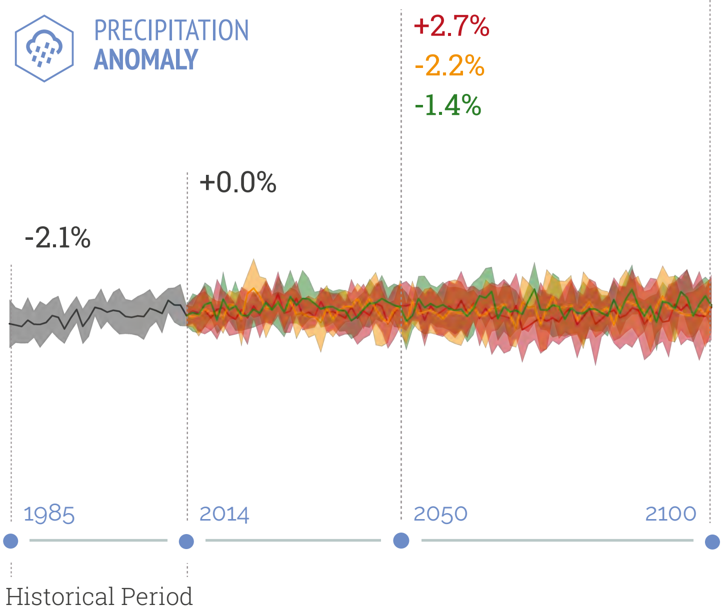
Precipiation anomalies over the last 60 years with respect to the annual mean of 777 mm/year in Europe during the 1961-1990 period



PRECIPITATION PROJECTIONS

Precipitation trends show a very complex signal, under all emissions scenarios, with a very large variability among climate models. This can be explained considering the complexity of the precipitation regime and dynamics requiring more detailed spatial and temporal analysis.

PRECIPITATION ANOMALY



EXPECTED VARIATION FOR PRECIPITATION AT 2050

The indicators show variations in selected precipitation characteristics for a thirty-year period centred on 2050 (2036-2065) with respect to the reference period 1985-2014.

Indicator			
Annual total precipitation	+1.4%	+1.2%	+2.2%
Precipitation of wettest month	+4.6%	+3.2%	+4.4%
Precipitation of warmest quarter	-3.8%	-1.2%	-0.6%

VARIATION OF SPECIFIC CLIMATE INDICATORS

Climate indicators variation showing impacts of climate change on sectors such as agriculture, health and water. Analysis considers 3 threshold average temperature increase: **+1.5°C**, **+2°C**, **+4°C**.

Indicator	Unit			
Agricultural drought proportion of time	% of time	+32%	+17%	+13%
Hydrological drought proportion of time	% of time	+25%	+12%	+10%
Heatwave duration	% of time	+1,247%	+184%	+63%
Runoff increase	% of area	+28%	+12%	+5%
Agricultural drought frequency	% of change	+66%	+42%	+30%
Hydrological drought frequency	% of change	+14%	+9%	+13%
Heatwave frequency	% of change	+84%	+32%	+19%
Runoff decrease	% of area	+34%	+20%	+10%

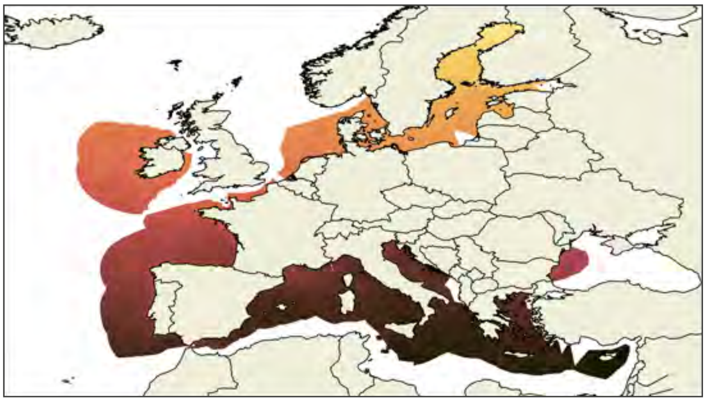
EUROPEAN UNION OCEAN

OCEAN IN EUROPEAN UNION

The EU's marine exclusive economic zone (EEZ) is characterized by subpolar to temperate coastal waters, which host a large variety of ecosystems with an invaluable biodiversity. The wide enseble of coastal systems can be divided into four main areas: the Atlantic region, the North Sea, the Mediterranean-Black Seas and the Baltic subbasins.

CURRENT CLIMATE CONDITIONS

Mean sea surface temperature reflects the different climate regimes, from the cold subpolar waters in the north to the temperate ones on southern basins.

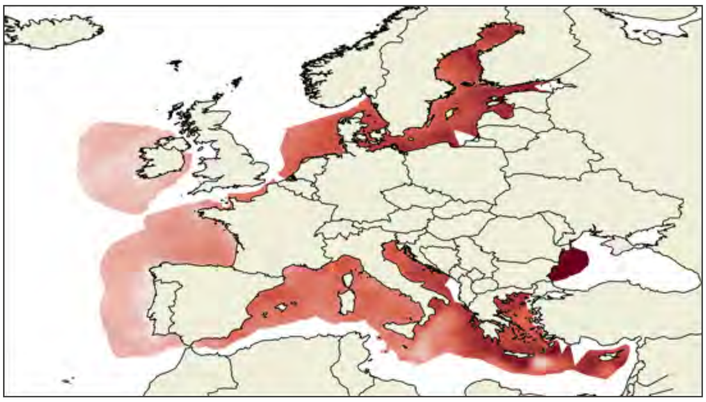


2 — 22 **MEAN**

SEA SURFACE TEMPERATURE

Celsius degrees / Over 1991-2020

0 — 0.7 **TREND**



Surface temperature trends indicate a general warming of 0.3°C per decade in all marine areas, with increased gains in the semienclosed basins of the Mediterranean and Baltic Seas.

FUTURE PROJECTIONS

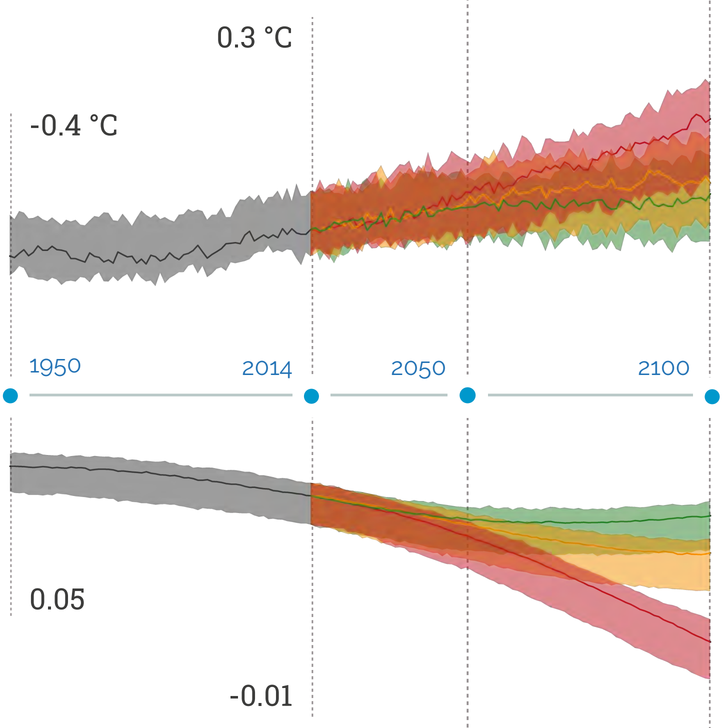
Projected annual changes within the marine EEZ for the two most significant marine indicators of climate change: sea surface water temperatures and pH.

Seawater temperature changes are in line with the definitions of each scenario, with maximum values around +4°C under a high emissions scenario in 2100.

+4.1 °C
+2.3 °C
+1.5 °C

SEA SURFACE TEMPERATURE **ANOMALY**

+1.9 °C
+1.5 °C
+1.3 °C



SEA SURFACE pH **ANOMALY**

-0.09
-0.11
-0.15

Seawater surface pH becomes more acidic in all scenarios, closely reflecting rising atmospheric CO_2 concentrations, and only a low emissions scenario leads to a stable condition by 2100.

-0.09
-0.18
-0.39

ECOSYSTEM INDICATORS AT 2050

Regional changes in key marine ecosystem indicators under projected future scenarios by mid-century (2036-2065) with respect to present climate conditions (1985-2014).

Atlantic

Mediterranean-Black Seas

North Sea

Baltic

Temperature regulates the metabolism of marine organisms determining which habitats remain suitable. Excessive warming will likely push ecosystems beyond tolerance thresholds.

pH represents the acid/base status of marine waters, where a decreasing pH reflects the acidification of the ocean due to increased absorption of atmospheric CO_2.

Oxygen is fundamental to sustain marine life and its reduction can have a large impact on coastal ecosystem services including fisheries and aquaculture.

Chlorophyll is an indicator of the biomass available at the base of the marine food web supporting all ecosystem productivity.

	Atlantic	Mediterranean-Black Seas	North Sea	Baltic
Temperature	15.10°C +0.99 °C +0.83 °C +0.41 °C	18.90°C +2.58 °C +1.96 °C +1.98 °C	11.22°C +1.52 °C +1.07 °C +0.83 °C	8.06°C +2.68 °C +2.06 °C +1.7 °C
pH	8.11 -0.18 -0.14 -0.11	8.1 -0.16 -0.13 -0.1	8.09 -0.18 -0.13 -0.1	7.76 -0.19 -0.13 -0.11
Oxygen	254.97 mmol/m^3 -0.71 % -0.38 % +0.04 %	236.21 mmol/m^3 -4.37 % -3.27 % -2.72 %	282.33 mmol/m^3 -3 % -1.94 % -1.3 %	354.62 mmol/m3 -5.86 % -4.34 % -3.53 %
Chlorophyll	0.44 mg/m^3 -8.9 % -6.16 % -15.53 %	0.15 mg/m^3 -1.99 % -10.6 % -25.17 %	0.38 mg/m^3 -15.67 % -15.67 % -15.67 %	0.28 mg/m3 -8.57 % -15.71 % -24.64 %

FISH CATCH POTENTIAL

Fish catch potential is an estimate of the maximum fish catch achievable given the marine resources available over a sustained period. It is linked to the concept of maximum sustainable yield, meaning the maximum amount of fish that can be extracted from a system without causing a collapse in fish populations.

It is a characteristic of the natural system, which is substantially different from realized catch, and a direct result of the fishery policy in place. The data reported exclude semi-enclosed seas, such as the Baltic, the Mediterranean and the Black Sea.

Fish catch percentage change

2050

-26.5%

-30.6%

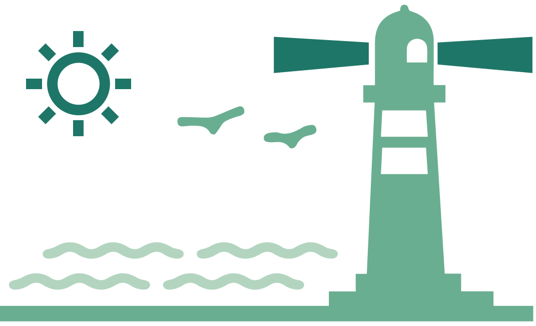
ANALYSIS DETAILS

All datasets were analysed using only data from within the marine EEZ and therefore excluding overseas territories, detached islands and any disputed or joint territories with other nations. In the assessment of current climate conditions, seawater surface tempereraturе data was obtained using satellite observations distributed in the framework of ESA Climate Change Initiative.

Future projections of marine indicators are represented by the combined analysis of results from 15 different Earth System models participating in the Coupled Model Intercomparison Project Phase 6 (CMIP6). These models include new and better representations of physical and biogeochemical processes, compared to previous IPCC assessment reports.

Fish catch potential data was obtained using the FAO's technical report and refers to the best and worst case climate scenarios from the Fifth IPCC Assessment Report. These mean estimates are subject to substantial uncertainties as discussed in the original work.

EUROPEAN UNION COASTS



OVERVIEW

The coastline surrounding the 24 non-landlocked member states of the European Union is long and diverse, bordering the Mediterranean, Baltic and Black Seas, as well as the Atlantic Ocean to the west. Coastal zones make up 13% of the landmass of EEA countries, amounting to 560,000 square kilometres and 68,000 kilometres long. Managing the coastal zones of the EU presents a range of challenges to protect people, ecosystems and socioeconomic systems in exposed coastal areas.

Shoreline Length: 68,000 km

Sandy Coast Retreat at 2050: -25.0 m

CLIMATE CHANGE HAZARDS

Coastal hazards such as erosion, storm tide inundation and permanent flooding, can have strong adverse impacts on coastal regions, with loss of sandy shores, damage to settlements, infrastructure and ecosystems. Climate change can exacerbate these impacts due to rising sea levels and increasing impacts of waves and storms. The coastal systems of the EU, and the populations that occupy them, face significant pressures from a variety of forces driven by climate change both on a global scale and regionally. Climate change has led to dangerous increases in sea levels across the European continent that are reshaping the shoreline and damaging coastal habitats, and it has also led to unpredictable hazard events such as storm surges and floods, as well as contributing to shifting patterns in temperature and precipitation on land and sea that could further exacerbate damaging effects in coastal zones. Other potential indicators of climate change include a warming of the sea temperatures, increased acidification, northward species migration, and lowered ecosystem resilience.

SEA LEVEL RISE

Sea level has been rising over the past century, with a further acceleration since 1970, averaging 1.7 millimetres per year around the European coast, and even reaching over 4 millimetres per year on the Mediterranean and North Sea coasts. The latest IPCC projections indicate that, by 2050, global sea levels may rise between 0.18 metres, under a low emissions scenario, and 0.23 metres, under a high emissions scenario.

Observed and projected sea level rise at 2050: 1.63 mm/year; 0.23 m; 0.18 m

EXTREME SEA LEVEL

Under a medium emissions scenario one in 100 year events could occur as often as one in 30 years by 2050. Under a high emissions scenario, extreme sea level events in 2100 may increase by up to 81 centimetres, particularly on the Baltic and North Sea coastlines, with communities across Europe having to face these events annually.

Current and projected extreme sea level at 2050: 1.98 m; 2.25 m; 2.17 m

OBSERVED STORMS

The combination of storms and high waves play an influential role on coastlines with many vulnerable coastal zones threatened by the possibility of storm-driven erosion. Coastal flooding is also a large risk factor particularly when extreme wave heights coincide with spring tides. Patterns in storm surges across Europe have in general not shown any strong trends over recent decades, although high variation makes them difficult to forecast, particularly on a local scale.

FUTURE STORMS

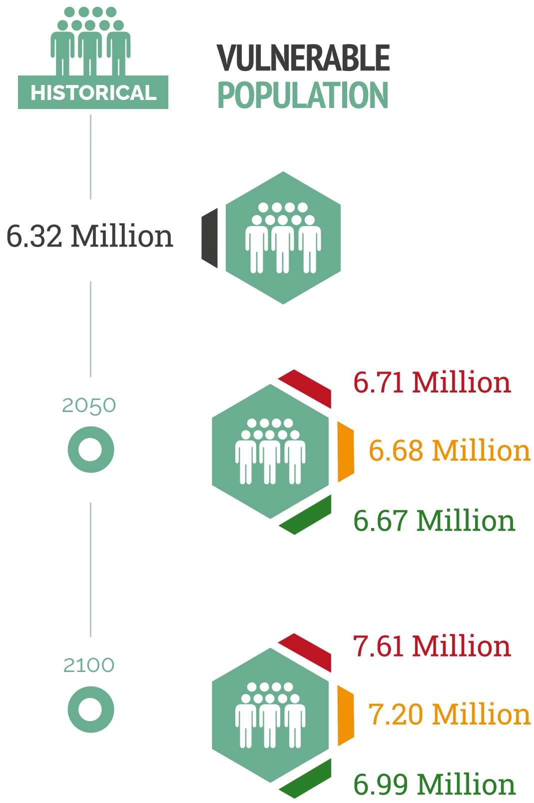
The frequency of high wave and water levels is correlated to rising sea levels, becoming much more likely when considering the effects of future climate change. Under a medium emissions scenario, 1 in 100 year events could occur as often as 1 in 30 years by 2050. With high emissions, extreme sea level events in 2100 may increase by up to 81 centimetres, particularly on the Baltic and North Sea coastlines, with communities across Europe having to face these events annually.

VULNERABILITY AND RISK

The impacts of sea level rise and increased storminess will be felt widely across each of the EU member states, with potentially disastrous consequences. Over 40% of the population of the EU lives within 50 kilometres of the sea, which amounts to at least 200 million people.

The potential impacts that they face will increase year by year, with higher sea levels increasing exposure to flooding events, coastal erosion, and damage to infrastructure. The particularly vulnerable coastal zones of the Mediterranean could face erosion of up to 10 metres per year.

From an economic perspective, assets within a kilometre of the shoreline would be valued at up to 1,000 billion euro for the EU area, with many important cities and ports, as well as economic activities, particularly those concerning tourism, found along the coast. Many natural habitats are also at risk of significant damage, with sand dunes and beaches vulnerable to erosion, and saltwater intrusion from high waters posing a further threat. Under a medium emissions scenario the population exposed to the annual coastal flood level is expected to increase from 6.32 million to 6.68 million by 2050.



INFLUENCE OF SEA LEVEL RISE ON EXTREME SEA LEVEL

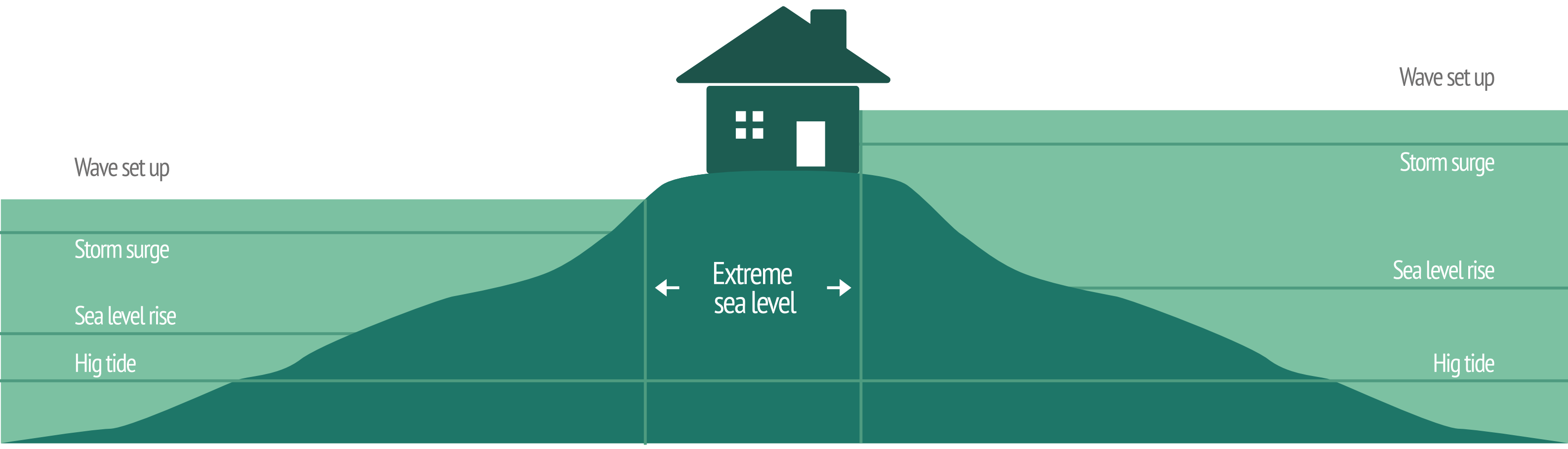
Present and future sea level rise are a consequence of carbon induced global warming causing melting ice and ocean expansion due to heat accumulation.

The extreme sea levels reported here are based on the 100-year storm surge + wave set up + sea level rise + high tide indicators. The first two parameters (storm surge + wave set up) are based on the 100-year value for the event; sea level rise is its projected value at 2050; and high tide is the absolute value of the highest tide calculated for a given locality, which won't be influenced by climate change.

+ Wave set up refers to the accumulation of water near the shore due to the presence of breaking waves.

+ Storm surge is an occasional increase in sea level driven by shoreward wind-driven water circulation and atmospheric pressure.

+ High tide is usually the highest tide reached in a given location based on tide records.



Present sea levels have risen globally by approximately 20 centimetres over the past century.

Future sea level rise is a projection based on different global warming scenarios, at approximately 100 centimetres by the end of 2100, with consequent inundation during extreme sea level events.

EUROPEAN UNION
WATER

OVERVIEW

Water management is a critical issue for numerous regions across the EU, particularly regions with lower rainfall and high population density, and areas with intensive agricultural or industrial activity. In addition to water supply issues, overexploitation of water has led to the drying out of natural areas in western and southern Europe and salt-water intrusion in aquifers, especially along the coast.

The overall extraction and consumption of water resources is mostly balanced in the long term. However, some areas may face water shortages, in particular in southern Europe where much improved efficiency of water use, especially in agriculture, is needed to prevent seasonal water shortages. In addition, climate change may affect water resources and water demand.

With a 2°C increase in global mean temperatures precipitation is expected to increase in most parts of Europe except for the Mediterranean region, with the highest increases over the Alps and Eastern Europe. These increases are likely to be linked to the increase in temperature which triggers more convective storms in the summer months.

CLIMATE CHANGE HAZARDS

In the EU (including the UK), around 51.9 million people and 995 billion euros in economic activity are currently exposed to water scarcity. Furthermore, 75 billion euros in economic activity are exposed to severe water scarcity, a large percentage of which is concentrated in Mediterranean countries. Even with a temperature increase of only 1.5°C, 7.4 million more people and 134 billion more euros in economic activity may become exposed to water scarcity, although the amount of people and economic activity exposed to severe water scarcity will remain constant. Under a high emissions scenario, leading to a temperature increase of over 3°C, an additional 7.7 million people and 99 billion euros in economic activity will be exposed to severe water scarcity.

KEY POINT RUNOFF

A 2°C temperature rise may result in an increase in extreme flooding and droughts, except for the Mediterranean area where a decrease in flow is projected over all four seasons. Surface runoff will increase accordingly and it will be exacerbated by urban expansion. This may cause local water excess problems and sewer overflows. In Northern Europe, numerous urban areas are projected to be more vulnerable to rainfall flooding.

In Southern Europe's arid and semi-arid regions, an increase of 1°C in mean annual temperature and decrease of 5% in mean annual precipitation - a likely scenario by 2030 - may result in an average decrease of 9-25% across its river basins.

2050

Runoff increase

% of area

+34.0%

+10.0%

KEY POINT DROUGHTS

Higher temperatures have significant impacts on human heat stress and related fatalities. An example is the 2003 drought and heatwave that affected large parts of central and northern Europe, with widespread impacts on various economic sectors and the population. Studies have shown how Southern Europe has already been subject to more intense and longer meteorological droughts.

During the 2018 and 2019 summers, severe restrictions on irrigation and reduced power supplies due to severe droughts around Europe raised concerns about a possible increase in the severity and frequency of droughts due to climate change.

KEY POINT GROUNDWATER

About 60% of the drinking water in the EU comes from groundwater, and in some countries in Europe it is the only source of drinking water. In Europe, most groundwater is high quality drinking water that has been naturally filtered by the rock pores through which it passes, although it can be vulnerable to long-lasting contamination by the industrial, agricultural or domestic wastes and leachates. The impacts of climate change on groundwater recharge are driven by water scarcity issues expected in southern European countries and by changes in seasonal regimes of snow-melt, wetter winters, drier summers and prolonged periods of droughts as well as groundwater flooding in other parts of Europe. It also appears that secondary impacts of climate change, caused by human adaptations in energy and water policies, have potentially large impacts on groundwater resources.

KEY POINT FLOODS

Climate change has altered the distribution of river floods in Europe. Specifically, river floods increased in northwestern and parts of central Europe, caused by increasing autumn and winter rainfall; decreased in southern Europe, due to decreasing precipitation and increasing evaporation; and decreased in northeastern Europe, because of decreasing snow cover and snowmelt. While individual catchments can be strongly influenced by changes in land use or other factors, the general homogeneity of the changes in large regions and the fact that they can be explained by observed changes in climate variables indicates that climate change has been the main driver of the changes observed. The distance over which floods affecting different river basins occur has grown from about 80 kilometres in 1960 to 130 kilometres in 2010 in Europe on average. This shows that neighbouring river basins can be flooded at the same time, creating new challenges for flood risk management.

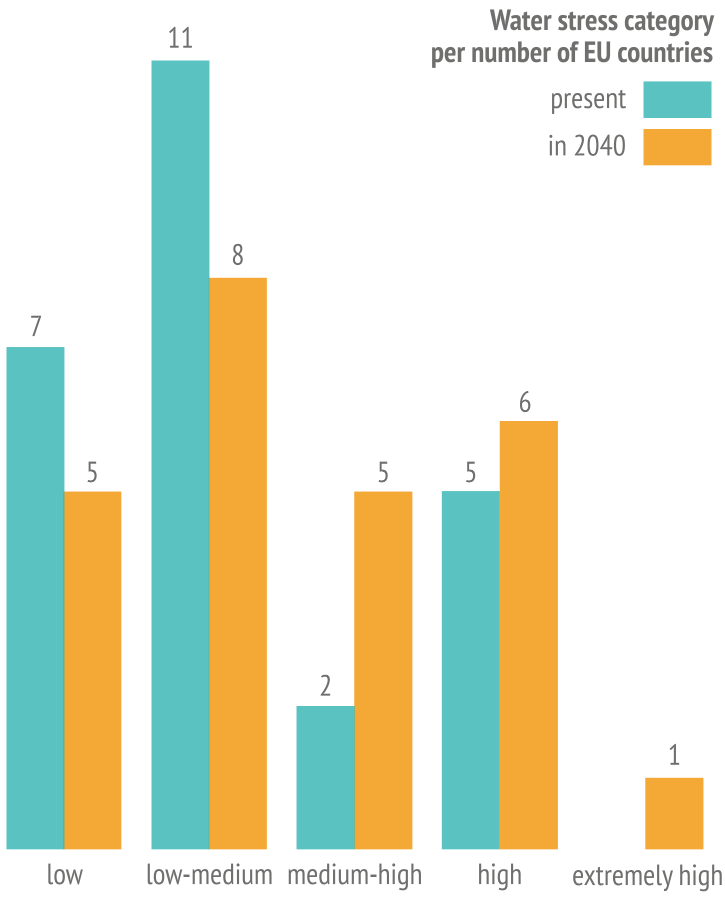
Climate change will increase the population affected and the economic damages from floods in almost all countries in Europe. The strongest increase in flood risk is projected for countries in Western and Central Europe, such as Austria, Hungary, Slovakia and Slovenia. A high emissions scenario could increase the socio-economic impact of floods in Europe more than three-fold by the end of the 21st century.

RISK INDICATORS

Water stress, which is pressure on the quantity and quality of water resources, exists in many places throughout Europe, resulting in serious problems of water shortages, flooding, pollution and ecosystem damage. Although there has been much improvement in water quality since the first European law on bathing water twenty years ago, there has been little progress on the integrated management of water resources, which is the most effective way to address water issues.

WATER STRESS

The intensity of water use, which is the percentage abstraction of water resources available from within the country and from transboundary rivers, varies widely from 0.1% for Iceland to 72% for Belgium, with an average of 15% for Europe. Although some countries rely exclusivley on internal water supplies, others such as The Netherlands, Belgium, Portugal and Hungary, depend on transboundary rivers.



EUROPEAN UNION AGRICULTURE

OVERVIEW

The EU is one of the leading producers and exporters of agricultural products worldwide. The EU produces about 75% of the world's olive oil, as well as 66%, 50% and 13% of the global production of wine, sugar beet, and cereal, respectively.

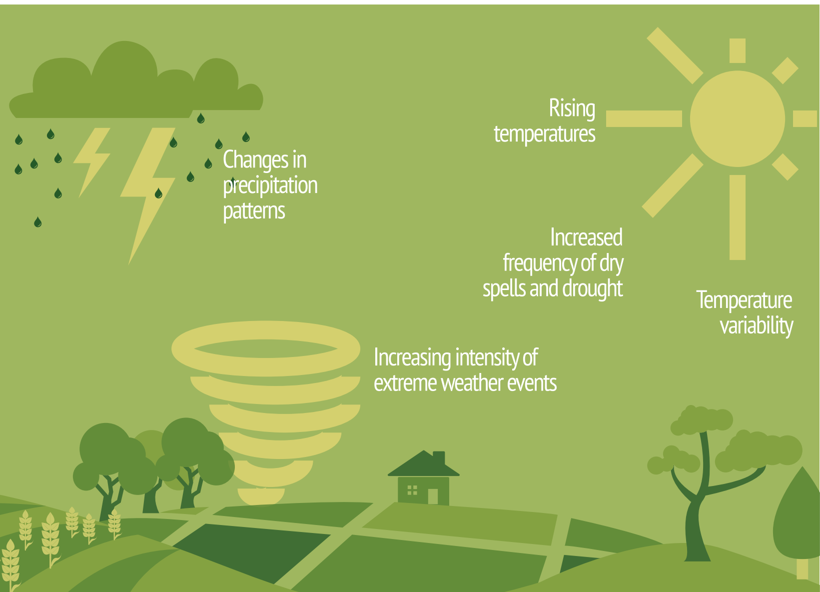
In 2016, about two thirds of the EU-27's utilized agricultural land was based in six Member States: France, Spain, Germany, Poland, Italy and Romania, and about 60% of agricultural produce was from France (18.1 %), Italy (15.3 %), Germany (14.5 %), and Spain (11.3 %). The majority of agricultural land is non irrigated arable land (46%), followed by grassland pastures (18%), and agricultural land with significant areas of natural vegetation (16%). The freshwater use for agriculture accounts for 55% of total water abstraction and is considerably higher in Southern Europe.

124.5 Mt Wheat	111.9 Mt Sugarbeet	69 Mt Maize
50.1 Mt Barley	27.6 Mt Grapes	13.8 Mt Olives

Year	Added Value of Agriculture, Forestry and Fishing	Share of Agriculture Value added in Total GDP	Agricultural land	Area Equipped for Irrigation
2000	160,016 USD Million	2.3 %	122,753 Thousand HA	18,425 Thousand HA
2018	256,141 USD Million	1.6 %	110,879 Thousand HA	18,631 Thousand HA

EXPECTED IMPACTS ON AGRICULTURE PRODUCTIVITY

Rising temperatures, reduction in average annual precipitation, and intensification of extreme events such as heat waves and drought, affect production variability with a tendency towards yield reduction for many cultivated species, accompanied by a probable decrease in food quality. Crops respond to increases in temperatures with changes in duration of the growing season, early appearance of phenological phases and potential shifts of cultivation areas toward higher latitudes and altitudes for better growing conditions. However, impacts vary significantly depending on the geographical area and specific crops in question.

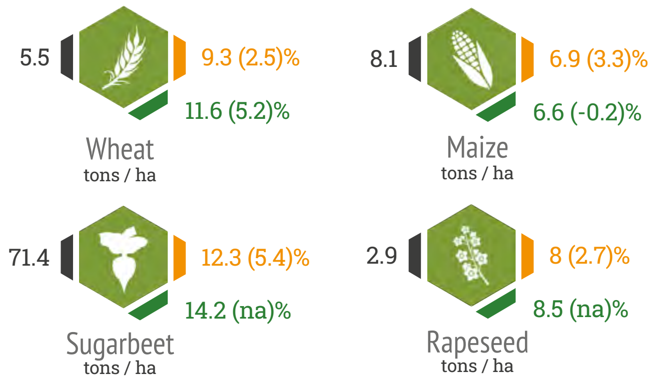


CROP PRODUCTIVITY

Crop productivity refers to the harvested yield of a crop per unit of land area. It is strongly influenced by climate and other environmental and management factors.

Climate change is expected to have an impact on the productivity of several major crops, although this may in part be offset by the fertilizing effect of higher CO_2.

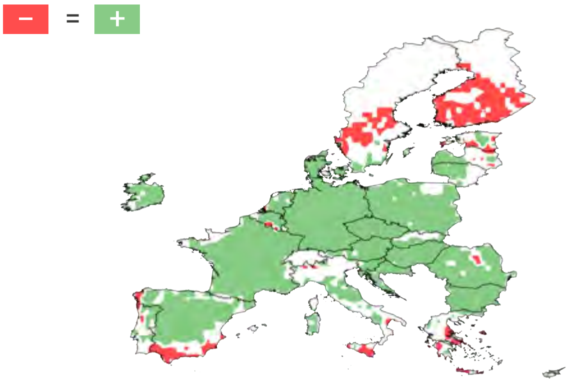
Impacts are estimated using a range of model projections based on low to high emission scenarios and reported as percentage changes between the 30-year average around the historical period and the 30-year average around 2050.



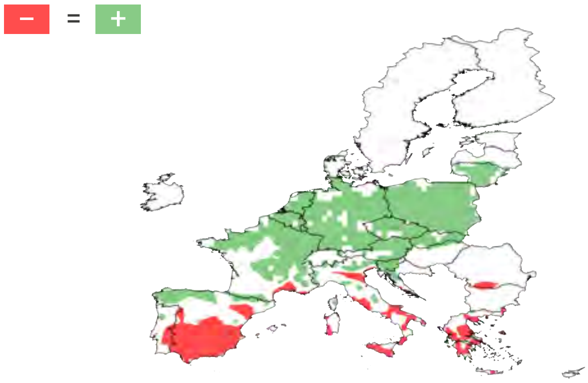
2050

Productivity change with (without) the CO_2 fertilization effect. Estimates assume sufficient water and nutrient supplies, and do not include impacts of pests, diseases, or extreme events.

CHANGE IN WHEAT



CHANGE IN MAIZE

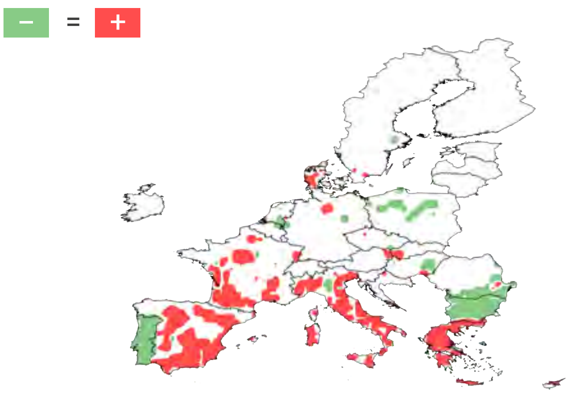


Wheat and maize productivity may benefit from climate change with yield increases projected in northern Europe. Crop losses are instead expected in southern Europe due to higher temperatures that affect the length of the crop growing period and reduce plant biomass accumulation. Extreme climate conditions (like heatwaves, drought and heavy rain) will be more pronounced in the future, triggering heavy yield losses and also affecting regions that are projected to experience average positive agro-climatic changes. Sugarbeet and rapeseed cultivation may also benefit from climate change, with up to 14% and 8% average increases in productivity, respectively. Summer temperature upsurge will harm productivity and reduce quality of perennial species, such as olive trees and grapevines,particularly in the warmest and driest regions. A potential northward and higher altitude shift of tree crop suitable areas is expected.

ADAPTATION IN AGRICULTURE AND WATER RESOURCES

The growing season will become drier in both northern and southern Europe, exposing crops to higher water deficits. However, summer temperatures will increase the most in southern Europe, where water resources may drop up to 40%. Even more intense droughts will occur in areas that are already water scarce. Higher temperatures will generally require more water for agriculture due to higher plant evapotranspiration. This may compromise recharge rates of groundwater levels and risks of saline intrusions into coastal aquifers.

CHANGE IN WATER DEMAND



Agriculture
Water Demand
% of change

2050

Major adaptation in agriculture will be needed, particularly in southern Europe, to reduce water resource risks, with potential benefits for climate change mitigation and sustainability goals.

EUROPEAN UNION FORESTS

FORESTS IN EUROPEAN UNION

The EU27 countries have an extensive and diversified topography hosting a multitude of forest types. In the south there is a predominance of mediterranean vegetation such as scrub and evergreen oak forests. In the north, on the main mountain ranges, the boreal coniferous forest prevails, whereas temperate forests are most common in the innermost territories where broad-leaved trees dominate.

1990

145 Mln ha
Million hectares
Forested area

165 Tons/ha
Tons of Carbon per hectare
Carbon stock

2020

159 Mln ha
Million hectares
Forested area

200 Tons/ha
Tons of Carbon per hectare
Carbon stock

FORESTED AREA AND CARBON STORAGE

With a constant increase in surface area over recent decades, wooded areas now cover almost 40% of the total land surface. This amounts to an overall stock of 30 gigatonnes of carbon including soil. Forests sequester the equivalent of about 400 million tons of carbon dioxide per year: a crucial sink that amounts to approximately 10% of total EU-27 greenhouse gas emissions. However, projections indicate a future decline.

FOREST PRODUCTIVITY

Forest productivity or Net Primary Production is the net carbon captured by plants. It is the difference between the carbon gained by Gross Primary Production - net photosynthesis measured at the ecosystem scale - and carbon released by plants' respiration. It is expressed per unit land area.

2050

Productivity anomaly
Tons of Carbon per hectare per year

+0.62

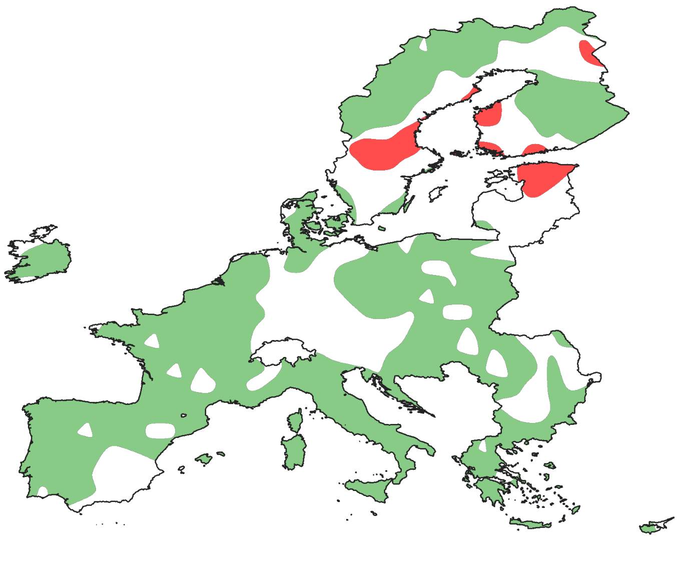
+0.45

Increase expected to be very weak and with high uncertainty between models. Growth areas in the whole continent except for Germany and southern Spain

+ Fertilizing effect of increasing atmospheric CO_2
+ Rising temperatures and nitrogen deposition promotes productivity

Notable decrease of large areas in Baltic countries

+ Lengthening dry season reduces productivity



KEY SPECIES UNDER CLIMATE CHANGE

CHANGE
MEDITERRANEAN
In mediterranean forests in southern Europe intensified drought impacts favour more dry tolerant species

VULNERABILITY
BEECH
Significant impacts on beech forests especially in the central-southern range

THREATENED
SPRUCE
Prolonged droughts are increasing the impacts of bark beetles on Norway spruce forests in Central Europe

GAIN
TEMPERATE
European temperate forests of mesophilic oaks could widen their distribution range to the north compared to boreal forests

FIRES IN EUROPEAN UNION

Fire is a structural ecological process that provides several types of ecosystem services and impacts on socio-ecological systems, including human health, carbon budgets, and climate change. Changes in global fire activity are influenced by multiple factors such as land-cover change, policies, and climatic conditions. Fire also releases large quantities of greenhouse gases into the atmosphere, contributing to a vicious cycle.

During the last two decades, the total area affected by fire was approximately 13.2 million hectares with 1.2 million fires occurring.

BURNING
13.2 MILLION HECTARES

EMITTING
0.22 TERAGRAMMES OF CARBON PER YEAR

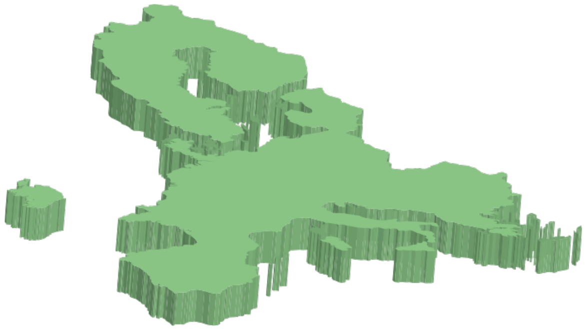
FOREST FIRE EMISSIONS CONTRIBUTED TO 11% OF TOTAL FIRE RELATED CARBON EMISSIONS

COSTING
APPROXIMATELY 3.5 BILLION USD PER YEAR IN ECONOMIC LOSSES (2000-2017)

WHERE DO FIRES OCCUR?

Portugal, Spain, Italy, Greece, and France contributed up to 90% of the total burned area.

611 fatalities occurred between 2000 and 2017.



Fires occur in most European countries, although they affect the Mediterranean region in particular.

Changes in land use, socio-economic factors and climate are the main drivers of fire regime changes in Europe.

FUTURE BURNED AREA

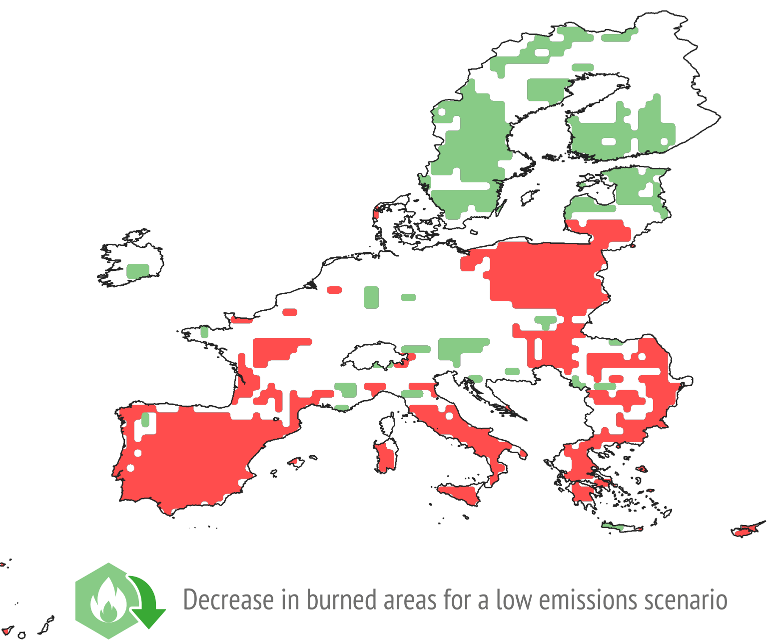
Under a low emissions scenario, a generalized increase in burned area is expected over the Mediterranean, affecting sclerophyllous, conifers and semi-deciduous forests. Some temperate and mixed forests in eastern Europe might also suffer an increase in burned area. However, in some boreal forests of Scandinavia burn area may decrease. Spatial patterns are expected to be similar under a medium emissions scena- rio.

Burned Area
km² per year

2050

+1,659

+1,494



Decrease in burned areas for a low emissions scenario

Increase in burned areas for a low emissions scenario
+ Prolonged and more intense fire season
+ Increase in future weather risk due to warming and drought conditions

VARIATION OF SPECIFIC FIRE INDICATORS

% of change
High-to-extreme fire danger days

+10%

+5%

2041-2071

% of change
Fire season lenght

+10%

2010-2050

% of change
PM2.5 emissions

+18%

+17%

FUTURE FIRE EMISSIONS

Fire emissions might follow a similar spatial pattern to burned area with a pronounced increase in northern boreal forests under a medium emissions scenario.

2050

Fire Carbon emission
Teragrams of Carbon per year

+15.7

+9.8

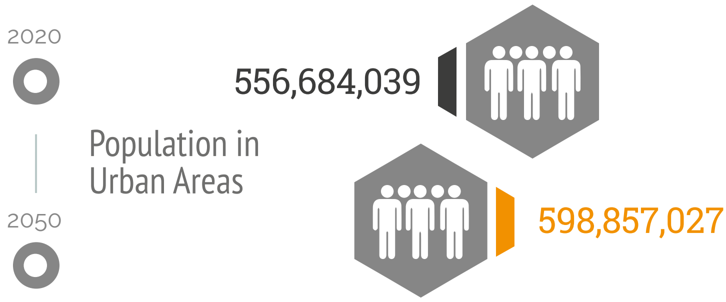
EUROPEAN UNION
URBAN

OVERVIEW

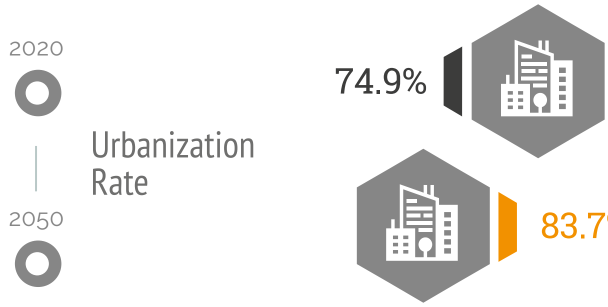
Urbanization rate in Europe in 2020 was 75%, it is expected to increase to 84% by 2050.

The EU's urban population lives predominantly in smaller urban centres with less than 300,000 inhabitants. There are only two mega-cities with more than 10million inhabitants, although a third one is expected to emerge by 2035.

Bult up areas cover 3.81% of the the European Union (156,895.59 square kilometers).



Graphs refer to data provided by United Nations, Department of Economic and Social Affairs, Population Division (2018). World Urbanization



OVERVIEW OF KEY CLIMATE IMPACTS IN URBAN AREAS

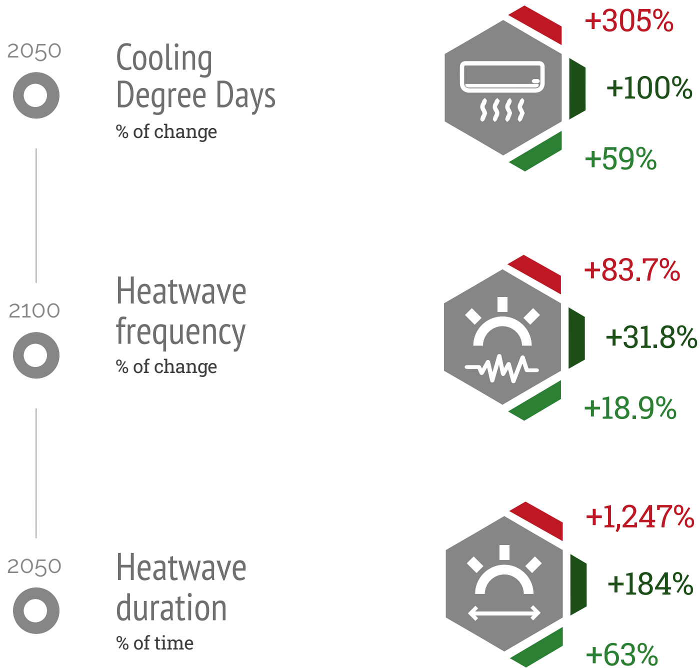
The main impacts of climate change on urban areas in the EU relate to increasing heat stress and flood events.

HEATWAVES AND HEAT STRESS

Temperatures in built-up areas are higher than in the surrounding rural areas due to the urban heat island effect. In particular in cities in the northern and western part of the EU, differences in temperatures between city centres and vegetated surroundings can be as high as 9°C. Heat stress during heatwaves accounted for 87% of fatalities from climate and weather related events, mainly due to the heatwave of 2003, which alone caused around 70,000 fatalities across Europe.

Official accounts counted almost 90,000 victims from heatwaves in Europe between 2000 and 2020. The number of hot days and intensity and frequency of heatwaves is expected to rise under all future climate change scenarios. In particular for cities in the Mediterranean area and in Eastern Europe, rising mean temperature increases will increase heat stress in urban areas.

Under such climate conditions, and without any adaptation measures, annual fatalities from extreme heat could rise from 2,700 deaths per year now to approximately 30,000 or 50,000 by 2050, with **1.5°C** or **2°C** global warming, respectively.



ENERGY POVERTY

In 2016, more than 20% of households in the European Union faced difficulties in keeping their house cool during heatwaves, due to energy poverty as well as poor quality of housing.

During heatwaves, high levels of air pollution in many European cities worsened health impacts. In 2017, almost 80% of the European population was exposed to levels of air pollution which exceeded WHO thresholds.

2017

Population exposed to air pollution

79.9%

COASTAL FLOODING

Europe's population is increasingly concentrated in coastal areas, and many of these are exposed to increasing risks due to sea level rise and more frequent storm surges.

Under a rapid sea level rise scenario, the population exposed to flood risk will increase, for example, from under 5 million to 8.8 million in the Netherlands, and from 1.5 million to 2 million in Germany.

Projected sea level rise

2050: 0.23 m / 0.18 m

2100: 0.77 m / 0.38 m

EXTREME PRECIPITATION EVENTS

European cities are vulnerable to flooding from extreme precipitation events, which cause high levels of damage to buildings and infrastructure. While overall precipitation is expected to decrease in most parts of Europe, extreme precipitation events might become more frequent.

Many cities in the European Union have been impacted by intense short-term precipitation events causing surface flooding. In Münster, Germany, 90 millimetres of rain fell in 7 hours, causing 72 million euros in damages in 2014, and in Copenhagen in 2011, 135 millimetres of rain in 2 hours caused losses for more than 800 million euros. Frequency and intensity of brief precipitation events are expected to increase further. Intensifying water cycles and increased seasonality of river flows, will result in more frequent and intense flood events.

2050

Runoff increase
% of area

+34%
+20%
+10%

SURFACE SEALING AND FLOODS

Heavy precipitation in cities is problematic due to the high level of sealed surfaces. Soil sealing increases run off and reduces the amount of water absorbed by soil. Where there are large amounts of impervious ground cover, short duration extreme rainfall events can lead to increased flooding, even resulting in flash floods.

URBANIZATION OF FLOOD PLAINS

High rates of urbanization and expansion into floodplains have increased levels of exposure to flooding. At the same time, built up and impermeable surfaces increase water run off and make extreme precipitation events more serious. In 2019, built up areas covered 3.8% of the overall surface of the EU.

In cities this rate was around 19.5% in 2015 (19.1% in 2006), and in core city areas (urban morphological zone, UMZ,) this rate was as high as 35.6% (up from 34.9% in 2006).

2010

% of urban population
Population living in slums

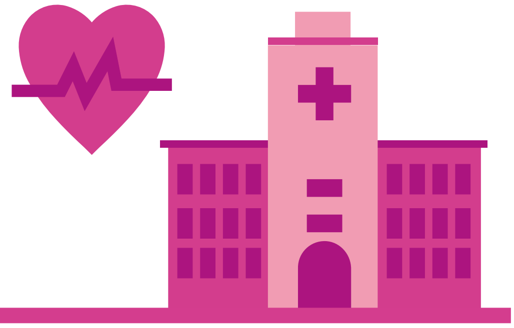
0%

2018

% of total population
Urban population living in areas where elevation is below 5 meters

5.0%

EUROPEAN UNION
HEALTH



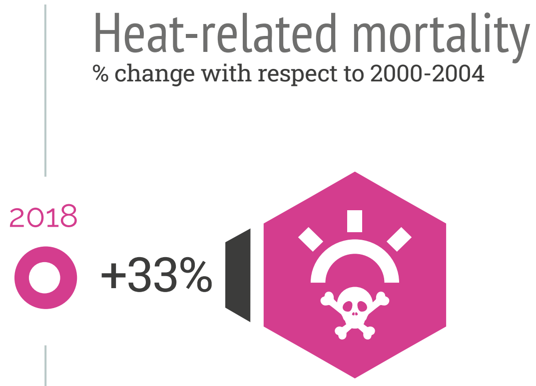
OVERVIEW

Climate change affects human health in Europe through warming and increased frequency and intensity of extreme events. Countries in the WHO European Region are experiencing accelerated rates of warming and an unprecedented frequency and intensity of heatwaves. Heat extremes are already leading to increased fatalities and negative health effects, also due to a growing urban population. Along with these direct changes, indirect effects through increases in vector-borne diseases, rodents, or changes in water, food, and air quality are also likely to increase. Climate change also makes some areas in Europe more suitable for infectious diseases, including dengue fever, Vibrio infections and West Nile fever. Environmental factors are estimated to account for almost 20% of all deaths in Europe.

HEAT RELATED MORTALITY

The EU accounted for more than a third of heat-related mortality among the elderly, with 104,000 out of the 296,000 global deaths recorded in 2018. Due to the higher number of people being exposed to heatwaves, heat-related mortality is expected to increase in Europe. Annual mortality from extreme heat is projected to rise from 2,700 deaths currently to around 30,000 under 1.5°C warming, 50,000 under 2°C, and 90,000 under a 3°C warming, by 2100.

In 2018, there was a 33% increase in heat-rela- ted deaths in the EU compared to the 2000 to 2004 baseline.

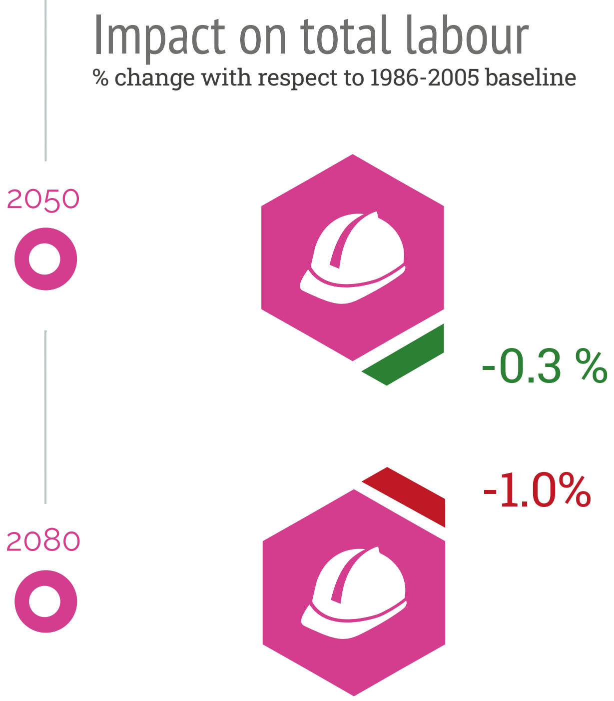


IMPACTS ON LABOUR

Labour is directly affected by changes in environmental conditions. Warming affects both the number of hours worked (labour supply) and on the productivity of workers during their working hours (labour productivity). Both labour supply and productivity are projected to decrease under future climate change in most parts of the world, and particularly in tropical regions.

Parts of sub-Saharan Africa, south Asia, and southeast Asia are at highest risk under future warming scenarios. Future climate change will reduce global total labour in the low-exposure sectors by 18 percentage points and by24.8 percentage points in the high-exposure sectors under a 3.0°C warming scenario.

Labour is directly affected by changes in environmental conditions and especially heat stress. Total labour in the EU is expected to decline by 0.3% under a low emissions scenario, and by 1.0% under a medium emissions scenario.



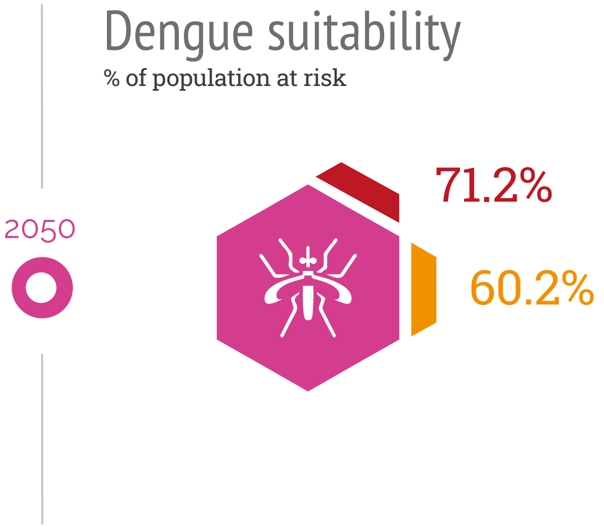
CLIMATE CHANGE AND DENGUE

Dengue has spread throughout the tropical world over the past 60 years and now affects over half the world's population. Globally, vectorial capacity for both dengue vectors (A. aegypti and A. albopictus) has been rising steadily since the 1980s, with nine of the ten highest years occurring since 2000.

Climatic stressors are one important driver of the current distribution and incidence of dengue. Climate change is likely to expand the geographical distribution and suitability of several vector-borne human infectious diseases including dengue. The risk of dengue transmission is increased by warming climates, as the growth and development of mosquitoes are significantly influenced by temperature, precipitation, and humidity.

Dengue suitability

% of population at risk



CLIMATE CHANGE AND ZIKA

Zika virus has spread to at least 49 countries and territories since 2013. Climate change impacts on transmission suitability risk have increased over the years and future warming over 1.3 billion additional people could face suitable transmission temperatures for Zika by 2050.

DENGUE AND ZIKA: POPULATION AT RISK

Though dengue cases in Europe are currently non-existent due to the principal vector (mosquito Aedes aegypti) disappearing, another vector (Aedes albopictus) has been introduced into Europe over the last two decades increasing the possibility of dengue transmission. Diseases such as chikungunya, tick-borne diseases, and West Nile virus may also increase.

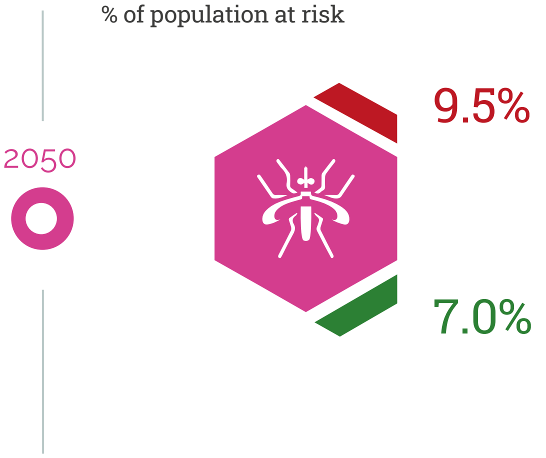
These risks are likely to increase due to future climate change. Under a medium emissions scenario, 60.2% of the population will be at risk of transmission-suitable mean temperature for dengue by 2050, whereas 71.2% will be at risk under a high emissions scenario.

CLIMATE CHANGE AND MALARIA

The exposure of Europe to malaria transmission will increase as a result of rising temperatures. In 2050, 7% of the EU population will be at risk of malaria under a low emissions scenario, whereas 9.5% will be at risk under a high emissions scenario.

Malaria suitability

% of population at risk



POLLUTION AND PREMATURE MORTALITY

Without adequate adaptation measures, short and long term exposure to air pollution is likely to increase health impacts in the EU. Despite improvements in air quality standards, challenges in terms of health impacts remain. Under a medium emissions scenario, annual premature deaths due to long-term exposure to near-surface ozone and heat will increase from 55,597 (2010) baseline to 86,337 in 2050.

EUROPEAN UNION
ENERGY

ENERGY SYSTEM IN A NUTSHELL

The EU energy system (net of national differences) is still heavily dependent on fossil fuels; however, since 1990 it has experienced a progressive decarbonization and energy efficiency improvement processes. The EU is also a net energy importer. In 2019, it produced domestically around 39% of its own energy, while 61% was imported, showing progressively an increase in energy dependency.

0.07
ktoe/US$
Energy intensity

1.7%
AC Share in electricity consumption

49.6%
Import dependence ratio

CLIMATE CHANGE TODAY

TEMPERATURE

Energy demand is affected when changes in parameters like temperature or humidity change the cooling and warming needs of households and firms. Current trends in heating and cooling degree days in the EU already show a consistent shift towards cooling needs as a main driver of energy demand for indoor thermal comfort.

RENEWABLES

Increasing hydropower and wind potential in northern EU, decreasing hydro and biomass in southern EU.

WATER

Water scarcity is reducing efficiency of thermal plants in southern EU. Extreme precipitations, riverine and coastal floods are already disrupting energy infrastructure all over the EU.

ENERGY SUPPLY

The current EU energy mix of total primary energy supply shows a prevalence of oil and gas. The share of renewables ranks third and is increasing. Coal and nuclear follow with similar importance. In 2019, the energy mix in the EU, was mainly made up by five different sources: Petroleum products (including crude oil) 36%, natural gas (22%), renewable energy (15%), nuclear energy and solid fossil fuels (13%).

ENERGY DEMAND

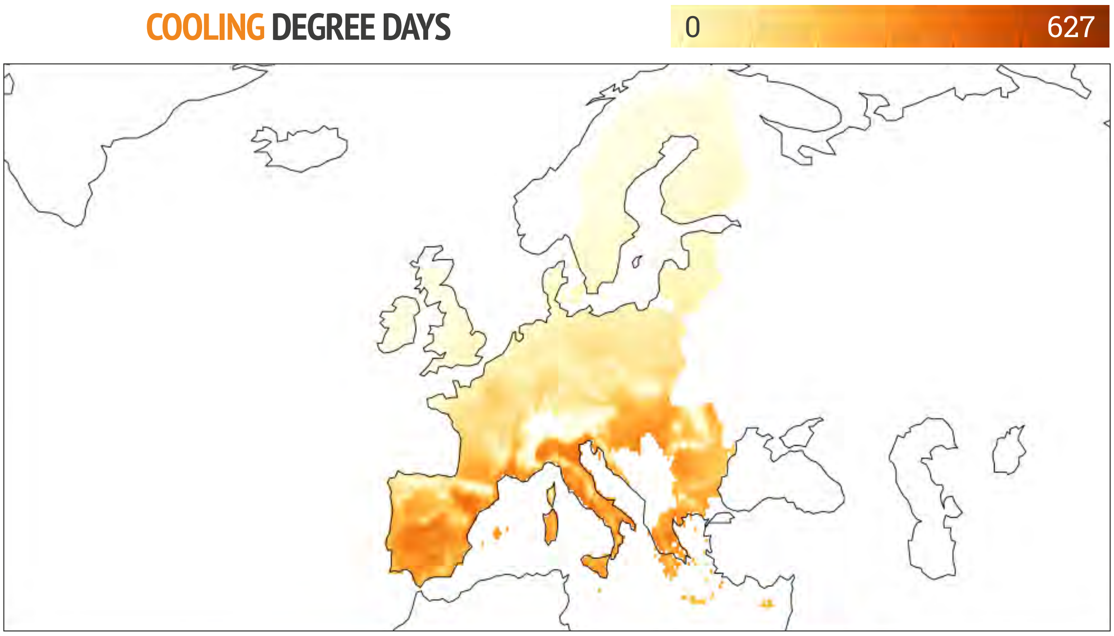
Energy use in Europe is absorbed primarily by industry followed by the transport sector, households, services and agriculture & forestry.
EU energy demand in 2019 as share of final energy consumption: Industry sector 32 %; transport sector 28 %; households 24 %; services 12 %; agriculture & forestry 3 %.

FUTURE ENERGY DEMAND

Residential and commercial demand is mainly driven by heating and cooling needs, determined by temperatures. At the EU level there is evidence that decrease in heating demand will be larger than the increase in cooling needs determining a net reduction in energy demand. Energy demand in the residential sector is projected to shift away significantly from natural gas (-27.5%) and oil products (-41.5%) toward electricity (increasing 3.8%) under a high emissions scenario, by 2070.

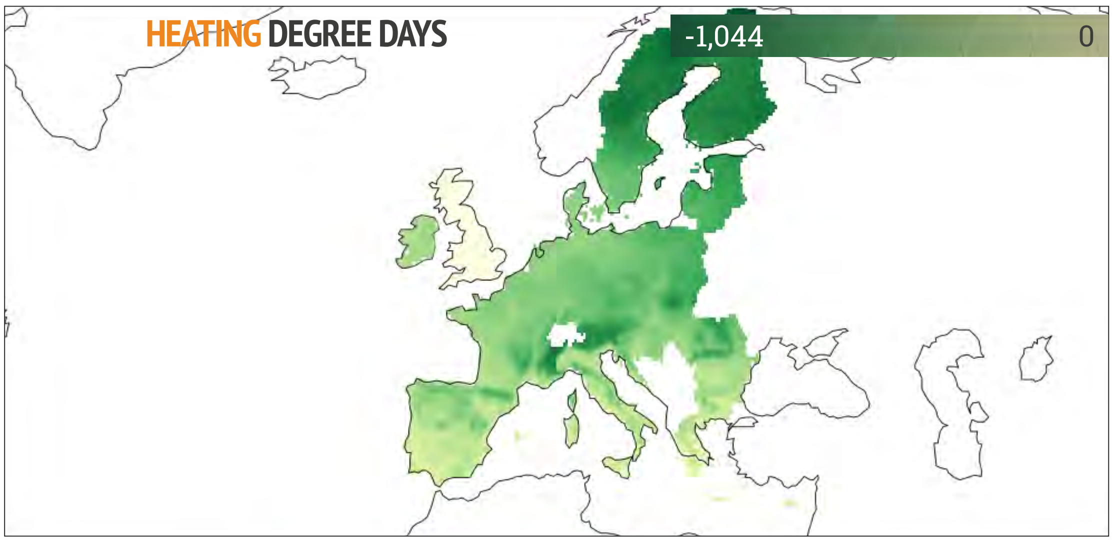
COOLING NEEDS

Marked increases in cooling needs in the Mediterranean Europe, but also in some metropolitan areas of Central Europe.



HEATING NEEDS

Heating needs are expected to decline drastically in Scandinavian coutries and Central/Eastern Europe, and in the the coldest regions of the Mediterannean (Alps, Pyrenees, Spanish mountain ranges).



EXPECTED IMPACTS OF CLIMATE CHANGE

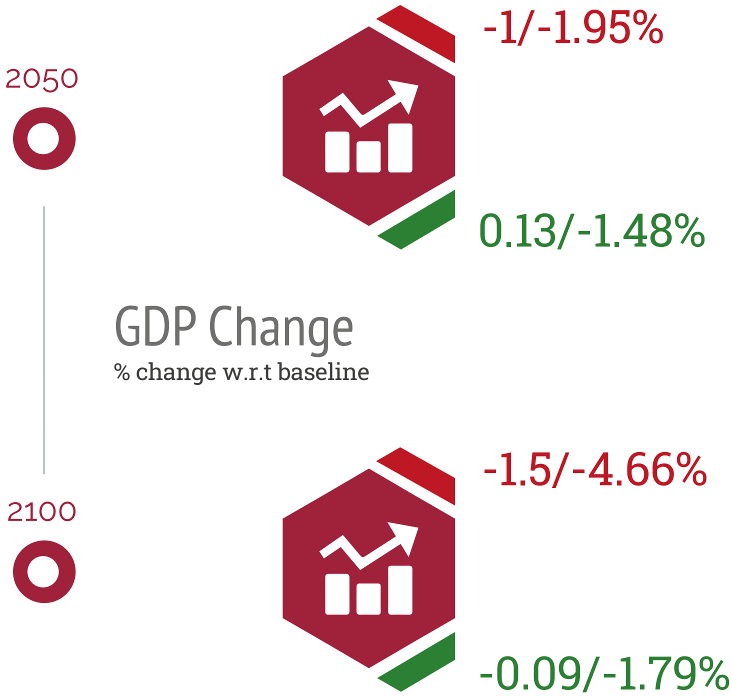
Increasing hydropower supply is projected for northern European regions, while a decline in hydropower and nuclear power is expected in southern Europe due to lower water availability for hydropower generation and for cooling of thermal plants.

Global warming is expected to affect wind and solar production only marginally. Overall EU hydropower production may increase by 2.3% or 3.2%, and nuclear power may decline by 0.7% or 1.8% under 2°C and 3°C warming scenarios respectively.

EUROPEAN UNION ECONOMY

OVERVIEW

In terms of the total value of all goods and services produced, EU GDP in 2019, when the UK was still part of the EU, was 16.4 trillion EUR. Over 64 % of total EU trade is done within the bloc. With just 6.9% of the world's population, EU trade with the rest of the world accounts for 15.6% of global imports and exports. Together with the USA and China, the EU is one of the three largest global players in international trade.



IMPACTS ON GDP

Climate change impacts growth prospects and the overall systemic economic performance of the continent. Studies emerging after the 2014 IPCC AR5, emphasize larger economic losses than previously estimated. There is agreement in the research community that these impacts will hit Southern Europe more than Northern Europe, increasing the North-South divide.

Negative impacts on GDP may be significant. By mid century, under a low emissions scenario, they could reach 1.5% of the EU's GDP; and by the end of century this could rise to 4.7% of GDP, under a high emissions scenario.

SECTORAL ECONOMIC IMPACTS

IMPACTS ON INDUSTRY AND INFRASTRUCTURE

The EU coastline is 68,000 kilometres long. Almost half of the EU population lives less than 50 kilometres from the sea; the majority is concentrated in urban areas along the coast. Economic assets within 500 metres of the sea have an estimated value of 500 billion to 1,000 billion EUR. Accordingly, climate change induced risk from sea-level rise and intensification of coastal storm surges can generate huge economic impacts.

In the 1960 to 2010 period, river floods increased in northwestern and parts of central Europe, caused by increasing autumn and winter rainfall; decreased in southern Europe, caused by decreasing precipitation and increasing evaporation; and decreased in northeastern Europe, caused by decreasing snow cover and snowmelt.

Flood events have resulted in over 4,300 fatalities and caused direct economic losses of more than 170 billion EUR (based on 2017 values) in EEA member countries over the 1980–2017 period. A possible increase in frequency and intensity due to climate change is particularly concerning.

IMPACTS ON AGRICULTURE

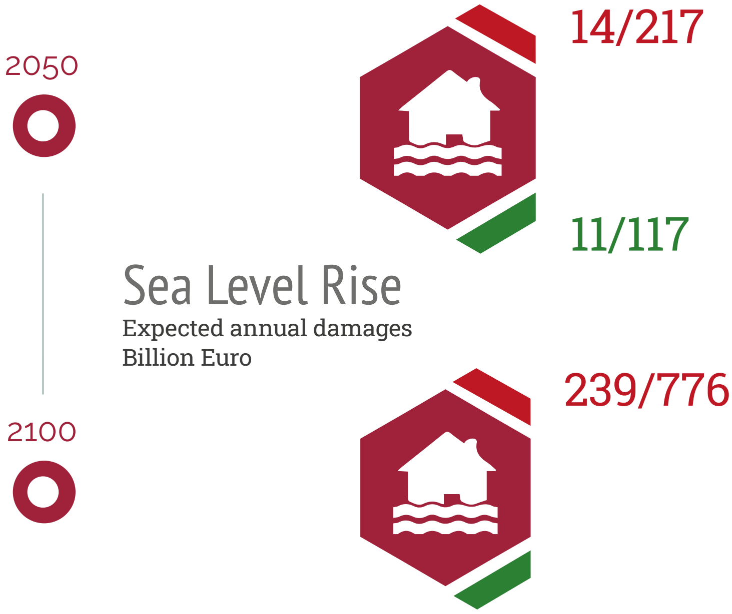
In a large, climatologically, environmentally, and economically differentiated area like the EU, impacts of climate change on agriculture and their economic consequences are highly differentiated depending on crops and regional specificities. Against this background Northern Europe could experience low negative impacts or even moderate yield improvements with associated economic gains due to climate change, whereas Southern Europe may experience substantial production losses, especially with regards to grain, maize and wheat.

The net economic costs for agricultural firms are estimated at 1.7 billion EUR under a medium emissions scenario and 0.83 billion EUR under a high emissions scenario, by 2050. However, by 2070 these could fall to 1 billion EUR and 0.63 billion EUR under a medium and high emissions scenario, respectivley. This is because, losses may be smaller under higher climate signal scenarios given the CO_2 fertilization effect. The interplay between agricultural production changes in the EU and other major producing countries (that may suffer more severe effects), could lead to export increases in wheat, barley, grain maize and soybean, with EU producer prices increasing between 1% and 7%. This could increase EU producer income between 25% and 50% in Northern Europe, and 10% to 30% in Southern Europe.

SEA LEVEL RISE DAMAGES

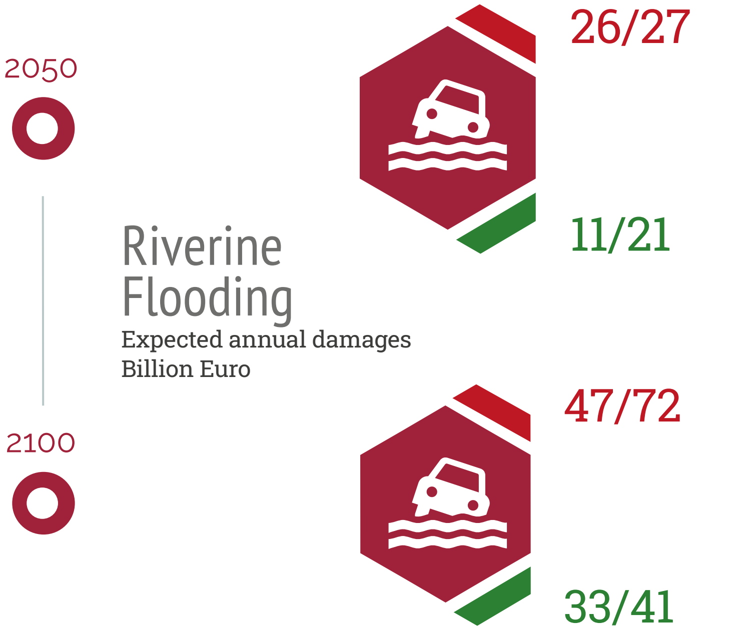
In the second half of the century, if coastal defenses are not upgraded to contrast increasing climate change risk, expected annual damages to EU coastal infrastructures could reach 776 billion EUR.

All the available studies also highlight the high benefit to cost ratio of coastal protection measures. Adaptation can reduce expected annual damages by roughly 90% at a cost that is roughly 2% of the avoided damage.



RIVER FLOODING DAMAGES

In a relatively moderate temperature increase scenarios, losses can amount to roughly 21 billion EUR by mid-century and € 30-40 billion end of century. Losses could reach over 70 billion EUR by the end of the century under a high emissions scenario.



IMPACTS ON FORESTRY AND FISHERY

Net production effects are unambiguously negative under a high emissions scenario in the forestry sector, amounting to 11 billion EUR aggregate lost production in 2070, whereas in other climate scenarios net economic gains due to trade effects could be expected even though net forest productivity declines.

The fishing sector can experience losses mostly related to decline in catches. Under a high emissions scenario producer losses can amount 1.3 billion EUR already in 2050.

IMPACTS ON ENERGY

As with all other economic sectors energy supply network in the EU will also be subject to increased stress from extreme weather events (see energy chapter)

The economic consequences in shifts of energy consumption patterns are mostly distributional, with firms and households changing their consumption basket, and increasing energy demand for cooling and decreasing that for warming. This also implies differentiated demand effects across energy vectors, with a lower demand for fossil fuels, oil and natural gas used mostly for warming purposes, and an increase in electricity (see the "Energy" chapter of this Atlas). Increases in electricity demand, induced primarily by cooling needs, represent an increase in production costs for firms. The final impact on GDP is rather moderate: an average decline of 0.2% in 2070 under a high emissions scenario and negligible for a low emissions scenario. However, some Southern European regions may experience macroeconomic losses larger than 1% of GDP not only under a high, but also medium emissions scenario. Under a medium to high emissions scenario, expected annual damage from extreme events on EU energy infrastructure will be 4.2 and 8.2 billion EUR in 2050 and 2080 respectively, roughly 7 and 15 times larger than today.

IMPACTS ON TOURISM

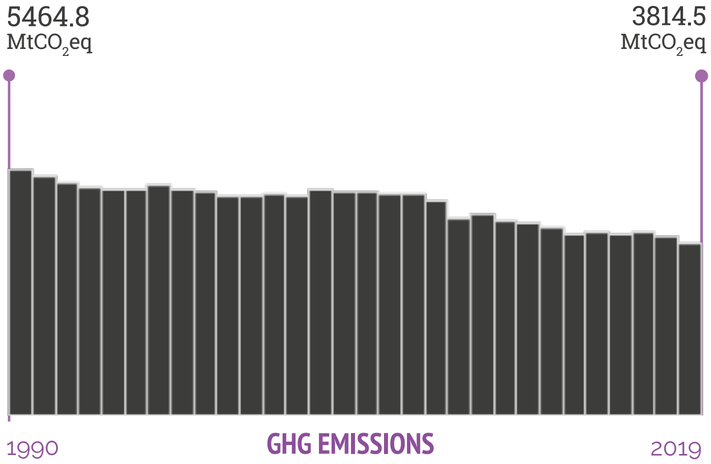
Climate change is projected to change the climatic attractiveness of EU countries, increasing the appeal of northern European destinations and decreasing that of southern ones, which will become “too hot”.

It is however difficult to derive a net economic estimate from these trends, as they are also highly dependent on non climatic variables.

EUROPEAN UNION POLICY

OVERVIEW

The EU is responsible for 7.8% of global GHG emissions and has a rate of CO_2 emissions per capita 43% higher than the world average (2018, World Bank). Its emissions have been declining since 1990, and it has a target to reach net zero emissions by 2050.



INTERNATIONAL COMMITMENTS

In its 2020 National Determined Contribution update, the EU strengthened its emissions reduction target from at least 40% reduction below 1990 levels by 2030 to at least 55% reduction.

CLIMATE POLICY COMMITMENTS CHRONOLOGY

2002 — **KYOTO PROTOCOL - 1ST PERIOD**

8% yearly average reduction of GHG over the four year period 2008-2012 and applied overall to EU-15 (the 15 States who were EU members in 1997), Bulgaria, Czech Republic, Estonia, Latvia, Liechtenstein, Lithuania, Monaco, Romania, Slovakia, Slovenia, Switzerland

2016 — **PARIS AGREEMENT - 1ST NDC**

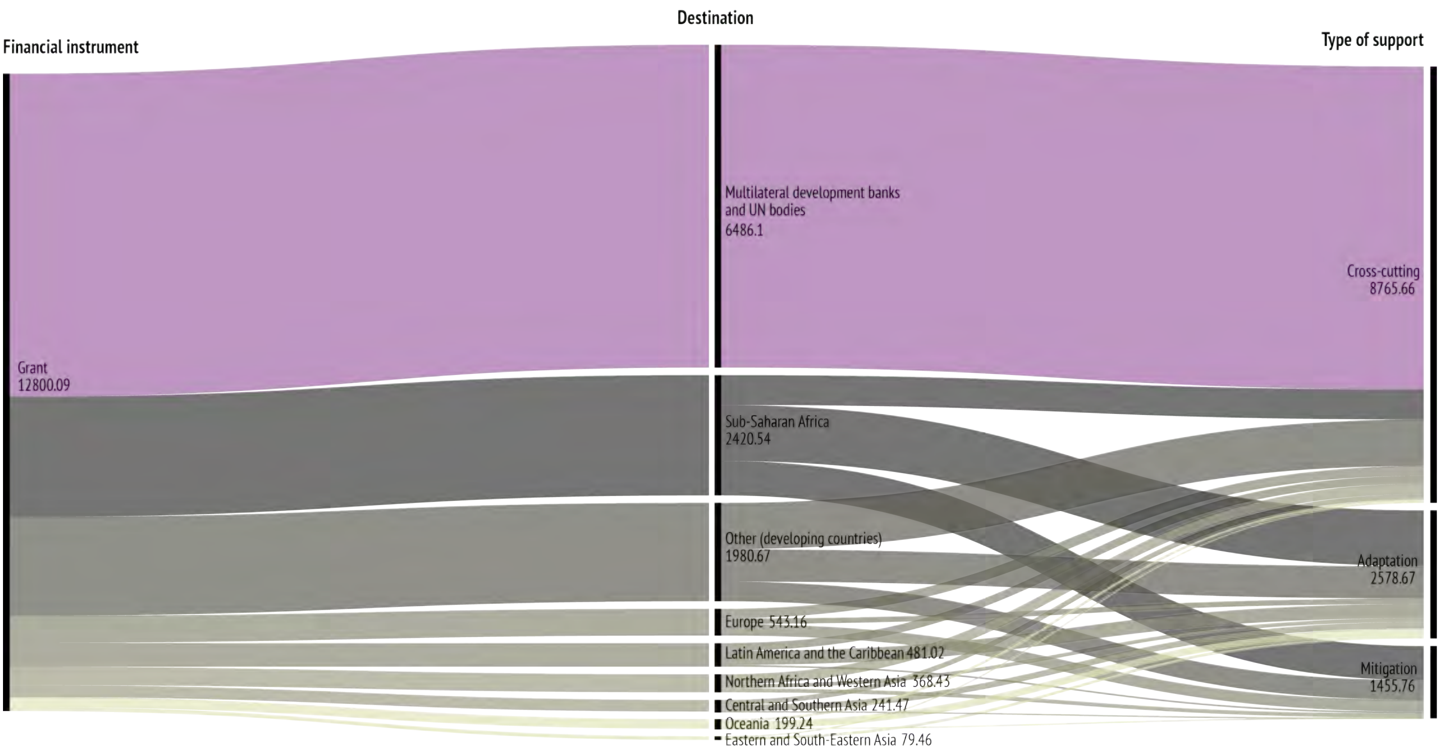
40 % of GHG reduction at 2030, with respect to 1990 level

2020 — **PARIS AGREEMENT - NDC UPDATE**

55 % of GHG reduction at 2030, with respect to 1990 level

INTERNATIONAL CLIMATE FINANCE ASSISTANCE

In the 4th Biennial Report, the EU, exercising its own competences as development aid provider, reported $ 12,8 Billion in climate-related development finance in 2017-2018. A half is devoted to bilateral channels and the largest share is directed to sub-Saharan Africa



SUSTAINABLE RECOVERY POLICY

According to the Global Recovery Observatory, in 2020 the proportion of green spending out of the total recovery spending was 10%.

Total Spending	Recovery Spending	Green Spending
2381.18 billion $	755.33 billion $	75.06 billion $

DOMESTIC ADAPTATION POLICY

In 2013 the EU adopted its first strategy on adaptation to climate change which was updated in 2021 to a "Forging a climate-resilient Europe – the new EU Strategy on Adaptation to Climate Change". The new strategy is built around 4 main pillars: smarter adaptation, more systemic adaptation, faster adaptation and international action.

- ○ Domestic Adaptation Policy
  - ○ Inclusion of Adaptation in NDCs
  - ● Integrated Adaptation & Mitigation Policy
  - ● Dedicated Adaptation Strategy
  - ○ Dedicated Adaptation Plan
- ○ Subordinate Adaptation Policies
  - ○ Sectoral Adaptation Plans
  - ○ Subnational Adaptation Plans

○ Policy not in place ● Active policy

ADAPTATION POLICY HIGHLIGHTS

TRANSNATIONAL INITIATIVES

Global Covenant of Mayors for Climate and Energy

An international coalition of cities and local governments with a shared long-term vision of promoting and supporting voluntary action to combat climate change

Global Climate Change Alliance Plus (GCCA+)

GCCA+ is a European Union flagship initiative which is helping the world's most vulnerable countries to address climate change.

EUROPEAN COMMISSION'S INITIATIVES

Climate-ADAPT

European Climate Adaptation Platform Climate-ADAPT supports governmental policy and decision-makers developing/implementing climate change adaptation strategies, policies and actions

The European Topic Centre on Climate Change Impacts, Vulnerability and Adaptation (ETC/CCA)

The ETC/CCA assists the EEA in supporting EU policy by improving data and indicators on climate change and its impacts across sectors and regions, enhancing the assessment of climate change vulnerabilities and natural hazard risks to society and ecosystems and building on current or planned adaptation strategies and actions.

Horizon Europe's Mission "Adaptation to Climate Change"

Horizon Europe is the Commission's programme for R&I. It defined 5 "Missions", to fund research projects that contribute to the political priorities of the European Commission. A specific Mission is dedicated to climate adaptation and specifically to make 150 regions across Europe climate resilience.

THE GREEN DEAL

In December 2019, the European Commission launched the EU Green Deal, a framework for the future European legislation, which promotes on one hand the prosperity of Member States' societies and on the other hand the protection of health and environment. In particular, the Green Deal aims at transforming European economy to achieve carbon neutrality by 2050. Do to so, it tackles the main environmental issues in a systematic way, by starting several parallel legislative processes in the fields of climate (the revision of the Climate Law to strengthen emission targets for 2030 and 2050, but also the new adaptation strategy as well as the package of legislative reforms included in the "Fit for 55" Communication), energy (including a roadmap for the deployment of hydrogen), circular economy (to increase the competitiveness of European manufacture), building sector (for the massive renovation of the building stock), chemistry and pollution prevention (to achieve a toxic-free environment), biodiversity (to restore ecosystems), agri-food (for the transformation of food's supply chains) and mobility (to decarbonize different transportation systems).