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Climate change and wildfires

In recent years, large wildfires have repeatedly affected Europe. Changing weather conditions associated with global warming will further increase fire danger in most of Europe. The projected increase in fire danger is strongest in southern European countries, where fires are already frequent and intense. Climate change would also result in major shifts in the locations of current ecological domains and induce stress on the structure and composition of vegetation, leading to increased vegetation vulnerability to fires.

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Wildfires in Europe today

In the first half of 2019 the number of forest fires recorded in the EU was three times the average over the past decade. Mediterranean countries like Portugal, Spain, Italy, Greece and France, are currently most prone to fires and account for around 85% of the total burnt area in Europe. In 2018, vulnerable ecosystems of the Natura 2000 network, home to several endangered plant and animal species, lost 50,000 hectares to fires, accounting for approximately one third of the total burnt area.

Wildfire danger on the rise with global warming

The number of days per year with high to extreme wildfire danger is projected to rise nearly everywhere in Europe with global warming as a result of higher temperatures and increased drought periods (Figure 1). Only in scattered parts of northern Europe are slight declines projected. Fire danger will worsen especially in southern regions of Europe that already face high fire danger conditions more often.

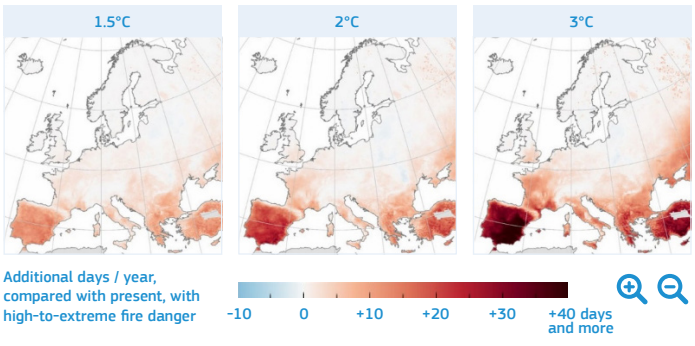


Figure 1. Additional number of days per year with high-to-extreme fire danger (daily Fire Weather Index ≥ 30) for different levels of global warming compared to present (1981-2010).

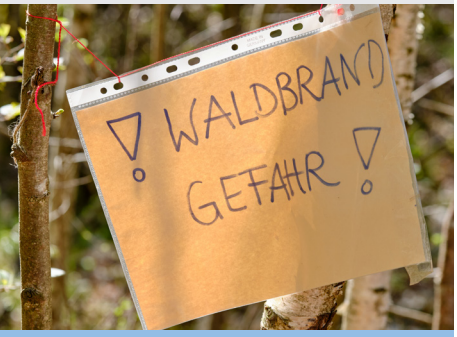
KEY MESSAGES

Climate change increases fire danger

The number of people living near wildland and exposed to high-to-extreme fire danger levels for at least 10 days per year grows by 15 million (+24%) with 3 °C warming, compared to now.

Mitigation partly reduces the impact

When global warming is restricted to 1.5 °C, the increase in exposure from now is limited to 5 million. Adaptation strategies will be needed to enhance social-ecological resilience to wildfires.



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About PESETA IV

The JRC PESETA IV project aims to better understand the biophysical and economic consequences of climate change. It does this by using projections of climate change for Europe from several climate models along with a set of climate change impact models. The project covers several sectors that are relevant to society and the natural environment, such as freshwater, agriculture, and coasts.

ec.europa.eu/jrc/en/peseta-iv

European Commission

Joint Research Centre

Although the projected worsening of fire danger is smaller with 1.5°C global warming, relative to 2°C or 3°C warming, fire danger would still be consistently worse compared to present. This suggests that mitigation alone will not be sufficient to lessen possible impacts of climate change.

Population in wildland-urban interface exposed to fire danger

The number of European citizens living near wildland and exposed to at least 10 days of high-to-extreme fire danger per year is projected to increase from 63 million in the present to 78 million with 3°C global warming, an increase of 15 million people (24%). When global warming is restricted to 1.5°C, an additional 5 million people would be exposed compared to now.

Climate change will exert stress on ecosystems and increase their vulnerability to fires

Global warming could result in a substantial shift northwards of European ecological domains (Figure 2). This results in a substantial contraction of the Boreal domain, as the Temperate domain migrates to the north. The degree of change in ecological domain components increases with the level of warming and could be considerably halted with climate mitigation.

The projected changes (both expansions and contractions) will have a direct influence on the structure and composition of wildland vegetation (forests, shrub and grassland) and corresponding fuel characteristics. This may exert stress on the vegetation and increase their vulnerability to fires, but also affect vegetation recovery after the fire. Recovery could become impossible where the intensity of eco-domain shift would prevent pre-fire ecosystems from re-establishing.

The need for adaptation

The projected increase in fire-conducive climate conditions in many regions of Europe, even under the lower levels of global warming, suggests that various adaptation mechanisms will be needed to lessen the potential effects of wildfires on people and ecosystems.

Most fire ignitions in Europe are linked to human actions, including negligence and arson. Awareness campaigns and wildfire prevention

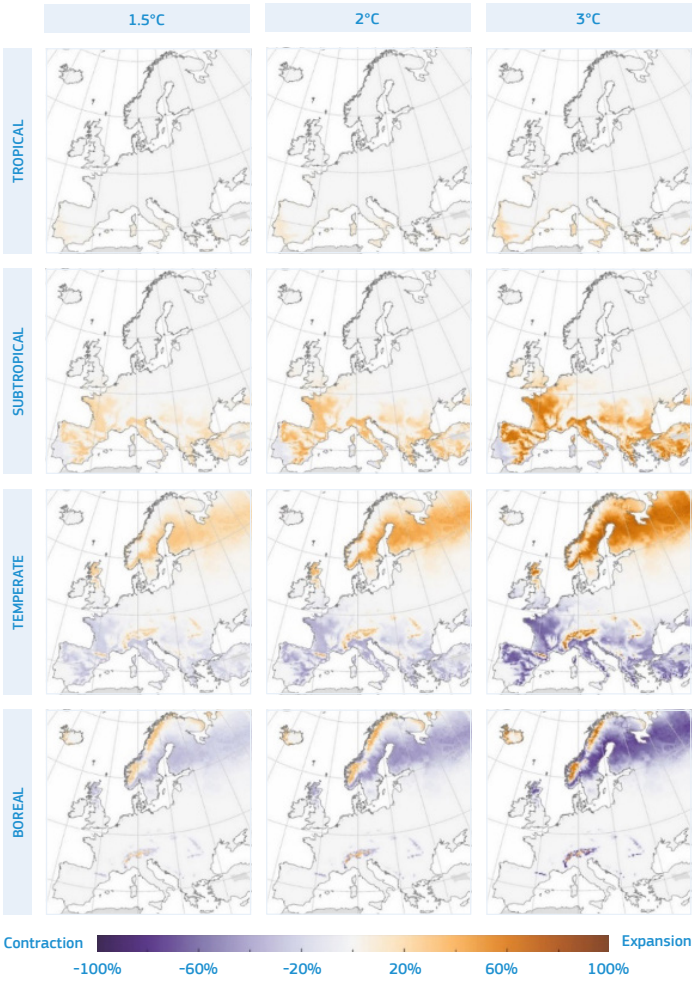

Figure 2. Projected changes in ecological domain components with global warming, relative to present (1981-2010).

programmes could help to reduce the number of human-ignited wildfires. Also, fuel reduction management or prescribed burning can limit the build-up of fuels and decrease the vulnerability to forest fires.

Where feasible and subject to the constraints imposed by ecological domain shifts, changing to less flammable species (e.g. from conifers to deciduous) and recreating mixed forests might also be a viable option in the longer term. Through adequate landscape management, natural fire breaks (e.g. agricultural land) can be created to prevent the spread of fire and reduce the area burned.

Approach

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The Canadian Fire Weather Index (FWI) was used to estimate weather-driven fire danger, based on climate model simulations of temperature, wind speed, relative humidity and precipitation, for present climate and 1.5, 2 and 3°C global warming above preindustrial levels.

The number of European citizens (based on available data for countries in EU, UK and EFTA, candidate countries and potential candidates) living in the vulnerable interface between wildland and settlements (wildland-urban Interface) was assessed by combining land use information and population density maps.

Changes in the spatial distribution of ecological domains and local ecological patterns, were assessed based on the temperature projections.