

Fact sheet - Europe

Climate Change Impacts and Risks

☁️ Climate change impacts and risks

Our current 1.1°C warmer world is already affecting natural and human systems in Europe (*very high confidence*). Impacts of compound heatwaves and droughts have become more frequent (*medium confidence*). Largely negative impacts are projected for southern regions. {ES-Ch13}

⚠️ Key Risks

Four key risks (KR) have been identified for Europe, with most becoming more severe at 2°C global warming level (GWL) compared to 1.5°C GWL in scenarios with low to medium adaptation (*high confidence*). From 3°C GWL and even with high adaptation, severe risks remain for many sectors in Europe (*high confidence*). {ES-Ch13}

🏠 Key Risk 1: Mortality and morbidity of people and changes in ecosystems due to heat

The number of deaths and people at risk of heat stress will increase two- to threefold at 3°C compared with 1.5°C GWL (*high confidence*). Above 3°C GWL, there are limits to the adaptation potential of people and existing health systems (*high confidence*). {ES-Ch13; 13.7.1}

Warming will decrease suitable habitat space for current terrestrial and marine ecosystems and irreversibly change their composition, increasing in severity above 2°C GWL (*very high confidence*). Fire-prone areas are projected to expand across Europe, threatening biodiversity and carbon sinks (*medium confidence*). {ES-Ch13}

🌾 Key Risk 2: Heat and drought stress on crops

Substantive agricultural production losses are projected for most European areas over the 21st century, which will not be offset by gains in Northern Europe (*high confidence*). While irrigation is an effective adaptation option for agriculture, the ability to adapt using irrigation will be increasingly limited by water availability, especially in response to GWL above 3°C (*high confidence*). {ES-Ch13}

Climate impacts drivers and socio-ecological vulnerabilities

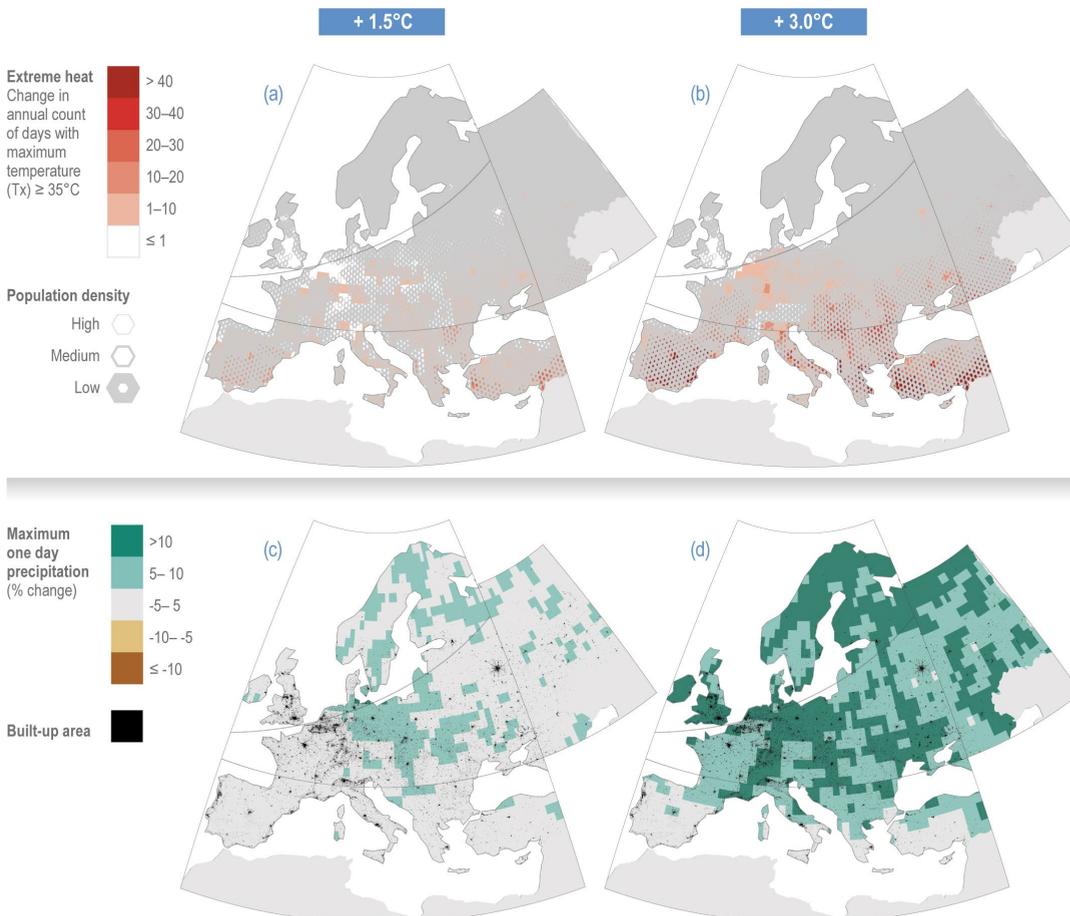


Figure 1: Changes in climate hazards for global warming levels of 1.5°C and 3°C based on the CMIP6 ensemble (Gutiérrez et al., 2021) with respect to the baseline period 1995-2014, combined with information on present exposure or vulnerability:

(a,b) number of days with temperature maximum above 35°C (TX35) and population density (European Commission, 2019);

(c,d) daily precipitation maximum (Rx1 d) and built-up area (JRCdatacatalogue, 2021); (Figure 13.4 panels a – d)

Key risks for Europe under low to medium adaptation

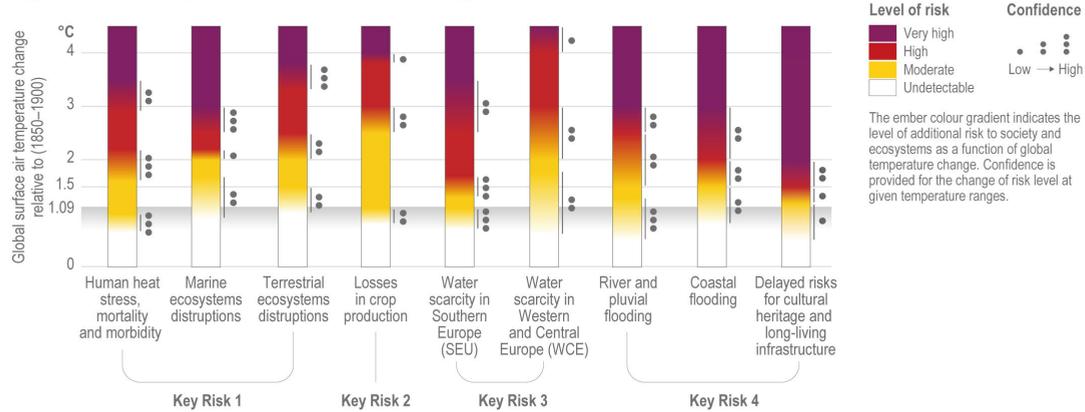


Figure 2: Burning ember diagrams for key risks for Europe with low to medium adaptation. {Figure 13.28}

Key Risk 3: Water scarcity

In Southern Europe, more than a third of the population will be exposed to water scarcity at 2°C GWL; under 3°C GWL, this risk will double, and significant economic losses in water and energy dependent sectors may arise (*medium confidence*). For Western Central and Southern Europe, and for many cities, the risk of water scarcity will increase strongly under 3°C GWL. {ES-Ch13}

Key Risk 4: Flooding and sea level rise

Above 3°C GWL, damage costs and people affected by precipitation and river flooding may double. Coastal flood damage is projected to increase at least 10-fold by the end of the 21st century, and even more or earlier with current adaptation and mitigation (*high confidence*). Sea level rise represents an existential threat for coastal communities and their cultural heritage, particularly beyond 2100. {ES-Ch13}

Adaptation Options and Barriers

Adaptation options

There is a growing range of adaptation options available today to deal with future climate risks (*high confidence*). Examples for adaptation to the key risks include:

- **Key Risk 1 (heat):** behavioural change combined with building interventions, space cooling and urban planning to manage heat risks; restoration, expansion and connection of protected areas for ecosystems
- **Key Risk 2 (agriculture):** irrigation, vegetation cover, changes in farming practices, crop and animal species, and shifting planting; [fire and forest management, and agroecology]
- **Key Risk 3 (water scarcity):** efficiency improvements, water storage, water reuse, early warning systems, and land use change
- **Key Risk 4 (flooding):** early warning systems, reserving space for water and ecosystem-based adaptation, sediment or engineering based options, land use change and managed retreat
- Nature-based solutions with safeguards for flood protection and heat alleviation are themselves under threat from warming, extreme heat, drought and sea level rise (*high confidence*). {ES-Ch13}

Barriers

Key barriers are limited resources, lack of private sector and citizens engagement, insufficient mobilisation of finance, lack of political leadership, and low sense of urgency. Most of the adaptation options to the key risks depend on limited water and land resources, creating competition and trade-offs, also with mitigation options and socio-economic developments (*high confidence*). {ES-Ch13}

Residual risks

In many parts of Europe, existing and planned adaptation measures are not sufficient to avoid the residual risk, especially beyond 1.5°C GWL (*high confidence*). Residual risk can result in losses of habitat and ecosystem services, heat related deaths, crop failures, water rationing during droughts in Southern Europe, and loss of land (*medium confidence*). {ES-Ch13}

Climate Resilient Development

Closing the adaptation gap requires moving beyond short-term planning and ensuring timely and adequate implementation (*high confidence*). Inclusive, equitable and just adaptation pathways are critical for climate resilient development. The success of adaptation will depend on our understanding of which adaptation options are feasible and effective in their local context (*high confidence*). {ES-Ch13}