ACCREU
Assessing Climate Change Risk in EUrope

Funded by the European Union



Policy Brief

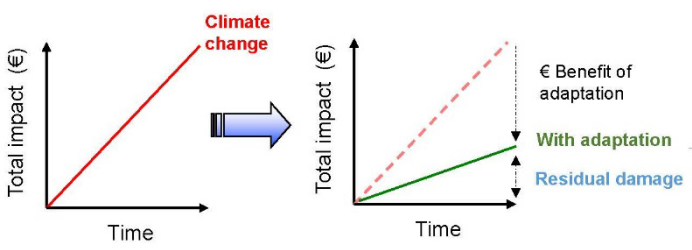
Key Findings: The Economic Impacts of Climate Change and the Costs and Benefits of Adaptation in Europe

ACCREU (Assessing Climate Change Risk in Europe) is a Horizon Europe research project that aims to advance knowledge on the economics of climate change and adaptation, working with stakeholders using a co-creation approach.

The project has undertaken a new analysis of the economic costs of climate change in Europe, using a suite of **sectoral impact models**. It assesses climate change impacts in terms of social welfare, including wider environmental and social losses, not just market damages. The analysis covers different warming scenarios (RCP2.6, 4.5 and 7.0, which broadly lead to warming of ~ 2°C, 3°C, 4°C globally, respectively). ACCREU also models adaptation explicitly, highlighting the trade-off between adaptation costs, avoided damages (adaptation benefits), and residual impacts after adaptation (see figure, right).

The sector findings are summarized in this short policy brief. More detailed results are in the longer technical brief and the project deliverables.

Two key messages emerge from the analysis. First, climate change will impose very large economic costs across Europe, estimated at several hundred billions of Euros per year in the decades ahead, even under low-warming pathways. Second, adaptation can reduce many of these losses, with benefits that outweigh costs. However, there are residual impacts after adaptation.



Coasts and sea-level rise

Sea-level rise and changes in storm surges will increase risks to Europe's coastal areas, which can lead to increased flooding, loss of land, erosion, salt-water intrusion and ecosystem impacts. Adaptation to these risks includes strategies to protect, accommodate, retreat or advance, with the potential to use ecosystem-based adaptation, as well as engineered options.

ACCREU has modelled these impacts (as expected annual damages, EAD) and assessed three adaptation pathways: no adaptation, constant flood protection, and economically optimal protection. Without adaptation, coastal damages are extremely large (shown in Figure 1). Patterns vary across Europe, but are especially concentrated around the North Sea.

These impacts can be significantly reduced with adaptation, and the economic benefits of this action far outweigh the costs (shown in Figure 2). The highest benefit-to-cost ratios are found for the economic optimal scenario. However, this optimal scenario may not match what is socially or politically acceptable. These issues are explored in the ACCREU adaptation case studies.

River flooding

River flooding is already one of Europe's most important weather-related loss drivers, and climate change will alter flood risk across regions. ACCREU has modelled these impacts (expected annual damages) and then assessed the same three adaptation pathways as used in the coastal analysis above.

Without adaptation, annual river flood damages are large in Europe (shown in Figure 3). Unlike coastal flood risk, river flood outcomes vary much more by country and region because some areas may become wetter while others become drier.

Adaptation is again a highly effective strategy to reduce these costs, but the benefits differ more between the three scenarios, and residual damages are high even after adaptation (and higher than for sea-level rise). Nonetheless, the benefits exceed costs (shown in Figure 4)

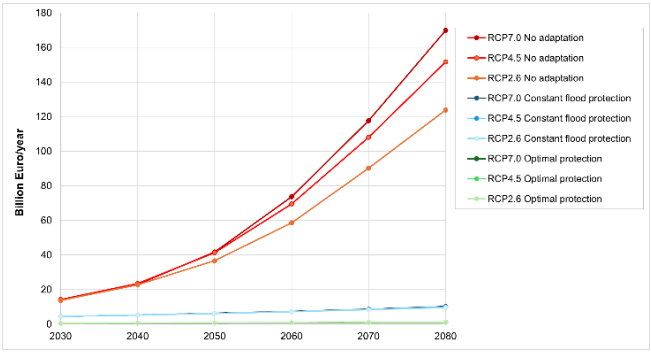


Figure 1. The costs of sea-level rise in the EU, with and without adaptation.

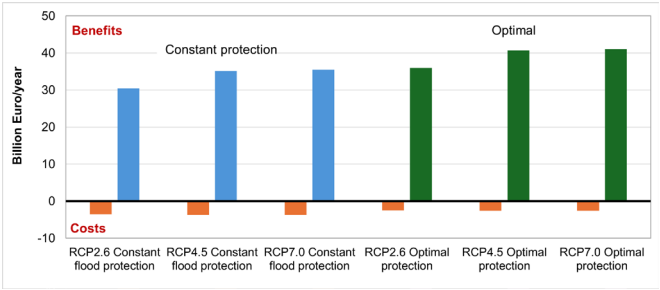


Figure 2. Annual costs and benefits of coastal adaptation in 2050 for the EU.

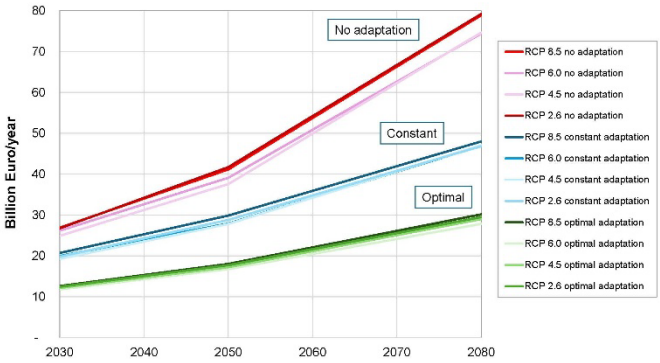


Figure 3. The costs of river floods in the EU, with and without adaptation.

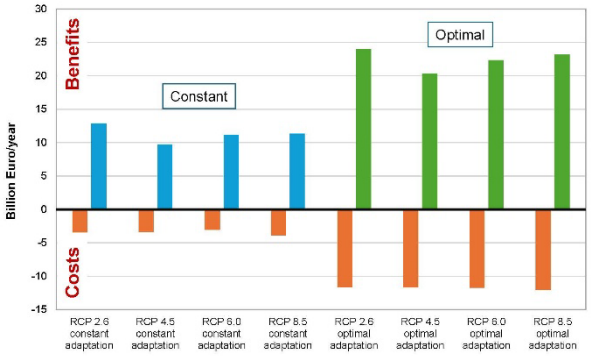


Figure 4. Annual costs and benefits of river flood adaptation in 2050 for the EU.

Agriculture and Land-Use

Climate change will have significant and uneven impacts on Europe's agriculture sector. It can reduce the productivity of land from changes in temperature, rainfall and extreme weather, but also create potential opportunities from CO_2 fertilization or longer growing seasons. These effects will influence profitability, market prices, trade flows, and land-use decisions, with economic, social and environmental consequences.

ACCREU combined crop, forest, hydrological, and livestock models with a land-use model to assess these effects. The analysis includes both autonomous adaptation by producers and planned measures, including irrigation expansion and agricultural R&D.

The results show that climate change impacts vary for different crops and by region across Europe (shown in Figure 5). The analysis of adaptation found that under a high scenario, irrigation expands greatly and can offset most climate impacts, though it does involve significant costs (shown in Figure 6). In contrast, under the low adaptation scenario, there is limited expansion and high residual impact.

Impacts on the Labour Force

Heat reduces both the number of hours worked, and the productivity during hours that are worked, especially for hotter regions and in high-exposure sectors (such as outdoors) in Europe. These effects will increase with climate change.

ACCREU has modelled these effects and finds large impacts by the 2050s, especially for Southern Europe (shown in Figure 7), though some Northern European countries may see net gains.

The analysis then assessed the potential costs and benefits of adaptation to address these impacts, focusing on the use of cooling through air conditioning to reduce indoor labour losses. This leads to high economic benefits (shown in Figure 8), which outweigh costs, though residual risks remain. Note that adaptation for outdoor impacts was not modelled.

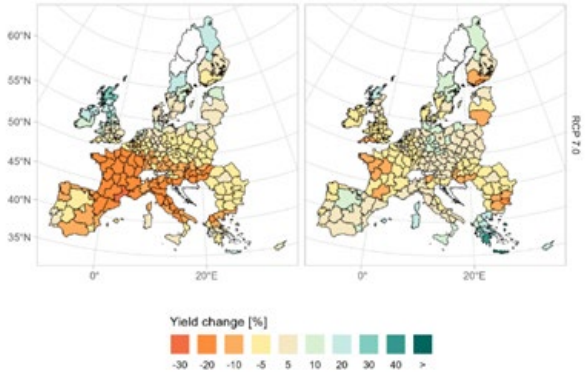


Figure 5. Example of climate change impacts on rainfed crop yields at mid-century.

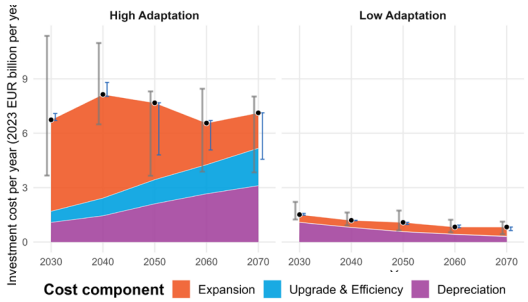


Figure 6. Example of adaptation costs for agriculture for high and low scenarios.

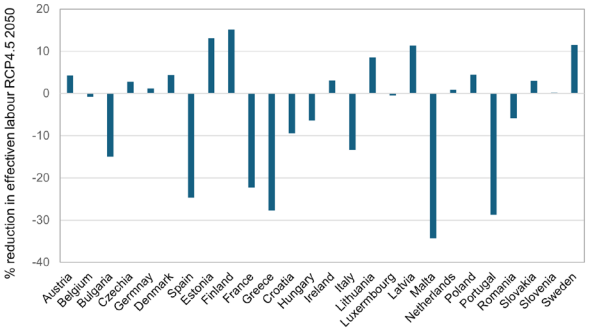


Figure 7. Percentage change in effective labour across the EU in 2050.

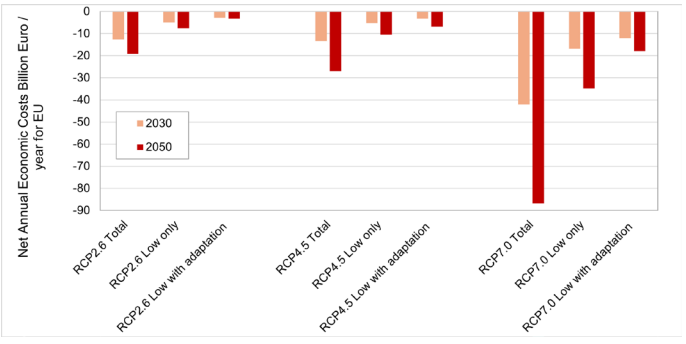


Figure 8. Economic costs of heat-related labour effects (EU), with and without adaptation.

Energy

Climate change will shift energy demand away from winter heating and towards summer cooling. ACCREU has modelled these changes and finds a modest net change in electricity demand in Northern Europe, but a large net increases in Southern Europe (shown in Figure 9). The analysis has assessed adaptation in the form of increased air-conditioning in residential and non-residential buildings – which provides benefits for the labour and health sectors (see previous page and below).

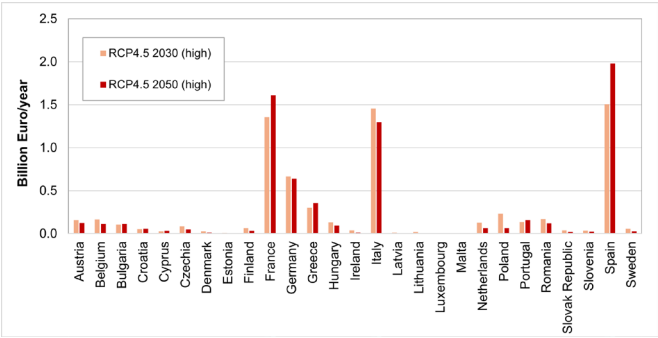


Figure 9. Additional costs of electricity from climate change for residential properties

Health

Climate change is projected to affect health, directly, such as through heat-related mortality, but also indirectly, from changes in the range, seasonality and intensity of vector-, food- and water-borne disease. The ACCREU analysis has estimated the number of annual fatalities from heat in Europe from climate change (shown in Figure 10), then valued these. It has then assessed the benefits and costs of adaptation, finding positive economic returns from such action.

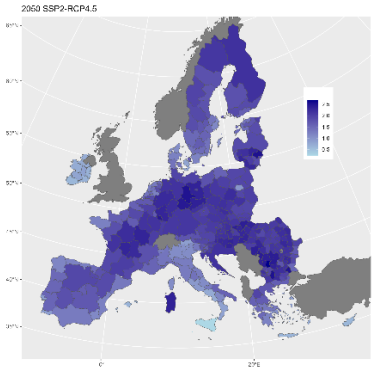


Figure 10. Heat-related deaths in 2050.

Wildfires

Wildfires are uncontrolled vegetation fires. They are exacerbated by fuel availability and land management, as well as by weather conditions. Wildfire risk is rising in Europe, with recent years showing larger and more severe fires, and the emergence of extreme “megafires.” ACCREU has modelled the potential effects of climate change on wildfires, assessing the potential increase in burned area (shown in Figure 11).

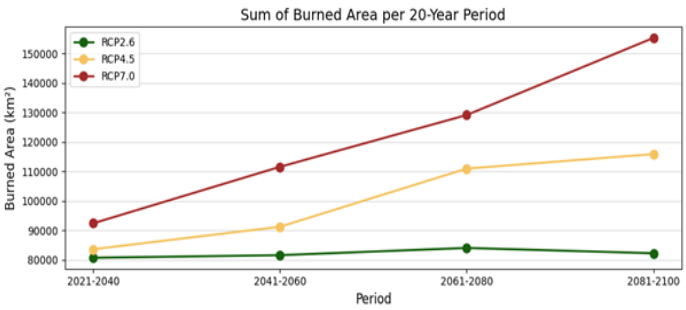


Figure 11. Cumulative burned area from wildfires across Europe.

Distributional effects on European households

The impacts of climate change on welfare, income and poverty will have strong distributional patterns across Europe. ACCREU has modelled these effects, looking at compound events (heatwaves combined with drought), and finds that the lowest-income groups experience a much larger income reduction with climate change (shown in Figure 12).

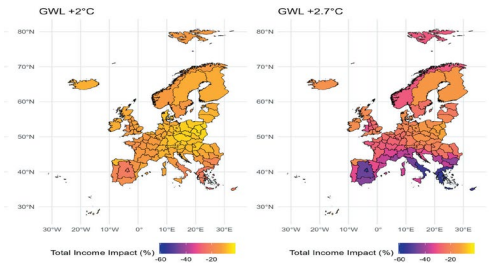


Figure 12. Projected reduction in household income (%) in Europe.

ACCREU, 2026. Cover photograph: Valencia floods. Getty Images.
The ACCREU project is coordinated by Fondazione Centro Euro-Mediterraneo sui Cambiamenti Climatici (CMCC). To find out more about the project, please visit https://www.accreu.eu/

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