



POLICY BRIEF | EUROPEAN CASE STUDY



INTEGRATED SOLUTIONS TO ADDRESS HIGH LEVELS OF CLIMATE CHANGE

We are not yet on track to meet the Paris goal to keep global mean temperatures below 2°C (and ideally below 1.5°C) above pre-industrial levels. IMPRESSIONS modelled the impacts of high levels of climate change (above +2°C) across Europe under different socio-economic scenarios, including the interactions between agriculture, forestry, water, health, biodiversity and urbanisation.

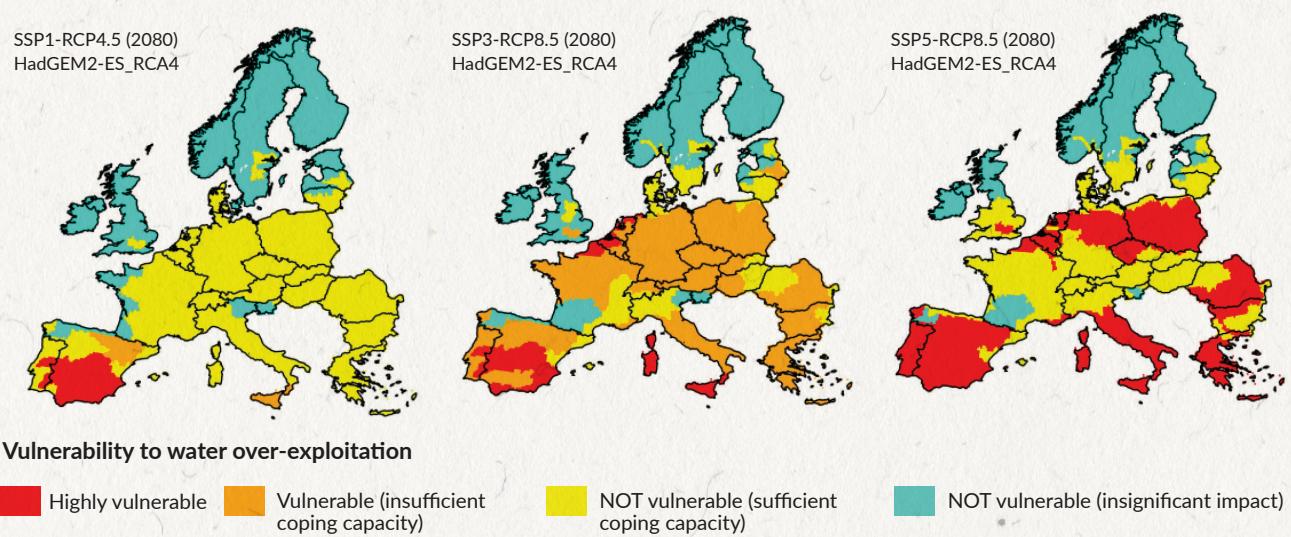
Key Messages

- **Impacts vary across Europe.** Under high levels of climate change, models predict severe water scarcity, heat stress and loss of agricultural productivity in southern, central and eastern Europe, and widespread flood damages. In northern Europe, there could be some benefits such as increased forest productivity.
- **Society can transform.** Transformative pathways towards sustainable lifestyles, sustainable resource management, and a circular low-carbon economy, underpinned by participatory governance, can reduce climate impacts under all socio-economic futures. Investing in social and natural capital can provide multiple benefits for climate change mitigation and adaptation.

What are the impacts and risks in a future above 2°C?

Modelling projects lower rainfall and higher temperatures in southern Europe, leading to severe water scarcity, reduced agricultural and forest productivity and tens of thousands more deaths each year from heat stress. In northern Europe, in contrast, agricultural and forest productivity could increase, boosted by higher temperatures and possibly by a CO₂ fertilisation effect, although this could be offset by spread of pests and diseases or increased forest fires (which were not modelled). Flood damages will increase across Europe, especially in coastal areas, with damage from a 1 in 100 year flood event growing from €50 billion today to €1800 billion in the 2080s and affecting an extra 17 million people under the most resource-intensive scenario. Impacts on biodiversity will be severe, especially if species cannot migrate northwards due to a lack of connected habitat networks.

Socio-economic factors such as population growth, urban settlement patterns and social and environmental policies strongly affect risks and vulnerability. For example, efficient water use coupled with high human, social and natural capital can increase coping capacity and reduce vulnerability to water stress.



Vulnerability to water scarcity in European river basins in the 2080s for a co-operative low-consumption scenario with lower climate change (left), a chaotic scenario with intense conflict (centre) and a techno-centric resource-intensive scenario (right).

Modelling shows important trade-offs between sectors. For example, an environmentally-driven shift to less intensive agriculture (with lower yields per hectare) or a focus on reducing food imports could lead to expansion of agricultural land in Europe at the expense of forests. Low-meat diets can free up agricultural land but this could be offset by an increase in dairy consumption. In a resource-intensive scenario with high productivity due to inputs such as fertilisers, arable and intensive livestock farming concentrate in the most productive areas in northern and western Europe, with forestry expanding in the east and south (unless limited by climate). This scenario is also associated with high levels of urban sprawl: sealed surfaces grow from 4% to 9% of Europe, with negative impacts on biodiversity and ecosystem services.

What are the transformative solutions?

Stakeholders developed a set of pathways for transforming society to address the causes of climate change while also adapting to the impacts. Two key pathways are effective across all socio-economic scenarios:

Participatory governance	Transparent, inclusive, participatory governance oriented towards sustainability. Enables synergies between different sectors to be optimised and trade-offs minimised.
Sustainable lifestyles	Underpins changes towards sustainable resource consumption and demands for sustainable products. Requires a transformational 'beyond GDP' accounting framework together with contentment with living with less, engendered through integrating sustainability as an explicit learning outcome throughout the educational system.

These pathways enable all people to become informed citizens, actively participating in decision-making, who embrace and foster sustainable lifestyles by supporting each other to change consumption behaviour. Together with strong environmental policy, this supports further pathways for the sustainable management of land, water and energy.

Policy Recommendations

- Develop a long-term sustainability vision as a common integrating European policy goal with high political priority. Policy development must take a systems approach to exploit synergies and minimise trade-offs between sectors such as agriculture, forestry, water, energy, biodiversity and urban development.
- Develop and implement pathways for adaptation, mitigation and transformation towards sustainable lifestyles and economies in all sectors. This will require co-ordination and governance mechanisms that bring together governments, civil society and businesses.
- Strengthen efforts to meet the Paris climate agreement, in order to avoid the most severe impacts of climate change (which are outside the range of adaptive capacity).
- Strengthen 'coping capacity' by reducing inequality and investing in human, social and natural capital (including nature-based solutions), especially in the most vulnerable areas in southern, central and eastern Europe.
- Set up a task force drawn from governments, the education sector, businesses and civil society to integrate sustainability values, systems thinking and social entrepreneurship into the education system.
- Encourage the adoption of a 'Beyond GDP' accounting framework by national governments, with credible indicators to fully account for the value of natural capital, well-being and social equity.
- Invest in research to increase yields from less intensive production methods such as organic farming, to counter potential trade-offs such as expansion of farmland at the expense of forests.
- Protect high quality areas of natural capital from development and create connected habitat networks to enable species to migrate to suitable new habitats as the climate changes.

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Find out more: www.impressions-project.eu.