ACCREU
Assessing Climate Change Risk in EUrope

Funded by the European Union



# Key Findings: The State of Knowledge on the Economics of Climate Change and Adaptation in Europe

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

The project has undertaken a review of the current knowledge on the economic costs of climate change, and the costs and benefits of adaptation. This provides a comprehensive picture of what we know — and what we don't. The findings are summarized in this policy summary, with a longer, fully referenced technical brief also available.

The review finds there is growing evidence that climate change is already leading to large economic impacts in Europe, estimated at tens of billions of Euros each year, and much higher than this in extreme years, see examples on the right.

Looking forward, climate change will affect every part of the European economy, leading to major economic costs, though these will differ by country. The review findings are summarised by theme over the page, with examples of projected impacts.

| | |
|---|---|
| **€7.6 bn**<br>Estimated average annual river flood damage | **€44 bn**<br>Estimated cost of July 2021 floods in Europe |
| **61000**<br>Premature deaths from the 2022 heatwaves | **€9.4 bn**<br>Estimated average annual losses from droughts |

See technical brief for details.

A key finding of the stock-take is that when compared to a similar exercise (under the COACCH project, see summary), undertaken around five years ago, there is much more evidence today on the economics of climate change (the **costs of inaction**), however, this varies: those risks at the top of the table are more comprehensively captured than those at the bottom

## Summary of the Evidence Review on Future Economic Impacts with Examples *

| Risk / Sector | Coverage of economic impacts | Example estimates from literature |
|---|---|---|
| **Coastal zones / storms** | Increasing damages from sea-level rise – comprehensive studies EU, national, local | Coastal damage from floods/storm surge could reach €145 billion/year by 2050s |
| **Floods** | Increasing flood impacts – good coverage river floods at EU, national, local level | River flood damage could rise to €44 bn/year with 3°C of warming |
| **Agriculture** | Changes to productivity – good coverage EU and national, extending to prices and trade | Southern Europe could face crop losses of 2.5–5% of GDP |
| **Forest and fisheries** | Some studies on the economic impacts on forestry (productivity) and for forest wildfires | Rising wildfire damages, especially in the Mediterranean |
| **Infrastructure** | Increasing risks – studies on critical infrastructure, roads, some air & waterways | Annual damage could rise to €20 billion by 2050s & €37 billion/year by 2080s |
| **Energy** | Increasing energy demand for cooling as well as impacts on supply (hydro, wind) | Southern Europe could see electricity demand rise 20–30% by 2050 |
| **Water management** | Increasing drought risk – EU wide & national and catchment supply-demand studies | Drought losses could potentially reach €45 billion/year at 3°C of warming |
| **Business and industry** | Rising heat-related impacts on labour – with good coverage, + some studies supply chains | Potential GDP reductions of 2% in Europe from labour impacts |
| **Tourism** | Impacts on beach tourism and winter ski tourism (Alps) – EU and national studies | Ski resorts at lower altitudes face an existential threat from declining snow |
| **Health** | Increasing heat-related mortality – good coverage – plus some vector+ food-borne | Economic costs of €41 billion/year with 2°C of warming from heat and health |
| **Biodiversity** | Potentially major risks to biodiversity and ecosystems they provide – low evidence base | Accelerating species extinction and ecosystem service disruption across EU |
| **Macro-economic** | Reduced GDP – EU studies using CGE models, though coverage varies as above | Average annual GDP loss > 5% in a quarter of EU regions |
| **Finance** | Rising physical climate risks – low evidence base on likely impacts and cascading risks | Public finances, financial and insurance markets likely to be significantly affected |
| **Other** | Little coverage of social sectors (education), socially contingent and tipping points. | Potentially important risks and very large economic costs from tipping points |

* See technical brief for details and full references.

The stock-take also assessed the state-of-the-art on **adaptation** economics. A key finding is that while there has been progress on adaptation costs and benefits, the evidence lags significantly behind that on impacts. This is shown in the table below, which compares the evidence base for costs of inaction (shown in the second column) with adaptation costs and benefits (shown in the third column). The review did identify studies that show that **adaptation can be highly effective in reducing the economic costs of climate change in Europe**, though it cannot reduce these impacts completely. Examples of high economic returns were found for coastal and river flood sectors, as well as for agriculture.

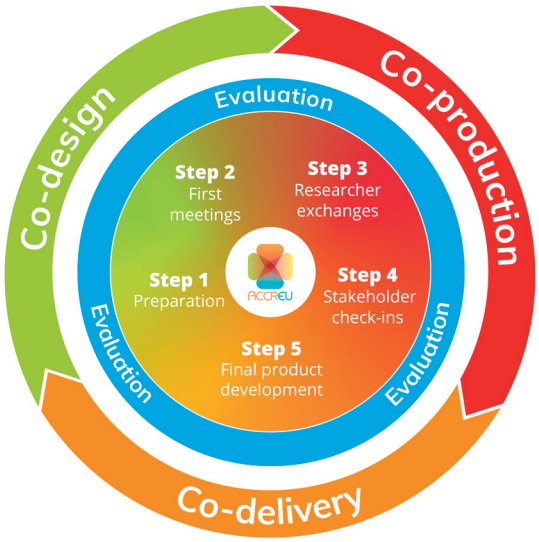
Finally, the stock-take identified the key knowledge gaps for both impacts and adaptation. These are summarised below in the right-hand column. Filling these gaps is a priority for ACCREU's research over the coming years.

## Summary of the ACCREU Evidence Review for Economic Impacts and Adaptation

| Sector | Impacts | Adaptation | Important knowledge gaps |
|---|---|---|---|
| Coastal zones | ✓✓✓✓ | ✓✓✓✓ | Multi-hazard & nature-based solutions |
| Floods | ✓✓✓✓ | ✓✓ | Surface water floods; cascading risks |
| Agriculture | ✓✓✓ | ✓✓ | Food security, pests & diseases |
| Energy | ✓✓✓ | ✓✓ | Compound extremes; net-zero linkages |
| Infrastructure | ✓✓✓ | ✓✓ | Digital infrastructure; cascading risks |
| Health | ✓✓✓ | ✓ | Vector-borne diseases; health systems |
| Water management | ✓✓ | ✓✓ | Cross-border drought impacts, ecosystems |
| Forestry/Fisheries | ✓✓ | ✓ | Ecosystem services, marine ecosystems |
| Tourism | ✓✓ | ✓ | Heat and future preferences |
| Business/Industry | ✓✓ | ✓ | Sector granularity; supply chains |
| Macroeconomic | ✓✓✓ | ✗ | Sector gaps as above, adaptation |
| Biodiversity | ✗ | ✓ | Quantification & valuation ecosystem services |
| Finance | ✗ | ✗ | Quantification and adaptation |
| Other | ✗ | ✗ | Social sectors (education), socially contingent, and tipping points. |

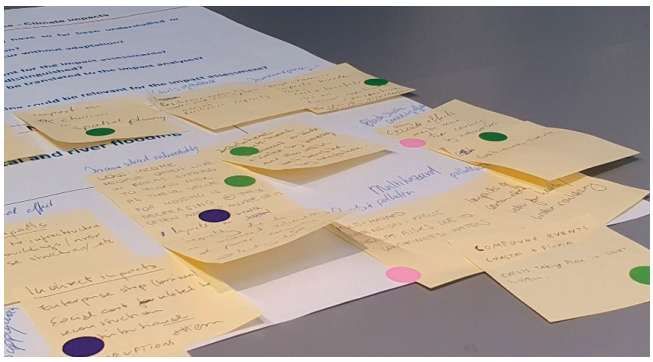
✓✓✓ = Very high coverage ✓✓✓ = High coverage. ✓✓ = Medium coverage. ✓ = Low coverage. x = Evidence gap

The ACCREU project is focused on producing research that supports evidence-based decisions and policy making. To advance this, the project adopts a **co-creation process**, shown in the figure to the right. This actively engages stakeholders throughout the project's research.




The first phase of this process is **co-design**, where the project team and stakeholders identify common interests and jointly develop research questions.

The findings of this stock-take review were discussed with stakeholders at the first ACCREU workshop, near the start of the project. This used a **participatory process** to ask potential end-users about their views on the priority areas for gap filling, based on lists of possible research questions. The workshop also discussed and identified potential opportunities that the research findings could feed into.



More than 220 research questions were discussed in total. The research team subsequently met to discuss how to reflect these priorities in the project. These are being taken forward through a combination of top-down impact models and bottom-up adaptation case studies.

The ACCREU project is co-ordinated 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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