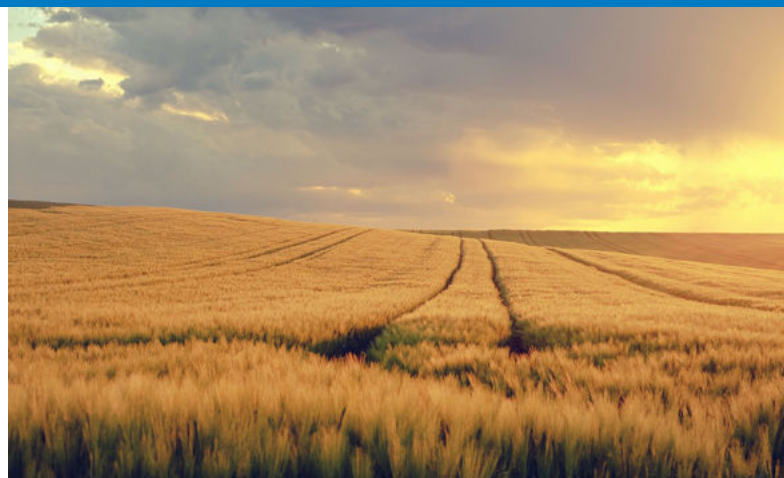


BIOCLIMAPATHS - Assessing climate-led social-ecological impacts and opportunities for resilient pathways in the EU bioeconomy (BIOCLIMAPATHS)

BIOCLIMAPATHS developed a cross-sectoral methodology for assessing supply chain risks and vulnerabilities of the EU bioeconomy due to intensifying climate extremes. The method links climate, crop, socio-economic, and agent-based models to understand the non-linear, spatial and interconnected impacts of climate extremes on crop yields, crop supply and monetary output at the (sub-)national level. BIOCLIMAPATHS analysed complex relations between climate-led yield damages, bioeconomy supply chains, household consumption and synergies and trade-offs among EU bioeconomy strategies and the Sustainable Development Goals (SDGs).

Key Findings

- The heat and drought extremes are becoming more frequent, co-occurring, and persistent in Europe in recent decades, while the frequency of cold waves has decreased. Northern and Southern Europe have noted the most significant changes.
- Climate extremes damage crop yields. The average yield damages in a number of French, Spanish and Romanian regions are significant, up to a level of >20%.
- The biophysical production loss analysis shows a concentration of losses due to extreme events in France, Spain, Germany and Poland. On average, pulses, rye, rapeseed, fibre crops, and fodder crops are more affected than e.g. wheat and maize. Regional crop diversity reduces average production loss. However, in most EU



Source: Karl Egger/Pixabay

regions yield increases largely compensate for production losses due to climate extremes.

- Livestock sectors, oilseed processing and bioethanol production have been particularly affected by climate-led shocks in domestic biomass supplies, with significant regional heterogeneity in monetary impacts.
- Large-scale circulation patterns in a bioeconomy transition context pose biophysical and monetary threats to the stability of sub-national and national societies worldwide.

Assessing Risks and Opportunities

BIOCLIMAPATHS provides evidence that societies face novel risks and vulnerabilities from advancing bioeconomies under intensifying climate extremes. The study reveals the duality – and limitations – of bioeconomy strategies with society depending on local ecosystems for both (climate) regulating and (crop) provisioning services to support macro-economic development. Thus, there is a need for a comprehensive assessment of synergies and trade-offs among national and sub-national bioeconomy strategies and the SDGs (undertaken in BIOCLIMAPATHS) to support priorities in policy-making for safe and just bioeconomy transition paths in the EU. For this, we developed a unified SDGs and Bioeconomy database as an initial step.



Closing Research Gaps for Climate-Resilient Bioeconomy Transition Paths

In BIOCLIMAPATHS, the important initial steps were realized, but research gaps still remain related to the design and simulation of scenarios for climate resilient bioeconomy transition paths. Future bioeconomy research would benefit from a knowledge co-production approach with stakeholders, reflecting the local context and (sub-)national strategies. In terms of reducing uncertainty in causal relations in quantitative approaches, data coverage and quality of both national and sub-national crop and forestry databases would have to be improved. Further, a price response function needs to be developed to model supply shocks in commodity markets and interregional trade to account for the full risk transmission channel of climate extremes in bio-based supply chains.

About AXIS

The ERA-NET Consortium AXIS (Assessment of Cross(X) - sectoral climate Impacts and pathways for Sustainable transformation) aims to promote cross-boundary, cross-community research with the overall goal to improve coherence, integration and robustness of climate impact research and connect it to societal needs. To this effect, AXIS aims to overcome boundaries between science communities through inter- or transdisciplinary research projects. <https://jpi-climate.eu/programme/axis>

Partners

- [Vienna University of Economics & Business](#)
- [Potsdam Institute for Climate Impact Research](#)
- [Universidad Pablo de Olavide](#)
- [University of Seville](#)
- [The International Institute for Applied Systems Analysis](#)

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<https://bioclimapaths.eu>

