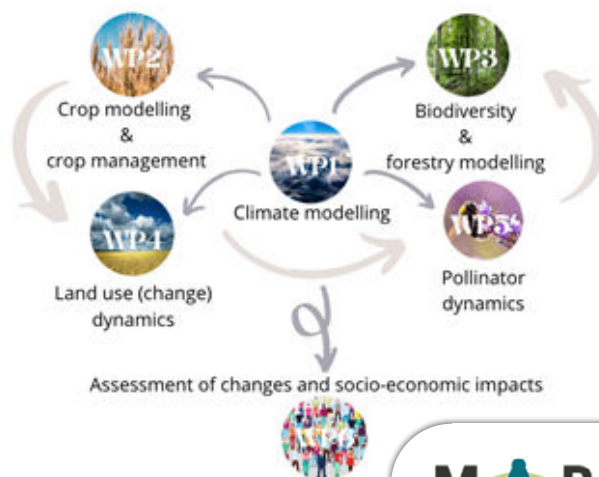


Multisectoral analysis of climate and land use change impacts on pollinators, plant diversity and crops yields (MAPPY)

The main objectives of MAPPY (www.mappy.uliege.be) were: (1) to perform climate and land cover change projections in selected areas of Western Europe up to the 2070 horizon, and, (2) assess the impact of these combined climate and land cover modifications on agricultural yields, forest ecosystems, and pollinator diversity. The project contained six interconnected work packages (Fig. 1). In the face of climate change and human pressures on ecosystems, we need to rethink our land management practices. The results of the study are used to raise awareness among professionals in the agricultural sector and managers of natural areas, so that they can make informed changes.

Key Findings

- Future trends generally indicated warmer summers with longer hot and dry periods. More intense but less frequent precipitation.
- Crop models used in the study showed that agricultural yields would increase due to climate warming and higher atmospheric CO₂ levels. However, yields would vary significantly from year to year, potentially leading to low incomes during dry years.
- Climate change would have a slight impact on the distribution of pollinated plant species. However, local and regional land use and land management would be key factors affecting pollinator habitats.
- Appropriate forest management measures, such as understorey vegetation development, were recommended to support pollinated plant species.
- The study emphasized that future pollinator diversity would heavily depend on land use changes and land management scenarios.



MAPPY work packages

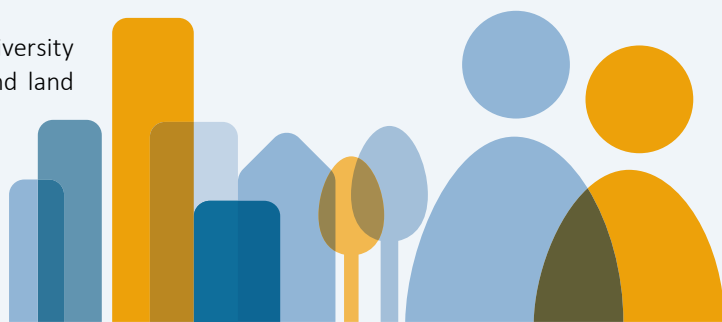


Climate, land use and pollinators interactions: the example of the Eisenwurzen region in Austria

The modelling chain for the Austrian case study (Eisenwurzen) has been completed in its entirety. However, an in-depth examination of future pollinator diversity's socio-economic impacts has been rendered unfeasible by several simplifying assumptions that were made in the course of the modelling process, as well as significant uncertainties and knowledge gaps.

Despite these factors, the primary findings and recommendations for the Eisenwurzen region were:

- The key strategy to safeguard and benefit from the functions that wild pollinators offer is to avoid further land clearings, and to combine intensive cropland cultivation with areas that offer suitable habitats for wild pollinators.
- Yield projections for pollination-dependent crops show increasing yield trends, thus underline the importance of safeguarding wild pollinators
- In the transition zone between intensive crop production and high mountains, extensive grassland areas provide suitable habitats for pollinators, and in those



regions pollinator-adapted management can realize economic potential while at the same time respecting environmental conditions and the local cultural heritage.

- Adapted land management can make a strong positive contribution to pollinator diversity, while climate change mitigation efforts are needed to avoid the double burden of direct impacts on pollinator communities and indirect impact via the effects from changing land-use decisions.

Deciphering the future: what are crucial feedback mechanisms for improved climate and crop yield forecasts?

Further research should address key feedbacks that could not be included in the current project. For instance, land use change scenarios have been developed within MAPPY, but these scenarios include land cover and land management changes (esp., crop cover changes) that may alter local climate, strengthening or mitigating climate change. This important feedback requires more research. Also, MAPPY brought some answers about possible changes in pollinator diversity in the future. However, current models are not able to estimate abundance of pollinators. Future research should thus attempt to describe in more detail the habitats of pollinators and converge towards a more mechanistic description of pollinator dynamics. Simultaneous evaluation of diversity and abundance of pollinators would allow us to assess the impacts of pollinator changes on crop yields. This important feedback is missing in current crop yield projections for the future.

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.

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Project Duration

September 2019 - June 2023

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https://www.mappy.uliege.be/cms/c_7943487/en/mappy

