PRESS RELEASE

The MAPPY Study identifies the impact of climate change on agricultural and forest ecosystems.

Liège, June 23rd 2023 – The University of Liège revealed the results of the MAPPY study, which identified the impact of extreme weather events on agricultural and forest ecosystems, and on society. With the result of the study, the University of Liège aims to raise awareness among professionals in the agricultural sector and management of natural spaces, so they can make informed changes. The study was funded by AXIS JPI Climate.

www.mappy.uliege.be

European study

The MAPPY study was coordinated by Professor Louis François, from the Department of Astrophysics, Geophysics and Oceanography at the University of Liège. In 2019, he brought together 9 European partners from 5 countries (Germany, Austria, Spain and the Netherlands) to model the evolution of plant diversity, crop yields and forests, as well as the distribution of pollinators in a context of climate change and land use.

Climate projections were made for Western Europe on a 3 km resolution grid. Such a smallscale projection allows for an accurate assessment of the impacts of extreme weather events (such as storms, floods, heat waves and droughts) on agricultural and forest ecosystems and on society. Five area in Western Europe (located in the partner countries) were analysed.
Integrated process modelling

All partners worked in close collaboration, in order to ensure integrated process modelling, via “interconnected” working groups.

The partners therefore rely on each other to link their data, as Louis François explained “For example, the simulation of crop models depends on regional climate simulations, and the development of land use change scenarios requires the results of these crop models.” The MAPPY study is one of the first to quantify these processes in an integrated manner, using models that identify their interactions.

Climate Projections by 2070

The MAPPY Study made climate projection by 2070 and carried out an analysis of the frequency and intensity of extreme events (extreme temperatures, heavy precipitation, rainfall deficits and droughts), making it possible to establish:

- A projection of expected crop yields, including some fruit crops.
- A simulation of the impact of climate change on several wild plants useful to pollinators.

Various possible scenarios have been evaluated for future forest management to ensure habitat quality for pollinators. An opportunity to inform and encourage professionals of the agricultural and natural spaces sector to adapt their practices to climate change challenges. This is the first step in a study that now requires more in-depth analysis, so that it can be projected into the future on a European scale.

Press contact and interviews: Magali Ronmans – 0477 55 71 05

Video Presentation of the study

More info: https://www.mappy.uliege.be

Persmap in attachment:
- Interview of Professor Louis François, coordinator of the study
- Mappy Story, a multisectoral analysis (sketchnote)
- Presentation of the results
PARTNERS OF THE MAPPY STUDY

The MAPPY study is coordinated by Louis François of the University of Liège (Belgium), with the following partners:

University of Namur (UNamur)
Prof. Nicolas Dendoncker, Sarah Smet
Namur, Belgium

Naturalis Biodiversity Center
Prof. Koos Biesmeijer, M. Moens, K. Biesmeijer
Leiden, The Netherlands

University of Utrecht
Prof. Hens Runhaar
Utrecht, The Netherlands

University of Kassel
Dr. Merja Tölle et Alessandro Ugolotti
Kassel, Germany

Senckenberg Biodiversity and Climate Research Center
Prof. Thomas Hickler, T. Anders
Frankfurt, Germany

Potsdam Institute for Climate Impact Research (PIK)
Dr. Christoph Müller
Potsdam, Germany

Consejo Superior de Investigaciones Científica (CSIC)
Dr. Luca Testi, F. Villalobos, O. Garcia Tejera, M. Volakaki.
Córdoba, Spain

University of Natural Resources and Life Sciences (BOKU)
Dr. Andreas Mayer, C. Egger, F. Weidinger
Wien, Austria
**MAPPY STORY**
A Multi-Sectoral Analysis

**OBJECTIVES**
- Inform professionals on the effects of climate change
- Provide tools for decision-making in land management

**CONTEXT**
- Land use change scenarios
- The effects of climate change on land use
- Crop modelling dynamics

**INTERACTIONS**
- Between pollinators and plant diversity
- Climate modeling

**SCENARIOS**
- 2081-2010 seasonal climate change signal
- Iberian Peninsula & Central Europe

**ANALYSIS**
- Components: local, regional, global

**Impact**
- Social: livelihoods, agriculture
- Economic: productivity, sustainability

**Crop Modelling Dynamics**
- Simulation of sunflower (1)
- Almond crops (2) in Andalusia (2001-2010)
- Widely pollinated by RCP8.5
- Sunflower yield

**Case Study Regions**
- Senckenberg
- Liege University
- Namur University
- Unikasell Vertsat
- World of biodiversity

**Illustration by EcoRes - JulietteNguyen 2023**
Interview Louis François
MAPPY Project
April 2023

We have interviewed Louis François, Professor at the University of Liège (Department of Astrophysics, Geophysics and Oceanography) and coordinator of the study. He tells us about the evolution of MAPPY since 2019, and its projection to the final results.

You’ve been coordinating the MAPPY study since its launch in late 2019. What are its main objectives?

Mappy makes climate projections to assess the impact of extreme weather events on agricultural and forest ecosystems and on society. In the face of climate disruption and the pressures humans exert on the ecosystems around us, we need to rethink our land management practices. We aim to use the results of the study to raise awareness among professionals in the agricultural sector and management of natural spaces, so they can make informed changes.

The study was conducted with several European partners (in Germany, Austria, Spain and the Netherlands). How did this collaboration work in practice?

All partners worked in close collaboration, in particular via a chain of models, where the outputs of one become the inputs for those that follow it. This is how the MAPPY study laid the foundations for integrated process modeling, in particular via the work packages set up by the project partners. These were dedicated to:

- The future evolution of regional climate (WP1)
- Agricultural yields (WP2)
- Natural ecosystems and forests (WP3)
- Changes in land use (WP4)
- The dynamics of wild pollinators (WP5)
- Integration of results to determine impact on society (WP6).
The partners therefore rely on each other to link their data. This is one of the main challenges of the study, since any delay in results has knock-on effects for the whole chain. For example, the simulation of crop models depends on regional climate simulations, and the development of land use change scenarios requires the results of these crop models. This was quite a challenge, especially since the MAPPY study was going on during the COVID lockdown. The biggest impact it had was in making information exchange between the teams, partners and field professionals more difficult.

The MAPPY study is one of the first to quantify these processes in an integrated manner, using models that identify their interactions and interrelations.

Exactly what types of data were analyzed?

We made climate projections for Western Europe on a 3 km resolution grid. Such a small-scale projection allows for an accurate assessment of the impacts of extreme weather events (such as storms, floods, heat waves and droughts) on agricultural and forest ecosystems and on society. To assess these impacts, the MAPPY study used models powered by climate projections. In particular, some of the models identify the evolution of agricultural yields up to 2070.

What leads you to believe agricultural and natural space management practices are likely to be impacted by climate change?

In the short-term, when CO2 levels increase in the atmosphere, this can actually have a positive impact on yields, as CO2 tends to stimulate photosynthesis. However, as summer heat waves and droughts become more frequent and intense, this may result in a significant decrease in yields. In addition, another critical factor for crop yields is the abundance of pollinators. Some crop species are dependent on pollinators for reproduction (notably certain fruit trees such as apples, pears and cherries, but also other species such as rapeseed and sunflower). Today, we’re witnessing a major decline in wild pollinators, linked to the interaction of several factors. A key element is the destruction of their habitat, linked to an increase in urban areas and intensive agricultural areas (especially for producing corn, which is of no interest to pollinators), to the detriment of meadows, forests, natural spaces and gardens.
One reason for the decline of wild pollinators is an increase in intensively farmed areas.

This destruction is leading to the progressive disappearance of wild plant species necessary for the survival of pollinators. Modern management of ecosystems also has an impact on pollinators: use of pesticides, mowing meadows too early or too frequently, increase in the size of plots with the disappearance of hedges, or forests planted too densely to allow for the development of undergrowth. Finally, faced by a combination of climate change, changes in precipitation and an increase in extreme weather events, the productivity of several plant species (resources for pollinators) is likely to be impacted.

**What are some of the most important elements among the data collected?**

The study focused on several target regions in Western Europe located in the countries participating in the project to facilitate data collection and simulations. Among the highlights are the climate projections over 3 km grids up to 2070, on two European areas including:
- Germany, Austria, Belgium and the Netherlands, on one hand
- and the Iberian Peninsula on the other.

We carried out an analysis of the frequency and intensity of extreme events (extreme temperatures, heavy precipitation, rainfall deficits and droughts). Another key element is a projection of expected crop yields, including some fruit crops. We also simulated the impact of climate change on several wild plants useful to pollinators.

Finally, we evaluated various possible scenarios for future forest management to ensure habitat quality for pollinators.

A three-year project is too short to quantify in detail the many processes and interactions involved in our study, and to properly predict the future on a European scale. We are keenly aware that, given the uncertainties that remain, more in-depth analyses will be necessary.

**How will the results of the study be used?**

The main objective of the MAPPY project is to raise awareness and inform professionals, particularly in the agricultural and natural spaces sector, to encourage them to adapt their practices to climate change challenges. The main results of the project will be presented graphically, which will allow us to identify the expected impacts according to various scenarios of climate evolution, land use and management of
agricultural and forest ecosystems. We’ll make an information and communication kit available on the website **mappy.uliege.be**, via social networks and the media, and we are also counting on the people who work in these sectors to get this information to their peers, associations and institutions whose work is so likely to be affected by climate change.

The reports of the different working groups are available to potential users on the project website mappy.uliege.be
FUNDINGS OF THE MAPPY STUDY

AXIS JPI Climate

JPI Climate

Forschung Wirkt

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