

LAMACLIMA: LAnd MAnagement for CLimate Mitigation and Adaptation

Anthropogenic changes in land cover and land management (LCLM) are substantially affecting climate through the release of carbon in the atmosphere (biogeochemical effects), and the alteration of local energy and water fluxes at the land surface and their interaction with large-scale atmospheric dynamics (biogeophysical effects). Accounting for the coupled LCLM-climate effect is thus very relevant for future climate mitigation and adaptation efforts. However, these coupled effects receive overall limited consideration in land use decision processes due to uncertainties on the full implications of changes in LCLM for climate and ecosystem services, but also due to a lack of dialogue between the relevant science and practice communities.

The goal of the LAMACLIMA project is to advance the scientific and public understanding of LCLM-climate coupling effects and to inform the elaboration of sustainable land-based adaptation and mitigation measures. It will investigate the biogeophysical and biogeochemical effects of three key changes in LCLM (re/afforestation, irrigation and wood harvest) on climate, their implications for several sectors (agriculture, water availability, biodiversity and economic productivity) as well as the resulting economic impacts, including teleconnections across key regions such as the world's breadbaskets. This will allow for an integrated analysis of their implications for the achievement of both the mitigation and adaptation objectives of the Paris Agreement and the Sustainable Development Goals 2 (Zero Hunger), 6 (Clean Water and Sanitation), 8 (Decent Work and Economic Growth), 13 (Climate Action), and 15 (Life on Land). The research outcomes will be synthesised into an open-access and user-friendly emulator, allowing their appropriate dissemination to regional-level adaptation planners and development actors as well as international institutions, environmental organisations and relevant private actors during dedicated workshops and online collaboration. Continuous stakeholder engagement and knowledge brokerage will bridge the gap between scientists and stakeholders, fostering the co-design of future trajectories for land management as adaptation and mitigation measures that will complement the Shared Socio-economic Pathways (SSPs).

The consortium includes experts on the interactions between LCLM and climate who will run a coordinated set of experiments with several climate models, economists who will integrate their results into a Computable General Equilibrium model and an agro-economic model, and stakeholder engagement experts. The project will complement on-going international research efforts such as CMIP6. The emulator will be made available as open source, and results from the climate model experiments will be stored according to EU guidelines. The project outputs, in particular the expanded SSPs or the emulator, will broadly serve the scientific community in addition to its societal benefits.