

Land Management for Climate Mitigation and Adaptation (LAMA CLIMA)

The LAMA CLIMA project aimed to understand the interconnected effects of land-use and climate change and develop strategies for sustainable global land use aligned with the Paris Agreement and broader sustainability goals. It brought together climate scientists, economists, experts in statistical methods or stakeholder engagement to study the impacts of changes in land cover and management on climate variables, water availability, and heat stress through Earth System Model experiments. The project used these findings to assess sectoral impacts like labor productivity and food security. It also involved stakeholders through webinars and workshops to bridge the gap between science and real-world concerns. Additionally, a scenario co-development process was conducted to create new narratives for land-use, which were modeled and analyzed to explore their potential in achieving climate and development objectives.

Key Findings

- The impacts of the large scale deployment of three key Land Cover and Land Management (LCLM) options (re/afforestation, irrigation, wood harvest) on climate were investigated using 3 Earth System Models (ESMs). Results revealed consistent local climate effects across the ESMs, while non-local effects varied between models.
- A land-use allocation model, MAGPIE, was used to show that accounting for the economic benefits from local climate effects caused by afforestation or deforestation would lead to more reforestation in the tropics.
- A statistical emulator for local temperature changes caused by tree cover alterations was developed.

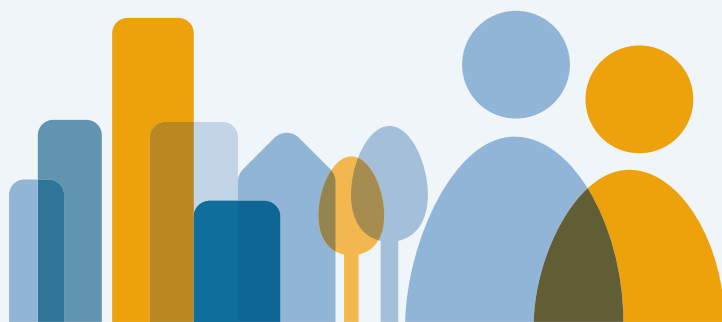


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- Two diverging narratives for future global land-use (Global Inequality and Global Sustainability) were co-developed with stakeholders. Using the MAGPIE model, it was then shown that only the latter of the two would lead to emissions levels from the land sector that would be in line with what is needed to achieve the objectives of the Paris Agreement. ESM simulations were also used to study the local consequences of these scenarios for climate and specific sectors, focusing on health.

Empowering Decision-Making Through Stakeholder Engagement and Emulator Innovation

The LAMA CLIMA project constituted a significant scientific contribution towards a more comprehensive understanding of the cross-sectoral impacts of Land Cover and Land Management (LCLM) practices. Such enables smarter land-use policy and decision making in pursuit of achieving the Paris Agreement and Sustainable Development Goals (SDGs). A central element to LAMA CLIMA was the stakeholder participation in co-designing future



scenarios. This provided stakeholders with unique insight into scenario development and modelling techniques, whilst enabling researchers to identify the main interests of stakeholders. The emulator developed during LAMACLIMA provided proof-of-concept on the utility of such a lightweight tool for stakeholders and policymakers. In future, such emulator could enable them to explore the local consequences of global land-use in an agile and interactive manner, and thus facilitate their accounting in decisionmaking.

Unlocking the Potential of LAMACLIMA: Advancing Climate Science, Stakeholder Engagement, and Decision-Making

LAMACLIMA demonstrates the importance of LCLM towards achieving the Paris Agreement and SDGs as well as its relevance for future health impacts, but also the need to improve our models and observational networks to better quantify those aspects. The co-designed land-use scenarios were recognized by the ScenarioMIP community, their consideration in the 7th phase of Coupled Model Intercomparison Projects could constitute an opportunity to further advance science on those topics. The scenario co-design process itself demonstrated the need for stakeholder engagement during scenario designing. To this extent, the ESM emulators developed have high potential to better inform stakeholders, and further emulator developments in the future (e.g. to account for other climate variables) would be encouraged for them to directly inform decisionmaking.

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>

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Project Duration

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Contact

Climate Analytics (headquarters)

Quentin Lejeune
Ritterstraße 3
10969 Berlin, Germany
+49 (0)30 259229520
contact@climateanalytics.org

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