

Topic: Addressing uncertainty and risk in climate change impact studies

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Can we be certain about future land use change in Europe? A multi-scenario, integrated-assessment analysis.

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The global land system is facing unprecedented pressures from growing human populations and climatic change. However, the number of complex, interacting effects involved makes any complete understanding very difficult to achieve. Integrated modelling frameworks allows for the exploration of the co-development of human and natural systems under scenarios of global change. Here, we describe the use of one such integrated modelling framework (the CLIMSAVE Integrated Assessment Platform) to investigate the range of projected outcomes in the European land system across climatic and socio-economic scenarios for the 2050s. We demonstrate substantial consistency in locations and types of change even under the most divergent conditions, with results suggesting that climate change alone will lead to a contraction in the agricultural and forest area within Europe, particularly in southern Europe. This is partly offset by the introduction of socioeconomic changes that change both the demand for agricultural production, through changing food demand and net imports, and the efficiency of agricultural production. Sensitivity analysis of the land use change thresholds of between 0.1 and 25% within each grid cell demonstrates the robustness of the results. The very low likelihood (< 33% probability) that current land use proportions in many parts of Europe will remain unchanged suggests that future policy should seek to promote and support the multi-functional role of agriculture and forests in different European regions, rather than focusing on increased productivity as a route to agricultural and forestry viability.