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3S1 Modeling the circular economy with sectoral and macro-economic models

Afforestation in EU: a spatially explicit multi-model framework

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The sustainability commitments of the Green Deal (European Commission) will be guiding the agenda for the near future in order to lead EU to be the first climate neutral continent. As a key driver to reach that goal, the afforestation pledge of approximately 2 – 3 Mha (not an official policy yet) by 2030 will play a key role in this decade, although earlier suggested targets were set much higher (e.g. 30 Mha). However, it is rather uncertain how much land is available to accommodate the afforestation goals due to increase land demand for food, feed and fiber, and where these areas will be established. Given that, we are conducting a land use assessment combining multi-thematic models to project forward looking spatially explicit scenarios to assess where the afforestation areas might take place. This study combines macro-economic general equilibrium model (MAGNET) containing a land downscaling component (MAGNETGrid), which are integrated with a regional forest model (EFISCEN), and a gridded crop growth model (LPJML). The integration of these models at grid level represents a toolbox capable of generating demand-driven land use scenarios coherent with SSP storylines. Our preliminary results show that by 2030 in a SSP2 scenario, EU will have approximately 155 Mha of residual land that could be used for afforestation, represented by four land use classes, i.e. “non-forest protected areas” (52 Mha), “unused areas” (5 Mha), “abandoned agriculture areas” (0.1 Mha), “unavailable areas for agriculture” (58 Mha). The main hotspots are located in east of Spain, south of Italy and scattered around France and Germany. Despite the large land availability, critical caveats must be taken into account, such as the biophysical conditions of converting “unused areas” or “unavailable areas for agriculture” (e.g. peatland) into forests and legal restrictions of converting “non-forest protected areas” into forests. These uncertainties are currently addressed through a multi-scenario assessment, which will be published in the final and complete version of the study.

Keywords: Green Deal, EU, Afforestation, Integrated Assessment Model