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## Optimising agri-environmental measures at catchment scale through specific allocation with the SWAT model – A case study in southern Andes of Ecuador

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Agricultural catchments are prone to high crop yield variability because of extreme weather events, and their impact destabilises agricultural income at different territorial scales. This study aims to use optimisation algorithms coupled with the Soil Water and Assessment Tool – SWAT to allocate specific agri-environmental measures to mitigate the impact of climate change in water fluxes availability at subbasin scale.

The SWAT tool as a semi-distributed model uses the hydrological response unit – HRU concept to split catchments into several territorial management units with similar soil properties, slopes, and land use. The HRUs were used as optimisation unit to change land use and crop management. The work was performed in a catchment located in the southern part of Cuenca city in Ecuador; the area delineates the *Tarqui* river. The primary land use of the area is grassland-livestock systems and seasonal cropping. Two steps were performed: first, a model run with calibration and validation was set as baseline model. A second step include an optimisation set of modeled scenarios derived from future stakeholder alternatives defined in a previous study as sustainable practices in the area.

Several SWAT model alternatives were optimised, changing crop sequences, fertilisation rates, and crop scheduling dates. As a result, stakeholders' perception majorly matches with scenarios results in optimising water availability during low flow periods increasing streamflow and soil water availability. However, several unexpected alternatives, coming from optimisation, hint at farmers and ranchers. These new options explore other uses and crop sequences that increase income and reduce fertilisation costs.

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