Multiple ecosystem services valuation with theoretical bio-economic modeling in intensive agricultural-landscape

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Abstract

Global change is a significant contributor to biodiversity loss and hence affects ecosystem services delivery. Ecosystem services are sustained by complex ecological processes or functions that are emergent properties of the natural system. The social or monetary value of ecosystem services depend on the ways that particular services are used by different stakeholders. Therefore, to assess ecosystem services delivery and the inherent trade-offs among them, it is essential to separate the valuation (monetary or not) of individual services from the ecological patterns and processes that deliver the former. Understanding how changes in biodiversity affects trade-offs among ecosystem services requires to include querying stakeholders and components of well-being from their perspective.

Here, we explored scenarios of public policies to determine the landscape composition that best supports sustainable and multifunctional agricultural landscapes. We develop a bio-economic model to analyse the dynamics of ecosystem services in an intensive-agricultural landscape. We consider four ecosystem services among which crop pollination service, which is key by linking the ecological and the economic models. We also consider two stakeholders: farmers and beekeepers with different demand in ecosystem services delivery. The analysis of scenarios of public policies focussed on beekeeping support reveals a perverse effect of this policy on biodiversity conservation, because of an existing substitution between wild and domestic pollinators. Furthermore, a structural antagonism between ecological and economic good state exists but can be reduced by supporting both farmers and beekeepers. In this way, our model highlights the importance to have a wide overview in public policy planning and show that various levers to promote multifunctional and resilient agricultural landscapes.

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