
Structural heterogeneity of landscapes as a way to overcome the production-biodiversity trade-off: a modelling approach

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Abstract

The post-WWII intensive model of agriculture generally implies a trade-off between production (provision service) and biodiversity (cultural service). At the landscape scale, a major driver of this trade-offs is the proportion of biodiversity friendly land-uses (e.g. agri-environment schemes) and land uses aimed at production only. Beyond this major driver, a second driver often described is the structural heterogeneity of the landscape. High levels of structural heterogeneity, by increasing the length of interfaces between land-uses, make it easier for mobile species to access the variety of complementary resources that they require. In this study, we develop a simple modelling framework to illustrate how both the overall level of agricultural intensity and structural heterogeneity of an agrolandscape impacts different metrics of biodiversity. Results of the simulations showed that landscape heterogeneity had a positive effect on the different biodiversity metrics. This effect depends on the intensity of the different land uses composing the landscapes and peaks at intermediate levels of land use intensity. Effects are stronger at the local scale (alpha biodiversity) than at the landscape scale (gamma biodiversity).

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