
How connectivity promotes biodiversity in the face of global changes.

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Abstract

Global changes including land-use and climate changes have already induced important biodiversity modifications, including poleward range shifts and declines in abundance of species. The spatial reshuffling of biodiversity question the role played by species dispersal ability and population connectivity in these dynamics. This paper investigates how the connectivity influences species dynamics in the face of global change.

To achieve this, we develop a multi-species and spatially explicit model of metapopulation dynamics accounting for climate and habitat drivers. We calibrate this model at a national scale using large monitoring databases (French Breeding Bird Survey) involving 37 common bird species (23 farmland bird species and 14 habitat generalist bird species), 5 land-uses classes and 13 climate variables across 713 small regions for the period 2001 - 2008. In particular, the model estimates for each species their level connectivity.

It turns out that accounting for species spatial dynamics significantly improves the model as compared to the model including only environmental variables. We also show that the connectivity level have no influence on specialists' population trends, whereas they are strongly correlated with abundance trends of generalist species.

More generally, with a unimodal relationship between habitat specialization of species and their level of connectivity, we exhibit a trade-off between the difficulty for species of finding suitable habitat and the need to disperse to these habitats.

Keywords: Biodiversity, meta, population, connectivity, common birds, viability, specialization, land, use, climate

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