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# Inconsistent spatial scale in species-landscape relationships: a case study with flower-visitors

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## Abstract

Many studies have sought to assess the 'characteristic scale of effect', i.e. the most appropriate spatial scale to study the relationship between landscape and ecological variables. However, few empirical works studied the importance of choosing appropriate landscape typology and landscape metrics in this context. We analyze the consistency of the characteristic scale of landscape effect on predicting species presence/absence, across species, landscape typologies and metrics, using arthropod species. We applied the widely-used focal site multiscale study design to infer the spatial scale (i.e. buffer size) at which the relationship between an ecological variable of a focal site and landscape structure is the strongest, using an original dataset of flower-visitor arthropods. Characteristic scales of effect identified were compared across 42 arthropod species, four landscape typologies of land cover and a large set of landscape metrics, to analyze their consistencies. Significant differences in characteristic scale were detected among species and among landscape metrics but not among the different typologies used. However, overall characteristic scales of landscape effects were highly unstable, both within and among species and landscape metrics. This result was true regardless of the thematic resolution of the typology. Our results suggest that the outcome of the focal site multiscale study framework cannot be easily interpreted and thus question the relevance of the method to identify the spatial scale of species-landscape relationships. Besides, we clearly highlight the need to assess the spatial scales of effect independently, both for landscape metrics and species, especially in community-centered approaches.

**Keywords:** citizen science, scale of response, characteristic scale, scale of effect, landscape configuration, landscape composition, insect, multiscale approach, landscape pattern, pollinator

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