

## 2 Landscape moderation of biodiversity patterns and processes - eight hypotheses.

Tscharntke T, Tylianakis JM, Rand TA, Didham RK, ..., Steffan-Dewenter I, Thies C, van der Putten WH, Westphal C.  
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### Recommendations:

Average rating:

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21 Nov 2012 | Good for Teaching, Interesting Hypothesis, Review / Commentary

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This review is very welcome! It summarizes many hypotheses related to the interaction between biodiversity and landscapes in a clearer and more comprehensive way than has previously been done. It will become an important reference for teachers in landscape ecology and inspire many new research applications worldwide.

#### Disclosures

None declared

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### Comments:

No comments yet.

### Abstract:

Understanding how landscape characteristics affect biodiversity patterns and ecological processes at local and landscape scales is critical for mitigating effects of global environmental change. In this review, we use knowledge gained from human-modified landscapes to suggest eight hypotheses, which we hope will encourage more systematic research on the role of landscape composition and configuration in determining the structure of ecological communities, ecosystem functioning and services. We organize the eight hypotheses under four overarching themes. Section A: 'landscape moderation of biodiversity patterns' includes (1) the landscape species pool hypothesis-the size of the landscape-wide species pool moderates local (alpha) biodiversity, and (2) the dominance of beta diversity hypothesis-landscape-moderated dissimilarity of local communities determines landscape-wide biodiversity and overrides negative local effects of habitat fragmentation on biodiversity. Section B: 'landscape moderation of population dynamics' includes (3) the cross-habitat spillover hypothesis-landscape-moderated spillover of energy, resources and organisms across habitats, including between managed and natural ecosystems, influences landscape-wide community structure and associated processes and (4) the landscape-moderated concentration and dilution hypothesis-spatial and temporal changes in landscape composition can cause transient concentration or dilution of populations with functional consequences. Section C: 'landscape moderation of functional trait selection' includes (5) the landscape-moderated functional trait selection hypothesis-landscape moderation of species trait selection shapes the functional role and trajectory of community assembly, and (6) the landscape-moderated insurance hypothesis-landscape complexity provides spatial and temporal insurance, i.e. high resilience and stability of ecological processes in changing environments. Section D: 'landscape constraints on conservation management' includes (7) the intermediate landscape-complexity hypothesis-landscape-moderated effectiveness of local conservation management is highest in structurally simple, rather than in cleared (i.e. extremely simplified) or in complex landscapes, and (8) the landscape-moderated biodiversity versus ecosystem service management hypothesis-landscape-moderated biodiversity conservation to optimize functional diversity and related ecosystem services will not protect endangered species. Shifting our research focus from local to landscape-moderated effects on biodiversity will be critical to developing solutions for future biodiversity and ecosystem service management.

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