
How prioritize habitat patches for conserving landscape connectivity? Use of least-cost versus resistance distances in graph models

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Abstract

Context. Methods quantifying habitat patch importance for maintaining habitat network connectivity have been emphasized in helping to prioritize conservation actions. Functional connectivity is accepted as depending on landscape resistance, and several measures of functional inter-patch distance have been designed. However, how the inter-patch distance, i.e. based on least-cost path or multiple paths, influences the identification of key habitat patches has not been explored.

Objectives. We compared the prioritization of habitat patches according to least-cost distance and resistance distance, using the most employed binary and probabilistic connectivity metrics.

Methods. Our comparison was based on a generic functional group of forest mammals with different dispersal distances, and was applied to two landscapes differing in their spatial extent and fragmentation level.

Results. We found that habitat patch prioritization did not depend on distance type when considering the role of patch as contributing to dispersal fluxes. However, the role of patch as a connector facilitating dispersal might be overestimated by LCD-based indices compared with RD for short- and medium-distance dispersal. In particular, when prioritization was based on dispersal probability, the consideration of alternative routes identified the connectors that probably provided functional connectivity for species in the long term. However, the use of LCD might help identify landscape areas that need critical restoration to improve individual dispersal.

Conclusions. Our results provide new insights about the way that inter-patch distance is viewed changes the evaluation of functional connectivity. Accordingly, prioritization methods should be carefully selected according to assumptions about population functioning and conservation aims.

Keywords: connectivity models, habitat prioritization, species conservation, habitat fragmentation, landscape connectivity

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