The use of a movement simulator improves estimates of landscape connectivity

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Abstract

Numerous conservation actions currently rely on the restoration or creation of corridors or natural areas designed to facilitate the movements of organisms. In order to be efficient, those actions need to be based on reliable estimates and predictions of landscape connectivity. While circuit theory and least-cost paths (LCPs) are increasingly being used to estimate connectivity, these methods also have proven limitations. In this talk we will present an alternative approach, based on individual-based modelling, called Stochastic Movement Simulator (SMS). SMS was designed to predict dispersal of organisms in a resistance landscape similar to LCPs and circuit theory-based estimates (i.e., a cost surface), while relaxing key LCP assumptions, namely individual omniscience of the landscape (by incorporating perceptual range) and the optimality of individual movements (by including stochasticity in simulated movements). We used empirical data of natterjack toads (*Bufo calamita*) and Cabanis's greenbul (*Phyllastrephus cabanisi*) to assess the relative performances of least-cost paths, circuit theory and of SMS. To do so, we compared their predictions on connectivity estimates with those inferred with population genetics. The results show that the movement simulator can significantly improve connectivity estimates.

Keywords: circuit theory, connectivity, dispersal, individual, based models, landscape genetics, least, cost paths

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