Least-cost path analysis for urban greenways planning: A test with moths and birds across two habitats and two cities

Urbanization is a major threat to biodiversity. In a new paper, Balbi and colleagues test the efficiency and ecological validity of least-cost path modelling in predicting effective corridors in urban environments.

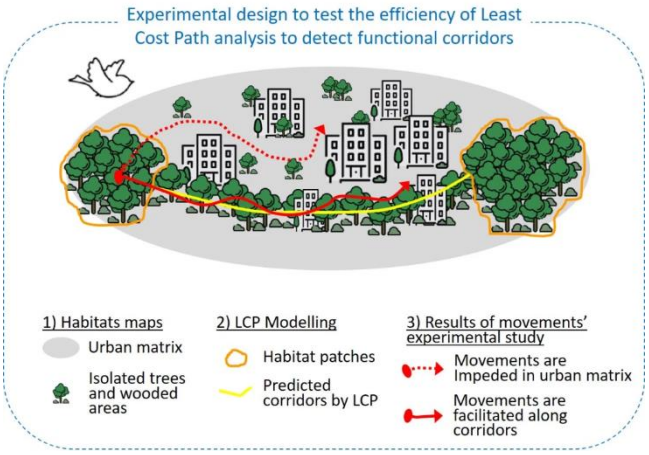
Urban biodiversity contributes to global biodiversity conservation and provides multiple ecosystem services. The growth of human populations living in urban environments and the associated expansion of urbanized land therefore means that conserving urban biodiversity is becoming increasingly important

The development of ecological corridors – a main target of environmental planning in numerous countries, including France (Grenelle Environment 2010) and the UK (DCLG 2012) – is one way to reduce the negative effects of habitat patch isolation on urban biodiversity. However, urban planners often have difficulty accessing and applying appropriate methods when planning ecological corridors and lack the required tools to target multi-species assemblages.

Landscape ecology offers several tools to model ecological corridors. Among them, least-cost path (LCP) analysis appears to be the easiest method to implement, but ecological validation of urban corridors using LCP is lacking and is yet to be generalized across different species, habitats and cities.

In our study, we tested the efficiency of LCP analysis for urban planners. We parameterized and ran LCP analysis on the basis of a literature review and expert knowledge, and assessed and compared movements of organisms along the predicted corridors by LCP and outside (i.e. in the urban matrix) in order to test if those corridors facilitated movements.

We then applied this methodology to moths and passerine birds that have different habitats – grassland and forest, respectively – in two medium-sized European cities, Rennes and Lens, using marked-release-recapture (MRR) for moths and light traps and playback recalls for passerine birds.



For both moths and passerine birds, movement patterns differed between the two connectivity contexts: moth recapture rates were higher in highly connecting contexts than in less connecting

contexts. For passerine birds, responses to playback recalls were faster and movement distance longer in highly connecting contexts. All results support the hypothesis that both taxa were more prone to move in corridors modelled by LCP.

Our study demonstrates the effectiveness of LCP in modelling functional corridors in field trials. It also shows that movements were reduced but not null in the urban matrix, suggesting that the urban matrix permeability, even if low, should be taken into account in connectivity models interpretations and in urban planning.

The agreement of our results in different biological models, habitat types and across cities strengthens the relevance of LCP as a tool to support landscape planners in the development and the management of functional urban greenways, which could therefore help maintain numerous species through various urban environments.

Read the full article, Least-cost path analysis for urban greenways planning: A test with moths and birds across two habitats and two cities, in *Journal of Applied Ecology.*

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