Graph theory in landscape connectivity: a survey

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Abstract

Landscape connectivity can be defined as the degree to which the landscape facilitates the movement of species (genes and individuals) among the habitat resources distributed in it (Taylor et al. 1993). Upholding landscape connectivity is a key part of biodiversity conservation efforts, as it contributes to ensure the genetic variability and persistence of endangered species, helps to counteract the potentially negative effects of habitat fragmentation, and facilitates the shifts in species ranges in response to climate change.

Graph-theoretical approaches have been promoted in the last decade (Dale and Fortin 2001, Urban and Keitt 2001, Urban et al. 2009) as analytical tools to study the effects of landscape fragmentation on animal movement and species persistence as well as to optimize the selection of reserve networks. In particular, graph structures have been shown to be a powerful and effective way of both modeling landscape networks and performing complex analysis regarding connectivity and population persistence across the landscape (Fall et al. 2007, Minor and Urban 2007, Saura and Pascual-Hortal 2007). They provide a spatially explicit representation of the landscape that is able to evaluate the contribution to connectivity of individual landscape elements.

In this talk I will present a brief survey on graph-theoretical approaches used in landscape connectivity, some study cases of the approaches conducted in different continents, and potential applications in Wallacea's biodiversity conservation.

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