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Beware of contagion!

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Abstract

Landscape ecology starts from the assumption that diversity and spatial arrangement of ecosystem mosaics has ecological implications and tries to understand the interactions between diversity and structure of large spatially heterogeneous areas and its ecological functions. This approach implies effective use of earth observation techniques and geographic information systems, enabling a global view of the landscape mosaics. Consequently, a large number of indices has been used to quantify the structure of categorical maps as a surrogate of actual landscapes and correlate them to ecological processes. In particular, the entropy-based contagion index has been extensively used to summarize the amount of clumping or fragmentation of patches on raster categorical maps. However, despite its widespread application, the contagion index is very dependent on pixel resolution. This effect may render it inadequate as a meaningful measure of landscape structure. To overcome this major shortcoming, in this short note we propose to quantify pixel adjacency with a bivariate summary statistics that is not adversely influenced by pixel resolution.

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1. Introduction

In the past 20 years, as the influence of global change became more prominent, ecological research has been conducted over larger and larger areas. Since terrestrial landscapes generally consist of mosaics of different ecosystems, as ecological analyses move from single ecosystems to entire landscapes, it becomes necessary to understand the ecological functions of large spatially heterogeneous areas. Landscape ecology is based on the premise that diversity and spatial arrangement of ecosystem mosaics

has ecological implications and tries to understand the interactions between diversity and structure of large spatially heterogeneous areas and its ecological functions (Forman, 1995). To enable a global view of landscape mosaics, effective use of earth observation techniques and geographic information systems (GIS) is required. In this view, the spatial variability of ecosystem mosaics is typically represented by categorical (i.e. thematic) maps that quantify this variability by identifying patches that are relatively homogeneous and that exhibit a relatively abrupt transition to adjacent areas (Gustafson, 1998). As a consequence, a large number of indices has been developed to summarize different aspects of categorical maps as a surrogate of landscape mosaics and correlate them to ecological processes (Baker and Cai,

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