SPECTRAL VARIATION EXPLAINS HIGHER VARIANCE IN PLANT β-DIVERSITY THAN SPATIAL-AUTOCORRELATION

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Most ecosystems lack long-term extensive data that can support understanding or predictions of what determines their inherent biodiversity patterns. The spectral variation hypothesis (SVH) suggests that the between-plot spectral variation is a proxy for environmental heterogeneity and therefore can act as an indicator of plant beta-diversity. We evaluate the variance in plant beta-diversity as explained by the spectral variation of Landsat-TM data (as a proxy for environmental variation) and spatial autocorrelation in a fragmented riparian landscape. We use Mantel correlograms to investigate the presence and the structure of spatial dependency in beta-diversity and spectral distances. The spatial lag-distance classes from mantel correlograms that had significant spatial autocorrelation in beta-diversity and spectral distances were used as spatial descriptors. We fitted a PLSR model with the plant beta-diversity as response and the Euclidean distances of spectral and spatial lag-distances classes as predictors. We partition variances due to pure spectral, spatial dependency in spectral distances and purely spatial autocorrelation. Mantel correlograms revealed significant spatial autocorrelation in beta-diversity and spectral distances and an exponentially decaying correlation between beta-diversity and spectral distances. This suggested that both spatial and spectral distances contributed significantly to beta-diversity in the landscape. The PLSR model explained 37% of total variance in beta-diversity. Combination of the proportion of total variance explained purely by spectral distances (30%) and spatially dependent spectral variation (36%) revealed that environmental (spectral) distances explained higher variance in beta-diversity (66) than purely spatial autocorrelation (34%). Results support both niche and dispersal assembly in determining beta-diversity patterns in this landscape, suggesting that conservation initiatives should aim at enhancing habitat diversity and increasing the abundance of individual species.

Key Words: dispersal assembly, Mantel correlograms, niche assembly, neutral theory of biodiversity, spatial autocorrelation, spectral variation hypothesis

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