
Coarse-Scale Gradient Analysis of Environmental Factors in Relation to Plant Species Diversity for Vegetation Communities of California

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Abstract

Plant species data from floristic subregions for chaparral, coastal sage scrub, foothill woodland, and yellow pine forest communities in California were analyzed for species turn-over in relation to environmental variables. Species-community data were related to climate and topography using detrended canonical analysis (DCA) and canonical correspondence analysis (CCA), to identify factors associated with composition gradients. Total species-community variance explained by the first two DCA/CCA axes was 65/59% for chaparral, 61/57% for coastal sage scrub, 49/43% for foothill woodland, and 60/48% for yellow pine forest. Seasonal variability and climatic extremes contributed more to species variation than mean annual climatic conditions. Species gradients were more strongly associated with climatic conditions during the growing season than in winter. Results for these vegetation communities confirm previous fine-scale studies, supporting the notion that local community structure is the result of both regional and landscape processes. Analysis of coarse-scale historical floral data reduced problems with spatial and temporal sampling effects found in many fine-scale field studies.
