
Topographic Effect on Spatial Variation of Plant Diversity in California

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Abstract

Plant diversity of 94 subcounty regions in California was analyzed at species, genus, and family levels. The richness indices at the three taxonomic levels were related to the mean and standard deviation of the elevation of each region, and the statistical relationships are examined. Species-genus and species-family ratios, used as indicators of speciation capacity, are also related to the elevation mean and standard deviation. We found that all indices of richness and speciation capacity correlated positively with both variables of topography; an apparent distinction in the degree of correlation existed among taxonomic levels; the correlation coefficient decreased as the taxonomic level moves from species to genus to family. The speciation capacity correlated more closely with elevation mean and standard deviation than the richness indices did, suggesting that the topography affect species richness indirectly through influencing speciation capacity. In addition, the correlation coefficients for standard deviation of elevation were all greater than those of elevation mean, indicating that spatial variability of elevation was more directly related to plant diversity. The habitat heterogeneity hypothesis was modified to explain our result and discrepancies among results from various studies.
