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Primary Contact:

Ruan van Mazijk , Department of Biological Sciences, University of Cape Town
Cape Town , South Africa

All Authors:

Ruan van Mazijk, Department of Biological Sciences, University of Cape Town (**Primary Presenter**)

Michael Cramer, Department of Biological Sciences, University of Cape Town

George Anthony Verboom, Department of Biological Sciences, University of Cape Town

Title:

Similar axes of environmental heterogeneity associated with plant species richness in two hyper-diverse floras

Abstract:

We aim to assess whether the difference in vascular plant species richness per unit area between two mediterranean-type biodiversity hotspots (the Greater Cape Floristic Region (GCFR) and Southwest Australian Floristic Region (SWAFR)) is explained by differences in environmental heterogeneity. Comparable, geospatially-explicit environmental and species occurrence data were obtained for both regions and used to generate environmental heterogeneity and species richness layers. At a range of spatial scales, species richness was regressed against a major axis of environmental heterogeneity, derived by principal component analysis, and, using multivariate regression, against separate environmental heterogeneity variables. We found the GCFR to be generally more environmentally-heterogeneous and species-rich than the SWAFR. Species richness per unit area is significantly related to the major axis of heterogeneity across both regions, which explains ca. 38–42% of overall heterogeneity, the slope of this relationship differing between the two regions only at the finest spatial scale. Multivariate regressions, and regressions against the first axes of the PCAs, revealed variations in the dependence of species richness on environmental heterogeneity that differed between the two regions. We have evidence for a common positive relationship between floristic richness and environmental heterogeneity across the regions. Though there are region-specific effects, broad, positive associations between various axes of heterogeneity (and the major axis thereof) and plant species richness hold across the two flora. The greater richness per unit area of the GCFR, compared to the SWAFR, is thus explained by its greater environmental heterogeneity and is concordant with its greater levels of floristic turnover.

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Country of presenting author:

South Africa

Gender identity:

he/him