

Will a decreasing winter rainfall cause a shift in Succulent Karoo boundaries? Evidence from competition and vegetation-change analyses

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The ecotone between the Namaqualand shrublands (Succulent Karoo biome) and Bushmanland Arid Grassland (Nama-Karoo biome) is characterised by transitional (ecotonal) physiognomy (grassland-shrubland mosaic, and grass and shrubs intermingling in arid communities). We discuss findings from studies of vegetation distribution patterns and processes at the ecotone, in the context of climate change and ecotone dynamic.

A reciprocal seedling transplant field experiment revealed that established grass vegetation competitively prevents the establishment of succulent shrub seedlings in grass communities. In communities where grass and succulent shrubs co-occur, a nearest-neighbour analysis technique revealed a stronger competitive impact from grass on the succulent shrubs. Higher competitive pressure from grasses on the succulent shrubs is important to grass-shrubs dynamics at the ecotone, particularly given the observed and predicted decline in winter rainfall, to which the succulents in Namaqualand are well adapted. It is inferred that the stronger competition from grass on the succulent shrubs reflects a reduction in water availability in the upper soil layer, where most of the root mass for succulent shrubs is concentrated. Furthermore, multi-temporal analyses of LANDSAT data between 1986 and 2006 revealed areas showing persistent signs of increasing grass cover, but not signs of a persistent increase in shrub cover.

We propose that changes brought about by a shift in seasonality of rainfall may already be manifest in the vegetation, as indicated from evidence of increasing grassiness. Such changes may be ascribed to competition for water and interactions between the different root morphologies at the ecotone.

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