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MODELING THE ENVIRONMENTAL NICHE OF A SOUTH AFRICAN FYNBOS ENDEMIC TREE ALOE, *KUMARA PLICATILIS*, AND PREDICTING IMPACTS OF CLIMATE CHANGE ON THE SPECIES' DISTRIBUTION

Abstract

Understanding why species occur where they do and, predicting where species might migrate to under different global change scenarios is an important aspect of biodiversity conservation. Regions that harbour high levels of species diversity and endemism arising from sharp local climatic and ecological gradients are highly susceptible to changing conditions. *Kumara plicatilis* is a tree aloe endemic to the Boland mountain ranges in the species-rich fynbos region in the Western Cape Province of South Africa. The species is currently listed as Least Concern as far as habitat degradation, population decline, invasive species and direct-use threats are concerned although impacts of anthropogenic climate change on this habitat specialist remain undocumented. This study used species distribution models to successfully classify the environmental niche of the species as well as delineate spatial patterns of probable occurrence and abundance based on this niche. In addition, models based on the IPCCs 2014 'best-case' and 'worst-case' climate change scenarios provide projections of changes in the spatial occurrence patterns of *Kumara plicatilis* expected under conditions of shifting climates. Niche-based statistical analyses were further used to draw temporal comparisons between current and future projected ranges to ascertain the degree and properties of shared niche space now and in the future. Results indicate that suitable habitat conditions for the species distribution is irregularly spread around the central and southwestern fynbos region constrained by several climatic and biophysical variables including winter rainfall and temperature conditions as well as vegetation type. The species is expected to experience limited to severe declines in the area of suitable habitat available under mild and harsh climate change conditions, respectively. The patterns arising from these models are in line with the environmental niche measurements which show large degrees of overlap between current and future niche space of the species. These outcomes suggest that *Kumara plicatilis* displays traits of environmental niche conservatism where unsuitable climate and biophysical conditions can limit its geographic range and local extinction of populations can occur due to global change. Whilst the results of this study offer a useful and initial insight into the possible impacts of shifting climates on this species, outcomes from modeling should be interpreted with caution to reach the best management decisions and conservation action for this endemic species.

Key words: conservation, diversity, endemism, global change, niche properties, species distribution models