Climate and land use changes will degrade the distribution of Rhododendrons in China

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Biodiversity loss and variation in species responses to climate and land use change have been found across broad taxonomic groups. However, whether species from the same taxonomic group with distinct geographical ranges will respond differently is poorly understood. The aim of this study is to predict the potential impacts of future climate and land use change on the distribution of narrow- and wide-ranging Rhododendron species, and estimate their relative contribution in China. We applied the presence-only ecological niche model MaxEnt to predict the distribution of 10 narrow-ranging and 10 wide-ranging Rhododendron species for the year 2070, using three general circulation models and three scenarios of climate and land use change. We measured the predicted distribution change of each species using change ratio, distance and direction of core range shifts, and niche overlap using Schoener' s D. We found that the distribution areas of six narrow-ranging species would decrease, of which one species would go extinct. The remaining four narrow-ranging species would experience range expansion. Distribution of all the wide-ranging Rhododendron species would decrease. All Rhododendrons will shift to the northwest. We conclude that Rhododendron species generally will be negatively affected by the climatic and land use change expected in 2070 from the three scenarios evaluated in this study, but some narrow-ranging species may be positively influenced. Narrow-ranging Rhododendron species are more vulnerable compared to wide-ranging Rhododendron species. This study demonstrated that the effects of climate and land use change on alpine and subalpine plant species is species-specific, thereby strengthening our understanding of the impacts of climate and land use change on plant distribution.

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