

Assessing ecosystem threats from global and regional change: Hierarchical modeling of risk to sagebrush systems from climate change and invasive species in Nevada, USA

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Abstract

Global change poses significant challenges for ecosystem conservation. At regional scales, climate change may lead to extensive shifts in species distributions and widespread extirpations or extinctions. At landscape scales, land use and invasive species may disrupt ecosystem function and reduce species richness. Various scale dependencies and a lack of spatially explicit data can make it difficult for science to inform conservation and management. In this work, I develop spatially explicit tools for assessing risk to sagebrush (*Artemisia spp.*) systems from climate change and land use in the state of Nevada, USA. Risk to sagebrush systems is derived from spatial relationships between sagebrush distribution and climate (based on regional bioclimatic envelope modeling) and between the invasive species cheatgrass (*Bromus tectorum*) and land use (based on landscape-scale invasive species distributions). By creating multiple layers of risk in a GIS environment, this approach provides land managers with hierarchical assessment tools important for developing long-term conservation strategies.

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