

Submitted Abstract

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Abstract

Climate warming, nitrogen deposition, and grazing pose major threats to alpine biodiversity. All of these can have complex effects on biodiversity and ecosystem function, and, especially for biodiversity, effects can often be negative. For plant communities, these impacts operate through many of the same ecological pathways, involving changes in plant productivity and biomass as well as carbon cycling processes. We use an experiment-based approach to (i) assess the single and interactive effects of these three global change drivers on alpine biodiversity and carbon cycling; and (ii) explore the circumstances under which grazing can be an effective tool for mitigating the ecological strains on biodiversity caused by climate warming and/or nitrogen deposition.

Warmer climate and nitrogen deposition significantly impact alpine biodiversity. In particular, they increase graminoid cover, while decreasing forb cover and species richness. However, grazing by sheep can mitigate these negative impacts to some extent. This study aims to understand impacts of global change on alpine ecosystems, and provide important information for farmers and policy makers in alpine areas to optimise the level of grazing on their land to improve biodiversity and ecosystem functions and is therefore highly relevant to society.