

Climate Change, Agency Decision-Making, and the Resilience of Land-Based Livelihoods



PAPER BY Corrine Noel Knapp, Shannon M. McNeeley, John Gioia, Trevor Even, and Tyler Beeton. Brief by Meghan Kent. Artwork by Joel Ostlind.

Why this study was needed

“Those extreme droughts are very hard to swallow and to manage through,” a Colorado rancher remarked, reflecting on the effects of climate change he’s witnessed. “We’ve done it twice and I hope I don’t have to ever do it again.” This rancher is one of many with land-based livelihoods in the West affected by climate change. Economies including agriculture and recreation rely on public lands, yet permittees are limited in the decisions they can make on these lands. Land management agencies like the Bureau of Land Management have the sole authority to make management choices which directly impact land users.

Researchers recognized a need to determine to what extent public land users are vulnerable to climate change, and how public land management agencies can adapt and facilitate the adaptation of permittees. By understanding user vulnerabilities and management capabilities, researchers aimed to identify how the BLM can better adapt to climate change in order to both maintain ecosystem health and support the economies dependent on the land.

How it was done

Researchers interviewed 60 stakeholders including BLM staff, livestock ranchers, and recreation outfitters in the BLM Gunnison and Little Snake field offices of Colorado. Researchers chose this region due to its large extent of public lands and the many users dependent upon them. Ski resorts, rafting companies, hunting outfitters, and agricultural producers all use public lands. By asking public land permittees about local changes in climate and how they were impacted, researchers determined the extent to which public land users in the area are vulnerable to climate change. Researchers also examined how management decisions inhibited or facilitated their ability to respond to the change. In addition, researchers interviewed BLM agency employees about climate change impacts, management responses, and the decision-making context.



This project was designed to understand how Bureau of Land Management permittees, including ranching and recreation-based businesses, in Colorado are vulnerable to climate change and how they and managers could better adapt.

What the researchers discovered

Land-based livelihoods dependent on public lands are already seeing the impacts of climate change, and inflexibility within land management agencies can inhibit adaptation.

Land users identified vulnerabilities to climate change such as increased wildfire, vegetation and wildlife responses, and precipitation change. Vulnerability varied among users due to their land use. While grazing permittees worried about vegetation response in the frame of forage quality, quantity and timing, recreation permittees were more concerned with the results of beetle kill on aesthetics and safety. Overall, drought was the primary climate change concern among land users.

Interviews revealed current land management practices have limitations for responding to user vulnerabilities exacerbated by climate change. Although agencies are using innovation to respond to vulnerabilities such as by increasing collaboration, there are structural barriers that limit their capacity to respond. Barriers include inflexible management structures, limited cross-agency collaboration, agency uncertainty, limited recreation permits, and slow process for range improvements. There is a need for agencies to be more nimble, allowing for in-season adaptation.



The researchers interviewed stakeholders in two BLM units in western Colorado, the Little Snake and Gunnison Field Offices, where nearly half of all jobs are dependent on natural resources and tourism.

Why it's important

Identifying how land management agencies can respond to climate change effects is essential to mitigating the vulnerabilities public land users experience. Public land permittees are already feeling the impacts of climate change, the strain of which will likely increase in the future.

There are several ways land management agencies can better plan for climate change, including incorporating adaptive management for more flexibility, increasing collaboration, and making timelier within-season range improvements. For example, the National Environmental Protection Act was identified as a barrier to more timely improvements due to its time-consuming process, but adaptive management could be built into NEPA documents in order to provide more flexibility to make timelier decisions. By identifying user vulnerabilities and management barriers, this research advances the conversation of how to equip land managers to respond to climate change vulnerabilities felt by land users.

About the authors

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Read the paper

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