

Building capacity among ranchers to promote climate change adaptation in the west

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Abstract

Rangelands cover over 50% of the land surface area in the western US, providing important economic, social and environmental benefits. The resilience of western rangelands, however, is threatened by climate change, including altered phenology and precipitation patterns, increased frequency and intensity of drought and forest fires, heightened pressure from invasive plants, and reduced water storage in winter snowpack. Climate adaptation strategies are available to ranchers, yet uptake varies substantially. Rancher decision-making is a complex function of their beliefs, knowledge, skill level, risk perceptions, and the institutions supporting them. Semi-structured interviews, focus groups and workshops will be utilized to examine how ranchers in Idaho, Montana, Wyoming perceive and respond to climate change, and the opportunities and barriers these social processes create for climate change adaptation.

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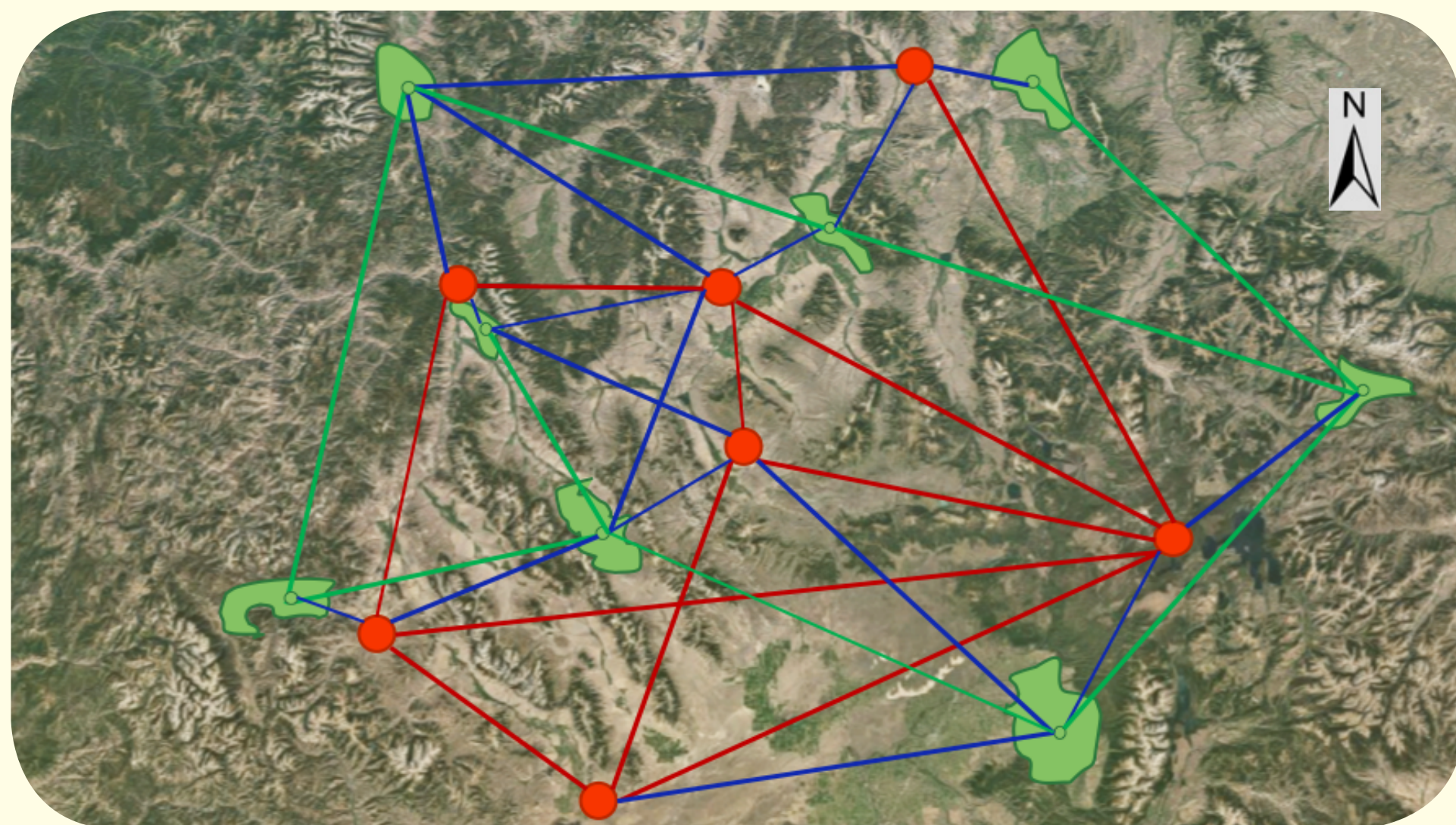
Abstract

Rangelands cover **over 50%** of the land surface area in the western US, providing important economic, social and environmental benefits. The **resilience** of western rangelands, however, is threatened by climate change, including **altered phenology and precipitation patterns**, increased frequency and intensity of **drought and forest fires**, heightened pressure from **invasive plants**, and **reduced water storage** in winter snowpack. Climate adaptation strategies are available to ranchers, yet uptake varies substantially.



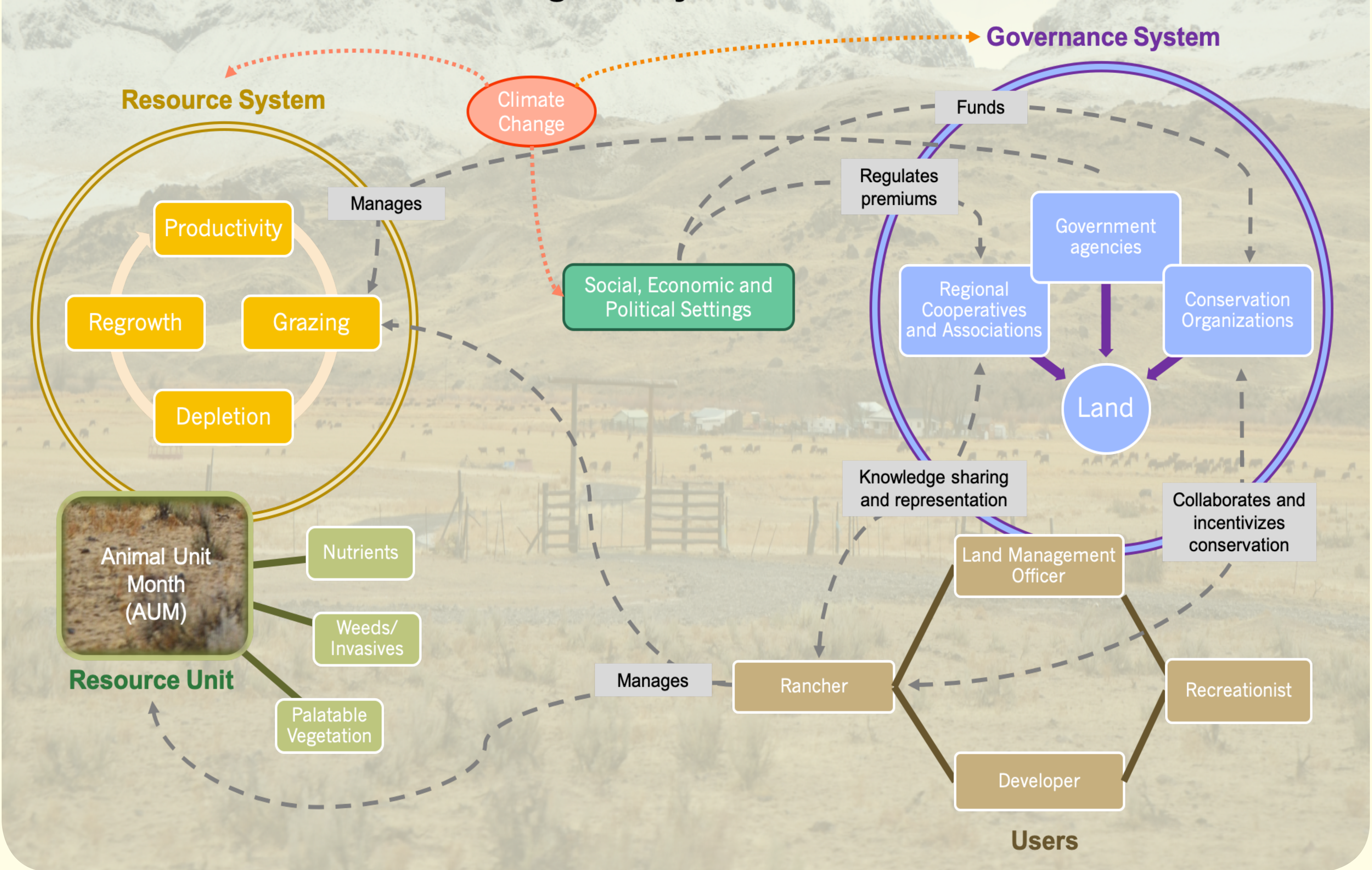
Mixed-Methods Approach

Rancher decision-making is a complex function of their beliefs, knowledge, skill level, risk perceptions, and the institutions supporting them. Semi-structured interviews, focus groups and workshops will be utilized to examine how ranchers in Idaho, Montana, Wyoming perceive and respond to climate change, and the opportunities and barriers these social processes create for climate change adaptation.



Complex network of social-ecological linkages (blue), social relationships (red nodes and linkages) and ecological patches and links (green)

Social-Ecological System Framework



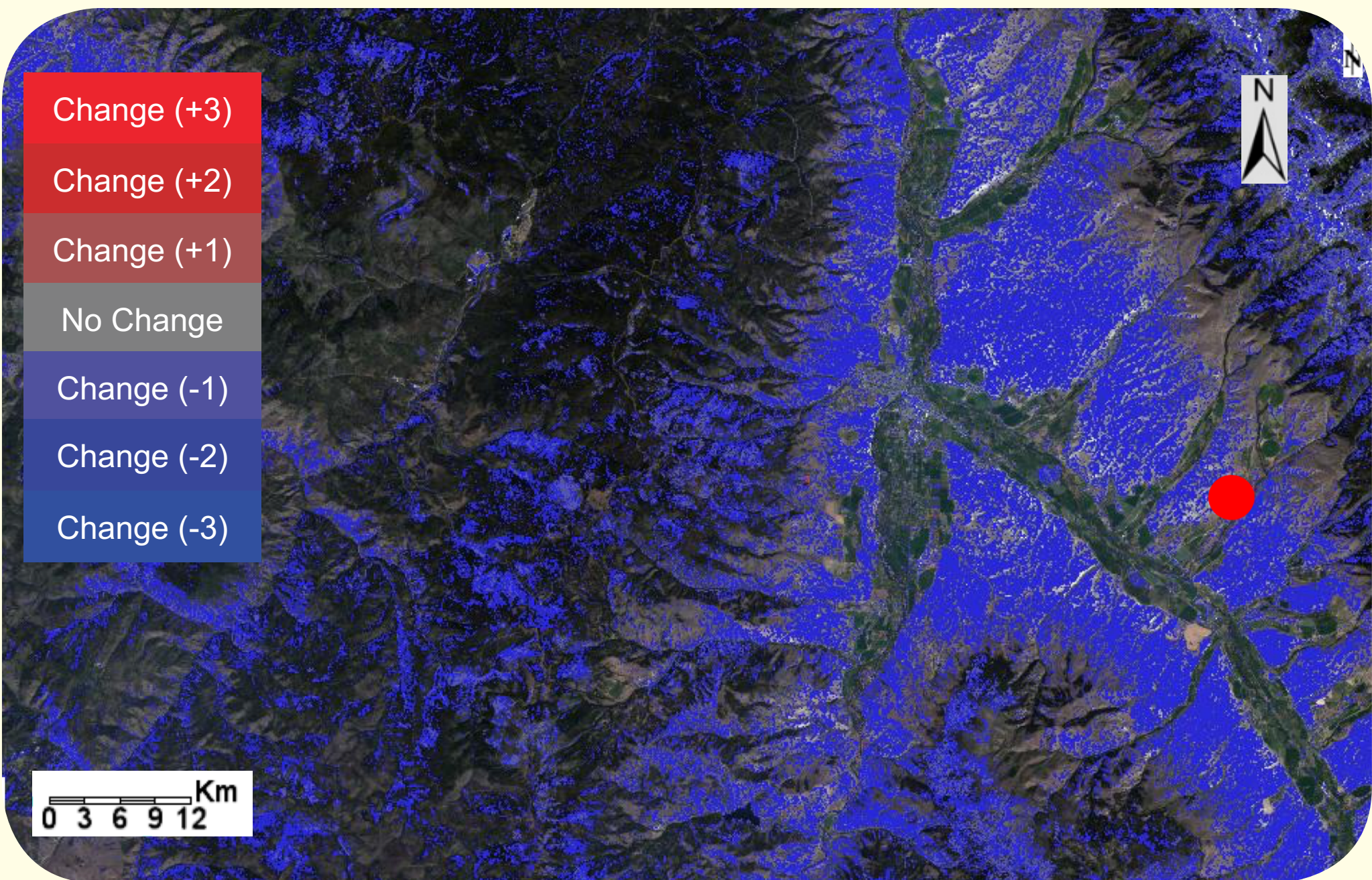
Interaction model of a social-ecological system with a focus on public lands ranching in the west. Adapted from Ostrom, E., 2009. A general framework for analyzing sustainability of social-ecological systems.

Objectives

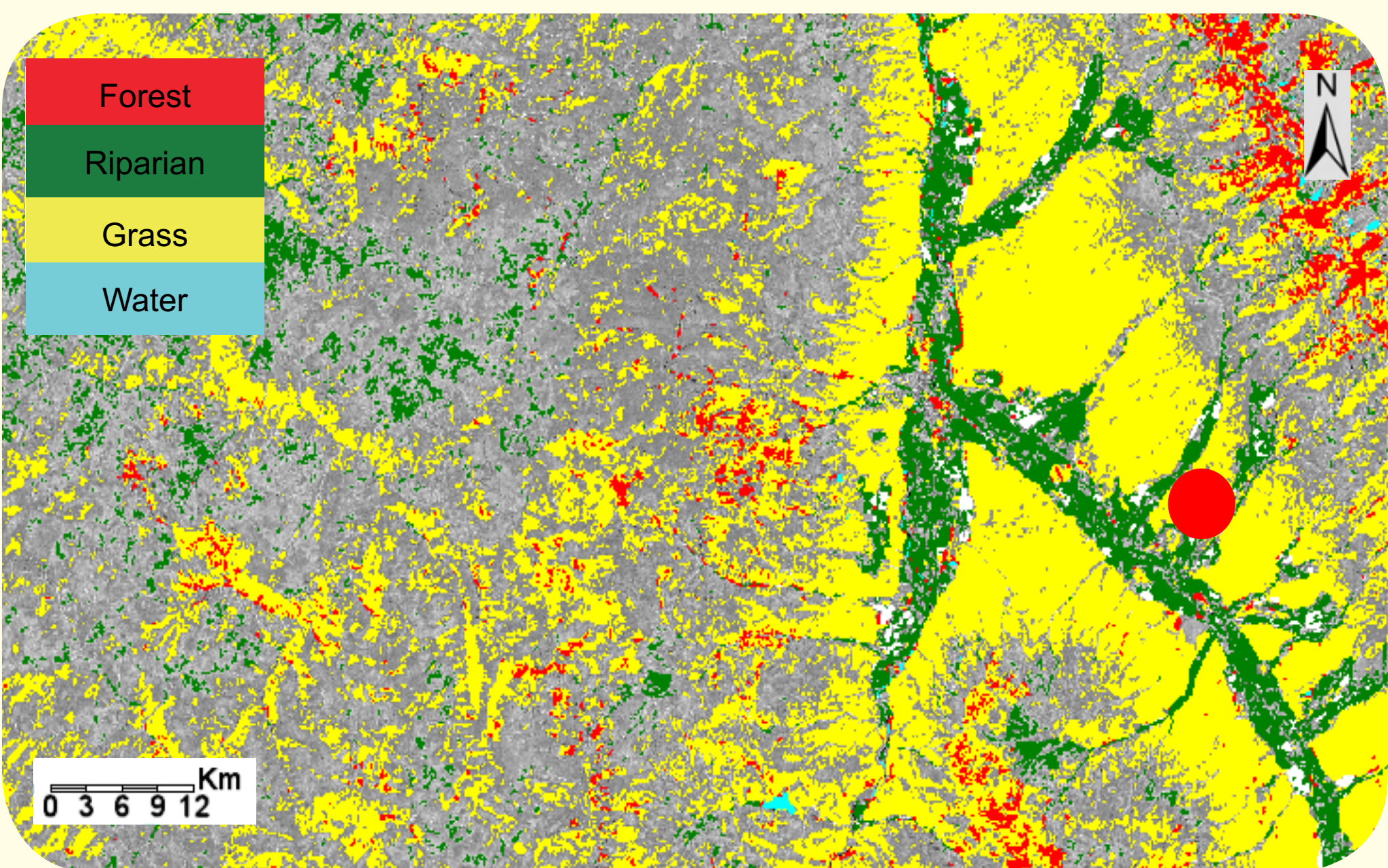
- Evaluate rancher perceptions of climate change and identify alternative ways of promoting climate change adaptation practices
- Prototype a behavioral field experiment and workshop to effectively promote climate adaptation
- Develop accurate visualizations of drought for informed decision-making
- Evaluate vegetation and drought indices to understand sensitivity and accuracy required for detecting drought at a spatial scale pertinent to ranchers
- Co-develop tools for drought onset threshold detection and location of most severe drought impacts

Preliminary Results

Accurate and accessible information would enable ranchers and other land managers to implement adaption strategies before a drought emergency is reached. Drought visualization maps may be one way ranchers, stakeholders, and researchers can share knowledge and current needs, improve management practices and direct productive research.



Change detection map of Soil Adjusted Vegetation Index (SAVI) differences due to a severe drought during 2012 in Lemhi County, ID when the county declared a state of emergency. The red marker indicates the location of Eagle Valley Ranch, LLC in Lemhi County, ID.



Supervised classification performed on the Soil Adjusted Vegetation Index difference 2012 - 2018 using Maximum Likelihood Classification indicates the land classes most vulnerable to drought. The red marker indicates the location of Eagle Valley Ranch, LLC in Lemhi County, ID.