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Communities and Forests in Oregon

Climate Change Adaptation In Working Landscapes Of The Intermountain Northwest

In partnership with University of Colorado, University of New Hampshire, the Carsey Institute, Oregon State University College of Forestry Extension, and Wallowa Resources

University of Colorado Boulder

Oregon State University OSU

CARSEY INSTITUTE AT THE UNIVERSITY OF NEW HAMPSHIRE

University of New Hampshire

Stewardship Community Education WR Wallowa Resources

Project Information

This project, titled **Climate Change Adaptation In Working Landscapes Of The Intermountain Northwest**, is support by a grant from the United States Department of Agriculture, National Institute for Food and Agriculture.

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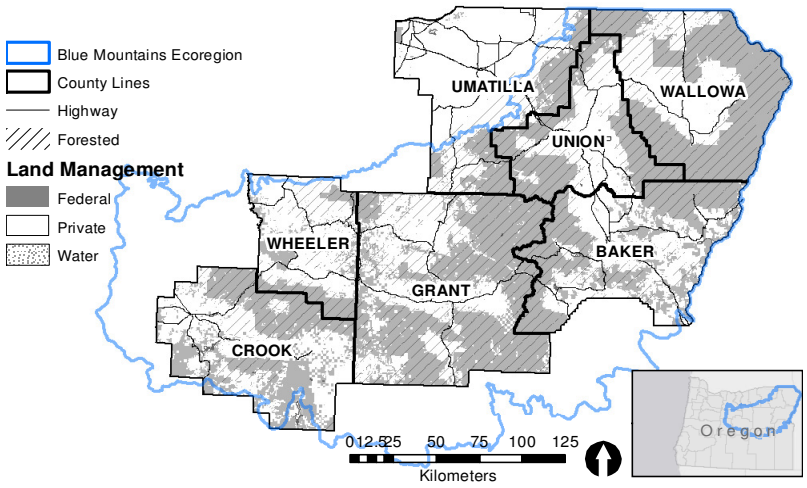
End date: January 31, 2018

Project Description

Climate Change Adaptation In Working Landscapes Of The Intermountain Northwest

Background

A decade into the 21st century, rural communities are at a transition. Traditional livelihoods in natural resource-based sectors have been eroded by changing markets and policies, resulting in significant demographic change. The effect of climate change on fire regimes has been exacerbated by contemporary changes in land-use patterns and fire suppression efforts, causing fuels to accumulate and risk of large fire to increase. Forecasted growth of large-scale natural disturbances in North American forests, such as insect outbreaks and catastrophic wildfire, have the potential to cause large, abrupt releases of carbon (C), accelerating future climate change. They would also inflict heavy socio-economic costs.



Our study area includes seven of the twelve counties covered by the Blue Mountains Ecoregion in northeastern Oregon.

Research Objectives

This study will provide an integrated social and biophysical assessment of vulnerability and adaptation to climate change and variability in the Blue Mountains Ecoregion of Oregon. Our main objectives are to A) quantify the current range of variation in forest conditions with a focus on small private landowners, and assess current landowner strategies for mitigating climate variability in forest and silvo-pastoral systems; B) examine historic range of variation, current range of variation, and "business as usual" projections of future variability to target and prioritize strategies for improving forest resilience to an uncertain and variable future climate; C) use recent climate data, IPCC scenarios, and climate matching techniques to enable landowner visualization of potential climate risks over the mid-term (10-30 years); D) analyze multivariate relationships between perceptions of climate change and strategies for adaptation and mitigation, separately among general public and forest-landowner populations; and E) use our findings to probe the mindset of stakeholder groups, collaboratives, and institutions regarding climate change to learn how the uncertainty of future conditions are factored and into *and prioritized* for management decision-making.

Approach

We will use an interdisciplinary, multi-scale approach combining remote sensing techniques and ecological field-based sampling with general-public and landowner surveys. We will focus on the dynamic feedbacks between landscape changes, land use conversion, and the strategies people use to respond to risk of climate change. By integrating these components we will study relationships between perceptions and adaptive behavior. i) We will characterize landscape change using an integrative hierarchical approach that incorporates high-resolution aerial imagery with vegetation sampling to analyze changes in these agro-ecosystems, then scaled up to the county level. ii) We will integrate forest characteristics with disturbance, drought, and weather data, and with general public and landowner views measured by two surveys to test relationships between environmental and social domains. iii) We will characterize climate variability over the historical record using data at multiple scales. iv) We will integrate results for climate and ecological literacy and management using scenario planning to reach stakeholders through “K-grey” education and extension programs.

Research Questions & Hypotheses

This project is intended to address the following fundamental, interrelated research questions. Outcomes for research questions create opportunities for extension, education, and engagement activities, which are detailed below.

1. How are immediate ecological context and landscapes related to the perceptions and management decisions of small forest landowners, or (separately) of the general public?
2. How do individual landowner decisions interact with ongoing and future ecological changes, such as drought, wildfire or insect troubles related to both management and climate change? Are negative or positive adaptation steps linked to specific perceptions?
3. Similarly, how are public perceptions about ecosystem, landscape changes and risks translated into support or resistance toward institutions and policies? What improvements in communication strategies do findings about public and landowner perceptions suggest?
4. What are the critical choke points within social systems for private landowners to maintain flexibility to respond to climate change, but also maintain individual and community well-being and a resilient production system (e.g., timber, cattle, agriculture together)?

Each of these questions is tied to one or more groups of testable hypotheses:

H1. The greatest variation in forest conditions and most dynamic land use is found within private, non-industrial landowners compared to federal lands and private industrial forests.

H2. Forest conditions on private forest lands relate to landowners' management of perceived risk and variability (e.g., drought, insects, wildfire), but also socio-economic constraints (agricultural production declines, log markets).

H3. Landowners and the general public show awareness of climate change realities, but interpret these through cultural filters. Sensible adaptive decisions could nevertheless take place, and be encouraged, within the framework of cultural perceptions that may differ from scientists'.

H4. Near and mid-term temporal scales (within lifetime) are salient for most people, and more likely to be considered in management choices or policy support. Private landowners planning strategies are more relevant for the next 10-30 years (rather than 100 years out) and do have strategies to account for and mitigate climate variability risk. Landowners are responding to climate variability since these threats in the near and mid-term (i.e., the next 30 years) is of greater concern for management (income, retirement, investment strategies).

H5. Identifiable constraints and opportunities exist in the social system for mitigation or adaptation to climate variability. These are implicit in the suite of mitigation and adaptation strategies and landowners' ability to employ them. Knowledge about these constraints and opportunities will be helpful for landowners and other stakeholders.

Methods Highlights

Social Science Research

- A broad survey of the general public in all counties of the study. Samples of approximately 250 people from each county (~1750 interviews).
- Distinguish land use and land management objectives, risks, economic opportunities, recreation, and access privileges among ownership groups, location, and land use history.
- Evaluate the linkage between forest conditions risk (e.g., wildfire, drought) and mitigation or adaptation choices people are making.

High Spatial Resolution Imagery Collected by Unmanned Aerial Vehicles

- UAV data will be collected with permission from, and provided to, individual land owners whenever on private land.
- Use UAV data, landowner input, and aerial photography to create highly detailed land and management maps.
- These data will be used to determine relationships between remotely-sensed (satellite and aerial photo) and field-collected measures of forest conditions

Forest Conditions & Management.

- We will collect high-quality ground reference data in local forests. The reference data will be designed to:
- Provide reference data for the remote sensing image analyses (satellite, airborne, and UAV).
- Provide an independent data set for validation and accuracy assessment of models and classifications derived from remotely sensed image data.
- Provide direct evidence about forest composition, structure, and health metrics in support of landowner outreach activities.

Satellite & Airborne High Resolution Analysis

- Scale up intensive ground and UAV data to characterize landscape-scale variability across the 7 counties in eastern Oregon.
- Vegetation structural attributes derived from this algorithm, especially stem frequency per unit area and the distribution of canopy diameters will be related to field based measurements and object analyses derived from UAV-collected data
- We will examine burned area over a 12 year period to compare inter- and intra-annual variability and identify lag times in the burned area trends and anomalies.

Integrated Education, Extension, &Stakeholder Engagement

Findings from the research and analysis create critical opportunities to disseminate place-based, locally relevant information on forest conditions and climate change through formal education, landowner extension, and community stakeholder engagement. Key outcomes include:

- Raise the understanding and awareness among K-12 students, undergraduate / graduate students, teachers, and landowners, and general public within the study region about the potential impacts of climate change on their local landscapes and ecosystems, and practical options to manage and mitigate that risk.
- Train and mentor undergraduate and graduate students with respect to the research methodology and continuing monitoring and assessment needs and methods.

- Stimulate open and creative dialogue within the community about the challenges of and potential responses to climate change and provide mechanisms for continued stakeholder input, participation, understanding, and ownership.

Project timeline and benchmarks according to first, second, third, and fourth quarters of each year.

Schedule of activities	Year 1				Year 2				Year 3				Year 4			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Team planning	x	x	x													
Develop surveys	x	x														
Conduct telephone survey			x													
Workshops, focus groups, town-hall meetings				x			x	x								
Forest data collection				x	x		x	x								
UAV data collection and landowner engagement				x	x		x	x								
Acquire high-resolution geospatial datasets		x	x	x	x											
High-resolution geospatial analysis					x	x	x	x								
Acquire moderate-resolution geospatial datasets					x	x	x									
Landscape-scale analyses and fire frequency analyses							x	x								
Climate matching analysis				x	x	x	x	x	x							
Synthesis and Integration						x	x	x	x	x	x	x	x	x		
Education & Extension			x	x			x	x	x	x	x	x	x	x	x	x

Project Personnel

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**Two graduate students will start in fall 2014. One student will be based at the University of Colorado (Environmental Studies) and the other at the University of New Hampshire (Natural Resources and the Environment).

Advisory Committee

Ken Gebhardt
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About Ken: Mr. Gebhardt supervises all aspects of forest and personnel management in one of 4 districts on the WWNF since 2008. He regularly collaborates with landowners, non-profit organizations, natural resource advisory councils, local leaders, and is a key participant in the new Wallowa-Whitman Forest Collaborative. He is respected at the agency and by the general public.

Colby Case Knifong
6th grade teacher, Enterprise Elementary School, Enterprise School District
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About Colby: Ms. Knifong is a lifelong eastern OR resident and an educator promoting STEM education in the schools, and she will provide important pedagogy, curriculum design, and evaluation of K-12 learning. She stresses experiential learning in and out of the classroom and seeks students to immerse students in culture as well as environmental issues (e.g., Nez Perse water rights).

Curt Grimm
Deputy Director, Carsey Institute, University of New Hampshire
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About Curt: Dr. Grimm is the lead investigator on Carsey's Communities and Environment in Rural America program, which explores the changing social, economic and environmental conditions in rural communities across the US. He will serve as chair of the Board. He has expertise in monitoring and evaluation for Carsey and regularly consults on design, implementation and evaluation development and education projects. Dr. Grimm is faculty in the Department of Anthropology at UNH and will provide guidance in grad and undergrad education and training.

Steve Edwards
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About Steve: Dr. Edwards is Vice Chair for Resilience and Social Learning for the IUCN Commission on Ecosystem Management where he promotes greater resilience in complex natural systems. He is a member of the local Woodland Owners Association and President Elect of the Blue Mountain Forest Cooperative, and an appointed member of several Baker County natural resource oriented committees/boards. He will provide feedback from local forest managers, which will enhance the efficacy of the research in relation to local needs, and facilitate communications between the research team and local policy bodies.