Title: Management and Climate Change in Coastal Oregon Forests: The Panther Creek Watershed as a Case Study

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Abstract:
The highly productive forests of the Oregon Coast Range Mountains have been intensively harvested for many decades, and recent interest has emerged in the potential for removing harvest residue as a source of renewable woody biomass energy. However, the long-term consequences of such intensive harvest are unknown, particularly as coastal forests face novel conditions resulting from climate change. We used the LANDIS-II forest simulation model to project the long-term (90 year) impacts of climate change and management actions on carbon sequestration in a small watershed in the northeastern Oregon Coast Range. We explored a large number of scenarios, including current climate, six scenarios of climate change, two harvest rotation periods, two harvest intensities (including biomass energy harvest), and no harvest. Simulations suggest that climate change is likely to increase forest productivity and biomass over the next century as warmer winter temperatures allow greater conifer production in cooler months, offsetting declines in production due to summer drought. Harvesting residual material for biomass energy had little impact on trees and soil, but caused declines in coarse woody debris under fast harvest rotations. Soil organic matter showed little variation among scenarios, indicating that soil carbon is relatively resilient to climate and management impacts. Ongoing work will expand the study to the entire Oregon Coast Range, where we will incorporate landscape-scale disturbances and a wider variety of management scenarios across a diverse range of landownerships.

Key words: forests, simulation modeling, landscape ecology, LANDIS-II

First topic: Forest Landscapes
Second topic: Forest Ecology

Impact statement

The work described in this abstract will further our understanding of climate change and forest management in the Oregon Coast Range. Our approach uses a state-of-the-art simulation model that will complement and enhance previous efforts to address similar questions, which have provided a foundation of knowledge but have been more limited by spatial and thematic resolution. We explore a large number of simulated scenarios varying in assumptions about management and climate, allowing us to compare the impacts of different management actions on future conditions. This information can be used by land managers to inform long-term forest management and help reduce uncertainty about the effects of climate change over the next century.