LCLUC Abstract

Modeling Carbon Dynamics and Their Economic Implications in Two Forest Regions: Pacific Northwestn USA and Northwestern Russia

(http://www.fsl.orst.edu/lter/research/hjarel/russia.htm)

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Our proposed project will compare two significant forest regions of the globe, the Pacific Northwest, USA and northwestern Russia with the overall objective of determining the relative importance of land-use versus biogeoclimatic factors in controlling spatial and temporal patterns of carbon dynamics.

Our four specific objectives are:

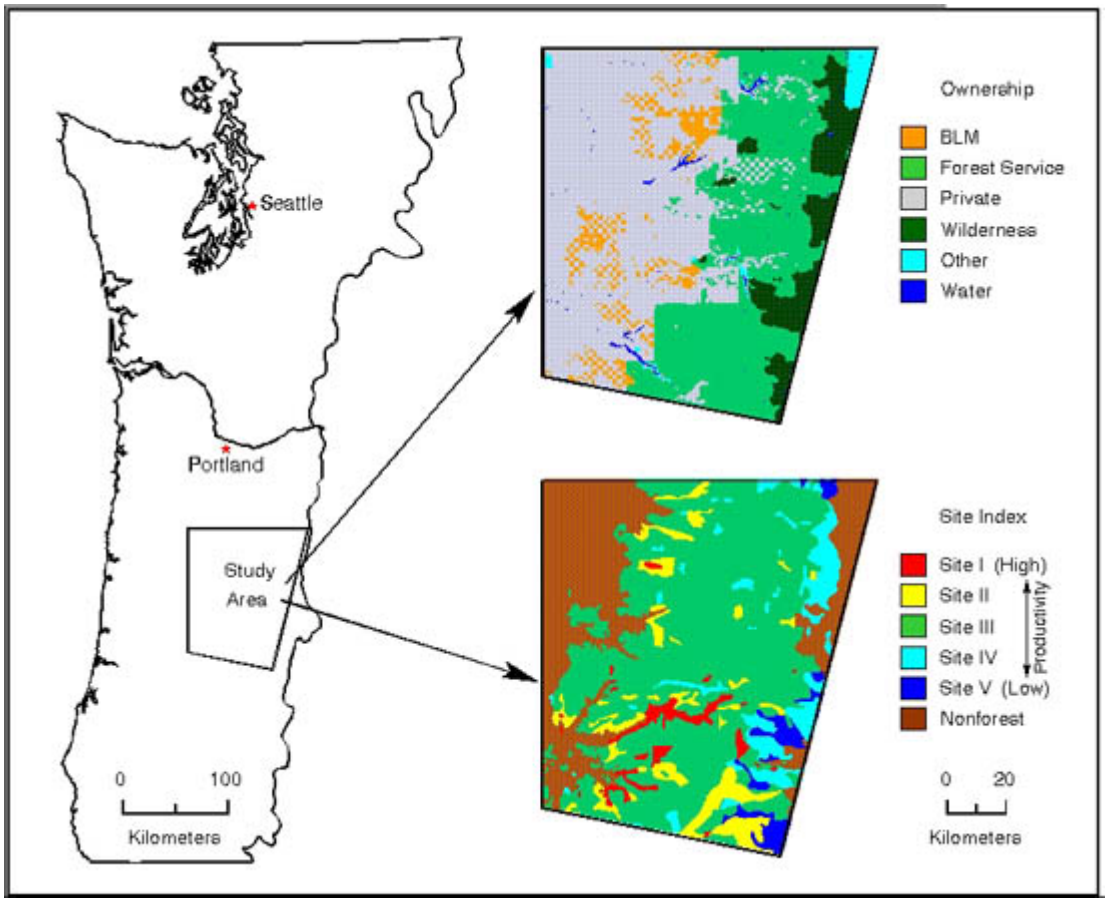
1. Link remotely sensed and biogeoclimatic data to ecosystem models at three spatial scales (region, landscape, and stand) to predict changes in regional carbon stores

2. Assess the major uncertainties introduced by complex and interactive natural processes and evaluate how these uncertainties propagate during the integration of scales

3. Use this analysis system to compare the changes in carbon stores in the Pacific Northwest and northwestern Russia over the last 25 years

4. Link our carbon stores analysis system with forest market models to determine the economic consequences accompanying changes in carbon stores.

The proposed research involves the continued integration of five highly complementary and interdependent carbon models into an overall regional analysis system. Each model addresses a particular process or pattern at a specific spatial scale, is linked to remotely sensed and biogeoclimatic data relevant to that scale, and will be tested with independent data from the Pacific Northwest and northwest Russia. Regional patterns of maximum potential carbon stores will be based on biogeoclimatic factors, potential vegetation, and maximum potential leaf area index. Landscape patterns of carbon flux will incorporate those constraints, but focus on the changes in carbon stores that result from changes in age structure caused by disturbances and the fate of carbon in forest products. Stand level patterns of carbon flux will incorporate the constraints of the previous two scales, but focus on the interactions of tree species, physiognomic forms, and small-scale disturbances (i.e., thinning) and their effects on successional changes in carbon stores. Once we have performed sensitivity analysis and corroborated the predictions of the separate system components, we will examine how uncertainty propagates in the overall analysis system, focusing on parameters and driving variables that the component models are most sensitive to and for which the largest uncertainty exists. Our analysis will also include a comparison of future scenarios of regional development for the next 25 years as a way to compare the overall "inertia" of these two regions to change in the current carbon flux.



Concurrent with assessing the uncertainty of our regional estimates, we will analyze the economic implications of changing harvest rates and other management treatments (i.e., planting, precommercial thinning, commercial thinning) as well as the manufacturing efficiency and use of forest products. Each of these changes entails a cost of implementation as well as changes in the quantity, quality, and timing of forest harvests. Analysis of these costs will allow us to generate schedules of the marginal cost of carbon storage for each type and location (PNW versus Russia) of treatment. The final result will be calculations of the relative efficacy of various management options and improvements in processing efficiency that can help guide decision makers intent on managing carbon emissions from forests.