

# USING LANDIS-II TO STUDY THE EFFECTS OF GLOBAL CHANGE IN SIBERIA

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## Abstract:

Landscape dynamics are characterized by complex interactions among multiple disturbance regimes, anthropogenic use and management, and the mosaic of diverse ecological conditions. LANDIS-II is a landscape forest succession and disturbance model that independently simulates multiple ecological and disturbance processes, accounting for complex interactions to predict forest species, age classes and biomass on forested landscapes. We present a case study of the use of LANDIS-II that explores the interacting effects of climate change and timber harvest of virgin forest in a Siberian landscape northwest of Lake Baikal. The landscape has been structured primarily by the fire regime. There are currently no tree-killing insect pests, but the Siberian silkworm may advance as the climate warms. The study area has recently been opened to timber harvest. Simulation of current climate and fire regimes shows that the composition of the current landscape is within the expected range of natural variability. Under a warming climate, composition varies more through time, and there are significant effects of the Siberian silk moth. Harvesting reduces forest biomass and stabilizes composition through time. The interaction of all these global changes produces large variations in carbon sequestration and species composition through time. We used LANDIS-II to explore silvicultural options to mitigate the negative impacts of global change. No single strategy appears able to achieve all forest management objectives, but the results offer insight into the tradeoffs among strategies.

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