LANDIS-II Newsletter
Summer 2013

What would summer be without another LANDIS-II newsletter?

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Introducing the LANDIS-II Foundation

We are pleased to announce the formation of the **LANDIS-II Foundation**, a non-profit dedicated to model development, maintenance, training, and education. We are incorporated as a non-profit in Oregon and are currently applying for 501(3)(c) status. In order to generate income for ongoing model maintenance and other activities, we will be seeking funding from multiple sources, including book sales, training, and from grants.

If you are writing a grant that substantially depends on LANDIS-II, we ask that you consider allocating up to $5000 per year to the LANDIS-II Foundation. Please contact us if you would like more information. Our current board members include: David Mladenoff as President, Robert Scheller as Treasurer, Jonathan Thompson as Secretary. The Technical Committee in charge of vetting all major modifications includes Brian Sturtevant, Jonathan Thompson, and Robert Scheller.

LANDIS-II Meeting and Training

We are planning our next LANDIS-II training and general meeting for **January 8-10, 2014**. This meeting will include both hands-on training and a larger meeting to exchange research, explore ideas, and plan for the future.

If you are interested in attending the two day introductory training session and/or the general meeting (presentations and discussions), please **contact us soon**. Training space is limited to 20.

In keeping with our new mission to raise funds for model upkeep, we will be charging fees for both the training and the general session.

LANDIS-II Extension Updates

As always, a number of extensions have been updated to address minor bugs. Please check the extensions page to be sure you're updated.

LANDIS-II Meeting Recaps

Two training sessions were held this past year, both in December 2012: Portland, Oregon and Sao Jose dos Campos, Brazil. We anticipate making the west coast training a regular event, alternating with the training and meeting held in Madison, Wisconsin.

Publications

It has been a good year for LANDIS-II publications with a diversity of teams publishing, including the first publications featuring Mexican forests. The following have been published (or accepted) in the past 12 months:

Loudermilk, E.L., R.M. Scheller, P.J. Weisberg, J. Yang, T. Dilts, S.L. Karam, C.N. Skinner. In press. Carbon Dynamics in the Future Forest: The Importance of Climate-Fire Interactions and Long-Term Successional Legacy. Global Change Biology.

Scheller, R. M. 2013. Landscape Modeling. Pages 531-538 in S. A. Levin, editor. Encyclopedia of Biodiversity. Academic Press, Waltham, MA.

Gustafson, E. J. and B. R. Sturtevant. 2013. Modeling forest mortality caused by drought stress: implications for climate change. Ecosystems 16:60-74.

Wang, F., D.J. Mladenoff, J.A. Forrester, J.A. Blanco, R.M. Scheller, S.D. Peckham, C. Keough, and M.S. Lucash. 2013. Multi-model simulations of forest harvesting effects on long-term productivity and CN cycling in aspen forests. Ecological Applications. http://dx.doi.org/10.1890/12-0888.1

Karam, S., P. Weisberg, R.M. Scheller, W. Miller,D. Johnson. 2013. Development and evaluation of a nutrient cycling extension for the LANDIS-II landscape simulation model. Ecological Modelling 250:45-57.

Scheller, R.M., A. M. Kretchun, S. Van Tuyl, K. L. Clark, M. S. Lucash, and J. Hom. 2012. Divergent carbon dynamics under climate change in forests with diverse soils,tree species, and land use histories. Ecosphere 3(11):110.

Dymond, C.C., R.M. Scheller, and S. Beukema. 2012. A New Model For Simulating Climate Change and Carbon Dynamics in Forested Landscapes. Journal of Ecosystems and Management 13(2):1–2.

Steenberg, J.W.N., P.N. Duinker and P.G. Bush. 2012. Modelling the effects of climate change and timber harvest on the forests of central Nova Scotia, Canada. Annals of Forest Science. DOI: 10.1007/s13595-012-0235-y.

If you have published a manuscript, dissertations, white-paper, report, etc., of research that used LANDIS-II, please add your publication to the list: www.landis-ii.org/documentation/PublicationsPage.

Photos from the Portland Training in December 2012

Students working hard.

Field trip to Columbia River Gorge and Old-growth forests

Featured Research

This newsletter's feature is provided by James Steenberg, , PhD student at Ryerson University, Toronto Ontario, Canada (james.steenberg@ryerson.ca).

Overview

The LANDIS-II model has been widely applied to explore the implications of climate change for forest ecosystems and their management. In our research, we employed LANDIS-II to investigate the potential impacts of climate change and corresponding management adaptations in central Nova Scotia, Canada. Forests here are characterized by mixedwood stands of red spruce, eastern hemlock, yellow birch, sugar maple, American beech, balsam fir, and white pine. Disturbed sites are dominated by red maple, white birch, and aspens. The watersheds investigated are the local water supply, and the project was a partnership with the municipal water utility, Halifax Water, which is responsible for forest management.

We parameterized the main biomass succession extension, as well as the biological disturbance, wind, and harvest extensions, at 10-yr time steps using 20-m resolution input rasters. We simulated several 300-yr harvest scenarios under both current-climate conditions and the SRES-A2 climate scenario. The establishment probability (Pest) and aboveground net primary productivity (ANPP) inputs were calculated using PnET-II prior to scenario simulation.

The first of two simulation experiments looked at climate change impacts in both pre-settlement and current forest conditions (Steenberg et al., 2013). A decline in the abundance of boreal species and an increase in some temperate and pioneer species were seen (Fig. 1). Importantly, under harvest simulation there were changes in the distribution of several species that would not be expected based on climate alone. Conversely, some late-successional species exhibited resistance in their distribution. Climate change caused an increase in forest productivity when harvest was simulated, but a decrease in no-harvest scenarios. A time lag in forest response was likely responsible for this decrease in the absence of widespread mortality. The range expansion of early-successional broadleaved species and subsequent decline of red and black spruce have implications for forest community associations, as well as for management where conifers are favoured for pulp and lumber production.

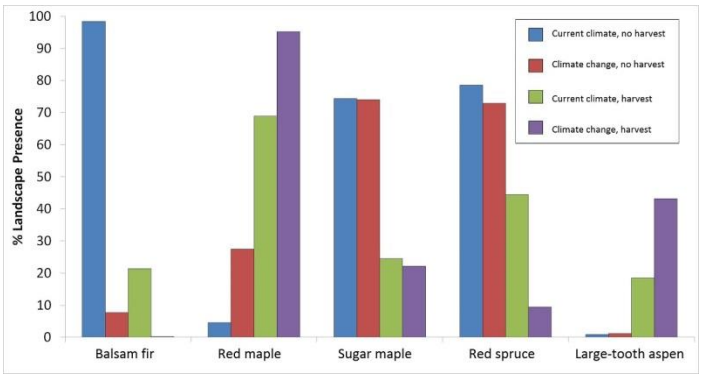

Fig. 1. Landscape presence of five representative species in the four scenarios of experiment one.

The second experiment explored possible management adaptations (Steenberg et al., 2011). In response to simulated climate change impacts, we adapted harvest size and the age and species composition of harvested trees into eight management scenarios. The timber supply was found to benefit from climate change in the absence of any adaptations, though there was a loss of target tree species and old growth forest. The combination of all three adaptation treatments yielded an adequate representation of target species and old forest without overly diminishing the timber supply, minimizing the tradeoffs between management objectives (Fig. 2). This supports a diverse approach to climate change adaptation with a balance of resistance, resilience, and transition facilitation.

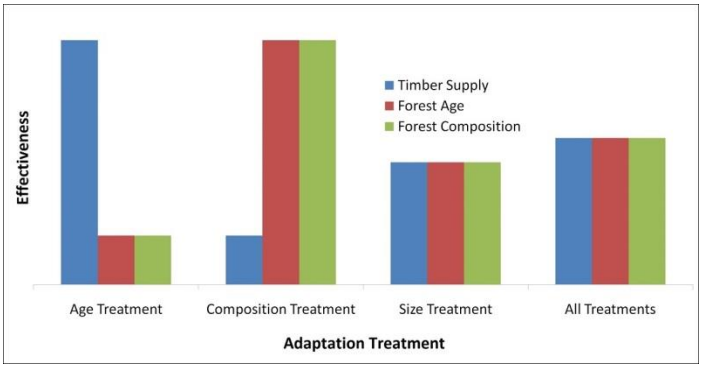

Fig. 2. Visualization of adaptation-treatment effectiveness for meeting management objectives in experiment two.

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References:

Steenberg, J.W.N., P.N. Duinker, P.G. Bush. 2011. Exploring adaptation to climate change in the forests of central Nova Scotia, Canada. Forest Ecology and Management 262: 2316-2327.

Steenberg, J.W.N., P.N. Duinker and P.G. Bush. 2013. Modelling the effects of climate change and timber harvest on the forests of central Nova Scotia, Canada. Annals of Forest Science. DOI: 10.1007/s13595-012-0235-y.

Columbia River Gorge