LANDIS-II Newsletter
Summer 2010

The intention of this newsletter is to keep everyone updated on model changes or enhancements, meetings, and to promote collaboration by sharing research ideas, etc. If you want to contribute to the newsletter, or would like to be removed from the list, please send me an email. And, as usual, your feedback is welcome and appreciated.

Robert Scheller (rmschell@pdx.edu), Eric Gustafson, Brian Sturtevant, David Mladenoff

LANDIS-II Meeting 2010

We held a LANDIS-II meeting in January of 2010 in Madison, Wisconsin. There were ~40 attendees with people joining us from across the world: Australia, Sweden, Italy, Canada, Austria, Canada, and the US. We began with one day of presentations and discussions followed by a two-day intensive training workshop for model users.

Details and outputs from the 2010 meeting can be found on the documentation tab at the LANDIS-II web site (www.landis-ii.org).

Thank you everyone for your participation and we look forward to seeing you again!

User Bulletin Board

Note: The User Bulletin Board has been moved to Google Groups. The new BB provides many more options. On the down-side, we lost many of our previous posting.

Please look through the user bulletin board. If you see a topic for which you have experience, share your thoughts and suggestions. Additional voices and perspectives are much appreciated. However, if you are having a technical difficulty, please contact Robert Scheller directly via email. Strange error messages, etc., are best resolved through direct email exchanges.

Model and Extension Updates

As usual, please browse through the extension list frequently to see which of your extensions have been updated

The biggest news is that we are currently updating the LANDIS-II Core to v6.0.

Improvements will include:

1. We are simplifying extension programming through changes to the architecture and the supporting tools. For example, we will move the cohort libraries out of the core in order to simplify programming to a large degree.
2. We are incorporating the Geospatial Data Abstract Library. This will allow us to read and write many more raster formats.

Unfortunately, we will lose the ability to write to the ERDAS 7.4 format (*.gis).

3. Improvements to the user experience. A few changes to the input design will significantly improve the user experience. One example is the pre-verification of all inputs files before program initiation. Many others will be implemented.

4. We are changing the Core and all extensions to compile with standard 'project' files. These files work with many IDEs on multiple OSs. Doing so will standardize the extension programming experience and lower the barrier for scientists hoping to create their own.

5. Developer documentation for the core will be updated.

As a result of these changes to the Core, all extensions will also undergo updates, but only what is necessary to work with the new core.

Publications

We also want to highlight our most recent publication:

Scheller, R.M., E.J. Gustafson, B.R. Sturtevant, B.C. Ward, and D.J. Mladenoff. 2010. Increasing the research and management value of ecological models using modern software engineering techniques. Frontiers in Ecology and the Environment 8(5): 253–260, doi:10.1890/080141

If you have published a manuscript, dissertations, white-paper, report, etc., of research that used LANDIS-II, please add your publication to the list.

Also visit the page to see the most recent published or in press manuscripts.

Featured Research

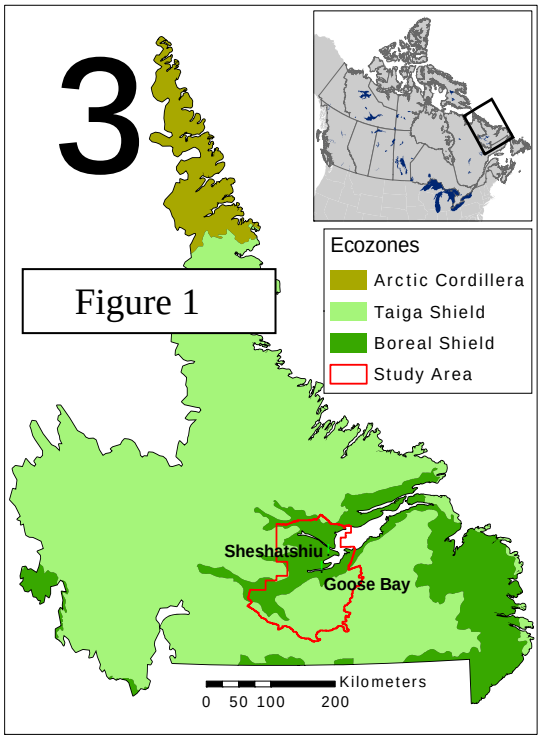
Beginning with the last newsletter, we began featuring research projects. ***Please submit a summary of your research for the next newsletter.***

This newsletter's feature is proved by Brian Sturtevant of the Northern Research Station (US Forest Service):

Old growth forests serve as useful benchmarks for the desired characteristics and behavior of managed forest ecosystems. A challenge common to forest ecologists across the globe are the identification of old-growth forests large enough to capture the processes of interest to forest dynamics – including their disturbance regimes. This is particularly true of high latitude forests affected by large scale disturbance agents such as fire, insects, and wind. Ideally landscape disturbance and succession models should be capable of reproducing the dynamics for such "natural" forest ecosystems without the confounding influence of human

forest management. It is therefore no surprise that remnant old growth forests often serve as sources of inspiration and evaluation of such models. Examples for the LANDIS family of models include Sylvania wilderness in northern Michigan (USA), the Boundary Waters Canoe Area of northern Minnesota (USA), and the Ulvinsalo nature reserve in eastern Finland.

Brian Sturtevant and Brian Miranda of the Northern Research Station (US Forest Service), in collaboration with both US and Canadian Colleagues (Rob Scheller, Michael Papaik, Frederik Doyon, Daniel Kneeshaw, and Christian Messier), are using the high latitude virgin forests of central Labrador as a testing ground for multiple developments in LANDIS-II. A 1.9 million ha forest management district (FMD-19a) in central Labrador (53° 19' N, 60° 25' W) is located at the transition between closed-canopy boreal and open-canopy taiga systems (Figure 1). Forests are compositionally simple, dominated by black spruce with lesser components of balsam fir, white spruce, paper birch, and tamarack. Fire is the dominant natural disturbance; though fire is both less prevalent and less intense relative to more continental regions further south and west. While commercial harvesting has been limited in the district, a new forest management plan designed to stimulate economic growth and balance cultural and ecological values was recently approved (Forsyth et al. 2003). LANDIS-II was included as part of a multi-scale model toolkit to inform sustainable forest management in the region (Sturtevant et al. 2007).



The relative rarity of such a large, unmanaged forest ecosystem offered a unique opportunity to examine forest, disturbance, and landscape characteristics of a boreal system in the near-absence of human intervention. The Labrador study area has already been featured as one of the testing sites for the dynamic fire extension (Sturtevant et al. 2009). However evaluation of the LANDIS-II succession dynamics relative to

Figure 2. Tree regeneration in central Labrador can be delayed – sometimes for decades – following fire disturbance. Such delay can be exacerbated by the more rapid regeneration of deciduous shrubs (e.g., at right). Photo by B.R. Sturtevant.

available plot data indicated modifications were needed to capture vegetation dynamics across central Labrador's natural boreal – taiga ecotone. Other key processes thought to affect the Labrador forest system behavior included regeneration delay following disturbance, related post-disturbance competition with shrubs (e.g., Figure 2), and small-scale (i.e., < 1 cell) gap-phase dynamics. In response to these needs Sturtevant, Miranda, and colleagues are developing a new biomass succession extension that simulates a more explicit light regime affecting growth and establishment of woody species.

The new extension (Biomass Succession v3) is nicknamed the "lego model" because its cartoon characterization of canopy layers resembles stacked Legos ® (Figure 3). The extension assumes that leaf area index (LAI) is a linear function of ANPP, and that available light for cohort growth and establishment may be approximated by the LAI of older cohorts. Additional modifications to cohort growth, competition-related mortality, and age-related mortality are currently underway to enhance the transparency and realism of the underlying assumptions governing cell-level vegetation dynamics. The new design provides avenues for simulation of more realistic partial disturbances (e.g., thinning, insect defoliation, etc.) as well as competition with other growth forms (e.g., shrubs). Anticipated completion of the new extension is in fall of 2010.

Funding for this research and development includes the US National Fire Plan, the Sustainable Forest Management Network.

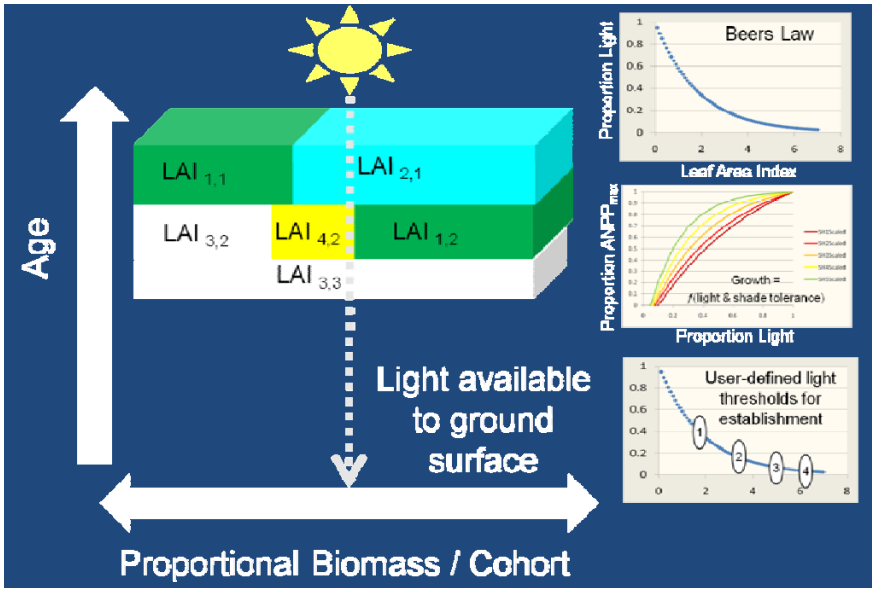


Figure 3. A conceptual schematic for a more explicit light-driven biomass extension currently being developed using data from the Labrador study landscape. cell-level interactions affecting light transmissivity through "canopy layers", affecting growth rates for lower layers and light available for species establishment.

Literature Cited

Sturtevant BR, Fall A, Kneeshaw DD, Simon NPP, Papaik MJ, Berninger K, Doyon F, Morgan DG, Messier C (2007) A toolkit modeling approach for sustainable forest management planning: achieving balance between science and local needs. Ecology and Society 12, 7. [online] URL: http://www.ecologyandsociety.org/vol12/iss2/art7/.

Sturtevant BR, Scheller RM, Miranda BR, Shinneman D, Syphard AD (2009) Simulating dynamic and mixed-severity fire regimes: A process-based fire extension for LANDIS-II. Ecological Modelling 220, 220: 3380–3393.