

LANDIS-II Newsletter Spring 2009

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.

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LANDIS-II Meeting 2009

We will be holding a LANDIS-II meeting in mid-October 2009 in Madison, Wisconsin. Our target audience is current and potential users. We will have a mixture of presentations of new or ongoing research and a mini-workshop with tutorials for new users, as well as ample time to exchange ideas. We will also dedicate time for newer users to consult directly with scientists with extensive experience using LANDIS-II. Fees will be nominal.

In order to plan for the meeting, we need your input! Is your research at a stage where you could present preliminary results? Are you a new user that would benefit from guided tutorials? Are there specific topics you would like to see on the agenda?

Unlike previous meetings, we will not review extension programming. If you have programming or other development needs, we can supply a list of qualified individuals who have LANDIS-II experience.

User Bulletin Board

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 me directly via email. Strange error messages, etc., are best resolved through direct email exchanges.

Model and Extension Updates

A number of extensions have been updated over the past 6 months:

Base Harvest and Biomass

Harvest: There have been a number of enhancements and bug fixes over the past 6 months.

Dynamic Biomass Fuels

Users can now restrict fuel types to select ecoregions.

Biomass Succession: Biomass Succession v1 was eliminated; only v2 is available and supported. I did this because of the difficulty of supporting the code for two nearly-identical extensions.

Century Succession: A new type of succession, based on the Century soil model, is now available.

Age-Only Succession: The extension was updated so that it now more faithfully reflects the

shading assumptions found in LANDIS versions 3.x.

Publications

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.

NEW Featured Research

Beginning with this newsletter, we will feature a research project. **Please submit a summary of your research for the Autumn 2009 newsletter.**

Eric Gustafson of the Northern Research Station (US Forest Service) headed a research team (Anatoly Shvidenko, Brian Sturtevant and Rob Scheller) to use LANDIS-II to investigate how multiple, overlapping global changes will affect the forests of south-central Siberia (Russia). Siberian forests are facing twin pressures of rapidly changing climate and increasing timber harvest activity. The combination of altered climate and altered species interactions will produce altered disturbance regimes. The incidence and severity of fires is likely to increase, and a moderation of the harsh Siberian winters may allow insect pests to become more widespread. The

frontier of timber harvest activity is pushing into previously inaccessible areas. New forest openings will increase fragmentation, and the building of roads may increase human access and fire ignition rates. Forest policy and management systems must take into account changing conditions and multiple interacting processes in order to achieve sustainable forest use in the future and to avoid unintended consequences.

The 3165 km² study area is situated near the city of Ust-Ilimsk, Russia (Figure 1). The forests of the study area are comprised of seven dominant species (*Picea obovata*, *Abies sibirica*, *Larix sibirica*, *Pinus sylvestris*, *Pinus sibirica*, *Betula pendula* and *Populus tremula*). The major natural disturbances are wildfire and windthrow. To explore the effects of impending global changes, we simulated five scenarios. 1) The range of natural variability (recent climate and disturbance regime), 2) increased timber harvest, 3) changing climate through 2099 as predicted by the Hadley A2 scenario (+5.1° C, +20% precipitation), which resulted in an altered fire regime (longer fire season, altered weather), 4) Siberian silk moth outbreaks (with warmer climate) and 5) all changes combined (climate, harvest and insects).

Based on a comparison of these scenarios, the following conclusions relevant to forest

policy in the study area can be drawn. 1) The direct effects of climate change in the study area are not as significant as the exploitation of virgin forest by timber harvest and the potential increase in outbreaks of the Siberian silk moth. 2) Global change is likely to significantly change forest composition of central Siberian landscapes, with some changes taking ecosystems outside the historic range of variability. 3) Novel disturbance by timber harvest and insect outbreaks may greatly reduce the ability of Siberian forests to sequester carbon, and may significantly alter ecosystem dynamics and wildlife populations by increasing forest fragmentation.

The results suggest management strategies that may help the forests in the region adapt to global change. 1) Encourage the regeneration of more productive species under future climate (pine and birch will have increased primary productivity and

probability of establishment under the future climate). Larch will be less productive, but it is best able to tolerate fire. 2) Silk moth will have a negative impact on all conifers except larch. A potential strategy to mitigate insect losses is to begin to reduce landscape concentrations of spruce and fir, since these are major hosts for the silk moth.

Literature cited

Gustafson EJ, Shvidenko AZ, Sturtevant BR, Scheller RM. (In review) Predicting climate change effects on forest biomass and composition in south-central Siberia. Ecological Applications.

