LANDIS-II background and extension descriptions

* LANDIS-II simulates the regeneration, growth, mortality, and dispersal of species and age-specific cohorts of trees that compete for resources (soil moisture, nitrogen, light) and undergo disturbances and management actions within a landscape of gridded cells. In the model, species are defined by a combination of traits that determine landscape and site-level demographics. Each cell on the landscape is assigned soil characteristics, climate conditions, and disturbance and management regimes. LANDIS-II (v7.0) operates as a core module interacting with user-determined extensions that determine cohort interactions, landscape-scale forest dynamics, and ecosystem processes.
* To simulate conservation scenarios, we used the NECN Succession extension (v6.3) to simulate forest successional dynamics, the Biomass Harvest extension (v4.4) to capture management actions, the Base Hurricane extension (v1.0) to simulate stochastic hurricane events, and the Biomass Output (v3.0) and Cohort Statistics Output (v3.0) to summarize model outputs.
* The Net Ecosystem Carbon and Nitrogen (NECN) Succession extension simulates the dynamic life cycle of tree species-age cohorts as they grow, reproduce, age, and die. NECN operates on a monthly time step and incorporates temperature, precipitation, and wind data from historic climate data or modeled future climate scenarios. Each species‐age cohort is limited by temperature, water, nitrogen, leaf area index, and competition. NECN provides a total ecosystem accounting of carbon and nitrogen. Dead biomass is divided into four pools and tracked over time: surface wood, soil wood (dead coarse roots), surface litter (dead leaves), and soil litter (dead fine roots). Three soil pools are simulated: fast (soil organic matter (SOM) 1), slow (SOM2), and passive (SOM3) are simulated.
* The Biomass Harvest extension simulates forest management by selecting and removing tree species biomass based on specific management prescriptions that specify the timing of harvest, the species harvested, the amount of biomass removed, and the species planted. These management prescriptions allow the user to specify how a stand is harvested (e.g., thinning or clearcut), how much of each species-age cohort is harvested, and whether the stand is replanted after harvesting, among other prescription criteria.
  + The harvesting landscape is first divided into management areas that define collections of stands to which specific management prescriptions can be applied. Stands are collections of cells on the landscape that represent typical forest management block sizes.
  + Harvest prescriptions define how stands are selected for management and what management actions are conducted. They determine which stands within a management area qualify for harvest and define the preferred order in which stands will be selected for harvest.
* The Base Hurricane extension simulates tree species-age cohort mortality from hurricane winds. Each simulated storm has a storm track direction, and generates a maximum wind speed at landfall. Cohort mortalities depend on maximum sustained wind speeds and vary by species.
* The Biomass Output extension summarizes output from the NECN Succession extension. Biomass outputs from every model time step can be summarized as a landscape total or by individual species.
* The Cohort Statistics Output extension creates output maps of individual or combined species statistics such as median and maximum age. Richness and evenness statistics can be applied at both the species and the community level.
* For additional details on the LANDIS-II modeling framework and the extensions used, please visit http://www.landis-ii.org/home