and those using remote sensing and GIS data, but few PEMMs incorporate significant elements of both data types. PEMMs are increasingly being developed for landscape-scale forest management and monitoring due to the availability of landscape-level data sets, the improvement in landscape-scale data acquisition, and the ability to improve these models as new data become available. In this study, a PEMM was developed that uses both airborne LiDAR data, which characterised forest structure, and ecological plot data to quantify the geographic extent and biomass/C content of cool temperate rain forest across the Central Highlands region of south-eastern Victoria, Australia. The authors demonstrate how field-based measures of this forest type combined with LiDAR structural information can give better predictions of spatial distribution and biomass and carbon content at the landscape scale within this region. They also demonstrate how this PEMM approach can be used for determining the impact of forest harvesting and management on the distribution and structure of cool temperate rain forest.

Western Africa tropical Sudanian riparian forest contribution to ecosystem carbon balance performance in Togo. Folega, F. (*Beijing Forestry University, China; ffolega@yahoo.fr*), Wala, K. (*Université de Lomé, Togo; kpwala75@yahoo.fr*), Zhang, C. (*Beijing Forestry University, China; zcy_0520@163.com*), Batawila, K. (*Université de Lomé, Togo; batawilakomlan@yahoo.com*), Zhao, X. (*Beijing Forestry University, China; bfuz@163.com*), Akpagana, K. (*Université de Lomé, Togo; koffi2100@gmail.com*).

Research was conducted to determine available biomass in a riparian ecosystem in the Sudanian area of northern Togo by analyzing land cover types and estimating biomass productivity of vegetation on the site. Diameter and height of trees of DBH ≥10 cm in rectangular 500-m^2 plots located adjacent to rivers were recorded. An allometric equation was used to compute aboveground and belowground biomass. Landsat ETM+ imagery was then used to assess the major land cover types, and net primary productivity (NPP) was calculated. Across the 5.4 ha sampled, total biomass density was 196.77 metric tons/ha. Tree species such as *Daniellia oliveri* contribute much of the total biomass. Four major land cover types (permanent woody vegetation, fallows-farmlands, barren land, and permanent moist areas) were defined. The NPP for the investigated site was estimated at $8.99x10^9$±11 738.13 g C/m^2/yr, and the map of NPP distribution matches well with the land cover map. This research could be useful for researchers, planners, and administrators within the clean development mechanism (CDM) framework.

Random forests and stochastic gradient boosting for predicting tree canopy cover: comparing tuning processes and model performance. Freeman, E., Moisen, G., Coulston, J., Wilson, B. (*U.S. Forest Service, USA; eafreeman@fs.fed.us, gmoisen@fs.fed.us*), *jcoulston@fs.fed.us; barrywilson@fs.fed.us*).

Random forests (RF) and stochastic gradient boosting (SGB), both involving an ensemble of classification and regression trees, are compared for modeling tree canopy cover for the 2011 National Land Cover Database (NLCD). The objectives of this study were twofold. First, sensitivity of RF and SGB to choices in tuning parameters was explored. Second, performance of the two final models was compared by assessing the importance of, and interaction between, predictor variables, the global accuracy metrics derived from an independent test set, and the visual quality of the resultant maps of tree canopy cover. Examination of relative variable importance elucidated the differences in how RF and SGB make use of correlated predictor variables. SGB had a tendency to concentrate variable importance in fewer variables, whereas RF tended to spread importance out amongst more variables. The predictive accuracy of RF and SGB was remarkably similar on all four of the pilot regions, by all the accuracy measures examined. RF is simpler to implement than SGB, as RF both has fewer parameters needing tuning, and also was less sensitive to these parameters.

Small-area estimation of forest attributes within fire boundaries. Frescino, T., Moisen, G. (*U.S. Forest Service, USA; tfrescino@fs.fed.us; gmoisen@fs.fed.us*), Adachi, K., Breidt, J. (*Colorado State University, USA; kristenkadachi@gmail.com; jbreidt@stat.colostate.edu*).

Wildfires are gaining more attention every year as they burn more frequently, more intensely, and across larger landscapes. Generating timely estimates of forest resources within fire perimeters is important for land managers to quickly determine the impact of fires on U.S. forests. The U.S. Forest Service's Forest Inventory and Analysis (FIA) program needs tools to produce these estimates in a timely matter. Small-area estimation methods were recently developed and applied to previous wildfires in Colorado. This paper illustrates how these methods were assimilated into an automated R-based programming environment, FIESTA, to produce estimates of forest resources affected by a specified fire perimeter. This small-area estimation approach uses a modified composite estimator, which is a weighted average of two estimators: a synthetic estimator built from model-based predictions, and a direct estimator built from the FIA plot data that fall within the small area. The synthetic estimator is generated from FIA sample data and Landsat geospatial layers (www.landfire.gov) that fall within a larger area encompassing the small area, delineated by the Forest Service EcoMap Subsections.

Austrian forest biodiversity index (AFBI) – concept and results. Geburek, T., Richard, B., Michael, E., Frank, G., Hauk, E., Liebmann, S., Neumann, M., Starlinger, F. (*Federal Research Centre for Forests, Austria; thomas.geburek@bfw.gv.at; richard.buechsenmacher@bfw.gv.at*), *michael.englisch@bfw.gv.at georg.frank@bfw.gv.at; elmar.hauk@bfw.gv.at; sylvia.liebmann@bfw.gv.at; markus.neumann@bfw.gv.at; franz.starlinger@bfw.gv.at*).

Forest biodiversity cannot be measured and monitored directly. Indicators referring to different biodiversity levels (genes, species, ecosystems) are needed to tackle this task. In addition, indicators must provide an appropriate basis for tangible goals in forest and environmental policy. In this paper a single aggregated measure is proposed: the Austrian forest biodiversity index (AFBI). This index is composed of different indicators that are weighted depending on their putative significance for the maintenance of forest species richness and genetic diversity. The AFBI consists of nine state and four response indicators. Selection of state indicators was based on the general hypothesis that forests which mimic natural conditions or are characterized by structural elements of old-growth forests maintain a high number of forest-dependent species and a high genetic richness therein. Among the response indicators, the establishment of natural forest reserves and of genetic reserve forests, and utilization of seed stands and seed orchards were considered the most relevant. Each indicator is referenced and the sum of all weighted indicator measures is rescaled as a total score that may vary from 0 to 100, so that the AFBI is simple to communicate and straightforward to apply. Data of the AFBI are presented and discussed.