



PINEMAP

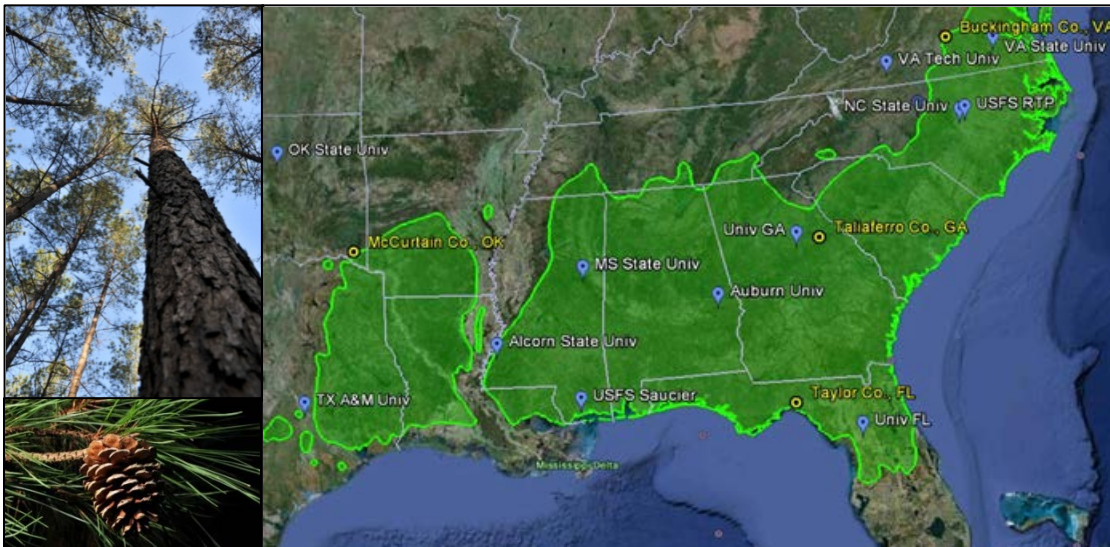
Mapping the future of southern pine management in a changing world

Year 1 Annual Report Executive Summary

Pine Integrated Network: Education, Mitigation, and Adaptation Project (PINEMAP) is one of three Coordinated Agricultural Projects awarded in 2011 by the USDA National Institute of Food and Agriculture. PINEMAP focuses on the 20 million acres of planted pine forests managed by private landowners in the Atlantic and Gulf coastal states from Virginia to Texas, plus Arkansas and Oklahoma. These forests provide critical economic and ecological services to U.S. citizens. Southeastern forests contain 1/3 of contiguous U.S. forest carbon and form the backbone of an industry that supplies 16% of global industrial wood, 5.5% of the jobs, and 7.5% of the industrial economic activity of the region.

PINEMAP's overall goal is to create, synthesize, and disseminate knowledge that enables southern pine landowners to

- manage forests to increase carbon sequestration by 15% by 2030;
- increase the efficiency of nitrogen and other fertilizer inputs by 10% by 2030;
- adapt forest management approaches and plant improved tree varieties to increase forest resilience and sustainability under variable climates.



Loblolly pine (*Pinus taeda*)
Photos courtesy of John Seiler

The shaded area depicts the native range of loblolly pine; tags show collaborating institutions and circles show locations of manipulative field experiments to examine the interaction of soil nutrient and water availability. Remote sensing image from Google Earth; range map from USDA Forest Service.

An unprecedented team of over 50 scientists, educators, and Extension professionals from eleven southeastern land grant universities and the USDA Forest Service work together in six disciplinary groups to achieve these outcomes by integrating research, extension, and education activities.

- The ecosystem ecology / silviculture team is implementing a regionwide monitoring network to evaluate the effects of climate, soils, and management approaches on carbon sequestration rates of planted pine. The team installed four large manipulative field experiments along the edges of the native range of loblolly pine to subject the species to environmental conditions that may occur in the future. The team also selected sites from existing research trials to provide regional baseline data on carbon, water, and nutrient storage rates as well as responses to climate and management. The TerraC terrestrial carbon information system was developed to archive and serve spatially-explicit PINEMAP datasets.

- The modeling team is applying a multi-scaled modeling program incorporating monitoring network data with spatially-explicit historical and predicted future climate data to assess alternative forest management approaches and the impacts on carbon sequestration and resilience to disturbance. The team established a standardized set of models and climate datasets and conducted initial regional-scale assessments to guide future analyses.
- The genetics team is developing guidelines to help growers understand where to plant specific southern pine seed sources given future climate scenarios and identify genes controlling traits such as growth, nitrogen responsiveness, cold hardiness, water usage, and resistance to southern pine beetle and fungal diseases. Analyses of weather and climate response of over 500 loblolly pine families in studies across the region are underway. The team has initiated a comprehensive assessment of current genotyping techniques.
- The economics and policy team is analyzing life-cycle carbon balance of regional forest management systems and conducting multi-scale analyses of market and non-market forest benefits and services under future management and climatic conditions. In year 1, the team completed key regional analyses of pine productivity responses to future climate scenarios and assessed optimal harvesting regimes for varying hurricane risk.
- The education team is creating resources and programs to educate high school students and teachers as well as university students about the relevance of forests, forest management, and climate impacts. The PINEMAP education program also engages university students in collaborative, interdisciplinary research aimed at solving complex societal problems. In year 1, the team launched a regionwide undergraduate internship program; coordinated a distance graduate education course to prepare students to address climate change mitigation and adaptation issues in southern pine forests; and partnered with the national Project Learning Tree education network to develop a module for high school students on southern pine forests and climate change.
- The extension team is disseminating emerging knowledge, practices, and PINEMAP decision support tools to enable corporate and non-corporate landowners to increase forest carbon sequestration, nitrogen fertilizer efficiency, and forest resilience under changing climate. The team has implemented a comprehensive audience assessment program, including a survey assessing climate change perceptions of over 4,000 Extension professionals across the region. Integrating efforts with state climatologists and Extension foresters has been a key focus.

PINEMAP is coordinated by the University of Florida; project collaborators include the following:

- eight regional university-corporate-governmental research cooperatives whose members manage 55% of the privately owned planted southern pine forestland and produce 95% of the pine seedlings planted each year;
- over 50 scientists at 11 land grant universities, including three 1890s institutions;
- the USDA Forest Service;
- the Southern Regional Extension Forester and associated Extension professionals;
- secondary school educators and the national Project Learning Tree network;
- state climate offices and the multi-state Southeast Climate Consortium.