

Mapping the future of
southern pine management
in a changing world
www.PINEMAP.org

PINEMAP

Pine Integrated Network: Education, Mitigation, and Adaptation Project

PINEMAP is one of three Climate Change Coordinated Agricultural Projects funded in 2011 by the USDA National Institute of Food and Agriculture. PINEMAP focuses on the 25 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 all regional jobs, and 7.5% of regional industrial economic activity.

PINEMAP'S OVERALL GOAL is to create, synthesize, and disseminate knowledge that enables southern pine landowners to:

- manage forests to increase carbon uptake and storage (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.

PINEMAP Partnerships and Networks

A key element of PINEMAP's success is the ability to leverage and expand successful existing networks, including:

- **The Southeast Climate Consortium** uses advances in climate sciences to provide scientifically sound information and decision support tools for forests and other ecosystems in the southeastern United States.
- **Southern Regional Extension Forestry** is working with the PINEMAP Extension team to disseminate knowledge, practices, and decision support tools to enable corporate and noncorporate landowners to increase forest carbon sequestration and forest resilience.
- **Project Learning Tree®**, a national environmental education program, is partnering with PINEMAP to implement a new module on climate change and forests for high school science teachers.
- **University-Corporate-Governmental Forestry Research Cooperatives** share research data with PINEMAP to establish regional carbon, nutrient, and water baselines. These partnerships enable PINEMAP to translate research results into practical applications for industrial land managers.
 - Cooperative Forest Genetics Research Program
 - Forest Biology Research Cooperative
 - Forest Modeling Research Cooperative
 - Forest Productivity Cooperative
 - North Carolina State University Cooperative Tree Improvement Program
 - Plantation Management Research Cooperative
 - Southern Forest Resource Assessment Consortium
 - Western Gulf Forest Tree Improvement Program

PINEMAP Team

58 principal investigators,
25 research and technical
staff, 10 postdoctoral research
associates, and 51 graduate
students associated with:



FOR ADDITIONAL INFORMATION visit www.pinemap.org or contact Dr. Timothy A. Martin (tamartin@ufl.edu) or Grace Crummer (gracec@ufl.edu).



Outcome Themes

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PINEMAP works toward its goals through integrated research, education and Extension programs in these areas:



Increased carbon (C) sequestration from silvicultural and genetic enhancement of productivity and efficiency of fertilizer use, and resilience to climate variability and disturbance. Planted southern pine forests already mitigate climate change by taking up and storing enormous amounts of atmospheric CO₂ in trees, soil, and long-lived wood products. PINEMAP produces the knowledge necessary to quantify, predict, and increase CO₂ sequestration.

- Three-tiered monitoring network quantifying productivity, carbon, and nutrient pools on hundreds of regionwide experimental plots in pine forests across 11 states
- Regionwide, fine-scale projections of pine forest carbon sequestration, productivity, and timber supply under future climate scenarios using newly-developed or enhanced statistical growth and yield, process-based, and bioeconomic models, driven by state-of-the-art downscaled climate projections
- Full life cycle assessment of carbon sequestration associated with production and use of wood products from southern pine systems
- Analysis of genetic variation relative to climate adaptation and productivity traits to accelerate breeding of future generations and improve deployment decisions



A more robust and resilient forest-based economy in the Southeast U.S. PINEMAP research enables pine landowners in the Southeast U.S. to continue providing economic and ecological services that benefit society.

- Multi-scale analyses of tradeoffs, costs, and benefits associated with forest management under future climate conditions
- Southern pine decision support system (DSS) providing tools for capitalizing on opportunities and mitigating risk associated with projected future climate including downscaled climate projection maps; seed deployment tool; interactive productivity maps; and risk assessment tools



Enhanced connections between corporate and noncorporate forest landowners and forestry and climate researchers and education and outreach professionals. PINEMAP strives to both strengthen existing and build new connections to forest managers to rapidly translate science into beneficial outcomes.

- Outreach to corporate landowners who manage >20 million acres of planted pine and produce >95% of seedlings planted
- Workshops and other outreach to non-corporate landowners and foresters who manage >5 million acres of planted pine
- Regionwide surveys of Extension professionals' and foresters' perceptions about climate change
- Comprehensive assessments of climate-related research and technology transfer needs of Southeast U.S. forest managers



Enhanced capacity for regional, interdisciplinary collaboration among climate and forest scientists and Extension and education professionals. PINEMAP's unprecedented coalition of more than 130 forestry researchers, educators, Extension professionals, and students has built new networks and infrastructure for innovative outcome-based science.

- Coordinated and standardized field ecology measurements across >120 locations from Virginia to Texas
- Meaningful engagement of research and Extension professionals in the production and delivery of PINEMAP educational research
- Climate change workshop series for 1890 Land Grant Universities
- Social Network Analyses documenting changes in relationships among project collaborators through time
- The first Southern Region Extension Climate Academy offered training and ongoing support to 90 agents and specialists across the South



Public policy that supports sustainable management of planted pine under future climate scenarios. PINEMAP's biophysical and human dimensions research provides information critical for guiding the development of rational natural resource policy.

- Multi-scale modeling and analysis of climate change and management impacts on forest economic values, and tradeoffs/synergies between wood products and ecosystem services
- Impacts of feasible land management and policy alternatives on environmental and economic sustainability of Southeast U.S. forests
- Stand- to regional-scale economic impacts of climate change-forced disturbance risks (e.g., wildfires, southern pine beetle, and hurricanes) and the role of adaptation in risk mitigation



Engaged and literate public with the capacity to make informed, practical decisions related to climate, forest ecosystems, and forest management. PINEMAP's education programs are designed to help nonscientists better understand and grapple with the complex issues surrounding climate and forest management.

- 14 engaging activities developed, reviewed by researchers, and pilot tested by teachers across the region; a 250-page module and supplemental materials are available on the web
- A common distance education course involving 41 graduate students from 10 universities integrating interdisciplinary science research with Extension
- 29 undergraduate fellows engaged in summer research projects with PINEMAP graduate students, then designed and delivered experiential science lessons to >3,500 middle schoolers



United States Department of Agriculture National Institute of Food and Agriculture

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