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Application of New Statistical Method Shows Promise in Mitigating Climate Change Effects on Critical Pine Plantations in Southern US

ALEXANDRIA, Virginia (April 20, 2017) – Confronting evidence that the global climate is changing rapidly relative to historical trends, researchers at North Carolina State University have developed a new statistical model that, when applied to the loblolly pine tree populations in the southeastern United States, will benefit forest landowners and the forest industry in future decades. The research, titled "Optimal Seed Deployment Under Climate Change Using Spatial Models: Application to Loblolly Pine in the Southeastern US" appears in the *Journal of The American Statistical Association*.

"In the past, statistical approaches that were used to help guide forest management decisions like strategic seedling planting had limitations," note the authors. "Our proposed model, which is based on future climate change scenarios, produces more accurate predictions than previous methods. As a result, it can be used as a quantitative tool for designing forest management strategies that mitigate the negative impacts of climate change."

The findings are the result of the Cooperative Tree Improvement Program, a joint effort between NC State's Department of Forestry and Natural Resources and Department of Statistics, in which NC State and its members carried out breeding of loblolly pine families and established a large number of field trials in approximately 25 locations across the southern U.S. in the early 1990s.

Stress to the loblolly pine plantations in the southern U.S. from projected temperature increases and likely precipitation decreases due to climate change could have significant economic and environmental impacts. The optimal seed sources that have been planted for decades will no longer be the optimal seed sources to plant today or in the future. The authors suggest an optimal assisted migration of loblolly pine seed sources from southern and warmer regions to northern and colder areas in the southeastern U.S. to mitigate adverse climate change effect.

Loblolly pine is the most important commercial pine species in the U.S. More than 39 million acres of pine plantations span the South, and about 1 million acres are planted every year by small landowners and forestry companies. Timber market models forecast overall production in the U.S. will increase by one-third leading up to 2040, and nearly all this growth will come from the South, which currently produces more timber than any country in the world. In addition to the financial benefits to landowners, loblolly pine plantations provide clean water and habitat for countless species in the region.

The research was conducted by Alfredo Farjat, department of biostatistics and bioinformatics, Duke University School of Medicine; Brian J. Reich, department of statistics, NC State; Joseph Guinness, department of statistics, NC State; Ross Whetten, department of forestry and environmental resources, NC State; Steven McKeand, department of forestry and environmental resources; and Fikret Isik, department of forestry and environmental resources, NC State, with support from the U.S. Department of Agriculture.

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