

Climate Change Increases Risk of Plant Invasion in the Eastern United States

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Abstract

Invasive plant species threaten native ecosystems, natural resources, and managed lands worldwide. Climate change may increase risk from invasive plant species as favorable climate conditions allow invaders to expand into new ranges. Here, we use bioclimatic envelope modeling to assess current climatic habitat, or lands climatically suitable for invasion, for three of the most dominant and aggressive invasive plants in the southeast United States: kudzu (*Pueraria lobata*), privet (*Ligustrum sinense*; *L. vulgare*), and cogongrass (*Imperata cylindrica*). We define climatic habitat using both the Maxent and Mahalanobis distance methodologies, and we define the best climatic predictors based on variables that best ‘constrain’ species distributions and variables that ‘release’ the most land area if excluded. We then use an ensemble of 12 atmosphere-ocean general circulation models (AOGCMs) to project changes in climatic habitat for the three invasive species by 2100. The combined methodologies, predictors, and models produce a robust assessment of invasion risk inclusive of many of the approaches typically used individually to assess climate change impacts. Current invasion risk is widespread in southeastern states for all three species, although cogongrass invasion risk is more restricted to the Gulf Coast. Climate change is likely to enable all three species to greatly expand their ranges. Risk from privet and kudzu expands north into Ohio, Pennsylvania, New York, and New England states by 2100. Risk from cogongrass expands as far north as Kentucky and Virginia. The majority of currently invaded lands remain climatically suitable for invasion in 2100, creating minimal opportunities for restoration. Heightened surveillance and prompt eradication of small pockets of invasion in northern states should be a management priority.