

US FORESTS ARE SHOWING INCREASED RATES OF DECLINE IN RESPONSE TO A CHANGING CLIMATE

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Abstract—How vulnerable are US forest to a changing climate? We answer this question using Landsat time series data and a unique interpretation approach, TimeSync, a plot-based Landsat visualization and data collection tool. Original analyses were based on a stratified two-stage cluster sample design that included interpretation of 3858 forested plots. From these data, we derived annual plot-based estimates (with uncertainties) of rates of forest decline from 1985-2012. Noted was a dramatic national-level increase in rates from the mid-90s (<1% of total forest per year) to 2000 (nearly 3% per year), with these elevated rates persisting for most of the past decade. Although forest decline was observed in eastern forests, the overwhelming proportion was in western forests, where rates reached as high as 8% per year. Increases in observed rates of decline exhibited a strong statistical relationship with the coupling of increasing summertime temperatures and decreasing precipitation beginning in the mid-90s. Using a statistical model, we developed a predictive relationship between forest decline and climate that allowed us to project the likelihood of forest decline forward to 2100 using expected climate projections. This analysis revealed that, even under reduced carbon emission scenarios, US forests are likely to be increasingly vulnerable to climate change. We are currently collecting more TimeSync interpretations (~10,000) and developing improved modeling strategies, and will present results from this more recent analysis.

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