“Linking definitions, mechanisms, and modeling of drought-induced tree death”

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Commentary: This article takes a multidisciplinary look at tree mortality from drought and heat stress. It provides a set of theories and hypotheses about how trees die, how they recover, and how we might use mathematical and computer models to predict when and where forests will be vulnerable to climate change.

Abstract: Tree death from drought and heat stress is a critical and uncertain component in forest ecosystem responses to a changing climate. Recent research has illuminated how tree mortality is a complex cascade of changes involving interconnected plant systems over multiple timescales. Explicit consideration of the definitions, dynamics, and temporal and biological scales of tree mortality research can guide experimental and modeling approaches. In this review, we draw on the medical literature concerning human death to propose a water resource-based approach to tree mortality that considers the tree as a complex organism with a distinct growth strategy. This approach provides insight into mortality mechanisms at the tree and landscape scales and presents promising avenues into modeling tree death from drought and temperature stress.

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