Predicting drought impacts on forests: mechanisms, approaches and current challenges

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Hotter and drier conditions under ongoing climate change are altering forest dynamics worldwide, frequently inducing events of forest mortality. These mortality events have profound implications for the carbon and water balances of ecosystems, from the plot to the global scale. However, their prediction remains a substantial research challenge, even if the mechanisms involved are relatively well understood.

I will discuss this apparent paradox highlighting the limitations of current trait-based approaches and providing ways forward in terms of better accounting for the scale- and context-dependency of trait effects and highlighting more holistic approaches that take advantage of enhanced forest monitoring schemes through continuous, on-site measurements and remote sensing.

My main area of research is forest functional ecology, at the interface between plant biology and Earth sciences. Work combines different scales and approaches (observational, experimental, modelling, big data approaches using large datasets) to understand how forests function and how they, and the contributions they provide to society, are affected by environmental changes. In particular, my current research focuses on (1) understanding fundamental aspects of the water and carbon economy of plants, with a focus on long-distance water transport; (2) characterizing how plant functional traits vary and coordinate in space and time and how they can be integrated to define synthetic axes of plant resource use; and (3) improving our capacity to predict how warmer and drier climates will change forest function and dynamics.

Dept Life Science Systems

Winter term 2025/26

Monday, 24.11.2025, 16:15–17:00

Zoom Meeting: https://tum-conf.zoom-x.de/j/69079483987?pwd=elJ6bStBbXo0RHQ4aUJjVGlqRVpLdz09

Meeting-ID: 690 7948 3987; Kenncode: 021482

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