iFAST: The International Forum on Advanced Environmental Sciences and Technology

A series of distinguished seminars by eminent scientists

8 a.m. CST; 9 a.m. EST; 2 p.m. GMT; 10 p.m. Beijing

Wednesday, Nov. 25, 2020

James S. Clark

Duke University

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James S. Clark is a distinguished professor of biology, environmental science, and statistical science at Duke University. His lab uses long-term experiments and monitoring studies to understand disturbance and climate controls on ecosystem dynamics. He currently leads the international effort, Masting Inference and Forecasting, to understand the changes in forest recruitment happening now, why they are occurring, and their effects on food webs. Professor Clark is a member of the National Academy of Sciences and of the American Academy of Arts and Sciences. He is a Fellow of the Ecological Society of America, an ESA Aldo Leopold Leadership Fellow and a Lauréat of Emmanuel Macron's Make Our Planet Great Again. He is a recipient of the Presidential Faculty Fellow Award, the William Skinner Cooper Award from ESA, the George Mercer Award and the Humboldt Research Prize.

Continent-wide change driven by indirect climate effects on fecundity

The composition and structure of 21st-century forests will depend on the seed production needed for tree populations to keep pace with climate change. North America is warming and drying out in much of the West. The dramatic impacts include large-scale die-backs that are transforming size-species structure. But the decade-scale trends will depend on the regeneration that follows tree death. Fecundity will determine the capacity of trees to disperse seed to the shifting habitats where they can survive in the future; risks to each species depend not only on the current distribution of fecundity, but also on its trajectory. As with many ecological processes, noisy, spatially variable fecundity trends are hard to quantify, but this is only the first problem. Attribution of trends to environmental variables is complicated by individual size, growth, and resource access. Conservation efforts must anticipate not just the direct climate effects on this trajectory, but also the indirect effects as climate affects growth and changing size structure. Because it has thus far been impossible to estimate at continental scales, fecundity is the only major demographic process that lacks field-based estimates in models of vegetation change. To address these challenges, we built the continental Masting Inference and Forecasting (MASTIF) network of primary data, and we developed trend attribution to quantify climate impacts, as modulated by the condition of the organisms themselves. Application to the MASTIF network shows that indirect effects dominate, operating through stand structure and growth. I discuss emerging insights from individual-scale processes such as demographic changes, to community consequences for mast-consuming wildlife, to global climate and soil controls on forest migration and resilience.

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Organizing Committee Chair: Jizhong Zhou (University of Oklahoma, USA; https://www.ou.edu/ieg)
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