## A good hypothesis is a matter of scale

Graduate students at the University of North Carolina at Chapel Hill used data from over 52,000 forested locations in the eastern U.S. to show that there is no regional level support for a widely held ecological hypothesis. The hypothesis, termed the stress-dominance hypothesis, posits that as the physical environment becomes less stressful, the presence of different species at a particular location should shift from being determined by the environmental stressor to being determined by competition. The researchers tested this hypothesis using two large forest datasets from the eastern U.S., combined with information about tree physiological traits and phylogenetic relationships. Although trees in different environments had different traits, there was no evidence for the predictions of the hypothesis. The researchers concluded that while the stress-dominance hypothesis may operate at smaller spatial scales, it is not generally applicable across larger regions.

The research project developed from a National Science Foundation distributed graduate seminar aimed to encourage biodiversity research that extended beyond traditional metrics, such as species counts. It enabled graduate students studying ecology at UNC and thirteen other universities to learn the challenges and opportunities of combining traditional biodiversity research with functional, phylogenetic, and genetic diversity data. The inter-institutional and collaborative nature of the seminar allowed the UNC team to learn from their peers around the world while developing the hypotheses and statistical techniques used in the study.

Their results highlight the difficulties that ecologists face in finding general laws and theories for ecological communities. It also demonstrates the promise these non-traditional dimensions of biodiversity have for yielding ecological insight. For example, the stress-dominance hypothesis would suggest that in regions where the climate is warming, competition between trees could become more intense, ultimately changing the functional landscape of forests. Yet the findings from this study suggest that forest responses to global change will be much more idiosyncratic, and predicting them will require detailed knowledge of individual forest communities.