

Diversity is key to stability, grassland study finds

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Biological diversity brings beauty and variety to our lives and to the world around us. It also could be the key to keeping ecosystems strong, according to a new University of Minnesota study published April 17 in the journal *Science*.

The study, led by Yann Hautier a Marie Curie Fellow associated with the College of Biological Sciences at the University of Minnesota and with the University of Oxford, U.K., looked at 28 years' worth of data on plant growth, number of species, ecosystem stability and exposure to changes in nitrogen, carbon dioxide, fire, grazing and water collected from experimental grassland plots at Cedar Creek Ecosystem Science Reserve near East Bethel as part of other studies. It found that all of the human-induced changes affected the productivity of the grassland plots, but only those that reduced biodiversity reduced ecosystem stability.

"Basically, we found that any driver of environmental change that will cause a loss of plant diversity will in turn reduce the stable production of plant biomass through time," Hautier said. "Biodiversity is somehow a special case, because it's not only a cause of changes in [ecosystems](#) but also a response to other changes."

The study is unusual because it looks at several factors that affect [ecosystem stability](#) at the same time over a long period in a setting that kept other potential variables constant. It is important because understanding the cause-and-effect cascade of changes to ecosystems is key to anticipating impacts of human actions and minimizing damage to

natural systems that undergird our planet's ability to support human life.

"The main message is that if we want to continue to benefit from the services that our ecosystems are providing, we should be very careful about preserving biodiversity," Hautier said.

Study co-author Forest Isbell, who was recently appointed associate director of Cedar Creek, underscored the importance of the research site in making the study possible. "Few, if any, natural ecosystems worldwide have been more thoroughly investigated than those at Cedar Creek Ecosystem Science Reserve," Isbell said. "Ecologists from around the world, such as Yann Hautier, are perpetually drawn to Cedar Creek and inspired to make new discoveries that transform our understanding of nature."

Based on the results, Hautier is now expanding his research to explore whether the decline in diversity affects natural grasslands' ability to provide multiple ecological benefits simultaneously. That work will take place through the Nutrient Network, an international collaboration coordinated by CBS faculty and study co-authors Eric Seabloom and Elizabeth Borer that makes it possible to conduct research on a variety of [grassland ecosystems](#) around the world at the same time.

"Because of Cedar Creek and the Nutrient Network, the University of Minnesota is uniquely positioned to contribute to understanding long-term, multi-continent problems," Borer said. "By providing new insights into the functioning and future of global environments, we hope such studies will help us keep ecosystems healthy in a fast-changing world."

More information: "Anthropogenic environmental changes affect ecosystem stability via biodiversity," *Science*.
www.sciencemag.org/lookup/doi/.../1126/science.aaa1788

Provided by University of Minnesota

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