

Scientists challenge current theories about natural habitats and species diversity

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Preserving biodiversity: A typical tropical rainforest scene in Daintree National Park, Queensland, Australia. Credit: Wikimedia Commons

(Phys.org)—How can a square meter of meadow contain tens of species of plants? And what factors determine the number of species that live in an ecosystem? *Science* journal has defined this as one of the [25 most important](#) unresolved questions in science, both for its importance in understanding nature and due to the value of natural ecosystems for mankind. The value of goods and services provided by natural ecosystems is estimated to exceed the GDP of our planet.

For over 50 years, conventional ecological theories have predicted that the number of species that can coexist in a given area increases with the heterogeneity of the environmental conditions in the habitat. This premise was examined in a study conducted by research students Omri

Allouche and Michael Kalyuzhny, guided by Prof. Ronen Kadmon from the Alexander Silberman Institute of Life Sciences at the Hebrew University of Jerusalem, in collaboration with Prof. Gregorio Moreno-Rueda and Prof. Manuel Pizarro from Universidad de Granada.

The researchers claim that in a heterogeneous environment—where there are many different types of habitats—there are fewer resources and less suitable area available to each species, making them more vulnerable to local extinction. This leads to the hypothesis that excessive habitat heterogeneity may actually reduce the number of species.

This hypothesis was examined using mathematical models and [empirical analyses](#) of [natural ecosystems](#). Its predictions were examined with a meta-analysis of tens of datasets of plant and animal species from various localities worldwide.

Both the theoretical results and the data analyses supported the researchers' hypothesis that habitat heterogeneity may increase the rate of [species extinctions](#) and therefore reduce the number of species that inhabit the ecosystem.

These findings are very important for the conservation of biodiversity, since the current practice is to conserve areas of maximal habitat heterogeneity and even to take measures to increase habitat [heterogeneity](#). The study shows that this conventional approach may lead to negative results, especially in the case of landscapes of limited size, which is typical of nature reserves.

Ecosystems and the [species](#) they consist of are under increasing pressure of human activity. In these conditions, skillful and intelligent management of natural landscapes is vital. This study provides scientists and policy makers with important insights for the selection and management of areas for conservation.

The study, [Area–heterogeneity tradeoff and the diversity of ecological communities](#), was published in the *Proceedings of the National Academy of Science*. It was funded by the Israel Science Foundation and by Israel's Ministry of Science and Technology.

Provided by Hebrew University of Jerusalem

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