

A new model for understanding biodiversity

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Photo: Pawel Ryszawa (Wikimedia Commons)

(PhysOrg.com) -- Animals like foxes and raccoons are highly adaptable. They move around and eat everything from insects to eggs. They and other "generalist feeders" like them may also be crucial to sustaining biological diversity, according to a new study published in the *Proceedings of the National Academy of Sciences (PNAS)*.

McGill biology researchers have developed a unified, spatially based understanding of biodiversity that takes into account the complex [food webs](#) of predators and prey. "Biodiversity exists within a landscape. Predators and prey are continuously on the move as their habitats change – it's a complex dynamic system," says lead author Pradeep Pillai, a doctoral candidate at McGill.

Previous theories of biodiversity have either concentrated on the

complex network of feeding interactions that connects all species into food webs or have focused on the way that species are connected in space. "A unified theory of ecological diversity requires understanding how species interact both in space and time, and this is what is different about our work," explains co-author Michel Loreau, who holds the Canada Research Chair in Theoretical Community and Ecosystem Ecology.

What they discovered was that a "branching network" maintained by generalist species, like [foxes](#) or coyotes, that are able to move around and prey on different species in different locations, have an important role in promoting complex food webs and thereby in maintaining biodiversity. The researchers concluded that these generalist species have the advantage of being able to find prey no matter where they are as they move from one place to another, and this sustains the network.

This theory also lays a foundation for understanding the effects human activities – like deforestation – are likely to have not simply on a single species but on whole food webs. The researchers show how food webs are eroded by species extinction when disturbed by habitat destruction. "The theory is useful because it helps us understand how biodiversity is maintained, but also the impacts humans have when they disrupt ecological networks by destroying and fragmenting habitat," concludes co-author Andrew Gonzalez, Canada Research Chair in Biodiversity Science and Director of the Quebec Centre for [Biodiversity](#) Science.

More information: To read an abstract of the paper:
[www.eurekalert.org/pio/tipshee ... p/237/pnas.201106235](http://www.eurekalert.org/pio/tipshee...p/237/pnas.201106235)

Provided by McGill University

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