

Logging means ants, worms and other invertebrates lose rainforest dominance

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Carnivorous ants help keep herbivorous invertebrate numbers down. Credit: Rob Ewers

Invertebrates perform essential functions for the smooth running of the ecosystems in tropical forests. For example, creatures such as termites and millipedes help dead leaves decompose and release their nutrients back into the soil, and carnivorous ants and spiders act as predators of herbivorous invertebrates that would otherwise munch through all the foliage.

Nearly a half of all tropical rainforests worldwide have been logged, and this often causes heavy changes to the number and type of invertebrates, with many species being lost from the ecosystem.

New research led by biologists from Imperial College London, published in *Nature Communications*, has discovered that when invertebrate diversity declines, their vital functions can be carried out by other members of the ecosystem.

The result shows that rainforest ecosystems have a remarkable resilience to change. "Invertebrates are often thought of as the controllers of [tropical forests](#), so it's surprising that people can upset their dominance to this level," said lead author Dr Robert Ewers from the Department of Life Sciences at Imperial.

Although the ecosystem can continue to function with vertebrates taking more of a leading role, Dr Ewers says the situation leaves rainforests vulnerable: "The forest will keep maintaining itself, but it will be much more susceptible to further change. Relying on vertebrates is a bad tactic - they are less diverse and vulnerable to new challenges such as land use change."

For example, the switch to agricultural plots such as palm plantations would cause biodiversity to drop faster. "Knocking out one or two invertebrates might not be too bad, as there are many others to take their place, but knocking out one or two vertebrates could now be disastrous," said Dr Ewers.



Polyrhachis sp ant with prey. Ants like this keep invertebrate numbers down.
Credit: Tom Fayle

By excluding certain organisms from patches of both natural and logged [tropical rainforest](#) in Borneo, the team were able to determine their contribution to the ecosystem. They found that in logged forests, the essential activities were still carried out at approximately the same speed, but that invertebrates contributed much less.

For example, the overall rate of invertebrate predation in natural and logged rainforests was the same. However, invertebrates were responsible for only around 60 percent of the activity in logged forests, compared to nearly all of it in natural forests. Instead, birds and bats were responsible for preying on many more invertebrates in logged forests.

The same trend was seen for seed disturbance, a vital function that helps maintain tree diversity, which was taken up by small mammals such as mice and treeshrews.

The decomposition of leaf litter also seemed to be unaffected by the lack of [invertebrates](#), although this was not a function picked up by vertebrates. Instead, the researchers think the litter may have continued to decompose thanks to a changing microclimate or the activities of soil bacteria.

More information: "Logging cuts the functional importance of invertebrates in tropical rainforest" by Robert M. Ewers, Michael J.W. Boyle, Rosalind A. Gleave, Nichola S. Plowman, Suzan Benedick, Henry

Bernard, Tom R. Bishop, Effendi Y. Bakhtiar, Vun Khen Chey, Arthur Y.C. Chung, Richard G. Davies, David P. Edwards, Paul Eggleton, Tom M. Fayle, Stephen R. Hardwick, Rahman Homathevi, Roger L. Kitching, Min Sheng Khoo, Sarah H. Luke, Joshua J. Marc1, Reuben Nilus, Marion Pfeifer, Sri V. Rao, Adam C. Sharp, Jake L. Snaddon, Nigel E. Stork, Matthew J. Struebig, Oliver R. Wearn, Kalsum M. Yusah & Edgar C. Turner is published Monday 13 April 2015 in *Nature Communications*, [DOI: 10.1038/ncomms7836](https://doi.org/10.1038/ncomms7836)

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