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Restoration helps forests recover faster

The rainforests of Southeast Asia are among the fastest declining tropical ecosystems worldwide. Researchers from 13 institutions studied an area of tropical forest in Sabah, Malaysian Borneo that had suffered heavy logging in the 1980s but was subsequently protected from further deforestation or conversion to agricultural land.

This long-term study paid special attention to the forest's capacity to rebuild biomass. The researchers found that areas left to regenerate naturally recovered by as much as 2.9 tonnes of aboveground carbon per hectare per year. "This quantitatively confirms that if degraded forests get effective protection, they can recover well naturally," says Christopher Philipson, Senior Scientist at ETH Zurich's Chair of Ecosystem Management.

More importantly, the research team found that areas of forest that underwent active restoration recovered 50% faster, from 2.9 to 4.4 tonnes of aboveground carbon per hectare per year.

The research, published today in Science, has its origins in work that Professor Mark Cutler from University of Dundee carried out in Borneo almost 25 years ago. Cutler led the project with Professor David Burslem at the University of Aberdeen, and ETH Zurich's Christopher Philipson, first author of the paper, who carried out the research at ETH Zurich and Dundee.

Fostering damaged forest

Commercial, selective logging in Sabah has been going on for decades, and has severely degraded large areas of the forest estate. While Sabah retains over 50% natural forest cover (with almost half of this area being fully protected), relatively little of this forest is in pristine condition. Restoration -- particularly in heavily logged lowland forests -- is considered essential to maintain biodiversity, carbon sequestration, and other ecosystem services.

"This active restoration encourages naturally diverse forest, and is therefore much more beneficial for biodiversity than monocultures or plantation forests," stresses Philipson. The approach involves cutting lianas (climbing plants that thrive in degraded forests, competing with trees and reducing seedling survival and growth) as well as weeding, and 'enrichment planting' of seedlings. The latter seeks to increase the valuable, native tree species in degraded forests that have been reduced through commercial logging. "In this way, restoration helps previously over-used forests not only to recover carbon, but also to become ecologically sound and diverse again," Philipson says.

Carbon price doesn't cover the cost

Now, for the first time, a long time-series dataset has demonstrated that active restoration helps forests to regenerate after disturbances. However, the current price of carbon doesn't cover the cost of restoration, and this limits the impact that restoring forests could have as a means of mitigating climate change.

"The increase in forest regrowth from restoration coupled with average global restoration costs suggests carbon prices need to be much higher. If they were around US$40-80 per tonne CO2 in accordance with the 2016 Paris climate agreement, this would be an incentive to invest in restoration," argues Dundee's Professor Cutler. He sees protecting previously logged tropical forests

from further degradation or even clearance as vitally important for reducing carbon emissions and conserving biodiversity. "We must find sustainable mechanisms for funding."

Collaborative partnership on the ground

According to David Burslem, last author and Professor at the University of Aberdeen, scientists have known for some while that tropical forests can regenerate from logging if left undisturbed for long enough. But the extent of the reduction in recovery time achieved by simple low-tech restoration techniques certainly was a surprise. "We gained this insight through a sustained investment in research by a multi-national team over more than 20 years," Burslem says.

For this study, Philipson ventured to remote areas of forest to measure the growth and biomass accumulation of trees. His work and indeed the entire study actively involved many local staff, scientists and organisations, while the Sabah government guaranteed effective protection of the forest. "The people and community of Sabah made this project successful; I'm looking forward to seeing more endeavours like this that promote the protection and restoration of tropical forests," he says.

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