

New research suggests global reforestation efforts need to take the long view

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Joshua Slaughter (left) and Matthew Fagan discuss a map of forest patches in Costa Rica. Credit: Marlayna Demond '11 for UMBC.

Many countries have made commitments to restore huge areas of forest as part of the Bonn Challenge, organized by the International Union for Conservation of Nature. For example, Costa Rica has promised to preserve 1 million hectares (3,861 square miles) of forest by

2020—about 20 percent of the nation's total area. However, a new paper in *Conservation Letters* suggests that quickly reforesting large areas may not be the best strategy to yield many of the benefits forests can provide.

Forests store carbon, clean water, prevent soil erosion, and provide habitat for a wide range of species, "but all those benefits start kicking in when forests are older," says Matthew Fagan, assistant professor of geography and environmental systems at UMBC and second author on the paper. That's why the new paper's findings were alarming: By analyzing a massive data set spanning 1947—2014, the authors found that in Costa Rica, 50 percent of secondary [forest](#) patches were re-cleared within 20 years, and 85 percent were re-cleared within 54 years.

A long-term commitment

"Young forests take something like 100 years to get to peak biodiversity, and as many as 80 years to store enough carbon to make a big difference," Fagan says. "A lot of these benefits accumulate over time, and they don't accrue linearly," he adds, so a 100-year-old forest is more than ten times as beneficial as a 10-year-old forest.

Committing to preserve a huge number of hectares of forest by 2020 might be appealing to a government trying to make a statement, but "for every 100 hectares restored in 2020, 20 years later they're going to have 50, and 50 years later they're only going to have 15," Fagan says.

Lead study author Leighton Reid, an assistant scientist at the Missouri Botanical Garden's Center for Conservation and Sustainable Development, says that he would prefer to see countries "commit to restore an area of 100-year-old forest by 2120." He added, "What I hope is that this research is going to lead to countries taking a more long-term view of their restoration commitments."

Green highways

The good news is that the study found certain types of forest patches were less likely to be re-cleared, particularly larger patches and those alongside rivers. That's critical, because as research partner Joshua Slaughter '22, computer engineering, explains, previous research has found that "patches just 30 feet across can serve as highways for rare endangered bird species to travel through the landscape." By teasing apart the relationships between external factors and the likelihood of a patch to persist, Slaughter hopes the team's work will inform new, targeted restoration policies.

"As long as these forests are being protected, it can help prevent extinction of endangered species," Slaughter says.

Taking a closer look

Overall, "all of our hopes and needs for secondary forests rely on them getting old, and what this study shows is that they aren't," Reid says. His main hope for this study is that it will lead to "people, and in particular, national governments, taking more seriously the problems of ensuring that restoration projects persist into the future."

"We want a world with more forests—where soil isn't eroding off hillsides, and where trees take carbon dioxide out of the air to help limit climate change. We want to see people drinking [clean water](#) and breathing clean air, and secondary forests are seen as a major way to get to that," Fagan says. "The tropics have been deforested for decades, and now they're starting to regrow. It's a really big positive story, but we need to take a closer look."

More information: J. Leighton Reid et al, The ephemerality of

secondary forests in southern Costa Rica, *Conservation Letters* (2018).
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