Article for the conversation

The ‘A list’ of tropical biodiversity conservation is topped by primary forests. They are the poster boys of tropical conservation, used to secure funding in much the same way as the next hot, young thing is used to sell a film. However, much like the real ‘A list’ primary forests are outnumbered by those considered less important. In Hollywood it’s character actors, in tropical conservation this place is filled by degraded forests. These degraded forests now make up about 60% of all forests as a result of clearance for farmland, logging and other human activities.

Previous studies have conclusively shown that primary tropical forests deserve to be poster boys. They consistently have higher conservation value than forests degraded by humans and store more carbon per acre. However, while not as celebrated as primary forests these degraded forests are important. Forests re-growing from agricultural clearance, called secondary forests, can help to soak up some of the carbon emissions we produce and may reduce the risk of extinction for some forest species.

However, not all secondary forests are equal. They differ in many ways, perhaps most importantly in age. And unlike in the venal world of celebrity, older=better. With this in mind my supervisors and I decided to investigate the recovery rates of carbon and plant biodiversity in these secondary forests after agricultural use stopped.

To do this we collated data from more than 600 sites throughout the tropics, most of which came from Central & South America.

Result from our study suggest that, on average, secondary forests appear to recover carbon more quickly than plant biodiversity. After about 80 years since last disturbance secondary forests contained approximately 85% of the carbon in undisturbed forests. The number of tree species increased rapidly recovering after 50 years, while the number of epiphyte species – plants that grow on trees – had still not recovered after 100 years.

Most worryingly the type of species in these secondary forests appears to be different from those found in primary forests – only about 25% of species found in primary forests were found in secondary forests on average. This should ring alarm bells for conservationists since these species are those most vulnerable to extinction since they tend to have small populations, to be found only in a small number of locations and be sensitive to deforestation.

These species probably aren’t found in secondary forests because their seeds rarely reach them. Secondary forests are often found in fragmented landscapes where clearing for farming has resulted in a patchwork of undisturbed forest, farmland and secondary forest. This farmland acts as a barrier to forest animals, such as birds, many of which will not fly across unforested land. Fruit and seed eating birds help disperse tropical tree species’ seeds and if they cannot reach these secondary forests they will lack species dispersed in this way.

Though carbon stored in trees recovered reasonably quickly it is likely that part of the reason secondary forests rarely reach the levels found in undisturbed forests is because of the lack of large, slow growing tree species. These species hold a disproportionately large amount of carbon, so it may be well over a century before secondary forests contain as much carbon as primary forests.

We think that one way to improve the biodiversity value of secondary forests may be to aid seed dispersal across these fragmented landscapes. The best way to do this may be to plant small ‘islands’ of trees throughout the wider farmland area to act as stepping stones to encourage movement of animals and seeds between different forest patches. This along with planting of seedlings into secondary forest patches may help plant biodiversity to recover.

It is vitally important that we recognise the benefits of conserving secondary forests and other degraded forests– they are not worthless, trash ecosystems. At the moment many are cleared for farmland or plantations after re-growing only for a few years so their benefits for conservation and carbon storage are rarely achieved. To accomplish the goal of reducing tropical species extinctions it is vital to reduce this clearance and incentivise more sustainable use of tropical forest landscapes.