

# Little helpers for the rainforest

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A black-fronted tamarin (*Leontocebus nigrifrons*) in the rainforest of Peru.  
Credit: Andrea Schell, German Primate Center, Germany

Tropical rainforests store large quantities of carbon dioxide, produce oxygen and provide habitats for many animal and plant species. If these

ecosystems, which are so important for the global climate and biodiversity, are destroyed, they will recover very slowly, if at all. Scientists from the German Primate Center (DPZ) - Leibniz Institute for Primate Research, the University Estadual Paulista, Brazil, and the University of Marburg have conducted a long-term study on the role monkeys play in the regeneration of degraded rainforests.

For over 20 years, they observed two tamarin species in the rainforest of Peru. These animals feed on fruits and void the seeds undigested with their faeces. The researchers have studied the dispersal and germination of seeds as well as the growth and genetic origin of various [plants](#) in a forest that had emerged from a former pasture. For the first time, they were able to prove that monkeys have a decisive influence on the dispersal of seeds from the original primary forest to the regenerating secondary forest (*Scientific Reports*).

The study was carried out in the Peruvian Amazon rainforest at the Estación Biológica Quebrada Blanco research station of the German Primate Center. Near the station there is an area of about four hectares which was cleared and used as pasture for water buffalo between 1990 and 2000. After the grazing was abandoned, rainforest slowly developed again. The researchers around Eckhard W. Heymann, scientist at the German Primate Center and head of the study, observed that moustached and black-fronted tamarins were temporarily in the early secondary forest.

Tamarins feed mainly on fruits and disperse the seeds of many different tropical trees and lianas over their faeces. "We wanted to find out whether the [seed](#) dispersal by monkeys has a demonstrable effect on the natural regeneration of forests," says Heymann.

To investigate which seeds were dispersed from the primary forest to the secondary forest, the researchers identified seeds from the monkeys'



faeces and observed their development in the secondary forest. Around ten per cent of these seeds stem from plants growing in the primary forest and were dispersed into the secondary forest. A part of these seeds germinated and the resulting seedlings survived for at least one year. These seedlings could be assigned to eight different [plant species](#). Seven of these species could only be found as adult plants in the nearby primary forest.



A secondary forest growing on a former water buffalo pasture. The regenerating forest consists of young, smaller trees and a dense herb layer, as more light reaches the ground. Credit: Eckhard W. Heymann, German Primate Center, Germany

In order to genetically verify the results, the scientists analyzed seedlings and young plants of the neotropical tree *Parkia panurensis*. The seeds of this tree are dispersed exclusively by tamarins in the area around the DPZ research station. The researchers extracted the DNA from leaves of seedlings and young plants growing in the secondary forest and compared the genotype with those of adult *Parkia* trees in the primary forest. Half of these seedlings and young plants could be matched to eleven parent trees in the primary forest. The distances between young and parent plants were exactly in the range over which the tamarins disperse *Parkia* seeds.

"Our data show for the first time that the moustached and black-fronted tamarins effectively disperse seeds from primary forest into secondary forest," says Heymann. "We were able to prove that the seeds germinate and form young plants, thus increasing the diversity of species in the secondary forest. The tamarins have been shown to contribute to the natural regeneration of areas destroyed by humans."

The study included data collected at the DPZ research station since 1994, but not initially against the background of the current issue. "At that time, we did not expect the cleared [forest](#) area to ever recover," emphasizes Heymann. "However, the study shows how important data collection and investigations over a very long period of time are in order to be able to make reliable statements about slowly developing ecological processes."

**More information:** Eckhard W. Heymann et al. Small Neotropical primates promote the natural regeneration of anthropogenically disturbed areas, *Scientific Reports* (2019). [DOI: 10.1038/s41598-019-46683-x](https://doi.org/10.1038/s41598-019-46683-x)

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