

These blue macaws help grow the forest around them, a new study finds

by Eduardo Franco Berton on 8 April 2020 | Translated by Matt Rinaldi

A new study has revealed how the hyacinth macaw (*Anodorhynchus hyacinthinus*) and Lear's macaw (*Anodorhynchus leari*) help spread the seeds of 18 plant species in Brazil and Bolivia.

Researchers used direct observation and camera traps to record more than 1,700 fruit dispersal events by the two macaw species.

The study's results challenge previously held views that the dispersal of large seeds was carried out by the now-extinct megafauna of the Pleistocene Epoch.

The hyacinth macaw, listed as vulnerable, and Lear's macaw, which is endangered, were also found to be effective seed dispersers, despite previously being thought to fully consume all the seeds they ate.

The hyacinth macaw (*Anodorhynchus hyacinthinus*) is the largest species of macaw and a dead ringer for the smaller Lear's macaw (*Anodorhynchus leari*). Both species have the strongest beaks in the Psittacidae family of true parrots, capable of easily breaking open the large fruits of different palm trees.

This gives them a starring role in dispersing the seeds of at least 18 plant species across their range, according to a study published in the journal *Diversity* in January. The study's authors, from five different institutions, carried out a dozen expeditions in the Caatinga, Cerrado and Pantanal biomes of Brazil and Bolivia, where they recorded a total of 1,722 seed dispersal events. They observed the macaws carrying the seeds distances of up to a mile (1.6 kilometers) from where they picked the fruit. Both macaw species even engaged in the unusual practice of tertiary dispersal, where they carried fruits to their nests that had previously been regurgitated by cattle.

The study's finding of symbiosis between the macaws and the plants they feed from was quite unexpected, the researchers say. Other macaw species only consume the pulp of palm fruits and discard the seeds, but the hyacinth and Lear's macaws are capable of breaking the hard shell that covers the fruits of different palms to get at the seeds that dominate their diet.

It was previously thought that by eating the seeds, these macaws didn't contribute to dispersing the plants. But the study shows a more nuanced relationship: "A functionally relevant proportion of the seeds is successfully employed in the macaws' dispersal events, as we show," it says.



Camera traps capture hyacinth macaws gathering palm fruit. Image by Doñana Biological Station, CSIC.

Camera traps

The researchers used a combination of direct observation and camera trap images of hyacinth and Lear's macaws foraging fruit and scattering seeds. They then used these findings to determine in detail the dispersal rates of the fruits of different palm species, such as *Acrocomia totai* (the grugru palm or macaúba) and *Attalea phalerata* (uricuri) in the Bolivian Pantanal, and *Attalea barreirensis* (catolé) and *Attalea eichleri* (babassu) in the Cerrado.

In the case of the Bolivian Pantanal, they were able to make direct observations in the San Matías Natural Area of Integrated Management (ANMI), one of the country's protected areas that's home to the hyacinth macaw.

In the Brazilian Cerrado, they had to use infrared cameras, since the *A. barreirensis* and *A. eichleri* palm species grow closer to the ground, making it difficult to observe foraging from a distance. They set up their cameras close to the ground, about 3 to 5 meters (10 to 16 feet) from the palm trees. The motion-activated cameras took instantaneous images every 5 seconds of the macaws gathering and spreading the fruits.

The study also looks into the key role that both endangered macaw species play in the dispersal of large seeds — a role that to date has been largely attributed to the now-extinct megafauna that inhabited South America during the Pleistocene Epoch that lasted from some 2.5 million to 12,000 years ago.

Study co-author Fernando Hiraldo, from the Spain-based Doñana Biological Station, said the findings clearly demonstrate that the hyacinth and Lear's macaws were responsible for spreading the large seeds once thought uniquely the domain of larger animals.

"And they do this in great distances, something very important for the genetic health of the dispersed plant," Hiraldo said. "It is amazing how they manage to transport more than one of these large fruits at large distances, whether in their mouths or their claws."

He said the study also highlights the success of this dispersal, observed through the countless plant germinations scattered beneath trees where the macaws took the fruit.

But an ongoing decline in the population of the two macaw species and the shrinking of their habitat may compromise the dispersal of large palm trees, the study warns. It emphasizes the need for plans to shore up both species, not just for their conservation, but also to restore their ecological functions in the threatened ecosystems they inhabit.

Conservation and threats

José Antonio Díaz-Luque, another study co-author and director of the Foundation for the Research and Conservation of Bolivian Parrots (CLB), said the "decline of these macaw populations ends up affecting the habitat, its structure and capacity for regeneration."

The hyacinth macaw is classified as vulnerable on the IUCN Red List, while Lear's macaw is considered endangered. Both species have experienced drastic population declines in recent decades and a reduction in their range. There are an estimated 6,500 hyacinth macaws left in the wild, scattered across isolated populations in the Pantanal, the Cerrado and the Amazon, with likely little to no genetic flow between them.

There are even fewer Lear's macaws, just around 1,200 in small, fragmented ranges of 50 km (30 mi) in radius, having once abounded across 845,000 km² (325,000 mi²) in the Caatinga.

The Caatinga has been heavily deforested by the expansion of livestock pasture, which has affected the regeneration of the licuri palm (*Syagrus coronata*), considered the main food source for Lear's macaw. Actions to conserve the macaw have thus centered on the regeneration and preservation of the licuri palm. The study indicates that the Pantanal and Cerrado are also suffering rapid deforestation as a result of the expansion of farmland and livestock pasture.

Motion-activated camera traps were used to observe macaws foraging on palm fruits and thus help calculate the dispersion rate of different species of palm seeds. Image by Doñana Biological Station, CSIC.

Banner image of hyacinth macaws feeding on the fruit of palm trees in the Brazilian Pantanal, by Eduardo Franco Berton.

Citation:

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