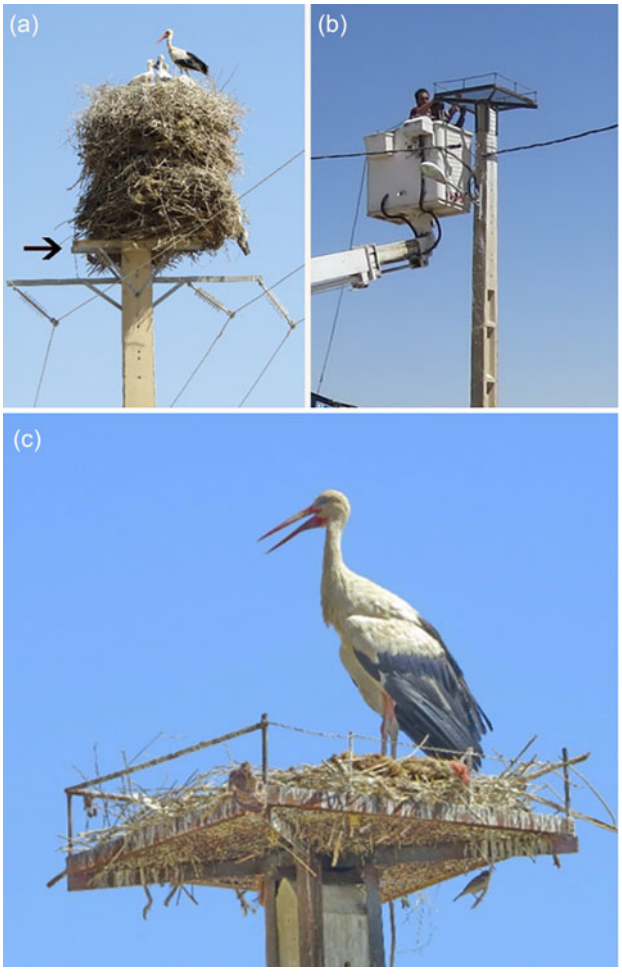
White stork conservation: first use of nest platforms on power poles in Iran

Overhead power lines are a global threat to birds. Because of its large body and tendency to nest on power pylons, the white stork *Ciconia ciconia* is highly susceptible to collision with power lines and electrocution. One of the main breeding habitats of this bird in central Iran is around the Bishe-Dalan Wetland, in Kapar-Joudaki village, Lorestan Province, where 33 pairs breed on low- and medium-voltage power distribution lines (220 V and 20 kV, respectively).

In 2020, Iran's Birds and Power Lines Committee received five reports of white stork electrocutions. We discovered that 20 kV power lines in the region were equipped with electrical components hazardous to birds such as pin-type insulators, fused cutouts and pole-mounted transformers, and nests on power poles were susceptible to being blown off in strong winds. We contacted the provincial energy utility company and recommended actions to prevent electrocutions and save nests. At the same time, we held two workshops for local residents, utility company personnel and a provincial environment agency, to raise public awareness and to discuss mitigation measures.



White stork *Ciconia ciconia* conservation project in central Iran: (a) reconfiguration of 20 kV medium-voltage power line (the arrow shows the original crossarm), (b) installation of first nest platform on 220 V low-voltage power pole, and (c) occupation of nest platform. Photos: Mahmood Kolnegari.

In the first phase of the mitigation project, in 2021, a medium-voltage line was reconfigured to make it bird-friendly. The utility company removed 75 pin-type insulators and installed the same number of suspended insulators on new crossarms suspended below the original arms. The original crossarms were left to provide nesting support. An energy pole with a fused cutout and transformer was relocated outside the stork's preferred habitat.

We then constructed a 60 × 60 cm metal nesting platform and donated it to the utility company. It was installed in late autumn 2021 and a pair of storks used the platform in spring 2022, the first powerline-mounted nest platform occupied by white storks in Iran. This success motivated local people who had taken part in the workshops. They constructed 23 nest platforms, and these were installed on a low-voltage power line by the utility company. All the platforms were used by breeding pairs in spring–summer 2023. In 2 years of monitoring there have been no electrocutions and no nests have been blown off the new platforms.

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Reasons for hope: an ecological corridor for the northern muriqui

The northern muriqui *Brachyteles hypoxanthus* is a treetop-dwelling primate, endemic to the Atlantic Forest of Brazil, with a total of c. 1,000 individuals distributed in 12 small and isolated forest remnants. Most of the remaining populations are probably not viable in the long term without reintroduction or translocation of individuals and improvements in habitat connectivity.

Since 2014, the Save The Muriqui Project led by the Brazilian NGO Rede Eco-Diversa has been protecting the northern muriqui in Caparaó National Park, south-east Brazil. Previously unknown muriqui groups have been discovered in the Park (Kaizer et al., 2016, *Oryx*, 50, 201), where nearly 300 muriquis survive. Despite being protected, the northern muriqui there suffers from the effects of fragmentation and the expansion of agriculture outside the Park, both of which hinder the dispersal of females between social groups.

However, because of its location the Park may be of critical importance for creating connectivity among the five priority areas for the long-term conservation of this muriqui.

On 28–30 September 2023, Rede Eco-Diversa facilitated a second workshop for the Brigadeiro-Caparaó ecological corridor, a pioneering initiative to encourage connectivity between the Caparaó National Park and the Serra do Brigadeiro State Park. The workshop brought together key stakeholders, including government environmental institutions, managers of the two parks, biologists, geologists, tourism experts, local people and species specialists. On the first two days there were seven plenary talks and two round-table discussions, open to local stakeholders and the general public. The third day was a closed session for key stakeholders, in which the proposed design of the ecological corridor for the species was presented.

The proposed corridor is based on least-cost path analysis, considering land use, topography, conservation areas and remnant forest fragment sizes between the two Parks. Implementation of the corridor is a long-term challenge. The next steps will include legal recognition of the ecological corridor and working with local communities and other stakeholders to design flexible management strategies to improve forest connectivity whilst also providing opportunities for socio-economic activity and improving local well-being.

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Signs of population recovery of the buffy-headed marmoset *Callithrix flaviceps*

The Private Natural Heritage Reserve–Feliciano Miguel Abdala, an Atlantic Forest fragment of c. 1,000 ha in Caratinga, Minas Gerais, Brazil, is well-known for its primates. These include one of the largest populations of the Critically Endangered northern muriqui *Brachyteles hypoxanthus*, which has been monitored since 1983 (Strier, 2021, *Primates*, 62, 861–868), and three other species, the Critically Endangered buffy-headed marmoset *Callithrix flaviceps*, the Vulnerable brown howler monkey *Alouatta guariba*, and the Near Threatened black-horned capuchin monkey *Sapajus nigritus*. We have been monitoring these three species since 2017, following a severe yellow fever outbreak, with funding from the National Geographic Society and Re:wild, and in collaboration with the Muriqui Project of Caratinga and Preserve Muriqui.

One of the species most affected by the outbreak was the buffy-headed marmoset, whose population declined by over 80% compared to 2015 census data (Possamai et al., 2022, *American Journal of Primatology*, 84, 10–14). However, births in three of the four monitored groups suggest the population may be recovering. During May–November 2023 we counted 35 individuals in total, compared to the 17 individuals counted during October 2017–October 2021. Based on their physical characteristics we infer that nine of the 18 new individuals were born in three study groups, with one infant in group A (estimated birth in April 2023) and two successive sets of twins in group B (estimated births in January and August 2023) and group C (estimated births in July 2022 and January 2023). Of the other nine newly sighted animals, we suspect two could be from a missed birth of twins that matured during a gap in monitoring, up to four could be immigrants from neighbouring fragments or, along with the other three animals, were missed in previous censuses. However, even in the most conservative scenario the population appears to have increased by 35% (from 26 to 35 individuals) since July 2022. Genetic pedigree analyses are needed for a more accurate picture of the extent of the recovery, but the survival of some infants over the past year is encouraging.

The buffy-headed marmoset has the narrowest distribution of the genus *Callithrix* and lives in a highly fragmented landscape in the states of Minas Gerais and Espírito Santo. Its small, isolated populations are threatened by competition with invasive species such as the common marmoset *Callithrix jacchus* and black-tufted marmoset *Callithrix penicillata*, and by natural hybridization with the buffy-tufted-ear marmoset *Callithrix aurita* and white-headed marmoset *Callithrix geoffroyi*, which could cause the loss of genetic characteristics and lead to extinction. Although threats to the buffy-headed marmoset persist, the increase in our study population is promising for the species' long-term recovery if the present trend continues, especially if the species is also recovering in other areas where it was decimated by yellow fever.

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