

Novel method identifies areas most suitable for conservation of black lion tamarin

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The researchers used modeling to show which areas are suitable in terms of forest cover and climate for occupation by the endangered species, which is endemic to the state of São Paulo. Their study is a contribution to translocation initiatives that move groups of these animals to areas from which the species has disappeared. Credit: Gabriela Cabral Rezende

The black lion tamarin (*Leontopithecus chrysopygus*) once inhabited most forest areas in the state of São Paulo, Southeast Brazil, but currently occupies only some Atlantic Rainforest remnants there. In recent years, after various studies of the endangered species, environmental NGO Instituto de Pesquisas Ecológicas (IPÊ) moved groups of these animals to areas from which the species had

disappeared.

Similar initiatives have now been reinforced by a group of researchers at IPÊ, São Paulo State University (UNESP) and the Federal University of Mato Grosso (UFMT), who cross-tabulated [climate data](#) and data on landscape ([forest cover](#)) to determine the sites best suited for future translocation, a technique used by conservationists to bolster the viability and gene flow of endangered species.

The study was supported by FAPESP and published in the *American Journal of Primatology*.

"We used climate and landscape data to try to predict which areas within the original distribution of the species are suitable for its conservation. The most widely used models use only climate data. Our study innovated by combining these two datasets in an approach that enabled us to identify the areas that are theoretically most suitable and compare them with the areas in which the species actually lives now," said Laurence Culot, a professor at UNESP's Institute of Biosciences (IB) in Rio Claro and principal investigator for the project "The effect of fragmentation on the ecological functions of primates", which was funded by FAPESP and gave rise to the study.

The first author of the published paper on the study is Gabriela Cabral Rezende, who conducted it as part of her Ph.D. research at IB-UNESP with a scholarship from FAPESP.

The black lion tamarin originally inhabited a long strip of the state of São Paulo running through its southwestern and central portions and amounting in aggregate to 92,239 square kilometers (km²). The model created by the researchers pointed to only 2,096 km² of suitable areas for the species, currently found in less than 40%. In sum, the species now occupies less than 1% of its original distribution area.

"The numbers are alarming," Rezende said. "However, at the same time, they show there are suitable areas not currently inhabited by the species. We used this information to design better targeted strategies."

Forest restoration

To determine which areas would be most suitable for the species, the researchers used a methodology that correlated data for the locations in which it lives now with climate and landscape data for the area it originally occupied. The model pinpointed more areas that would be suitable in terms of climate than landscape, such as Pontal do Paranapanema in the southwest of the state and Upper Paranapanema in southeastern São Paulo.

"These areas should be prioritized for forest restoration, connecting the forest remnants inhabited by the species and benefiting other animals," Culot said.

Areas that would be suitable in terms of both climate and landscape rank highest on the list of translocation priorities. Groups moved to these areas would be far more likely to be ecologically and genetically healthy in the medium to long run than those translocated elsewhere. Some areas in the southwest and southeast of the state matched these criteria and are therefore considered the top priority for conservation of the species.

The researchers also stress the need to identify [suitable areas](#) in light of the climate change scenarios projected for the coming decades.

According to a study by a different group, an area south of the Serra de Paranapiacaba (Paranapiacaba ridge, which is already inhabited by black lion tamarins) will undergo change that will make its climate more suitable for conservation of the species in the next 30-60 years. This is a large forest and considered highly suitable in landscape terms by Rezende et al., with major potential to serve as a habitat for populations

of black lion tamarins in future, assuring their viability.

The species is known to be ecologically plastic and should be able to adapt to [climate](#) and landscape change, although to what extent this will affect its physiology is hard to know exactly. Its diet can shift toward fruit or small vertebrates, depending on availability. It can travel about 180 meters on the ground between forest fragments, although this incurs risks such as roadkill, predation, and attacks from domestic animals. It also plays an important role in forest regeneration by dispersing seeds.

For the researchers, it is particularly urgent to be as cost-effective as possible at a time in which resources for species conservation are increasingly scarce—hence the importance of prioritizing areas and implementing properly targeted strategies.

"The study shows how [theoretical models](#) can be used in practice to help plan conservation policies and actions, increasing the likelihood of success," Rezende said. "Although it focuses on a single species, the approach it describes is a powerful tool that can be used to establish conservation priorities for other [species](#)."

More information: Gabriela Rezende et al, Integrating climate and landscape models to prioritize areas and conservation strategies for an endangered arboreal primate, *American Journal of Primatology* (2020). [DOI: 10.1002/ajp.23202](https://doi.org/10.1002/ajp.23202)

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