

# Cerrado biome requires strict protection and rehabilitation of areas to curb deforestation, scientists warn

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The scientists stress the need for specific measures to conserve the Cerrado's rich biodiversity. Credit: Marcelo Camargo/Agência Brasil

The fast pace at which natural vegetation is being destroyed in the Cerrado, Brazil's savanna-like biome, to make way for pasture and

cropland is seriously affecting ecosystem services. More effective action is needed to address the problem by implementing conservation measures and drafting territorial management plans that provide for ecological corridors and rehabilitation of degraded pasture.

The warning is part of a letter by Brazilian researchers [published](#) in the journal *Nature Sustainability*.

The Cerrado is the second-largest biome in South America, with an area of 2 million square kilometers (km<sup>2</sup>), about the same as Mexico. It is the world's most biodiverse savanna and home to more than 11,600 [native plant species](#). Several of Brazil's most important rivers rise in the Cerrado, the only savanna in the world with perennial rivers, many of which ultimately supply the South and Southeast with water.

Destruction of the Cerrado's native vegetation increased by 16.5% between August 2022 and July 2023, affecting 6,300 km<sup>2</sup>, according to data published on August 3 by DETER, the deforestation detection alert system operated by Brazil's National Space Research Institute (INPE).

This was the worst result since 2017 when measurement by the current system began. Most of the alerts were for the region known as MaToPiBa, a portmanteau of Maranhão, Tocantins, Piauí and Bahia—four Brazilian states each holding a piece at which the agricultural frontier grows. MaToPiBa accounted for almost 75% of deforestation in the Cerrado.

Already in 2022, deforestation in the Cerrado had risen 25% compared with the previous year, reaching 10,689 km<sup>2</sup>, almost as much as deforestation (11,568 km<sup>2</sup>) in the same period in the Amazon, which is twice the size of the Cerrado.

"It's a reflection of the fact that fewer enforcement actions are

undertaken to curb deforestation in the Cerrado than in the Amazon, and agricultural activities on deforested land are profitable. Nevertheless, the planet needs the environmental, economic and social functions of the Cerrado. The European Union won't finalize its agreement with Mercosur unless the agricultural supply chain is demonstrably sustainable, although it continues to neglect the Cerrado, which should be prioritized in diplomatic talks," Michel Eustáquio Dantas Chaves, first author of the letter, told Agência FAPESP.

According to the researchers, the loss of vegetation is contributing to [extreme weather events](#) by raising the temperature, reducing evapotranspiration (which transfers moisture to the atmosphere) and altering the rainfall regime, all of which endangers the feasibility of multi-cropping systems and threatens crop yields.

"Deforestation has accelerated and is already affecting key edaphoclimatic conditions [environmental characteristics such as weather, topography, temperature, humidity and rainfall affecting soil fertility and crop yields]. This is a threat to future agricultural production. It could trigger an environmental and socioeconomic crisis. It also affects food security policies," Chaves said.

## **Precaution**

In the letter published in *Nature Sustainability*, entitled "Reverse the Cerrado's neglect", the scientists note that the biome has been left out of efforts to guarantee sustainability, such as the Amazon Soy Moratorium (ASM), an initiative involving NGOs, companies and governments to reduce deforestation rates in the Amazon based on the hypothesis that soy is a deforestation driver.

Soybeans planted after July 2006 cannot be bought by the Brazilian Association of Vegetable Oil Producers (ABIOVE) and the National

Association of Grain Exporters (ANEC), which represent about 90% of the Brazilian soybean market. The authors also mention several bills before the Brazilian Congress (PL-2633/2020, PL-510/2021 and PL-337/2022), and a new rule introduced by the European Commission to ban imports from deforested areas, which "leaves 74% of the Cerrado unprotected".

The biome is not protected by any of these measures, "arguably leaving the Cerrado as a 'sacrifice zone' for agricultural development", they write.

"We need strategies that combine ecosystem service provision and agricultural production. The Cerrado is a key part of this challenge, but it's usually remembered only for its agricultural potential. Other important dimensions are overlooked, such as the fact that it's the most biodiverse savanna in the world. Its contributions to climate regulation, water supply and carbon storage are also significant. We propose mechanisms for the Cerrado to be respected as an engine of Brazilian agri-environmental capacity," Chaves said.

The other authors of the letter are INPE researcher Guilherme Mataveli, Ieda Sanches and Marcos Adami (DIOTG-INPE); Rafaela Aragão (Griffith University, Australia); and Erasmus zu Ermgassen (Louvain Catholic University, Belgium).

The authors point out that technological investment in the Cerrado has boosted grain yields from 1,258 kilograms per hectare to 4,048 kg/ha since the 1970s, "indicating that agricultural activity can be reconciled with conservation policies". They also praise "science-based efforts to strengthen the protection of the Cerrado", such as the Plan for Prevention and Control of Deforestation (PPCD), which initially applied only to the Amazon but has now been extended to all biomes.

The PPCD, they note, aims to establish sustainable productive activities, environmental monitoring and control, territorial management and economic instruments to reduce deforestation and carbon emissions in line with Brazil's commitments under the Paris Agreement and UN Conference of the Parties (COP).

However, "implementing the PPCD in the Cerrado depends on biome-specific policies that involve coordinated efforts across municipal, state and federal governments; increasing the number of agents that enforce environmental laws;" and including farmers and traditional communities in public policy formulation and discussion of compensation for conserving native vegetation via payment for environmental services, as per Law 14119/2021.

"The PPCD is focused solely on reducing illegal deforestation. However, the Cerrado has more than 330,000 km<sup>2</sup> of vegetation that may legally be cleared (surpluses of the so-called legal reserve)," they write.

"Protection of natural capital needs to be integrated with structural policies for educational and technological development," Chaves said, adding that stronger monitoring systems are also essential to sustainability.

A recently published study by Chaves and Sanches shows how crop mapping accuracy and precision can be improved in the Cerrado for the purposes of land use and land cover monitoring, using field data, knowledge of crop calendars, machine learning, spectral indices, and data cubes produced by INPE's Brazil Data Cube project. An article on the study is available from [Remote Sensing Applications: Society & Environment](#).

"Reducing uncertainty and strengthening legal certainty are important, alongside restoration of agri-environmental epistemic sovereignty and

support for public policies. Paying for technological initiatives that make all this possible isn't expenditure but investment," Chaves said.

**More information:** Michel E. D. Chaves et al, Reverse the Cerrado's neglect, *Nature Sustainability* (2023). [DOI: 10.1038/s41893-023-01182-w](https://doi.org/10.1038/s41893-023-01182-w)

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