Water in the Cerrado

INICIATIVA CERRADO

1 HOW VEGETATION CAN PLAY A FUNDAMENTAL ROLE IN CONSERVING WATER AND PROTECTING THE HEALTHY FUNCTIONING OF ECOSYSTEMS

The Cerrado is undergoing intense economic and environmental transformation. Even though it is home to some of the richest flora in the world, the biome's land is increasingly being used for productive purposes. This agricultural production is tremendously important to the economy.

Of the biome's 204 million original hectares, an estimated 24 million hectares are currently in use for annual and perennial crops, 60 million hectares for managed pasture lands, and 3 million hectares for commercial forest plantations. **Yet, if the Cerrado biome is not conserved, water levels will drop and agricultural production will falter.**

This factsheet shows how vegetation can play a fundamental role in protecting the healthy functioning of the Cerrado's ecosystems, which in turn will protect its agricultural production.

Water serves to illustrate the rich biodiversity of the Cerrado better than any other component of the region – and what's at stake for farmers and the nation.

Assisted by deep root systems, many plants survive the dry season by using water stored in deeper soil layers, recharged during the rainy season (between October and April). These deep soils, the Cerrado's central location, and its high elevation are also critical to protecting water resources in Brazil, as they support a wide network of rivers that supply nearly all of the nation's biomes (Figure 1).

Rural farmers know how important water is to production, though this knowledge may often be more intuitive than technical. When the soil is dominated by grasses commonly planted for pasture, water balance can be affected, since such grasses extract more water from the ground over the course of the year than the Cerrado's native ecosystems do. Pastures and agricultural systems also have lower soil water infiltration when compared to natural ecosystems, which increases overland flow.

This is not the only type of documented impact of the loss of native ecosystems in the Cerrado.

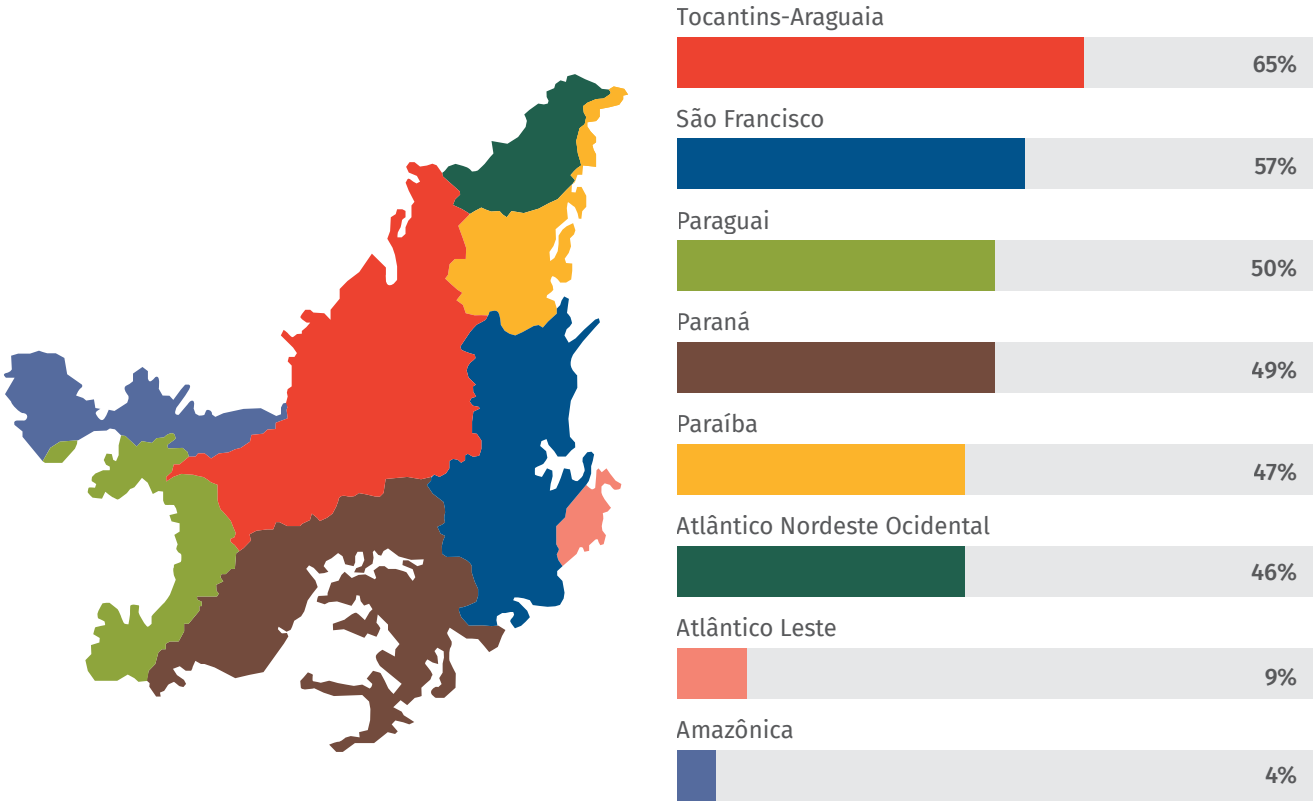

Figure 1. The Cerrado biome's contribution to the hydrographic regions in Brazil (modified from Sano et al. 2010). The numbers refer to the proportion of each hydrografic basin within the Cerrado biome.

Scientific studies have shown in some regions that converting native ecosystems to pasture lands and plantations has caused biophysical changes to the ecosystems and climate over the last forty years. For example, the temperature at the indigenous park of Xingu is three degrees Celsius lower than it is in the mosaic of pasture lands, plantations, and fragmented forests surrounding the park in the state of Mato Grosso. And deforested areas in the state of Rondônia have recorded prolonged dry seasons and decreases in precipitation.

Water use and quality are vital to protecting the ecosystem services that are of enormous environmental importance to Brazil and the world, including for food production, bioenergy, and carbon storage.

The Cerrado Initiative role is to develop sustainable solutions for the biome, only an innovative approach will succeed. It will need to take into account the economic benefits of agricultural production as well as the negative effects of removing native vegetation to the ecosystems. The participation of the multiple actors involved in building this solution will be necessary.

Despite the importance of water and ecosystem services in the Cerrado, relevant information about how to conserve it remains scarce. Therefore, sharing knowledge of ecosystem services could resonate widely, since these services are critical to the needs of the various stakeholders in the Cerrado.

Some small-scale examples of this work, which reconciles short- and long-term prooduction and conservation goals, are already in progress. These projects demonstrate how feasible it can be to construct functional ecosystems. For example, establishing a "payment for environmental services" system through economic instruments has already been tested in some parts of Brazil, such as through the Water Production Program from the National Water Agency (ANA). The ANA program financially compensates farmers who invest in soil and water conservation.

One of the most successful examples of a solution for balancing production and conservation in the Cerrado uses analytical tools for decision-making. Researchers at Embrapa (Brazilian Agricultural Research Corporation) created a spatial mapping of ecosystem services in the Cerrado. The MapES is based on the idea that production and conservation knowledge can be applied while making land use decisions and thereby help protect an ecosystem's capacity to provide environmental services.

Researchers collected information on eight ecosystem services – erosion monitoring, water runoff monitoring, water supply, water quality, soil quality, biodiversity conservation, food production, and energy production – in order to set evaluation parameters for various types of land cover grouped together within a landscape. In practice, this mapping helped researchers identify changes to the landscape and evaluate the possible impacts of changes in land use and ground cover. It also allowed for uncertainty analysis as well as analysis of the interrelated effects of different land uses.

These efforts show that it is possible to protect production and promote conservation effectively in the Cerrado. Existing public policy should be optimized, particularly in regards to compliance with the Forest Code, with an eye to boosting production.

A pragmatic and conciliatory land-use agenda should be developed, based on scientific knowledge. To support innovative decision-making solutions by public policymakers, it is necessary to combine the participation of stakeholders and institutions – particularly farmers and donors. Farmers are in the best position to guide the "design" of the Cerrado's landscapes. Donors can support this objective by creating and sharing knowledge on ecosystem services and by developing incentives to encourage better use of ecosystem services.

*The **Cerrado Initiative** aims to increase awareness about ecosystem services and incorporate them into decision-making on public and private land use. The project is a partnership between the Department of Ecology of the University of Brasilia (UnB) and Climate Policy Initiative (CPI/PUC-Rio) and is supported by Children's Investment Fund Foundation (CIFF).*