

1 CONSERVING AND BUILDING FUNCTIONAL ECOSYSTEMS

Fire plays an important role in the Brazilian Cerrado region. Fires may occur naturally, started by lightning mainly during the transition from dry to rainy seasons, or they may be caused by human activity during the dry season. For indigenous populations, burns are an ancestral practice used to prepare the land for farming. Rural farmers also

use fire to renew their fields, clear new areas for agriculture, and control pests.

Fires in the Cerrado account for half of the 35 million hectares that burn annually in Brazil. Some specialists have concluded that banning fire in the Cerrado would be a “disruptive agent,” since fire is already present in the biome’s structure.

The Cerrado Initiative emerged from the desire for an unprecedented dialogue among the primary parties involved in the Cerrado: the business sector, foundations, public policy makers, researchers, rural farmers, and civil society. CI’s goal is to find concrete solutions to challenges like fire to ensure that economic growth and environmental conservation are both taken into account during investment decisions and land-use planning.

A comprehensive approach to management techniques using fire in the Brazilian Cerrado must attempt to understand the issue from its many sides. How best should this crucial feature of the Cerrado be managed and controlled? How should the rural farmers’ short-term economic benefits be balanced with long-term environmental effects? Must fire be used?

The misuse of fire can result in changes that are harmful to vegetation. Scientific evidence has shown that changes to vegetation structure

and species composition alters the functioning of ecosystems and carbon storage. It can also change water evaporation and transpiration (evapotranspiration), as well as a reduction in the use of water from the deepest layers of the soil.

The Cerrado also contains some of the world’s richest flora, with more than twelve thousand species of plants, of which 80% are grasses and shrubs on savanna. At least 40% of that vegetation is considered endemic – that is, found only in the Cerrado. These are essential natural resources for Brazil.

2 TOWARD A FUNCTIONAL ECOSYSTEM

An abundance of academic literature points to the complexity of fire in the Cerrado. The use of fire as a management tool depends on a series of factors, such as its frequency, the season, the precipitation, the type of soil, and the type of vegetation. Fire has a varied effect on native species. Some plants recover rapidly after a fire, blooming or sprouting within a few days (see Boxes 1 and 2), while others die. Plants' capacity to survive is affected by the interval between burns and the time of year at which a fire occurs.

The biome has two main types of vegetation: savannas and forests, each with a distinct dynamic in relation to fire. To understand these dynamics, it is important to know the characteristics of the vegetation and the microclimatic conditions at the time of the fire, as well as the potential for damage to the ecosystems.

With savanna vegetation, which occupies the largest part of the Cerrado, fire directly affects plants that are up to 3m in height (Figure 1). While some plants, such as grasses, are completely consumed by fire, others are only partially destroyed.

Box 1. Examples of plants flowering after fire, clockwise, starting from the top left:

Bulbostylis paradoxa (cabelo de índio), *Lantana montevidensis* (lantana rosa), and *Anemopaegma arvensis* (catuaba).





Figure 1. A Project Fire controlled burn, August, 2008, in a “*campo sujo*” (i.e., grasslands with shrubs) on the Ecological Reserve of IBGE, Brasília.

Forests have more dense vegetation and present microclimates with high humidity, low temperatures, and no wind, all of which makes them not sites prone to spreading fire. However, changes to the forest structure, such as cutting trees, could increase the incidence of fire.

Scientific knowledge about the effects of fire on vegetation must move beyond the walls of academia to connect with public policy and inform concrete tools for action in the Brazilian Cerrado.

Yet public policy proposals on the use of fire often appear contradictory. They range from the total prohibition of management with fire to using fire to prevent extensive wildfires by controlling fuel biomass.

The debate continues during the 7th International Wildland Fire Conference (Campo Grande, Brazil), where conservation units managers support the use of fire as management to control fuel biomass, but the academics do not agree. In the international arena, several countries are also moving to prioritize their ecosystems. In recognition of the importance of conservation, the United Nations has declared 2021 to 2030 the **Decade of Ecosystem Restoration**.

The discussions won't stop there. Within the framework of the Forest Code, the Ministry of the Environment (MMA) sent Congress a bill to establish the use of controlled burns in some protected areas, on indigenous lands, and on private lands in the Cerrado. The goal is to reduce the incidence of wildfires and the potential damage they can cause.

This is a unique opportunity to begin an in-depth discussion on the subject of fire in the Cerrado and Cerrado Initiative is poised to lead the way.

The public conversation on the restoration of degraded areas should identify various goals for ecosystem conservation and/or ecosystem restoration, with or without the use of fire. These could range from keeping ecosystems intact, as in the fully-protected areas, to searching for functional ecosystems within areas of permanent protection and within legal reserves on rural property.

The goal should be to construct an ecosystem based on a dialogue between all stakeholders: researchers, farmers, policymakers, and investors. Public policy should balance economic and conservation needs.

Only through the search for a joint solution will we be able to realize a combination of economic growth and environmental conservation practices,

thereby ensuring food production, bioenergy, the integrity of habitats and biodiversity, climate and water regulation, and carbon stock.

Box 2. Examples of sprouting plants after fire, from left to right:

Symplocos rhamnifolia (congonha), *Styrax ferrugineus* (laranjinha do cerrado), and *Kielmeyera coriacea* (pau santo).



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).