

Policy Forums

Solving the problem of wildfires in the Pantanal Wetlands

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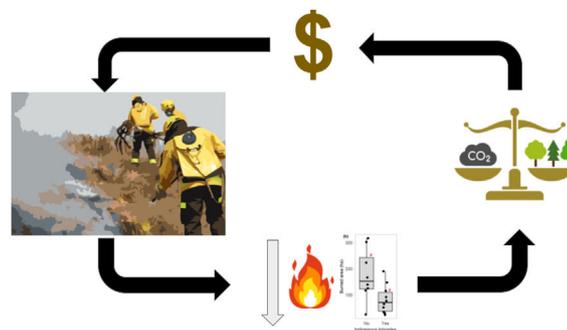
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HIGHLIGHTS

- IFM can reduce Carbon emissions.
- Carbon credits from the emissions avoided could worth 100 million USD annually.
- The money from avoided emissions could finance IFM programs and restoration in the Pantanal.

GRAPHICAL ABSTRACT



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ABSTRACT

The increasing frequency and severity of wildfires is a matter of concern for biodiversity conservation around the world. Integrated fire management (IFM) can effectively prevent wildfires or reduce damage, decreasing the extent of burned areas and consequently carbon emission. However, funding sources for IFM are scarce. The carbon emission avoided by IFM in an indigenous land in the Brazilian Pantanal equals to 100 million dollars per year in carbon credits. This amount could be used to finance IFM in this area, as well as other conservation initiatives, such as forest restoration. A well-implemented program to pay for prevented carbon emission could substantially reduce the extent of burned areas and solve the problem of wildfires in the Pantanal.

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Fire is an important driver of ecological processes in several biomes worldwide, affecting species distribution (McLauchlan et al., 2022) and evolutionary process (Pausas and Parr, 2018). Human activity has changed fire patterns around the globe. The frequency of fires has increased in the recent past (Pyne, 2020) and this pattern is predicted to continue or even worsen, as the number of wildfires is expected to rise by 50% by 2100 (Ellis et al., 2022; Sullivan et al.). The negative consequences of these modified

fire regimes range from deleterious effects on human health (Ford et al., 2018) to the death of valuable individuals of threatened plant and animal species (Gallagher et al., 2021; Tomas et al., 2021) and are substantially increasing the cost of species conservation (Ward et al., 2022). Increased fire frequency and intensity as a result of climate change even affect fire-dependent biomes that have been shaped by fire for millennia in the Pantanal.

The Pantanal is a large and well-preserved continental wetland in South America, covering 160,000 km² in Brazil, Bolivia and Paraguay (Junk and Cunha 2012). In recent years, it has been affected by record-breaking wildfires, for instance in 2020, when almost 30% of the biome got burned. The 2020 fires had a partic-

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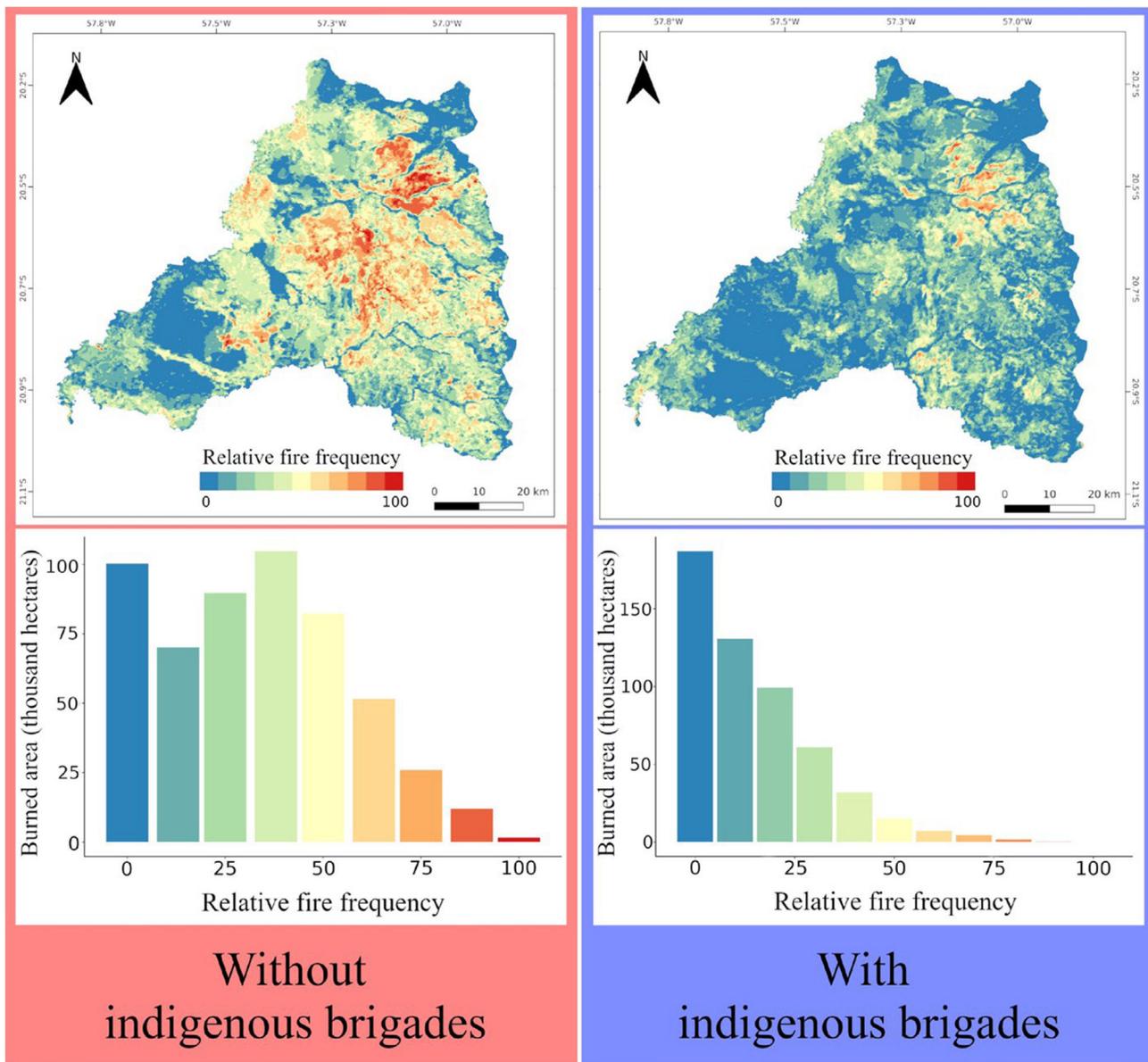


Fig. 1. Relative fire frequency before (2001–2008) and after the establishment of indigenous fire brigades (2009–2018) in the Kadiwéu Indigenous Land, Brazil. Maps in the top row compare fire frequencies for the two periods. The histograms in the bottom row indicate the amount of area burned in each category of fire frequency, from areas with no wildfires during the study period (relative fire frequency = 0) to areas that experienced annual wildfires (relative fire frequency = 100). Adapted from Oliveira et al. (2022).

ularly large negative impact, since 43% of the area affected was not burned in the previous 17 years (Libonati et al., 2020). The fires have led to the loss of an estimated 17 million vertebrates (Tomas et al., 2021) and the emission of 115,576,561 tons of CO₂ (Pletsch et al., 2021), along with several other negative impacts (Pivello et al. 2021).

Nevertheless, advances have been made when dealing with the threat of wildfires. In 2009, fire protection and management actions started in the Kadiwéu Indigenous Land in the Pantanal with the training and hiring of indigenous fire brigades (BRASIL, 2009). The initiative focused on combating wildfires in the middle of the dry season, but also on other prevention actions, such as support for controlled burning, building firebreaks and guidance activities on the impacts caused by forest fires. Activities improved from 2014, with the introduction of Integrated Fire Management (MIF) in which, in addition to the above-described actions, prescribed burning was introduced during the early dry season. Compared to 2001–2008, the extent and severity of forest fires decreased in

the 10 subsequent years up to 2018. The area burned decreased by an average of 53%. Furthermore, when only areas with recurrent high-frequency fires (>70%) are considered, the reduction was 80% (Fig. 1). This result was achieved through the reinforcement of IFM. If we consider the average burned area per year without fire brigades (176,669 ha) and compare it to burned area per year with fire brigades (82,256 ha), the area burned per year decreased by 97,413 ha. According to Pletsch et al. (2021) each ha burned in Pantanal liberates 25.7 tons of CO₂. Multiplying this value by the area saved, we have prevented the emission of 2.5 million tons/year of CO₂ only considering the Kadiwéu Indigenous Land. Using a conservative estimate (US\$40/ton of carbon), it translates to about 100 million US\$ of carbon credits annually. This value could cover wildfire prevention and other conservation actions in the Pantanal, including financing fire brigades and the cost of ecological restoration and preservation of natural areas. For instance, in 2020, which was one of the worst years for the Pantanal, approximately 400,000 US\$ was spent on fighting fires in a mere two months. These costs

covered hiring firefighters, and paying for equipment, as well as ground and air vehicles used for fire combat. On the other hand, the fire prevention and management measures that need to be conducted for six months each year, counting with two brigades of 15 firefighters each, cost around 240,000 US\$ annually. We believe that adding one more fire brigade and a helicopter for 100 h/year to implement prescribed burning and firefighting would improve fire management in the Kadiwéu Indigenous Land.

Taking into account the above-mentioned costs and that improvement would add 120,000 and 260,000 US\$ respectively for the additional fire brigade and helicopter, adding up to 620,000 US\$/year for “ideal” fire management. A 1% reduction in emissions would be worth enough carbon credits to cover the price of these actions. In relation to forest restoration, the estimated cost to recover priority areas in the Pantanal can be up to 275 million US\$ (Martins et al. 2022), which is less than three years of carbon credits from the Kadiwéu indigenous Land alone.

Potential funding bodies might find the volatility of carbon credit prices concerning. However, the carbon market was established in 2005 and in 2020–21 it was worth 53 billion US\$ (World Bank 2022). A similar initiative is already operating in Australia (Ansell and Evans 2019). In northern Australia, Aboriginal people rely on their ancestral knowledge to manage the land using fire, and thereby reduce the incidence of large wildfires, cutting carbon emission and selling the generated carbon credits. Gained funds are invested in improving fire management structures and are used to fight wildfires, to pay the salary of aboriginal rangers and to acquire equipment, including helicopters to access remote areas. Carbon credits are also used to construct dwellings and schools (Coyne et al., 2022). Using carbon credits to prevent wildfires has also been suggested for other important areas worldwide, including in savannahs in Africa (Tear et al. 2021). Similarly, we think that it would be a feasible way to solve the problem of wildfires in the Pantanal wetlands.

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