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Rethinking fire governance in fire-prone ecosystems: stakeholders perspectives and conflicts over traditional fire-use in paraguay's grasslands and savannahs

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Abstract

Fire plays a central role in the grassland and savannah ecosystems of Paraguay, functioning both as a natural ecological process and as a traditional land management tool. However, recent decades have witnessed major alterations in fire regimes due to land use and land cover changes, coupled with climate change. These shifts have led to more frequent, intense, and widespread fires, resulting in significant ecological degradation and threats to rural livelihoods. While indigenous communities and traditional farmers are often blamed for these developments, their fire-use practices are grounded in long-standing ecological knowledge and contribute to wildfire risk mitigation by reducing flammable biomass. State-led prohibitions and criminalisation of these practices have contributed to knowledge erosion and the increasing use of ecologically harmful alternatives such as mechanised land clearing and pesticides. This study investigates the role of Indigenous and local fire-use practices in shaping fire regimes in Paraguay's grasslands and savannahs, with a focus on the Gran Chaco and Pantanal ecoregions. In 2024, preliminary fieldwork was conducted to gain an initial understanding of local practices and governmental strategies. This involved semi-structured interviews (n=12) with stakeholders, including representatives of a Nivaclé community, NGOs, firefighters, academic experts, policymakers, and farmer associations. Findings reveal significant conflicts of interest and mutual blame among stakeholders regarding fire-related problems, alongside inadequate fire governance. High penalties have contributed to the decline of traditional fire-use practices, while firefighting infrastructure, often reliant on volunteer forces, is under-resourced and insufficient to address the increasing number of fires, especially in remote areas such as the Pantanal. These insights highlight the urgent need to foster inclusive dialogue and co-develop integrative strategies that reflect the diverse knowledge systems and priorities of local actors. The ongoing research will further document fire-use practices at the household level and contribute to the

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development of a participatory, ecologically grounded fire management framework that fosters fire-adaptive communities and resilient landscapes.

Keywords: Altered fire regimes, conservation, integrative fire management, participatory governance