

Climate Change and Family Farming in the Pantanal

Luciana Vicente Silva, André Nunes, Maxwell Oliveira, Gabriel Paganini Faggioni, Fábio de Oliveira Roque and Bemmy Granados

Climate Change and Family Farming

Climate change is transforming ecosystems, economies, and social well-being, increasing uncertainty and the need for adaptation. Since 2019, the Brazilian Pantanal has experienced persistent droughts, record temperatures, low river levels, and a reduction in flooded areas, intensifying wildfires, biodiversity loss, and economic damage.

Family farming is particularly vulnerable due to its strong dependence on natural resources, low incomes, and limited access to infrastructure and technical assistance. This study examines climate change scenarios and their future implications, together with farmers' perceptions, the impacts they face, and their adaptation strategies in response to climate change in the Pantanal Model Landscape.

Climate Projections for 2070 and Farmers' Perceptions

An analysis of historical maps, climate projections for 2070, and interviews indicates a process of warming and rainfall redistribution across the Pantanal. Temperatures are projected to increase (by up to +2.53°C in the northern region), while precipitation is expected to decline in that area, where key headwaters that sustain the flood pulse and regulate water resources are located.

The sixteen interviews conducted confirm local perceptions of these changes, which are reflected in prolonged droughts, irregular and scarce rainfall, the disappearance of water bodies, and rising temperatures. Local knowledge therefore emerges as a sensitive indicator of ongoing climate transformations and a strategic foundation for designing adaptation policies and strengthening socio-ecological resilience in the Pantanal.

Impacts on Production and Livelihoods

The climate changes perceived by farmers have translated into direct impacts on agricultural production and livelihoods in the Pantanal. Key effects include reduced production (ranging from 40% to 90% over the past five years), the abandonment of crops such as maize and beans, increased pest and disease pressures, higher mortality of plants and animals, and rising production costs and water demand.



Impacts of prolonged drought and soil degradation on agricultural production

The study also highlights an increase in the frequency and intensity of wildfires, as well as growing conflicts with wildlife associated with drought and the scarcity of natural resources. Reported impacts include jaguar attacks on calves, crop damage caused by birds and mammals, and losses in beekeeping due to smoke and the abandonment of hives. These impacts underscore how climate extremes are reshaping both productive and ecological dynamics in the region.

Adaptation Strategies

Despite these challenges, farming families have developed a range of adaptation strategies. Some are supported through public policies, including the installation of water cisterns, water distribution programs, and technical assistance services. Others have been implemented through projects and partnerships, including agroforestry systems, solar energy, ecosystem restoration initiatives, wildfire brigades, and strengthened community organization.

Families have also developed their own emerging adaptation measures, such as intensive use of artesian wells, concentrating agricultural production during cooler months, replacing crops with more heat-tolerant varieties, shifting cultivation practices, and temporarily relocating livestock during drought periods. These strategies demonstrate creativity and resilience, while also highlighting the vulnerability of local communities.



Production in irrigated and fenced agroforestry systems

Implications and Recommendations

The findings underscore the importance of integrating climate science and local knowledge into participatory territorial planning. Analyzing climate impacts and adaptation strategies helps identify and prioritize more effective actions while strengthening evidence-based decision-making.

Although focused on the Pantanal, the findings offer lessons for other territories vulnerable to climate change. The study recommends expanding access to adaptation finance, strengthening technical assistance, and promoting sustainable technologies such as agroforestry systems and solar energy. These efforts should be complemented by integrated landscape management approaches that include wildfire prevention, drought management, and coexistence with wildlife. Strengthening community-based strategies and cooperation networks is also essential for building long-term socio-ecological resilience.

Download the full research paper [here](#).

We thank the local communities for their time, hospitality, and valuable contributions of local knowledge. We also thank the Pantanal Model Landscape, Ecoa, the Federal University of Mato Grosso do Sul, EcoAgriculture Partners, and 1000 Landscapes for 1 Billion People for their support of this research.