

EMPOWERING LOCAL COMMUNITIES TO FIGHT FIRES IN THE BRAZILIAN PANTANAL – PROGRESS REPORT

Arnaud L.J. Desbiez¹, Ph.D and Patricia Medici² Ph.D

¹ Wild Animal Conservation Institute Brazil – ICAS. Brazilian NGO

² Institute for Ecological Research – IPE. Brazilian NGO

Executive summary

The Brazilian Pantanal suffered immense wildfires in 2020, affecting almost a third of the biome. The Lowland Tapir Conservation Initiative and the Giant Armadillo Conservation joined forces to help fundraise for urgent mitigation purposes in 2020, but also collaborated to create long term preventive measures through the creation of community-based fire brigades.

To help mitigate urgent impacts of the fires and rescue efforts materials and supplies which were purchased by our teams and then hand delivered in both the North and South of the Pantanal. Firefighting gear and equipment was donated to our partner ECOA an NGO that has been key in fighting the fires. Furthermore, 50 Bushnell camera traps, batteries and disks were purchased and deployed by a our partner SESC Pantanal to monitor animals in fully burnt area that were receiving supplementary feeding. Finally, a WhatsApp group, coordinated by Patricia Medici, to rescue, care and release tapirs injured by the fires was created and continued well into 2021.

To prevent catastrophic wildfires community-based fire brigades were created in the Nhecolândia region of the Pantanal. The community fire brigade is organized in such a way that key large equipment including a 5,000-liter portable water tank and motor pumps are kept at the Baia das Pedras ranch and can be transported in an emergency to the neighboring ranches. Each of the ranches was then provided with both firefighting equipment and tools as well as personal firefighting equipment (enough for 3-7 people depending on the size of the ranch). Traditionally ranches have helped each other combat fires and will continue to do so. 42 people from seven ranches participated in two sessions of two days training provided by the IBAMA PrevFogo. Thanks to this effort 1,000 Km² of Pantanal is protected for the future.

In 2021, the drought persisted, more wildfires broke out. Due to climate and landscape changes out of control fires are expected to become a new reality for the Pantanal. We plan to extend the Nhecolândia fire brigades. A neighboring ranch already agreed to host a training to improve skills of the community and also bring in new ranches and neighbors. We hope this effort will spread to new ranches throughout the region. Please contact us if you are interested in contributing to this effort.

About the Pantanal

The Pantanal is a vast and well-preserved tropical wetland that is shared between Brazil (140,000 km²), Bolivia (15,000 km²), and Paraguay (5000 km²). Besides sheltering the highest number of mammal species per square kilometer in South America, the Pantanal is recognized for having large healthy populations of the species it harbors. In fact, some of the largest densities of rare and endangered species occur in the Pantanal such as jaguars, giant otters, hyacinth macaws, amongst others. The highest giant armadillo population density ever recorded was documented in the Pantanal. The Pantanal is recognized as a National Heritage site by the Brazilian constitution of 1988, as an area of international importance by the Ramsar convention and, in 2000, was declared as a Biosphere Reserve by UNESCO, enabling the coupling of biodiversity conservation and sustainable development.

The pristine landscape of the Pantanal is composed by a naturally fragmented mosaic with ponds surrounded by native grassland vegetation, savanna and large woodland areas. The region presents a particular socioeconomic context, as only 2.5% of the Pantanal's territory is formally protected and most land is privately owned and used for traditional extensive cattle ranching. Therefore, any hope to safeguard the Pantanal must be done with participation and engagement of the local landowners. Under traditional extensive cattle ranching, cattle are raised in natural grassland and woodlands are preserved. Hence, anthropogenic threats were generally low (with limited habitat loss, limited hunting, and no paved roads) and the natural landscape heterogeneity was maintained benefiting both wildlife and cattle. Unfortunately, due to cultural and economic changes, there have been increasing changes which threaten the harmonious 250-year-old cattle ranching/biodiversity conservation equilibrium.

The 2020 mega-fires

The Brazilian Pantanal suffered immense wildfires in 2020, affecting 40,000 km², almost a third of the biome (Libonati et al., 2020), an area comparable to the size of Switzerland. Wildfire is an essential feature in many ecosystems across the planet, particularly in savannah wetlands, such as the Pantanal. However, Garcia, et. al., (2021) estimated an unprecedented 376% increase in wildfires, compared to the annual averages from the last two decades. Worst of all 43% of the area burnt in 2020 had not been burnt previously and affected ecosystems that had been acting as fire for wildlife refuges during past events.

One of the potential factors responsible for this increase was the severe drought. In 2020, a persistent extreme drought over the Pantanal, induced a wet season with 60% less rain than normal

(Marengo et al., 2021). This pattern is expected to become more frequent in the future due to climate change, which may amplify the susceptibility of the biome to fires (Thielen et al., 2020). The 2020 drought is considered to be the most prolonged and most severe in the last 60 years (SPEI - Standardised Precipitation-Evapotranspiration Index, 2020). Furthermore, the location of fires in remote areas made access extremely challenging. Successive and constant cuts in the Forest Fire Prevention and Control program of ICMBio, insufficient fire prevention strategy, aggravate the already challenging situation (Libonati et al., 2020; Garcia et. al., 2021). Recent landscape changes have also promoted the use of fire the border between lowlands and highlands in the Upper Paraguay River has been identified as a new “arc of deforestation”, with a projected vegetation loss of up to 14,005 km² until 2050 (Guerra et al., 2020). Comparing the first six months of 2019 and 2020, total vegetation loss has doubled in the Pantanal, as detected by MapBiomias Alerta (2020). Deforestation in the southern Amazon and less humidity arriving to the Pantanal region also creates conditions for immense wildfires in the region (Bergier et al., 2018). Climate and land use change from the Amazon, neighboring Cerrado and in the Pantanal itself will further increase the frequency of these extreme events (Garcia et.al., 2021).

Patricia Medici, founder and coordinator of the Lowland Tapir Conservation Initiative, and Arnaud Desbiez founder of the Giant Armadillo Conservation Program and Anteaters & Highways Project have joined forces to help fundraise for urgent mitigation purposes in 2020, but have also collaborated to create long term preventive measures to prevent catastrophic fires in their study area in the future.

Bergier, I., Assine, M.L., McGlue, M.M., Alho, C.J.R., Silva, A., Guerreiro, R.L., Carvalho, J.C., 2018. Amazon rainforest modulation of water security in the Pantanal wetland. *Sci. Total Environ.* 619, 1116–1125. <https://doi.org/10.1016/j.scitotenv.2017.11.163>.

Garcia, L. C., Szabo, J. K., de Oliveira Roque, F., Pereira, A. D. M. M., da Cunha, C. N., Damasceno-Júnior, G. A., ... & Ribeiro, D. B. (2021). Record-breaking wildfires in the world's largest continuous tropical wetland: Integrative fire management is urgently needed for both biodiversity and humans. *Journal of environmental management*, 293, 112870. <https://doi.org/10.1016/j.jenvman.2021.112870>

Guerra, A., Roque, F.O., Garcia, L.C., Ochoa-Quintero, J.M., Sanches de Oliveira, P.T., Dettogni Guariento, R., Rosa, I.M.D., 2020. Drivers and projections of vegetation loss in the Pantanal and surrounding ecosystems. *Land Use Pol.* 91, 104388. <https://doi.org/10.1016/j.landusepol.2019.104388>.

Libonati, R., Sander, L.A., Peres, L.F., DaCamara, C.C., Garcia, L.C., 2020. Rescue Brazil's burning Pantanal wetlands. *Nature* 588, 217–220. <https://doi.org/10.1038/d41586-020-03464-1>.

MapBiomias Alerta, 2020. <https://plataforma.alerta.mapbiomas.org/mapa>.

Marengo, J.A., Cunha, A.P., Cuartas, L.A., Leal, K.R.D., Broedel, E., Seluchi, M.E., Michelin, C.M., Baiao, ~ C.F.P., Angulo, ^ E.C., Almeida, E.K., Kazmierczak, M.L., Mateus, N.P.A., Silva,

R.C., Bender, F., 2021. Extreme drought in the Brazilian pantanal in 2019-2020: characterization, causes, and impacts. *Front. Water* 3, 1–20. <https://doi.org/10.3389/frwa.2021.639204>.

PEI, 2020. Standardised Precipitation-Evapotranspiration Index [go.nature.com/ 2jpdubc](https://www.nature.com/2jpdubc).

Thielen, D., Schuchmann, K.-L., Ramoni-Perazzi, P., Marquez, M., Rojas, W., Quintero, J. I., Marques, M.I., 2020. Quo vadis Pantanal? Expected precipitation extremes and drought dynamics from changing sea surface temperature. *PloS One* 15, e0227437. <https://doi.org/10.1371/journal.pone.0227437>.

IPE-ICAS short term strategy

Last year during the fires our NGOs actively tried to help mitigate urgent impacts of the fires and rescue efforts through several emergency initiatives

- During the fires rescue teams have been finding and rescuing burned animals that were then brought to local universities and rescue centers in both Northern and Southern Pantanal. Patricia constantly liaised with the coordinators of the different centers to update lists of materials and supplies which were purchased by our teams and then hand delivered in both the North and South of the Pantanal.
- Funds were raised to purchase firefighting gear including protective equipment for firefighters (such as fire-resistant boots, pants, shirts, gloves, and balaclavas, as well as helmets, and special glasses for eye protection) and water pumps, fire hoses, shovels, chainsaws, air blowers, brush cutters etc. All the equipment was donated to our partner ECOA an NGO that has been key in fighting the fires.
- We purchased 50 Bushnell camera traps, batteries and disks to monitor animals in fully burnt area that were receiving supplementary feeding.
- Tapir rescue. Patricia created and coordinated a whatsapp group to rescue, care and release tapirs injured by the fires. This effort continued well into 2021. As for the anteaters, no known anteater rescued from the fires survived their ordeal.

IPE-ICAS long term strategy

Background - For over 16 years the Lowland Tapir Conservation Initiative (LTCI) and for 11 years the Giant Armadillo Pantanal Project have been working in an area of over 450 km² surrounding the Baia das Pedras ranch in the Nhecolândia region of the Pantanal. In 2020 the area managed to avoid catastrophic wildfires as the local ranches were constantly on high alert and put out natural and accidental fires. However, in 2019 the same area experienced out of control fires where over

15% of our study area was burnt. During these fires, our teams observed the communities fight fires as best they could with very little equipment. Both climate and land use change will further increase the frequency of these extreme events. Fires can start far away and reach our study area in less than 24 hours as it happened in 2019. How can we prevent this?

We discussed and listened to the landowners of Baia das Pedras to understand what we accomplish and create together to prevent catastrophic wildfires. It was from these discussions that the idea of a community firefighting brigade was born. This would not only protect the study area, most importantly, it would help engage other landowners in the region to have discussions about fires, find a common solution and recognize this threat. Fire is a key management tool used in the region to re-generate pasture. These controlled fires are usually started at the beginning of the wet season where the natural humidity also helps control the fires. However out of control wildfires, started in the dry season, as it happened in 2020, are catastrophic for both wildlife as well as for cattle. Loss of pasture means cattle starve, loss fences and infrastructure can also be very detrimental to owners.

Creating the brigade – To create the brigade we talked to many partners and also examine other volunteer fire brigades in Brasil. The government program responsible for fighting fires IBAMA Prevfogo was extremely patient and generous with their advice and time. They were instrumental in providing the key list of equipment needed to be purchased. They also agreed to provide the training.

The community fire brigade is organized in such a way that key large equipment including a 5,000 liter portable water tank and motor pumps are kept at the Baia das Pedras ranch and can be transported in an emergency to the neighboring ranches. The owners of the Baia das Pedras ranch suggested and agreed to this. Each of the ranches was then provided with both firefighting equipment and tools as well as personal firefighting equipment (enough for 3-7 people depending on the size of the ranch). Firefighting is a community affair. Traditionally ranches have helped each other combat fires and will of course continue to do so.

Central equipment based at the Baía das Pedras ranch (to be shared)

- Firefighting portable water tank - mepel 5000 litros (x1)
- Water pump motobomba mini-striker water pump (x1)
- Accessories (hoses, connectors etc...) (1)

Equipment for each of the 10 each ranch

- Fire burner for controlled fires - guarany - 5 litros (x1)
- Chainsaw - stihl - 260 sabre 40cm rollomat (x1)
- Portable blower - stihl - br 600 (x1)
- Portable blade cutter - stihl - fs380 3 facas 2kw 40,2cc (x1)
- Light sickle - tramontina - 1,20m c (x2)

- Large hoe - tramontina - 2,5 1,5m goiv/canav (x2)

Equipment for each ranch/firefighting kits for a team of three to seven people. (depending on size of ranch) a total of 50 kits were created.

- Flexible backpack fire resistant 21 liters
- Fire fighting reflective overalls
- Fire fighting helmet with reflective thermoplastic
- Balaclava hood
- Fire fighting boots
- Protective glasses -
- Protective gloves -
- Water bottle - ntk
- Belt for water bottle -
- Leather anti snake velcro leg

In all we purchased over 753 pieces of equipment ranging from protective gloves to a 5,000 L water tank. Firefighting kits were individually packed so that each bag contained everything a potential fire fighter would need.

The Baia das Pedras ranch hosted the events gathering all the neighboring ranches to distribute materials. Experienced fighter fighters taught landowners and workers how to use, store and upkeep the equipment.

The brigade is born

Due to the pandemic, training was initially postponed by a month and two training events (27-28 of July/29-30 of July) instead of one were held at the Baia das Pedras. We therefore managed to reduce the number of people to increase bio-security. Two groups of 20-30 people were trained outdoors, even the theory part was done outdoors (despite the cold front that moved in that week). Both ranch owners and ranch workers participated. Two firefighters from the IBAMA Prevfogo program gave the training. The IBAMA Prevfogo teachers were remarkable at adapting vocabulary, examples, and situations to the reality of the Pantanal. Everyone participating was very engaged.

- 1st morning: A theoretical class on firefighting took place in a ventilated outdoor barn. Topics included fire behavior, techniques to control a fire, safety issues and more theoretical content was presented, illustrated and discussed with the group.
- 1st afternoon: Practical training of how to use, store and maintain of the equipment donated took place outdoors. Everybody got a chance to handle all the equipment.
- 2nd day: Firefighting Practice. During the second day the group learned how to effectively fight a fire using all of the equipment provided, including the 5,000 liter water tank. How

to organize the equipment, teams and give orders was explained as various fires were put out. Everyone had the opportunity to wear all the firefighting clothes and protective gear.

At the end of the second day conversations about the training and participant feedback took place. Ranch owners participating then signed Memorandum of Understanding guaranteeing the proper use and care of the materials donated. Once the MoU was signed materials were donated. If the owner of a particular ranch was not present on the day of training (only workers), we signed the MoU in Campo Grande and then brought all the equipment to the ranch a week later.

Overall, this project was a huge success on several levels

- All participants were extremely enthusiastic and pleased with the training. This is in most part due to the quality and experience of the Prevfogo which was able to provide individual attention to all participants and share knowledge using clear examples
- A brief survey led by our team showed that all participants were extremely satisfied by the training and materials donated. All felt confident in their ability to fight fires and use the equipment. Almost all participants had experience in fighting fires, however, none had ever had access to such materials.
- This event created a cultural change. Fire is seen as mostly positive and necessary in the Pantanal by ranch owners and workers. It has always been a management practice tool. Uncontrolled wildfires are considered an unfortunate fatality. However, for the first-time ranches and ranch workers were led to differentiate between types of fires. While recognizing the importance of fire in the Pantaneiro culture they were empowered with the proper tools and training to be able to use and control fires. In the Pantanal in November and December, owners bring basic food supplies and mineral salts for the cattle for the next 6 months in case there is a major flood and the ranch becomes inaccessible. Now a new routine of preparing for the fire season needs to take place. Equipment must be tested, oiled washed and kept ready for the potential upcoming fire season.

A 5 minute video summarizing the two days of the training is provided to all donors of this initiative. <https://www.dropbox.com/s/3zbnqgr5kv65r85/Legends%20ENG..mp4?dl=0>

Next steps

- In December we will visit all the participating ranches to get feedback on fires prevented and check if materials are being properly stored and maintained. The wet season will be well underway, and all the equipment should be stored until next June at the start of the dry season.

- Next June 2022 we will visit all the ranches again, to make sure that everyone working in the trained ranches is ready to combat fires. Equipment must be tested, knowledge on the use of each tool must be tested. We will share the videos on how to use all the tools to any new workers. Our projects will now visit all collaborating ranches twice a year.
- Videos and images of the event are being shared with the media to inspire other regions of the Pantanal to take action.
- Next steps were discussed at the end of the training. The Prevfogo will return next year to hear about the experiences of the different ranches but also to invite new neighboring ranches to participate. Santa Maria ranch has already agreed to hold such an event. We hope this becomes an annual event in the Pantanal to ensure that everyone is ready to combat any potential out of control fires.

How you can help.

IPE-ICAS would like to continue fundraising for funds to mitigate impacts and prevent out of control wildfires. The current context of climate change and land use (Both here in the Pantanal and in the Amazon) make it clear that out of control wildfires will continue in the foreseeable future. We would like to raise more funds to be able to respond to emergency needs as well as continue our long-term strategy. We want to be able to purchase emergency supplies when needed to save individual animals and continue purchasing firefighting kits and equipment to expand the community firefighting brigade.

If you are interested in continuing to support us please get in touch with Arnaud Desbiez contato@icasconservation.org.br or Patricia Medici medici@ipe.org.br