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IUCN SSC
Human-Wildlife
Conflict & Coexistence
SPECIALIST GROUP

HUMAN-WILDLIFE CONFLICT & COEXISTENCE
/ CASE STUDIES

USING A CONFLICT FRAMEWORK TO IDENTIFY THE CORRECT PROBLEM TO MANAGE



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INTRODUCTION

In the Cerrado biome of the Mato Grosso do Sul state in Brazil, honey production is an important activity. The state has the country's highest production amount per hive/year. Beekeepers place hives along the edge of native vegetation to ensure bees visit the wildflowers. However, large areas of the Cerrado biome have been converted to pasture or agriculture, resulting in the biome being highly fragmented and native vegetation is increasingly found in small patches. The iconic giant armadillo *Priodontes maximus* still survives in some of these fragments, often unnoticed due to their solitary, nocturnal, and fossorial (burrowing) habits. Where apiaries have been established along the edge of patches of native vegetation, giant armadillos have learnt to knock over the beehives, giving them access to the bee larvae, resulting in substantial economic losses to the beekeepers through damage to hives. This unfortunately can lead to retaliatory killings as a giant armadillo can completely destroy a beekeeper's livelihood in a matter of weeks.



STATE OF MATO GROSSO DO SUL, BRAZIL



CERRADO BIOME

BRAZIL



KEY INSIGHTS &
LESSONS LEARNT
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These negative interactions became apparent to the Giant Armadillo Conservation Program's (hereafter "the project") staff, following initial research in the Cerrado. The project, therefore, sought to investigate the situation further, before seeking to manage the situation.

THE PROJECT CONDUCTED A STAKEHOLDER ANALYSIS AND APPLIED A CONFLICT FRAMEWORK ANALYSIS TO INVESTIGATE WHETHER THE HUMAN-WILDLIFE CONFLICT SITUATION WAS SOLELY DUE TO THE DAMAGE INFLICTED BY GIANT ARMADILLOS TO THE APIARIES OR WHETHER UNDERLYING OR DEEP-ROOTED CONFLICTS MIGHT HAVE BEEN PRESENT BETWEEN STAKEHOLDERS, INFLUENCING HOW THE SITUATION MIGHT NEED TO BE MANAGED.



PROCESS

The project started in 2015 when researchers began investigating the spatial distribution of giant armadillos in the Cerrado biome of Mato Grosso do Sul. The researchers visited 5000 micro watersheds in the biome to look for signs of giant armadillos. To gain access to the land, the researchers would interview the land owners. These could be small-scale landowners, indigenous communities, multinational companies, or large-scale landowners.

FROM THIS WORK, THE RESEARCHERS CREATED A DISTRIBUTION MAP OF GIANT ARMADILLOS, REVEALING THAT THERE WERE 69 FRAGMENTS OF HABITAT LARGER THAN 25 KM², WHICH IS THE HABITAT AREA ADEQUATE FOR GIANT ARMADILLOS.

Although the existing habitat was fragmented, giant armadillos managed to survive, but due to their isolation and scattered distribution the species was likely to become extinct in the future, if a better habitat connectivity was not achieved and other threats mitigated.



During preliminary interviews, it was occasionally mentioned that giant armadillos were destroying beehives. This initially appeared strange, even impossible to the researchers. Giant armadillos feed almost exclusively on ants and termites. However, in collaboration with a beekeeper, a camera trap was set up in an apiary that had been damaged in the past, and to the project's surprise the culprit of the damage was confirmed to be a giant armadillo. Most interestingly, the team learned that some beekeepers had already devised mitigation methods themselves, while others had resorted to killing the giant armadillo.

FURTHERMORE, AS MANY BEEKEEPERS DID NOT KNOW FOR CERTAIN THAT THE GIANT ARMADILLO WAS THE CULPRIT OF THE DAMAGE, OTHER SPECIES SUCH AS GIANT ANTEATERS, SIX BANDED ARMADILLOS AND OTHER WILD ANIMALS WERE ALSO SUFFERING RETALIATION.

As giant armadillos have a low population growth rate, the loss of an individual can significantly impact the total population. It was clear that this issue had to be urgently investigated further.

ANALYSIS

In 2017, the researchers consulted with ten beekeeper associations in the Mato Grosso do Sul region, to help gather information from their associates on the prevalence of damage, and to quantify the damage caused by giant armadillos to beehives. Informal conversations were also held with beekeepers to document the giant armadillo damage, identify and evaluate any mitigation methods being used by the beekeepers. In total, 178 beekeepers were consulted, thus resulting in a better understanding about the prevalence of beekeeping in the region. The number of beehives kept by each beekeeper ranged from four to 2000, and for 53 percent of the beekeepers, over half of their income came from beekeeping.

NEARLY HALF OF THE RESPONDENTS HAD REPORTED DAMAGE BY GIANT ARMADILLOS IN THE PREVIOUS 12 MONTHS, AND 73 PERCENT HAD EXPERIENCED LOSSES ATTRIBUTABLE TO GIANT ARMADILLOS IN THE LAST FIVE YEARS, RESULTING IN ESTIMATED FINANCIAL COSTS OF USD 103 600 AND USD 626 500 IN THE PAST 12 MONTHS AND PAST FIVE YEARS, RESPECTIVELY.



Beekeepers used various strategies to prevent damage, including lethal and non-lethal methods. Although some beekeepers reported using poison, other methods involved elevating the beehives above 1.3 m, fencing the beehives (including with electric fences), placing beehives on barrels or even using visual (hanging CDs) or olfactory deterrents (perfume, urine, human hair).

The researchers also placed 21 camera traps to document the effectiveness of potential mitigation methods. They showed that the giant armadillos use their skull and nose rather than their claws to knock over the beehives, walking on their hind legs and using their tails for balance to push over the beehives weighing up to 35 kg. Understanding this behaviour helped the researchers draw up new mitigation methods. Camera footage also showed that after the beehives were destroyed, mostly overnight, other wildlife species would then forage on the destroyed beehives during the day, including tayra *Eira barbara*, giant anteater *Myrmecophaga tridactyla* and southern tamandua *Tamandua tetradactyla*.

This resulted in the blame sometimes being misplaced onto other animals. These recordings were key to discussing the issue with beekeepers and seeking solutions. However, to better understand the whole issue and potential solutions, a stakeholder analysis exercise was deemed necessary. Not only did this help the researchers to determine the most effective strategies, it also helped them evaluate the impact of the initiative as the project progressed.

A CONFLICT FRAMEWORK ANALYSIS WAS CONDUCTED TO IDENTIFY THE COMPLEXITY AND SCOPE OF THE INTERACTIONS BETWEEN THE BEEKEEPERS AND GIANT ARMADILLOS TO DETERMINE WHETHER THEY WENT BEYOND THE DAMAGE TO BEEHIVES.



ACTIVITIES

In 2018, face-to-face interviews were conducted with 111 beekeepers in the Mato Grosso do Sul state, adapting and expanding a previously developed framework by Zimmermann et al. 2020, to identify the levels and intensity of the conflict situation. The original framework suggested investigating five critical criteria to achieve this: 1) peoples' perception of the species causing damage; 2) the conflict situation itself, 3) previous attempts to solve the situation; 4) the extent of people's willingness to engage and find solutions with other groups, and 5) views about others involved in or trying to help the situation. Using quantitative and qualitative social research methods, the researchers devised indicators and associated measures to assess each of these key criteria.

Perceptions amongst beekeepers towards giant armadillos were found to be neutral, with most respondents (82 percent) believing that they are beneficial and should not be eradicated. However, they did wish fewer individuals occurred in their region.

MOST BEEKEEPERS EXPERIENCED DAMAGE BY GIANT ARMADILLOS, AND THOSE MOST AFFECTED WERE MORE LIKELY TO HOLD NEGATIVE ATTITUDES AND BE MORE FAVOURABLE TO THEIR PERSECUTION.



Although, in general, it was found that beekeepers had a high tolerance to the damage. When investigating the beekeeper's willingness to adapt their management, most were willing to alter their approach in order to avoid their beehives being damaged. As a matter of fact, most had already voluntarily implemented non-lethal methods to prevent damage. However, most beekeepers were not satisfied with the method's effectiveness.

The beekeepers did not highlight any resentment to the other stakeholder groups involved in the issue, such as government authorities, landowners who allowed beekeepers to access their land, federations and associations of beekeepers and other wildlife conservation groups. In fact, in general they welcomed their help. Discussions with all the stakeholders showed their concern for the issue and a willingness to promote peaceful coexistence.

OVERALL, THE ANALYSIS SUGGESTED THAT THE INTERACTIONS BETWEEN GIANT ARMADILLOS AND HUMANS WERE NOT ROOTED IN LESS VISIBLE SOCIAL DISAGREEMENTS, BUT FOUNDED IN A MATERIAL DISPUTE REGARDING THE DESTRUCTION OF BEEHIVES.

However, the analysis indicated that the conflict could be approaching a more complex level. These indicators were that resentment of the beekeepers might have been building due to the ineffective damage mitigation methods some had been trying to implement, as well as a growing resentment towards the giant armadillos due to the fact that certain beekeepers showed a low preference for spatial proximity to the giant armadillos (the NIMBY effect). This underscored the importance for the project to identify appropriate and effective mitigation methods and to always be transparent with the beekeepers about what does and doesn't work to prevent beehive damage.



CAVALETES RESISTENTES MAIS ALTOS DO QUE 1.30 M

Prós

- Baixo custo para implementação
- Materiais de fácil obtenção
- Muito eficaz

Contras

- Trabalho feito com caixas no alto
- É preciso plataforma para acesso
- Exige manutenção

EFICÁCIA: BAIXA MÉDIA ALTA

PROJETO CANASTRAS E COLMEIAS
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CERCA DE TELA ALAMBRADA COM MURO SOB O SOLO

Prós

- Pode-se manter as caixas baixas
- Boa durabilidade
- Previne ataque de outras espécies

Contras

- Alto custo
- Colmeias ficam concentradas
- Indicado apenas para apicultura fixa

EFICÁCIA: BAIXA MÉDIA ALTA

PROJETO CANASTRAS E COLMEIAS
WWW.CANASTRASECOLMEIAS.ORG.BR

COLMEIAS FIXADAS COM AMARRAÇÃO EM "X"

Prós

- Altura não muito elevada
- Baixo custo
- Materiais de fácil obtenção

Contras

- Podem ocorrer perdas eventuais
- Método cansativo
- Resultado depende de boa amarração

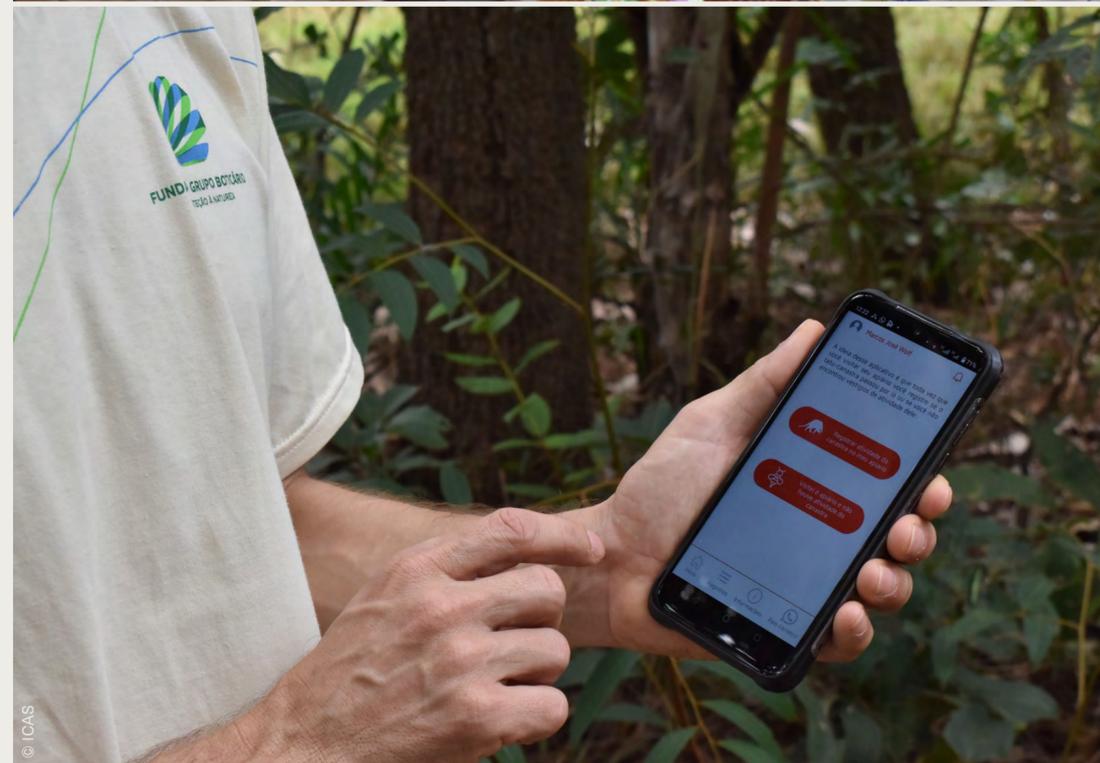
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OUTCOMES

Having determined that the beekeeper's interactions with giant armadillos were predominantly triggered by the economic loss associated to beehive destruction, and conflicts between stakeholders were not present at the time, the project created an intervention strategy, focusing on the following elements:

- 1) compiling of information and field trials with camera traps to measure the efficacy of different methods in order to prevent giant armadillos from damaging beehives. All results were compiled in a simple manual, illustrated cards, and videos;
- 2) implementing a certification process for Giant Armadillo Friendly Honey, which provided access to niche markets, while adding value to beekeepers products. The norms and contract were created through a collaboration with the NGO Wildlife Friendly Network Enterprises. Before being launched, several pilot certification schemes were run and feedback from beekeepers were used and greatly improved both the norms and the certification contract;
- 3) creating a smartphone application to engage beekeepers to register any depredation on their beehives, and for them to receive information on test methods and interact with the project.





A beekeeper was hired to act as an extension officer between the project and the beekeepers in the region. The beekeeper's role was to support and guide other beekeepers in implementing strategies to prevent beehive damage. Furthermore, they also informally reported on any issues that arose. The project's communication officer helped to create materials to promote the Giant Armadillo Friendly Honey and worked with individual beekeepers on their labels.

THE PROJECT TEAM PARTICIPATED IN ALL BEEKEEPING EVENTS AND LAISED WITH GOVERNMENT OFFICIALS, AS WELL AS SUPERMARKET OWNERS AND JOURNALISTS TO PROMOTE THE GIANT ARMADILLO FRIENDLY HONEY LABEL.

KEY INSIGHTS & LESSONS LEARNT

01 LOCAL EXPERTISE

The project chose to employ a biologist who was an active beekeeper as the extension officer. This brought along multiple benefits as the officer understood the struggles that the beekeepers dealt with on a day-to-day basis, had the vocabulary and know-how to better communicate with the communities. Moreover, the officer was greatly appreciated and trusted in the community.

02 SUPPORT AND CAPACITY BUILDING TO MARKET PRODUCTS

As a means of improving marketing strategies and sales techniques, the project brought in capable professionals in these areas to help beekeepers develop their businesses.

03 IMPORTANCE OF LANGUAGE

The project chose to use the term “coexistence” rather than “conflict”, as the term resonated more with beekeepers. This was important not only when engaging with the beekeepers but also when promoting the Giant Armadillo Friendly Honey. Care is always taken so that neither beekeepers nor giant armadillos are perceived as the villain or the culprit. The focus is always on a potential positive coexistence.

04 STAKEHOLDER IDENTIFICATION

Conducting a stakeholder analysis was critical. The analysis identified a lack of stakeholders involved in this beekeeper issue and that other stakeholders were largely unaware of the problem. The project is now working to create a network of stakeholders that interact through positive, supportive relationships.

05 PATIENCE IS KEY

It took a long time to create a history of shared experiences and trust with the stakeholders, which meant that measuring the impact of the work took time. This wasn't easy to relay to donors who often provided funding on a yearly basis and wanted to see the impacts in a shorter timeframe.

06 STRONG RELATIONSHIPS

Beekeepers are at the heart of the project and are involved in every step of the project, from certification contracts to the development of the project's logo and to the promotion of the initiative in the media. Every two weeks, project staff and beekeepers meet to discuss progress.

07 CLEAR EXPECTATIONS

The project was honest and transparent with the beekeepers to ensure that expectations were made clear to all parties. The project did not promise financial gains from certification – even though that did eventually happen. All mitigation methods were illustrated on cards that clearly stated effectiveness, pros and cons, and could be easily sent through WhatsApp.

08 LOCAL STRATEGIES

Mitigation methods proposed usually came from the beekeepers themselves but were thoroughly tested in field trials using camera traps. The project acknowledged and credited beekeepers who had provided the knowledge and methods for each strategy.

09 SMARTPHONE APPLICATION AS A TOOL TO ENGAGE BEEKEEPERS

The adoption and use of the smartphone application was relatively low, even though several trials were run with beekeepers and it was very intuitive and easy to use. Face-to-face meetings, participating in beekeeper association meetings and events were found to be the best way to engage the community.

FURTHER INFORMATION

- Using a conflict framework analysis to help beekeepers and giant armadillos (*Prionomys maximus*) coexist. *Frontiers in Conservation Science*. 2021
- Bee careful! Conflict between beekeepers and giant armadillos (*Prionomys maximus*) and potential ways coexist. *Edentata*. 2020
- Levels of conflict over wildlife understanding and addressing the right problem. *Conservation science and practice*. 2020

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ABOUT THE CASE STUDIES

The **Food and Agriculture Organisation of the United Nations** (FAO) and the **IUCN SSC Human-Wildlife Conflict & Coexistence Specialist Group** (HWCCSG) have jointly developed a set of case studies with the aim of covering the process projects have taken to manage various aspects of a human-wildlife conflict & coexistence situation. This case study is one of many that will be used to illustrate key components of the **IUCN SSC Guidelines on Human-Wildlife Conflict & Coexistence**. The published case studies can be found in the **Human-Wildlife Conflict & Coexistence Library**.

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