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The myth of the serpent: from the Great Snake to the henhouse

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Introduction: The relationship between humans and snakes is permeated by myths and legends, which have led to these animals being seen as malevolent beings since biblical times. As a result, their interaction tends to be negative, mainly in Occidental Cultures, often leading to the frequent killing of snakes in cases of perceived self-defense. Among them, anacondas stand out as the largest snake species in Brazil, widely known through legends such as the “Boiuna” and the “Cobra Grande.” As this is a semi-aquatic species, some traditional populations, such as the varzeiros (riverine people who live in periodically flooded áreas known as várzea), have a historical generational coexistence with these animals.

Methods: Here, we focus on the várzea regions of the Lower Amazon River, where despite the lack of official studies on snake hunting, it is a known region of conflict. By analyzing different narratives from the local populations, we dug some key points behind the conflicts between humans and the local anaconda population, aiming to understand the main causes of killings and explore potential arguments to prevent them.

Results: Our findings reveal that local dwellers possess notable ecological and biological knowledge about the anaconda, particularly its feeding and reproductive behaviors. However, their perceptions of these snakes remain predominantly negative. We identified a cultural aspect in the act of killing anacondas, as men often expressed the perceived necessity to do so. Most notably, we observed that the primary trigger for these killings was anger due to economic losses, while fear acted as a deterrent to slaughter.

Conclusion: Based on this, our results suggest the development of a collaborative management plan and conservation strategy for anacondas, with an emphasis on protecting the local economy. Improving henhouse structures and a management plan for the use or trade of anaconda fat appear to be promising initial steps.

KEYWORDS

ethnoherpetology, traditional communities, conservation strategies, anaconda mortality, Brazilian Amazon, human–wildlife conflict, *Eunectes murinus*

1 Introduction

Being considered one of the most mystical animals, snakes are perceived as either sacred or evil, depending on culture (Crump, 2015; Alves et al., 2011). The mythology and emotions surrounding these animals vary greatly by region, making them perhaps the creatures that most elicit ambiguous and contrasting feelings in people (Crump, 2015). However, in addition to the fear of snakes, which could have a genetic bias (Wilson, 1984), in many parts of the world—particularly in the Occidental Cultures—snakes are often associated with evil, linked to myths and stories that frighten people (Cosendey and Salomão, 2016). These factors contribute to the creation of barriers to fostering a positive relationship between animals and humans.

In Brazil, legends about snakes have been reported in similar ways for more than a century (Brazil, 1911; Cosendey and Salomão, 2016), reflecting a deeply rooted fear and strong emotional element in how information is shared. Furthermore, a lack of knowledge about Brazilian snakes exacerbates their slaughter, as people tend to fear the unknown (Crump, 2015). The primary reaction when people feel threatened by snakes is often to kill them as a precautionary act of self-defense (Freitas, 2003). This issue is particularly significant when it comes to distinguishing between venomous and non-venomous snakes due to widespread misconceptions (Sandrin et al., 2005).

Brazil has a high diversity of serpents, with 463 catalogued species, 23 of which are endemic (Uetz and Hallermann, 2024). However, few studies have investigated the relationship between people and these animals (Alves and Souto, 2011). Research involving the local population and their knowledge about wildlife has proven to be highly effective, especially for accessing information on the ecology and biology of species, as well as variations in their population densities (Albuquerque et al., 2019; Barboza et al., 2021). Understanding these interactions is essential for conservation efforts and for fostering coexistence between humans and snakes.

Data on home range, population dynamics, and feeding habits are essential for understanding species ecology and behavior and play a crucial role in the development of management and conservation plans (Miorando et al., 2013). Often gathered through long-term studies, this knowledge is an inherent part of the daily lives of local residents. This connection is even deeper among traditional people, who maintain a close bond with nature (Silva and Simonian, 2015). Their relationship with the environment is shaped by traditional knowledge and practices that are deeply rooted in their natural surroundings and the sustainable use of local resources (Lira and Chaves, 2016). In this context, traditional knowledge and popular beliefs about local fauna represent valuable tools for conservation (Reichel-Dolmatoff, 1976; Pezzuti et al., 2010). Thus, integrating local knowledge into scientific research can strengthen conservation initiatives and improve our understanding of species distribution and behavior.

Pará State, located in the northern region of Brazil, stands out for its historical process of colonization and miscegenation, which has resulted in a diverse range of traditional populations and

distinct ethnic groups (Lira and Chaves, 2016). Colonization along rivers, waterways, and wetlands has played a crucial role in shaping the lives of traditional dwellers in the Amazon (MEGAM, 2005). The construction of riverine identity, for example, has developed through a deep relationship with the water, which influences social interactions and ways of life (Pojo et al., 2014; Lira and Chaves, 2016). This implies that indigenous culture and knowledge remains prominent among riverside communities.

In this study, we focused on the greater Brazilian snake, Anaconda (*Eunectes* sp.), an animal with aquatic habits that has a strong relationship with riverine people, especially in floodplain areas (Uetz and Hallermann, 2024; Haddad-Junior et al., 2012). In the Amazon River, floodplain areas undergo a historical sedimentation process, resulting in a floodplain that is constantly modified by the river (Sioli, 1951). This flood/dry cycle directly affects the dynamics of the local area (Pezzuti et al., 2010; Barboza and Pezzuti, 2011; Pignati et al., 2013), making the contact between local dwellers and anacondas even more frequent during flood periods (Waldez and Vogt, 2009).

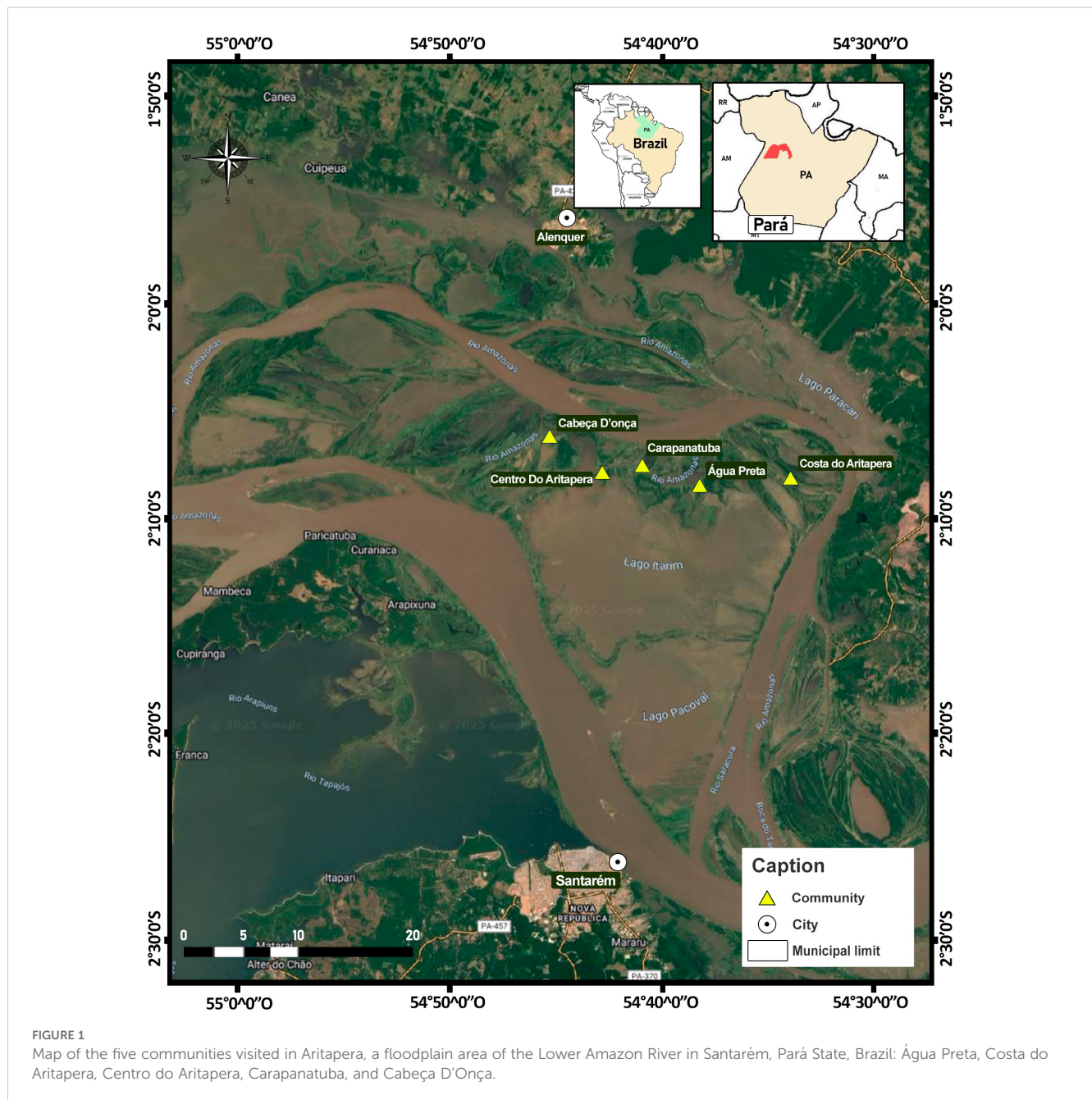
In such situations, where human/animal contact is frequent, an intervention focusing on the local residents' understanding of the need for species conservation is recommended; otherwise, this contact may cause harm to the fauna (Rodrigues et al., 2021). Extirpation of anaconda populations, or even the total extinction of the species, may lead to loss of genetic diversity, ecological imbalance, and even the loss of potential sources of important medicinal compounds (Alves and Rosa, 2007; Souza et al., 2017; Abrão et al., 2021). This is especially true in the floodplain regions of the Lower Amazon, where although there are no official studies on snake hunting, it is known to be a common practice (Pezzuti, pers. obs.).

In this sense, we aim to better understand the relationship between local dwellers and anacondas by analyzing their daily habits and the knowledge they share. This will make it possible to identify the frequency of hunting local anaconda populations, establish a pattern, identify the main motivations behind the attack, and explore situations of vulnerability.

2 Materials and methods

Field research was conducted in the Aritapera region (latitude 02°06'–02°09'S and longitude 54°34'–54°46'W), a floodplain area of the Lower Amazon River, located in the municipality of Santarém, Pará. According to local residents, this region is home to 11 riverside communities, with the present research focusing on five of them: Água Preta (AP), Carapanatuba (Cap), Centro do Aritapera (CeA), Costa do Aritapera (CoA), and Cabeça D'Onça (CdO) (Figure 1).

The first step in conducting this research was to contact the general president of the Aritapera region and the presidents of each community to request permission to temporarily settle in the communities and talk to the dwellers. In addition to contacting them by telephone, I attended two meetings of the local committee, which included not only community representatives but also



dwellers. This allowed me to expand my network, and broaden the project's scope, and make some residents aware of this study.

With the arranged logistics and the project proposal explained, data collection began. This phase took place between 18–25 February and 8 April–4 June 2023, totaling 64 days of immersion. We chose the semi-structured interview method (Huntington, 2000); here based on predefined topics, the interviewee developed the subject in a way that best suits them. The key topics to be addressed include the frequency of anaconda sightings and the time of year they are most commonly seen, information about possible encounters between the locals and anacondas, the emotional relationship between the locals and

these animals, cases of killing, stories, uses, problems, and recollections of encounters.

To process the data without losing information, the responses were systematized into broad topics divided into subtopics. Once systematized, data were analyzed both qualitatively and quantitatively to understand the relationship between the riverine people of the Lower Amazon floodplain and the local anaconda population. The information was obtained on a community-by-community basis and later cross-analyzed.

At the end of the study, we organized a follow-up visit to the communities to provide the dwellers with feedback on the study in which they participated. The return visits occurred between 24–29 October and 7–10 November 2023.

3 Results

Due to its open nature, the interview method used provided us with a broad range of information, totaling approximately 43 h 21 m of conversations with residents of different genders, ages, and occupations. To better visualize and understand the topics addressed, we performed content analysis based on Bardin (2016). Based on the main subjects discussed in the interviews, we created 18 major topics about the anaconda that permeated most of the narratives: frequency of appearances, ease of encounters, chicken coops, encounters in 2023, pregnant anacondas, encounter cases, reactions to encounters, hunting cases, defensive reactions, anaconda characteristics, density differences, uses, accident cases, emotional aspects, interviewee activity, the Great Snake legend, years of residence, and venom. For better data utilization, we divided each topic into subtopics (ranging from four to 14 divisions each), within which we categorized the collected information.

The information obtained was classified in a way that allows understanding the context of the relationship between riverine dwellers and anacondas in each community, and is presented below in topics. The percentages shown refer to the number of interviews conducted on each topic, not the number of participants. Due to the format of the interviews, conversations could occur simultaneously between different individuals. It is also important to note that throughout the conversations, although the same subject was always approached with key questions, not all topics were mentioned by all participants. Whether the conversation took a different direction or was the participant's choice, the priority was to make them feel at ease in a situation similar to an informal conversation. Thus, the percentages are often derived from the number of accounts that address a given theme rather than the total number of interviews conducted.

3.1 General profile of respondents

In the Água Preta (AP) community, 36 interviews were conducted, involving 47 residents of both sexes (27 men and 20 women), encompassing four age groups: six participants aged 18–29 years, 16 aged 30–50 years, 23 aged 51–79 years, and two aged 80–100 years. Among these residents, at least 38 (80.85%) reported being born in the community even if they had spent a few years living elsewhere.

In Carapanatuba (Cp), 23 accounts were collected, including 31 residents (18 men and 13 women). Respondents were aged 30–50 (11 participants) and 51–79 (20 participants). In 19 accounts (61.3%), participants mentioned being born and raised in Carapanatuba, although two indicated having spent some time away and another two stated that they had moved to the mainland several years ago.

In the Centro do Aritapera (CeA), 37 interviews were conducted, involving 57 dwellers (27 women and 30 men). The interviewees included 19 dwellers aged 30–50 years, 33 aged 51–79 years, four aged 80–100 years, and one who chose not to disclose

their age. At least 75.4% of respondents (43 out of 57) reported being born in the community, while another 8.7% (five out of 57) reported moving to the region over a decade ago.

Thirty interviews were conducted in the Costa do Aritapera (CoA) community, encompassing a total of 40 participants (23 men and 17 women). Among them, six were aged 18–19 years, 19 were aged 30–50 years, and 15 were aged 51–79 years. At least 62.5% of the respondents (25/40) were born in the community, nine had moved there more than 10 years ago, and three were recent residents.

In the Cabeça D'Onça (CdO) community, 27 interviews were conducted with 40 participants (20 men and 20 women). Among these, one was aged 18–29 years, 16 were aged 30–50 years, 17 were aged 51–79 years, two were aged 80–100 years, and four did not provide their age. At least 60% of the respondents (24 participants) reported being born in the region; two moved there as children, three in their 20s, and one as an elderly person aged 85.

3.2 Frequency of sightings and density

Dwellers from the five communities reported frequent sightings of anaconda, ranging from 0 to 10 in a single year. In 2023, up until the date of the interview, they reported an average of 0.26 ± 0.5 sd *sucuris* in Água Preta; 0.5 ± 1.14 sd in Carapanatuba; 0.4 ± 0.5 sd in Centro do Aritapera; 0.7 ± 1.23 sd in Costa do Aritapera; and 0.42 ± 0.6 sd in Cabeça D'Onça. It is important to note, however, that the frequency of sightings was not uniform within each community, with some houses receiving up to five visits, while others received none during the same period.

The most likely scenarios for an encounter were when the dwellers were fishing or when they were inside the chicken coops, followed by when the anacondas were trapped in fishing nets (Figure 2). In the latter, it is typically tangled at the bottom of the river, and dwellers have to cut it to remove the animal. Additionally, some interviewees mentioned that anaconda sightings are more common at night (in the yard near the houses), especially during strong storms.

Despite the occasional classification of sightings, typically occurring at a rate of three to four snakes per year, in the Centro do Aritapera community, 46.43% of the participants indicated that it had been a long time since they last encountered an anaconda, with some having gone up to 13 years without spotting one. In this regard, there was consensus among the communities regarding a possible decrease in the density of the species (94.4% AP, 78.6% Cp, 90.3% CeA, 83.3% CoA, and 90% CdO). In the Água Preta and Costa do Aritapera communities, over 90% of the reports indicated that this change occurred more than a decade ago. In Carapanatuba, only two participants mentioned the topic: one indicated around 10 years and the other when they moved houses (suggesting a more geographical than temporal issue). In the Centro do Aritapera and Cabeça D'Onça communities, about 58% of participants also indicated that this change occurred more than a decade ago, ranging from the 60s in CeA (42.7%) to the 70s in CdO (14.3%).

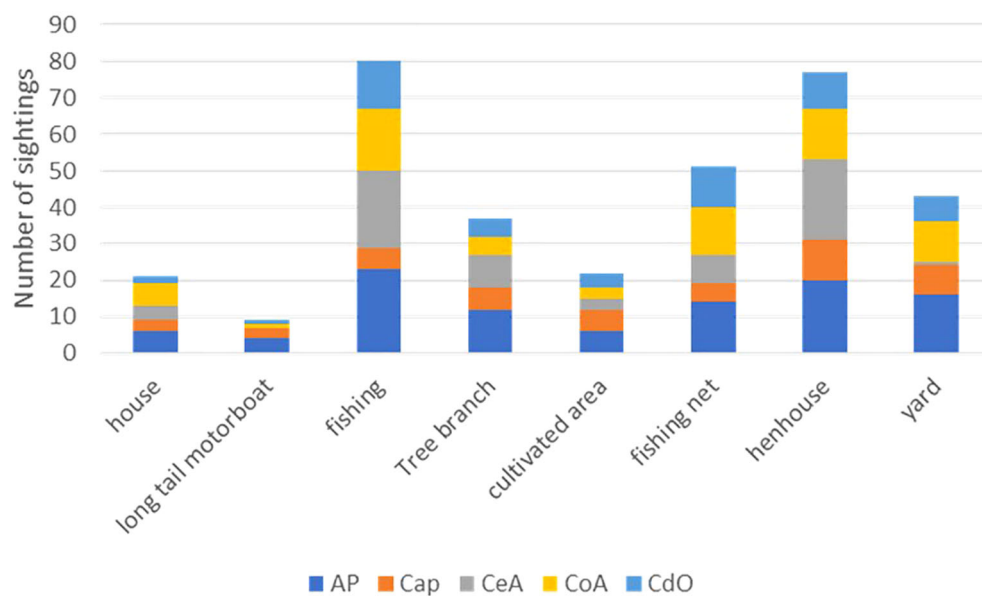


FIGURE 2

Most common locations for sightings of *Eunectes murinus* according to dwellers of the five communities. Communities: AP, Água Preta; Cap, Carapanatuba; CeA, Centro do Aritapera; CoA, Costa do Aritapera; CdO, Cabeça D'Onça.

The remaining participants indicated a more recent period (less than 10 years) or did not notice any significant differences between the past and present.

The main reasons cited for this population density change varied between natural causes and the phenomenon of land expansion (sedimentation of riverbanks), decrease in Montrichardia forests (known as aningal), and lower flood levels—and anthropogenic causes—moving houses (higher/lower areas or far/near from the aningals), animal hunting, increased protection of livestock (chickens kept in pens), change in habits (such as the activity of harvesting jute, which requires long periods of time in the water), community growth (increasing noise, both in the water and on land, and decreasing forested areas), and opening of pastures. Among these, animal hunting (whether for leather, fat, or to protect livestock) and the decrease in aningal were the most cited causes for the reduction/avoidance of sucturis, with 18 reports each (Table 1).

For leather collection, the dwellers gathered in groups to do the hunting. One method to find the individuals was to set fire to the grass and return two days later to follow the tracks. Another technique was the “soca-soca,” where they would insert a stick into the holes created during the low water period to find the snake; they were then captured with a lasso as they were stuck in the mud. The leather would then be removed and left to dry in the sun.

Among the narratives, there was also mention of the variation in the average size of the individuals. The largest individuals observed were about 6 m + 2.4 m (ranging from 2 m to 15 m) and dated back to past decades, while more recent sighting featured individuals averaging 2.3 m + 0.8 m. Finally, the time of year also proved to be an important variable influencing anaconda sightings in the communities. In all five communities, most interviewees reported that they appear more during the flood season or during

the flooding, suggesting that the deeper the water, the better (89%—32/36 interviews in AP; 73.9%—17/23 interviews in Cap; 61.2%—23/37 interviews in CeA; 70%—21/30 in CoA; and 90.5%—19/21 reports in CdO).

3.3 Reaction to encounter

Among the total interviewees, we collected 67 accounts where participants indicated that the most common reaction to encountering an anaconda is usually to kill it (23 in AP; 12 in

TABLE 1 Main reasons cited by residents of the five communities as the primary causes for the decrease/reduction in the number of sucturis in the region.

Cause	AP	Cap	CeA	CoA	CdO
Sedimentation	5				1
House location	1	2		1	3
Loss of Montrichardia habitat	3	5	7		3
Killing	3	1	5	5	4
Lower flood levels	1	2	1		
Protected livestock	1	1	3	2	
Habit change			1		
Community growth			2	1	4
Pasture					4

Communities: AP, Água Preta; Cap, Carapanatuba; CeA, Centro do Aritapera; CoA, Costa do Aritapera; CdO, Cabeça D'Onça.

Cap; 15 in CeA; 9 in CoA; 8 in CdO). The Água Preta community showed the highest predisposition to killing, with 32 cases reported (Figure 3A). In all communities, this action was more common among men than among women. That is, although some women claimed to have killed an anaconda, others also stated they had never done so, even in an encounter; the reasons ranged from fear to lack of necessity (Figure 3B).

More than personal safety (15.9%), fear (6.8%), or the search for fat (13.3%), the main motivation for killing anacondas was economic—either to protect livestock (47.7%) or, in the past, to trade their skin (15.9%). The damage the anacondas currently cause to livestock can be summarized by a resident from Água Preta (Drn, male, 28 years old): “The biggest loss is that they keep taking chicks and chickens...” Dwellers expressed frustration at having to invest time and money in raising chickens, and then lose part of their flock overnight. One interviewee even mentioned retrieving a chicken from inside an anaconda’s belly, as it had just been swallowed and was still fresh.

Among the 35 accounts that mentioned simply walking away from an anaconda without attacking it, 60% (70%—7/10 AP; 60%—3/5 Cap; 50%—6/12 CeA; 75%—3/4 CoA; 50%—2/4 CdO) were related to fishing, particularly when the snake was in the water or perched on a branch. According to the reports, larger anacondas are more commonly encountered while fishing, with the largest one reported measuring 10 m–12 m: “Bigger than the motorboat and as wide as a large pot,” described a participant from Água Preta (Drn). The smallest anaconda mentioned was 83 cm, a juvenile. On average, those seen around houses and chicken coops were reported to measure approximately $2.3 \text{ m} \pm 0.8 \text{ m}$ in length.

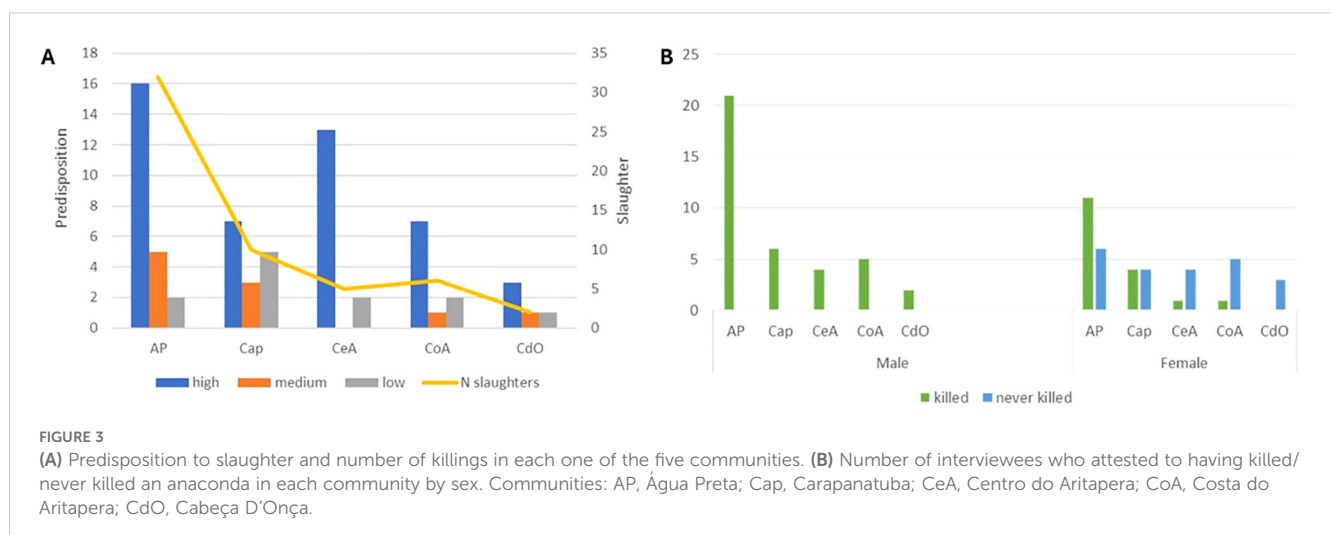
Some of the tools mentioned for dealing with anacondas included bladed weapons, such as machetes and knives; tools like axes and sickles; large, sturdy objects available at the moment, such as sticks and poles; fishing hooks; and firearms. However, a common method identified for handling anacondas involved dragging them by their tail across dirt or sand. According to dwellers, moving the snake backward on such surfaces causes its scales to lift, trapping grains between them, which inhibits its undulatory movement.

In any case, using the snake’s fat after killing it proved to be a common practice, particularly when the snake was thick-bodied (84.2% AP; 85% Cap; 71.4% CeA; 55.5% CoA; and 60% CdO). Interestingly, in CoA, most dwellers did not keep the fat for themselves but donated the carcass to a woman in the community (interview with dFsD, 68 years old) who processed it. She was considered the local reference for treatments using zootherapy.

Additionally, dwellers shared some cultural techniques for avoiding encounters or scaring anacondas away from their property. According to those interviewed in Carapanatuba (interview MnMc), “When you kill one anaconda, the others get scared and won’t come back.” Furthermore, as another dweller from the same community explained, if you “place the snake’s head on a stake and display it in front of the house,” it would deter others. In another interview, a plant called *sucuriju* (local name for *E. murinus*) was mentioned, with claims that its tea has the same anti-inflammatory properties as the snake’s fat. Having this plant at home, according to the interviewees, would prevent the animal from entering the property.

3.4 Feelings and perceptions about the anaconda

Fear of the anaconda (identified in 44.5% of the reports) is related to the belief that it is a treacherous and sly animal. The interviewees convey that the anaconda is a silent creature that arrives without making any noise, causing them to feel uneasy and always vigilant during fishing (precaution/respect—emotions mentioned in 22.7% of the reports), with the fear of having their canoe flooded in case of an attack. Some dwellers even reported being more afraid of an anaconda than of a crocodile because the latter warns when it is about to attack. Other emotions related to the anaconda include anger (8.2%)—particularly when it is near chickens; aversion (4.5%); and indifference or neutrality (disliking it or stating that they feel neither anger nor fear—20%) (Figure 4A).



Throughout the reports, we identified 70 characteristics related to anacondas, including physical traits, habits, and personality (Figure 4B). Besides treacherous (7.52%—23/385) other characteristics related to anacondas were luring (4.2%—13/385) and stealthy (3.6%—11/385), precisely because they make no noise: “it comes and you don’t even see it” (as summarized by resident Crbt, 32, from Água Preta); that is why it is considered luring, because it seems that the person, or the prey, becomes hypnotized. They also pointed out the hiss (4.9%—15/385), like a whistle, that it makes when ready to strike.

Some interviewees also described anacondas as brave (1.9%—6/385) because, even when they are young, they already have the boldness to go after prey. Boldness (0.7%—2/385) was also related to the offspring, which are already born ready to attack. Additionally, they highlighted its size, mentioning that it is a large (1.6%—5/385), strong (3.6%—11/385), and fat (0.3%—1/385) animal, and that, to attack, it twists its tail (2.9%—9/385), throws the lasso (3.3%—10/385), and wraps it around the prey (4.6%—14/385), with this coiling being the most dangerous part.

For some, a large anaconda could kill and swallow a person, while for others, it posed no risk at all. In general, only 2.1% of the characteristics were positive or neutral, divided between harmless (1.6%—5/385), not aggressive (0.3%—1/385) and did not attack people (0.6%—2/385). Furthermore, the accounts regarding perceptions of the anaconda also included ecological information, which is discussed in more detail in the following section.

3.5 Ecological information

In most cases (83%), the participants identified the anaconda as a non-venomous animal (compared to 16.6% who mentioned it might be somewhat venomous), emphasizing that its danger lies in

its strength. The species mentioned as venomous were primarily the surucucu (i.e., jararaca—*Bothrops* sp.), the comboia (*Bothrops atrox*), and the coral snake (since it was not observed during the fieldwork, it is not possible to determine whether it belongs to the *Micrurus* sp. species or is a false coral). In nine interviews (with at least two dweller in each community), it was also mentioned that the boa (*Boa constrictor*) and/or the pepeua (*Waglerophis merremi*) could be venomous, but only in May (the period of its reproduction). The boa constrictor, in addition to being more venomous than the surucucu, was said to become faster than usual during this month, as it is its reproductive period.

The reports on the reproductive period of the anaconda varied among the interviewees, as did its reproductive method. While some dwellers claimed that the female lays eggs, others compared it to the alligator, explaining that, unlike alligators, which incubate their eggs externally, anacondas retain their eggs internally, giving birth to fully formed hatchlings. Among the 73 reports that mentioned the reproductive characteristics of the anaconda, 95.5% said they had seen a pregnant anaconda, either with eggs (62%) or hatchlings (38%). According to the reports, they had observed between 20 and 257 hatchlings emerging from the same mother after being killed, and up to 150 very small hatchlings still inside her belly. As for the eggs, they reported seeing a larger quantity, reaching up to 300 eggs inside the belly of a single individual. The eggs were described as similar to chicken or turtle eggs, usually white, with soft shells, and yellowish when still in formation, or even red.

The sightings of anacondas gravid with eggs were limited to the summer but varied between June–August (low water), February–May (beginning of the flood), and even October–November. On the other hand, encounters with hatchlings were reported both in summer and winter, during rising or receding water. Thus, among the reports of those who had seen or heard about the

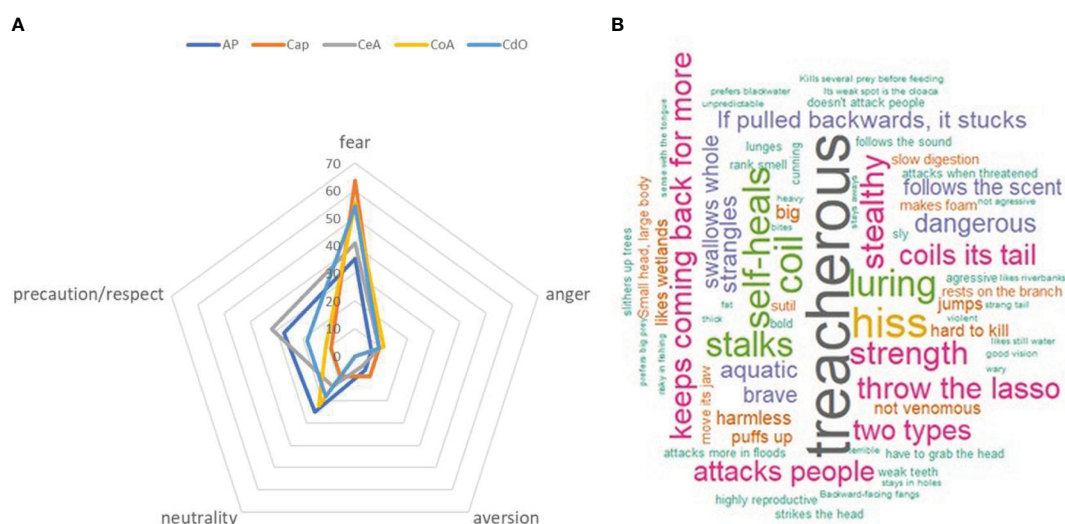


FIGURE 4 (A) Emotions related to the anaconda in each community involved (AP, Água Preta; Cap, Carapanatuba; CeA, Centro do Aritapera; CoA, Costa do Aritapera; CdO, Cabeça D'Onça). (B) Wordcloud summarizing the main characteristics of anacondas as described by the dwellers of the five communities all together.

anaconda in its reproductive period, the interviewees concluded that it incubates in the summer and mates over several months, producing many offspring. As highlighted by one interviewee (interview AgVd, 61 years old, Cap), individuals during their reproductive period spend the whole summer in a *panelaço* (a type of hole in the ground), and thus become thin. Another dweller (interview Nei, 42 years old, CeA) added that during the reproductive period, the anaconda becomes more aggressive and questioned whether they exhibit parental care.

Some encounters with gravid anacondas occurred due to the hunting of the animal for its fat; since it was plump, the dwellers couldn't discern whether it had a lot of fat or if it was pregnant. Some also mentioned having opened the egg inside the mother and were surprised to see that the hatchlings were already formed, with their tongues out, ready to attack, being brave from birth (Figure 4B). Although it is generally mentioned that the hatchlings survive even if the mother is killed, in one interview, the participant said that if the mother dies, the hatchlings also die.

However, what most surprised and alarmed the interviewees was the number of offspring the animal produces. In this sense, they explained that the number of anacondas increases very quickly because they give birth to many young. We highlight a specific occasion where a former resident found eight snakes together in heat, of which he killed seven. Those who knew the story defended that it was a good reaction, as otherwise, there would be many more, as they were copulating. Among other reports of anacondas in heat (seven in total), all described a group of animals (ranging from three to eight individuals), with the female being the largest individual and the males smaller. There were also reports of possible interspecific copulations. One resident (interview Frcc, 62 years, AP) said he saw an anaconda coiled with a boa on a tree—although he believed they were fighting, some told him they were probably copulating; and another participant (interview Stos, 48 years, Cap) said he saw an anaconda in heat with a surucucu (*Bothrops* sp.).

Although in five reports, dwellers said it was possible to visually identify the sex of the anacondas, the characteristics were not consensual. In some of the reports, they reported that the female was shorter and thicker, and the male was larger. Meanwhile, other dwellers reported the opposite, saying that the female was longer and the male smaller. However, despite this, in general, dwellers said they could not differentiate between males and females beforehand, only in cases where they opened the animal and found eggs or young inside.

The interviewees also described anacondas as a “water animal,” which does not live on dry land. Thus, during the drought season (winter), they would remain in holes in the ground or move from one well to another. They also commented on the hunting/fishing habits of this species. When it is digesting or lying-in while waiting for prey, it coils itself on a tree branch (Figure 4B). Regardless of the situation, once on the branches, it takes time for it to move. In fact, to catch prey, one can wait for days in an ambush. They also said that its fang was turned backward to bite and grab, with its jaw moving to swallow the animal whole, rather than tearing pieces like a caiman. Additionally, they reported that it is attracted by the smell of chicken feces (following the scent) and, after capturing one, it continues to return for more (Figure 4B). Among its observed prey

were the toró (*Dactylomys dactylinus*), capybara (*Hydrochoerus hydrochaeris*), tinga caiman (*Caiman crocodilus*), tracajá (*Podocnemis expansa*), tapir (*Tapirus terrestris*), pigs, surucucu (local name for *Bothrops* sp.), and, of course, backyard birds, such as chicken, duck, and chick.

Furthermore, they commented on how the animals captured their prey. According to reports, the anaconda is a stealthy animal that arrives unnoticed. It first monitors the prey, and at the time of the attack, it coils its tail around something to support and throws the lasso, capturing it with its mouth. For this reason, in all the communities, the anaconda was considered more treacherous and sutil than aggressive (Figure 4B). According to the interviewees, it coils itself to wait for the prey and can stay still, observing it for a while. Many, in fact, have felt watched by them during fishing and were afraid that it might throw the lasso.

3.6 Use of anacondas

According to previous reports, hunting anaconda for its skin was very common and economically profitable. According to participant Svtr (75 years old, CeA), it was considered almost a status symbol among young men, which would be regarded as successful. According to this interviewee, the leather of an anaconda of 5 m was sold for an equivalent of R\$1,500 (US\$255.00). At least two participants in each community claimed to have hunted anaconda to sell its skin (in groups with 13 participants in total). This practice involved removing the animal's skin, stretching it by the ends on a stick to dry; afterward, it was rolled up and sold. Anaconda's skin was more valuable than that of a caiman, as long as there were no holes or wounds on the hide. One resident mentioned having already sold chameleon leather in addition to these.

After the ban on the use of snakeskin, this practice fell into disuse. Currently, when the skin is used, it is grated, burned, and macerated to produce a powder. This powder is then used to heal wounds, mainly in animals (a practice reported by Cap, CeA, and CdO dwellers). However, the main use of anaconda derivatives in these communities was its fat, which was mentioned by 74.5% of the interviewees. The largest amount of fat obtained from the same animals was 9 L. Currently, fat is used more by dwellers than sold, although four reports mentioned having sold it. One participant (interview StRs, 63 years, Carap) mentioned having sold fat many years ago at R\$ 40.00 per liter (US\$6.80). Other fats used as zootherapeutic by dwellers were from stingrays, caimans, boas, and Amazon River dolphins.

As for meat, although an interviewee of Cabeça D'Onça and a relative of a dweller from Costa do Aritapera claimed to have eaten snake meat (probably *Bothrops atrox*), no one reported having eaten anaconda meat, or had the desire or the need to do so.

3.7 Record of encounters

Based on the stories told, it was found that the most common place to encounter anacondas was during fishing. Out of 153

interviews discussing the subject, in 80 of them the dwellers mentioned that they had come across this animal while fishing (28.7% AP; 7.5% Cap; 26.2% CeA; 21.2% CoA; 16.2% CdO—Figure 2). Notably, some of the most famous conflict cases have also occurred during fishing. Among these, we highlight the stories of *Seu Braz* and *Dodó*, which were repeatedly narrated across all communities, even though both incidents took place in Água Preta. These accounts generally describe an initial attempt by the animal to strike, followed by the near flooding of the canoe, culminating in the anaconda's death.

In *Seu Braz's* case, the anaconda leapt at him while fishing but failed to drag him into the water because he clung to the vegetation, ripping his shirt. The animal had escaped and was not found again. Although *Braz* still owns a house in Água Preta, he spends most of his time in Santarém, PA, so we are unable to meet him in person. In *Dodó's* story, he was fishing with a group of three and had fallen asleep in the bazaras. When they realized it, an approximately 5.2-meter-long anaconda was already boarding, its head in his cousin's canoe. Fortunately, they noticed in time, shouted to warn him, and killed the anaconda. Although *Dodó* was not in the community during the interview period, I managed to speak with his wife, who was also from Água Preta.

Another frequently mentioned fishing incident involved a man who earned a nickname: “resto de sucuriçu” (the anaconda remnant—in a literal translation). His story became so famous among the communities that a local artist made a drawing inspired by it, reflecting the common vision of the story (Figure 5). It is said that he was on a tree trunk harpooning pirarucu (*Arapaima gigas*). As he lowered the spear, the anaconda struck, coiled around his waist and one arm. To avoid being dragged, he clung to the aningas. He called for his son, who helped him break free while he struck the snake with his free hand.

Two other cases, also from Água Preta, frequently mentioned across all communities are those of *Sara* and *Neide*. *Sara's* case appears to be the most recent, possibly occurring in 2019 during the flood season. It is said that *Sara* was washing clothes on her home's pier when an anaconda leapt at her but missed its strike. Startled, she screamed and her husband came to her rescue, killing the anaconda with a harpoon. According to these accounts, it was very large, measuring over 4 m in length. In the same house, there was a year when an anaconda took six ducks. Currently, due to the fear of anacondas, no one lives there anymore.

Neide's case occurred at the end of the 1980s or the early 1990s also during the flood season. She was washing dishes on the open pier of her kitchen when she felt an animal striking her leg with force. She managed to jump back into the house. Although the animal let go, its tooth caught her leg, leaving it bruised and bleeding. Her husband set up a baited hook to discover what it was. Within a few days, they captured the anaconda. It was very thick and measured more than 5 m in length.

We collected other more isolated accounts of near-accidents or attempted strikes by anacondas as well as some stories where the subject of the tale held their breath, so the anaconda would not sense their presence, and escape. However, we chose to detail these specific accounts because they are widely known throughout the region. Finally, regardless of the victim's activity or what they were doing at the time, the incidents were always water related.

3.8 The legend of the Great Snake

Although existing, reports about the Great Snake are scarce. Among all the communities surveyed, seven people claimed to have seen or knew someone who had seen some indication of its



FIGURE 5

Illustration created to depict the story of the man known as “Resto de Sucuriçu.” Artist: Marrisson Pereira, year: unknown.

presence. The main characteristic described was the “fire in the eyes” in the middle of the river at night, a phenomenon explained by the reflection of the lantern light in the snake’s eyes. According to the testimonies, the Great Snake is an anaconda (or boa constrictor) that grew very large and now inhabits the Amazon River. In an interview in the Centro do Aritapera community, participants specified: “*The anaconda would be up to 10–11 meters; beyond that, it’s the Great Snake.*” Although both species share morphological characteristics, they pointed out that, once it becomes a Great Snake, it differs in color.

According to previous reports, the Great Snake tends to appear mainly during storms. Its movement, attributed to its large size, is responsible for the *banzeiros* (a regional term used to describe water swells in rivers), which can even rock the canoes. According to the interviewees, it slides along the riverbed but avoids grassy areas to prevent hurting its scales. Thus, to avoid encounters with the Great Snake, people would often jump into murizal (an aquatic vegetation similar to grass). However, reports have indicated that sightings were more frequent in the past. Nowadays, owing to the noise of boats, it is said to have moved away and is rarely seen.

Interviewees also presented inferences about the origin of the Great Snake. According to them, it would live coiled beneath the center of the town, with its head under the church of Óbidos, PA, located on the banks of the Amazon River. Its movement would be so powerful that it would cause earthquakes, having been responsible for the collapse of a part of the church. Another legend states that the Great Snake is so large that a knight can pass under its ribs while being mounted. Finally, there was also a racist anecdote in which a man, when approached by the Great Snake, remained motionless. Checking about his breathing from time to time, it decided not to swallow him, thinking he was a burned log and not a person.

4 Discussion

The method applied for data collection proved efficient for the intended objectives as the diversity of respondents involved resulted in narratives that encompassed different perspectives on the topic. This allowed for a more well-founded elucidation of the fragilities in the relationship between the dwellers of the Aritapera region and anacondas. The feedback process also proved to be an important part of the process, enabling collaborative discussions with residents to consider solutions for the issues identified. However, owing to the unprecedented drought in the Amazon River during the referenced year (Santos et al., 2024), we encountered difficulties in this process, as it was not possible to return to the communities of Centro do Aritapera and Cabeça D’Onça.

In general, interviewees from the five communities reported a decrease in the sightings of the anaconda over the years. The reasons provided as possible explanations for this change were primarily environmental. According to the dwellers, the white water of the Amazon, in addition to destroying the aningais (a type of blackwater vegetation), also promotes the deposition of solid

material on the riverbanks, which began to silt up the community—a phenomenon known as “*terras crescidas*” (expanded lands), common in the floodplain regions of Santarém (Anderson and Pinheiro, 2022). The combination of these factors would reduce the available habitat for animals.

In addition to the environmental explanations, anthropological reasons were also mentioned. Some dwellers reported that, in the past, hunting anacondas for their skin was permitted and a common practice (which ceased after the prohibition under Environmental Crimes Law No. 9,605/1998 and Regulatory Instruction 07/2015). For some interviewees, hunting practices were one of the causes of the decrease in anacondas, due to both direct killing and burning of aningais to locate them (the primary habitat of these animals). As summarized by resident Crbt, for him, the main problem for these animals is “*the pursuit by mankind.*”

Thus, although environmental factors were cited, their interaction with human activities could not be overlooked. For instance, aningais degradation may result not only from changes in the water level but also from human actions such as burning and deforestation. Another point raised was the location of the houses, as some dwellers reported fewer encounters after moving, whether due to geographic factors or the presence or absence of nearby livestock. In this regard, the reduction in free-range poultry farming has attracted fewer anacondas near home, thereby reducing the number of sightings.

This suggests that the decline in encounter frequency may be due not only to a reduction in population density, but also to the animals retreating to more sheltered locations. Variation in the average size of frequently sighted individuals was also identified, decreasing from 9 m to 2 m. This is corroborated by the fishing activities (the main occupation of the respondents). Although fishing areas are still among the easiest places for sightings, reports indicate that in the past, encounters were not only more frequent but also involved larger individuals. Therefore, there was not only a decrease in the number and frequency of encounters but also in the average size of the individuals observed.

One resident even mentioned that the anacondas had disappeared and emphasized their importance for medicinal purposes. The use of anaconda fat as a zootherapeutic aligns with that described in the literature, as its properties have been pharmacologically tested (Abrão et al., 2021; Souza et al., 2017). Thus, the decline in anaconda populations could pose a problem for the riverside population, as fat is considered an important zootherapeutic among the dwellers. This presents a valid point for proposing community-based management of these animals, advocating for controlled harvesting based on the economic benefits the animals can bring to the community (Camera et al., 2023; Rivas et al., 2007), both in terms of subsistence and sales. Reports of the selling and purchase prices for this zootherapeutic range between R\$70.00/L (US\$ 11.54) and R\$50.00–R\$70.00/L (US\$ 8.24–US\$ 11.54), respectively. The development of a management plan aimed at ensuring the continued availability of anaconda fat could be well accepted by the dwellers as a sustainable conservation strategy.

There have also been reports of anacondas preying on the lancehead snake (*Bothrops* spp.), a highly dangerous species for locals. Although there is evidence of *Eunectes murinus* eating other snakes and even conspecifics (Rivas, 2000b) in the literature, we did not find any accounts of *E. murinus* preying on *Bothrops* spp. However, if this is confirmed, it would be another strong argument for the maintenance of anaconda populations, as ophidic accidents in this region are very common (Cosendey and Pezzuti, 2024).

Regardless of the frequency of encounters, interviews revealed a medium-to-high predisposition among residents to kill anacondas, varying between communities and especially between genders—since, in none of the communities, any male participant claimed never to have killed an anaconda. This suggests a stronger association with the power and virility that hunting represents for this demographic (Stuhmiller, 2015). Overall, there was a consensus among participants from the five communities that most conflicts with anacondas arrived from their attacks on poultry. Dwellers of Água Preta, having a longer history of anaconda sightings compared to other communities, have developed the habit of keeping their poultry confined in coops or similar enclosures, especially at night.

However, it was found that building coops do not always prevent anacondas from entering, although this makes their escape more difficult. According to the dwellers, this happens because, after feeding on prey, the anaconda “*tufa*” (a local verb used to describe the expansion of body parts after consuming an animal), making it unable to exit through the same gaps it used to enter. Consequently, despite the fear that residents feel (Wilson, 1984; Crump, 2015; Cosendey and Salomão, 2016), the primary emotion behind these killings was anger.

For instance, Água Preta was both the community where participants showed the highest propensity to kill anacondas and, due to the significant number of conflicts, the community where participants expressed the most anger toward this animal. The anger was primarily tied to economic issues, as illustrated by interviewees of the aforementioned community, who identified the main problem with anacondas as the financial loss caused by their predation of chickens: “*We spend time feeding and raising the birds, and then the snake comes and takes them*” (literal translation). Beyond protecting poultry, financial concerns were also linked to the destruction of fishing nets, which is why the dwellers disliked Amazon River dolphins and caimans (*personal observation*).

Fear, on the other hand, acted as a deterrent to killing, as evidenced by the women who were the most likely to report fear and also the least likely to kill an anaconda. Similarly, during fishing trips, the primary activity of the respondents, encounters with anacondas tended to be less conflictual, at least in recent times. In general, participants reported a more cautious approach in this context, usually opting to move away upon sighting an anaconda, possibly because of their sense of vulnerability while in the water.

As a result, aningais, river islands with high densities of *Montrichardia arborescens* Schott (Cruz et al., 2008), are generally avoided and even feared by fishermen. These areas are reputed to harbor not only large numbers of snakes (among the marajás,

Bactris maraja, or within aquatic vegetation), but also other large and dangerous animals, such as arapaima and caimans. In addition, dense vegetation reduces visibility and increases feelings of insecurity. Anaconda killings during fishing were reported only when encounters involved groups of men, who would kill the very large animals and bring their carcasses back to the community as a trophy—sometimes nearly sinking their canoe (*bajara*) in an effort to transport it to the land.

Thus, the narratives clearly show that, despite there being a cultural factor regarding the subject of the killing, innate fear (Wilson, 1984) and the “fear of the unknown” (Crump, 2015) were locally replaced by a practical feeling of discontent from the dwellers regarding the potential economical damage caused by the anacondas. Therefore, despite there being reports with esoteric and mythological biases, we identified a shift from the role of the indestructible predator (Cosendey and Salomão, 2016) to that of a “*chicken thief*” (colloquial expression used in Portuguese to describe small and furtive actions). Thus, since the prohibition of snakeskin sales, when people would go after the anacondas, the main way to avoid slaughter is by preventing the anacondas from approaching the communities, especially poultry.

The perceptions expressed about the anaconda reinforce this argument, as the adjectives used revolved around their role as treacherous and stealthy, arriving unseen. This role reversal probably occurred because of frequent contact between the dwellers and this animal. Thus, the paradigm of fearing the different or unknown—common to non-charismatic animals—was broken, giving way to a practical feeling stemming from daily life. Even though stories about sightings of the Great Snake have been reported, these were few and, like the large snakes, are more related to the past. Thus, anger, not fear, proved to be the main trigger for killing.

Another consequence of this daily interaction is the extensive knowledge gained about the ecological and biological characteristics of the species, characterized as Traditional or Local Ecological Knowledge (TEK and LEK—Aswani and Lauer, 2013). In this regard, we highlight reports on the constriction behavior of anaconda and its reproductive mode. Regarding the first, it was reported that when feeding, the anaconda coils its tail to a branch for stability, jumps onto its prey, bites it near the head, and then throw the lasso around its body, suffocating it; after that, it swallows the whole animal, starting with jaw displacement. These descriptive reports show the similarities between dwellers’ prior conceptions and scientific knowledge published on the subject (Baptista et al., 2008; Willard, 1997).

Regarding the reproduction of the anaconda, the interviewees explained that it mates in breeding aggregations, composed of one female and several males (Rivas, 2000a), and that it gives birth to fully formed offspring, reproducing on land and not in water. In an attempt to understand this concept, one dweller questioned whether the anaconda laid eggs and swallowed them to later give birth to the offspring. These inferences attempt to explain the ovoviviparous characteristics of this species, as stated by Reichel-Dolmatoff (1976), a cultural reinterpretation of the fact that the explanation for such a

phenomenon is sought through the subject's lived experience, in contrast to scientific narratives.

Although they did not know the scientific term used for both phenomena, they described, in their own way, the observed behavior from an emic perspective and intrinsic observation of the facts (Rosa and Orey, 2012). Similarly, we have reported that snakes are venomous during their reproductive period, representing a way to avoid contact during a time when they may be more aggressive (Cosendey and Simonian, 2025). As stated by a resident of Água Preta, "*Culture is a way of telling the story.*"

4 Conclusion

We conclude that in the analyzed communities, the anaconda has lost its traditional role in folklore as a spiritual and mythological entity, now being perceived in a pragmatic way, primarily as an obstacle to free-range poultry farming. However, cultural factors remain in the act of killing these snakes, as this activity is predominantly carried out by men. The decrease in conflicts and encounters with large specimens, resulting from the general reduction in sightings, highlighted that anger, driven by economic losses, was the main factor triggering the killing of anacondas. Therefore, protected henhouses can lead to a decrease in the number of kills. The analysis of different poultry enclosures, including cases with and without anaconda attacks, revealed that structures with closely spaced slats covered with nylon mesh and overlaid with a plastic aviary grid provided the best solution for securing chicken coops. Because large anacondas can squeeze through small gaps, it is essential for construction to use closely spaced slats and an additional protective layer. While nylon mesh, despite being fragile, prevents snakes of any size from passing through the plastic grid, although allowing smaller animals to enter, blocks larger ones, and protects the nylon mesh from damage. Thus, we conclude that the main concern regarding the anaconda population in the Aritapera region has shifted from the myth of the Great Snake to the economics of the henhouse.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving humans were approved by the Ethics Committee license from Plataforma Brazil (CAAE: 66400022.0.0000.0018). The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

BC: Writing – original draft, Writing – review & editing. JP: Conceptualization, Supervision, Writing – original draft.

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Conflict of interest

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