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Perception, preference and hunting strategies of mammals in a rural community in the semi-arid region of Northeastern Brazil

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Summary - The goal of this study was to characterize the hunting of mammals in a rural community in the Northeast of Brazil affected by the largest hydro project in the country. We used semi-structured questionnaires, free lists and visual stimuli to estimate the perceived abundance of species, which are prioritized for hunting, selection criteria and methods used in collection. 23 species were perceived as occurring in the region, which have potential for hunting. Of these, nine were prioritized for hunting *Conepatus semistriatus*, *Euphractus sexcinctus* and e *Dasypus novemcinctus* species with greater cultural prominence. The averages of perceived abundance of the species ranged from 1.1 a 3,8. Meat flavor was the main prioritization criterion at the time of hunting. Nine methods are used in hunting, which can be combined between, as well as used in more than one species. The recent scenario of environmental modification with the creation of perennial water sources may be promoting changes in the local hunting pattern. However, new research must be carried out to understand how the permanent availability of water will contribute to changes in socioecological systems in the Brazilian semi-arid region.

Keywords: Ethnomastozoology. Cinegetic species. Hunting.

Percepção, preferência e estratégias de caça de mamíferos em uma comunidade rural do semiárido do Nordeste do Brasil

Resumo – O objetivo deste estudo foi caracterizar a caça de mamíferos em uma comunidade rural do Nordeste do Brasil afetada pelo maior empreendimento hídrico do país. Usamos questionários semiestruturados, listas livres e estímulos visuais para estimar a abundância percebida das espécies,

quais são priorizadas para caça, os critérios de escolha e métodos empregadas na coleta. 23 espécies foram percebidas como ocorrentes na região, as quais apresentam potencial para caça. Destas, nove foram priorizadas para caça, sendo *Conepatus semistriatus, Euphractus sexcinctus* e *Dasypus novemcinctus* as espécies com maior destaque culturalmente. As médias de abundância percebida das espécies variaram 1,1 a 3,8. O sabor da carne foi o principal critério de priorização no momento da caça. Nove métodos são empregados na caça, podendo ser combinados, bem como usados em mais de uma espécie. O cenário recente de modificação do ambiente com a criação de fontes de água perene pode estar promovendo mudanças no padrão de caça local. Contudo, novas pesquisas devem ser realizadas para entender como a disponibilidade permanente de água contribuirá para modificações dos sistemas socioecológicos no semiárido do nordestino.

Palavras-chave: Etnomastozoologia. Espécies cinegéticas. Caça.

Percepción, preferencia y estrategias de caza de mamíferos en una comunidad rural en la región semiárida del noreste de Brasil

Resumen - El objetivo de este estudio fue caracterizar la caza de mamíferos en una comunidad rural del Nordeste de Brasil, operada por el mayor proyecto hídrico del país. Utilizamos listas libres semiestructuradas y estímulos visuales para estimar la abundancia percibida de las especies, las cuales son prioritarias para la caza, los criterios de selección y los métodos utilizados en la recolección. Se percibieron 23 especies presentes en la región, que tienen potencial para la caza. De estos, nueve fueron priorizados para la caza, siendo *Conepatus semistriatus, Euphractus sexcinctus* y *Dasypus novemcinctus* las especies culturalmente más destacadas. La abundancia media recibida de la especie osciló entre 1,1 y 3,8. El sabor de la carne fue el principal apoyo de priorización a la hora de cazar. Se emplean nueve métodos en la caza, lo que permite combinarlos y usarlos en más de una especie. El escenario reciente de cambio ambiental con la creación de fuentes de agua perennes puede estar promoviendo cambios en el patrón de caza local. Sin embargo, se deben realizar más investigaciones para comprender cómo la disponibilidad permanente de agua contribuirá a cambios en los sistemas socioecológicos en la región semiárida del Nordeste.

Palabras clave: Etnomastozoología. Especies cinegéticas. Caza.

Introduction

Animal hunting is still a practice reproduced by several human populations around the world (Hanazaki et al. 2009; Morales 2000; Lechuga 2001; Alves, 2012; Alves and Souto, 2015). Among the various motivations, the purpose of hunting for food represents the main demand for faunal resources. Among these, the group of mammals are one of the main targets of human attention (Nasi et al. 2008; Alves and Souto, 2015; Mendonça et al. 2015; Barboza et al. 2016).

Brazil has one of the greatest diversities of mammal species in the world (Burgin et al. 2018). Data from the Brazilian Society of Mastozoology indicate that at least 755 species of mammals occur in Brazilian territory (Abreu et al. 2022). Associated with this diversity of species, rural and traditional communities in Brazil have developed a vast knowledge about these animals, which is reflected in different practices and interactions (Alves 2012). Among the Brazilian biomes, in the Caatinga there are about 40 species of mammals, which are used by humans for food, medicinal, magical / religious and "pet" purposes (Alves et al. 2016).

The preference for hunting mammals in the Caatinga, especially for food, seems to follow patterns based on ecological and evolutionary models. Considering that most of the specimens shot in this group are medium to large animals (Cullen et al. 2000; Alves 2012; Alves and Souto 2015), the choice of these guarantees the hunter an interesting balance in the energetic cost-benefit ratio involved in the obtaining the resource. This selection behavior, based on the optimal foraging theory proposed by Marcarthur and Pianka (1996), is widely tested in ethnobiology studies (Ladio and Lozzada, 2000; Albuquerque et al. 2008, Soldati and Albuquerque 2011; Alves et al. 2017). However, hunting is a complex, multifactorial phenomenon and, therefore, studies that address cultural and ecological aspects allow for greater understanding of the mechanisms that modulate the relationship between humans and animals (Santoro et al. 2018; Albuquerque et al. 2019), as well as understanding the dynamics of hunting and, therefore, greatly assisting in the conservation of biodiversity (Melo et al. 2014).

As the relationships between humans and mammals within a socioecological system are influenced by cultural aspects, this interrelationship can cause impacts (Albrechtsen et al. 2007), but can also provide protection mechanisms for the species involved (Albuquerque et al. 2019). Thus, characterizing how human populations identify mammalian species, as well, as how they interrelate, may encourage conservation studies of the local mammalian fauna.

In view of this, the present research was developed with the objective of characterizing the local hunting practices in a community surrounding the project for the Integration of the São Francisco River with hydrographic basins in the Northeast, popularly known as the Transposition of the São Francisco River.**,** highlighting i) listing the species of greatest cultural importance; ii) the motivating criteria for hunting and iii) mammal collection strategies.

Material and methods

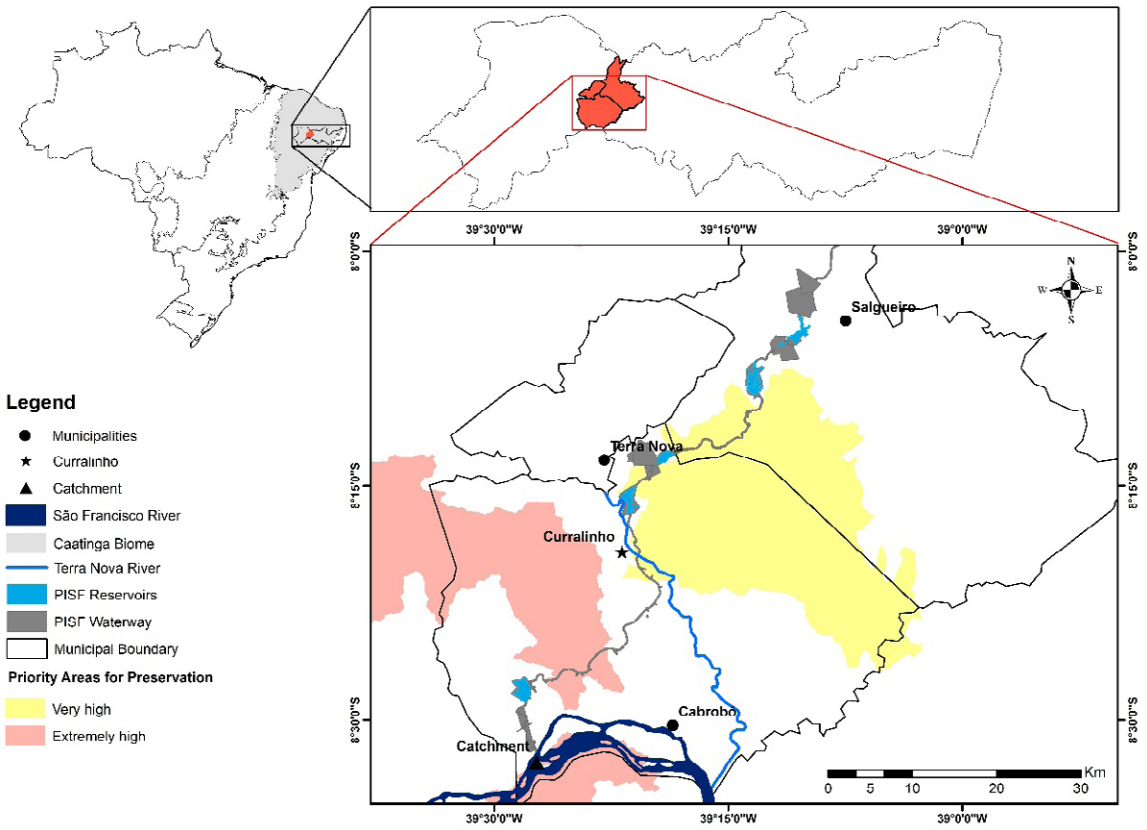
Study area

The study was carried out in the rural community of Curralinho, municipality of Cabrobó in the state of Pernambuco, northeastern Brazil. This city is located in the mesoregion of São Francisco Pernambucano, microregion of Petrolina and in the development region of Sertão do São Francisco (BDE, 2006). The headquarters is located about 536 km from Recife, the state capital. Its territorial area occupies 1,657.706 km^2, with the municipality of Terra Nova, to the north; the state of Bahia, to the south; Orocó and Parnamirim, to the west; and, Salgueiro and Belém do São Francisco, to the east (Pernambuco, 2006; Brasil, 2018).

From an ecogeographical point of view, the municipality of Cabrobó is located in the border region between the central Sertão and São Francisco de Pernambuco, in the middle of the ecoregion called the southern Sertaneja depression, in the Caatinga, considered as a priority area for conservation of the biome in the high and very high categories (Velloso et al., 2002; Silva et al. 2017, Brasil 2018).

Curralinho is located about 30 kilometers from the municipal seat. This area is on the border with the cities of Salgueiro and Terra Nova (Figure 01). Data from the health department provided by community agents show that Curralinho is currently subdivided into six farms, housing a total of 79 families and 239 residents.

Figure 01. Localization of the community of Curralinho, highlighting its localization in the triple border among the municipalities of Cabrobó, Terra Nova, and Salgueiro, in the State of Pernambuco. The map details the Caatinga biome, the priority areas for its preservation, the São Francisco river, and its affluent, the Terra Nova river, and the components of the Integration Project of the São Francisco river (PISF).



Source: Leandro Oliveira.

The productive systems developed by this population have gone through intense processes in the last 20 years. Excessive droughts and frequent crop losses at the beginning of the current decade (mid-2010-2011) caused rice production to cease in this location, the herds of cattle that survived were sold and onion production declined sharply. In the same period, with the interiorization of major works on the national scene, this location was impacted by the project to integrate the São Francisco River with the northeastern hydrographic basins (PISF), generating important changes in different aspects of the community.

Among the route that makes up the North Axis of the project, Curralinho is the first social group of greater proportion to be touched by the work, causing many local residents to be resettled in rural productive villages or to move to areas not directly affected by the implementation of the enterprise.

Legal aspects and access to local knowledge

In order to access local knowledge about mammals in the region and the relationships that the community develops with them, the present study was submitted and approved by the ethics committee for research with human beings (CEP) of the Federal University of Vale do São Francisco (UNIVASF) (CAAE: 81373517.4.0000.5196).

After approval by the CEP, partnerships were signed with local representatives, the first contact being made via the Cabrobó rural workers' union. On the first visit to the community, the representative of the local union gathered some of the associates to participate in a meeting, in which the objectives, risks and benefits of the research were exposed and clarified. Partnerships were also established with community health agents and teachers from the municipal school present in the locality.

Due to the whole scenario of tensions, that surrounds the study area, as well as the illegal character of the hunting activity, the participants' adherence was carried out gradually, with the research objectives explained again and the TCLE (Term of Free and Informed Consent) individually signed. The study took place between May 2017 and February 2019.

Selection of participants

The selection of participants was based on an intentional non-random sampling (Albuquerque et al. 2010), aimed at "local specialists", who are considered by the community as the people who hold information about mammals in the region. The identification of "local specialists" was carried out using the "Snowball" technique (Albuquerque et al. 2010), with the aim of covering all experts on the local mastofauna. It should be noted that people who had lived in the community for at least a decade were selected. In total, 45 people were interviewed, male, aged between 18 and 87 years. This number represents 38.5% of the adult male population residing in Curralinho.

Ethnobiological data collection

Data collection was based on four stages that occurred simultaneously, aiming to survey all the variables that were the object of this research. An a priori test was performed to select photographic material, with all steps described below.

Collection of data on mammalian species

Data collection related to hunted species, prioritization and selection of hunting sites was done using the free list method. For the list of species, the participant indicated the most hunted and then ordered each taxon according to capture priority (Mello, 1996; Huntington, 2000; Albuquerque et al., 2014). Additionally, they were asked about hunting methodologies, for which each informant indicated the methodology (ies) used to capture a given species.

Perception data collection of local mastofauna

Perception data were collected based on the work developed by Silva-Neto et al. (2016), using a combination of visual stimulus methods (checklist/interview and abundance perception diagram) (Medeiros et al. 2010; Albuquerque et al. 2014; Silva-Neto et al. 2016). Based on the list of species

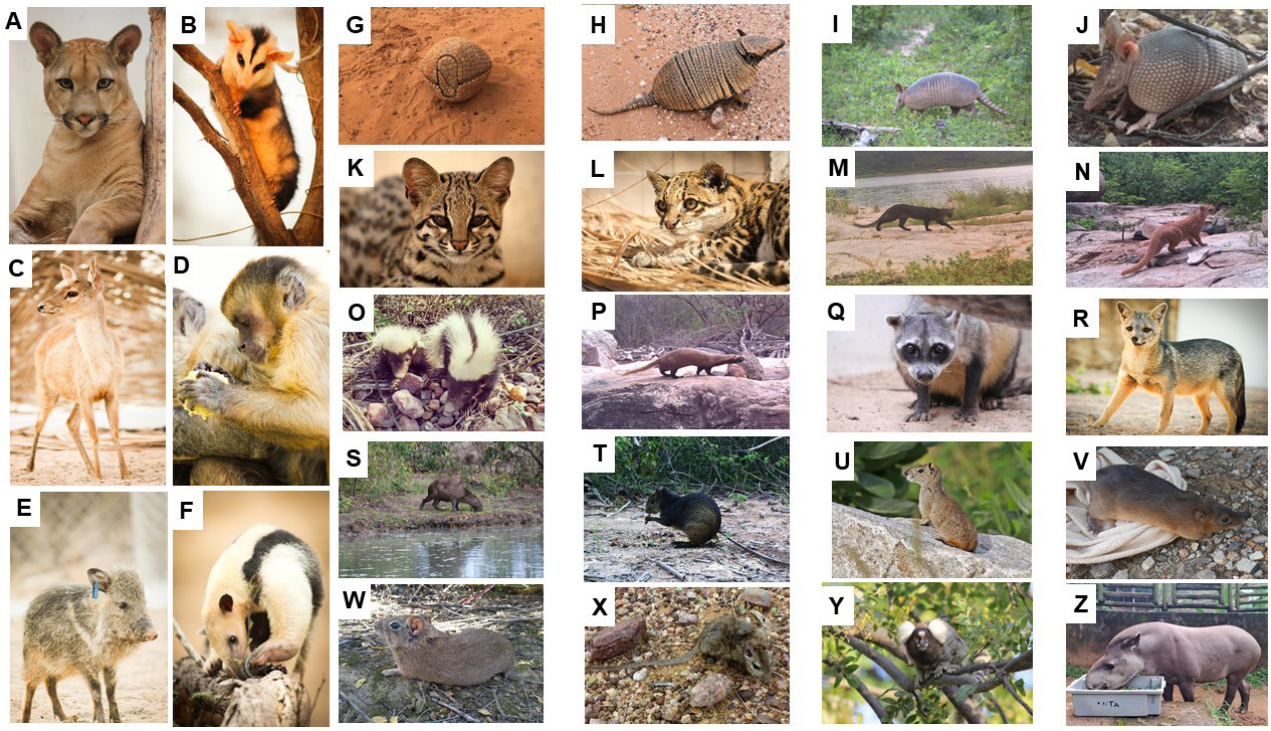
from the bibliographical survey and testimonial material previously carried out, good quality photos (resolution greater than 600 megapixels) were selected of each taxon occurring in the region.

A priori, in order to test whether the previously selected photos would be suitable for applying the method in the field, they were presented to a triple list of specialists external to the studied community. These specialists, who are native to the region, are knowledgeable about the caatinga fauna and act as assistants in the PISF fauna monitoring activities. The photos were stored on a tablet with a seven-inch screen that adjusted the positioning of the image according to the rotation of the device (automatic rotation system), allowing the photograph to occupy the entire space of the display.

With adjustments obtained with the application of this a priori test, small rodents such as cricetids and marsupials were excluded from the sample, as it was identified that at the time of exposure of the photos, the species of this group generated perception biases (different species were seen as a single species), even if new photos were selected for these animals. This fact is due to the bodily similarity of these animals, and their identification based on external characters is difficult even for technicians trained in the area.

Still, the species *Herpailurus yagouaroundi* (Jaguarundi, eyra cat) because it has two basic phenotypic coat patterns (reddish or grayish, with variants on this scale; Silva, et al. 2016) was recognized by the triple list as two distinct "ethnotaxonomic" entities. Therefore, a photo was used for each color pattern. In addition, photos of a species that does not occur in the region (Tapir –*Tapirus terrestres* Linnaeus, 1758) and another one supposedly extinct from the place (Brazilian three-banded armadillo - *Tolypeutes tricinctus*, 1758) were used in the visual stimulus to test the reliability of the information provided by the interviewees. In total, for the application of the perception method in the field, 26 photographs of 25 species of mammals were used, unanimously approved by the triple list of field assistants (Figure 02).

Figure 02. Photographs of mammal species used in the checklist/interview in the community Curralinho, municipality of Cabrobó, Pernmabuco, Northeastern Brazil: A – *Puma concolor* (Puma); B – *Didelphis albiventris* (White-eared opossum); C –*Subulo gouazoubira* (Brazilian brocket); D – *Sapajus libidinosus* (Capuchin monkey); E – *Dicotyles tajacu* (Collared peccary, musk hog,); F – *Tamandua tetradactyla* (Southern tamandua); G – *Tolypeutes tricinctus* (Brazilian three-banded armadillo); H – *Euphractus sexcinctus* (Six-banded armadillo); I – *Dasypus novemcinctus* (Nine-banded armadillo); J – *Dasypus septemcinctus* (Seven-banded armadillo); K – *Leopardus tigrinus* (Oncilla), L – *Leopardus pardalis* (Ocelot); M – *Herpailurus yagouaroundi* – "blue variation"(Jaguarundi); N - *Herpailurus yagouaroundi* – "red variation"(Jaguarundi), O – *Conepatus semistriatus* (Striped hog-nosed skunk); P – *Galictis cuja* (Greater grison); Q – *Procyon cancrivorus* (Crab-eating raccoon); R – *Cerdocyon thous* (Common fox); S - *Hydrochoerus hydrochaeris* (Capybara); T – *Dasyprocta prymnolopha* (Black-rumped agouti); U – *Kerodon rupestris* (Rock cavy, moco); V – *Holochilus oxe* (Marsh rat); W – *Galea spixii* (Spix's yellow-toothed cavy); X – *Thrichomys laurentius* (Common punare); Y – *Callithrix jacchus* (Common marmoset, white-tuftedear); Z – *Tapirus terrestres* (Tapir).

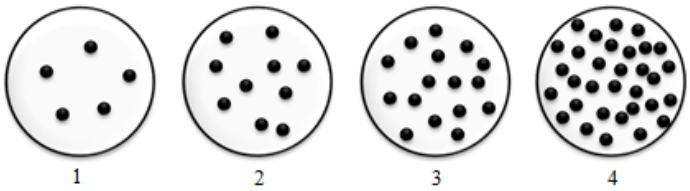


Sources: A, B, C, D, E, F, K, L O, P, V – Collection CEMAFAUNA; Z – Rodrigo C. Oliveira; G, I, T – Ellen Cândida Ataíde Gomes; H, J, M, N, S, U, W, X, Y – Iardley Cicero Gomes Varjão.

In the field, the tablet containing the photographs was given to the informant who could handle it, resulting in greater involvement with the research. In addition, this tool made it possible to enlarge the image at specific points or structures, increasing the recognition success and accuracy of the collected information.

Concomitantly with each species that was presented in the photographs, the participants estimated the abundance according to their own perception, through a visual stimulus, applying the technique developed by Silva-Neto et al. (2016). On a printed sheet of "A4" paper, an image was presented containing different amounts of points inside four circles, with each circle representing values ranging from 1 to 4, according to the following description: (1) a small abundance, (2) a low intermediate abundance, (3) a high intermediate abundance, and (4) a high abundance (Figure 03)

Figure 03. 1 Visual stimulus presented to the informants to assess their perceptions regarding the abundance of the mammal species with cynegetic importance in the community of Curralinho, municipality of Cabrobó, Pernambuco, Brazil. (1 low abundance, 2 low to intermediate abundance, 3 intermediate to high abundance, 4 high abundance)



Data analysis

Using data obtained through visual stimulation on the abundance of mammalian species, the average perceived abundance of each recognized taxon was calculated. For this, the values of perceived abundance indicated for each species per informant were added and the number of informants that recognized a particular species (SILVA, et al. 2016) divided this value.

The cultural importance of hunted animals was analyzed based on the salience index (SI), which considered the citation frequency and the average position of the items in the obtained lists (Smith 1997). The protocol proposed by Chaves et al (2019) was used, from which it was possible to verify the significantly more salient animals. Thus, these were divided into three groups, the first being formed by animals that obtained salience values significantly high and distinct from the null scenario; then those whose observed values did not differ from the null model and, finally, the animals with the lowest saliency values, which differed significantly from the null model. These analyzes were performed using the R software version 3.6.1 (R Core Team 2020).

To assess the conservation status of the species, the Official National List of Fauna Species Threatened with Extinction, published by the Ministry of the Environment through Ordinance No. 300/2022 (BRASIL 2022), was considered, as well as the Red List of Threatened Species, prepared by the International Union for Conservation of Nature (IUCN 2022).

Results

The data resulting from the visual stimulus revealed that almost all 25 species, except the control *Tapirus terrestres* is a *Tolypeutes tricinctus,* were perceived as occurring in the area and flagged as locally hunted species. With regard to perceived abundance, the recognized taxa showed means of perceived abundance ranging from 1.1 to 3.8; with the highest average attributed to the primate *Callithrix jacchus* and the smallest to the feline *Leopardus pardalis* and the rodent *Holochilus oxe*. Of the 23 assessed taxa, 9 were indicated as preferentially hunted for food purposes, being *Conepatus semistriatus, Euphractus sexcinctus* and *Dasypus novemcinctus* the most prominent species according to the cultural salience index (see Table 1).

On the conservation status of species from the IUCN list, *Leopardus tigrinus* e as VU (vulnerable) *Sapajus libidinosus* as NT (Near Threatened), Holochilus oxe as NE (Not Evaluated) and Thrichomys laurentius is data deficient (DD). Yet, *Subulo gouazoubira* e *Tamandua tetradactyla* were identified with their populations in decline by international criteria. By national assessment, *Kerodon rupestris*, *Herpailurus yagouaroundi* and *Puma concolor* were considered VU (vulnerable) and *Leopardus tigrinus* as endangered (EN) (Table 01).

Tabela 01. Mastofauna recognized by informants from the community of Curralinho, Cabrobó, Pernambuco, Brazil, with information on species and common names, perceived abundance, salience and conservation status. Legend: Conservation status of the species: EN - Endangered; VU - Vulnerable; LC – Least concern, NE - Not Evaluated.

Order	Family	Scientific name	Common name	Average of perceived abundance (standard deviation)	Salience of the most-hunted species	Conservation status	
						IUCN, 2022	BRASIL 2022
Didelphimorphia	Didelphidae	*Didelphis albiventris* Lund, 1840	White-eared opossum	2,09 (±1,09)	-	LC	LC
Cingulata	Dasypodidae	*Dasypus novemcinctus* Linnaeus, 1758	Nine-banded armadillo	1,7 (±0,83)	0,63	LC	LC
		Dasypus septemcinctus Linnaeus, 1758	Seven-banded armadillo	1,6 (±0,81)	-	LC	LC
	Chlamyphoridae	*Euphractus sexcinctus* (Linnaeus, 1758)	Six-banded armadillo	2,3 (±0,97)	0,79	LC	LC
Pilosa	Myrmecophagidae	*Tamandua tetradactyla* (Linnaeus, 1758)	Southern tamandua	2 (±0,82)	0,41	LC	LC
Primates	Callitrichidae	*Callithrix jacchus* (Linnaeus, 1758)	Common marmoset, white-tuftedear marmoset	3,8 (±0,48)	-	LC	LC
	Cebidae	*Sapajus libidinosus* (Spix, 1823)	Capuchin monkey	1,8 (±1,17)	-	NT	LC
Rodentia	Cricetidae	*Holochilus oxe* Prado, Knowles and Percequillo, 2021	Marsh rat, cane rat	1,1 (±1,11)	-	NE	LC
	Caviidae	*Galea spixii* (Wagler, 1831)	Spix's yellow-toothed cavy	2,6 (±1,07)	0,04	LC	LC
		Hydrochoerus hydrochaeris (Linnaeus, 1766)	Capybara	1,4 (±0,84)	-	LC	LC
		Kerodon rupestris (Wied-Neuwied, 1820)	Rock cavy, moco	2,8 (±1,05)	0,19	LC	LC
	Dasyproctidae	*Dasyprocta prymnolopha* Wagler, 1831	Black-rumped agouti	1,5 (±1,04)	0,03	LC	LC
	Echimyidae	*Thrichomys laurentius* Thomas, 1904	Common punare	2,4 (±1,15)	-	DD	LC

Order	Family	Scientific name	Common name	Average of perceived abundance (standard deviation)	Salience of the most-hunted species	Conservation status	
						IUCN, 2022	BRASIL 2022
Carnivora	Felidae	*Leopardus pardalis* (Linnaeus, 1758)	Ocelot, dwarf leopard	1,1 (±0,43)	-	LC	LC
		*Leopardus tigrinus (*Schreber*, 1775)*	Oncilla, little spotted cat, tigrillo	1,6 (±1,13)	-	VU	EN
		Puma concolor (Linnaeus, 1771)	Cougar, Puma	1,7 (±0,74)	-	LC	VU
		Herpailurus yagouaroundi (É. Geoffroiy Saint-Hilaire, 1803) – red variation	Jaguarundi, eyra cat	1,9 (±1,03)	-	LC	VU
		Herpailurus yagouaroundi (É. Geoffroiy Saint-Hilaire) –blue variation	Jaguarundi, eyra cat	1,3 (±0,80)	-	LC	VU
	Canidae	*Cerdocyon thous* (Linnaeus, 1766)	Common fox, crab-eating fox, forest fox, wood fox "	3,3 (±0,83)	-	LC	LC
	Mustelidae	*Galictis cuja* (Molina, 1782)	Greater grison	1,5 (±1,07)	-	LC	LC
	Mephitidae	*Conepatus semistriatus* (Boddaert, 1785)	Striped hog-nosed skunk	2,3 (±0,94)	0,84	LC	LC
	Procyonidae	*Procyon cancrivorus* Cuvier, 1798	Crab-eating raccoon	2,7 (±1,11)	-	LC	LC
Artiodactyla	Tayassuidae	*Dicotyles tajacu* (Linnaeus, 1758)	Collared peccary, musk hog,	1,9 (±1,12)	0,07	LC	LC
	Cervidae	*Subolo gouazoubira* (Fischer 1814)	Brazilian brocket	2,2 (±0,95)	0,30	LC	LC

Among the main criteria used to determine which species are most hunted, meat flavor is the most recurrent (n = 38), followed by ease of collection (n = 29) and local abundance (n = 27) (Table 02).

Table 03. Main selection criteria used to choose faunal resources by hunters from the community of Curralinho, Cabrobó, Pernambuco, Brazil

Utilization criterion	Number of citations	Percentage of citation (%)
Meat floavor	38	84%
Ease of collection	29	64%
Local abundance	27	60%
Versatility of use	16	36%
Pleasure at hunting	14	31%

According to the informants, the main hunting methods were hunting with dogs, hunting traps "Fôjo", armadillo cages, grid traps, food bait, water bait, shotgun and sling-shots "baladeira" (Table 3).

Table 3. Main hunting methods, target species of each method and number of citations of use for collecting mammals prioritized by informants from the community of Curralinho, Pernambuco - Brazil. Combined methods can be used to hunt a given species, exceeding the number of informants (n = 45).

Species	Main hunting methods.							
	Hunting with dogs	Hunting traps "Fôjo"	Armadillo cages "Tatuzeiras"	Grid traps	Food bait	Water bait	Shotgun	Sling-shots "Baladeira"
Conepatus semistriatus	45						1	
Dasypus novemcinctus	44		11					
Dasyprocta prymnolopha	1				3		3	
Euphractus sexcinctus	44		11				2	
Galea spixii		8					5	6
Kerodon rupestris	22			3	2	1	20	21
Subulo gouazoubira	3				14	13	29	
Dicotyles tajacu	6				1	1	8	
Tamandua tetradactyla	42						1	

Discussion

According to the results obtained here *Callithrix jacchus* was cited as the most abundant species by informants, while *Leopardus pardalis* it is *Holochilus oxe* species with less abundance. The informants' perception of the abundance of these species is in line with what the literature indicates about the populations of these animals in areas of the Caatinga (Feijó and Langguth, 2013; Mendonça et al. 2015; Penido et al. 2016; Chaves et al. 2020; Malukiewicz et al. 2020; Prado et al. 2021). This statement is reinforced by the fact that none of the informants reported the occurrence of the control species, *Tapirus terrestres* and *Tolypeutes tricinctus*, in the region.

The tapir (*Tapirus terrestres*) is considered regionally extinct in the Caatinga, with historical records (four decades ago) associated with the northern region of Bahia in more humid portions of the biome,

such as Boqueirão da Onça and Chapada diamantina (Médici et al. 2012). The three-banded armadillo (*Tolypeutes tricinctus*) has historically suffered from high hunting pressure, destruction and alteration of its habitat, which makes its recent records less and less frequent. The lack of recent records suggests that the species may now be locally extinct in a large proportion of its original geographic range (Feijo et al. 2015). Older informants from Curralinho (more than fifty years old) report that this species was once quite common in the area, but that around 30 years ago it was no longer found. This fact demonstrates a time compatible with the record of the species collected by Feijó et al. (2015) for the municipality of Cabrobó (carried out in 1991). Currently the species is classified as endangered by national assessments (BRASIL, 2022) and as vulnerable in the IUCN assessment (2022).

The species *C. jacchus,* perceived as the most abundant, is adapted to urban and rural environments in Brazil and abundant in both types of environments, presenting a set of ecological and evolutionary adaptations that guarantee its successful occupation in semi-arid environments (Abreu et al. 2016; Schiel and Souto 2017; Malukiewicz et al. 2020). Possibly, in addition to the characteristics already mentioned, the habit of living in flocks, relative docility and tolerance to human presence also contribute to the high data of perceived abundance and its use as a pet. Brazilian legislation prohibits the creation of wild animals in captivity, but the presence of *C. jacchus* in homes in the northeastern semi-arid region, it is very common.

On the other hand, *L. pardalis,* percebido como menos abundante, it has low density in Caatinga environments, being associated with environments in more forested areas or dependent on more intact vegetation (Alves et al 2016; Penido et al. 2016). Its occurrence is negatively influenced by human presence (Dias et al. 2019), which combined with its nocturnal habits imply less possibility of contact between informants and the species, reflecting its low perceived abundance. In northeastern Brazil, this species has many conflicts with breeders of domestic animals. Studies indicate that *L. pardalis* is the target of many hunters for preying on animals such as goats and chickens, causing damage to the breeders of these animals (Dias et al. 2019). Thus, conflict relations and landscape alteration can directly contribute to the reduction of the population of these animals in northeastern Brazil.

The present study represents the first record of the hunting of *Holochilus oxe* in the northeast of Brazil. Although not currently cited as hunted, informants reported that this species was a pest in the rice plantations that existed in that locality, being slaughtered for control and usually used for food. The low perceived abundance of this species may be associated with the interruption of rhizoculture in Curralinho, which may have led to the loss of contact with the species and/or its decline. It is worth noting that *H. oxe* is a newly described semiaquatic species, previously identified as other species of the genus. The new taxon inhabits the northeastern region of Brazil and differs from other congeners by a unique combination of phenotypic and genomic characters (Prado et al. 2021).

Data show that informants effectively hunt fewer species than they actually recognize. Of the 23 locally recognized species, only nine are prioritized in hunting activities. We can list some scenarios that explain the reduction in demand for certain animals. The first scenario is due to the illegal nature of hunting. Possibly, the low number of prioritized species is the fact that this activity is illegal (Law 5,197 of 1967). Ferreira et al (2012) pointed out that informants recognize that they practice an illegal activity and avoid listing the actual numbers of hunted species.

Recent studies show that mammals represent one of the main hunted taxonomic groups, but that due to the local extinction of many large species, hunting tends to migrate to other more diverse and abundant taxonomic groups such as birds and reptiles (Mendonça et al. 2015; Santos et al. 2022;

Souza et al. 2022). Hunting data for mammals in the Caatinga point to numbers of potentially hunted species varying between nine and thirty species. However, it is worth mentioning that the richness of hunted species can be influenced by several factors, such as location, purpose of use and size of the sample of informants used (Mendonça et al. 2015; Barboza et al. 2016, Silva-Neto et al., 2016; Santos et al. 2019; Santos et al. 2022; Souza et al. 2022).

Among the vertebrates hunted in northeastern Brazil, mammals represent one of the main game taxa. Its hunting is mainly related to food and medicinal use (Mendonça et al. 2015; Barboza et al. 2016). As they are medium to large animals, they provide a large amount of meat for food, being a source of protein for many rural populations (Cullen et al. 2000; Alves 2012; Alves and Souto 2015). Its by-products, such as skin and body fat, are widely used in traditional Brazilian medicine. There are also reports of other uses; however, it does not stand out when compared to food and medicinal use (Mendonça et al. 2015; Barboza et al. 2016).

With regard to the hunted species, it was observed that *Conepatus semistriatus*, *Euphractus sexcinctus* and *Dasypus novemcinctus* showed the highest values for the cultural salience index. Alves et al (2016) in a review of mammals with hunting importance in the Caatinga listed the main uses of *Conepatus semistriatus*, *Euphractus sexcinctus* and *Dasypus novemcinctus* namely: pet, ornamentation, food, medicine, religious magic (only *Euphractus sexcinctus* it is *Dasypus novemcinctus*), and conflict relations (only for *Conepatus semistriatus*).

Possibly, the multiple uses of these three species favor them to become species with high cultural importance. Albuquerque et al (2019) proposed an approach on species selection criteria (through the maximization of benefits and cost reduction) and functioning of socioecological systems (through utilitarian redundancy). The study by Albuquerque et al (2019) points out that natural resources within a socioecological system are selected to favor a multiplicity of uses. In this way, we could admit that species of high cultural importance are species with multiple uses and these would be prioritized within socioecological systems. Thus, the high values of the cultural salience index of *C. semistriatus*, *E. sexcinctus* it is *D. novemcinctus* can be explained by the high demand for uses of these three species.

According to informants, meat flavor and ease of collection are the main motivators for hunting an animal. Preference for a particular flavor of meat has been discussed in the literature on hunting animals. Chaves et al (2020) observed that the probability of a species being hunted can be twice as high if it is a flavor preference species. Souza et al (2023), who found that preference for flavor increases the chances of a species being hunted by up to three times, observed the same results.

Regarding the ease of collection, the literature points out as influencing the choice of fauna species this factor. Analyzes that aim to evaluate the cost-effectiveness of hunting strategies consider that availability is a factor considered when making a decision about which animal to hunt (Reis et al. 2018). Lucena et al (2012) state that the availability of the resource favors that the species have greater cultural importance, having their priority for use. However, it is important to emphasize that variables that influence hunting encompass several dimensions, from the biological to the cultural, so that they can change from region to region.

With regard to collection methods, it was observed that hunting using dogs is the most used method among informants. This type of hunting usually takes place at night and the target prey is usually a medium-sized mammal such as *C. semistriatus, D. novecinctus, E. sexcinctus or T. tetradactyla.* In the present study, hunters tend to select areas with intact vegetation (generally mountainous areas) where larger animals are more abundant and use established game trails. The literature points to this type of

hunting as the most destructive, as there is no selectivity in the capture of animals (Santos et al. 2022). However, this is a widely used method in the region and in other regions of Brazil (Alves et al. 2009).

Traps such as the forge, tatuzeira or grid traps are widely used by hunters in the Caatinga. The purpose of the forjo is to hunt rodents, armadillo species (Alves et al. 2009). The grid trap was cited for capturing medium-sized rodents, especially *K. rupestris* additionally, the use of firearms and slingshots was also mentioned. According to informants, both strategies are associated with other methods, especially hunting with dogs.

Informants mentioned the use of waiting traps (with food or water) in the present study. The literature points out that this type of equipment consists of creating strategies that attract the animals while the hunters wait for them in small hiding places. Waiting with food attracts animals due to the supply of food resources. However, in the present study, a type of local improvement was observed for the use of the wait with water. As with waiting for food, hunters also build hiding places near places that store rainwater, whether natural or artificial. Many of these hunting sites are located close to deformities that arise in rocky outcrops, locally known as cauldrons. These environments can store water for an entire annual cycle, as low infiltration implies a longer time with water present in the locations.

In addition, hunters modify these environments by expanding storage capacity, preventing access by domestic animals and covering them to reduce evaporation. These changes in sites imply that water is available for a longer period. In cauldrons closer to homes and in prolonged droughts, hunters to attract animals for slaughter can fill this type of wait. Informants cited this type of trap as being very efficient and low-cost to maintain, allowing its use more frequently.

The region where the research was carried ou t has a project to transpose the body of a river, called São Francisco. A dry environment without permanent bodies of water characterized the region. The transposition work on the São Francisco River has modified the landscape of the communities, bringing other perspectives for obtaining resources associated with the establishment of a perennial water network. It was observed during data collection that most informants reported a recent preference for fishing rather than hunting terrestrial animals.

As the hunting activity is also a purpose of entertainment and leisure, associated with social interaction and belonging to a group (Reyes-garcia et al. 2008; Hanazaki et al. 2009; Mendonça et al. 2015; Alves et al. 2017; Stafford et al. 2017) it is possible that this new reality created by the work can supply this local demand through fishing, in addition to being an alternative source of protein in scenarios where there is a low availability of terrestrial prey. Silva and collaborators (2023) observed 25 species of fish occupying the reservoirs created on the east axis of the PISF, which is a considerable implement and diversification of food resources to be used by local human populations. However, more research should be conducted in order to identify the occurrence, as well as the socioecological contexts, of the hunting/fishing transition.

The presence of permanent artificial water bodies acts as an attraction for fauna, leaving species more vulnerable to hunting, especially aquatic animals, ou with a greater need for water intake and mesic environments for thermoregulation (Valeix et al. 2008; Wolff 2001; Astete et al. 2016). Medium-sized mammals such as *Puma concolor* and *Subulo goazoubira*, which are thermoregulators that are more active and dependent on greater water intake (Astete et al. 2016) may be the most affected by hunting in these locations. In this way, it is important to ensure that these places are properly supervised and protected, so that they do not function as hunting and predatory fishing sites. Investing

in environmental education and establishing conservation units along the PISF can mitigate this vulnerability scenario.

In addition, the establishment of canals and adjacent accesses allowed the connection of inland areas, such as Curralinho, with closer urban centers. Informants reported the existence of more constant hunters outside the community, attracted by the better hunting conditions when compared to more urbanized areas.Recent data evaluating the implementation of large enterprises in the Caatinga demonstrate that the opening of roads in natural areas increases the intensity of poaching (Dias et al., 2020). Possibly, this same increase in hunting pressure may be associated with the PISF, being one of the impacts already foreseen in the environmental impact reports of the enterprise (Brasil, 2004).

Finally, it is important to highlight that the Curralinho community is located in an area considered to be of high and very high priority for the conservation of the Caatinga (Brasil, 2018), protecting recently described, endangered species and with aspects of its basic biology little known. In this region, it is still possible to find endangered species that have been disappearing from the Caatinga, such as the felines *Puma concolor*, *Herpailurus yagouaroundi* and *Leopardus tigrinus* – this being the most endangered small feline in Brazil (Oliveira et al., 2013).

It is important to note that lists organized by federal states in northeastern Brazil, such as Bahia and Ceará, include some species that are threatened at the regional level and which are not included in broader assessments, such as *Subulos gouazoubira* and *Dicotyles tajacu*, categorized as Vulnerable (VU) and endangered (EN), respectively, in the state of Ceará (Sema, 2022). The state of Pernambuco still does not have an official list of endangered species, which makes it difficult to understand the factors that threaten the state's fauna and what public policies to use for conservation.

Conclusions

The hunters from the Curralinho community present a perception of the local mastofauna consistent with the available literature data for the species. Despite recognizing the 23 assessed taxa, only nine are effectively hunted, mainly for food purposes. Meat flavor and availability are important predictors in prioritizing mammal collection. These informants use a set of collection techniques, some of which are specific to a particular resource to be explored. Furthermore, they select more preserved areas with greater return potential, following an efficiency perspective.

The scenario imposed with the creation of a perennial water matrix seems to be influencing the way these informants use local resources. Fishing ended up assuming an important role within the community, although terrestrial species are still hunted. This study encourages lines of investigation on a complex scenario that is established in the Brazilian northeast, which has started to receive large-scale developments in recent years. These large-scale modifications can interfere with the way these populations interact with the environment, demanding study and public policies that allow regional development and biodiversity conservation.

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Ethical approval: The ethics committee of the Federal University of Vale do São Francisco (UNIVASF) approved the present study under the number 2.637.890/ CAAE 81373517.4.0000.5196 to access local knowledge about the mammals of the region and the relationships between the inhabitants of the community and the local fauna

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Data availability: Manuscript from the ICGV master's dissertation available at http://www.ppgcsb.univasf.edu.br/index.php?page=dissertacoes

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