HUNTING ACTIVITIES IN THE SEMIARID POTIGUAR UNDER THE STUDENTS PERSPECTIVE

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1 Introduction

The man/nature/animal connection dates back thousands of years and has perpetuated itself over time in the form of a relationship that has both predatory and symbiotic aspects (ALVES; SOUTO, 2010a). Although man does not have the typical morphology of a carnivore, he has actually become one of the world's most efficient predators (OJASTI; DALLMEIER, 2000), capturing animals for food, protection, clothing, cultural activities, tool production, medicinal and magic-religious purposes, and as pets (e.g., OJASTI; DALLMEIER, 2000; JEROZOLIMSKI; PERES, 2003; NARANJO et al., 2004; ALVES et al., 2010).

Brazil is considered to have the greatest biological diversity on Earth. It is estimated that there are around 713 species of mammals, 1,901 of birds and 721 of reptiles (CBRO, 2014; MMA, 2014) in its territory. That biodiversity, however, is seriously threatened. Currently the main causes of fauna extinction in Brazil are habitat changes, over-exploitation of natural resources, biological invasions, pollution, contamination and climate change (SCARIOT, 2010).

In spite of its long, notable history, the hunting of wild animals has been the object of very little scientific investigation in Brazil (ALVES; SOUTO, 2010b) and the few studies that do exist are mainly concentrated on areas of Atlantic Forest and Amazon Forest formations (e.g., CULLEN JR. et al., 2000, 2001; TRINCA; FERRARI, 2006). In regard to the Caatinga ecosystem there are very few studies of the question of hunting even though it is considered to be one of the main factors threatening the fauna in the semi-arid regions of northeastern Brazil (LEAL et al., 2005). In regard to the state of Rio Grande do Norte specifically, studies addressing cynegetic activities and the use of wildlife

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species are still merely incipient (BEZERRA; ARAUJO; ALVES, 2011, 2012; LUCENA; FREIRE, 2012; BARBOSA et al., 2014).

On the other hand, capturing wild animals plays an important socioeconomic role among the populations of Brazil's semi-arid region especially in its aspect of supplying meat of high nutritive quality to local families (ALVES; GONÇALVES; VIEIRA, 2012).

Hunting activities have obvious implications for conservation and they need to be more thoroughly investigated and studied to support the production of sustainable management plans (ALVES et al., 2009, 2010). In the particular case of the Caatinga biome, given that the local population is heavily dependent on the wild fauna for its survival, there is a need to delineate conservation strategies in consonance with the user population and that takes into consideration the socio-cultural context of people involved in hunting wildlife species (ALVES; GONÇALVES; VIEIRA, 2012).

In that perspective this paper analyzes the cynegetic activities (hunting techniques, prey and forms of use) and the socioeconomic context of the population using fauna resources in two municipalities in the state of Rio Grande do Norte, in the northeast of Brazil, and displays important data to support the delineation of conservation measures and the sustainable use of hunted fauna in the Brazilian semi-arid region.

2 Material and Method

2.1 Studied Area

This research was conducted in two schools of the public education network of the State of Rio Grande do Norte: the Professora Terezinha Carolino de Souza State School in the municipality of Jaçanã (06º25'33"S; 36º12'18"W), and the José Joaquim State School in the municipality of Coronel Ezequiel (06°22'58"S; 36°12'54"W). The two schools are the only ones in their respective municipalities and they offer education up to higher secondary level to students from both urban and rural areas.

The municipality of Jaçanã has an area of 58 km^2 and is located at an altitude of 724m above sea level making it the fourth highest town in Rio Grande do Norte (CPRM, 2005b, MARIO 2016). It has a population of 8,949 inhabitants (IBGE, 2016). Coronel Ezequiel occupies an area of around 203 km^2 with a population of approximately 5,590 inhabitants (IBGE, 2016). The towns are small with demographic densities of 145.25 inhab/km^2 and 29.10 inhab./km^2 respectively (IBGE, 2010). The climate is hot with an average annual temperature of 25.6 °C. The xerophytic Caatinga vegetation is composed of thorny trees and shrubs, creeping herbaceous plants and cacti. There are no protected areas or nature reserves in the two locations studied. Mario (2016) reports that region's evolution process and the great predominance of rural communities over the years has led to the devastation of the native vegetation and its replacement by fruit trees or small fields dedicated to agricultural crops. The economic base of the two municipalities is centered on subsistence agriculture, livestock production, extractive activities and trade (MARIO, 2016; CPRM, 2005a, 2005b).

2.2 Data Gathering

Research was conducted in the period from August 2014 to January 2015 and contact was made with students in higher secondary education in the two state schools Prof.ª Terezinha Carolino de Souza (Jaçanã) and José Joaquim (Coronel Ezequiel) who resided in rural areas as they were the ones with greater practical experience in relation to hunting activities. At the time of the investigation 100 students attended the two schools and of those 80 agreed to participate in the study; 32 from the school in Jaçanã and 48 from the one in Coronel Ezequiel.

The data gathering instruments were semi-structured interviews complemented by participative observation (ALBUQUERQUE; LUCENA; ALENCAR, 2010; AMOROZO; VIERTLER, 2010). Interviews were individual, lasted from 30 to 90 minutes and were conducted in the library or the classroom according to the student's availability. The interview script contained questions on socioeconomic aspects, the use made of the fauna species, hunting techniques and environmental perceptions. More specifically the following information was sought: municipality of residence, gender, age, place of residence, marital status, number of children, number of residents in the household, monthly income of the family, profession, time of residence in the area, perceptions in regard to the availability of wildlife species in the area, species made use of and the kind of use made of them, mode of obtaining wild animals (capture or purchase), which family members take part in hunting activities, game species, which species are targeted for commercial purposes and the times of year in which the various species appear to be more abundant in the region.

Students aged 18 or over were invited to sign a voluntary declaration of informed consent and in the case of those under 18, their parents or guardians were asked to sign the same. A date was appointed for the reception of two printed copies of those documents in compliance with National Health Council Resolution Nº 196/96 (Ministry of Health).

Identification of the fauna species referred to in the interviews was as follows: 1) using the checklist technique in the interview displaying a clipboard with images of animals that might be among those hunted; 2) during the accompaniment in the field of hunting activities (guided-tour technique) with actual sighting of the species *in situ* (ALBUQUERQUE; LUCENA; ALENCAR, 2010) and photographic registration whenever possible; and 3) on the basis of previous studies carried out in the region (BARBOSA et al. 2014; BARBOSA; MARIANO; CHAVES, 2014).

The Study adopted the taxonomic classification and nomenclature of the Brazilian Ornithological Registrations Committee (*Comitê Brasileiro de Registros Ornitológicos*) for the avian fauna and for the reptiles, the norms of the Brazilian Herpetology Society (*Sociedade Brasileira de Herpetologia*) (BÉRNILS; COSTA, 2012). In the case of the large and medium-sized mammals Feijó and Langguth (2013) were the reference consulted and for the small mammals, Paglia et al. (2012) The conservation status assessments of the various species was based on a consultation of the List of Brazilian Fauna Species Threatened with Extinction (*Lista das Espécies da Fauna Brasileira Ameaçada de Extinção*) (MMA, 2014) and the database of the International Union for Conservation of Nature (IUCN, 2013).

Data were tabulated and organized in electronic spreadsheets and subjected to qualitative and quantitative analysis using empirical method to reveal covert categories (HAYS, 1976). Descriptive statistics was applied whereby the absolute frequencies of responses were calculated and converted into percentages. In regard to the data concerning environmental perceptions associated to the local fauna populations the Chi-squared test was used to verify whether there were any statistically significant differences associated to interviewee gender or age group. To determine the relative cynegetic importance of the species mentioned in each category of use, the Use Value was calculated for each one in accordance with the formula proposed by Phillips et al. (1994), namely: $UV = \Sigma U/n$; where UV = the species' use value, U = the number of citations per species and n = the number of informants.

3 Results and Discussion

3.1 Socio-economic features of the sample group

Of the 80 students interviewed, fifty-four were men and twenty-six were women. Ages ranged from 14 to 30 but most were concentrated in the 14 to 17 age group (71% - n = 57); of those 51% (n = 41) were males and 20% (n = 16) were females. A considerable portion of the students have lived for more than 10 years in the rural area of their municipalities (81% - n = 65) and some of them have resided there since they were born (76% - n = 61). More than half of the sampled population (52% - n = 42) are natives of the two locations studied. In regard to marital status, most of the students declared that they were single (86% - n = 69). The household groups mainly consist of 3 - 4 persons (49% - n = 39) and only 14% (n = 11) of the students have children. As for family income bracket, only 2.5% (n = 2) have an income of three minimum salaries, 17% (n = 14) have one of two minimum salaries and 35% (n = 28) of just one minimum salary. The majority (45% [n = 36] of those interviewed) has a family income of less than one official minimum salary. In regard to occupations, a significant proportion (80% - n = 64) only study and the rest, in addition to their academic efforts, undertake work in agricultural activities (17% - n = 14), as bricklayers in construction work (1% - n = 1), and in sales activities (1% - n = 1).

3.2 Cynegetic Activities

Seventy students (87%) stated that they had at some time used fauna species. Hunting activities begin during childhood when animals (mainly birds) are hunted for food using simple catapults (BARBOSA et al., 2014) or by setting traps. When they were asked how they obtained wild animals some of them reported more than one means but most of them (67% - n = 54) declared that it was by hunting carried out either by themselves or by members of their families, while 46% (n = 37) declared that they purchased them and 26% (n = 21) stated that they got the from acquaintances.

The cynegetic fauna registered by this research was comprised of 84 species altogether, distributed among 22 taxonomic orders, 44 families and 73 genera (Table1). The

greatest species diversity was among the birds (n = 57), followed by mammal species (n = 16), and reptiles (n = 11). The avian families with the highest number of species represented were Thraupidae (n = 11) and Columbidae (n = 8). The mammal families most represented were Dasypodidae (n = 3), Myrmecophagidae, Felidae and Caviidae (2 species each). Among the reptiles, the most represented families were the Chelidae, Tropiduridae and Teiidae (with 2 species each). The greatest diversity among the captured species was registered for the municipality of Jaçanã (55 bird species, 15 mammal species and 11 reptile species) whereas in Coronel Ezequiel the numbers were smaller (28 bird species, 14 mammal species and 5 species of reptiles). That fact may be related to the greater variety of hunting techniques employed by the hunters of Jaçanã (n = 12) compared to those in Coronel Ezequiel (n = 9).

In regard to the species' environmental statuses among the hunted animals registered by this research, some are in a delicate situation according to the data published by the International Union for Conservation of Nature (IUCN, 2013). The blue-winged macaw (*Primolius maracanã*) is classified as near threatened while the yellow-faced siskin (*Sporagra yarrellii*), the Brazilian thee-banded armadillo (*Tolypeutes tricinctus*), the giant anteater (*Myrmecophaga tridactyla*) and the spotted cat sp. (*Leopardus sp.)*, are classified as vulnerable. Those same species appear in the National List of Brazilian Fauna Species Threatened with Extinction (*Lista Nacional das Espécies da Fauna Brasileira Ameaçada de Extinção*) (MMA, 2014). In the Brazilian list the rock cavy (*Kerodon rupestres*), is included in the vulnerable category and it is highly probable that the decline in the population of that species has much to do with hunting and the destruction of its habitat in rocky outcrops (MMA, 2014).

3.3 Utilization of fauna species

The interviewees reported four kinds of use made of the captured animals: as food, as pets, for zoo-therapy and to sell. The Values of Use scores varied from 0.01 to 0.49 (Table 1). The highest value scores were those of the six-banded armadillo (*Euphractus sexcinctus*) with a UV=0.49 and the ruddy ground dove (*Columbina talpacoti)* with a UV=0.47. Species with scores of less than 0.20 are those species least affected by anthropic activities. On the other hand, species with scores of 0.45 or over are those that rural communities capture and make use of most and over-hunting of them may trigger a series of negative factors and eventually lead to a decline in their local populations.

Three of the species were cited for all four forms of use, namely the side-necked turtle (*Phrynops tuberosus*), the common green iguana (*Iguana iguana*) and the black and white tegu (*Salvator merianae*) which meant that they were notably among the most captured specimens.

Among those students who declared using or having used wild animals (n = 70) both males and females make use of animals as food, as pets, for therapeutic purposes or to trade.

As regards age groups, it was found that individuals in the 14 to 21 age group make use of wild animals in all four utilization categories. Older students in the 26 to 30 age

group also reported making use of animal species but not for selling them and that may have been due to their awareness of the legislation and the sanctions that such actions are subject to insofar as the capture of animals and their sale is considered classified as a crime whereas their capture as a source of food supply is not necessarily considered to be one, depending on the social conditions of the hunter involved. Among interviewees in the 22 to 25 age group, the prevalent uses were for food or for medicinal purposes only.

Another aspect that appeared was that students whose family incomes were in the range of less than one up to two minimum salaries make use of fauna species in all four categories of utilization. Those with a declared family income of three minimum salaries also make use of wildlife species but not for trading.

A significant proportion of the students (67% - n = 54) stated that they consume or have at some time consumed, the meat of captured animals. Altogether 73 animal species compose the list of those that students capture or have captured to eat. The outstanding groups in terms being a source of food in the region addressed by the study were the birds and the mammal species. Similar results have been reported for other regions of the semi-arid Brazilian northeast macro-region (ALVES et al., 2009; BARBOSA; NOBREGA; ALVES, 2011; DANTAS-AGUIAR et al., 2011; PESSOA; WAGNER; LANGGUTH, 2014) and other semi-arid regions of the world (FUSARI; CARPANETO, 2006; SANTOS-FITA; NARANJO; RANGEL-SALAZAR, 2012). Mammal species are the favorites for human consumption, especially because they have much greater body masses and consequently the energy they provide is far greater (ZAPATA RÍOS et al., 2011; ALVES; GONÇALVES; VIEIRA, 2012). Among the bird species, members of the Columbidae family were those most mentioned as a source of food. The importance of that family as a food option is glaringly apparent (BEZERRA; ARAUJO; ALVES, 2011; 2012; FERNANDES-FERREIRA et al., 2012; BARBOSA et al., 2014). According to the students, the meat of all those species is delicious hence the preference for them as food. Among the bird species, *C. talpacoti* (UV=0.47) was the most cited in relation to its importance as food. However the animal that is actually the most consumed is a mammal species, the six-banded armadillo (*E. sexcinctus* - UV = 0.49).

Table 1. Identification of hunted wildlife species made by students resident in rural areas of the municipalities of Jaçanã and Coronel Ezequiel, in Rio Grande do Norte, including species local names, data gathering method, use categories and respective Use Values and conservation status. Legend: E – Interview; T – Participative Observation; A – Food; E – Pet; M – Medicinal; C – Trade; UV – Use Value; LC – Least Concern; NT – Near Threatened; UV – Vulnerable.* Species students identified as sporadic or rare in the region.

Taxon	Local Name [English Common Name]	Data Gath-ering		Mentions per Use categoiry								IUCN status
		E	T	A	UV	E	UV	M	UV	C	UV	
BIRDS												
TINAMIFORMES												
Tinamidae												
Crypturellus parvirostris (Wagler, 1827)	Lambú espanta boiada, lambú do pé vermelho **[Small-billed Tinamou]**	X	-	28	0,40	-	-	-	-	6	0,09	LC
Crypturellus tataupa (Temminck, 1815)	Lambú, lambú do pé roxo **[Tataupa tinamou]**	X	-	10	0,14	-	-	-	-	4	0,06	LC
Nothura boraquira (Spix, 1825)	Cordoniz **[White-bellied Nothura]**	X	-	3	0,04	-	-	-	-	2	0,03	LC
Nothura maculosa (Temminck, 1815)	Lambú pedrês, lambú espanta boiada **[Spotted Nothura]**	X	-	6	0,09	-	-	-	-	3	0,04	LC
ANSERIFORMES												
Anatidae												
Dendrocygna viduata (Linnaeus, 1766)	Pato d'água, galinha d'água **[White-faced Whistling-duck]**	X	-	4	0,06	-	-	-	-	-	-	LC
Nomonyx dominica (Linnaeus,1766)	Paturi **[Masked Duck]**	X	-	2	0,03	-	-	-	-	-	-	LC
PELECANIFORMES												
Ardeidae												
*Butorides striata** (Linnaeus, 1758)	Socó **[Striated Heron/Green-backed Heron]**	X	-	1	0,01	-	-	-	-	-	-	LC
ACCIPITRIFORMES												
Accipitridae												
Urubitinga urubitinga (Gmelin, 1788)	Gavião **[Great Black Hawk]**	X	-	2	0,03	1	0,01	-	-	-	-	LC
GRUIFORMES												
Rallidae												
Gallinula galeata (Lichtenstein, 1818)	Galinha d'água, pato d'água **[Common Gallinule]**	X	-	10	0,14	-		-		-		LC
COLUMBIFORMES												
Columbidae												
Columbina minuta (Linnaeus, 1766)	Rolinha cabocla, rolinha pé de anjo, rolinha azul **[Plain-breasted Ground Dove]**	X	-	24	0,34	3	0,04	-	-	7	0,10	LC
Columbina talpacoti (Temminck, 1811)	Rolinha roxa, rolinha cafuta, rolinha vermelha **[Ruddy Ground Dove]**	X	X	33	0,47	3	0,04	-	-	8	0,11	LC
*Columbina squammata** (Lesson,1831)	Rolinha cascavel **[Scaled Dove]**	X	-	3	0,04	-	-	-	-	1	0,01	LC
Columbina picui (Temminck, 1813)	Rolinha branca **[Picui Ground Dove]**	X	-	25	0,36	5	0,07	-	-	5	0,07	LC
*Claravis pretiosa** (Ferrari-Perez, 1886)	Rolinha azul **[Blue Ground Dove]**	X	-	3	0,04	-	-	-	-	-	-	LC
Patagioenas picazuro (Temminck, 1813)	Asa branca **[Picazuro Pigeon]**	X	-	3	0,04	2	0,03	-	-	2	0,03	LC
*Zenaida auriculata** (Des Murs, 1847)	Arribaçã, ribaçã **[Eared Dove]**	X	X	17	0,24	-	-	-	-	6	0,09	LC
Leptotila verreauxi(Bonaparte, 1855)	Juriti **[White-tipped Dove]**	X	-	5	0,07	-	-	-	-	3	0,04	LC
CUCULIFORMES												
Cuculidae												
Coccyzus melacoryphus (Vieillot, 1817)	Papa lagarta, lagarteiro **[Dark-billed Cuckoo]**	X	-	6	0,09	-	-	-	-	-	-	LC
Crotophaga ani (Linnaeus, 1758)	Anu preto **[Smooth-billed Ani]**	X	-	1	0,01	-	-	-	-	-	-	LC
STRIGIFORMES												

Strigidae												
Glaucidium brasilianum (Gmelin, 1788)	Coruja, caboré **[Ferruginous Pygmy Owl]**	X	-	2	0,03	2	0,03	-	-	-	-	LC
CAPRIMULGIFORMES												
Caprimulgidae												
Nyctiphrynus ocellatus (Tschudi, 1844)	Bacurau **[Ocellated Poorwill]**	X	-	3	0,04	-	-	-	-	-	-	LC
GALBULIFORMES												
Bucconidae												
Nystalus maculatus (Gmelin, 1788)	Fura barreira **[Spot-backed Puffbird]**	X	-	6	0,09	-	-	-	-	-	-	LC
CARIAMIFORMES												
Cariamidae												
*Cariama cristata** (Linnaeus, 1766)	Seriema **[Red-legged Seriema]**	X	-	1	0,01	1	0,01	-	-	-	-	LC
PSITTACIFORMES												
Pisittacidae												
*Primolius maracana** (Vieillot, 1816)	Maracanã **[Blue-winged Macaw]**	X	-	-	-	2	0,03	-	-	-	-	NT
Eupsittula cactorum (Kuhl, 1820)	Maritaca, maracanã, periquito rico **[Cactus Parakeet]**	X	-	-	-	4	0,06	-	-	3	0,04	LC
Forpus xanthopterygius (Spix, 1824)	Periquito **[Blue-winged Parrotlet]**	X	-	5	0.07	9	0,13	-	-	5	0,07	LC
*Amazona aestiva** (Linnaeus,1758)	Papagaio **[Blue-fronted Amazon Parrot]**	X	-	1	0,01	1	0,01	-	-	-	-	LC
PASSERIFORMES												
Furnariidae												
Furnariu sleucopus (Swainson, 1838)	João-de-barro **[Pale-legged Hornero]**	X	-	1	0,01	-	-	-	-	-	-	LC
Synallaxis frontalis (Pelzeln, 1859)	Tio Antônio **[Sooty-fronted Spinetail]**	X	-	1	0,01	-	-	-	-	-	-	LC
Tyrannidae												
Phyllomyias fasciatus (Thunberg, 1822)	Ceguim, ceguinho **[Planalto Tyrannulet]**	X	-	1	0,01	-	-	-	-	-	-	LC
Pitangus sulphuratus (Linnaeus, 1766)	Bem-te-vi **[Great Kiskadee]**	X	X	3	0,04	-	-	-	-	-	-	LC
Tyrannus melancholicus (Vieillot, 1819)	Bem-te-vi **[Tropical Kingbird]**	X	-	2	0.03	-	-	-	-	-	-	LC
Corvidae												
Cyanocorax cyanopogon (Wied, 1821)	Canção **[White-naped Jay]**	X	X	1	0,01	3	0,04	-	-	2	0.03	LC
Hirundinidae												
Progne tapera (Vieillot, 1817)	Andorinha **[Brown-chested Martin]**	X	-	1	0,01	-	-	-	-	-	-	LC
Troglodytidae												
Troglodytes musculus (Naumann, 1823)	Rouxinol **[Southern House Wren]**	X	X	1	0,01	-	-	-	-	-	-	LC
Turdidae												
Turdus rufiventris (Vieillot, 1818)	Sabiá, sabiá laranjeira **[Rufous-bellied Thrush]**	X	-	3	0,04	7	0,10	-	-	4	0,06	LC
Mimidae												
Mimus saturninus (Lichtenstein, 1823)	Papa sebo **[Chalk-browed Mockingbird]**	X	-	1	0,01	-	-	-	-	-	-	LC
Passerellidae												
Zonotrichia capensis (Statius M., 1776)	Tico-tico, salta caminho **[Rufous-collared Sparrow]**	X	X	3	0,04	4	0,06	-	-	3	0,04	LC
Icteridae												
Icterus cayanensis (Vigors, 1825)	Pêga **[Epaulet Oriole]**	X	-	2	0.03	4	0,06	-	-	3	0,04	LC
Icterus jamacaii (Gmelin, 1788)	Concriz **[Campo Troupial, Campo Oriole]**	X	X	1	0,01	7	0,10	-	-	4	0,06	LC
Gnorimopsar chopi (Vieillot, 1819)	Graúna **[Chopi Blackbird]**	X	-	-	-	1	0,01	-	-	2	0,03	LC
Molothrus bonariensis (Gmelin, 1789)	Anumará **[Shiny Cowbird]**	X	-	1	0,01	1	0,01	-	-	3	0,04	LC
Thraupidae												
Coereba flaveola (Linnaeus, 1758)	Chupa mel, cibito **[Bananaquit]**	X	X	5	0,07	4	0,06	-	-	3	0,04	LC
Lanio pileatus (Wied, 1821)	Maria fita **[Pileated Finch]**	X	X	7	0,10	4	0,06	-	-	3	0,04	LC

Tangara sayaca (Linnaeus, 1766)	Sonhaçu, sonhaçu azul [**Sayaca Tanager**]	X	X	4	0,06	6	0,09	-	-	8	0,11	LC
Tangara cayana (Linnaeus, 1766)	Sonhaçu pega [**Burnished-buff Tanager**]	X	-	1	0,01	1	0,01	-	-	3	0,04	LC
Paroaria dominicana (Linnaeus, 1758)	Galo de campina [**Red-coweled Cardinal**]	X	X	7	0,10	14	0,20	-	-	10	0,14	LC
Sicalis flaveola (Linnaeus, 1766)	Canário da terra [**Saffron Finch**]	X	X	1	0,01	7	0,10	-	-	9	0,13	LC
Volatinia jacarina (Linnaeus, 1766)	Tiziu [**Blue-black Grassquit**]	X	-	1	0,01	4	0,06	-	-	2	0.03	LC
Sporophila lineola (Linnaeus, 1758)	Bigode [**Lined Seedeater**]	X	-	-	-	9	0,13	-	-	8	0,24	LC
Sporophila nigricollis (Vieillot, 1823)	Papa capim, cabeça preta [**Yellow-bellied Seedeater**]	X	X	1	0,01	6	0,09	-	-	5	0,07	LC
Sporophila albogularis (Spix, 1825)	Golinha [**White-throated Seedeater**]	X	X	7	0,10	26	0,37	-	-	16	0,23	LC
Sporophila bouvreuil (Statius M., 1776)	Caboclinho, caboclo lindo [**Copper Seedeater**]	X	-	-	-	2	0.03	-	-	8	0,11	LC
Cardinalidae												
*Cyanoloxia brissonii** (Lichtenstein, 1823)	Azulão [**Ultramarine Grosbeak**]	X	-	2	0.03	19	0,27	-	-	12	0,17	LC
Fringilidae												
*Sporagra yarrellii** (Audubon, 1839)	Pintassilva [**Yellow-faced Siskin**]	X	-	-	-	2	0.03	-	-	2	0.03	UV
Euphonia chlorotica (Linnaeus, 1766)	Vêm-vêm [**Purple-throated Euphonia**]	X	-	-	-	2	0.03	-	-	-	-	LC
Estrildidae												
Estrilda astrild (Linnaeus, 1758)	Bico de lacre [**Common Waxbill**]	X	-	-	-	1	0,01	-	-	1	0,01	LC
MAMMALS												
DIDELPHIMORPHIA												
Didelphidae												
Didelphis albiventris (Lund, 1840)	Tacaca, timbu, gambá [**White-eared Opossum**]	X	-	6	0,09	-	-	1	0,01	-	-	LC
CINGULATA												
Dasypodidae												
*Dasypus novemcinctus** (Linnaeus, 1758)	Tatu verdadeiro, peba verdadeiro [**Common long-nosed Armadillo/Nine-banded Armadillo**]	X	-	13	0,19	1	0,01	-	-	5	0,07	LC
Euphractus sexcinctus (Linnaeus, 1758)	Tatu peba, peba [**Six-banded Armadillo**]	X	X	34	0,49	7	0,10	-	-	8	0,11	LC
*Tolypeutes tricinctus** (Linnaeus, 1758)	Tatu bola [**Brazilian Three-banded Armadillo**]	X	-	2	0.03	2	0.03	-	-	1	0,01	UV
PILOSA												
Myrmecophagidae												
*Myrmecophaga tridactyla** (Linnaeus,1758)	Tamanduá [**Giant Anteater**]	X	-	5	0,07	-	-	-	-	-	-	UV
*Tamanduate tetradactyla** (Linnaeus, 1758)	Tamanduá´mirim [**Lesser Anteater**]	X	-	4	0,06	-	-	-	-	-	-	LC
PRIMATES												
Callitrichidae												
Callithrix jacchus (Linnaeus, 1758)	Soinho, sagui [**Common Marmoset/White Tufted-ear Marmoset**]	X	-	1	0,01	5	0,07	-	-	4	0,06	LC
CARNIVORA												
Felidae												
Leopardus sp.	Gato do mato [**Spotted Cat Species**]	X	-	5	0,07	-	-	-	-	-	-	UV
Puma yagouaroundi (É. Geoffroy, 1803)	Gato do mato [**Jaguarundi**]	X	-	1	0,01	-	-	-	-	-	-	LC
Canidae												
Cerdocyon thous (Linnaeus, 1766)	Raposa [**Wood Fox**]	X	-	4	0,06	-	-	15	0,21	-	-	LC
Mustelidae												
Galictis cuja (Molina, 1782)	Furão [**Lesser Grison**]	X	-	1	0,01	-	-	-	-	-	-	LC
Mephitidae												
Conepatus semistriatus (Boddaert, 1785)	Tacaca	X	-	1	0,01	-	-	1	0,01	1	0,01	LC

	[Striped Hog-nosed Skunk]											
Procyonidae												
Procyon cancrivorus (Cuvier, 1798)	Gachite, guaxinim **[Crab-eating Raccoon]**	X	-	2	0.03	-	-	-	-	-	-	LC
ARTIODACTYLA												
Cervidae												
*Mazama sp.**	Veado **[Brocket Deer species]**	X	-	13	0,19	-	-	1	0,01	4	0,06	LC
RODENTIA												
Caviidae												
Galea spixii (Wagler, 1831)	Preá **[Spix's Yellow-toothed Cavy]**	X	X	22	0,31	7	0,10	-	-	10	0,14	LC
Kerodon rupestris (Wied, 1820)	Mocó **[Rock Cavy]**	X	-	2	0.03	-	-	1	0,01	2	0.03	LC
REPTILES												
TESTUDINES												
Chelidae												
Mesoclemmys tuberculata (Lüderwaldt, 1926)	Cágado **[Tuberculate Toad-headed Turtle]**	X	-	2	0.03	4	0,06	1	0,01	-	-	-
Phrynops tuberosus (Peters, 1870)	Cágado, tartaruga **[Guyanan Side-necked Turtle]**	X	-	1	0,01	6	0,09	5	0,07	4	0,06	-
SQUAMATA												
Gekkonidae												
Hemidactylus mabouia (Moreau Jonnès 181	Briba, lagartixa **[Tropical House Gecko]**	X	-	-	-	-	-	2	0.03	-	-	-
Phyllodactylidae												
Phyllopezus pollicaris (Spix, 1825)	Briba, lagartixa **[Brazilian Gecko]**	X	-	1	0,01	1	0,01	1	0,01	-	-	-
Iguanidae												
Iguana iguana (Linnaeus, 1758)	Camaleão, iguana **[Common Green Iguana]**	X	-	22	0,31	5	0,07	3	0,04	6	0,09	-
Polychrotidae												
Polychrus acutirostris (Spix, 1825)	Calango cego **[Brazilian Bush Anole]**	X	-	-	-	-	-	1	0,01	-	-	-
Tropiduridae												
Tropidurus hispidus (Spix, 1825)	Lagartixa **[Peter's Lava Lizard]**	X	X	1	0,01	1	0,01	4	0,06	-	-	LC
Tropidurus semitaeniatus (Spix, 1825)	Lagartixa **[Striped Lava Lizard]**	X	-	-	-	-	-	2	0.03	-	-	LC
Teiidae												
Ameiva ameiva (Linnaeus, 1758)	Bico doce **[Giant Ameiva]**	X	-	5	0,07	-	-	-	-	-	-	-
Salvator merianae (Duméril & Bibron, 1839)	Teju, tivaçu **[Black and White Tegu]**	X	X	23	0,33	4	0,06	9	0,13	9	0,13	LC
Boidae												
Boa constrictor (Linneaus, 1758)	Jibóia **[Boa Constrictor]**	X	-	2	0.03	-	-	-	-	-	-	-

In regard to the mammalian fauna, those most mentioned as being of great value as food were the six-banded armadillo, (*E. sexcinctus* - UV=0,49), the Spix's yellow-toothed cavy (*Galea spixii* - UV=0,31), the nine-banded or long-nosed armadillo (*Dasypus novemcinctus* - UV=0,19) and the brocket deer (*Mazama sp*). There have been several studies such as those of Vasconcelos Neto et al. (2012), Feijó and Langguth (2013) and Pessoa, Wagner and Langguth (2014) that have registered the existence of strong hunting pressure targeting armadillos in general (*D. novemcinctus* or *E. sexcinctus*).

In regard to the reptiles as a source of food, the species that were most mentioned as such were the black and white tegu (*S. merianae* - UV=0.33) and the common green iguana (*I. iguana* - UV= 0.31). Those two species represented the main reptiles that serve as a source of food in the Brazilian northeast (ALVES et al., 2012; FERNANDES--FERREIRA et al., 2013).

For most of the sampled population (67% - n = 54), game represents an alternative way of obtaining protein and possibly that is what motivates the performance of hunting activities in the region. In some cases, however, the cynegetic activities are carried out as a form of leisure.

As regards the use of wildlife species as pets, 56% (n = 45) of the sample group reported keeping or having kept at least one fauna species specimen. Those specimens are obtained by one or another of the following methods: 80% (n = 36) obtain them by hunting; 33% (n = 15) by purchasing them; and 29% (n = 13) stated that they received them as gifts from family members or friends. Altogether 43 vertebrate species were mentioned as having been captured to raise in captivity and the bird species were the most prevalent in that situation. The fact of birds being outstanding as pets is largely due to their abundant presence in the natural environment, to their physical beauty (plumage and colors) and to their birdsong qualities (BEZERRA; ARAUJO; ALVES, 2011; ALVES; LIMA; ARAUJO, 2013; BARBOSA et al., 2014). Among the registered bird species, the white-throated seedeater (*Sporophila albogularis* - UV=0.37) was the one with the highest Use Value followed by the Ultramarine Grosbeak (*Cyanoloxia brissonii* - UV=0.27) and the Red-cowelled Cardinal (*Paroaria dominicana* - UV=0.20). Usually those specimens of the bird fauna are kept in cages or large encaged spaces. It is a traditional practice throughout Brazil, present just as much in small town as in great urban agglomerations (SICK, 2001; ALVES; LIMA; ARAUJO, 2013).

Five species of mammal were reported as being kept in captivity. The most frequently mentioned species for this form of use were Spix's yellow-toothed cavy (*G. spixii* - UV= 0.10), the six-banded armadillo (*E. sexcinctus* - UV= 0,10) and the common long-nosed armadillo (*D. novemcinctus*). These animals are kept in captivity to be fattened up and then eaten or sold. It is a common practice in the semi-arid region of northeastern Brazil (ALVES et al., 2009, 2010; BARBOSA; NOBREGA; ALVES, 2011). The students stated that the common marmoset (*Callithrix jacchus*) is also captured but to be kept as a pet, not for food.

Six reptile species were mentioned as being captured to keep as pets. They were two species of turtle (*P. tuberosus* - UV=0.09 and *Mesoclemmys tuberculata* - UV=0.09), the common green iguana (*I. iguana* - UV=0.07) and the black and white tegu (*S. me-*

rianae - UV=0.06). These animals are kept in cages or concrete tanks and may also be fattened up to be eaten. On the other hand, two lizard species *Tropidurus hispidus* and *Phyllopezus pollicaris* and in some cases *I. iguana*, *M. tuberculata* and *P. tuberosus* are kept as pets without being caged and are not intended to serve as food.

Around 36% (n = 29) of the informants use animal species to treat human maladies. 14 species (9 reptile species and 5 mammalian species) were registered for that therapeutic use category. All the species listed here as having medicinal uses have been reported in other studies (COSTA-NETO; ALVES, 2010; ALVES et al., 2012; ALVES; GONÇALVES; VIEIRA, 2012; LUCENA; FREIRE, 2012) The reptiles are the main group of animals hunted for zoo-therapeutic purposes among the students in the areas of this study. One mammal species, the fox (*Cerdocyon thous* - UV=0.21) was one of the most frequently mentioned species in this use category. The animal's fat is used to treat rheumatism and sore throat. Similar results for this category were reported for a community in an area in the surroundings of the Stoessel de Britto Privately-owned Natural Heritage Reserve (*Reserva Particular do Patrimônio Natural* -RPPN) in the state of Rio Grande do Norte (LUCENA; FREIRE, 2012).

Our analysis revealed that 34% (n = 27) of the students had at some time in their lives purchased a wildlife specimen. Of those students, 48% (n = 13) declared that they had purchased it from friends or relatives, 37% (n = 10) from small-scale wildlife traffickers and 15% (n = 4) directly from the hunter, all of which shows the existence of a wildlife species trade in the region. At least 45 wildlife species (34 bird species, eight mammal species and three reptile species) are traded in the areas encompassed by the study. The most traded species of all is the white-throated seedeater (*S. albogularis* - UV= 0.23). The taxonomic order with the most species represented and preferred in the local trade was the Passeriformes with 30 species registered and that preference has been reported for other places as well (ALVES; GONÇALVES; VIEIRA, 2012; FERNANDES-FERREIRA et al. 2012; BARBOSA et al., 2014; PESSOA; WAGNER; LANGGUTH, 2014).

3.4 Hunting techniques

Of the total number of students interviewed, forty-nine percent (n = 39) reported engaging in or having engaged in hunting activities at some time. Most of them (90% - n = 35) were males and only 10% (n = 4) were females. In regard to family income, 33% (n = 13) have a family income of less than one minimum salary, 46% (n = 18) one minimum salary and 21% (n = 8) two minimum salaries. The distribution by ages of this group of students that engaged in hunting was as follows: aged 14 to 17, 69% (n = 27), aged 18 to 21, 28% (n = 11) and aged 22 to 25, 5% (n = 2). All the information regarding hunting techniques was obtained from this group.

The interviewees cite a total of 47 species captured. Most of them (n = 11) captured from 1 to 4 different species (Figure 1) and made use of 1 to 3 techniques (n = 30, Figure 2). There is a clear tendency to use few techniques and the number of techniques is certainly proportional to the number of species captured. Thus hunters who employ a greater number of techniques capture higher numbers of animals. Students in the 18 to

21 age group are those who use the highest numbers of techniques (1 to 12) followed by those in the 14 to 17 age group (1 to 6 techniques) and in the 22 to 25 age group (1 to 3 techniques). The trend to fewer techniques may be due to the fact that people tend to specialize more as they get older.

In regard to gender, males used more hunting techniques (1 to 12) than females who used only 1 to 3 techniques.

In regard to the economic conditions of the students, those with a family income of around one official minimum salary were the ones who used the greater number of techniques (1 to 12) to capture wildlife species, followed by those with an income of less than one minimum salary (1 to 9 techniques) and then those with a two-salary income (1 to 6 techniques).

The students reported that the best places for hunting were; thick forest (61%), places near to sources of water (28%) and underneath fruit-bearing trees (20%). Most students (87%) declared that the best time for capturing wildlife was during the day but 56% of them declared that they hunted at night as well.

Students identified fifteen capturing techniques that they used, namely: bird call imitators (Figures 3A-C), armadillo cage trap (Figure 3D), catapult (Figure 3E), shotgun (Figure 3F), trapdoor cage (Figure 3G), armadillo pit trap (Figure 3H), tegu cage trap (Figure 3I), stick spring trap (Figure 3J), sticky gum (Figure 3N, Q), pit (Figure 3O-P), ambush, hunting with dogs, shining at night, tracking and a covey hook. The most used among the techniques are hunting with a shotgun (64% - n = 25), hunting with a catapult (56% - n = 22) bird call imitation (28% - n = 11).

Figure 1. Numbers of wildlife species interviewees captured. Legend: Número de entrevistados = Number of interviewees; Espécies capturadas=Captured species.

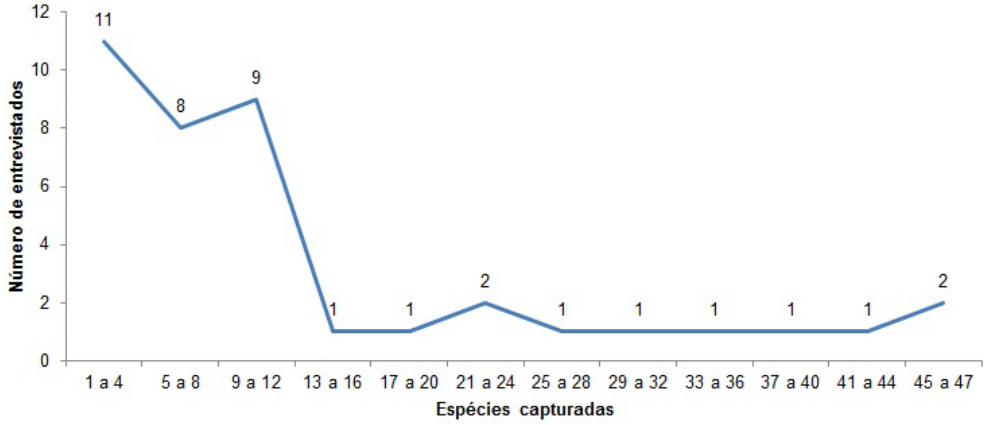
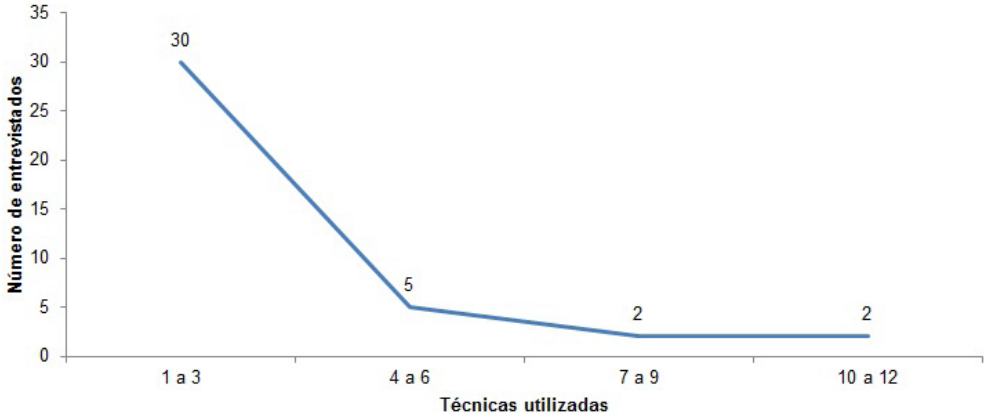


Figure 2. Numbers of hunting techniques interviewees used. Legend: Número de entrevistados = Number of interviewees; Técnicas utilizadas=Techniques used



Hunting with a shotgun (Figure 3f) is designed to kill the animal on the spot, The shotgun, known locally as an *espingarda* or *cartucheira,* is the hunter's basic instrument and serves not only to kill prey but also to protect the hunter from threatening situations during the hunt (ALVES et al. 2009). The shotgun is the predominant firearm throughout the neo-tropical region (JEROZOLIMSKI; PERES, 2003). According to Trinca and Ferrari (2006), the shotgun makes hunting much more efficacious.

The catapult (Figure 3E) known locally as *balinheira* or *estilingue*, consists of a sturdy forked stick two elastic strips of natural rubber and a small leather pouch. It is used to fire stones and kill birds and small lizards. Children often hunt with this instrument with their friends just for fun.

The trapdoor cage (Figure 3G) known locally as an *assaprão* [alçapão] is a small cage with a trapdoor on top used to catch birds alive. It is usually associated to another larger cage (Figure 3L) in which a captive bird is placed to "call" and attract other male birds with its song.

When using the ambush technique, the hunter hides himself in the midst of branches and foliage so that he is completely camouflaged, and there he waits for an animal to appear when he will shoot it with his shotgun. An ambush is usually carried out near to a source of water or to a place where animals are accustomed to forage.

Hunting with dogs is usually done in forested areas at night and undertaken by groups of two or three hunters. The dogs are trained to guide the hunters to wherever they find prey. Hunting with dogs in the daytime is usually for tegus (*S. merianae*), but at night the targets are small mammals like Spix's covey (*G. spixii*) or armadillos (Dasypodidae). According to Vasconcelos Neto et al. (2012), in the Amazon region of Brazil, hunting with dogs is widely practiced and it results in much higher numbers of captures.

Figure 3. Photographs of some of the instruments and traps students in the municipalities of Jaçanã and Coronel Ezequiel (Rio Grande do Norte, Brasil) use to capture wildlife species. **A-C-** Bird call imitators; **D-** Armadillo cage trap; **E-** Catapult; **F-** Shotgun; **G-** Trapdoor cage; **H-** Armadillo pit trap; **I-** Tegu cage trap; **J-** Stick spring trap; **L-** Trapdoor cage together with a regular cage; **M-** Shovel on the left and digging hoe on the right; **N-** Sticky gum; **O-** Pit trap set; **P-** Pit trap uncovered; **Q-** Sticky gum smeared on a branch (Photos: A-L, N-Q- Robson Júnio; M- Douglas Pereira).

Shining is of course a nocturnal activity carried out with the use of torches or lanterns and designed to catch the animals "asleep" as it were. The light shining on the animals dazzles their vision and they cannot see to take flight making it easy to capture them by hand or by shooting them with catapults.

The stick trap or *arapuca* (Figura 3J) is a pyramidal trap formed by sticks and held together by string or fine wires. It is set up to rest one side on a release device triggered by a springy stick. When the bird enters the trap and touches the release triggers the trap falls down on it. The hunter usually puts bait (maize or fruit) inside to attract the animal. This kind of trap is designed to capture medium sized birds such as tinamous (Tinamidae), ground doves (*Columbina* sp.) and the eared dove (*Zenaida auriculata*).

The pit trap (Figure 3O-P) consists of a pit lined with wood and metal. To build it a hole is dug in the ground and a metal bin is placed at the bottom. The pit is then covered by two boards one of which is suspended so that when there is any pressure on it will open towards the inside of the pit; bait in the form of maize or fruits is placed on the boards to attract the animals. This technique is largely used to capture animals like Spix's cavies (*G. spixii*), rock cavies (*K. rupestris*), tinamous (Tinamidae) and eared doves (*Z. auriculata*).

Another method that the students described was the use of special whistles to imitate birdsong (Figure 3A-C). The technique is used to attract the prey as close as possible to the hunter until it is in range and can be killed. It is widely used in the rainy season which the students say is the mating season for birds.

Tracking consists of following the animal's tracks until the place of capture. According to Alves et al. (2009, 2010), hunters in the state of Paraíba report that when a field of maize is destroyed or when wild animals kill domestic ones such as chickens or sheep the smallholders affected hire a hunter to track down the wild animals responsible and capture or kill them.

The use of gum or resin (Figure 3N) is a technique for capturing small birds, especially those prized for their song. The viscous adhesive material is produced from the sap of the Jackfruit tree (*Artocarpus heterophyllus*) which is mixed with ashes and charcoal. The gum is usually smeared on branches where birds like to perch (Figure 3Q) and when the birds land on the branch they get stuck and are captured.

The armadillo cage trap (Figure 3D) is made of metal rods arranged in the form of a cylinder open at one end only and used to capture armadillos (Dasypodidae). Alves et al. (2009, 2010) have described the use of a similar technique in the state of Paraíba. The tegu cage trap (Figure 3I) is similar but smaller and is specifically designed to capture tegus (*S. merianae*). No mention of this technique was found in the literature. In both these traps, when the animal enters the open end a suspended wooden board is released that falls and blocks the exit keeping the animal locked inside the trap. The cages are places just outside or even inside the animal's den tunnel and the hunters usually place a bait of rotten chicken egg (*Gallus gallus domesticus*) inside the trap to attract the animal

The tegu (*S. merianae*) is hunted when the hunter sights the animal going into hiding in its hole. The hunter then blocks the entrance with a rock and uses a digging hoe and a shovel (Figure 3M) to dig out the reptile. The same capture technique has been described for armadillos (Dasypodidae) as well.

The tool known as a *preaca* is a metal hook with a long handle used capture the Spix's covey by pulling it from inside its tunnel. Alves et al. (2009, 2010) have reported the use of a similar hooked implement to dislodge the covey from inside its den.

The armadillo pit trap (Figure 3H) is a form of trap similar to the pit trap with the metal container but bigger. A large hole is dug in the earth into which a wooden box is fitted with a lid suspended over it. The lid is camouflaged with sand and cactus plants (*Cereus squamosus*) are placed around it to stop the animal from getting away. Bait (usually rotten eggs) is then placed on the lid. This device is usually used to catch six-banded armadillos (*E. sexcinctus*) but sometimes it is used to catch tegus (*S. merianae*) as well. No mention of this kind of trap was found in the literature.

Among the techniques mentioned that capture animals without any active action on the part of the hunter are the trapdoor cage (n = 9), the spring trap made of twigs (*arapuca)* (n = 6), the pit trap (n = 5) and the sticky gum (n = 3), but the female interviewees (n = 2) only referred to using the sticky gum. These last techniques were mainly used by adolescents in the 14 to 17 age group (n = 10), followed by others in the 18 to 21 age group (n = 5)

It was found that in some cases the students make use of more than one technique depending on the species they want to capture and that corroborates the report of observations made in Paraíba (ALVES et al., 2009, 2010), in Ceará (FERNANDES-FERREIRA et al., 2012) and in Rio Grande do Norte (BEZERRA; ARAUJO; ALVES, 2012; BARBOSA et al., 2014). The decision as to which strategy or technique to use to capture a given species reveals the hunters' perception and knowledge of the ecology of the respective animals.

Most of the hunting methods described in this paper have been reported in other states of the Brazilian northeast (ALVES et al., 2009; BEZERRA; ARAUJO; ALVES, 2012; FERNANDES-FERREIRA et al., 2012) and in the Amazon (TRINCA; FERRARI, 2006), although some of them present local peculiarities. All the bird capturing techniques described above are similar to the capture strategies described by Barbosa et al. (2014) in research undertaken previously with some hunters from the rural parts of the municipality of Jaçanã, one of the localities embraced by the present research.

3.5 Environmental Perception

The students had various different perceptions in regard to the environment they live in. The data regarding this aspect were extracted from the interviews with all the students in the sample group (n = 80). 91% of them (n = 73) stated that the game animals are more frequently found at certain times of the year and of the group that made that affirmation, 79% (n = 55) declared that it was in the rainy season which coincided with the mating period of various bird species and also the time of year when migratory species such as the eared dove *Z. auriculata* arrived (OLMOS; SILVA; ALBANO, 2005). According to Alves et al. (2010) many Caatinga fauna species have habits clearly defined by the local seasons and are most abundant in the rainy periods.

In regard to the availability of wildlife species in the course of the year, 91% (n = 73) of the students state that the frequency of wildlife sightings has been going down.

When asked what they thought might be the reason for that, 78% of them thought that the main factor was hunting. Other factors that were mentioned were: deforestation 11% (n = 8), drought - 10% (n = 7), illegal trafficking - 7% (n = 5), and burning the land- 3% (n = 2).

Most of the men and women considered hunting to be the main cause of the reduction of the local fauna (Table 2). According to the Chi-squared test, with the exception of hunting ($X^2 = 5.75$, $p = <0.05$), there was no statistically significant correlation between gender and the other factors cited as being responsible for the fauna decline.

Table 2. Factors that may have triggered the decline of local fauna according to the interviewees, together with the Chi-squared values obtained, by genders. * P value (significant for X^2) less than 0.05.

	Men	Women	X^2
Hunting	44	13	5.75*
Deforestation	6	2	0.3
Drought	4	3	0.5
Illegal trafficking	2	3	0.4
Burning the land	1	1	0.2

Most of the younger students also accused hunting as being the main factor involved in the decline of the local fauna. However the relatively older group (aged 22 to 25) stressed that deforestation was actually the only factor responsible for the increasing scarcity of wildlife species in the region (Table 3). The results of the Chi-squared test showed that there was a statistically significant relations between the responses of students in the 22 to 25 age group and the younger ones in the 14 to 17 group ($X^2 = 18.621231$, $p = 0.00093291$) and those of the 18 to 21 age group ($X^2 = 10.578$, $p = 0.014242$). It is therefore clear that the overall perception is that hunting is largely responsible for the decline in the local fauna even though it is not the only one but is part of a whole set of anthropic pressures.

Table 3. Possible factor that have triggered the decline in local fauna according to the interviewed students, dis-aggregated by age groups.

Age Group	Factors that contribute to a reduction in the fauna				
	Hunting	Deforestation	Drought	Illegal Trafficking	Burning
14 to 17	44	4	5	3	2
18 to 21	12	1	1	1	0
22 to 25	0	2	0	0	0
26 to 30	1	1	1	1	0
Total	57	8	7	5	2

Conservationist Implications

As this study has clearly shown, the most avid hunter/persecutors of local wildlife species in the areas embraced by the research are males in the 18 to 21 age group. They use a variety of strategies and techniques and in doing so capture a greater diversity of animals which means they have a propensity for causing greater negative impacts on the environment.

The analysis of hunting methods identifies the shotgun as the most important instrument for the majority of hunters in the region, possibly because it is such an efficient way of killing prey but it is also used in alliance with other hunting strategies such as bird-call whistles, ambushing and hunting with dogs. It must be considered the technique that has the heaviest impacts on the local fauna due to the widespread dispersion and intensity of its use.

It is important to note that capture methods that are species–specific like the cage trap for the six-banded armadillo (*E. sexcinctus*) and the special trap for the tegu (*S. merianae*) are an indication of the intensity with which those species are hunted. The greatest number of techniques (n = 11) are suitable for catching birds and there are five of them which are bird-specific, namely, the trapdoor cage, shining at night, the twig spring trap, bird call whistles and the sticky gum. That indicates a clear preference for bird species which is most certainly associated to the relative abundance and diversity of bird species both locally and nationally so they can be considered the most-threatened hunted wildlife group in the region.

Furthermore, it was shown that some capture techniques (trapdoor cage, twig spring trap, pit and sticky gum) mainly used by young males in the 14 to 17 age group, are capable of capturing the animals without the hunter being present so that there is no question of selectivity at the moment of capture. From the conservationist point of view, such techniques should be avoided given their notable efficiency and the wide variety of species they can capture.

The most hunted species and therefore those most intensely threatened were: the white-throated seedeater (*S. albogularis*) mainly captured to keep as a pet, the six-banded armadillo (*E. sexcinctu*) and the ruddy ground dove (*Columbina talpacoti)* both hunted for food and following them, reptiles like the side-necked turtle (*P. tuberosus*), the common iguana (*I. iguana*) and the tegu (*S. merianae*) all captured go food but also for medicinal purposes and to trade.

It is possible that making use of wildlife species and undertaking cynegetic activities in the areas embraced by the study are linked to local cultural and socioeconomic factors. The interviewed students stated that the populations of some species are declining and that fact, coupled to the hunting of species under threat of extinction, which is taking place both nationally and globally, reflects the need to apply measures to ensure the sustainability of the wildlife species being exploited in the region, especially because those species play an important role in the local ecosystem and in the lives of the local population.

The students showed that they have important knowledge about hunting activities so that the data presented in this paper may prove to be useful for the implantation of con-

servation strategies that could include: (1) unfolding environmental education programs, bearing in mind that the hunting habit generally begins in childhood; (2) participative monitoring of hunting activities involving the local government authorities (Environment Department or Agricultural Department), the community, those that carry out hunting themselves (the students), schools and the university and/or the respective environmental body – the University and the Environmental bodies are those that will carry out research and conduct monitoring, modify and adapt hunting techniques to be practiced at adequate times of the year and in restricted area open to specific hunting practices under controlled condition as a way of ensuring that species populations are maintained in levels that guarantee their sustainability and that their exploitation does not exceed the fertility rate and survival capacity of each specific group making it possible to maintain a guaranteed minimum level of such fauna resources for the use of the poorest human populations; (3) Stimulate the planting and management of fruit-bearing species given that many of the target species are frugivorous and that some of the hunting techniques are normally applied near to orchards; Also promote less invasive techniques that are more selective in regard to the target species – expanding orchards will also result in more food available for the local population. (4) create incentives for the legalized production of some cynegetic species in captivity; (5) foster rural tourism with ecotourism activities, open air walks, observation of local flora and wildlife all of which would not only help to preserve the ecosystem but also arouse the sensitivity of local communities and create a source of income for the population.

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Original Article

HUNTING ACTIVITIES IN THE SEMIARID POTIGUAR UNDER THE STUDENTS PERSPECTIVE

***Abstract*:** In areas of Caatinga, hunting is considered a threat to fauna and ecological balance, and the study of hunting activity is relatively important for the elaboration of conservation strategies. This research aims to identify hunted wildlife species, their use, and hunting techniques in two towns of Rio Grande do Norte state, Brazil. We interviewed 80 resident students from rural areas. Eighty-four species were recorded, which fall into the following categories of use: food (73), pets (43), medicinal (14) and trade (45). The animals are captured through 15 techniques, the shotgun being the most impactful technique for local fauna. The species with the highest Use Value were the six-banded armadillo (*Euphractus sexcinctus*) and the ruddy ground dove (*Columbina talpacoti*). The use of faunal resources and the achievement of hunting activities in the studied areas are closely related to cultural and socioeconomic factors.

***Keywords*:** Caatinga; Use of Fauna; Conservation; Hunting techniques.

***Resumo*:** Em áreas de Caatinga, a caça é considerada uma ameaça à fauna e ao equilíbrio ecológico, sendo o estudo da atividade cinegética relativamente importante para elaboração de estratégias de conservação. Baseado nesta premissa, esta pesquisa visa identificar os animais silvestres capturados, suas formas de uso e técnicas de caça em dois municípios do Estado do Rio Grande do Norte, Brasil. Para tanto, foram realizadas entrevistas com 80 estudantes residentes da zona rural. Foram registradas 84 espécies, que se enquadram nas seguintes categorias de uso: alimentação (73), estimação (43), medicinal (14) e comércio (45). Os animais são capturados através de 15 técnicas, sendo a espingarda a técnica mais impactante para fauna local. As espécies com maior valor de uso foram tatu peba (*Euphractus sexcinctus*) e rolinha vermelha (*Columbina talpacoti*). A utilização dos recursos faunísticos e a realização das atividades cinegéticas nas áreas estudadas estão intimamente relacionadas a fatores culturais e socioeconômicos.

***Palavras-chave*:** Caatinga; Uso da Fauna; Conservação; Técnicas de captura.

***Resumen*:** En áreas de Caatinga, la caza es considerada una amenaza a la fauna y al equilibrio ecológico, siendo el estudio de la actividad cinegética relativamente importante para la elaboración de estrategias de conservación. Partiendo de esta premisa, esta investigación tiene como objetivo identificar los animales salvajes capturados, formas de uso y técnicas de caza en dos ciudades del estado de Rio Grande do Norte, Brasil. Con este fin, se realizaron

entrevistas con 80 estudiantes residentes de las zonas rurales. Se registraron 84 especies, que se dividen en las siguientes categorías de uso: alimentación (73), mascotas (43), medicinales (14) y comercio (45). Los animales son capturados a través de 15 técnicas, siendo la escopeta la técnica más impactante para la fauna local. Las especies con mayor valor de uso fueron "*tatu peba*" (*Euphractus sexcinctus*) y "*rolinha vermelha*" (*Columbina talpacoti*). El uso de recursos faunísticos y el logro de actividades de caza en las áreas estudiadas están estrechamente relacionados con factores culturales y socioeconómicos.

Palabras clave: Caatinga; Uso de la fauna; Conservación; Técnicas de caza.