

DIAGNOSIS OF FAUNA APPREHENSION IN THE SEMI-ARID REGION OF BAHIA: AN ANALYSIS FROM THE ENVIRONMENTAL NOTICES OF VIOLATION

¹Mahatma Lenin Avelino de Almeida and ^{2,*}Carlos Alberto Batista Santos

¹Department of Technology and Social Sciences at the University of the State of Bahia - UNEB, Juazeiro-BA. Post-Graduate Student in Human Ecology and Socio-Environmental Management

²Department of Technology and Social Sciences at the State University of Bahia; Coordinator of the Master's Degree in Human Ecology and Socio-Environmental Management DTCS, UNEB

ARTICLE INFO

Article History:

Received 11th July, 2018
Received in revised form
06th August, 2018
Accepted 22nd September, 2018
Published online 29th October, 2018

Key Words:

Wildlife seizures,
Environmental crimes,
Environmental Notices of Violation.

ABSTRACT

This paper is aimed to investigate the Environmental Notices of Violation – ENV, applied in crimes against wildlife in the Brazilian semi-arid region by IBAMA. 598 ENV were analysed, which were generated based on data from DOC IBAMA and SEI systems between January 2006 and December 2017, relative to seizures of birds, reptiles, and mammals, resulting in warnings and fines. In 100 cities in the semi-arid region of Bahia, the ENV generated administrative fines totaling R\$ 15,545,027.00. The animals seized by IBAMA represented 12,697 live animals, and 3,679 of them were not classified by their agents. They identified 7,240 birds, 238 mammals, 1,068 reptiles, 442 fighting cocks, and 30 marine animals in illegal exhibitions. In addition, IBAMA registered seizures of 215 whole animals slaughtered (6.9 kg of meat), 2 skins, and 2 carcasses. Among the species seized and identified, 14 were birds and 6 were mammals presenting a threat according to IUCN. Furthermore, 22 species of birds, 11 species of mammals, and 6 species of reptiles were identified in the CITES appendices. Therefore, the results demonstrated the need for investment in inspection and improvement of the public policies of environmental education and sustainable management of wildlife in the semi-arid region.

Copyright © 2018, Mahatma Lenin Avelino de Almeida and Carlos Alberto Batista Santos. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Citation: Mahatma Lenin Avelino de Almeida and Carlos Alberto Batista Santos, 2018. "Diagnosis of fauna apprehension in the semi-arid region of bahia: an analysis from the environmental notices of violation.", *International Journal of Development Research*, 8, (10), 23462-23470.

INTRODUCTION

The indiscriminate use of the wild fauna by man passed through significant changes throughout the history of Brazil (Alves *et al.*, 2012; Dias Júnior *et al.*, 2014; Ferreira *et al.*, 2016). If before the second half of the 20th century its use was restricted to the trade of live animals, bird feathers and the slaughter for skin removal, currently its use is based on the supply of clandestine trade of exotic meats and on the animal trafficking for the maintenance of the pet Market (COSTA 2006; Dias Júnior *et al.*, 2014). These actions are criminalized in the country (Oki and Pandeff, 2016) and is configured antagonistic to the maintenance of balance and sustainable management of biodiversity (Milner-Gulland; Bennett, 2003; Dias Júnior *et al.*, 2014).

***Corresponding author:** Carlos Alberto Batista Santos, Department of Technology and Social Sciences at the State University of Bahia; Coordinator of the Master's degree in human ecology and socio-environmental management DTCS, UNEB.

In the Brazilian semi-arid, which has the Caatinga biome as hegemonic in your portion, the human exploration of wild fauna has an intimate connection with the lifestyle of traditional populations (Alves *et al.*, 2012; Alves *et al.*, 2011; Alves *et al.*, 2010; Alves *et al.*, 2009), since against the natural shortage of resources, people used the animals in nutritional supplementation, in activities linked to culture, in the commercialization of live specimens (Rocha *et al.*, 2006), besides parts of them or by-products used as vestment, tools, for medical use and magical-religious (Pereira; Schiavetti, 2010; Fernandes-Ferreira *et al.*, 2012; Ferreira *et al.*, 2012; Santos *et al.*, 2016). However, the human interference has been causing devastating environmental damages in this biome. It is known that the process of predatory extraction can be easily visualized with the reduction of the fauna and flora diversity, erosion everyday more pronounced by the decreased soil fertility and the amount of water (Alves *et al.*, 2012). Data show us that the desertification process already reaches 15% of its natural space and, at least 41 species of

fauna that occur in Caatinga, are threatened with extinction (Schober, 2012; Nascimento; Campos, 2011). The Brazilian Institute of Environment and Renewable Natural Resources – IBAMA, is one of the main agencies responsible for inspection of environmental crimes against the fauna in the northeastern semi-arid region. The law number 9.605/98 established in chapter V, section I, the criminal conduct related to human action on the fauna (BRASIL, 2016), to catch, to murder, to transport, to sell, to purchase, to use, to keep in captivity, to keep wild animals or products from them, without proper authorization, license or permission are some of the crimes that will result in penal and financial consequences to the responsible, generating an Environmental Notice of Violation – ENV, which may result in a fine or warning, and the animal or product of it will be apprehended (IBAMA, 2016). Studies in the Brazilian semi-arid that investigate the relationship between man and wild fauna, estimating qualitative and quantitative aspects related to most impacted species and the types of environmental crimes, can be used specially to subsidize actions for conservation and awareness of scarce wildlife resources (ALVES *et al.*, 2012). Through the exposed, this work proposed to investigate the way the human being relates to the wild fauna, through analysis of the Environmental Notices of Violation made in the apprehensions of animals realized by The Brazilian Institute of Environment and Renewable Natural Resources – IBAMA in the semi-arid of Bahia.

MATERIALS AND METHODS

Study Area: The study was carried out in the semi-arid state of Bahia, which is composed of 277 cities (SUDENE, 2017), covering a total area of 390,549.4 km² and a population of approximately 7,227,399 people (INSA, 2014).

Methods: The period established for the documentary research was between January 2006 to December 2017, determined by the viability of access to the documentary information made available by IBAMA. The data collection was obtained from the records of the Environmental Notices of Violation (ENV), accessed in the DOC IBAMA system and in the Electronic Information System (SEI), concerning wildlife crimes (seizures of birds, reptiles and mammals) in the semi-arid of Bahia, which resulted in warnings or fines with the respective notice of apprehension drawn up by the environmental agency. In order to do so, the analysis of ENV considered the total number of notices, total fines applied, recurrence of human criminal conduct in the records, the seized species identified in the ENV, the physical situation that the animals were, and the analysis from their ecological status on the lists of the International Union for Conservation of Nature (IUCN), Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and the Official National List of Endangered Species of Extinguishment of Portaria n° 444/2014, of the Brazilian Ministry of Environment.

RESULTS

The results showed that 598 environmental notices of violation were applied in crimes against wildlife by IBAMA in 100 cities of the semi-arid region of Bahia between January 2006 and December 2017, which generated 598 administrative fines and no warnings. The fines recorded a total of R \$ 15,545,027.00 during the period, with an average of approximately R\$ 1,413,184.27 / year.

The values of the fines vary according to the quantity of specimens seized and also with the degree of vulnerability of the species, with fines applied from R\$ 500.00 to R\$ 5.000,00 per species (IBAMA, 2016). Another aspect analyzed was the classification of human behaviors in the semi-arid region of Bahia at the time of the IBAMA seizure, revealing that the action of "keeping the wild fauna in captivity" was the one that had the largest volume of notifications, corresponding to 340 (56.86%) environmental notices of violation registered, followed by the conduct of "exposing for sale" with 75 (12.54%), and the action of "transporting" with 67 (11.20%) notifications. There were still other conducts registered with less intensity according to Table 01. In relation to animals, the study revealed that 12,697 live animals were seized in the cities of the semi-arid region of Bahia, and 3,679 of them were not classified by IBAMA agents. 7,240 birds, 238 mammals, 1,068 reptiles, 442 fighting cocks, and 30 marine animals in illegal exhibitions were identified.

Twenty-one whole animals slaughtered (6.9 kg of meat), 2 skins, and 2 carcasses were recorded in the seizures. Birds represented 80.27% of the total number of live specimens with 107 species belonging to 21 families. 2 species have ecological status according to IUCN (2018) in danger of extinction and 8 are listed as vulnerable species, while 2 species are listed in Appendix I and 20 species in Appendix II of CITES (2018), and 1 critically endangered species, 1 endangered species, and 6 vulnerable species according to Brazilian Ministry of Environment (2014) (Table 02). The mammals represented 2.64% of the seizures, totaling 238 specimens of 21 species and 15 families. 1 species is critically endangered and 1 other species is endangered, all with estimated population reduction, according to IUCN (2018). In addition, 3 are in Appendix I, 6 species in Appendix II, 2 species in Appendix III of CITES (2018), and 4 endangered and 2 vulnerable in the list of Brazilian Ministry of Environment (2014) (Table 03). Reptiles represented 11.84% of the total number of specimens seized, totaling 1,068 specimens of 7 species and 6 different families. Among these species, 5 species are not listed in IUCN (2018), 2 are listed in Appendix I and II, 6 in Appendix II of CITES (2018), and none of them are listed by Brazilian Ministry of Environment (2014) (Table 04). In the seizures, dead animals were also registered, and the forms of seizure were included in the notices of violation: slaughtered, commercialization, custody, storage, and transport of animals (Table 05). Finally, during the study period, 30 animals taxidermized for exhibitions were seized, belonging to 11 species of marine animals.

DISCUSSION

The hunt is the first link of wild animals trafficking. According RENTAS (2001), the organized crime of animals trafficking moves billions of dollars every year, considered the third illegal activity more rentable in the world being overcome only by drugs and arms trafficking. However, due to the poor transport conditions, around 90% of these species don't arrive with life at its final destination (Recntas, 2016). In the Brazilian semi-arid, it is influenced by a series of biological, socioeconomic, political, and institutional factors (Alves *et al.*, 2012; ALVES *et al.*, 2009). From the point of view of state protection it is very clear that this process is illegal in the country, however, it is possible to indicate some exceptions, such as the state of necessity, to satiate the agent or his family's hunger, to protect crops, orchards, and herds from the predatory or destructive

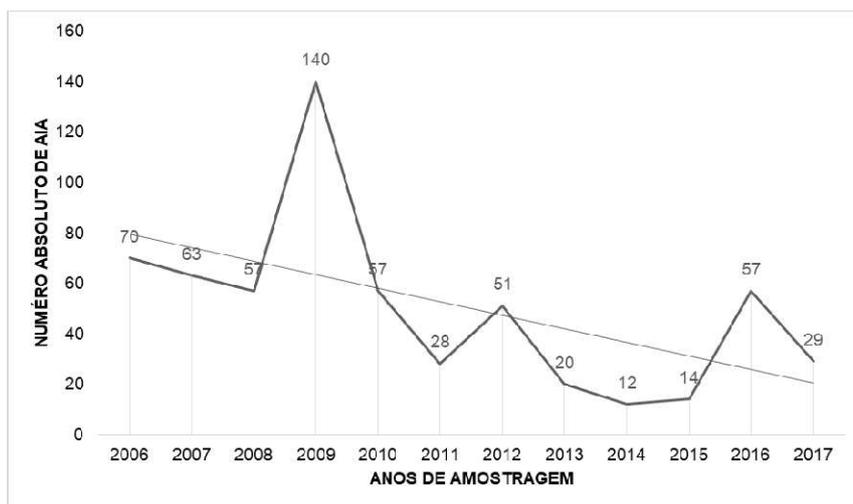


Figure 1. Quantity of environmental notices of violation processed by IBAMA Juazeiro-BA from 2006 to 2017

Table 1. Quantity and percentage of environmental notices of violation according to human conduct and the respective violation from 2006 to 2017 recorded in IBAMA seizures in the semi-arid region of Bahia

Registered human conduct ENV	N° ENV	% ENV
Keep in captivity	340	56,86%
Market /expose the sale /sell	75	12,54%
Carry	67	11,20%
Store maintain on deposit /saving	34	5,69%
To practice ill-treatment	22	3,68%
To hunt	17	2,84%
Shoot /kill	16	2,68%
Purchase	12	2,01%
Use	8	1,34%
Trading hunting instrument	3	0,50%
Obstructing the inspection action	2	0,33%
Failing to report the death of animals	1	0,17%
Introduce species of exotic fauna	1	0,17%

Table 2. List of bird species seized in the semi-arid region of Bahia between 2006 and 2017, classified according to IUCN (2018), CITES (2018), and Brazilian Ministry of Environment (2014) threat levels

Family	Scientific name	Popular name	N	Category and criteria IUCN	Current population trend IUCN	CITES	MMA
Anatidae	<i>Anas querquedula</i>	Marreco	2	LC	Decreasing	-	-
	<i>Cairina moschata</i>	Pato do mato	5	LC	Decreasing	-	-
	<i>Dendrocygna viduata</i>	Irerê	1	LC	Increasing	-	-
	<i>Nomonyx dominicus</i>	Marreca-bico-roxo	1	LC	Decreasing	-	-
Cardinalidae	<i>Cyanoloxia brissonii</i>	Azulão	1091	LC	Unknown	-	-
	<i>Cyanoloxia rothschildii</i>	Azulão-da-amazônia	2	LC	Decreasing	-	-
Cariamidae	<i>Cariama cristata</i>	Seriema	5	LC	Stable	-	-
Columbidae	<i>Columbina minuta</i>	Rolinha-de-asa-canela	3	LC	Stable	-	-
	<i>Columbina passerina</i>	Rolinha-cinza	2	LC	Decreasing	-	-
	<i>Columbina picui</i>	Rolinha-picui	23	LC	Stable	-	-
	<i>Columbina squammata</i>	Fogo-apagou	24	LC	Stable	-	-
	<i>Columbina talpacoti</i>	Rolinha-caldo-de-feijão	23	LC	Increasing	-	-
	<i>Leptotila rufaxilla</i>	Juriti-verdadeira	18	LC	Stable	-	-
	<i>Leptotila verreauxi</i>	Juriti-pupu	9	LC	Increasing	-	-
	<i>Patagioenas cayennensis</i>	Pomba-galega	3	LC	Stable	-	-
	<i>Patagioenas picazuro</i>	Asa-branca	27	LC	Increasing	-	-
	<i>Streptopelia decaocto</i>	Rola-turca	4	LC	Increasing	-	-
	<i>Zenaidura macroura</i>	Arriabaça	113	LC	Increasing	-	-
Corvidae	<i>Cyanocorax coerulesus</i>	Gralha-azul	13	NT	Decreasing	-	-
	<i>Cyanocorax cristatellus</i>	Gralha-do-campo	1	LC	Stable	-	-
	<i>Cyanocorax cyanopogon</i>	Cancão	13	LC	Decreasing	-	-
Cotingidae	<i>Procnias nudicollis</i>	Araponga	2	VU	Decreasing	-	-
Cracidae	<i>Penelope jacucaca</i>	Jacu	1	VU	Decreasing	-	VU
Estrildidae	<i>Estrilda astrild</i>	Bico-de-lacre	1	LC	Stable	-	-
Fringillidae	<i>Euphonia chlorotica</i>	Guriatã-de-coleira	4	LC	Stable	-	-
	<i>Euphonia violacea</i>	Gaturamo-verdadeiro	2	LC	Decreasing	-	-
	<i>Spinus magellanicus</i>	Pintassilgo	40	LC	Stable	-	-

Continue.....

	<i>Spinus yarrellii</i>	Pintassilgo do nordeste	31	VU	Decreasing	II	VU
Furnariidae	<i>Pseudoseisura cristata</i>	Carrega-madeira-do-sertão	7	LC	Increasing	-	-
Icteridae	<i>Agelaioides badius</i>	Asa-de-telha	3	LC	Stable	-	-
	<i>Cacicus cela</i>	Xexeu	1	LC	Decreasing	-	-
	<i>Cacicus haemorrhous</i>	Guaxe	1	LC	Decreasing	-	-
	<i>Chrysomus ruficapillus</i>	Garibaldi	89	LC	Stable	-	-
	<i>Gnorimopsar chopi</i>	Pássaro preto	453	LC	Stable	-	-
	<i>Icterus cayanensis</i>	Pega	41	LC	Stable	-	-
	<i>Icterus jamacaii</i>	Corrupião	113	LC	Stable	-	-
	<i>Molothrus bonariensis</i>	Chupim	8	LC	Increasing	-	-
Mimidae	<i>Mimus saturninus</i>	Sabiá-do-campo	1	LC	Stable	-	-
Passerellidae	<i>Ammodramus humeralis</i>	Tico tico do campo	5	LC	Stable	-	-
	<i>Arremon taciturnus</i>	Tico-tico-de-bico-preto	1	LC	Stable	-	-
	<i>Zonotrichia capensis</i>	Tico-tico	195	LC	Stable	-	-
Phasianidae	<i>Coturnix coturnix</i>	Corduniz	1	LC	Decreasing	-	-
Pipridae	<i>Antilophia galeata</i>	Soldadinho	4	LC	Stable	-	-
Psittacidae	<i>Brotogeris tirica</i>	Periquito rico	3	LC	Stable	II	-
	<i>Amazona aestiva</i>	Papagaio verdadeiro	222	LC	Decreasing	II	-
	<i>Amazona amazonica</i>	Papagaio do mangue	4	LC	Decreasing	II	-
	<i>Amazona rhodocorytha</i>	chauá	1	VU	Decreasing	II	VU
	<i>Ara ararauna</i>	Arara canidé	9	LC	Decreasing	II	-
	<i>Ara chloropterus</i>	Arara vermelha	4	LC	Decreasing	II	-
	<i>Aratinga solstitialis</i>	Jandaia sol	3	EN	Decreasing	II	EN
	<i>Cyanoramphus unicolor</i>	Periquito verde antipodas	2	VU	Stable	-	-
	<i>Deropterus accipitrinus</i>	Anacã	2	LC	Decreasing	II	-
	<i>Diopsittaca nobilis</i>	Maracanã-nobre	1	LC	Stable	II	-
	<i>Eupsittula aurea</i>	Periquito estrela	7	LC	Stable	II	-
	<i>Eupsittula cactorum</i>	Periquito jandaia	162	LC	Stable	II	-
	<i>Forpus passerinus</i>	Tuim santo	4	LC	Decreasing	II	-
	<i>Forpus xanthopterygius</i>	Tuim	23	LC	Stable	II	-
	<i>Guaruba guarouba</i>	Guaruba	3	VU	Decreasing	I	VU
	<i>Pionus maximiliani</i>	Maitaca verde	1	LC	Decreasing	II	-
	<i>Primolius maracana</i>	Maracanã verdadeiro	7	NT	Decreasing	I	-
	<i>Psittacara acuticaudatus</i>	Periquitão	53	LC	Decreasing	II	-
	<i>Psittacara leucophthalmus</i>	Periquitão maracanã	6	LC	Decreasing	II	-
	<i>Pyrrhura frontalis</i>	Tiriba-de-testa-vermelha	2	LC	Stable	II	-
Rheidae	<i>Rhea americana</i>	Ema	4	NT	Decreasing	II	-
Thraupidae	<i>Coereba flaveola</i>	Cambacica	3	LC	Stable	-	-
	<i>Coryphospingus cucullatus</i>	Tico-tico-rei	5	LC	Stable	-	-
	<i>Coryphospingus pileatus</i>	Tico-tico-rei-cinza	146	LC	Stable	-	-
	<i>Leistes militaris</i>	Papo-de-fogo	1	LC	Stable	-	-
	<i>Paroaria coronata</i>	Cardeal	143	LC	Stable	II	-
	<i>Paroaria dominicana</i>	Galo-da-campina	707	LC	Stable	-	-
	<i>Saltator atricollis</i>	Batuqueiro	2	LC	Unknown	-	-
	<i>Saltator maximus</i>	Papa-pimenta	113	LC	Decreasing	-	-
	<i>Saltator similis</i>	Trinca ferro	440	LC	Decreasing	-	-
	<i>Schistochlamys ruficapillus</i>	Bico-de-veludo	10	LC	Stable	-	-
	<i>Sicalis citrina</i>	Canário rasteiro	2	LC	Stable	-	-
	<i>Sicalis flaveola</i>	Canário-da-terra	827	LC	Stable	-	-
	<i>Sicalis luteola</i>	Tipio	35	LC	Increasing	-	-
	<i>Sporophila albogularis</i>	Golinha	369	LC	Stable	-	-
	<i>Sporophila angolensis</i>	Curió	34	LC	Increasing	-	-
	<i>Sporophila ardesiaca</i>	Patativa chorona	262	LC	Increasing	-	-
	<i>Sporophila bouvreuil</i>	Caboclinho	106	LC	Decreasing	-	-
	<i>Sporophila caerulescens</i>	Coleirinho	170	LC	Increasing	-	-
	<i>Sporophila falcirostris</i>	Cigarra-verdadeira	1	VU	Decreasing	-	VU
	<i>Sporophila fringilloides</i>	Papa capim de coleira	2	LC	Stable	-	-
	<i>Sporophila frontalis</i>	Pixoxó	5	VU	Decreasing	-	VU
	<i>Sporophila leucoptera</i>	Patativa-chorona	87	LC	Stable	-	-
	<i>Sporophila lineola</i>	Bigode	127	LC	Stable	-	-
	<i>Sporophila maximiliani</i>	Bicudo	3	EN	Decreasing	-	CR
	<i>Sporophila nigricollis</i>	Papa-capim	441	LC	Increasing	-	-
	<i>Sporophila plumbea</i>	Patativa	17	LC	Stable	-	-
	<i>Sporophila schistacea</i>	Cigarrinha-do-norte	2	LC	Decreasing	-	-
	<i>Tachyphonus rufus</i>	Maria preta	2	LC	Stable	-	-

Continue....

	<i>Sporophila schistacea</i>	Cigarrinha-do-norte	2	LC	Decreasing	-	-
	<i>Tachyphonus rufus</i>	Maria preta	2	LC	Stable	-	-
	<i>Tangara cyanoptera</i>	Sanhaço-de-encontro-azul	1	NT	Decreasing	-	-
	<i>Tangara palmarum</i>	Sanhaço-de-coqueiro	1	LC	Stable	-	-
	<i>Tangara sayaca</i>	Sanhaço	42	LC	Stable	-	-
	<i>Volatinia jacarina</i>	Tiziu	7	LC	Stable	-	-
Tinamidae	<i>Crypturellus parvirostris</i>	Inhambu-chororó	7	LC	Decreasing	-	-
	<i>Crypturellus tataupa</i>	Inhambu-xintã	1	LC	Stable	-	-
	<i>Rhynchotus rufescens</i>	Perdiz	4	LC	Decreasing	-	-
Turdidae	<i>Turdus amaurochalinus</i>	Sabiá-poca	31	LC	Stable	-	-
	<i>Turdus fumigatus</i>	Sabiá-da-mata	3	LC	Decreasing	-	-
	<i>Turdus leucomelas</i>	Sabiá-barranco	24	LC	Stable	-	-
	<i>Turdus rufiventris</i>	Sabiá laranjeira	133	LC	Stable	-	-
Tyrannidae	<i>Knipolegus poecilocercus</i>	Maria preta do igapó	1	LC	Decreasing	-	-
	<i>Lophotriccus vitiosus</i>	Maria-fiteira	8	LC	Stable	-	-
	<i>Myiarchus ferox</i>	Maria-cavaleira	1	LC	Decreasing	-	-
	<i>Pitangus sulphuratus</i>	Bem-te-vi	4	LC	Increasing	-	-

Legend: 1. IUCN: VU - Vulnerable; NT - Near Threatened; LR / CD - Low Risk / Conservation Dependent; LC-Least Concern; DD - Data deficient; (*) - Not on the IUCN List; 2. CITES I: Annex I of CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora). They include endangered species that are or potentially could be affected by trade. Trade in these species shall be authorized only after careful consideration and under exceptional conditions; Cites II: Annex II of CITES includes those species which, although not currently in danger of extinction, will fall into this category if their trade is not subject to strict regulations in order to avoid exploitation above the carrying capacity of the populations; CITES III: Species included in Annex III of CITES through a declaration from any country are those whose exploitation needs to be restricted or prevented and which requires cooperation in its control, and may be allowed to be commercialized, by means of a license or certificate, by the Administrative Authority; 3. MMA: Extinct in Nature (EW), Critically Endangered (CR), Endangered (EN) and Vulnerable (VU).

Table 3. List of mammal species seized in the semi-arid region of Bahia between 2006 and 2017, classified according to IUCN (2018), CITES (2018), and Brazilian Ministry of Environment (2014) threat levels.

Family	Scientific name	Popular name	N	Category and criteria IUCN	Current population trend IUCN	CITES	MMA
Callitrichidae	<i>Callithrix penicillata</i>	Sagui	19	LC	Increasing	II	-
	<i>Callithrix jacchus</i>	Saguim	10	LC	Stable	I	-
	<i>Leontopithecus chrysomelas</i>	Mico-leão-de-cara-dourada	2	EN	Decreasing	I	EN
Canidae	<i>Cerdocoyon thous</i>	Raposa	2	LC	Stable	II	-
Caviidae	<i>Cavia aperea</i>	Preá	34	LC	Stable	-	-
Cebidae	<i>Sapajus xanthosternos</i>	Macaco-prego-do-peito-amarelo	3	CR	Decreasing	II	EN
Cervidae	<i>Mazama gouazoubira</i>	Veado-catingueiro	6	LC	Decreasing	-	-
Cuniculidae	<i>Cuniculus paca</i>	Paca	3	LC	Stable	III	-
Dasypodidae	<i>Dasybus novemcinctus</i>	Tatu-verdadeiro	10	LC	Stable	-	-
	<i>Dasybus septemcinctus</i>	Tatu-galinha-pequeno	1	LC	Unknown	-	-
	<i>Euphractus sexcinctus</i>	Tatu-peba	18	LC	Stable	-	--
	<i>Tolypeutes tricinctus</i>	Tatu-bola-da-caatinga	54	VU	Decreasing	-	EN
Dasyproctidae	<i>Dasyprocta leporina</i>	Cutia	31	LC	Stable	-	-
Didelphidae	<i>Didelphis albiventris</i>	Sariguê	2	LC	Stable	-	-
Erethizontidae	<i>Coendou prehensilis</i>	Porco-espinho brasileiro	2	LC	Stable	-	-
Felidae	<i>Leopardus tigrinus</i>	Gato do mato	1	VU	Decreasing	I	EN
	<i>Leopardus colocolo</i>	Gato-palheiro	1	NT	Decreasing	II	VU
Myrmecophagidae	<i>Tamandua tetradactyla</i>	Tamanduá-mirim	3	LC	Unknown	-	-
	<i>Myrmecophaga tridactyla</i>	Tamanduá-bandeira	1	VU	Decreasing	II	VU
Procyonidae	<i>Nasua nasua</i>	Quati	1	LC	Decreasing	III	-
Tayassuidae	<i>Pecari tajacu</i>	Caitatu	34	LC	Stable	II	-

Legend: 1. IUCN: VU - Vulnerable; NT - Near Threatened; LR / CD - Low Risk / Conservation Dependent; LC-Least Concern; DD - Data deficient; (*) - Not on the IUCN List; 2. CITES I: Annex I of CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora). They include endangered species that are or potentially could be affected by trade. Trade in these species shall be authorized only after careful consideration and under exceptional conditions; Cites II: Annex II of CITES includes those species which, although not currently in danger of extinction, will fall into this category if their trade is not subject to strict regulations in order to avoid exploitation above the carrying capacity of the populations; CITES III: Species included in Annex III of CITES through a declaration from any country are those whose exploitation needs to be restricted or prevented and which requires cooperation in its control, and may be allowed to be commercialized, by means of a license or certificate, by the Administrative Authority; 3. MMA: Extinct in Nature (EW), Critically Endangered (CR), Endangered (EN) and Vulnerable (VU).

action of animals, provided that it is legal and expressly authorized by the qualified authority, for the animal being harmful, since it is so characterized by the qualified organ (Alves *et al.*, 2012). Therefore, our results demonstrated that it is worrying the great amount of examples apprehended (12.697 live animals, 215 whole animals slaughtered, 6,9kg of meat, 2 skins and 2 carcasses), seeing that in 11 years researched, IBAMA was able to produce an average of 54/year of wildlife seizures and with occurrences registered in only 36,10% of counties belonging to the semi-arid of Bahia.

This factor reflected in the high values of fines applied which vary by the quantity of animals apprehended and not by the number of notices. Besides that, there was a gradual decrease in the apprehensions (Figure 01) during the years researched. Also, more than 50% of exemplaries apprehensions were related to captive breeding (Table 01), which demonstrates that the supervision preponderantly can only reach the final link of wild animals trafficking, having little efficiency in the links of supply of illegal market, that is, in hunting and species transport.

Table 4. List of reptilespecies seized in the semi-arid region of Bahia between 2006 and 2017, classified according to IUCN (2018), CITES (2018), and Brazilian Ministry of Environment (2014) threat levels

Family	Scientific name	Popular name	N	Category and criteria IUCN	Current population trend IUCN	CITES	MMA
Alligatoridae	<i>Caiman latirostris</i>	Jacaré papo amarelo	16	LC	Unknown	I, II	-
Boidae	<i>Boa constrictor</i>	Jiboia	7	-	-	I, II	-
	<i>Eunectes murinus</i>	Sucuriúba	1	-	-	II	-
Chelidae	<i>Mesoclemmys tuberculata</i>	Cagado	164	-	-		-
Iguanidae	<i>Iguana iguana</i>	Iguana	223	-	-	II	-
Teiidae	<i>Salvator merianae</i>	Teiú-gigante	2	LC	Stable	II	-
Testudinidae	<i>Chelonoidis carbonarius</i>	Jabuti piranga	655	-	-	II	-

Legend: 1. IUCN: VU - Vulnerable; NT - Near Threatened; LR / CD - Low Risk / Conservation Dependent; LC-Least Concern; DD - Data deficient; (*) - Not on the IUCN List; 2. CITES I: Annex I of CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora). They include endangered species that are or potentially could be affected by trade. Trade in these species shall be authorized only after careful consideration and under exceptional conditions; Cites II: Annex II of CITES includes those species which, although not currently in danger of extinction, will fall into this category if their trade is not subject to strict regulations in order to avoid exploitation above the carrying capacity of the populations; CITES III: Species included in Annex III of CITES through a declaration from any country are those whose exploitation needs to be restricted or prevented and which requires cooperation in its control, and may be allowed to be commercialized, by means of a license or certificate, by the Administrative Authority; 3. MMA: Extinct in Nature (EW), Critically Endangered (CR), Endangered (EN) and Vulnerable (VU).

Table 5. List of species seized in the semi-arid region of Bahia between 2006 and 2017, classified according to the slaughtering situation at the time of seizure.

Class	Family	Scientific name	Popular name	Situation at the time of seizure	by-product found in seizure	N
Aves	Columbidae	<i>Leptotila rufaxilla</i>	Juriti-verdadeira	Guardar	Whole animal slaughtered	32
Aves	Columbidae	<i>Zenaida auriculata</i>	Arribaça	Abater	Whole animal slaughtered	16
				Transportar	Whole animal slaughtered	3
				Comercializar	Whole animal slaughtered	25
				Caçar	Whole animal slaughtered	1
Aves	Rheidae	<i>Rhea americana</i>	Ema	Ter em depósito abatido	Whole animal slaughtered	3
Mammalia	Dasypodidae	<i>Dasypus novemcinctus</i>	Tatu-verdadeiro	Ter em depósito abatido	Whole animal slaughtered	3
				Ter em depósito para comercialização	Whole animal slaughtered	2
				Ter em depósito abatido	Stew	1
				Transportar	Whole animal slaughtered	4
				Guardar	Whole animal slaughtered	1
				Caçar	Whole animal slaughtered	2
Mammalia	Cervidae	<i>Mazama gouazipira</i>	Veado catingueiro	Ter em depósito abatido	Carcass	1
				Guardar	Whole animal slaughtered	2
				Caçar	Whole animal slaughtered	2
Mammalia	Didelphidae	<i>Didelphis albiventris</i>	Sariguê	Ter em depósito abatido	Whole animal slaughtered	2
				Ter em depósito freezer - ponto comercial (BAR)	Whole animal slaughtered (frozen)	2
Mammalia	Dasypodidae	<i>Dasypus septemcinctus</i>	Tatuí	Transportar	Whole animal slaughtered	1
				Ter em depósito para comercialização	Whole animal slaughtered	1
Mammalia	Dasypodidae	<i>Dasyprocta leporina</i>	Cutia	Transportar	Whole animal slaughtered	2
				Ter em depósito abatido	Whole animal slaughtered	3
				Abater	Whole animal slaughtered	10
Mammalia	Cuniculidae	<i>Cuniculus paca</i>	Paca	Guardar	Whole animal slaughtered (frozen)	1
				Ter em depósito abatido	Whole animal slaughtered	2
Mammalia	Chlamyphoridae	<i>Euphractus sexcinctus</i>	Tatu-peba	Transportar	Whole animal slaughtered	1
				Ter em depósito freezer - ponto comercial (Restaurante)	Whole animal slaughtered	1
				Ter em depósito para comercialização	Whole animal slaughtered	6
Mammalia	Tayassuidae	<i>Pecari tajacu</i>	Caititu	Transportar	Whole animal slaughtered	2
Mammalia	Chlamyphoridae	<i>Tolypeutes tricinctus</i>	Tatu-bola-da-caatinga	Caçar	Whole animal slaughtered	2
				Ter em depósito para comercialização	Whole animal slaughtered	4
				Ter em depósito abatido	Whole animal slaughtered	35
				Abater	Whole animal slaughtered	2
				Transportar	Whole animal slaughtered	2

Continue.....

Mammalia	Myrmecophagidae	<i>Myrmecophaga tridactyla</i>	Tamanduá bandeira	Ter em depósito para comercialização	Whole animal slaughtered	1
Mammalia	Caviidae	<i>Cavia aperea</i>	Preá	Ter em depósito abatido	Whole animal slaughtered	4
				Abater	Whole animal slaughtered	18
Mammalia	Myrmecophagidae	<i>Tamandua tetradactyla</i>	Tamanduá-mirim	Ter em depósito para comercialização	Whole animal slaughtered	1
				Abater	Whole animal slaughtered	1
Mammalia	Erethizontidae	<i>Coendou prehensilis</i>	Porco espinho brasileiro	Abater	Whole animal slaughtered	1
Reptilia	Alligatoridae	<i>Caiman latirostris</i>	Jacaré do papo amarelo	Ter em depósito para comercialização	Skin	2
				Vender	Meat for consumption	5 kg
				Transportar	Whole animal slaughtered	12
Reptilia	Boidae	<i>Eunectes murinus</i>	Sucuriúba	Ter em depósito freezer - ponto comercial (BAR)	Meat for consumption	1,9kg
Reptilia	Boidae	<i>Boa constrictor</i>	Jiboia	Transportar	Whole animal slaughtered	1
Reptilia	Teiidae	<i>Salvator merianae</i>	Teiú gigante	Ter em depósito para comercialização	Whole animal slaughtered	1

The preponderant factor for such situations is the fact that IBAMA in the northeastern semi-arid suffers with budget cut, units closing, and the gradual decrease in the number of servers (Trigueiro; Costa, 2016), increasing the sensation of impunity and making it difficult the work of repression, inspection. Besides that, the organ suffers with the inefficiency of collecting the fines applied, according to the IBAMA management report (2016), it was only possible to collect in the years of 2014 to 2016 less than 0,5% per year from the total value of fines applied. In addition, in the semi-arid of Bahia there is an extensive relationship of man with fauna (Alves *et al.*, 2012, Albuquerque *et al.*, 2012, Silva, *et al.*, 2003, Oliveira, *et al.*, 2003), our results evidence the apprehensions of 107 different species of birds, 21 of mammals and 7 species of reptiles found with life and 3 species of birds, 13 species of mammals and 4 species of reptiles found in the form of by-products (meat, skin, carcasse). For the birds, our results pointed apprehensions of 21 families of birds with 14 species with high degree of threat, 56 species with low degree of threat, however, with its populations decreasing according to IUCN, 22 listed in the appendices of CITES and 08 listed by the list of MMA. Therefore, the results presented the Thraupidae family standing out with the biggest number of species apprehended (32) and the more quantity of exemplaries (4.113), besides having 4 species threatened according to IUCN and 1 specie be in the appendix II of CITES.

The Psittacidae family was the second one with most species apprehended (20), having 5 with high degree of threat according to IUCN and 19 being in the appendices of CITES. Moreover, the three bird species (*Leptotila rufaxilla*, *Zenaida auriculata*, *Rhea americana*) found in the form of by-products reveal a subsistence hunting, a parallel market of exotic meats, and also sport and leisure (Alves *et al.* 2009). Previous studies in the Brazilian semi-arid region also report that birds are the most exploited group through hunting, both because of their availability of species and the habit of creating wild birds as pets and consequently being a high-profit market in Brazil and internationally. (Alves *et al.*, 2012; Recntas, 2016). The mammal group presented a significant amount of seized species (21) belonging to 15 families, with 6 of them being threatened according to IUCN, 11 being listed in CITES appendices and 6 cited by the Brazilian Ministry of Environment, besides being the largest variety of species in a by-product situation (13). Studies have shown that hunting

activities in the Brazilian semi-arid region are used to supply international animal traffic, conflicts with carnivorous mammals, subsistence consumption, and exotic meat market due to higher biomass returns (Dantas-Aguiar *et al.*, 2011 And Oliveira *et al.*, 2003). The reptiles presented in the research a smaller variety of seized species (7). However, the number of animals was significant (1068). *Chelonoidis carbonarius* represented 61.33% of reptile seizures by IBAMA. Because of that, it was indicated by previous studies as a pet in Brazil, frequently commercialized both in markets in Brazil and internationally, with a destination for pet shops, private collections and zoos. In addition, reptiles have widespread use in folk medicine, subsistence feeding, and by-product trade (meat and skin) (Alves *et al.*, 2007). Furthermore, it is important to show a significant setback in the fight against illegal hunting with the Bill 6268/16, authored by congressman Valdir Colatto (MDB-SC), a member of the ruralist group in Congress, which suggests the repeal of the Law of Protection to the Fauna (Law 5197/67). Besides that, aggravation of up to three times the penalty of detention of six months to a year and fine for killing, pursuing, hunting, catching or using unlicensed animals if done during professional hunting would be extinguished from the Environmental Crimes Law (Law 9605/98) (Brasil, 2017). Hunting continues to have a strong cultural and socioeconomic relevance, so mitigation of its ecological implications should be planned taking into account the different aspects associated with these activities (ALVES *et al.*, 2012). However, when this action is unsustainable and meets market demands, it ends up encouraging over-hunting, which constitutes a great threat to biodiversity (Milner-Gullanda, Bennett, 2003, Dias Júnior *et al.*, 2014).

Conclusion

The indiscriminate use of wildlife in the semi-arid region is one of the main environmental problems to be curbed by the State and reflected by the population. The data collected in this study serve as an important indicator of the human relationship with wildlife, demonstrating that the human behaviors revealed in the records of environmental notices of violation registered by IBAMA in the semi-arid region of Bahia are mostly related to illegal pet trade sustained by captive maintenance and in a smaller proportion by meat consumption. Therefore, this study shows the need to allocate investments in environmental control, mainly IBAMA, which suffers from the constant precariousness of its services. But it is also essential to implement and improve public policies aimed at

environmental education and the sustainable management of wildlife in the semi-arid region, taking into account the social and cultural context of the populations that live in this area, in order to effectively change the current scenario.

REFERENCES

- Albuquerque, Araújo, E., Lima, A., Souto, A., Bezerra, B., Freire, E. M. X., Sampaio, E., Casas, F. L., Moura, G., Pereira, G., Melo, J. G., Alves, M., Rodal, M., Schiel, M., Neves, R. L., Alves, R. R. N., Azevedo-Júnior, S. and Telino Júnior, W. 2012. Caatinga revisited: ecology and conservation of an important seasonal dry forest. *Scientific World Journal in press*. Available online at <http://www.tswj.com/aip/205182/>
- Alves, R. R. N., Souto, W. M. S. and Mourão, J. S. 2010. A Etnozoologia no Brasil: Importância, Status atual e Perspectivas. NUPEEA, Recife, PE, Brazil.
- Alves, R. R. N., Lima, J. R. F. and Araújo, H. F. 2012. The live bird trade in Brazil and its conservation implications: an overview. *Bird Conservation International*, Doi: 10.1017/S095927091200010X1-13.
- Alves, R. R. N., Gonçalves, M. B. R. and Vieira, W. L. S. 2012. Caça, uso e conservação de vertebrados no semiárido Brasileiro. *Tropical Conservation Science* 5 (3):394-416.
- Alves, R. R. N., Mendonça, L. E. T., Confessor, M. V. A., Vieira, W. L. S. And Lopez, L. C. S. 2009. Hunting strategies used in the semi-arid region of northeastern Brazil. *Journal of Ethnobiology and Ethnomedicine*, 5:1-50.
- Alves, R. R. N., Rosa, I. L. And Santana, G. G. 2007. The Role of Animal-derived Remedies as Complementary Medicine in Brazil. *BioScience* 57: 949-955.
- Alves, R. R. N., Vieira, K. S., Santana, G. G., Vieira, W. L. S., Almeida, W. O., Souto, W. M. S., Montenegro, P. F. G. P. and Pezzuti, J. C. B. 2011. A review on human attitudes towards reptiles in Brazil. *Environmental Monitoring and Assessment*, DOI 10.1007/s10661-011-2465-0 1-25.
- Bennett, E. L., Milner-Gullanda, E. J., Bakarr, M., Eves, H. E., Robinson, J. G., Wilkie, D. Hunting the world's wildlife to extinction. Bodmer, R. E. And Robinson, J. G. 2004. In: *People in nature: wildlife conservation in South and Central America*. Silvius, K., Bodmer, R. E. and Fragoso, J. M. V. (Eds.), pp.299-323. Columbia University Press, New York, USA.
- Bennett, E., Eves, H., Robinson, J. and Wilkie, D. 2002. Why is eating bushmeat a biodiversity crisis. *Conservation Pract.* 3: 28-29.
- Borges, R. C., Oliveira, A., Bernardo, N., Costa, R. M. M. C. 2006. Diagnóstico da fauna silvestre apreendida e recolhida pela Polícia Militar de Meio Ambiente de Juiz de Fora, MG (1998 e 1999). *Revista Brasileira de Zootecias*, v. 8, n. 1, p. 23-33.
- Brasil. 2014. Ministério do Meio Ambiente – MMA. Portaria nº 444, de 17 de dezembro de 2014. Lista nacional oficial de espécies da fauna ameaçadas de extinção. Available from: http://www.icmbio.gov.br/portal/images/stories/biodiversidade/fauna-brasileira/avaliacao-do-risco/Portaria_N%C2%BA_444_DE_17_DE_DEZEMBRO_DE_2014.pdf
- Brasil. 2017. Câmara dos Deputados. PL 6268/2016. Available online at <https://www.camara.gov.br/proposicoesWeb/fichadetramitacao?idProposicao=2113552>
- Brasil. Congresso Nacional. Legislação Federal. Lei Nº 9.605, De 12 de Fevereiro de 1998 que dispõe sobre as sanções penais e administrativas derivadas de condutas e atividades lesivas ao meio ambiente, e dá outras providências. 2016. Available online at http://www.planalto.gov.br/ccivil_03/leis/L9605.htm. Access in 30/10/2017.
- Brasil. Decreto No. 2.848 de 07 de Dezembro de 1940 – Dispõe sobre as sanções penais e administrativas derivadas de condutas e atividades lesivas ao indivíduo, e dá outras providências. Available online at http://www.planalto.gov.br/ccivil_03/decreto-lei/del2848.htm. Access in: 30/10/2017.
- Convenção Sobre Comércio Internacional Das Espécies Da Flora E Fauna Selvagens Em Perigo De Extinção – CITES. Available online at <http://checklist.cites.org/#/en>. Access in: 30/06/2018.
- Costa, R. L. 2006. Ecologia e manejo de espécies da fauna da bacia fauna nativa, para que o Amazônica com interesse econômico. Instituto Brasileiro de Desenvolvimento Florestal-Pa. UFPA.
- Dantas-Aguiar, P. R., Barreto, R. M., Santos-Fita, D. And Santos, E. B. 2011. Hunting Activities and Wild Fauna Use: A Profile of Queixo D'antas Community, Campo Formoso, Bahia, Brazil. *Bioremediation, Biodiversity and Bioavailability* 5:1-10.
- Dias Júnior, M. B. F., H. F. A. Cunha And T. C. A. C. Dias. 2014. Caracterização das apreensões de fauna silvestre no estado do Amapá, Amazônia Oriental, Brasil. *Biota Amazônia* 4(1):65-73.
- Dwiwedi, R. S. 2004. Un-nurtured and untapped super sweet non-sacchariferous plant species in India. Available online at <http://www.ias.ac.in/cursrci/jun10/articles19.html>
- Fernandes-Ferreira, H., Mendonça, S. V., Albano, C., Ferreira, F. S. And Alves, R. R. N. 2012. Hunting, use and conservation of birds in Northeast Brazil. *Biodiversity and Conservation*, 221-244.
- Ferreira, F. S., Albuquerque, U. P., Coutinho, H. D. M., Almeida, W. O. And Alves, R. R. N. 2012. The Trade in Medicinal Animals in Northeastern Brazil. *Evidence-based Complementary and Alternative Medicine* 2012:1-20.
- Ferreira, H. F., Moura, Geraldo J.B., Alves, R. R. N. História da caça no Brasil nos séculos XVI e XVII. In: *Jairton Fraga e Juracy Marques. (Org.). Ecologia Humana e Agroecologia*. 1ed. 2016, v. 1, p. 311-333.
- Fitzgerald, S. 1989. International wildlife trade: whose business is it? *World Wildlife Fund*.
- Gama, T. F., Sassi, R. 2008. Aspectos do comércio ilegal de Pássaros Silvestres na Cidade de João Pessoa, Paraíba, Brasil. *Gaia Scientia* 2:1-20.
- IBAMA. Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis. DECRETO Nº 3.179, DE 21 DE SETEMBRO DE 1999. Dispõe sobre a especificação das sanções aplicáveis às condutas e atividades lesivas ao meio ambiente, e dá outras providências. 2016. Available online at <http://www.ibama.gov.br>. Access in: 22 de out. 2017.
- IBAMA. Relatório De Gestão Ibama. 2016. Available online at http://www.ibama.gov.br/phocadownload/auditorias/relatorio_gestao/2016-ibama-relatorio-gestao.pdf. Access in: 22 de out. 2016
- Instituto brasileiro do meio ambiente e dos recursos naturais – ibama. Crimes contra a fauna. 2018. Available online at http://ibama.gov.br/phocadownload/cites/legislacao/decreto_cites.pdf. Access in: 22 de jul. 2018.
- International Union For Conservation Of Nature – IUCN. 2018. Available online at <http://www.iucnredlist.org/search>. Access in: 01/06/2018.

- Leal, I. R., Silva, J. M. C. D. A., Tabarelli, M. And Lacher Jr., T. E. 2005. Changing the Course of Biodiversity Conservation in the Caatinga of Northeastern Brazil. *Conservation Biology* 19:701-706.
- Lopes, J. C. A. O Tráfico de Animais Silvestres no Brasil, 2009. Available online at <http://www.jardimdeflores.com.br>. Access in 30/10/2017
- Milner-Gulland, E. J. and Bennett, E. L. 2003. Wild meat: the bigger picture. *Ecol. Evol.* 18(7):361-367.
- Ministério Da Integração Nacional. Nova delimitação do Semiárido Brasileiro (Cartilha). Brasília, DF: Secretaria de Políticas de Desenvolvimento Regional/MIN, 2005. 35 fls.
- Nascimento, J. L. And Campos, I. B. 2011. Atlas da fauna brasileira ameaçada de extinção em unidades de conservação federais. Instituto Chico Mendes de Conservação da Biodiversidade, Brasília.
- Observatório UNIFG Do Semiárido Nordeste. Mapa Localização Semiárido Bahia. 2018. Available online at <http://observatorio.faculdadeguanambi.edu.br/wp-content/uploads/2018/06/LOCALIZA%C3%87%C3%83O-DO-SEMI%C3%81RIDO-BAIANO-1.pdf>. Access in: 01/06/2018.
- Oki, V. G., Pandeff, P. A. 2016. Análise da efetividade da Lei de Crimes Ambientais e o tráfico de animais no Brasil. *AMPLIANDO Revista Científica da Facerb*, v. 3. n. 1. Jan./Jun. 2017.
- Oliveira, J. A., Gonçalves, P. R. And Bonvicino, C. R. 2003. Mamíferos Da Caatinga. In: *Ecologia E conservação da caatinga*. Leal, I. R., Tabarelli, M. and Silva, J. M. C. (Eds.), pp.275-333. Ed. Universitária da UFPE Recife, Recife.
- Pereira, J. P. R. And Schiavetti, A. 2010. Conhecimentos e usos da fauna cinegética pelos caçadores indígenas “Tupinambá de Olivença” (Bahia). *Biota Neotropica* 10:175-183.
- Porfirio Junior, N. F. Responsabilidade do Estado em face do Dano Ambiental. São Paulo: Malheiros Editores, 2002.p. 116
- RENTAS. 1º Relatório Nacional Sobre o Tráfico de Fauna Silvestre. 2001. Disponível em: http://www.rentas.org.br/files/REL_RENC_TAS_pt_final.pdf. Access in: 01/11/2017
- RENTAS. Cruel tráfico de animais silvestres. Available online at <http://www.rentas.org.br/cruel-trafico-de-animais-silvestres-ligia-meira-martoni/>. Access in: 01/11/2017.
- Rocha, M. S. P., Cavalcanti, P. C. M., Sousa, R. L., Alves, R. R. N. 2006. Aspectos da comercialização ilegal de aves nas feiras livres de Campina Grande, Paraíba, Brasil. *Revista de Biologia e Ciências da Terra* 6:204-221.
- Schober, J. 2002. Caatinga: preservação e uso racional do único bioma exclusivamente nacional. *Ciência e Cultura* 54:6-7.
- Sick, H. 1993. *Birds in Brazil: a natural history*. Princeton University Press, New Jersey.
- Sick, H. 1997. *Ornitologia Brasileira*. Nova Fronteira, Rio de Janeiro.
- Silva, J. M. C., Souza, M. A., Bieber, A. G. D. And Carlos, C. J. 2003. Aves da Caatinga: Status, uso do habitat e sensibilidade. In: *Ecologia e conservação da caatinga*. Leal, I. R., Tabarelli, M. and Silva, J. M. C. (Eds.), pp.237-274. Ed. Universitária da UFPE, Recife, Brasil.
- Superintendência De Desenvolvimento Do Nordeste – SUDENE. Municípios que compõem o semiárido baiano. 2018. Available online at <http://sudene.gov.br/images/arquivos/conselhodeliberativo/resolucoes/resolucao115-23112017-delimitacao-do-semiarido.pdf>. Access in: 01/06/2018.
