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WILDLIFE TRAFFICKING IN METROPOLE SÃO PAULO – BRAZIL: AN ANALYSIS OF THE LEGAL, CULTURAL AND CHARACTERISTICS OF THIS (UN)SUSTAINABLE ACTIVITY

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ABSTRACT

Wildlife trafficking is one of the greatest causes of biodiversity loss in the world, and combating it is one of the goals described in the SDG 2030 (Goal 15.7). This descriptive article, using the hypothetical-deductive method, and a qualitative-quantitative research, aims to analyze its application in actions to combat this activity through a documentary survey of wild animal seizures in the state of São Paulo in the years 2018 and 2019 based on the current legislation associated with wild animal trafficking. 7,653 occurrences were identified in this period that resulted in 41,137 seized animals of 322 species, and of the 10 most seized animals, 09 are songbirds, and none of them are considered endangered. The average number of seized animals per occurrence was 03 animals, with a fashion of 01 animal. It was identified that 90% of the animals were seized in urban areas and that it occurred in a homogeneous way throughout the territory, associated with population densification. It was concluded that even with effective enforcement, there is no downward trend in the number of wild animals trafficked due to their transgenerational cultural character, low social disapproval, and the soft legislation in force, thus causing several damages to the conservation of biodiversity.

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Keywords: biodiversity; environmental legislation; illegal trade in animals; illegal trade wildlife; wildlife trafficking.

O TRÁFICO DE ANIMAIS SILVESTRES NA METRÓPOLE SÃO PAULO – BRASIL: UMA ANÁLISE DOS ASPECTOS LEGAIS, CULTURAIS E CARACTERÍSTICOS DESSA ATIVIDADE (IN)SUSTENTÁVEL

RESUMO

O tráfico de animais silvestres é uma das maiores causas de perda de biodiversidade no mundo, sendo seu combate uma das metas descritas nos ODS 2030 (Meta 15.7). Este artigo descritivo, utilizando-se o método hipotético-dedutivo, e uma pesquisa do tipo qualitativa-quantitativa, tem como objetivo analisar as ações de combate a essa atividade através de levantamento do tipo documental de apreensões de animais silvestres no estado de São Paulo nos anos de 2018 e 2019 com base na legislação vigente associada ao tráfico de animais silvestres. Foram identificados neste período 7.653 ocorrências que redundaram em 41.137 animais apreendidos de 322 espécies, sendo que dos 10 animais mais apreendidos, 09 são aves canoras, e nenhum deles considerados ameaçados de extinção. A média de animais apreendidos por ocorrências foi de 03 animais e com moda de 01 animal. Identificou-se que 90% dos animais foram apreendidos em áreas urbanas, e que ocorreu de forma homogênea pelo território, associado ao adensamento populacional. Concluiu-se que mesmo com uma efetiva fiscalização, não há uma tendência de queda da quantidade de animais silvestres traficados devido ao seu caráter cultural transgeracional, de baixa reprovação social e da legislação branda vigente, causando assim diversos danos à conservação da biodiversidade.

Palavras-chave: *biodiversidade; comércio ilegal de animais; comércio ilegal de vida silvestre; legislação ambiental; tráfico de animais silvestres.*

INTRODUCTION

The objective of this article was to describe the characteristics of wildlife trafficking by delimiting its quantity, the places where it happens, the types of animals seized, the evolution of legislation, and to verify how this information correlates with law enforcement regarding this activity, whether such enforcement is effective and the main challenges in fighting the second largest cause of biodiversity loss on the planet.

There are differences in the literature regarding the definition of animal trafficking, understood as a set of illegal actions related to the use, trade, or keeping of animals and parts of wild animals, which highlights the complexity in the task of setting the parameters of this activity at local, national and even world levels.

Among the Sustainable Development Goals of the UN 2030 Agenda, the SDG 15, concerning terrestrial life, goal 15.7 demonstrates the need for urgent measures to effectively combat trafficking in species of fauna and flora, which increases the importance of understanding the characteristics of animal trafficking in order to effectively fight it.

One of the ways to combat animal trafficking is with effective law enforcement, which can prevent or at least minimize actions related to trafficking and thus mitigate the harmful effects of this activity for biodiversity, consequently the environment.

In this article, we used the hypothetical-deductive method, starting from a research problem to be investigated by creating hypotheses, which were tested to be proven or refuted by applying methodologies known in the literature in order to achieve the set objective.

Our hypothesis is that the distribution of seized animals and their quantities are directly associated with a higher concentration of people, and that they have a strong cultural impact.

In addition, there is the hypothesis that enforcement actions are efficient in controlling animal trafficking actions in the state; however, effective combat goes beyond enforcement actions to also include market actions, changes in legislation and environmental education.

To verify these hypotheses, we used a qualitative-quantitative study since a quantitative study is based on quantification both in the collection and in its treatment of statistical techniques of qualitative research that increases the scope for an interpretation of perceptions, motivations and aspects that extrapolate a numerical analysis, given this situation for the

objectives of this article, which verifies the need to merge the two types of expertise of the study type, quantification with the qualitative aspects of the data that will be collected.

In this article, we used secondary "documentary" data, such as documents of public institutions in the State Administration. The target documents for the development of the study were the Environmental Incident Reports in the years 2018 and 2019.

The discussion of animal trafficking took place in three circumcenter aspects, one broader, historical and conceptual, presenting the types of wildlife trafficking and how they occur in different parts of the world, with global aspects, a brief mention of the issues at national level and consequently the related legislations, and then the peculiarities found in the Metropolitan Area of São Paulo State.

This research shows the possibility of providing necessary information so that enforcement agencies, researchers and society in general – both at local, national and even global level – can be aware of some of the characteristics of animal trafficking and able to replicate this methodology in other regions.

1 THE ISSUE OF ANIMAL TRAFFICKING IN GLOBAL ASPECTS

The impact on biodiversity caused by illegal trafficking in wild animals was first discussed in the 1960s, when the IUCN (International Union for Conservation of Nature and Natural Resources) drafted the *Red list* addressing the list of species threatened with extinction. In the 1970s, it conceived CITES (*Convention on International Trade in Endangered Species of Wild Fauna and Flora*). Initially, 175 countries joined this convention, which includes 177 nations today (IUCN, 2016). Identifying the threats of animal trafficking to the conservation of biodiversity, CITES began its work seeking the protection of around 34,000 species, and today this number is reaches 35,600 species of animals and plants (CITES, 2013).

Estimates show that animal trafficking generates more than US$ 20 billion a year worldwide in both large international trafficking as small local trafficking (BARBER-MEYER, 2010). However, recent studies present information that the profit ranges from US$ 7 to US$ 25 billion a year (MATEO-TOMÁS *apud* THE CONSERVATION CRISIS..., 2019). It is the third largest cause of trafficking in the world, second only to arms and

drug trafficking (ROSEN; SMITH, 2010; DESTRO *et al*., 2012), and regarding biodiversity loss it is a crucial agent when it contributes directly to overexploitation of natural resources, second only to habitat loss (NETO, 2007; FISCHER; LINDENMAYER, 2007; BRANCO, 2015; IPEBS, 2019), either due to the lack of it or its fragmentation and loss of connectivity (LINDENMAYER *et al.*, 2020).

In 2018 in London, the *London Conference on the Illegal Wildlife Trade* was signed by 65 countries. It stated that animal trafficking contributes dramatically to declines in the populations of many protected species found on all continents and that a necessary alternative to fight animal trafficking would be to address local livelihoods, including creation of decent jobs, offering people alternative and sustainable forms of income generation and, in some cases, benefits originating directly from wildlife, thus avoiding the need for poaching (London Conference on Illegal Wildlife Trade Statement, 2018).

Among the possible uses of trafficked fauna, five stand out: (1) hunting for consumption, (2) capture for trade in animal parts, (3) capture for medicinal purposes, (4) capture for keeping in captivity as pets, and (5) collection for religious and aphrodisiac purposes (CRUZ-ANTÍA, 2010).

The objectives of wildlife trafficking vary greatly from region to region, including, for example, the information obtained from Cambodia, Southeast Asia, where law enforcement efforts aim to prevent the poaching of large charismatic mammals, even with data showing that most of the animals seized are songbirds and that seizures take place near urban centers, even if it is not possible to trace trafficking routes and whether the animals were bound for internal or external trade (HEINRICH *et al.*, 2020).

Also in Southeast Asia, in Myanmar, research conducted in 2018 showed that animal trafficking occurs mostly for consumption of wild animal meat, with captivity as a domestic animal as the second largest cause. This led to the conclusion that fighting animal trafficking in that country would require command and control actions, but also economic alternatives and substitution of sources of animal protein (MCVOY, 2020).

In Africa, in countries such as South Africa, Kenya and Zimbabwe, wildlife trafficking focuses mainly on poaching of large mammals, with elephants and rhinos as the main targets, to meet the demand for Asian medicine and as a symbol of wealth, which seeks the ivory of these animals, abandoning their carcasses and causing a decrease in the populations of these animas (MATEO-TOMÁS, 2020). In South America, the situation is

just as worrying, but the objectives of trafficking have other characteristics, such as were identified in Colombia, where the main factor for taking animals from the wild is to keep them as pets, as was found while conducting research with children from the 5th to the 10th years of school. They reported having a wild animal at home or at least knowing someone who does. Although this practice is considered a criminal offense, it is culturally and socially acceptable. Most wild animals kept at home as pets are, according to the reports, parrots (*Amazona spp*) and tortoises *(Podocnemis spp. and Geochelone sp*.) (CRUZ-ANTIA, 2010).

2 THE ISSUE OF ANIMAL TRAFFICKING IN BRAZIL

In Brazil, animal trafficking amounts to around US$ 2.5 million per year (DESTRO *et al*., 2012). The country is considered one of the main suppliers of flora and fauna to the world market, where approximately 12 million wild animals are taken from nature every year to meet the demand of this activity. Around 30% of the product from this illegal market is exported, while the rest is marketed domestically. In the process, mortality rates from the moment of capture until the final destination can reach 90% of animals taken from the wild (BASTOS, 2008).

As it occurs in a dispersed way throughout Brazil, it is difficult to identify the places in nature where wildlife is captured, since they are usually not the same places where they are traded (DESTRO *et al*., 2012). In these places, many people acquire wild animals with the intention of having them as domestic pets, as well as dogs and cats, and not with the purpose of enocuraging international trafficking. A large number of people who keep animals in captivity, especially birds, reflect a transgenerational cultural practice as these birds are easy to care for and they sing beautifully (LICARIÃO, 2013). Nevertheless, this form of purchase is one of the main reasons that fuels this type of criminal act (RENCTAS, 2001).

Although we are dealing with wildlife trafficking, many of these animals can be acquired legally, provided that the requirements of the State Environment Department are met and that the animals come from a certified breeder, born in captivity for this purpose. (RENCTAS,2016).

Governance instruments supported by Command and Control were developed by Brazil to try to combat wildlife trafficking. The legal device established by the policy to combat actions degrading the environment included the criminalization of animal trafficking, as seen in art. 29 and

paragraphs of Law No. 9,605 of February 12, 1998 (Brazil, 1998), also known as Environmental Crimes Law. This law sets the penalty of detention from six months to one year for whoever is identified as having committed infractions related to animal trafficking, such as people who are caught in the act of selling, exposing for sale, exporting, purchasing, keeping, holding captive animals or parts of animals. However, the same law creates a contradiction by stating that if an individual is caught in these situations, but can prove that the animal is considered a pet, the judge, considering the circumstances, may choose not to apply the penalty (Brazil, 1998).

In addition to the criminal procedure aimed at curbing illegal wildlife trafficking, there is also the possibility of applying an administrative sanction that regulates the application of fines to the offender who commits wildlife trafficking. As described in art. 24 and paragraphs of Decree No. 6.514, of July 22, 2008, which sanctions the offender to sums ranging from R$ 500.00 to R$ 5,000.00 per animal, with a R$ 500 fine for animals not threatened with extinction and a R$ 5,000.00 one for animals listed by CITES as under threat. The total sum of the fine is estimated considering two different aspects: the first is the number of animals in the possession of the offender; the second depends on the species of animal (Brazil, 2008).

Aiming to curb animal trafficking, the state police departments and federal agencies, as well as their branches specialized in Environmental Protection, are the main bodies fighting wildlife trafficking. The lack of places for keeping the seized animals is the main problem after seizure, as well as the lack of available veterinarians and even the challenge to reintroduce these animals back in the wild due to the lack of areas for release (BRANCO, 2015). This same problem is reported by countries such as Colombia, where animals are seized and left with their captors because there are no places to send them to (CRUZ-ANTÍA, 2010).

Although it is a criminal offense, open-air trade persists in Brazil, as in the so-called “feiras do rolo” (open-air makets where people sell goods often with uncertified origin). In this sense, there is evidence that the so-called “feiras de rolo” play an important role in feeding this type of trafficking (REGUEIRA e BERNARD, 2012) in the North and Northeast, where they are common, as they can also be found in other regions of the country. In the Northeast, for example, a study by Regueira and Bernard (2012) shows that in 22 visits to these markets in the city of Recife, in 2011, 2,130 animals were found, 87% of which were birds. Although they are places with a large influx of people, therefore likely to undergo inspection, these “markets” take place without any major obstacles.

Studies in the Brazilian states of Santa Catarina, Bahia, Minas Gerais and Pernambuco, as well as in the Amazon, show a similarity in the most trafficked species, mostly songbirds, which stand out because they are easy to take care of, beautiful and sing beautifully (NETO, 2007).

3 THE ISSUE OF ANIMAL TRAFFICKING IN REGIONAL ASPECTS: METROPOLITAN SÃO PAULO

In the state of São Paulo alone, an average 20 thousand wild animals are seized annually, considering only the data about seizures made by the Environmental Police of the state of São Paulo, and these seizures result from responses to reports made through different channels, such as by telephone, internet and applications (CPAMB, 2020).

A study based on interviews with 129 people charged with animal trafficking in São Paulo State concluded that the main reason for this crime is cultural, with concealed social acceptance, and that the ease of obtaining animals is not one of the predominant factors for purchasing them (SILVA, 2014).

In law enforcement actions, the environmental police collects information about the site of the seizure, the number of animals and their species. This information enables the police to build the big picture of wildlife trafficking in this metropolis, identifying hotspots, the most trafficked kinds of animals, where large seizures are concentrated, and whether it is possible to trace an alternative plan to fight this practice, which is responsible for the loss of much of the world's biodiversity.

4 ANIMAL TRAFFICKING AND EVOLUTION OF NATIONAL LEGISLATION

One of the possibilities pointed out for the culture of trafficking to be rooted in our culture is that the taking of animals from the wild for export and for keeping in captivity lasted for over 400 years, and was only effectively regulated in 1934 by the hunting code, Decree No. 23.672, of January 2, 1934 (Brazil, 1934).

It should be noted that this decree underwent another legal evolution, albeit precarious, in 1967 with the emergence of Law No. 5,197, of January 3, 1967, which "provides for the protection of fauna" (Brazil, 1967), breaking the wild animal paradigm as one that lives free, not being the

property of a person, by determining that all wild animals are the property of the State and ending the dispute over the ownership of this right.

Law No. 5,197/67 proved to be more restrictive in the context of the prohibition of hunting because it prohibited professional hunting and wildlife trade (art. 3) in all the national territory (art. 2), allowing only cases in which animals originate from a certified establishment for breeding in captivity (Brazil, 1967). An important aspect of this legal instrument was the penalty associated with non-compliance, with imprisonment for 2 to 5 years. This law was, in some ways, a major development in the context of wildlife protection, however it is still far from achieving its goal because of the lack of sufficient enforcement agents to meet the demand and the delay in regulating commercial wildlife breeders, which was only regulated in 1972.

In 1981, Law No. 6,938, of August 31, 1981, known as the National Environment Policy, was published, regulating many aspects related to the preservation, improvement and recovery of environmental quality, which proved to be a positive action by the Brazilian State in response to the deliberations resulting from the United Nations Conference on the Human Environment that took place between June 5 and 16, 1972, in Stockholm, Sweden. Regarding the protection of fauna, it was defined as a natural resource (art.3º, V), which promoted greater environmental protection by providing punishment for polluters who caused animal mortality (art. 15, par. 1, I, a) and instituted the Federal Technical Registration – CTF, which regulated the activities of legal organizations and individuals as "users of Environmental Resources", which included the "products and by-products of fauna" (art. 17, II) strengthening regulated trade (Brazil, 1981).

Although there were protective rules for fauna, it was the promulgation of the Federal Constitution, on October 5, 1988, that further improved the protection of fauna on a constitutional level. We can highlight the important advance of section VII of art. 23, which made it a shared responsibility of the federal government, states, municipalities and the federal district to preserve fauna as well as forests and flora, thus increasing protection. It also made it a shared responsibility, through art. 24, VI, of all levels of government to produce legislation for fauna (Brazil,1988). The shared responsibility was complemented only in 2011 with the edition of Complementary Law No.140, of December 8, 2011 (Brazil, 2011).

In the text of the Federal Constitution of 1988, clause VII of paragraph 1, art. 225, is imperiously highlighted as prescribing the duty of the public

authority, "To protect fauna and flora by prohibiting, according to the law, actions that jeopardize their ecological function, cause the extinction of species or subject animals to cruelty", Paragraph 3 of the same article also provides that, "Actions and activities considered harmful to the environment will subject offenders, whether natural persons or legal entities, to criminal and administrative sanctions, regardless of the obligation to repair the damage caused" (Brazil, 1988).

In this vein, we notice that the scope of protection of wild fauna has broadened and, consequently, the repression of illegal wildlife trade, pointing out that Law No. 6,938/81 was received by the constitution and kept its legal effects. However, in order to achieve the objectives of the constitutional protection of the fauna, new legal instruments are needed to subject natural persons and legal entities in criminal and administrative law, which happened in the years of 1998 and 2008, respectively, with the publication of Law No. 9,605, of February 12, 1998, and Decree No. 6,514, of July 22, 2008.

4.1 Criminal and administrative protection of wildlife

Before bringing the legal instruments created for the administrative and criminal protection of fauna, it is important to clarify that this "double" protection is not supported by all of the doctrine. For instance, Prado argues when there is a double punishment for the same fact, committed by the same agent and whose legal consequences have the same basis, the constitutional principle of "*non bis in idem*" is disrespected. An example in the case of wildlife trafficking is article 29 of Law No. 9,605/98, which defines the crime of illegal animal trade with a possible penalty of detention in the penal code, and with the same definition we have art. 24 of Decree No. 6,514/08, which defines its administrative offense, in other words, it would be a double punishment by the State for the same action committed by an agent (PRADO, 2012).

Nevertheless, the prevailing doctrine does not see it as a double, or even triple, punishment considering that there may also be a civil sanction if there is a need to repair damages (MILARÉ, 2005; STEVENS, 2005; CARVALHO, 2013; AMADO, 2013) first, since each of the spheres follows its own rules to achieve different objectives. Besides, this was precisely the intention of the lawmakers by making this possibility clear in our constitution, and this is asserted by Freitas when he illustrates that this

shared protection into one action, and reflecting this in their responsibilities, because in his view there is an objective responsibility, that is, the duty to repair damages regardless of the intent (will) of the author in civil law, and at the same time as it is subjective, in other words, it depends on the evidence of willful misconduct or negligence in criminal law so that a penalty can be set (MILARÉ, 2005).

Considering the majority doctrine that the criminal and administrative spheres can regulate the protection of fauna in different and harmonious ways, the two current laws that create the framework for the protection of fauna regarding the crime of animal trafficking will be presented, even if in a single act the legal or natural person can commit an environmental crime that at the same time is considered a crime, and also an administrative offense.

4.1.1 Law No 9,605/98 – Environmental Crimes Law

To meet the provisions of the constitution, on February 12, 1998, that is, only ten years after the publication of the Constitution, Law No. 9,605/98 was published, providing criminal and administrative sanctions derived from the behaviors and activities which are detrimental to the environment. It also enabled the criminalization of certain types of conduct against the environment and also made it possible to subject legal entities to the penalties for such actions, according to the art. 3 of this Law, which previously was only possible for natural persons" (BRASIL, 1998).

Law No. 9,605/98 managed to bring together environmental crimes previously contained in scattered legislation, such as specific codes like the fishing and hunting code of 1967, the forestry law of 1965, and crimes of the Penal Code, which have now merged into a single legal instrument capable of increasing the protective character of natural resources.

Regarding wildlife in particular, this law provides that whosoever "kills, catches, uses, sells, exposes for sale, purchases, or even keeps wildlife in captivity" can be imprisoned for up to a year. It is important to note that although there is no term in the text of this law "illegal trafficking of animals", it has application in paragraph III of Article 29 of Law No. 9,605/98, where it criminalizes those who sell, expose for sale and even those who keep wildlife in captivity. In the second paragraph of the same article, the law provides that a judge may choose not to apply the penalty if an animal is kept at home as a pet, which can make the activity that was

supposed to be unlawful a lawful activity with no punishment. (Brazil, 1998).

According to Carvalho's account, trade takes place in the open air and can be seen at roadsides, and even when such actions are reported by the media nationwide, they take place without being regarded as illegal. In spite of being punishable by law since 1934, this practice does not seem to have decreased (CARVALHO, 2013). Amado mentions the possibility of pardon when an animal in captivity is not listed as threatened with extinction, as stated in paragraph 2 of article 29 of Law No. 9,605/98, (AMADO, 2013). This may be one of the indications of the authors who criticize the penalties related to fauna as soft (CARVALHO, 2013; SILVA, 2014; COSTA *et al*., 2018; MARQUES, 2018; SUGIEDA, 2019).

Another important aspect of this law is described in chapter VI, article 70 and following articles, which regulates the imposition of administrative sanctions, and in particular art. 70, paragraph 1, which designated as the authorities charge of drafting the drafting of the Notice of Environmental Offense the environmental agencies comprising the National Environment System (SISNAMA). It should be pointed out it was created by Law No. 6,938/81, and the application of the administrative sanctions was regulated with the publication of Decree No. 3,179, of September 21, 1999, which was subsequently replaced by the decree currently in force, Decree No. 6,514, of July 22, 2008.

4.1.2 Decree No. 6,514/08, of July 22, 2008 – "Implementation" of Administrative Protection of the Environment

In administrative law, aimed at curbing illegal wildlife trafficking, and to regulate article 70 of Law No. 9,605/98, another legal instrument was created to regulate the application of fines to those who are charged with wildlife trafficking, to wit Decree No. 6,514, of July 22, 2008. As described in article 24 of that decree, the offender is penalized with fines ranging from R$ 500 (five hundred reais) to R$ 5,000 (five thousand reais) per animal, the former for animals not threatened with extinction and the latter for animals listed as threatened by CITES. The total sum of the fine is then estimated considering two distinct aspects: the first is the number of animals in possession of the offender and the second depends on the species of animal. In the latter case, the amount of the fine will depend on whether the species is threatened with extinction, according to CITES. It should also be noted that in addition to the fine, Decree No. 6,514/08 also

provides other sanctions that may be imposed on those caught committing an infraction, such as seizure of the animals, suspension of the sale, and even the destruction of materials and objects used to commit the offence, such as, in the case of wildlife, cages or nets for catching birds (BRAZIL, 2008).

It is imperative to point out that Decree No. 6,514/08 can be applied in all the national territory, its sanctions are imposed by the employees of the environmental bodies comprising the SISNAMA, therefore at the federal level by IBAMA and ICMBIO agents, in the areas of their jurisdiction as defined by the aforementioned complementary Law No. 140/2011. In each state of the Federation, administrative sanctions can be imposed either by Decree No. 6,514/08 itself, or by specific subnational legislation provided that in compliance with the guidelines of the federal decree, since the Federal Constitution of 1988 established the matter of common and concurring environmental jurisdiction, according to articles 23, VII, and 24, VI, respectively. (Brazil, 1988)

5 MATERIALS AND METHOD

5.1 Area of study

Brazil is a continental-sized country, with an area just over 8.5 million Km², and a population of approximately 210 million inhabitants (IBGE, 2020). It is composed of six distinct biomes, namely: Amazon, Caatinga, Pantanal, Pampa, Cerrado and Atlantic Forest (IBGE, 2012), which makes Brazil one of 17 countries known as megadiverse as it is home to more than 20% of all species on Earth. (Ministry of Environment – MMA, 2020). Regarding the fauna alone, 114,848 species were catalogued until 2014, including vertebrates and invertebrates, of which 8,967 were vertebrates and 105,881 invertebrates. Birds species alone total 1,924 (MMA, 2014).

The country is divided into 26 States and one federal district, and this study has been conducted in São Paulo State, which has an area of 248.219,481 km², is divided into the 645 municipalities, has an estimated population of 41.262.199, according to the 2010 Census, of which 39.585.251 (95%) live in urban areas and 1.676.948 (5%) in rural areas (IBGE, 2019), making it the most populous state in the country, home to approximately 19.64% of the population of the entire country although it is only the 12th largest. It also has the highest Human Development Index,

with 0.783 (IBGE, 2010), and comprises two different predominant biomes, the Cerrado in the mid-state and the Atlantic Forest in the midwest and coast.

5.2 Data collection

The data used in this article were secondary data because they were collected by the Environmental Police while responding to incidents in which wildlife was seized. This methodology was used in other studies with similar objectives (SUGIEDA, 2018; HEINRICH *et al.*, 2020) and entered in the police digital database, called SIOPM WEBAIA (Military Police Operational Information System) (CPAMB, 2020). Specifically, among the secondary data types, the study was based on secondary "documentary" data since they refer to documents of public institutions, such as forms, reports, meeting minutes, among others (SAUNDERS, 2007). The target documents for conducting the study were reports of incident reports in which wildlife seizures were found.

Studies based on secondary data, such as this one, have as main advantages (SAUNDERS, 2007): (I) low cost, given that the information is available in a digital database; (ii) ease of acess since there is a digital file that allows the extraction of data specific to the topic, and (iii), when using information extracted directly from the agency responsible for wildlife seizures, there is a certainty regarding the reliability of the data.

Despite these advantages, because they are secondary data, this main limitation of this method is not possible to expand the research to information that, although interesting, was not collected previously (SAUNDERS, 2007), in this case by the Environmental Police. For example, although it would be interesting to address questions such as the reasons that led a person to keep a wild animal in captivity, or whether the offender is aware of the impacts of wildlife trafficking on biodiversity, there are no data, and there is no way of obtaining them, for these identified cases.

The first phase consisted in requesting the extraction from the CPAMB digital database of information on wildlife seizures contained in Environmental incident reports, generating extension files" ".xls", which can be viewed in spreadsheet format. The extracted data were the following: (I) incident report number, (ii) geographic coordinate in decimal degrees (DD) and in Datum SIRGAS 2000, to identify the location of the seizure; and (iii) number of specimens seized per species, which will show the number

of animals, (iv) municipality where the seizure was made and based on the CITES for the classification of the animal and the scientific name of the species in the database.

This procedure to quantify animals and species through specific terms related to animal seizures is equivalent to the method used in other scientific studies aimed at identifying animals seized in the states of Bahia (NASCIMENTO *et al*., 2015) and Minas Gerais (DESTRO *et al*., 2012).

This study considered data on seizures made in the last 2 years (2018 and 2019), which correspond to the years in which the implementation of the Electronic System of filling in incident reports by theEnvironmental Police (CPAMB, 2020) began.

5.3 Data processing

The data were distributed in a spreadsheet in Microsoft Excel 2010 software, version 14.0.4760.1000, with the following columns: incident report number; day, month and year of incident; Latitude and Longitude of the site of the incident; scientific name of the seized animal and number of animals; municipality where seizure was made, thus allowing the identification of the total of animals seized by incident and species.

By using the "Dynamic Tables" tool available in Microsoft Excel 2010 software, version 14.0.4760.1000, and crossing the scientific name of the animal and number of animals seized, we were able to identify the most trafficked wildlife species São Paulo State.

Still in possession of the table, by selecting the column "total animals seized per incident", we were able to identify the mean, mode, and standard deviation of the incidents in which wildlife is seized. Aiming to achieve a low standard deviation so that the sample is representative (BOLFARINE, 2004), the calculations were redone in two steps, those in which seizures were above the standard deviation value and those in which the value was within the standard deviation, thus identifying new means, modes and standard-deviations.

Then, the sites of wildlife seizures were georeferenced with the quantum GIS software, version PI, using the DATUM "Sirgas 2000" and the "Decimal Degrees" coordinate system superimposed on the map of the state of São Paulo subdivided into municipalities and superimposed onto the layer of urban and rural areas of the state (IBGE, 2020) which allowed us to visualize the spatialization of the seizure sites.

Different maps were generated to better identify the characteristics of wildlife trafficking in São Paulo state, which are the following: mapping of the points of the seizure sites overlapped on the map of urban and rural areas, considering: the total numbers of incidents; and those in which the incidents took place above the standard deviation of those below the standard deviation; a map of the concentration of the seizure incidents per municipality; and maps of the color gradient of such incidents, stressing that entering the coordinates of the seizure sites was the method used for identifying monkeys caught in Bahia State (NASCIMENTO *et al*., 2013).

6 RESULTS

6.1 On wildlife seizure data

In the years 2018 and 2019, the Environmental Police responded to a total of 7,653 (seven thousand, six hundred and fifty-three) incidents in which wild animals were seized were identified. Those incidents resulted in 41,137 (forty-one thousand, one hundred and thirty-seven) animals seized in the two years analyzed.

Considering the information about the seizure terms, it was found that the average of animals seized in these incidents was Me = 5.37 animals/incident, however of the 7,653 incidents analyzed, in 2,462 (two thousand, four hundred and sixty-two) incidents, that is, in 32.2% only "one" animal was seized, which made the mode Md= 1.

About the data analysis, a high standard deviation value was observed, $\delta = 13.43$, due to the *outliers* identified because we have an Md = 1 and an average of Me = 5.37 at the same time as we found eight incidents that exceeded 200 (two hundred) seized animals, and in only one of them 563 (five hundred and sixty-three animals) were seized.

By dividing the data into two analyses, those that are within the standard deviation and those that exceeded this value of seized animals, we found that:

Considering the incidents in which up to 13 animals were seized, 7,076 incidents were found, amounting to 92% of the cases, which resulted in a decrease of the mean to I = 3,34 Animals/incident, keeping the mode at Mean = 1. However, this value now amounts to 34% of the cases, but with a significant drop in the standard deviation, to $\delta = 2,83$.

Incidents with more than 14 animal seized amounted to 577, updating

the mean to Me = 30.29, the mode Md = 14 with 75 incidents, amounting to 13% of the total number of incidents, and generating a standard deviation of δ = 40.30, which remained high due to the discrepancy in the number of incidents with high values of seized animals.

Ultimately, the calculations were made considering only incidents in which the number of seized animals was above 50, which is half the limit provided for in national regulations for legally acquired animals (IBAMA, 2011). We found 63 incidents presenting the following average values: Me = 103; Mode Md = 53, and standard deviation δ = 91.41. This shows that as the amount of animals seized in the incidents increases, the sample is less representative.

6.2 About animals seized

By applying the dynamic spreadsheet between the scientific names of the seized animals and the numbers of animals per incident, we found that the 41,137 seized animals were distributed into 322 species, and the ten most seized species alone comprise 30,965 animals, which amounts to 75.23% of the total of seized animals, nine of them birds, and one reptile, according to:

Table 1-Ten Most seized animals in 2018 and 2019 by the Environmental Police

Scientific name of species	Animals seized (individual)
Sporophila caerulescens	8.715
Sicalis flaveola	8.686
Saltator similis	5.566
Amazona aestiva	1.674
Gnorimopsar chopi	1.585
Sporophila lineola	1.170
Sporophila angolensis	1.127
Chelonoidis carbonaria	830
Cyanoloxia brissonii	815
Aratinga leucophthalma	797

Source: prepared by the authors.

When analyzing the incidence of the species by the number of seizures in which it appears, we found that of the ten most seized animals, nine are also among the most commonly occurring in different incidents, with the exception of *Paroaria dominicana* , which shows the dispersion of the most seized animals in different locations across the state,

We found that the most seized animal in the state, *Sporophila*

caerulescens, it was identified in 40% of inspections that resulted in wildlife seizures, that is, this animl was identified in 4 out of every 10 seizures made in different places.

Table 2 – Number of seizures in which species were identified:

Scientific name of species	Incidents in which the species occurs
Sporophila caerulescens	3,043
Sicalis flaveola	2,404
Saltator similis	1,948
Amazona aestiva	1,301
Gnorimopsar chopi	718
Sporophila lineola	699
Aratinga leucophthalma	610
Cyanoloxia brissonii	518
Sporophila angolensis	430
Paroaria dominicana	383

Source: prepared by the authors.

Regarding the diversity of seized animals in terms of their class, we found that 39,877 (96.9%) were birds, 1,012 (2.46%) were reptiles, 245 (0.59%) were mammals, and only three were arachnids.

We found that of the ten most seized animals, nine are birds, with the exception of *Chelonoidis carbonaria*, a reptile. Because it is docile and easy to take care of, this species is often identified in wildlife seizures.

6.3 Geoprocessing of seizure sites

By georeferencing the incidents in which wildlife was seized on the map of São Paulo State, we found:

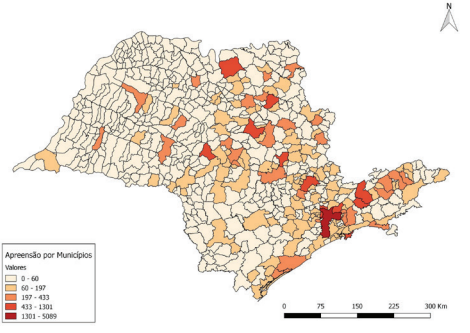

Figure 1 – Map: animals seized per municipality.
Source: prepared by the authors.

Considering the municipalities in which the largest seizures took place, the following are the municipalities of São Paulo where 804 incidents were identified (10% of the total) with 5,108 animals (12% of the total): Bauru, in the west of São Paulo, with 310 occurrences and 1,298 animals, and the municipalities of Guarulhos, Campinas and Araraquara with 1,104, 838 and 619 animals respectively.

The highest concentration was found the state capital, closely followed by its surrounding municipalities, such as Guarulhos and Osasco (6th municipality with the largest amount of seized animals).

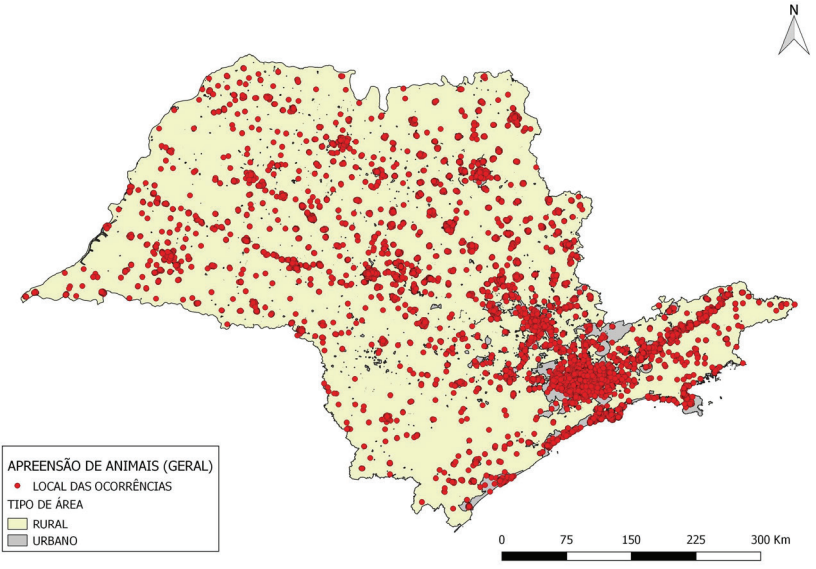

Figure 2 – Map of the locations of incidents on urban and rural areas.

Source: prepared by the authors.

When analyzing the overlapping incident locations on the map of urban and rural areas (IBGE, 2020), we found that of the 7,653 incidents responded to, in 7,625 valid coordinate points were inserted, which showed that 6,931 incidents (with 37,450 animals) were identified as occurring in urban areas of the state and 694 (with 3,531 animals) in rural areas, which shows that 90% of incidents, and of seized animals, were located in urban areas.

By processing these points as a color gradient, we were able to obtain the following characteristic:

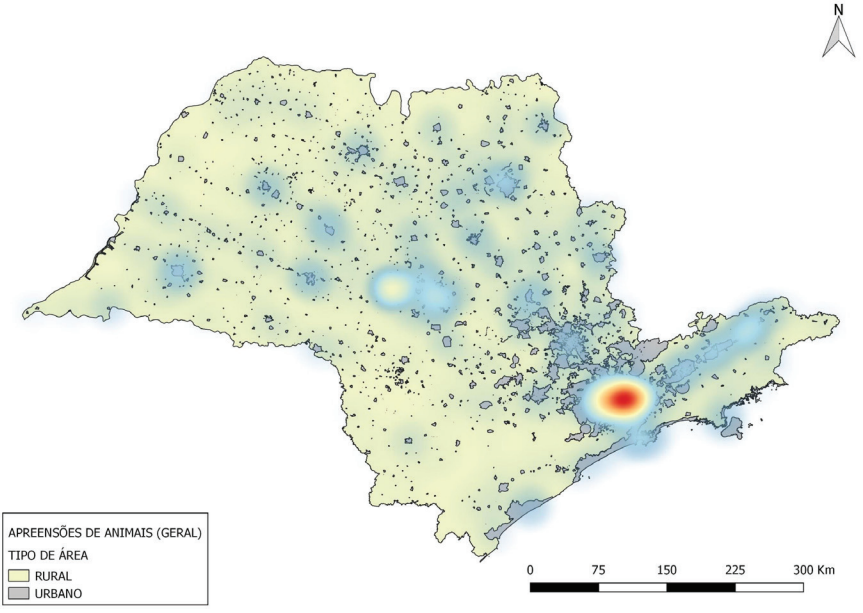

Figure 3 – Color gradient map by concentration of incidents.
Source: prepared by the authors.

It can be inferred from the processed image that the main point of incidents is in fact in the state capital, in the city of São Paulo, and follows toward the northwest, coinciding with the region called Paraíba Valley, which is crossed by federal highway BR-116, connecting the states of São Paulo and Rio de Janeiro. This is the are with the second highest concentration of seizures the central region of the state, as well as the southeast and northwest areas of the capital.

7 DISCUSSION

Based on the results obtained, we found that wildlife trafficking in São Paulo is a reality caused by the huge amount of animals seized in just two years, more than 20,000 animals/year, which confirms studies that showed the issue of trafficking for the loss of biodiversity (NETO, 2007; FISCHER; LINDENMAYER, 2007; BRANCO, 2015; IPBES, 2019).

An important point that the results allow us to infer is the type of

human trafficking identified in the state of São Paulo, which has the same characteristics as in the Asian countries of Myanmar or Cambodia and in Africa, as was stated in the London Conference on the Illegal Wildlife Trade, where trafficking is associated with poaching since only 104 animals seized are animals that can be described as game (such as small mammals), but instead is similar to wildlife trafficking in Colombia, where the local population lives in proximity with wild animals and often seeks them for pets (CROSS-ANTÍA, 2010), since of the ten animals were seized in São Paulo, nine were the birds and were found live, being kept as pets, with emphasis on the species *Amazona aestiva*, which was the 4th most seized in São Paulo and was identified as the most seized bird in Colombia.

Considering that Brazil has 8,500.000 km² (IBGE, 2019) and the data published estimate that approximately 12 million animals are taken from the wild annually in Brazil, of which only 10% make it to their final destination, that is, to 1,2 million, and of these 70% (to 840,000), are sold in the country (GOLD, 2008), and that São Paulo State has 248.219 km², which implies in-state trafficking of approximately 24,500 animals per year, it is also possible to identify that the work conducted by the Environmental Police of São Paulo State manages to seize a little more than 84% of all the wildlife trafficked in-state every year.

Based on the data obtained, we found that in over a third of the cases analyzed, the person was cought in possession of only one wild animal, which shows that the type of trafficking that happens in São Paulo involves the capturing of wildlife to be kept as pet animals (CROSS-ANTÍA, 2010), therefore of way in which these animals may in fact be acquired at the "feiras de rolo" (open air markets) or through small local deals, as had been shown by the study by Regueira and Bernard (2012). Even considering large seizures, with more than 100 of the animals, there were only 17 cases, which amounts to less than 0.3% of the total number of incidents responded to by the law enforcement, although they represent 8.7% of the total number of animals seized.

And for this reason it is necessary to use the value of the standard deviation (δ), since values much above the mean, called *outliers*, might lead to a result that does not reflect reality, given that by extracting from the calculation values above the standard deviation, we found that the mean of animals seized per incident went from Me = 5.37 to Me = 3.34, reinforcing that wildlife trafficking in the state of São Paulo happens with the goal of keeping animals as domestic pets.

Regarding the seized animals, the results in the state of São Paulo had similar conclusions to the studies conducted in the states of Santa Catarina, Pernambuco and in the Amazon, where the most seized animals included small songbirds that can be kept in cages, amounting to 96% of the seizures, a percentage close to that found in the state of Minas Gerais, 91% (FREITAS *et al*., 2015), as was found by Regueira and Bernard (2012), where 87% of the animals sighted at open air markets were birds, or in the study conducted by Sugieda (2018), where birds were 72% to 79% of the individuals seized, as well as Costa *et al*. (2018), who identified in their study that approximately 82% of trafficked animals were birds, and even in the study conducted in Cambodia, where law enforcement efforts against trafficking are focused on combating poaching, birds totaled 57% of seizures (HEINRICH *et al.*, 2020).

It is interesting that of the ten most seized animals none features in Appendices I, II or III of CITES (CITES, 2020): although they have significant figures, these animals do not feature as threatened with extinction, and of the total animals only 104 are mammals considered "game animals", for example *Cuniculus paca*, and of these only nine are considered "top-of-the-chain animals", for example *Leopardus pardalis*.

Regarding the site of the seizures, the data showed that they were predominantly in urban areas, that is, places with a large population and large circulation of people, and although it is a practice punishable as a crime and subject to a fine, it seems to occur without fears of sanctions, which corroborates the idea that animal trafficking in São Paulo has a strong cultural appeal, since it does not appear to be disapproved by society, as shown by Licarião (2013). It aligns with a homogeneous distribution across the state when related to the population residing in urban and rural areas (a ratio 95% and 5% respectively) and in areas where animals were seized (90% and 10% for in urban and rural areas respectively).

Based on the processing of the sites of the incidents, we were able to find that they were concentrated in the most densely populated areas, considering that most populous cities in the state of São Paulo are São Paulo (12,252,023 inhabitants) Guarulhos (1,379,182 inhabitants), Campinas (1,204,073 inhabitants), São Bernardo do Campo (838,936 inhabitants), and São José dos Campos (721,944 inhabitants) (IBGE, 2020), which matches the towns and cities in the most animals were seized, such as São Paulo (1st), Guarulhos (3rd) and Campinas (4th).

CONCLUSION

The illegal wildlife trade in São Paulo State is not like the poaching seen in African and Asian countries; it is similar to the kind of trafficking seen in countries like Colombia and other Brazilian states of brazil, such as Santa Catarina, Minas Gerais and Pernambuco, where the objetive of trafficking is to take animals from the wild to be kept as pets, which can be verified in the small number of animals seized in the majority of cases, one as a rule, with an average of three per state, considering a population of more than seven thousand cases.

Another important result is that trafficking takes place mainly in urban, rather than rural, areas, which shows that the people of São Paulo State have become used to living in close proximity to the keeping of wild animals as if they were domestic pets, a situation proportional to the population residing in urban and rural areas.

We stress that though the enforcement actions carried out by the Environmental Police in São Paulo State have proven effective in seizing 84% of in-state wildlife trafficking every year, there is no evidence of a decrease in wildlife trafficking as in the figure recorded in this study shows a result similar to seizures in the last ten years, that is to say, an average 20 thousand animals per year, which reinforces the idea that the real fight against wildlife trafficking in places with a strong cultural-historic factor should extrapolate enforcement actions, but rather actions of environmental education aiming to change of behavior in society.

Changes in the legislation are needed to curtail wildlife trafficking, including animals kept as domestic pets, that is, by revoking paragraph 2 of art. 29 of Law No. 9,605/98, since in 32% of cases the people were surprised in possession of only pet, and those cases in which the number of animals was not higher than 13 make up more than 92% of all incidents in the state of São Paulo, and the non-application of criminal sanctions on violations can encourage the acquisition of other animals, and can also encourage new generations to continue this practice.

Although 322 species seized were identified in the period of analysis, the preference for songbirds is notable and, as a rule, species native to São Paulo state and not threatened with extinction, which reinforces the idea that in addition to animal trade, people may have obtained these animals by taking them directly from the wild or even by *ex-situ* breeding (at home), therefore they cannot trace the real origin of the animal, which would only be possible if there were a gene bank.

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