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Urban sloths: public knowledge, opinions and interactions

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Simple summary: Free-range sloths living in an urban environment is rare. In this study, human opinions, attitudes and interactions with a population of *Bradypus variegatus* in a public square were investigated. A questionnaire was applied to people in the square where the sloths live. Opinions about population size differed greatly and younger people were concerned if the square was appropriate place for them. Some human-sloth interactions showed the consequence of lack of biological knowledge. Sloths are strictly folivorous and are independent of human sources food. Apparently, sloths are indifferent to humans. Despite the good intentions of the people, there are many mistakes about the behaviour and needs of sloths, which causes low wellbeing for the animals. These results demonstrate that actions in environmental education of the public could be beneficial for the sloths.

Abstract

Free-range sloths living in an urban environment is rare. In this study, human opinions, attitudes and interactions with a population of *Bradypus variegatus* in a public square were investigated. A questionnaire was applied to people in the square where the sloths reside, and informal, opportunistic observations of human-sloth interactions were made. 95% of respondents knew of the sloths' existence in the square and 87.8% likes their presence. Opinions about population size differed greatly and younger people were concerned if the square was appropriate place for them. Some human-sloth interactions showed the consequence of lack of biological knowledge. People initiated all sloth-human interactions. The fact that sloths are strictly folivorous has limited their interactions with humans and consequently minimised negative impact of the human-animal interaction on their wellbeing. These results demonstrate that while there is a harmonious relationship between people and sloths, actions in environmental education of the square's public could be beneficial for the sloths.

Keywords: brown-throated sloth; human-animal interactions; questionnaire; urban wildlife, *Bradypus variegatus*.

1 - Introduction

There have been many studies concerning urban birds (Lepczyk & Warren, 2013) and more recently urban mammals in the Neotropical region have started to receive attention of researchers (Goulart, Teixeira & Young, 2010). These urban mammals have included urban adapters or exploiters such as marmosets (Leite, Duarte & Young, 2011) and opossums (Souza, Teixeira & Young, 2012). Generally, the mammal species found are small and have flexible behaviour (Sol, Lapiedra &Gonzalez-Lagos, 2013). However, some unexpected species, such as large obligate folivores, maybe found within the urban environments of the Neotropics, such as sloths. The presence of such species may result from direct human intervention (e.g., translocation) or because their habitat was engulfed by urban sprawl.

Habitat fragmentation, although it can happen naturally, is one of the most prominent effects of environmental degradation caused by humans. Consequently, the reduction of natural habitats of wild animals increases the interaction between them and humans (Ditchkoff, Saalfeld & Gibson, 2006). The presence of wild animals in urban environments seem to have a high aesthetic value (Curtin, 2005; Ditchkoff et al, 2006) and was a probable reason for the practice of introducing wild animals to city squares in the past. However, the lack of knowledge about the biology of wild animals could lead people to adopt inappropriate behaviours, which could harm the wellbeing of the species involved. The most affected species appear to be those who most adopt an anthropogenic lifestyle (Leite et al, 2011). In addition, it is believed that wild animals living in the urban environment have greater availability of food resources and few natural predators (Ditchkoff et al, 2006).

Animal species, which arouse interest and promote physical contact, are considered calming agents (Wilson, 1984). Pets, for example, benefit the physical and mental well-being of humans, being used in the treatment of depression and low self-esteem (Barker & Wolen 2008). When investigating the interaction between wild animals and humans, there is great scientific interest in the zoonotic diseases (Thompson, 2013). Presently, few studies have examined how these interactions take place and what is the human perception of these interactions (Leite et al 2011; Imam & Ahmad, 2013).

The brown-throated sloth (*Bradypus variegatus*) is a three-toed sloth and belongs to a primitive group of mammals from the Pilosa order. Sloths are imperfect homeotherms because they cannot maintain a constant body temperature (Gilmore, Costa & Duarte, 2001) and have a low metabolism, which is a consequence of their strictly folivorous diet. The low metabolism gives rise to the popular name of the species, as they are slow in their movements and spend much of the day resting and sleeping (Hutchins et al, 2003). Sloths spend most of their time in the trees (breeding, feeding, etc). However, to defecate and urinate they descend to the ground, once or twice a week, and dig a hole with their tail while the front legs are attached to the trunk of the tree (Hutchins et al, 2003).

Tiradentes Square in Teófilo Otoni, Brazil, has a population of brown-throated sloth in a highly urbanised area at least since the 1960s. These animals are isolated from their natural environment and frequently interact with the city's human population. The aims of this research were to: (1) verify that the human population knows about the sloths in the square; (2) investigate their views regarding the presence of these animals in an urban area; and (3) to describe human-sloth interactions. This research was done by conducting interviews using a structured questionnaire and informal observations of human-sloth interactions.

2 - Materials and Methods

2.1 - Study area

The study was conducted in Tiradentes Square in Teofilo Otoni, Minas Gerais, Brazil (17º51'52.73 "S 41º30'29.48" W). Teofilo Otoni is a city in the northeast of Minas Gerais, located in the Mucuri River Valley and has a population estimated at 140,000 inhabitants (IBGE, 2010). Currently the city borders contain an area of 3242 square kilometres. The climate is tropical with an average annual temperature of 23ºC; it has dry, mild winters and rainy summers with high temperatures (IBGE, 2010).

Tiradentes Square is the main square of Teofilo Otoni, and the city's main traffic artery runs through the square. The square is widely used by the population for trade, especially of precious stones (e.g., aquamarine stone); it is also containing bus stops for all

99 municipal lines, as well as some inter-municipal lines, which makes the square heavily
100 visited.

101 In the square there is a population of brown-throated sloths (seven adult males, one adult
102 female and one infant of undetermined sex). Manchester and Jorge (2009) recorded 85
103 trees in the square, and the only tree species sloths use as food, which is found in nature
104 and the square is the *Ficus* sp, which represents only 10.58% (n = 9) of the trees. The
105 other species found in the square are plants commonly used as ornamentation in cities.

106 *2.2 - Interviews*

107 Interviews were carried out using a structured questionnaire targeting people passing
108 through Tiradentes Square in Teofilo Otoni, MG, between the 18th and 27th December
109 2014. One hundred and eighty-two people (91 female and 91 male) were interviewed
110 (Table 1). The interviews took place from 08:00 to 12:00 hours and from 14:00 to 17:00
111 hours. The interviewer randomly approached people who were already stationary to avoid
112 disrupting the daily lives of passers-by. The questions were applied by the researcher: so,
113 any doubts could be immediately clarified.

114 The questionnaire consisted of 13 questions, five demographic factors (such as gender,
115 age, occupation, how long resident in the city and frequency of visits to the square), three
116 questions concerning the existence of sloths in the square, two in relation to the animal's
117 biology, and three to identify the perception of people about having these wild animals in
118 urban areas.

119 This study was approved by the Human Ethics Committee (CAAE:
120 32229514.4.0000.5153, Filed on: September 23, 2014) of the University of Viçosa, Minas
121 Gerais, Brazil.

122

123 *2.3 - Data Analysis*

124 We used Minitab 16.0 for Windows for descriptive analysis of the data: as data we used
125 the percentage of valid answers to each question. To analyse the effects of age and sex on

some of the questions presented, we analysed the frequencies of responses using chi-squared tests and alpha <0.05.

2.4 – Observations of human-sloth interactions

Ad libitum observations of the interactions between humans and sloths were undertaken. The aims of these observations were to classify the types of human-sloth interactions spontaneously occurring in the square.

3 - Results

3.1 – Questionnaire: Social demographics

The first questions of the questionnaire sought to create a demographic profile of the respondents. The mean age of respondents was 40 years (±16.6), with the youngest aged 13 and the oldest 84 years. Of the respondents 67% lived in Teofilo Otoni, and 50% for over 20 years. Many of the respondents (43.3%) frequented the square more than 5 days a week, while 28.3% frequented the square, at least two-three times a month.

(Insert table 1 here)

3.2 - Sloth existence in the square

Most respondents (95%) knew of the existence of animals in Tiradentes Square, and 90.6% of them have seen the animals in the trees. However, the majority (56.5%) of respondents reported no more than five animals, 6.8% thought that there were no longer animals, 25.4% believed there to be up to 10 animals and only 4% said they was more than 20 animals.

150 *3.3 – Sloth biology*

151 In relation to alimentation 69.5% correctly answered that sloths feed only on leaves, 23%
152 said that they also eat fruits, 2.3% answered leaves, fruits and meat and 5.2% believed
153 they feed on any food that is offered.

154 Twenty-four percent of respondents believed that sloths never go down to the ground,
155 19.6% believe that sloths go down to the ground to look for food, 32.4% say that they go
156 down to defecate and 24% could not say why sloths would go down to the ground but
157 believed that they do. When comparing these two questions, we observed that 40% of
158 respondents who answered correctly the first question also got the second question
159 correct.

160

161 *3.4 – People's perceptions about sloths*

162 Sixty-nine percent said they believed that the sloths are healthy, and this is one of the
163 reasons that 87.8% would like to see them in the square. Only 3.3% do not like to see
164 them in the square and 8.8% like sometimes. Of the 22 people who said they did not like
165 or sometimes like to see these animals in the square, 17 believed that animals are not
166 healthy. It was found that older people significantly believed that sloths are healthier than
167 younger people ($\chi^2 = 15.72$; DF = 3; $P<0.001$) (Figure 1). Gender had no significant
168 effect on whether people thought the sloths were healthy or not ($P>0.05$).

169 Table 1 - Demographic characteristics of respondents interviewed in Teofilo Otoni, Minas
170 Gerais, Brazil about the presence of brown-throated sloths in Tiradentes Square(we used
171 the valid percentage as data, since some people did not answer all questions)

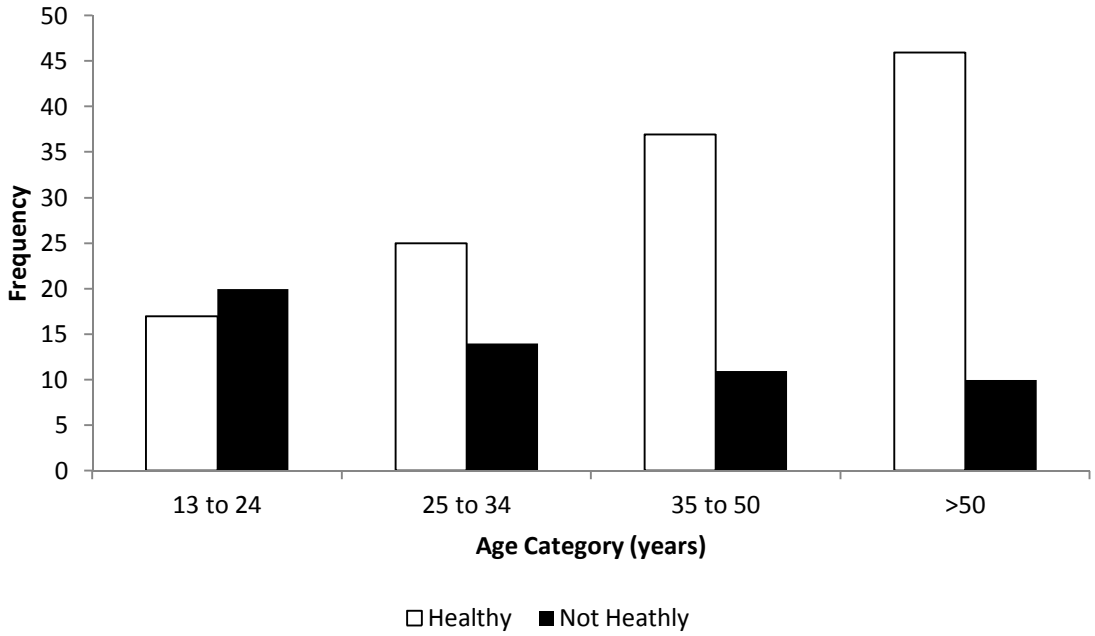
172 T.O. = Teofilo Otoni

Category	Frequency	Percentage (%)
Sex		
Male	91	50

Female	91	50
Age		
13 to 24 years	37	20
25 to 34 years	39	22
35 to 50 years	49	27
>50 years	57	31
How long have you lived in T.O.?		
I do not live in T.O.	60	33
<1 year	3	1.60
1 to 5 years	8	4.40
5 to 10 years	5	2.70
10 to 20 years	15	8.20
>20 years	91	50
Frequency of square visits		
2 times per month	49	28.30
1 time per week	26	15
3 times per week	23	13.30
5 times per week	21	12.10
Every day	54	31.20

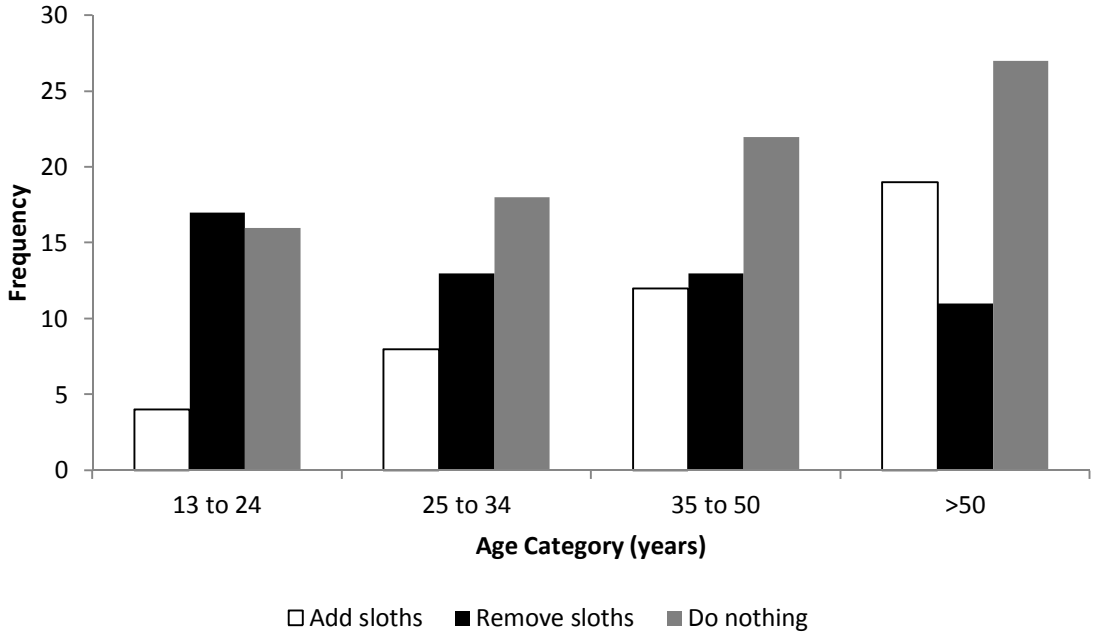
Respondents were asked about what should be done with sloths living in the square: 23.9% thought more sloths should be added; 30% thought that the sloths must be translocated to another location, such as a forest; and 46.1% thought that animals should continue in the square without interference in population size. There was no significant difference in the preference of older or younger people in terms of what should be done with the sloths ($P>0.05$) nor a difference by gender ($P>0.05$) (Figure 2).

Figure 1 - Relationship between ages of respondents who thought that the brown-throated sloths in Tiradentes Square, Teofilo Otoni, Minas Gerais, Brazil were healthy.



184

185 Figure 2 - Relationship between ages of respondents and their opinions about what should
186 be done with the brown-throated sloths in Tiradentes Square, Teofilo Otoni, Minas
187 Gerais, Brazil.



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191 *3.5 – Informal observations of human-sloth interactions*

192 The types of interaction observed were: look for sloths, cherish sloths, take photographs,
193 hold sloth in arms, remove sloth from its location and offer food to sloth. All observed
194 interactions were initiated by people; however, there was no reciprocity on the part of
195 animals for any type of interaction.

196

197 **4 - Discussion**

198 *4.1 - Questionnaires*

199 In the questionnaires, we can see that most respondents have seen and knew of the
200 existence of the sloths in the square. Of the nine respondents who said they did not know
201 of the existence of these animals in the square, only one was a resident of Teófilo Otoni,
202 and those who have never seen animals only four live in the city. Older residents reported
203 the existence of hundreds of animals in the square, and said they were there since the
204 creation of the city, on 7th September 1853. Other residents, however, suggested that the
205 sloths were placed in the square. This second hypothesis is more probable, since old
206 photographs show the square without any trees (Figure 3). However, the number of sloths
207 has been much higher, and the population has declined significantly in recent times
208 (Manchester & Jorge, 2009). Most respondents believed that there are few animals in the
209 square and were surprised when they were informed of the number of animals. People
210 who said there were more than 20 animals; fifty percent of them said they go to the
211 square almost every day of the week but had not perceived the decline in population.
212 Several people suggested that many sloths were stolen and sold to tourists, however, this
213 information has never been proven. Teofilo Otoni is on the route of wildlife trafficking in
214 the southeast Brazil, although it is not considered by RENCTAS (National Network for
215 Combating Trafficking of Wild Animals) as a local capture point for animal trafficking
216 (RENCTAS, 2001). The main purpose of animal trafficking in Latin America is to
217 transform wild animals in pets (Nassar-Motoya & Crane 2000) and the most trafficked
218 species are those that develop affection and empathy in people (Vining, 2003), which
219 makes sloths a target of this trade. However, our study point evidences that sloths are a

cultural patrimony of the city, and robbery is unlikely due the effects on the popular reaction. Unfortunately, the lack of information in relation to sloth trafficking and sloth mortality makes it difficult to know the reason for the population's decline.

Figure 3: vintage photograph of the Tiradentes Square, *circa* 1930, freely available at the Teófilo Otoni municipal administration internet site (http://www.teofilootoni.mg.gov.br/site/sobre/historia/, copy at december 10th 2017).

Sloths are an attraction in the square, especially for children and tourists. It is common to see people looking at the trees searching for animals, and when they descend to the ground people approach them to take pictures and to nurture them. Most respondents knew that sloths eat leaves; many people said only leaves, because they realized that the trees in the square, mostly, did not produce fruit. Some respondents said they had tried to give other foods (such as savoury items and bananas), but the animals did not accept. Vining (2003) states that the fact that people try to feed animals is a way to get into the animal's world and so connect with nature. Empathy to non-human animals is largely

present on attitudes in the mankind, particularly well-studied on the occidental civilization (e. g., Taylor & Signal 2015). Empathy of the people could play an important role on people the attitudes in trying to contact with sloths. However, there are not reciprocity from sloths to the people, and scape, avoiding and indifference are the response from these animals. Therefore, we believe that the fact that these sloths are folivores has been essential for their health and has limited their direct contact with humans.

The sloths have been in the square for a long time, and people have direct contact with them. Despite this, the lack of knowledge on sloth biology was surprising. The three-toed sloths only defecate in soil, preferably in a place with soft earth where they can dig a hole with their tail. However, this information was unknown by most respondents, when asked if sloths go down to the ground, and for what purpose, the responses were quite varied. This lack of knowledge often leads to inappropriate behaviour of the square visitors, which when faced with the sloths on the ground put them back in the trees, believing this to be a risky behaviour for sloths. Thus, the animals need to come down again to the ground to defecate, which increases energy expenditure. Another situation observed was sloths using the ground to move to another tree, but failed to reach its destination, because people put them in the same tree from where the animal had just come from.

Many people believed that the sloths were healthy, and this conclusion was derived from the fact that the animals continue to survive and breed in the square. Despite the number of sloths having decreased considerably, in recent years, people have not associated this with health problems. When we analysed the answers concerning the health of the sloths by respondent's gender, we found that 62% of women and 77% of men thought that they are healthy. Although this difference was not significant, previous studies (Kellert & Berry 1987) have shown that women have a greater concern for the welfare of animals in relation to men.

The fact that wild animals are in the square makes people feel they are more in touch with nature. Thus, the vast majority liked the sloths, and described a state of tranquillity when observing them. The relationship between humans and animals are usually made in to bring benefits to both with the animals act as calming agents (Wilson, 1984; Kaplan, 1995). There was no significant difference between the percentage of men and women

who like to see these animals (87% of men and 89% women). Most of those who did not like or sometimes liked to see sloths in the square believed that they are not healthy (77.27%). The fact that older people (82%) believed that animals are healthier than younger people (46%), shows that they have different perception of animal wellbeing. Studies have shown that older people express less care or concern for animals than younger people (Kellert 1996).

When asked what they think should be done with the sloths from Tiradentes Square, people thought it was best to leave things as they are, because sloths were already adapted to the environment: despite the noise and air pollution and believed that to take them to another place would be bad for the sloths' wellbeing. Additionally, people believed that it should not bring more animals to the square, as it is not the ideal environment for them. Those who thought they should bring more animals into the square, would like to restore the "original" and larger sloth population size, because they believed that population decrease was mainly due to traffic. These responses were especially given by older people, who historically witnessed a larger population living in the square. The older people think are regularly referenced in the past and think less than young people about the future (Gaesser et al 2011). The sloths could be a symbol of the "oldies", a time of abundance ("many sloths"), a kind of nostalgic remembering, the good times which goes away.

Those in favour of removing sloths from the square argued that they should be taken to a forest or a reserve: so, they can be in their natural environment; this response was given mainly by the younger respondents. Young people are more conscious about the relationships between nature and urban life, the right place for wild animals and ecological concepts, since ecology is matter of Brazilian formal teaching nowadays (Seniciato & Cavassan 2009). Higher education is correlated to more knowledge about wild animals (Randler, Höllwarth & Schaal, 2007). In fact, formal education access was increased past decade in Brazil, and older people didn't have the same opportunity to a higher-level education. Therefore, the influence of the media, such television, movies and internet, are motivating young people to building a new *constructo* of morality to wild animals, nature and biodiversity (Boykoff, 2009), compared to older ones. Despite this positive aspect, young people has an idealistic and romantic view about the right place to

sloths, a wild animal species. Forest would be an ideal place, despite the logistic troubles, health and wellbeing of the sloths, which are ignored in a putative translocation program (Nogués-Bravo et al 2016). The morality of this idealization encompasses the symbolic world on the untouchable nature, and sloths are transient things, out of the space, but not uncomfortable to emotional reaction of the people to the animals in the present days. Thus, sloths in the Tiradentes square, are a part of symbolic world about nature to young and old people of Teofilo Otoni city. We think that sloths in the Tiradentes square are a cultural symbol to the Teofilo Otoni people more significant than the real needs of the animals.

4.2 –Ad libitum observations of human-sloth interactions

People who frequented Tiradentes Square are already habituated to the presence of sloths and often did not pay attention to the fact that they were there, unless the animals were near to the ground. At such times people tried to interact with them. The interactions for the most part were people trying to take pictures of these animals or trying to cherish them. But the sloths did not show any reaction to these interactions and acted as if people were not there. People of all ages and both sexes tried to interact with the sloths. Sometimes children tried to approach the sloths and those responsible prevented them due to fear of the sloth hurting them, due to their large claws. The sloths did not show any behavioural fear of people and sometimes crawled along the ground to change trees, crawling among people.

Some patrons of the square tried to feed the animals, but since they are strictly folivorous they did not accept any other type of food, this practice has decreased over time. People usually offer food to animals out of concern for animal welfare (Orams, 2002), because they believe that this habit is important and to also create a dependent relationship. We believe that lack of sloths' interest towards people makes people's interest in relation to sloths low, promoting low levels of interactions between the two.

5 – Conclusion

The results of this study show that there is a harmonious relationship between the sloths and the humans in this urban setting. However, some lack of knowledge concerning sloth biology caused a few inappropriate interactions such as putting defecating sloths back into trees. This suggests that some environmental education of the square's public could be beneficial for the sloths. Furthermore, the present population containing only one female in this slow breeding species is not sustainable in terms of maintaining sloths in the long-term in the square. Intervention will eventually be needed to prevent this group from dying out, but as the results show this should be done in consultation with the public.

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