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“SAUINS” ON TOUCHSCREENS: SOCIAL MEDIA AS A TOOL FOR PIED TAMARIN CONSERVATION AWARENESS

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Abstract

Conservation is only possible when conservation thinking and awareness permeate people's lives. Communication is key to informing and sensitizing people to conservation issues. In this sense, social media may be a communication facilitator. Here we addressed people's engagement with and perceptions of the content created by the Pied Tamarin Project on the Facebook webpage. We found an increase in the number of "likes" across the years and received numerous messages expressing willingness to help. Further, people engaged more with posts related to published scientific papers. In general, we found a good atmosphere with positive attitudes toward collaboration for the conservation of the pied tamarin, as evidenced by the high number of "likes" and positive content of direct messages on the Pied Tamarin Project social media.

Keywords: Science outreach, Amazon, primates, Callitrichidae, *Saguinus bicolor*

Resumo

A conservação só é possível quando o pensar conservação permeia a vida e decisão das pessoas diariamente. Nesse sentido, a comunicação é fundamental para informar e sensibilizar pessoas e as mídias sociais podem ser um facilitador dessa comunicação. Aqui quantificamos o engajamento e a percepção das pessoas sobre o conteúdo criado na página do Facebook pelo Projeto Sauim-de-Coleira. Constatamos um aumento no número de "curtidas" ao longo dos anos e recebemos um grande número de mensagens expressando vontade de ajudar na conservação da espécie. Além disso, as pessoas se envolveram mais com postagens relacionadas a artigos científicos publicados. Em geral, encontramos um bom clima com atitudes de colaboração para a conservação do sauim-de-coleira, o que foi evidenciado pelo alto número de "likes" e conteúdo positivo das mensagens diretas recebidas nas redes sociais do Projeto Sauim-de-Coleira.

Palavras chave: divulgação científica, Amazônia, primatas, Callitrichidae, *Saguinus bicolor*

Introduction

Conservation is only possible when conservation thinking and awareness permeate people's lives. In this sense, science literacy and interpersonal communication may lead to attitude and behavioral changes that hopefully will help to reduce wildlife threats and enhance the chances of conservation success (Wright et al. 2015; Nilsson et al. 2020). Social media, an umbrella term for internet platforms that facilitate communication between users (Loom 2017), has the potential power to reach a large number of people and communicate ideas that might inspire them to act and influence policy (Vries 2020). For any successful conservation strategy, it is important

to constantly evaluate its outcomes and feedback, so we can address whether our goals are being accomplished, and, if not, how we could adapt them to be more effective (Padua 2010). In Brazil, internet access is relatively widespread and smartphones are the main equipment used to access it (IBGE 2018). Using social media, conservation messages can be on the touchscreens in everyone's hands.

The pied tamarin (*Saguinus bicolor*), or *sauim* as it is locally known, has a narrow geographic range in central Brazilian Amazonia. Past and ongoing habitat loss have restricted tamarin groups to isolated forest fragments in the city of Manaus, where urbanization has expanded rapidly in the last decades (Gordo et al. 2013). In

addition to habitat loss, fragmentation also leads to the loss of tamarins through roadkill, electrocution, and attacks by domesticated animals. The pied tamarin is Critically Endangered (Gordo et al. 2019) and a national plan has been developed for its conservation (PAN Sauim, Brasil 2018). Among the suggestions for securing viable populations of pied tamarins is the creation of ecological corridors to connect urban forest fragments and reserves (BRASIL 2018). Such an urban matrix inevitably provokes close contact between people and tamarins (Santos et al. 2017). Thus, the Pied Tamarin Project (or Projeto Sauim-de-Coleira) was created in 2022 to increase knowledge about pied tamarin and its habitats through research, monitoring, and education actions. In 2014, we created profiles on social media platforms to facilitate the outreach of our activities and to call people for actions that would benefit pied tamarin survivorship. Here, we evaluate people's perceptions and propensity to engage in conservation actions directed toward pied tamarins and their habitat in and around the city of Manaus. To do so, we investigated the Pied Tamarin Project Facebook profile metrics and the content of people's comments and "likes" directed to posts as an indirect measure of people's engagement with the content.

Methods

We carried out a manual search on our Facebook page (Projeto Sauim-de-Coleira 2020) categorizing and accounting for the content of posts and people's reactions (number of likes and direct messages) from November 2014 to August 2019. During this period, the social media publications were created by a team of three biologists (TVS, ASMM, RNC). We checked for demographic aspects such as sex and municipal origin of the followers using Facebook's own statistics. We also estimated the average internet quality (download speed) of our followers using a free database about internet quality in the cities of Brazil (<https://qualidadedainternet.nic.br/> accessed on 31/05/2022).

We categorized our publications according to their content in: Pied Tamarin Project daily activities (N=38), Pied Tamarin Biology (N=37), messages for celebrating holidays (N=18), invitations for conservation events (N=18), information about reserves (N=15), forest nursery activities and group planting (N=11), published articles (N=8), ongoing research (N=8), and activities of the PAN Sauim (N=7). We also analyzed 70 direct messages (N=70) with variable content, including 1) Willingness to help, 2) Admiration, 3) Reports of environmental crimes, 4) Suggestions of research topic and partnerships, 5) Requests for internships, 6) Reports of pied tamarin occurrences and their behavior, 7) Requests for educational material, 8) Demonstration of concern for the pied tamarin, 9) Disbelief in conservation actions or institutions and 10) Other. The "Other" category included a) suggestions of posts, b) suggestions of granting agencies, c) requirements of

seedlings to plant in gardens, and d) expressions of desire to observe wild tamarins. We tested for the variation in the number of posts and likes per year using linear regression and report the distribution of likes and posts visually in graphics that we produced. Further, we briefly discuss our social media impact on Facebook and Instagram from 2019 to 2021.

Results

By August 2019, our Facebook page had 1540 followers (i.e. people that accompany the content) and 111 posts. We found that the Projeto Sauim-de-Coleira Facebook page had followers from 39 countries, but the great majority of our followers were Brazilians. These included users from 45 different cities, Manaus being the most numerous (N=878). The internet quality of our followers was on average 53.34 mbps (sd=22), while cities from Amazonas, the state where pied tamarins occur, had on average 10.47 mbps (sd=16.25). Until August 2019, we had no followers from Rio Preto da Eva and Itacoatiara, the two other cities where pied tamarins naturally occur in addition to Manaus. Followers were mainly young (25-34 years old) women (61%). The average number of posts per month was 1.5, which did not vary across the years ($t=0.44$, $r^2=0.04$, $p=0.68$) (Figure 1). On the other hand, the number of "likes" significantly increased across the years ($t=3.45$, $r^2=0.74$, $p=0.026$) (Figure 1), and the number of posts and "likes" were not correlated ($cor=0.24$). Proportional to the number of posts, followers engaged more with the posts about published articles and ongoing research (Figure 2).

We received 70 direct messages, "Willingness to help" being the most common content, followed by "Other" (Figure 3). From the 70 messages, 31 people spontaneously reported their occupation, of which 12 related to some natural sciences (undergraduate students or professionals from biology, veterinary, and self-claimed environmentalists). The remaining occupations included police, architects, historians, teachers, high-school students, visual communicators, and journalists. From 2019 to 2021, we mostly changed our activities to other social media (Instagram) keeping an average of 1.9 posts/month. On this platform, we obtained nearly 10 times more engagement from the followers. During this time period, the annual number of likes on our Facebook page was about 370 while on Instagram 3064.

Discussion

As shown by the high number of "likes" and positive content of direct messages at the Projeto Sauim-de-Coleira social media, we found a positive atmosphere with attitudes towards cooperation for the pied tamarin conservation. We did not track the number of followers per year; thus, it is possible that there is a positive correlation between the increase in the number of followers per year

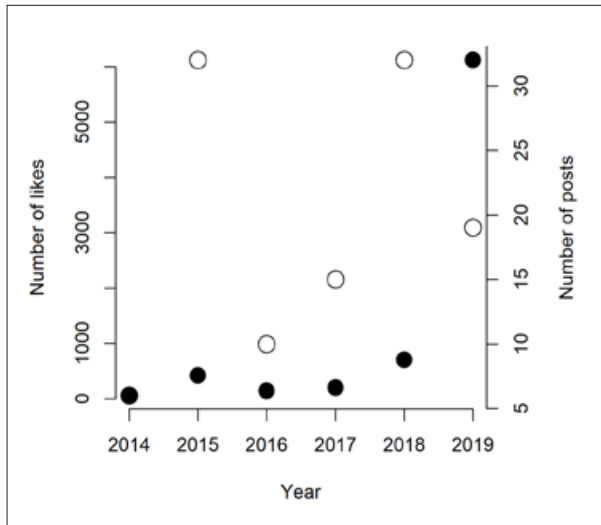


Figure 1. Correlation between the number of posts (open dots) and the number of “likes” (closed dots) of the Pied Tamarin Project (Projeto Sauim-de-Coleira) Facebook page across the years (N=6).

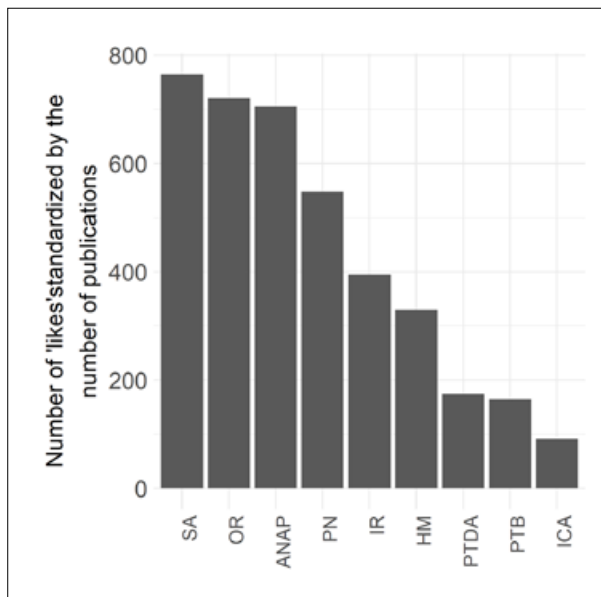


Figure 2. Number of “likes” proportional to the number of posts across different post topic content on the Pied Tamarin Project (Projeto Sauim-de-Coleira) Facebook page between 2014 and 2019. Ordered by topic (N=111). SA= Scientific articles; OR= Ongoing research; ANAP= Activities of the National Action Plan (PAN) for the pied tamarin conservation; PN= Plant nursery and group planting activities; IR= Information about reserves; HM= holiday messages; PTDA= Pied tamarin project daily activities; PTB= Pied tamarin biology; ICA= Invitation for conservation actions.

and the increase in the number of likes. If so, we consider this a positive outcome as more people are consuming the content from the page. The “Willingness to help” and “Other”, the most common content in the messages that we received, were generally positive (see Methods). Some of the students that contacted us volunteered to work in our plant nursery, though we are not aware of “how far” this willingness to help goes regarding the

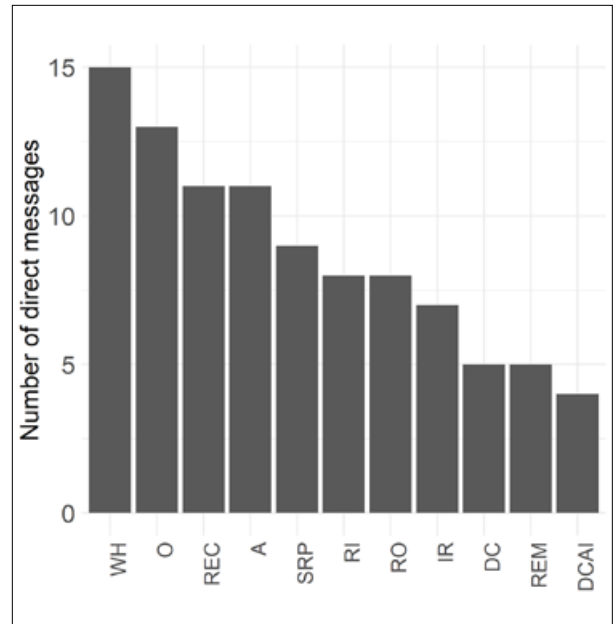


Figure 3. Content from direct messages received on Pied Tamarin Project (Projeto Sauim-de-Coleira) Facebook page between 2014 and 2019 (N=70). WH= Willingness to help; O=Other; REC= Reports of environmental crimes; A= Admiration; SRP= Suggestions of research topics and partnership; RO= Reports of pied tamarin occurrences; RI= Request for internships; IR= Interview requests; DC= Demonstration of concern with the pied tamarin; REM= Requests for educational material; DCAI= Disbelief in conservation actions or institutions.

other followers. This feedback from the community is in line with previous studies, which found that people that live near forest fragments with pied tamarins are likely to show affection for the species and want to cooperate with conservation actions (Santos et al. 2017; Coelho et al. 2018). Such willingness to engage is extremely important, as foreseen wildlife crossings of the urban ecological corridor planned for the pied tamarin, ideally include citizens’ gardens and, consequently, close contact between humans and pied tamarins may occur (Santos et al. 2017; Coelho et al. 2018). People from Manaus that are not necessarily close neighbors of forest fragments share such perceptions and 47% of them affirmed that TV and internet content contributed to their knowledge about the species and its conservation status (Guimarães et al. 2019). It is worth mentioning that we do not know the proportion of local people that share their gardens with pied tamarins among our followers. Regardless, it seems that we have a positive context that would facilitate conservation measures in the urban area of Manaus.

In our study, we detected that our posts attracted mostly Manaus citizens (N=878), but not people from Rio Preto da Eva city and Itacoatiara; these are the only three municipalities where the pied tamarin naturally occurs. A possible reason for that is that our research and educational actions mostly occur in Manaus. From 2014 to 2019, we conducted only four non-intensive research projects and no education initiatives in these

areas. Therefore, we are failing to publicize our material in these two municipalities. This is also true for other educative initiatives that focus on pied tamarin conservation (Lagroteria et al. 2017). They also focused mainly on Manaus but agree that it is important to extend the activities to the rural area of its distribution (Lagroteria et al. 2017). The quality of internet access in rural areas in the region is among the worst in Brazil (IBGE, 2018), which reduces social accessibility to the content. In terms of conservation, such areas are truly important, as they account for 42% of the pied tamarin range and comprise a great amount of forested area that, if protected, could guarantee the survival of viable populations of pied tamarins (Coelho et al. 2018). If internet social media is not reaching these areas, complementary activities of scientific outreach that use mainstream communication media such as local TV and, especially, radio are crucial. Regarding the characteristics of our public, most of our followers were women, which aligns with a global trend of feminine engagement with environmental behavior and digital activism (Hunter et al. 2004).

Additionally, some messages that we received had a direct impact and utility in conservation efforts such as the reporting of the occurrence of pied tamarins in urban forest fragments. The city of Manaus has more than 900 forest fragments and with the current human and monetary resources it is almost impossible to survey all of them to track pied tamarin groups (Coelho et al. 2018). Therefore, such user-provided information is valuable, considering the ongoing efforts to establish an ecological urban corridor for the species (Barr 2016). Citizen science-based research was successful in assessing a small ape population (Mohd Rameli et al. 2020) and this must also be the case for the pied tamarin. Additionally, we received several reports of criminal activities, mainly associated with deforestation, but also illegal trade. In such cases, we immediately contacted the government sector responsible for dealing with the situation. Fortunately, pied tamarins are not frequently kept illegally in captivity, but we did receive a direct message with such content, thus social media can continue helping us to track such activities, as is the case for lemurs (Reuter and Schaefer 2017).

Based on our analysis, we noted some aspects that could be improved, and we received some requests that may be considered in the future. First, people enjoy posts about published scientific articles, therefore we should put more effort into producing such kind of content. Secondly, we received some messages that show the lack of confidence in environmental governmental agencies and their capacity for surveillance of criminal activities. Thus, it would be interesting to publish more stories with a message of hope, which is more likely to motivate people to keep engaged in conservation actions (Kelsey 2012; Vries 2020). We also detected in “disbelief” messages that some people do not think that the *National Plan for the Pied*

Tamarin Conservation (PAN Sauim) (Jerusalinsky et al. 2017; Decree 281/2018) would be effective without considering the human population’s values and needs. We agree with such a statement and indeed a human dimension is part of the objectives and goals of the PAN. Hence, it is recommended that we clarify what those goals are to a broader audience. Finally, we received requests for didactic material from educators, an important request that should be fulfilled, as teachers are key stakeholders and multipliers of knowledge, which is pivotal to long-term behavioral changes in human populations.

Digital culturomics (i.e. the field that aims to analyze digital data to get insights on human–nature interactions) are inherently biased, especially because people have different levels of internet access which can lead to geographic bias (Correia et al. 2021). Further, social media data can contain gender, age, and educational differences in representativeness (Correia et al. 2021). Other limitations include the fact that negative experiences and perspectives are not necessarily reported by the followers (Di Minin et al. 2015). Also, people often use social media platforms to engage with content that they are already interested in (Nikolov et al. 2015). Nevertheless, conservation messages in social media can burst such bubble filters and achieve new conservation actors. This is especially likely when the message spread is repeated different times by different platforms/actors (Wu et al. 2018), which may be our case since many other initiatives using pied tamarin as a flagship species exist in Manaus (e.g. “Salve o Sauim”, “SOS Fragmentos Florestais e Sauim”). One example of this may be the peak in 2015’s number of posts (Figure 1). In that year, several actors for pied tamarin conservation (researchers, employees from the environmental agency, and politicians) made a symbolic action calling 2015 “The Year of the Pied Tamarin” and organized events such as lectures, planting trees, theater performances in public spaces, etc. (Lagroteria et al. 2017). The Pied Tamarin Project page was one of the channels to promote such events that achieved hundreds of participants. Despite the bias in using social media as a conservation awareness tool, we still believe it should be encouraged. By adding together all the efforts of these and further initiatives, we hope to create an effective web of popular actors for the conservation of pied tamarins and their habitat, as these actors are one of the most important allies for species’ conservation success.

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