REVISTA TÓPICOS
ISSN 2965-6672 | Qualis A2

“IF YOU SAW IT, YOU KNOW”: ANALYSIS OF AN AWARENESS CAMPAIGN AGAINST ENVIRONMENTAL CRIMES ON FACEBOOK

“SE VOCÊ VIU, VOCÊ SABE”: ANÁLISE DE UMA CAMPANHA DE SENSIBILIZAÇÃO CONTRA CRIMES AMBIENTAIS NO FACEBOOK

Ciências Humanas, Ciências Biológicas • 30/06/2026

REGISTRO DOI: 10.70773/revistatopicos/782638839

Alex Braz Iacone Santos[1]

ABSTRACT

There are few studies exploring environmental awareness campaigns on social media, with no studies on the perspective of environmental crimes, which are often ignored by mainstream justice systems and ineffectively combated by traditional reactive policing models. To address this knowledge gap, this research investigated a public engagement campaign carried out on Facebook between 11 Feb. 2019 and 05 Nov. 2021, which is intended to encourage the public to submit complaints about environmental infractions. This work identifies awareness campaigns as an alternative and preventive way to deal with environmental crimes, and also points out guidelines for research on public engagement in environmental campaigns on social media, highlighting the need to contemplate all available information (images, quantitative metrics and comments) and multiple viewpoints of those who produce and those who receive social media information.

Keywords: Environmental communication; Public engagement; Science; Technology; Social media.

RESUMO

Existem poucos estudos explorando as campanhas de sensibilização ambiental nas redes sociais, e nenhum na perspectiva dos crimes ambientais, que são frequentemente ignorados pelos sistemas de justiça e combatidos de forma ineficaz pelos modelos tradicionais de policiamento reativo e punitivo. Para suprir essa lacuna de conhecimento, esta pesquisa investigou uma campanha de engajamento público conduzida no Facebook entre 11 fev. 2019 e 05 nov. 2021, que visava encorajar o público para o envio de denúncias sobre infrações ambientais. Este trabalho identifica as campanhas de sensibilização como um caminho alternativo e preventivo frente aos crimes ambientais, além de apontar direcionamentos para

investigações sobre o engajamento público em campanhas ambientais nas redes sociais, destacando a necessidade de contemplar todas as informações disponíveis (imagens, métricas quantitativas e comentários) e os múltiplos pontos de vista, daqueles que produzem e dos que recebem as mensagens.
Palavras-chave: Comunicação ambiental; Engajamento público; Ciência; Tecnologia; Redes sociais.

1. INTRODUCTION

Environmental crimes comprise the fourth most lucrative category of crime in the world after drug trafficking, counterfeiting, and human trafficking (McFann; Pires, 2018), negatively impacting species and ecosystems worldwide (World Bank, 2019), with the illegal use of natural resources being the greatest threat to global biodiversity (Gavin; Solomon; Blank, 2010). These illicit activities involve actions like deforestation, forest fires, poaching, wild animal trade, illegal land occupation, and violation of environmental resource use regulations (Brasil, 2008). Even so, environmental violations are often ignored by mainstream justice systems in the face of other types of crimes (Lynch; Stretesky, 2014), and ineffectively combated by traditional reactive policing models of detection, apprehension, and punishment (Nurse, 2016), requiring the development of other mechanisms to interrupt or prevent environmental damage.

Several environmental crimes are related to cultural practices rooted in society (e.g., wild animal breeding, use of fire in natural areas, poaching and unauthorized fishing), which is often unaware of the illicit nature of the actions and their possible consequences (Von Essen *et al.*, 2014). On the other hand, there are those who believe

that combatting environmental crimes is an exclusive responsibility of public authorities and remain inert in front of the problem. Recognizing the need to understand factors that govern pro-environmental behavior (Chang Wu, 2015), social media can be alternative ways to engage the public in science in general (Jarreau; Dahmen; Jones, 2019; Barel-Ben David; Garty; Baram-Tsarabi, 2021), and on environmental issues in particular (Di Minin; Tenkanen; Toivonem, 2015; Papworth *et al.*, 2015).

With the advances of the internet and social media environments, engaging in online communities and communicating through Web 2.0 have become a common practice for individuals in the twenty-first century (Kulavuz-Onal, 2015; Taddicken; Reif, 2016). Social media have revolutionized science communication (Brossard, 2013; Welbourne; Grant, 2016), are potential venues for informal science education and learning (Russo, Watkins; Groundwater-Smith, 2009; Su *et al.*, 2015), encourage citizens to be more active (Coleman, 2001; Pavelle; Wilkinson, 2020; Taddicken; Krämer, 2021), and are the main source of information for people in different countries (Reuters Institute, 2021; Shearer, 2021). Moreover, social media have demonstrated its value as a new medium for civil and political change and its capacity for revolutionizing the collective behavior of human beings (Watts, 2007; Lovejoy; Waters; Saxton, 2012), a major factor in changing the society status quo regarding environmental crimes.

Social media usage is on the rise, with the number of people engaging online increasing steadily since the start of the decade (Pew Research Center, 2021). There are 6.12 billion internet users around the world today, equating to almost 74 percent of the world's population, of which nearly 95 percent use social media

(DataReportal, 2025). Facebook continues to be a dominant social force worldwide with over 3 billion active monthly users, and a critical player in Brazil's digital landscape (Statista, 2025). Beyond quantitative questions, a recent comparative study has identified Facebook as significantly more attractive for non-specialists when engaging with scientific issues (Hargittai; Füchslin; Schäfer, 2018). Consequently, in order to analyze people's representations of everyday life, the present study turns to discussions on the platform Facebook (cf. Olausson, 2018; 2019).

Despite the study and definition of public engagement in science being tackled in the last decade, scientific studies on the evaluation of the online sphere are still scarce (López-López; Olvera-Lobo, 2018), and much rarer on environmental questions (Pavelle; Wilkinson, 2020). Even the development of different methodological approaches compatible for each type of social media is in progress. Social media engagement has been defined in many ways including a visitor taking some action beyond viewing or reading, for example, by liking, sharing, commenting, or other available forms of interaction (Paine, 2011). However, although the role of images is recognized in arousing emotions, raising awareness, and mobilizing action to environmental problems (Primack, 2010; Jacobson *et al.*, 2018), previous research on social media has hardly taken into consideration the importance of visual information (as exceptions see Ardèvol; Martorell; Cornelio, 2021; Quijandría, 2021).

This conjecture between communication, visual information, and public engagement points to a suitable scenario for research on environmental awareness campaigns in social media. Here, we consider communication campaign as a “purposive attempts to inform or influence behaviors in large audiences within a specified

time period using an organized set of communication activities and featuring an array of mediated messages in multiple channels generally to produce noncommercial benefits to individuals and society" (Atkin; Rice, 2013, p. 2). The previously presented context reveals the potential of each component mentioned above, but there is a lack of studies that examine these factors in an integrated way. To this end, in the current study we investigate a campaign conducted on Facebook to raise public awareness and engagement regarding environmental crimes.

Research on the relationship between environmental issues and social media is in its infancy, especially those focused on communication campaigns. This is the first study that, to the best of our knowledge, explores environmental crimes on social media. With the main objective to investigate an awareness campaign about environmental crimes carried out on Facebook, identifying ways to analyze public engagement campaigns on social media, we conducted an exploratory research with the following questions:

Q1: Is it possible to consider semiotic analysis of visual elements employed?

Q2: How to investigate engagement indicators in quantitative analyses?

Q3: How does public engagement behave on time scale?

Q4: What perceptions about environmental crimes emerge through comments?

2. METHODOLOGY

We used a quali-quantitative approach with exploratory purposes (Gil, 2010) on the information available on Facebook page of Linha Verde Program, which belongs to a non-governmental organization (NGO) called *Disque Denúncia*, located in Rio de Janeiro, Brazil. It is specially dedicated to receiving complaints about environmental crimes. Our research corpus includes all posts related to the communication campaign "*Se você viu, você sabe*", which means "If you saw it, you know", published between 11 Feb. 2019 (campaign start date) and 05 Nov. 2021. This campaign is composed of five pieces with different themes (poaching, clandestine charcoal production, irregular construction, illegal mining, and irregular fishing), addressing illegal activities foreseen in the Brazilian Environmental Crimes Law (Brasil, 2008).

To analyze visual information, observation tables were produced following a semiotic analysis model, in which a visual record is made, and the icon, denotation and connotation are defined (Eco, 1968; Joly, 1994). Denotation refers to the meaning understood objectively, while connotation indicates the interpreter's appreciations, what the image suggests and/or makes the reader think (Sardelich, 2006).

A census of all posts was performed for quantitative analyses, and the following information was collected: date, time, piece theme, number of each engagement indicator (likes, shares and comments). Data were then exported to Microsoft Excel for analysis. Each indicator was standardized by dividing the total of each metric per communication piece by the number of posts recorded for the respective piece. The nonparametric Kruskal-Wallis test followed by Mann-Whitney post hoc test were used to test for differences in the number of likes over the years ($p < 0.05$). This variable was chosen because it is the most popular and intuitive (Peruta; Shields, 2016).

Moreover, it is the only one to guarantee a 1:1 relationship between users and interactions, in other words, each profile can interact only once with a given post.

All comments were analyzed according to content analysis, which consists of "a set of techniques of communications analysis aiming to obtain, by systematic and objective procedures of description of the contents of the messages, indicators (quantitative or otherwise) that allow the inference of knowledge relating to the conditions of production/reception (inferred variables) of these messages" (Bardin, 1977, p. 42). A thematic categorical analysis was performed in three phases: pre-analysis, material exploration (including the establishment of categories a posteriori), and treatment of results obtained.

When it comes to qualitative analysis of social media, there are always ethical issues to take into consideration, such as whether or not to reveal commentators' identities (Kozinets, 2014). Since the analyzed comments are published in a public forum, and are searchable on Facebook, it is impossible to guarantee full anonymity. Even so, when reporting the comments, the initials of the commentators are changed (cf. Olausson, 2018; 2019).

3. RESULTS

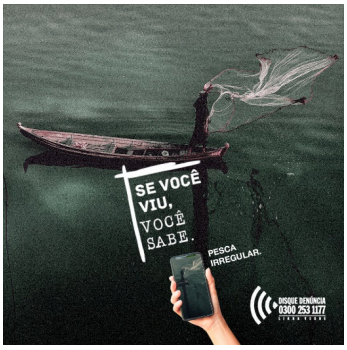
3.1. Visual Message Perspective

The investigated campaign addresses environmental crime issues and attempts to make people aware of the need to adopt an active position towards this contemporary problem. All five campaign pieces share the following visual communication features: i) background photography with elements alluding to the theme; ii)

the slogan “If you saw it, you know”; iii) a title corresponding to the theme; iv) Linha Verde logo; v) mockup of a hand holding a phone and registering on the screen a photo identical to the background image. Next, the detailed semiotic analysis of each piece and its unique characteristics is presented (Table 1).

Table 1: Semiotic analysis of “If you saw it, you know” campaign, promoted on the Linha Verde Program Facebook page, Brazil.

Campaign pieces	Semiotic analysis
	Icon: hunting tools. Denotation: picture consisting of various materials scattered on the grassy soil; rifles, revolver, ammunition, knife, bags, camouflage cap, containers, whistles, and cartridge cases. Connotation: image with hunting tools scattered on the ground, usually registered in surveillance actions to show objects found in flagrant cases of poaching in natural environments.
	Icon: charcoal production in rural area. Denotation: in the foreground, inputs (cut tree trunks and branches), products (coal in raffia bags) and a charcoal kiln used in manufacturing; in the background, landscape composed of plant species from anthropized areas. Connotation: clandestine charcoal factory in a rural area, symbolizing the threat posed by the activity to native vegetation.
	Icon: building inside the forest. Denotation: picture taken from top to bottom, centering a building composed of bricks, concrete slab, and rebar; the background is represented by different types of plants (grasses, banana trees, and native trees). Connotation: unfinished building being erected in a densely forested environment, certainly an

	Atlantic Forest ecosystem with legal restrictions for construction.
	Icon: sandy mining. Denotation: picture of an equipment working in sand mining, highlighting; grain classifier suspended by an iron and wood structure, pipe system, conveyor belt and sand piles with different size fractions. Connotation: illegal sand mining in riverbeds, emphasizing the process of dredging, screening, transport, and final disposal.
	Icon: fisherman throwing a cast net. Denotation: picture taken from top to bottom, highlighting a fisherman standing on the tip of a wooden canoe, and throwing a cast net in a lentic water body. Connotation: fisherman throwing a cast net in lentic waters (e.g., reservoirs, bays, lakes, or lagoons), a forbidden technique in recreational fishing, but allowed in artisanal or subsistence fishing.

3.2. Quantitativa Perspective

We identified 105 posts during the investigated period, with 30 in 2019, 42 in 2020 and 33 in 2021 (Table 2). The most frequent publications were about irregular construction (min-max = 7-15/year) and clandestine charcoal production (8-11/year), in contrast to illegal mining (3-4/year) and irregular fishing (2-6/year).

Table 2: Quantitative overview of “If you saw it, you know” campaign, promoted on the Linha Verde Program Facebook page, Brazil.

Year	Campaign pieces	Total number of posts	Likes (total/mean)	Comments (total/mean)	Shar (total/n)
2019	poaching	5	77 / 15.4	0 / 0	68 / 13
	charcoal	8	53 / 6.6	1 / 0.1	22 / 2
	building	7	119 / 17.0	13 / 1.9	83 / 11
	mining	4	18 / 4.5	2 / 0.5	14 / 3

⚠ Esta tabela possui muitas colunas e foi cortada para impressão. Para visualizá-la completa, acesse o artigo original em: https://revistatopicos.com.br/artigos/if-you-saw-it-you-know-analysis-of-an-awareness-campaign-against-environmental-crimes-on-facebook?noblockage

Regarding engagement indicators, the irregular construction piece got the most likes (40.7%), followed by poaching (26.3%) and clandestine charcoal production (18.8%). The other engagement indicators showed consistent patterns, with comments being predominantly for irregular construction posts, while shares were closely linked with poaching and irregular construction.

Significant differences were found between number of likes across years ($H = 18.07$; $p < 0.001$), with 2019 (Med = 9) recording less interaction than 2020 (Med = 19) and 2021 (Med = 17).

3.3. Content Analysis Perspective

The content analysis performed on comments allowed to determine five distinct categories (Table 3).

Table 3: Content analysis of “If you saw it, you know” campaign, promoted on the Linha Verde Program Facebook page, Brazil.

Categories	Description
Public power	Comments criticizing public power authorities (mayor, police officers, environmental guard, prosecutor’s office, and firefighters), reporting omission, unbelief, and clandestine actions.
Complaints	Comments to make, reinforce, or encourage complaints, often supported by pictures and location.
Doubts	Submission of questions from users, generally answered by page administrators.
Disparities	Messages that point to disparities in the treatment given to people from different socioeconomic groups.
Feelings	Comments with text, interjections, or symbols that express emotions, sensations, and the interlocutor's state of mind.

Comments belonging to public power category were the most frequent and indicated personal and collective disappointment in relation to public agents conduct, with some claims of omission:

> *T.H.:*
>
> *“Municipal government omission!!! Is it possible that no inspector sees these invasions?!” 29 June 2019. 18.50.*
>
> *B.S.:*
>
> *“But the municipal government are omissive and still count on the support of the prosecutor’s office!!!! It's hard!” 30 June 2019. 11.05*
>
> *M.N.:*
>
> *“More and more construction is taking place in green areas. Municipal government does nothing to break up these land grabbers.” 29 Jan. 2020. 21.48.*

Although most of the mentions were related to municipal governments, other public authorities were also reported:

> *R.S.:*
>
> *“We know. The public works secretariats, firefighters, and local governments are the ones who tore up the Constitution on Inauguration Day.” 1 Apr. 2020. 17.42.*

In addition to claims of omission, comments about possible clandestine operations were also found:

> *A.R.:*
>
> *“Municipal governments are the main instigators. Putting land grabbers in charge to manage the 'invaded' land and sell it.” 10 Aug. 2019. 13.30.*

Complaints category was the second most frequent and could be divided into three subcategories: Novel, Reiteration, and Encouragement. The first case refers to new complaints, namely:

> *S.J.:*
>
> *“It's blatant but nobody cares! Here is a picture and directions.” 15 Jan. 2020. 16.21.*
>
> *P.C.:*
>
> *“You have to come to São João da Barra's garbage dump!” 10 Nov. 2020. 21.04.*

Reiteration subcategory was considered when there were clues indicating a renotification:

> *T.A.:*
>
> *“I have already denounced countless times, but the land invasions only increase!!!” 6 May 2021. 17.21.*

The third subcategory refers to encouragement to be proactive in relation to environmental crimes, usually carried out by page administrators, for example:

> *M.N.:*
>
> *“Report it please, nature thanks you.” 29 June 2019. 11.05.*
>
> *V.L.:*
>
> *“Please call us or report it in the 'send message' button. It is important to have this information.” 12 feb. 2020. 14.14.*

Doubts category is related to message exchange to answer any queries or provide explanations. Only objective questions were considered, avoiding those with strong connotative or rhetorical meaning. The following dialog elucidates this category:

> *S.F.:*
>
> *“When is the closed season for fishing?” 5 May 2021. 10.27.*
>
> *V.L.:*
>
> *“What species? We constantly make posts with closed dates for fishing.” 5 May 2021. 17.52.*

Another example is provided below:

> *D.W.:*
>
> *“On the beaches there are a lot of gillnets, is this also forbidden or only when a person is fishing?” 27 Aug. 2020. 01.10.*
>
> *V.L.:*
>
> *“Yes, it is forbidden. They usually leave gillnets in the sea and after a while come back to collect the fish. You can report it to our team here.” 27 Aug. 2020. 08.03.*

Disparities category was determined to consider posts that dealt with contradictions or inconsistencies in the treatment given to irregularities committed by people from different socioeconomic

status. Like other categories, comments were matching with theme. Irregular fishing piece raised the following comments within this group:

> *P.E.:*
>
> *“Bullshit! The guy gets arrested for fishing with a cast net, but a mining company destroys an entire river, and nothing happens! So much hypocrisy!!! 11 Feb. 2019. 12.55.*
>
> *P.E.:*
>
> *“A coword who trawls all night in the Ilha Grande bay is not a crime! For every kilo of shrimp caught, about 500 kilos of young fish are discarded! Is there more predatory fishing than this?” 26 Sep. 2019. 19.25.*

Meanwhile, irregular construction piece provided the subsequent feedback:

> *M.A.:*
>
> *“It will arrest a lot of working poor people.” 8 Aug. 2020. 13.08.*
>
> *R.A.:*
>
> *“Only for poor people. The rich man has a beautiful wallet, and he makes it anywhere, even in the mountains.” 23 Jan. 2021. 18.11.*

Feelings category, although with lower occurrence, considered comments with information expressing emotions, sensations, and the interlocutor's state of mind, usually revealing a nonconformist discourse:

> *H.M.:*
>
> *“Too dangerous...scary.” 7 June 2019. 08.57.*
>
> *A.M.:*
>
> *“🧐” 23 July 2021. 18.17.*
>
> *T.A.:*
>
> *“I can't stand it anymore. I report it and nothing happens 😡.” 1 Apr. 2021. 11.09.*
>
> *G.F.:*
>
> *“Hahahaha... Nothing but promises!” 2 Apr. 2021. 11.00.*

4. DISCUSSION AND CONCLUSIONS

This study reveals the potential of social media for engagement on environmental problems and points out possibilities and needs to approach communication campaigns in a more holistic way, taking into account the importance of visual information, engagement indicators, and the perceptions provided by comments. Besides questions involving partial approaches, previous research on public engagement with environmental issues have mostly relied on survey studies (e.g., Poortinga *et al.*, 2011) and focus-group studies (Olausson, 2011; Marcu *et al.*, 2015). Materials consisting of social media discussions, as in the present work, constitute research data with higher validity because they are unaffected by elements

associated with the investigation process (Regan *et al.*, 2014; Olausson, 2018; 2019).

Considering the significant gap between public concern for the environment and their actions (Jacobson; McDuff; Monroe, 2015), social media platforms such as Facebook, Instagram and YouTube, offer opportunities to expand environmental initiatives' reach and impact (Smith; Rainie; Zickuhr, 2011; Arrobo, Mancinas-Chávez; Aguaded, 2021; Quijandría, 2021). Most organizations make use of digital media, as images and videos, which can influence a person's attention, cognition, emotion, and subsequent actions (Corbett, 2006; Jacobson *et al.*, 2018). So, when promoting the campaign on its Facebook page, the NGO seeks to inform and influence pro-environmental attitudes. Furthermore, social media tools help an organization interact with existing and potential stakeholders and bring attention to circumstances that traditional media might ignore (Guo; Saxton, 2012).

This campaign calls on each person to see themselves as a responsible or able to combat environmental crimes, mainly by reporting them. In this way it is related to encouraging public awareness and uptake of calls-to-action (Pavelle; Wilkson, 2020; Taddicken; Krämer, 2021), as well as being aligned with the Brazilian Federal Constitution, which states: "Everyone has the right to an ecologically balanced environment, an asset for the common use of the people and essential to the wholesome quality of life. This imposes upon the public authorities and the community the obligation to defend and preserve it for present and future generations." (Brasil, 1988). However, the responsibility still falls disproportionately on public authorities, which was widely reported in the comments.

According to Senes and Ricciulli-Duarte (2019), the analyzed material is characterized as social publicity, which unlike commercial publicity, does not have a mercantile purpose but seeks to generate a change in ideas, behavior, and attitudes towards social problems to generate collective wellness and improve life quality. Saxton and Waters (2014) classify three communicative functions of Facebook messages: Information-Sharing, Community Building, and Promotion/Mobilization. The content analysis allowed to identify all these communicative functions, with a predominance of Promotion/Mobilization, which seeks responses from the audience, typically to petition for donations or sales, volunteering, lobbying or advocacy efforts. In the present case, protecting the environment through active participation in the fight against environmental crimes.

Quantitative differences found between engagement indicators are in agreement with literature and possibly associated with level of commitment and cognitive requirement needed to perform the different types of interactions (Oviedo-García *et al.*, 2014; Peruta; Shields, 2016). Comments are more than one-click activities, people need to formulate their thoughts, beliefs, and feelings in their own words when commenting (Taddicken; Kramër, 2021). However, even with less quantitative information, comments provide valuable information inaccessible by other indicators, strengthening the argument in favor of content analysis.

Since campaign strategy is to repeat all communication pieces periodically and using the same informative elements, it can be said that our temporal analysis result (likes in 2019 < 2020 = 2021) contrasts with previous studies, which show that when individuals are subjected to repeated posts from the same source, they may

selectively filter the message and ignore them (Wurman; Sume; Leifer, 2001), or even to present a more negative affective response (Holton; Chyi, 2012). COVID-19 pandemic is a probable cause for the identified trend, since before pandemic the interactions were significantly smaller. Two reasons may be behind this finding: i) increased use of social media during the pandemic period (CGI.Br, 2021; DataReportal, 2021); ii) on the other hand may suggest a close connection between the environmental crisis and the pandemic (Silva *et al.*, 2021).

In general, we found that content comments are not indifferent to the piece theme. As well as page administrators seem to be influenced by engagement indicators, selecting more frequently materials that give more feedback. From environmental perception point of view, the different ways people perceive and understand the environment reflect their respective historical and cultural contexts (Ingold, 2000; Hoeffel *et al.*, 2008; Chierrito-Arruda *et al.*, 2018), a fact confirmed by the comments made by users. Perception is an intrinsic cognitive process of the individual that organizes and interprets the received sensations from his experience, consequently, depends on both the external environment and who perceives them (Davidoff, 2001). Thus, public participation via social media allows us to conjecture a collective perception about contemporary environmental issues.

Some comments clearly depicted a perception of environmental injustice, defined by Acselrad (2010) as the unequal distribution of negative environmental impacts in the most socially vulnerable populations. The environmental injustice is permeating several anthropic activities, for instance mining exploration (BUSS; SILVA, 2020), predatory fishing (Aceves-Bueno; Read; Cisneros-Mata, 2021),

or illegal construction in green areas (Madeiros; Grigio; Pessoa, 2018), themes present in the analyzed campaign. In addition, the above-mentioned comment about the "mining company" (on 11 Feb. 2019), demonstrates the potential of public campaigns to raise awareness and trigger contextualized reflections. It should be remembered that this comment was related to the impacts of Brumadinho dam rupture on the environment, occurred on 25 Jan. 2019 (Ragazzi; Rocha, 2019).

Our results are in accordance with previous research, which highlighted the predominance of verbal language and low representativeness of emoticons in virtual communication (Tosell *et al.*, 2012; Riordan; Trichtinger, 2016). However, emoticons seem to be related to the affective intensification of verbal (Luor *et al.*, 2010). Whereas emoticons are arguably universally understood by those who use social media, their use represents an alternative to be considered in environmental awareness campaigns. A good example is provided by an Asian advertising agency, which explores the red-faced anger emoticon as the protagonist in a campaign about use and trade of endangered species products (Wildaid, 2021).

Although the campaign fulfills the purpose of raising awareness about environmental crimes, the used images per se do not indicate an actual crime. This point should be considered when using visual information, which has polysemy and ambiguity as its fundamental features (Penn, 2008). In this sense, campaigns that explore visual information should take into account the fact that an image is not an exact representation, it implies authors' choices through which they intend to enhance and intensify expressive intensions in order to persuade the target audience, and it also depends on previous cultural experience of those who receive them (Dondis, 2003;

Sturken; Cartwright, 2009). Without a context, it is not possible to know what the image hides and its subjectivity becomes even more susceptible to any information provided, be it true or false (Rigutto, 2017).

Therefore, social media provide a fertile ground not only for public engagement in environmental issues or to promote activism, but a possible and necessary arena to explore public awareness campaigns. It is worth emphasizing the importance of evaluating communication campaigns in a broad sense and considering multiple perspectives (e.g., producers, audience, stakeholders, etc.). Among the possible approaches, we advocate in favor of hybrid methods as a promising alternative, which combine quantitative and qualitative data, including exploratory statistics, hypothesis testing, semiotic and content analysis.

REFERENCES

ACEVES-BUENO, E.; READ, A.J.; CISNEROS-MATA, M.A. Illegal fisheries, environmental crime, and the conservation of marine resources. **Conservation Biology,** v. 35, n. 4, p. 1120-1129, 2021.

ACSELRAD, H. Ambientalização das lutas sociais – o caso do movimento por justiça ambiental. **Estudos Avançados,** v. 24, n. 68, p. 103-119, 2010.

ARDÈVOL, E.; MARTORELL, S.; SAN CORNELIO, G. Myths in Visual Environmental Activism Narratives on Instagram. **Comunicar: Media Education Research Journal,** v. 29, n. 68, p. 57-67, 2021.

ARROBO, J.P.; MANCINAS-CHÁVEZ, R.; AGUADED, I. El papel de las redes sociales en los desastres naturales. El caso de Facebook y el

terremoto de Ecuador en 2016. **Revista Ibérica de Sistemas e Tecnologias de Informação,** n. 40, p. 232-245, 2021.

ATKIN, C.K.; RICE, R.E. Theory and principles of public communication campaigns. In: RICE, R.E.; ATKIN, C.K. **Public communication campaigns.** Newbury Park, CA: SAGE, 2013, p. 2-19.

BARDIN, L. **Análise do Conteúdo.** Lisboa: Edições 70. 1977.

BAREL-BEN DAVID, Y.; GARTY, E.S.; BARAM-TSABARI, A. Can scientists fill the science journalism void? Online public engagement with science stories authored by scientists. **PLoS ONE,** v. 15, n. 1, 2021.

BRASIL. **Constituição da República Federativa do Brasil.** Brasília, DF: Centro Gráfico. 1988.

BRASIL. **Decreto Nº 6.514,** de 22 de julho de 2008. Dispõe sobre as infrações e sanções administrativas ao meio ambiente. Diário Oficial da União. 2008.

BROSSARD, D. New media landscapes and the science information consumer. **Proceedings of the National Academy of Sciences,** v. 110, supplement 3, p. 14096-14101, 2013.

BUSS, A.; SILVA, M.M. Percepção ambiental de alunos que viveram o maior desastre-crime ambiental do Brasil: implicações para a Educação Ambiental. **Revista Eletrônica do Mestrado em Educação Ambiental,** v. 37, n. 1, p. 47-67, 2020.

CHANG, M.C.; WU, C.C. The effect of message framing on pro-environmental behavior intentions: An information processing view. **British Food Journal,** v. 117, n. 1, p. 339-357, 2015.

CHIERRITO-ARRUDA, E.; YAEGASHI, S.; RAIMUNDO, F.; PACCOLA, E.A.D.S.; GROSSI-MILANI, R.U.T.E. Environmental perception and affectivity: experiences in a community garden. **Ambiente & Sociedade,** v. 21, e01232, 2018.

COLEMAN, S. The Transformation of Citizenship? In: AXFORD, B.; RICHARD, H. **New Media and Politics.** London, U.K.: SAGE, 2001, p. 109-126.

COMITÊ GESTOR DA INTERNET NO BRASIL (CGI.BR). **Pesquisa web sobre o uso da Internet no Brasil durante a pandemia do novo coronavírus: Painel TIC COVID-19.** São Paulo: CGI.BR. 2021.

CORBETT, J.B. **Communicating Nature: How We Create and Understand Environmental Messages.** Washington, DC: Island Press. 2006.

DATAREPORTAL. **Digital around the world.** 2025. Available at: https://datareportal.com/global-digital-overview. Accessed: 27 Feb. 2026.

DAVIDOFF, L.L. **Introdução à psicologia.** São Paulo: Makron Books. 2001.

DI MININ, E.; TENKANEN, H.; TOIVONEN, T. Prospects and challenges for social media data in conservation science. **Frontiers in Environmental Science,** v. 63, n. 3, p. 1-6, 2015.

DONDIS, A. **A sintaxe da linguagem visual.** São Paulo: Martins Fontes. 2003.

ECO, U. **La estructura ausente: introducción a la semiótica.** Barcelona: Lumen. 1968.

GAVIN, M.C.; SOLOMON, J.N.; BLANK, S.G. Measuring and monitoring illegal use of natural resources. **Conservation Biology,** v. 24, n. 1, p. 89-100, 2010.

GIL, A.C. **Como elaborar projetos de pesquisa.** São Paulo: Atlas. 2010.

GUO, C.; SAXTON, G.D. Tweeting social change: How social media are changing nonprofit advocacy. **Nonprofit & Voluntary Sector Quarterly,** v. 43, n. 1, p. 57-79, 2012.

HARGITTAI, E.; FÜCHSLIN, T.; SCHÄFER, M.S. How do young adults engage with science and research on social media? Some preliminary findings and an agenda for future research. **Social Media + Society,** v. 4, n. 3, p. 1-10, 2018.

HOEFFEL, J.L.; FADINI, A.A.B.; MACHADO, M.K.; REIS, J.C. Trajetórias do Jaguary - unidades de conservação, percepção ambiental e turismo: um estudo na APA do Sistema Cantareira, São Paulo. **Ambiente & Sociedade,** v. 11, n. 1, p. 131-148, 2008.

HOLTON, A.E.; CHYI, H.I. News and the overloaded consumer: Factors influencing information overload among news consumers. **Cyberpsychology, Behavior, and Social Networking,** v. 15, n. 11, p. 619-624, 2012.

INGOLD, T. **The perception of the environment.** London: Routledge. 2000.

JACOBSON, S.K.; McDUFF, M.D.; MONROE, M.C. **Conservation education and outreach techniques.** Oxford, UK: Oxford University Press. 2015.

JACOBSON, S.K.; MORALES, N.A.; CHEN, B.; SOODEEN, R.; MOULTON, M.P.; JAIN, E. Love or Loss: Effective message framing to promote environmental conservation. **Applied Environmental Education & Communication,** v. 18, n. 3, p. 252-265, 2018.

JARREAU, P.B.; DAHMEN, N.S.; JONES, E. Instagram and the science museum: a missed opportunity for public engagement. **JCOM,** v. 18, n. 2, A06, 2019.

JOLY, M. **Introdução à análise da imagem.** São Paulo: Papirus. 1996.

KOZINETS, R.V. **Netnografia: realizando pesquisa etnográfica online.** Porto Alegre: Penso Editora. 2014.

KULAVUZ-ONAL, D. Using netnography to explore the culture of online language teaching communities. **Calico journal,** v. 32, n.3, p. 426-448, 2015.

LÓPEZ-LÓPEZ, L.; OLVERA-LOBO, M.D. Public engagement in science via Web 2.0 technologies. Evaluation criteria validated using the Delphi Method. **JCOM,** v. 17, n. 2, A08, 2018.

LOVEJOY, K.; WATERS, R.D.; SAXTON, G.D. Engaging stakeholders through Twitter: How nonprofit organizations are getting more out of 140 characters or less. **Public Relations Review,** v. 38, n. 2, p. 313-318, 2012.

LUOR, T.T.; WU, L.L.; LU, H.P.; TAO, Y.H. The effect of emoticons in simplex and complex task-oriented communication: An empirical study of instant messaging'. **Computers in Human Behavior,** v. 26, n. 5, p. 889-895, 2010.

LYNCH, M.J.; STRETESKY, P.B. **Exploring Green Criminology: Toward a Green Criminological Revolution.** Farnham, Surrey, UK: Ashgate. 2014.

MADEIROS, H.; GRIGIO, A.; PESSOA, Z. Desigualdades e justiça ambiental: um desafio na construção de uma cidade resiliente. **GOT: Revista de Geografia e Ordenamento do Território,** n. 13, p. 247-265, 2018.

MARCU, A.; GASPAR, R.; RUTSAERT, P.; SEIBT, B.; FLETCHER, D.; VERBEKE, W.; BARNETT, J. Analogies, metaphors and wondering about the future: lay sense-making around synthetic meat'. **Public Understanding of Science,** v. 24, n. 5, p. 547-562, 2015.

MATSA, K.E.; SILVER, L.; SHEARER, E.; WALKER, M. Western Europeans under 30 view news media less positively, rely more on digital platforms than older adults. **Pew Research Center.** 2018. Available at: https://www.journalism.org/2018/10/30/western-europeans-under-30-view-news-media-less-positively-rely-more-on-digital-platforms-than-older-adults/. Accessed: 27 Feb. 2022.

McFANN, S.C.; PIRES, S.F. Taking stock in wildlife crime research: Trends and implications for future research. **Deviant Behavior,** v. 41, n. 1, p. 118-135, 2018.

NURSE, A. An introduction to green criminology and environmental justice. London, UK: Sage. 2016.

OLAUSSON, U. “Stop blaming the cows!”: how livestock production is legitimized in everyday discourse on Facebook. **Environmental Communication,** v. 12, n. 1, p. 28-43, 2018.

OLAUSSON, U. “We’re the ones to blame”: citizens’ representations of climate change and the role of the media. **Environmental Communication,** v. 5, n. 3, p. 281-299, 2011.

OLAUSSON, U. Meat as a matter of fact(s): the role of science in everyday representations of livestock production on social media. **JCOM,** v. 18, n. 06, A01, 2019.

OVIEDO-GARCÍA, A.; MUÑOZ-EXPÓSITO, M.; CASTELLANOS-VERDUGO, M.; SANCHO-MEJÍAS, M. Metric proposal for customer engagement in Facebook. **Journal of Research in Interactive Marketing,** v. 8, n. 4, p. 327-344, 2014.

PAINE, K. **Measure what matters: Online tools for understanding customers, social media, engagement, and key relationships.** Westford, MA: John Wiley & Sons. 2011.

PAPWORTH, S.K.; NGHIEM, T.P.L.; CHIMALAKONDA, D.; POSA, M.R.C.; WIJEDASA, L.S.; BICKFORD, D.; CARRASCO, L.R. Quantifying the role of online news in linking conservation research to Facebook and Twitter. **Conservation Biology,** v. 29, n. 3, p. 825-833, 2015.

PAVELLE, S.; WILKINSON, C. Into the digital wild: utilizing Twitter, Instagram, YouTube, and Facebook for effective science and environmental communication. **Frontiers in Communication,** v. 5, p. 1-8, 2020.

PENN, G. Análise semiótica de imagens paradas. In: BAUER, M.W.; GASKELL, G. **Pesquisa qualitativa com texto, imagem e som: um manual prático.** Petrópolis: Vozes, 2008, p. 319-342.

PERUTA, A.; SHIELDS, A.B. Social media in higher education: understanding how colleges and universities use Facebook. **Journal of Marketing for Higher Education,** v. 27, n. 1, p. 1-13, 2016.

PEW RESEARCH CENTER. **Social media fact sheet.** 2021. Available at: https://www.pewresearch.org/internet/fact-sheet/social-media/. Accessed: 27 Feb. 2022.

POORTINGA, W.; SPENCE, A.; WHITMARSH, L.; CAPSTICK, S.; PIDGEON, N.F. Uncertain climate: An investigation into public scepticism about anthropogenic climate change. **Global Environmental Change** v. 21, n. 3, p. 1015-1024, 2011.

PRIMACK, R. **Essentials of conservation biology.** Stanford, CT: Sinaur. 2010.

QUIJANDRÍA, E.A. Estudio sobre la publicidad social de la WWF (World Wildlife Foundation) Perú en Facebook y la cultura ambiental de los jóvenes de Lima-Perú. **Anagramas: Rumbos y sentidos de la comunicación,** v. 20, n. 39, p. 7-31, 2021.

RAGAZZI, L.; ROCHA, M. **Brumadinho: a engenharia de um crime.** Belo Horizonte: Editora Letramento. 2019.

REGAN, Á.; SHAN, L.; McCONNON, Á.; MARCU, A.; RAATS, M.; WALL, P.; BARNETT, J. Strategies for dismissing dietary risks: insights from user-generated comments online. **Health, Risk & Society,** v. 16, n. 4, p. 308-322, 2014.

REUTERS INSTITUTE. **Reuters Institute Digital News Report 2021.** 2021. Available at: https://reutersinstitute.politics.ox.ac.uk/digital-news-report/2021. Accessed: 27 Feb. 2022.

RIGUTTO, C. The landscape of online visual communication of science. **JCOM,** v. 16, n. 02, C06, 2017.

RIORDAN, M.A.; TRICHTINGER, L.A. Overconfidence at the keyboard: Confidence and accuracy in interpreting affect in e-mail exchanges. **Human Communication Research,** v. 43, n. 1, p. 1-24, 2017.

RUSSO, A.; WATKINS, J.; GROUNDWATER-SMITH, S. The impact of social media on informal learning in museums. **Educational Media International,** v. 46, n. 2, p. 153-166, 2009.

SARDELICH, M.E. Leitura de imagens e cultura visual: desenredando conceitos para a prática educativa. **Educar em revista,** v. 22, n. 27, p. 203-219, 2006.

SAXTON, G.D.; WATERS, R.D. What do stakeholders like on Facebook? Examining public reactions to nonprofit organizations' informational, promotional, and community-building messages. **Journal of Public Relations Research,** v. 26, n. 3, p. 280-299, 2014.

SENES, F.; RICCIULLI-DUARTE, D. La publicidad social como herramienta para la construcción de ciudadanía. **Razón Crítica,** v 6, p. 183-199, 2019.

SHEARER, E. More than eight-in-ten Americans get news from digital devices. **Pew Research Center.** 2021. Available at: https://www.pewresearch.org/fact-tank/2021/01/12/more-than-eight-

in-ten-americans-get-news-from-digital-devices/. Accessed: 27 Feb. 2022.

SILVA, S.D.; JACOBI, P.R.; LAUDA-RODRIGUEZ, Z.; MILZ, B. Ciência e crise ambiental em meio a incêndios e pandemia. **Ambiente & Sociedade,** v. 24, e00001, 2021.

SMITH, A.; RAINIE, L.; ZICKUHR, K. **College students and technology.** 2011. Available at: http://www.pewinternet.org/2011/07/19/college-students-and-technology/. Accessed: 27 Feb. 2022.

STATISTA. **Most popular social networks worldwide as of October 2025, ranked by number of active users.** 2025. Available at: https://www.statista.com/statistics/272014/global-social-networks-ranked-by-number-of-users/. Accessed: 27 Feb. 2026.

STURKEN, M.; CARTWRIGHT, L. **Practices of Looking: An Introduction to Visual Culture.** Oxford, New York: Oxford University Press. 2009.

SU, L.Y.F.; AKIN, H.; BROSSARD, D.; SCHEUFELE, D.A.; XENOS, M.A. Science news consumption patterns and their implications for public understanding of science. **Journalism & Mass Communication Quarterly,** v. 92, n. 3, p. 597-616, 2015.

TADDICKEN, M.; KRÄMER, N. Public online engagement with science information: on the road to a theoretical framework and a future research agenda. **Journal of Science Communication,** v. 20, n. 3, A05, 2021.

TADDICKEN, M.; REIF, A. Who participates in the climate change online discourse? A typology of Germans' online engagement. **Communications,** v. 41, n. 3, p. 315-337, 2016.

TOSSELL, C.C.; KORTUM, P.; SHEPARD, C.; BARG-WALKOW, L.H.; RAHMATI, A.; ZHONG, L. A longitudinal study of emoticon use in text messaging from smartphones. **Computers in Human Behavior,** v. 28, n. 2, p. 659-663, 2012.

VON ESSEN. E.; HANSEN, H.P.; KÄLLSTRÖM, H.N.; PETERSON, M.N.; PETERSON, T.R. Deconstructing the poaching phenomenon: A review of typologies for understanding illegal hunting. **British Journal of Criminology,** v. 54, n. 4, p. 632-651, 2014.

WATTS, D.J. A twenty-first century science. **Nature,** v. 445, n. 7127, p. 489-489, 2007.

WELBOURNE, D.J.; GRANT, W.J. Science communication on YouTube: factors that affect channel and video popularity. **Public Understanding of Science,** v. 25, n. 6, p. 706-718, 2016.

WILDAID. WildAid Gets Angry with Wildlife Traffickers. **WildAid.** Available at: https://wildaid.org/wildaid-gets-angry-with-wildlife-traffickers/. Accessed: 27 Feb. 2022.

WORLD BANK. **Illegal Logging, Fishing, and Wildlife Trade: The Costs and How to Combat it**. Washington, DC.: World Bank. 2019.

WURMAN, R.S.; SUME, D.; LEIFER, L. **Information anxiety 2.** Indianapolis: Macmillan. 2001.

[1] Docente EBTT do Colégio Técnico da Universidade Federal Rural do Rio de Janeiro. E-mail: acesse o artigo original para visualizar o e-mail. ORCID: https://orcid.org/0000-0002-4326-8029