Journal of the Geological Survey of Brazil

Strategic diagnosis of geocommunication using SWOT analysis in the Varvite Geological Park, São Paulo, Brazil

Andrea Duarte Cañizares[1*], Christine Laure Marie Bourotte[2]

[1]Universidade de São Paulo, Instituto de Geociências, Programa de Pós-Graduação em Mineralogia Experimental e Aplicada, Rua do Lago, 562, São Paulo - SP, Brazil, CEP: 05508-080
[2]Universidade de São Paulo, Instituto de Geociências, Rua do Lago, 562, São Paulo - SP, Brazil, CEP: 05508-080

Abstract

The central concern for geodiversity conservation is the low perception of its importance and appreciation by society, as the individual rarely values what he does not know. Thus, communication is essential to promote a better perception and comprehension by the public and, consequently, the conservation of geodiversity. Geosites are exceptional places to promote the communication of Geosciences because they allow public engagement through the enchantment provided, for example, by the story that can be told there. The Varvite Geological Park is a geosite of São Paulo state and is frequently used in formal education field activities pointing out its importance to geoscience knowledge dissemination. This municipal park brings important geodiversity elements that represent the late Paleozoic glaciation in southeastern Brazil, such as sedimentary structures, dropstones and ichnofossils. The development of a communication strategy requires an understanding of the Park's current situation. To this end, a SWOT (strengths, weaknesses, opportunities and threats) analysis of the Varvite Geological Park was carried out involving several stakeholders whose professional performance is related to the Park. This analysis resulted in a situational matrix with data organized in four quadrants that considered strengths, weaknesses, opportunities and threats. The results of the SWOT analysis pointed out a discontinuity in the existing communication actions and that an integrated and strategic approach is missing. Thus, the current communication gives to the visitor a fragmented view of Park's geological, historical and cultural context. Consequently, the potential to disseminate important geological concepts for public understanding and preservation is not fully explored.

Article Information

Publication type: Research papers
Received 15 October 2020
Accepted 9 December 2020
Online pub. 22 January 2021
Editor: Marcos Nascimento

Keywords:
Geoconservation,
Geodiversity,
Communication,
SWOT analysis

*Corresponding author
Andrea Duarte Cañizares
E-mail address: andreacanizares@usp.br

1. Introduction

Geodiversity, as a set of abiotic elements of nature and their natural processes, is indispensable for the existence of life on our planet. Despite this, its importance is not adequately perceived by society (Cañizares et. al. 2019). This perception deficiency impairs the individual's ability to exercise citizenship through behaviors aimed at the conservation and demanding priority public policies and protective measures. Therefore, the gap in the perception of geodiversity and the basic concepts of geosciences impacts its conservation. In this sense, geocommunication and the dissemination of geosciences to the lay public is fundamental for improving this perception. Geocommunication goes beyond making the content available to the public and search for its engagement instead. One way to do it is by sharing scientific knowledge through entertainment, for example.

Geosites are excellent scenarios for this purpose for two reasons. First, the search for deeper experience with nature is increasing as well as the interest in knowing more about the place visited. Second, the geosites can provide enchantment through their geological history. Thus, narrating this story in a fantastic way facilitates the absorption of complex concepts and promotes public engagement (Somerville and Hassol 2011).

The Varvite Geological Park is a geosite of São Paulo State's Geological Heritage Inventory (2018), very suitable for the study and development of communication strategies. It is a place that arouses public interest and is widely explored as a tourist attraction receiving visitors from Brazil and around the world. In addition, it has an established vocation for teaching figuring in field activities for students from elementary to graduate school, as well as in scientific research (Guimarães et al. 2018).

The hypothesis claimed is that strategic principles combined with the most current methodologies of geocommunication can

This work is licensed under a Creative Commons Attribution 4.0 Internacional License.

ISSN: 2595-1939
https://doi.org/10.29396/jgsb.2021.v4.SI1.1
Open access at jgsb.cprm.gov.br

improve the public's perception of the geodiversity in this Park. As a first approach, we conducted a situational diagnosis of this geosite focusing the current geocommunication practices using a SWOT (strengths, weaknesses, opportunities and threats) analysis. This methodology allows the identification and systematic organization of the positive and negative aspects, both internal and external Park´s environments. This data rationalization facilitates aspects crossing and prioritization for decision making on the communication strategy to be used in further studies.

2. Area of interest

The Varvite Geological Park is located at Rua Parque do Varvito, 400, in Itu, São Paulo (Figure 1). Currently, it is a municipal park managed by the Environment City Secretary, with an area of 44,346 m^2 and attended by an annual audience of over 60 thousand visitors. It is also a geosite included in São Paulo State's Geological Heritage Inventory due to its outstanding scientific value identified in its geological aspects (paleoenvironmental, paleontological, sedimentological, stratigraphic) in addition to its tourist, historical and educational importance (Garcia et al. 2018).

Before becoming a Park, the site was a quarry and the rock was extracted for building. In Itu city's historic center some varvite rock floors, jambs, streets and sidewalks remain preserved and can be appreciated nowadays. The scientists' interest combined with the site historical character sensitized public management to its importance and need for conservation and protecting measures. In 1974, the Condephaat (Council for the Defense of the State's Archaeological Artistic and Tourist Heritage) recognized this heritage and preserved part of the quarry area. In 1993, the Municipality of Itu expropriated the entire quarry area, including the previous partially preserved one, totalizing a protected area of 44,346 m^2. In 1995, the place was transformed into a municipal park (Rocha-Campos 2002).

In 2011, the Varvite Geological Park was recognized as one of the 11 Geological Monuments of São Paulo State by the Geological Monuments Centre, which is a research centre of the Geological Institute, related to the São Paulo's Environment State Secretary. Geological Monuments have a special character as a protected area and are included in the State's Information and Management System for Protected Areas and Environmental Interest (Sigap) (Moura 2017). The Park is now included in São Paulo State's Geological Heritage Inventory (Garcia et al. 2018) which further demonstrates its patrimonial character.

Its relevance is related to its geological context since the sedimentary rocks in the Park register the Itararé Subgroup of the Paraná Basin, and its formation occurred during the Permo-Carboniferous period. The outcrop consists of rhythmites with alternating deposition of light-colored and thicker layers of fine sandstone and siltstone, and dark-coloured and thinner layers of claystone and siltstone. Ichnofossils are present mainly as trails left by invertebrate animals, in addition to dropstones and glaciogenic debris released by icebergs (Rocha-Campos 2002). Varvite is a type of sedimentary rock probably deposited in a glacio-lacustrine environment, in a lake in contact with the margin of an ancient glacier. The characteristically annual seasonality is evidenced by light layers deposited by turbidity currents action during the summer, alternated by dark layers (greater presence of organic matter) decanted during the winter while the body of water was frozen (Rocha-Campos 2002). The outcrop in the Varvite Geological Park brings together elements of high scientific value, as it is one of the few sites in the country where researches can be performed to decipher the geological history of glaciation in southeastern Brazil during the Permo-Carboniferous period. These researches are also important for understanding the climate changes that society currently faces. In addition, it is also the most extensive and well-preserved varvite example of the Paraná Sedimentary Basin (Guimarães et al. 2018).

In this way, the Park offers a unique opportunity to put the public in touch with its geodiversity at the same time the Earth history contained in the countless elements found there is told, besides connecting them to the entire historical, economic, cultural and tourist context of the region.

3. SWOT analysis and strategic communication

According to Mintzberg et al. (2006), strategy can be considered a set of actions rationally designed, with a predefined purpose, aiming to solve a problem in a systematic way. With a well-formulated strategy, any institution can organize and manage its resources (financial ones or others)

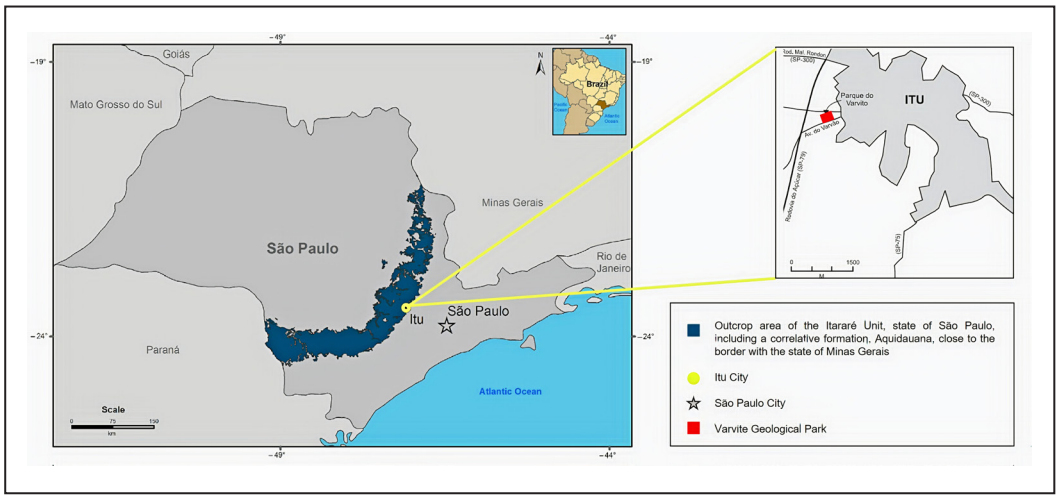

FIGURE 1. Varvite Geological Park's location (adapted from Guimarães et al. 2018 and Rocha-Campos 2002).

in order to make itself viable, singular and efficient. This level of excellence is reached when the institution's competences are properly explored and any environment changes are anticipated (Mintzberg and Quinn 2001).

A strategy formulation is an interactive process that depends on constantly evolving factors and their in-depth knowledge is essential for the development of this plan. SWOT analysis is one of the most used tools in strategic diagnosis. This methodology seeks to understand the boundary conditions through methodical and in-depth evaluation of the universe in which the institution is inserted. In other words, this diagnosis maps the strengths (S) and weaknesses (W) present in the institution's internal environment, and the opportunities (O) and threats (T) present in its external environment. Internal factors, positive or negative, are those that the institution can control. The external ones take into account the stakeholders, the competitors and social, technological, economic, political and other aspects over which the institution has little interference. The result is a matrix where these boundary conditions are mapped and organized into four quadrants (Figure 2) (Kotler and Keller 2012). Thus, it is a methodology that can be applied in a traditional proposal or using additional methodologies, depending on the complexity of the decision-making process, and already aiming at building the action plan such as the TOWS Matrix, GUT method, the Balanced Score Card, among others (Lurati and Zamparini 2018).

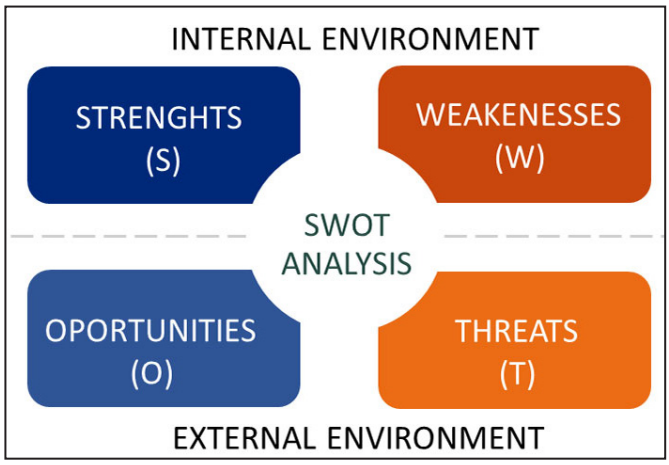

FIGURE 2. SWOT analysis Matrix

The use of SWOT analysis for the development of strategic communication considers specific factors that impact both its implementation and its result. The internal analysis considers the following aspects: communication execution (efficiency and effectiveness), the institution's relationship with its stakeholders, the organization's identity and its reputation. The external analysis is based on the communication strengths and weaknesses of the institution's competitors, the external environment (social, technological, economic, political aspects) and the stakeholders' environment factors that influence communication (Lurati and Zamparini 2018).

The SWOT analysis has being applied in conservation units such as Parque Estadual Restinga de Bertioga, Brazil (Banzato et al. 2012), in national park tourism evaluation in Penang National Park, China (Hong and Chan, 2010), in assessment of the educational potential of mining morphology in Červený kopec, Czech Republic (Kubalíková 2017), in the Seridó geopark, Brazil for geotourism evaluation (Medeiros et al. 2017), or in the formulation of geoconservation strategies in geomorphosite in Mama Bhagne Pahar, India (Datta 2020), among others.

4. Analytical procedures

As this diagnosis will support a future communication strategy formulation, the data used in this study covered aspects of communication and accessibility such as infrastructure, communication elements (existing types, conservation conditions, content, location, etc.); physical aspects of geodiversity such as its elements conservation conditions and vulnerability resulting from the anthropic visitors actions; and the perception of visitors, employees, different institutions partners and public managers.

The data were collected through:

a) bibliographic research on the geoscientific aspects of the Park and the historical use and scientific approach evolution;

b) online and offline Park's current communication content and means research;

c) field observation of visitor behaviour, as well as existing communication elements;

d) face-to-face interviews to investigate Park's visiting public perception;

e) online questionnaires to investigate the perception of Park's stakeholders.

Two perception surveys were carried out since the investigated groups expectations and interactions have different natures and purposes. The questionnaire applied to stakeholders addressed issues related to geodiversity, geoconservation, geological heritage and the connection of Park's context (geoscientific, historical and cultural aspects) to the visitors' daily lives. In this case, the objective was to investigate what issues stakeholders consider relevant to be disseminated in the Park. Brief explanations on these topics were included throughout the questionnaire to assess whether stakeholders would change their prioritization as they became more familiar with them. Issues related to the Park's current communication were also addressed to assess how their expectations were pleased. The visitors' interviews addressed issues listed by stakeholders as priorities for the exercise of citizenship in order to assess how the information in the Park's communication is retained. Additionally, the time dedicated to the appreciation of the panels was also observed in the field to assess the interest aroused by them.

An online solution was taken in place in order to facilitate the stakeholders' data collection considering schedules incompatibility and individuals' locomotion difficulty. A presentation with a Park's panel location map and its respective pictures was sent to the stakeholders in the way they could enjoy its contents as if they were conducting a face-to-face visit. After appreciating the presentation, participants answered an online form with subjective and objective questions.

Starting from the data collected, a traditional SWOT analysis was carried out and the strengths, weaknesses, opportunities and threats were identified using adapted guidelines from the propositions of Lurati and Zamparini (2018) summarized in Table 1.

TABLE 1. SWOT analysis structure applied to the Varvite Geological Park's communication.

Environment	Aspects analyzed	Guiding questions
Internal	Identity	Does the institution have a clear purpose?
		Does that purpose motivate people?
		Are the institution's values inspiring?
		Is there a brand (logo, slogan, colors, etc.) developed?
	Reputation	Are the products and services adequate?
		Does the institution have the ability to innovate?
		How does the institution play its role in society?
External	Competitors	What are the strengths and weaknesses of the competitors' communication?
	External environment (social, technological, economic, political)	
	Communication with stakeholders	How diverse are the interests and opinions among stakeholders?
		Is the exchange of information with the Park adequate?

FIGURE 3. Communication elements available at the Park's entrance (Photos: Andrea Duarte Cañizares, 03/13/2020).

5. Results

5.1 Communication in use

Visitors access a single entrance (Figure 3) where there are no communication elements indicating a visitation route, the attractions location or other Park's and its stakeholders' institutions' informative and promotional material such as flyers. At this point the visitors find visitation rules and the Park's inauguration board.

The current elements of communication found in the Park are: nine explanatory panels installed at different locations (Figure 4A), a totem pole (Figure 4B), a notice board (Figure 4C) with a posted leaflet (Figure 4D), a website (Figure 5A) and a page on Facebook social network, which is temporarily disabled due to the proximity of municipal elections, according to the Park administration (Figure 5B). There is no formal communication plan for the Park. The communication currently installed on the site is the result of a partnership with the Universidade Estadual Paulista – UNESP that also resulted in a commemorative edition of the magazine "Revista do Parque do Varvito" due to the Park's 20 years' anniversary in 2015 (Figure 6) (Furlan et al. 2015).

Some attractions, such as the Iceberg Viewpoint (Figure 7) do not have neither interpretive elements nor an attraction's name board or a rules signal. Others have attraction's name board but no explanation about its meaning.

5.2 Stakeholders' perception

The online questionnaire applied to stakeholders was available for 60 days. Sixteen stakeholders (44% men, 56% women), between 40 and 66 years old (62.5%) answered it. Most of them have an education level in higher education (25%) or postgraduate education (62.5%) and they are working as managers (environment, tourism, education, historical heritage and culture), teachers in public and private schools, scientists, environmental monitors, museum curators and administrators/caretakers.

Table 2 synthetized what content stakeholders expect to be addressed in the Park's communication before introducing them the concepts of geodiversity, geoconservation and

FIGURE 4. A) Panel on the Benthic Trail, B) Totem, C) Notice board and D) Leaflet in the Civic Square (Photos: Andrea Duarte Cañizares, 03/13/2020).

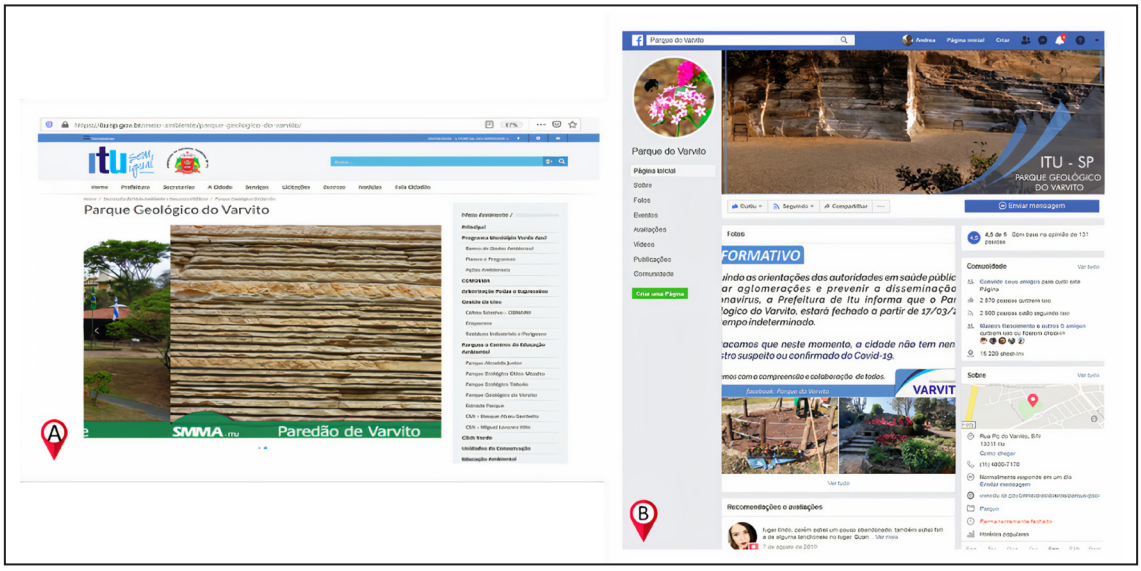

FIGURE 5. A) website (Website: https://itu.sp.gov.br/meio-ambiente/parque-geologico-do-varvito/); B)Facebook page (https://www.facebook.com/Parque-do-Varvito-145485018972603/).

FIGURE 6. Summary of the commemorative edition of 20 years of the Park (2015) of Parque do Varvito Magazine (Itu 2015).

FIGURE 7. Different views from the Iceberg Viewpoint (Photos: Andrea Duarte Cañizares, 03/13/2020).

TABLE 2. Stakeholders' expectation and authors' analysis about their approach in the different Parks' communication channels (not observed: gray; partially observed/explained: blue; detailed explanation: green).

Within the context in which you relate to the Park, describe what geoscientific knowledge you think the public should obtain during the visit.	Mentions	Panels	Totem	Flyer	Magazine	Site
glaciations and climatic variations	6					
sedimentary processes as a whole	5					
geological time	5					
varvite formation process	4					
fossilization processes (fossils and ichnofossils)	4					
paleoenvironment of varvite	4					
types of rocks and their formation processes (rock cycle)	3					
importance of the Park as a geological heritage	3					
geodiversity: concept, valorization and protection / conservation	2					
sedimentary structures	2					
supercontinents (especially connection to Africa)	2					
Earth's internal and external dynamics	2					
Earth's history and formation process	1					
Park's foundation history	1					
São Paulo State's geology	1					
biodiversity, urbanization and environmental impacts	1					
soil formation process	1					
varvite use in regional architecture and its importance (economic, cultural, etc).	1					
Atlantic Forest and Brazilian Cerrado's current ecosystems	1					
naturalists' expeditions during the 19th century	1					
connection with Tietê river	1					
local anthropology, topography and geography	1					
sense of belonging	1					
information on geology subject	1					

geological heritage. This table also shows an authors' analysis about how is the approach of these concepts in the different Park's communication channels. The Facebook content was not evaluated because the official page is not available. Table 3 synthetized what knowledge stakeholders judge to be essential, after being introduced to the concepts mentioned above, to prepare the visitors to exercise their citizenship.

Asked about how much the Park's communication makes clear the meaning of the names of its attractions (such as Permian Lake, Benthic Trail, Boulder Grove, etc.), 56.25% of stakeholders understand that their meaning is not clear for the visitor. When asked about the identification of these attractions, 56.25% understand that the Park's communication makes clear the location of its attractions. In general, the stakeholders showed themselves to be knowledgeable about the Park's context, although one of them voluntarily stated that he had never accessed the Park's website. The perceptions about the use of the Park's structure can be seen in figure 8.

Regarding the challenges and suggestions to improve the Park's communication, the stakeholders' answers were compiled in Tables 4 and 5.

5.3 Visitors´ perception

Face-to-face interviews were held on a Saturday, during the park's opening period (8 am to 5 pm). Thirty visitors were interviewed (47% men, 53% women), between 25 and 34 years old (33%) with training mostly in higher education (46.7%) or postgraduate (23.3%). The objectives of the visit declared by the visitors were: curiosity and knowledge (43.3%), contact

TABLE 3. Geoscientific knowledge deemed necessary by stakeholders for citizens' formation.

Geoscientific knowledge deemed necessary by stakeholders for citizens' formation	Answers Frequency
concept and importance of geoconservation (balance between exploration and conservation), like mining in the quarry and its transformation into a park	9
perception of the concept, value and need for conservation of the geological heritage	4
types of rocks and their formation processes (rock cycle)	2
geological time	2
rocks use and the importance of mineral resources to society	2
geodiversity concept	2
tourist possibilities	2
geosciences importance and individual responsibility on geoscientific issues	2
geological characteristics association with forming processes and environments.	1
sense of belonging	1
natural and urban environment perception	1
tectonics plate	1
pebbles concept	1
supercontinents (Pangea)	1
varvite formation process	1
connecting rock use with urban perimeter and transposing it to the daily lives of individuals	1
reflections on new attitudes about the environmental resources' management and its exploration impacts	1
recognition of the geological trajectory of the territory on a world scale	1
climatic variations	1
comparison of geological ages and climate change in Brazil	1
individual's relationship with the environment	1
paleontological site	1
scope of sciences (Geology, Paleontology, Geography, History and Economics)	1
legislation	1
natural history of the individual's city, region and country	1
science relevance to social development	1

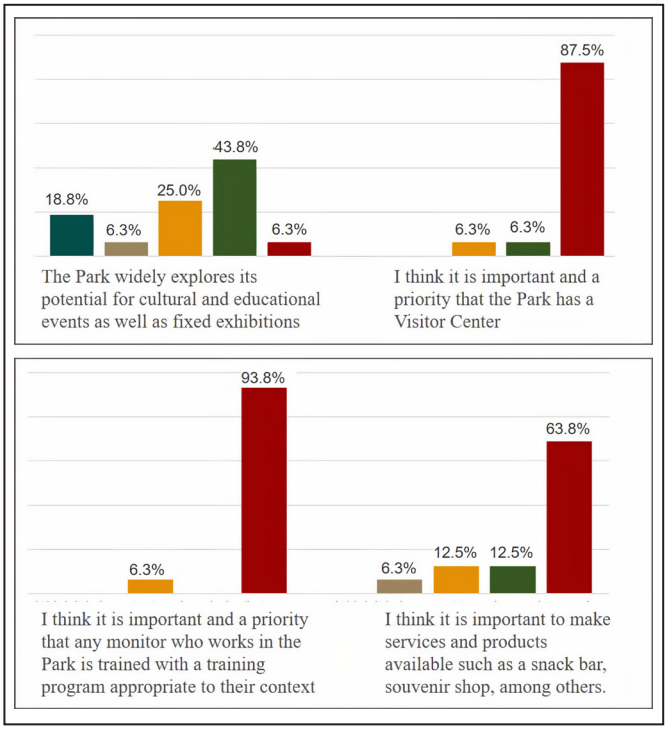

FIGURE 8. Perceptions of stakeholders on the use of structure holding events, providing products and services, visitor centre and monitors training.

with nature (36.7%) and other reasons (20%). Many visitors declared not seeking information about the Park previously the visit (43.3%) and those who sought it, did so mainly using the internet (82.4%) followed by books and scientific articles (11.8%) and consultation with family and friends (11.8%).

To measure understanding about the meaning of geodiversity, visitors were asked to mention words that came to their mind when they heard that term. The words rock / stone / rock formation was most frequently cited (11 mentions), followed by diversity / variety (10 mentions), soil (3 mentions) and study (3 mentions). The term geological was mentioned only twice and mineral, trace, past and Earth only once. When asked to give examples of geological heritage, 47% replied that they did not know how to exemplify, 10% provided incorrect examples and 43% mentioned the Park itself. When asked about the actions that could be taken to better preserve the Park, respondent mentioned investment in security and inspection such as installing cameras, focusing on maintaining the facilities regardless of elected public management, implementing communication aimed at preserving nature, creation of digital content, elaboration of specific legislation, incentive to visitation, involvement of the local community in activities, programs with schools, population education, public-private partnerships, dissemination of the Park´s importance and place information.

To assess the panels attractiveness, visitors were asked about the time dedicated to each one of them (Figure 9). In

TABLE 4. Stakeholders suggestions to improve communication and the visitor experience.

Suggestions	Answers Frequency
Park placed training courses for different audiences including environmental monitors	3
clearer connection with citizen daily life, the importance of geodiversity for the economy	2
specialized team to attend visitors	2
partnerships with educational institutions in the region, including universities in São Paulo	2
partnerships with other attractions in the region promoting exchanges of knowledge and integration with other tourist spots where the varvite extracted from the Park is used	2
Park's historical and economic importance contextualization and its link with the city at the beginning of the visit	2
implementation of didactic activities associated with student visits	1
bus or train that takes people city centre - park and park - city centre	1
improving explanatory signs and signage	1
implementation of a script that tells a story	1
tailored communication to each type of audience	1
place to receive and guide the public at the beginning of the visit (explanatory video or lecture)	1
more suitable space for visitors stay and socialize, since currently stay is very short	1
future study centre with forty seats	1
better implement of existing ideas	1
transforming the park into a museum	1
interpretation centre	1
creative economy and tourism as a source of income	1
entrance charge to generate funds to be invested to improve visitors experience	1
electronic interactions	1
real-time interactions, like geoscientists showing how they study rocks and fossils	1
update the geological information on the panels	1
implementation of physical accessibility in compliance with NBR 9050	1
public-private partnerships	1
educational and cultural public policy for the park	1
better park conservation	1
use simple and didactic ways to divulge complex and difficult to understand concepts	1
promote sense of belonging	1
use the current research for revitalizing the park and helping the city and the population to maintain and enhance this important geological heritage	1
taking into account that the heritage list process was aggressive	1
create a work plan with the local team	1

TABLE 5. Challenges of the external environment listed by the stakeholders regarding communication.

Challenges	Answers Frequency
financial resources	6
need of specialized people to develop communication (geologists, educators, designers, communicators, administrators, etc.)	4
awareness of public bodies about the importance of the Park, political will	3
dialogue with the Park management	1
park management interest	1
training people working in the Park	1
coordination of the Park's activities by a specialist	1
continuity of communication actions	1
projects to bring the academy (researchers, students and teachers) close to population	1

parallel, the authors observed visitors' behaviour and noticed that the time spent did not exceed 15 seconds, with the exception of two individuals.

In order to ascertain the degree of information retention, the interviewees were asked to mention examples of rocks found in the Park. Only 20% of them mentioned the varvite itself and the rest did not answer, did not know or mentioned unsatisfactory or very generic examples such as "stratified rocks" or "metamorphic rocks". When asked about the varvite time magnitude order, 54% answered millions, 29% thousands, 11% billions and 7% hundreds of years.

5.4 SWOT Analysis

The results obtained were organized in a four quadrants matrix and presented in Tables 6, 7, 8 and 9.

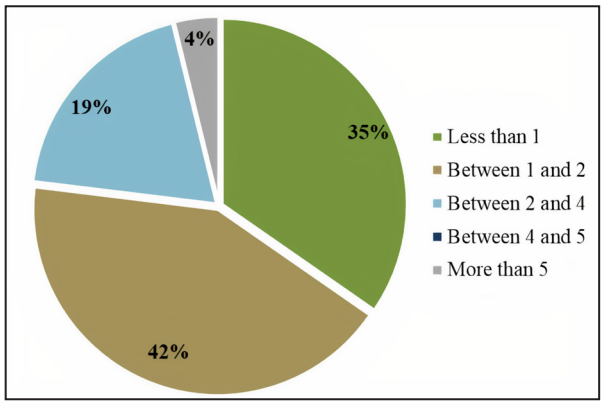

FIGURE 9. Declared reading time of each panel by the interviewees.

6. Discussions

The Park's communication currently in use is already well developed which provides a more favorable starting point for future actions and planning (S1). It makes the Park a reference for other institutions (S2). Its panels are well maintained and located which facilitates their viewing. Some panels are close to the geodiversity element they refer to. This location allows the content association with what is being observed which provide a better understanding (S3). The panels' content is in line with the scientific literature but lacks update in order to comply more actual interpretations (W1). Other important Park' strengths are the geodiversity preservation state, the Earth system representative elements and its geological history (S4, S5 and S6). However, there is no pre-defined

TABLE 6. SWOT Matrix Quadrant 1: Strengths.

	STRENGHTS
S1	current communication is already well developed (more favourable starting point for future developments)
S2	one of the only facilities like this in the state (reference for other institutions)
S3	conservation status of panels, easy localization and association of content with the element of geodiversity
S4	reasonably preserved geodiversity
S5	representative elements of the Earth System
S6	unique features (paleoenvironment glacial lake)
S7	the panels follow standards in terms of number of words and format
S8	strong historical, cultural and emotional connection with the region
S9	structure for holding events: Amphitheatre, Civic Square, etc.
S10	responsive management to partnerships with the academic environment
S11	dissemination of other tourist and cultural attractions in the region on the totem of Civic Square
S12	future study centre
S13	high scientific value (geological heritage)

TABLE 7. SWOT Matrix Quadrant 2: Weaknesses.

	WEAKNESSES
W1	panel content needs updating according to the most current scientific interpretations (periodic review)
W2	there is no pre-established target audience
W3	previous communication objectives not identified
W4	take away communication material not available
W5	non-integrated communication (website, social networks, email, applications, etc.)
W6	low accessibility for handicapped people
W7	current trends in geocommunication not observed (storytelling and panels layout order, simple language, interactivity, etc.)
W8	partial or unobserved approach to various topics expected by stakeholders (connections with the region's history, culture and economy and use of geodiversity in visitors' daily life)
W9	low impact on visitors
W10	low integration with stakeholders to establish and achieve common goals
W11	Park's promotional materials not available in its stakeholders' institutions
W12	lack of materials in the Park to promote other regional attractions, besides the Totem
W13	there is no Park's brand (logo, colors, fonts, etc.)
W14	there is no Visitor Centre
W15	lack of training actions for internal employees and stakeholders in addition to adequate training for monitors
W16	there is no products and services offer (snack bar, souvenirs, etc.)
W17	Park's map not available at the visit beginning
W18	attractions without a board indicating their name
W19	low involvement of the local community in activities, programs with schools and education of the population

TABLE 8. SWOT Matrix Quadrant 3: Opportunities.

	OPPORTUNITIES
O1	create a strategic differential with innovative attractions offering
O2	explore digital media to create a geoconservation based culture around the Park
O3	use Park's context and vocation to reach new official curricula
O4	use numerous research and scientific publications available for content development
O5	explore stakeholders' awareness of Park's role and their openness to partnerships
O6	make place for integrative practices as a permanent working group to develop projects with stakeholders
O7	develop public-private partnerships, creative economy initiatives and other actions in order to generate financial resources

TABLE 9. SWOT Matrix Quadrant 4: Threats.

	THREATS
T1	other parks in the region offer products and services that Varvite Geological Park doesn´t
T2	information are widely available on the web but it is not always reliable
T3	Park's communication management is directed by political issues (for example: deactivation of Facebook page)
T4	the dialogue with the Park's management is not frequent
T5	individuals have different cognition mechanisms
T6	Parks haven´t a dedicated communication management that involve specialized professionals in a systematic way
T7	financial resources depend on municipal budget

target audience. A technical approach language is observed in most of the panels, which suggests that the target audience is a specialized one (W2).

There is no communication plan based on previously defined objectives (W3). According to the field observation and perception results, the main objective is to provide information on the Park's paleoenvironmental interpretation. Although it is not possible to ensure that this objective has been intentionally and previously planned. The objectives are a vital point for the communication development as they guide the direction to be followed. They describe the expected results both in terms of audience's knowledge and behaviour and also the expectations of the stakeholders (Lurati and Zamparini 2018).

The panels installed in the Park are almost the only communication tool on site. There is no take away communication materials available for visitors (W4). The offer of this kind of material is important to guide the visit and for knowledge consolidation. They are even important to Park's promotion as the visitors could share these materials within their relationship network.

It is relevant to observe the role of integrated communication. The expected result of integrated communication is the public being able to identify and dialogue with the institution and its community, to perceive its purpose and values in all its interfaces in a congruent and consistent way (Duncan and Mulhern 2004). However, this proposal is not observed in the Park's different communication channels. What is generally observed is an informative and unidirectional content. The channels do not seem to have been developed to promote a single image perception neither the existence of a general message previously planned (W5). The website is not an exclusive page. It is part of Municipality's website which has a very summarized content about the Park. It does not indicate links to other relevant content such as an agenda of events or more details about its geological and historical context, for example.

The panels follow guidelines from Gross (2006) regarding the number of words (less than 200) (S7). In structural terms, the Park's panels follow the (rectangular) formats most used by the members of the Unesco Global Geoparks Network, but do not follow the (horizontal) orientation or material most used (wood) (Von Ahn and Simon 2019). Moreira (2014) indicates that rectangular and horizontal panels are more visible and facilitate access. In fact, the issue of accessibility requires greater care, since adequate handicapped adaptations are not observed both in the route that takes visitors to the panels and in the panels themselves (W6). Some current trends in geocommunication such as storytelling narrative are not clearly identified in the panels (W7). The panels order is not aligned according to the geological time, the language is not always accessible to the lay public. The use of metaphors, images, illustrations and interactivity to stimulate imagination, reflection and understanding is also little explored (Stewart and Nield 2013).

Many of stakeholders' expectations about the knowledge dissemination are not being met (W8) (Table 2). For the stakeholders, it is also relevant to tell the Park's foundation history showing its connection with the city's history, its economic and cultural importance and the presence of rock in the historic centre architecture, for example. Some of these issues are covered in the Magazine (Figure 7) available on the Park's website, but none of them are addressed in the communication in use at the geosite. Addressing this issue on the site is essential because 43.3% of visitors do not search for Park's information before the visit. In the same way, other themes identified by the stakeholders (Table 2), for example, glaciations and climate variations on the past and present time, are not fully addressed on the geosite.

The fact that the Park was once a quarry is an aspect that can also be explored as it enables a strong historical,

cultural and emotional connection with the region (S8). The promotion of this bond contributes to the sense of belonging development, which is also one of the stakeholder's expectations. Sense of belonging leads to the individual's awareness of nature conservation importance (Sorrentino 2010). This sense of belonging leads to the individual's awareness of geological heritage, geodiversity importance to sustain life and need for its conservation and rational consumption. The Park's history can also be used to promote understanding that a mining area can be transformed into benefits for nature and for society (W8). The Park's flower boxes and drinking fountains are made of varvite extracted from this quarry. The communication approach could lead the visitors to perceive this use and make connections with geodiversity elements presence in their daily lives (W8).

The expected public impact analysis is related to the changes in the visitor's knowledge and behaviour promoted by the Park's communication (W9). When asked about what knowledge is needed to enable the individual to fully exercise their citizenship (Table 3), the stakeholders mentioned geoscientific themes already indicated with regard to their involvement with the Park (Table 2) and other ones such as the relevance of geoscience to social development. However, stakeholders consider themes related to geoconservation and geological heritage a priority for the full exercise of citizenship, as shown in Table 3. This priority change was expected since clarifications on these themes were provided during the survey and consequently promoted a change in their understanding regarding the impact of such knowledge on the citizenship exercise (W8). This change was not observed in visitors' interviews. Visitors were asked to provide words that came to mind when the term geodiversity was mentioned. According to the results, we can assume that the interviewees were able to deduce the meaning of geodiversity through connections that the word itself raises since this concept is not clearly present in the Park's communication. There was no mention of sustaining life or conserving geodiversity. It is inferred, therefore, that the communication did not sensitize the visitor about the role of geodiversity, the importance of its conservation and the impacts caused by the individual's actions. In other words, communication does not seem to demonstrate to the individual his responsibility for geoconservation or to influence his future behaviour (W9).

As pointed out by Stewart and Nield (2013) and Cañizares et al. (2019), there were many gaps regarding the geoscientific knowledge held by the public. These authors related this to the fact that formal education does not deal with geosciences in a specific subject. Thus, geosciences are addressed in a fragmented and non-systemic way in several courses like geography and biology, for example. This is one of the reasons why the effectiveness of communication in non-formal education environments such as the Varvite Geological Park becomes so relevant. Concepts such as rock types and geological time were not absorbed by the visitors since only 20% of them mentioned the varvite itself as an example of rock present in the Park and almost half of them (46%) do not answer a correct order of time magnitude (W9). These results indicate low information retention of Park's communication contents, which may be explained by a low attractiveness of the panels (visitor dedicated less than 15 seconds to read panel information) or the need for greater alignment with the most current trends in geocommunication. Besides of it, the fact that much of the knowledge listed by the stakeholders (Tables 2 and 3) is not addressed or is partially addressed in the Park´s communication suggests that the communication impact on the public is not satisfactory (W9).

The relationship with stakeholders is a very relevant factor to be considered in the communication development because the institution reputation and identity are built through it (McPhee and Zaug 2000). In general, the stakeholders showed a great openness and willingness to collaborate, as well as a feeling of belonging with the Park. It suggests that there is commitment between all parties involved. The proactive and receptive posture of the Park's management stands out, especially for partnerships with the academic environment which has been frequently observed (S10). This attitude and partnerships are opportunities that can be explored, for example, to implement a scheme for periodic review of the Park's communication and eliminate this weakness (W1). On the other hand, the results do not show a mutual influence on decisions as a usual practice. The practice of meetings to discuss common objectives or any other systematic form of dialogue and integration to increase synergy was not observed, for example (W10). There are no Park's promotional materials availability in the stakeholders' institution facilities such as the tourist information office in Matriz Square, for example (W11). Also, there are stakeholders who declared they had never visited the Park website. The Park, in turn, discloses tourist and cultural attractions of the region in the Totem located at Civic Square (S11) but could provide other materials such as leaflets to highlighting the city's relationship with the Park (W12). For example, the Republican Museum exhibits works by Miguelzinho Dutra and samples of varvite and the Museum of Energy exhibits an archaeological excavation in its garden in which the use of varvite is also observed as it does in many other places in the city historical centre.

The Park's identity is not evident in the communication in use (panels, website, social networks, email, etc.) as it regards to tangible elements (brand, slogan, logo, colours, fonts, etc.) and intangible elements (purpose, values, offered experience) (W13). The institution's identity is important because the individuals recognize in it their world perceptions, their beliefs and values. That is why it is such a relevant influence in the individuals' behaviour (Stewart and Nield 2013). When identity permeates communication in a coherent and integrated way, the public recognizes these values and objectives on all the fronts it gets in touch with the Park and creates consistent bonds. These ties, that mean the sense of belonging, lead to conservation-oriented behaviour. For this reason, identity must guide strategic communication (Jankovic et al. 2019).

According to the stakeholders, the Park has a ready and satisfactorily explored structure for holding cultural events such as concerts, exhibitions, fairs, etc. (S9). However, it does not meet their expectations when it comes to the Visitors Centre (W14), monitors training (W15), services and products offer (cafeteria, souvenir shop, etc.) (W16). The Park's offered experience is one of the intangible aspects of identity and these weaknesses affect its perception by both stakeholders and visitors.

Considering the experience aspect, one of the first needs of the individual when arriving at Park is to be able to locate and identify the available attractions. A map or other form of visual representation of the place availability at the beginning of the visit is important because it provides information that allows

the visitor to rationally enjoy the Park. This communication element helps in the prior creation of an image and design of the place, which, depending on how it is prepared, arouses visitors' interest in obtaining more information about its history, importance of preservation, culture, among other aspects (Morandi and Gil 2002).

Although Civic Square has a leaflet containing a map of the attractions fixed on its notice board, it is barely visible and is only available after the visitor has already covered a great part of the route (W17). Besides of it, many of the attractions do not have boards with their names and, when they do, they do not explain their meaning or relationship with the context of the Park (W18). The name of the attractions would be a good motto to contextualize geoscientific concepts, such as the Permian Lake, which is related to the geological time and the Park's paleoenvironment.

The offered products and services quality, or the absence of offers, for example, interfere with the visitors' experience. This experience impacts directly the public's formed opinion about the Park's, that is, impacts its reputation. Many respondents mentioned the involvement of the local community in activities and programs with schools and education of the population as suggestions for preserving the Park, in addition to the need for improvements in safety and inspection and maintenance of facilities (W19). In this sense, the Park management informed that it is investing in the installation of a study centre, which will certainly integrate its set of forces (S12). Eventually, a tourist itinerary could be developed to unite the tourist attractions of the region, may be with a circular transport linking the Park to the city historic centre, as suggested by one of the stakeholders.

Angelkova et al. (2012) considers the ability to increase tourist consumption and attract visitors by offering a memorable and wellness-promoting experience, a strategy that generates competitive advantage over other places that compete for public attention. The Moutonnée Rock Park, for example, has a souvenir shop, snack bar, video projection room, monitors present on the site and a panel with a Park map for prior visit guidance (T1). It also has dinosaurs' replicas that stimulate fantasy and entertain, especially children, although this attraction is geologically out of context with main attraction of the Park and, consequently, conveys incorrect concepts to the public (O1). These facilities can be seen as an opportunity to be taken advantage of by the Varvite Geological Park. For example, it could be installed Park's paleoenvironmental animals and plants replicas and even a glacier model as they are elements that can bring fantastic and disseminate correct concepts.

In addition, a large amount of information is available on the internet and may have a little trustworthy nature. Consequently, relevant and accurate content do not reach the public properly (T2). Despite this challenge, internet communication brings the institution and the public closer together (Amirkhanpour et al. 2014). The internet expanses the public reached by communication, both in number and individuals' diversity, requires relatively low financial investment and enhances interactivity and engagement. In addition, the internet communication dynamics stimulates cognitive processes and empirical and emotional associations, as well as interest and connection with the institution (De Valck et al. 2009). Thus, internet communication is an indispensable means to be used to involve the public in the community creation that identifies itself with the Park and a culture around it (O2). However, the political scenario is a limiting factor in the Park's communication. For example, the Park's Facebook page was temporarily disabled due to the proximity of the municipal elections (T3). This action not only reduces the public reached, but also leads to a discontinuity perception that can compromise the Institution's reputation. In addition, in the current scenario in which face-to-face visits were interrupted due to the coronavirus pandemic, social networks play an essential role in disseminating information to the public, including on the Park's reopening dates and procedures.

Another opportunity is the new teaching approaches (O3) that have been proposed in the country for elementary and secondary education, which stimulate a transdisciplinary, integrative, creative and practical training (Brasil 2017; Brasil 2018 and São Paulo 2020). These new approaches are other opportunities to be explored to expand education focused on geosciences, including basic, higher, and non-formal education.

The academic community interest in the Park attests to its high scientific value (S13). There are numerous researches and scientific publications about the place. The research addresses topics such as education, geotourism and geological heritage, among other more traditional areas of geosciences such as paleontology, sedimentology, stratigraphy, among others (Garcia et al 2018). The framework of knowledge generated by the academic community allows the development of a dissemination sustained in a reliable and updated theoretical foundation (O4). For this, it is necessary to incorporate periodic review of the contents in the Park's communication practices.

The stakeholder's external environment is very similar to that of the Park and for this reason they have many common goals and challenges. They are aware of the context, connections and importance of the Park. They are open to partnerships (O5) but feel the need for greater dialogue with the Park's management (T4). Thus, the formation of a permanent working group that meets regularly to discuss common objectives can be a great opportunity for successful projects to disseminate geodiversity (O6).

On the other hand, stakeholders and visitors have different mechanisms of understanding as well as different levels of cognition (T5) (Ahmad et al. 2014). A communication focused only on panels restricts the scope of geocommunication. In this sense, the inclusion of expert team to develop Park's communication (geologists, educators, designers, communicators, administrators, among others) is another challenge (T6) to be overcome, which can improve and also promote continuity, dialogue and common projects.

The main challenge of the common external environment indicated by the stakeholders (Table 5) is to obtain financial resources (T7), mainly because it is a public institution. It is true that financial resources are scarce and affect the development of communication, but it is not a totally insurmountable obstacle. It is possible to implement low-cost changes such as the reordering of panels and the permanent reactivation of social networks. Stakeholders also indicated some opportunities for generating resources (Table 4) such as public-private partnerships, initiatives aimed at the creative economy with the community (handicrafts, local products, etc.) and the offer of products and services (O7). It is therefore

necessary to rethink the objectives of communication and make it meaningful for the citizen, adding social and symbolic values to its already academic and scientific nature (Martín-Cáceres and Cuenca-López 2016).

7. Conclusions

The present work offers a situational diagnosis based on the traditional SWOT analysis. In other words, the proposal is to provide an overview of the situation of geocommunication in the Park with brief discussions of possible paths to be followed from the crossing of some observed factors. The analysis already pointed out a discontinuity in the currently communication actions and a lack of an integrated and strategic approach. This discontinuity and also the lack of connection with the city itself result in specific actions that lose part of their potential because they are not strategically related.

Based on this diagnosis, crosschecking and prioritization methodologies can be used in the future to formulate a more detailed communication strategy. The definition of the communication objectives that will guide the direction to be followed to promote the desired positioning of the Park is, without a doubt, the necessary starting point for the development of action plans derived from the chosen strategy, or strategies.

A more detailed case study on the panels can support the elaboration of specific objectives that better guide the development of the strategic communication plan through the analysis of both its standards and its impact on the public. An example of an objective would be to capture public interest through the epic narrative of the separation of the supercontinent Gondwana and the existence of glaciers in Brazil, engaging public with the fascination of these themes. In addition, initiatives such as new tourist routes, souvenirs and geoproducts, cafeteria, visitor centre or study centre, training of monitors, exhibitions, better exploration of digital and online communication channels, etc., can positively contribute to the visitor's experience and consequently, for the Park's identity and reputation.

Acknowledgements

The authors would like to thank the support for of the present work received from the Institute of Geosciences from the University of São Paulo (IGc-USP), State of São Paulo Research Support Foundation São Paulo (FAPESP Nº. 2017 / 17750-5) and Coordination for the Improvement of Higher Education (Capes) for the Master's scholarship. The authors also thank the reviewers for their valuable recommendations.

References

Ahmad S., Abbas M. Y., Taib M. Z. M., Masri M. 2014. Museum Exhibition Design: Communication of Meaning and the Shaping of Knowledge. Procedia - Social and Behavioral Sciences, 153, 254-265. https://doi.org/10.1016/j.sbspro.2014.10.059

Amirkhanpour M., Vrontis D., Thrassou A. 2014. Mobile marketing: a contemporary strategic perspective. International Journal of Technology Marketing, 9(3), 252-269. https://doi.org/10.1504/IJTMKT.2014.063855

Angelkova T., Koteski C., Jakovlev Z., Mitrevska E. 2012. Sustainability and competitiveness of tourism. Procedia - Social and Behavioral Sciences, 44, 221-227. https://doi.org/10.1016/j.sbspro.2012.05.023

Banzato B. M., Favero J. M., Arouca J. A. C., Carbonari J. H. B. 2012. Análise Ambiental de Unidades de Conservação através dos Métodos SWOT e GUT: O Caso do Parque Estadual Restinga de Bertioga. Revista Brasileira de Gestão Ambiental, 6(1), 38-49. Available on line at: https://www.gvaa.com.br/revista/index.php/RBGA/article/view/1772

Brasil. Ministério da Educação. 2017. Base Nacional Comum Curricular: Educação Infantil e Ensino Fundamental. Brasília, MEC/Secretaria de Educação Básica.

Brasil. Ministério da Educação. 2018. Base Nacional Comum Curricular: Ensino Médio. Brasília, MEC/Secretaria de Educação Básica.

Cañizares A. D., Bourotte C. L. M., Garcia M. G. M. 2019. Estudo Exploratório sobre a Percepção da Geodiversidade e das Geociências pela População da Região Metropolitana de São Paulo. Anuário do Instituto de Geociências, 42(4), 375-386. http://dx.doi.org/10.11137/2019_4_375_386

Datta K. 2020. Application of SWOT-TOWS Matrix and Analytical Hierarchy Process (AHP) in the Formulation of Geoconservation and Geotourism Development Strategies for Mama Bhagne Pahar: an Important Geomorphosite in West Bengal, India. Geoheritage 12 (2), 45. https://doi.org/10.1007/s12371-020-00467-2

De Valck K., Van Bruggen G.H., Wierenga B. 2009. Virtual communities: A marketing perspective. Decision Support Systems, 47(3), 185-203. https://doi.org/10.1016/j.dss.2009.02.008

Duncan T. R., Mulhern F. 2004. A White Paper on the status, scope and future of IMC (IMC symposium sponsored by the IMC programs at Northwestern University and the University of Denver). New York, McGraw-Hill.

Furlan L.M., Pelisam L.G.T., Marques G.F., Farias V., Biquinhão F.F.P., Leite Júnior W. B. 2015. Revista "Parque Geológico do Varvito" - Edição comemorativa pelos 20 anos de fundação do Parque. In: Congresso de Extensão Universitária da UNESP, 8. Available on line at: https://repositorio.unesp.br/handle/11449/142791

Garcia, M.G.M., Brilha J., Lima F.F., Vargas J.C., Pérez-Aguilar A., Alves A., Campanha G.A.C., Duleba W., Faleiros F.M., Fernandes L.A., Fierz M.S.M., Garcia M.J., Janasi V.A., Martins L., Raposo M.I.B., Ricardi-Branco F., Ross, J.L.S., Sallum Filho W., Souza C.R.G., Bernardes-de-Oliveira M.E.C., Brito Neves B.B., Campos Neto M.C., Christofoletti S.R., Henrique-Pinto R., Lobo H.A.S., Machado R., Passarelli C.R., Perinotto J.A.J., Ribeiro R.R., Shimada H. 2018. The Inventory of Geological Heritage of the State of São Paulo, Brazil: Methodological Basis, Results and Perspectives. Geoheritage, 10(2), 239-258. https://doi.org/10.1007/s12371-016-0215-y

Gross L. 2006. Scientific Illiteracy and the Partisan Takeover of Bilology. PLoS Biology, 4(5), 680-683. https://doi.org/10.1371/journal.pbio.0040167

Guimarães G.B., Lima F.F., Rocha-Campos A.C. 2018. Varvite Park, a Brazilian Initiative for the Conservation and Interpretation of Geoheritage. In: Reynard E., Brilha J. (eds.). Geoheritage: Assesment, Protection, and Management. Amsterdam, Elsevier, 23, 405-415. https://doi.org/10.1016/B978-0-12-809531-7.00023-X

Hong C., Chan N. 2010. Strenght-Weakness-Opportunities-Threaths Analysis of Penang National Park for Strategic Ecotourism Management. World Applied Sciences Journal. 10(Special Issue of Tourism & Hospitality), 136-145. Available on line at: https://idosi.org/wasj/wasj10(T&H)2010/17.pdf

Itu (SP). Prefeitura. 2015. Parque Geológico do Varvito: edição comemorativa pelos 20 anos de fundação do Parque. 31p. Available on line at: https://itu.sp.gov.br/wp-content/uploads/2015/secretaria_meio_ambiente/2015_07_24_revista_para_jornal.pdf

Jankovic M., Jakšić Stojanović A., Vukilić B., Seric N., Ibrahimi A. 2019. Branding of Protected Areas and National Parks: A Case Study of Montenegro. African Journal of Hospitality, Tourism and Leisure, 8(4). Available on line at: https://www.ajhtl.com/uploads/7/1/6/3/7163688/article_6_vol_8_2__2019.pdf

Kotler P., Keller K.L. 2012. Administração de marketing. 14. ed. São Paulo, Pearson Education do Brasil. 794 p.

Kubalíková L. 2017. Mining Landforms: An Integrated Approach for Assessing the Geotourism and Geoeducational Potential. Czech Journal of Tourism, 6(2), 131-154. https://doi.org/10.1515/cjot-2017-0007

Lurati F., Zamparini A. 2018. Communication SWOT Analysis. In: Heath R. L., Johansen W. The International Encyclopedia of Strategic Communication. Hoboken, NJ, John Wiley & Sons, 1, 272-280. https://doi.org/10.1002/9781119010722.iesc0203

Martín-Cáceres M. J., Cuenca-López J. M. 2016. Communicating heritage in museums: outlook, strategies and challenges through a SWOT analysis. Museum Management and Curatorship, 31(3), 299-316. https://doi.org/10.1080/09647775.2016.1173576

McPhee R.D., Zaug P. 2000. The Communicative Constitution of Organizations: A Framework for Explanation. Electronic Journal of Communication/La Revue Electronique de Communication, 10(1-2), 1-16. Available on line at: http://www.cios.org/EJCPUBLIC/010/1/01017.html

Medeiros J.L., Nascimento M.A.L., Perinotto A.R.C. 2017. Análise SWOT e Turismo: Uma Avaliação Estratégica no Projeto Geoparque Seridó/RN. Ciência e Sustentabilidade - CeS, 3(1), 94-123. https://doi.org/10.33809/2447-4606.31201794-123

Mintzberg H., Lampel J., Ghoshal S. 2006. O processo da estratégia. 4. ed. Porto Alegre, Bookman. 496p.

Mintzberg H., Quinn J.B. 2001. O processo da estratégia. 3. ed. Porto Alegre, Bookman. 408p.

Morandi S., Gil I. C. 2002. Espaço e turismo. 2. ed. São Paulo. 148p.

Moreira J.C. 2014. Geoturismo e interpretação ambiental. Ponta Grossa, Editora da UEPG.

Moura A. K. 2017. Monumentos geológicos: atrativos naturais que atravessam eras. Available on line at: https://www.infraestruturameioambiente.sp.gov.br/2017/05/monumentos-geologicos-atrativos-naturais-que-atravessam-eras/. (accessed on 25 May 2020).

Rocha-Campos A.C. 2002. Varvito de Itu, SP - Registro clássico da glaciação neopaleozóica. In: Schobbenhaus C., Campos D.A., Queiroz E.T., Winge M., Berbert-Born M.L.C. (eds.). Sítios Geológicos e Paleontológicos do Brasil: volume 1. Brasília, DNPM/CPRM. p.147-154.

São Paulo (Estado). Secretaria da Educação. 2020. Currículo Paulista. 301p.

Somerville R.C.J., Hassol S.J. 2011. Communicating the Science of Climate Change. Physics Today, 64(10), 48. https://doi.org/10.1063/PT.3.1296

Sorrentino M., Nascimento E.P. Universidade e Políticas Públicas de Educação Ambiental. In: Azevedo D. Educação em foco. Juiz de Fora, Editora UFJF. p. 15-38.

Stewart I., Nield T. 2013. Earth stories: context and narrative in the communication of popular geoscience. Proceedings of the Geologists' Association, 124(4), 699-712. https://doi.org/10.1016/j.pgeola.2012.08.008

Von Ahn M.M., Simon A.L.H. 2019. Geoturismo e Interpretação Ambiental: Análise dos Critérios Técnicos e Estruturais dos Painéis Interpretativos da Rede Global de Geoparques. In: Encontro Luso-brasileiro de Património Geomorfológico e Geoconservação, 3, 88-102.