

## **Analysis of Natural Attractions in Serra dos Alves, Senhora do Carmo, Itabira, MG, Brazil: a contribution to the development of sustainable tourism**

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### **Abstract**

Tourism is an economic modality that aims to promote the conservation of natural resources and the social development of a community, including specific aspects that a region has – such as nature, history and even geological elements. Thus, this study aimed to assess tourism potential of trails in Serra dos Alves, Senhora do Carmo, Itabira, MG, Brazil, as well as to verify the existing local infrastructure concerning tourism. Documentary analysis and interviews were used as instruments of data collection and observation. Regarding the tourism potential of the trails, negative aspects can be mentioned such as the lack of signage to access the tourist sites. However, all of them presented great potential for developing different tourism modalities, among which ecotourism, geotourism and adventure tourism can be highlighted.

**Keywords:** Tourist activities; Ecotourism; Sustainability; Trail; Senhora do Carmo.

### **Rsumo**

#### **Análise dos Atrativos Naturais da Serra dos Alves, Senhora do Carmo, Itabira, MG, Brasil: uma contribuição para o desenvolvimento do turismo sustentável**

O turismo é uma modalidade econômica que busca promover a preservação dos recursos naturais e o desenvolvimento social de uma comunidade, abrangendo os aspectos peculiares de uma região, como natureza, história e até mesmo elementos geológicos. Dessa forma, este trabalho objetivou avaliar o potencial turístico de trilhas na região da Serra dos Alves em Senhora do Carmo, distrito de Itabira (MG), bem como verificar a infraestrutura existente no local para atendimento ao turismo. Assim, análise documental e entrevistas foram utilizadas como instrumentos de coleta de dados e observação. Com relação ao potencial das trilhas, podem ser citados aspectos negativos, como a falta de sinalização para acesso aos pontos turísticos. Porém, todos os atrativos apresentaram grande possibilidade para desenvolvimento de diversas modalidades turísticas, entre as quais podem ser ressaltadas o ecoturismo, o geoturismo e o turismo de aventura.

**Palavras-chave:** Atividades turísticas; Ecoturismo; Sustentabilidade; Trilha; Senhora do Carmo.

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## Resumen

### **Un Análisis de los Atractivos Naturales de la Serra dos Alves, Senhora do Carmo, Itabira, MG, Brasil: una contribución al desarrollo del turismo sostenible**

El turismo es un modo económico que se propone promover la conservación de los recursos naturales y el desarrollo social de una comunidad, que incluye los aspectos específicos de una región: su naturaleza, su historia, sus elementos geológicos, entre otros. Por lo tanto, este estudio tuvo como objetivo evaluar el potencial turístico de senderos en la región de la Serra dos Alves en Senhora do Carmo, Itabira (MG), Brasil, así como verificar la infraestructura existente en el lugar para atender al turismo. Así se utilizaron como instrumentos para la observación y recopilación de datos, el análisis de documentos y entrevistas. En cuanto al potencial turístico de los senderos, se puede citar como aspecto negativo, por ejemplo, la falta de señalizadores a los lugares turísticos. Todos los lugares turísticos en este lugar presentan un gran potencial para el desarrollo de las diferentes modalidades turísticas, a ejemplo del ecoturismo, geoturismo y turismo de aventura.

**Palabras clave:** Actividades turísticas; Ecoturismo; Sostenibilidad; Sendero; Senhora do Carmo.

## INTRODUCTION

For a long time natural resources were considered inexhaustible goods, which could continue to support the economic development indiscriminately, without major concerns. However, from the 1970s, this conception was transmuted. The main discussions at the time began to be grounded on the search for alternatives that harmonize environmental preservation and progress (Machado, 1999).

In this context, tourism is an economic activity that consists of the exploration of a region that has relevant aspects, whether natural, historical-cultural or geographic (Brasil, 2010b). Thus, in order to meet different preferences, tourism can be subdivided into modalities that aim to adapt to the peculiarities of the location.

According to Liccardo (n.d.), one of the variants of this modality that is growing the most in Brazil is geotourism, which is comprehended as the association of natural and geological resources. It was recently studied and applied in several parks, such as the Grand Canyon National Park (USA), the Iguazu National Park (PR) and Conservation Units (UC). This tourism modality aims to interest people who wish to explore the geological and geomorphological aspects of a certain place. For Silva (2004), geology can contribute significantly to boost the evolutionary process with unique information about the environment that brings subsidies to the culture and environmental education.

The Serra dos Alves region, which belongs to the Senhora do Carmo district – Itabira (MG) – is a location sought by tourists, mainly because of its waterfalls. However, village natives may be adversely impacted by this activity, especially regarding tranquility, a striking feature of regions secluded from urban centers.

In this sense, this study aims to characterize aspects that can positively intervene in the tourism of the region, as well as to verify the existing infrastructure for tourists, presenting information concerning the sustainable tourism planning of that location.

## METHODOLOGICAL REMARKS

In order to conduct the touristic characterization of some resources in the Serra dos Alves region, three general aspects were analyzed: infrastructure, biophysical indicators and tourism potential. Four parameters for evaluating the trails were adopted, as shown in Chart 1.

**Chart 1** – Degree of difficulty associated with the access route used to analyze the trails in the Serra dos Alves (MG)

Degree of difficulty	Characteristics
Easy	Flat and well- marked route
Moderate	Slightly inclined route
Hard	Inclined route
Very Hard	Steeply inclined route

Source – Oliveira (2015)

The existence of signage on the site, degree of difficulty of the trails and eventual peculiarities in its length – such as river crossings and the presence of bridges, for example – were evaluated to characterize the infrastructure of the location. On the other hand, issues such as vegetation cover, erosion processes and possible damage to the attractions were observed to include biophysical indicators. Finally, the tourism modalities were qualified in order to observe which of them could be developed in the nine trails that cross the region of Serra dos Alves, taking into account some singularities of the location, such as landscape and attractions.

According to the methodology of hierarchization applied by the Ministry of Tourism (Brasil, 2007) and proposed by the World Tourism Organization (UNWTO) and the Inter-American Tourism Training Center (Cicatur), the attractions of the Serra dos Alves region were evaluated. From this analysis, a certain degree of importance was conjectured to the touristic sites by means of the categorization shown in Chart 2.

**Chart 2** – Hierarchization for the degree of attractiveness potential

Hierarchy	Characteristics
3 (High)	It is an exceptional tourist attraction of great interest, with significance for the international tourist market, capable of motivating important current and potential visitors.
2 (Medium)	Attractions with exceptional aspects of a country, capable of motivating a current or potential foreign or local visitors, along with other attractions located nearby.
1 (Low)	Attractions with some expressive aspect, capable of interesting visitors from different places in the country, who have arrived in the area due to other touristic motivations, or capable of motivating regional and local tourist flows (current and potential)

(continues...)

**Chart 2 – Continuation**

Hierarchy	Characteristics
0 (None)	Attractions without sufficient merit, but that form part of the tourist heritage as elements that complement others of greater hierarchy. They can motivate local tourist flows, in particular the demand for popular recreation.

Source – Ministry of Tourism (2007)

Soon after scoring the hierarchy for the attractiveness potential, other factors that contribute to the classification of each attraction were analyzed, as arranged in Chart 3.

**Chart 3 – Requirements for the classification of tourist attractions**

Requirement	Characteristics
Representativeness	Established from the peculiarities of the attractions: the more similar to other tourist spots, the less attractive it is.
Landscape conservation status	Assess the level of conservation of the landscape with the observation method.
Signage	Check for proper signage indicating the tourist sites of the location.
Access routes	It comprises the conditions of the routes, as well as their degree of difficulty.

Source – Ministry of Tourism (2007, adapted)

As a consequence, the hierarchy matrix was created, with assigned values ranging from zero to three, in order to qualify the level that each tourism attribute has, according to the evaluation criteria used in this research (Chart 4).

**Chart 4 – Hierarchy matrix for the classification of tourist attractions**

Criteria	Values			
Attractiveness potential	0 (none)	1 (low)	2 (medium)	3 (high)
Signage	Terrible	Regular	Good	Very good
Access routes	Very hard	Hard	Moderate	Easy
Landscape conservation status	Terrible	Regular	Good	Very Good
Representativeness	None	Fairly common element	Small group of similar elements	Unique element, rare

Source – Ministry of Tourism (2007, adapted)

Weight two was attributed to “representativeness” and “attractiveness potential,” since these aspects are more relevant in categorization (Brizolla, 2008).

The maximum sum of the classification of tourist points is 21, therefore, the closer to this number, the greater the significance of that tourist attraction.

## **TOURISM AND SUSTAINABILITY**

### Theoretical and conceptual aspects

It is increasingly necessary to incorporate humans in natural environments, so that this interrelation is viewed with greater commitment and depth, contributing to the sustentation of the environment and the economic, social and cultural development of a given place (Hübner, Bahia, Fortes & Ferreira, 2008; Vilas Boas & Dias, 2010).

For the relationship between human beings and nature to be effectively established, tourism has been used as a central focus for social, cultural and environmental restoration and sustentation of a certain location, which can be an influential agent in protecting the environment (Zamignan & Sampaio, 2010). In this sense, tourism can be understood as an activity in which fragilities and peculiarities of a place are adapted, with the possibility of unfolding in various modalities, as long as they are appropriate to the identity and variables present in the environment (Brasil, 2010b).

Due to its growth, the tourist activity is becoming specialized in the rural, ecological, cultural, religious, adventure, nautical, business, gastronomic areas as well as for the elderly, for children, etc. (Bueno, et al., 2011). The concept of ecotourism can be understood as a way of associating environmental conservation with the development of communities, with sustainability as a predominant factor (Brasil, 2010a). In this sense, according to Felizardo and Crispim (2011), ecotourism corresponds to a modality focused on small groups that aim to value and conserve the environment, culture and aesthetics of the visited location. Therefore, it has its own characteristic related to the tourist service provided, since it is commonly developed in regions with great ecological potential.

Community tourism, or community-based tourism, can be understood as a modality in which communities, in an associative way, organize local productive arrangements, holding effective control of the land and economic activities related to tourism (Grimm & Sampaio, 2011). Similarly, for the Ministry of Tourism (Brasil, 2010b), it is related to the individuals of a community that meet in a differentiated way, pursuing means for economic survival by joining tourism activity to factors such as environmental protection and valorization of their way of life and culture.

In turn, adventure tourism is defined by its uncertain results, thus, the unawareness of the outcome of the activity is rewarded by adrenaline and experience of coping with risks and fears, which are common in many people's lives (Brazil, 2008). So it is observed that, in a general way, this modality is based on the direct contact with nature, joining the quest for tranquility and, at the same time, for emotion.

The concept of geological tourism was initially presented by Hose (1995 *apud* Rodrigues, 2009), who argues that this modality aims at providing

services that aid the tourist to interpret and acquire knowledge to better understand the geology and geomorphology of a given location, as well as to appreciate the landscape features. Thus, the geological aspects of a given region can be employed in the development of local tourism, favoring the region's economy, while providing the knowledge concerning geological history and tourism appreciation.

## Impacts of tourism and the importance of public policies

Tourism, more than an activity that provides rest, knowledge and leisure to the visitor, manifests economic performance by providing analysis, growth and capital movement, that is, it becomes a relevant point in the business world (Oliveira, 2007). When the social aspect is involved, tourism establishes the interaction between people with different cultures and socioeconomic levels of the resident population, which can have negative impacts on their relationships, with interference factors such as the duration and intensity of the tourist activity (OMT, 2001).

Silva and Rocha (2010) point out that the simple fact of coexisting with people from different locations and realities impacts the way of living of a social group through regular exposure to different lifestyles and behaviors, so it can be a driving force for changes in the local culture. However, tourism can contribute considerably to the development as well as economic and social values of the communities. Thus, local culture is also covered. Moreover, regional traditions can be sustained by the development of tourism (Pires, 2004).

Regarding the environmental aspect, Vieira Filho, Duarte and Souza (2006) point out that tourism in natural spaces can instill environmental awareness and even tourism improvement. However, it can also lead to problems such as biotic environment pollution, incorrect disposal of solid wastes and liquid effluents, erosion and deforestation.

For Reis (2009), even if tourists of this century are more attentive to environmental issues, a well-structured planning for local or regional tourism is necessary in order to properly use spaces, minimizing negative impacts and avoiding damages to resources, loss of biodiversity and increased pollution.

Therefore, the elaboration and foundation of public policies in the scope of tourist activities are of great importance, considering that the State must fulfill its role of favoring society by promoting the conservation of the environment and the economic development of the location in a sustainable way.

In Minas Gerais, until the end of the 1990s, no specific public policy had been developed for tourism, there were only governmental actions that preceded the creation of the State Tourism Council and the Tourism Superintendence (Gomes, Silva & Santos, 2008).

The year of 2003 was a milestone in the elaboration of public policies in the state, as Decree n° 43.321, which establishes criteria for the regularization and operation of tourist circuits, was instituted. Its first article describes that:

§ 1º - Tourism Circuit shall be considered as the set of municipalities of the same region with cultural, social and economic affinities that unite to organize and

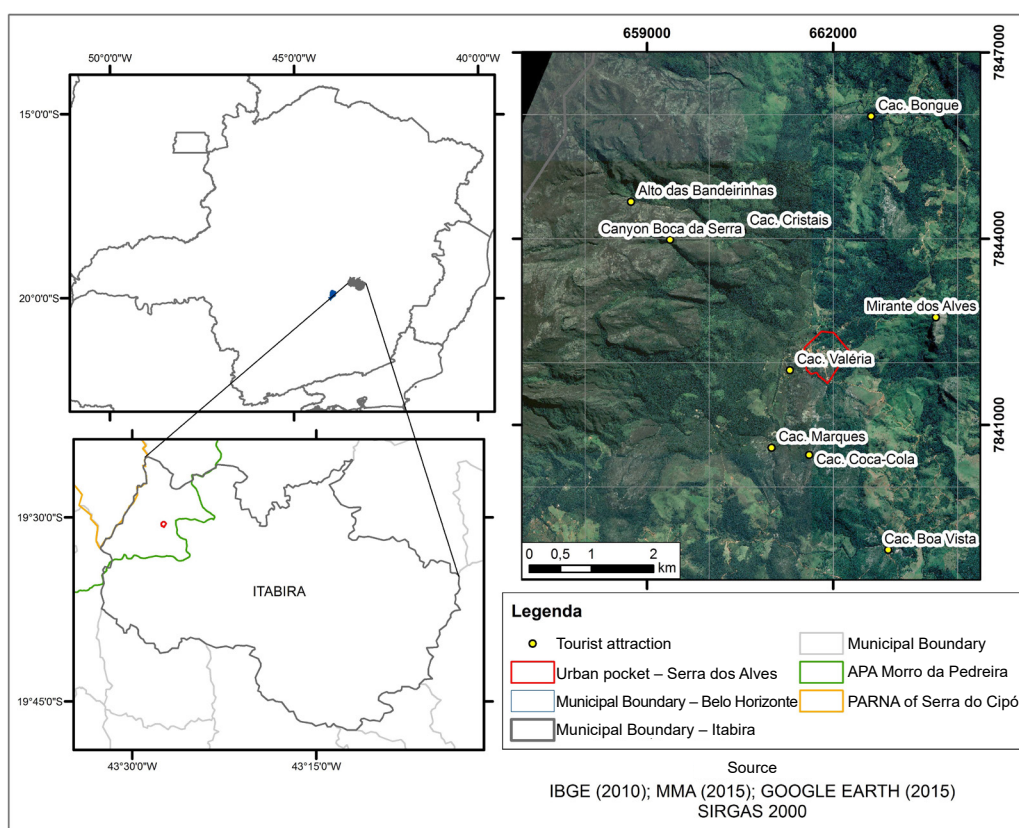


develop regional tourism activity in a sustainable way, through the continuous integration of municipalities, consolidating a regional activity (Minas Gerais, 2003).

## Serra dos Alves region

Serra dos Alves is a village located in the Senhora do Carmo district in the municipality of Itabira, Minas Gerais. It is located on the eastern side of the Environmental Protection Area (APA) Morro da Pedreira, attached to the Serra do Cipó National Park (Map 1).

**Map 1** – Location of the municipality of Itabira within the state of Minas Gerais, with emphasis on the urban pocket referring to Serra dos Alves and local tourist attractions.



**Source** – Modified from IBGE (2010), Ministry of Environment (Brasil, 2016) and Google Earth (2015)

The Serra do Cipó National Park, created by Federal Decree nº 90.223 (Brasil, 1984), in APA Morro da Pedreira, is located in the southern portion of the Serra do Espinhaço. It is characterized by the transition of two Brazilian biomes – Cerrado and the Atlantic Forest –, presenting great diversity of plant species, guaranteed by the geological and geomorphological complexities of the mountain range (Madeira, 2009).

The village of Serra dos Alves was founded in mid-1850, when the bandeirantes<sup>1</sup> began to look for crystals and gold. However, the results of the Portuguese exploration in Serra dos Alves (as in Itambé, Itabira, Serro and Conceição do Mato Dentro) were

1. 17th century Portuguese settlers in Brazil.

not as significant as those obtained in Ouro Preto and Mariana, where the extraction of minerals was easier. This explains the village's dedication to rural activities (Itabira, 2004).

In 1866, some residents donated one hectare of land to build a chapel, the first of the village. The donors and other inhabitants of the region built this oratory and, soon after, the church and the cemetery. There are also buildings with characteristics of the late nineteenth century (Itabira, 2004). Today, the urban part of Serra dos Alves has approximately thirty houses of which only thirteen are inhabited.

The region is characterized by natural attractions and relevant cultural aspects, such as centennial farms, *canyons*, waterfalls, rustic bridges and interpretative rural trails, which makes it a scenario of admiration for tourists whose objective is to preserve and value natural, cultural, regional and historical reserves (Braz, 2005). However, in spite of its natural and historical-cultural attractions, Rosa (2007) argues that, according to the residents, tourism only prospered around 2003, as it was more accentuated in traditional religious celebrations and June festivals.

According to Ventura (2006), the local infrastructure for tourism up to 2006 was deficient, since there were no formal professional establishments such as lodging facilities, gastronomic networks and tourist signage. The residents themselves offered lodging and meals when necessary.

One of Serra dos Alves's landmarks is its historical-cultural potential, the region is characterized by the tradition of batuques (typical slaves dance), fashion of four, marujadas and the historical patrimony itself, such as the church located in the center of the village (Braz, 2005).

## **DISCUSSION OF RESULTS**

### Touristic characterization of the region

From the hierarchyization, the categorization of each trail and tourist spot observed was established, according to Chart 1.



**Table 1** – Categorization of the trails observed in the Serra dos Alves region, Itabira (MG)

Attraction	Attractiveness potential (x weight two)	Signage	Access	Landscape conservation status	Representativeness (x weight two)	Total
Cachoeira do Marques	6	1	2	2	4	15
Cachoeira da Valéria	2	0	3	1	2	8
Cachoeira da Coca-Cola	4	0	2	2	4	12
Cachoeira do Bongue	6	3	0	2	4	15
Cachoeira dos Cristais	6	1	1	2	6	14
Alto das Bandeirinhas	4	0	1	3	6	12
Mirante dos Alves	6	1	2	3	4	16
Cachoeira da Boa Vista	4	2	3	1	2	12
Ponte de Pedra	6	0	0	3	6	15

**Source** – Elaborated by the authors

Cachoeira do Bongue, Cachoeira dos Cristais, Mirante dos Alves and Ponte de Pedra are the most representative attractions of the region. In addition, all of them resemble each other by having hits classified as moderate to very hard, which can be a negative point, since they would not be accessible to all visitors.

In general, the signage of the tourist spots is deficient, with the exception of the Cachoeira do Bongue, where it is possible to observe the presence of signs at strategic points of the access road, facilitating the arrival to the waterfall (Figures 1A and 1B). However, it is worth mentioning that there is no large room for parking many cars on the spot because of its narrow road (Figure 1C).

It is important to emphasize that, despite the great ecotourism potential, Cachoeira do Bongue is characterized by the expressive quantity of large quartzite blocks and mafic rock (Oliveira, 2015). This hinders movement near the waterfall, therefore, it is inadvisable for children and the elderly (Figure 1D).

**Figure 1** – Touristic aspects observed along the access to Cachoeira do Bongue, Serra dos Alves, Itabira (MG)



**A.** Indicative sign on the access road to Cachoeira do Bongue; **B.** Indicative sign of the beginning of the access trail to Cachoeira do Bongue; **C.** Place used as parking lot, to the left of the road; **D.** Frontal view of Cachoeira do Bongue

Source – Oliveira (2015)

The access trail to Cachoeira dos Cristais, which has a bridge over the Tanque River in its first fifty meters, is inadequate for crossing, due to broken woods that stop at the end of the route (Figure 2A). In regard to signage, there is a



sign displaying information regarding the location of tourist attractions, but it is deteriorated, constituting one of the negative aspects for arriving at the waterfall (Figure 2B). The first fall of Cachoeira dos Cristais, when the flood occurs, creates shallow wells that can be inserted into the ecotourism potential. In addition, the existence of a waterfall with great uneven surface also allows the local waterfall to be explored by adventure tourism practitioners, such as rappel (figures 2C and 2D).

**Figure 2** – Touristic aspects observed along the access trail to Cachoeira dos Cristais, Serra dos Alves, Itabira (MG)

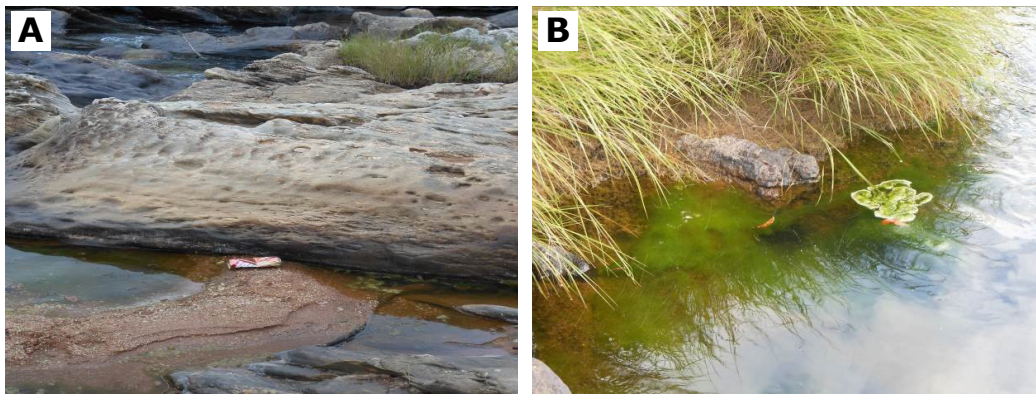


**A.** Wooden bridge over the River Tanque with damaged and non-existent parts; **B.** Damaged sign indicating Cachoeira dos Cristais and Alto das Bandeirinhas; **C.** First fall of Cachoeira dos Cristais; **D.** Wells upstream of the first fall of Cachoeira dos Cristais

**Source** – Oliveira (2015)

On the right bank of the Tanque River, in Cachoeira do Boa Vista, disposed residues (Figure 3A) and wells in the early stage of eutrophication (Figure 3B) were observed, a negative environmental indicator, considering that the site is frequently visited by tourists. Thus, for a more detailed investigation of this site, it is indicated to conduct specific works with emphasis on the analysis of the quality of the water, pursuing the evaluation of parameters to determine the existence of algae as well as the presence or absence of thermotolerant coliforms, in order to identify the causes for this situation and applicable corrective or mitigating measures.

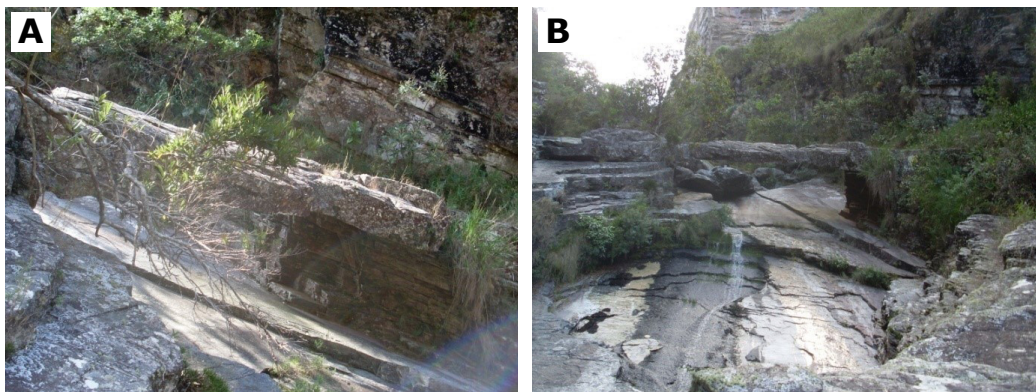
**Figure 3** – Touristic aspects observed in Cachoeira do Boa Vista, Itabira (MG)



**A.** A can thrown on the right bank of the Tanque River; **B.** Well with initial stage of eutrophication  
**Source** – Oliveira (2015)

Finally, although Ponte de Pedra (Figures 4A and 4B) is not visited frequently due to its difficult access, it is a tourist spot sought after by adventure tourists and those who wish to contemplate the natural attractions. In addition, it has geotouristic potential, considering that the metamorphic foliation plans with sub-horizontal dipping in quartzite rock, sculpted by the water flow in the geological structure, were a fundamental factor for the formation of this site (Oliveira, 2015). In this sense, geotourism can be used as an important tool for the preservation and enhancement of geological heritage, allowing the tourist to appreciate abiotic natural resources with great cultural, scientific and landscape potential.

**Figure 4** – Touristic aspects observed on the trail to Ponte de Pedra, Serra dos Alves, Itabira (MG)



**A.** Side view of Ponte de Pedra; **B.** Frontal view of Ponte de Pedra.  
**Source** – Oliveira (2015)

From the observations, the need to further explore the spots that have tourism potential in the region is perceptible, as to make a specific planning so that the tourism activity is conducted in a sustainable and structured way.



## Existing equipment in the scope of touristic planning

Planning can be described as a concentration of efforts to set objectives and goals, as well as how they can be achieved, developing diagnostics, forecasting, monitoring and evaluations so that present and future scenarios are constructed based on the experiences and knowledge acquired over time (Amorim & Umbelino, 2010).

Thus, planning can be increased in tourism activities, constituting a mechanism of fundamental use for municipal public administrations that believe in the development of tourism in a sustainable way (Castro & Midlej, 2011). From this perspective, the existing structure in the Serra dos Alves region was verified through an interview with the thirteen families living in the community, as well as observation in the field, presenting the diagnosis of the area and the needs that can be contemplated for the development of local tourism.

The urban pocket of Serra dos Alves is composed of approximately thirty houses, of which only thirteen are inhabited, accounting for about fifty inhabitants. In the village, the water supply is conducted by a spring connected to a water tank located in the center of the community that distributes it to the residences. Regarding the disposal of domestic effluents, residents reported that the public authority has provided a septic tank for each house.

Domestic solid waste is collected once a week by the Itabira Development Company (Itaurb). However, 30% of the interviewed residents choose to burn sanitary remains; 16% use organic waste to feed animals and fertilize vegetable gardens, and 4% (one resident) burns all solid waste. Such data were recently verified by Sá *et al.* (2015).

Considering the other structural services, the community has electricity in all households, as well as complementary services such as mobile telephony – available to about 78% of the interviewed residents – and the Internet – used by 15% of them.

Regarding tourism indicators, 36% of respondents reported that this activity is very profitable for the region, especially during festive seasons and long holidays, in view of the increase in demand for products and services such as cookies, sweets and cleaning. However, the residents complain of times of great activity, highlighted by one of the interviewees when saying that “some tourists make a lot of mess” (*sic*). Another situation, reported by 15% of the interviewees, was the provision of irregular campsites that could dump residues in the soil, in addition to possible remnants of fire from fires lit by tourists, which could trigger damage to the vegetation and residents.

Furthermore, residents were asked if they visited any tourist site in the area. Among the interviewees, 77% answered that they visit them sporadically, among the preferred attractions are Cachoeira do Bongue (the choice of 24% of the interviewed inhabitants), the Cachoeira dos Marques (reported by 20%) and the Crystals (indicated by 17%).

Nowadays, the region of Serra dos Alves has two inns, ten residences allocated for the season, a gastronomic point and two bars. Thus, when perceiving the growth of tourism, many invested so that the location could have equipment that would improve the attendance to the visitors, in contrast to

what was reported by Ventura (2006). The author stated that, until that year, the community did not have any formal professional establishment, means of lodging and gastronomic networks.

In regard to the provision of public equipment, Serra dos Alves is characterized by a rural complex, even though it is located in an urban pocket, since there are no health units, banks, pharmacies and police stations. Thus, one has to go to the Senhora do Carmo district – around 15km away – when these services are needed.

In order to achieve a sustainable development of tourism, the municipality of Itabira can count on some public policies involving the activity in the region, attesting to the assertions of Garcia and Ashton (2006). The authors discuss the importance of the role of the State in the institution of policies concerning tourism comprising economic, social, cultural and environmental dimensions. In the case of Itabira, the main policies established correspond to the Plano Diretor (Director Plan), regulated by Municipal Law n° 4.034/2006 and the Municipal Tourism Plan.

The Itabira Director Plan classifies the region as AIC zone, that is, Area of Cultural Interest, establishing in its Art. 45 that this zoning corresponds:

to the areas belonging to the complex of the Historical Center of the municipal headquarters, where buildings and spaces representing the memory and cultural identity of its society are located, which must be protected individually and in groups, as well as other listed areas and goods according to criteria of the Municipal Advisory Council of Historical and Artistic Patrimony of Itabira. (Itabira, 2006, Art. 45).

For the tourism scope, the Town Hall of Itabira (2014) elaborated the Municipal Tourism Plan, stating that the activity is incipient and it has been growing in an unregulated way and without effective planning in the village of Serra dos Alves. However, it was only in the last two years that modest interventions were made – through the Municipal Secretary of Tourism – with the objective of generating economic and social benefits, trying to minimize possible negative impacts that may be generated by this segment.

In this sense, tourism planning can be guided in a sustainable way in the village of Serra dos Alves in three aspects: general infrastructure, tourism and sustainability and, within these, more important perspectives inserted in the matrix of Forces, Opportunities, Weaknesses and Threats (FOFA).

The FOFA matrix, originally determined as SWOT (Strengths, Weaknesses, Opportunities, Threats), is a framework used to diagnose the strategic position of an organization or, in this case, the tourist activities in an environment, as a *suiChart* instrument for management and tourism monitoring in a given location (Dantas & Melo, 2008).

In the case of APA Morro da Pedreira, a matrix was elaborated by ICMBio (Chico Mendes Institute for Biodiversity Conservation) (Madeira, 2009). However, in this study, FOFA was structured in the context of tourism activities in the Serra dos Alves region, according to the model presented by Barbosa Filho (2009), shown in Chart 5.



**Chart 5** – FOFA Matrix in the scope of tourism activities for the region of Serra dos Alves (MG)

		Internal aspects	
		Strengths	Weaknesses
Aspectos externos		<ul style="list-style-type: none"> <li>• Diversity of natural attractions;</li> <li>• Protected cultural attractions;</li> <li>• Practice of various tourist modalities;</li> <li>• Historical and cultural attractions preserved;</li> <li>• Growth of mobile telephony;</li> <li>• Public network of structured sewage.</li> </ul>	<ul style="list-style-type: none"> <li>• Irregular road access;</li> <li>• Lack of signage of tourist attractions;</li> <li>• Inexistence of medical posts and pharmacies;</li> <li>• Water distribution network without treatment;</li> <li>• Inexistence of tourist assistance center;</li> <li>• Unorganized community.</li> </ul>
		<b>Opportunities</b> <ul style="list-style-type: none"> <li>• Encouragement for the creation of protected areas;</li> <li>• Growth of services for the tourist;</li> <li>• Increase in residents' income;</li> <li>• Growth in public-private investments;</li> <li>• Increased consumption of local products.</li> </ul>	<b>Threats</b> <ul style="list-style-type: none"> <li>• Likely overvaluation of land;</li> <li>• Increased consumption of water and electricity beyond the capacity of the village;</li> <li>• High production of waste;</li> <li>• Increase of buildings outside the architectural standard of the village.</li> </ul>

Source – Oliveira (2015)

Consequently, the development of this matrix enables the identification of relevant external and internal aspects that can be considered in tourism planning, optimizing strengths and involving opportunities while correcting weaknesses and preparing for possible threats.

## FINAL REMARKS

Tourism is an economic activity that can comprise environmental, historical-cultural and social elements, requiring an appropriate identification of the positive (to be improved) and negative (to be attenuated) impacts for its proper implementation. When analyzing the natural resources present in the village of Serra dos Alves, located in the Senhora do Carmo district, Itabira (MG), there is a potential for the development of tourism in the region, however there are unfavorable elements that may compromise tourism on a sustainable basis.

Regarding tourism analysis, the main aspects in each of the trails, both positive and negative, that have to be considered for the promotion of sustainable tourism have been identified. In general, the region presents potential for the development of different tourist modalities, such as ecotourism, adventure tourism and geotourism. On the other hand, the absence of adequate signage of tourist resources and the poor conservation of access routes are elements that must be adjusted for the growth of tourism in the region.

In addition, for the village to benefit from tourism activities, it is fundamental to survey existing structures such as lodging, public facilities and gastronomy

aspects so that these elements are also included in the planning for sustainable tourism in the region. Thus, it has been observed that natural attractions are more frequently sought on weekends and long holidays, which can mean a negative aspect for local residents, especially regarding water supply and solid waste, given that such services are still insufficient to meet the demand of visitors, which grows each year.

In this perspective, the conciliation between environment and development is increasingly rising. The institution of public policies that establish a harmonious relationship between economic activities and the environment is also important, alongside the planning and environmental management of processes and impacts resulting from tourism activities.

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