

# The public opinion of the teachers about the mineral exploitation in São José de Itaboraí Basin – Itaboraí (Rio de Janeiro State, Brazil)

Wellington Francisco Sá dos Santos (\*) & Ismar de Souza Carvalho (\*)

(\*) Universidade Federal do Rio de Janeiro, Centro de Ciências Matemáticas e da Natureza, Instituto de Geociências, Departamento de Geologia. Av. Athos da Silveira Ramos, 274. Bloco F. 21941-916. Cidade Universitária, Ilha do Fundão, Rio de Janeiro, Brazil. E-mail: wfsantos@gmail.com; ismar@geologia.ufrj.br

Document type: Short note

Manuscript history: received 24 May 2013; accepted 16 July 2013; editorial responsibility and handling by Domenico Calcaterra.

## ABSTRACT

The mining of limestone had positive and negative effects on the 6<sup>th</sup> district of Itaboraí (Rio de Janeiro State). During the time of mining activity by the National Company of Portland Cement "Mauá" (1933 to 1984) several invertebrate and vertebrate fossils, especially mammals from the Late Paleocene (57 Ma) were discovered in São José de Itaboraí Basin. Mineral exploitation contributed to creating jobs and improving the infrastructure of the region. However, with the end of the activity, the area entered in a process of socioeconomic decay. To establish geosite geoconservation, the São José de Itaboraí Paleontological Park was created in 1995. The institution is currently going through a revitalization process, which includes the construction of a cultural center for the protection of fossiliferous collections and scientific exposition. These initiatives can result in social and economic development of neighborhoods near the paleontological park through the intensification of geotouristic activity. In this context, interviews were conducted with teachers around the paleontological park, to seek their public opinion on relation to the mineral exploitation.

**KEYWORDS:** Environmental impacts, geotourism, mineral exploitation, socioeconomic development.

## INTRODUCTION

São José de Itaboraí, Cabuçu and Curuzu are quarters of the 6<sup>th</sup> district of Itaboraí (Rio de Janeiro State, Brazil) and together have a population of approximately 10,000 inhabitants (Fig. 1). A small sedimentary basin of 1,400 m long by 500 m width filled with limestone rocks was discovered in São José de Itaboraí in 1928 (Fig. 2a). Field studies and chemical analysis revealed the potential of limestone for the manufacture of Portland cement. From 1933 to 1984, the National Company of Portland Cement "Mauá" explored sedimentary basin (Santos, 2010).

During studies in the basin, dozens gastropods fossils, palynomorphs, ostracodes, vegetables, reptiles, amphibians, birds and mammals were found, awakening scientific interest in the region. Noteworthy are the Late Paleocene mammals of approximately 57 Ma, which spread throughout the Earth after the extinction of the dinosaurs 65 Ma. The remains of the megafauna mammals of the old Oligocene/Pliocene were also discovered 100 m south of the basin (Fig. 2b) (Bergqvist et al.,

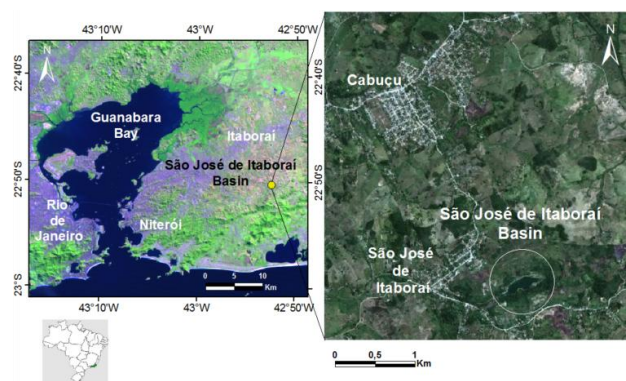


Fig. 1 - Location of São José de Itaboraí Basin and the neighbourhoods of Cabuçu and São José de Itaboraí. Image taken from Landsat (2007) and Google Earth (2010).

2006). Furthermore, lithic artifacts of prehistoric man were found in the "Morro da Dinamite", dating from  $8,100 \pm 75$  BP (Fig. 2a) (Beltrão, 2000). It is verified then that São José de Itaboraí has an evident geological, archaeological and historical-cultural heritage.

The deep and extensive excavations effected by the mining company over time formed a trough of approximately 70 m, which was slowly filled by rainwater and groundwater, necessitating drainage for the continued extraction of limestone. However, in 1984, the drainage and extraction activities were halted because they were no longer economically viable for the National Company of Portland Cement "Mauá", which resulted in the formation of a lake in the depression left by the extraction of limestone, which today hinders new geological studies because the remaining outcrops are flooded or covered by vegetation and mining tailings (Fig. 2a) (Bergqvist et al., 2006).

Regarding the socioeconomic aspects of the region, with the end of mining, São José de Itaboraí and thus Cabuçu and Curuzu, which are nearby neighbourhoods, entered into a process of decline and became virtually abandoned. However, due to the efforts of many researchers from Rio de Janeiro, the

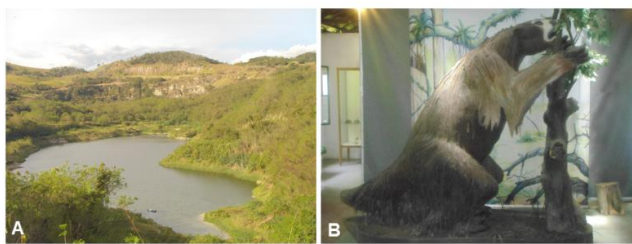


Fig. 2 - São José de Itaboraí Paleontological Park. A, São José de Itaboraí Basin. In the background, we can see the “Morro da Dinamite”, place where lithic artifacts of prehistoric man were found. The lake formed with the end of mining is shown (February, 2013). B, Replica of a giant sloth exposed in Environmental, Paleontological and Archaeological Reference Centre (February, 2013).

São José de Itaboraí Paleontological Park was created on 12 December 1995 in the area of the sedimentary basin, which became permanent preservation areas (APP) of Itaboraí (Santos & Carvalho, 2012).

Currently, the São José de Itaboraí Paleontological Park is going through a revitalization process, which includes the renovation of the Environmental, Paleontological and Archaeological Reference Centre. The project includes the investments of Petrobras and the Virtual Institute of Paleontology (Velloso & Almeida 2006). This initiative can generate new socioeconomic momentum in the region by intensifying the geotouristic activity (Santos & Carvalho, 2012).

Santos (2010), Santos & Carvalho (2011a; 2011b) conducted interviews with the people of São José de Itaboraí, Cabuçu and teachers in the region seeking to understand the perception they have of the paleontological park. In general, they commented that the site is not like a park and is abandoned due to the lack infrastructure and attractions for visitors. They complained about the delay in implementing the revitalization project and the absence of dialogue with the public about what will actually be done to improve the park. It is for this reason that respondents believe the São José de Itaboraí Paleontological Park has little acceptance in the region.

In this context, we sought to the opinion of public school teachers of the 6th district of Itaboraí on the positive and negative effects of mining. We sought to interpret the social and economic influence of mining in the area. The purpose is to verify the possibility of linking the historical and cultural aspects of the region with scientific studies and use them for geotourism and the creation of a population identity with the paleontological park projects. The study has been utilized in territory planning and uses projects, in popular education programs and measures to meet the needs of geotourism and local populations.

## METHODOLOGY

Were conducted 100 interviews with direct approaches randomly with the public school teachers of the 6th district of

Itaboraí. We developed a questionnaire with pre-established themes directed to the influence of mining activity in the region to provide a quantitative and qualitative analysis of the data. Some of the questions had closed answers because the intention was to obtain quantitative data in this case. However, other questions were open and in search of qualitative information (Table 1). The interviews were conducted between 30 October and 12 November 2009, and the teachers were usually interviewed in the interval between classes. We visited five municipal schools, one state college, one state school and one municipal daycare.

The mineral exploitation in São José de Itaboraí
1 What economic activity existed in São José de Itaboraí before the creation of the paleontological park?
2 This practice resulted in positive or negative effects for the region? What are these effects?

Table 1 - Interviews seeking the public opinion of teachers on the positive and negative effects of mining in São José de Itaboraí.

## PROFILE OF TEACHERS

Among the 100 teachers, 11% were male, and 89% were female. It is noticed then that the majority of respondents were female, which shows the greater aptitude of women to work with elementary and middle school children. The ages of these individuals ranged from 21 to 60 years: 26% were 21-30 years old, 32% were 31-40 years old, 36% were 41-50 years old, and 5% were 51-60 years old. Only one teacher did not reveal the age. A total of 71% reside in different districts of Itaboraí while the other 29% live in other cities, especially São Gonçalo (23%), the neighbouring municipality Itaboraí.

## THE HISTORY OF THE ECONOMIC ACTIVITY OF SÃO JOSÉ DE ITABORAÍ

In Figure 3, a total of 60% of teachers remembered mining as one of the oldest existing economic activities in São José de Itaboraí before the creation of the paleontological park, and 25% were unable to answer this question.

Itaboraí was known from 1929 to 1980 as the city of orange as a result of the various farms that had orange plantings in the region. However, this activity has been in decline due to errors in the techniques of planting, harvesting and transportation and by lack of fertilization. Currently, there are some farms producing oranges in region. Thus, 7% of the teachers remembered this economic activity in the area as existing before the creation of the paleontological park (Fig. 3).

Figure 3 shows that 5% of teachers recalled the shoe factory that existed inside the park before its creation and that no longer exists. A total of 2% of teachers said that the old economic activity in São José de Itaboraí was an agricultural school, which really functioned inside the park, but, according to Souza (2009), was transferred to a CIEP out of São José de Itaboraí. Only 1% of teachers said that trade was an old economic activity of São José de Itaboraí.

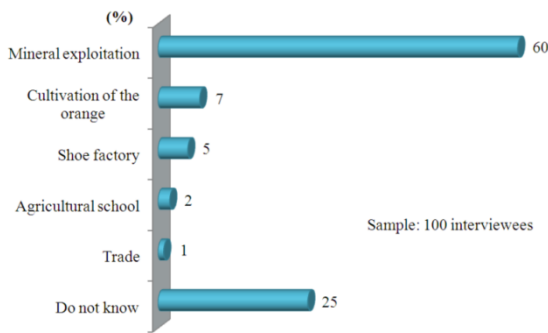


Fig. 3 - Results of the research that examined whether public school teachers remember the old economic activity existing in São José de Itaboraí before the creation of the paleontological park according to 100 interviewees (30/10/09 to 11/12/09).

### POSITIVE AND NEGATIVE EFFECTS OF MINING

Figure 4 shows that 35% of 60 teachers believe that mineral exploitation caused positive effects, whereas only 5% understand that this activity resulted in adverse effects. However, we can see a good percentage of teachers (56.7%) believing that mining activity of the National Company of Portland Cement “Mauá” brought effects both positive and negative to the region surrounding the current paleontological park.

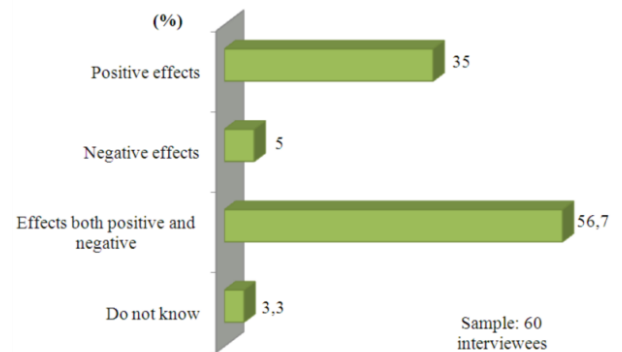


Fig. 4 - Results of the study that investigated the public opinion of the teachers about the effects of mining in the region with 60 interviewees (10/30/09 to 11/12/09).

### POSITIVE EFFECTS OF MINERAL EXPLOITATION

Figure 5 shows 143 citations for positive effects of mining in the region given by 55 interviewees. A total of 29.4% of the 143 indications referred to the existence of more jobs and better income distribution in the area during the mining operation. Survey participants commented that the mining company employees received good salaries and awards for good job performance, and many retired from the company.

A total of 25.1% of the 143 quotes referred to the existence of a good infrastructure in the region during the period of mining (1933-1984). The teachers commented that there was quality housing for employees of the mining company, in addition to schools, a club sports court, leisure areas, 24 hours health center with a ward and a significant number of doctors and dentists, a soccer field (which still exists today), adequate street lighting, efficient public transportation and unpaved roads that were in great condition.

Figure 5 verified that 13.3% of the 143 opinions approached the presence of different attractions/entertainment in the region, such as theaters, concerts, Cinema and festivals during the operation of the National Company of Portland Cement “Mauá”. A curious fact is that 9.1% of the 143 suggestions from 55 respondents considered "the lagoon" as a positive effect of mining activity. The population has identity with the lake because it currently supplies water to the communities surrounding the paleontological park, but the

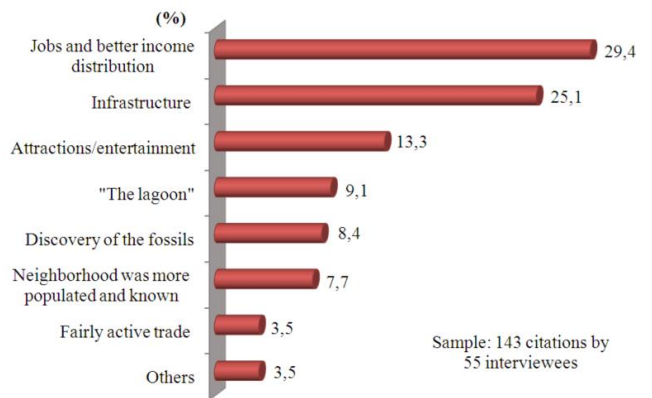


Fig. 5 - Opinions of public school teachers about the positive effects of mining in the region with 143 citations from 55 interviewees (10/30/09 to 11/12/09).

treatment given to this water is unknown, which has a large concentration calcium carbonate.

Figure 5 shows that 8.4% of the 143 citations were related to the importance of mining in São José de Itaboraí to the discovery of the fossils. Excavations for the removal of limestone enabled the discovery of a rich fossil heritage. The perceptions that the neighborhood was more populated and known at the time mining is an opinion shared by 7.7% of the 143 quotes. A total of 3.5% of the 143 opinions indicated that the region had fairly active trade during the mining phase.

The other topics received 3.5% of the 143 suggestions and included quotes that did not fit in previous topics, such as the existence of training courses for employees holding positions in the mining company and a better life quality in the region.

### NEGATIVE EFFECTS OF MINING

Figure 6 shows 67 citations of the negative effects of mining made by 37 interviewees. A total of 67.2% of the 67 opinions highlight the socioeconomic effects related to the end of mining. Teachers believe that the 6th district of Itaboraí was abandoned with the end of mining and virtually "failed", becoming decadent, which created unemployment and the migration of many residents to other regions. The houses that

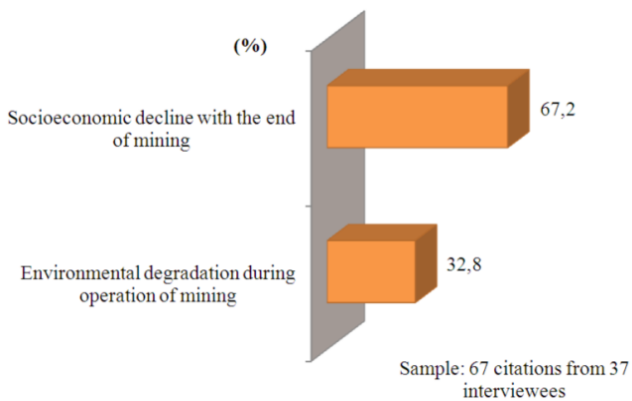


Fig. 6 - Opinions of public school teachers about the negative effects of mining in the area with 67 citations from 37 interviewees (10/30/09 to 11/12/09).

were built to serve as residences for employees of the mining company in São José de Itaboraí were demolished, the infrastructure was removed, the railroad that was responsible for transporting limestone mined for cement factory in Guaxindiba (São Gonçalo) has been disabled (extension of the Railroad "Leopoldina"), and trade declined vertiginously. Participants commented that a lack of political support for the population with the end of mining caused the absence of expectations of social and economic growth for the region.

A total of 32.8% of the 67 citations was related to environmental effects that occurred in São José de Itaboraí during mining (Fig. 6). Among them, there is the mischaracterization of the landscape and noise pollution caused by the use of bombs in the mining of limestone, which also generated cracks in houses due to explosions, and air pollution (grinding of limestone). Other negative effects were deforestation and the depletion of mineral resources, which caused a revolt among the people because they commented that the miner company abandoned the region with the end of the natural resources, bringing with them all of the improvements and not performing any project rehabilitation of the area. The interviewees also remembered crater formation and the upwelling of groundwater that generated the lagoon as the negative effects of mining, showing that not everyone has the perception of the lake as a positive aspect.

## CONCLUSIONS

The majority of respondents believe that the benefits of forming mining activity were positive. Among these benefits, we highlight the existence of employment, income, infrastructure and trade. Among the negative effects are the end of mining, especially the end of employment, the withdrawal of infrastructure and the reduction of trade, which led to the abandonment and the "failure of the region." Among the environmental impacts, we highlight the mischaracterization of the landscape, noise and air pollution, deforestation and the exhaustion of mineral resources.

The area surrounding the park is characterized by a very strong historical past underpinned by the mining activity,

which practically took over the role of the state in relation to social investment and economic benefits. Thus, local populations feel the lack of the operation of the National Company of Portland Cement "Mauá" and have identity with this old practice. This reason is one of the reasons why local populations believe that the organizers of the park have to worry about the socioeconomic issues of the community, which somehow removes the responsibility of the Itaboraí prefecture. It is important to give more emphasis in the paleontological park revitalization project to the question of mining because this activity had positive contributions to the socioeconomic issues of the 6th district of Itaboraí. Thus, we can link the historical and cultural aspects of the region with the scientific aspects because mining activity had a great contribution to the discovery of the fossils. The success of the paleontological park project depends on the mobilization of the community for the management and preservation of geological heritage. Thus, local populations, in all its segments, need to know and identify with their heritage.

## ACKNOWLEDGEMENTS

This study was supported by CNPq, CAPES and FAPERJ.

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