

# Historical Archaeology of Lavras do Abade: An Environmental Conflict in Nineteenth-Century Brazil

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Published online: 12 December 2013

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**Abstract** The Lavras do Abade research is a historical archaeological study about a gold mining village in midwestern Brazil that was destroyed by an environmental conflict at the end of the nineteenth century. This article concerns the history and archaeology of Lavras do Abade and consists of a post-disciplinary intersection of documentary and material sources about the site. In addition, only this type of reconstruction of a long-term event permits the scientific analysis of all the possible causes and consequences of this ecological contention. In this way, historical archaeology can be used to transpose a simple narrow view of the reconstruction of the past and offer insights into understanding similar unrest and group conflict today and in the future.

**Keywords** Environmental conflict · Mining village · Nineteenth century · Brazil

## Introduction

In 1887, the gold mining village of Lavras do Abade was attacked by the neighboring village of *Meia Ponte*, what is today, the town of Pirenópolis for two nights and three days. According to local narratives, the Abade's village was destroyed over a water pollution disagreement between the villages. However, the author's research reveals substantial evidence that the conflict was associated not only with water dispute but also with economic disparities and political struggles between the villages (Costa 2011a).

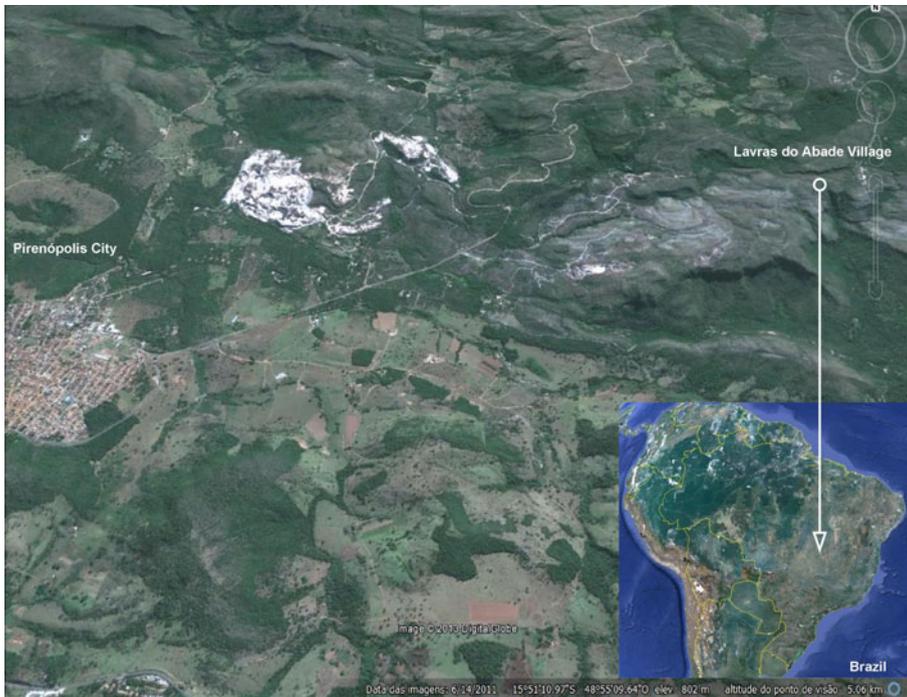
Mining exploration has historically been an enormous source of pollution worldwide and continues to be so today. In developing countries, mining exploration adversely affects natural resources and directly jeopardizes local communities. What this particular historical archeological study reveals is a social conflict with consequences influencing the control and management of natural resources both for this specific place and period and as a useful case study for many societies (Costa 2011b).

In this paper, the historical development of mining entrepreneurs in the hinterland of nineteenth-century midwestern Brazil is first presented. A historical description of the protagonists, the people of the mining villages of *Meia Ponte* and *Lavras do Abade* in the *Pireneus Mountains*, is then presented (Fig. 1). The objective here is to illustrate the

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**Fig. 1** The location of Lavras do Abade and Pirenópolis City (Costa 2013)

historical context of the environmental conflict to better understand the particularities of a nineteenth-century capital enclave in an agricultural and pastoral economy.

The archaeological investigation of an economic disparity and political struggle is presented next, including a description of the archaeological fieldwork conducted and analysis and interpretation of archaeological deposits and structural remains. The examination and socioeconomic interpretation of the recovered vestiges of the material culture of the Lavras do Abade site are described. The building structures of the site are analyzed from different perspectives, as is the historical landscape of the site, which is broadly interpreted. This section concludes with a comparative archaeological study of the similarities and differences between the old Meia Ponte and Lavras do Abade sites.

Finally some thoughts about the research and its results are summarized. The findings of the archaeological work are discussed, along with their validation or lack of validation according to the archaeology literature. The final conclusion reached is that, at least in the case of Lavras do Abade, the historical archaeological study is not only a simple study connecting written, pictorial, and oral sources to vestiges of the material culture but also a unique intersection of types of information that results in a crossroads of new knowledge regarding the site.

### History of Lavras do Abade

The “open cut” gold mining technique came into use in Brazil in 1819. This mining technique was first used in the establishment of the Passage Mine in the town of

Mariana in the state of Minas Gerais (Eschwege 1978). The open cut technique was used for gold extraction in mountainous hillsides in areas with ore deposits. Miners claimed these ore deposits and applied the open cut exploitation technique in Lavras. In open cut gold mining, the earth of a hillside is perforated using iron bars, and channels are constructed close to one another, followed the contours of the hill below. Water is brought to the highest point of the hill through a main channel to generate enough force to remove the topsoil. The topsoil removed by the water is deposited in a foothill channel created by a succession of little dams. When the last channel is full, the contents are stirred until the heavier ore is deposited at the bottom, and the barren soil is released in successive discharges.

No other mining techniques used in the nineteenth century were as dangerous as the hydraulic dismount technique, which is a variant of the open cut technique described above. The details of the hydraulic dismount technique can be understood by examining an example of its application at Lavras do Abade. In addition to the high costs associated with great energy consumption, the operations involved in hydraulic dismount mining are considered extremely polluting, thus demanding special care in their application. The oldest example of the hydraulic dismount technique in Brazil is the mine of São João D'el Rey in Minas Gerais. This type of exploitation became common at the end of the 1800s (Doce 1992), most likely because of the entrance of some foreign mining companies that brought this technology into Brazil (Eakin 1989). Other than some records of perceptions regarding foreign gold mining in Brazil at the end of the 1800s (Doce 1992) and the installation of the Goyana Mining Company (CMG) in the Pireneus Mountains (Calogeras 1938), no record exists in the researched Brazilian mining historiography of studies concerning the violent events that took place between the Lavras do Abade and Meia Ponte communities in the nineteenth-century Goiás state.

The mine of Nossa Senhora do Rosário de Meia Ponte was founded in 1731 by Manoel Rodrigues Tomaz while he was looking for gold in the margins of the Almas River. In the following years, the mine became a camp and was located along the left margin of the Almas River on a soft hillside that faced the Pireneus Mountains. The labor in the mine consisted primarily of natives that had previously inhabited the area and African slaves. The mine quickly became a place of lawlessness, marked by authoritarianism, violence, and tax evasion (Costa 1979). Because of the rich gold content of the sands, the number of people in the village increased rapidly with the arrival of Portuguese and São Paulo newcomers (Jayme and Jayme 2002).

At the beginning of the 1800s, the camp turned into a village, but its irregular terrain would not support the expansion of a traditional town. The urban center grew in the direction of the river and around the main church. The north part of the village was not organized uniformly with a street system, but the south part was established with large and regular streets. This urban design remained unchanged until the construction of the Bonfim and Carmo churches, which attracted houses to their surroundings and consequently created the urban framework that exists today. The first decades of the nineteenth century were also productive in the village, with increases in commerce that were supported by soldiers passing through the village on their way to other provinces (Leal 1892; Pohl 1976; Saint-Hilaire 1975).

In 1819, the village had the format of a square and comprised more than 300 houses covered with roof tiles. Each house had a backyard with banana and orange trees and

coffee plants. In general, the streets were wide and followed perfectly straight lines with sidewalks on both sides. In this village lived a Latin professor with 14 students. The village also had a Franciscan hospital to serve the population suffering from elephantiasis and leprosy (Saint-Hilaire 1975). One year before, the houses that were constructed of wood and clay did not have glass windows. The windows in the majority of houses were covered with linen fabric. Glass windows were found in only one of the five churches in the village (Pohl 1976). The Meia Ponte society of the 1820s was marked by endogamy among the elite, with expanded incidents of illegitimate marriage among the subaltern classes (Costa 1979).

In 1823, the village had an average-sized population and was the only village in the province other than the capital, Vila Boa, with growing commerce (D’Alincourt 2006). In the same year, the village had artificial illumination and had 194 soldiers in three cavalry and four infantry companies. Between 1830 and 1834, the city became the headquarters of the first newspaper in the province of Goiás, the *Matutina Meia Pontense*, as well as the location of a musical band. The recreational activities of the meiapontense society included long baths in the Almas River and the celebration of religious festivities, such as the Festa do Divino and Cavalhadas (Mattos 1979). The Meia Ponte village was the second urban nucleus of the Goiás province during the Colonial and Imperial periods, competing actively with the capital Vila Boa in economic and cultural expression (Costa 1979).

Around the 1850s, in parallel with the end of mining in the Almas River, the Meia Ponte society was organized into new economies based on agriculture, cotton exploitation, livestock production, and trade. This new phase in the life of the village provided a forum for agricultural oligarchies that were controlled by extended families and a patriarchal political system. The cotton exports of the village were so valuable in the province that some farmers, such as Joaquim Alves de Oliveira, prohibited slaves from participating in mining activities and gave them “incentives” to plant cotton on their days of rest. The patronage and slave system in Meia Ponte was hence strong enough that, in subsequent decades, the same farmer established his slaves as police officers. His plantation was so autonomous that all supplies were produced internally, and the only imported products were salt, iron, and more slaves (D’Alincourt 2006).

The economic changes that occurred during the nineteenth century had many effects on the Meia Ponte society. The common types of agriculture were executed by many residents, while the large farmers concentrated on monoculture and then eventually on cattle breeding. Most entrepreneurs focused on trade (Costa 1995).

Commerce, however, was restricted to the provincial and internal village market; the village had few exportable products to offer coastal consumers from other provinces. At the turn of the nineteenth century, the fragile commerce accumulated a monetary debit among the residents while it improved the suzerain and vassalage system in the village. Political favors carried the price of economic dependence. At the end of the nineteenth century, the old mining community, now a farming village, grew into the municipal district referred to as Pirenópolis.

Since the eighteenth century, villages in Goiás had appeared and disappeared at the mercy of gold-bearing ore deposits. Many of those nuclei regressed with the decadence of the Lavras, while others survived and adapted to the new conditions in the nineteenth century. Meia Ponte was one of those villages; in less than one century, it experienced the splendor and decadence of gold, sometimes with different products. However, gold

exploitation recurred at the end of the nineteenth century in the Lavras do Abade, and what could have been a revival of ostentatious times in the village of Meia Ponte was marked only by disagreements and conflicts.

The exploitation of gold in the Lavras do Abade began in approximately 1750 when the military official João Rodrigues Abbade discovered a gold-bearing ore deposit in the southwest of the Pireneus Mountains on the Cabaçeiros farm between the villages of Meia Ponte and Corumbá de Goiás. The oldest written information about the area dates to a traveler's short visit to the Pireneus Mountains in 1819. The traveler found vestiges of a house in the area, which, according to his informants, belonged to one old miner who had employed slaves for gold extraction. Along the top of the mountain, the voyager also observed gold mining debris in the nearby streams. At night, he stayed in a shelter of an old ex-slave who lived in a cabin in the area and who most likely was one of the miners or a miner's descendant (Saint-Hilaire 1975).

The mineral formation of the Lavras do Abade ore deposit is very similar to that of the Ouro Preto in the Minas Gerais area. Gold is in the shale rock matrix and is formed with small concentrations of crystal quartz, pyrite, manganese oxide, iron, and titanium. The typical depth is approximately 2–6 m, and the soil is loose enough that it can be worked with hydraulic jets. The expected production is 1/8 gold, or 3,586 g, for each 23 kg of cubic soil meter, an amount that generates a considerable profit (Tavares 1883).

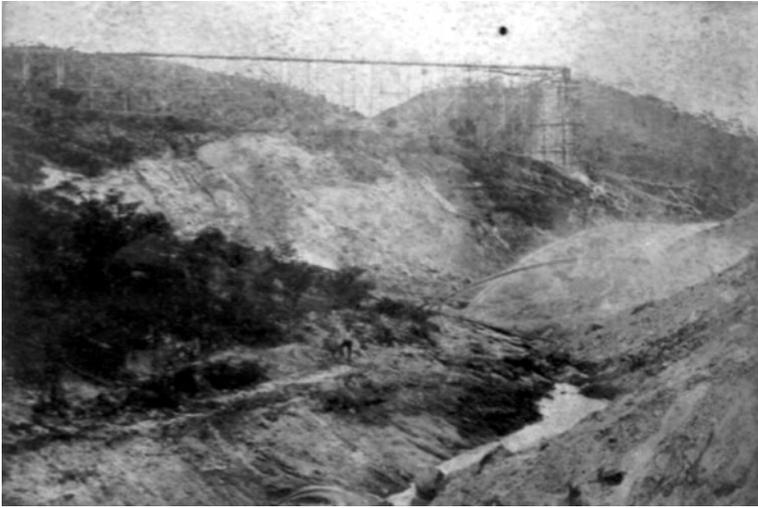
Lavras do Abade remained without an owner until the 1880s, when gold exploitation was reactivated by the Prado Company, which was commanded by the French manager Bernard Alfred Amblard D'Arêna, or in Brazilian Portuguese, Alfredo Arena. The Freemason and writer Alfredo Arena was a native of Toulon and had lived in Brazil since 1851 (Costa 2011a).

Arena was trained in dentistry and had knowledge of law, engineering, mechanics, and medicine. He was of medium stature with blue eyes and a square mustache and was balding. He was known for being a great speaker, fluent in more than one language, and well mannered. He always dressed in white, with a Chilean hat, a jacket with four pockets, culottes, high boots, and a cartridge holder around his belt with two revolvers (Jayme 1971).

The Prado Company also explored gold in the mining village of Bagagem in Minas Gerais and, together with Arena Society, formed the Companhia de Mineração Goyana, or CMG, in 1882 (Brandão 1978). CMG had more than 300 small investors, from Rio de Janeiro businessman to Goiás farmers. Its president was Antonio da Costa Chaves Faria (Costa 1995).

The installation of the mine brought significant modifications to the area, such as adjustments to the Almas River and the Barriguda stream created with ditches of stones more than 1 km in length. The redirected water was accumulated in dams, with fluctuations controlled by gates. One gate was connected through stone ditches with the mine's eastern extremity to clean the detritus of open cut mining at the base, while another was directed to an aqueduct, a wooden structure more than 70 m high and 370 m long. This flume passed by a waterwheel that provided energy to the crunchers and saws, and it ended in a 20-m cascade that fed the hydraulic machine with a force of approximately five bars (Fig. 2).

In addition to the installation of mining equipment, a town was built for the employees, with approximately 30 houses with stone walls and straw roofs (four were covered with roof tiles) and wide streets (Fig. 3). The village also included a trade store, a drugstore, a dining hall and kitchen, a butcher shop, a slaughterhouse, a soap factory,



**Fig. 2** The Lavras do Abade Mine (from Philermon 1883)

and a sawmill. Inside the sawmill, which was next to the carpentry office, was the maintenance facility for the hydraulic system and the mill activities of the village. The soap factory also produced candles. The store sold medicine, cosmetic items, plates, cups, fabrics, hats, coats, and umbrellas. The village was dispersed along the small plateau in front of the mine, enclosed within stone walls and two gates—one closing the road to Meia Ponte and the other the road to Corumbá de Goiás. Outside of the walls were the cattle corral and a coffee plantation, and within the border of the Lavra, at a distance of approximately 2 km, were a roof tile factory and a clay deposit.

Arena's home was located in the center of everything, and it contained the foundry and arsenal. He channeled the water and built his house with glass windows and with



**Fig. 3** Lavras do Abade Village (from Philermon 1883)

wooden stairs in front of the door. In the internal patio, he had several fruit trees and areas covered with pavement stones. He furnished the house with valuable pieces of furniture that arrived directly from Europe, along with curtains and rich rugs. In the weapons room, rifles were hung up, and clavinets, revolvers, and swords were decorated with red velvet and hunting horns. The dining room contained an enormous table with a marble top. His house was similar to the European style of homes, and parties and dances took place at his home on many occasions.

On the hill opposite Arena's house, an artillery piece was installed, and two mortars were mounted on his patio. In the mine apex, Arena coined his own money in gold and copper, with engravings of Valida-Arena. At that time, the village was known as the largest auriferous mine with hydraulic dismounts in Imperial Brazil (Calogeras 1938). The number of employees is unclear; there were 22 men and 12 women in 1887, but most of them were temporary employees (Freitas 1996). While most of the workers were from the towns of Meia Ponte and Corumbá, there were many workers from the surrounding villages and other provinces.

Beginning in 1884, problems with water pollution and legal disputes soured the relationship between the villages of Lavras do Abade and Meia Ponte. The mine was accused of becoming unacceptable because of its pollution of the water of the Barriguda stream, which is a tributary of the Almas River that cuts through the town. The work in the mine continued despite these protests, and the waters of the river were consequently always dirty. The residents made several agreements to try to solve the problem, but the water resources continued to be depleted. Arena was served by the public authority with a petition supported by 169 signatures that threatened him with the possible destruction of the place and expulsion of the workers. In response to this provincial resolution of March 1, 1886, Arena obtained an Imperial resolution from the Agriculture Office on February 25, 1887, to proceed with mining activities (Carvalho 2001).

Mining exploitation continued at maximum capacity until March 22, 1887, when a group of approximately 27 assailants from the village of Meia Ponte, heavily armed and masked, invaded and set fire to the town, driving out the miners with shouts and shots. According to historical documents from the CMG Company in the National Archive of Rio de Janeiro, a claim was presented to the Imperial Government concerning the assault that occurred between March 22 and 24, 1887, while Arena was traveling to Rio de Janeiro. Alongside the group of assailants that was formed by local authorities, there were members of important families of Meia Ponte, with their faces painted black with sugar spirit and gunpowder, and others, such as residents, slaves and soldiers convoked to participate in the attack. The slaves, sent by their masters, made up the majority of the party that participated directly in the assault.

Following the assault, many newspapers publicized stories about it, and a series of judicial battles resulted in the pardoning of all participants, mainly because of their youth (Leal 1892). Arena was in Rio de Janeiro during the event, and he never returned to Lavras do Abade, switching instead to the exploitation of diamonds in Minas Gerais, where he died during the twentieth century.

Over the course of 3 years, numerous lawsuits were initiated by Alfredo Arena against the Imperial Government, soliciting federal compensation for the destruction of the mine. In the majority of the petitions, the argument was that the destruction of the village was prompted by disagreements with the Meia Ponte family Jayme de Sá, who controlled the economic and political spheres of the town. Supporters of Arena's

actions were few; they included the Marquez do Tocantins, who opposed the slowness of the process, and Herculano Fleury Curado of Corumbá de Goiás, who was the former owner of the Lavras do Abade mine. The majority of the claims were resolved against the CMG Company, except for a decision in 1889 by one of the directors of the Ministry of Agriculture, Commerce and Public Works, Machado de Assis. However, this decision came too late; a few days prior, the Imperial government had been removed, and the decision was not executed by the new military Republican government.

In 1892, another traveler repeated the visit of the earlier traveler to the Pireneus Mountains. The remains of the village included only 12 standing houses and the ruins of several others, the damaged aqueduct, and the burned sawmill structure. The traveler was approached by an old man named Ignácio, who pointed out that the machines, pipes, instruments, and iron pieces were exposed to weather or were collected in stone wall buildings without doors. Ignácio also noted that, during the rainy season in the years following the abandonment of the village, some people from surrounding villages came to recover the gold that fell from the ravine and other remains (Leal 1892).

The conflict, according to the historical documents, was based to a great degree on the mine pollution of the Almas River and the insubordination of the mine manager to the province's order to close the mine. However, other causes identified in the same historical documents were related to the disagreement between Alfredo Arena and Meia Ponte village authorities, such as in the case of *Bugre*. This case concerned an employee of the Lavras do Abade mine who was acquitted at trial because of Arena's influence with the Imperial Government. The miner was accused of murdering a soldier from Major Jayme de Sá's troop in 1886 but was absolved of the crime. Nevertheless, the singularity of the Lavras do Abade conflict made it a unique event in nineteenth-century Goiás history.

Numerous revolts during the period of Imperial Brazil were demonstrative of the inequalities among the Brazilian nineteenth-century society. The principal popular revolts of the period, such as Praiera in Pernambuco, Cabanagem in Pará, Malês and Sabinada in Bahia, Farroupilha in Rio Grande do Sul, and Balaiada in Maranhão, were characterized mainly as social claims. Nevertheless, neither these nor other economic or political conflicts during the same imperial period had the type of origin, development or legacy of the Lavras do Abade conflict.

The incident was a singular conflict against a private enterprise, described in period accounts as caused by the pollution of water resources and executed by a group of assailants. The Lavras do Abade conflict was an act of "rule of the coronels", perpetuated by the rural Meia Ponte oligarchy against the entrepreneurial actions of the CMG Company. The village destruction was a terrible result, and the assault against the mine was not a justifiable protest against the water pollution sponsored by Alfredo Arena. On the contrary, it was possibly a conflict generated by two distinct worldviews, one illuminated by the yellow of gold and the other maintained by the green of plantations.

The Lavras do Abade conflict was a unique event in the history of Brazil, and it carries within it a mosaic of issues that are at the same time the origin and consequence of the economic and political disputes between the villages and personal interests in the region. What can be concluded about these historical facts is that the environmental claim was not the only cause of the Lavras do Abade conflict, although it was used as

an excuse for the conflict. Other factors in the Lavras do Abade conflict must be individually understood, and to achieve this goal, it is necessary to look beyond the historical documentation and oral tradition and consider other sources of information, such as the material culture.

### Archaeology in Lavras do Abade

Today the site is located at the Lavras do Abade Farm and Cabaçeiros Farm in an environmental protection area (EPA) of the Pireneus Mountains State Park in the state of Goiás in midwestern Brazil. These farms are situated 10 km from the city of Pirenópolis and 18 km from the city of Corumbá de Goiás. High-altitude cerrado (Brazilian savanna) is the predominant form of vegetation, and the nearest water source is the Almas River. The urban nucleus, which serves as the object of this study, has an estimated area of 2,500 m<sup>2</sup>, with remaining stone structures measuring a maximum of 3 m tall. The location of these structures is an open area with vestiges of material culture, such as ceramic, glass, metal, and constructive elements, such as roof ceramic and nails dispersed in superficial arrangements. The other areas of the site were not yet specified, but they included building structures, roads, and defense walls, as well as mines and milling structures, wood and clay extraction areas, and channels and dams for managing creeks, rivers and waterfalls.

The archeological fieldwork at the Lavras do Abade site began in 2003 when, to conclude my master's thesis, I began a survey of the site (Costa 2003). The first contact was not a systematic archeological survey but rather a first step toward understanding the location and composition of the site's more exposed structures. A walking survey of the village was complemented by aerial photography and preliminary measurements of the building remains.

Further and more systematic fieldwork was conducted in 2005 as part of the completion of my master's thesis and the beginning of my doctoral research (Costa 2006). In 2005, the identification of the urban area was completed through systematic walking transects and the digitization of some building structures with a 3D laser scanner. The result of the walking transect was a broader view of the village and its limits, with the identification of auxiliary structures such as the stone aqueduct, walls and the mine entrance.

The last fieldwork campaigns were conducted in 2007 and 2008, beginning with geological and environmental observations of the area around the site. In 2007, some prospection was conducted in the urban area to identify the depths of the soil deposits and the occurrence of archaeological vestiges at the surface. The surveys did not involve the collection of materials or the exposure of the archeological strata but were nonetheless fundamental in preparing for the campaign of 2008. In 2008, the first archaeological excavation at the site was begun. With few resources and team members, couple of weeks of test pit and surface collecting were completed in three selected areas: the administration house, the store and warehouse, and the sawmill and watermill (Costa 2010).

In the Lavras do Abade case study, the written and pictorial historical documentation was the key element in identifying and interpreting the structures. Nevertheless, the application of Prince and Deetz's (in McGuire and Recner 2003) photographic

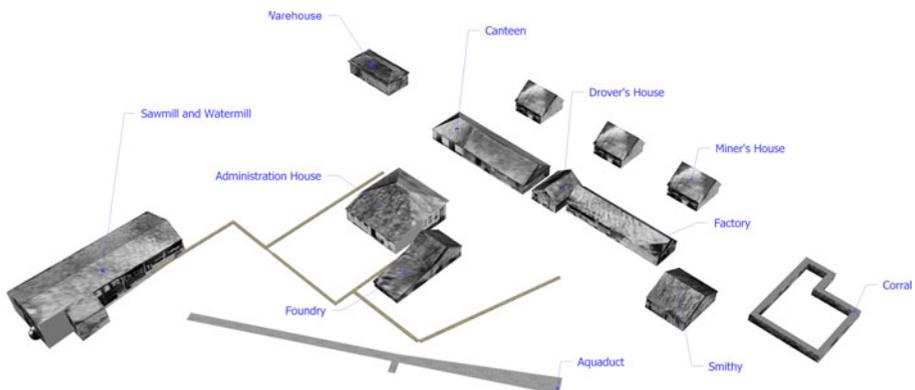
methodology in previous research at the Lavras do Abade site did not yield conclusive results. The excessive vegetation did not permit accurate identification of structures and places at the site through pictures. However, a step forward in the understanding of these historical sources was accomplished using digitized data of the buildings to create a virtual model of the site (Fig. 4). The virtual model helped with the projection and selection of planned archaeological interventions at the site and later with the composition of data and spatial analyses of the vestiges (Costa 2012a).

The ceramic and glass artifacts recovered at the Lavras do Abade site were also objects of chronological and socioeconomic analyses, specifically, the application of the mean ceramic date formula (South 2002) and the ceramic index value (Miller 2000) for each category of artifacts. In contrast, the interpretation of metal artifacts was conducted through analysis of form and function association. However, because of the small quantity of the sample, both in terms of the areal coverage of the Lavras do Abade site and the recovery units, all results presented here are minimalist and preliminary (Costa 2012b).

Fragments were selected and identified as floral-cut sponge stamp decorations and as band-and-line hand painting decorations. The average date for the floral-cut sponge stamp decoration was established as 1875, while the average date for the band-and-line hand-painting decoration was established as 1887 (Godden 1966). The latest date at which either decoration was produced was established as 1900 (Eberlein and Ramsdell 1925). The number of fragments was multiplied by the average dates of the decoration types, and the product was divided by the total number of fragments of the sample. By this calculation, the average date of the ceramic samples of the Lavras do Abade site was established as 1883.

The determination of a ceramic index value followed the ordinary orientation (Hull 2007). It was first established on the basis of the number of fragments in the sample and with the minimal number of vessels and forms. The result of the index comparison among the samples at the site revealed that the decorated bowls and tureens were more expensive than the cups and plates with simple decorations or no decoration. In this way, the ceramic samples recovered at the Lavras do Abade site were characterized by a lower value for the individual and utilitarian artifacts than for the shared pieces.

When the scale value of the ceramic samples was compared with the average date for the objects, a consumer pattern emerged (Majewski and O'Brien 1987), indicating an



**Fig. 4** Lavras do Abade Virtual Model (Costa 2013)

investment in vessels mostly associated with social and sporadic representations. The large quantity of ceramic material found in the administration house might represent a preoccupation with collective participation over individual distinction. In the same way, it is interesting to think that in the house of the mine owner, the place where social distinctions were most likely fiercest, the artifacts with maximum expressions of value in the Abade's society were directed from the personal domain to the public sphere.

The mean date formula was also applied to the glass bottle vestiges of Lavras do Abade. However, the selected proprieties of the fragments were restricted to the mold manufacture marks; other elements needed to establish narrow chronological attributes were not present in the sample. Mostly, bottle body fragments compounded the utilitarian glass artifacts at the site. The date established for the selection of bottom-hinged and three-part molds, both nineteenth-century technologies, was 1850.

The average date of 1850 for these bottle fragments was not an exception, as glass bottle technology, unlike ceramic technology, did not regularly change in the nineteenth century. However, it is necessary to be sensitive to chronological indicators that include closure technology and changes in the color process (Firebaugh 1983). The purple fragments in the glass artifacts suggest an average date of 1867, placing the sample of the site in the third quarter of the nineteenth century. Consequently, the average date between 1850 and 1867 attributed to the glass utilitarian artifacts in the Lavras do Abade site corresponds to the period of production of these artifacts. Therefore, it is necessary to extend the date of use beyond the period of production due to the extensive recycling activity of glass containers.

Glass bottle manufacturing in the nineteenth century was a uniform process, with shapes that permitted recognition as medicine bottles, wine bottles, or others (Baugher-Perlin 1988). Through an exploration of the principles of the ceramic index value, it is possible to establish an economic and social "value" for these imported artifacts. The Brazilian production of glass bottles, however, only began in the twentieth century. Glass bottles were classified as being for medicinal, hygiene, or beverage purposes and were interpreted according to their fragment quantities. A massive concentration of patent medicine bottles (Fike 1987) would indicate, in addition to a preoccupation with health, a significant financial expense in the acquisition of these artifacts.

The sample of roof tiles at the site was researched through the identification of the raw materials that formed the clay, the type of firing used, and the thickness of the fragments. The entire sample came from the excavation units in the administration house and compounded an archaeologically recognized layer. However, the mica and pyrite distributions in the sample were the most interesting aspects, despite the commonality of these two types of minerals in the occurrence of quartz and hematite in primary deposits of clay. The quantity of roof tiles containing only pyrite is a possible indicator of the clay deposit being influenced by a proximity with gold. The pyrite of these deposits gives the roof tiles a distinct "golden" coloration.

The massive quantity of window glass in the manager's house and store also serves as a chronological indicator (Day 2001; Rivers 1999) and can be interpreted as a status element. The majority of flat glass fragments with a thickness of 2 mm confirm the dates of the site between 1835 and 1881, and the large quantity of window glass could be a result of the wealth patterns in the Lavras do Abade village. Window glass was most likely used as another social element, similar to the "gold" roof tiles, to distinguish buildings by status within the village.

The metal sample of the Lavras do Abade site serves as a limited example of an expressive universe significantly distinct from the construction elements. The age of the sample was represented by two square-cut nails from the first quarter of the nineteenth century and by one sample of a square rose-head nail dated from between the 1600s and the 1800s. These dates are typical of the time expected for this type of material, which is heavily recycled at the majority of historical archaeological sites. In general, metal is a difficult element to date.

The degree of corrosion (Rodgers 2004) was more evident in the square nails and the cut nails than in the rose-head nail or the wire nails of the sample. The different degrees of corrosion of the square nails could be associated with the type of metal or poor iron matrix of this type of nail or even with the soil conditions in which the object was deposited, in addition to the age. However, it is necessary to note that the village had a smithy, and more research needs to be carried out concerning this topic.

The building structures of the Lavras do Abade site could be subject to many interpretations, but instead of making a deep architectonic analysis, it is necessary here to consider the social context (Hicks and Horning 2006). In the case of Lavras do Abade, the “life history” of the remaining structures is clear, not only at the archaeological site but also in the city of Pirenópolis today, where many building elements, such as glass windows, ceramic roofs and wall stones, have been reprocessed to construct new houses. For instance, an element that was recurrent in the recycling process of reused artifacts from the mine was the metal pipes of the mining hydraulic machine, which, after being plundered from the village, were used as chimneys in many houses of the ancient Meia Ponte village.

In addition to approaching the Lavras do Abade structures from the domestic archaeology (King 2006), it is also my intention to observe “lifestyles” and the social construction of household spaces. In the Lavras do Abade buildings, the social context is clearly identified in the construction materials studied. The exclusivity of certain items, such as “golden” roof tiles, point directly to this segmentation.

As another important part of the examination of this site, the study of the landscape requires a general understanding and practical application of particular concepts. The Lavras do Abade historical landscape is interpreted according to the framework of the anthropological spatial theory (DeCunzo and Emstein 2006). The panoptic concept of constructed surveillance changes the normative view of “spaces of constructed visibility,” and introduces the notion of spatial modern discipline (Foucault 2008).

At the Lavras do Abade site, the spatial discipline was represented in the dispersion of buildings, roads and stone walls. The mine was a restricted, built environment in which the centralized management building controlled the work and living spaces of the miners. The urban plan of the village was concentrated around the essential productive aspects of the mining, such as the administration house and the foundry being located in the center. The space between the goldmine and the miners’ houses was occupied by Arena’s house. The roads were parallel and segregated the public and private spheres, keeping the common services, such as the canteen, factory and store, in the middle, while the residences were located on the periphery. Protection and containment were also relevant issues, with two large stone walls and gates closing the only accesses to the Lavras do Abade mine and village.

In the *lato sensu*, the Lavras do Abade historical landscape can be understood as a capitalist urban space (O’Keeffe and Yamin 2006). In the Lavras do Abade village, the

use of parallel streets was innovative to the period, a time in which the majority of Brazilian towns followed the Portuguese colonial urban patterns. Constructive technology also separated the Lavras do Abade village from others around it because the combination of wood framework and stone-covered structures were not similar to the adobe buildings produced during the same period.

Based on the conjunction of buildings and urban planning, the Lavras do Abade site could be considered an early example of an industrial town. A discussion of the field of urban archaeology is also justified but should carefully applied. The notion of space and time in the Lavras do Abade site is less significant than that for current archaeological investigations in other cities, but the same notions of theoretical and methodological approaches can be employed. In the case of mining sites, industrial archaeology and, in a broad sense, industrial capitalism look for signs of the everyday lives of entrepreneurs and employees being shaped by the cultural landscape of “bourgeoisie and proletarian” relations (Symonds and Casella 2006). The Lavras do Abade was a fertile space for these conflicted relations, which existed internally among the manager and workers and externally among the miners and farmers.

In comparison with other archeological vestiges recovered from the present-day city of Pirenópolis from the same nineteenth-century period, the Lavras do Abade material culture presents some similarities and differences. The first apparent similarity lies in the glass samples that appear in both deposits, with expressive occurrence of medicinal bottles in the two sites, which could perhaps be connected with the practice of Hippocratic medicine during the period. However, the massive occurrence of medicinal bottles in Lavras do Abade is an exception, given that historical archaeological sites identified as mining sites in the United States are more characterized by an accumulation of alcoholic beverage bottles (Baxter and Allen 2005). Another false similarity between the two archeological samples is the concentration of metal vestiges in the classified construction categories. However, the preservation of metal artifacts as construction elements is not exclusive to these sites. On the contrary, it is the most common category of metal artifacts in most historical archaeological sites.

Nevertheless, the first real difference concerns the ceramic artifacts from the Lavras do Abade and Meia Ponte villages, which were characterized for the most part as pieces of great value and collective use contrasted with pieces of little value and individual use. The ceramic sample recovered from the old Meia Ponte village was characterized by the low incidence of more valuable items, such as porcelain, and the massive presence of simple earthenware without decoration, as well as by small concave fragments from individual bowls (Carvalho and Lima 2003; Curado 2009). Ceramic artifacts are one of the best indicators of economic status in historical societies. The expressive difference between these specific categories of material culture in the two sites is a good social indicator of disparity. Specifically, in the case of the Lavras do Abade sample, ostentation and the preoccupation with the communal are intimately related to the historical information of public display but could also be related to gender influence (Majewski and O'Brien 1987).

In the same fashion, the building construction elements are also associated with the economic and social similarities and differences established between the Lavras do Abade and Meia Ponte villages, such as the glass windows and roof tiles. Glass windows are an important element of wealth measurement in the interior villages of nineteenth-century Brazil. The substantial presence of this vestige in the Lavras do

Abade sample is an indicator of high levels of concern with the quality of buildings. The roof tiles used in Alfredo Arena's house are unique among the entire sample studied. The presence of "golden" roof tiles in the administration house is a remarkable indicator of economic and social distinction inside, and most likely outside, the mining village. In similar ways, but with different manners of execution, the old Meia Ponte residents were also concerned with the ostentation of their houses; however, their main preoccupation was not with construction materials but with their location inside the village (Curado 2009).

Otherwise, the main difference between the two investigated archeological deposits is associated with the complete absence of pottery samples from the Lavras do Abade site and the extensive presence of pottery samples in the old Meia Ponte village excavations areas. It is generally accepted that African-related pottery is a common occurrence in mining sites in the Brazilian midwest. However, the Lavras do Abade site presents an intriguing counterpoint that needs to be further explored in future research. The total absence of pottery in the studied sample could be a reflection of the collection methodology or could reflect the different social constitutions within the mining village.

In summary, the similarities and differences between the material culture vestiges of the Lavras do Abade, Pirenópolis, and old Meia Ponte sites demonstrate significant economic and social disparities. The glass windows and roof tiles are undeniable, physical indicators of economic and social status, and their abundance, in the absence of information from any other documentary historical resource, is what mainly characterizes the historical archaeology of the site.

## Final Considerations

The material culture recovered from the Lavras do Abade site provides valuable information about the mining feature systems employed, the consumption choices of the residents and the social representations of the objects, as well as about the building structures and spatial organization of the mining village. According to the literature on mining archaeology (Baxter and Allen 2005; Bell 1987; Davis 2005; Douglas 1998; Hardesty 1988; Jones et al. 2004; Knapp 1998), mining sites could be classified as spaces that, despite their monumental scale, reflect three distinct spheres of knowledge: material, population and information. At the Lavras do Abade site, all three spheres are recognizable.

First, the material sphere of the site can mainly be identified through the technology employed in the mine. The installation of the CMG Company in 1880 brought to the mine a corporative vision of gold exploitation. The changes made to the landscape, such as the diversion of streams and the waterfall, the implantation of flumes in wood and stone, and the hill dismount by the hydraulic machine, were the most significant. Today, the environmental impact of these actions is still evident, as are the archaeological and environmental testimonies that populate the Lavras do Abade site.

Second, the population sphere is represented by the village itself and by the history of conflict that is attached to this place. The type of occupation planned for the Lavras do Abade village was definitely not a temporary settlement but rather the establishment of permanent households. The best example of the urban planning program of the mine

village is the administration house. The Arena house is a perfect combination of administrative office and domestic household; the materials used in its construction, such as “golden” roof tiles and glass windows, were clear elements of ostentation. On the other hand, the activities that took place inside the house combined many different activities, such as residence, production and power control.

Third, the information sphere is also visible in the material culture from the Lavras do Abade site. As an ideological component of modern archaeological mining sites, the capitalistic mentality can be noted through the study of material culture in Western societies. The ceramic, glass and metal recovered from the site reflect not only the economic aspects of a mining village in midwestern Brazil at the end of the nineteenth century but also its social aspirations. In addition, subjects such as class and gender can also be inferred through the materiality, with the socially segmented areas being represented by the context of the finds.

Finally, the feature system applied to the Lavras do Abade mine site is characterized by its autonomy and isolation, and this site can be defined as an industrial island in an extractive landscape. Autonomy, a consequence of the technology employed in gold exploration, which was monumental in scale, produced a boom-bust economic exploration of the area. Isolation, a result of the production options chosen by Alfredo Arena and the CMG Company, involved no regard for the indiscriminate use of valuable environmental resources, such as water.

The preliminary structural and spatial analysis of the site also indicate the existence of urban patterns most likely related to industrial cities. This result leads us to conclude that the archaeological vestiges and spatial organization of the structures demonstrated a high level of economic and social segmentation within the mine, as well as between the Lavras do Abade and Meia Ponte villages. In light of this, the question emerges whether the samples of archaeological vestiges recovered in the excavations were representative of the entire population that lived at the Lavras do Abade site. To address this question in future research, it will be necessary to increase the archaeological sample with the excavation of other units and to expand those already in existence, such as the miner’s houses, the canteen, the smithy, the drover’s house, and the factory.

The Lavras do Abade site today serves as a place of memories for the living community of the city of Pirenópolis (Costa 2013b). The references found not only in the historical documents but also in the residents’ oral histories and memories are clear testimonies of the environmental conflict that occurred between the villages in 1887. The preliminary and exploratory condition of the archaeological excavations conducted and presented in this work also emphasizes the need for broader research about the topic and the place (Costa 2013a).

In conclusion, initial archaeological investigations were conducted with plentiful recognition of the information revealed by documented sources. Knowledge of the historical facts contributed to the organization and program of the archaeological research. The historical insights were also important in the verification and counter-verification of the material studies formulations. This interconnection of written, pictorial and oral information and the vestiges of material culture is what best characterizes the historical archaeology of Lavras do Abade. The multidisciplinary approach of the Lavras do Abade case study demonstrates an interdisciplinary analysis of such archaeological vestiges, which serve a historical function as memorials to an environmental conflict exacerbated by political and economic tensions in the region.

**Acknowledgments** I would like to thank PROPESP/UFPA and FADESP for their financial support of the publication of this article.

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