

Livelihoods and the Rural Exodus
In Rosário da Limeira, Brazil

Final Practicum Report

Presented at Iracambi

June 20, 2014

By American University
Led by Professor Eve Bratman

Table of Contents

Abstract.....	2
Introduction.....	3
Section 1: Rural Livelihoods.....	5
Section 2: Community Assessment.....	8
Section 3: Environmental.....	11
Section 4: Mining.....	13
Future Scenarios.....	14
Conclusion and Recommendations.....	18
Works Cited.....	22
Appendices.....	24
Contributor Biographies.....	24
Figures, Graphs and Photos.....	27

Abstract

Rural exodus is a phenomenon that has been documented in Rosário da Limeira and yet its potential effects on the region are not well understood. This report includes the findings of a study done by a team of graduate researchers from American University's School of International Service in June 2014. It addresses the impacts of rural exodus on livelihoods, community, and the environment in the Rosário da Limeira region with a focus on youth migration. Over a three week period, the team used semi-structured and informal interviews with members of the community including municipal leaders, farmers, and youth to collect relevant data on the perceived causes of rural exodus, the threats it presents to the region, and potential measures that could be taken to mitigate the trend. Based on a review of secondary sources and the interviews, the report provides a brief overview of the current context in and surrounding Rosário da Limeira and juxtaposes this with possible future scenarios for the study area depending on whether efforts will be made to prevent rural exodus. To conclude, several recommendations are offered based on observations from the study, and the feedback received from interviewees.

Introduction

We live in a rapidly urbanizing world. Globally, the percentage of rural dwellers is expected to plummet from its current level of 47% to 33% by 2050 (United Nations, 2014). Even more dramatically, between 1960 and 2000 the share of rural residents in Latin America and the Caribbean declined from around 50% to less than 25% (Grau and Aide, 2007). Among the reasons for the decline are factors linked to a lack of economic and livelihood opportunities in rural areas, barriers of access to social and political resources, and perceived higher wages and employment options in urban areas (Proctor and Lucchesi, 2012)--a combination described in the literature as 'push' and 'pull' factors. According to Lall et al. (2006), these factors also reflect the existence of local amenities, the cost and availability of public goods, and even institutional factors. Although economists and others have made arguments on behalf of rural migration to cities, the effect of this phenomenon on rural communities, urban areas, and nations is decidedly mixed. It is particularly difficult to capture the social and cultural impacts of rural-urban migration, as they cannot be readily quantified in the same manner that economic effects can. However, scholarly studies have been critical of the rural exodus on health (Ebrahim et al., 2010), environmental (Robson and Berkes, 2011), water and land scarcity (Maheshwari et al., 2014), and rural labor availability (Byerlee, 1974) grounds.

Throughout Brazil the push and pull forces described above have triggered a wave of rural out-migration resulting population that is 85% urban (World Bank, 2013). The municipalities of Rosário da Limeira (hereafter, "Limeira") and Muriaé, located in the south of the Brazilian state of Minas Gerais, are experiencing their own rural population declines as individuals and entire families migrate to surrounding and distant cities. The rural population of Limeira has fallen by 12% between 2000 and 2010, and in Muriaé it has declined by 7.8% over the same period (IBGE, 2014) (fig. 1).

Brief Background for the Study

Concern over the ramifications of this trend, particularly among youth, within a rural area straddling the dividing line between the Limeira and Muriaé municipalities provided the impetus for our research. The Iracambi Research Center, a conservation and education NGO located in the region, asked our team of graduate students from American University's School of International Service to conduct a study to determine the drivers and underlying causes of rural exodus of youth in the area, as well as to offer constructive ideas on potential means to slow or reverse this phenomenon. This report represents the final product of our research. The ongoing trend towards rural out-migration has created a concern for long-term community land holdings and farming practices in the area of study. As the population in Limeira continues to age and young people are drawn to urban areas, the opportunities for land to turn over to mining companies has become a possible reality. Our team set out to learn more about these perceived threats to rural livelihoods and causes linked to the rural exodus.

Overview of the Area of Study

The residents of the region have traditionally tended the land as subsistence farmers and sharecroppers, with coffee dominating the rural economy and milk production as a secondary activity. As in most regions of Brazil, land distribution is skewed, although land ownership inequality is lower in the region than in many other areas of the country, with 60% of the land being owned by 20% of landowners (Le Breton, 1998). Coffee cultivation is intensive and focuses on producing large quantities of low quality berries. Historically, coffee cultivation and pastureland for cattle has driven deforestation and soil erosion in the region. Agricultural livelihoods have been most dramatically affected by a series of issues including low prices for products such as coffee and milk, and an overall declining surface area of agriculture (Zita Wilhelmina van Ree, 2007). This has resulted in reduced agricultural employment opportunities for small scale farmers and hired laborers. Non-agricultural livelihood options for local residents are virtually nonexistent.

Inhabitants of the region structure themselves around two main platforms: the family and the church. In general, the family unit in the region is insular, although there are evident differences between families that live in rural and urban areas within the region. Most socialization takes place during family and religious functions. Given a general absence of entertainment and social amenities outside of the church and family, opportunities for young people to interact are limited. For this reason, proximity to one's neighbor is an important factor in the interaction of residents. As one youth told us (Interview, June 18, 2014), those families that live closer to one another tend to interact more than those that live further apart. This creates additional social isolation for already geographically segregated community members living in the area of study.

In 1995, Limeira split with Muriaé to establish its own municipality and was subsequently able to fund investment toward improved infrastructure for its residents, including the construction of roads and expanded access to utilities. As evidenced by interview responses discussed throughout this paper, residents agree that they have benefited from these infrastructural improvements. However, they also perceive government shortcomings, particularly the lack of employment opportunities in Limeira, as a reason for the declining rural population. Furthermore, there is an immediate concern for alternatives for Limeira youth in the face of a decreasing population. The town has yet to meet this demand, especially within its rural areas.

Methodology

The study is rooted in a qualitative epistemological position that recognizes the importance of locating the research within a particular social, cultural, and historical context. It bases its conclusion primarily upon a series of semi-structured interviews with local residents. An initial two-day meeting with Iracambi founder Robin Le Breton paved the way for a series of interviews through the use of snowball sampling. These interviews took place in Rosário da Limeira, Belisário, Muriaé, and the rural area between them. For purposes of this paper, these locations will be referred to as "the area of study," "the study area," or "the region." (fig. 2) Over the course of two weeks, we conducted a total of 16 interviews with input from 27 participants including municipal officials, former residents of the study area, NGO staff, and community members, including both youth and adults. To ensure that diverse opinions were

represented, we met with families participating in a variety of rural livelihood options including conventional small-scale coffee farmers, local cachaça producers, organic farmers, and family-run rural tourism operations.

In addition, we carried out a review of existing secondary sources, including a series of reports produced for the Iracambi Research Center on conditions in the region and municipal reports from Limeira and Belisario. We also briefly reviewed existing scholarly literature on the causes and effects of rural migration. Finally, we draw on statistics from the national census and agricultural price data to provide empirical support for our findings.

Limitations

The limited time available (research was conducted over 15 days from June 1-19, 2014) for the researchers to investigate factors contributing to a rise in the previously observed rural exodus is a significant impediment to this study. While the in-situ research approaches formulated and implemented during our time in the field offer valuable insight into community thoughts and aspirations, we also recognize the narrow sample size to be a limitation to our findings. As such, it is difficult to provide thorough recommendations to Iracambi or the municipalities that are inclusive of the voices of all community members.

An additional limitation on the representativeness of voices included in the study arose from the fact that many of our interview subjects had current or previous affiliations with Iracambi and were aware of various issues, especially those of an environmental nature, affecting the region. We also noticed a trend in the political awareness of the respondents, who were well versed in the role of government in addressing their concerns. Both examples cast doubt on whether the views of interview subjects were characteristic of residents of the region.

Organization of Report

This report is organized around four interrelated “game-changing” factors for rural migration in the region: Livelihoods, Community, Environment, and Mining. Each factor is covered individually in a section in which we present the context surrounding the factor and potential threats to, or stemming from it; identify the potential impact of these threats on rural migration; and offer general conclusions. The sections on game-changing factors are followed by a section on future scenarios in which we develop two alternate pathways for the region based on.... Finally, we present global conclusions regarding the causes of migration in the region and then close by offering recommendations for potential actions and policies for stemming or reversing the tide of this phenomenon.

Section 1: Rural Livelihoods

Context

Households in the rural areas of the region are heavily dependent upon the agricultural sector for their livelihoods. Coffee, as in much of the rest of Minas Gerais, is the crop of choice, being well suited for the area’s altitude and having constant international demand. It is the primary source of cash income for regional households, which is to be expected in a state where 74% of agricultural income is derived from coffee production (FAEMG, 2005). Watson

and Achinelli (2008) characterize coffee cultivation in Limeira as being driven by quantity over quality, as well as being almost exclusively sun-grown and erosion-prone. This assessment is confirmed by our direct observations of coffee farms in the region, featuring trees planted on steep slopes without vegetative cover between rows, use of chemical fertilizers to compensate for degraded soils, and the strip-picking of cherries, usually regardless of ripeness (image 1).

In terms of sale prices, coffee farmers are largely at the mercy of international commodity prices, which are frequently non-remunerative. They cannot command premium pricing because of the low quality of their harvest, and they also lack the ability to process their coffee to earn higher prices, as equipment is beyond the financial reach of individual households. One farmer commented that, at the current price of R\$60 per bag, his coffee was only worth slightly more than the labor he paid to pick it (Interview, June 16, 2014). As a result, farmers are forced to employ high-intensity measures to maximize their production without regard for long-term considerations such as soil quality and crop diversification (Watson and Achinelli, 2008) (image 2).

A second significant component of farm livelihoods in the area is milk production. However, depressed prices have made dairying little more than a subsistence activity, with some farmers exiting production and others selling whatever surplus they have for a few extra reais, as current prices range between R\$.85-.95/liter (Indexmundi, 2012; Interview, June 16, 2014) (image 3). Food crops are grown almost entirely for household consumption, as markets for produce such as rice, beans, manioc, vegetables, and fruits either do not exist locally or are too difficult to reach. Some farmers have planted eucalyptus to harvest for timber, and although trees can be coppiced (cut down at the trunk, where they grow back) up to four times before becoming economically unviable, stands are often not sustainably managed and further degrade local soil as eucalyptus tends to draw on water and nutrients intensively to support its rapid growth (image 4).

Beyond agriculture, current livelihoods opportunities for rural households in the region are minimal. For small-scale farmers with fewer landholdings, wage labor during the coffee harvest and other times of year is one means of earning extra income, although this provides no more than sporadic employment. Members of some rural households commute daily to Rosário da Limeira for municipal jobs or with the local clothing factory, while others perform textile piecework at home. On rare occasions, a handful of households may host so-called “rural tourists,” referred by the municipality of Muriaé, who pay to stay at their homes in order to experience “life on the farm”. Others earn some income by producing value-added food products such as (Brazilian sugarcane liquor) and candies. These activities benefit a small fraction of local households (image 5).

Threats to Livelihoods and Implications for Rural Migration

Threats to the livelihoods of rural households in the region are myriad. An ever-present medium-term threat, bauxite mining, is discussed in a later section. Many households’ continued dependence on a single commodity, coffee, is one cardinal danger, particularly in light of volatility and recent record low international coffee prices. A threat that goes in tandem with the monocropping of coffee is the ongoing depletion of the region’s soil quality

through erosion and intensive cultivation methods. With some local farmers already reporting that agriculture does not pay enough for subsistence, continued degradation of the land bodes ill for the future feasibility of small-scale agriculture in the area.

Other threats to agricultural livelihoods include the lack of access to markets for produce other than milk or coffee and scant success in acquiring government support for family agriculture (Interview with Pastoral Land Commission volunteer, June 12, 2014). Poor roads and lack of affordable transportation limit farmers' contact with broader market opportunities, particularly in urban areas. Federal programs that permit the government to purchase up to \$R5,000 of food crops from family farmers and mandate that small farmers supply 30% of all of the produce for the national school lunch program have not benefited households in much of the region. In the case of the former, farmers must be part of cooperatives in order to have their produce purchased; in the latter, poor transportation infrastructure from the area inhibits the ability to supply schools with produce (Interview, June 17, 2014). Likewise, federal programs such as PRONAF (*Programa Nacional de Fortalecimento da Agricultura Familiar*), which provides support and credit to family farms, and the 2010 Act on Extension and Technical Assistance for Family Farming and Agrarian Reform, which prioritizes support to rural extension activities in ecological agriculture (De Schutter, 2010), also have not reached the area. Government extension agents have virtually no contact with local farmers due to the fact that there is one extension agent for 46 communities. Furthermore, government credit is only extended for coffee production, and while interest rates are low, short repayment schedules constrain farmers' ability to wait for better prices for their crop (Interview, June 17, 2014).

The implications for rural migration are relatively straightforward: although the causes of migration are multiple, complex, and interlocking, it seems clear that the inability to earn a viable livelihood in the region is one of the strongest contributing factors. A common refrain among local farmers when asked about migration was that life on a farm is hard (involving "slave-like" work) (Interview, June 16, 2014) and generally coupled with a paltry income, the implication being that migration is usually inevitable in such a context. The lack of substantive non-agricultural livelihood options in the area is a key contributor to this broader problem.

Conclusion

Strengthening and diversifying livelihoods in the region will require a multi-faceted approach. Addressing one or two areas of weakness (e.g. paving roads without improving land management and promoting crop diversification) in a single alternative livelihoods strategy (tourism) is unlikely to produce long-term results. Agriculture is likely to dominate the local economy into the foreseeable future, so strategies to address local livelihood deficiencies must confront constraints on family farmers, while simultaneously pursuing new income options for residents.

Above all, local farmers need the knowledge, economic incentives, and opportunities to diversify their production and pursue more sustainable means of cultivation. In the absence of such incentives, the prevailing risk-averseness of farmers will ensure the perpetuation of existing patterns and practices, which, as noted above, hold little potential for a sustainable future. Farmers also need to be able to participate in government programs designed for

their benefit, particularly those offering built-in markets and credit for food crops. Finally, farmers will require the means of transportation and infrastructure necessary to further access urban markets.

Specific conclusions regarding non-agricultural livelihoods in the region come less readily, as building viable opportunities from a nearly non-existent base means that such conclusions must be broad. What is clear is the necessity that income-generating alternatives to agriculture be created, and that such alternatives be diverse in nature: in Limeira's case, attempting to utilize a single strategy is not a viable strategy. Building on existing strengths, such as the area's potential for tourism (discussed at length in the next section), and the production of value-added food products may be a good starting place. Other activities may focus on the substitution of locally produced goods and services for goods usually purchased outside of the community. Lastly, leveraging available government support (in the form of credit for small enterprise start-up or technical aid) may provide essential assistance in launching viable alternatives.

Section 2: Environmental

Current Context

The Atlantic Rainforest is one of the most biodiverse places in the world. It is home to important and rare species such as the critically endangered Woolly Spider Monkey. Despite this importance, the forest has been decimated to just 7% of its original area largely due to human activity (World Land Trust, n.d). In particular, deforestation has been the result of expansion of coffee and pastoral farming activities after the 1980s when the government of Brazil moved towards an open economy and began encouraging large-scale agricultural production (Watson and Achinelli, 2008; Interview with Pastoral Land Commission Volunteer, June 12, 2014). The loss of forest cover as a result has in turn exposed the soil to erosive elements that has contributed to a decline in soil fertility (Watson and Achinelli, 2008).

In recognition of these environmental challenges, there have been several government and non-governmental initiatives to promote conservation of the Atlantic Rainforest as well as initiatives of individual farmers to practice "non-aggressive" farming methods. In 1965, the government of Brazil made it mandatory that 20% of each private farm land outside the Amazon be preserved as forest as a requirement of the Forest Code (IPAM, n.d.). Additionally, the government also passed a law to make cutting forests without a permit illegal (Interview, June 5, 2014). If caught, perpetrators face imprisonment. The farmers interviewed for this study were aware of and abided by these laws. The non-governmental organization (NGO) *Centro de Tecnologia Alternativa da Zona da Mata* (CTA) has been active in supporting farmers who choose to practice agro-ecological farming. One of their initiatives has been to encourage shade grown coffee farming that prevents soil erosion and preserves soil fertility (Agroecology, n.d.). Iracambi is also an organization of great significance with regards to conservation. To date, some of their accomplishments include creation of 2000 ha of Environmental Protection Areas (EPAs) and 1000 ha of private forest reserves; conservation of habitat for the endangered Woolly Spider Monkey; and reforestation efforts (Iracambi, n.d.).

Beyond government and NGO conservation efforts, there is an emerging trend of individual farmers recognizing the need to practice agro-ecological farming methods. One of the organic farmers interviewed explained his “non-aggressive” approach to farming that is a sustainable alternative to conventional farming (image 6). These conventional farming methods, according to him, perpetuate a dependency on agro-toxin use. Some alternative, sustainable methods mentioned include the use of garlic to fight fungus on strawberries, cow urine as insect repellent, and homemade fertilizer mixture including animal bone ash, rice husks, and efficient microorganisms (EMs) to facilitate decomposition and nutrient release within plants and the soil (Interview with farmer, June 17, 2014). Another farmer interviewed preserved the trees around a stream on his farm because he recognized the direct connection between the preservation of forested land around a stream and the volume of water provided by it (Interview, June 5, 2014).

Rural tourism gained ground in the Limeira area in the mid-2000s with the recognition of its importance in the territorial development plan of the Serra do Brigadeiro State Park which was complemented with funding from the Brazilian Ministry of Tourism. Additionally, tourism in rural family agriculture was seen as encouraging the rational use of natural resources, and its preservation, conservation and reclamation that serve as tourist attractions (Moraes et al., 2013).

Some of the initiatives taken by the local municipalities to promote rural tourism include the promotion of community based tourism by providing local farmers with free courses on how to organize and display their farming activities to tourists, how to produce local foods to sell to visitors, and how to welcome and host visitors on their farms. Additionally, local municipalities involved with this initiative identify and send tourists to rural farmers trained in these courses (Interview, June 16, 2014). Hand painted signs neatly marked the various relevant activities in many of the farms visited for this study (image 7). One farmer interviewed displayed posters about the distillation process he employed for his cachaça (Brazilian sugarcane liquor) production as well as a tourist guestbook.

The Iracambi Research Center plays a significant role in promoting ecotourism and volunteerism for the rural farmers in both Muriaé and Limeira Municipalities. Volunteers and visitors to Iracambi are encouraged to visit local farmers and hike the various trails in the surrounding areas to gain a better appreciation of the lifestyle and people in the region.

Implications for Rural Livelihoods and Rural Migration

The focus on large-scale pastoral farming in the area significantly impacted the rural exodus as pastoral farming requires fewer laborers compared to other farming activities. In the 1990s it was common for entire families to migrate to urban areas in search of income opportunities as they were “pushed out” of their former livelihoods (Interview with Pastoral Land Commission Volunteer, June 12, 2014). Pastureland continues to expand today, as those who abandon farming in search of urban life tend to sell their land to the area’s increasing large-scale pastoral farmers (Interview, June 16, 2014).

Many of the current agricultural practices pose the danger of further decimation of the forest cover and decline in soil fertility, which threatens agricultural productivity and rural

livelihoods (see Livelihoods section for further details). Additionally, the encroaching threat of mining activities in the area also has the potential to displace farmers and negatively impact their livelihoods as discussed in the following section. Collectively, these factors have the potential to increase the rural exodus.

All interviewees alluded to the potential of ecotourism to complement incomes of local farmers, create new job opportunities such as tour guide and equipment rental services, and promote the production of local foods such as homemade cheese and candies. Ecotourism was also seen as a way to promote a positive image of the countryside and a potential way to reduce the rural exodus. Community tourism, however, was not seen as a permanent or dependable source of income, with farmers usually receiving visitors only several times a year. Nevertheless, farmers continued efforts to improve their future visitors' experiences by building small shops on their farm to display and sell their produce and build accommodation for tourists (Interviews, June 13 and 16, 2014).

There is a growing domestic tourism trend of urban Brazilian families traveling to rural areas in order to experience rural life by spending a day in a farm, engaging in farm activities and consuming the fresh produce (Interview, June 6 and 15, 2014). Ecotourism's potential to prevent rural youth from migrating out of rural areas, however, is less clear. While most of the adults interviewed for this study believed that tourism would create an incentive for young people to remain and work in rural areas, none of the youth interviewed explicitly mentioned a preference for rural tourism-related jobs over migrating to urban areas. There was also a general belief among the youth interviewed that tourism in the area would be mostly sought by retirees.

Conclusion

Though many smallholder farmers in Rosário da Limeira recognize the negative impacts of growing coffee without forest cover, the desire to maximize profits often overrides the environmental concerns (Watson and Achinelli, 2008). It is important to acknowledge that this profit-seeking tendency is a matter of survival and providing for one's family as opposed to a deliberate effort to harm the environment. Further, the culture of conservation has not yet taken root in the region, a fact that will remain a challenge to any conservation attempts (Interview, June, 2, 2014).

Current agricultural practices that negatively impact the environment, especially in coffee and pasture farming, continue to pose a danger of further decimation of the forest cover will continue to negatively impact rural livelihoods. The provision of economic or other incentives may help to offset the threat of human activity to the environment. Payments for Ecosystem Services (PES) and ecotourism can both be used to this end. With regard to PES, there is potential to engage more farmers in conservation activities as long as the provision of ecosystem services is shown to be directly profitable.

While the consensus among those interviewed was that ecotourism would positively impact rural livelihoods and help promote a positive image of the "countryside", there was also a general concern that tourism might be implemented in a way that is harmful for the environment. It is also important to note that while the Muriaé Municipality has made a

serious effort to promote rural tourism, the Rosário da Limeira Municipality has not followed suit as of late (interview with Vice Mayor of Rosário da Limeira, June 13, 2014; Interview, June 17, 2014).

Section 3: Community Engagement

Current Context

Community relations within the greater Rosário da Limeira and Muriaé area are composed of highly complex networks, depending on demographic and geographic contexts. Based on our assessment of the ways in which this diverse community organizes, we uncovered several foundational characteristics of community, three of which were consistently mentioned by interviewees. One of the most significant characteristics of the community throughout the region pertains to its religious organizations, which are almost exclusively comprised of Catholic and Evangelical denominations. A second key feature of community in this region pertains to its tradition of individualism and lack of collective organization, especially regarding labor cooperation. The third significant community characteristic evident in the majority of interviews conducted is that youth share common childhood experiences but often have divergent future aspirations due to the lack of opportunities, quality of education, and future prospects for community improvements. The existing community context must also be considered in combination with threats to religion, employment, infrastructure, and education. Consequently, a shift in the community context has implications on the capacity of the community to adapt to future impacts on livelihoods inclusive of substantial rural to urban migration.

Throughout the region, religious groups are important in terms of personal spirituality and community building, with religious devotees gathering for large weekend services and house group services during the week. Preparations for and participation in religious festivities offer opportunities for gatherings among family and neighbors. When asked about community, several interviewees primarily cited religious activities as their main form of interaction with others outside of their family. In addition to formal services and events, the Catholic Church provides catechism classes and opportunities for youth congregations, such as *Restauração*, an organized group for youth over sixteen. While representing a smaller proportion of the total population, the Evangelical church also provides services for both youth and adults (Interview, June 13, 2014). Thus, it is evident that religion plays a major community building role in the region.

After conducting interviews and field observations, it became apparent that geographic proximity and cultural idiosyncrasy hinders the work of cooperatives, particularly in relation to its impact on the effectiveness of diversifying distribution of agricultural products. A common theme among all of the farmers interviewed revealed a reluctance to cooperate with other small producers outside of the immediate family or vicinity. There is a sense of individualism generated both from tradition and from the more pragmatic risk of relinquishing autonomy if one were to partially rely on others to generate an income and maintain a livelihood. Thus, there is less potential for forming labor-based cooperatives or

collectives among small rural farmers who could benefit from increased efficiency in production distribution, resulting in income levels that may not reach their full potentials. Furthermore, it is evident that there are minimal opportunities available for youth activities and professional development. Examples of existing youth participation in community initiatives are dance and capoeira classes, both of which have low participation levels, and a municipality-sponsored *Para Jovens* (literally “For Youth”) program that offers limited job experience and wages (Interview, June 13, 2014). Despite these few opportunities for community social involvement, the overwhelming assertion from youth is that there are deficiencies in education and employment opportunities. According to census data on Rosário da Limeira, levels of participation in education in urban areas are higher than those in rural areas (IBGE, 2014). Moreover, there appears to be a severe lack of venues for entertainment and socializing outside of the house and school. Several youth commented that they must travel to larger urban areas to access restaurants, movie theaters, bars, and classes that are not available in the vicinity, making their place of residence less appealing and fomenting the desire to migrate. (Interview, June 18, 2014). (image 8).

Implications for Rural Livelihoods and Rural Migration

While religion serves as one of the central pillars of the community, there has been a relative loss in its influence within the region. This creates a missed opportunity to provide more extensive social services that could improve the livelihoods of community members. Given the cultural context of the region, individualistic household idiosyncrasies can threaten economic livelihoods of small family farmers that could otherwise benefit from participation in cooperative associations improving direct access to markets. In addition, a lack of educational materials and opportunities inhibits local professional development and employment, which are then usually sought outside of the community. Finally, a lack of venues for youth to socialize within the region also serves as an impetus for early onset migration from rural to urban areas (image 9).

In order to strengthen social resilience as a basic attribute of sustainable agricultural communities, it is important to provide “recognition and dynamic conservation of agricultural heritage systems that allows social cohesion and a sense of pride and promote a sense of belonging and reduce migration” (Koohafkan, et al. 2012). Thus, while the preservation of tradition is necessary for sustaining a sense of community, a certain level of dynamism and openness to change is also necessary to progress and prevent high levels of out migration. Unfortunately, the current foundational characteristics and threats to community in Rosário da Limeira and surrounding areas are key factors spurring the desires by many youth to migrate out of the region to pursue more opportunities for the future. Consequently, various internal actions are necessary to maintain the sense of community, allowing it to prosper and flourish.

Section 4: Mining

Context

Mining has played an important role in the identity of Minas Gerais since colonization, when the Portuguese discovered gold in the region. Since then, other natural resources have been discovered, extracted, and used to fuel the economic engine of both the state and country. Today, Brazil is a resource-rich country eager to participate in the globalized economy, and as such has signed several trade agreements involving resource export quotas. According to the U.S. Geological Survey, Brazil is the world's third largest exporter of bauxite, which is used to make the aluminum found in many personal electronics and other household items.

The region of study is home to part of Brazil's second largest bauxite deposit, estimated to be worth US\$2 billion (Harper, 2007). As such, the Votorantim Group, a conglomerate using 100% Brazilian capital to conduct mining operations throughout South America (Votorantim, 2012), has been granted mining concessions on 112 sq km of the Limeira municipality's 114 sq km, including land designated as protected areas by government or private owners. In 2004-2006, residents in the area encompassing Rosário da Limeira organized themselves to prevent Votorantim from extracting bauxite (Harper, 2007). These residents were able to secure three public hearings with the mining company, secure official anti-mining statements and positions from three local municipalities, halt mining activities that were licensed without public hearings, and work with the state park to define a buffer zone of 10 km around the park perimeter. The security offered by this buffer zone is now in question as the *Ministério Público* recently made a ruling reducing community and environmental protections (Interview, June 13, 2014). (fig. 3)

Threats and Implications for Rural Migration

Mining poses a large potential threat to livelihoods in the region. Many of the residents we spoke with acknowledged that the advocacy activities of the last decade were successful at both stopping Votorantim from commencing operations and in preserving their current livelihoods. As a result of this diligence, community members also stated in interviews that they no longer perceive mining as a threat to their land and agricultural practices. This myopic view is a cause for concern. It is very likely that Votorantim, as well as other mining companies, are still aiming to help Brazil meet its export needs and access the wealth of deposits in Minas Gerais and the Serra do Brigadeiro region. While companies have been persuaded to change their approach as a result of community organizing and social movements, they are unlikely to give up entirely with so much to be gained. In addition, the recent *Ministério Público* ruling creates a possible point of weakness within the community since the original community victory has been overturned and the mining companies can now enter this area.

Arguments in support of mining highlight that extractive activities have created great economic wealth in the past and will continue to provide new economic opportunities with their expansion. Possible benefits from mining activities include local job creation in mining and auxiliary businesses, in addition to rental incomes to landowners. Unfortunately mining

can have many negative social, environmental, and health-related impacts that are rarely mentioned in the analysis of mining activities (IBRAM, 2012). These impacts could dramatically change regional lifestyles and opportunities. Farmers that are forced to rent their land to mining companies will almost certainly see the land returned to them in a state unsuitable for agricultural use. Thus, due to diminishing agricultural activities, mining threatens the region by encouraging youth migration from farming households.

Conclusions

Despite the clear threat posed by mining interests in the region, advocacy efforts in 2004-2006 demonstrate that communities can influence a company's practices, as evidenced by new corporate social responsibility (CSR) initiatives. Since 2006, Votorantim has increased its CSR activities in the area to include educational, cultural, health, and other social programs ("14,000 residents," 2014). Through AdeMata, the Regional Development Authority, and the Votorantim Institute, the company has demonstrated the desire to build stronger relationships within the community. The residents in the greater Serra do Brigadeiro area can use this potential commitment to shape the relationship into one that increases livelihood opportunities. History has demonstrated that when the community has mobilized, government and the private sector have responded. Residents can work to ensure that sustainable development plans for their communities include continued and improved livelihood options. If mining is to occur, having guidelines in place requiring comprehensive land restoration after mining operations are completed would help owners restore the productivity of their land.

While mining in national and state parks is illegal, it is uncertain what protections, if any, exist on designated "conservation areas." Clarifying this in the Brazilian judicial system could be arduous and costly, but may yield positive results for communities given the history of how previous environmental and property law cases have settled.

Above all, Rosário da Limeira and surrounding municipalities should remain vigilant and ready to mobilize against mining companies should the need arise to ensure that community livelihood concerns are protected and enriched, and that current residents are not forced to locate elsewhere.

Future Scenarios

What the future holds for the region is indeterminate and depends largely on choices and priorities made by community members and local governments. The information gleaned from interviews in the area can be used to paint both hopeful and bleak scenarios depending on the context of the questions asked and the perspective of the individual interviewed. This section provides possible scenarios for this region, both positive and negative, as an attempt to provide insight into where future choices may lead. The timeframe projected in the following scenarios predict situations likely to occur in approximately 25 years. These events depend on and will affect crucial pivot points regarding rural exodus away from the region, specifically by youth.

Positive Scenario

A “best case” scenario is one in which the region retains, and even attracts residents. This scenario depends on multiple factors that we believe will discourage migration out of the region, largely by providing citizens with what they need to live productively and pursue their interests. Increased investments in social services and infrastructure by local and federal governments will benefit both youth and adult residents in the study area. The impacts on population retention associated with the expansion of existing programs in place for family farmers should not be ignored. These programs include *Minha Casa, Minha Vida*; the *Programa Nacional de Alimentação Escolar* (PNAE) to promote organic agricultural markets; and the *Programa de Aquisição de Alimento* (PAA), a government subsidy for farmers. Additional regional priorities to be maintained, managed, and regularly assessed include: 1) funding for better roads; 2) commitments to improving education opportunities; and 3) promoting farmer livelihoods through publicly sponsored training, rural-tourism, and commercialization; 4) cooperative activities.

Transportation Infrastructure

With better roads, residents would experience faster access to urban areas, commercial centers, and social services. Additionally, improved access to rural areas would incentivize buyers of agricultural products, tourists, and urban residents to journey into the countryside. Increased visitors to this area could create direct points of sale for producers and encourage tourism. Improved roads would also make it easier for youth to live in the country and commute to Muriaé for education and employment opportunities, since geographically the two municipalities are in close proximity to one another. (image 10). No longer faced with the ultimatum of choosing between a “labor-intensive rural life” and the job or education they seek, ambitious youth will be incentivized through minor infrastructure investments to continue a productive and promising life in Limeira. In turn, an active and engaged youth community might lead to attentive political voices for further investment in the types of services that make for a community in which people choose to live.

Educational Opportunities

Investments in higher quality education would enable youth in the area to harness appropriate knowledge and training for future career aspirations, be it vocational or advanced education. This need for education has been expressed by multiple youths in the region who acknowledge the fact that they lack the skills, tools, and supplies typically supplied through education to reach their aspirations. In addressing this concern, the government can incentivize youth to pursue their goals in the area of study. (Interviews 6/18 with Rosário da Limeira youth).

Farming Practices

In a scenario where the government chooses to invest in sustainable and organic farming methods farmers are encouraged and incentivized to learn and implement new techniques. In turn, these improved applications of knowledge and inputs will help them produce healthier products and provide the same to the community. Investments including the development of markets for organic crops and the technical support of farmers desiring to

switch from conventional to organic agriculture would alleviate much of the risk generally associated with the implementation of alternative farming practices. Ideally, these investments would also allow farmers the opportunity to scale up production through subsidies or access to credit. These funds can be used to access the necessary inputs such as sugar cane presses, agro-ecological labels, and the creation of ecotourism infrastructure (image 11).

Regardless of production methods, however, this positive scenario depicts a world where farmers have the ability to acquire the necessary inputs as well as improved access markets. Sustainable and agro-ecological farming methods present the added benefits of diversifying crop production, reducing or reversing environmental footprints, and providing a community of like-minded farmers who can work together to set fair prices and expand markets. Accordingly, it also aspires to a community where farmers interact and share effective and sustainable cultivation methods with their friends and neighbors. The community cohesion fostered through these relationships also allows for the sharing, spreading, and growth of knowledge through practical experiences in the field. This provides social, economic, and emotional benefits, with families solving problems internally without as much reliance on government support. This sense of community would be a supportive and mobilizing system, should external threats such as mining return to the region (image 12).

Cooperatives & Community

Formation of and involvement in cooperatives that promote organic products and more direct sales with buyers would also provide farmers with market power that currently does not exist. However, community cohesion is perhaps most powerful in its ability to incite collaborative decisions for policies and appropriate investments. The increased involvement of youth and women in local government activities would help establish accountability and higher levels of transparency as well as an understanding of the forces at work within community decision-making. In establishing a decisive role in their community, youth would then be encouraged to collaborate with each other in the sharing of ideas, encouraging avenues for effective government investment, and establishing good practices and effective life skills to be used in the future (image 13).

Negative Scenario

Alternative scenarios to those previously discussed would encompass a more negative trajectory for the region, with activities and events that foment an increase in the migration of youth and families from the region. First and least hypothetical is the threat of mining in the area, which would not only incentivize rural flight, but would dramatically alter the biosphere. With a deteriorated and unproductive environment in the Limeira area, few people will be interested in returning to the region when the mining ceased, due to degraded farmland. Increasingly powerful outside market forces in combination with unimproved roads and poor infrastructure would further decrease regional farmers' access to and competition in markets, necessitating the pursuit of livelihoods elsewhere. On a micro-scale, the perseverance of damaging farming practices by landowners with no incentive to produce using alternative methods, will strip once fertile lands from the resident smallholders and

subsistence farmers. Finally, the deterioration of community cohesion would further isolate the already marginalized rural residents.

Mining

The first possibility is that the mining company, Votorantim, gains permission to commence operations and persuades rural landowners to rent their land for the extraction of the mineral bauxite. If farmers perceive the money offered by Votorantim as sufficient to cover their costs of relocation for the several years their farmland would be borrowed, they might accept the offer (despite the related effects oftentimes not discussed).

As mentioned above, this land would most likely be unfit for agricultural production after mineral extraction in spite of the Votorantim's promise to restore the land. Despite the individualistic attitudes of many farmers, it is likely that if one or two farmers agree to rent their land it would be perceived as a viable option for others in close proximity. This will lead to a domino effect whereby an increasing number of farmers grant Votorantim access to their land. If allowed to occur, the permanent damage caused to mined farmland will force entire families to remain in the city or seek land elsewhere.

Market Forces and Infrastructure

In addition to the threat mining presents, small farmers may also be driven off of their land by outside market forces. As evidenced in several of our conversations with rural residents, many instances of exodus occurred when people were unable to compete in the market due to the extremely low prices that allow for a domination of the market by industrial producers. Ideally, area residents would have preferred to maintain ownership and access to their farms but a lack of education, transportation, and other factors made this option impossible without substantial outside interventions (image 14).

Farming Practices

Unsustainable agricultural practices such as monoculture and agrochemical-intensive cultivation are examples of activities that will slowly degrade soil fertility and diminish crop yields. As such, rural farmers who already face challenges with market prices will be forced into a cycle of unstable production and increased exploitation.

Community

Lastly, the relationships established within the community will have a significant impact on livelihoods in the area as well as on the migration of youth. If government investment in infrastructure such as roads and education remains low, those youth and families with the ability to relocate may choose to move to a city granting them more secure access to jobs and education. Furthermore, government transparency creates an environment that facilitates a community's belief in their ability to affect change and participate politically. These factors could persuade youth to move elsewhere. If these needs are not met regionally, residents will be left with few alternatives to seeking out a location that meets those needs. Since young people do not have the same means of attachment as some older generations, it is easier for them to relocate. (image 15)

Conclusions and Recommendations

The phenomenon of rural migration in the area of study is highly complex, as there are many actors involved, and many aspects to consider before drawing conclusions regarding its causes. Of course, as in any community, some young members will leave and others will stay. However, the ongoing trend over the last decade has shown a marked increase in urban residents and a coinciding decline in rural inhabitants. Based on interviews conducted with members of the Limeira community, we believe that the trend of rural exodus is driven by deficiencies of investment in regional livelihoods and community functions, compounded by a lack of exploration into alternatives. Specifically, the areas we propose to address in responding to current and potential drivers of migration in the region are community fracturing, mining concessions and interests, underproductive agricultural livelihoods, and environmental concerns.

- Improving livelihoods in the region must be a multifaceted process, given the currently underdeveloped state of transportation infrastructure, inefficient farming techniques, overall lack of crop diversification, and stunted tourism industry.
- Despite extensive environmental degradation throughout the region, some small farmers have been adopting more agroecological practices. While Muriaé has a longer and better established tradition of tourism, residents of the Rosário da Limeira area are beginning to appreciate the possibility of additional income through ecotourism.
- With regards to perceived community fracturing in the region, the main issues are a decline in the importance of religion, which affects potential social service investment, pervasive individualism resulting in a lack of smallholder labor cooperation, and a lack of educational and professional development opportunities for the youth.
- The persistent threat of mining also has serious potential implications for the rural exodus, given the fact that the people pushed off of their land in any one of the 112 kilometers of mining concessions in the municipality of Rosário da Limeira faces permanent losses in land productivity.

None of these issues are immutable, and the region has enormous potential to benefit from new ideas, developments, and innovations in all of these areas. Despite this, any proposed initiatives for improvements to prevent continued rural to urban migration can only be fully developed and implemented by the community members within the region.

Livelihoods Recommendations

In order to sustain and enhance livelihoods within the region, we have three recommendations for the Limeira area: improved farmer organization, stronger efforts on the part of the municipal government, and diversified approaches towards to farm and non-farm income.

- First, more cohesive organization among farmers will promote collective action in marketing produce, improved crop cultivation, the purchase of inputs, accessing extension services, and advocating for pro-family farmer policies. Farming organizations have the potential to take many forms, including cooperatives, associations, unions, or

other similar structures depending on the needs and desires of the community. Although organization may be difficult given the lack of local experience with collective measures, few other steps are likely to bring benefits as substantial or widespread to the farmers in the region. This being said, organizations generally do not succeed unless they come about organically from the bottom up, not imposed by governments or development efforts.

- Stronger efforts on the part of municipal governments, the Rural Workers' Union, and local NGOs may be undertaken to link households to federal programs designed explicitly for the benefit of family farmers. These include the PAA, PNAE, PRONAF, and the 2010 Act on Extension and Technical Assistance for Family Farming and Agrarian Reform. These programs collectively hold great potential to encourage diversification away from coffee, promote sustainable agricultural practices, and open markets for locally grown food crops.
- Lastly, a diversified approach to creating alternative rural livelihoods undertaken by municipalities, the private sector, and NGOs, can create diverse and vibrant income options in the region. Concrete steps to this end may include grants and low-interest loans for small business start-ups, as well as continued support and technical assistance to promising ventures in tourism and value-added food products.

We believe that the implementation of any of the discussed techniques and ideas can contribute to the growth of economic potential for families in the area. These steps can increase the availability of livelihood options, ultimately increasing retention and involvement of youth in the area.

Community Recommendations

Cooperation, participation and unity among citizens of the region is a necessity for addressing any perceived issues involving youth migration.

- First and foremost, youth should be included in institutional community frameworks, especially the municipal government, providing a platform through which regional youth can voice opinions and participate in decision-making forums. One potential way of fostering inclusion in government affairs would be to elect one or more youths as a community representative at such forums, serving as a balance to the older generations who are traditionally the primary participants in community decision-making; this could be a voting or non-voting position.
- The increased funding and improvement of educational systems in the region would be of enormous benefit not just for youth, but also for the long-term development of the community. As previously mentioned, based on several interviews with youth, current educational systems in place often do not meet the needs or future motivations of those served by the system. We would recommend investment in existing educational services, technical or agricultural schools, which cater to harvesting or family farm labor schedules, as well as vocational programs, such as foreign language classes, which would help support future tourism and employment opportunities.
- A recurring theme amongst youth interviewed was that few entertainment or recreational activities exist within the community. For this reason, youth are motivated to go to larger urban centers in search of social life and entertainment. The creation of

community programs such as organized sports, social mixers, arts, and live entertainment would diminish the need for young people to search for entertainment elsewhere. Additionally, increased involvement from area churches in social initiatives, ranging from community service projects, educational excursions (such as the ones conducted at Iracambi), and afterschool programs would facilitate greater youth community involvement.

- Finally, the paving and widening of area roads are a key component for community building activities to reach rural areas. This, of course, extends beyond community initiatives, as improved roads would have benefits for family farm incomes and tourism in the region.

Environment, Ecotourism, and Mining Recommendations

Addressing degradation of the natural resource base has positive implications for both agricultural livelihoods and eco-tourism, while remaining responsive to mining threats is essential to effective contestation of future encroachment.

- In order to address some of the main issues related to the environment and ecotourism, area farmers should be aware of agroecological practices that can potentially increase their output and income while simultaneously reducing their environmental footprint. Methods that can increase levels of production and reduce environmental impacts include intercropping, use of organic fertilizer (including recycled farm animal waste, leaves, and husks), and incorporation of agroforestry techniques into farming systems.
- A second powerful option for area farmers is to lobby for a Payment for Ecosystem Services (PES) system in the Limeira area. By actively replenishing the immensely biodiverse forests of the Mata Atlântica, farmers can also promote the natural beauty of the Serra do Brigadeiro for ecotourism incentives. The promotion of ecotourism can provide alternative livelihood opportunities as well as to incentivize rural residents to participate in conservation activities.
- In tandem with reforestation and ecotourism activities, the people of Rosário da Limeira and surrounding municipalities in the Serra do Brigadeiro should remain vigilant and ready to mobilize against mining activities, should the need arise, to ensure that community livelihood concerns are protected and enriched. Social mobilization can be used again to influence company practices in the future and the community should require mining company investment contributing the above mentioned recommendations should mining activities occur. Not only can these community-based protests potentially dissuade mining companies from overtaking large swathes of land within the region, they also have the potential for further uniting the community in the face of external threats.

Concluding Remarks

The options for the Limeira area are many, and there are undoubtedly dimensions of this complex, beautiful and energetic zone of the Mata Atlântica that we have not yet discovered, or simply could not incorporate into this paper. The phenomenon of youth exodus, and rural exodus more generally, is highly complex and unpredictable, but we would hope that the research and recommendations incorporated into this work will be considered and further

developed for the future well-being of the area. Youth retention will remain a daunting challenge for the region indefinitely. However, after becoming acquainted with area stakeholders, families, youth, students, researchers, and blooming professionals, we believe that the Limeira area has the potential for growth in social and economic development that will aid in slowing the current rate of youth exodus.

With regards to future research, it is recommended that the data collected through our report is expanded upon and that it broadly incorporates the viewpoints of community members that are not affiliated with Iracambi. This will ensure a holistic community response to the research and allow for clear and measurable analysis of the changes caused by migration within the region. We recommend that future researchers pay particular attention to community input and opinions regarding the feasibility of our recommendations as they relate to rural out migration. In order for improvements to be made and solutions to work well within the local context, it is essential that community members own and shape the process. Thus, future research should focus mainly on feedback from community members in the creative and implementation processes necessary for developing new policies.

Works Cited

"14,000 residents in the forest zone have benefited from projects Votorantim Metais." *Ideia Sustentavel*. (2014) Accessed June 16, 2014.

<http://www.ideiasustentavel.com.br/2014/04/14-mil-moradores-da-zona-da-mata-foram-beneficiados-com-projetos-realizados-pela-votorantim-metais/>

Agroecology. "Shade coffee in Southeastern Brazil". (n.d.) Accessed June 18, 2014.
<http://www.agroecology.org/Case%20Studies/coffee.html>

Amazon Environmental Research Institute (IPAM). (n.d.) "Proposed Changes to the Brazilian Forest Code: A Brief Overview of the Critical Issues and Next Steps" Accessed June 19, 2014. <http://www.ipam.org.br/>

Ranjana Audichya, and D. C. Pant. "Challenges in the Urban and Peri-urban Transition Zones and Strategies for Sustainable Cities: Experiences from Selected Cities." *The Security of Water, Food, Energy and Liveability of Cities Water Science and Technology Library*. (2014) Volume 71: 71-85

Associação Amigos de Iracambi. Diagnostico Rural Participativo (Drp) Comunidade De São Geraldo Da Babilônia. *Área De Proteção Ambiental Da Babilônia Rosário Da Limeira – Minas Gerais*. (2009)

Byerlee, Derek. "Rural-urban migration in Africa: Theory, policy and research implications." *International Migration Review* (1974): 543-566.

De Schutter, Olivier. "Agroecology and the Right to Food." *Report submitted to the U.N. Human Rights Council by the Special Rapporteur on the Right to Food*. (2010) New York: United Nations.

Ebrahim S, Kinra S, Bowen L, Andersen E, Ben-Shlomo Y, et al. "The Effect of Rural-to-Urban Migration on Obesity and Diabetes in India: A Cross-Sectional Study." *PLoS Med* (2010) Vol. 7(4): e1000268. doi:10.1371/journal.pmed.1000268

Grau, H. Ricardo and T. Mitchell Aide. "Are Rural-Urban Migration and Sustainable Development Compatible in Mountain Systems?" *Mountain Research and Development* (2007) 27(2):119-123. doi: <http://dx.doi.org.proxyau.wrlc.org/10.1659/mrd.0906>

Harper, Jessica. "Confronting Corporate Development: Anti-Mining Advocacy in the Brazilian Atlantic Forest." *Capstone Collection*. Paper 42. (2007)
<http://digitalcollections.sit.edu/capstones/42>

Iracambi. (n.d.) Serra do Brigadeiro: Natural Resources Management.

- “Indicadones do agronegócio Mineiro 2004.” (2005) Belo Horizonte: FAEMG.
- “Information and Analyses on the Brazilian Mineral Economy.” Brazilian Mining Association. 7th Edition. (2012) Accessed June 15, 2014. <http://static.pulso.cl/20130617/1770668.pdf>
- Lall, Somik V., Harris Selod and Zmarak Shalizi. “Rural-Urban Migration in Developing Countries: A Survey of Theoretical Predictions and Empirical Findings.” *The World Bank Development Research Group*. (2006) Washington: The World Bank.
- “Minas Geras-Rosário da Limeira.” *Instituto Brasileiro de Geografia e Estatística*. (2014) Accessed June 13, 2014. <http://cod.ibge.gov.br/300L>.
- Moraes, Werter Valentim, Luiz Emmendoerfer Magnus, and Nadja Maria Castilho da Costa. “Good Practices of Community Based Tourism in the Territory of the Serra do Brigadeira (Minas Gerais, Brazil).” *Studies and Perspectives in Tourism*. (2013) Vol 22: 1074-1095.
- Mullan, Katrina and Pauline Grosjean, Andreas Kontoleon. “Land Tenure Arrangements and Rural–Urban Migration in China.” *World Development*. (2011) Vol 39, Iss 1:123-133
- Parviz Koohafkan , Miguel A. Altieri and Eric Holt Gimenez. Green Agriculture: foundations for biodiverse, resilient and productive agricultural systems. *International Journal of Agricultural Sustainability*. (2012) Vol 10:1, p. 61-75.
- Proctor, F.J. and V. Lucchesi. Small-scale farming and youth in an era of rapid rural change. (2012) IIED/HIVOS: London/The Hague.
- “Profile.” Votorantim Group. (2012) Accessed June 16, 2014. <http://www.votorantim.com.br/en-us/grupoVotorantim/perfil/Pages/perfil.aspx>
- Schmidt, Blake H. Looking Back, Moving Forward: Success-based Capacity Building in Rural Brazil. Capstone Paper. (2008)
- Watson, Kelly and Moira Achinelli. “Context and Contingency: The coffee crisis for conventional small-scale coffee farmers in Brazil.” *The Geographical Journal*. 17: 223 – 234.
- “World Urbanization Prospects, the 2011 Revision.” United Nations Department of Economic and Social Affairs. (2011) Accessed June 17, 2014. <http://esa.un.org/unup/CD-ROM/Urban-Rural-Population.htm>
- Van Ree, Zita Wilhelmina “The motivation of farmers to apply sustainable agricultural methods. How motivated are farmers of Rosário da Limeira (Minas Gerais, Brazil) to use sustainable medicinal plants production as an alternative income resource?” *Master-thesis fieldwork training Cultural Anthropology and Non-Western Sociology*. Doctoraal-scriptie CA/SNWS. (2007)
- World Land Trust (n.d.) The Atlantic Rainforest, Brazil. Accessed June 20, 2014. <http://www.worldlandtrust.org/projects/brazil>

Appendices

Contributor Biographies

Claudia Barragan - BA in French/Int. Business (University of Maryland) and BA in Architecture (Florida Atlantic University). Claudia is a seasoned Urban Design professional pursuing an Executive Master's degree in International Service, with a certificate in Environmental Risk Assessment. Claudia's area of study is in environmental policy particularly urban ecology with a regional focus in Brazil. Her main analytical tool is GIS, as she collects and analyzes spatial data to determine the socio-environmental impacts of large development projects. She has worked in the design and architecture field developing master plans for various private and public sector clients including work in China, and Honduras. Her professional goal is to work in a mission driven organization advancing forest and wildlife conservation, both in rural and urban contexts. Claudia is a native of Bolivia.

Jaron Bass – BA in Psychology and BA in Spanish from the University of Idaho. Jaron is a rising second-year MA candidate for International Development with the American University. After two years of teaching English and promoting afterschool enrichment programs for disadvantaged children in Spain, Jaron moved to Washington, DC to pursue a career that focuses on the intersection of community development and sustainable environmental practices. Currently, Jaron is working as a Program Coordinator for the Clinical Program at American University's Washington College of Law, and is the President of the 2014-2015 International Development Student Program Association board at American University's School of International Service.

Dr. Eve Bratman- Eve Bratman is an assistant professor at American University's School of International Service. Dr. Bratman's primary research involves sustainable development politics in the Brazilian Amazon. Her major projects focus on the links between environmental policy, agriculture, and human rights in Brazil and beyond. Her book-in-progress is tentatively entitled *Development's Crossroads: Infrastructure, Sustainability, and Human Rights in the Brazilian Amazon* and is based on nearly a decade of research and work in Brazil. Dr. Bratman also has a keen interest in development issues closer to home as well, including in Washington DC. In addition to teaching a Brazil-based course in Rural Livelihoods and Food Systems, she also teaches Urban Development, International Development, and Environment and Development courses.

Dr. Bratman holds a Ph.D. from American University's School of International Service (2009). She was a Fulbright Scholar in Brazil (2007) and holds a Certificate in Human Rights from the Washington College of Law (2004).

Peter Gaff -- BA in English from Goshen College. Peter has spent the previous seven years working in a range of capacities in the international development field, including with international and local NGOs, an international research institute, and a Washington DC-based development consulting firm. Most recently, he served as the Livelihoods Coordinator for the United Methodist Committee on Relief (UMCOR) in Haiti, where he oversaw projects

supporting micro-enterprise development and agriculture. He has also worked in Kenya, India, and Malawi. Peter hopes to continue to pursue his professional interests in agriculture and rural development when he graduates with an MA in International Development from American University this December.

Amanda Harris - BA in Criminology and Criminal Justice, with a focus in Criminal Law from University of Maryland, College Park. Amanda spent just over one year beginning in 2013 learning from and with rural communities in Nepal and Myanmar. Her experiences provided a firsthand understanding of how to inspire and create change at a grassroots level. Under the guidance of community leaders, Amanda helped to build an ecological water filtration system using a balance of plant and algae, not harsh chemicals, to provide a clean water supply to a community of 3,000. In Myanmar, she participated in and helped to facilitate a course on agro-ecological farming practices and natural building techniques. Understanding the aspirations of local communities helps her to see the tangible benefits of conserving natural resources while still meeting basic human needs. She is currently pursuing a Dual-Master's in International Affairs from American University and Natural Resources and Sustainable Development *Universidad para La Paz* in Costa Rica.

Ben Hemenway- BA in Foreign Affairs and Latin American Studies from the University of Virginia. Currently, Ben is an MA candidate at American University's School of International Service, expecting a degree in Comparative Studies of Latin America with a focus in International Development. He is currently doing work as a research assistant for two professors at the university. His main academic areas of interest are in human rights and migration policy, particularly in the Southern Cone and Brazil. In the immediate future, Ben will be conducting research on human trafficking in Brasília and Goiânia, before completing his degree at the Peruvian Diplomatic Academy and School of International Service.

Mukhaye Muchimuti - BSc in Neuroscience, minors in Chemistry and Spanish from St. Lawrence University, NY. A native of Kenya, Mukhaye is currently pursuing a Master's degree in International Development with a concentration in Water Management. Recently, she developed a Monitoring and Evaluation Plan for The Samburu Project's well drilling initiatives in Samburu, Kenya. As a recipient of the Kathryn Wasserman Davis 100 Projects for Peace grant, she previously partnered with The Samburu Project to fund the drilling of a well, and to conduct trainings on water sanitation and hygiene, and well management. Additionally, she has five years of experience as an educator. Mukhaye is eagerly looking forward to staying on at Iracambi this summer to conduct research related to water conservation. In the 2014-2015 academic year, she will serve as a Friday Forum Coordinator on the International Development Student Program Association board at American University's School of International Service.

Tony Piaskowy- Mr. Piaskowy is a Communication Specialist for the Land Tenure and Property Rights Division at USAID. He oversees implementation of the Division's communication strategy and management of all related project documentation activities. Prior to joining USAID, Piaskowy spent eight years managing development programs focused on communications, policy, training, and technology under two USG domestic

programs in the public health and housing sectors. He holds a bachelor's degree in Urban Planning and Development from Ball State University and is currently pursuing a master's degree in International Service at American University. He has studied or worked in Ethiopia, Kenya, India, Italy, Japan, Spain, Sri Lanka and Timor-Leste. Outside of professional endeavors, Tony enjoys architecture, music, yoga and wine.

Dilanthi Ranaweera - BA in Economics with a minor in Mathematics from Middlebury College. Originally from Kandy, Sri Lanka, Dilanthi is currently pursuing a MA in International Development with a focus in Rural Development at American University. Most recently, Dilanthi served as the Country Director in Sri Lanka for the Educate Lanka Foundation where she helped expand the organization's reach to the former conflict-affected Northern and Eastern Provinces. She has also designed and developed an M&E Plan for the Educate Lanka Mentorship and Skills Development Program. Additionally, Dilanthi has worked as the Communication and Outreach Assistant for the USAID Supporting Regional Governance Program (SuRG) in Sri Lanka and as an Admissions Counselor for Middlebury College. Dilanthi continues to work with the Educate Lanka Foundation and will serve as the 2014-2015 Alumni-Student Liaison for the International Development Program Student Association at American University.

Rachel Teter- BA in International Business, minors in Economics and Spanish from Arcadia University. Rachel served in the Peace Corps as a sustainable agriculture volunteer in El Platano, Panamá from 2011-2013. Her work focused on teaching pruning and processing techniques to coffee farmers, giving business seminars to local organizations and small business owners across Panamá as well as building a community library. She will be completing her MA in International Development at American University's School for International Service, with a research focus of food security in Asia. She is currently serving as a leader of the American University Peace Corps Community group on campus. Rachel is also a fellow at the DC Bilingual Charter School in Washington, DC, working to build an artifact library for staff to use as a teaching aid for elementary school history and social studies classes.

Vanessa Vega - BA in Communications, focus in Public Relations and minor in Marketing. Vanessa currently works as a Contract Supervisor to USAID's Bureau for Global Health and works in the Office of Professional Development and Management Support which provides personnel management and organizational development support to the Bureau's seven Offices. Her team of 20 provides technical and administrative support throughout the agency and State Department. Prior to working with USAID, Vanessa worked for the City of Alexandria and Arlington County, Virginia as a Program Manager in their Transportation and Urban Development offices. She is currently pursuing her Master's in International Service from American University and hopes to continue a career in International Development upon completion this summer.

Figures, Graphs and Photos

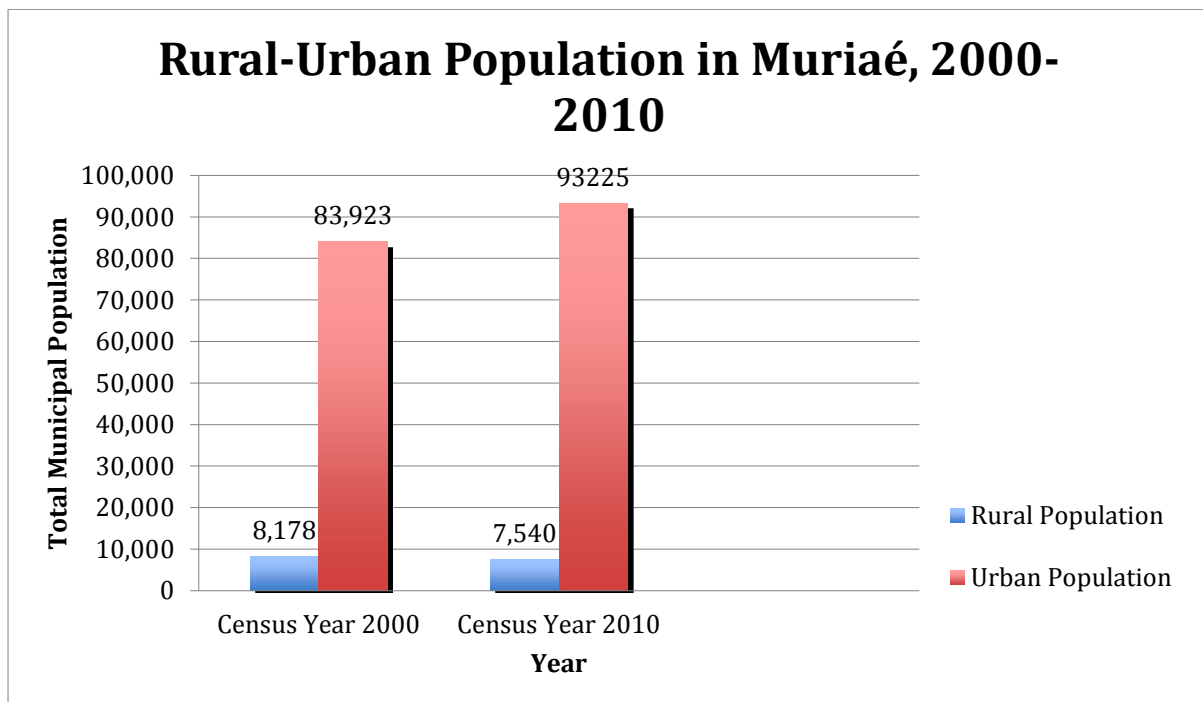
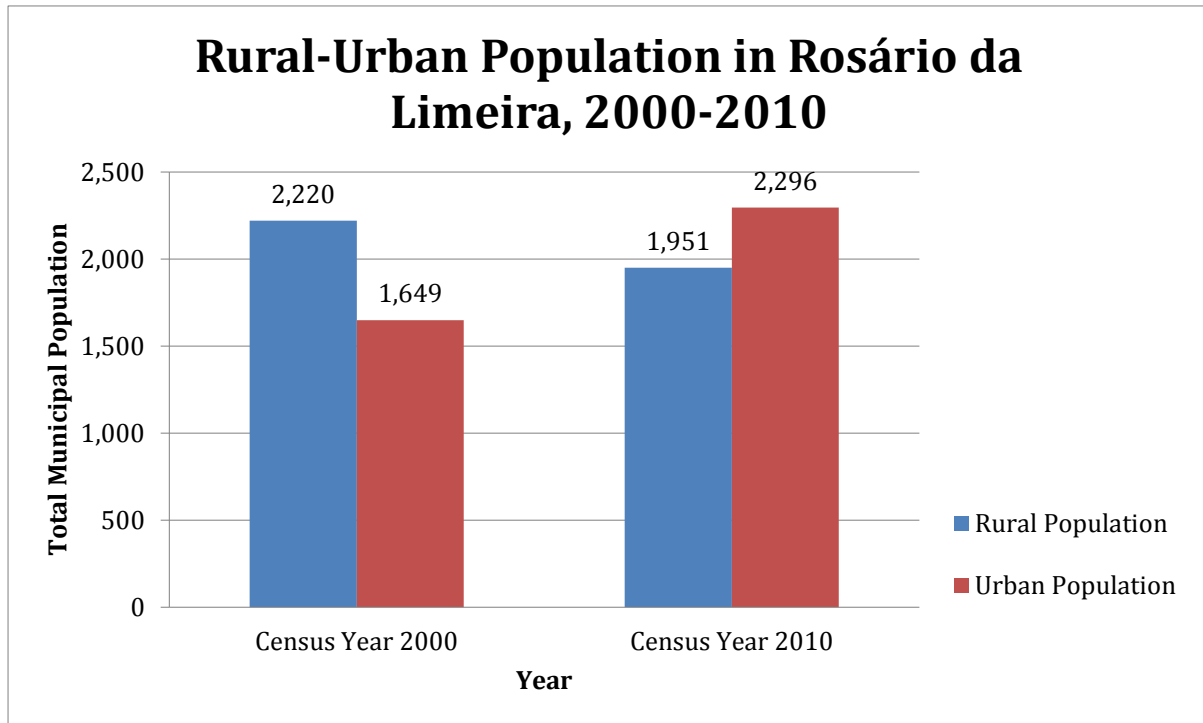
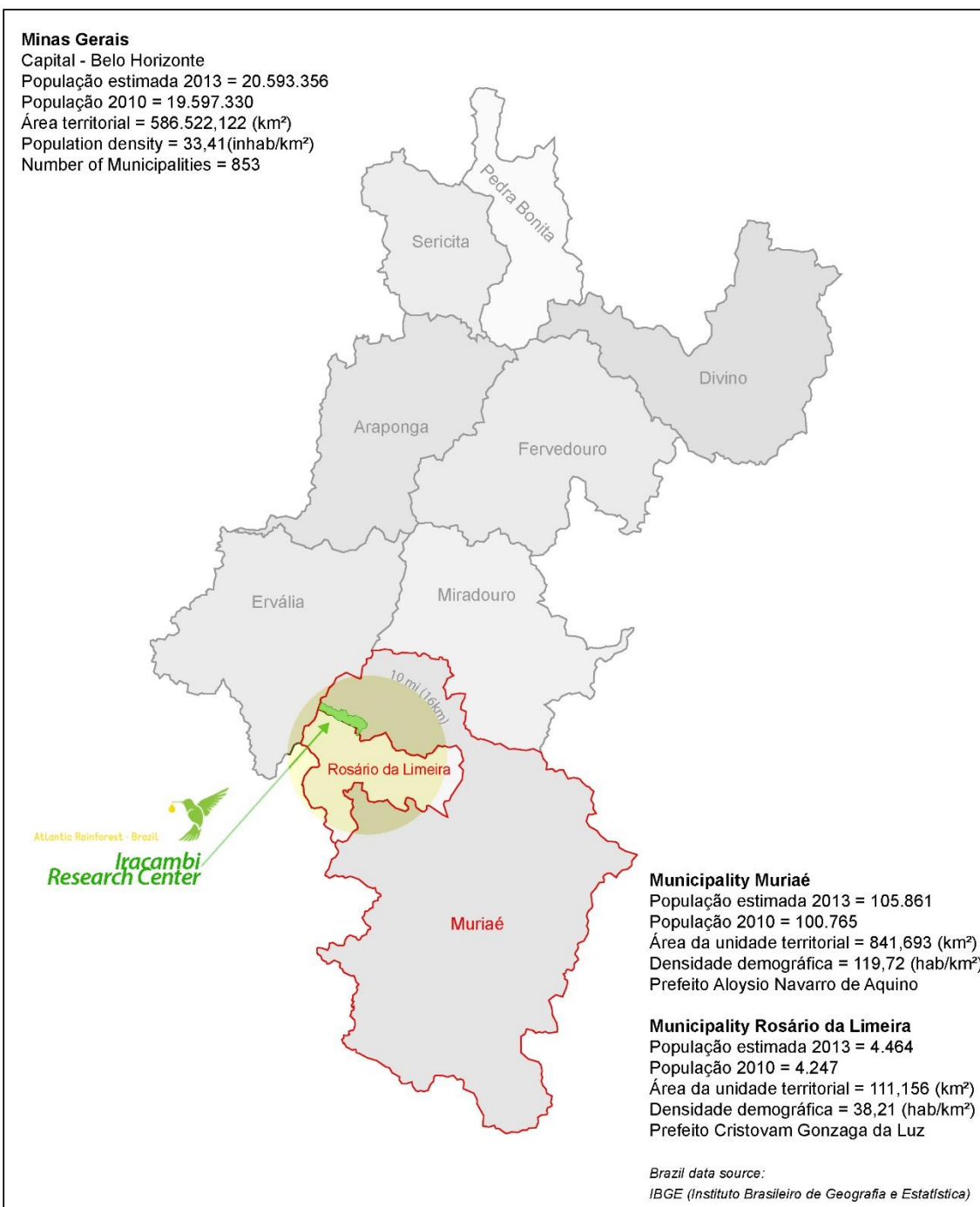


Fig 1. Population change between 2000 – 2010; in Rosario de Limeira and Muriaé

Source: Census city data - IBGE (Instituto Brasileiro de Geografia e Estatística)



Study Area

Fig. 1 Rural areas surrounding town of Rosário da Limeira

June 20, 2014



Fig 2 Geographical area of analysis

Source: IBGE (Instituto Brasileiro de Geografia e Estatística)

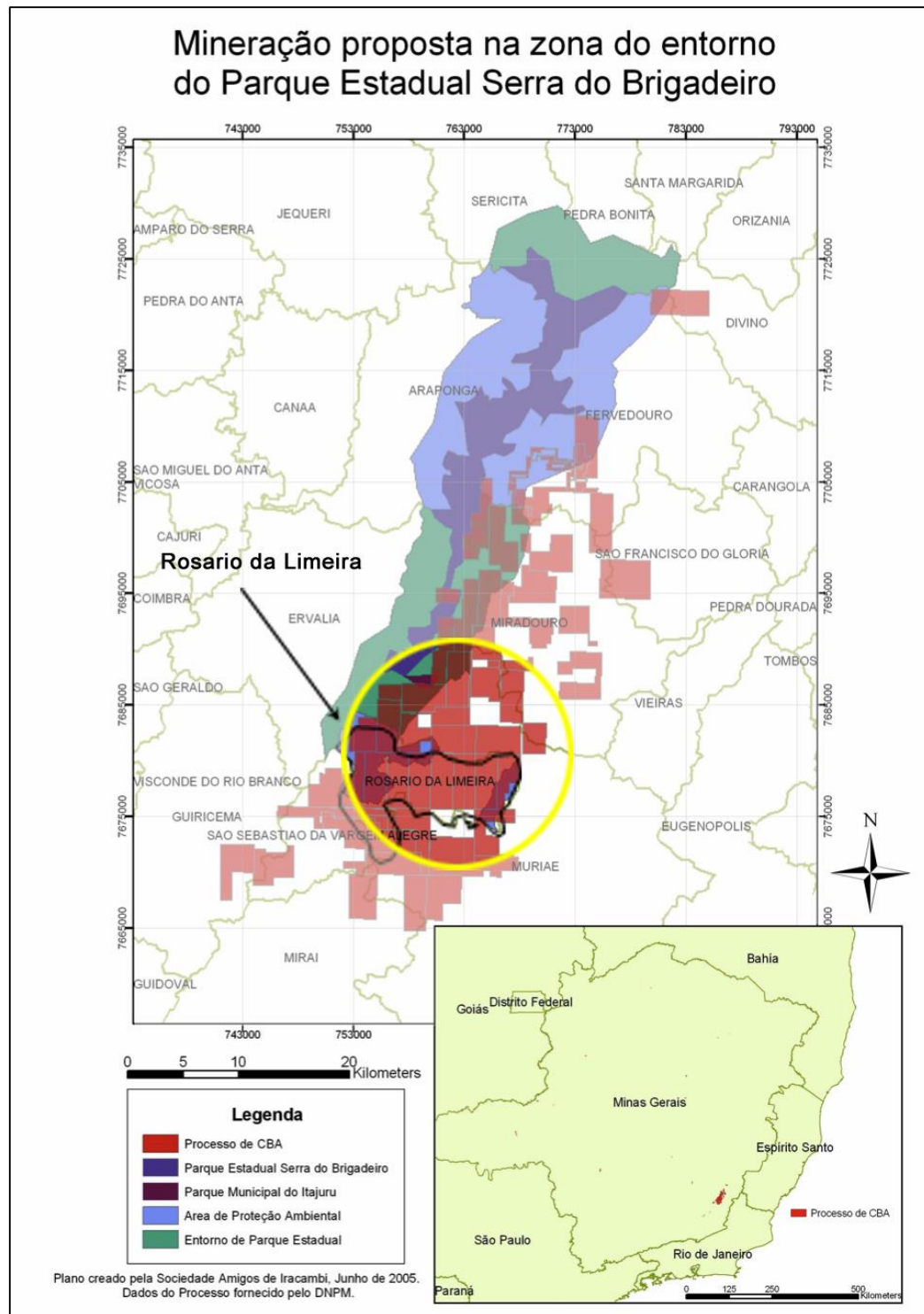


Fig 3 Geographical area of proposed Mining Impact

Source: Plano creado pela Sociedad Amigos de Iracambi Junho de 2005 - Dados do Processo fornecido pelo DNPM



Image 1 – Picked coffee drying in the sun



Image 2 - Coffee picking



Image 3 - Milk production



Image 4 - Eucalyptus tree harvest



Image 5 - Rural tourism cachaça



Image 6 - Agro-ecological Organic farming methods



Image 7 - Hand-painted sign for rural tourism



Image 8 - interview with community youth



Image 9 - Center of town Limeira

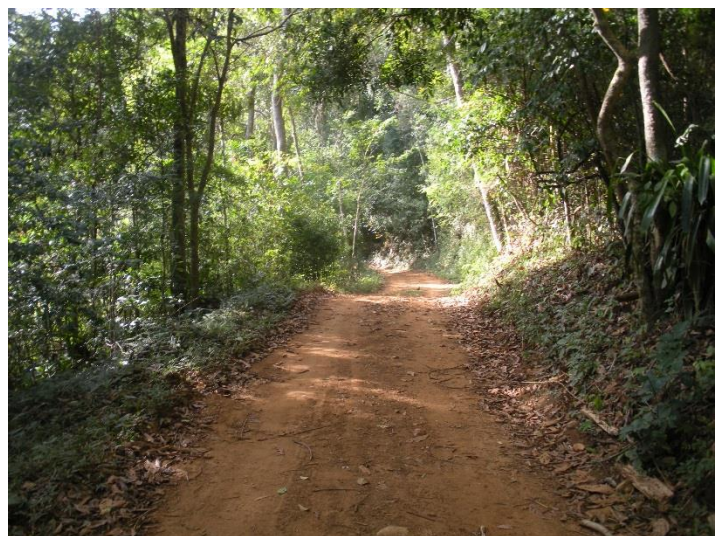


Image 10 - Existing road conditions



Image 11 - Cachaça artisan process



Image 12 - Visitors picking organically grown strawberries



Image 13 - Young adults sharing ideas



Image 14 – Abandoned farmhouse



Image 15 - Old horse carriage