

Transportation Costs and the Non-Agricultural Sector in 19th Century Brazil:

A Response to Nathaniel Leff's, "Economic Development in Brazil, 1822-1913."

I. Review of Literature

The article, "Economic Development in Brazil, 1822-1913," by Nathaniel Leff attempts to explain the poor performance of the Brazilian economy from its independence until the 20th century, and then further attempts to explain the dramatic shift to a period sustained long term economic growth. Leff claims that the original poor performance was due the fact that the domestic agriculture sector of the economy was a very large, if not dominant, part of the economy and that its performance was hindered by extremely high transportation costs which kept it from being profitable. Leff explains the shift to long term growth with the introduction of a new constitution in Brazil which shifted it to a decentralized federal republic and allowed for greater public investment that spurred the economy.

The information presented in Leff's article is important because it provides evidence that suggests that states that have tightly controlled governments can restrict economic growth. It further shows how a switch to a decentralized federal republic can provide necessary public finance that allows for investments that can help instigate economic long term growth.

In his article, Leff argues that transportation costs could have been reduced by the introduction of an extensive railroad system, but this system was late in coming because difficult terrain made the construction costs very high and the tax revenues generated by the government through the taxation of imports and exports was simply not enough to fund it. Taxing the domestic agriculture sector of was unattractive economically because of the great distances involved, poor communications, and low literacy rates. Taxing imports and exports, however, had much lower administrative costs, and thus provided the bulk of Brazil's public funds. When the government adopted a new constitution in 1889 which changed Brazil from a centralized imperial regime into a federal republic it allowed for greater opportunities for overseas borrowing. These increased public finances led to an increase in government spending which help jump start the Brazilian economy into a period of long-term economic development.

In order to demonstrate the size of the domestic agriculture sector Leff explains that at 1820, 70 percent of the population were free people, and that free labor was seldom employed in export activities. He also explains that the "limited information available on the sectoral composition . . . suggests a large fraction . . . was engaged in domestic agriculture." One last piece of evidence he uses to support his estimate of the size of the sector is his claim that from 1911-1913 exports only accounted for an estimated 16 percent of GDP, leaving an obvious gap to be filled by the domestic agriculture sector. The evidence he presents to support the governmental change causing the economic shift is simply history. When Brazil abandoned its absolutist imperial regime for the new constitution of decentralized federal republic, the states could and did raise more in tax money and overseas borrowing. He further supports this by charting out the increase in public expenditure dedicated to transportation, namely the railroads. He demonstrates this increase with the year and the corresponding amount of railway track

existent in Brazil, with it showing that after the time of the new constitution the length of railway track dramatically increases, and that this increase corresponds with the boom of the economy.

II. Hypothesis and Goals of Paper

As just discussed, one of the main points of Nathaniel Leff's article, "Economic Development in Brazil, 1822-1913," is that the dismal performance of the economy of Brazil from the time of its independence from Portugal until the late 19th century was the result of the poor performance of the domestic agriculture sector. Leff argues that the domestic agriculture sector could have this effect because it was a very large part of the economy. I think that the evidence presented by Leff to support his estimate of the size of the domestic agriculture sector is very weak, and his argument could have been vastly improved if he had done additional research to produce a more accurate estimate of the amount of the population invested in activities other than domestic agriculture from 1822-1913. In addition to the actual size of the domestic agriculture sector, I believe that his argument involving its unprofitability due to the high transportation costs of Brazil is also weak. Leff provides very little explanation about why the complex system of rivers found in Brazil, including the Amazon River, could not be utilized to provide cheap transportation. In addition to the system of rivers, I think that a further discussion of the condition of existing roads in Brazil would be a worthwhile undertaking.

If the domestic agriculture sector was actually in fact much smaller than Leff claims, his argument that Brazil's poor economic performance was derived from its poor performance is less credible because the smaller the sector can be proven to be, the less of an effect it would have on overall economic performance. Accurately measuring the amount of labor actually invested in the domestic agriculture sector is therefore crucial to his argument. In addition to minimizing the domestic agriculture sector's size, it would have an equal detrimental impact on Leff's argument if it could be proven that it wasn't actually an unprofitable sector to be engaged in. Investigating the transportation costs would demonstrate that if he was in fact correct about the size of the sector, then the fact that it was so unprofitable would accurately explain why the economy did so poorly until the time when railroads were introduced (which effectively cut transportation costs).

In order to test my hypothesis I am going to examine the levels of urbanization in Brazil during this period with the intention of determining the extent to which people were engaged in the non-agricultural sector. Leff claims that as late as 1890 only 11 percent of the population resided in urban centers of 10,000 or more inhabitants, meaning that the number of people working in transportation, commerce, crafts, manufacturing, and government must be small. I believe that urban centers of much less than 10,000 were plenty and provided many opportunities for the inhabitants to be engaged in activities other than agriculture. Further I believe that non-agriculture activities were not limited to the urban centers and could instead also be found in rural areas. First I am going to address the issue of transportation costs, specifically addressing the Amazon River, and then addressing the rivers in São Paulo and Minas Gerais. I am going to focus my research on the non-agricultural sector into two case studies of Minas Gerais and São Paulo.

III. Sources

Through the consultation of three online encyclopedias, Britannica Online, MSN Encarta, and Wikipedia, I have determined which rivers were the most significant in São Paulo and Minas Gerais. These sources are valuable because they are providing facts about the rivers that are not debated. The information has been provided by actual documentations of the real conditions present.

The article by William R. Summerhill, "Railroads in Imperial Brazil, 1854-1889," appears in book *Latin America and the World Economy since 1800*. The main point of Summerhill's article is to evaluate the economic consequences of railroads and the role of government policy in Brazil from 1854-1889. Through his analysis he provides useful information about the existing transportation costs in Brazil.

The primary purpose of the article, "Monarchy, monopoly and mercantilism: Brazil versus the United States in the 1800s," by Zanella, Ekelund, and Laband draw support to the notion that the difference in growth rates between the two countries are due to relative factor endowments and institutions. The article claims that political and economic structures present in Brazil allowed the persistence of monopoly restrictions, and that the United States did not, accounting for the differences in growth in the 1800s. The article is particularly relevant to this research paper in its discussion of monopoly and the Amazon River.

The book, *Slavery and the Economy of São Paulo, 1750-1850* by Luna and Klein provides a vast array of valuable information. Its primary purpose is to outline the growth of the economy and society of São Paulo from the time of its colonization by Portugal, to introduction of coffee in the mid-19th century. The book claims that there had been a lack of interest in this topic because the most substantial social and economic data surviving were from the first national census in 1872, but because of the discovery of a "vast store of previously unknown and unused population and production censuses in the state archives that go from at least the 1760s until the 1850s," the authors of this book could now undertake such a topic.¹ The previously unknown censuses they use provide valuable information for this paper such as the breakdown of agricultural and non-agricultural heads of household in São Paulo, the households engaged in liberal professions and the military, as well as information about those engaged in commerce, transport, and as day laborers. Furthermore they give us population estimates so that we can determine the percentages of the population engaged in the non-agricultural sector.

Slavery and the Demographic and Economic History of Minas Gerais, Brazil, 1720-1888 by Laird Bergad provides us with much of the same type of information for Minas Gerais. Bergad claims that the absence of empirical time-series data on the Minas Gerais slave economy was why he chose to write the book, and that he constructed such a time-series by examining the property inventories of deceased persons whose estates were being assessed for vision among heirs.² He claims that these documents were prepared by local notarial offices and carefully conserved in historical archives through Minas Gerais.

Another source for São Paulo that will be addressed is Elizabeth Kuznesof's *Household-Economy & Urban Development: São Paulo, 1765 to 1836*. Her claim is that between 1765 and 1836, the household economy of São Paulo was "transformed from subsistence to a market-

¹ Luna and Klein, pg 1.

² Bergad, pg xxii.

oriented economy.”³ She bases her analysis on household-level census data obtained from three manuscript censuses, property inventories, genealogies, and other records from São Paulo during this time period.⁴

The article, “Freedmen in a Slave Economy: Minas Gerais in 1831,” by the Herbert Klein and Clotilde Andrade Paiva also uses two unpublished 1831 censuses from two major municípios; those of Campanha in the southwestern part of the province, and Sabara in the central zone near present day Belo Horizonte.⁵ This article is mostly about the freed colored population, but the analysis provides many insights to the fraction of the population not engaged in agriculture.

IV. Support

The first issue to address now will be Leff’s claim that extremely high transportation costs were what caused the domestic agriculture sector to be unprofitable. This argument seems counterintuitive if one considers the extremely complex system of rivers that can be found in Brazil, including the world’s second largest river, the Amazon. Within his article, Leff does concede that rivers and coastal shipping were used for transportation, but he claims that “some of the country’s rivers (the Amazon, for example) were poorly located from the viewpoint of promoting economic development,” and further he argues “other rivers flowed in a direction that was not advantageous from the perspective of production for markets.”⁶ These arguments supported by no evidence or in-depth explanations seem quite weak.

The key river with the highest economic potential was that of the Amazon River. The Amazon River is the second largest river in the world (second to the Nile River), measuring 4,000 miles, with roughly half of it located in Brazil.⁷ Over 200 of its tributaries are located in Brazil, and the main body of the Amazon is navigable by ships as large as ocean liners over two-thirds of its length.⁸ The ease at which goods could be transported on the Amazon is undeniable, but upon further investigation it can be seen that Leff’s denial of its lack of influence in Brazil’s 18th century economy can become clear. First we will address the part of Brazil actually able to utilize the Amazon River.

As mentioned earlier, the article by Zanella et al addresses the Amazon River and the monopolies granted in regards to transportation of goods. They argue that even by the mid-19th century, the Amazon was largely unexplored despite its tremendous economic potential. With the permission of the Brazilian government, the U.S. Navy Department was given permission to explore the Amazon in 1850. However, Matthew Fontaine Maury, the first head of the United States Naval Observatory and Hydrographic Office caused alarm to the Brazilian government by speaking openly and enthusiastically about the economic potential of the Amazon River to both businessmen and the U.S. Congress. As a result, the alarmed Brazilian king granted monopoly rights over the navigation of the Amazon River to Baron Mauá to protect Brazilian interests in

³ Kuznesof, preface.

⁴ Kuznesof, pg xvii.

⁵ *Freedmen in a Slave Economy*, pg 1.

⁶ Leff, pg 43.

⁷ *Amazon River*, pg 1.

⁸ *Amazon River*, pg 2.

the Amazon (from the United States).⁹ As a result of these rights, Mauá was receiving freight-rates on transported goods of 18-30% of their value. While this would have been exceedingly profitable for Mauá, those wishing to take advantage of the Amazon to transport goods cheaply found themselves not much better off than if they had been transporting them overland. However, the monopoly rights held by Mauá were ended in 1867. Bearing this in mind, we have an idea of why the Amazon did little to help high transportation costs in the 19th century. First being that it was simply unexplored, and second were the high rates charged by Mauá until 1867. The reason why the ending of monopoly rights on the Amazon did little to help the overall Brazilian economy will become clear after examining the Amazon River's location.

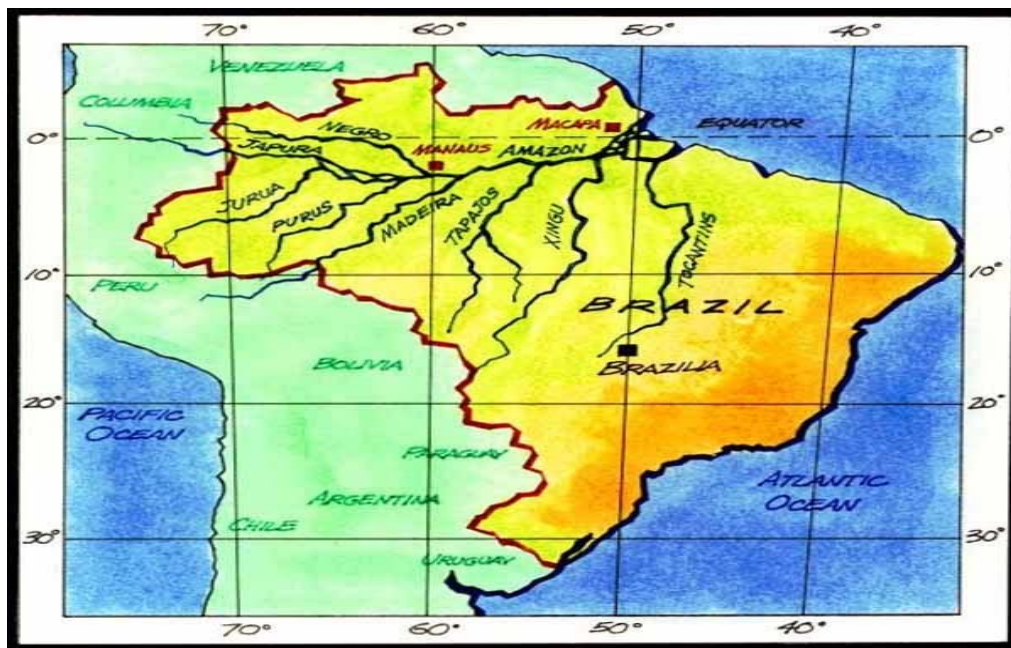


Figure 1¹⁰

Figure 1 shows a map of Brazil and the Amazon River and its tributaries. It can easily be seen that the Amazon proper is strictly isolated to northern Brazil. The tributaries, the Xingu and the Tocantins are somewhat more central to Brazil, but still do not reach the southeast, specifically those regions of Minas Gerais and São Paulo. Summerhill argues in his article that “although the north was well served by rivers, by the end of the eighteenth century most of the population was well south of the Amazon basin.”¹¹ By 1872, roughly 10% of the population of Brazil resided in São Paulo and about 21% in Minas Gerais alone.¹² So the primary reason the Amazon did little to alleviate high transportation costs is simply that it did not reach the southeastern parts of Brazil in which most of the population was increasingly becoming located.

Even though the Amazon was not available to the southern territories does not mean there were no other rivers located in these regions. In São Paulo there are the Tietê River and the

⁹ Zanella et al, pg 390.

¹⁰ Image provided by Science Museum of Minnesota.

¹¹ Summerhill, pg 388.

¹² Kuznesof, pg 78; Bergad, pg 91.

Grande River. The Tietê River is about 700 miles in length before joining into the Paraná, and several of São Paulo's largest cities are located on it, but it has relatively poor navigability due to frequent falls and rapids.¹³ The Grande River, or *Rio Grande*, which flows through Minas Gerais and along the border of São Paulo is also hindered by waterfalls and rapids.¹⁴ The São Francisco flows through Minas Gerais and is navigable for about 850 miles on its middle course, but the rest is interrupted by rapids.¹⁵ There are various other rivers located in the southeast of Brazil, but like those already mentioned, their economic viability is eliminated due to the existence of waterfalls and rapids. It seems at this point that Leff's argument about the complex system of rivers of Brazil doing little to provide cheap transportation can be taken as credible, although it could have been strengthened within his paper had he explained about the overwhelming existence of waterfalls and rapids in the southeast.

Because of the lack of navigable rivers, states like São Paulo had to make do with roads. Kuznesof tells us that by 1802 roads had greatly improved but were still very costly and that it was between 1802 and 1836 that a new important road had been constructed between Cubatao and Santos, and another road which would be passable by cars was in the planning stages.¹⁶ Summer further tells us that as a result of São Paulo's efforts to improve roads, such as paving them with macadam, by 1864, São Paulo had the lowest freight charges in all of Brazil at the time.¹⁷ However, in most other areas of Brazil, freights were hauled by mules over unimproved trails and the charges were drastically higher than those of São Paulo.

The next important issue to tackle is the size of the domestic agriculture sector. As we have determined, because of the high cost involved in the transportation of goods, the domestic agriculture sector would have been indeed quite unprofitable. This is why it will be important to determine that the domestic agriculture sector was as large as Leff claims, and its unprofitability because of transport costs would indeed explain the poor performance of the Brazilian economy at this time. To do this I am going to specifically address Minas Gerais and São Paulo and by examining their urbanization levels, try to determine the extent of those who were engaged in other activities besides agriculture. First I will examine São Paulo.

The choice someone entering the non-agriculture sector of São Paulo had included many diverse activities. There were merchants, store owners, civil construction workers, potters, metalworkers, woodworkers, spinners and weavers, clothing workers, shoemakers, and leather workers. There were also educated liberal professionals such as clergymen, government officials, lawyers, doctors, and teachers of all types. They could also be members of the military.¹⁸

¹³ *Encyclopædia Britannica Online*, pg 1.

¹⁴ *Grande River (Brazil)*, *Wikipedia*.

¹⁵ "Brazi," *Encarta Online*.

¹⁶ Kuznesof, pg 86.

¹⁷ Summerhill, pg 388.

¹⁸ Luna and Klein, pgs 185, 192-193.

Heads of Household	Males	Females	Total
White			
Non-agricultural	7997	2772	10769
Agricultural	16552	2260	18812
Brown			
Non-agricultural	3262	1776	5038
Agricultural	3843	642	4485
Black			
Non-agricultural	307	164	471
Agricultural	245	56	301
Total			
Non-agricultural	11566	4712	16278
Agricultural	20640	2958	23598

Table 1¹⁹

This table, taken from Luna and Klein's book, shows the breakdown of agricultural and non-agricultural heads of household by color and sex for the 41 counties of Sao Paul in 1829. It can be seen that at least at this time, more than half of the heads of households in São Paulo were engaged in activities other than agriculture. If taken at simply this it might be determined that of the 16,278 households in São Paulo at this time, roughly 41% were engaged in the non-agricultural sector, and that this percentage would carry over to the population as a whole. However, it must be taken into account that only 22% of non-agricultural households owned slaves, compared to 29% of households owning slaves in the agricultural sector, on top of which most non-farmers averaged about half of the total number of slaves as agriculturalists.²⁰ This pushes the amount of total amount of the population engaged in non-agricultural activities to a lesser degree, but it would still be more than the figures alluded to by Leff. Leff argues that by 1890 only 11% of Brazil's population resided in urban centers of 10,000 or more inhabitants, and because jobs in the fields of transportation, commerce, crafts, manufacturing, and government, were typically located in cities, that this figure suggested a large fraction of the population was engaged in agriculture.²¹ However, Luna and Klein point out that a "large proportion of the population in even the most rural communities did not work the land, but rather provided crucial services for those who were engaged in agriculture." Despite this statement, Luna and Klein tell us that most non-farmers were concentrated in the first few districts of an urban settlement.²² This, combined with the amount of households engaged in non-agriculture, suggest that Leff's figure of 11% urbanization by 1890 is perhaps not correct. Luna and Klein, however, also consider those engaged in export activities as members of the agricultural sector, so if they are accounted for, the figure for those engaged in the domestic agriculture sector decreases.

¹⁹ Luna and Klein, pg 183.

²⁰ Luna and Klein, pg 184.

²¹ Leff, pg 41.

²² Luna and Klein, pg 181.

One theory presented in Luna and Klein is that as export activities grew, such as sugar and coffee, former subsistence farmers (who would have been counted as agricultural) were forced off of their lands and into urban centers to become either skilled, or more likely, unskilled laborers. One of the examples they list is the fact that several families who had been listed as subsistence farmers in a 1777 census were listed as weavers and spinners or leather workers in the next census in 1798, which they claim resulted from the increase in sugar production in that area. Furthermore, Luna and Klein point out that although non-agriculturists in São Paulo could sometimes attain great wealth, on the whole they tended exhibit more characteristics of those in poverty than farmers and planters.²³ Keeping this in mind, a counter-theory to Leff for the explanation of Brazil's poor economic performance can be formulated. Perhaps because the non-agricultural sector was larger than he thought, and that most of those engaged in this sector were in relative poverty, this would instead change the explanation from the dominance of the agricultural sector to the dominance of the impoverished non-agricultural sector.

Now it is time to switch focus from Sao Paul to Minas Gerais. Minas Gerais is another state of Brazil located in the southeast. In *Freedman in a slave society*, it is claimed that "at least half of the rural population engaged in non-agricultural activities" in the 19th century.²⁴ This estimate does not take in account those rural households engaged in both agricultural and non-agricultural activities, but at least demonstrates that participation in the non-agricultural sector was prevalent. In 1833 the total population of Minas Gerais by administrative divisions was 768,666 and by 1872 the population was up to 2,102,689.²⁵ Bergad does not provide any information on the occupational categories of the population for 1831, but he does however provide a selected breakdown for both slave and free populations in 1872:

Occupational Category	Total Free	Total Slaves	Total Employed
Seamstresses	141768	17157	158925
Textile Workers	63904	6454	70358
Farmers	370896	114706	485602
Salaried Workers	169772	27673	197445
Domestic Service Workers	249588	81994	331582
Others	67737	4376	72104
Totals	1063665	252360	1316016

Table 2²⁶

When comparing this graph to the figure I just listed for population in 1872 (2,102,689) it can easily be seen that the graph does not account for the entire population, and instead only a sample. From this sample, however, we can see that farmers only make up 37%. The non-farmer population it accounts for totals to 830,414. If the population was indeed 2,102,689, then the non-agricultural sector in Minas Gerais at this time was at least 40%. While the farming population is obviously underrepresented in this table, the non-agricultural sector, at least, is not overrepresented, and could also possibly be underrepresented as well. What is known is that during the 19th century, Minas Gerais had the largest slave population (382,628) accounting for

²³ Luna and Klein, pg 182-183.

²⁴ Klein and Paiva, pg 4.

²⁵ Bergad, pg 101.

²⁶ Bergad, pg 74.

18.2% of its total population.²⁷ Typically the type of “farming” that slave labor was engaged in were export activities, which should not be counted in the domestic agriculture sector. Bergad also gives us another occupational breakdown based on a limited sample of 3,062 slaves and finds that only 21.6% are engaged in agriculture, while the rest are in many other non-agricultural occupations such as: carpenter, blacksmith, coachman, cook, barber, shoemaker, tailor, muleteer, seamstress, stonemason, miner, and others.²⁸ While Bergad tells us that the sample is too small to indicate any general occupational data of slaves in Minas Gerais because only 2.7% had occupations listed in the inventories, it still provides us with an idea of the vast amount of other positions besides agriculture that the population was engaged in.

V. Conclusion

It can be seen through the analysis of the this paper that Leff’s argument about transportation costs in 19th century Brazil are founded, and have been strengthened by the evidence presented. Even after dealing with the problem of monopoly pricing, the Amazon River was still restricted to northern Brazil. Where there existed rivers in southern and southeastern problems, they were on the whole not navigable to any profitable degree because of the abundance of rapids and waterfalls. There were roads in existence in Brazil, but even the ones in the best condition, those of São Paulo, were still highly costly. The argument that high transportation costs would have rendered the domestic agriculture as unprofitable stands credible and has been further substantiated.

Where Leff’s argument seems to lose credibility is his dismissal of a substantial non-agriculture sector. One of his claims is that because of the lack of large urban centers, claiming that only 11% of Brazilians resided in cities of 10,000 or more by 1890, very few people would be engaged in activities considered non-agricultural. However, by examining the cases of Minas Gerais and São Paulo this paper has shown that there existed a large and significant population that was engaged in the non-agricultural sector, in both rural and urban areas. Because most of those engaged in this sector were in relative poverty, it is possible to explain at least a portion of the poor economic performance of Brazil in the 19th century to the fact that *this* sector was so large, instead of the domestic agriculture sector.

²⁷ Bergad, pg 91.

²⁸ Bergad, pg 158.

Works Cited

Bergad, Laird W. *Slavery and the Demographic and Economic History of Minas Gerais, Brazil, 1720-1888*. Cambridge, UK: Cambridge University Press. 1999.

"Brazil." 2008. Microsoft® Encarta® Online Encyclopedia 2007. 23 Mar. 2008.
<<http://encarta.msn.com>>.

Fernando Zanello, Robert Ekelund, and David Laband. "Monarchy, Monopoly and Mercantilism: Brazil Versus the United States in the 1800s." *Public Choice*. 25 Mar. 2008. Springer Netherlands. 2004. <<http://www.springerlink.com/content/117616303r53n704/>>.

"The Grande River." Wikipedia. 24 Mar. 2008.
<http://en.wikipedia.org/wiki/Rio_Grande%2C_Minas_Gerais>

Klein, Herbert S. "Freedmen in a slave economy: Minas Gerais in 1831". *Journal of Social History*. FindArticles.com. 08 Apr. 2008.
<http://findarticles.com/p/articles/mi_m2005/is_n4_v29/ai_18600987>

Kuznesof, Elizabeth. *Household Economy and Urban Development: São Paulo, 1765 to 1836*. Boulder, Colorado: Westview Press, Inc. 1986.

Leff, Nathaniel H. "Economic Development of Brazil, 1822-1913," in Stephen Haber (ed.) *How Latin America Fell Behind: Essays on the Economic Histories of Brazil and Mexico, 1800-1914*. Stanford University Press. Stanford. 1997. Chapter 2.

Luna, Fransico and Klein, Herbert. *Slavery and the Economy of São Paulo, 1750-1850*. Stanford, California: Stanford University Press. 2003.

"Map of Amazon Area." Greatest Places Online. 1999. Science Museum of Minnesota. 1 Apr. 2008. <<http://www.greatestplaces.org/images/maps/brazilma.htm>>.

Summerhill, William R. "Roads in Imperial Brazil, 1854-1889." *Latin America and the World Economy since 1800*. Edited by John H. Coatsworth and Alan M. Taylor. David Rockefeller Center for Latin American Studies. 1999.

"Tietê River." Encyclopædia Britannica. 2008. Encyclopædia Britannica Online. 23 Mar. 2008
<<http://www.britannica.com/bps/topic/595430/Tiete-River>>.