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Organic Cacao Farming in Transamazônica: An Assessment of Sustainable Livelihood Development

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Organic Cacao Farming in Transamazônica: An Assessment of Sustainable Livelihood Development

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ABSTRACT

Cacao production is growing in the newly opened forest frontiers of the Trans-Amazonian Highway in central Pará, the second biggest producer region in Brazil. This region has recently witnessed the growth of some of the first organic cocoa cooperatives in the country, initially formed in 2006. Cacao presents a unique option for agricultural livelihoods, because grows well in its native habitat under the shade of Amazon forest species, and there is a growing market demand for cocoa. This study aims to assess the organic certification's effects on tree diversity and cocoa production in this Amazon frontier, together indicating sustainable livelihoods. Through structured interviews and farm visits, this study analyzes the economic stability and environmental sustainability of a sample of organic certified and non-certified farmers in the largest Transamazon cooperative region, Medicilândia, Pará. For large-scale properties, the non-certified, conventional producers are found to produce more cacao revenue than the large certified producers, yet they have lower forest species diversity than the certified producers. In small-scale production systems, the organic certified farmers had both greater cacao revenue and greater species diversity. Several issues with achieving the organic price premium currently prevent some organic producers from earning more for their beans. This study recommends cooperative restructuring and enhanced financial planning in order for organic certification to be viable for long-term sustainable livelihood development.

RESUMO

Produção de cacau está crescendo nas fronteiras florestais da Rodovia Transamazônica, no centro de Pará, a região o segundo maior produtor no Brasil. Esta região foi recentemente testemunhado o crescimento de alguns dos primeiros cooperativas de cacau orgânicos no país, inicialmente formado em 2006. Cacau apresenta uma opção única para a subsistência agrícolas, porque cresce bem em seu habitat natural sob a sombra de espécies da floresta amazônica, e há uma crescente demanda do mercado para o cacau. Este estudo visa avaliar os efeitos da certificação orgânica sobre a diversidade de plantas e produção de cacau nesta fronteira amazônica, juntamente indicando meios de vida sustentáveis. Através de entrevistas estruturadas e visitas a fazendas, este estudo analisa a estabilidade econômica ea sustentabilidade ambiental de uma amostra de agricultores certificados orgânicos e não-certificados na maior cooperativa da região Transamazônica, Medicilândia, Pará. Para as grandes propriedades, os não-certificados, os produtores convencionais são encontrados para produzir mais receita cacau do que os grandes produtores certificados, ainda que hace menor diversidade de espécies da floresta do que os produtores certificados. Nos sistemas de pequena escala de produção, os agricultores orgânicos certificados tinha tanto maior receita de cacau e uma maior diversidade de espécies. Vários problemas com a realização do prêmio de preço orgânica impedem actualmente alguns produtores orgânicos de ganhar mais por seus grãos. Este estudo recomenda reestruturação cooperativa e planejamento financeiro maior para que a certificação orgânica para ser viável a longo prazo o desenvolvimento de subsistência sustentável.

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Introduction

Brazil is a major source of the world's chocolate, as the fifth largest cocoa (*Theobroma cacao*) producer in the world and one of the first countries to produce cocoa for export. Cacao is a native fruit tree to the northeast Amazon, traditionally grown amongst other native shade tree species in Brazil. In 2000, 682,000 hectares of Brazil were used for the production of cacao (Rice & Greenburg, 2000). Chocolate making earns more than \$60 billion each year on the international market, and in the next forty years the global demand for chocolate is expected to more than double (Bisseleua et al., 2009). The demand for sustainably grown, fairly traded cocoa is increasing rapidly in industrialized countries. Global sales of certified organic products are rising about 20% per year, 97% of which are within North America and Europe (Davidson, 2005). Yet Brazil has a minimal amount of organically certified cocoa farms and cooperatives. There are only two cooperatives certified organic shade-grown by the international agency the Rainforest Alliance, and only seven organic and fair trade certified cocoa cooperatives in all of Brazil (Oelofse et al., 2010).

Defining key terms

A "conventional" agricultural product does not have any certifications and is grown and produced in the industrial system currently dominating global agriculture. Popularized in the 20th century, conventional agriculture has high inputs in energy external to the farm in order to return high yields. Generally it involves uniform cropping in streamlined, technology based efficiency systems, namely monocultures. These agricultural products contain synthetic fertilizers, herbicides, and insecticides and are grown with a focus on yields. The mechanized production is socially exclusive in requiring less human labor for large production areas, producing high quantities of commodity products (Davidson, 2010).

A certified organic agricultural product comes from an "alternative" form of production based on supporting an agroecosystem of closed-loop energy systems within the farm. The produce must be grown, harvested, prepared, and transported in a system that guarantees the produce is not contaminated by synthetic chemicals, fumigated, or irradiated. The farming techniques must consider food safety, healthy nutrition, and social justice within the production process. The International Federation of Organic Agriculture Movements claims that organic farming enhances soil structure while conserving water and biodiversity.

This type of system demands high levels of soil, weed, and pest management, with diversified production techniques (Davidson, 2010).

Agricultural products that are organically certified are often fair trade certified as well, as many organic certifying agencies also certify for fair trade. Fair trade refers to the working conditions, payment, and treatment of the workers involved in the growth and export of a product. Fair trade and organic agriculture are inextricably linked, because organic is associated with small-scale, socially inclusive farming systems that do not expose workers to synthetic pesticides. Fair trade means long-term direct partnerships between a producing community and the product-buyer with transparent price setting, open negotiations, and prices that allow for social development of the communities (IMO, 2012). Cooperatives are provided access and participation in markets and the global food supply chain. Farmers are paid adequately to cover costs of production and support their livelihoods while receiving a social premium to improve the quality of life. This social premium is most often kept as a developmental fund for the community (Kilcher, 2007).

Background

Conventional cacao production in Brazil has been historically dominated by monocultures in Bahia. Yet the late 20th century witnessed a major collapse of this type of cocoa production. The fungal disease “witches’ broom” attacked millions of hectares of cacao in Bahia, for the climate is different than its native Amazon atmosphere and the usually non-existent fungus spread throughout the monocultures (Bright, 2001). In addition, because cacao grows naturally underneath the shade of Amazon tree species, extensive sun is detrimental to its growth. Without native tree diversity to prevent widespread pest disease, expansion of conventional cacao in monocultures is quickly clearing more forest for planting. Conventional cacao producers face a host of other diseases, a loss of soil fertility, and socioeconomic problems (Rice & Greenberg, 2000). Although Bahia has been known as a major producer state since the end of the 18th century, because of these issues with monocultures, today the state of Pará’s production is now almost equal.

Organic Cacao and Sustainable Development

Cacao is generally grown in agroforestry systems, which are forestry systems where agricultural products are grown under shade trees (Kilcher, 2007). These systems have been

proven to mitigate the effects of deforestation and promote diversity of tree species. Economically viable solutions to prevent biodiversity destruction are necessary, for in 2006, 17% of the original Amazon forest cover had been destroyed, particularly due to the clearing of trees for agriculture. When produced organically, cacao is planted in the shade of native Amazonian trees, contributing to the preservation of tropical forest. Long-term, organic agroforestry systems minimize impacts of agriculture on the climate and soil, and do not use any chemicals that are detrimental to the health of the forest or the health of humans (FVPP, 2012). Although it varies greatly depending on landscape and climate, organic farming has been found to increase species richness on average by 30% and species abundance by 50% when compared to conventional farming systems (Bengtsson et al., 2005). Expanding cocoa cultivation with organic agroforestry techniques can recover degraded areas and is estimated to be able to recover over 100,000 hectares of destructed forest in the Transamazônica region of Brazil, employing an estimated 250,000 people (Brandão, Santos, & Melo, 2008).

Organic cacao production can be used as a dual tool of economic development and recuperation of tree diversity, for with organic certification farmers are guaranteed stable wages, fair labor standards, and steady market access. The access of markets and of technical assistance within certified cooperatives provides incentive for farmers to minimize the impacts of agriculture on tropical forest (Gibbon et al., 2009). But organic production is more labor-intensive, and requires innovative techniques for inputs. Often the conversion period between conventional and organic is financially and physically challenging. Farmers can be faced with yield decreases during the conversion process (Oelofse, et al. 2010). When organic management is fully implemented, however, in studies of different tropical crops, yields have increased significantly. If the conversion to organic certification is from the already low-input system that is common for low-income farmers in developing regions, yields under organic management tend to be more stable compared to the previous management system. Studies have revealed that increasing premium values can create a dramatic shift from intensive plantations with high yields but low species diversity towards farms with lower yields yet high species diversity. This is due to incentives, such these organic certifications, which can generate simultaneous increases in income and biodiversity in a farming system (Bisseleua, 2009). In this sense, organic certification can ideally serve to subsidize tree diversity and landscape conservation.

Agricultural Development in Pará and Livelihood Context

Transamazônica municipalities produce 70% of Pará's cacao, and also have the only organic certified cacao in Pará. The Transamazon region refers to the Trans-Amazonian Highway BR-230 (Rodovia Transamazônica) built in 1972 as part of the military government's National Integration Plan. The highway runs through seven Brazilian states in the Amazon, beginning in Pará. It opened up large tracts of Amazon forest for cutting and settlement. The focus of this study is on the tract of Trans-Amazonian highway in central Pará, which was settled in the 1970's by thousands of "colonists" (colonos) from southern Brazilian states like Rio Grande de Sul and Paraná. Settlers in this area were given around 100 hectares of forested land to deforest and plant crops, along with one or two years of support salary from the government when they first arrived. Today, almost forty years later, this region is culturally diverse, with farmers from various areas of Brazil, and is dominated by agriculture, mainly cattle, cocoa, manioc, and sugar cane (FVPP, 2012). The original migrants began planting sugar cane, but the quality and type of soil steered the families into growing cacao, which grew well and had a growing market demand. In 2009 over 69,000 hectares in this region were under cocoa production, with plans to plant 10,000 new hectares. Cocoa production in Transamazônica in Pará is large-scale: the estimated revenue for 2007 was R\$ 110,761,868, with Pará's total cacao output increasing 20% in the last three years (Brandão, Santos, & Melo, 2008).

The settlement program along the Transamazon highway was intended to develop the Amazon and provide new livelihoods, but the region still suffers from extreme poverty. Defining "extreme poverty" as not having sufficient income to buy a minimum basket of food, in 2000, 2.7 million people in Pará were in extreme poverty, with a poverty rate of 58% in rural areas. Over 31% of these poor households cited agriculture as their primary form of employment. In the region within and surrounding Altamira, the family income per capita (R\$/month) averaged 337, with 7,670 household heads earning less than minimum salary (Verner, 2004). The next generation has now grown in this Trans-Amazonian area outside of Altamira, as the first residents who were born there are now bearing a new generation. The towns are growing and developing quickly, although land is now very expensive and difficult to acquire. Therefore, there is a new population growing within the downtowns of families

who come for land but cannot attain it, and therefore live in favelas along the side of the highway.

According to this comprehensive poverty study in Pará, those who work in agriculture are more likely to be in poverty than all other forms of employment in the region. Poverty levels among farmers are much higher than among service workers and industrial workers. More than a third of the poor population in Pará live in rural areas “with limited access to basic infrastructure and services” (Verner, 2004). The majority of Pará’s small farmers lack access to agricultural technology, credit, structures for processing and storing products, and organized marketing. Therefore, rural family income is highly variable and dependent on price fluctuations (Verner, 2004). In order to ensure constant income, further structure and rural extension is necessary; access to market is a limiting factor without the organizational support.

Along with organizational support, cocoa producers in the Transamazon region of Pará began a project in 2006 to form cooperatives and gain organic, fair trade certifications for their beans. In Transamazônica and in all of Pará, the conversion to organic certified cooperatives is new, but it has the potential to grow and consolidate through further organization and technical assistance. There is a lack of research comparing conventional, uncertified cacao production with those certified in the Transamazônica region. In order for other farmers in rural areas in Pará to seek organically certified agroforestry production, there needs to be documentation of livelihood indicators after certification is procured. Studies accomplished in this region have yet to publish documents on the income of the different farm families and their livelihoods since the years following certification 2008. This study aims to analyze the effects of certification on cacao farmers in the largest cooperative formed, in Medicilândia, Pará.

Study Site

Medicilândia is twenty-four years old municipality about two hours outside of Altamira, with about 27,000 inhabitants. Most of the residents are involved with agriculture, and it is among the largest cacao producing regions in the world; the municipality produced over 20,000 tons of cacao in 2010. Its organic cooperative (COPOAM) has 21 members, which is still less than 2% of the total number of cocoa producers. The largest farm in the cooperative has 127 hectares of cacao, but over 60% of the cacao farms around the town are

less than 20 hectares. COPOAM took two years to go through the certification process. The cooperative sells its certified higher quality cacao to Europe or to the cosmetic company Natura for cocoa butter. Natura aided in the cooperative's success by buying conversion cocoa beans in the transition to organic, before gaining certification, for the same price as organic, in order to help subsidize some of the conversion costs. The majority of growers in the region, who are not certified, sell to an "atravesador" (middle man) in Medicilândia who then sells to the chocolate corporation Barry Callebaut or the agricultural corporation Cargill, who both have storage facilities in the closest city of Altamira. There have been attempts to eliminate the *atravesador* by selling through the organic cacao project and by verticalizing cocoa production in Medicilândia, as the municipality has begun to supersede Bahia as the biggest producing area in Brazil. A union of cacao producers, both organic and non-organic, invested in building a small chocolate factory (Cacauway) in 2010 that has the capacity to produce 300 kg per day; it is intended to retain the higher value of chocolate in the producing area, as opposed to only exporting the beans. They only sell the chocolate in Medicilândia and Altamira. While Pará's governor also helped fund some of the project, the intent is for the profit from chocolate sales to flow back to the producer of the beans. They are currently unable to gain organic certification for their chocolate, because they are unable to access organic certified milk and sugar, which are necessary for the seal.

The Fundação Viver, Produzir, e Preservar, in Altamira, works with sustainable development projects across the Transamazon region around Altamira. The organization has an Organic Cacao Program that has helped cacao farmers consolidate into cooperatives, providing rural extension and technical assistance so that the farmers can become certified. The project, with collaboration from CEPLAC (Comissão Executiva do Plano da Lavoura Cacaueira) and a German developmental agency, has organized and certified six cooperatives around Altamira: Medicilândia, Uruará, Pacajá, Anapu, Brasil Novo, and Vitória do Xingu (CEPLAC/SUEPA, 2009). See cocoa productivity in map below.

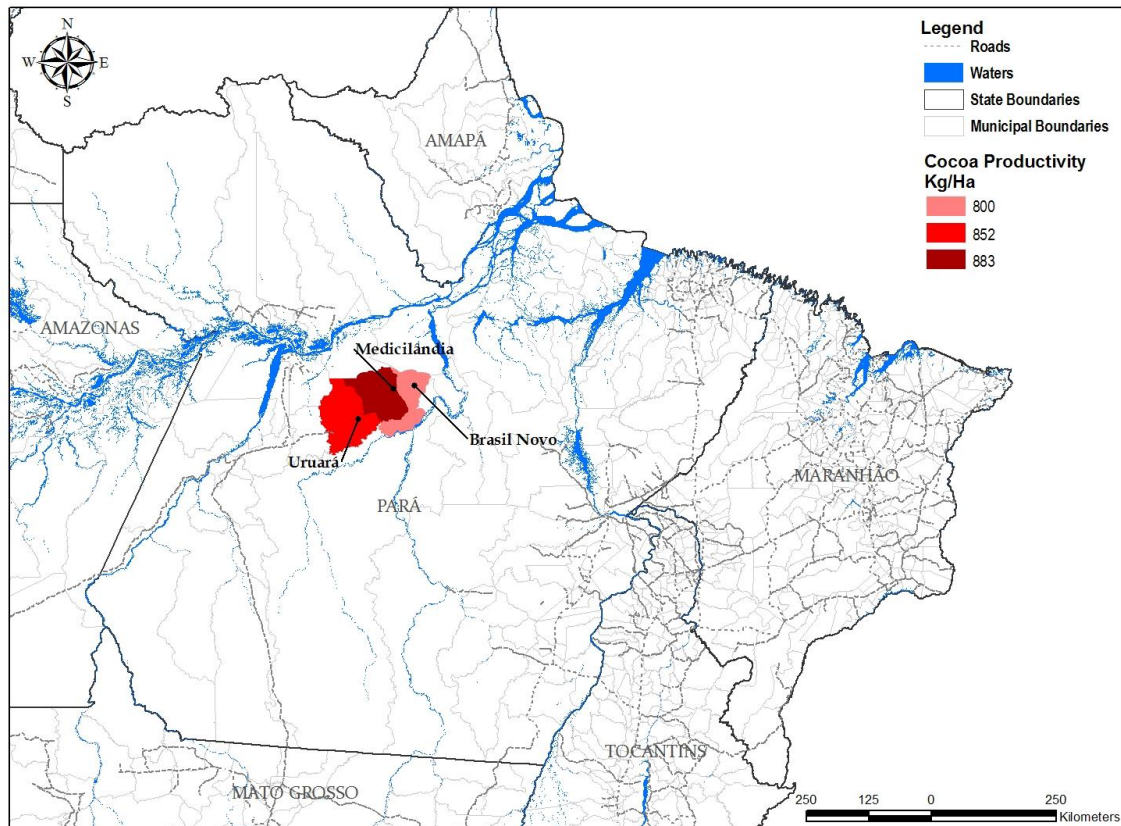


Figure 1. Cocoa Productivity in the Transamazon Highway region, Pará, Brazil, 2009

* Source: Cunha, M., Hirsch-Soares, D., Nascimento, N. 2011. Does organic cocoa certification contribute to socioeconomic development and environmental conservation in Brazil and Peru? *World Agroforestry Centre. Universidade Federal do Para (UFPA)*

This region sells organic cocoa to Zotter, an Austrian chocolate company, and Natura, a Brazilian cosmetic company. They are certified through the Institute for Market Ecology (IMO) “Fair for Life,” a Swiss certification agency that has been accredited by certifying agencies through the United States Department of Agriculture, the European Union, and Japan’s Agricultural Standards. It is an independent certification program for social accountability and fair trade in agricultural, manufacturing and trading operations, and the certification entails social, fair trade and environmental criteria based on internationally recognized standards such as the conventions of ILO, SA 8000, various fair trade standards, and the social criteria of IFOAM (IMO, 2012). The cooperatives’ first export of organically certified cacao was in 2008, to Zotter industries (FVPP, 2012).

Objectives

The aim of this study is to analyze the extent to and the conditions under which organic and fair trade cacao certification may contribute to socioeconomic development and environmental conservation, viewed together as sustainable livelihood development. Using various livelihood and sustainability indicators, this research examines the potential of certification to balance the economic needs of producers and the conservation needs of Amazon forest landscape. The goal is to analyze the differences between the livelihoods of farmers that are certified organic and those non-certified. The value of a farmer's livelihood is a combination of the income flowing into the household, the level and extent of inputs, as well as the long-term value of the producing perennials and non-commercial species in the fields. In this case, non-commercial products would be other trees besides cacao grown on the same fields, for various other values and reasons.

The core research questions surround differences in prices of and revenue from cacao, inputs into the production system, diversity of native Amazonian tree species, and the farmer's thoughts on his livelihood. In order to gain an overarching perspective, the goal is to look at small and larger farmers, with varying levels of experience with cacao production. The amount and the diversity of production are intended as indicators of long-term stability and sustainability of the different farm categories. For example, if a farmer has an average higher income along with more tree diversity on his farm, it will indicate a more sustainable livelihood.

Methods

In order to analyze the livelihoods of cacao farmers, this study examined the farmers' basic inputs and outputs, along with their own perspective on their sustenance. Due to local guidance, the study intended to represent the diversity of cacao production in the area by using a sample of two larger and two smaller properties for each category of certified and non-certified production, totaling eight samples. In addition, the study looked at producers with varying experience in years growing cacao.

Using structured interviews with questionnaires, information was obtained on the amount of cacao produced and sold; the amounts of inputs and labor; the non-cacao revenue sources; and the type and diversity of production. The amount, price, and revenue of their cocoa and other products were used as indicators of economic stability of the livelihoods. As

for sustainability, the diversity of native shade tree species and non-cacao products, along with amounts of chemical inputs, were used as indicators of livelihood sustainability. The study also included the farmers' perceptions of their livelihood, on sustainable development, and on the non-economic values of their forest species. This was included in order to assess the long-term nature of their practices and to address the various unquantifiable values and sources of livelihood stability. The list of values was chosen because of their relation to sustenance and sustainability, along with room for the farmer to add in other non-listed uses. The information was obtained through structured interview questions and field observations through a tour of each property (see Appendix I & II for questionnaire).

The research used information from last year's harvest for the interviews, because most of the farmer's did not keep record books and could not provide accurate answers for years further back or for exact averages. Revenue from cacao and non-cacao products, along with money spent on inputs, was calculated by multiplying price (R\$/kg) and quantity (kg) given in the interview for past harvests, while the average yearly net profit for each family was based off the farmer's estimate.

The study also involved participatory observation within the community through staying at the farm of the director of COPOAM, with work on the farms, attendance of workshops and meetings, and discussing the issues with family members besides just the head property owners. This was in order to more fully understand the process of cacao production, for organic and non-organic.

Results

Production

Eight interviews and field surveys were conducted on cocoa farms along the Trans-Amazonian highway in Medicilândia. Four producers interviewed have organic, fair trade certifications and are associated with the COPOAM cooperative, and four producers do not have any certifications. Small-scale producers (less than ten hectares) and large-scale producers (greater than 90 hectares) were interviewed for each category; two producers of each category have less than 15 years of experience with cacao production, and two have over 30 years of experience with cacao production. The certified farmers average 15,250 cacao trees, while the non-certified producers average 36,750 trees. One of the four certified producers and two of the non-certified producers sell agricultural products besides cacao.

Only two of the total eight farmers sell other fruits; both of these properties are greater than 90 hectares. Two producers within each producer category (certified and non-certified) have a source of off-farm income (see Appendix III for full profile of each producer).

Using the past year’s harvest for information on production, the four certified farms produced a total of 34,705 kilograms of cacao. The average selling price for their cacao was R\$ 6.22 per kilogram. The non-certified farms produced a total of 103,150 kilograms of cacao, with an average selling price of R\$ 4.44 per kilogram. All of the farmers explained that the price is variable and changes on a weekly basis throughout the season and is different each year as well. See Figure 2 for a comparison of the total revenues from cacao from the past harvest, along with each producer’s estimation of his average yearly profit.

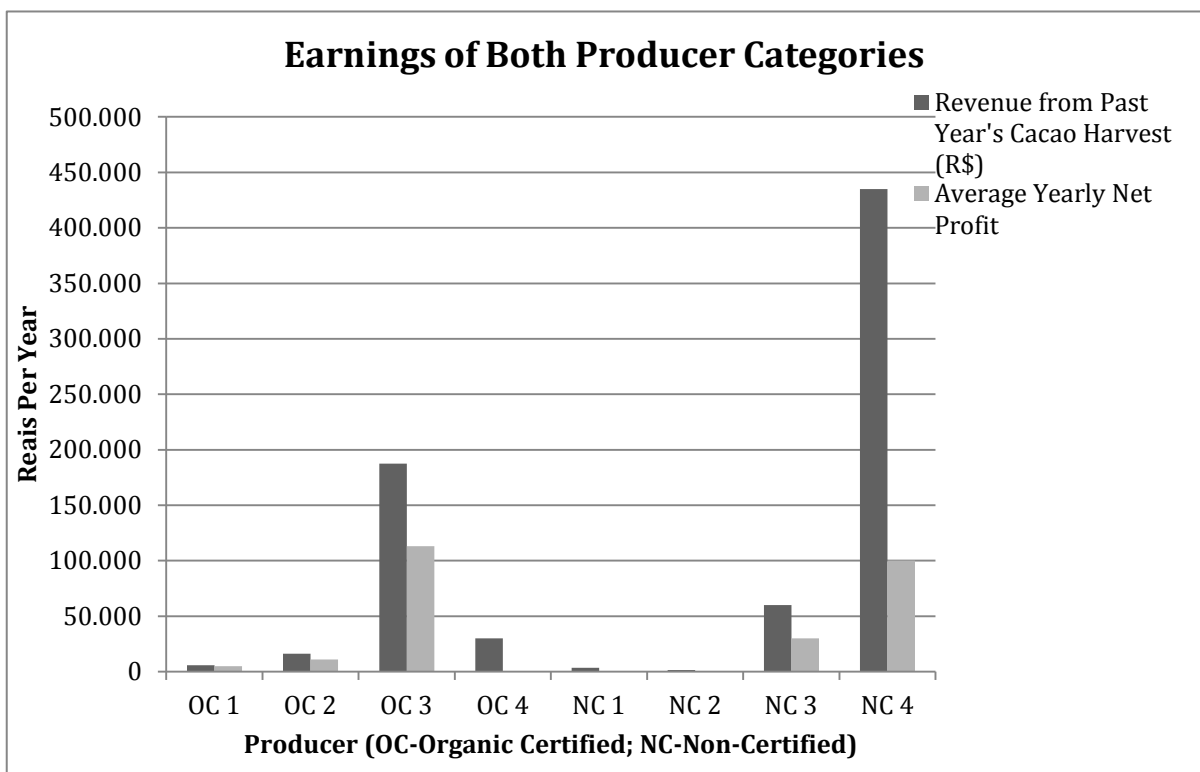


Figure 2. Cacao Revenue and Overall Profit for Producers

The amount and level of production for each farm varies greatly, so data was compared between the two farms within each category of similar size (See Figure 3).

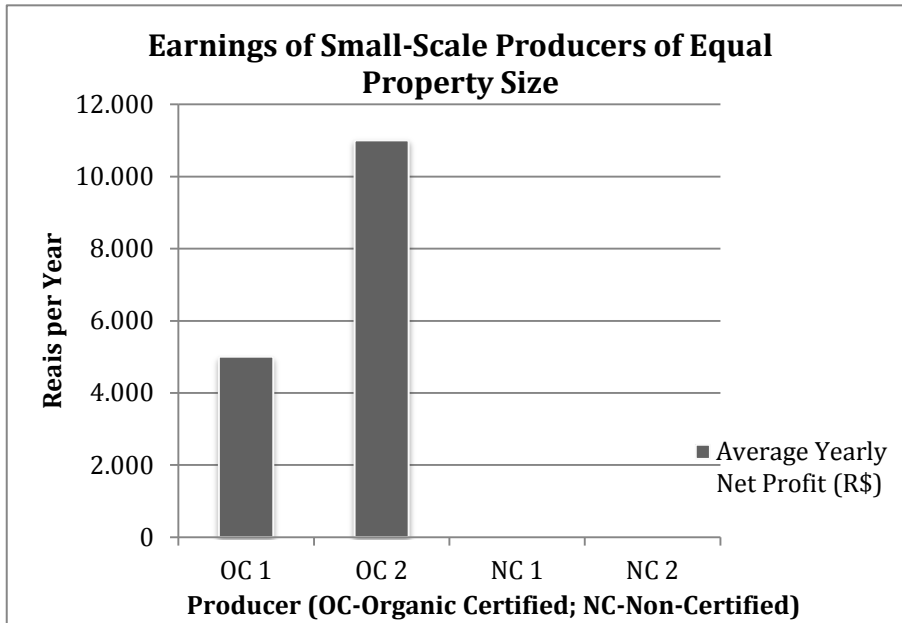


Figure 3. Comparison of Average Yearly Profit for Small Producers (8 hectares or less of cacao)

The two small non-certified farmers reported not having any yearly profit left over from their cacao, with their weekly revenue going directly towards survival necessities. One of the organic producers over ten hectares also does not usually make any profit each year from his cacao.

Inputs

Two farmers within each producer category have a form of paid labor besides family. The most common form of this labor is “meeiros,” or sharecroppers, who have houses and families on the owner’s property and work the land for a portion of the total cacao revenue. In addition, contracted workers are common for when the harvest is especially large. The certified producers average 6 workers for their property, while non-certified workers average 13 workers; both producer categories average approximately 7 hours per day of work. Every producer noted that the average hours per day for each laborer is highly variable, along with the number of workers needed. Table 1 indicates the different type and amount of labor for each producer.

Producer	Number of paid non-familial workers	Average Number of Workers Total	Average Hours (per worker/day)	Costs of Organic Inputs Past Year's Harvest (R\$)	Costs of Non-Organic Inputs Past Year's Harvest (R\$)
OC 1	0	4	6	0	0
OC 2	1	3	8	0	0
OC 3	5	8	8	2700	0
OC 4	0	10	7	0	0
NC 1	0	2	8	0	200
NC 2	0	1	6.5	0	0
NC 3	8	12	6	0	12000
NC 4	35	35	8	0	40000

*OC- Organic Certified; NC- Non-Certified

Table 1. Information Collected on Inputs into the Production System

Beyond labor inputs, farmers also provided information on whether they buy organic or inorganic inputs for their fields, using past year's harvest as a basis. For certified producers, this would involve compost and biological sprays; for non-certified, this includes herbicides, fertilizers, insecticides, and fungicides. Only one organic producer pays for inputs onto his fields (bone flour and occasionally cow urine), while three out of the four non-certified producers pay for chemical inputs. Three of the certified producers use compost as fertilizer and biological sprays as insect repellents, made from materials grown on their properties. None of the non-certified producers use compost, biological sprays, or other "home-made" remedies on their properties, and therefore purchase all inputs used on the fields. For the three producers who purchase chemicals, those most common are chemical fertilizers, herbicides, and insecticides. Table 1 indicates the costs of these inputs for each producer.

Tree Diversity

Each producer was asked to self-describe his property as either a monoculture, which was explained as dominated by only cacao; as a complex agroforestry system, defined as having multiple native tree species growing among cacao; or as a simple agroforestry system, with one or two forest species growing among cacao. Three of the four conventional producers identified their property as a monoculture; all of the organic producers identified as growing within an agroforestry system, displayed in Table 2.

Type of Production System	Certified	Non-certified
Monoculture	0	3
Complex Agroforestry System	3	0
Simple Agroforestry System	1	1

Table 2. Type of Production Systems Among Producer Categories

The farmer’s description was followed with field observations, which corresponded with the identification of the system.

While only three of the producers interviewed keep a written record of their native shade tree species, all of the producers had knowledge on the amount and type of non-commercial species growing within their cacao. The most common species present were ipê, andiroba, castanheira, Amazonian mahogany, inga, babaçu, copaiba, jenepapo, and tatajuba. The estimated species diversity of all non-commercial, native shade trees growing within the cacao is provided for each property in Figure 4.

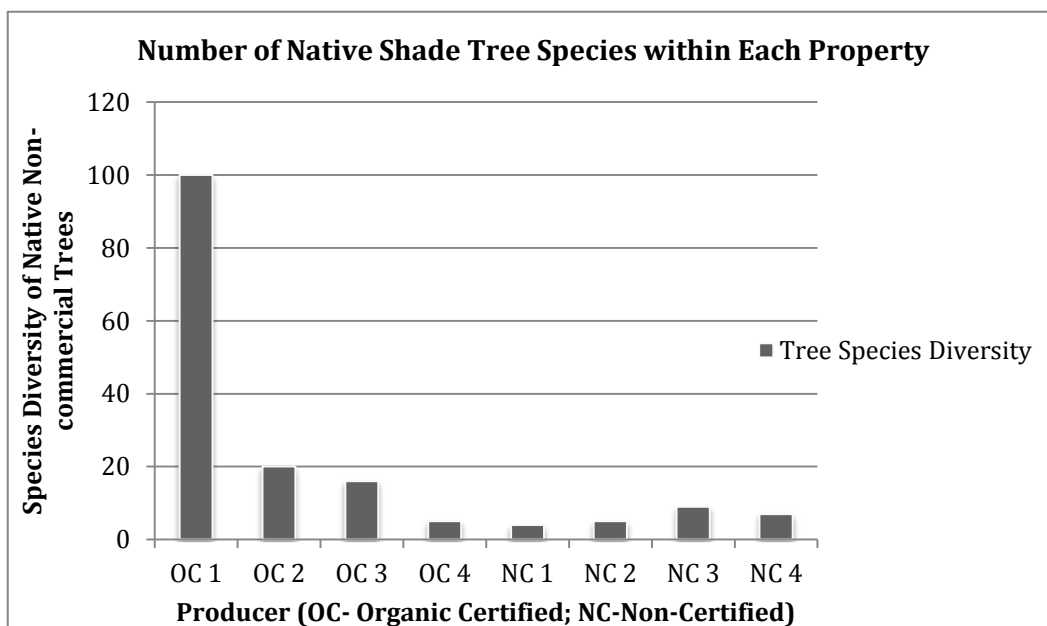


Figure 4. Comparison of Forest Species Among Producer Groups

These species were either already growing when the farmer arrived or were planted by the farmer when he arrived. Many of the farmers mentioned regulations prohibiting them from cutting, and incentives from research organizations like CEPLAC to plant them.

Farmers' Values and Perspectives

Because it is difficult to quantify the value of these forest species in their contribution to producers' livelihoods, the results indicate the number of different types of values besides economic. The majority of the certified producers use their trees for at least seven non-commercial uses, and the majority of non-certified have three other uses. The only type of use in common with every producer interviewed was shade. The same amount of certified and non-certified producers listed conservation as a non-economic value of their tree species. The producers that had other values beyond the options provided were all certified producers; an example of their uses was to attract pollination. Appendix IV displays each farmer's response.

In the open-ended section of each farm visit and interview, farmers provided their own perspective on livelihood and development for them and their region. The majority of certified producers answered that they were pleased with their livelihoods, all citing satisfaction with their health, their work climate, and their forest resources. These certified producers viewed themselves as rich, although many added that they have a different definition of the term than solely financial. Table 3 indicates the number of interviewees who responded "yes" to livelihood satisfaction and feelings of being rich.

Satisfied with livelihood	
Certified	3 (75%)
Non-certified	2 (50%)
Viewed themselves as rich	
Certified	3 (75%)
Non-certified	0

Table 3. Proportion of Producers Reported Positive Livelihood Perspective

Half of the non-certified farmers reported as satisfied with their livelihoods, and none of them answered that they viewed themselves as rich. The non-certified producers mentioned health as a reason why they are not completely satisfied with their livelihood, because they do not have enough financial and logistical access to health care. The majority of non-certified producers responded that no one in Transamazonica is rich, and that their own satisfaction depends on the international market.

When asked about why there are so few organic certified cacao farms in Brazil, three certified producers answered that financing for families and economic opportunity are the

main limiting factors. For non-certified producers, the two largest both referenced a fault of technical assistance and incentive from the state government.

Each producer gave his own definition of sustainable development as a conclusion of the interview and visit. The majority of non-certified producers defined it as environmental conservation while earning an income. (One of the non-certified producers had never heard the term before and did not know how to respond). The responses from certified producers were more varied, with some mentioning “minimum impact” and others just answering “money”; but all four certified cited producing one’s own food.

Analysis & Discussion

Production and Economic Stability

Large-scale producers

The great differences in size and type of production systems among the farmers in the study indicate the varying levels of development for the region. Both producer categories displayed vast income inequality among cacao farmers. The largest production and revenue from cocoa was on the largest farm studied, with 100 hectares of cacao, producing 87,000 kg per year. The revenue for this producer (NC 4) was far greater than all others interviewed, and was the only producer to sell a significant amount of other fruits. Yet he retained less than 22% of his total revenue because of the amount of his paid laborers and the quantity of his chemical inputs (he averages about R\$35,000 per year just for fertilizer). His property can only be properly compared with those of similar size, yet the large-scale organic producer only dedicates a 30 of his 91 hectares to cacao, for the rest remains forest. Yet, because the organic producer was receiving the premium for the majority of his beans (30% per kg in comparison), and had minimal input costs, he ended up with a comparable average yearly net profit (R\$100,000 compared to R\$113,200; view Figure 2). When this large-scale certified producer (OC 3) is compared to a non-certified producer of more comparable size (50 hectares) his yearly production in kilograms, overall revenue, and average yearly profit are all greater even though his property size is smaller (see Figure 2).

The two large conventional producers have several homes, cars, and electronics, yet both definitively explained that they do not view themselves as rich. The large organic producer has a small home and fewer indicators of wealth, yet reported himself as very rich.

Small-scale producers

For the small-scale producers studied, the two certified properties, each with 8 hectares under cacao production, far exceed the economic stability of those non-certified. For these small producers, on average the certified production (kg of cacao) more than triples the amount of production for the small conventional farms. The organic producers are able to retain a net profit at the end of the year, while the two non-certified producers do not (view Figure 3). Only one of these four small producers pays for any form of input (NC 1), and none of them use paid labor. But the small, certified producers were able to retain more of their cacao revenue as profit; both certified producers commented on getting the majority of their health and food necessities from the species on their property. These farmers cited themselves as satisfied with their livelihoods and viewed themselves as rich; the two small non-certified producers responded as unsatisfied with their livelihoods and did not view themselves as rich.

Notable economic factors

There is still a great deal of poverty within both producer categories, namely for the small producers. When the first generation of colonos arrived and acquired land here, they each received 100 hectares, with relatively little economic investment. The more experienced farmers are these colonizers who are now more established and do not have debts to the land. Today, land is expensive and difficult to come by. Therefore, the smaller producers interviewed, who have bought off “chakras,” or pieces, of larger landowner holding, are generally less experienced, with younger cacao trees. The age of the trees determines the production and quality of the producers’ harvest, for cacao takes about five years to start producing fruit and will produce for decades. So those older producers with better established stands of cacao are going to have better production.

In order for any of these smaller landowners to retain certification, they must pay an annual cost per hectare for the cooperative, which some are unable to do. This relates to the responses given by several producers on the lack of financial assistance as a major limitation in the conversion to organic premiums.

Receiving the Organic Premium

The organic certified producers studied earned a greater price premium for their beans, an average of R\$1.78 more per kilogram. While the current market price for certified cacao is

around R\$7.50 per kilogram, the majority of the certified producers interviewed had an average selling price much lower. This is due to several factors inhibiting organic producers from earning the highest value possible. Several of the certified producers sell a large portion of their cacao for the conventional market price, because they do not have the economic means to store large portions of their harvest for several months, since the Austrian importer of the organic beans only buys once or twice a year in large quantities. One of the certified farmers (OC 4) still has never sold his beans with the organic premium, after four years of being certified, because he relies solely on cacao revenue to feed his household and provide other weekly necessities. He does not have any yearly net gains and was the one organic producer who did not view himself as rich. He sells to “atravesadors” because they buy the beans while the cacao fruit is still growing on the tree, to then sell to a larger corporation. In this scenario, the producer is ensured of a profit before he labors towards the finished product, and the middleman is able to secure the cocoa for a cheaper price. This producer displays a common problem with the certified cooperative. Today, only about 7 of the 21 certified member producers actually are receiving the organic premium for their beans. Even the producers who do sell beans for the organic premium still sell cheaply to the *atravesador* in Medicilândia, because they can only afford to store a portion of their harvest. Several producers noted that it can take over six months after the harvest to actually sell and ship out their organic product. Examples were cited of beans getting thrown out after staying in storage too long, waiting to be sold to an organic buyer.

In addition, transport is an enormous factor in the area, for both producer categories. The Trans-Amazonian Highway is not paved in this the producing region, and throughout the rainy winter season in particular, it often is impassable. In order for farmers involved with the cooperative project to receive the organic price, their cacao must be transported to the project’s storage facility in Altamira, about two hours away. Only two of the certified producers had vehicles. The project’s office and cacao storage in Altamira has four employees, who organize five other cooperatives along the Trans in addition to Medicilândia. Therefore, while there is transport assistance, it is limited.

The other limitation for securing the organic price premium cited by the certified producers, and evident on the farms, is due to quality. Only fermented cacao beans can be made into chocolate, and the Austrian importer selects the highest quality of beans, that have

been fermented and dried meticulously. The majority of farmers interviewed did not ferment their beans because they did not have fermentation boxes; only two of the producers had built them (both certified). In addition, in order to fully clean and dry the beans to make organic chocolate, the producer needs infrastructure for drying (a “secador”). The same certified producer that had yet to achieve the organic price does not have fermentation or drying infrastructure, only a tarp on the ground in the same fashion as the conventional producers. The organic producer that received the full organic price premium for his beans of R\$7.60 had the most elaborate infrastructure for both fermenting and drying; it is still simple though, wooden structures made by hand, with stone ovens to speed the drying process. None of the non-certified producers’ properties had fermentation, for they sold their cacao to the *atravesador* for Cargill or Barry to make cocoa butter.

Therefore, while the project has secured certification and organic buyers, there needs to be better infrastructure for all of the cooperative members. Small-scale producers will not receive the higher price if they do not have assistance with financial planning, transportation, and fermentation infrastructure. There is a community development fund involved in the fair trade aspect of their certification, but it is currently non-existent. There are issues with equal representation within COPOAM, because it is the same small group of larger, more developed farmers within the cooperative that meet regularly and go to Altamira to discuss the project. Certified producers interviewed commented on a generally individualistic attitude among the farmers in the cooperative.

Some farmers cited the organic cacao program’s organizing agency, the Fundação Viver, Produzir, e Preservar, as becoming a new form of “*atravesador*” for them, because they pay the costs for conversion and certification yet do not receive financial assistance to achieve the premium price. They are unsure whether their full product value is being returned to them. There were originally seven cooperatives certified in Transamazônica through this project, but one of them (Senador José Porfírio) fell apart for this reason. Right now, it is debated whether another cooperative will have to drop out of the program. The director of the Medicilândia cooperative, who meets with the project organizers several times a week, has indicated that if their financial support system for farmers does not change, the cooperative will not last into the future. The members within the FVPP office explain that they are understaffed and do not have the resources to expand the project.

Sustainability of Livelihoods

Each producer interviewed had a different perspective on sustainability. In terms of forest conservation, the majority of the non-certified producers grew their cacao in monocultures, while all the certified producers identified as using a type of agroforestry system. One of the certified producers (OC 1) essentially retains his entire property as forest, growing and harvesting cacao from underneath a full canopy of native trees. The other organic properties are not as fully integrated agroecosystems, yet all contain multiple species shading over their cacao. Figure 4 reveals that three of the organic producers cultivate far more native tree species among their cacao than all of the conventional producers; the average diversity is 35 for the certified category, and 6 for the non-certified category. These forest species are valuable for each producer long-term for multiple reasons. In addition, the certified properties' forest species are not being polluted by the chemical fertilizers and pesticides spread within three of the non-certified production systems.

The producers with organic certifications had a wider variety of values for the forest species on their property than the conventional producers. Being able to use their property as their source of food, medicine, oils, etc (see Appendix IV), minimizes external inputs into their livelihood system and provides free necessities for long-term sustenance. These resources are unable to be valued, and were often mentioned by the farmer as “incalculable.” Although the large conventional farms produce much more cacao and earn greater revenues, they are inherently paying for the resources that they could be receiving from the land if it was not mostly monocultured with cacao (since cacao does not provide for a livelihood unless its beans are sold for money). This also corresponds with how the certified producers have a more satisfied perspective on their livelihood.

Challenges within the Study

The diversity of different forms of cacao production in the area made it challenging to study a sample that was both representative and able to draw comparisons. The small-scale producers and the large producers have completely different realities. There are many factors in the production systems that proved to be different and difficult to quantify for every farmer, such as ownership/access of machinery, size of families, costs of organic conversions, exchange of labor instead of payment for labor, and owning several properties or only

fragments of properties. Producers had a wide range of education levels as well, which is important to note when discussing livelihoods but difficult to quantify. The smaller, conventional farmers often cannot read or write, and therefore gathering information becomes challenging.

It became apparent that some of the small producers financial problems stem from the lack of records or calculations keeping track of their income and their spending. In general, the farmer would only know average/estimated quantities, and recent information from the past season. Only two of the producers provided written records for the study. So, the results leave space for further information on production of years past (for the organic producers, especially before certification) and on the wide breadth of inputs into the agricultural system beyond just field chemicals. Also, most of the producers mentioned their various issues with fungi, insects, and diseases of their cacao, so it would be valuable to compare these production problems between organic and conventional.

In addition, farmers would not necessarily be truthful during interviews, and would be uncomfortable over certain topics, especially yearly profits and chemical inputs. After procuring information from one farmer, the next farmer would describe the same thing differently. Some producers claimed that other ones were “lying,” because there is corruption between with the large conventional producers and Banco do Brasil.

All of the producers interviewed are the first generation of their family to live in Transamazônica, although most are bearing the second and third generation. The area is new and has only contained agriculture for less than forty years. So in terms of assessing the long-term sustainability of their agricultural livelihoods, it is difficult to decipher just how significantly and rapidly the region is going to develop as these first native-born generations grow and make choices about whether to stay growing cacao or to abandon this lifestyle for an urban livelihood. When the colonists first came, the area was dominated by sugar cane, with a sugar-processing factory; will these future generations abandon cacao and their new chocolate factory in a similar fashion decades from now? Or will the region continue to grow and become the top producer in the world?

Conclusion

Cacao production is growing in Pará's Amazon forest, and it varies widely in style and approach. Organic cacao agroforestry systems provide alternative livelihoods to clear-cutting

forest for crops or for cattle along the Trans-Amazonian highway. Organic certified cacao producers in this region maintain their cacao in agroforestry systems that preserve numerous species of native, non-commercial Amazon trees. Certified producers have greater forest species diversity than do non-certified producers, which are predominantly monocultures of cacao. In addition, the forest species occurring among cacao have more values and uses within the households of certified producers, contributing to greater stability and sustainability of their livelihood.

Conventional, large-scale properties (>90 hectares) of cacao produce greater quantity of cocoa beans and earn higher revenues in this region, but they must invest in more paid employees and inputs. An organic producer of similar size, while generally producing smaller quantities of cocoa, can exceed the profit of a conventional farmer with a certification's added price premium if he produces quality beans. Small-scale producers (<8 hectares) both produce and earn more than small, non-certified producers. But to achieve this additional revenue from the certification, the producer needs financial assistance and infrastructure. There are costs to the producer's economic livelihood when involved in organic cooperative participation, and difficulties in procuring higher quality, fermented beans.

Opportunities

While the certified cooperative in the study site has 21 members, only 7 of them are earning the organic price premium. This is due to various organizational issues within the cooperative and the sponsoring organization that negotiates the export. Today, many producers are supporting their households and are content with their livelihoods; but there are many small producers that need further assistance if they are to start earning any profit from their production. This study suggests the potential for a direct trade partnership as an opportunity to enhance the livelihood development of small-scale producers. Paying money directly back to the producer, without going through a separate fund or organization, could potentially help sustain the region's cacao production in the long-term.

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Appendices

Appendix I.

QUESTIONÁRIO PARA PRODUTORES DE CACAU Medicilândia, PA, Maio 2012 __

Por favor, responda cada pergunta com o melhor de sua capacidade. Você pode optar por não responder a nenhuma das perguntas listadas. Por favor me diga se você quer esclarecimentos ou explicações para qualquer das informações solicitadas. Estes dados não serão publicados e você pode optar por permanecer completamente anônimo.

Nome: _____

Distância entre a propriedade e a cidade de Altamira (km): _____

Quantas pessoas vivem na residência _____

Sócio da COPOAM: **Sim**____ **Não**_____

Tem certificação de comércio orgânico e de comercio justo: **Sim**_____ **Não**____

Você tem meeiros? Se tem, quantos?

Quando vocês chegaram aqui e quantos gerações já viveram aqui?

Desde quando cultivam cacau? _____

Como você descreve sua propriedade (**marque**):

-Cacau em agrofloresta complexos (múltiplas espécies)_____

-Cacau em agrofloresta simples (uma espécie ou duas espécies adicional ao cacau)_____

-Cacau em monocultivo _____

Qual tipo de trabalhadores você tem (**marque**):

-familiar_____

-contratada_____

-meeiro _____

-combinação _____

Quantos trabalhadores trabalham na sua propriedade_____

Qual é a média de horas por dia que cada trabalhador trabalha_____

Perguntas sobre produção de cacau

Quantos hectares de produção que você tem em total	
Hectares de área de produção de cacau	
Quantos pés de cacau	

Produção de cacau de safra passada (kg)	
Preço de venda (R\$/kg)	
Ganho liquido de cacau de safra passada (R\$)	
Estimado de ganho liquido média de cacau/ ano (R\$)	

Quais são as idades das suas roças de cacau _____

Perguntas sobre produção além do cacau

Quantos espécies florestais você tem dentro dos plantios/ roças de cacau (estimado)

*Se o agricultor não sabe, pergunta sobre uma roça só (com a diversificação mais alta)

Quais são? _____

Como é a densidade das florestais? _____

Outros produtos além do cacau (maior de menor)	Quantidade de safra passada (kg)	Preço de venda (R\$/kg)
1		
2		
3		
4		
5		
6		
7		
8...		

Total

Qual é o valor das florestais além de econômico? Qual é o valor para você como pessoa, com emocional?

Marque todas que se aplicam:	
Alimento	
Sombra	
Madeira	
Medicina / Remédios	
óleo	
Ornamental	
Conservação	
Outro (escreve)	

Você tem outra fonte de renda além de produtos agrícolas? **Sim**_____ **Não**_____

Se assim, quais são?

Perguntas sobre insumos

Você usa pesticidas, herbicidas, ou outros produtos químicos em seus campos?

Sim_____ **Não**_____

Tipo de insumo	Nome	Quantidade (kg total de ano passado)	Custo (R\$)
Herbicidas			
Fertilizantes químicos			
Fertilizantes minerais			
Inseticidas			
Fungicidas			
Compostagem			
Caldas Biologicas			

OPEN ENDED (em aberto)

Você está satisfeito com o seu sustento? **Sim**_____ **Não**_____

Você vê asi mesmo tão rico? **Sim**_____ **Não**_____

Porque você acha que há tão poucas fazendas orgânicas certificadas de cacau no Brasil?

Qual é o significado de “desenvolvimento sustentável” pra você?

Appendix II. (English translation)

QUESTIONNAIRE FOR CACAO PRODUCERS, Medicilandia, PA May 2012

Please answer each question with the best of your ability. You can choose not to answer any of the questions listed. Please tell me if you want clarification or explanations for any of the information requested. These data will not be published and you can choose to remain completely anonymous.

Name: _____

Distance between your property and Altamira (km): _____

How many people live in your home _____

Associated with COPOAM: **Yes** ___ **No** _____

Have organic and fair trade certification for cacao: **Yes** _____ **No** _____

Do you have sharecroppers? If yes, how many?

When did you arrive here and how many generations have lived here?

Since when have you cultivated cacao? _____

How would you describe your cacao property (**mark**):

-Cacao in complex agroforestry system (multiple tree species) _____

-Cacao in simple agroforestry system (one or two tree species in addition to cacao) _____

-Cacao in monoculture system _____

What type of workers you have (**mark**):

-family _____

-contracted _____

-meeiro _____

-combination _____

How many workers work on your property _____

What is the average number of hours per day that each laborer works _____

Questions on cacao production

How many hectares of production in total	
How many hectares dedicated to cacao	

How many cacao trees in total	
Production of cacao beans in past harvest (kg)	
Price sold as (R\$/kg)	
Revenue of cacao from past harvest (R\$)	
Estimated average net profit cacao/ano (R\$)	

What are the ages of your fields of cacao _____

Questions on production besides cacao

Estimated number of forest tree species you have among your lots of cacao

What are they? _____

What is the density of your forest species? _____

Other products sold besides cacao from property	Quantity from past harvest (kg)	Price sold (R\$/kg)
1		
2		
3		
4		
5		
6		
7		
8...		

Total

What is the value of your tree species besides economic? What is the value for yourself as a person?

Mark all that Apply:	
Food	
Shade	
Wood	
Medicine/Remedies	
Oil	
Ornamental	
Conservation	
Other (write-in)	

Do you have another source of income besides agriculture? **Yes**_____ **No**_____

If yes, what is it?

Questions on inputs

Do you use pesticides, herbicides, or other chemical products on your fields?

Yes_____ **No**_____

Type of Input	Name	Quantity (total kg past year)	Cost (R\$)
Herbicide			
Chemical fertilizer			
Mineral fertilizer			
Insecticide			
Fungicide			
Compost			
Biological spray			

Open Ended

Are you satisfied with your livelihood? **Yes**_____ **No**_____

Do you see yourself as rich? **Yes**_____ **No**_____

Why do you think there are so few organic certified cacao farms in Brazil?

What is the meaning of sustainable development for you?

Appendix IV.

Producer	Food	Shade	Wood	Medicine	Oil	Ornament	Conservation	Others
OC 1	X	X	X	X	X	X	X	X
OC 2	X	X	X	X	X		X	X
OC 3	X	X	X	X	X	X	X	X
OC 4		X						
NC 1	X	X	X					
NC 2	X	X					X	
NC 3	X	X		X	X		X	
NC 4	X	X	X				X	

*OC- Organic Certified; NC- Non-Certified

Table 5. Non-Economic Values of the Producer's Property

Appendix III.

*OC- Organic Certified; NC- Non-Certified

Table 4. Collected Information on Production for Certified and Non-Certified Propertie

Producer	Years Producing Cacao	Property size (total hectares)	Property dedicated to cacao (hectares)	Number of cacao trees	Average Price for Past Year's Harvest (R\$/ kg of beans)	Cacao Production Past Harvest (kg)	Revenue from Past Year's Cacao Harvest (R\$)	Revenue from Non-cacao Products Past Harvest (R\$)	Estimated Average Yearly Net Profit (R\$)
OC 1	12	48	8	12,000	6.5	900	5,850	0	5,000
OC 2	12	22	8	8,000	5.88	2,805	16269	0	11,000
OC 3	28	91	30	30,000	7.5	25,000	187,500	3,400	113,200
OC 4	36	10	10	11,000	5	6,000	30000	0	0
NC 1	8	12	5	4,000	4.25	800	3400	0	0
NC 2	15	3	3	3,000	4.5	350	1575	45	0
NC 3	34	96	50	40,000	4	15,000	60,000	0	30,000
NC 4	36	100	100	100,000	5	87,000	435000	43,200	100,000

