



Feasibility Study:
Food Cooperative Implementation in
Monteverde, Costa Rica

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1. Executive Summary

The client, Fabricio Camacho, requested to develop a feasibility study for a food cooperative in Monteverde, Costa Rica. Fabricio Camacho is the Associate Director of the UGA Costa Rica Campus and is the Community Leader for Monteverde. His goals for this cooperative include providing food that is local (within 50 km of the area) and organic for the Monteverde community of 5,000 residents, and potentially support the tourism industry of 200,000 people. Costa Rica's legal definition of organic is defined as non-GMO food that has not come into contact with human excretions or synthetic chemicals and has been farmed on land that has not used chemicals for 3 years (Organic Coffee in Costa Rica, 2014). This cooperative would support sustainability and improve the health of the Monteverde community.

The methods used to determine feasibility included a spatial analysis, SWOT analysis, and evaluative matrix. The spatial analysis was completed with Geographical Information Systems (ArcMap 10.7) and land data was sourced from the Monteverde Institute. By assuming that the data is accurate and relying on government-reported data, the available farming area could be predicted to support the community. The SWOT analysis outlined the strengths, weaknesses, opportunities, and threats for this feasibility study which aided in determining how to proceed. An evaluative matrix was developed and the land use, food consumption, and population use were focused on for this feasibility study.

For a successful farmers market cooperative, a leading executive board would have to be established, along with supportive members and farmers. The spatial analysis determined that 70% of the 5,000 Monteverde residents would be able to be supported by the food produced, meaning that food would have to be supplemented by outside resources. Organic certification would justify raised prices while payment security could be gained by increasing prices for tourists and discounting food for locals. Recruiting members and developing a business plan while securing financing would benefit the economics of the cooperative. Socially, the Monteverde community will benefit from a diverse diet and improved economy, while learning more about sustainable farming practices and attracting tourists. This cooperative will be feasible if 30% of the food is supplemented and if the cooperative members and community are involved and supportive.

2. Introduction

Monteverde, home of the Monteverde Cloud Forest Biological Reserve and referred to as "the jewel in the crown of cloud forest reserves" by National Geographic, is a major hub for ecotourism in Costa Rica. Not only does it attract many tourists, but it is also home to a small community who prides themselves on being sustainable and protecting the unique ecosystem that surrounds them (Nadkarni., 2000). With a large influx of approximately 200,000 tourist visiting the area yearly, supplying the restaurants, hotels, and groceries with fresh local food is a major concern for the community (Stuckey et al., 2014).

The Monteverde community plans to address this concern by establishing a farmers cooperative for the community. Fabricio Camacho requested from the UC Davis D-Lab Civil and Environmental Engineering students to conduct a feasibility study for implementing an organic farmer's market cooperative. Ideally this cooperative will provide local, fresh, and organic food for the local community to improve the sustainability of food production/sources in the area and the health of the community.

Currently a local farmer's market is operated out of a school gym on Saturday mornings. Over 20 local growers and vendors pay \$10 to set up a stall, selling their produce and goods to the local community (Farmers Market Monteverde Costa Rica. (n.d.)). However, it was noted by the client this type of operation could become much larger and a major source food for not only the local community but also the hotels, restaurants, and possibly tourists. Historically, agriculture is the main source of income for the Monteverde area (Nadkarni, 2000). With agriculture and the existence of a small farmer's market already present, the product and local support necessary to start a farmer's market cooperative may already be in place. However, there are many components (environmental, technical, social, and economic) involved in the startup of cooperatives, meaning the overall feasibility of each component needs to be evaluated.

This study was broken into four parts in order to provide sufficient information regarding the environmental, social, technical, and economic components necessary to implement this cooperative. To determine the feasibility of this cooperative, the land available and current agricultural practices, the best model for the cooperative, and the social impacts

associated with the implementation of successful cooperatives were investigated and are addressed. The ultimate feasibility for the implementation of a cooperative in the Monteverde area based on these factors is determined.

3. Methodology

3.1 Spatial Analysis

Determining the amount of agricultural land available for food production is necessary to determine if the area can support the population of Monteverde. The percentage of the population that can be fed from the current agricultural land was determined. Spatial analysis was conducted to quantify the amount of farmland currently available in the region. The amount of severely overused land was also quantified in order to determine any environmental risk associated with agricultural activity.

Geographical information systems (ArcMap 10.7) was used to spatially evaluate the Monteverde region. Shapefiles, layer files, and all land data was sourced from the Monteverde Institute. Using this data, the agricultural land was mapped and quantified using the field calculator tool. In addition to the agricultural land, the severely overused land was clipped and quantified using the calculator tool. The base layer of each map was sourced directly from ArcMap 10.7.

3.2 Investigation

A SWOT analysis was conducted in order to determine the major objectives focused on in analysis. The SWOT analysis determined any strengths, weaknesses, opportunities, and threats that would be impactful for this feasibility study (Table 1). This aided in deciding focus areas and decision-making. By completing an evaluative table, objective functions were defined for the cooperative (Table 2). Target values were provided from the spatial analysis, literature, and the client, Fabricio Camacho. The topics focused on for this feasibility study include land use, food consumption, and population use.

Table 1. SWOT Analysis

Strengths <ul style="list-style-type: none"> ● Climate/Environment ● Existing Infrastructure 	Weaknesses <ul style="list-style-type: none"> ● Knowledge Gap ● Funding
Opportunities <ul style="list-style-type: none"> ● Tourism <ul style="list-style-type: none"> ○ Farms/Tours, Education, Economy boost ● Singular Coop in area ● Decrease in processed food 	Threats <ul style="list-style-type: none"> ● Government/Contracts ● Land Degradation

Table 2. Evaluative Table for Costa Rica Coop

Objective Function	Functional Unit	Target Value	Quantitative/Qualitative	Evaluation Method
Land use	Crops/m ² /year	809,371	Quantitative	Measurement done by GIS data
Food Consumption	Food kg/person/year	906	Quantitative	Sales reports
Capital cost	\$	\$3,000	Quantitative	Recording bills
Maintenance cost	\$/year	\$250	Quantitative	Recording bills
Transportation	km/year = \$	10,400km	Quantitative	Self-reporting

Produce production cost	\$/crop/year	\$3,000	Quantitative	Self-reporting
Livestock production cost	\$/animals/year	\$4,000	Quantitative	Sales reports
Population Use	People use/year	20,000	Qualitative	Surveys
Farmer participation	Number of farmers/year	15	Qualitative	Membership forms
Revenue	\$/farmer/year	\$6,000	Quantitative	Membership forms

4. Results and Discussion

4.1 Environmental Feasibility

4.1.1 Land Assessment

The total agricultural area available was calculated to be approximately 4,423 acres as seen in Figure 1 (Chinchilla, 2019). This land does not account for “kitchen farms” or small-scale farms used to support an individual home or small community. This data is not readily available and highly variable, so it is not included in this analysis (Nadkarni, 2000). OECD (2017) reported the amount of small-scale farms, which grow more traditional produce, is increasing in Costa Rica, while the larger scale farms are decreasing. This trend is attributed to the idea that several larger farms sold small plots, which are still used for agricultural purposes, such as kitchen farms, but are no longer registered as farmland. So, acquiring the actual land dedicated towards agricultural purposes in the Monteverde region is limited to the registered farmland (OECD, 2017).

According to the Food and Agriculture Organization of the United Nations’ statistic, the Monteverde region would need approximately 6,200 acres of land to feed 5,000 people. With only approximately 4,423 acres of land currently registered as agricultural land, only 70% of the

population can be supported with Monteverde’s agricultural land. Monteverde will need to outsource to supply the local community with food. It should also be noted, not all of the 4,423 acres of land is utilized for produce and livestock since coffee is a dominant crop in the area. It will be necessary for a portion of the community’s food to be sourced from different areas of Costa Rica, especially if the community desires to support its tourism with the local food production.

$$1.24 \text{ acres/person} * 5,000 \text{ people} = 6,200 \text{ acres}$$

$$4,423 \text{ acres} / 6,200 \text{ acres} * 100 = 70\%$$

Agricultural Land in Monteverde, Costa Rica

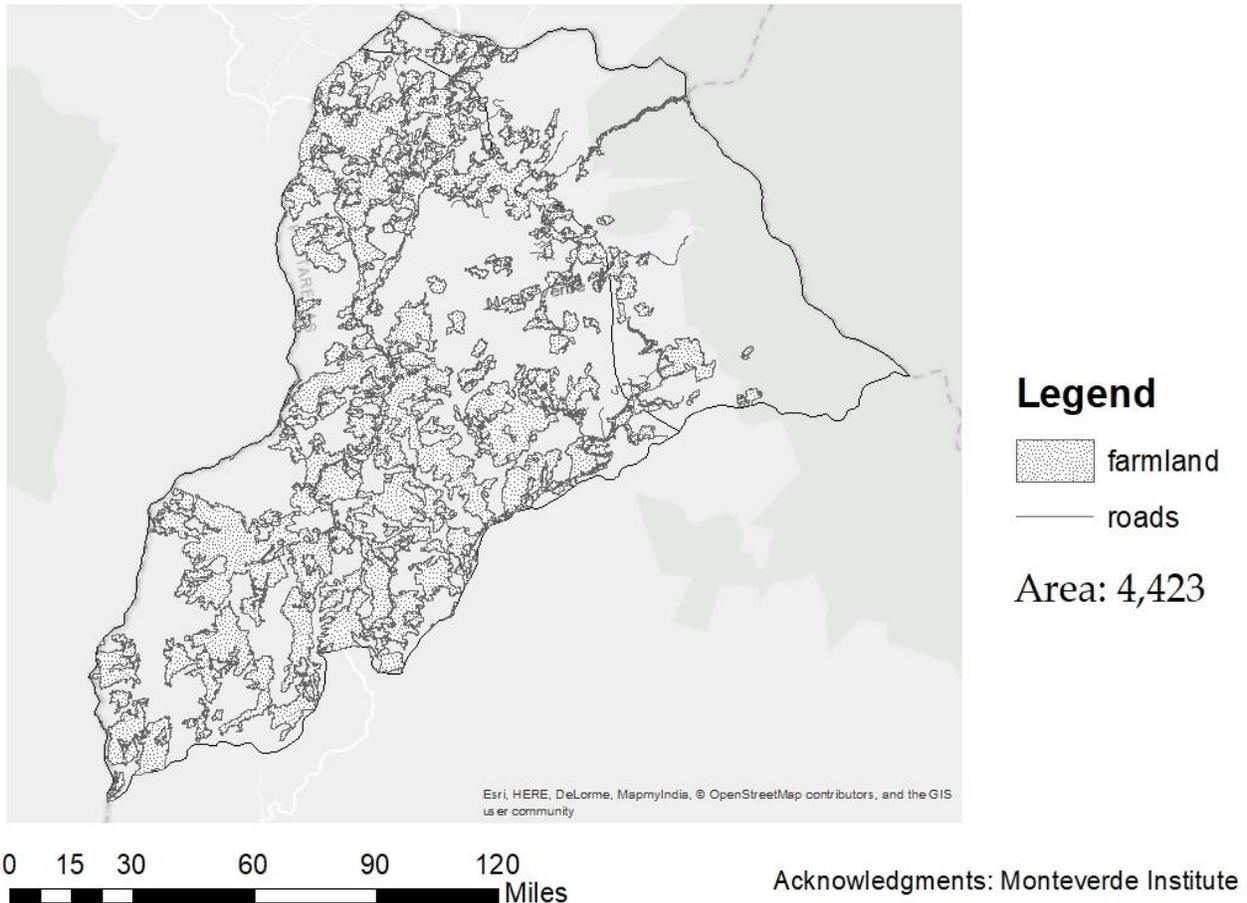


Figure 1. Registered agricultural land in the Monteverde Region. An enlarged map is found in the appendices.

Other aspects to consider are the agricultural environmental stresses. Figure 2 represents the amount of severely overused land is predominantly the farmland area from Figure 1 (Chinchilla, 2019). The desire to produce more food from the area may put more stress on the already overused land. However, with the implementation of the cooperative, organic and more sustainable agricultural practices like land rotation and plant diversity may alleviate some of the current stresses and promote rehabilitation of the overused land.

Severely Overused Land in Monteverde, Costa Rica

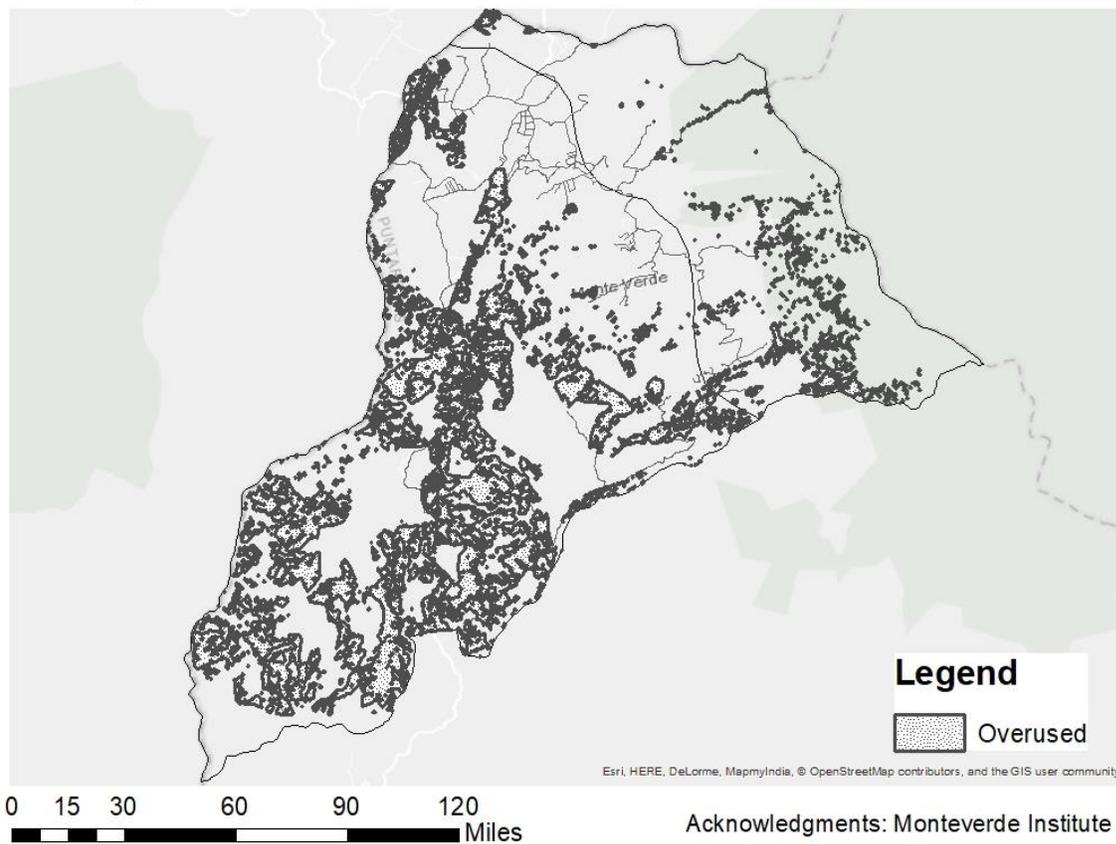


Figure 2. Severely overused land in Monteverde is predominantly the farmland from Figure 1. A enlarged map is found in the appendices.

4.1.2 Small-Scale farming Contributions

Small-scale farms or “kitchen farms” produce a broad range of products, such as coffee, fruits, livestock, and basic grains. As shown in Table 3 in the appendices, there is a wide variety

of produce sold locally in small quantities (a few kilograms per week per farmer) in the community (Nadkarni., 2000). Most of the production from these smaller farms are used for private consumption (OECD, 2017). Since the total land area and the production rate of these small farms are not reported or registered as agricultural land as mentioned above, it is difficult to determine if the Monteverde region can support the local community.

It is possible the small-scale, unregistered farms can supplement the remaining amount of food for the area. This cannot be determined without acquiring the actual production rate and land of these small farms. Despite insufficient land available to accommodate 5,000 people and the gap of knowledge regarding the total food production rate in the region, the implementation of a cooperative is still feasible due to the social, technical, and economic benefits associated with cooperatives discussed later in this report.

4.2 Proposed Administrative Structure

For Monteverde, two types of cooperatives will be investigated: a farmers market cooperative and a distribution cooperative. Either cooperative will be first-level, including farmers as members/assembly, a supervisory board for finances and marketing, and an administrative board with a president and treasurer (Beuchelt & Zeller 2012). The farmers market cooperative will involve a congregation of farmers and their produce to serve their local community. Alternatively, the distribution cooperative will be more lucrative by selling the farmers' produce to tourists and lowering prices for locals. Cooperatives commonly pay participating farmers in steps: an initial credit for producing the food, a payment when the food is brought to the processing facility, and a final payment when the produce is exported. Some cooperatives relate the farmer directly to the produce so that if the produce is not sold, the farmer will not receive a payment.

Case studies of implementing cooperatives in Central America reviewed the process of creating a cooperative and challenges Costa Rica may face. The Costa Rican coffee cooperatives participate in voluntary certification programs to upgrade produce and create stability because consumers do have a willingness to pay higher prices for an organic-certified produce (Snider et

al. 2017). The success of this coffee cooperative relied on certification programs and the ability to raise prices because of the certification.

The Northern Nicaraguan cooperative modelled a farmers market cooperative and provided organic food for the local and tourist populations. Farmers listed their motivations for certified organic production as it is safer for their families and children to be on the farm without chemicals, expenditures are lower without the synthetic inputs, and the environment/water will be protected (Bacon 2005). This cooperative charged higher prices for tourists to make profits but adjusted prices for the local economy so natives could still afford to purchase food. Surveys found that Nicaraguan farmers involved with cooperatives selling to tourists received higher average prices and felt more secure in their land tenure, versus farmers selling to locals because of low price vulnerability (Bacon 2005). In 2001, it took 73 days for 61 Nicaraguan farmers to receive their full pay in the organic cooperative by only selling to tourists (Bacon 2005). For immediate cash, farmers sold some of their coffee to the local community at a lower price which led to a successful cooperative with consistent payments.

Monteverde Cooperative Suggestions:

- Develop an executive board with a president/treasurer, financial analysts and marketers, and members.
- Enter a voluntary certification program to certify the cooperative produce as organic. This will allow for a raise in prices and consumers will be willing to pay more for a certified organic item.
- Sell produce to locals at lower prices to stay competitive and increase prices for tourists. This will allow for security in consistent payments for the participating farmers.

4.3 Economics and Business Models

Cooperatives in Costa Rica are not a new concept. According to OECD (2017), 17% of farmers in Costa Rica are members of cooperatives as seen in Table 4. Less than 30% of all farmers belong to some form of an organization, however, cooperatives represent a majority of the farmers who do belong to an organization. Agricultural cooperatives have a strong tradition in Costa Rica and even include large scale cooperatives like Dos Pinos (OECD, 2017).

Cooperatives are user-owned and user-controlled businesses, meaning the members who hold equity control and own the cooperative. The implementation of this cooperative, from an economic standpoint, will provide an effective savings tool and financial safety net for small-scale farmers (Equal Exchange, 2017).

Table 4. Breakdown of farmers who are members of different types of organizations (OECD, 2017)

Type of organisation	Number of farmers	Percentage of farmers
Corporations and chambers ¹	9 210	10%
Co-operatives ²	15 905	17%
Umbrella associations	2 848	3%
Not belonging to any organisation	65 582	70%
Total	93 545	100%

Note: Individual farmers can belong to multiple organisations.

1. Including all organisations that either aim at the marketing and commercialisation of agricultural products, or advise producers on these issues.

2. Defined by Law No. 4179 de Asociaciones Cooperativas.

Source: INEC-Agricultural Census (2014).

4.3.1 Steps to Cooperative Startup

The following section will briefly breakdown and describe the steps necessary to implement a cooperative (Reid, S., 2017). The steps are as followed:

- a. Establish a steering committee and carry out feasibility studies
- b. Create a business plan and recruit members
- c. Secure financing
- d. Launch

4.3.1a – Establish a committee and carry out feasibility studies

Establishing a steering committee is necessary as cooperatives are defined as user-owned and user-controlled businesses that distribute benefits based on use. To initiate the planning of a cooperative, a group of people who represent the cooperative’s potential members need to be established so the mission and core values of the coop can be determined. Cooperative’s success is highly dependent on community involvement, so a committee that represents the community’s interest in the establishment of a cooperative is necessary to being planning.

4.3.1b – Creating a business plan and recruiting members

The type of cooperative is dependent on the services offered by cooperative (Chom, V, 2017). Cooperatives can be divided into categories based on who owns the cooperative, such as worker, consumer, volunteer, multi-stakeholder, and producer cooperatives. The Monteverde community will need to determine who will own the cooperative; the farmers (producer model), the consumers (consumer model), or both (multi-stakeholder model). Determining the model for the cooperative will also require the recruitment of members, meaning whichever model is chosen (producer, consumer, or multi-stakeholder) will determine what members to recruit. In the case of a multi-stakeholder model, farmers and community members will need to be recruited.

A case-study on the startup of a food coop in Fairbanks, Alaska, United States, revealed the Fairbanks community held similar values as the Monteverde region. They wanted more local, fresh food and to build a way for local agriculture to gain a foothold in the state. Their coop is categorized as multi-stakeholder, where the consumers and the farmers providing the food are all members. By using a multi-stakeholder model, the quantity of members is substantial enough to keep the cooperative running and the source of food meets the community's standards (Reid, S., 2017).

4.3.1c Secure financing

The development of a strong capital base is one of the most critical issues facing cooperatives. Member equity, or the member's contribution to the cooperatives capital base, is fundamental to the startup of the cooperative. Ownership of capital is the most effective avenue to creation of loyalty. If one has a financial stake in their organizations, they are more likely to have greater loyalty than those who may only occasionally use the cooperative. This suggests not only farmers supplying the market should hold equity but also those who shop at the market. This will build a strong initial capital foundation as well as keep the market in use. Equal Exchange (2017) report states startup cooperatives depend predominantly on member's contribution and donor contributions for the initial capital. If the Monteverde region

community acquires enough members and donor funds from organizations (see recommendations), the initial funding of the cooperative may be feasible. As outlined in Figure 3, the breakdown for the sources of capital for cooperatives is seen.

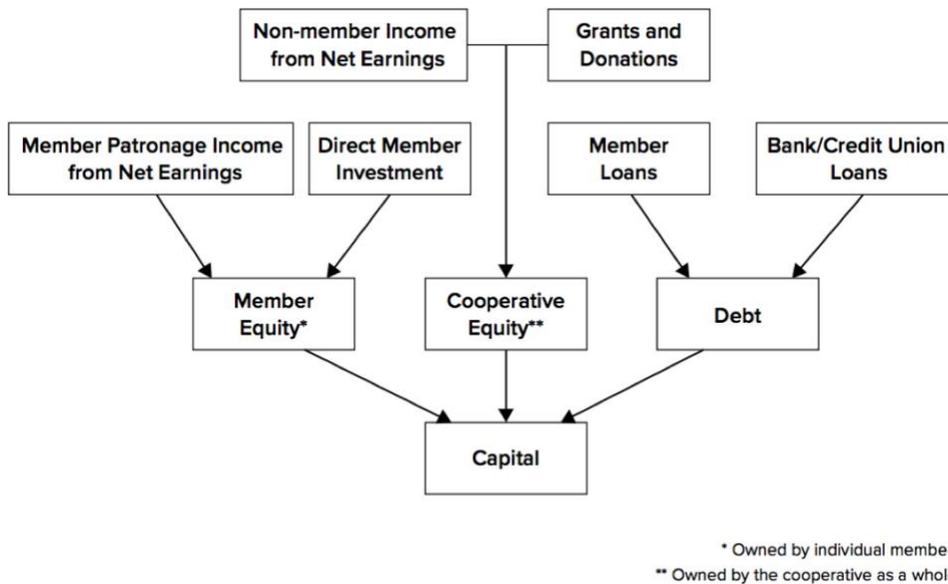


Figure 3. Sources of Capital for Cooperative Startups

The main sources of capital from the cooperative overtime will be from net earnings from operations, equity contributions from members, direct investment, per-unit capital retains, retained patronage refunds, and donations. It should also be noted that cooperatives are not created to provide profit for the business or members, but instead they are designed to pay farmer members the highest possible price for their product. This means the cooperative will need to operate as close to cost as possible. Also, with a strong membership base, cooperatives are more likely to qualify for bank financing. Overall, the economics of implementing the cooperative is dependent on the quantity of member’s, farmers and the community, who invest equity into the cooperative.

Member equity was shown to be one of the most important factors that defined success for two farmers member cooperatives in Peru. Committed leadership in coop fostered capital growth where member equity grew 400% in one year. Another cooperative that faced

bankruptcy was able to address their financial crisis by gaining more member equity. A farmers cooperative in the Dominican Republic was able to increase their member equity accounts by 365% after a new law restricted their ability to gain capital using their original capital source. Overall, member equity is an important factor that is dependent on the quantity of members (Equal Exchange, 2017).

4.3.1d Launch

A more in depth description of the launch step can be found in *The FCI Guide to Starting a Food Co-op* (Reid, S., 2017). The following steps are a brief breakdown of what the launch step will look like:

- the market location and infrastructure is complete
- staff is hired
- Contract farmers and other products and services providers
- Members acquired and educated about their rights and responsibilities as coop members

4.4 Social Feasibility

A social impact assessment was done to ensure the implementation of the farmer's cooperative would meet the desired objectives of financial opportunity, community-oriented mindsets, access to healthy diet, and all while still maintaining their local lifestyle and the viability of the environment (Valkila, 2009). As with any projects, the social impact assessment must be closely analyzed and adjusted to maximize benefits and minimize any cost to the community to ensure the cooperative is fully accepted, which will increase the chances of success. As stated previously, the goal of the cooperative is to provide local, fresh, and organic food for the local community improving the sustainability and health of the community. Done properly, the implementation of the farmer's cooperative has the potential to provide a higher standard of living socially, economically, and through preserving the environment.

4.4.1 Financial Opportunity

Successful cooperatives are proven to increase the financial security of the community members by opening new markets with a high willingness to pay to sell crops to (Gordon, 2014). Cooperatives provide a collective voice which seeks to uphold the needs of both small and large farm members (Valkila, 2009). The mission of the cooperative is focused around providing member services through the sales of its products to the tourists at a higher price to subsidize the sale of the local organic produce to community members. This model decreases the financial burden to the community members while concurrently increasing the sale of produce for the farmers. Accessing the tourist market allows for surge pricing and the community sales help the farmers sell out of their harvest optimizing their revenue(Snider, 2017).

4.4.2 Community-oriented Mindset

Community wellbeing will be enhanced as the community members becomes more involved in the decision process. The cooperative will have a democratic structure where the constituents nominate and vote on their leaders. These leaders will be the voice of their community and will allow for a more streamlined decision making process while increasing the stability of prices in the market (Valkila, 2009). Community run project have shown to enhance a sense of pride and common ground to rally around. This is important for satisfaction and the longevity of the cooperative as well as provide a socioeconomic structure for social mobility (Raghda, 2012).

4.4.3 Access to Diverse Diet

Access to a healthier diet is one of the biggest motivations for the implementation of the cooperative. Currently, the close contact with tourists has influenced many of the local residents to partake more in an American diet. Having access to subsidized local and organic food will be beneficial to the health and sustainability of the community. The specialization and mass export of specific crops in the area is one of the biggest problems because it restricts access to local healthy food, resulting in increased health risks associated with the consumption

of processed food. Having a diverse market that provides a Costa Rican diet, including: fruits, vegetables, eggs, fish, poultry, lamb, and grains, to the tourists will also provide locals with the same access (Stuckey et al., 2014). These benefits come without compromising the integrity of the community and the environment which is one of its most attractive features (Huang et al., 2015).

4.4.4 Education

A case study in an Ethiopian agriculture cooperative focused on the spread of education on agriculture practices amongst participating members. Participants in the cooperative recorded their initial agriculture practices and productivity then compared it to adopted practices. The study resulted in that member participation within a cooperative correlated positively to the adoption of new ideas and willingness to partake in skill workshops (Abebaw, 2012). The participants in this study were primarily male landowners who were the head of their households. (Abebaw, 2012). Productivity was low due to overused farmlands and poor agricultural techniques which degraded the lands even further. With the implementation of the agriculture cooperative, members of smaller farms were given opportunities to meet and talk to more successful growers. Within the cooperative, leaders formed mentorship programs and information was shared freely among members (Abebaw, 2012). The community wellness model was exemplified here and could be easily transferred to other cooperatives. Social perception of farmers shifted from competitors to allies who can favorably decide on local market prices for the benefit of all.

4. Conclusions and Recommendations

4.1 Conclusions

The implementation of a food cooperative in the Monteverde region was determined feasible, but only based on the analysis conducted in this study. The feasibility requires further investigation. Below are the major conclusions drawn from the analysis.

- Due to only ~4,423 acres of registered farmland available, the cooperative can only supply 70% of the required food for the area. However, this value may change if the

small scale farms and productivity of the area is quantified. It should also be taken into consideration the amount of land needed to feed the community was based off the NAFO statistic, which may not be entirely accurate for the Monteverde region.

- Member equity will be one of the main contributors to capital and the amount of equity will be dependent on the community and farmers who join the cooperative. The business model decision may not be determined until leaders are elected or volunteered to work on the startup.
- The feasibility of the cooperatives needs to be further investigated by following the next steps and recommendations listed in the next section

4.2 Recommendations and Next Steps

1. A board and set of community leaders will need to be determined first before the implementation of the cooperative can begin.
2. A continuing feasibility study involving the logistics of transportation, community support, and the amount of food being produced on large and small scale farms will be necessary
3. Develop an executive board with a president/treasurer, financial analysts and marketers, and members.
4. Enter a voluntary certification program to certify the cooperative produce as organic. This will allow for a raise in prices and consumers will be willing to pay more for a certified organic item.
5. Sell produce to locals at lower prices to stay competitive and increase prices for tourists. This will allow for security in consistent payments for the participating farmers.
6. Investigation into cost associated with food production and distribution
7. Funding will be necessary and can be acquired through member equity as well as loans and donations from organizations like:
 - Food Co-op Initiative Seed Grants
 - United Nations Organization for Food and Agriculture Organization (FAO)
 - International Alliance of Cooperatives

- World Farmers Organization
 - Organization of Peasant Women
 - The International Planning Committee for Food Sovereignty
8. The implementation of a distribution cooperative should be investigated first, It may be more feasible to start with a distribution cooperative of the produce meant to supply hotels and restaurants first to make capital, then create a coop market for the community.
 9. Further investigation into startup cooperatives is recommended. Further information regarding the startup and economics of coops can be found in *The FCI Guide to Starting a Food Co-op (2017)* and *Equal Exchange (2017)*.

5. References

- Bacon, C. (2005). Confronting the Coffee Crisis: Can Fair Trade, Organic, and Specialty Coffees Reduce Small-Scale Farmer Vulnerability in Northern Nicaragua? *World Development*, 33(3), 497-511.
- Beuchelt, T. & Zeller M. (2012). The role of cooperative business models for the success of smallholder coffee certification in Nicaragua: A comparison of conventional, organic, and organic-fairtrade certified cooperatives. *Renewable Agriculture and Food Systems*, 28(3), 195-211.
- Chinchilla, Randy (2019). Monteverde Institute: Geographical Information Systems Database. Monteverde, Costa Rica.
- Chom, V., José, J., & Ferreira, P. (2017). *Analysing the Cooperative Model for Startups*. <https://doi.org/10.13140/rg.2.2.21309.56802>
- Equal Exchange (2017). Not Too Poor to Invest: The Case for Smallholder Farmer Ownership Programs.
- OECD (2017), *Agricultural Policies in Costa Rica*, OECD Publishing, Paris
<http://dx.doi.org/10.1787/9789264269125-en>
- Organic Coffee in Costa Rica (2014). Organic Farming Methods: Certification. University of Illinois.
- Mojo, Dagne, Terefe Degefa, and Christian Fischer. 2018. "The Development of Agricultural Cooperatives in Ethiopia: History and a Framework for Future Trajectory." *Ethiopian Journal of the Social Sciences and Humanities* 13(1): 49.
- Nadkarni, N. M. (2000). *Monteverde: Ecology and conservation of a tropical cloud forest*. (pp. 389 – pp. 419). Oxford University Press.
- Reid, S. (2017). The FCI Guide to Starting a Food Co-op. Food Co-op Initiative.
- Snider, A., Gutierrez, I., Sibelet, N., et al. (2017). Small farmer cooperatives and voluntary coffee certifications: Rewarding progressive farmers of engendering widespread change in Costa Rica? *Food Policy*, 69, 231-242.
- Solano, C. et al. 2006. "Using Farmer Decision-Making Profiles and Managerial Capacity as Predictors of Farm Management and Performance in Costa Rican Dairy Farms." *Agricultural Systems* 88(2-3): 395-428.
- Stuckey, J., Camacho, F., Vargas, G., Stuckey, S., Vargas, J. (2014) *Agriculture in Monteverde, Moving Toward Sustainability –Update 2014*.
- Tefera, Delelegne A., Jos Bijman, and Maja A. Slingerland. 2017. "Agricultural Co-Operatives in Ethiopia: Evolution, Functions and Impact: Agricultural Co-Operatives in Ethiopia." *Journal of International Development* 29(4): 431-53.
- Water policies and agriculture*. (1993). Rome: Food and Agriculture Organization of the United Nations.
- Wollni, Meike, and Manfred Zeller. 2007. "Do Farmers Benefit from Participating in Specialty Markets and Cooperatives? The Case of Coffee Marketing in Costa Rica1." *Agricultural Economics* 37(2-3): 243-48.
- Wollni, Meike. "Productive Efficiency of Specialty and Conventional Coffee Farmers in Costa Rica: Accounting for the Use of Different Technologies and Self-Selection." : 31.

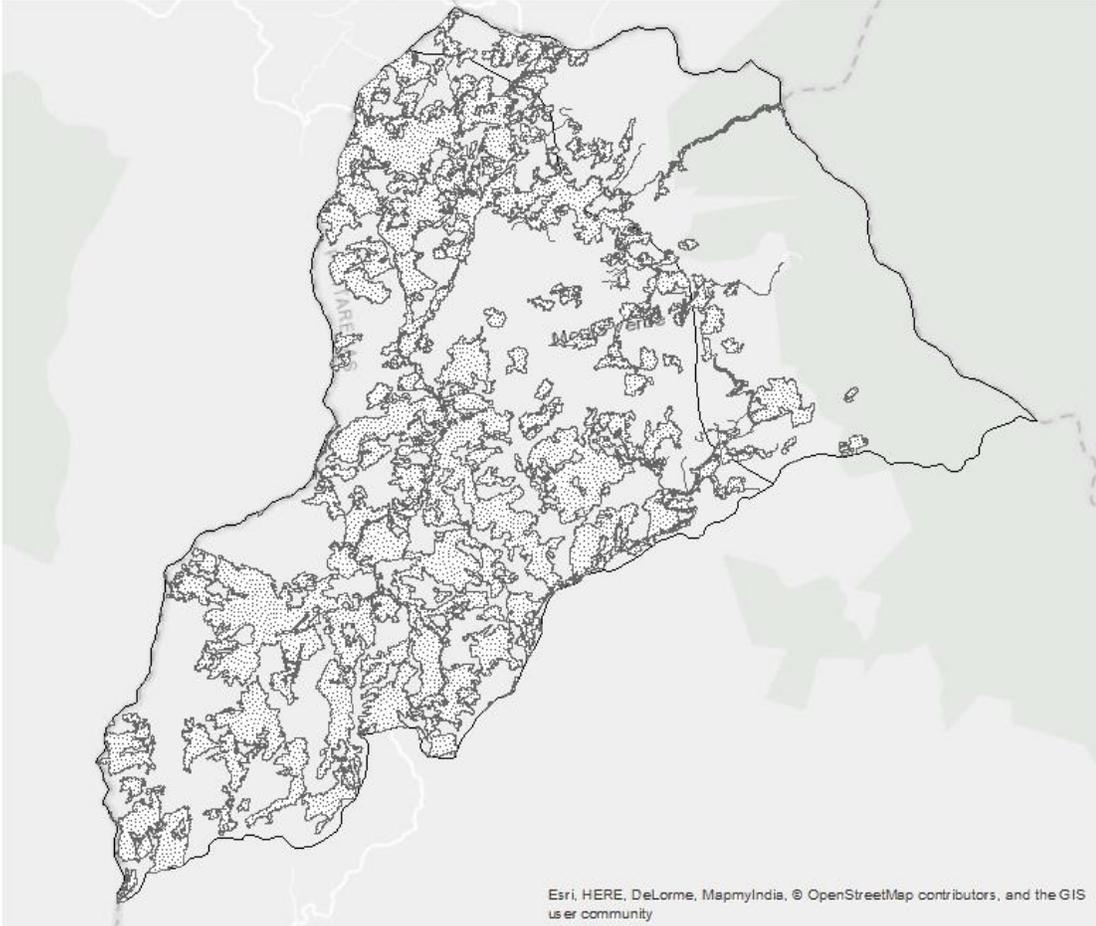
6. Appendices

Table 3. Summary of produce grown in the Monteverde region in small quantities (Nadkarni,2000)

English Name	Spanish Name	Scientific Name
Vegetables		
Beet	Remolacha	<i>Beta vulgaris</i>
Broccoli	Broccoli	<i>Brassica oleracea</i>
Cabbage*	Repollo	<i>Brassica campestris</i>
Carrot	Zanahoria	<i>Daucus carota</i>
Cauliflower	Coliflor	<i>Brassica oleracea</i>
Celery	Apio	<i>Apium graveolens</i>
Chyote	Chayote	<i>Sechium edule</i>
Cucumber	Pepino	<i>Cucumis sativus</i>
Eggplant	Berenjena	<i>Solanum melongena</i>
Green bean	Vainica	<i>Phaseolus vulgaris</i>
Lettuce	Lechuga	<i>Lactuca sativa</i>
New Zealand spinach	Espinaca	<i>Tetragonia tetragonioides</i>
Onion*	Cebolla	<i>Allium cepa</i>
Potato*	Papa	<i>Solanum tuberosum</i>
Radish	Rábano	<i>Raphanus sativus</i>
Sweet pepper	Chile dulce	<i>Capsicum annum</i>
Sweet potato	Camote	<i>Ipomoea batatas</i>
Swiss chard	Acelga	<i>Beta vulgaris</i>
Spinach	Espinaca	<i>Spinacia oleracea</i>
Tiquisque	Tiquisque	<i>Xanthosoma violaceum</i>
Zucchini	Zapallo	<i>Cucurbita pepo</i>
Fruits		
Apple	Manzana	<i>Malus pumila</i>
Banana	Banano	<i>Musa acuminata</i>
Blackberry	Mora	<i>Rubus spp.</i>
Grapefruit	Toronja	<i>Citrus paradisi</i>
Lemon	Limón	<i>Citrus limon</i>
Orange	Naranja	<i>Citrus cinensis</i>
Papaya	Papaya	<i>Carica papaya</i>
Peach	Durazno	<i>Prunus persica</i>
Pineapple	Piña	<i>Ananus comosus</i>
Tomato	Tomate	<i>Lycopersicon esculentum</i>
Tree tomato	Tomate de palo	<i>Cyphomandra betacca</i>
Herbs		
Basil	Albahaca	<i>Ocimum basilicum</i>
Cilantro	Culantro	<i>Coriandrum sativum</i>
Dill	—	<i>Anethum graveolens</i>
Lemon grass	Zacate limón	<i>Cymbopogon citratus</i>
Mint	Menta	<i>Mentha spp.</i>
Other		
Black bean	Frijol negro	<i>Phaseolus vulgaris</i>
Buckwheat	Trigo	<i>Fagopyrum polygonaceae</i>
Coffee*	Café	<i>Coffea arabica</i>
Corn (dry)	Maíz	<i>Zea mays</i>
Sugarcane	Caña	<i>Saccharum officinarum</i>

*Crops that have been grown at a commercial scale for sale within or outside the Monteverde area. Others are sold locally in small quantities (a few kilograms per week per farmer).

Agricultural Land in Monteverde, Costa Rica



Legend

- farmland
- roads

Area: 4,423

0 15 30 60 90 120 Miles

Acknowledgments: Monteverde Institute

Figure 1. Registered agricultural land in the Monteverde Region

Severely Overused Land in Monteverde, Costa Rica

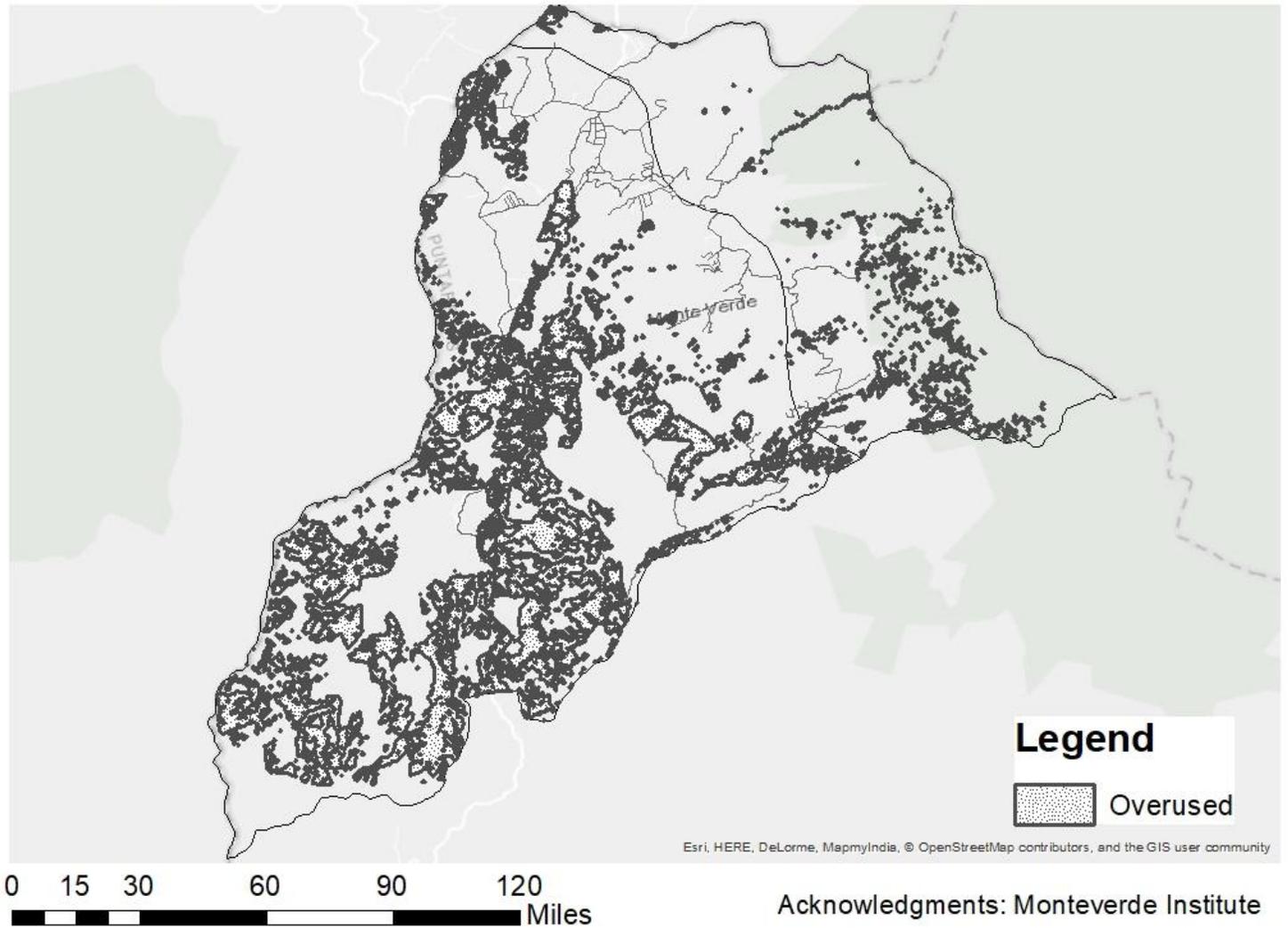


Figure 2. Overused farmland from Figure 1 in Monteverde